# Chapter 13: Noise and Vibration



## Figures

# 13. Noise & Vibration

## 13.1. Executive Summary

13.1.1. The Proposed Varied Development relates to an increase in tip height of the proposed turbines from 149.9m to up to 200m, compared to the Consented Development, and a minor increase in the maximum rotor diameter from 136m to 138m. Maximum noise emission levels are therefore unlikely to change significantly. There would be no change to construction or decommissioning activities or locations. The Scoping Report therefore proposed to scope out assessment of noise during construction, operational and decommissioning phases.

13.1.2. The ECU Scoping Opinion confirmed that construction noise and vibration could be scoped out but requested an updated operational noise assessment. This is consistent with THC's Scoping Response which requested an updated operational noise assessment to demonstrate that the Proposed Varied Development would comply with the consented development's conditioned noise limit.

13.1.3. Therefore, an assessment of predicted noise levels for the Proposed Varied Development has been carried out in relation to the consented development's conditioned noise limit.

13.1.4. Consideration has also been given to whether an updated cumulative assessment is required for the Proposed Varied Development in relation to the recent submission of an application for the proposed Allt an Tuir Renewable Energy Park.

13.1.5. The assessment has been carried out in accordance with ETSU-R-97 and the IOA Good Practice Guide as required by the consultation responses and in accordance with current Government Policy and best practice.

13.1.6. The operational noise assessment considered the worst-case of four potential turbine models and concluded that the Proposed Varied Development would comply with the Consented Development's conditioned noise limit.

13.1.7. Examination of the Allt an Tuir cumulative noise assessment and additional noise modelling confirmed that sufficient allowance had been made for the Consented Development and Proposed Varied Development's noise effects. Therefore, no update to the Proposed Varied Development's cumulative assessment is required.

13.1.8. In conclusion, operational noise effects, including cumulative effects, are considered to be **not significant**.

## 13.2. Introduction

13.2.1. This chapter of the EIA Report presents an assessment of the likely noise effects of the Proposed Varied Development. It has been prepared by the SSE Renewables in-house Acoustics team, overseen by Michael Reid, who is a full (corporate) member of the Institute of Acoustics and has approximately 20 years' experience of the assessment of environmental noise from wind energy developments.

## 13.3. Scope of Assessment

13.3.1. The Proposed Varied Development Scoping Report proposed to scope out assessment of noise during construction, operational and decommissioning phases.

13.3.2. The Proposed Varied Development relates to an increase in tip height of the proposed turbines from 149.9m to up to 200m, compared to the Consented Development and a minor increase in the maximum rotor diameter from 136m to 138m. As such, maximum noise emission levels are unlikely to change significantly, and the assessment presented here demonstrates that the Proposed Varied Development will be able to maintain compliance with condition 34 of the Consented Development's Section 36 consent notice, which limits operational noise at any noise sensitive location existing at the time of the consent to no more than 35 dB, LA90,10min.

13.3.3. Noise and vibration from both Construction and Decommissioning are also not expected to increase for the Proposed Varied Development in comparison with the Consented Development. This is because both the construction process, and the transport and plant vehicles the project intends to use, are not expected to substantially change.

## 13.4. Consultations

13.4.1. The Highland Council's Environmental Health Department (THC EHD) provided a comprehensive Scoping Response in July 2025. The ECU's Scoping Opinion was issued on 13 August 2024. **Table 13.1** details the comments contained within these responses, and how these are addressed within this assessment.

**Table 13.1: Scoping Responses**

| Comment | SSE Response |
|---|---|
| **Highland Council Environmental Health Response** | |
| It is understood the application is to vary the consented 21/03695/S36, specifically with regard to increasing the turbine tip height resulting from a change to the candidate turbine. The applicant will be required to submit a noise assessment, carried out in accordance with ETSU-R-97 "The Assessment and Rating of Noise from Wind Farms" and the associated Good Practice Guide published by the Institute of Acoustics which | The assessment below presents an updated assessment of predicted operational noise levels for the Varied Development against the 35dB noise limit specific in the Consented Development's Consent Conditions. |

| Comment | SSE Response |
|---|---|
| demonstrates that the development will still meet the limits stipulated in the decision for 21/03695/S36 | |
| The target noise levels are either a simplified standard of 35dB LA90 at wind speeds up to 10m/s or a composite standard of 35dB LA90 (daytime) and 38dB LA90 (night time) or up to 5dB above background noise levels at up to 12m/s. The night time lower limit of 43dB LA90 as suggested in ETSU is not considered acceptable in many areas of the highlands due to very low background levels. These limits would apply to cumulative noise levels from more than one development. | As the assessment is carried out against conditioned noise limits, this aspect of the response does not require to be taken into account. |
| The noise assessment must take into account the potential cumulative effect from any other existing or consented or, in some cases, proposed wind turbine developments. Where applications run concurrently, developers and consultants are advised to consider adopting a joint approach with regard to noise assessments. The noise assessment must take into account predicted and consented levels from such developments. The good practice guide offers guidance on how to deal with cumulative issues. Where existing development has consented limits higher than suggested above, the applicant should agree appropriate limits with the Council's Environmental Health Officer. | Cumulative effects were assessed in the consented development EIA and taken into account in the conditioned noise limit.<br><br>Consideration of whether the cumulative effects of any additional developments require assessment is presented in paragraph 13.8.7 below. |
| The assessment should include a map showing all wind farm developments which may have a cumulative impact and all noise sensitive properties including any for which a financial involvement relaxation is being claimed. | The Allt an Tuir Renewable Energy Park lies 3.5km (distance from T19 to closest turbine) to the southwest of the Development. The potential for cumulative effects from the Proposed Varied Development and Allt an Tuir Renewable Energy Park is addressed in section 13.8.7 below.<br><br>**Figure 13.1** shows the closest noise sensitive properties to the proposed turbine locations.<br><br>Glencassley Castle and Glenrossal House were assessed in the EIA as being financially involved and remain so. However, this has no direct bearing on the current assessment against the conditioned noise limit. |
| The assessment should also include a table of figures which includes the following:<br>• The predicted levels from this development based at each noise sensitive location (NSL) at wind speeds up to 12m/s.<br>• The maximum levels based on consented limits from each existing or consented wind farm development at each NSL. If any | **Table 13.3** details the predicted operational noise levels from the Proposed Varied Development at the maximum noise output of the candidate turbine at wind speeds of up to 12m/s.<br><br>Cumulative effects are addressed in section 13.7, paragraph 13.7.8 onwards. |

| Comment | SSE Response |
|---|---|
| reduction is made for controlling property or another reason, this should be made clear.<br>• The predicted levels from each existing or consented wind farm development at each NSL.<br>• The cumulative levels based on consented and predicted levels at each NSL. | |
| The assessment should also include a mitigation scheme to be implemented should noise levels from the development be subsequently found to exceed consented levels. | Mitigation is addressed in section 13.9. |
| When assessing the cumulative impact from more than one wind farm, consideration must be given to any increase in exposure time. Regardless of whether cumulative levels can meet relevant criteria, if a noise sensitive property subsequently becomes affected by wind turbine noise from more than one direction this could result in a significant loss of respite. | As the varied development is not introducing any new wind turbines or increase in noise limits, it will not result in any change to noise exposure. |
| If background noise surveys are required, these should be undertaken in accordance with ETSU-R-97 and the Good Practice Guide. It is recommended that monitoring locations be agreed with the Council's Environmental Health Officer. Where a monitoring location is to be used as a proxy location for another property, particular care must be taken to ensure it is not affected by other noise sources such as boiler flues, wind chimes, etc. which are not present at that other property.<br><br>Difficulties can arise where a location is already subject to noise from an existing wind turbine development. ETSU states that background noise must not include noise from an existing wind farm. The GPG offers advice on how to approach this problem and in some cases, it may be possible to utilise the results from historical background surveys.<br><br>It is recommended that the developer's noise consultant liaises with Environmental Health at an early stage to discuss any issues regarding the proposed methodology. | Background noise measurements were made for the consented development EIA, which was the subject of consultation with environmental health at the time, and do not require to be updated for the current assessment. |
| Research has been carried out in recent years on the phenomenon of amplitude modulation arising from some wind turbine developments. However at this time, the Good Practice guide does not provide definitive Planning guidance on this subject. That being the case, any complaints linked to amplitude modulation would be investigated in terms of the Statutory Nuisance | Acknowledged, no action required. |

| Comment | SSE Response |
|---|---|
| provisions of the Environmental Protection Act 1990. | |
| Operational vibration, infrasound, and low frequency noise can be scoped out from further assessment. | Acknowledged, no action required. |
| Given the separation distances to noise sensitive receptors, it is unlikely that a detailed construction noise assessment will be required in relation to work at the turbine sites. | Acknowledged, no action required. |
| It is assumed that access would be through the existing Achany site, therefore, there will be no requirement for track construction work close to noise sensitive receptors. Provided that is the case, further detailed assessment of construction noise and vibration can be scoped out. If a different access is proposed, there may be a requirement for a construction noise assessment depending on the proximity of receptors. | It is confirmed that access would be through the existing Achany wind farm. Please see **Figure 1.1** for details. |
| Planning conditions are not used to control the impact of construction noise as similar powers are available to the Local Authority under Section 60 of the Control of Pollution Act 1974. Generally, people are tolerant of construction noise during typical working hours which are taken to be 8am to 7pm Monday to Friday and 8am to 1pm on Saturdays. Works for which noise is inaudible at the curtilage of any noise sensitive property could still be carried out out-with these times. | Acknowledged, no action required. |
| If the applicant intends to undertake noisy work out-with the aforementioned times, they will be required to submit a detailed construction noise assessment for the written approval of the Planning Authority. The assessment should include:<br>1. A description of construction activities with reference to noise generating plant and equipment.<br>2. A detailed plan showing the location of noise sources, noise sensitive premises and any survey measurement locations.<br>3. A description of any noise mitigation methods that will be employed and the predicted effect of said methods on noise levels.<br>4. A prediction of noise levels resultant at the curtilage of noise sensitive receptors.<br>5. An assessment of the predicted noise levels in comparison with relevant standards. | No such requirement is included in the consent conditions for the Consented Development. However, if considered appropriate this could be included within the requirements of the Construction Environmental Management Plan required under Condition 14. |
| Regardless of whether a construction noise assessment is required, it is expected that the developer/contractor will employ the best practicable means to reduce the impact of noise from construction activities. The applicant will be | Noise mitigation requirements will be addressed within the Construction Environmental Management Plan (previously required under Condition 14 of the Consented Development Section 36 consent). |

| Comment | SSE Response |
|---|---|
| required to submit a scheme demonstrating how this will be implemented. Particular attention should be given to the use of tonal reversing alarms and ground compaction plant which are often the most intrusive noise generating elements of a large construction project. | |
| The previous application included a substation, however, as the separation distance to receptors was approximately 2.5km, a noise assessment was scoped out. It isn't clear if this current application will include a sub-station or a battery energy storage system but provided the separation distances are similar, further noise assessment from these sites can be scoped out. | There is no change to the proposed substation location and no battery energy storage system included in the varied development.<br><br>No action required. |
| If the application includes a proposal for a sub-station or battery storage site, a separate noise assessment may be required to demonstrate that noise will meet the following standards:<br>• Noise arising from within the operational land of the sub-station, when measured and/or calculated as an LZeq, 5min, in the 100Hz one third octave frequency band must not exceed 30 dB, at noise sensitive premises<br>• The Rating Level of noise arising from the use of plant, machinery or equipment installed or operated within the operational land of the sub-station, must not exceed the current background noise levels at noise sensitive premises. The Rating Level should be calculated in accordance with BS 4142: 2014+A1:2019 Methods for rating and assessing industrial and commercial sound. | There is no change to the proposed substation location and no battery energy storage system included in the varied development.<br><br>No action required, |
| **ECU Scoping Opinion** | |
| 3.14 The noise assessment should be carried out in line with relevant legislation and standards as detailed in section 4 of the Scoping Report. The noise assessment report should be formatted as per Table 6.1 of the IOA "A Good Practice Guide to the Application of ETSU-R-97 for the Assessment and Rating of Wind Turbine Noise". | The assessment presented below is in accordance with these standards. |
| Due to the increase in turbine height, Scottish Ministers advises that a new noise assessment is carried out for operational noise. However, due to the distance of the proposed development from noise sensitive receptors, construction noise and vibration assessments can be scoped out of the EIAR if construction is carried out within typical working hours. | Operational noise is assessed below; construction noise and vibration are scoped out. |

13.4.2. The scope of the assessment presented here is therefore limited to:

- Assessment of operational noise effects against the noise limit specified in the Consented Development's conditions; and
- A consideration of whether additional cumulative assessment is required in relation to the recently submitted Allt an Tuir Renewable Energy Park.

## 13.5. Assessment Methodology

13.5.1. The operational noise effects of the varied development have been assessed in accordance with ETSU-R-97 The Assessment and Rating of Wind Turbine Noise (ETSU-R-97) and A Good Practice guide to the Application of ETSU-R-97 to the Assessment and Raring of wind Turbine Noise (the IOA GPG), specifically:

- The Consented Development condition limiting noise to 35 dB, LA90,10min is consistent with the 'simplified criterion' described in ETSU-R-97; and
- Noise levels from operation of the Proposed Varied Development have been predicted in accordance with the methods described in the IOA GPG.

13.5.2. To determine whether the cumulative noise effects of the proposed Allt an Tuir Renewable Energy Park require an update to the cumulative assessment for Development, a review of the Allt an Tuir Renewable Energy Park EIA Report (Chapter 11, Noise and Vibration, and associated Technical Appendix 11.3, Cumulative Turbine Details) was carried out.

13.5.3. The Allt an Tuir Technical Appendix detailed that the Consented Development had been modelled within the Allt an Tuir cumulative assessment using a candidate turbine model of an Enercon E-126 with a hub height of 86m. No details of predicted noise levels specific to the Consented Development were presented, however it is stated with the EIA Report main text Chapter 11 that an additional margin of 2dB was added to the predictions to take account of headroom between the predicted levels and consented noise limit for Achany Extension.

13.5.4. Therefore, noise modelling was carried out to determine the predicted operational noise levels likely to have been included within the Allt an Tuir cumulative assessment and to confirm whether the 2dB additional margin was appropriate. From this, it is possible to draw conclusion as to whether the cumulative effects of Allt an Tuir and The Consented or Varied Development require further consideration.

## 13.6. Consented Development EIAR Baseline

13.6.1. Chapter 15: Noise and Vibration of the 2021 EIAR for the Consented Development identified a single noise-sensitive receptor within the cumulative noise study area, Glenrossal House, which, as stated above, has a financial involvement in the Development. A baseline, background noise survey was carried out, the results of which were not required for the assessment as simplified criteria, unrelated to background

noise, were applied. The results of the survey were provided in **Volume 4, Technical Appendix 15.3 of the 2021 EIAR**.

## 13.7. Summary of Effects Predicted & Mitigation Measures suggested for the Consented Development

13.7.1. No significant noise effects were identified for the construction, operation (including cumulatively) or decommissioning phases of the Consented Development and therefore no specific noise or vibration mitigation measures were deemed to be necessary.

## 13.8. Revised Assessment of Effects for the Proposed Varied Development

**Operational Noise from Revised Development**

13.8.1. Four potential candidate turbine models were compared to determine which had the potential to generate the highest levels of operational noise at the nearest noise-sensitive receptors, i.e., at distance of approximately 1.7 to 2.0km, specifically:

- Enercon E138 4.5MW;
- Nordex N133 4.8MW;
- Vestas V136 4.5MW; and
- Vestas V136 4.2MW (extreme climate).

13.8.2. Taking into account frequency spectra and appropriate additions for uncertainty, in line with the IOA GPG, it was found that the Vestas V136 4.2MW was likely to result in the highest operational noise levels at the nearest noise sensitive receptors.

13.8.3. **Table 13.2** details the maximum noise emissions of this turbine model, which have been used in the assessment of likely operational noise effects. An uncertainty addition of 2dB has been applied in modelling, in accordance with the IOA GPG recommendations.

**Table 13.2: Candidate Wind Turbine Model (V136 4.2MW) Maximum Noise Emission Levels**

| Octave Band Centre Frequency, Hz | 63 | 125 | 250 | 500 | 1000 | 2000 | 4000 | 8000 | Overall |
|---|---|---|---|---|---|---|---|---|---|
| Sound Power Level, dB(A) | 86.2 | 92.9 | 97.4 | 99.1 | 98.1 | 94.3 | 88.0 | 78.8 | 104.1 |

13.8.4. **Figure 13.1** shows noise contour lines based on the above candidate turbine model and the location of the nearest noise-sensitive receptors. It can be seen that no receptors are predicted to experience operational wind turbine noise levels greater than 35dB,LA90,10min. Therefore, the Proposed Varied Development will comply with both the simplified criterion defined in ETSU-R-97 and the conditioned noise limit attached of the Consented Development.

13.8.5. For completeness, **Table 13.3** details the predicted operational noise levels due to the Proposed Varied Development at the nearest noise sensitive receptors as shown in **Figure 13.1**.

**Table 13.3: Predicted Operational Noise Levels**

| Name | Maximum Predicted Operational Noise Level, dB, $L_{A90,10min}$ |
|---|---|
| Glencassley Castle | 31.3 |
| Badintaggart | 31.2 |
| Keepers Cottage | 30.7 |
| March Cottage | 29.9 |
| Glenrossal House | 25.8 |

13.8.6. Operational noise effects from the Varied Development are therefore considered to be **not significant.**

**Cumulative Effects – All an Tuir Wind Farm**

13.8.7. **Table 13.4** details the noise emissions used to replicate the modelling of the Consented Development carried out for the Allt an Tuir EIA. An uncertainty addition of 2dB has been applied in modelling, in accordance with the IOA GPG recommendations.

**Table 13.4: Enercon E-126 (Hub Height 86m) Maximum Noise Emission Levels**

| Octave Band Centre Frequency, Hz | 63 | 125 | 250 | 500 | 1000 | 2000 | 4000 | 8000 | Overall |
|---|---|---|---|---|---|---|---|---|---|
| Sound Power Level, dB(A) | 89.3 | 95.2 | 98.2 | 100.4 | 100.4 | 98.4 | 90.9 | 74.2 | 106.1 |

13.8.8. **Table 13.5** details the predicted operational noise levels for the Consented Development, as considered within the Allt an Tuir EIA.

**Table 13.5: Predicted Operational Noise Levels for Consented Development as per Allt an Tuir EIA**

| Name | Maximum Predicted Operational Noise Level, dB, $L_{A90,10min}$ |
|---|---|
| Glencassley Castle | 32.6 |
| Badintaggart | 32.3 |
| Keepers Cottage | 32.1 |
| March Cottage | 31.7 |
| Glenrossal House | 27.2 |

13.8.9. The Allt an Tuir EIA stated that an additional 2dB was added to the predicted levels for the Consented Development within their cumulative assessment. Therefore, levels of up

to 34.6dB have been assumed for the Consented Development within the Allt an Tuir EA, which is equal, to within 1 dB, to the Consented Development's conditioned noise limit.

13.8.10. Therefore, sufficient allowance has been made within the Allt an Tuir EIA cumulative noise assessment to take account of both the likely noise emissions of the Consented Development and its conditioned noise limit.

13.8.11. Comparison of Table 13.3 with 13.5 shows that the operational noise level from the Proposed Varied Development would be lower than has been taken into account in the Allt an Tuir EIA cumulative noise assessment. Therefore, there would be no additional cumulative effect from the Proposed Varied Development in conjunction with Allt an Tuir.

13.8.12. As stated above, the consented noise limit makes allowance for the cumulative effect for other nearby wind energy development.

13.8.13. Cumulative noise effects of the Varied Development are therefore considered to be **not significant**.

## 13.9. Revised Mitigation Measures for the Proposed Varied Development

13.9.1. No mitigation measures are required in relation to Operational noise and vibration effects of the Proposed Varied Development.

13.9.2. As with the Consented Development, during construction the Contractor will employ the best practicable means to reduce the impact of noise and vibration from construction activities and such measures would be detailed within the CEMP as required by planning condition 14.

## 13.10. Comparison of Effects of the Proposed Varied Development with the Effects of the Consented Development

13.10.1. The significance of noise effects is unchanged from that of the Consented Development.

## 13.11. Conclusion

13.11.1. The operational noise effects of the Proposed Varied Development have been predicted and assessed in accordance with ETSU-R-97 and the IOA GPG and in comparison to the Consented Development's noise limit. It was found that operational noise levels would be within the consented noise limit, and it was therefore concluded that such effects would be **not significant**.

13.11.2. The cumulative operational noise effects of the Proposed Varied Development and Allt an Tuir Renewable Energy Park have been considered by examination and replication

of the modelling of the Consented Development that was carried out for the All an Tuir EIA. Through this, it was confirmed that adequate allowance had been made within that EIA of the effects of both the Consented and Varied Development. Therefore, the Varied Development would not result in any additional significant cumulative effect and cumulative operational noise effects are considered to be **not significant**.

## 13.12. References

ETSU-R-97 The Assessment and Rating of Noise from Wind Turbines, Energy Technology Support unit for the DTI, 1996.

A Good Practice guide to the Application of ETSU-R-97 to the Assessment and Rating of Wind Turbine Noise, Institute of Acoustics, May 2013.

Allt an Tuir Renewable Energy Park, Environmental Impact Assessment Report, Volume 1, Main Text and Technical Appendix 11.3 Cumulative Turbine Details, RSK, December 2024.

Achany Extension Wind Farm, Environmental Assessment Report, Chapter 15: Noise and Vibration, July 2021.