13 NOISE AND VIBRATION

13.1 Introduction

13.1.1 This chapter assesses the potential effects on noise sensitive receptors (NSRs) associated with the construction and operation of the Proposed Development. This chapter (and its associated Figures and 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, Chapters-1-5**).

13.1.2 The assessment has been carried out by a member of Wood VDN (Vibration Dynamics and Noise), who is an associate member of the IOA (Institute of Acoustics) with over 5 years' of experience in noise assessments across a variety of sectors, including the assessment of electrical transmission infrastructure.

13.1.3 This chapter is supported by the following figures and technical appendices:

- Volume 3a: Figures
  - **Figure 13.1: Noise Sensitive Receptors**
- Volume 4: Technical Appendices
  - **Technical Appendix: 13.1 Noise**; and
  - **Technical Appendix: 13.2 Outline Construction Noise Management Plan**

13.1.4 Figures and technical appendices are referenced in the text where relevant.

13.2 Assessment Methodology and Significance Criteria

Scope of the Assessment

13.2.1 This chapter considers effects on:

- potential construction noise effects on NSRs in the vicinity of the Site; and
- the potential effects of noise emissions from the operational overhead line (OHL).

13.2.2 A preliminary construction schedule has been supplied for the purposes of the assessment. It must be noted however that a specific construction schedule from the Principal Contractor has not been supplied at the time of writing, therefore the construction noise assessment and management plan must be revisited by the Principal Contractor once appointed and when the specific schedule is known. The detailed construction phasing and programme would be subject to change as the design progresses and also following the grant of the necessary consents, and wayleaves being obtained.

13.2.3 Baseline noise measurements have been conducted and a desk-based construction noise appraisal has been prepared for the purpose of assessing the effects of construction works on any nearby residents.

13.2.4 A desk-based operational noise assessment has been prepared for the purpose of assessing the effects of dry and wet overhead line noise on any nearby residents. The results are presented in **Technical Appendix 13.1: Noise, EIAR Volume 4.**

13.2.5 The assessment is based on the Proposed Development as described in **Chapter 2: Description of the Proposed Development (EIAR Volume 2)**.

13.2.6 The scope of the assessment has been informed by consultation responses summarised in **Table 13-1**:. This chapter has also been prepared with reference to the applicable legislative framework and national and local planning policy; these are outlined in the following section.

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

13.2.7 Published in March 2011[1], 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.

13.2.8 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 British Standard (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]

13.2.9 Guidance on the prediction and assessment of noise and vibration from construction sites is provided in 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.

13.2.10 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)

13.2.11 British Standard 4142[3] 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.

13.2.12 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.

13.2.13 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.

13.2.14 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.

[1] Planning Advice Note, PAN 1/2011, Planning and Noise. 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] BS 4142:2014, 2014. Methods for Rating and Assessing Industrial and Commercial Sound, BSI.

13.2.15 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."

TR(T)94 - A Method for Assessing the Community Response to Overhead Line Noise

13.2.16 The National Grid has derived a procedure[4] to assess the impact of OHL noise in both dry and rainy conditions. The guidance of the British Standard BS 4142: 2014 can also be used to assess the impact of the noise from a specific industrial source at NSRs.

13.2.17 The procedure requires that the background noise (BGN) at NSRs within a set distance from the OHL (usually 200 m to 300 m) be measured during quiet night times and in dry conditions with little wind. The nature of the ground surface around the sensitive receptors is noted so that the contribution to BGN of the surface noise attributable to the rainfall can be derived from empirically derived curves (Miller curves). The logarithmic sum of the measured BGN and the empirically derived contribution for rainfall is adopted as the BGN level, in rainy conditions, against which to compare the predicted received noise from the OHL. Using the parameters provided in TR(T)94 the likelihood of an adverse impact can be assessed.

13.2.18 The assessment procedure follows TR(T)94, and has been conducted in the following stages:

- The attended collection of night-time BGN levels at NSRs, or groups of such NSRs, within 500 m of the centreline of the OHL during suitable dry weather conditions, before construction;
- Allowance for the effects of rainfall on BGN;
- Prediction of contribution from conductors; and
- Determination of expected value of the excess integrated over the rain rate distribution.

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

13.2.19 An update document to TR(T)94 has been issued by National Grid. The procedure requires a series of assessments are conducted in tiers.

- 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.

[4] Technical Report No. TR(T)94, 1993. A Method for Assessing the Community Response to Overhead Line Noise, National Grid Technology & Science Laboratories.

13.2.20 The assessment is performed to TR(T)94 standard for all NSRs, and therefore the tiered assessment has not been conducted in this instance. TR(T)94 is similar to the Tier 3 assessment in TGN(N)322, and this methodology has been applied to all NSRs. Additional differences in methodology are that TR(T)94 weights the probability of specific rain rate occurring in a specific location, where TGN(E)322 uses 1 mm values.

Extent of the Study Area

13.2.21 The Proposed Development will run between a proposed substation at Creag Dhubh and a connection point on the recently constructed Inveraray to Crossaig 275 kV OHL, North Argyll. The NSRs within 500 m buffer zone of the Proposed Development have been highlighted for assessment, additional properties up to 1 km have been included for a conservative assessment.

13.2.22 A map of the project area and identified NSRs is presented in **Figure 13.1: Noise Sensitive Receptors**.

Consultation Undertaken to Date

13.2.23 Consultation undertaken to date mainly pertains to the EIA Scoping Report that requested a formal Scoping Opinion from Scottish Ministers under the EIA Regulations. Scoping responses received at the time of writing that are relevant to this chapter are captured in **Table 13-1**:. Further information can be found in **Appendix 1.1: Scoping Consultation Register (EIAR Volume 4).**

Table 13-1: Scoping Responses and Other Consultations of Relevance to Chapter 13

Organisation	Type of Consultation	Response	How response has been considered
Argyll and Bute Council	Pre-Application Consultation - Noise assessment methodology and noise sensitive receptor locations.	No response recieved.	Previous assessments conducted within the council area have been accepted upon consultation on methodology. Receptors are considered at greater distances than required to ensure a robust assessment.
Argyll and Bute Council	Scoping Opinion	The applicants state that Construction noise will be short term and intermittent and can be controlled through the implementation of an appropriate Constuction Environmental Management Plan (CEMP). It is recommended that prior to the submission of the CEMP that consultations are undertaken with the appropriate Environmental	Initial construction noise calculations have been performed to identify noisy activities within the project area and form an initial impact assessment based on assumed input infromation. Due to no specific construction schedule being available at this stage, a framework for a construction noise management plan (CNMP) to be intergrated into the CEMP has been included (see **Technical Appendix 13.2, EIAR Volume 4**).

Organisation	Type of Consultation	Response	How response has been considered
		Protection Officers for the area to ensure best practice mitigation is embedded into the CEMP and a clear path/actions required for resolution of any identified noise impacts is clearly set out.	

Effects Scoped Out

Noise from Operational Maintenance

13.2.24 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 aspect is scoped out of the EIA.

Vibration

13.2.25 There are no known vibrational noise issues associated with the operation of the OHL at nearby NSRs. Therefore, vibration is scoped out of the assessment.

Construction Traffic

13.2.26 Based on the scope and duration of construction activities required for tower construction, it is expected that construction traffic noise impacts and construction traffic vibration impacts would negligible; therefore, no detailed assessment of construction traffic noise and vibration is proposed as part of the EIA Report.

Method of Baseline Data Collation

Desk Study

13.2.27 To inform the assessment in this chapter, a background noise survey was undertaken to establish the prevailing noise environment at NSRs. A desk based survey was carried out using maps and satellite imagery to identify measurement locations from which to determine the background conditions. NSR locations have been chosen where properties are within 500 m of the OHL. Due to the lack of NSRs within this range for certain sections of the line, this range has been expanded to 1 km. Where there are clusters of properties, the closest single property has been assessed as the worst case for that cluster (other properties in the cluster will have less impact). Identified NSRs have been checked against Address Base data points.

13.2.28 A map of the project area and identified representative NSRs is presented in **Figure 13.1: Noise Sensitive Receptors.**

Field Survey

13.2.29 Background noise measurements were conducted at defined NSRs on the night of 25 April 2022. The measurements consisted of attended spot measurements for a period of 5-minute intervals at night-time in free field conditions and fair weather conditions in accordance with in compliance with TR(T)94. The survey measured $L_{A,90}$ values and was conducted at night time between the hours of 23:00 and 06:00.

13.2.30 Background noise measurements were conducted during night time to avoid the impact of anthropogenic noise sources, such as traffic.

13.2.31 The background noise measurements were undertaken using the following Class 1 specification noise measuring equipment:

- Rion NL-52 Sound Level Meter S/N 00175536
- Rion NC-74 Acoustic Calibrator S/N 34178103
- Measured parameters are listed below:
- 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

13.2.32 The background noise measurements inform the construction noise impact assessment (CNIA) and operational noise impact assessment. See **Technical Appendix 13.1: Noise, EIAR Volume 4** for results tables.

Limitations and Assumptions

13.2.33 The assessment is reliant on spot measurements taken at each of the NSRs. Background noise levels are subject to significant diurnal variation as well as changes based on weather conditions and seasonal effects. Even with long term noise measurements, which can be employed to investigate this fluctuation, representative values are calculated through statistical analysis, and therefore there will be a significant number of periods during which noise levels are greater or less than the reported levels. The time and conditions during which these measurements were performed was carefully chosen to carry out measurements at the quietest period, in the course of the night with no rainfall and little to no wind, in order to ensure a worst case assessment.

Method of Assessment

Construction

13.2.34 A Construction Noise Impact Assessment (CNIA) has been carried out according to the ABC method specified in Table E.1 of BS 5228-1, in which noise sensitive receptors (NSRs) are classified in categories A, B or C according to their measured or estimated background noise during construction activities. BS 5228-1 recommends limits based on the local environment and time of day. The criteria provided for the ABC method detailed in BS 5228-1 are shown in **Table 13-2**:**.**

Table 13-2: 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

13.2.35 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.

13.2.36 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.

13.2.37 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.

13.2.38 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.

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

13.2.40 Excess noise over Category A criteria will result in Major impact magnitude. Noise levels below the criteria thresholds results in Negligible/Minor impact.

Operational Noise

13.2.41 There are differences in assessment methods for dry and wet conditions, with dry assessments indicating the excess of rating level over background and wet conditions assessing the weighted mean increase in noise levels, dry and wet predictions are assessed differently.

Dry Line Noise Impacts

13.2.42 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."

Wet Line Noise Impacts

13.2.43 TR(T)94, similarly to BS 4142: 2014, recognises the following thresholds by which the new sound level exceeds the background noise, and the likely community response. The criteria are outlined in **Table 13-3**.

Table 13-3: Subjective Effect of Changes in Noise Level (Hassall & Zaveri, 1988)

Amount in dB(A) by which the new sound level exceeds the background noise	Description	Related Impact Magnitude Category
<0	No observed reaction	Negligible
0	No observed reaction	Minor
5	Sporadic complaints	Moderate
10	Widespread complaints	Major
15	Threats of community action	Major
20	Vigorous community action	Major

Sensitivity of Receptor

13.2.44 The sensitivity of an NSR is estimated in its current state prior to any change implied by the Proposed Development. It is a measure of the 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 13-4 Sensitivity of Receptor

Level of Sensitivity	Description
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.
Moderate	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.
High	Legislation strictly conserves the receptor, or it is very valuable to society, or very liable to be harmed by the Project development.

13.2.45 All NSRs considered in this assessment are residential in nature and for the purposes of the assessment are rated as Moderate sensitivity due to the rural nature of the surroundings.

Magnitude of Impact

13.2.46 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. The magnitude of effects is predicted quantitatively where possible, taking into account the duration and reversibility of effects, and is considered spatially and temporally as described within **Table 13-5.** The impact magnitude is worked out on a case-by-case basis for each NSR and classified as Negligible, Minor, Moderate, or Major.

Table 13-5 Description of Spatial Impact Magnitudes

Spatial Impact Magnitude	Description
Negligible	Impact to the receptor is immeasurable, undetectable or within the range of normal natural background variation.
Minor	The impact is minor, affecting a specific area, group of localized receptors and of little concern over a short time period (it is undesirable but acceptable).
Moderate	The impact gives rise to some concern, likely to be tolerable or would require a value judgement as to its acceptability requiring mitigations.
Major	The impact gives rise to great concern; it should be considered unacceptable and requires mitigating or a significant change to the development if no alternative is available. If no mitigation is possible, then the impact would require a value judgement as to its acceptability.

Significance Criteria

13.2.47 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 in **Table 13-6**.

13.2.48 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. An assessment result of Major or Moderate significance effects would require specific mitigation, the extent to which dependant on context.

13.2.49 The evaluation of impact significance shall be performed by following a conservative approach to account for potential uncertainties affecting baseline data.

Table 13-6: Evaluation of the Impact Significance

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

Limitations and Assumptions

13.2.50 A specific construction schedule from the Appointed Contractor has not been supplied at the time of writing and assessment. Assumptions on the construction equipment used and the schedule of construction have been made for the purpose of assessment noise during construction. The assumptions made have been based on information provided by the Applicant, based on experience in constructing other similar OHLs. The construction noise assessment must be revisited by the Appointed Contractor when a schedule is made available, as deviation from assumed input may increase impact.

13.2.51 As is the nature of OHL noise, the magnitude of noise generation and excess is based on varying environmental factors. The noise modelling of operational levels is based on statistical averaging to determine an appropriate excess for a range of weather conditions. In reality, the excess will vary with weather conditions, the noise due to corona discharge (reliant on preceding weather conditions and the age of the conductor) and noise levels due to local vegetation interacting with meteorological conditions. There will be periods under certain conditions where excess noise from the OHL is more prominent, and times when it is less prominent. The excess wet figure is derived by integrating the total noise as a function of rain rate, weighted according to the probability of a given rain rate. The TR(T)94 assessment methodology seeks to apply an overall excess value according to these statistics. TR(T)94 is a well-used industry standard that has been used to predict and assess noise levels for numerous overhead line developments.

13.2.52 The assessment has been carried out on the assumption that the position of the OHL is fixed at the preferred alignment. However, a horizontal limit of deviation (LOD) of 100 m either side of the proposed alignment provides flexibility for micrositing during construction. Minimum distances to receptors should be retained for existing receptors where possible.

13.3 Baseline Conditions

Sensitive Receptors

13.3.1 Noise sensitive receptors (NSRs) in this assessment are defined as residential properties in the vicinity of the Proposed Development. The CNSR locations are listed in **Table 13-7.**

Table 13-7: Noise Sensitive Receptor Coordinates

NSR	Coordinates (British National Grid) X	Coordinates (British National Grid) Y	Distance from the OHL (m)	Distance from OHL + Temporary Diversion (m)
NSR 1 - High Balantyre	207862	711720	139.4	107.2
NSR 2 - Sallachry	207677	712233	407.5	407.5
NSR 3 - Kilmun	207831	712720	332.2	332.2
NSR 4 - Three Bridges	208795	712402	670.5	670.5
NSR 5 - Linneghlutton	208932	712951	696.6	696.6
NSR 6 - Stronmagachan	208222	714089	807.5	807.5
NSR 7 - Drimfern	208094	714620	495.3	495.3
NSR 8 - South Tullich	208510	715433	335.5	335.5
NSR 9 - North Tullich	208880	716078	226.6	226.6

Current Baseline

13.3.2 Background conditions are variable and depend on the local environment for each receptor. The area of monitoring has a reasonably similar nature, being in a rural setting. The primary reason for a number of receptors having higher background noise level was running water. Other sources of noise noted along the line were anthropogenic sources, such as traffic, wind interaction with vegetation, even in low wind speeds, and noises from animals. The results of the baseline noise measurements for the relevant NSRs are summarised in **Table 13-8.**

Table 13-8: Noise Sensitive Receptor

Measurement Location	Timestamp	L_{Aeq} (dB)	L_{A90} (dB)
NSR 1 - High Balantyre	25/04/2022 23:07	26.0	24.1
NSR 2 - Sallachry	25/04/2022 23:38	23.8	21.4
NSR 3 - Kilmun	26/04/2022 00:03	23.7	22.0
NSR 4 - Three Bridges	26/04/2022 00:32	36.7	36.4
NSR 5 - Linneghlutton	26/04/2022 00:53	45.5	45.3
NSR 6 - Stronmagachan	26/04/2022 01:17	24.8	24.3
NSR 7 - Drimfern	26/04/2022 01:45	26.5	25.5
NSR 8 - South Tullich	26/04/2022 02:12	29.0	28.0
NSR 9 - North Tullich	26/04/2022 02:33	24.0	23.4

Future Baseline

13.3.3 Excluding the site in question, there are no foreseeable developments that will greatly change the noise environment. Potential forestry works in the area would have an effect on noise levels due to the removal of trees, a large source of noise in wind. However, this, along with potential wind farm developments, results in changes to the background conditions during periods of high wind speeds where the noise levels are higher. The assessment considered herein is applicable for low wind speeds, when noise is at its lowest, to investigate the period during which the impact will be greatest.

13.4 Assessment of Effects

Construction Noise

13.4.1 The construction programme would comprise four key phases shown in the indicative construction programme in **Chapter 2: Description of the Proposed Development (EIAR Volume 2)**. The phases would include:

1. Enabling works
2. OHL Construction
3. OHL Commissioning
4. Reinstatement

13.4.2 Potential noise impacts are only expected from phases of enabling works and OHL construction. It is expected that there will not be significant noise impacts of OHL commissioning and reinstatement phases.

13.4.3 A baseline assessment using assumed input information has been conducted for the vegetation management and forestry clearance stage of the enabling phase, and for the tower foundations, tower erection, and conductor stringing stages of the OHL construction phase. Details of this assessment are included in **Technical Appendix 13.1: Noise, EIAR Volume 4.**

13.4.4 The detailed construction phasing and programme would be subject to change as the design progresses and also following the grant of the necessary consents, and wayleaves being obtained.

13.4.5 The nature of construction noise is inherently temporary. Human receptors will generally tolerate higher impacts where it is known that they will only be present for a limited time period.

Operational Noise

13.4.6 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.

13.4.7 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. 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.

13.4.8 A TR(T)94 assessment has been conducted to determine where the results indicate complaints are likely rather than no observed reaction. The TR(T)94 assessment assesses the impact of noise during dry and wet conditions, based on the sound power level per metre of the conductor and the background noise level. The predicted noise level at the receptor is calculated based on a propagation model. Further details are provided in **Technical Appendix 13.1: Noise, EIAR Volume 4.**

Potential Effects

Potential Construction Effects

13.4.9 At the closest point, the forestry activity comes within approximately 150 m of NSR 1. At that distance, the sound pressure level, with air absorption but no ground absorption, will be approximately 64 dB(A), just below the 65 dB(A) limit. This calculation based on conservative assumptions, and will only reach the maximum level briefly, while the forestry work is within the minimum distance of that receptor.

13.4.10 A conservative estimate for the sound pressure level for each stage of the OHL construction phase has been calculated at each receptor by taking a logarithmic ratio of distances, with the total equivalent noise level at 10 m as a reference. All receptors fall below the daytime construction noise limit of 65 dB for all phases, resulting in a predicted Minor impact significance.

13.4.11 It is noted that for NSRs 1 and 9, the level of noise exceeds the evening and weekend noise limits. All construction activities are assumed to be conducted within daytime defined periods.

Potential Operational Effects

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

13.4.13 A full table of the assessment results is provided in **Technical Appendix 13.1: Noise, EIAR Volume 4.**

13.4.14 A summary of results is provided in Error! Reference source not found. below.

Table 13-9: Results of the Dry and Wet Noise Assessments

Assessment Criteria	Dry Conditions	Wet Conditions
No observed reaction	9	9
Sporadic complaints	0	0
Widespread complaints	0	0
Threats of community action	0	0
Vigorous community action	0	0

13.4.15 The breakdown of results shows that for dry conditions, the entirety of the receptors along the Proposed Development receive a rating of 'no observable reaction' with excess values all below 0 dB. The assessment rates the impact magnitude as Negligible.

13.4.16 The breakdown of results shows that for wet conditions, the entirety of the receptors along the Proposed Development receive a rating of 'no observable reaction' with a maximum excess value of 1 dB at NSR 1. The assessment rates the impact magnitude as Minor.

13.5 Mitigation

Mitigation During Construction

13.5.1 Construction noise limits for daytime are met according to BS 5228. However, noise may be above the background noise level for the area and a perceived change in noise levels could occur. The nature of construction activities means these would any potential impacts are localised, short term and intermittent.

13.5.2 No specific mitigation is identified at this stage; however, it is best practice that construction is controlled with a construction noise management plan (CNMP). Mitigation measures will be committed to in accordance with the guidance and procedures outlined in BS5228-1. Procedures will include:

- clear construction schedule detailing identified equipment to be used and schedule;
- detailed plan showing how permitted working hours will be adhered to;
- any changes to predicted noise levels and work stages to be reassessed;
- 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;
- providing advance notice of unavoidable periods of high noise levels to residents;

- a detailed plan on community relations, including a community engagement plan, the setting up of a complaint phone line, a procedure to notify residents of any necessary work outside of the permitted working hours and an approach to the investigation of any complaints.

13.5.3 Further details are provided in **Technical Appendix 13.2: Outline Construction Noise Management Plan, EIAR Volume 4**.

13.5.4 An updated CNIA will be undertaken by the Appointed Contractor. A detailed CNMP will relate to specific work activities and identify mitigation measures where appropriate to ensure appropriate construction noise levels are achieved at all NSRs.

13.5.5 The highest noise levels have been predicted for the forestry stage of works in the enabling phase. This phase of works should be particularly considered by the updated assessment and CNMP for any potential changes that could increase adverse impacts. Concerns have been raised by ABC about the noise from any potential rock breaking. The details provided with the generic construction schedule do not specifically reference the need for such activity. However, if rock breaking is found to be required then the applicant will assess potential impacts and agree a mitigation plan in consultation with Argyll and Bute Council's Environmental Health officer as soon as possible.

Mitigation During Operation

13.5.6 No mitigation is required as there are no significant effects as a result of the operation of the Proposed Development.

13.6 Residual Effects

Residual Construction Effects

13.6.1 The level of construction noise is predicted to be below BS 5228-1 daytime limits for category. No specific mitigation has been identified however it is best practice to implement a CNMP. With an impact magnitude of Minor, and sensitivity of Moderate, the effect of construction noise at NSRs is therefore rated as Minor significance.

Residual Operational Effects

13.6.2 For all receptors, the TR(T) assessment predicts a worst case impact magnitude of Minor for wet conditions at NSR 1. With an NSR sensitivity of Moderate, the assessment predicts impacts are of Minor significance for the Proposed Development.

13.7 Cumulative Effects

13.7.1 The cumulative impacts of developments have been scoped in Error! Reference source not found..

Table 13-10: Other Developments Considered in the Cumulative Assessment

Application reference name	Status	Comment
Wind Farms		
Blarghour Wind Farm	Consented	Wind farm noise tends to be only significant at moderate wind speeds (6 to 9 m/s at 10 m) and in dry weather. At lower wind speeds, wind turbines are very quiet (or not
An Suidhe Substation	Consented	
An Suidhe Wind Farm	Operational	
Clachan Flats Wind Farm	Operational	

Application reference name	Status	Comment
Carraig Gheal Wind Farm	Operational	turning) and at higher wind speeds, the background noise continues to rise, while the turbine levels off. The nature of noise generation and noise type are different to the Proposed Development, no long term cumulative effects are predicted.
Beinn Ghlas Wind Farm	Operational	
Carr Dubh Wind Farm	Scoping	
Ladyfield Wind Farm	Scoping	
Transmission		
Blarghour OHL Connection	Reasonably Foreseeable	Project is at a sufficient distance that there are no shared NSRs.
Creag Dhubh Substation	Reasonably Foreseeable	Substation and Overhead line noise are different in nature, both in terms of tonality and in terms of when they are most significant. Substation noise tends to be most significant at 100 Hz. at times of low background noise (particularly at night). The impact from the proposed Creag Dhubh Substation is rated as low in terms of noise. In dry conditions the OHL impact is low, in wet conditions, when the OHL is at its loudest, background noise due to rain will generally increase and the impact from this line will still be low. Distances are large from NSRs and therefore levels from the site would be so low that no long term cumulative effects are predicted.
Creag Dhubh to Dalmally 275 kV OHL Connection	Reasonably Foreseeable	Projects relatively close due to the connection at Creag Dhubh, however at sufficient distance that there are no shared NSRs.

Application reference name	Status	Comment
ITE/ITW Connection to Creag Dhubh Substation from existing 132 kV Taynuilt to Inveraray OHL	Reasonably Foreseeable	Projects relatively close due to the connection at Creag Dhubh, however at sufficient distance that there are no shared NSRs.
LT40 Inverary - Crossaig Circuit	Recently Constructed	Projects may share NSRs however noise from the Proposed Development is minor and will not contribute to significant cumulative noise.
Other Development		
Ladyfield Forest Meteorological Mast	Consented	There are no expected cumulative operation noise impacts, or nature of noise generation and noise type are different to the Proposed Development (In wet weather, rain noise would largely mask other noise), or due to large distance between the proposed sites no long term cumulative effects are predicted. Each project should be assessed for its own application.
Creagan and Cabrach Long Term Forest Plan		
River Aray Hydro Connection		
Proposed Agricultural Shed	Consented	
Formation of access and engineering operations to re-contour the adjacent landscape (retrospective). A819 Land Opposite Kilchurn Castle View Point Dalmally Argyll and Bute	Consented	
Formation of forest access track. Kenachreachan Forest	Consented	
Erection of telecommunications equipment compound with 25 m high lattice tower and associated works East of Keeper's Cottage	Consented	
Telecommunications Masts at Tom Breac & Glen Aray	Consented	

13.8 Summary

13.8.1 This chapter has considered the potential noise effects that could arise due to the Proposed Development at the closest NSRs within 500 m of the Proposed Development. The assessment has taken account of applicable planning policy and current guidance.

13.8.2 No comment was initially given by ABC on the methodology of the assessment. However, comments were received in the Scoping Opinion.

13.8.3 The level of construction noise is predicted to be below BS5228-1 daytime limits for category A. The effect of construction noise at NSRs is therefore rated as Minor significance.

13.8.4 The nature of construction activities is localised, short term and intermittent. No specific mitigation has been identified as required, however it is best practice to implement a CNMP. Potential control measures have been outlined in this report to limit impact at NSRs, see **Technical Appendix 13.1: Noise, EIAR Volume 4**.

13.8.5 The CNMP must be revisited by the Appointed Contractor when a construction schedule is made available. This report has been based on assumptions from previous OHL assessments and this must be considered when interpreting the conclusions and recommendations.

13.8.6 If works are to include potential noisy activities such as rock breaking, the applicant will assess potential impacts and agree a mitigation plan in consultation with Argyll and Bute Council's Environmental Health officer as soon as possible.

13.8.7 For all receptors, the TR(T) assessment predicts no observable reaction with a maximum excess of 1 dB in wet conditions. The assessment predicts Minor significance for the Proposed Development.

13.8.8 No significant cumulative effects are predicted by the assessment.

13.8.9 Accordingly, no specific mitigation outwith standard control measures is required for the Proposed Development.

13.8.10 Noise is defined as unwanted sound. Human ears can respond to sound in the frequency range 20 Hz (deep bass) to 20,000 Hz (high treble) and over the audible range of 0 dB (the threshold of perception) to 140 dB (the threshold of pain). The ear does not respond equally to different frequencies of the same magnitude but is more responsive to mid-frequencies than to lower or higher frequencies. To quantify noise in a manner that approximates the response of the human ear, a weighting mechanism is used. This reduces the importance of lower and higher frequencies, in a similar manner to the human ear.

13.8.11 Furthermore, the perception of noise may be determined by a number of other factors, which may not necessarily be acoustic. In general, the impact of noise depends upon its level, the margin by which it exceeds the background level, its character and its variation over a given period of time. In some cases, the time of day and other acoustic features such as tonality or impulsiveness may be important, as may the disposition of the affected individual. Any assessment of noise should give due consideration to all of these factors when assessing the significance of a noise source.

13.8.12 The most widely used weighting mechanism that best corresponds to the response of the human ear is the 'A'-weighting scale. This is widely used for environmental noise measurement, and the levels are denoted as dB(A) or LAeq, LA90 etc., according to the parameter being measured.

13.8.13 The decibel scale is logarithmic rather than linear, and hence a 3 dB increase in sound level represents a doubling of the sound energy present. Judgement of sound is subjective, but as a general guide a 10 dB(A) increase can be taken to represent a doubling of loudness, whilst an increase in the order of 3 dB(A) is generally regarded as the minimum difference needed to perceive a change under normal listening conditions.