CHAPTER 13: NOISE

Figures (Volume 2 of this EIA Report)

There are no figures associated with this Chapter. Plates are instead included within the main body of this Chapter.

Technical Appendices (Volume 4 of this EIA Report)

Technical Appendix 13.1 Acoustics Glossary

Technical Appendix 13.2 Construction Noise Assessment of 400 kV OHL

Technical Appendix 13.3 Construction Noise of Invergarry Tee OHL Diversion

Technical Appendix 13.4 Construction Noise of Fort Augustus to Fort William OHL Diversion and Temporary Diversion

Technical Appendix 13.5 Construction Noise of Invergarry Tee OHL Dismantling

Technical Appendix 13.6 Construction Noise of Fort Augustus to Fort William Dismantling

Technical Appendix 13.7 Operational Noise Impact Assessment of 400 kV OHL

Technical Appendix 13.8 Table 7 and Table 8 of TGN(E)322

13. NOISE

Executive Summary

A noise impact assessment has been carried out to predict the likely significant effects of the construction and operation of the Proposed Development. The decommissioning and diversion of two existing overhead lines has also been assessed.

Short-term attended noise measurements were conducted at nearby noise sensitive receptors relating to the Proposed Development to obtain background noise levels in the vicinity of the site. This is the baseline noise level used for the purpose of the operational noise impact assessment.

Current guidance and planning policy has helped inform this assessment to consider the potential noise effects that could arise due to the Proposed Development at the closest noise sensitive receptors (NSRs).

The BS 5228 construction noise assessment of the Proposed Development has concluded that the noise is predicted to fall below the Category A 55 dB limit for construction noise at evenings and weekends. To ensure the construction noise remains below the limit during working hours, a construction noise management plan should be implemented. The construction noise of the Proposed Development is predicted to have a **Minor** impact on nearby NSRs.

The construction noise of the diversions of both the 132 kV Invergarry Tee OHL and the 132 kV Fort Augustus to Fort William OHL were predicted to have a **Minor** impact at NSRs. The construction noise of the dismantling of the 132 kV Invergarry Tee OHL was also predicted to have a **Minor** impact on NSRs.

The construction noise of the dismantling of part of the 132 kV Fort Augustus to Fort William OHL was predicted to have a **Major** impact on six of the fourteen NSRs. This was also the case for the tree felling of the 400 kV OHL at all fourteen NSRs. These consider the limit to be 55 dB, which includes working on evenings and weekends.

The operational noise of the Proposed Development was assessed to TGN(E)322 standard. The outcome of this assessment predicted the overhead line to have **Minor** impacts on nearby NSRs during wet and dry conditions. The operational noise of the new 132 kV diverted lines at Invergarry Tee and Fort Augustus to Fort William is predicted to be **Negligible**.

The assessment concludes that nearby NSRs will not be impacted by noise from the Proposed Development in construction and operation of the site, with the exception of the dismantling of the 132 kV Fort Augustus to Fort William OHL and tree felling for the construction of the 400 kV OHL.

The identified mitigation requirement at this stage is to carry out the dismantling of the 132 kV Fort Augustus to Fort William OHL during defined daytime hours. Daytime is defined to be 07:00 – 19:00 on weekdays and 07:00 – 13:00 on Saturdays.

13.1 Introduction

13.1.1 This Chapter considers the potential effects, including cumulative effects, of the Proposed Development on Noise during construction and operation. The effects associated with the rerouting and dismantling of the existing 132 kV overhead lines (OHLs) are also considered as part of the construction noise assessment. Where likely significant effects are predicted, appropriate mitigation measures are proposed, and the significance of predicted residual effects are assessed.

13.1.2 This assessment has been carried out by Wood. A table presenting relevant qualifications and experience of key staff involved in the preparation of this Chapter is included in **Technical Appendix 4.1**, contained within Volume 4 of this EIA Report.

13.1.3 The objectives of this Chapter are to:

- Describe and define the baseline noise environment;
- Identify the potential direct and indirect impacts on noise sensitive receptors; and
- Describe any mitigation measures proposed to address likely impacts.

13.1.4 An energised electrical transmission 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. While OHL conductors are designed and constructed to minimise corona discharge, surface irregularities such as damage, attached raindrops, insects and other types of contamination can increase local electric field strength beyond the inception level for local corona discharge at these sites. Such corona discharge can be the source of audible noise, a crackling sound accompanied sometimes by a low frequency hum.

13.1.5 The highest noise levels generated by an OHL usually occur during light 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. Mist or fog can also cause corona discharge from droplets condensing on and attaching to the conductor surface. Sometimes, after a prolonged spell of dry weather, conductors can become contaminated with accumulated dust particles and other materials on which corona discharge can occur and audible noise can be generated. Later rain showers have the effect of washing the conductors clean of such debris.

13.1.6 There are no known vibrational effects as a result of the operation of the OHL.

13.1.7 This Chapter is necessarily technical in nature so, to assist the reader, a glossary of acoustic terminology is included in **Technical Appendix 13.1**.

13.2 Scope of Assessment

Study Area

13.2.1 The Study Area encompasses the area over which all desk-based and field data were gathered to inform the assessment presented in this Chapter. The Study Area comprises fourteen nearby noise sensitive receptors (NSRs) in proximity to the Proposed Development. These NSRs are all within 500 m of the nearest point to the OHL. The Study Area is considered to be the area approximately 3.5 km west of Invergarry, moving in a northeasterly direction to the area around Auchterawe, approximately 1.5 km southwest of Fort Augustus.

Consultation Undertaken To Date

13.2.2 To inform the scope of the assessment for the Proposed Development, consultation was undertaken with statutory and non-statutory bodies. **Table 13.2** summarises the responses relevant to this Chapter and provides information on where and/or how points raised have been addressed in this assessment.

13.2.3 Further details on consultation responses can be reviewed in **Chapter 5: Scoping and Consultation**, and associated appendices.

Table 13.1: Summary of Consultation Undertaken

Consultee	Type of consultation	Response	Action
The Highland Council (THC) 8th February 2023	The proposed methodology and procedure of the operational and construction noise assessments has been sent to THC's Environmental Health Officer, for the assessment of potential effects caused by the Proposed Development.	The Environmental Health Officer (EHO) does not anticipate any significant issues arising from construction noise, however there may need to be consideration of construction traffic closer to noise sensitive receptors. For noise which is audible at any receptor, the recommended hours of operation are 8am to 7pm Monday to Friday; 8am to 1pm on Saturdays and no work on Sundays. Work which is inaudible can be undertaken at any time. The EHO has noted that historically there have been significant noise issues regarding Fort Augustus Substation, Auchterawe. These have largely been addressed but there is ongoing construction at the site. It may be necessary to include a cumulative assessment for receptors closer to the site.	Construction traffic noise impact on each receptor has been calculated for each construction phase. Paragraph 13.5.8 details the inclusion of traffic noise. The hours of operation are detailed in Chapter 3, Section 3.11. Construction works are likely to take place during daytime periods only. Weekend working could be proposed with slightly reduced working hours. Therefore, the construction noise will be assessed against a limit which includes weekend working to remain conservative. Fort Augustus Substation cumulative effects have been discussed in Table 13.19**Error! Reference source not found.**.
The Highland Council (THC) 1st December 2021	Pre-Application Advice Package	Construction Noise Impacts: Planning conditions are not used to control the impact of construction noise as similar powers are available to the Local Authority under Section 60 of the Control of Pollution Act 1974. Generally, people are tolerant of construction noise during typical working hours which are taken to be 8am to 7pm Monday to Friday and 8am to 1pm on Saturdays. Works for which noise is inaudible at the curtilage of any noise sensitive property could still be carried out out-with these times. If the applicant intends to undertake noisy work out-with the aforementioned times, they will be required to submit a detailed construction noise assessment for the written approval of the planning authority. The assessment should include: -	The construction noise assessment includes a description of activities, the equipment and the assumed quantity and on-time of the equipment. These are shown in Table 13.11 to Table 13.15 inclusive. Survey locations are shown in Table 13.10, with maps of these locations shown in Plate 13.1and Plate 13.2. The construction noise assessment describes necessary mitigation measures in Section 13.6. Predicted levels in the area of the receptors for each construction phase are shown in **Technical Appendix 13.2** to

Consultee	Type of consultation	Response	Action
		1) A description of construction activities with reference to noise generating plant and equipment. 2) A detailed plan showing the location of noise sources, noise sensitive premises and any survey measurement locations. 3) A description of any noise mitigation methods that will be employed and the predicted effect of said methods on noise levels. 4) A prediction of noise levels resultant at the curtilage of noise sensitive receptors. 5) An assessment of the predicted noise levels in comparison with relevant standards. Regardless of whether a construction noise assessment is required, it is expected that the developer/contractor will employ the best practicable means to reduce the impact of noise from construction activities. The applicant will be required to submit a scheme demonstrating how this will be implemented. Particular attention should be given to the use of tonal reversing alarms and ground compaction plant which are often the most intrusive noise generating elements of a large construction project.	**Technical Appendix 13.6** inclusive. These levels are assessed to limits detailed in BS 5228.
The Highland Council (THC) 1st December 2021	Pre-Application Advice Package	Noise Impacts – Operational It is not anticipated that operation noise will be an issue for the proposed of overhead lines elements. Our Service's primary concern is the potential impact of any operational noise from the proposed Coire Glas Switching Station and Loch Lundie Substation on noise sensitive locations within the vicinity. The applicant will be required to submit a detailed noise assessment undertaken by a competent person, which should include, but is not limited, to the following: - • A description of the proposed development in terms of noise sources • A plan showing the location of noise sources, noise sensitive locations and survey measurement locations both the	Noted that THC do not anticipate that operational noise will be an issue for the proposed of OHL elements of the Coire Gras Grid Connections Project. However, an operational noise assessment has been conducted of the Proposed OHLs in Section 13.5.15 to quantify any potential noise issues. The Coire Glas Switching Station and Loch Lundie Substations form Associated Works to the Proposed Development and are not assessed as part of the EIA Report, except under potential cumulative effects.

Consultee	Type of consultation	Response	Action
		Coire Glas Switching Station and Lundie Substation. • A survey of the background (LA90,T) ambient noise (LAeq,T), and 1/3rd octave band spectrum levels to determine the existing noise level in the area and at any nearby noise sensitive locations likely to be affected by the noise • A prediction of noise levels arising from the proposed development at noise sensitive locations for both locations. Predicted noise level should be expressed as both a 15-minute LAeq and a 5 minute Leq in the 100Hz octave band as measured at the curtilage of any noise sensitive property. • A comparison of the predicted Rating Level for noise arising from the development with the background level in accordance with BS4142:2014+A1:2019: Methods for rating and assessing industrial and commercial sound. • A description of any noise mitigation methods that will be employed. The effect of mitigation methods on the predicted levels should be reported including data and equations used in any calculations. • The outcome of the noise assessment must demonstrate that noise arising from proposed development/switching station/substation will not have any adverse impact on existing noise sensitive locations. • The raw data and equations used in the calculations must be made available on request Monitoring locations must be agreed beforehand with the Council's Environmental Health Service. To ensure that values are reliable and suitably represent the periods of interest a minimum of 1 week's continuous background monitoring should be conducted. This should comprise of continuous measurements of normally not less than 15 min intervals which can be continuous or disaggregated.	

Sensitive Receptors

13.2.4 The NSRs in this assessment are defined as residential properties or another sensitive building in the vicinity of the Proposed Development. Detailed maps and addressed-based data of the area surrounding the Proposed Development were examined resulting in the NSRs detailed in **Table 13.2**. Maps of receptors are presented in **Plate 13.1** and **Plate 13.2**. In areas of a high concentration of receptors, measurement locations were selected which were deemed to be representative of the relevant surrounding area.

Table 13.2: Noise Sensitive Receptors

NSR	Name	Coordinate (X)	Coordinate (Y)	Distance from Proposed Development (m)
NSR 1	Glenluie	227399	800859	304.7
NSR 2	Faichemard Chalet	228594	802137	275.8
NSR 3	Eriskay Cottage	235310	806781	474.2
NSR 4	Sandray	235317	806787	470.7
NSR 5	Vatersay	235283	806827	419.9
NSR 6	Netherby	234623	807327	278.5
NSR 7	Marnach	234761	807618	504.6
NSR 8	Woodside South	235211	807705	351.4
NSR 9	Woodside N	235210	807733	372.7
NSR 10	Meadowside	235312	807775	330.7
NSR 11	Pinetops	235206	808083	334.7
NSR 12	Forest Lodge	235190	808130	378.9
NSR 13	Auchterawe Road House	235259	808135	331.9
NSR 14	Old Farmhouse	235233	808277	319.3

image sourced from Apple Maps @https://gridreferencefinder.com/

Plate 13.1: Satellite Image of the Environment Surrounding the Proposed Development – NSRs 1 and 2

image sourced from Apple Maps @https://gridreferencefinder.com/

Plate 13.2: Satellite Image of the Environment Surrounding the Proposed Development – NSRs 3 to 14

Plate 13.3: QGIS Image of the 14 NSRs in relation to the Proposed Development

Issues Scoped Out

Noise from Operational Maintenance

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

Noise from Operation of the Diverted Lines

13.2.6 The following diversions are further than 500 m from any receptor, so can therefore be scoped out of this assessment.

- 132 kV Fort Augustus to Fort William OHL (to be rerouted into the proposed Loch Lundie Substation);
- Temporary 132 kV Fort Augustus to Fort William OHL; and
- 132 kV Invergarry Tee OHL (to be rerouted into the proposed Loch Lundie Substation).

Vibration

13.2.7 As described in Section 5.6, of Chapter 5: Scope and Consultation, there are no known vibrational noise issues associated with the operation or construction (including the rerouting and dismantling of the existing 132 kV OHLs) phases of the Proposed Development at nearby NSRs. Therefore, vibration is scoped out of the assessment.

13.3 Legislation, Policy and Guidance

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

13.3.1 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 (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.

13.3.2 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 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 5228-1:2009 +A1:2014 (BS5228), Code of Practice for Noise and Vibration Control on Construction and Open Sites[2]

13.3.3 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.

13.3.4 The construction noise impact assessment (CNIA) has been 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.

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

13.3.5 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.

13.3.6 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.

13.3.7 In accordance with the assessment methodology, the specific sound level ($L_{Aeq,T}$) 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" ($L_{Ar,Tr}$).The British Standard effectively compares and rates the difference between the rating level and the typical background sound level ($L_{A90,T}$) in the absence of the noise source being assessed.

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

13.3.8 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.

13.3.9 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."

TGN(E)322 – Operational Audible Noise Assessment Process For Overhead Lines [4]

13.3.10 An update document to TR(T)94 has been issued by National Grid, named TGN(E)322. Where the former weights the probability of specific rain rate occurring in a specific location, the latter uses 1 mm/hr values and is a more conservative assessment. The procedure requires a series of assessments to be conducted in a tiered approach.

- 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.
- The Tier 3 assessment takes account of existing background sound levels in the area and noise levels due to rainfall.

13.4 Methodology

Desk Study

Construction Noise

13.4.1 A desk-based construction noise appraisal has been prepared for the purpose of assessing the effects of the construction 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.

13.4.2 The criteria provided for the ABC method detailed in BS 5228-1 are shown in **Table 13.3**.

[4] Technical Guidance Note TGN(E)322, 2021, Operational Audible Noise Assessment Process for Overhead Lines, National Grid

Table 13.3: 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

13.4.3 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.

13.4.4 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.

13.4.5 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.

13.4.6 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.

13.4.7 Ambient noise levels for all receptors are below those stated in Category A. Therefore, all NSRs are defined as Category A.

13.4.8 The construction programme for the Proposed Development is outlined in **Table 13.4**.

Table 13.4: Project Schedule

Phase	Start	End
Mobilisation	17/07/24	13/08/24
Enabling works	14/08/24	30/02/25
OHL Construction	30/08/24	30/11/27
OHL Commissioning	01/12/27	31/12/27
Re-instatement	15/01/28	28/04/28
Decommissioning of FFE/FFW	15/01/28	28/04/28

13.4.9 An estimated construction schedule is outlined in **Table 13.5**, with likely construction equipment identified in Annex C of BS 5228-1. These works are based upon previous projects of a similar nature due to a specific schedule not available at the time of writing. 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 of 400 kV OHL

Contract Works	Standard Working Hours	Description of Works
Felling	Mon-Sat 07:00-19:00 Sun 1/2 day (6hrs)	Cutting and disposal of trees
Foundations	Mon-Sat 07:00-19:00 Sun 1/2 day (6hrs)	Excavation/material removal/concrete works/backfilling
Tower Erection	Mon-Sat 07:00-19:00 Sun 1/2 day (6hrs)	Erection of steel towers
Stringing	Mon-Sat 07:00-19:00 Sun 1/2 day (6hrs)	Stringing of conductors between towers

13.4.10 It is expected that construction works will occur during daytime only. However, where required it is identified works may be extended into evenings and weekends. 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.

13.4.11 Land take will consider working areas of 50 x 50 m around each 400 kV tower and 40 x 40 m around each new 132 kV tower in the rerouted section of the 132 kV Fort Augustus to Fort William OHL .

13.4.12 From Tree Felling Operational Data, shown in Table 14.6 of Chapter 14, the felling area required is 66.075 ha. The buffer areas considered for tree felling is either 50 m or 90 m from each tower (refer to **Technical Appendix 14.1: Woodland Reports** of this EIA Report).

13.4.13 The dismantling of the 132 kV Fort Augustus to Fort William OHL and 132 kV Invergarry Tee OHL will follow the summary outlined in **Table 13.6**, which is detailed in **Technical Appendix 3.3**.

Table 13.6: Dismantling Summary of Fort Augustus to Fort William OHL and Invergarry Tee OHL

Contract Works	Description of Works
Access	The majority of route runs alongside an existing access road. Where the towers are to be felled access will be via atv. Any remaining towers will be dismantled via crane. All foundations will be removed by an excavator.
Conductor and Earthwire Removal	Both a reel winder and Tesmec pulling machines will be used in the recovery of conductor and earthwire. A reel winder will be utilised where access permits and for short sections. For longer sections, a Tesmec pulling machine will be used.
Insulator and Fitting Removal	These redundant materials will be removed with a low pressure tracked dumper for the majority of tower locations and moved to the nearest point on the access route. Materials will then loaded into lorries and removed from site.
Tower Steel Removal	Most of the existing towers will be felled with a winch. With shears mounted on an excavator, the steel will be cut up into lengths that are suitable to be removed by low ground pressure tracked dumpers. Any remaining tower will be removed via a crane. the steelwork will be lowered to the ground in sections, cut and then removed from site.
Foundation Removal	For tower locations an excavator can access the foundations which will be removed to below ground level. For foundations that are in some of the more remote locations there may be an option to cut the steel level with the foundations and leave the remaining foundation in place. This would need to be agreed with the landowners.

Operational Noise

13.4.14 There are differences in assessment methods for dry and wet conditions. Dry noise is assessed by indicating the excess of rating level over background. During wet conditions, the noise output from OHLs varies according to the number and size of rain droplets accumulated on the surface of the conductors. Therefore, there is a strong relationship between the rainfall rate and the noise output from an OHL. Background noise levels also increase with rainfall rate, such that during very heavy rain noise is generally inaudible. For these reasons, an alternative noise assessment method to deal with rain-induced noise is required. The external rain-induced noise levels are assessed using the methodology developed by National Grid and detailed in their Technical Guidance Note TGN(E)22.

13.4.15 The excess wet figure is derived by comparing the total noise to the background noise level for the appropriate Miller Curve rating at each receptor at a rain rate of 1 mm/hr.

13.4.16 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 (**Major**), depending on the context.
- A difference of around +5 dB is likely to be an indication of an adverse impact (**Moderate**), 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 **Minor/Negligible** impact, depending on the context."

Field Survey

13.4.17 The field survey consists of free-field attended spot measurements at each noise sensitive receptor using a sound level meter. This is necessary to determine the existing noise environment and to obtain background noise (BGN) levels at each location.

13.4.18 The background noise levels are used as a baseline for the operational noise impact assessment for dry and wet conditions.

13.4.19 Measured parameters include the following:

- L_{Aeq} (5 minutes)
- L_{Aeq} (5 minutes) one-third octave band spectrum
- L_{A90} (5 minutes)
- L_{A90} (5 minutes) one-third octave band spectrum

Assessment of Effects

13.4.20 Potential significant effects that may result from the construction (including the rerouting and dismantling of the 132 kV OHLs) and operational phases (including cumulative) and of the Proposed Development include:

- Effects of construction noise on the surrounding area and on NSRs.
- Operational effects of noise from the Proposed Development on NSRs.
- Effects of static and quasi-static construction noise from construction plant, such as excavators, dump trucks and cranes, on the surrounding area and on NSRs; and
- Operational effects of noise from the Proposed Development, mainly the wet noise due to rain settling on the conductors of the overhead line, on NSRs.

Sensitivity of Receptors

13.4.21 The sensitivity of the NSR is estimated in its current state prior to any change implied by the Proposed Development. It is a measure of level of protection 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, Moderate or High (**Table 13.7**).

Table 13.7: 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 Project development. Area used primarily for leisure activities, including recreational routes, sites of historic or cultural importance.
Medium	The receptor has moderate value to society, its vulnerability for the change is moderate, 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 moderate 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.

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

Magnitude of Effect

13.4.23 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**, **Minor**, **Moderate**, or **Major**.

13.4.24 and the level of excess and stated impacts from a BS4142 assessment have been implemented into an impact magnitude matrix detailed in **Table 13.8**:

Table 13.8: BS4142 Impact Magnitude

Impact Magnitude	Definition
No Effect/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

13.4.25 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 impact significance can be derived by applying a calculation matrix (**Table 13.9**).

13.4.26 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 impacts.

13.4.27 The evaluation of impact 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 13.9: Evaluation of the Impact Significance.

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

Limitations and Assumptions

Construction

13.4.28 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

13.4.29 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.

13.4.30 The assessments are based on information received at the time of publications, any changes to design or specification of the site will require reassessment.

13.5 Baseline Conditions

Existing Baseline

13.5.1 Noise monitoring has been conducted in the vicinity of the Proposed Development to determine the existing prevailing noise environment. Free-field attended spot measurements were conducted at the nearby NSRs between 23:00 on 03 November 2022 and 01:30 on 04 November 2022 to determine the background noise (BGN) at each location.

13.5.2 Measurements were conducted using a Rion NL-52 sound level meter (serial number 01265436) which was spot calibrated with a Rion NC-74 calibrator (serial number 34178103), before and after the measurement campaign.

13.5.3 Measured parameters include the following:

- L_{Aeq} (5 minutes)
- L_{Aeq} (5 minutes) one-third octave band spectrum
- L_{A90} (5 minutes)
- L_{A90} (5 minutes) one-third octave band spectrum

13.5.4 5-minute measurements were conducted due to the steady-state nature of the noise environment. At NSRs 1 and 2, the acoustic environment contained distant noise from River Garry, with NSR 1 observing dominant 100 Hz tonal noise from an existing overhead line. NSRs 5, 6, 7, 9, and 13 were dominated by noise of flowing water from multiple nearby streams.

13.5.5 Seven background measurements were conducted at locations deemed to be representative of all NSRs, as shown in **Table 13.10**.

Table 13.10: Measurement Location Coordinates and Levels

NSR / Measurement Location	Name	Coordinate (X)	Coordinate (Y)	LAeq (dB)	L_{A90} (dB)
NSR 1	Glenluie	227399	800859	37.3	36.8
NSR 2	Faichemard Chalet	228594	802137	32	31
NSR 5	Vatersay	235283	806827	37.9	37.5
NSR 6	Netherby	234623	807327	45.8	45
NSR 7	Marnach	234761	807618	45.5	45
NSR 9	Woodside North	235210	807733	35.6	35.1
NSR 13	Auchterawe Road House	235259	808135	38.5	38.2

13.5.6 Meteorological conditions were compliant with BS 4142: 2014 criteria throughout the duration of the survey. There was extremely low wind during the measurements. The ambient temperature was approximately 2 degrees Celsius, and the environment was dry, clear night with 3-4 oktas cloud cover over the survey period. The temperature, wind, and precipitation were measured by the commissioned meteorological station.

Potential Effects

13.5.7 This section considers the potential impacts and associated effect significance of the construction (including the rerouting and dismantling of the existing 132 kV OHLs), operation of the Proposed Development based on the typical activities described in **Chapter 3: Project Description**.

Construction Effects

13.5.8 For the purposes of this assessment, the construction of the Proposed Development is split into four phases. These are the felling, foundations, tower erection and stringing with the conductors**. Table 13.11** to **Table 13.16**, show the plant activities, items, their quantities, utilisation, and associated noise levels at 10 m from the source, based on worst-case construction activities from a similar overhead line construction. Also included is the noise due to the vehicles using access tracks at each receptor. Combining the utilisation and quantity of equipment, an equivalent noise level at 10 m can be calculated for each row. These are then logarithmically summed to give a total value for the construction noise at 10 m. Vehicle noise from the access tracks were calculated at each receptor and logarithmically added to the sound pressure level due to the construction of the line. Rock breaking has not been assessed as part of the foundations scope, however, investigations are ongoing for this requirement. If rock breaking occurs, it is highly likely that the construction noise will exceed the evenings and weekends limit of 55 dB at the nearest receptor. The potential for rock breaking activities must be determined and strategically planned to mitigate impact at receptors. Rock breaking works should be limited to the daytime and Saturday hours outlined in Paragraph 13.4.3.

Table 13.11: Worst Case Construction Activities and Associated Noise Levels for Felling

Activity	Plant Item	Quantity	Utilisation %	Sound Power, LW (dB(A))	Sound Power corrected for quantity and utilisation, LW (dB(A))	L_{Aeq} at 10 m (dB)
Felling	Forwarder	1	100%	84	84	56
	Harvester	1	100%	92	92	64
	Wood Chipper	1	100%	119	119	91
	C2.2 Tracked Excavator	1	100%	105	105	77
Total					119	91

Table 13.12: Worst Case Construction Activities and Associated Noise Levels for Foundations

Activity	Plant Item	Quantity	Utilisation %	Sound Power, LW (dB(A))	Sound Power corrected for quantity and utilisation, LW (dB(A))	L_{Aeq} at 10 m (dB)
Foundations	C4.7 Concrete mixer truck	2	100	107	110	82
	C4.24 Concrete pump	2	100	96	99	71
	C2.15 Excavator	2	50	104	104	76
	C4.33 Poker Vibrator	2	50	106	106	78
	C4.95 Impact Wrench	2	50	101	101	73
Total					113	85

Table 13.13: Worst Case Construction Activities and Associated Noise Levels for Tower Erection

Activity	Plant Item	Quantity	Utilisation %	Sound Power, LW (dB(A))	Sound Power corrected for quantity and utilisation, LW (dB(A))	L_{Aeq} at 10 m (dB)
Tower Erection	D7.121 Lorry (pulling up)	98	95	67	98	95
	D12.5 Wheeled loader	114	111	83	114	111
	C4.57 Telehandler	95	95	67	95	95
	C4.41 Crane	99	99	71	99	99
Total					112	84

Table 13.14: Worst Case Construction Activities and Associated Noise Levels for Stringing with Conductors

Activity	Plant Item	Quantity	Utilisation %	Sound Power, LW (dB(A))	Sound Power corrected for quantity and utilisation, LW (dB(A))	L_{Aeq} at 10 m (dB)
Stringing with Conductors	C3.7 Hydraulic jack	2	100	98	101	73
	C.457 MEWP	2	50	95	95	67
Total					102	74

Table 13.15: Worst Case Construction Activities and Associated Noise Levels for Dismantling

Activity	Plant Item	Quantity	Utilisation %	Sound Power, LW (dB(A))	Sound Power corrected for quantity and utilisation, LW (dB(A))	L_{Aeq} at 10 m (dB)
Dismantling	C4.49 Tower Crane	1	100	105	105	77
	C2.29 Tracked Excavator	1	100	106	106	78
Total					109	81

Table 13.16: Sound Pressure Level at Each Receptor due to Access Track Noise

NSR	Name	Coordinate (X)	Coordinate (Y)	Access Track Noise - Sound Pressure Level (dB)
NSR 1	Glenluie	227399	800859	42.4
NSR 2	Faichemard Chalet	228594	802137	41.2
NSR 3	Eriskay Cottage	235310	806781	29.7
NSR 4	Sandray	235317	806787	29.7
NSR 5	Vatersay	235283	806827	30.1
NSR 6	Netherby	234623	807327	44.8
NSR 7	Marnach	234761	807618	37.0
NSR 8	Woodside South	235211	807705	36.0
NSR 9	Woodside N	235210	807733	35.7
NSR 10	Meadowside	235312	807775	36.9
NSR 11	Pinetops	235206	808083	32.3
NSR 12	Forest Lodge	235190	808130	32.0
NSR 13	Auchterawe Road House	235259	808135	32.0
NSR 14	Old Farmhouse	235233	808277	31.0

13.5.9 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.

13.5.10 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.

13.5.11 Based on the results shown in **Technical Appendix 13.2**, the construction noise at each NSR is below the 65 dB daytime but not the 55 dB evening and weekends criteria. For the felling phase, all NSRs are between 1 and 9 dB above the 55 dB noise limit. The distance is considered to be the distance from the NSR to the felling buffer boundary. The construction schedule in Section 3.11 of Chapter 3 indicates that works would in general commence during daytime only, but could be proposed at weekends when required, with working ceasing at 16:00. Therefore, prior to the mitigation measures as outlined in Section 13.6, construction noise is assessed as **Major** and therefore significant due to the 55 dB limit breach.

13.5.12 A BS5228 assessment has been conducted to construction noise effects of the diversions of the 132 kV Invergarry Tee OHL and the permanent and temporary 132 kV Fort Augustus to Fort William OHL. The results of this assessment are shown in **Technical Appendix 13.3** and **Technical Appendix 13.4**, the distances from the receptors to these OHLs is sufficient enough for construction noise levels to have low impact. Access track

noise is dominant and comfortably below the 55 dB limit. Therefore, construction noise is assessed as **Minor** and not significant.

13.5.13 A BS5228 assessment has also been conducted for the dismantling of both the 132 kV Invergarry Tee OHL and the 132 kV Fort Augustus to Fort William OHL. The results of the dismantling are shown in **Technical Appendix 13.5** and **Technical Appendix 13.6**. The results from the dismantling of the Invergarry Tee OHL show the noise at all receptors is comfortably below the 55 dB limit. Therefore, construction noise is assessed as **Minor** and not significant.

13.5.14 The results of the assessment of the dismantling activities required to the Fort Augustus to Fort William OHL in **Technical Appendix 13.6** show that six receptors observe an exceedance of the 55 dB limit. These receptors are within 150 m of the existing line. The highest excess is 9 dB at NSR 6. Therefore, construction noise is assessed as **Major** and significant if working is required during evenings and weekends.

Operation Effects

13.5.15 A summary of conductor audible noise levels has been provided by the Applicant and are presented in **Table 13.17**. These results of the Twin Araucaria conductor were obtained for a rain rate of 0.75 mm/hr.

Table 13.17: Supplied 400 kV OHL Noise Emission Data

	TWIN ARAUCARIA										
Distance	0	10	20	30	40	50	60	70	80	90	100
L50 (dBA)	49.7	50	48	47	45.7	44.7	43.7	42.9	42.1	41.4	41

13.5.16 The corona-induced audible noise of the OHL in rainfall has been based on Figure 3 of TR(T)94[5]. This response has been calibrated to the supplied values at 100 m at 0.75 mm/hr rain rates and produces the following rain noise curve including a 6 dB tonal penalty at 1 mm/hr.

[5] Technical Report TR(T)94, 1993, A Method for Assessing the Community Response to Overhead Line Noise, National Grid

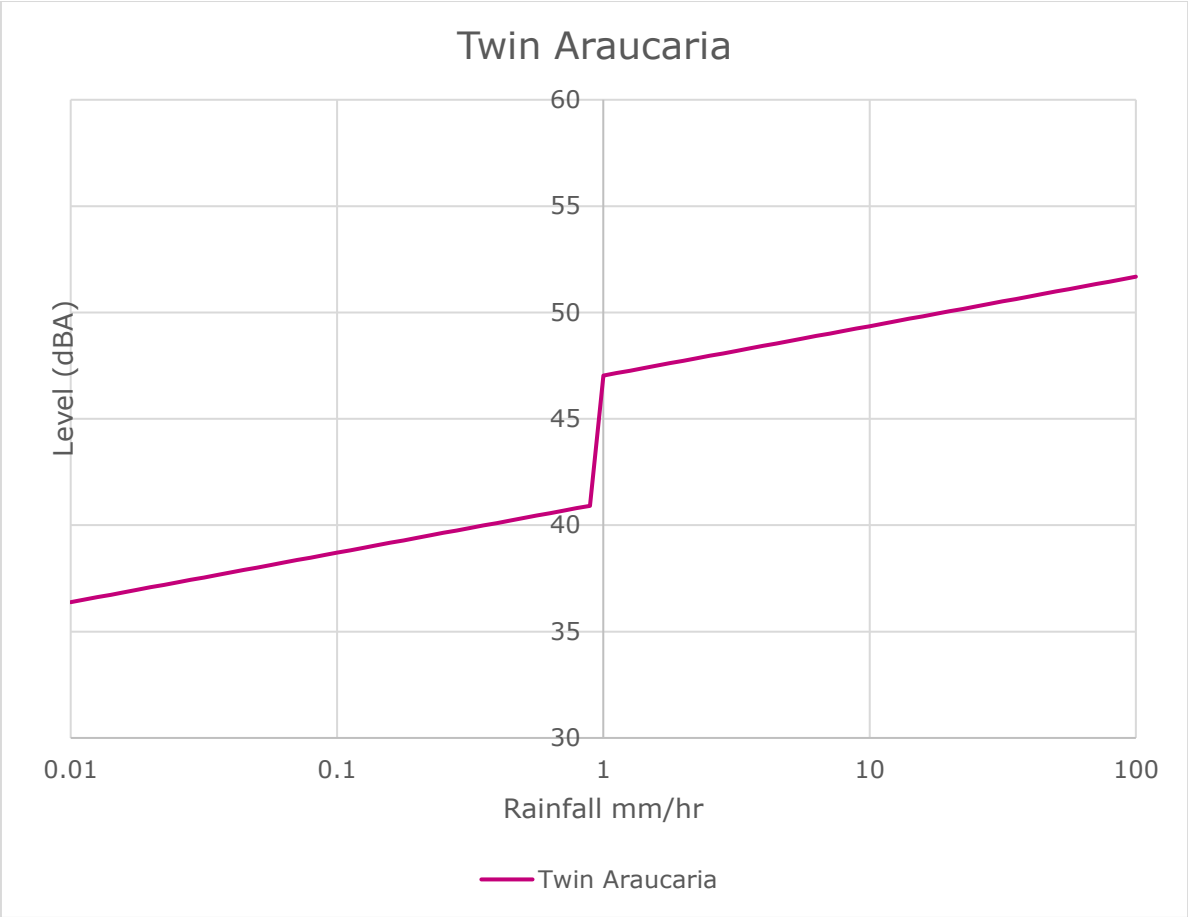

Plate 13.4: Twin Araucaria Level against Rainfall

13.5.17 The OHL noise value at NSRs can be calculated by assuming attenuation of 11.4 dB for each factor of 10 in distance or "11.4 dB/decade". This is consistent with the BPA method of calculating OHL noise.

13.5.18 Input noise data supplied by the Applicant has been provided at a set of discrete distances. The attenuation with distance in this provided data set indicates an attenuation of 8.8 dB for each factor of 10 in distance or "8.8 dB/decade". This deviates from the BPA method and is more conservative.

13.5.19 During wet conditions, the noise output from OHLs varies according to the number and size of rain droplets accumulated on the surface of the conductors. Therefore, there is a strong relationship between the rainfall rate and the noise output from an OHL. Background noise levels also increase with rainfall rate, such that during very heavy rain noise is generally inaudible. For these reasons, an alternative noise assessment method to deal with rain-induced noise is required.

13.5.20 The external rain-induced noise levels will be assessed using the TGN(E)322 methodology developed by National Grid, which is recommended by the Department of Energy & Climate Change for the assessment of rain induced noise.

13.5.21 Wood has approached the operational OHL analysis by using the TGN(E)322 method, where the tiered system screens out receptors of low wet noise, assesses the combined wet and dry noise, and assesses the total noise at a worst-case rain rate of 1mm/hr to provide the excess above the wet background noise.

13.5.22 In the TGN(E)322 method, attenuation of noise from the OHL to the receptor uses the:

1. BPA method (11.4 dB/decade); and
2. The L50 values supplied by the Applicant at a rain rate of 0.75mm/hr, that suggests 8.8 dB/decade.

13.5.23 The excess wet figure is compared against a background noise level calculated through the addition of dry background noise levels and predicted noise due to rainfall according to the Miller curve value for that specific NSR. Miller curve descriptions are provided in **Table 13.18**.

Table 13.18: Miller Curve Description

Miller Curve	Description
R-1	Essentially bare, porous ground (that is ploughed field or snow covered ground); no standing puddles or water. Relatively small-leafed ground cover vegetation, such as grass lawn, meadow, hayfield shortly after mowing, field of small-leaf plants.
R-2	Non-porous, hard, bare ground or pavement, falling raindrops splash on thin layers of puddles of collected water; or in or beside wooded area of deciduous trees without leaves or with only small leaves; or in or beside wooded area of coniferous trees or evergreens having needles rather than leaves; or thin-leafed ground cover of crop, such as hay, clover or grain.
R-3	A few small, fully leafed deciduous trees 15 to 30 m or a few large, fully leafed trees 30 to 90 m distance.
R-4	Large area of fully leafed trees or large-leafed crops or vegetation, such as corn starting 15 to 30 m distance.
R-5	Large area of fully-leafed trees or large-leafed crops or vegetation entirely surrounding the area of interest.

13.5.24 An example of all factors considered at 100 m with an R-2 Miller rating.

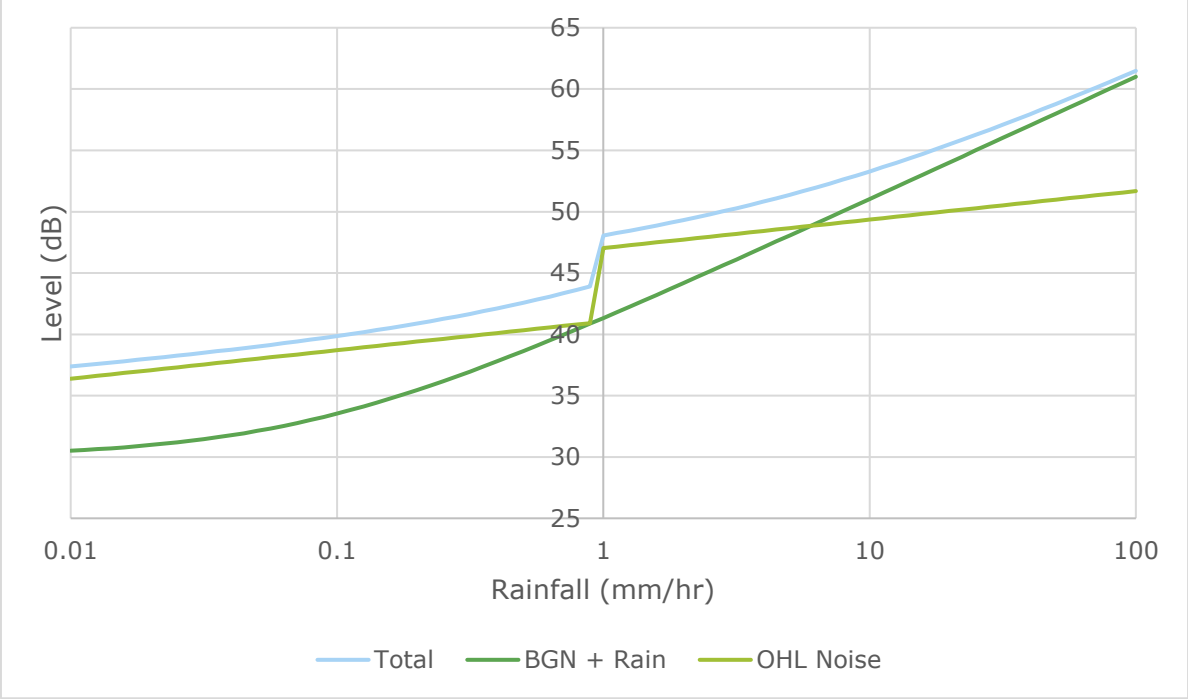

Plate 13.5: Example Noise Level Curves at 100 m for R-2 Miller rating

13.5.25 The assessment has considered potential significant effects from operational OHL noise due to “corona discharge”, during both dry and wet conditions.

13.5.26 All receptors are considered to be of ‘Medium’ sensitivity. As shown in Table 1.1 of **Technical Appendix 13.7**, for the Tier 1 assessment, the wet noise at each location was either between 39 and 44 dB, or above 44 dB, so each receptor either fell into the ‘Medium’ or ‘High’ magnitude of impact, therefore all proceed to a Tier 2 assessment.

13.5.27 Tier 2 finds a value of the combined dry and wet noise at each receptor. For the attenuation of 8.8 dB/decade, the level at six receptors suggested an 'adverse impact', which implies the significance of the effects are Moderate/Minor, and the magnitude of noise impact is medium/low in these six cases (Table 1.2 of **Technical Appendix 13.7**Error! Reference source not found.). When receptors fall in to the 'adverse impact' category, the TGN suggests consideration should be given to mitigating and minimising noise from the OHL, or to progress to a Tier 3 assessment.

13.5.28 Tier 3 considers the background noise, at rain rate of 1 mm/hr. This tier calculates how much the rain increases the OHL noise and background noise. Results of Tier 3 are shown in Table 1.3 of **Technical Appendix 13.7.** The magnitude and significance are colour-coded to correspond with Table 7 and 8 of the TGN, shown in **Technical Appendix 13.8**. For wet noise, and an attenuation of 8.8 dB/decade, the wet noise excess was 4 dB at three receptors.

13.5.29 In all cases, the final assessment value excesses are between 0 and +4dB, therefore, the magnitude of impact is **Low**, and the significance of effect is rated as **Minor** and therefore not significant.

13.5.30 The result will vary per site and the distribution of rain rate. Lower rain rates contribute lower background noise and higher excess values at these lower rain rates, whereas higher rain rates have increased background noise and generally low excess values (even with the 6 dB tonal penalty after 1 mm/hr). The TGN(E) assessment would generally produce the more conservative results as 1 mm/hr is the inception point of the 6 dB tonal penalty.

Cumulative effects

13.5.31 Cumulative impacts of developments have been scoped in **Table 13.19**. For the OHL, a 5 km cumulative search area from the Proposed Development is proposed, and these developments are identified for inclusion:

Table 13.19 Other developments considered in the cumulative assessment

Application reference name	Comment
Scenario 1: Other developments associated with the wider Coire Glas Grid Connection Project	This scenario would include two developments (both subject of separate applications under the Town and Country Planning Act) which form part of the wider project for the Coire Glas grid connection. As these developments would be very likely to be constructed concurrently, this assessment would consider the cumulative effects of these developments during both construction and operation. They are: • the proposed Coire Glas Switching Station; and • the proposed Loch Lundie Substation. The dry noise effects of the 400 kV OHL have been shown to be negligible (Section 13.5.28) at the relevant receptors. The worst case wet noise results have been shown to have low impact. In these conditions, the background noise is increased due to the rainfall, which would make the effects of the other developments associated with the Coire Glas Grid Connection Project less likely to have an impact on the relevant receptors. Similarly, the Switching Station has only been assessed for construction noise and is also comfortably below any Category A limits according to BS 5228. Cumulatively, this would be negligible in addition to the construction of the OHL. The specific noise from the Loch Lundie Substation has been assessed to comfortably below any background noise level. Therefore, cumulatively, the effects of these Associated Works are predicted to be negligible and therefore not significant. • Coire Glas Pumped Storage Scheme - (Planning Ref: ECU00000577):

Application reference name	Comment
	Operation of The Proposed Development has been scoped out of a quantitative assessment, as the reversible pump-turbine, generators and associated equipment would be located within the underground cavern power station, with the bulk of the mountain and the long connecting tunnels reducing noise breakout to the surface to a negligible level. If the construction of the Coire Glas Pumped Storage Scheme were to overlap with the construction of the Proposed Development, there may be cumulative effects regarding the noise due to equipment and increased traffic.
Scenario 2: Other Proposed Developments	The Skye Reinforcement Project comprises: • An underground cable replacing the existing wood pole OHL between the point on the circuit where it turns from following the 132 kV Fort Augustus to Fort William line towards Skye near Loch Lundie (called the 'Skye Tee' point) and the existing Fort Augustus Substation; • A steel lattice tower OHL replacing the existing wood pole OHL[6] to the west of the 'Skye Tee' point – (Planning Ref: ECU00004639) and; • The proposed Bhlaraidh Extension Wind Farm Grid Connection (pre-planning stage) – (Planning Ref: ECU00004639). The underground cable section of the Skye Reinforcement Project would produce negligible noise being ground borne, therefore this can be scoped out of further assessment. 132 kV overhead lines are known to produce little to no noise therefore the operational noise can be scoped out. The final 500 m of the proposed Bhlaraidh Extension Wind Farm Grid Connection is proposed to be underground cable and can therefore be scoped out of further assessment. Other Proposed Developments: • Erection of Battery Energy Storage System at Aucheterawe, Fort Augustus – (Planning Ref: 20/04565/FUL) The battery storage containers will be fitted with air conditioning units and the operation of the facility, as a whole, may create noise. While recognising there are other noise generating uses in the vicinity of the site, there are a small number of properties which may be adversely affected by noise from the development. With application 19/05385/FUL consultation with Environmental Health resulted in a noise assessment which identified there would be no adverse impact on noise sensitive properties subject to the mitigation which the developer has provided in the form of an acoustic fence. The applicant has confirmed that the equipment installed on this site will not have any tonal or other characteristics that would increase the potential impact. The results of the noise assessment show that the external noise levels at the nearest noise sensitive property will be below 30dB(A) and that the noise level will comply with NR 20 curve when the noise is measured within the bedrooms of noise sensitive properties with windows open for ventilation. The noise assessment concludes "the noise levels from the development will be sufficiently low to cause negligible impact and will not adversely impact on the amenity of nearby noise sensitive properties." As this is the case, Environmental Health do not have concerns with regard to the proposed

[6] Steel lattice towers may also be present at time of writing but are due to be dismantled in 2022 (as part of the 2019 Quoich to Aberchalder 132 kV Woodpole Overhead Line project), so are therefore not considered as part of the Skye project.

Application reference name	Comment
	development subject to a condition being attached to ensure reasonable noise levels are met. Therefore, cumulative impacts due to the Battery Energy Storage System would be low and considered to have negligible impact. • Fort Augustus Substation Construction Activities The dry noise effects of the 400 kV OHL have been shown to be negligible (Section 13.5.28) at the relevant receptors. The worst case wet noise results have been shown to have low impact. In these conditions, the background noise is increased due to the rainfall, which would make the effects of the other developments such as the Fort Augustus Substation less likely to have an impact on the relevant receptors. It is not expected that construction activities of the Proposed Development will overlap with Fort Augustus Substation. However, if this is the case, there may be cumulative effects regarding the noise due to equipment and increased traffic. Construction works are expected to be short-term and intermittent and are not expected to be of significant impact.

13.5.32 No significant cumulative effects are predicted therefore, cumulative effects are not considered further.

13.6 Mitigation

Mitigation by Design

13.6.1 As part of the impact assessment process, mitigation measures are suggested to minimise the significance of the identified potential impacts. Two types of measures can be distinguished, as follows:

- Mitigation measures, aimed at managing potential impacts of moderate or major significance to reduce residual impacts to an acceptable level; and
- Recommendations and good practices aimed at managing potential impacts of Minor significance.

Mitigation during Construction

13.6.2 The dismantling of the 132 kV Fort Augustus to Fort William OHL is predicted to cause Major impact significance against the 55 dB limit as well as the felling works of the 400 kV OHL. The Major impact significance from the dismantling occurs at NSRs 6, 8, 9, 11, 12, and 13 however this will be for a very short duration. The Major impact significance from the felling occurs at all NSRs. Therefore the mitigation required would involve restricting the work hours to daytime weekdays to meet the 65 dB limit at these receptors. No specific mitigation is required for the remaining works for the Proposed Development as the assessment indicates Minor impact significance during day and weekend conditions.

13.6.3 Construction noise will be above background noise, yet, the limit is met according to BS 5228. Although the limit is met, it is best practice that construction noise should continue to be controlled with a Construction Noise Management Plan (CNMP), in accordance with the guidance and procedures outlined in BS 5228-1. 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

13.6.4 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. 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
- Working typically will not take place outside of hours defined in the construction schedule.

13.6.5 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 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.

13.6.6 In setting working hours, consideration is given to the fact that the level of noise through the normal working day is more easily tolerated than during the evening and night-time. As the work is short term in nature, working can continue into the evenings, as long as the threshold noise levels established in **Table 13.3** are adhered to. Construction works should not occur during night.

Mitigation during Operation

13.6.7 No specific mitigation has been identified as required for the Proposed Development once operational.

13.7 Residual Effects

Construction

13.7.1 With the implementation of a CNMP, the level of construction noise will be below BS5228-1 limits for Category A limit of 55 dB for evenings and weekends for all scopes with the exception of the dismantling of the 132 kV Fort Augustus to Fort William OHL at NSRs 6, 8, 9, 11, 12, and 13, and the tree felling phase of the 400 kV OHL at all NSRs. It is recommended that these works are conducted during daytime hours in the vicinity of the above NSRs on weekdays to be assessed against a 65 dB limit. The effect of construction noise at NSRs is therefore rated as **Minor** and not significant.

Operational

13.7.2 For all receptors, under normal operating conditions, and for wet and dry noise, the TGN(E)322 assessment predicts **Minor** and therefore not significant effects, as a result of the operation of the Proposed Development.

13.8 Summary and Conclusions

13.8.1 This Chapter has considered the potential noise effects that could arise due to the Proposed Development during the construction (including the rerouting and dismantling of the existing 132 kV OHLs) and operational phases at the closest NSRs. The assessment has taken account of applicable planning policy and current guidance.

13.8.2 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 below the 55 dB limit at the location of interest. The implementation of a robust construction noise management plan will ensure the construction noise of the 400 kV OHL will have **Minor** impact on nearby NSRs.

13.8.3 Construction noise assessments were also conducted for the diversions and dismantling of sections of both the 132 kV Invergarry Tee OHL and the 132 kV Fort Augustus to Fort William OHL (permanent and temporary). The construction noise of the diversion and dismantling of the Invergarry Tee OHL and diversion of the Fort Augustus to Fort William OHL were assessed to have **Minor** impact on the nearby NSRs. The construction noise of the dismantling of the 132 kV Fort William to Fort Augustus OHL was shown to cause an excess over the 55 dB limit at six of the fourteen receptors. The 65 dB daytime limit was not exceeded at any receptor. It is therefore strongly encouraged that any dismantling works are conducted during the daytime during the weekdays. This is also the case for tree felling works associated with the construction and operation of the 400 kV OHL, where the 55 dB limit is breached at all NSRs. Felling works are therefore recommended to be undertaken in daytime hours only during weekdays in the vicinity of the NSRs.

13.8.4 Operational noise has been assessed to TGN(E)322 standards and indicates that the Proposed Development operating in normal conditions, wet, and dry noise, will have **Minor** impact predicted for nearby NSRs. The operational noise of the diversions of the 132 kV Invergarry Tee OHL and the 132 kV Fort Augustus to Fort William OHL were scoped out due to the distance from all receptors.

13.8.5 The Construction Noise Management Plan is, at this stage, based on assumptions of construction equipment and utilisation. Any updates to the construction schedule and plant will need to be implemented to inform a more detailed management plan. A robust construction noise management plan is recommended for the construction phases of the Proposed Development, diversion, and dismantling works.

13.8.6 The assessment concludes that nearby NSRs will not be impacted by noise from the Proposed Development in construction and operation of the site, with the exception of the dismantling of the 132 kV Fort Augustus to Fort William OHL and tree felling associated with the 400 kV OHL. Avoiding dismantling work and felling during the weekends and evenings in the vicinity of the impacted NSRs will ensure this phase meets the 55 dB limit and ensures all effects are not significant.