CALEDONIA
Offshore Wind Farm

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# Volume 5 Proposed Development (Onshore)

## Chapter 8 Airborne Noise and Vibration

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# Volume 5 Chapter 8 Airborne Noise and Vibration

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# Acronyms and Abbreviations

| | |
|---|---|
| **ANC** | Association of Noise Consultants |
| **BNL** | Basic Noise Level |
| **BS** | British Standard |
| **CIA** | Cumulative Impact Assessment |
| **CEMP** | Construction Environmental Management Plan |
| **CTMP** | Construction Traffic Management Plan |
| **dB** | Decibels |
| **dBA** | A weighted decibel |
| **$dBL_{A90}$** | A weighted 90 percentile background noise level in decibels |
| **$dBL_{Aeq}$** | A weighted time-equivalent noise level in decibels |
| **DMRB** | Design Manual for Roads and Bridges |
| **EIA** | Environmental Impact Assessment |
| **EIAR** | Environmental Impact Assessment Report |
| **EHO** | Environmental Health Officer |
| **HDD** | Horizontal Directional Drilling |
| **ISO** | International Organization for Standardization |
| **km** | Kilometres |
| **m** | Metres |
| **MLWS** | Mean Low Water Spring |
| **$ms^{-1}$** | Metres per second |
| **NMP** | Noise Monitoring Position |
| **NSR** | Noise Sensitive Receptor |

| | |
|---|---|
| **NR** | Noise Rating |
| **ONEC** | Onshore Export Cable Corridor |
| **OnTI** | Onshore Transmission Infrastructure |
| **PAN** | Planning Advice Note |
| **PPP** | Planning Permission in Principle |
| **RLB** | Red Line Boundary |

# Executive Summary

This chapter of the Onshore Environmental Impact Assessment Report (EIAR) assesses the potential noise and vibration effects from the Proposed Development (Onshore) on Noise Sensitive Receptors (NSRs).

NSRs considered comprise the closest residential properties to construction activities and the Onshore Substation Site. For construction activities along the Onshore Export Cable Corridor (ONEC) and at the Landfall Site, the assessment has not considered specific NSRs, instead stand-off distances have been determined at which appropriate criteria would be exceeded, and therefore where potential significant effects may occur.

Potential noise impacts considered in the chapter comprise construction activities at the Landfall Site, along the ONEC and at the Onshore Substation Site and operational activities at the Onshore Substation Site. Noise impacts from road traffic during construction have also been considered. Detailed consideration of vibration impacts from construction was scoped out of the assessment, on the basis that vibration can be limited to within appropriate threshold values at NSRs by the implementation of appropriate mitigation.

The assessment has taken account of embedded mitigation measures for the assessment of potential noise effects, specifically; Horizontal Directional Drilling (HDD)[i] site attenuation, attenuation of electrical plant within the Onshore Substation Site and the implementation of a outline Construction Traffic Management Plan (CTMP) and outline Construction Environment Management Plan (CEMP).

Potentially significant noise effects have been identified at a range of separation distances from proposed construction activities at the Landfall Site and ONEC. Noise impacts during the construction of the Onshore Substation Site have been determined to be not significant during weekday daytimes. Noise impacts associated with road traffic during construction have been determined to be not significant for most links in the study area. Potential significant effects have been identified on three links, however, these are expected to prove not significant once further clarity is available on actual construction traffic movements to access points along the ONEC. Noise impacts due to operation of the Onshore Substation Site have been determined to be not significant at the closest NSRs, following specification of appropriate mitigation and commitment to meeting appropriate noise limits.

Mitigation has been specified, comprising the production and implementation of a detailed CEMP and CTMP to address potential noise and vibration impacts during construction and the optimisation of the Onshore Substation Site during detailed design stage to minimise noise from electrical plant.

No significant residual effects have been identified.

[i] This assessment has considered HDD, however, other trenchless technologies may be deployed. Noise impacts from these are likely to be similar to or lesser than HDD and similar mitigation measures would therefore be considered.

# 8 Airborne Noise and Vibration

## 8.1 Introduction

8.1.1.1 This chapter of the Environmental Impact Assessment Report (EIAR) identifies the potential effects on Airborne Noise and Vibration (groundborne) associated with the construction, operation and decommissioning of the Proposed Development (Onshore) landward of Mean Low Water Spring (MLWS).

8.1.1.2 This chapter is supported by the following technical appendices:

- Appendix 8-1 – Summaries of Relevant Policy and Guidance;
- Appendix 8-2 – Summary of Noise Consultation;
- Appendix 8-3 – Baseline Survey Method and Results;
- Appendix 8-4 – Method of Assessment;
- Appendix 8-5 – Evaluation of Construction Phase Noise Levels; and
- Appendix 8-6 – Operational Phase - Results.

## 8.2 Legislation, Policy and Guidance

8.2.1.1 Volume 1, Chapter 2: Legislation and Policy, of this EIAR sets out the policy and legislation associated with the Proposed Development (Onshore).

8.2.1.2 Legislation, Policy and Guidance that relate to the noise and vibration assessment are identified and described in Table 8-1.

Table 8-1: Legislation Policy and Guidance

| Relevant Legislation, Policy and Guidance | Description |
|---|---|
| Planning Advice Note [PAN] PAN1/2011: Planning and Noise (PAN1/2011) (Scottish Government, 2011a[1]) | Scottish planning guidance relevant to noise. |
| Assessment of noise: technical advice note (Scottish Government, 2011b[2]). | Technical advice note to PAN1/2011[1] |
| British Standard (BS)4142:2014+A1:2019 Methods for rating and assessing industrial and commercial sound (BS4142) (BSI, 2019a[3]). | Relevant guidance for the assessment of industrial noise. |

| Relevant Legislation, Policy and Guidance | Description |
|---|---|
| BS5228:2009+A1:2014 – Code of practice for noise and vibration control on construction and open sites – Part 1 (Noise) and Part 2 (Vibration) (BS5228) (BSI, 2014a[4]; BSI, 2014b[5]) | Relevant guidance for the assessment of construction noise and vibration. |
| BS8233:2014 Guidance on sound insulation and noise reduction for buildings (BS8233) (BSI, 2019b[6]). | Relevant guidance relating to acoustic attenuation performance of buildings and evaluation using Noise Rating (NR) method. |
| Design Manual for Roads and Bridges (DMRB), LA 111 Noise and vibration (DMRB, 2020[7]) | Relevant guidance for screening and detailed evaluation of changes to road traffic flows and potential resultant noise and vibration impacts |
| Calculation of Road Traffic Noise (Department of Transport- Welsh Office, 1988[8]). | Prediction method for calculating road traffic noise based on traffic flow, proportion of heavy goods vehicles and speed. |
| ISO 9613: Attenuation of Sound During Propagation Outdoors, Part 1 and Part 2 (International Organization for Standardization [ISO], 1993[9]; ISO, 2024[10]) | Method for predicting sound propagation in outside conditions. |
| BS7445: Description and measurement of environmental noise (BSI, 2003[11]). | Method detailing appropriate equipment and suitable weather conditions for undertaking representative environmental noise measurements. |

## 8.3 Stakeholder Engagement

### 8.3.1 Overview

8.3.1.1 The Scoping Report was submitted to Aberdeenshire Council in December 2022 who then circulated the report to relevant consultees. A Scoping Opinion was received from Aberdeenshire Council on 1 February 2023. Relevant comments from the Scoping Opinion specific to noise and vibration are provided in Table 8-2.

Table 8-2: Scoping Opinion Response

| Consultee | Comment | Response |
|---|---|---|
| Aberdeenshire Council | Detailed survey work would be required to inform the EIAR. Following analysis of the aspects of the environment which would be likely to be significantly affected, a detailed assessment of the effects themselves would be required along with mitigation measures proposed. | Baseline noise monitoring surveys were conducted for key receptors at the Onshore Substation Site and Landfall Site. Monitoring locations and the methodology used was agreed in consultation with Aberdeenshire Council. |
| Aberdeenshire Council | "Examples of the types of issues that should be addressed include:<br><br>▪ Climate Change<br>▪ Local Economic Effect<br>▪ Landscape Resource<br>▪ Soils and Geology<br>▪ Visual Amenity<br>▪ Ecology<br>▪ Nature Conservation<br>▪ European Protected Species<br>▪ Hydrology and Water Supplies<br>▪ Forestry and Tree Felling<br>▪ Transport and Traffic, including road safety issues and impact on the local road network during and after construction work<br>▪ Noise<br>▪ Cultural Heritage and Archaeology<br>▪ Land Use<br>▪ Land Ownership | Noise has been addressed in this chapter of the EIAR and supporting appendices. The baseline noise environment is discussed in Section 8.4.3. Potential impacts are outlined in Section 8.7 to Section 8.9 with mitigation measures and monitoring discussed in Section 8.10. A summary of effects after the application of mitigation is presented in Table 8-15. |

| Consultee | Comment | Response |
|---|---|---|
| | ▪ Tourism and Recreation, including Footpaths<br>▪ Proposed Mitigation Measures" | |
| Aberdeenshire Council | The Environmental Health Service noted that in the absence of exact site locations, it has no prescriptive comments to make on the proposed documents. It notes that once a clearer site location is finalised, any noise and vibration consultant should engage with the Service to agree a detailed methodology. | Pre-application consultation with Aberdeenshire Council's Environmental Health Service confirmed the noise assessment methodology used in preparation of this chapter of the EIAR and the noise monitoring locations surveyed to establish the baseline noise environment. |
| Aberdeenshire Council | The Planning Service would not wish to comment on the questions posed at section 13.12.1.1 [of the Onshore Scoping Report] in the absence of more detailed input from the Environmental Health Service. Once the site selection has been refined it would be recommended that you engage with the Environmental Health Service to agree a methodology and address those questions. | Pre-application consultation with Aberdeenshire Council's Environmental Health Service confirmed the noise assessment methodology used in preparation of this chapter of the EIAR and the noise monitoring locations surveyed to establish the baseline noise environment. |

8.3.1.2 Further consultation has been undertaken throughout the pre-application stage. Table 8-3 summarises the consultation activities carried out of relevant to noise and vibration.

Table 8-3: Stakeholder Engagement Activities

| Date | Consultee and Type of Consultation | Summary |
|---|---|---|
| 15/11/2023 | Email to Aberdeenshire Council Environmental Health Department seeking agreement of detailed approach to assessment, including specifics of characterisation of baseline noise environment. | Proposal for use of BS5228[4],[5] to evaluate noise from construction activities and the scoping out of assessment of vibration.<br>Proposal for use of BS4142[3] to evaluate noise from operational phase noise sources.<br>Proposal for baseline survey locations and methods.<br>Proposal for use of supplementary NR criteria for evaluation substation noise.<br>Refer to Volume 7E, Appendix 8-2 Summary of Noise Consultation. |
| 20/11/2023 | Email from Aberdeenshire Council Environmental Health Officer (EHO) | EHO instructed that BS4142[3] assessment should aim for a 'low impact' depending on the context, noting their opinion that low impacts occur when the rating level is equal to the background level, rather than at up to five decibels (dB) above the background.<br>EHO instructed that the assessment should include an internal receptor NR curve comparison and assess the cumulative impact with other steady state developments, noting that the NR assessment should not be supplementary but the focus of the assessment during the night-time period, and that it would be expected that NR20 be achieved internally and cumulatively.<br>Query about duration of baseline monitoring, given presence of existing wind turbines in the vicinity. |

| Date | Consultee and Type of Consultation | Summary |
|---|---|---|
| 01/02/2024 | Email to Aberdeenshire Council Environmental Health Department seeking agreement of approach to determination of effect significance | Confirmed completion of baseline noise survey.<br>Proposed that all residential Noise Sensitive Receptors (NSRs) would be considered to have a high sensitivity to noise.<br>Proposed that where predicted operational noise levels meet the adopted criteria (specifically NR20), the assessment will consider that noise effects are not significant in Environmental Impact Assessment (EIA) terms.<br>Proposed that the Concurrent construction phasing scenario will be the worst case in terms of noise, therefore only this scenario would be assessed. |
| 02/02/2024 | Email from Aberdeenshire Council EHO | Agreed that exceedance of the NR curve criterion would be viewed as significant by Environmental Health. Refer to Section 8.5.4.2.<br>Agreed the approach to assessment of the Concurrent construction scenario would be acceptable. |
| 12/03/2024 | Email to Aberdeenshire Council Environmental Health Department seeking agreement of approach to consideration of vibration impacts and cumulative noise approach to SSE substation development. | Noted that vibration may arise associated with removal of rock, in the event of shallow rockhead being present at the Onshore Substation Site.<br>Proposed that vibration associated with removal of rock could be evaluated qualitatively.<br>Highlighted that SSE proposes to construct a substation approximately 1.1 kilometres (km) to the north of the Onshore Substation Site – requested clarification of whether this would require assessment as a cumulative development, noting that cumulative contribution of the overall noise level at NSRs due to the SSE substation is expected to be negligible. |

| Date | Consultee and Type of Consultation | Summary |
|---|---|---|
| 13/03/2024 | Email from Aberdeenshire Council EHO | Agreed approach to qualitative evaluation of potential vibration impacts. Requested further clarity on how noise from SSE substation can be determined to be negligible. |
| 19/03/2024, 27/03/2024 | Email to Aberdeenshire Council Environmental Health Department providing further representation regarding the SSE substation | Provided further justification for excluding potential cumulative effects arising due to proposed SSE substation to north. |
| 27/03/2024 | Email from Aberdeenshire Council EHO | Agreed to scope out SSE substation from cumulative assessment on the basis that a planning application has not yet been submitted and therefore the future application will be required to consider the Proposed Development in its cumulative assessment, where potential cumulative effects are identified. |
| 07/06/2024 | Email to Aberdeenshire Council EHO | Request for clarification on pre-application information provided by Aberdeenshire Council. Queried instruction that BS4142 and NR criteria must be given equal weighting in determining significance. |
| 20/06/2024 | Email from Aberdeenshire Council EHO | EHO confirmed that both sets of criteria should be given equal weighting. |

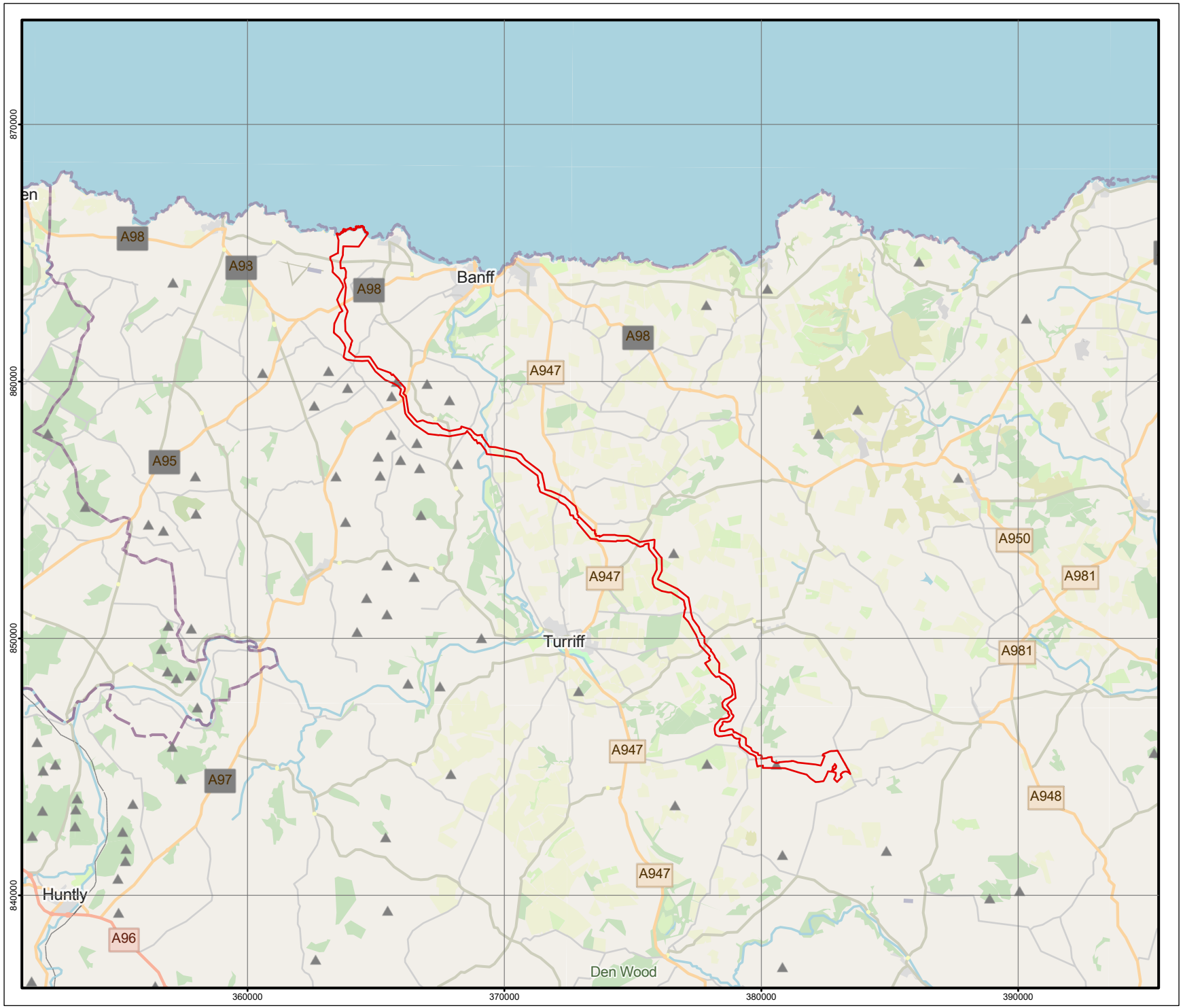
## 8.4 Baseline Characterisation

### 8.4.1 Study Area

8.4.1.1 A study area for this assessment has been selected drawing on experience of similar projects. Noise impacts associated with the Proposed Development (Onshore) will be greatest at NSRs closest to the Proposed Development (Onshore); noise impacts at more distant NSRs will be lesser. On this basis, noise impacts arising from the Proposed Development (Onshore) can be assessed considering only the closest NSRs to any proposed component of the Proposed Development (Onshore) and a study area has been selected accordingly.

8.4.1.2 This assessment considers both the construction phase and the operational phase of the Proposed Development (Onshore). During construction, noise impacts will predominantly occur in proximity to work sites along the ONEC and at the Landfall Site. Physical works (construction activity) may be required within the ONEC and the actual location of work sites is yet to be determined. The study area for the ONEC therefore includes all NSRs within the Onshore Transmission Infrastructure (OnTI) Red Line Boundary (RLB) and those within approximately 300 metres (m). The OnTI RLB is shown in Figure 8-1.

8.4.1.3 The selected study area used to consider potential noise impacts arising from the proposed Onshore Substation Site includes the closest NSRs in each direction and also the closest NSRs to the existing and proposed substations in the vicinity, to enable the evaluation of potential cumulative noise impacts. The study area and NSRs at the Onshore Substation Site and Landfall Site are shown in Figures 8-2 and Figure 8-3.






| REV | DATE | DOC STATUS | ORIGIN | REVIEW | APP |
|---|---|---|---|---|---|
| 03 | 30/08/2024 | Approved | CW | JN | GS |
| 02 | 30/07/2024 | For Review | CW | JN | GS |
| 01 | 29/04/2024 | For Review | CE | JN | GS |

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CONTRACTOR REV: 03

GEODETIC PARAMETERS: OSGB36 / British National Grid (EPSG:27700)

DRAWING TITLE

# Figure 8-1: Onshore Transmission Infrastructure Red Line Boundary

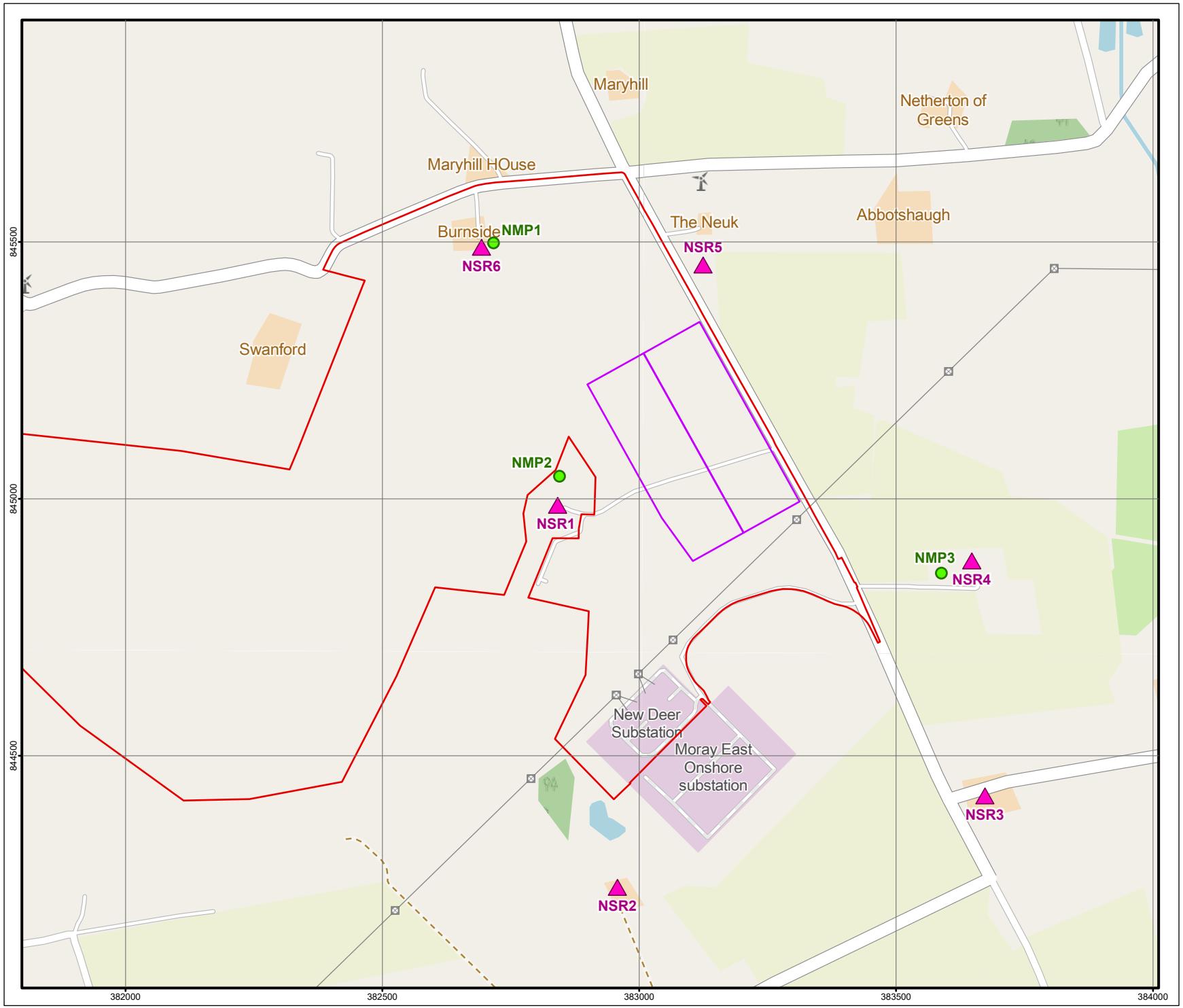
STATUS: Approved

SCALE: 1:200,000

DRAWING NUMBER: N/A

SHEET NO: 01 of 01

REV: N/A



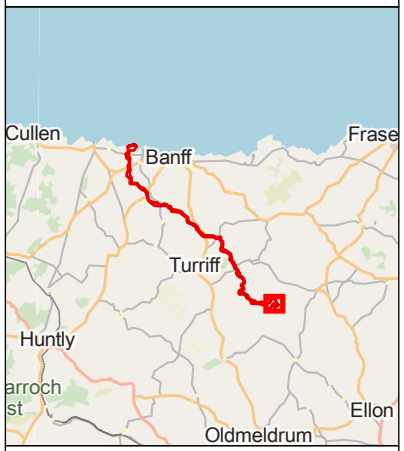

Onshore Transmission Infrastructure Red Line Boundary

Indicative Onshore Substation

Noise Sensitive Receiver (NSR)

Noise Monitoring Position (NMP)



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| 03 | 20/08/2024 | Approved | CW | JN | GS |
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CONTRACTOR DRAWING NO: UKCAL1_ARP_WNF_ENV_MAP_00459

CONTRACTOR REV: 03

GEODETIC PARAMETERS: OSGB36 / British National Grid (EPSG:27700)

DRAWING TITLE

# Figure 8-2: Baseline Survey Noise Monitoring Positions and Representative NSRs

STATUS: Approved

SCALE: 1:10,000

DRAWING NUMBER: N/A

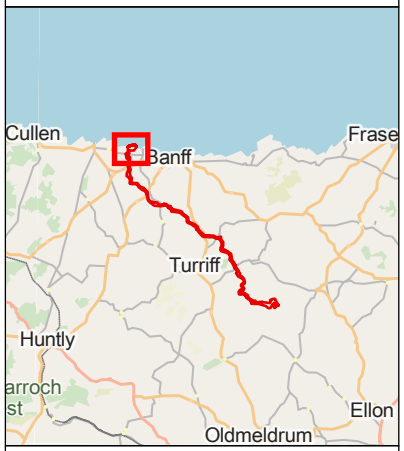
SHEET NO: 01 of 01

REV: N/A


Onshore Transmission Infrastructure Red Line Boundary

Noise Monitoring Position (NMP)



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| GEODETIC PARAMETERS<br>OSGB36 / British National Grid (EPSG:27700) | |

DRAWING TITLE

# Figure 8-3: Landfall Site Noise Monitoring Positions

| | | |
|---|---|---|
| STATUS<br>Approved | SCALE<br>1:20,000 | |
| DRAWING NUMBER<br>N/A | SHEET NO<br>01 of 01 | REV<br>N/A |

## 8.4.2 Data Sources

8.4.2.1 All data used in the characterisation of the baseline noise environment has been collected by survey specifically for the Proposed Development (Onshore). No other sources of data have been relied upon.

### Desk Study

8.4.2.2 Prior to commencement of the baseline survey, a review was completed of the noise assessments submitted in support of the applications for neighbouring substation developments. During the review, baseline survey measurements undertaken prior to the development of the existing New Deer and Moray East Substations were noted; these informed consultation with Aberdeenshire Council and influenced the scope of the baseline survey undertaken as part of this assessment.

### Site Specific Surveys

8.4.2.3 A baseline survey was undertaken in December 2023 to characterise the prevailing noise environment at NSRs surrounding the proposed Onshore Substation Site and at the Landfall Site. Additional short duration measurements were undertaken at representative locations along the ONEC.

8.4.2.4 Full details of the survey method and a record of the measurements completed are provided in Volume 7E, Appendix 8-3: Baseline Methodology and Results. A brief summary of the survey is provided as follows:

- Measurements were undertaken in accordance with BS4142[3] and BS7445[11] guidance, by an appropriately qualified surveyor using sound level meters which were within their laboratory calibration period;
- Weather conditions were monitored using an on-site weather station during the survey and were mostly appropriate for monitoring;
- Periods of rainfall or elevated wind speeds were excluded from subsequent analysis; and
- Monitoring locations were sited such that noise from extraneous or non-representative noise sources was suppressed.

8.4.2.5 The monitoring locations used during the survey are shown in Figure 8-2 and Figure 8-3.

## 8.4.3 Baseline Description

8.4.3.1 A full record of the baseline noise environment characterised in the survey is provided in Volume 7E, Appendix 8-3: Baseline Methodology and Results. A brief summary of the noise environment observed at each Noise Monitoring Position (NMP) is provided below:

- NMP1 Burnside – Dominant noise source was traffic on local roads and more distant traffic on the wider road network and bird calls. Lesser contributors to the noise environment were aircraft overhead and a continuous low humming or buzzing sound, possibly from existing electrical infrastructure;
- NMP2 East Swanford – Dominant noise source was distant machinery. Lesser or more infrequent contributors were bird calls and barking dogs and aircraft passing overhead;
- NMP3 Mains of Asleid – Dominant noise source was bird calls (rooks)and infrequent vehicle traffic on the nearby road. Lesser contributors were a distant whirring from the north-east (attributed to wind turbines), infrequent aircraft and distant banging, possibly from a construction site; and
- NMP4 Landfall Site – During commissioning the NMP was downwind of the sea and the dominant noise source was breaking waves. During decommissioning the dominant noise source was road traffic on the nearby main road and the sea was barely audible, due to the NMP being upwind of the sea.

8.4.3.2 The charts provided in Volume 7E, Appendix 8-3: Baseline Survey Method and Results show that the wind speed over the survey duration did not exceed 2.5 metres per second ($ms^{-1}$) and therefore met the requirements of BS4142[3]. As identified above, noise data affected rain showers was screened out of further analysis.

8.4.3.3 At NMP1, NMP2 and NMP3 the measured ambient and background levels show a diurnal profile with typically higher levels during the daytime and lower levels during the night-time. Variations in the ambient, background and maximum levels are also attributed to wind speed, with higher noise levels coinciding with higher wind speeds.

8.4.3.4 At NMP4 the measured ambient and background levels show a high degree of consistency on the first day of monitoring; this is attributed to constant levels of noise from the sea. On the second day the variability of the measured levels increased, attributed to a reduction in noise from the sea and corresponding increasing dominance of road traffic noise.

8.4.3.5 The measured baseline noise levels are summarised in Table 8-4.

Table 8-4: Summary of measured baseline noise levels

| Monitoring location | Period | Measured ambient noise level, $dBL_{Aeq}$ | Measured background level, $dBL_{A90}$ |
|---|---|---|---|
| NMP1 Burnside | Daytime | 42 | 34 |
| NMP1 Burnside | Night-time | 37 | 31 |
| NMP2 East Swanford | Daytime | 33 | 26 |
| NMP2 East Swanford | Night-time | 31 | 25 |
| NMP3 Mains of Asleid | Daytime | 38 | 24 |
| NMP3 Mains of Asleid | Night-time | 36 | 33 |
| NMP4 Landfall Site | Daytime | 42 | 39 |
| NMP4 Landfall Site | Night-time | 44 | 41 |

$dBL_{Aeq}$ = A weighted time-equivalent noise level in decibels.
$dBL_{A90}$ = A weighted 90 percentile background noise level in decibels

8.4.3.6 Measured background levels at NMP2 are below $30dBL_{A90}$, both during the daytime and the night-time periods and may be considered objectively low. The noise environments at both NMP1 and NMP3 are also quiet. Where measured background levels are objectively low, this assessment adopts a representative background level of $30dBL_{A90}$, in accordance with the provision discussed in Paragraph 1.3.2.7 of Volume 7E, Appendix 8-1: Summaries of Relevant Policy and Guidance.

8.4.3.7 Measured background levels at NMP3 are higher during the night-time period than during the daytime. This is attributed to higher levels of wind noise during the night-time periods of the measurement period and a robust approach to determining the representative background level. Data affected by wind speeds above $5ms^{-1}$ have been excluded from the dataset, however, a relatively small increase in wind speed can give a notable increase in background level in such quiet environments. The ambient level is higher during the daytime period than the night-time period, as may be expected.

8.4.3.8 At NMP4 the background and ambient level was higher than at locations close to the Onshore Substation Site; this is attributed to noise from the sea and the proximity of a busy road.

8.4.3.9 Observations on the noise environment recorded at spot measurements along the ONEC are provided in Volume 7E, Appendix 8-3: Baseline Survey Method and Results. The measurements and observations indicate the noise environment was typical of a quiet rural area, with low levels of road traffic and natural sources (the wind, vegetation, watercourses) typically dominant.

### 8.4.4 Future Baseline

8.4.4.1 Future baseline noise conditions along the OnTI RLB are expected to remain similar to the current baseline.

8.4.4.2 The future baseline in the vicinity of the proposed Onshore Substation Site is expected to remain similar. There are live planning applications for further development of cumulative substations nearby, therefore a slight increase in cumulative noise of industrial character may be expected at the closest NSRs to these developments.

### 8.4.5 Data Gaps and Limitations

8.4.5.1 The baseline noise environment along the ONEC has been characterised qualitatively, due to the extent of the study area. Appropriate assumptions have been made regarding noise levels, based on subjective observations and short-duration spot measurements.

8.4.5.2 Construction phase noise levels at NSRs along the ONEC will depend primarily on their separation distance from the work site and the nature of the works. It would not be feasible to predict noise levels from each work site at each NSR for every stage of works, therefore appropriate assumptions have been made and assessment undertaken of noise levels at incremental separation distances from representative work sites and assemblages of plant. These predictions provide worst-case noise levels excluding the screening benefit of local topography.

8.4.5.3 The Onshore Substation Site location and indicative layout have been considered in the prediction of operational noise. The equipment specification for the proposed items of plant is expected to represent a reasonable worst-case scenario and will be refined at the detailed design stage. Appropriately robust assumptions have been made in the interpretation of the proposed layout and noise specifications of proposed items of plant for prediction of operational noise at NSRs.

## 8.5 EIA Approach and Methodology

### 8.5.1 Overview

8.5.1.1 This section outlines the methodology for assessing the likely significant effects on airborne noise and vibration from the construction, operation and decommissioning of the Proposed Development (Onshore). Full details of the

methodology, including relevant assumptions and limitations, can be found in Volume 7E, Appendix 8-4: Method of Assessment.

### 8.5.2 Impacts Scoped into the Assessment

8.5.2.1 The Onshore Scoping Report was submitted to Aberdeenshire Council in December 2022. The Scoping Report set out the overall approach to assessment and allowed for the refinement of the Proposed Development (Onshore) over the course of the assessment. The proposed scope of the assessment is set out in Table 8-5.

Table 8-5: Scope of Assessment

| Potential Impact | Phase | Nature of Impact |
|---|---|---|
| Noise from construction activities at the Landfall Site and along the ONEC | Construction | Direct |
| Noise from construction activities at the Onshore Substation Site | Construction | Direct |
| Noise from road traffic associated with construction activities along the ONEC and at the Landfall Site and Onshore Substation Site | Construction | Direct |
| Noise from operation of the Onshore Substation Site | Operation | Direct |

### 8.5.3 Impacts Scoped out of the Assessment

8.5.3.1 The impacts scoped out of the assessment during EIA scoping, and the justification for this, are listed in Table 8-6.

Table 8-6: Impacts Scoped Out

| Potential Impact | Justification |
|---|---|
| Vibration from construction activities at the Landfall Site and along the ONEC | Locations of work sites are not yet confirmed. Vibration associated with construction activity is expected to be negligible at distances of >50m. It is not confirmed at Planning Permission in Principle (PPP) application stage whether piling or ground compaction is required, however, it is unlikely and as such, no significant sources of vibration are expected. Vibration will be considered at detailed design. |
| Vibration from construction activities at Onshore Substation Site | Vibration associated with construction activity is expected to be negligible at distances of >50m. It is not confirmed at PPP application stage whether piling or ground compaction is required, however, it is unlikely and as such, no significant sources of vibration are expected. Vibration will be considered at detailed design. |
| Vibration from the Onshore Substation Site during operation | Vibration from operation of electrical plant is expected to be negligible at the boundary of the Onshore Substation Site and at NSRs beyond. Consideration of vibration impacts associated with the operational phase has therefore been scoped out. |
| Noise from road traffic during operation | Road traffic flows associated with operation of the Proposed Development (Onshore) are expected to be negligible. Noise from additional vehicle movements during the operational phase has therefore been scoped out. |

### 8.5.4 Assessment Methodology

8.5.4.1 The project-wide approach to EIA assessment is set out in Volume 1, Chapter 7: Environmental Impact Assessment Methodology. The assessment methodology for noise is consistent with that provided in the Onshore Scoping Report.

8.5.4.2 The methodology for the assessment of noise is set out in full in Volume 7E, Appendix 8-4: Method of Assessment. An overview is provided in the following sections.

8.5.4.3 The overall approach to the noise assessment is summarised as follows:

- Adoption of appropriate evaluation criteria (noise limits), comprising either fixed criteria, or criteria relative to a baseline level, in accordance with agreements with Aberdeenshire Council;
- Prediction of noise levels associated with proposed plant and activities for the construction and operational phases;

- Evaluation of predicted noise levels against adopted criteria; NR20 (standalone and cumulative - internal) and a rating level of 35dB;
- The assessment considers that all residential NSRs have a high sensitivity to noise;
- The assessment considers that where predicted noise levels are below or meet the adopted criteria, the impact magnitude will be low or lesser. At high sensitivity NSRs the resultant effect significance will be minor or negligible;
- The assessment further considers that where predicted noise levels are above the adopted criteria, the impact magnitude will be moderate or greater. At high sensitivity NSRs the resultant effect significance will be medium or major;
- On the basis of the above, where predicted noise levels meet the adopted criteria, effects have been assessed as not significant in EIA terms. Where predicted levels exceed the adopted criteria, effects have been assessed as significant in EIA terms;
- Given that the exact location of work sites within the ONEC and at the Landfall Site have yet to be determined, noise impacts arising from construction activities have been evaluated at a range of separation distances from a likely plant assemblage from typical work sites; and
- Noise impacts arising from construction and operation of the Onshore Substation Site have been evaluated at specific NSRs.

### 8.5.5 Approach to Cumulative Effects

8.5.5.1 The Cumulative Impact Assessment (CIA) assesses the impact associated with the Proposed Development (Onshore) together with other relevant plans, projects and activities. Cumulative effects are therefore the combined effect of the Proposed Development (Onshore) in combination with the effects from a number of different projects, on the same receptor or resource.

8.5.5.2 The approach to the CIA for noise follows the process outlined in Volume 1, Chapter 7: Environmental Impact Assessment Methodology.

8.5.5.3 The list of relevant developments for inclusion within the CIA is outlined in Volume 7A, Appendix 7-1: Cumulative Impact Assessment Methodology.

8.5.5.4 An application for the construction of a new 400kV overhead line (reference ECU00005165, Beauly to Blackhillock to New Deer to Peterhead 400kv Connection) is proposed within the OnTI RLB, with the potential that this may occur at the same time as construction of the Proposed Development (Onshore). Limited information is available about the overhead line at present. Consideration of potential cumulative effects are considered in Section 8.8.

8.5.5.5 No other relevant plans, projects or activities within 300m of the OnTI RLB have been identified as potentially cumulative and therefore cumulative construction noise effects have not been considered further.

8.5.5.6 In regards cumulative vibration effects, developments within approximately 100m of the study area have the potential to result in cumulative effects. There are no proposed cumulative developments within 100m, therefore cumulative vibration effects have been scoped out.

8.5.5.7 Relevant plans, projects and activities which are located within approximately 1km of the study area for the Onshore Substation Site have the potential to result in operational cumulative effects. The evaluation criteria for the operational Onshore Substation Site therefore considers the cumulative noise level from the Proposed Development (Onshore) and relevant plans, projects and activities within 1km utilising reported noise levels provided in accompanying technical assessments of submitted planning applications.

## 8.5.6 Embedded Mitigation

8.5.6.1 Caledonia Offshore Wind Farm Limited (the Applicant) is committed to meeting the adopted evaluation criteria (noise limits). Where possible, mitigation measures will be embedded into the design of the Proposed Development (Onshore), such that these are met.

8.5.6.2 Where embedded mitigation measures have been developed into the design of the Proposed Development (Onshore) with specific regard to noise, these are described in Table 8-7.

8.5.6.3 The layout of the Onshore Substation Site considered in this assessment is indicative only. The eventual plant specification and layout will be determined in the detailed design stage. Mitigation will be adopted such that appropriate noise limits are met.

8.5.6.4 Embedded mitigation measures are presented in this assessment which will be utilised to enable the adopted evaluation criteria can be met. Compliance with the evaluation criteria will be secured by specification of planning conditions. The eventual layout of the Onshore Substation Site will be different to the example layout modelled in this assessment. Good acoustic design principles will be considered within the detailed design of the substation, seeking to minimise the cost and complexity of noise-reducing mitigation methods. Refer to Section 8.10.3 for further details.

8.5.6.5 The impact assessment presented in Section 8.7 to Section 8.9 considers the embedded mitigation.

Table 8-7: Embedded Mitigation

| Code | Mitigation Measure | Securing Mechanism |
|---|---|---|
| M-39 | An Outline Construction Environmental Management Plan (CEMP) has been produced and included alongside the EIAR to support the Planning Permission in Principle (PPP) (Volume 7, Appendix 10: Outline Construction Environment Management Plan). The Outline CEMP includes measures on pollution prevention, noise control, biosecurity, and waste management. The Outline CEMP will then be developed further through the final design process and this will result in a detailed CEMP being submitted for discharge. The CEMP will be implemented to avoid, minimise or mitigate effects on the environment during the construction and decommissioning phases of the Proposed Development (Onshore). | Detailed CEMP secured through a condition attached to the PPP. |
| M-71 | The Applicant is committed to meeting appropriate noise limits (NR criteria and the proposed rating level limit, based on the BS4142 approach) at all NSRs. The requirement for specific mitigation measures will be identified at the detailed design stage. The below stages will be considered during the specification of the Onshore Substation Site:<br>▪ Updated operational noise predictions, incorporating a review of proposed plant items and identification of sound power levels for each item through consultation with suppliers;<br>▪ Movement of noisy items of plant within the Onshore Substation Site to locations away from NSRs;<br>▪ Use of buildings and other plant items within the Onshore Substation Site to provide screening to noisy plant items; | Requirement for the Onshore Substation Site to meet noise limits to be secured through condition to the PPP. Sound power level of proposed plant to be confirmed and layout optimised to minimise noise at neighbouring NSRs at detailed design stage. |

| Code | Mitigation Measure | Securing Mechanism |
|---|---|---|
| | ▪ Specification of attenuation at source, such as quieter plant items, or by enclosure; and<br>▪ Iterative modelling of detailed layouts to determine requirement for further mitigation until noise limits are met. | |
| M-97 | Horizontal Directional Drilling (HDD)[ii] sites will be attenuated by selection of silenced plant where required to meet appropriate noise limits at the closest receptors. The drilling contractor will be required to provide the source level of their plant items, with particular attention paid to the drilling mud recycling unit. Where practicable, plant will be attenuated at source by installation of silencers. Temporary noise barriers will be installed around the work site and temporary buildings, such as site cabins and stores, will be used to provide further screening. Pulling cables through the completed ducts will be similarly attenuated. Considering this mitigation for HDD and cable pulling works, such as placing screening close to the noisiest items of plant, noise levels at receptor locations can be reduced by up to 15dB, when compared with unattenuated work sites. | Specification within the Construction Environmental Management Plan (CEMP). The detailed CEMP will be secured through a condition attached to the PPP. |

[ii] This assessment has considered HDD, however, other trenchless technologies may be deployed. Noise impacts from these are likely to be similar to HDD or lesser and similar mitigation measures would therefore be considered Trenchless crossing techniques such as Horizontal Directional Drilling (HDD) are hereafter referred to as 'HDD'.

## 8.6 Key Parameters for Assessment

8.6.1.1 Volume 1, Chapter 4: Proposed Development Description (Onshore) details the parameters of the Proposed Development (Onshore) using the Rochdale Envelope approach. This section identifies those parameters during construction, operation and decommissioning relevant to potential impacts on noise and vibration.

8.6.1.2 The worst case assumptions with regard to noise and vibration are summarised in Table 8-8.

### 8.6.2 Proposed Development Phasing

8.6.2.1 As described in Volume 1, Chapter 5: Proposed Development Phasing, three possible construction programme scenarios have been identified for the Proposed Development (Onshore).

8.6.2.2 For construction activities, the worst-case scenario is expected to be the concurrent scenario, as this would likely involve the greatest amount of construction activity at any given work site. The enabling and sequential scenarios are expected to have a lesser amount of plant and activity, albeit for a longer period than the concurrent scenario.

8.6.2.3 The worst case assumptions with regard to the consideration of construction scenarios are also summarised in Table 8-8.

Table 8-8: Worst Case Assessment Scenario Considered for Each Impact as Part of the Assessment of Likely Significant Effects

| Potential Impact | Assessment Parameter | Explanation |
|---|---|---|
| **Construction** | | |
| Noise from road traffic | Robust assumptions made within traffic assessment (refer to Volume 5, Chapter 9: Traffic and Transport) regarding construction traffic flows result in worst-case noise impacts.<br>Noise predictions have been undertaken for links on which the greatest changes to overall traffic flows are expected as a result of construction traffic. The projected traffic flows consider the construction scenario (Concurrent) expected to have the greatest number of vehicle movements. | At this stage in the there is insufficient information to determine where construction traffic will be routed during the construction phase. The Concurrent scenario has the greatest expected increase to traffic flows. Actual road traffic flows are therefore expected to be lesser. |
| Noise from construction activities | Construction plant on-times and number of plant items.<br><br>Predictions of HDD noise assume two rigs operating simultaneously up to 24 hours a day. In practice, it is expected that only one drill may be used at a time per HDD location.<br><br>Predictions at NSRs surrounding the Onshore Substation Site assume three identical assemblages of construction plant operating simultaneously at the distance of closest approach. | Robust assumptions have been made regarding the likely on-times of construction plant; actual on-times are likely to be lower. The number of plant items assumed to be operating simultaneously in each construction scenario is greater than expected to occur in practice. Further details on assumptions used can be found in Volume 7E, Appendix 8-4: Method of Assessment.<br><br>At the Onshore Substation Site it is likely that only one of the three modelled assemblages of plant will |

| Potential Impact | Assessment Parameter | Explanation |
|---|---|---|
| | With the exception of HDD, working hours are limited to Monday to Friday 7am to 7pm and Saturday 7am to 12pm. | operate, therefore noise levels will be lower than predicted. |
| **Operation** | | |
| Noise from Onshore Substation Site and the two co-located Onshore Substations. | Assumed sound power levels of proposed electrical plant items.<br><br>Layout of Onshore Substation Site<br><br>Height of NSRs above local ground level. | Typical sound power levels have been provided for likely items of electrical plant to be installed at the Onshore Substation Site.<br><br>The Onshore Substation Site operational noise model considers the indicative PPP layout and example mitigation which would enable the adopted criteria to be met.<br><br>NSRs have been considered at a height of 4m above ground level, indicative of a first-floor bedroom window, to minimise the influence of ground absorption effects. Actual noise levels within garden areas of NSRs are likely to be lower. Further details on assumptions used can be found in Volume 7E, Appendix 8-4: Method of Assessment. |

| Potential Impact | Assessment Parameter | Explanation |
|---|---|---|
| **Decommissioning** | | |
| Noise from decommissioning activities | - | No predictions of decommissioning and demolition works noise have been undertaken, however, noise impacts associated with these will be similar to, but lesser than, construction noise. |

# 8.7 Potential Effects

## 8.7.1 Construction

8.7.1.1 Noise from construction works will be temporary and the noise environment will revert to the baseline condition (barring noise from operational sources) following completion of the construction programme.

### Construction stage noise effects – Onshore Substation Site

8.7.1.2 Noise impacts arising from construction at the Onshore Substation Site have been evaluated, with detailed results provided in Volume 7E, Appendix 8-5: Evaluation of Construction Phase Noise Levels. The significance of effects is summarised for each construction period and at each NSR in Table 8-10 for the daytime (D), evenings and weekends (E&W) and night-time (N) periods.

8.7.1.3 The definition of the time periods used in the construction assessment are provided in Table 8-9 below.

Table 8-9: Definition of time periods used in the construction assessment

| Period | Time |
|---|---|
| Weekday daytime and Saturday mornings (D) | 07:00 – 19:00 weekdays<br>07:00 – 13:00 Saturdays |
| Evenings and weekends (E&W) | 19:00 – 23:00 weekdays<br>13:00 – 23:00 Saturdays<br>07:00 – 23:00 Sundays |
| Night-time (N) | 23:00 – 07:00 all days |

Table 8-10: Results – Construction noise impacts – Onshore Substation Site

| Construction Period | | Significance at NSRs | | | | | |
|---|---|---|---|---|---|---|---|
| | | NSR1 | NSR2 | NSR3 | NSR4 | NSR5 | NSR6 |
| **1** - Site establishment – establishing contractor compound and securing site boundary | D | Not significant | Not significant | Not significant | Not significant | Not significant | Not significant |
| | E&W | Evening and weekend working not proposed | | | | | |
| | N | Night-time working not proposed | | | | | |
| **2** – Civil enabling works – topsoil stripping and formation of bunds, subsoil excavation to form level platform | D | Not significant | Not significant | Not significant | Not significant | Not significant | Not significant |
| | E&W | Evening and weekend working not proposed | | | | | |
| | N | Night-time working not proposed | | | | | |
| **3** - Civil construction works – breaking out rock, crushing and removal | D | Not significant | Not significant | Not significant | Not significant | Not significant | Not significant |
| | E&W | Evening and weekend working not proposed | | | | | |
| | N | Night-time working not proposed | | | | | |

| Construction Period | | Significance at NSRs | | | | | |
|---|---|---|---|---|---|---|---|
| | | NSR1 | NSR2 | NSR3 | NSR4 | NSR5 | NSR6 |
| **4** - Substation construction works | D | Not significant | Not significant | Not significant | Not significant | Not significant | Not significant |
| | E&W | Evening and weekend working not proposed | | | | | |
| | N | Nighttime working not proposed | | | | | |
| **5** - Installation and commissioning - plant and equipment installation and commissioning | D | Not significant | Not significant | Not significant | Not significant | Not significant | Not significant |
| | E&W | Evening and weekend working not proposed | | | | | |
| | N | Night-time working not proposed | | | | | |
| **6** - Landscaping – remediation works and planting of trees and shrubs for visual mitigation | D | Not significant | Not significant | Not significant | Not significant | Not significant | Not significant |
| | E&W | Evening and weekend working not proposed | | | | | |
| | N | Night-time working not proposed | | | | | |

8.7.1.4 Predicted compliance with the adopted criteria at high sensitivity residential NSRs has been used to determine significance. Worst-case noise effects have been determined to be not significant at any NSRs surrounding on Onshore Substation Site during the weekday daytime period.

8.7.1.5 Nighttime and evenings and weekends working is not proposed at the Onshore Substation Site.

## Construction stage noise effects – Onshore Cable Corridor and Landfall Site

8.7.1.6 The predicted construction phase noise impacts are evaluated in Volume 7E, Appendix 8-5: Evaluation of Construction Phase Noise Levels for incremental stand-off distances from construction activities at work sites along the ONEC and at the Landfall Site. The worst-case impacts have been assessed and significance determined accordingly. The results are summarised in Table 8-11.

Table 8-11: Results – Construction noise impacts – ONEC and Landfall Site

| Construction Period | Significance at NSRs | | |
|---|---|---|---|
| | Daytime | Evenings and Weekends | Night-time |
| **7** - Establish primary construction compounds and site access points, site preparation including fencing and haul road construction | Not significant | Not proposed | Not proposed |
| **8** - HDD – large work site (two drill rigs operating simultaneously)* | Not significant | Significant at distances up to 100m | Significant at distances up to 400m |
| **9** - Pulling cables | Not significant | Not proposed | Not proposed |
| **10** - Jointing bay construction | Significant at distances up to 100m | Not proposed | Not proposed |
| **11** - Open trenching | Significant at distances up to 100m | Not proposed | Not proposed |

| Construction Period | Significance at NSRs | | |
|---|---|---|---|
| | Daytime | Evenings and Weekends | Night-time |
| **12** - Removal of haul road, reseeding | Significant at distances up to 100m | Not proposed | Not proposed |
| **13** - Testing and commissioning, demobilisation of construction compounds | Significant at distances up to 100m | Not proposed | Not proposed |
| * Predictions of Horizontal Directional Drilling (HDD) noise assume two rigs operating simultaneously. In practice, it is expected that only one drill may be used at a time per HDD location. | | | |

8.7.1.7 The noise levels presented in Table 8-11 include embedded mitigation to HDD and cable pulling works, as detailed in Table 8-7.

8.7.1.8 The distance at which noise levels meet the adopted criteria, and therefore noise effects become not significant in EIA terms, has been determined for construction activities during the daytime, evenings and weekends and night-time periods.

8.7.1.9 During evenings and weekends potential significant effects have been identified at the closest NSRs. By their nature, the construction effects will be temporary. Where required, evening and weekend working will be agreed with Aberdeenshire Council, for specific activities. No night-time working is proposed, with the exception of HDD and pulling cables, for which mitigation has been specified and will be secured through the CEMP, refer to Section 8.10.2 for further details.

## Construction Stage Noise Effects – Road Traffic

8.7.1.10 Noise impacts associated with construction traffic access points are evaluated in Volume 7E, Appendix 8-5: Evaluation of Construction Phase Noise Levels.

8.7.1.11 As discussed in Volume 7E, Appendix 8-4: Method of Assessment, predictions have been undertaken of the likely change in the Basic Noise Level (BNL) of links on which the projected increase in road traffic flows due to construction works was above ten percent, or where the percentage increase in heavy vehicles was considered to have the potential for raising the BNL. Links on which these thresholds were not met were screened out of further assessment.

8.7.1.12 As shown in Volume 7E, Appendix 8-5: Evaluation of Construction Phase Noise Levels the predicted increase over the future baseline BNL due to construction traffic on link 2039 and 2379 resulted in an increase of greater than 1dB but less than 3dB. DMRB[7] advises that this results in a minor impact magnitude (refer to Volume 7E, Appendix 8-1: Summaries of Relevant Policy and Guidance), which is not significant.

8.7.1.13 On links 1743, 7559 and 7922 the predicted increase over the future baseline BNL is 3dB. DMRB[7] advises that this corresponds to a moderate impact magnitude, which is significant.

8.7.1.14 The assessment notes that the projected traffic flows are based on the assumption that all construction traffic will traverse specific access points along the ONEC on any given day. The predicted increases to the BNL are only marginally above the 3dB threshold for the onset of moderate impact magnitude. Actual traffic flows are likely to be lower as traffic will be distributed along the ONEC, therefore the resultant noise impacts would be lesser than predicted and are therefore likely to be minor and not significant. Mitigation has been specified to further minimise potential road traffic noise impacts (refer to Section 8.10.2).

## 8.7.2 Operation

### Operational Stage Noise Effects – Onshore Substation Site

#### Evaluation Against NR20 Criterion

8.7.2.1 Predicted operational noise impacts from the Onshore Substation Site and 2 x co-located Onshore Substations at the closest NSRs have been evaluated against the NR20 criterion, both for standalone and cumulative operation. The results of the assessment are provided in Volume 7E, Appendix 8-6: Operational Phase – Results and are summarised in Table 8-12.

Table 8-12: Results – Operational noise impacts – Onshore Substation Site – NR20 evaluation

| Operational Scenario | EIA significance at NSRs | | | | | |
|---|---|---|---|---|---|---|
| | NSR1 | NSR2 | NSR3 | NSR4 | NSR5 | NSR6 |
| Standalone | Predicted levels meet NR20 criterion. Not significant in EIA terms. | | | | | |
| Cumulative | Predicted levels meet NR20 criterion. Not significant in EIA terms. | | | | | |

8.7.2.2 Predicted noise levels meet the NR20 criterion, both in standalone and cumulative operation and are therefore not significant in EIA terms.

### Evaluation Against BS4142 Criteria

8.7.2.3 The significance of noise impacts associated with the Onshore Substation Site has been evaluated in EIA terms by determination of compliance with the NR20 criterion and BS4142[3].

8.7.2.4 As noted in Volume 7E, Appendix 8-1: Summaries of Relevant Policy and Guidance, BS4142[3] advises that where the rating level exceeds the background by 10dB or more, this is likely to be an indication of a significant adverse impact, where the rating level exceeds the background by around 5dB, this can indicate an adverse impact and where the rating level does not exceed the background, this is an indication of a low impact. In determining the impact, BS4142[3] requires a consideration of context.

8.7.2.5 The following is context relevant to the assessment:

- The representative measured background levels were below 30dB$L_{A90}$ both during the daytime and the night-time period at the closest NSR and may therefore be considered 'objectively low';
- BS4142[3] notes that where background levels are low, absolute levels may be more relevant than the margin by which the rating level exceeds background when determining the impact;
- An absolute rating level limit of 35dB$L_{Aeq}$ has therefore been adopted, in accordance with the recommendation of the Association of Noise Consultants (ANC), as discussed in Paragraph 1.3.2.7 of Volume 7E, Appendix 8-1: Summaries of Relevant Policy and Guidance; and
- The noise environment at NSRs in the vicinity of the Onshore Substation Site will be affected to a varying degree by existing noise from other substation developments, depending on distance. On this basis, the Onshore Substation Site will not constitute a noticeably new or novel noise source.

8.7.2.6 Predicted operational noise levels (rating level, including +2dB 'just audible' tonality correction) have been evaluated against the adopted rating level limit at each NSR. The results are provided in Volume 7E, Appendix 8-6: Operational Phase – Results and are summarised in Table 8-13.

Table 8-13: Results – Operational noise impacts – Onshore Substation Site – BS4142 evaluation

| Operational Scenario | Comparison (rating level minus 35dB rating level limit), dB | | | | | |
|---|---|---|---|---|---|---|
| | NSR1 | NSR2 | NSR3 | NSR4 | NSR5 | NSR6 |
| Daytime | -1 | -15 | -10 | -6 | -1 | -8 |
| Night-time | -1 | -15 | -10 | -6 | -1 | -8 |

8.7.2.7 Predicted noise levels meet the NR20 criterion, both in standalone and cumulative operation, and are therefore not significant in EIA terms. The predicted rating level at all NSRs meets the proposed 35dB$L_{Aeq}$ rating level limit, both during the daytime and night-time period. The resultant effect is not significant in EIA terms.

8.7.2.8 Example mitigation solutions to reduce the rating level to comply with the rating level limit are discussed in Section 8.10.3.

## 8.7.3 Decommissioning

### Decommissioning Noise Effects

8.7.3.1 No predictions of decommissioning and demolition works noise have been undertaken, however, noise impacts associated with these will be similar to, but lesser than, construction noise. Decommissioning works will typically be of shorter duration than construction and working hours will likely be similar or shorter.

8.7.3.2 On the basis of the above and with reference to Section 8.7.1, noise impacts during decommissioning are considered to be not significant.

### Decommissioning Vibration Effects

8.7.3.3 While no predictions of decommissioning and demolition works vibration have been undertaken, vibration impacts associated with these will be similar to but lesser than construction noise. Decommissioning works will typically be of shorter duration than construction and working hours will likely be similar or shorter.

# 8.8 Cumulative Effects

## 8.8.1 Noise

8.8.1.1 Potential cumulative effects associated with a proposed Beauly to Blackhillock to New Deer to Peterhead 400kv Connection (pre-application reference: ECU00005165)may arise during the construction phase. The proposed overhead line route intersects with the On TI RLB.

8.8.1.2 This development is currently at the scoping stage, with the Scoping Report dated June 2024. Construction of transmission towers is not expected to require large numbers of plant or extensive work areas, therefore there is limited likelihood of significant cumulative effects with the Proposed Development (Onshore).

8.8.1.3 No data on the estimated construction vehicle generation and/or distribution is available. This includes the location of construction compounds, location of access points into/out of the construction corridor, and the proposed construction vehicle routing. Therefore an assessment in regards the potential construction traffic noise impacts is not able to be undertaken at this stage.

8.8.1.4 It should be noted that consultation remains ongoing with developers with regards to refining the potential construction traffic timing and vehicle numbers. The Applicant will continue this dialogue in order to manage future potential construction traffic impacts.

8.8.1.5 As identified in Section 8.5.5, no other potentially cumulative developments have been identified.

8.8.1.6 The operational noise assessment is inherently cumulative, therefore the assessment results presented in Section 8.7 includes consideration of the adjacent Green Volt, New Deer and Moray East substations (note; the Green Volt substation had not been built at the time of this assessment therefore data from the Green Volt EIAR has been used to inform the assessment). Potentially cumulative noise effects arising from other developments further from the Onshore Substation Site have been scoped out through discussion with Aberdeenshire Council. It is identified that the Stromar Offshore Wind Farm has submitted a Scoping Report which includes a scoping area for a potential substation site. Given the stage of these proposals with no location or further plans provided a cumulative noise and vibration assessment cannot be undertaken. No further cumulative assessment is therefore required in relation to operational noise.

## 8.8.2 Vibration

8.8.2.1 Given the high rate of attenuation of vibration with distance and the expected low impact of vibration impacts associated with the Proposed Development (Onshore), cumulative vibration effects are highly unlikely. It is not expected

that cumulative vibration effects would occur beyond a stand-off distance of approximately 100m. There are no proposed cumulative developments within 100m, therefore cumulative vibration effects have been scoped out.

## 8.9 In-combination Effects

8.9.1.1 In-combination impacts may occur through the inter-relationship with another EIAR topic that may lead to different or greater environmental effects than in isolation.

8.9.1.2 There is also the potential for in-combination impacts resulting from onshore and offshore works. These are identified within Volume 6, Chapter 5: Intertidal Assessment and are therefore not repeated here.

8.9.1.3 The potential in-combination effects for noise and vibration receptors resulting from effects between onshore Proposed Development works are described below.

### 8.9.2 In-Combination effects between onshore Proposed Development (Onshore) works

8.9.2.1 No in-combination noise or vibration effects are expected during either the construction or operational phase.

## 8.10 Mitigation Measures and Monitoring

8.10.1.1 As part of the Proposed Development (Onshore) design process, measures have been proposed to reduce the potential for impacts due to noise and vibration. These include measures which have been incorporated as part of the Proposed Development (Onshore) design (referred to as 'embedded mitigation') and measures which will be implemented regardless of the impact assessment (referred to as 'tertiary mitigation'). As there is a commitment to implementing these measures, they are considered inherently part of the design of the Proposed Development (Onshore) and have therefore been considered in the assessment presented in Section 8.7 (i.e. the determination of magnitude and therefore significance assumes implementation of these measures). These measures are considered standard industry practice for this type of development.

### 8.10.2 Construction Phase

8.10.2.1 An Outline Construction Environmental Management Plan (CEMP) has been produced and included alongside the EIAR to support the planning application in principle (Volume 7, Appendix 10: Outline Construction Environment Management Plan).

8.10.2.2 The Outline CEMP will then be developed through the final design with submission of a detailed CEMP for discharge as part of the Approval of Matters Specified in Conditions applications.

8.10.2.3 The CEMP will include Proposed Development (Onshore) mitigation/monitoring measures and commitments and detail standard construction industry practice to reduce noise emissions during construction, expected to include (but not limited to):

- Specification of working hours;
- Scheduling of deliveries to work sites;
- Consideration of appropriate plant and methods for specific tasks;
- Updated predictions of noise levels at NSRs for the noisiest tasks, where potential significant impacts have been identified at NSRs;
- Use of temporary acoustic screening around noisy plant and activities, including HDD compounds, specification of maximum allowable noise levels for HDD plant;
- Compliance monitoring and reporting schedule; and
- Details of the contact for making noise or vibration complaints and the procedure to be followed in the event that a complaint is received.

8.10.2.4 Should geotechnical site investigations determine that shallow rockhead is present and blasting or breaking out of rock be required, further mitigation will be specified within the CEMP to minimise vibration at neighbouring NSRs. A schedule of noise and vibration monitoring will be laid out in the CEMP and a point of contact for any noise or vibration complaints will be provided.

8.10.2.5 A Construction Traffic Management Plan (CTMP) will set out traffic management plans such that road traffic impacts at NSRs are minimised. Where practicable, deliveries to construction compounds will be scheduled to avoid the most sensitive times. Construction traffic will be routed to minimise disruption to sensitive areas, such as villages and schools.

## 8.10.3 Operational Phase

8.10.3.1 Predicted noise levels during the operational phase meet the agreed NR20 criterion, both in standalone and cumulative operation, and also meet the proposed 35dB rating level limit, therefore noise impacts have been assessed as not significant in EIA terms.

8.10.3.2 This assessment has necessarily considered typical sound power levels of potential plant items, with typical levels of attenuation by enclosure or application of routine attenuation methods adopted as embedded mitigation. Actual noise levels from the installed plant items may be reduced by specification of low-noise plant or by further increasing the specification of the acoustic enclosures and noise-reduction methods. Example mitigation measures are outlined below.

8.10.3.3 The proposed substation design will be reviewed during the detailed design stage, such that the adopted noise criteria are met at neighbouring NSRs. During detailed design, mitigation will be specified in order of the partial level (the relative contribution to overall noise levels) that individual plant items have at NSRs. Where mitigation at source is not possible (i.e. specification of quieter plant, or installation of acoustic attenuation to proposed items), plant will be enclosed. As specified in Section 8.5.6, an iterative process will be followed.

8.10.3.4 This assessment has specified appropriate mitigation such that the indicative layout considered enclosure of plant items until the predicted rating level meets the proposed rating level limit. This is an example of mitigation which could be implemented to enable the proposed rating level limits to be met. The predicted noise levels at NSRs including the benefit of this example mitigation are provided and evaluated against the rating level limits in Table 8-14.

Table 8-14: Operational noise impacts – Mitigated Onshore Substation Site – BS4142 evaluation

| Item | Comparison (rating level minus 35dB rating level limit), dB | | | | | |
|---|---|---|---|---|---|---|
| | NSR1 | NSR2 | NSR3 | NSR4 | NSR5 | NSR6 |
| Predicted specific level, $dBL_{Aeq}$ | 32 | 22 | 23 | 27 | 32 | 26 |
| Derived rating level, $dBL_{Ar,Tr}$ | 34 | 24 | 25 | 29 | 34 | 28 |
| Evaluation against adopted rating level limit, dB (predicted level minus limit) | -1 | -15 | -10 | -6 | -1 | -8 |

8.10.3.5 Following consideration of example mitigation measures, the predicted specific level at all NSRs is below the adopted rating level limit. Assuming a +2dB tonality correction to determine the rating level (noting that this may be over-conservative where the specific level is at or below the prevailing ambient noise level) the rating level meets the proposed rating level limit at all NSRs.

8.10.3.6 The actual mitigation adopted will be the result of an iterative process. The specification of detailed mitigation will require a proposed, rather than indicative, layout.

## 8.11 Residual Effects

8.11.1.1 Where effects have been assessed as significant, taking into account secondary mitigation to reduce the magnitude of impacts, the residual effects have been assessed below.

### 8.11.2 Construction Effects

8.11.2.1 Following implementation of methods provided in the detailed CEMP, noise and vibration impacts during the construction phase are expected to be not significant in EIA terms. This will be evidenced alongside the detailed CEMP submitted to Aberdeenshire Council for discharge.

### 8.11.3 Operation Effects

8.11.3.1 Following implementation of mitigation to the final layout of the Onshore Substations, noise impacts during the operational phase will meet NR and BS4142 criteria at all NSRs.

8.11.3.2 The example mitigation measures described in Section 8.10.3 gives an indication of the potential reduction to operational noise from the Onshore Substations, with a commitment to meet the adopted criteria.

8.11.3.3 To provide further confidence that such reductions are practicable, this assessment makes reference to compliance measurements at the boundary of the operational East Anglia One onshore substation (Scottish Power Renewables, 2020[12]), which is comparable in scale to the Onshore Substations of the Proposed Development (Onshore). This assessment notes that the measured background noise level at a location 110m from the East Anglia One substation met 35dB$L_{A90}$. The background level was used to provide an indication of the specific level from the substation, seeking to exclude transient noisier events occurring in the wider noise environment. The 35dB$L_{A90}$ level was achieved by enclosure and appropriate specification of plant, without requiring an acoustic barrier around the substation boundary.

8.11.3.4 NSR1 and NSR5 are approximately 110m and 160m from the Onshore Substations of the Proposed Development (Onshore), and it may therefore be assumed that noise levels during operation can be attenuated to meet a 35dB rating level.

8.11.3.5 On the basis of the demonstrated compliance with the adopted criteria all NSRs, noise impacts associated with the Proposed Development (Onshore) will be not significant in EIA terms.

### 8.11.4 Decommissioning Effects

8.11.4.1 Following implementation of a CEMP, decommissioning effects are expected to remain not significant in EIA terms.

## 8.12 Summary of Effects

8.12.1.1 Table 8-15 presents a summary of the significant effects assessed within this EIAR, any mitigation required, and the residual effects are provided.

Table 8-15: Summary of Effects

| Impact | Magnitude | Sensitivity of Receptor | Significance | Mitigation Measures | Residual Effect |
|---|---|---|---|---|---|
| **Construction** | | | | | |
| Construction activities at Onshore Substation Site | - | High | Not significant | Implementation of a CEMP | Not significant |
| Construction activities at Landfall Site and Onshore Cable Corridor | - | High | Various – depending on distance from NSR | Implementation of a CEMP | Not significant |
| Construction – road traffic noise | - | High | Significant (on three links). Not significant across majority of study area. | Implementation of a CEMP and CTMP | Not significant |
| **Operation** | | | | | |
| Standalone and cumulative operation of Onshore Substation Site | - | High | Not significant (meets NR20 and BS4142[3] target level) | Enclosure of noisiest plant items. To be confirmed by mitigation study at detailed design stage | Not significant |

| Impact | Magnitude | Sensitivity of Receptor | Significance | Mitigation Measures | Residual Effect |
|---|---|---|---|---|---|
| **Decommissioning** | | | | | |
| Decommissioning activities at Onshore Substation Site | - | High | Not significant (daytime period) | Implementation of a CEMP | Not significant |

# 8.13 References

[1] Scottish Government (2011a) 'Planning Advice Note 1/2011: Planning and Noise'. Available at: https://www.gov.scot/publications/planning-advice-note-1-2011-planning-noise/documents/ (Accessed 25/04/2024).

[2] Scottish Government (2011b) 'Assessment of noise: technical advice note'. Available at: https://www.gov.scot/publications/technical-advice-note-assessment-noise/pages/1/ (Accessed 25/04/2024).

[3] BSI (2019a) 'BS 4142:2014+A1:2019 Methods for rating and assessing industrial and commercial sound'. BSI, London

[4] BSI (2014a) ' BS 5228-2:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites – Part 1: Noise'. BSI. London

[5] BSI (2014b) 'BS 5228-2: 2009+A1:2014 Code of practice for noise and vibration control on construction and open sites – Part 2: Vibration'. BSI. London

[6] BSI (2019b) 'BS8233:2014 Guidance on sound insulation and noise reduction for buildings'. BSI. London

[7] Design Manual for Roads and Bridges [DMRB], overseen by Highways England, Transport Scotland, Welsh Government, Department for Infrastructure (2020) 'Design Manual for Roads and Bridges - LA 111 Noise and Vibration'. Highways England. Available at: https://www.standardsforhighways.co.uk/tses/attachments/cc8cfcf7-c235-4052-8d32-d5398796b364?inline=true (Accessed 25/04/2024).

[8] Department of Transport – Welsh Office (1988) 'Calculation of Road Traffic Noise'. Department of Transport – Welsh Office, Her Majesty's Stationery Office, London.

[9] International Organization for Standardization (1993) 'ISO 9613-1:1993: Attenuation of sound during propagation outdoors - Part 1: Calculation of the absorption of sound by the atmosphere'. International Organization for Standardization

[10] International Organization for Standardization (2024) 'ISO 9613-2:2024: Attenuation of Sound During Propagation Outdoors, Part 2: Engineering method for the prediction of sound pressure levels outdoors'. International Organization for Standardization

[11] BSI (2003) 'BS 7445-1:2003 Description and measurement of environmental noise. Guide to quantities and procedures'. BSI. London.

[12] Scottish Power Renewables (2020) 'Onshore Substation Operational Noise Assessment DCO Requirement 24 Final for Discharge,'.

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