Galileo 05 Limited

# Lynemore Wind Farm

## Additional Information Volume 1

## Chapter 11: Noise and Vibration

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# Table of Contents

**11.1 INTRODUCTION** ..... **11-1**
**11.2 POTENTIAL EFFECTS** ..... **11-1**
Potential Cumulative Construction Effects ..... 11-2
Potential Cumulative Operational Effects ..... 11-2
**11.3 METHODOLOGY** ..... **11-3**
**11.4 UPDATED IMPACT ASSESSMENT** ..... **11-5**
Construction Noise and Vibration Assessment for Revised Proposed Development ..... 11-5
Operational Noise Prediction Results for Revised Proposed Development ..... 11-7
Site-specific Operational Noise Assessment for the Revised Proposed Development ..... 11-8
Cumulative Operational Noise ..... 11-9
**11.5 NOISE CHANGES FOR THE REVISED PROPOSED DEVELOPMENT** ..... **11-9**
**11.6 MITIGATION** ..... **11-10**
Best Practice Measures ..... 11-10
**11.7 RESIDUAL EFFECTS** ..... **11-11**
**11.8 SUMMARY AND CONCLUSIONS** ..... **11-11**
Construction - Significance of Effects ..... 11-11
Operational – Significance of Effects ..... 11-12
Cumulative Effects ..... 11-12
Summary of Effects ..... 11-12
**11.9 CROSS REFERENCING** ..... **11-13**
**11.10 REFERENCES** ..... **11-13**

**TABLES**

Table 11.1 Scoped in Noise Sensitive Receptors ..... 11-2
Table 11.2 Scoped in Wind Farms for Cumulative Operational Assessment ..... 11-3
Table 11.3 Operational noise limits ($L_{A90}$, dB) apportioned to the Revised Proposed Development in isolation for daytime period ..... 11-4
Table 11.4 Operational noise limits ($L_{A90}$, dB) apportioned to the Revised Proposed Development in isolation for night-time period ..... 11-5
Table 11.5 Predicted Construction Noise Levels for Revised Proposed Development ..... 11-6
Table 11.6: CRTN predicted increase in daily average traffic noise levels ($L_{A10,18hour}$) and comparison to EIA ..... 11-7
Table 11.7: Predicted Noise Levels ($L_{A90}$, dB) from Revised Proposed Development ..... 11-8
Table 11.8: Assessment of predicted level against operational noise limits ($L_{A90}$, dB) apportioned to the Revised Proposed Development in isolation for daytime period ..... 11-8
Table 11.9: Assessment of predicted levels against operational noise limits ($L_{A90}$, dB) apportioned to the Revised Proposed Development in isolation for night-time period ..... 11-9
Table 11.10: Changes in Predicted Noise Levels (dB) from Revised Proposed Development ..... 11-10
Table 11.11: Summary of Effects ..... 11-12
Table 11.12: Cross reference to updated AI figure for noise ..... 11-13

**FIGURES**

AI Figure 11.1: Updated Noise Contours and Sensitive Receptors

# 11 NOISE AND VIBRATION

## 11.1 Introduction

11.1.1 This Chapter of the AI report summarises the assessment of the potential noise and vibration effects on the residents of nearby noise-sensitive receptors, to reflect the updates made to the Proposed Development since the submission of the EIA Report (EIAR). The noise and vibration assessment was set out and presented within **Chapter 11 Noise and Vibration** of the submitted EIAR, with more details found in the Hoare Lea Technical Report, included as **Technical Appendix 11.1** of the previous EIAR.

11.1.2 The number of Proposed Development turbines has reduced from 14 to 12 since the EIA and changes are also proposed to the location of some turbines with associated infrastructure such as Site access tracks. Tip height of the retained turbines will remain the same as the EIAR at 200 m, please refer to **Chapter 2 Updated Description of the Revised Proposed Development** for the detailed description of the revised layout and infrastructure.

11.1.3 A summary of the predicted residual effects of noise based on the EIA Proposed Development were presented in **Table 11.7** of **Chapter 11 Noise and Vibration** of the EIAR. The chapter concluded that:

- Construction noise effects before mitigation were, at most, moderate and significant and following additional mitigation all noise and vibration residual effects were determined to be minor and not significant.
- Noise from construction traffic accessing the Site during construction was determined to have negligible effects (not significant)
- Operational wind farm noise met the relevant ETSU-R-97 noise limits and are therefore determined to be not significant.
- Operational noise from the substation and proposed BESS was scoped out of the assessment given the large (2 km) separation distance (considered negligible and not significant).
- Noise from decommissioning activities were determined to be negligible and not significant.

11.1.4 This chapter of the AI Report considers the potential for significant effects on noise receptors associated with the construction, operation and decommissioning of the Revised Proposed Development.

## 11.2 Potential Effects

11.2.1 Decommissioning noise impacts and effects are unchanged from those presented in **Chapter 11 Noise and Vibration** of the EIAR, which assessed qualitatively based on construction effects and were concluded as minor to negligible and not significant.

11.2.2 Noise effects from construction activities for the proposed revised infrastructure located near the turbines remain unchanged from the EIAR as there are no changes to the Revised Proposed Development that would introduce noisier construction equipment or bring construction activities substantially closer to residential properties, these activity

areas are located more than 1.4 km from the nearest properties. These activities will remain unchanged from EIAR as representing minor to negligible effects (not significant). However, site access track off the A9 has been relocated to the east of the residence cluster, as such, noise and vibration effects from associated construction activities of the site access tracks and associated works are reassessed for the closest receptors located south of A9 based on the changes proposed.

11.2.3 Noise effects from the operation of the BESS, control building and substation have been scoped out of the assessment given the large separation distance of more than 2 km as they were scoped out in the EIA Report and this remains the case.

11.2.4 NSRs remain the same as those assessed in the EIAR, however, due to change in turbine locations, the distance to proposed turbine have changed. Updated distances to nearest turbines of the Revised Proposed Development are presented in Error! Reference source not found. below.

**Table 11.1 Scoped in Noise Sensitive Receptors**

| Receptor Location | Easting | Northing | Approximate Distance to Closest Turbine (m) | Closest Turbine (ID) | EIAR distance to Closest Turbine (m) [Turbine ID] |
|---|---|---|---|---|---|
| Moy More House | 276625 | 835425 | 2960 | T1 | 2960 [T1] |
| Lynemore Cottage | 276252 | 833940 | 1470 | T12 | 1540 [T12] |
| Lynebeg | 276529 | 833976 | 1570 | T12 | 1650 [T12] |
| Invermoy House | 276438 | 834490 | 2040 | T12 | 2090 [T10] |
| Suilven | 276480 | 834336 | 1900 | T12 | 1970 [T12] |
| Moybeg Cottage | 276857 | 834147 | 1850 | T12 | 1930 [T12] |
| The Kennels, Moy Mains | 277105 | 835396 | 3100 | T12 | 3180 [T12] |

### Potential Cumulative Construction Effects

11.2.5 Similar to the EIA, the assessment of noise from onsite construction activities is based on the period when each potential activity would occur closest to each of the nearest noise-sensitive locations. Therefore, given the conservative nature of this approach, onsite construction activities from other sites, such as, the A9 upgrade works **[Ref 11-7]**, are considered unlikely to produce any additional noise impacts, even if the construction periods were to coincide. Construction cumulative effects are therefore not assessed further in this AI.

### Potential Cumulative Operational Effects

11.2.6 The operational noise impact assessment also considers the potential for significant cumulative noise effects. Other wind farms in the area in relative proximity have not changed since the EIAR, as such the scoped in wind farm for the cumulative assessment remain the same and are summarised in **Table 11.2** below.

**Table 11.2 Scoped in Wind Farms for Cumulative Operational Assessment**

| Wind Farm Name | Approximate distance from Site (km) | Number of turbines | Turbine model assumed | Hub height (m) |
|---|---|---|---|---|
| Farr Wind Farm | 2.2 | 40 | Siemens 2.3 MW (82.4 m rotor diameter) | 60 |
| Glen Kyllachy Wind Farm | 3.8 | 20 | Nordex N80 2.5 MW (80 m rotor diameter) | 70 |
| Moy Wind Farm | 4.6 | 20 | Nordex N100 3.3 MW (100 m rotor diameter) | 75 |

## 11.3 Methodology

11.3.1 Relevant policies and guidance adopted in this AI report are the same as those in the EIAR, as outlined in **Section 2** of **Appendix 11.1: Noise Assessment** of the EIAR.

11.3.2 Construction noise and vibration have been assessed against relevant criteria referred to in BS 5228-1:2009+A1:2014. '*Code of Practice for Noise and Vibration Control on Construction and Open Sites-Part 1: Noise'* **[Ref 11-1]** and BS 5228-2:2009+A1:2014. '*Code of Practice for Noise and Vibration Control on Construction and Open Sites-Part 2: Vibration'* **[Ref 11-2]** guidance, at noise sensitive receptor locations in the vicinity of the Revised Proposed Development. The relevant thresholds were presented in **Table 11.2** and **Table 11.4** of **Chapter 11 Noise and Vibration** of the EIAR and have been adopted in this AI assessment.

11.3.3 Changes to the predicted construction traffic have been assessed based on the criteria derived from the Design Manual for Roads and Bridges (DMRB) **[Ref 11-3]**, as shown in **Table 11.3** of the **EIA Chapter 11: Noise and Vibration**. Changes in the predicted traffic noise level were calculated using the Calculation of Road Traffic Noise (CRTN) **[Ref 11-4]** methodology as done in the EIA.

11.3.4 Operational noise from the wind turbines has been assessed by comparing predicted operational noise levels with the relevant noise limits derived in line with ETSU-R-97 '*The Assessment and Rating of Noise from Wind Farms'* **[Ref 11-5]** and Institute of Acoustics (IOA) Good Practice Guide (GPG) **[Ref 11-6]**, at noise sensitive receptors. ETSU-R-97 noise limits typically range from 35 dB to 40 dB $L_{A90}$ lower fixed limit or 5 dB above background (whichever is greater) for daytime and 43 dB $L_{A90}$ or 5 dB above background (whichever is greater) for night-time. The assessment in the EIA adopted more conservative noise limits based on preferences expressed by the Environmental Health Officer (EHO) of The Highlands Council (THC) during the consultation. The same limits have been used in this AI assessment and are outlined below:

- For daytime periods, the limit is either a fixed level of 35 dB $L_{A90}$, or 5dB above the derived background noise level, whichever is higher.
- For night-time periods, the limit is either a fixed level of 38 dB $L_{A90}$, or 5dB above the derived background noise level, whichever is higher.

11.3.5 The above limits were applied cumulatively in the EIA, in line with the general requirements of ETSU-R-97. This approach has also been adopted in this AI and assessment of predicted levels from the Revised Proposed Development has been

undertaken against site-specific apportioned limits derived from the total cumulative limits.

11.3.6 The apportioned limits have been derived by logarithmically subtracting total predicted noise levels from other wind farms in the area from the adopted cumulative limit. Compliance of the Proposed Development with these specific limits results in compliance of cumulative levels with the cumulative limits. For the purposes of the AI, the operational noise effect is determined to be not significant if the relevant noise limit (as adopted in the EIA) is met. The apportioned limits as presented in **Table 11.5** and **Table 11.6** of **Chapter 11 Noise and Vibration** in the EIA Report are reproduced in **Table 11.3** and Error! Reference source not found. below for day and night.

**Table 11.3 Operational noise limits ($L_{A90}$, dB) apportioned to the Revised Proposed Development in isolation for daytime period**

| Receptor | Standardised Wind Speed (m/s) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
| Moy More House | 33.0 | 33.0 | 33.0 | 33.0 | 33.0 | 33.0 | 36.4 | 39.6 | 42.6 | 45.2 | 47.5 | 49.2 |
| Lynemore Cottage | 38.2 | 38.2 | 38.2 | 38.8 | 39.5 | 40.5 | 42.1 | 44.1 | 46.2 | 48.7 | 51.4 | 54.4 |
| Lynebeg | 38.2 | 38.2 | 38.2 | 38.8 | 39.6 | 40.7 | 42.3 | 44.1 | 46.3 | 48.7 | 51.4 | 54.4 |
| Invermoy House | 38.2 | 38.2 | 38.2 | 38.9 | 39.6 | 40.7 | 42.3 | 44.2 | 46.3 | 48.7 | 51.4 | 54.4 |
| Suilven | 38.2 | 38.2 | 38.2 | 38.9 | 39.6 | 40.7 | 42.3 | 44.2 | 46.3 | 48.7 | 51.4 | 54.4 |
| Moybeg Cottage | 38.2 | 38.2 | 38.2 | 38.8 | 39.6 | 40.7 | 42.3 | 44.2 | 46.3 | 48.7 | 51.4 | 54.4 |
| The Kennels, Moy Mains | 32.1 | 32.1 | 32.1 | 32.1 | 32.1 | 32.1 | 36.0 | 39.3 | 42.4 | 45.2 | 47.5 | 49.2 |

**Table 11.4 Operational noise limits ($L_{A90}$, dB) apportioned to the Revised Proposed Development in isolation for night-time period**

| Receptor | Standardised Wind Speed (m/s) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
| Moy More House | 34.2 | 34.2 | 34.2 | 34.2 | 34.2 | 34.2 | 34.2 | 34.2 | 34.2 | 39.1 | 43.7 | 49.0 |
| Lynemore Cottage | 36.3 | 36.3 | 36.3 | 36.3 | 36.3 | 36.3 | 36.3 | 39.1 | 42.3 | 45.7 | 49.3 | 49.6 |
| Lynebeg | 36.4 | 36.4 | 36.4 | 36.4 | 36.4 | 36.4 | 36.4 | 39.2 | 42.4 | 45.7 | 49.3 | 49.6 |
| Invermoy House | 36.5 | 36.5 | 36.5 | 36.5 | 36.5 | 36.5 | 36.5 | 39.2 | 42.4 | 45.7 | 49.3 | 49.6 |
| Suilven | 36.4 | 36.4 | 36.4 | 36.4 | 36.4 | 36.4 | 36.4 | 39.1 | 42.3 | 45.7 | 49.3 | 49.6 |
| Moybeg Cottage | 34.7 | 34.7 | 34.7 | 34.7 | 34.7 | 34.7 | 34.7 | 38.4 | 42.1 | 45.6 | 49.3 | 49.6 |
| The Kennels, Moy Mains | 34.3 | 34.3 | 34.3 | 34.3 | 34.3 | 34.3 | 34.3 | 34.3 | 34.3 | 38.7 | 43.3 | 49.0 |

## 11.4 Updated Impact Assessment

### Construction Noise and Vibration Assessment for Revised Proposed Development

11.4.1 Noise levels have been calculated from construction activities of the Revised Proposed Development. No changes have been made to the selected plant, number of operating machine/equipment, type of construction activity, and operating times, only the location of the activity have been revised relative to the changes in layout.

11.4.2 Minor changes associated with the infrastructure around the turbine area (>1 km from receptors) are not expected to have any significant changes on noise levels at receptors, therefore, only construction activities closer to the receptors have been assessed, such as change in access track layout, associated forest felling activity, and construction compound.

11.4.3 A review of the Revised Proposed Development shows that the remaining Construction compound has moved closer to receptors from 485 m to 240 m, site tracks with associated road verge activities have moved further away from 35 m to approximately 80 m, and forest felling has also moved further from 30 m to approximately 110 m, from the nearest receptors. The resulting predicted levels are shown in **Table 11.5**.

11.4.4 Due to the site track being repositioned east of the cluster of receptors north of the Site, the nearest receptor for all these activities is the Lynebeg (Foresters House) property located east of the cluster of receptors. The predicted levels presented in **Table 11.5**, are the highest noise levels predicted to be experienced for a short duration at the closest point to the receptor, and so, present worst-case impacts, as the activity moves away from the receptors the noise levels will also decrease.

**Table 11.5 Predicted Construction Noise Levels for Revised Proposed Development**

| Task Name | Plant/ Equipment | Upper Collective Sound Emission Over Working Day $L_{WA,T}$ dB(A) | Nearest Receiver | Minimum Distance to Nearest Receiver (m) | Predicted Upper Day-Time $L_{Aeq}$ |
|---|---|---|---|---|---|
| Construct temporary site compound | excavator / dump truck / tippers / rollers/ delivery trucks | 120 | Lynebeg (Foresters House) | 240 | 62 |
| Construct site tracks | excavators / dump trucks / tippers / dozers / vibrating rollers | 120 | Lynebeg (Foresters House) | 80 | 73 (short period, see below) |
| Reinstate road verges | excavator / dump truck | 115 | Lynebeg (Foresters House) | 80 | 68 (short period, see below) |
| Forestry felling around turbines and access tracks | Harvesters and forwarders, characterised by saw noise diesel engine noise emissions commonly associated with tractors and excavation noise | 115 | Lynebeg (Foresters House) | 110 | 65 |
| Concrete Batching (Assuming at Construction Compound as worst-case) | Batching Plant | 110 | Lynebeg (Foresters House) | 240 | 52 |

11.4.5 **Table 11.5** shows activities at construction compound and forest felling to be at or below the 65 dB(A) level and therefore represent negligible to minor impacts in line with the construction criteria (see **EIAR Chapter 11 Noise and Vibration - Table 11.2**). This represents a short-term minor adverse effect at most on high-sensitive receptors and not significant in EIA terms. Construction activity for site tracks and road verges at the nearest point from receptor results in levels above 65 dB(A), however these are short-duration works, expected to be less than 4 weeks in such proximity and then moving away from the receptor, based on the criteria for short term works these levels are below the 75 dB(A) threshold and therefore are also correspond to a minor adverse impact which results in a short-term minor adverse effect on high-sensitive receptors which is not significant in EIA terms.

11.4.6 The above distances are from the closest point of activity to the nearest receptor and therefore represent worst-case construction noise levels, relocation of the new site track

layout further from the receptors has reduced the worst-case noise levels for site track construction activities from 81 dB(A) in the EIA to 73 dB(A) and road verge activities from 76 dB(A) in the EIA to 68 dB(A). The new access road layout also avoids exposing all the residences in the cluster of noise-sensitive receptors south of A9 to the construction noise and moves away from these receptors, as such, the predicted noise levels will be experienced for a shorter duration at fewer receptors than previously in the EIA.

11.4.7 A comparison of the construction traffic noise has been undertaken based on the revised construction traffic movement as detailed in **AI Chapter 10 Traffic and Transport.** The updated traffic values show no increase in LGVs, and an overall increase of 66 average daily HGV movements distributed across the roads from the EIA. **Table 11.6** below presents the assessment for each road and comparison of traffic noise results to the EIA.

**Table 11.6: CRTN predicted increase in daily average traffic noise levels ($L_{A10,18hour}$) and comparison to EIA**

| Road | AI - Maximum Change in Traffic Noise Level, dB(A) | EIA – Maximum Change in Traffic Noise Level, dB(A) | Change in Noise Levels between AI and EIA |
|---|---|---|---|
| A9 north of A9/B9154 Junction | 0.1 | 0.1 | No Change |
| A9 north of A9/B9177 Junction | 0.1 | 0.1 | No Change |
| A9 south of Raigmore Interchange | 0.1 | 0.1 | No Change |
| A9 between Longman Roundabout to Raigmore Interchange | 0.0 | 0.0 | No Change |
| A95 between B9152 to A9 | 0.0 | 0.0 | No Change |
| A9 north of A9/B9154 Junction | 0.2 | 0.1 | Increase from EIA of 0.1 dB |

11.4.8 **Table 11.6** shows no change for all roads except 'A9 north of A9/B9154 Junction' which has an increase of 0.1 dB from the EIA. All levels are below the lowest criteria for construction traffic noise (see **EIAR Chapter 11 Noise and Vibration – Table 11.3**) and remain negligible in impact and not significant in EIA terms.

11.4.9 Other impacts such as vibration from ground compacting would be lower due to relocation of the activity further away, i.e. from 35 m in the EIA to 80 m in the Revised Proposed Development layout at the nearest point. The vibration levels are calculated to be below 0.3 mm/s at this distance and therefore reduced from minor in the EIA to negligible impact based on the criteria (see **EIAR Chapter 11: Noise and Vibration – Table 11.4)** and remains **not significant** in EIA terms.

11.4.10 Construction noise and vibration impacts are negligible to minor at most at high-sensitive receptors, which translates to short-term negligible to minor adverse effects and considered not significant in EIA terms.

### Operational Noise Prediction Results for Revised Proposed Development

11.4.11 Noise levels were predicted from the Revised Proposed Development at the receptors considered in Error! Reference source not found. and the EIA.

**Table 11.7: Predicted Noise Levels ($L_{A90}$, dB) from Revised Proposed Development**

| Receptor | Standardised Wind Speed (m/s) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
| Moy More House | 20.5 | 23.0 | 27.8 | 31.9 | 32.2 | 32.2 | 32.2 | 32.2 | 32.2 | 32.2 |
| Lynemore Cottage | 24.4 | 26.9 | 31.7 | 35.8 | 36.1 | 36.1 | 36.1 | 36.1 | 36.1 | 36.1 |
| Lynebeg | 23.2 | 25.7 | 30.5 | 34.6 | 34.9 | 34.9 | 34.9 | 34.9 | 34.9 | 34.9 |
| Invermoy House | 22.4 | 24.9 | 29.7 | 33.8 | 34.1 | 34.1 | 34.1 | 34.1 | 34.1 | 34.1 |
| Suilven | 22.4 | 24.9 | 29.7 | 33.8 | 34.1 | 34.1 | 34.1 | 34.1 | 34.1 | 34.1 |
| Moybeg Cottage | 21.9 | 24.4 | 29.2 | 33.3 | 33.6 | 33.6 | 33.6 | 33.6 | 33.6 | 33.6 |
| The Kennels, Moy Mains | 19.7 | 22.2 | 27.0 | 31.1 | 31.4 | 31.4 | 31.4 | 31.4 | 31.4 | 31.4 |

11.4.12 **Table 11.7** shows predicted levels of up to 36.1 dB(A) at the nearest receptor (Lynemore Cottage), which remains mostly the same as the EIAR, with negligible differences (less than 0.5 dB) at some receptors such at Moy More House, Invermoy House, and The Kennels. Changes in predicted levels between the EIA and AI are presented in more detail in **Table 11.10**.

### Site-specific Operational Noise Assessment for the Revised Proposed Development

11.4.13 Predicted levels from the Revised Proposed Development (**Table 11.7**) are compared against the respective apportioned limits for day (**Table 11.3**) and night (**Table 11.4**) periods. The assessment is shown in **Table 11.8** and **Table 11.9** for day and night respectively.

**Table 11.8: Assessment of predicted level against operational noise limits ($L_{A90}$, dB) apportioned to the Revised Proposed Development in isolation for daytime period**

| Receptor | Difference to apportioned limits, dB, at Standardised Wind Speed (m/s) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
| Moy More House | -12.9 | -10.4 | -5.6 | -1.0 | -4.2 | -7.4 | -10.3 | -13.0 | -15.3 | -17.0 |
| Lynemore Cottage | -13.8 | -12.0 | -7.8 | -4.8 | -6.1 | -8.0 | -10.2 | -12.6 | -15.3 | -18.3 |
| Lynebeg | -15.0 | -13.1 | -9.1 | -6.1 | -7.4 | -9.2 | -11.4 | -13.8 | -16.5 | -19.5 |
| Invermoy House | -15.8 | -13.9 | -9.9 | -6.9 | -8.2 | -10.0 | -12.2 | -14.6 | -17.3 | -20.3 |
| Suilven | -15.8 | -14.0 | -9.9 | -6.9 | -8.2 | -10.1 | -12.2 | -14.6 | -17.3 | -20.3 |
| Moybeg Cottage | -16.4 | -14.5 | -10.4 | -7.4 | -8.7 | -10.6 | -12.8 | -15.2 | -17.9 | -20.8 |
| The Kennels, Moy Mains | -12.4 | -9.9 | -5.1 | -1.0 | -4.6 | -8.0 | -11.1 | -13.8 | -16.1 | -17.8 |

**Table 11.9: Assessment of predicted levels against operational noise limits ($L_{A90}$, dB) apportioned to the Revised Proposed Development in isolation for night-time period**

| Receptor | Difference to apportioned limits, dB, at Standardised Wind Speed (m/s) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
| Moy More House | -13.7 | -11.2 | -6.4 | -2.3 | -2.0 | -2.0 | -2.0 | -6.9 | -11.5 | -16.8 |
| Lynemore Cottage | -12.0 | -9.5 | -4.7 | -0.6 | -0.3 | -3.0 | -6.2 | -9.6 | -13.3 | -13.6 |
| Lynebeg | -13.2 | -10.7 | -5.9 | -1.8 | -1.5 | -4.3 | -7.5 | -10.8 | -14.4 | -14.7 |
| Invermoy House | -14.1 | -11.6 | -6.8 | -2.7 | -2.4 | -5.1 | -8.2 | -11.6 | -15.2 | -15.5 |
| Suilven | -14.0 | -11.5 | -6.7 | -2.6 | -2.3 | -5.0 | -8.3 | -11.6 | -15.3 | -15.5 |
| Moybeg Cottage | -13.6 | -11.1 | -6.3 | -2.2 | -1.1 | -4.8 | -8.5 | -12.1 | -15.8 | -16.1 |
| The Kennels, Moy Mains | -14.6 | -12.1 | -7.3 | -3.2 | -2.9 | -2.9 | -2.9 | -7.4 | -11.9 | -17.6 |

11.4.14 **Table 11.8** and **Table 11.9** above show no exceedance to the applicable apportioned limits for the development in isolation, which were derived from the cumulative limits. The Revised Proposed Development is therefore compliant with its applicable limits for both day- and night-time.

### Cumulative Operational Noise

11.4.15 The cumulative scenario has not changed from the EIA, and the above apportioned limits have been derived by logarithmically subtracting predicted noise levels of other wind farms from the cumulative limits, as done in the EIA. Compliance with the apportioned limits for the Revised Proposed Development therefore translates to compliance with the cumulative limits.

11.4.16 Operational noise from the Revised Proposed Development is found to be compliant with the apportioned and cumulative limits and therefore its effects remain **not significant** in EIA terms.

## 11.5 Noise Changes for the Revised Proposed Development

11.5.1 A comparison of the predicted noise levels is presented in **Table 11.10**, negative values indicate a decrease in noise levels from the Revised Proposed Development as compared with those predicted for the EIA Proposed Development.

**Table 11.10: Changes in Predicted Noise Levels (dB) from Revised Proposed Development**

| Receptor | Change in noise levels, dB, at Standardised Wind Speed (m/s) | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
| Moy More House | -0.3 | -0.3 | -0.3 | -0.3 | -0.3 | -0.3 | -0.3 | -0.3 | -0.3 | -0.3 |
| Lynemore Cottage | 0.0 | 0.0 | -0.1 | 0.0 | -0.1 | -0.1 | -0.1 | -0.1 | -0.1 | -0.1 |
| Lynebeg | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 | 0.0 |
| Invermoy House | -0.3 | -0.3 | -0.3 | -0.3 | -0.3 | -0.3 | -0.3 | -0.3 | -0.3 | -0.3 |
| Suilven | -0.1 | -0.1 | -0.1 | -0.1 | -0.1 | -0.1 | -0.1 | -0.1 | -0.1 | -0.1 |
| Moybeg Cottage | 0.0 | 0.0 | -0.1 | 0.0 | -0.1 | -0.1 | -0.1 | -0.1 | -0.1 | -0.1 |
| The Kennels, Moy Mains | -0.3 | -0.3 | -0.3 | -0.3 | -0.3 | -0.3 | -0.3 | -0.3 | -0.3 | -0.3 |

11.5.2 **Table 11.10** shows no increase in noise levels and a marginal decrease of no more than 0.3 dB at some receptors. This is consistent with the reduction in the number of turbines from 14 to 12. The difference in separation distances is minimal (<100 m) therefore the overall results do not differ much from the EIA.

## 11.6 Mitigation

11.6.1 The selection of the final turbine to be installed for the Proposed Development would still be made on the basis of enabling the relevant derived noise limits, as set out in **Table 11.3** and **Table 11.4**, to be achieved at the neighbouring properties, including any relevant tonality corrections. This can be secured through conditions attached to the planning consent, including the requirement that, in the event of a noise complaint, noise levels resulting from the operation of the wind farm are measured to demonstrate compliance with the conditioned noise limits. Such monitoring would be done in full accordance with ETSU-R-97 and IOA GPG.

11.6.2 The significance of effects (pre-mitigation) from construction has been reduced to minor adverse at most, including site access track activities. As such, the additional mitigation measures originally outlined in **EIAR Chapter 11 Noise and Vibration – Section 11.8** are no longer required. However, embedded and best practice measures previously outlined remain applicable and to be implemented for the Revised Proposed Development as well, these are reproduced below for completeness.

### Best Practice Measures

11.6.3 The best practice measures detailed below will be implemented to manage the effects of noise and vibration during construction activities, and will be required of all contractors:

- As proposed in **EIAR Chapter 2 Proposed Development**, those activities that may give rise to audible noise at the surrounding properties and heavy goods vehicle deliveries to the site would be limited to the hours 07:00 to 19:00 Monday to Friday and 08:00 to 13:00 on Saturdays unless otherwise approved in advance by THC (except in case of an emergency). Those activities that are unlikely to give rise to noise audible at the project area boundary, or light vehicle traffic accessing

the site such as that involved with staff mobilisation, may continue outside of the stated hours.

- Construction noise will be managed via a site-specific Noise Management Plan (NMP) provided to the Council. The embedded mitigation contained in the NMP will include the commitment to liaise directly with local residents, and the wider community.
- Where practicable, night-time working will not be carried out. Local residents shall be notified in advance of any night-time construction activities likely to generate audible noise levels, e.g., abnormal load movement.
- All equipment used would be maintained in good working order and associated noise attenuation such as engine casing and exhaust silencers shall remain fitted at all times.
- A Construction Traffic Management Plan (CTMP) will be developed and secured through planning condition to control the movement of vehicles to and from the Proposed Development site.
- The site contractors shall be required to employ the best practicable means of reducing noise emissions from plant, machinery, and construction activities, as advocated in BS 5228-1.
- Where practicable, the work programme will be phased, which would help to reduce the combined effects arising from several noisy operations.
- All sub-contractors appointed by the main contractor will be formally and legally obliged, and required through contract, to comply with all environmental noise conditions.
- Any plant and equipment normally required for operation at night (23:00 - 07:00), e.g. generators or dewatering pumps, shall be silenced or suitably shielded to ensure that the night-time lower threshold of 45 dB $L_{Aeq}$ shall not be exceeded at the nearest noise-sensitive receptors.
- Rock extraction from borrow pits by means of blasting operations is possible, and a Blast Management Plan will be prepared by the Contractor in advance of any blasting operations.

## 11.7 Residual Effects

11.7.1 The residual noise and vibration construction effects are the same as predicted construction noise and vibration effects (pre-mitigation) and therefore considered to be at most ‘minor’ temporary adverse, which is not significant in EIA terms.

11.7.2 Construction noise and traffic effect are temporary and will only be in effect over the period of the construction programme, therefore, no residual effects are anticipated after completion.

11.7.3 The residual operational effects are the same as the operational effects identified in the EIA: not significant in EIA terms.

## 11.8 Summary and Conclusions

### Construction - Significance of Effects

11.8.1 Noise impact from the revised construction layout has reduced from moderate to short term minor adverse at the nearest high-sensitive receptors, which translates to short-term minor adverse effect, considered not significant in EIA terms.

11.8.2 Change in noise levels from construction traffic remain negligible and not significant in EIA terms.

11.8.3 Vibration impact has reduced from minor to negligible adverse effects which remains not significant in EIA terms.

### Operational – Significance of Effects

11.8.4 Operational effects from the Revised Proposed Development are considered not significant in EIA terms, with marginal reduction in noise levels from the EIA predicted at some receptors.

### Cumulative Effects

11.8.5 Assessment of operational noise inherently includes the assessment of cumulative effects; non-significant effects of operational noise therefore translate to not significant cumulative effect.

### Summary of Effects

11.8.6 **Table 11.11** below presents a summary of effects in this AI and any changes in significance of effects from the EIA.

**Table 11.11: Summary of Effects**

| Topic / Receptor | EIA – Significance of Effect / conclusion | Change | AI – Resulting Significance of Effect | Evaluation |
|---|---|---|---|---|
| *Construction Phase – Noise and Vibration* | | | | |
| Access Track Construction near Receptors South of A9 | **Minor - Not Significant** | No significant effects before mitigation: additional mitigation not required | **Minor - Not Significant** | Noise reduced both in levels and exposure duration and the number of receptors affected. |
| Construction Traffic – all receptors | **Negligible – Not Significant** | Slight increase in HGVs and noise levels (0.1 dB) for A9 north of A9/B9154 Junction | **Negligible – Not Significant** | Slight increase but remain not significant. |
| All other activities | **Minor to Negligible- Not Significant** | No notable change | **Minor - Not Significant** | No notable changes |
| *Operational Phase* | | | | |
| All receptors | **Not Significant** | Marginal decrease (less than 0.3 dB) in operational levels | **Not Significant** | Minimal change (decrease) in predicted noise levels |
| *Cumulative Effects* | | | | |

| | | | | |
|---|---|---|---|---|
| All receptors | **Not Significant** | No change | **Not Significant** | No notable change in cumulative effects. |

## 11.9 Cross Referencing

11.9.1 Due to marginal changes (less than 0.3 dB) in the predicted noise levels, associated noise contours would remain largely unchanged from those shown in EIA **Figure 11.1 Noise contours and Sensitive Receptors** submitted in the EIA. The only exception is the area in proximity to the western two turbines removed in the Revised Proposed Development when compared to the EIA Layout, but no noise-sensitive receptors are present in that area. **AI Figure 11.1** shows updated noise contours for the Revised Proposed Development. Other noise elements such as cumulative wind turbines, survey measurement locations, historic measurement location will remain substantially unchanged from those shown in the EIA.

**Table 11.12: Cross reference to updated AI figure for noise**

| Figures in support of the AI | Corresponding Figure in EIA Report |
|---|---|
| AI Figure 11.1: Updated Noise Contours and Sensitive Receptors | Figure 11.1: Noise Contours and Sensitive Receptors |

## 11.10 References


[11-1] British Standard BS 5228-1:2009-A:2014 (2009). 'Code of practice for noise and vibration control on construction and open sites – Part 1: Noise'

[11-2] British Standard BS 5228-2:2009-A:2014 (2009). 'Code of practice for noise and vibration control on construction and open sites – Part 2: Vibration'

[11-3] The Highways Agency, Transport Scotland, Transport Wales and The Department for Regional Development (Northern Ireland) (2020). 'Design Manual for Roads and Bridges, LA 111 Noise and vibration', revision 2.

[11-4] Department of Transport (1988). 'Calculation of Road Traffic Noise'.

[11-5] ETSU R 97, the Assessment and Rating of Noise from Wind Farms, Final ETSU-R-97 Report for the Department of Trade & Industry. The Working Group on Noise from Wind Turbines, 1996.

[11-6] M. Cand et al (2013). 'A Good Practice Guide to the Application of ETSU-R-97 for the Assessment and Rating of Wind Turbine Noise'. Institute of Acoustics.

[11-7] Transport Scotland – A9 Dualling Perth to Inverness Project: A9 Tomatin to Moy | Transport Scotland