



A specialist energy consultancy

Appendix 7.2

Operational Noise Report

Scout Moor II Wind Farm

Cubico UK Development Ltd

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Executive Summary

TNEI Services Ltd was commissioned by Cubico UK Development Ltd ('the Applicant') to undertake predictions of the wind turbine noise that would be emitted by the operation of the proposed Scout Moor II Wind Farm (hereinafter referred to as 'the Project for Assessment'). The noise predictions were used to assess the potential impact of operational noise from the Project for Assessment on the nearest noise sensitive receptors.

On 19th June 2026, the UK Government published updated guidance for the '*Assessment and Rating of Wind Turbine Noise*' (hereafter referred to as ARWTN). The ARWTN guidance replaces the previous guidance ETSU-R-97 '*The Assessment and Rating of Noise from Wind Farms*' but is designed to be used alongside the good practice guidance produced by the Institute of Acoustics '*A good practice guide to the application of ETSU-R-97 for the assessment and rating of wind turbine noise*' (IOA GPG). The guidance contained in ARWTN and the IOA GPG has been used to assess the potential operational noise impact of the Project for Assessment.

The operational noise assessment has been undertaken in three stages:

- 1) deriving the Total Noise Assessment Criteria (TNAC) (which are applicable to noise from all wind turbines in the area operating concurrently) at noise sensitive receptors;
- 2) predicting the likely effects (undertaking a cumulative noise assessment where required) to determine whether noise immission at noise sensitive receptors would meet the TNAC; and
- 3) deriving Site Specific Noise Limits for the Project for Assessment (taking account of the guidance contained within ARWTN) and comparing predicted noise levels from the Project for Assessment against those limits.

Background sound monitoring was undertaken at six noise sensitive receptors, considered to be representative of the noise sensitive receptors located closest to the Project for Assessment.

A total of twenty one noise sensitive receptors were chosen as Noise Assessment Locations (NALs). The NALs were chosen to represent the noise sensitive receptors located closest to the Project for Assessment and other nearby wind developments in order consider cumulative noise impacts. For assessment locations where no background sound measurements were undertaken, noise data collected at proxy locations deemed representative of the expected background sound environment was used to assess the wind turbine noise impact at those receptors.

Wind speed data was measured using a LIDAR unit. The wind data measured at 83 m and 102 m height was used to calculate hub height wind speeds (at 105 m). These hub height wind speeds were then standardised to a height of 10 m in accordance with current good practice. Analysis of the measured data has been undertaken in accordance with ARWTN and current good practice to determine the pre-existing background sound environment and to establish the daytime and night-time noise limits at each of the NALs.

Based on the guidance in ARWTN and to reflect the presence of existing wind turbines in the area, the daytime TNAC was set at 40 dBA or background plus 5 dB whichever is greater. The night-time TNAC was set at 43 dBA or background plus 5 dB whichever is greater.

The Site Specific Noise Limits associated with the Project for Assessment have been calculated in accordance with ARWTN. The daytime SSNL is restricted from exceeding the limit that would be applicable to the Project for Assessment in isolation, i.e. 35 dBA or background plus 5 dB, whichever is greater.

The exception to the setting of both the daytime and night-time Lower Limiting Values occurs where a property occupier has a financial involvement in the Project for Assessment where the Lower Limiting Value can be increased to 45 dBA for both the daytime and night-time. For the purposes of this assessment, it has been assumed that the occupiers of NAL21 are financially involved with the Project for Assessment.

Predictions of wind turbine noise for the Project for Assessment were made, based upon the sound power level data for a candidate wind turbine, the Nordex N149 5.7 MW with serrated trailing edges and a hub height of 105 m. This wind turbine model has been chosen as it is considered to be representative of the type of turbine that could be installed at the site. Whatever the final turbine choice is, the Project for Assessment would have to meet the noise limits determined and contained within any condition applied as part of the planning permission.

Modelling was undertaken using the ISO 9613:2024 '*Acoustics – Attenuation of sound during propagation outdoors Part 2: Engineering method for the prediction of sound pressure levels outdoors*' noise prediction model which accords with current good practice and is considered to provide a realistic impact assessment. For the other schemes, predictions have been undertaken using sound power level data for the installed turbines. The model of turbine was either identified through an online search, or through the use of the Council's Planning Portal.

A cumulative assessment was undertaken at all 21 NALs. The cumulative assessment undertaken shows that the Project for Assessment can operate concurrently with the operational wind turbines in the area, whilst still meeting the TNAC at the receptors.

Site Specific Noise Limits have also been derived in accordance with ARWTN. Predicted noise levels indicate that wind turbine noise immission were below the Site Specific Noise Limits at all but two NALs (2 and 4) when considering the Nordex N149 5.7 MW as a candidate turbine.

At the two NALs where predicted noise immission levels exceeded the Site Specific Noise Limits, exceedances were limited to a narrow range of wind speeds and directions. In these instances, the exceedances could be mitigated through the use of wind turbine Mode Management.

The use of Site Specific Noise Limits would ensure that the Project for Assessment could operate concurrently with other proposed, consented or operational turbines in the area and would also ensure that the Project for Assessment's individual contribution could be measured and enforced if required.

Should permission be granted for the Project for Assessment it would be appropriate to include a set of noise related planning conditions, which detail the noise limits applicable to the Project for Assessment.

There are a number of wind turbine makes and models that may be suitable for the Project for Assessment. Should the Project for Assessment receive consent the final choice of turbine would be subject to a competitive tendering process. As such, predictions of wind turbine noise are for information only. The final choice of turbine would, however, have to meet the noise limits determined and contained within any condition imposed.

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1 Introduction

1.1 Brief

1.1.1 TNEI Services Ltd was commissioned by Cubico UK Development Ltd ('the Applicant') to undertake an operational noise assessment for the proposed Scout Moor II Wind Farm (hereinafter referred to as 'the Project for Assessment'). The following steps summarise the noise assessment process:

- Measure existing background sound levels, assess and present the noise data with reference to existing Government Guidance contained within the 'Assessment and Rating of Wind Turbine Noise' (ARWTN) ⁽¹⁾ and 'A Good Practice Guide to the Application of ETSU-R-97 for the Assessment and Rating of Wind Turbine Noise' ⁽²⁾ (IOA GPG) which represents current good practice;
- Determine the Total Noise Assessment Criteria applicable to all wind farms/ turbines in the area;
- Assess and undertake a cumulative noise assessment, where required, to take account of other proposed, consented or operational schemes near to the Project for Assessment;
- Derive Site Specific Noise Limits for the Project for Assessment, suitable for inclusion in the noise related planning condition should the Local Planning Authority be minded to grant planning permission for the Project for Assessment;
- Undertake predictions of the operational wind turbine noise immission from the Project for Assessment that will be incident at neighbouring noise sensitive receptors;
- Compare predictions of the operational wind turbine noise immission from the Project for Assessment against the Site Specific Noise Limits at neighbouring noise sensitive receptors; and
- Assess the impact of noise from the Project for Assessment with reference to existing Government Guidance, which are contained within ARWTN and the IOA GPG.

1.2 Background

1.2.1 The Project for Assessment is located approximately 2.5 km northwest of Rochdale and to the north/ north east of the operational Scout Moor Wind Farm. The approximate OS Grid Reference for the centre of the site is 385450, 419150 and the proposed layout is shown on Figure A1.1 in Annex 1.

1.2.2 In the absence of a confirmed turbine model, this noise assessment models a candidate turbine, the Nordex N149 5.7 MW with serrated trailing edge blades and a hub height of 105 m. This turbine has been selected as it is representative of the turbine type which could be installed at the site.

1.2.3 The noise assessment has considered existing nearby operational schemes located within approximately 5 km of the Project for Assessment where predicted noise levels are within 10 dB of the Total Noise Assessment Criteria (TNAC) and the generation capacity of the development is greater than 50 kW. ARWTN states in Section 2.40:

“...the noise impacts of small wind turbines are generally localised and could represent a disproportionate constraint on larger wind energy developments. In such cases, the contribution of these turbines should be excluded from the cumulative noise assessment. For the purposes of this guidance, turbines with generating capacities of 50 kW or less can be considered to have localised noise impacts and can therefore be excluded from cumulative noise assessment. Turbines with generating capacities above 50 kW and less than (for example) a few hundred kilowatts can be excluded from cumulative assessment where it can be demonstrated that noise impacts from these turbines are localised and where including these turbines in a cumulative assessment would result in disproportionate constraints on larger developments.”

1.2.4 As such, the assessment has excluded turbines with generation capacities between 50 kW and 500 kW where noise impacts from the turbines are localised and where they would have a disproportionate constraint on the Project for Assessment. Further information on turbines which fall within this category can be found within Annex 12.

1.2.5 The cumulative wind farm developments considered within the cumulative noise assessment are summarised in Table 1.1. TNEI is not aware of any other consented (not operational) or proposed (planning application submitted) wind farm/ turbine schemes.

Table 1.1 Cumulative Wind Farm/ Turbine Development¹

Wind Farm/ Wind Turbine	Status	Number of Turbines	Make and Model of Turbine considered in Modelling
Scout Moor Wind Farm	Operational	26	Nordex N80 (60 m hub)
Reaps Moss Wind Farm	Operational	3	Senvion 3.4M 104 (73 m hub)

1.2.6 Figure A1.1a in Annex 1 shows the location of the above developments relative to the Project for Assessment, and coordinates for all cumulative turbines are provided in Annex 6.

1.2.7 For the operational schemes noise related planning conditions may have been set within the relevant Decision Notices. The Decision Notice for Scout Moor Wind Farm is included in Annex 2 for reference. The Site Specific Noise Limits presented in this report for the Project for Assessment have taken account of the noise limits that have already allocated to, or could potentially be used by, the other schemes in the area.

1.2.8 For the purposes of assessing the above schemes in conjunction with the Project for Assessment the following terms have been referred to throughout the assessment:

¹ A number of cumulative wind farm/ turbine developments were identified, but have been excluded from assessment due to predicted noise levels from the development being more than 10 dB below the TNAC at all NALs. These sites include: Crook Hill Wind Farm, Todmorden Wind Farm, the Stand Lees Farm Turbine, the Wind Hill Farm Turbine, and the Shawfield Farm Turbine.

- 'Total Noise Assessment Criteria' (TNAC); defined as being the limit that should not be exceeded from the cumulative operation of all wind farm developments, including the Project for Assessment; and
- 'Site Specific Noise Limits' (SSNL); defined as being the limit that is specific to the Project for Assessment only, and derived in accordance with ARWTN.

1.2.9 Note that in this report, the term 'noise emission' relates to the sound power level actually radiated from each wind turbine, whereas the term 'noise immission' relates to the sound pressure level (the received noise) at any receptor location due to the operation of the wind turbines. All references to dB are dB(A) unless otherwise stated. A full glossary of terms is provided in Section 8.

2 Noise Planning Policy and Guidance

2.1 Overview of Noise Planning Policy and Guidance

2.1.1 In assessing the potential noise impacts of the Project for Assessment, the following guidance and policy documents have been considered:

- Local Planning Policy, namely the Rossendale Borough Council Local Plan ⁽³⁾, the Rochdale Borough Council Local Plan ⁽⁴⁾ and the Greater Manchester Combined Authority Places for Everyone Joint Development Plan ⁽⁵⁾;
- Overarching National Policy Statement for Energy (EN-1) ⁽⁶⁾;
- National Policy Statement for Renewable Energy Infrastructure (EN-3) ⁽⁷⁾;
- The National Planning Policy Framework ⁽⁸⁾ and other relevant national guidance (including Planning Practice Guidance (PPG));
- UK Government 'Assessment and Rating of Wind Turbine Noise' (ARWTN); and,
- Institute of Acoustics 'A Good Practice Guide to the Application of ETSU-R-97 for the Assessment and Rating of Wind Turbine Noise' (IOA GPG) May 2013.

2.2 Local Planning Policy

Rossendale Local Plan 2019 to 2036

2.2.1 The Rossendale Local Plan (RLP) was adopted by Rossendale Borough Council on the 15 December 2021. The adopted Local Plan designates land and buildings for future uses to meet the Borough's needs and set out what developments should look like and how they should fit in with their surroundings.

2.2.2 Policy ENV6 of the RLP relates to environmental protection in relation to new developments, and states that:

'Development which has the potential, either individually or cumulatively, to result in pollution that has an unacceptable impact on health, amenity...will only be permitted if the risk of pollution is effectively prevented or reduced and mitigated to an acceptable level by:

...

Ensuring developments are sensitively designed, managed and operated to reduce exposure of sensitive uses and wildlife to noise and noise generation having regard to the location of the proposed development, existing levels of background noise and the hours of operation.'

2.2.3 Policy ENV7 relates to proposed wind turbine developments, and states that commercial proposals for new wind turbines should ensure that:

'The scheme would not result in unacceptable noise impacts, including amplitude modulation, on residential properties and other sensitive users.'

2.2.4 The Policy goes on to state:

‘Noise impact can change according to the weather conditions and should be modelled according to the latest good practice guidance including the effects of amplitude modulation.’

Rochdale Borough Council Local Plan

- 2.2.5 The Rochdale Borough Local Plan encompasses a number of separate documents, with the Rochdale Core Strategy (adopted in October 2016) forming the lead document, providing an overview of objectives for the whole Borough, and which all other plans and policies must comply. The Rochdale Core Strategy states:

‘Renewable energy developments such as windfarms, biomass, CHP and other technologies will play an important role in achieving the transition to a low carbon economy and associated reductions in carbon. Where developments can successfully minimise and mitigate significant harm they will be promoted and encouraged.’

- 2.2.6 Policy G3 of the Rochdale Core Strategy relates to renewable and low carbon energy developments, and states:

‘Any proposal and associated infrastructure must avoid harm to the health and safety of the public.’

- 2.2.7 Policy G9 of the Rochdale Core Strategy relates to pollution, contamination and land instability, and requires that:

‘development does not have impacts that lead to an unacceptable increase in ... noise, ... or other pollution;

- 2.2.8 Policy DM1 relates to general requirements that all developments must adhere to, and states:

‘All development proposals ... will be expected to demonstrate that they:

Mitigate against any impacts due to noise ... where such mitigation is identified as being necessary.’

Places for Everyone Joint Development Plan

- 2.2.9 The Places for Everyone Joint Development Plan for Bolton, Bury, Manchester, Oldham, Rochdale, Salford, Tameside, Trafford and Wigan 2022 to 2039 provides a ‘long-term plan for jobs, new homes, and sustainable growth’ and the spatial strategy ‘seeks to deliver sustainable, inclusive growth by focusing significant growth in jobs and housing’.

- 2.2.10 Policy JP-C8 provides states the following in relation to noise from the construction of new developments:

‘Ensuring Construction Management Plans are produced for developments, where appropriate, to mitigate construction logistics and environmental impacts including air quality and noise on the surrounding area and encourage sustainable deliveries.’

2.3 Overarching National Policy Statement for Energy (EN-1) and National Policy Statement for Renewable Energy Infrastructure (EN-3)

2.3.1 A total of seven National Policy Statements (NPS) for energy infrastructure have been prepared and designated by the UK Government. These NPSs set out the national need, policy framework, and decision-making principles for nationally significant energy infrastructure projects and provide planning guidance for developers of such projects. These NPSs are intended to apply primarily to nationally significant energy infrastructure projects and are therefore directly applicable to the Project for Assessment. Of particular relevance for the Project for Assessment are the Overarching NPS for Energy (EN-1) and the NPS for Renewable Energy Infrastructure (EN-3). The most recent versions of EN-1 ⁽⁹⁾ and EN-3 ⁽¹⁰⁾ (published in November 2025) came into force in January 2026 and are therefore the most up to date expression of government policy on energy infrastructure.

2.3.2 It is important to note that, contrary to the previously adopted EN-1 and EN-3 (which were published in November 2023), onshore wind is now included in both EN-1 and EN-3. In particular EN-1 recognises the Government's ambition to accelerate the deployment of onshore wind to meet their Clean Power 2030 Mission and references the reinstatement of onshore wind generating stations above 100 MW as Nationally Significant Infrastructure Projects (NSIPs) under the Infrastructure Planning (Onshore Wind and Solar Generation) Order 2025, which came into force on 31st December 2025. Section 5 of EN-1 considers generic impacts that can arise from the various different types of energy infrastructure covered by the energy NPSs, including onshore wind developments. There is a specific section about Noise and Vibration (5.1) however it makes no specific reference to onshore wind. Nonetheless, EN-1 Section 5.1 does state that:

'Information on assessment of particular noise sources may be contained in the technology specific NPSs. In particular, for renewables (EN-3) ... there is assessment guidance for specific features of those technologies.'

2.3.3 EN-3 does include a section specifically for onshore wind developments (Section 2.12), and the following is stated in relation to assessing noise impacts of such developments:

'The method of assessing the impact of noise from a wind farm on nearby residents is described in the report, 'The Assessment and Rating of Noise from Wind Farms' (ETSU-R-97). This was produced by the Working Group on Noise from Wind Turbines Final Report, September 1996 and the report recommends noise limits that seek to protect the amenity of wind farm neighbours. Therefore, noise limits will often influence the separation of wind turbines from residential properties.'

The applicant's assessment of noise from the operation of the wind turbines should use ETSU-R-97, taking account of the latest industry good practice [such as the IOA GPG]. This should include any guidance on best practice that the government may from time to time publish.'

2.3.4 Furthermore, when discussing how the Secretary of State should approach decision making for onshore wind developments in EN-3, the following is stated with relation to noise:

'The Secretary of State should consider noise and vibration impacts according to Section 5.11 of EN-1 and use ETSU-R-97, or any updated versions of this guidance that may be produced,

to satisfy itself that the noise from the operation of the wind turbines is within acceptable levels.

Where the correct methodology has been followed and a wind farm is shown to comply with ETSU-R-97 recommended noise limits, the Secretary of State should give no weight to adverse noise impacts from the operation of the wind turbines.'

2.3.5 EN-3 notes, with regards to the above, that:

'All references to ETSU-R-97 in this section should be taken to include any updated, successor or supplementary guidance endorsed or published by the Government'

2.3.6 Furthermore, ARWTN itself states in Section 1.12, that:

'Reference to ETSU-R-97 in UK planning policy or guidance should be interpreted to mean a reference to this technical guidance, which replaces ETSU-R-97.'

2.3.7 As the successor to ETSU-R-97, ARWTN is therefore endorsed by EN-3.

2.4 National Planning Policy Framework

2.4.1 The NPPF sets out the Government's planning policies for England and how these are expected to be applied, by providing a framework within which locally-prepared plans can provide for sufficient housing and other developments in a sustainable manner.

2.4.2 Chapter 14 – Meeting the challenge of climate change, flooding and coastal change of the NPPF looks to support renewable and low carbon energy and associated infrastructure. Paragraph 168a states that when determining planning applications for renewable and low carbon development, local planning authorities (LPA) should not require applicants to demonstrate the overall need for renewable energy and to recognise that even small-scale projects provide a valuable contribution to significant cutting greenhouse gases.

2.4.3 Chapter 15 of the NPPF – Conserving and enhancing the natural environment, prevents new and existing developments from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of noise pollution and that new developments are appropriate to their location. Developments therefore should mitigate and reduce to a minimum potential and adverse impacts resulting from noise from new development. Developments should also avoid noise giving rise to significant adverse impacts on health and the quality of life.

2.4.4 The policies in the NPPF are material considerations which should be taken into account in dealing with applications.

2.4.5 In December 2025, a draft revised NPPF was issued for consultation ⁽¹¹⁾, which proposed a number of changes aimed to accelerate onshore wind development in England. An update is anticipated to be issued in the autumn of 2026.

2.5 Planning Practice Guidance

- 2.5.1 PPG⁽¹²⁾ has been prepared to expand on, provide context to and to help interpret the NPPF and policies contained within it. PPG and the NPPF should be read together when assessing and considering planning applications for development proposals.
- 2.5.2 PPGs relevant to the assessment of noise are expanded upon in the following two sections of this report.

Planning Practice Guidance for Noise

- 2.5.3 The PPG for Noise⁽¹³⁾ was first issued in March 2014 and was most recently updated in July 2019.
- 2.5.4 The UK Government's PPG for Noise states that the management of the noise associated with wind turbines is considered in the 'National planning practice guidance for renewable and low carbon energy' (hereafter referred to as the UK Government's PPG on Renewable and Low Carbon Energy) and the 'Assessment and rating of noise from wind farms (ETSU-R-97)'.

2.6 Planning Practice Guidance for Renewable and Low Carbon Energy

- 2.6.1 The PPG for Renewable and Low Carbon Energy⁽¹⁴⁾ was first issued in June 2015 and was most recently updated in August 2023.
- 2.6.2 The PPG for Renewable and Low Carbon Energy was adopted to help LPAs in developing policies for renewable and low carbon energy and to help identify the planning considerations for such developments.
- 2.6.3 The online Guidance Note on Renewable and Low Carbon Energy states:

'The report, ETSU-R-97: The assessment and rating of noise from wind farms should be used by local planning authorities when assessing and rating noise from wind energy developments.'
- 2.6.4 As noted in Section 2.3.6, references to ETSU-R-97 in planning policy documents should be interpreted as referring to ARWTN, which supersedes ETSU-R-97. Information on ARWTN and how it has informed this assessment is provided in Section 2.7 below.
- 2.6.5 The UK Government's PPG on Renewable and Low Carbon Energy also states:

'Good practice guidance on noise assessments of wind farms has been prepared by the Institute of Acoustics. The Department of Energy and Climate Change accept that it represents current industry good practice and endorses it as a supplement to ETSU-R-97. It is available on the Department of Energy and Climate Change's website.'
- 2.6.6 More information on the good practice guidance and how it has informed this assessment is provided in Section 2.8 below.

2.7 Assessment and Rating of Wind Turbine Noise

- 2.7.1 On 19th June 2026, the UK Government Department of Energy Security and Net Zero (DESNZ) published guidance on the 'Assessment and Rating of Wind Turbine Noise' (ARWTN). The aim the document *'is to provide technical guidance to practitioners, developers, planners and other stakeholders on the environmental assessment and control of operational noise from wind turbines.'*
- 2.7.2 The guidance document was developed with advice from a group of wind turbine noise specialists which formed a Technical Advisory Team and was externally peer reviewed by a number of interested parties including, amongst others, Environmental Health professionals, representatives from the UK, Welsh, Scottish and Northern Irish Governments, the Institute of Acoustics, wind farm developers and independent acoustic consultants.
- 2.7.3 In this way it represented the views of a range of stakeholders that are involved in the assessment of noise impacts of wind farm developments.
- 2.7.4 The document is an update and replacement of the previous guidance ETSU-R-97 'The Assessment and Rating of Noise from Wind Farms.' The aim of ARWTN is to provide:
'guidelines for the control of wind turbine noise, such that wind farm neighbours receive a reasonable degree of protection without placing unreasonable restrictions on wind farm development.'
- 2.7.5 The noise assessment criteria contained within ARWTN are *'consistent with the UK's statutory commitment to achieve net zero greenhouse gas emissions by 2050, supporting the deployment of renewable energy infrastructure while ensuring that potential adverse impacts on people are appropriately limited.'*
- 2.7.6 Where wind turbine noise is expected to be below 35 dB L_{A90} , background sound levels do not need to be recorded and a simplified Total Noise Assessment Criteria (TNAC) of 35 dBA up to wind speeds of 10 ms⁻¹ can be used. In this regard ARWTN states that:
'a simplified total noise assessment criterion (TNAC) of 35 dB (up to a wind speed of 10 m/s) can be set without relating the assessment criteria to a margin above background sound levels. This applies during both day and night. This would not require the measurement of background sound levels. This criterion is particularly suitable for single or smaller scale turbines or cases where a large setback distance exists between turbines and neighbouring properties'
- 2.7.7 The ARWTN assessment procedure specifies that where wind turbine noise is expected to be above the simplified TNAC of 35 dB L_{A90} , noise limits should be set relative to:
- a Lower Limiting Value (LLV) where background sound levels are low; or
 - 5 dBA above the typical background sound levels determined in accordance with ARWTN.
- 2.7.8 Different LLVs apply during the day and night periods for noise sensitive receptors where the occupiers do not have a financial involvement with the wind farm development:

- For day periods, the LLV is set in the range from 35 to 40 dB.
 - For night periods, the LLV is set to 43 dB.
- 2.7.9 The choice of daytime LLV in within the range 35-40 dB is determined based on three factors which consider the planning impacts and merits of the wind farm(s) in relation to noise. The three factors are presented below in priority order (i.e. the largest weight should be given to the first factor):
- *The generating capacity of the wind farm and the likely consequence that the choice of LLV would have on the energy generation of the wind farm(s).*
 - *The number of dwellings in the neighbourhood of the wind farm(s) and the magnitude of the levels to which these are exposed.*
 - *The duration and level of exposure to wind turbine noise of dwellings in the neighbourhood of the wind farm(s).*
- 2.7.10 The choice of daytime LLV should be considered in the national context (Scotland, England, Wales and Northern Ireland) *'as the range of wind energy projects, national policy priorities, and population density in practice can vary in each case.'* The three factors are discussed in further detail in Section 6.5 below.
- 2.7.11 The chosen LLV is applicable to all NSRs in the vicinity. The only exception being those NSRs where the occupier is financially involved with the wind farm development or a nearby scheme. In this regard, paragraph 2.29 of ARWTN states:
- 'The LLV used to define the noise assessment criteria can be increased to 45 dB for both day and night periods where the occupier (whether owner-occupiers or tenants) of the property has a financial involvement in the wind farm.'*
- 2.7.12 The daytime noise assessment criteria is derived from background sound data measured during so-called 'quiet periods of the day', which comprise weekday evenings (18:00 to 23:00), Saturday afternoons and evenings (13:00 to 23:00) and all day and evening on Sundays (07:00 to 23:00).
- 2.7.13 Multiple samples of 10 minute background sound levels using the $L_{A90,10min}$ measurement index are logged continuously over a range of wind speed conditions. These measured noise levels are then plotted against concurrent wind speed data and a 'best fit' curve is fitted to the data to establish the background sound level as a function of wind speed. The TNAC, is then set at a level 5 dBA above the best fit curve over the 0 - 10 ms^{-1} wind speed range; subject to an appropriate daytime LLV.
- 2.7.14 The night-time noise limit is derived from background sound data measured during the night-time periods (23:00 to 07:00), with no differentiation being made between weekdays and weekends. The 10 minute L_{A90} noise levels measured over the night-time periods are plotted against concurrent wind speed data and a 'best fit' correlation is established. The night-time TNAC is also based on a level 5 dBA above the best fit curve over the 0 - 10 ms^{-1} wind speed range, with a LLV of 43 dB L_{A90} .
- 2.7.15 The TNAC is the limit to which all cumulative schemes need to operate within at each assessed NSR. A separate set of Site Specific Noise Limits (SSNLs) specific to a Project for

Assessment then need to be derived. ARWTN provides guidance on the derivation of SSNLs and this is discussed in further detail in Section 6.7 below.

- 2.7.16 ARWTN provides a robust basis for determining noise limits to control wind turbine noise and is the accepted standard for such developments across the UK.

2.8 Current Good Practice

A Good Practice Guide on the Application of ETSU-R-97

- 2.8.1 In May 2013, the Institute of Acoustics issued 'A Good Practice Guide to the Application of ETSU-R-97 for the Assessment and Rating of Wind Turbine Noise' (IOA GPG). The document provides guidance on background data collection, data analysis and limit derivation, noise predictions, cumulative issues, reporting requirements and other matters such as noise related planning conditions.

- 2.8.2 The Authors of the IOA GPG sets out the scope of the document in Section 1.2:

'This guide presents current good practice in the application of the ETSU-R-97 assessment methodology for all wind turbine developments above 50 kW, reflecting the original principles within ETSU-R-97, and the results of research carried out and experience gained since ETSU-R-97 was published. The noise limits in ETSU-R-97 have not been examined as these are a matter for Government.'

- 2.8.3 The guidance document was endorsed, by the Secretary of State to the Department of Energy and Climate Change, the Rt Hon Mr Ed Davey MP. The recommendations included in the IOA GPG have been considered and applied throughout this noise assessment for the Project for Assessment.

- 2.8.4 The IOA GPG refers to six Supplementary Guidance Notes and where applicable these have also been considered in this report.

- 2.8.5 The ARWTN guidance is designed to be used alongside the IOA GPG. Following the publication of ARWTN, the IOA subsequently published a statement² regarding the IOA GPG, which stated:

'A replacement for ETSU-R-97 for the assessment and rating of wind turbine noise, has been published by the Government. The Assessment and Rating of Wind Turbine Noise (ARWTN), endorses good practice guidance produced by the Institute of Acoustics. In this refreshed guidance, noise limits have not changed, and assessment principles are generally the same as before. The ARWTN does introduce new terminology and clarifications.

For the assessment of wind turbine noise IOA have set out a statement advising on good practice, and practitioners should continue to use the IOA Good Practice Guide published in 2013, alongside the six 2014 Supplementary Guidance Notes. These cover the following technical areas: SGN 1: Data Collection; SGN 2: Data Processing & Derivation of ETSU-R-97 Background Noise Curves; SGN 3: Sound Power Level Data; SGN 4: Wind Shear; SGN 5: Post

² Available at <https://www.ioa.org.uk/news/wind-turbine-noise-assessment-guidance-arwtm-replaces-etsu97> (last accessed 03/07/2026).

Completion Measurements; SGN 6: Noise Propagation Over Water, until updates are issued later this year.'

- 2.8.6 The guidance contained within ARWTN and the IOA GPG has therefore been used to assess and rate the operational noise immissions from the Project for Assessment.

3 Potential Impacts

3.1 Operational Noise Sources

3.1.1 Wind turbines may emit two types of noise. Firstly, aerodynamic noise is a more natural sounding ‘broad band’ noise, albeit with a characteristic modulation, or ‘swish’, which is produced by the movement of the rotating blades through the air. Secondly, mechanical noise may emanate from components within the nacelle of a wind turbine. Potential sources of mechanical noise include gearboxes or generators.

3.1.2 Aerodynamic noise is usually perceived when the wind speeds are fairly low although at very low wind speeds the blades do not rotate, or rotate very slowly, and so negligible aerodynamic noise is generated. In higher winds aerodynamic noise may be masked by the normal sound of wind blowing through the trees and around buildings. The level of this natural ‘masking’ noise relative to the level of wind turbine noise is one of the several factors that determine the subjective audibility of the wind turbines⁽¹⁵⁾.

3.2 Infrasound, Low Frequency Noise and Vibration

3.2.1 The term infrasound can be defined as the frequency range below 20 Hz, while low frequency noise (LFN) is typically in the frequency range 20 – 200 Hz⁽¹⁶⁾. An average young healthy adult has an audible range from 20 Hz to 20,000 Hz, although the sensitivity of the ear varies with frequency and is most sensitive to sounds with frequencies between 500 Hz and 4,000 Hz. Wind turbines do produce low frequency sounds⁽¹⁷⁾, but our threshold of hearing at such low frequencies is relatively high and they therefore go unnoticed. Infrasound from wind turbines is often at levels below that of the noise generated by wind around buildings and other obstacles.

3.2.2 In 2004, the former DTI commissioned The Hayes McKenzie Partnership to report on claims that infrasound or LFN emitted by wind turbine generators (WTGs) were causing health effects. Of the 126 wind farms operating in the UK, five had reported LFN problems, therefore, such complaints are an exception, rather than a general problem that exists for all wind farms. Hayes McKenzie investigated the effects of infrasound and LFN at three wind farms for which complaints had been received and the results were reported in May 2006⁽¹⁸⁾. The report concluded that:

- *‘infrasound associated with modern wind turbines is not a source which will result in noise levels which may be injurious to the health of a wind farm neighbour;*
- *low frequency noise was measurable on a few occasions but below the existing permitted Night Time Noise Criterion. Wind turbine noise may result in internal noise levels within a dwelling that is just above the threshold of audibility, however at all sites it was always lower than that of local road traffic noise;*
- *that the common cause of complaint was not associated with LFN, but the occasional audible modulation of aerodynamic noise especially at night. Data collected showed that the internal noise levels were insufficient to wake up residents at these three sites. However once awoken, this noise can result in difficulties in returning to sleep.’*

- 3.2.3 The Applied and Environmental Geophysics Research Group at Keele University was commissioned by the Ministry of Defence (MOD), the DTI and the British Wind Energy Association (BWEA) to undertake microseismic and infrasound monitoring of LFN and vibrations from wind farms for the purposes of siting wind farms in the vicinity of Eskdalemuir in Scotland. Whilst the testing showed that vibration can be detected several kilometres away from wind turbines, the levels of vibration from wind turbines were so small that only the most sophisticated instrumentation can reveal their presence and they are almost impossible to detect. Nevertheless, the Renewable Energy Foundation alleged potential adverse health effects and when that story was picked up in the popular press, notably the Scotsman, the report's authors expressed concern over the way in which their work had been misinterpreted and issued a rebuttal statement⁽¹⁹⁾ in August 2005:

'Vibrations at this level and in this frequency range will be available from all kinds of sources such as traffic and background noise – they are not confined to wind turbines. To put the level of vibration into context, they are ground vibrations with amplitudes of about one millionth of a millimetre. There is no possibility of humans sensing the vibration and absolutely no risk to human health.'

- 3.2.4 In response to concerns that wind turbines emit infrasound and cause associated health problems, Dr Geoff Leventhall, Consultant in Noise Vibration and Acoustics and author of the Defra Report on Low Frequency Noise and its Effects, said in the article in the Scotsman ('Wind farm noise rules 'dated' - James Reynolds, 5 August 2005'):

'I can state quite categorically that there is no significant infrasound from current designs of wind turbines.'

- 3.2.5 An article⁽²⁰⁾ published in the IOA Bulletin (March/April 2009) concluded that there is no robust evidence that either low frequency noise (including 'infrasound') or ground-borne vibration from wind farms, has an adverse effect on wind farm neighbours.

- 3.2.6 Work⁽²¹⁾ by Dr Leventhall looked at infrasound levels within the ear compared to external sources and concluded:

'The conclusion is that the continuous inner ear infrasound levels due to internal sources, which are in the same frequency range as wind turbine rotational frequencies, are higher than the levels produced in the inner ear by wind turbines, making it unlikely that the wind turbine noise will affect the vestibular systems, contrary to suggestions made following the measurements at Shirley. The masking effect is similar to that in the abdomen (Leventhall 2009). The body, and vestibular systems, appear to be built to avoid disturbance from the high levels of infrasound which are produced internally from the heartbeat and other processes. In fact, the hearing mechanisms and the balance mechanisms, although in close proximity, have developed to minimise interaction (Carey and Amin 2006).'

- 3.2.7 During a planning Appeal (PPA-310-2028, Clydeport Hunterston Terminal Facility, approximately 2.5 km south-west of Fairlie, 9 Jan 2018), the health impacts related to LFN associated with wind turbines were considered at length by the appointed Reporter (Mr M Croft). The Reporter considered evidence from Health Protection Scotland and the National Health Service. In addition, he also considered LFN surveys undertaken by the Appellant and the Local Authority, both of which demonstrated compliance with planning conditions and did not identify any problems attributable to the turbine operations; some periods with

highest levels of low frequency noise were in fact recorded when the turbines were not operating.

3.2.8 The Reporter concluded that:

- The literature reviews by bodies with very significant responsibilities for the health of local people found insufficient evidence to confirm a causal relationship between wind turbine noise and the type of health complaints cited by some local residents;
- The NHS's assessment is that concerns about health impact are not supported by good quality research; and
- Although given the opportunity, the Community Council failed to provide evidence that can properly be set against the general tenor of the scientific evidence.

3.2.9 In February 2023, WSP published 'A review of noise guidance for onshore wind turbines' ⁽²²⁾ ('WSP BEIS report'). The WSP BEIS Report notes on page 113 that:

'Several studies have investigated the claimed links between adverse health symptoms and infrasound emissions from wind turbines. Although some experimental studies have linked infrasonic signals with activation of physiological sensory processing, these have tended to be based on signals that are not representative of wind turbine infrasound. There remains no compelling evidence of adverse health effects associated with wind turbine infrasound exposure at sound frequencies and' levels expected to be present at noise-sensitive receptor locations in the vicinity of wind farms'

3.2.10 The WSP BEIS Report goes on to note on page 114 that:

'Overall, the findings from the existing evidence base indicate that infrasound from wind turbines at typical exposure levels has no direct adverse effects on physical or mental health, and reported symptoms of ill-health are more likely to be psychogenic in origin.'

3.2.11 It is noted that research into infrasound is ongoing but the WSP BEIS report concluded that:

'It is expected that further evidence from ongoing studies into wind turbine infrasound effects will emerge soon, in particular from the NHMRC studies in Australia. However, based on the existing scientific evidence, it does appear probable that the above findings will not be contradicted by newer evidence.'

3.2.12 Since the publication of the WSP BEIS report, the study that was granted funding by NHMRC (the National Health and Medical Research Council of Australia) was published in the Environmental Health Perspectives (EHP) journal which is published by the United States National Institute of Environmental Health. The study ⁽²³⁾ aimed to test the effect of exposure to 72 hours of infrasound (designed to simulate a wind turbine infrasound signature) exposure on human physiology, particularly sleep. The study concluded that:

'Our findings did not support the idea that infrasound causes WTS3. High level, but inaudible, infrasound did not appear to perturb any physiological or psychological measure tested in these study participants.'

³ WTS stands for Wind Turbine Syndrome which is a term for adverse human health effects related to the proximity of wind turbines.

- 3.2.13 LFN and Infrasound was also discussed in detail at the co-joined Inquiry for three wind farms at Craiginmoddie (WIN-370-4), Carrick (WIN-370-5) and Knockcronal (WIN-370-6); the decision letters for which were issued on 5 November 2025. On low frequency noise/ infrasound, the Reporter stated that:

"206. Based on existing guidance, we consider there is no requirement to impose planning conditions to monitor/control infrasound or low frequency sound or related vibration. It would be unreasonable, without policy direction, to impose conditions as a precaution. In coming to that conclusion, we are also aware that 'A' weighted sound levels in ETSU-R-97 assessments are said (in the guidance) to provide sufficient control over impacts of low frequency noise. This is backed by the WSP BEIS report."

207. Based on the above, we do not consider that significant effects can be predicted relating to infrasound/low frequency sound or that mitigation by planning conditions is necessary.'

- 3.2.14 Furthermore, the UK Government Department for Energy Security & Net Zero document titled 'National Policy Statement for Renewable Energy Infrastructure (EN-3)' states the following in respect of infrasound and LFN.

"2.12.165 There is currently no evidence that ground transmitted vibration, infrasound or low frequency noise from wind turbines occurs at a sufficient level to be harmful to human health. Therefore, the Secretary of State should give no weight to claims of harm to human health as a result of ground transmitted vibration, infrasound or low frequency noise."

- 3.2.15 ARWTN sets out (Section 1.20) that there are:

'a number of aspects of wind turbine noise that do not require assessment at the planning stage because their effects on humans can be considered negligible or suitably controlled by the criteria set out in this guidance. These include infrasound, ground-borne vibration and low frequency sound.'

- 3.2.16 It is therefore not considered necessary to carry out specific assessments of LFN and/ or infrasound and they have not been considered further in the noise assessment.

3.3 Amplitude Modulation of Aerodynamic Noise (AM)

- 3.3.1 In the context of wind turbine noise, amplitude modulation describes a variation in noise level over time; for example, observers may describe a 'whoosh whoosh' sound, which can be heard close to a wind turbine as the blades sweep past. Amplitude Modulation of aerodynamic noise is an inherent characteristic of wind turbine noise and was noted in ETSU-R-97, on page 68:

'The modulation or rhythmic swish emitted by wind turbines has been considered by some to have a characteristic that is irregular enough to attract attention. The level and depth of modulation of the blade noise is, to a degree, turbine-dependent and is dependent upon the position of the observer. Some wind turbines emit a greater level of modulation of the blade noise than others. Therefore, although some wind turbines might be considered to have a character that may attract one's attention, others have noise characteristics which are considerably less intrusive and unlikely to attract one's attention and be subject to any penalty.'

This modulation of blade noise may result in a variation of the overall A-weighted noise level by as much as 3dBA (peak to trough) when measured close to a wind turbine. As distance from the wind turbine [or] wind farm increases, this depth of modulation would be expected to decrease as atmospheric absorption attenuates the high frequency energy radiated by the blade.'

- 3.3.2 In recent times the Acoustics community has sought to make a distinction between the AM discussed within ETSU-R-97, which is expected at most wind farms and as such may be considered as 'Normal Amplitude Modulation' (NAM), compared to the unusual AM that has sometimes been heard at some wind farms, hereinafter referred to as 'Other Amplitude Modulation' (OAM). The term OAM is used to describe an unusual feature of aerodynamic noise from wind turbines, where a greater than normal degree of regular fluctuation in sound level occurs at blade passing frequency, typically once per second. In some appeal decisions it may also be referred to as 'Excess Amplitude Modulation' (EAM). It should be noted that the noise assessment and rating procedure detailed in ETSU-R-97 and its successor ARWTN fully takes into account the presence of the intrinsic level of NAM when setting acceptable noise limits for wind farms.
- 3.3.3 On 16 December 2013, RenewableUK (RUK) released six technical papers⁽²⁴⁾ on AM, which reflected the outcomes of research commissioned over the previous three years, together with a template planning condition. Whilst this research undoubtedly improved understanding of Other Amplitude Modulation (OAM) and its effects, it should be noted that at the time of writing it has not been endorsed by any relevant body such as the Institute of Acoustics (IOA).
- 3.3.4 On 22 January 2014, the IOA released a statement regarding the RUK research and the proposed planning condition to deal with the issue of amplitude modulation from a wind turbine and stated:
- 'This research is a significant step forward in understanding what causes amplitude modulation from a wind turbine, and how people react to it. The proposed planning condition, though, needs a period of testing and validation before it can be considered to be good practice. The IOA understands that RenewableUK will shortly be making the analysis tool publicly available on their website so that all interested parties can test the proposed condition, and the IOA will review the results later in the year. Until that time, the IOA cautions the use of the proposed planning condition.'*
- 3.3.5 Research regarding amplitude modulation continued. In April 2015, the IOA issued a discussion document entitled 'Methods for Rating Amplitude Modulation in Wind Turbine Noise'. The document presented three methods that can be used to quantify the level of AM at a given measurement location. After extensive consultation a preferred method of measuring OAM, which provides a framework for practitioners to measure and rate AM, was recommended by the IOA.
- 3.3.6 On 3 August 2015, the Department for Energy and Climate Change (DECC)⁴, commissioned independent consultants WSP Parsons Brinkerhoff to carry out a literature review on OAM (which they refer to simply as AM). The stated aims were as follows:

⁴ The DECC was merged into the Department for Business, Energy & Industrial Strategy (BEIS) in 2016, which was subsequently split into the Department for Energy Security and Net Zero (DESNZ), Department for Science, Innovation and Technology (DSIT), and Department for Business and Trade (DBT) in 2023

- *‘To review the available evidence on Amplitude Modulation (AM) in relation to wind turbines, including but not limited to the research commissioned and published by RenewableUK in December 2013;*
- *To work closely with the Institute of Acoustics’ AM working group, who are expected to recommend a preferred metric and methodology for quantifying and assessing the level of AM in a sample of wind turbine noise data;*
- *To review the robustness of relevant dose response relationships, including the one developed by the University of Salford as part of the RenewableUK study, on which the correction (or penalty) for amplitude modulation proposed as part of its template planning condition is based;*
- *To consider how, in a policy context, the level(s) of AM in a sample of noise data should be interpreted, in particular determining at what point it causes a significant adverse impact;*
- *To recommend how excessive AM might be controlled through the use of an appropriate planning condition; and*
- *To consider the engineering/cost trade-offs of possible mitigation measures.’*

3.3.7 Their report, which was released in October 2016, concluded that there is sufficient robust evidence that excessive AM leads to increased annoyance from wind turbine noise and recommended that excessive AM is controlled through a suitably worded planning condition, which will control it during periods of complaint. Those periods should be identified by measurement using the metric proposed by the work undertaken by the IOA, and enforcement action would rely upon professional judgement by Local Planning Authority Environmental Health Officers based on the duration and frequency of occurrence.

3.3.8 It is not clear within the body of the report which evidence the authors relied upon to arrive at their conclusions, although the Executive Summary states (page 4):

‘It is noted that none of the Category 1 or 2 papers have been designed to answer the main aim of the current review in its entirety. The Category 1 studies have limited representativeness due to sample constraints and the artificiality of laboratory environments, whereas the Category 2 studies generally do not directly address the issue of AM WTN exposure-response. A meta - analysis of the identified studies was not possible due to the incompatibility of the various methodologies employed. Notwithstanding the limitations in the evidence, it was agreed with DECC that the factors to be included in a planning condition should be recommended based on the available evidence, and supplemented with professional experience.’

3.3.9 The report ⁽²⁵⁾ states that any planning condition must accord with existing planning guidance, and should be subject to legal advice on a case by case basis. Existing guidance would include compliance with the six tests of a planning condition embodied in Circular 4/98. The report’s authors did not dictate a particular condition to be used but did suggest that any condition should include the following elements (p5):

- *‘The AM condition should cover periods of complaints (due to unacceptable AM);*
- *The IoA-recommended metric should be used to quantify AM (being the most robust available objective metric);*

- *Analysis should be made using individual 10-minute periods, applying the appropriate decibel 'penalty' to each period, with subsequent analysis;*
- *The AM decibel penalty should be additional to any decibel penalty for tonality; [tonality means mechanical sound already covered by ETSU noise limits]; and*
- *An additional decibel penalty is proposed during the night time period to account for the current difference between the night and day limits on many sites to ensure the control method works during the most sensitive period of the day.'*

3.3.10 AM was considered in the WSP BEIS report. The report notes that the IOA Method provides a suitable approach to measure and quantify AM (whilst noting that work is ongoing to refine the approach) but also highlights that further work is required to develop a robust mechanism for controlling AM that could be incorporated into a planning condition. In relation to the potential adoption of a penalty scheme to control AM the WSP BEIS report notes on page 208 that:

'In practice, the details of applying such a penalty scheme are complicated by the complexities of wind turbine sound measurements. These often involve a considerable amount of data filtering and data aggregation to address the practical difficulties of measuring a highly variable source, which is often also at a level that is relatively low compared with other, fluctuating residual sounds present in the acoustic environment. Such details will need to be carefully considered in further study, and the example planning condition proposed by a group of IOA members in 2017⁵⁰⁵ should be considered as a starting point.'

3.3.11 ARWTN confirms (para 2.8) that:

'All wind turbines generate AM (or blade swish, to a limited extent), but the occurrence of elevated levels of AM is a complex phenomenon that is likely to be related to a combination of turbine and site characteristics; the current consensus is that AM cannot be predicted.'

3.3.12 In relation to control of AM, should elevated levels occur, the guidance states (para 2.8) that:

'Tonal noise and AM are therefore best controlled through enforcement of planning conditions which include the application of character corrections as described in section 4. The approach set out in this technical guidance is formulated on this basis, and consequently, character corrections should only be applied to compliance measurements and should not be added at the planning/application assessment phase, unless there is strong evidence to do so.'

3.3.13 The example planning condition included within ARWTN includes a penalty for elevated levels of AM (should they occur).

3.3.14 As noted in Section 2.2.3, the Rossendale Local Plan states in Policy ENV7 that proposals for commercial wind farms should demonstrate that unacceptable noise impacts, including AM, would not occur. As AM cannot currently be predicted, there is presently no way to demonstrate this although it should be noted that, should elevated levels of AM occur in practice the Council would be able to take action using its existing Statutory Nuisance powers to ensure that local residents are protected. Elevated levels of AM could also be controlled via the proposed Planning Condition presented in Annex 9.

4 Methodology

4.1 Assessing Operational Noise Impact

- 4.1.1 To undertake an assessment of the operational noise impact in accordance with the requirements of ARWTN and the IOA GPG, the following steps are required:
- Specify the location of the wind turbines for the Project for Assessment;
 - Measure the background sound levels as a function of on-site wind speed at a selection of representative Noise Monitoring Locations (NML);
 - Identify the locations of all nearby noise sensitive receptors and select a sample of relevant Noise Assessment Locations (NAL). For each NAL, identify the most representative measured background sound data;
 - Establish for each NAL the TNAC on analysis of the measured background sound levels;
 - Specify the likely noise emission characteristics of the wind turbines for the Project for Assessment and all nearby cumulative wind turbines;
 - Calculate the likely noise immission levels due to the cumulative operation of all relevant wind turbines and compare it to the TNAC;
 - Determine the Site Specific Noise Limits in accordance with ARWTN; and
 - Calculate the likely noise immission levels due to the operation of the Project for Assessment on its own and compare it to the Project for Assessment's Site Specific Noise Limits.
- 4.1.2 In order to consider the steps outlined above the assessment has been split into three separate stages:
- Stage 1 – determine the TNAC (which are applicable to noise from all wind turbines in the area operating concurrently) at noise sensitive receptors;
 - Stage 2 – undertake a cumulative assessment where noise predictions from the Project for Assessment are within 10 dB of the total noise predictions from the other wind farms/turbines within the area; and
 - Stage 3 – establish the Project for Assessment's Site Specific Noise Limits (at levels below the TNAC, where limit apportionment is required) and compare the noise predictions from the Project for Assessment on its own against the proposed Site Specific Noise Limits.
- 4.1.3 There are a range of turbine makes and models that may be appropriate for the Project for Assessment. In the absence of a confirmed turbine model, this noise assessment models a candidate turbine, the Nordex N149 5.7 MW with serrated trailing edge blades and a hub height of 105 m, which is representative of the kind of turbine that may be installed. The final selection of turbine will follow a competitive tendering process and thus the final model of turbine may differ from those on which this assessment has been based. However, the final choice of turbine will be required to comply with the noise limits which have been established for the site.

4.2 Consultation

EIA Scoping

- 4.2.1 An EIA Scoping Report was submitted to Rossendale Borough Council and Rochdale Metropolitan Borough Council in December 2024. At the time of writing (July 2026), no Scoping Opinion has been received.

Consultation with Rochdale Metropolitan Borough Council (RMBC)

- 4.2.2 Prior to the commencement of the noise impact assessment for the Project for Assessment, direct consultation was undertaken with the Environmental Health Department at RMBC in order to agree the approach to the noise assessment and the noise monitoring locations. To date (July 2026) no response has been received.

Consultation with Rossendale Borough Council (RBC)

- 4.2.3 Prior to the commencement of the noise impact assessment for the Project for Assessment, direct consultation was undertaken with the Environmental Health Department at RBC in order to agree the approach to the noise assessment and the noise monitoring locations.
- 4.2.4 A senior Environmental Health Officer (EHO) from RBC responded to confirm general agreement with the proposed methodology and general noise monitoring locations.
- 4.2.5 A copy of the original consultation letter and subsequent email correspondence is included in Annex 2.

EIA – Post Submission

- 4.2.6 Following submission of the Environmental Statement in July 2025 (the '2025 ES'), a review was undertaken by Hayes McKenzie Partnership (HMP) on behalf of RBC of the Noise Impact Assessment submitted as part of the ES. The review concluded that the operational noise assessment was generally undertaken in line with ETSU-R-97 and current good practice, but suggested a number of clarifications on topics including cumulative noise conditions and mitigation requirements. The full review document is included within Annex 2 and summarised as part of **Appendix 2.4** of the FEI ES.
- 4.2.7 Following the review, a meeting took place between RBC, RMBC, HMP, TNEI and the Applicant in March 2026 to further discuss the points raised in the HMP review.
- 4.2.8 TNEI proposed that a number of clarifications be included within the FEI submission, and further discussion was undertaken on the topics of cumulative noise conditions, amplitude modulation, topographic corrections and directivity.
- 4.2.9 A summary note prepared by TNEI was issued to HMP, RBC and RMBC in May 2026 (included in Annex 2), confirming topics that would be addressed within the FEI. The note provided clarification on the proposed approach to directivity, and sought agreement from HMP on an approach to deriving noise limits.
- 4.2.10 On 15th May 2026, HMP provided copies of their topographical corrections and also provided further clarification on the cumulative modelling assumptions.

- 4.2.11 Following the publication of ARWTN in June 2026, TNEI consulted via email with HMP to discuss the exclusion of a number of small scale wind turbines from the cumulative noise assessment. HMP responded to request further information on this topic, which has been included within Annex 12.

4.3 Setting the Total Noise Assessment Criteria (Stage 1)

Identify Existing Noise Limits

- 4.3.1 Noise limits have been previously established in the area of the Project for Assessment, as part of the planning conditions set for the operational Scout Moor Wind Farm. Condition 19 from the Scout Moor Wind Farm Decision Notice references tables from the development's Environmental Statement. However, the limits are set in reference to the Scout Moor Wind Farm hub height (60 m), and as such would not be directly applicable at the hub height of the Project for Assessment without an adjustment to account for the differences in wind shear.
- 4.3.2 As such, background sound data collected by TNEI, which is deemed representative of the receptors proximate to the developments, has been used to establish the Total Noise Assessment Criteria.
- 4.3.3 Extracts of the Scout Moor Wind Farm Decision Notice containing the noise conditions are included in Annex 2.

Background Sound Levels and Wind Shear

- 4.3.4 Wind shear can be defined as '*the change in the relationship between wind speed at different heights*'. Due to wind shear, wind speeds recorded on one meteorological mast at different heights are usually different, generally the higher the anemometer the higher the wind speed recorded. For example, if a wind speed of 4 ms^{-1} is recorded at 80 m height, 3.5 ms^{-1} may be recorded at 40 m and 2.5 ms^{-1} may be recorded at 10 m.
- 4.3.5 Hub height wind speed is the key wind speed for a wind farm noise assessment, as it is the wind speed at hub height which will determine the noise emitted by the wind turbines and informs the turbine control system. Ideally, both wind turbine noise predictions and background sound level measurements should refer to hub height wind speed (or a representation thereof), ensuring that there is no discrepancy between the wind speed at which the noise is emitted and the wind speed at which the corresponding background sound is measured.
- 4.3.6 The IOA GPG states that one of three methods (A, B or C) to account for wind shear may be adopted. For this assessment wind speeds were recorded at two different heights, one at a height of more than 60 % of the hub height and another located at least 15 metres below it. These were then used to calculate hub height wind speeds in line with 'Method B' of Section 2.6.3 of the IOA GPG to fully take account of wind shear. The details are described in Section 5 'Baseline'.

Noise Impact Criteria in ARWTN

- 4.3.7 Analysis of the measured data has been undertaken in accordance with ARWTN and current good practice to determine the pre-existing background sound environment and to

establish, for each NAL, the daytime and night-time TNAC, which would apply for the cumulative operation of all wind turbines in the area. The TNAC for the daytime has been set at 40 dB(A) or background plus 5 dB whichever is the greater, and the TNAC at night-time has been set at 43 dB(A) or background plus 5 dB whichever is the greater. The TNAC relates to noise from all wind farm developments in the area. The limit was chosen with due regard to the guidance in ARWTN and following a review of the predicted levels for existing wind turbines in the area (and the noise limit that has effectively been allocated already to those consented developments).

4.3.8 ARWTN suggests that the daytime Lower Limiting Values (LLV) should be set in the range between 35 - 40 dBA. The precise choice of criterion level depends on a number of factors:

- *'The generating capacity of the wind farm and the likely consequence that the choice of LLV would have on the energy generation of the wind farm(s).'*
- *'The number of dwellings in the neighbourhood of the wind farm(s) and the magnitude of the levels to which these are exposed.'*
- *'The duration and level of exposure to wind turbine noise of dwellings in the neighbourhood of the wind farm(s).'*

4.3.9 Depending on the levels of background sound, the satisfaction of the ARWTN derived limits can lead to a situation whereby, at some locations and under certain wind conditions, wind turbine noise could be audible for a proportion of the time. Acceptable limits for wind turbine operational noise, however, are clearly defined for all time periods by the application of the ARWTN methodology and consequently, the test applied to operational noise is whether or not the predicted wind turbine noise immission levels lie below the ARWTN noise limits, rather than whether or not they are audible.

4.4 Assessment of likely effects and the requirement for a cumulative assessment (Stage 2)

4.4.1 ARWTN states in Section 2.40 that:

'Where noise levels from the proposed development are lower than 25 dB, or 10 dB or more below both the day and night TNAC, a cumulative operational noise assessment is not necessary at that noise-sensitive receptor.'

and

'... wind farm developments must be considered in the cumulative assessment where their individual noise level contribution is within 10 dB of the TNAC.'

4.4.2 The IOA GPG (2013) includes a detailed section on cumulative noise and provides guidance on where a cumulative assessment is required. Section 5.1.4 and 5.1.5 of the GPG state:

'During scoping of a new wind farm development consideration should be given to cumulative noise impacts from any other wind farms in the locality. If the proposed wind farm produces noise levels within 10 dB of any existing wind farm/s at the same receptor location, then a cumulative noise impact assessment is necessary.'

Equally, in such cases where noise from the proposed wind farm is predicted to be 10 dB greater than that from the existing wind farm (but compliant with ETSU-R-97 in its own right), then a cumulative noise impact assessment would not be necessary.'

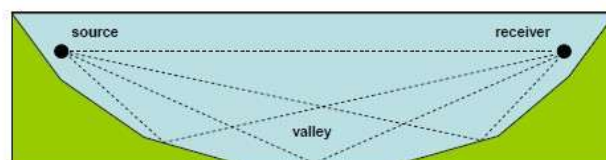
- 4.4.3 An assessment was undertaken at each of the NSRs proximate to the Project for Assessment, to determine whether the wind turbine noise immission from the Project for Assessment were within 10 dB of the TNAC and the noise immission levels from the other schemes. The noise immission levels from other schemes were also checked to see if they were within 10 dB of the TNAC. Where predictions were found to be within 10 dB of each other and of the TNAC, then a cumulative noise assessment was required to determine the likely cumulative impact, however, if wind turbine immission were more than 10 dB apart, a cumulative noise assessment was not required.

Noise Prediction / Propagation Model

- 4.4.4 Modelling was undertaken using the methodology presented in ISO 9613:2024 Acoustics – Attenuation of sound during propagation outdoors Part 2: Engineering method for the prediction of sound pressure levels outdoors (26).
- 4.4.5 The ISO 9613-2 model can take account of the following factors that influence sound propagation outdoors:
- Geometric divergence;
 - Atmospheric absorption;
 - Reflecting obstacles;
 - Screening;
 - Vegetation; and
 - Ground attenuation.
- 4.4.6 The model uses as its acoustic input data the octave band sound power output of the turbine and calculates, on an octave band basis, attenuation due to the factors above, as appropriate.
- 4.4.7 There is currently no standard approach to specifying error bands for wind turbine noise predictions, however, Table 4 of ISO 9613-2 suggests an estimation of accuracy for downwind conditions of ± 3 dBA for calculations of up to 1000 m for broadband noise levels.
- 4.4.8 The ISO 9613-2 noise model is intended for the modelling of many noise source types and was not written specifically for the modelling of wind turbine noise, however, a number of studies have been undertaken to determine the standard's accuracy for wind turbine noise predictions and some amendments to the propagation model have been widely adopted for the modelling of wind turbine noise in the UK, primarily through the incorporation of recommendations in the IOA GPG.
- 4.4.9 In 1998, a European Commission (EC) research project into wind farm noise propagation over large distances, published 'Development of a Wind Farm Noise Prediction Model,' JOULE project JOR3-CT95-0051, which identified a simplified version of ISO 9613-2 as the most suitable prediction method at that time (27).

- 4.4.10 Additional wind farm specific studies have also been undertaken to validate the use of the standard and these are referenced in Section 4 of the IOA GPG, which goes on to conclude that: *'The outcome of this research has demonstrated that the ISO 9613-2 standard in particular, which is widely used in the UK, can be applied to obtain realistic predictions of noise from on-shore wind turbines during worst case propagation conditions (i.e. sound speed gradients due to downwind conditions or temperature inversions), but only provided that the appropriate choice of input parameters and correction factors are made.'*
- 4.4.11 It should be noted that the IOA GPG references the 1996 version of the 9613 standard, which was updated in 2024, however, use of either version when adopting the IOA GPG amendments to the noise model, results in negligible differences in predicted noise levels.
- 4.4.12 TNEI's experience of undertaking compliance monitoring for operational wind farms also indicates that noise predictions undertaken using ISO 9613-2, whilst following the guidance in the IOA GPG, show a good correlation with measured noise levels, with predicted levels usually slightly higher than measured levels.
- 4.4.13 The IOA GPG quotes a comparative study undertaken in Australia that indicated ISO 9613-2 can, in some conditions, under-predict ground attenuation effects and the potential for additional reflection paths 'across a valley', whilst slightly over-predicting wind turbine noise on flat terrain (28). With due regard to this study, the IOA GPG states that a *'further correction of +3 dB should be added to the calculated overall A-weighted level for propagation 'across a valley, i.e. a concave ground profile or where the ground falls away significantly between a turbine and the receiver location.'* The potential reflection paths are illustrated in Schematic 4.1 below.

Schematic 4.1: Multiple reflection paths for sound propagation across concave ground



Source: IOA GPG, page 21, Figure 5

- 4.4.14 A formula from the JOULE Project JOR3-CT95-0051 dated 1998 is suggested for determining whether a correction is required.

$$h_m \geq 1.5 \times (\text{abs}(h_s - h_r) / 2)$$

where h_m is the mean height above the ground of the direct line of sight from the receiver to the source (as defined in ISO 9613-2, Figure 3), and h_s and h_r are the heights above local ground level of the source and receiver respectively).

- 4.4.15 The calculation of h_m requires consideration of the digital terrain model and needs to be performed for each path between every turbine and every receiver. Interpretation of the results of the calculation above and the subsequent inclusion of a concave ground profile correction requires careful consideration with any topographical variation considered in the context of a site.

4.4.16 The IOA GPG also discusses the potential for topographical screening effects of the terrain surrounding a wind farm and the nearby noise sensitive receptors. Although barrier screening effects in ISO 9613-2 can make corrections of up to 15 dB, the IOA GPG states that where there is no line of sight between the highest point on the rotor and the receiver location a reduction of no more than 2 dB may be applied.

4.4.17 The modelling parameters used in this assessment are detailed in Section 6.4 below.

4.5 Setting the Site Specific Noise Limits (Stage 3)

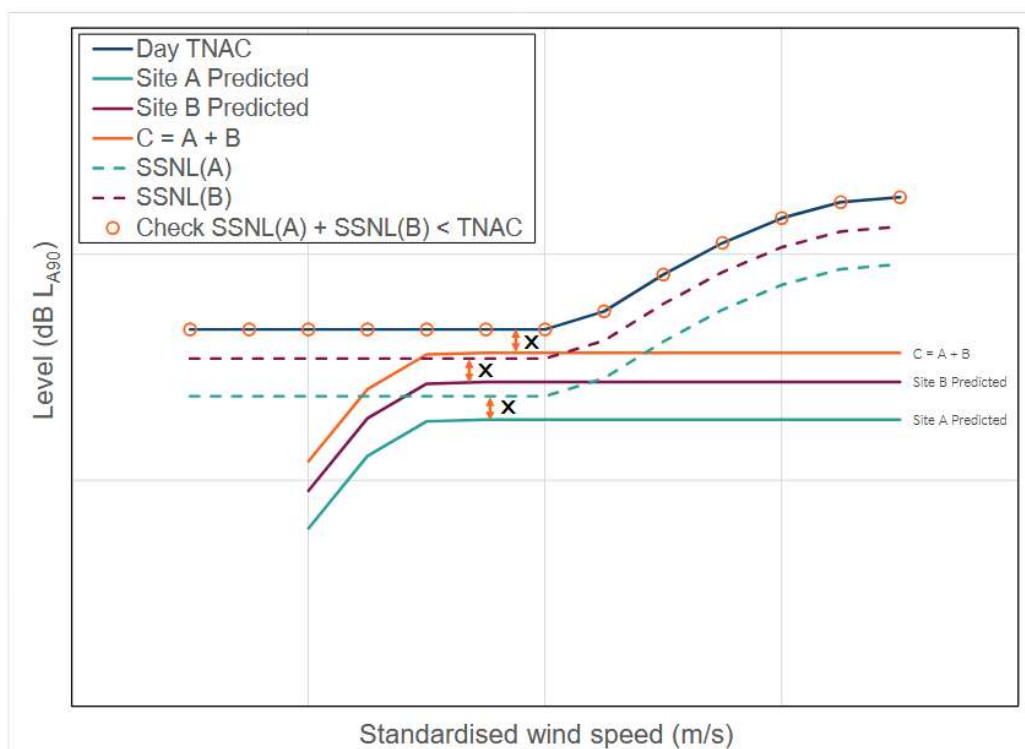
4.5.1 Summary Box 21 of the IOA GPG states:

'Whenever a cumulative situation is encountered, the noise limits for an individual wind farm should be determined in such a way that no cumulative excess of the total ETSU-R-97 noise limit would occur.'

4.5.2 In order to determine Site Specific Noise Limits at receptors in proximity to the Project for Assessment (where required), apportionment of the TNAC has been undertaken. The limit apportionment has considered the noise limit already allocated to other wind farms in the area.

4.5.3 This approach is demonstrated in Graph 4.1 below. In this example the TNAC (shown in blue) is shared between wind farm A and wind farm B. The two site specific wind farm noise limits for a given receptor (the solid purple and green lines), when added together, equal the TNAC, and the predicted levels for each wind farm (the dashed lines), meet the Site Specific Limits for the individual wind farms.

Graph 4.1: Limit Apportionment Example



- 4.5.4 The limit derivation can also be undertaken with consideration to the amount of headroom between another schemes(s) predictions and the Total Noise Assessment Criteria. With regard to this Section 5.4.11 of the IOA GPG states:

'In cases where there is significant headroom (e.g. 5 to 10 dB) between the predicted noise levels from the existing wind farm and the Total Noise Limits, where there would be no realistic prospect of the existing wind farm producing noise levels up to the Total Noise Limits, agreement could be sought with the LPA as to a suitable predicted noise level (including an appropriate margin to cover factors such as potential increases in noise) from the existing wind farm to be used to inform the available headroom for the cumulative assessment without the need for negotiation or cumulative conditioning. This may be the case particularly at low wind speeds.'

- 4.5.5 With this in mind, where appropriate, an additional 2 dB buffer has been added to the other schemes' turbine noise predictions. This is considered to be a suitable buffer in accordance with Section 5.4.11 of the IOA GPG and would represent a 60 % increase in emitted noise levels from the other schemes.
- 4.5.6 Where predicted wind turbine noise levels from the individual wind farm/turbine schemes are found to be >10 dB below the TNAC then the maximum noise limit available for use by the Project for Assessment is equal to the TNAC.
- 4.5.7 The apportionment calculation described above determines the proportion of the TNAC that is available for future wind farms taking account of operational and consented wind farms in the area (hereafter referred to as the 'residual noise budget').
- 4.5.8 The residual noise budget effectively represents that maximum SSNL that it would be appropriate to allocate to the Project for Assessment but ARWTN details that it may not be appropriate to allocate all of the residual noise budget to a proposed wind farm, instead it may be appropriate to only allocate a proportion of the residual noise budget to retain headroom for developments which may be proposed in the future.
- 4.5.9 To assist with the calculation of suitable SSNLs which ensure that the TNAC is achieved whilst maintaining headroom for future developments and not resulting in 'unreasonable restriction' (as described in para 2.45 of ARWTN) to a proposed wind turbine development, para 2.47 of the ARWTN guidance provides a series of points that should be considered:
- *'The SSNL should not be higher than the TNAC that would apply to the Project for Assessment in the absence of other wind turbine developments.'*
 - *The SSNLs should normally follow a profile (variation with wind speeds) closer to the TNAC, rather than the profile of predicted noise levels (see illustration in Figure 3);*
 - *The SSNL may be calculated using the 'remaining noise budget' principle, but the applied SSNLs should normally follow a profile closer to the TNAC;*
 - *The SSNLs should not normally be set substantially higher than predicted noise levels for the wind farm under consideration at wind speeds where the wind turbines reach their maximum noise levels;*
 - *SSNLs shall not be set lower than 10 dB below the TNAC;*
 - *SSNLs that apply to noise sources outside of the control of the operator/owner of the development (i.e. cumulative limits) should not be used;*

- *The difference between the SSNL and the TNAC may vary at different noise sensitive receptor locations to account for the relative contribution of other cumulative sites considered, ensuring that cumulative levels remain below the TNAC;*
- *In some cases, it may be appropriate to define a single value SSNL that applies at all wind speeds within a defined range (for example where the lowest applicable LLV is met at all wind speeds).'*

4.5.10 The guidance is not prescriptive and an element of judgement is required to determine suitable SSNLs. The following steps are taken for each NAL:

- 1) Restrict the residual noise budget so that it does not exceed the limit that is applicable to the Project for Assessment in isolation (the maximum of an LLV of 35 dB or background plus 5 dBA during daytime periods at receptors which are not financially involved;
- 2) An appropriate buffer is selected in order to leave space for future wind farm development in the area without unduly restricting the Project for Assessment. A buffer of 3 dB is deemed appropriate considering the use of a candidate turbine and the potential need to consider character corrections during compliance monitoring;
- 3) The minimum margin (over the wind speed range considered in the assessment) between the predicted noise levels due to the Project for Assessment and the residual noise budget is determined;
- 4) Where the minimum margin is greater than the buffer, the difference between the minimum margin and the buffer is subtracted from the residual noise budget at each wind speed to determine the SSNL e.g. if the buffer is 3 dB and the minimum margin is 4 dB then 1 dB is subtracted from the residual noise budget to determine the SSNL. The resulting SSNL will follow the profile of the residual noise budget and the minimum margin between the predicted noise levels from the Project for Assessment and the SSNL will be equal to the buffer;
- 5) Where the minimum margin at any wind speed is less than the buffer but the margin at other wind speeds is greater than the buffer then the minimum margin at wind speeds other than those where the margin is less than the buffer is determined. The difference between this margin and the buffer is subtracted from the residual noise budget to determine the SSNL at wind speeds where the margin is greater than the buffer;
- 6) An exception is made if either of steps 4 or 5 result in an SSNL of less than the TNAC - 10 dB, in which case the SSNL is set at the TNAC - 10 dB in line with the ARWTN guidance; and
- 7) Where the SSNL does not follow the profile of the TNAC, adjustments are made to follow the profile of the TNAC more closely e.g. if the SSNL decreases with wind speed then the SSNL at lower wind speeds is set to the SSNL at the wind speed above as long as the buffer is maintained.

4.5.11 Detailed information on the approach to apportionment per NAL is provided in Section 6.7 below.

5 Baseline

5.1 Identification of Potential Noise Receptors

- 5.1.1 The properties identified for noise monitoring were selected following a detailed review of the area using aerial photography to identify receptors which would be representative of other nearby properties. Where possible, locations were selected which were subject to minimal influence from other noise sources such as local watercourses, operational wind turbines and vegetation.
- 5.1.2 The IOA GPG notes that *'noise-sensitive receptors, [are] principally houses (existing or for which planning consent is being sought / has been given) and any building used for long-term residential purposes (such as a nursing home)'*. Following a review of noise sensitive receptors surrounding the Project for Assessment, the closest receptors were found to be residential properties.

5.2 Background Sound Survey

- 5.2.1 Background sound monitoring was undertaken for the purposes of setting the Total Noise Assessment Criteria. Data was recorded over the period 3rd December 2024 – 11th February 2025 at six noise sensitive receptors.
- 5.2.2 The noise equipment installed at Noise Monitoring Location (NML) 1 stopped recording on 26th December due to an apparent power failure, determined to be due to poor battery performance during cold temperatures. Similar power failures occurred at NML2 (ending 3rd January) and NML3 (11th January), leading to a loss of some measurement data. The background sound survey was subsequently extended to ensure sufficient data was captured at all measurement locations.
- 5.2.3 Details of the exact monitoring periods, the rationale behind the exact kit location and the dominant noise sources observed at each of the Noise Monitoring Location (NML) are detailed in the Noise Monitoring Records and installation report included in Annex 3.
- 5.2.4 The NML is the position that the sound level meter was sited at each property, as shown on Figure A1.1 (Annex 1) and summarised in Table 5.1 below.

Table 5.1 Noise Monitoring Locations

NML/ Receptor Name	Easting	Northing
NML1 – Lower Mount Pleasant Farm	381534	420739
NML2 – Lowerfold Barn	383670	420397
NML3 – Law Head	385266	421321
NML4 – New Road Farm	387576	418432
NML5 – Windy Harbour	387242	416208
NML6 - Jubarn	386386	415823

5.3 Noise Monitoring Equipment

- 5.3.1 Section 2.4 of the IOA GPG includes information on the type and specification of noise monitoring equipment which should be used for background sound surveys and states:

'Noise measurement equipment and calibrators used on site should comply with Class 1/Type 1 of the relevant standard(s). Enhanced microphone windscreens should be used. Standard windshields of a diameter of less than 100 mm cannot be relied upon to provide sufficient reduction of wind noise in most circumstances.'

- 5.3.2 The noise monitoring equipment used for the background sound survey was comprised of Rion NL-52 and NL-53 Class 1 sound level meters along with Rion WS-15 wind shields, and field calibrated with a Rion NC-74 calibrator, and as such meets with the requirements of the IOA GPG.
- 5.3.3 Details of the noise monitoring equipment used, the calibration drift recorded and photographs at each NML are detailed in the FDS included in Annex 3. The IOA GPG states that for calibration drift greater than 1 dB the measurements should be discarded. The maximum calibration drift recorded during the noise survey was +/- 0.2 dB as detailed in the FDS (included in Annex 3) therefore no correction has been applied to the noise data.
- 5.3.4 Copies of the calibration/conformance certificates for the sound level meters and sound level calibrator used for the noise survey are included in Annex 4. All sound level meters conform to Class 1/ Type 1.
- 5.3.5 The microphones were all mounted between 1.2 m and 1.5 m above local ground level, situated between 3.5 m and 20 m from the dwelling⁵ and were located *'in an area frequently used for rest and relaxation'* (Section 2.5.1 of IOA GPG), where appropriate, away from obvious local sources of noise such as boiler flues, fans and running water. The sound level meters were situated as far away from hard reflective surfaces such as fences and walls as practicable.
- 5.3.6 All measurement systems were set to log the L_{A90} and L_{Aeq} noise levels over the required ten minute intervals continuously over the deployment period.

5.4 Meteorological Data

- 5.4.1 ARWTN states on Page 22 that:

'Where typical background sound levels are to be determined, these are measured at noise-sensitive receptors and related to wind speeds experienced on the wind farm site being assessed. Wind speeds need to be representative of those experienced at the hub height of the wind turbines being considered and standardised to 10-metres height.'

⁵ With the exception of NML2 and NML5, where equipment was located within the garden area, but at distances exceeding 20 m from the dwelling. At NML2 this was done to minimise the influence of a water feature on the measured levels; at NML5 the resident requested the equipment was placed at the end of the garden.

- 5.4.2 The preferred methodologies for measuring or calculating wind shear are detailed in Section 4.3.4.
- 5.4.3 For the Project for Assessment, concurrent wind speed/direction were recorded using a LIDAR unit which was located within the site (grid reference 385294, 419417). The meteorological data was collected and provided by the Applicant. The installation report and calibration information for the LIDAR can be provided upon request.
- 5.4.4 Tipping bucket rain gauges were installed at NML1 and NML4 for the duration of the noise survey to record periods of rainfall, time synchronised to the sound measurements. Rain data were collected by TNEI. As per the recommendations in Section 3.1.9 of the IOA GPG, the rain data were analysed by TNEI and the 10 minute periods which contain the registered rainfall events and the preceding 10 minute period have been excluded. All excluded rainfall periods are shown on Figures A1.2a-A1.2f (Annex 1) as blue squares.
- 5.4.5 Wind speed and direction data were collected over the same time-scale, and averaged over the same ten minute periods as the noise data to provide the analysis of the measured background sound as a function of wind speed and direction.
- 5.4.6 In accordance with the IOA GPG, methodology B, has been adopted for this assessment which involved using data collected at 83 m and 102 m on the LIDAR which were used to calculate hub height (105 m) wind speeds which, in turn, were standardised to a height of 10 m above ground.

5.5 Influence of Existing Turbines on Background Measurements

- 5.5.1 ARWTN states that measurements of background sound should not include noise from any operational wind turbine. The IOA GPG details that, in situations where measurement locations are potentially influenced by existing turbine noise, the following approaches can be adopted:
1. The existing wind turbines can be switched off (assuming the applicant has control of those turbines and noting that there would be associated cost implications);
 2. The contribution of the wind turbines can be accounted for by filtering the measured data by direction (only including background data when a receptor is upwind of the wind turbines) or by subtracting predicted turbine noise from the measured levels;
 3. Limits can be set using 'proxy' datasets measured at location(s) outside of the influence of the wind turbines; or
 4. Limits can be set using data collected as part of previous background sound assessments undertaken before the wind turbines were operational, providing the equipment and both noise and meteorological data obtained are appropriate.
- 5.5.2 The operational Scout Moor Wind Farm is located to the south and west of the Project for Assessment, and the operational Sheep House Farm turbines are located to the north. In addition, a number of small-scale (< 50 kW) turbines have been identified in the area surrounding the Project for Assessment. NMLs were carefully selected such that they were located away from the operational turbines wherever possible.

- 5.5.3 Following the careful selection of appropriate background sound monitoring locations additional analysis was undertaken in accordance with approach 2 listed in Section 5.5.1 above, the approach taken is described in detailed in Sections 5.6 and 5.7.

5.6 Directional Filtering of Background Sound

- 5.6.1 In Section 3.1.22 of the IOA GPG the need to directionally filter background sound data is discussed. Where a receiver is located upwind of a dominant local noise source whilst also being systematically downwind of the turbines then it may be necessary to filter background sound data particularly when this corresponds to the prevailing wind direction.
- 5.6.2 Directional filtering was undertaken to minimise the influence of noise from operational turbines on the measured levels. The filter angles that were used determined through a process of identifying the downwind direction of nearby operational turbines, and applying filters of various sizes centred on the downwind angle. The filtering sizes tested were 90, 135 and 180 degrees, and the option which resulted in the lowest dataset was chosen. At some NMLs, filtering was applied for multiple operational turbine developments, resulting in a wider overall filtering angle. At other NMLs, filtering was found to increase the noise level (such as at NML4 and NML5), and as such no filtering was ultimately applied.
- 5.6.3 Table 5.2 provides a summary of the directional filtering used at each NML to remove the influence of operational turbine noise.

Table 5.2 Directional Filtering for Operational Turbines

NML/Receptor Name	Approximate Distance to Nearest Operational Turbine	Filtering Applied
NML1 – Lower Mount Pleasant Farm	122 m from Lower Mount Pleasant Farm turbine 160 m from White Jones Farm turbine 1,750 m from nearest Scout Moor Wind Farm turbine	Filter angle: 240° (120° – 360°)
NML2 – Lowerfold Barn	560 m from End Cottage Tippet Farm turbine 1,620 m from nearest Scout Moor Wind Farm turbine	Filter angle: 135° (119.5° – 254.5°)
NML3 – Law Head	560 m from nearest Sheep House Farm turbine, 2,475 m from nearest Scout Moor Wind Farm turbine	Filter angle: 180° (91° – 271°)
NML4 – New Road Farm	2,925 m from nearest Scout Moor Wind Farm turbine	None applied
NML5 – Windy Harbour	1,010 m from Shawfield Farm turbine 2,450 m from nearest Scout Moor Wind Farm turbine	None applied
NML6 – Jubarn	680 m from Shawfield Farm turbine 1,800 m from nearest Scout Moor Wind Farm turbine	Filter angle: 180° (220° – 40°)

5.7 Subtraction of Predicted Operational Wind Turbine Noise Levels

- 5.7.1 To ensure that the influence of the operational turbines was appropriately considered, the remaining data (following the filtering detailed above) was adjusted by subtracting the predicted wind turbine noise levels (for each ten-minute period) from the noise level measured at the NML (this method is also referenced in Section 5.2.3 of the IOA GPG). Where predicted noise levels were equal to or above the measured noise levels it is not possible to undertake the correction and in this case it has been assumed that the background sound levels are 10 dB below the measured value. Adoption of this approach has resulted in a band of data between 10 and 15 dB, in practice this is considered to be a cautious approach which should result in the calculation of a cautious prevailing background sound level.
- 5.7.2 The results of this analysis are visible on Figures A1.2b-f. For the remaining data the original measured data is shown in blue and the calculated background sound data is shown in grey; the calculated background sound levels effectively shift down as viewed on the graph. In addition, directionally filtered data is shown in orange, rain exclusions are shown in light blue and manually excluded data is shown in red (which primarily relate to a period of snowfall followed by a period of approximately one week where snow was on the ground, leading to atypical conditions). Two versions of each figure are provided with version 'a' showing all of the data described above and version 'b' showing only the resulting calculated background sound data for clarity.
- 5.7.3 Following the subtraction of predicted operational noise levels, the remaining data measured at NML1 (following directional filtering) was almost entirely shifted 10 dB below the measured values, suggesting that the calculation was overly conservative. The resulting values were considered to be unrepresentative of actual background sound levels at NML1, and consequently the dataset was discarded. Data measured at NML3 was used as a proxy, as the quietest available dataset (the levels of which are below the measured total noise levels from NML1, as can be seen on Figures A1.2aa and A1.2ab).

5.8 Analysis of Measured Data

- 5.8.1 Analysis of the measured data has been undertaken in accordance with the recommendations in ARWTN and the IOA GPG.
- 5.8.2 Meteorological data was screened upon receipt by TNEI and where rainfall occurred, the noise and wind speed data has been excluded from the assessment as detailed in Section 5.4 above.
- 5.8.3 Time series graphs are provided in Annex 5, which show the variation in measured wind speed/direction and noise level over the monitoring period. These graphs also show where data was excluded, either due to rainfall, birdsong or manual exclusions due to atypical data.

5.9 Prevailing Background Sound Level

- 5.9.1 Table 5.3 and Table 5.4 summarise the prevailing background sound levels measured during the noise monitoring period, after filtering and analysis of the individual datasets as discussed above.

Table 5.3 Summary of Prevailing Background Sound Levels during Quiet Daytime Periods (dB(A))

NML	Prevailing Background Sound Level $L_{A90,10 \text{ min}}$									
	1	2	3	4	5	6	7	8	9	10
NML2 – Lowerfold Barn	31.6*	31.6*	31.6	31.6	31.7	31.9	32.1	32.5	32.8	33.2
NML3 – Law Head	26.4	28.1	29.4	30.3	31.0	31.5	32.1	32.9	34.0	35.6
NML4 – New Road Farm	26.1*	26.1*	26.1*	26.1*	26.1*	26.1	26.4	27.7	30.2	34.3
NML5 – Windy Harbour	29.5	30.0	30.6	31.2	32.0	33.0	34.3	36.0	38.1	40.7
NML6 - Jubarn	30.4	31.3	32.2	33.1	34.0	34.8	35.7	36.4	37.2	37.8

*flatlined where derived minimum occurs at lower wind speeds, see Section 5.9.7.

Table 5.4 Summary of Prevailing Background Sound Levels during Night-time Periods (dB(A))

NML	Prevailing Background Sound Level $L_{A90,10 \text{ min}}$									
	1	2	3	4	5	6	7	8	9	10
NML2 – Lowerfold Barn	29.7*	29.7*	29.7*	29.7*	29.7*	29.7*	29.7	30.1	31.3	33.4
NML3 – Law Head	20.7	23.0	24.4	25.0	25.3	25.4	25.7	26.3	27.5	29.7
NML4 – New Road Farm	23.4*	23.4*	23.4*	23.4*	23.4*	23.4	24.2	26.2	29.5	34.1
NML5 – Windy Harbour	27.3*	27.3*	27.3*	27.3	27.5	28.5	30.2	32.5	35.6	39.3
NML6 - Jubarn	29.6*	29.6	29.9	30.3	31.0	31.7	32.7	33.9	35.2	36.7

*flatlined where derived minimum occurs at lower wind speeds, see Section 5.9.7

5.9.2 A series of graphs are presented for each of the NMLs to illustrate the data collected, these are included as Figures A1.2ba - A1.2fb (Annex 1). There is a set of graphs for each of the NMLs, which show the range of wind speeds and directions recorded during the survey at the Lidar and the 10 minute average wind speeds plotted against the recorded $L_{A90, 10\text{min}}$ noise

levels at the NML along with a calculated 'best fit' polynomial regression line for the quiet daytime and night-time periods.

- 5.9.3 The prevailing measured background sound levels have been calculated using a best fit polynomial regression line of no more than a fourth order through the measured $L_{A90, 10min}$ noise data, as required by ARWTN and the IOA GPG.
- 5.9.4 In line with the recommendations included in Section 3.1.21 of the IOA GPG, where relevant, the polynomial background curve for the low speed conditions has been flatlined at the lower wind speeds where the derived minimum occurs. This is presented Figures A1.2ba-fb, the final regression analysis curve is shown as a continuous black line and the original polynomial line of best fit through the data is shown as a dashed black line.
- 5.9.5 Section 2.9.5 of the IOA GPG recommends that no fewer than 200 valid data points should be recorded in each of the quiet daytime and night-time periods, with no fewer than 5 valid data points in any 1 ms^{-1} wind speed bin. Where the background sound data has been filtered by wind direction the IOA GPG (Section 2.9.6) recommends that 100 data points and 3 per wind speed bin may be appropriate. The minimum number of datapoints were recorded all wind speeds for both quiet day time and night-time at all of the NMLs.
- 5.9.6 The number of data points measured in each wind speed bin for each receptor, once exclusions were applied, are summarised in Figures A1.2ba - A1.2fb (Annex 1). The Figures also show the final prevailing background sound levels which have been determined following the analysis detailed above.

6 Noise Assessment Results

6.1 Noise Assessment Locations

6.1.1 Noise Assessment Locations (NAL) refer to the position on the curtilage denoted by the yellow circle symbol on Figure A1.1 (Annex 1). A total of twenty one noise sensitive receptors were chosen as representative NALs. The operational wind farm NALs were defined at an early stage of the project before the design was fixed. The NALs were selected considering initial noise level predictions based on early feasibility studies, the scoping layout, and the potential for that layout to evolve i.e. considering the potential for wind turbines to be located elsewhere within the Site. As such, there are now more NALs than are strictly required for the assessment, however, the NALs have remained the same throughout the evolution of the layout design to maintain consistency throughout the project timeline, and are useful to demonstrate the operational noise impacts for all dwellings in the local area i.e. not just those that are the closest. Predictions of wind turbine noise have been made at each of the NALs as detailed in Table 6.1.

6.1.2 This approach ensures that the report models the worst case (highest) noise immission level expected at each group of noise sensitive receptors, as, generally speaking, sound levels decrease due to the attenuating factors described in Section 6.3 and thus the closer to a noise source, the higher the noise level. Table 6.1 details which NML has been used to set noise limits for each NAL.

Table 6.1 Noise Assessment Locations

Noise Assessment Location (NAL)	Easting (m)	Northing (m)	Elevation (m AOD)	Approximate Distance to Nearest Scout Moor II Turbine* (m)	Background Sound Data Used
NAL1 – Cowpe Hall Farm	383665	420416	292	1,115 (T15)	NML2
NAL2 – Willowfield Farm	383925	420092	307	1,070 (T15)	NML2
NAL3 – Cowpe Lodge	384074	420340	274	1,200 (T11)	NML2
NAL4 - Height	384817	420785	342	995 (T11)	NML3
NAL5 – Sheep House Farm	385514	421094	280	955 (T12)	NML3
NAL6 – Cutler Lane	386037	421302	273	1,220 (T12)	NML3
NAL7 – Deansgreave Road	387941	421215	334	2,185 (T10)	NML3

Noise Assessment Location (NAL)	Easting (m)	Northing (m)	Elevation (m AOD)	Approximate Distance to Nearest Scout Moor II Turbine* (m)	Background Sound Data Used
NAL8 – Cowm Top Farm	388352	419627	321	2,270 (T10)	NML4
NAL9 – The Old Farmhouse	387935	418320	257	1,575 (T1)	NML4
NAL10 – Houses o' Th' Hill	387665	417476	269	1,080 (T1)	NML4
NAL11 – Snipe Barn Farm	387115	416360	272	1,270 (T1)	NML5
NAL12 – Doldrum Farm	386373	415890	291	1,635 (T1)	NML6
NAL13 – Naden House	385784	416346	236	1,415 (T1)	NML6
NAL14 – Knowl Farm	384705	416030	304	1,990 (T7)	NML6
NAL15 – Higher Red Lumb Farm	384076	416138	314	2,170 (T7)	NML6
NAL16 – Edenfield Road	382694	416438	294	2,535 (T13)	NML6
NAL17 – Fecit Farm	382022	417649	311	2,000 (T13)	NML6
NAL18 – Lowes Farm	381072	418802	254	2,090 (T15)	NML6
NAL19 – Higher Mount Pleasant	381590	420567	370	1,810 (T15)	NML3
NAL20 – Lench Fold	383086	421058	285	1,570 (T15)	NML2
NAL21 – Limed Farm**	387574	418433	314	1,350 (T1)	NML4

* Please note the distances to nearest turbines quoted above may differ from those reported elsewhere. Distances for the noise assessment are taken from the nearest turbine to the closest edge of the amenity area (usually the garden).

** the occupiers are financially involved with the Project for Assessment.

6.2 Noise Emission Characteristics of the Wind Turbines

- 6.2.1 There are a range of wind turbine models which may be suitable for installation at the Project for Assessment. This assessment considers the Nordex N149 5.7 MW with serrated trailing edge blade and a hub height of 105 m.
- 6.2.2 The turbines considered in the cumulative assessment are summarised in Annex 6 and are shown on Figure A1.1a. Details of the sound power level, octave data and measurement uncertainty used for the turbines considered in this assessment are included in Annex 8. Due to the differences in the way in which levels are provided by the different manufacturers, TNEI has accounted for uncertainty using the guidance contained within Section 4.2 of the IOA GPG.
- 6.2.3 Manufacturer data is usually supplied based on a specific hub height whilst values are presented as standardised to 10 m height. The noise model used in this assessment alters turbine noise data to account for different hub heights, where applicable. The hub heights considered for the other wind farm/turbine developments are summarised in Annex 6.

6.3 Cumulative Turbine Wind Shear Adjustment

- 6.3.1 Predicted noise immission levels from the cumulative turbines considered in this assessment are based on specific turbine hub heights, referenced to 10 m (assuming a standardised roughness length of 0.05 m). Where hub heights differ from the noise limit reference height, there is the potential that wind shear is not correctly accounted for. The cumulative developments Scout Moor Wind Farm and the Sheep House Farm turbines have 60 m and 30.8 m hub heights respectively, which are substantially lower than the 105 m hub height of the Project for Assessment. In order to more accurately account for differences in wind shear, the sound power level data used for Scout Moor Wind Farm and the Sheep House Farm turbines has been adjusted using a correction factor determined from analysis of wind measurement data.
- 6.3.2 The analysis utilised LiDAR data captured over the period of the baseline survey (28th November 2024 to 12th February 2025), as well as wind distribution data captured from a meteorological mast located within the Scout Moor Wind Farm over a period of 5 years. The locations of the LiDAR and mast are shown on Figure A1.1 in Annex A.
- 6.3.3 Wind shear exponents were calculated for the hub heights of the Scout Moor Wind Farm and Sheep House Farm turbines.
- 6.3.4 Wind shear exponents were calculated between the hub heights of the Scout Moor Wind Farm and Sheep House Farm turbines and the reference height (the hub height of Project for Assessment). Separate shear exponents were calculated for quiet daytime and night-time periods. The shear exponents were used to calculate wind speeds at the hub heights of the operational Scout Moor Wind Farm and Sheep House Farm turbines. A WAsP flow model was then used to extrapolate the hub height wind speeds to the individual operational turbine locations.
- 6.3.5 The difference between the calculated hub height wind speeds at the operational turbine locations and the wind speed to which the sound power level data is referenced was used to apply a correction to the sound power level data used in the noise predictions. As a cautious approach, the worst-case correction between quiet day and night-time periods was applied at all times. The calculated shear adjustments are presented in Annex 7, and the corrected SWLs are presented in Annex 8.

6.4 Noise Propagation Parameters

- 6.4.1 As detailed in Section 4.4 above, the full version of the ISO 9613-2 model has been used to calculate the noise immission levels at the nearest receptors.
- 6.4.2 For the purposes of the present assessment, all noise level predictions have been undertaken using a receiver height of 4.0 m above local ground level, mixed ground ($G=0.5$) and air absorption co-efficients based on a temperature of 10 °C and 70 % relative humidity to provide a realistic impact assessment. The modelling parameters reflect current good practice as detailed within the IOA GPG.
- 6.4.3 The wind turbine noise immission levels are based on the $L_{A90,10 \text{ minute}}$ noise indicator in accordance with the recommendations in ARWTN, which were obtained by subtracting 2dB(A) from the turbine sound power level data (L_{Aeq} indicator).
- 6.4.4 A topographical assessment has been undertaken between each noise sensitive receptor and wind turbine location to determine whether any concave ground profiles exist between the source and receiver (noise sensitive receptor). Analysis undertaken using a combination of CadnaA (29) and an Excel model found that if the formula in the IOA GPG is applied directly a +3 dB correction is required for some turbines at a number of receptors as summarised in Annex 6.
- 6.4.5 In addition, an assessment has been undertaken to determine whether any topographical screening effects of the terrain occur where there is no direct line of sight between the highest point on the turbine rotor and the receiver location. Upon analysis of each noise sensitive receptor it was found that a barrier correction of -2 dB could be applied for some turbines at a number of receptors as detailed in Annex 6. In reality, there is significant screening at some of the locations so more attenuation may occur in practice, the use of a 2 dB value is therefore considered to be conservative as it results in the highest predicted levels. All corrections have been applied, where necessary, in all of the Tables and Graphs in this report.
- 6.4.6 The need to include a concave ground/screening correction may change depending on the final location of the turbines (following micro-siting) and the final turbine hub height. Nevertheless, turbine noise levels will have to meet the noise limits detailed in planning conditions regardless of any difference in noise propagation caused by topography. Should planning permission be granted, the need to apply a concave slope correction will need to be considered by the Applicant prior to the final selection of a turbine model for the Project for Assessment.
- 6.4.7 The cumulative assessment has taken into account directivity effects in line with good practice. The directivity of wind turbines has been recognised for some time. Building on earlier work by NASA, in 1988 Wyle Laboratories studied sound propagation using an omnidirectional loudspeaker source elevated 80 ft above ground, in upwind, downwind and cross wind situations, and in both flat and hilly terrain, then compared those measurements to measured data from actual wind turbines. Their study quantified directivity factors for a limited frequency range, but was unable to conclusively demonstrate the anticipated directivity effects on real wind turbines. It also highlighted, but was unable to explain, measured differences observed between flat and hilly terrain.

- 6.4.8 Hubbard (1990) (IOA GPG Section 4.4.3) described a number of factors believed to influence propagation and directivity, notably refraction caused by vertical wind and temperature gradients. In the downwind direction the wind gradient causes the sound rays to bend toward the ground, whereas in the upwind direction the rays curve upward away from the ground. Upwind of the turbine this results in a region of increased attenuation termed the 'shadow zone'. The excess attenuation is frequency dependent, with lowest frequencies least attenuated. Relating this to the earlier NASA studies, Hubbard noted that the distance from the source to the edge of the shadow zone is related to the wind speed gradient and the elevation of the source, which for a typical turbine source was calculated to be approximately 5 times the source height.
- 6.4.9 This observation was adopted in the IOA GPG, which states (Section 4.4.2) '*Such reductions (due to "shadow zone" refraction effects) will in practice only progressively come into play at distances of between 5 and 10 turbine tip heights*', while Section 4.4.3 provides graphical examples of increasing broadband directivity with increasing tip height scaling in both flat and hilly terrain, without qualifying either of those designations.
- 6.4.10 The IOA GPG recommends (Section 4.4.1) that directivity attenuation factors adopted in any assessment should be clearly stated. The TNEI noise model can consider the effect of directivity, and in line with current good practice the attenuation values used are in detailed in Table 6.2. These are based upon the examples given in the IOA GPG (Section 4.4.2), using interpolation where required, and adopt a single attenuation value for receptors between located more than 5 tip heights from a receiver.

Table 6.2 Wind Directivity Attenuation Factors used in Modelling

Direction (°)	0	15	30	45	60	75	90	105	120	135	150	165
Attenuation dB(A)	-10	-9.9	-9.3	-8.3	-6.7	-4.6	-2	0	0	0	0	0
Direction (°)	180	195	210	225	240	255	270	285	300	315	330	345
Attenuation (dB(A))	0	0	0	0	0	0	-2	-4.6	-6.7	-8.3	-9.3	-9.9

- 6.4.11 For predictions of cumulative noise, this assessment considers the worst-case wind direction. For predictions for a single wind development, the worst-case direction is typically downwind of the turbine, however for combined predictions of multiple cumulative developments, the direction resulting in the highest predicted noise level is used.
- 6.4.12 For developments comprising of pitch-regulated turbines (where the angle of the blades are adjusted to optimise efficiency, maintain constant power output and to protect the turbine in high winds), turbines typically reach a maximum noise output at higher wind speeds. Where this is the case, the worst-case wind direction may be identified based on a single wind speed (typically between 8-10 ms⁻¹). For stall-regulated turbines (where the angle of the blades do not change), noise levels can continue to rise at high wind speeds, rather than 'levelling out' once their maximum speed is reached.
- 6.4.13 For cumulative scenarios where there is a mix of pitch-regulated and stall-regulated turbines, this can lead to instances where the worst-case wind direction varies with wind speed. This

has been identified at NAL19, which is located between Scout Moor Wind Farm and the Lower Mount Pleasant Farm and White Jones Farm (stall regulated) turbines. Where this is the case, noise limits have been derived based on the worst-case direction per wind speed, to ensure a cautious approach.

6.5 Total Noise Assessment Criteria (Stage 1)

6.5.1 ARWTN states in Section 2.24) that:

‘When determining a cumulative TNAC for several wind farms or the extension of an existing project (see cumulative noise section 2.39 to 2.43), the total generating capacity from the relevant sites included in the assessment should be considered.’ and ‘The effect of the choice of LLV on energy generation should also represent a consideration. If the choice of LLV does not impact on energy generation of the wind development, for example because the nearest noise-sensitive receptors are relatively distant, then a lower LLV should be applied.’

6.5.2 The derivation strategy for the daytime LLV used to determine the TNAC for the cumulative assessment is summarised in Table 6.3 below. Based on consideration of the three factors specified by ARWTN, a daytime LLV of 40 dB is deemed appropriate for use in the cumulative scenario.

Table 6.3 TNAC Derivation Strategy

Factor	Guidance in ARWTN	Commentary for the Project for Assessment
1)	<i>‘The generating capacity of the wind farm and the likely consequence that the choice of LLV would have on the energy generation of the wind farm(s).’</i>	The generating capacity of the sites considered in the cumulative assessment is 133 MW which is large in the national context and would allow a significant amount of renewable energy to be generated. If the TNAC was derived based on a lower LLV, this would result in the derivation of lower Site Specific Noise Limits and exceedances of the noise limits would occur. In particular, this would result in SSNLs at some NALs set 10 dB below the TNAC at certain wind speeds, and mitigating to meet this limit would require substantial noise management and reduce the amount of energy generated by the Project for Assessment. Consideration of this test suggests that an LLV towards the upper end of the allowed range would be appropriate.
2)	<i>‘The number of dwellings in the neighbourhood of the wind farm(s) and the magnitude of the levels to which these are exposed.’</i>	The Site is located in a rural area with a relatively low number of scattered dwellings in the immediate vicinity of the wind turbines. Of the 21 NALs considered, 16 need to be considered in the cumulative assessment as

Factor	Guidance in ARWTN	Commentary for the Project for Assessment
		predicted noise levels from the Project for Assessment are within 10 dB of the TNAC and within 10 dB of those from the other sites considered in the cumulative assessment. Of the 21 NALs considered, 18 are predicted to experience cumulative noise levels of greater than or equal to 35 dB. Whilst some of these NALs represent multiple NSRs, this number is considered to be low given the size of the cumulative development. Three of the 21 NALs considered in the cumulative assessment are predicted to experience cumulative wind farm noise levels of 40 dB or more. The maximum predicted cumulative noise level at the 21 NALs considered is 42.2 dB. Consideration of this test suggests that an LLV towards the upper end of the range permitted in ARWTN would be appropriate.
3)	<i>'The duration and level of exposure to wind turbine noise of dwellings in the neighbourhood of the wind farm(s).'</i>	The level of exposure is low (<35 dB) for three of the 21 NALs when considering the cumulative predicted noise levels. At the 18 NALs where cumulative noise levels of ≥ 35 dB are predicted it should be noted that this is only the case when the standardised 10 m wind speed is high enough. Cumulative noise levels of ≥ 35 dB are not predicted to occur for wind speeds of less than 7 m/s at 8 NALs (5, 6, 8, 10, 12, 18 - 20), excluding those NALs where the maximum noise level does not exceed 35 dB. Background sound levels are relatively low, which is consistent with rural locations in the UK. As such, there are times when the predicted cumulative noise levels are likely to exceed the background sound levels, particularly at standardised 10 m wind speeds in the middle of the range considered. At lower wind speeds, the wind farm noise levels are low and the background sound levels continue to increase at higher wind speeds whilst the wind farm noise levels level off once they have reached their maximum. Of the 18 NALs with predicted cumulative noise levels of greater than 35 dB, one (NAL18) is located such that it is not predicted to experience noise levels of greater than 35 dB

Factor	Guidance in ARWTN	Commentary for the Project for Assessment
		when the wind is from predominant wind directions (taken to be direction sectors of between 210 and 270 degrees). 15 NALs are located such that noise levels experienced in the predominant wind directions, whilst ≥ 35 dB, would be less than those used in the assessment, i.e. the worst case wind direction sector is a non-predominant sector. The remaining two NALs (10 and 21) are located such that the maximum cumulative noise levels occur in a predominant wind direction sector although it should still be noted that the noise levels would be reduced at times when the wind is from non-predominant sectors. Of the 18 NALs with predicted cumulative noise levels of greater than 35 dB, the average difference in the predicted noise level between the wind direction with the greatest noise level and the wind direction with the lowest noise level is 8.5 dB. At all of these NALs, noise levels of below 35 dB would be experienced in two or more wind direction sectors. Consideration of this test suggests that an LLV towards the upper end of the range specified by ARWTN may be appropriate.

6.5.3 The TNAC have been established for each of the NALs as detailed in Table 6.4 and Table 6.5 below, based on a LLV of 40 dBA (daytime) or 43 dBA (Night-time). A 45 dBA LLV is applicable at NALs with financial involvement with either the Project for Assessment or a neighbouring scheme.

Table 6.4 Total Noise Assessment Criteria Daytime

Location	Wind Speed (ms^{-1}) as standardised to 10m height									
	1	2	3	4	5	6	7	8	9	10
NAL1	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0
NAL2	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0
NAL3	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0
NAL4	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.6
NAL5	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.6
NAL6	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.6
NAL7	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.6

Location	Wind Speed (ms ⁻¹) as standardised to 10m height									
	1	2	3	4	5	6	7	8	9	10
NAL8	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0
NAL9	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0
NAL10	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0
NAL11	40.0	40.0	40.0	40.0	40.0	40.0	40.0	41.0	43.1	45.7
NAL12	40.0	40.0	40.0	40.0	40.0	40.0	40.7	41.4	42.2	42.8
NAL13	40.0	40.0	40.0	40.0	40.0	40.0	40.7	41.4	42.2	42.8
NAL14	40.0	40.0	40.0	40.0	40.0	40.0	40.7	41.4	42.2	42.8
NAL15	40.0	40.0	40.0	40.0	40.0	40.0	40.7	41.4	42.2	42.8
NAL16	40.0	40.0	40.0	40.0	40.0	40.0	40.7	41.4	42.2	42.8
NAL17	40.0	40.0	40.0	40.0	40.0	40.0	40.7	41.4	42.2	42.8
NAL18	40.0	40.0	40.0	40.0	40.0	40.0	40.7	41.4	42.2	42.8
NAL19	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.6
NAL20	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0
NAL21	45.0	45.0	45.0	45.0	45.0	45.0	45.0	45.0	45.0	45.0

Table 6.5 Total Noise Assessment Criteria Night-time

Location	Wind Speed (ms ⁻¹) as standardised to 10m height									
	1	2	3	4	5	6	7	8	9	10
NAL1	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0
NAL2	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0
NAL3	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0
NAL4	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0
NAL5	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0
NAL6	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0
NAL7	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0
NAL8	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0
NAL9	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0
NAL10	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0
NAL11	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	44.3
NAL12	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0
NAL13	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0
NAL14	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0
NAL15	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0
NAL16	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0
NAL17	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0
NAL18	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0
NAL19	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0
NAL20	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0
NAL21	45.0	45.0	45.0	45.0	45.0	45.0	45.0	45.0	45.0	45.0

6.6 Predicting the requirement for a cumulative assessment and the likely effects (Stage 2)

- 6.6.1 A comparison has been undertaken of the predicted wind turbine noise immission levels from the Project for Assessment alongside all other schemes at each of the identified noise sensitive receptors in order to demonstrate whether predictions are within 10 dB of the TNAC and of each other. All cumulative turbines have been assumed to be operating in unconstrained mode. Table 6.6 below summarises the results and whether a cumulative noise assessment is required. As is detailed in Section 4.4 above, if the predictions are greater than 10 dB apart then a cumulative noise assessment is not required. Where predictions are found to be within 10 dB of each other then a cumulative assessment is required.

Table 6.6 Cumulative Assessment Requirement

Noise Assessment Location (NAL)	Are predicted wind turbine noise levels within 10 dB?	Is a cumulative assessment required?
NAL1	YES	YES
NAL2	YES	YES
NAL3	YES	YES
NAL4	YES	YES
NAL5	YES	YES
NAL6	YES	YES
NAL7	NO	NO
NAL8	YES	YES
NAL9	YES	YES
NAL10	YES	YES
NAL11	YES	YES
NAL12	YES	YES
NAL13	YES	YES
NAL14	YES	YES
NAL15	NO	NO
NAL16	NO	NO
NAL17	NO	NO
NAL18	NO	NO
NAL19	YES	YES
NAL20	YES	YES
NAL21	YES	YES

- 6.6.2 As summarised in Table 6.6 above a cumulative noise assessment is required at all but five receptors (NALs 7, & 15-18), however all NALs have been included within the cumulative assessment for completeness. A detailed list of all of the wind farms/wind turbine

developments considered in the noise predictions are included in Table 2 of Annex 6⁶. In addition, a summary of the noise prediction comparisons are included as Table 3 of Annex 6, a summary of predicted noise levels from the Project for Assessment against the TNAC are provided in Table 4 of Annex 6, and a summary of predicted cumulative noise levels (excluding the Project for Assessment) against the TNAC are provided in Table 5 of Annex 6.

- 6.6.3 The results of the likely cumulative noise assessment are summarised in tabular form in Table 6.7 and Table 6.8. The results show that the predicted cumulative wind turbine noise immission levels meet the Total Noise Assessment Criteria under all conditions at all NALs.
- 6.6.4 The predicted 'likely' cumulative levels are the actual noise levels expected at an NAL and include the addition of an appropriate level of uncertainty to the turbine data as per Section 4.2 of the IOA GPG. The uncertainty level added is generally +2 dB but this can vary depending on the turbine manufacturer data available for each turbine.
- 6.6.5 Figures A1.3a-u (Annex 1) show predictions from the Project for Assessment and 'Cumulative (including Project for Assessment)' against the 'Total Noise Assessment Criteria' at all NALs. The individual contribution of the cumulative schemes are also shown. In line with section 2.41 of ARWTN, for NAL21 (which is financially involved with the Project for Assessment), an additional Non-FI TNAC is shown, applicable to 'Cumulative (excluding Project for Assessment)'.

⁶ Table 1 and 2 of Annex 6 include topographical corrections, coordinates and hub heights for the Sheep House Farm turbines, however it should be noted that these turbines are only considered within Annex 12 and not within the cumulative assessment.

Table 6.7 TNAC Compliance Table – Likely Cumulative Noise - Daytime

Location		Wind Speed (ms ⁻¹) as standardised to 10 m height									
		1	2	3	4	5	6	7	8	9	10
NAL1	TNAC	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0
	Predicted Cumulative Wind Turbine Noise L _{A90}	-	-	-	-	33.2	36.9	38.3	38.5	38.6	38.8
	Exceedance Level	-	-	-	-	-6.8	-3.1	-1.7	-1.5	-1.4	-1.2
NAL2	TNAC	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0
	Predicted Cumulative Wind Turbine Noise L _{A90}	-	-	-	-	34.1	37.8	39.1	39.3	39.5	39.6
	Exceedance Level	-	-	-	-	-5.9	-2.2	-0.9	-0.7	-0.5	-0.4
NAL3	TNAC	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0
	Predicted Cumulative Wind Turbine Noise L _{A90}	-	-	-	-	33.0	36.6	37.9	38.1	38.3	38.5
	Exceedance Level	-	-	-	-	-7.0	-3.4	-2.1	-1.9	-1.7	-1.5
NAL4	TNAC	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.6
	Predicted Cumulative Wind Turbine Noise L _{A90}	-	-	-	-	33.1	36.9	38.3	38.4	38.6	38.7
	Exceedance Level	-	-	-	-	-6.9	-3.1	-1.7	-1.6	-1.4	-1.9
NAL5	TNAC	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.6
	Predicted Cumulative Wind Turbine Noise L _{A90}	-	-	-	-	30.7	34.7	36.1	36.2	36.3	36.4
	Exceedance Level	-	-	-	-	-9.3	-5.3	-3.9	-3.8	-3.7	-4.2
NAL6	TNAC	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.6
	Predicted Cumulative Wind Turbine Noise L _{A90}	-	-	-	-	29.6	33.5	34.9	35.0	35.1	35.2
	Exceedance Level	-	-	-	-	-10.4	-6.5	-5.1	-5.0	-4.9	-5.4

Location		Wind Speed (ms ⁻¹) as standardised to 10 m height									
		1	2	3	4	5	6	7	8	9	10
NAL7	TNAC	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.6
	Predicted Cumulative Wind Turbine Noise L _{A90}	-	-	-	-	26.5	30.1	31.8	32.1	32.2	32.2
	Exceedance Level	-	-	-	-	-13.5	-9.9	-8.2	-7.9	-7.8	-8.4
NAL8	TNAC	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0
	Predicted Cumulative Wind Turbine Noise L _{A90}	-	-	-	-	29.5	33.5	34.9	35.0	35.1	35.2
	Exceedance Level	-	-	-	-	-10.5	-6.5	-5.1	-5.0	-4.9	-4.8
NAL9	TNAC	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0
	Predicted Cumulative Wind Turbine Noise L _{A90}	-	-	-	-	27.8	31.6	33.0	33.1	33.3	33.4
	Exceedance Level	-	-	-	-	-12.2	-8.4	-7.0	-6.9	-6.7	-6.6
NAL10	TNAC	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0
	Predicted Cumulative Wind Turbine Noise L _{A90}	-	-	-	-	30.3	34.3	35.7	35.8	35.9	36.0
	Exceedance Level	-	-	-	-	-9.7	-5.7	-4.3	-4.2	-4.1	-4.0
NAL11	TNAC	40.0	40.0	40.0	40.0	40.0	40.0	40.0	41.0	43.1	45.7
	Predicted Cumulative Wind Turbine Noise L _{A90}	-	-	-	-	29.0	32.8	34.2	34.3	34.5	34.6
	Exceedance Level	-	-	-	-	-11.0	-7.2	-5.8	-6.7	-8.6	-11.1
NAL12	TNAC	40.0	40.0	40.0	40.0	40.0	40.0	40.7	41.4	42.2	42.8
	Predicted Cumulative Wind Turbine Noise L _{A90}	-	-	-	-	31.9	34.7	36.1	36.5	36.9	37.2
	Exceedance Level	-	-	-	-	-8.1	-5.3	-4.6	-4.9	-5.3	-5.6

Location		Wind Speed (ms ⁻¹) as standardised to 10 m height									
		1	2	3	4	5	6	7	8	9	10
NAL13	TNAC	40.0	40.0	40.0	40.0	40.0	40.0	40.7	41.4	42.2	42.8
	Predicted Cumulative Wind Turbine Noise L _{A90}	-	-	-	-	33.9	36.6	37.9	38.4	38.8	39.1
	Exceedance Level	-	-	-	-	-6.1	-3.4	-2.8	-3.0	-3.4	-3.7
NAL14	TNAC	40.0	40.0	40.0	40.0	40.0	40.0	40.7	41.4	42.2	42.8
	Predicted Cumulative Wind Turbine Noise L _{A90}	-	-	-	-	34.4	37.0	38.3	38.8	39.2	39.6
	Exceedance Level	-	-	-	-	-5.6	-3.0	-2.4	-2.6	-3.0	-3.2
NAL15	TNAC	40.0	40.0	40.0	40.0	40.0	40.0	40.7	41.4	42.2	42.8
	Predicted Cumulative Wind Turbine Noise L _{A90}	-	-	-	-	35.0	37.4	38.7	39.2	39.7	40.1
	Exceedance Level	-	-	-	-	-5.0	-2.6	-2.0	-2.2	-2.5	-2.7
NAL16	TNAC	40.0	40.0	40.0	40.0	40.0	40.0	40.7	41.4	42.2	42.8
	Predicted Cumulative Wind Turbine Noise L _{A90}	-	-	-	-	35.0	37.4	38.7	39.2	39.7	40.1
	Exceedance Level	-	-	-	-	-5.0	-2.6	-2.0	-2.2	-2.5	-2.7
NAL17	TNAC	40.0	40.0	40.0	40.0	40.0	40.0	40.7	41.4	42.2	42.8
	Predicted Cumulative Wind Turbine Noise L _{A90}	-	-	-	-	37.1	39.3	40.7	41.2	41.8	42.2
	Exceedance Level	-	-	-	-	-2.9	-0.7	0.0	-0.2	-0.4	-0.6
NAL18	TNAC	40.0	40.0	40.0	40.0	40.0	40.0	40.7	41.4	42.2	42.8
	Predicted Cumulative Wind Turbine Noise L _{A90}	-	-	-	-	30.9	33.3	34.6	35.1	35.7	36.0
	Exceedance Level	-	-	-	-	-9.1	-6.7	-6.1	-6.3	-6.5	-6.8

Location		Wind Speed (ms ⁻¹) as standardised to 10 m height									
		1	2	3	4	5	6	7	8	9	10
NAL19	TNAC	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.6
	Predicted Cumulative Wind Turbine Noise* LA90	-	-	-	-	31.2	34.2	35.5	35.9	36.2	36.5
	Exceedance Level	-	-	-	-	-8.8	-5.8	-4.5	-4.1	-3.8	-4.1
NAL20	TNAC	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0	40.0
	Predicted Cumulative Wind Turbine Noise LA90	-	-	-	-	30.0	33.5	34.8	35.1	35.3	35.5
	Exceedance Level	-	-	-	-	-10.0	-6.5	-5.2	-4.9	-4.7	-4.5
NAL21	TNAC	45.0	45.0	45.0	45.0	45.0	45.0	45.0	45.0	45.0	45.0
	Predicted Cumulative Wind Turbine Noise LA90	-	-	-	-	31.0	35.0	36.4	36.5	36.6	36.7
	Exceedance Level	-	-	-	-	-14.0	-10.0	-8.6	-8.5	-8.4	-8.3

Note: For the cumulative noise predictions the noise model considers the range of noise data available for each turbine type modelled. For some turbines noise data was not available for wind speeds less than 5 ms⁻¹ therefore no cumulative predictions are included for wind speeds less than 5 ms⁻¹.

*Predictions consider worst case wind direction on a per-wind-speed basis.

Table 6.8 TNAC Compliance Table – Likely Cumulative Noise – Night-time

Location		Wind Speed (ms ⁻¹) as standardised to 10 m height									
		1	2	3	4	5	6	7	8	9	10
NAL1	TNAC	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0
	Predicted Cumulative Wind Turbine Noise L _{A90}	-	-	-	-	33.2	36.9	38.3	38.5	38.6	38.8
	Exceedance Level	-	-	-	-	-9.8	-6.1	-4.7	-4.5	-4.4	-4.2
NAL2	TNAC	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0
	Predicted Cumulative Wind Turbine Noise L _{A90}	-	-	-	-	34.1	37.8	39.1	39.3	39.5	39.6
	Exceedance Level	-	-	-	-	-8.9	-5.2	-3.9	-3.7	-3.5	-3.4
NAL3	TNAC	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0
	Predicted Cumulative Wind Turbine Noise L _{A90}	-	-	-	-	33.0	36.6	37.9	38.1	38.3	38.5
	Exceedance Level	-	-	-	-	-10.0	-6.4	-5.1	-4.9	-4.7	-4.5
NAL4	TNAC	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0
	Predicted Cumulative Wind Turbine Noise L _{A90}	-	-	-	-	33.1	36.9	38.3	38.4	38.6	38.7
	Exceedance Level	-	-	-	-	-9.9	-6.1	-4.7	-4.6	-4.4	-4.3
NAL5	TNAC	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0
	Predicted Cumulative Wind Turbine Noise L _{A90}	-	-	-	-	30.7	34.7	36.1	36.2	36.3	36.4
	Exceedance Level	-	-	-	-	-12.3	-8.3	-6.9	-6.8	-6.7	-6.6
NAL6	TNAC	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0
	Predicted Cumulative Wind Turbine Noise L _{A90}	-	-	-	-	29.6	33.5	34.9	35.0	35.1	35.2
	Exceedance Level	-	-	-	-	-13.4	-9.5	-8.1	-8.0	-7.9	-7.8

Location		Wind Speed (ms ⁻¹) as standardised to 10 m height									
		1	2	3	4	5	6	7	8	9	10
NAL7	TNAC	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0
	Predicted Cumulative Wind Turbine Noise L _{A90}	-	-	-	-	26.5	30.1	31.8	32.1	32.2	32.2
	Exceedance Level	-	-	-	-	-16.5	-12.9	-11.2	-10.9	-10.8	-10.8
NAL8	TNAC	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0
	Predicted Cumulative Wind Turbine Noise L _{A90}	-	-	-	-	29.5	33.5	34.9	35.0	35.1	35.2
	Exceedance Level	-	-	-	-	-13.5	-9.5	-8.1	-8.0	-7.9	-7.8
NAL9	TNAC	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0
	Predicted Cumulative Wind Turbine Noise L _{A90}	-	-	-	-	27.8	31.6	33.0	33.1	33.3	33.4
	Exceedance Level	-	-	-	-	-15.2	-11.4	-10.0	-9.9	-9.7	-9.6
NAL10	TNAC	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0
	Predicted Cumulative Wind Turbine Noise L _{A90}	-	-	-	-	30.3	34.3	35.7	35.8	35.9	36.0
	Exceedance Level	-	-	-	-	-12.7	-8.7	-7.3	-7.2	-7.1	-7.0
NAL11	TNAC	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.1	45.7
	Predicted Cumulative Wind Turbine Noise L _{A90}	-	-	-	-	29.0	32.8	34.2	34.3	34.5	34.6
	Exceedance Level	-	-	-	-	-14.0	-10.2	-8.8	-8.7	-8.6	-11.1
NAL12	TNAC	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0
	Predicted Cumulative Wind Turbine Noise L _{A90}	-	-	-	-	31.9	34.7	36.1	36.5	36.9	37.2
	Exceedance Level	-	-	-	-	-11.1	-8.3	-6.9	-6.5	-6.1	-5.8

Location		Wind Speed (ms ⁻¹) as standardised to 10 m height									
		1	2	3	4	5	6	7	8	9	10
NAL13	TNAC	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0
	Predicted Cumulative Wind Turbine Noise L _{A90}	-	-	-	-	33.9	36.6	37.9	38.4	38.8	39.1
	Exceedance Level	-	-	-	-	-9.1	-6.4	-5.1	-4.6	-4.2	-3.9
NAL14	TNAC	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0
	Predicted Cumulative Wind Turbine Noise L _{A90}	-	-	-	-	34.4	37.0	38.3	38.8	39.2	39.6
	Exceedance Level	-	-	-	-	-8.6	-6.0	-4.7	-4.2	-3.8	-3.4
NAL15	TNAC	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0
	Predicted Cumulative Wind Turbine Noise L _{A90}	-	-	-	-	35.0	37.4	38.7	39.2	39.7	40.1
	Exceedance Level	-	-	-	-	-8.0	-5.6	-4.3	-3.8	-3.3	-2.9
NAL16	TNAC	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0
	Predicted Cumulative Wind Turbine Noise L _{A90}	-	-	-	-	35.0	37.4	38.7	39.2	39.7	40.1
	Exceedance Level	-	-	-	-	-8.0	-5.6	-4.3	-3.8	-3.3	-2.9
NAL17	TNAC	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0
	Predicted Cumulative Wind Turbine Noise L _{A90}	-	-	-	-	37.1	39.3	40.7	41.2	41.8	42.2
	Exceedance Level	-	-	-	-	-5.9	-3.7	-2.3	-1.8	-1.2	-0.8
NAL18	TNAC	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0
	Predicted Cumulative Wind Turbine Noise L _{A90}	-	-	-	-	30.9	33.3	34.6	35.1	35.7	36.0
	Exceedance Level	-	-	-	-	-12.1	-9.7	-8.4	-7.9	-7.3	-7.0

Location		Wind Speed (ms^{-1}) as standardised to 10 m height									
		1	2	3	4	5	6	7	8	9	10
NAL19	TNAC	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0
	Predicted Cumulative Wind Turbine Noise* LA90	-	-	-	-	31.2	34.2	35.5	35.9	36.2	36.5
	Exceedance Level	-	-	-	-	-11.8	-8.8	-7.5	-7.1	-6.8	-6.5
NAL20	TNAC	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0
	Predicted Cumulative Wind Turbine Noise LA90	-	-	-	-	30.0	33.5	34.8	35.1	35.3	35.5
	Exceedance Level	-	-	-	-	-13.0	-9.5	-8.2	-7.9	-7.7	-7.5
NAL21	TNAC	45.0	45.0	45.0	45.0	45.0	45.0	45.0	45.0	45.0	45.0
	Predicted Cumulative Wind Turbine Noise LA90	-	-	-	-	31.0	35.0	36.4	36.5	36.6	36.7
	Exceedance Level	-	-	-	-	-14.0	-10.0	-8.6	-8.5	-8.4	-8.3

Note: For the cumulative noise predictions the noise model considers the range of noise data available for each turbine type modelled. For some turbines noise data was not available for wind speeds less than 5 ms^{-1} therefore no cumulative predictions are included for wind speeds less than 5 ms^{-1} .

*Predictions consider worst case wind direction on a per-wind-speed basis.

6.7 Derivation of Site Specific Noise Limits (Stage 3)

- 6.7.1 In order to protect residential amenity, the IOA GPG (2013) recommendations are that cumulatively, all schemes operate within the TNAC. This can be found in summary box SB21 of the IOA GPG (2013) which states:

‘Whenever a cumulative situation is encountered, the noise limits for an individual wind farm should be determined in such a way that no cumulative excess of the total ETSU-R-97 noise limit would occur.’

- 6.7.2 As detailed in Section 1.1 above, the daytime Site Specific Noise Limits (SSNLs) have been derived based on guidance contained within ARWTN.
- 6.7.3 The apportionment options provided in the IOA GPG were considered to determine the most appropriate option for each NAL. Site Specific Noise Limits have been derived for each of the NALs considered within Table 6.1 above. Table 6.9 below summarises the approach adopted at each NAL in order to derive the Site Specific Noise Limits for the Project for Assessment.

Table 6.9 Limit Derivation Strategy

NAL	Limit Derivation Strategy
NALs 1, 3 – 4, 7, 12, 15 – 20	The likely predictions level from other schemes were found to be within 10 dB of the Total Noise Limits. As such, the limit has been apportioned based on a cautious prediction of cumulative turbine noise. The noise predictions for the other proposed, consented and operational schemes show that there is, in theory, significant headroom between the likely predicted levels and the Total Noise Assessment Criteria (>5 dB). In accordance with Section 4.5 above, a 2 dB buffer was therefore added to the turbine noise predictions for each of the other developments; this is considered to be a suitable buffer in accordance with Section 5.4.11 of the IOA GPG and would represent a 60% increase in emitted noise levels from the other schemes. The resulting ‘cautious’ predictions of cumulative wind turbine noise have then been logarithmically subtracted from the Total Noise Assessment Criteria to determine the ‘residual noise limit’. The daytime residual noise limit is then adjusted by taking the lowest of either: • The residual noise limit; or • Background sound plus 5 dB or the daytime LLV applicable to the Project for Assessment in isolation (35 dB), whichever is greater. Taking into account the guidance within ARWTN, the Site Specific Noise Limits were determined by adjusting the Residual Noise Limits down where appropriate to preserve noise headroom for future development. Where there was more than 3 dB headroom between the predicted noise level from the Project for Assessment and the Residual Noise Limit, the limit was adjusted down to 3 dB above the predicted level, and not lower than 10 dB below the TNAC.

NAL	Limit Derivation Strategy
NALs 5 – 6, 8 - 11	The likely predictions level from other schemes were found to be more than 10 dB below the Total Noise Assessment Criteria and as such the entire noise limit is available for use by the Project for Assessment. During daytime periods the Residual Noise Limit is equal to the background sound level plus 5 dB or the relevant daytime fixed minimum limit of 35 dB, whichever is greater. Taking into account the guidance within ARWTN, the Site Specific Noise Limits were determined by adjusting the Residual Noise Limits down where appropriate to preserve noise headroom for future development. Where there was more than 3 dB headroom between the predicted noise level from the Project for Assessment and the Residual Noise Limit, the limit was adjusted down to 3 dB above the predicted level, and not lower than 10 dB below the TNAC.
NALs 2, 13 - 14	The likely predictions level from other schemes were found to be within 10 dB of the Total Noise Limits. As such, the limit has been apportioned based on a cautious prediction of cumulative turbine noise. The noise predictions for the other proposed, consented and operational schemes (specifically Scout Moor Wind Farm) show that there is not significant headroom (>5 dB) between the likely predicted levels and the Total Noise Assessment Criteria. In accordance with Section 5.4.9 of the IOA GPG, the Controlling Property principle was used to determine suitable headroom buffers which may apply to Scout Moor Wind Farm, based on the minimum headroom between the predicted noise level and the developments noise limits. At NAL2, the controlling property is NAL2 itself, where the minimum headroom between predictions from Scout Moor Wind Farm and the development's noise limits is 3 dB under worst case down wind conditions. At NALs 13 and 14, the controlling property is NAL15, where the minimum headroom between predictions from Scout Moor Wind Farm and the development's noise limits is 2.6 dB under worst case down wind conditions. The buffers detailed above were added to the predicted noise levels from Scout Moor for each NAL, and a 2 dB buffer was added to the turbine noise predictions for all other developments; this is considered to be a suitable buffer in accordance with Section 5.4.11 of the IOA GPG and would represent a 60% increase in emitted noise levels from the other schemes. The resulting 'cautious' predictions of cumulative wind turbine noise have then been logarithmically subtracted from the Total Noise Assessment Criteria to determine the 'residual noise limit'. The daytime residual noise limit is then adjusted by taking the lowest of either: • The residual noise limit; or • Background sound plus 5 dB or the daytime LLV applicable to the Project for Assessment in isolation (35 dB), whichever is greater.

NAL	Limit Derivation Strategy
	Taking into account the guidance within ARWTN, the Site Specific Noise Limits were determined by adjusting the Residual Noise Limits down where appropriate to preserve noise headroom for future development. Where there was more than 3 dB headroom between the predicted noise level from the Project for Assessment and the Residual Noise Limit, the limit was adjusted down to 3 dB above the predicted level, and not lower than 10 dB below the TNAC.
NAL21	This location is Financially Involved with the Project for Assessment, and therefore the TNAC is based on a Lower Limiting Value of 45 dB for day and night periods. Predicted cumulative noise is more than 10 dB below the TNAC at all wind speeds, and as such the entire noise limit is available for use by the Project for Assessment. Taking into account the guidance within ARWTN, the Site Specific Noise Limits were determine by adjusting the Residual Noise Limits down where appropriate to preserve noise headroom for future development. Where there was more than 3 dB headroom between the predicted noise level from the Project for Assessment and the Residual Noise Limit, the limit was adjusted down to 3 dB above the predicted level, and not lower than 10 dB below the TNAC.

- 6.7.4 Please note the buffers detailed above are in addition to the appropriate level of uncertainty already added to the turbine data as per Section 4.2 of the IOA GPG.
- 6.7.5 As summarised in Table 6.9 above, the maximum noise limit available for the Project for Assessment is equal to the TNAC at six noise assessment locations (NALs 5 - 6, and 8 - 11), as the other schemes do not need a portion of the limit. However, during daytime periods the Site Specific Noise Limits at these NALs are restricted to the limit applicable to the Project for Assessment in isolation and the SSNLs for both day and night-time periods are then further refined in line with ARWTN guidance, as detailed above. For the remaining noise assessment locations, apportionment was required in order to allow the Project for Assessment and the other wind farm developments to co-exist to within the Total Noise Assessment Criteria prior to the refinement of the SSNLs in line with ARWTN.
- 6.7.6 The Site Specific Noise Limits derived for NALs 15-18 are set at 10 dB below the TNAC at some wind speeds. Given that the noise levels from the Project for Assessment are predicted to be greater than 10 dB below the noise levels from other sites at these NALs, and that they are also 10 dB below the TNAC, it may not be necessary to include Site Specific Noise Limits for these NALs in the planning conditions should the Project for Assessment be granted planning permission.
- 6.7.7 Table 6.10 and Table 6.11 show the daytime and night-time Site Specific Noise Limits, noise predictions for the Project for Assessment and the exceedance level. A negative exceedance demonstrates compliance with the Site Specific Noise Limits.
- 6.7.8 The Tables show that the predicted wind turbine noise immission levels meet the Site Specific Noise Limits under all conditions and at all locations for both daytime and night-time periods, with the exception of NAL2 at 7 - 10 ms⁻¹ and NAL4 at 7 ms⁻¹ under worst case downwind directions during daytime periods.
- 6.7.9 Under these conditions, the Site Specific Noise Limits could be met through the use of targeted mitigation in the form of wind turbine mode management, to reduce noise levels

under specific conditions. An example of mitigation that may be used to achieve this is provided in Section 6.9.

- 6.7.10 A series of graphs to show the predicted wind turbine noise from the Project for Assessment compared to the Site Specific Noise Limits are included as Figures A1.4a - A1.4u (Annex 1). There is a set of graphs for each of the NAL, which show the TNAC (solid red line), the prevailing background sound level (black line), the Residual Noise Limit (dashed orange line with triangles), the Site Specific Noise Limit (dashed red line with triangles) and the predicted wind turbine noise from the Project for Assessment (solid blue line).

Table 6.10 Site Specific Noise Limits Compliance Table – Daytime

Location		Wind Speed (ms ⁻¹) as standardised to 10 m height									
		1	2	3	4	5	6	7	8	9	10
NAL1	Site Specific Noise Limit L _{A90}	34.0	34.0	34.0	34.0	34.1	36.9	37.1	37.5	37.8	37.7
	Predicted Wind Turbine Noise L _{A90}	-	-	-	26.5	31.1	35.5	36.9	36.9	36.9	36.9
	Exceedance Level	-	-	-	-7.5	-3.0	-1.4	-0.2	-0.6	-0.9	-0.8
NAL2	Site Specific Noise Limit L _{A90}	34.8	34.8	34.8	34.8	34.9	36.9	37.1	36.8	36.0	35.3
	Predicted Wind Turbine Noise L _{A90}	-	-	-	27.3	31.9	36.3	37.1*	36.8*	36.0*	35.3*
	Exceedance Level	-	-	-	-7.5	-3.0	-0.6	0.0*	0.0*	0.0*	0.0*
NAL3	Site Specific Noise Limit L _{A90}	33.5	33.5	33.5	33.5	33.6	36.9	37.1	37.5	37.8	37.7
	Predicted Wind Turbine Noise L _{A90}	-	-	-	26.0	30.6	35.0	36.4	36.4	36.4	36.4
	Exceedance Level	-	-	-	-7.5	-3.0	-1.9	-0.7	-1.1	-1.4	-1.3
NAL4	Site Specific Noise Limit L _{A90}	33.5	33.5	33.5	33.8	34.5	36.5	37.1	37.9	38.5	39.2
	Predicted Wind Turbine Noise L _{A90}	-	-	-	26.9	31.5	35.9	37.1*	37.3	37.3	37.3
	Exceedance Level	-	-	-	-6.9	-3.0	-0.6	0.0*	-0.6	-1.2	-1.9
NAL5	Site Specific Noise Limit L _{A90}	34.2	34.2	34.2	34.5	35.2	36.5	37.1	37.9	38.2	39.8
	Predicted Wind Turbine Noise L _{A90}	-	-	-	24.8	29.4	33.8	35.2	35.2	35.2	35.2
	Exceedance Level	-	-	-	-9.7	-5.8	-2.7	-1.9	-2.7	-3.0	-4.6
NAL6	Site Specific Noise Limit L _{A90}	34.9	34.9	34.9	35.2	35.9	36.4	37.0	37.8	38.9	40.5
	Predicted Wind Turbine Noise L _{A90}	-	-	-	23.6	28.2	32.6	34.0	34.0	34.0	34.0
	Exceedance Level	-	-	-	-11.6	-7.7	-3.8	-3.0	-3.8	-4.9	-6.5

Location		Wind Speed (ms ⁻¹) as standardised to 10 m height									
		1	2	3	4	5	6	7	8	9	10
NAL7	Site Specific Noise Limit L _{A90}	30.0	30.0	30.0	30.0	30.4	30.9	31.5	32.3	33.4	34.1
	Predicted Wind Turbine Noise L _{A90}	-	-	-	18.1	22.7	27.1	28.5	28.5	28.5	28.5
	Exceedance Level	-	-	-	-11.9	-7.7	-3.8	-3.0	-3.8	-4.9	-5.6
NAL8	Site Specific Noise Limit L _{A90}	32.6	32.6	32.6	32.6	32.6	35.0	35.0	35.0	35.2	36.9
	Predicted Wind Turbine Noise L _{A90}	-	-	-	23.5	28.1	32.5	33.9	33.9	33.9	33.9
	Exceedance Level	-	-	-	-9.1	-4.5	-2.5	-1.1	-1.1	-1.3	-3.0
NAL9	Site Specific Noise Limit L _{A90}	34.8	34.8	34.8	34.8	34.8	34.8	34.8	34.8	35.0	39.1
	Predicted Wind Turbine Noise L _{A90}	-	-	-	21.4	26.0	30.4	31.8	31.8	31.8	31.8
	Exceedance Level	-	-	-	-13.4	-8.8	-4.4	-3.0	-3.0	-3.2	-7.3
NAL10	Site Specific Noise Limit L _{A90}	33.7	33.7	33.7	33.7	33.7	35.0	35.0	35.0	35.2	38.0
	Predicted Wind Turbine Noise L _{A90}	-	-	-	24.6	29.2	33.6	35.0	35.0	35.0	35.0
	Exceedance Level	-	-	-	-9.1	-4.5	-1.4	0.0	0.0	-0.2	-3.0
NAL11	Site Specific Noise Limit L _{A90}	31.6	31.6	32.2	32.8	33.6	34.6	35.9	37.6	39.7	42.3
	Predicted Wind Turbine Noise L _{A90}	-	-	-	22.5	27.1	31.5	32.9	32.9	32.9	32.9
	Exceedance Level	-	-	-	-10.3	-6.5	-3.1	-3.0	-4.7	-6.8	-9.4
NAL12	Site Specific Noise Limit L _{A90}	31.2	32.1	33.0	33.9	34.2	34.2	34.6	35.4	36.3	37.0
	Predicted Wind Turbine Noise L _{A90}	-	-	-	21.2	25.8	30.2	31.6	31.6	31.6	31.6
	Exceedance Level	-	-	-	-12.7	-8.4	-4.0	-3.0	-3.8	-4.7	-5.4

Location		Wind Speed (ms ⁻¹) as standardised to 10 m height									
		1	2	3	4	5	6	7	8	9	10
NAL13	Site Specific Noise Limit L _{A90}	35.2	35.6	35.6	35.6	35.6	35.6	35.6	36.5	37.7	38.6
	Predicted Wind Turbine Noise L _{A90}	-	-	-	22.2	26.8	31.2	32.6	32.6	32.6	32.6
	Exceedance Level	-	-	-	-13.4	-8.8	-4.4	-3.0	-3.9	-5.1	-6.0
NAL14	Site Specific Noise Limit L _{A90}	33.7	33.7	33.7	33.7	33.7	33.7	33.8	34.9	35.1	36.3
	Predicted Wind Turbine Noise L _{A90}	-	-	-	21.7	26.3	30.7	32.1	32.1	32.1	32.1
	Exceedance Level	-	-	-	-12.0	-7.4	-3.0	-1.7	-2.8	-3.0	-4.2
NAL15	Site Specific Noise Limit L _{A90}	30.0	30.0	30.0	30.0	30.0	30.0	30.7	31.4	32.2	32.8
	Predicted Wind Turbine Noise L _{A90}	-	-	-	19.6	24.2	28.6	30.0	30.0	30.0	30.0
	Exceedance Level	-	-	-	-10.4	-5.8	-1.4	-0.7	-1.4	-2.2	-2.8
NAL16	Site Specific Noise Limit L _{A90}	30.0	30.0	30.0	30.0	30.0	30.0	30.7	31.4	32.2	32.8
	Predicted Wind Turbine Noise L _{A90}	-	-	-	16.2	20.8	25.2	26.6	26.6	26.6	26.6
	Exceedance Level	-	-	-	-13.8	-9.2	-4.8	-4.1	-4.8	-5.6	-6.2
NAL17	Site Specific Noise Limit L _{A90}	30.0	30.0	30.0	30.0	30.0	30.0	30.7	31.4	32.2	32.8
	Predicted Wind Turbine Noise L _{A90}	-	-	-	17.2	21.8	26.2	27.6	27.6	27.6	27.6
	Exceedance Level	-	-	-	-12.8	-8.2	-3.8	-3.1	-3.8	-4.6	-5.2
NAL18	Site Specific Noise Limit L _{A90}	30.0	30.0	30.0	30.0	30.0	30.0	30.7	31.4	32.2	32.8
	Predicted Wind Turbine Noise L _{A90}	-	-	-	15.9	20.5	24.9	26.3	26.3	26.3	26.3
	Exceedance Level	-	-	-	-14.1	-9.5	-5.1	-4.4	-5.1	-5.9	-6.5

Location		Wind Speed (ms ⁻¹) as standardised to 10 m height									
		1	2	3	4	5	6	7	8	9	10
NAL19	Site Specific Noise Limit L _{A90}	32.6	32.6	32.6	32.9	33.6	34.1	34.7	35.1	35.1	35.9
	Predicted Wind Turbine Noise L _{A90}	-	-	-	21.3	25.9	30.3	31.7	31.7	31.7	31.7
	Exceedance Level	-	-	-	-11.6	-7.7	-3.8	-3.0	-3.4	-3.4	-4.2
NAL20	Site Specific Noise Limit L _{A90}	35.5	35.5	35.5	35.5	35.6	35.8	36.0	36.4	36.7	37.1
	Predicted Wind Turbine Noise L _{A90}	-	-	-	22.6	27.2	31.6	33.0	33.0	33.0	33.0
	Exceedance Level	-	-	-	-12.9	-8.4	-4.2	-3.0	-3.4	-3.7	-4.1
NAL21	Site Specific Noise Limit L _{A90}	38.8	38.8	38.8	38.8	38.8	38.8	38.8	38.8	38.8	38.8
	Predicted Wind Turbine Noise L _{A90}	-	-	-	25.4	30.0	34.4	35.8	35.8	35.8	35.8
	Exceedance Level	-	-	-	-13.4	-8.8	-4.4	-3.0	-3.0	-3.0	-3.0

*Predicted noise levels inclusive of mitigation.

Table 6.11 Site Specific Noise Limits Compliance Table – Night-time

Location		Wind Speed (ms ⁻¹) as standardised to 10 m height									
		1	2	3	4	5	6	7	8	9	10
NAL1	Site Specific Noise Limit L _{A90}	39.9	39.9	39.9	39.9	39.9	39.9	39.9	39.9	39.9	39.9
	Predicted Wind Turbine Noise L _{A90}	-	-	-	26.5	31.1	35.5	36.9	36.9	36.9	36.9
	Exceedance Level	-	-	-	-13.4	-8.8	-4.4	-3.0	-3.0	-3.0	-3.0
NAL2	Site Specific Noise Limit L _{A90}	40.7	40.7	40.7	40.7	40.7	40.7	40.7	40.7	40.7	40.7
	Predicted Wind Turbine Noise L _{A90}	-	-	-	27.3	31.9	36.3	37.7	37.7	37.7	37.7
	Exceedance Level	-	-	-	-13.4	-8.8	-4.4	-3.0	-3.0	-3.0	-3.0
NAL3	Site Specific Noise Limit L _{A90}	39.4	39.4	39.4	39.4	39.4	39.4	39.4	39.4	39.4	39.4
	Predicted Wind Turbine Noise L _{A90}	-	-	-	26.0	30.6	35.0	36.4	36.4	36.4	36.4
	Exceedance Level	-	-	-	-13.4	-8.8	-4.4	-3.0	-3.0	-3.0	-3.0
NAL4	Site Specific Noise Limit L _{A90}	40.3	40.3	40.3	40.3	40.3	40.3	40.3	40.3	40.3	40.3
	Predicted Wind Turbine Noise L _{A90}	-	-	-	26.9	31.5	35.9	37.3	37.3	37.3	37.3
	Exceedance Level	-	-	-	-13.4	-8.8	-4.4	-3.0	-3.0	-3.0	-3.0
NAL5	Site Specific Noise Limit L _{A90}	38.2	38.2	38.2	38.2	38.2	38.2	38.2	38.2	38.2	38.2
	Predicted Wind Turbine Noise L _{A90}	-	-	-	24.8	29.4	33.8	35.2	35.2	35.2	35.2
	Exceedance Level	-	-	-	-13.4	-8.8	-4.4	-3.0	-3.0	-3.0	-3.0
NAL6	Site Specific Noise Limit L _{A90}	37.0	37.0	37.0	37.0	37.0	37.0	37.0	37.0	37.0	37.0
	Predicted Wind Turbine Noise L _{A90}	-	-	-	23.6	28.2	32.6	34.0	34.0	34.0	34.0
	Exceedance Level	-	-	-	-13.4	-8.8	-4.4	-3.0	-3.0	-3.0	-3.0

Location		Wind Speed (ms ⁻¹) as standardised to 10 m height									
		1	2	3	4	5	6	7	8	9	10
NAL7	Site Specific Noise Limit L _{A90}	33.0	33.0	33.0	33.0	33.0	33.0	33.0	33.0	33.0	33.0
	Predicted Wind Turbine Noise L _{A90}	-	-	-	18.1	22.7	27.1	28.5	28.5	28.5	28.5
	Exceedance Level	-	-	-	-14.9	-10.3	-5.9	-4.5	-4.5	-4.5	-4.5
NAL8	Site Specific Noise Limit L _{A90}	36.9	36.9	36.9	36.9	36.9	36.9	36.9	36.9	36.9	36.9
	Predicted Wind Turbine Noise L _{A90}	-	-	-	23.5	28.1	32.5	33.9	33.9	33.9	33.9
	Exceedance Level	-	-	-	-13.4	-8.8	-4.4	-3.0	-3.0	-3.0	-3.0
NAL9	Site Specific Noise Limit L _{A90}	34.8	34.8	34.8	34.8	34.8	34.8	34.8	34.8	34.8	34.8
	Predicted Wind Turbine Noise L _{A90}	-	-	-	21.4	26.0	30.4	31.8	31.8	31.8	31.8
	Exceedance Level	-	-	-	-13.4	-8.8	-4.4	-3.0	-3.0	-3.0	-3.0
NAL10	Site Specific Noise Limit L _{A90}	38.0	38.0	38.0	38.0	38.0	38.0	38.0	38.0	38.0	38.0
	Predicted Wind Turbine Noise L _{A90}	-	-	-	24.6	29.2	33.6	35.0	35.0	35.0	35.0
	Exceedance Level	-	-	-	-13.4	-8.8	-4.4	-3.0	-3.0	-3.0	-3.0
NAL11	Site Specific Noise Limit L _{A90}	35.9	35.9	35.9	35.9	35.9	35.9	35.9	35.9	35.9	37.2
	Predicted Wind Turbine Noise L _{A90}	-	-	-	22.5	27.1	31.5	32.9	32.9	32.9	32.9
	Exceedance Level	-	-	-	-13.4	-8.8	-4.4	-3.0	-3.0	-3.0	-4.3
NAL12	Site Specific Noise Limit L _{A90}	34.6	34.6	34.6	34.6	34.6	34.6	34.6	34.6	34.6	34.6
	Predicted Wind Turbine Noise L _{A90}	-	-	-	21.2	25.8	30.2	31.6	31.6	31.6	31.6
	Exceedance Level	-	-	-	-13.4	-8.8	-4.4	-3.0	-3.0	-3.0	-3.0

Location		Wind Speed (ms ⁻¹) as standardised to 10 m height									
		1	2	3	4	5	6	7	8	9	10
NAL13	Site Specific Noise Limit L _{A90}	35.6	35.6	35.6	35.6	35.6	35.6	35.6	35.6	35.6	35.6
	Predicted Wind Turbine Noise L _{A90}	-	-	-	22.2	26.8	31.2	32.6	32.6	32.6	32.6
	Exceedance Level	-	-	-	-13.4	-8.8	-4.4	-3.0	-3.0	-3.0	-3.0
NAL14	Site Specific Noise Limit L _{A90}	35.1	35.1	35.1	35.1	35.1	35.1	35.1	35.1	35.1	35.1
	Predicted Wind Turbine Noise L _{A90}	-	-	-	21.7	26.3	30.7	32.1	32.1	32.1	32.1
	Exceedance Level	-	-	-	-13.4	-8.8	-4.4	-3.0	-3.0	-3.0	-3.0
NAL15	Site Specific Noise Limit L _{A90}	33.0	33.0	33.0	33.0	33.0	33.0	33.0	33.0	33.0	33.0
	Predicted Wind Turbine Noise L _{A90}	-	-	-	19.6	24.2	28.6	30.0	30.0	30.0	30.0
	Exceedance Level	-	-	-	-13.4	-8.8	-4.4	-3.0	-3.0	-3.0	-3.0
NAL16	Site Specific Noise Limit L _{A90}	33.0	33.0	33.0	33.0	33.0	33.0	33.0	33.0	33.0	33.0
	Predicted Wind Turbine Noise L _{A90}	-	-	-	16.2	20.8	25.2	26.6	26.6	26.6	26.6
	Exceedance Level	-	-	-	-16.8	-12.2	-7.8	-6.4	-6.4	-6.4	-6.4
NAL17	Site Specific Noise Limit L _{A90}	33.0	33.0	33.0	33.0	33.0	33.0	33.0	33.0	33.0	33.0
	Predicted Wind Turbine Noise L _{A90}	-	-	-	17.2	21.8	26.2	27.6	27.6	27.6	27.6
	Exceedance Level	-	-	-	-15.8	-11.2	-6.8	-5.4	-5.4	-5.4	-5.4
NAL18	Site Specific Noise Limit L _{A90}	33.0	33.0	33.0	33.0	33.0	33.0	33.0	33.0	33.0	33.0
	Predicted Wind Turbine Noise L _{A90}	-	-	-	15.9	20.5	24.9	26.3	26.3	26.3	26.3
	Exceedance Level	-	-	-	-17.1	-12.5	-8.1	-6.7	-6.7	-6.7	-6.7

Location		Wind Speed (ms^{-1}) as standardised to 10 m height									
		1	2	3	4	5	6	7	8	9	10
NAL19	Site Specific Noise Limit L_{A90}	34.7	34.7	34.7	34.7	34.7	34.7	34.7	34.7	34.7	34.7
	Predicted Wind Turbine Noise L_{A90}	-	-	-	21.3	25.9	30.3	31.7	31.7	31.7	31.7
	Exceedance Level	-	-	-	-13.4	-8.8	-4.4	-3.0	-3.0	-3.0	-3.0
NAL20	Site Specific Noise Limit L_{A90}	36.0	36.0	36.0	36.0	36.0	36.0	36.0	36.0	36.0	36.0
	Predicted Wind Turbine Noise L_{A90}	-	-	-	22.6	27.2	31.6	33.0	33.0	33.0	33.0
	Exceedance Level	-	-	-	-13.4	-8.8	-4.4	-3.0	-3.0	-3.0	-3.0
NAL21	Site Specific Noise Limit L_{A90}	38.8	38.8	38.8	38.8	38.8	38.8	38.8	38.8	38.8	38.8
	Predicted Wind Turbine Noise L_{A90}	-	-	-	25.4	30.0	34.4	35.8	35.8	35.8	35.8
	Exceedance Level	-	-	-	-13.4	-8.8	-4.4	-3.0	-3.0	-3.0	-3.0

- 6.7.11 In the event that planning permission is granted for the Project for Assessment it would be appropriate to set noise limits equal to the Site Specific Noise Limits contained Table 6.10 and Table 6.11.

6.8 Micrositing

- 6.8.1 A 50 m micrositing distance is proposed. It should be noted that the need to include a concave ground profile correction and/or barrier correction may change depending on the final location of the turbines (following micrositing) and the final turbine hub height. Nevertheless, turbine noise levels will have to meet the noise limits established in this report regardless of any increases and decreases in noise propagation caused by topography. Should planning permission be granted, the need to apply a concave ground profile/ barrier correction will need to be considered by the Applicant prior to the final selection of a turbine model for the site.

6.9 Mitigation Requirements

- 6.9.1 As identified in Table 6.10, mitigation in the form of turbine mode management is predicted to be required to ensure compliance with the Site Specific Noise Limits at NAL2 and NAL4. Mode management would be required only during the daytime between wind speeds of 7 - 10 ms⁻¹ under worst-case downwind conditions when the wind is blowing from the southeast.
- 6.9.2 This assessment considers the Nordex N149 5.7 MW candidate turbine, and the Site Specific Noise Limits could be met by operating T11 in a maximum of 'Mode 6', and T14 and T15 in a maximum of 'Mode 12' during the specific required conditions of wind speed and wind direction.
- 6.9.3 To provide context to the operational modes, Mode 0 (standard operational mode for the N149) has a maximum ranked output of 5.7 MW. Mode 6 equates to a maximum generation of 5.06 MW, and Mode 12 to 4.11 MW. It should be noted that these are the maximum modes required per turbine, required where the exceedance of the SSNL is largest (i.e. at 10 ms⁻¹). At lower wind speeds, the turbines may operate in less restrictive modes, and below 7 ms⁻¹ and above 10 ms⁻¹ under downwind conditions (as well as all wind speeds for upwind and crosswind conditions) the turbines may operate unconstrained.

6.10 Tonality

- 6.10.1 While the candidate turbine considered in this assessment is not anticipated to produce tonal noise, the final choice of turbine will be subject to a competitive tendering process and may vary from the model assessed here. As such, it is advised that a turbine warranty inclusive of tonality is sought by the Applicant as part of the process.
- 6.10.2 Should tonal noise be experienced at nearby receptors once the Project for Assessment becomes operational, an assessment may be necessary to determine whether the development is compliant with its noise limits, when considering any tonal penalty which may be applied. The suggested planning condition detailed in Annex 9 provides a mechanism for determining the level of tonality and the tonal penalty that should be applied.

7 Summary and Conclusions

- 7.1.1 This report has assessed the potential impact of operational noise from the Project for Assessment on the residents of nearby residential receptors. The guidance contained within ARWTN and current good practice (IOA GPG) has been used to assess the potential noise impact of the Project for Assessment.
- 7.1.2 A TNAC of 40 dBA daytime and 43 dBA night-time was used for this assessment with the exception of financially involved properties where a 45 dBA limit was applied.
- 7.1.3 A cumulative assessment was undertaken at all 21 NALs. The results show that the predicted cumulative wind farm noise immission levels would meet the TNAC at all NALs during both the daytime and night-time periods.
- 7.1.4 Site Specific Noise Limits have been derived in accordance with ARWTN.
- 7.1.5 The wind turbine noise immission levels from the Project for Assessment were predicted to be below the Site Specific Noise Limits at all NALs, with the exception of NAL2 and NAL4 under specific wind conditions during the daytime only, when considering the Nordex N149 5.7 MW with serrated trailing edge blades as a candidate turbine. The Site Specific Noise Limit may be met through the use of Low Noise Modes during specific wind conditions and times.
- 7.1.6 The Nordex turbine model was chosen as it is considered to be representative of the type of turbine that could be installed. There are a number of wind turbine makes and models that may be suitable for the Project for Assessment. Should the proposal receive consent, the final choice of turbine would be subject to a competitive tendering process. The final choice of turbine would, however, have to meet the noise limits determined and contained within any condition imposed.

8 Glossary of Terms

AOD: Above Ordnance Datum is the height above sea level.

Amplitude Modulation: a variation in noise level over time; for example observers may describe a 'whoosh whoosh' sound, which can be heard close to a wind turbine as the blades sweep past.

Attenuation: the reduction in level of a sound between the source and a receiver due to any combination of effects including: distance, atmospheric absorption, acoustic screening, the presence of a building façade, etc.

Background Sound: the noise level rarely fallen below in any given location over any given time period, often classed according to daytime, evening or night time periods. The L_{A90} indices (see below) is often used to represent the background sound level.

Bin: subset or group into which data can be sorted; in the case of wind speeds, bins are often centred on integer wind speeds with a width of 1 m/s. For example the 4 m/s bin would include all data with wind speeds of 3.5 to 4.5 m/s.

Dawn Chorus: noise due to birds which can occur at sunrise.

Broadband Noise: noise with components over a wide range of frequencies.

Decibel (dB): the ratio between the quietest audible sound and the loudest tolerable sound is a million to one in terms of the change in sound pressure. A logarithmic scale is used in noise level measurements because of this wide range. The scale used is the decibel (dB) scale which extends from 0 to 140 decibels (dB) corresponding to the intensity of the sound level.

dB(A): the ear has the ability to recognise a particular sound depending on its pitch or frequency. Microphones cannot differentiate noise in the same way as the ear, and to counter this weakness the noise measuring instrument applies a correction to correspond more closely to the frequency response of the human ear. The correction factor is called 'A Weighting' and the resulting measurements are written as dB(A). The dB(A) is internationally accepted and has been found to correspond well with people's subjective reaction to noise. Some typical subjective changes in noise levels are:

- a change of 3 dB(A) is just perceptible;
- a change of 5 dB(A) is clearly perceptible;
- a change of 10 dB(A) is twice (or half) as loud.

Directivity: the property of a sound source that causes more sound to be radiated in one direction than another.

Frequency: the pitch of a sound in Hz or kHz. See Hertz.

Ground Effects: the modification of sound at a receiver location due to the interaction of the sound wave with the ground along its propagation path from source to receiver. Described using the term 'G', and ranges between 0 (hard), 0.5 (mixed) and 1 (soft).

Hertz (Hz): sound frequency refers to how quickly the air vibrates, or how close the sound waves are to each other (in cycles per second, or Hertz (Hz)).

L_w : is the sound power level. It is a measure of the total noise energy radiated by a source of noise, and is used to calculate noise levels at a distant location. The L_{WA} is the A-weighted sound power level.

L_{eq} : is the equivalent continuous sound level, and is the sound level of a steady sound with the same energy as a fluctuating sound over the same period. It is possible to consider this level as the ambient noise encompassing all noise at a given time. The $LA_{eq,T}$ is the A-weighted equivalent continuous sound level over a given time period (T).

L_{90} : index represents the noise level exceeded for 90 percent of the measurement period and is used to indicate quieter times during the measurement period. It is often used to measure the background sound level. The $L_{A90,10min}$ is the A-weighted background sound level over a ten minute measurement sample.

Noise emission: the noise energy emitted by a source (e.g. a wind turbine).

Noise immission: the sound pressure level detected at a given location (e.g. the nearest dwelling).

Night-time Hours: ARWTN defines the night time hours as 23.00 to 07.00 every day.

Quiet Daytime Hours: ARWTN defines the amenity hours as 18.00 to 23.00 Monday to Friday, 13.00 to 23.00 on Saturdays and 07.00 to 23.00 on Sundays.

Sound Level Meter: an instrument for measuring sound pressure level.

Sound Power Level: the total sound power radiated by a source, in decibels.

Sound Pressure Level: a measure of the sound pressure at a point, in decibels.

Standardised Wind Speed: a wind speed measured at a height different than 10 m (generally measured at the turbine hub height) which is expressed to a reference height of 10 m using a roughness length of 0.05 for standardisation purpose (in accordance with the IEC 61400-11 standard).

Tonal Noise: noise which covers a very restricted range of frequencies (e.g. a range of ≤ 20 Hz). This noise can be more annoying than broadband noise.

Wind Shear: the increase of wind speed with height above the ground.

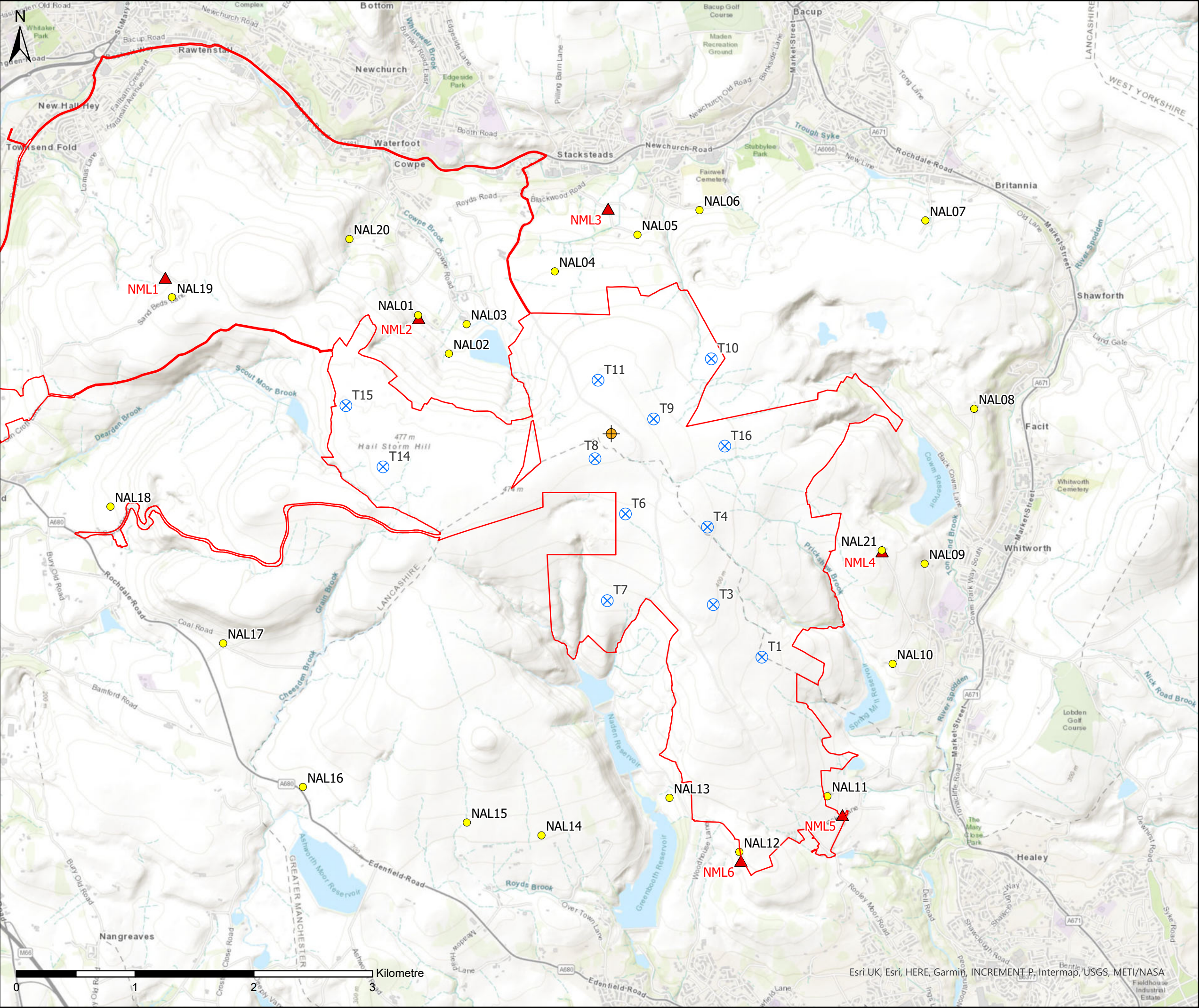
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Annex 1 – Figures



LEGEND

Assessment Boundary

Proposed Wind Turbine Locations

Noise Assessment Locations (NALs)

Noise Monitoring Locations (NMLs)

Lidar Location

1	12/05/2026	REVISION	MT	GC
0	22/04/2025	FOR PLANNING	MT	JM
Rev.	Date	Amendment Details	Drawn	Approved

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Project Title:

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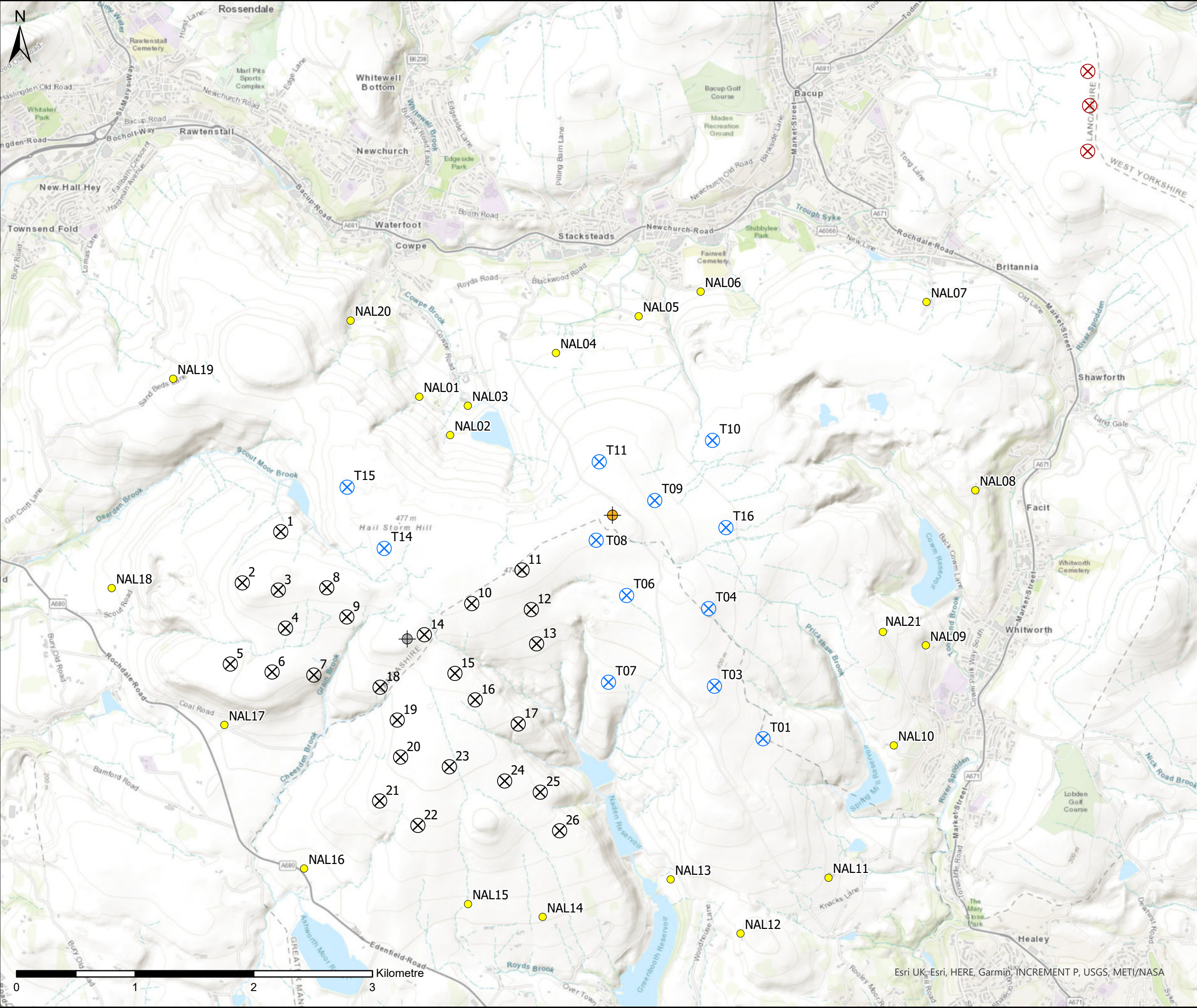
Drawing Title:

FIGURE A1.1: OPERATIONAL NOISE ASSESSMENT AND NOISE MONITORING LOCATIONS

Scale:	Original Size:	Spatial Reference:
1:30,000	A3	British National Grid

Drawing Number:

16647-018



LEGEND

- Noise Assessment Locations (NALs)
- Proposed Wind Turbine Locations
- Scout Moor Wind Farm
- Reaps Moss Wind Farm
- Lidar Location
- Scout Moor Wind Farm Met Mast

2	16/07/2026	REVISION	MT	GC
1	12/05/2026	REVISION	MT	GC
0	23/04/2025	FOR PLANNING	MT	JM
Rev.	Date	Amendment Details	Drawn	Approved

DoBH, OS, Esri, HERE, Garmin, USGS, NGA

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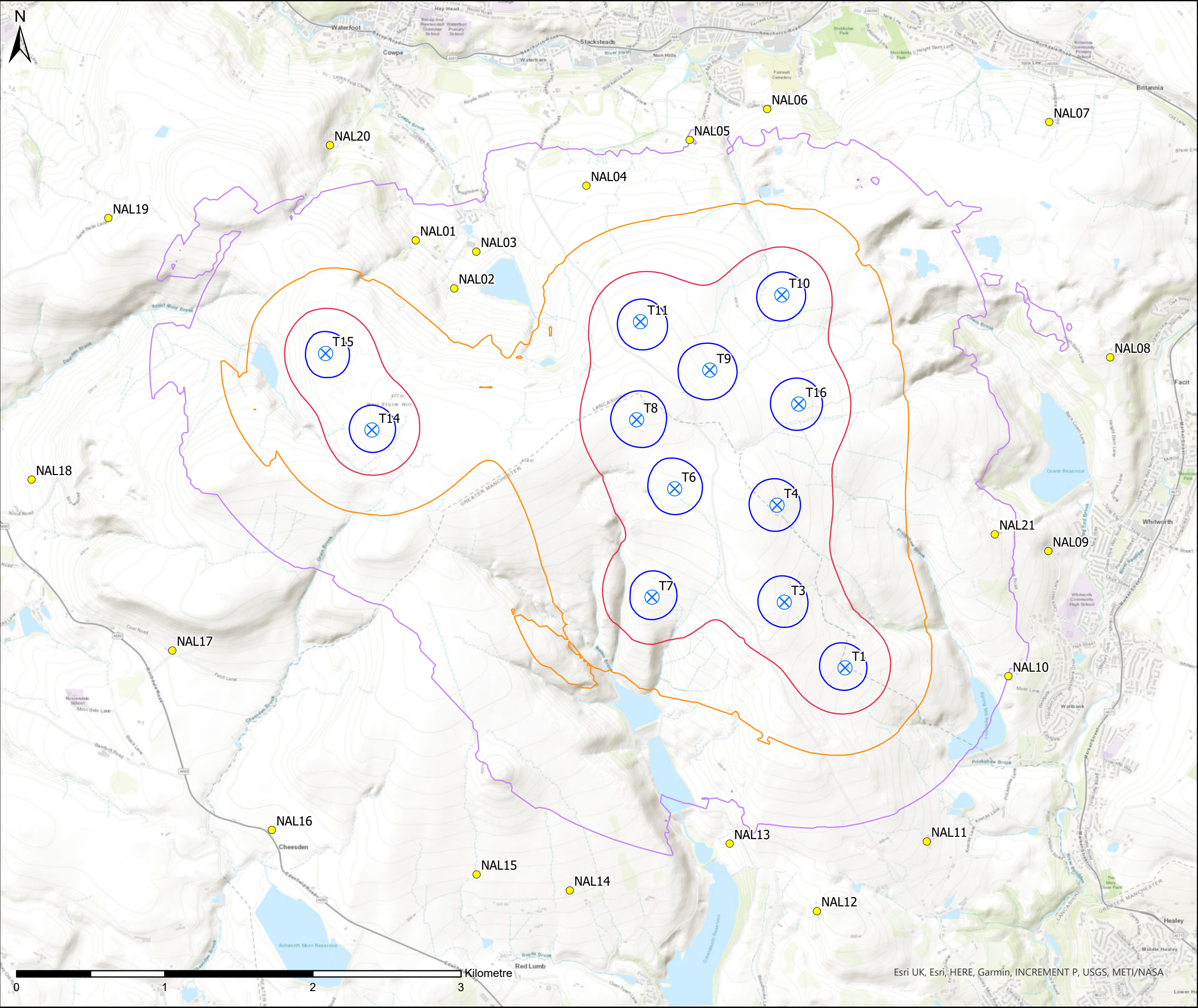
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FIGURE A1.1A: CUMULATIVE WIND TURBINES

Scale:	Original Size:	Spatial Reference:
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Drawing Number:

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LEGEND

- Noise Assessment Locations (NALs)
- Proposed Wind Turbine Locations

Predicted Noise Level Contours, dBA:

- 35
- 40
- 45
- 50

Note: Predicted noise levels are calculated at a height of 4m, a wind speed of 10m/s (standardised) and do not account for wind directivity. As such, predicted noise levels shown here may differ from those presented elsewhere.

0	12/05/2026	FIRST ISSUE			GB MT
Rev.	Date	Amendment Details			Drawn Approved



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SCOUT MOOR II WIND FARM

Drawing Title:

FIGURE A1.1B: NOISE CONTOUR PLOT
(PROJECT FOR ASSESSMENT ONLY)

Scale:

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Original Size:

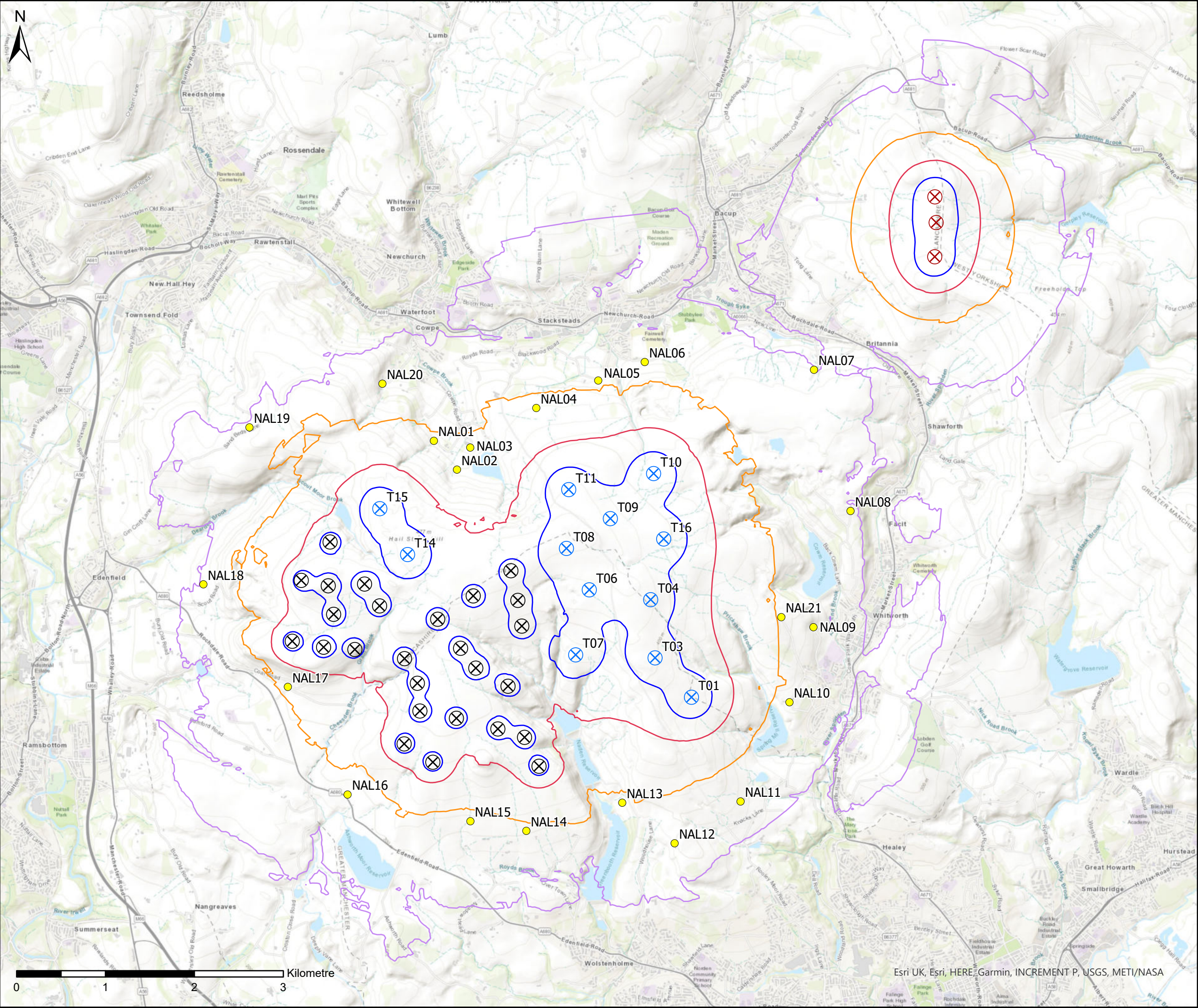
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Spatial Reference:

British National Grid

Drawing Number:

16647-020



LEGEND

- Noise Assessment Locations (NALs)
- Proposed Wind Turbine Locations
- Scout Moor Wind Farm
- Reaps Moss Wind Farm

Predicted Cumulative Noise Levels (Inc. the Proposed Wind Turbines), dBA

- 35
- 40
- 45
- 50

Note: Predicted noise levels are calculated at a height of 4m, a wind speed of 10m/s (standardised) and do not account for wind directivity. As such, predicted noise levels shown here may differ from those presented elsewhere.

1	16/07/2026	FIGURE AMENDMENTS	FL	MT
0	21/05/2026	FIRST ISSUE	GB	MT
Rev.	Date	Amendment Details	Drawn	Approved

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Drawing Status:

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Project Title:

SCOUT MOOR II WIND FARM

Drawing Title:

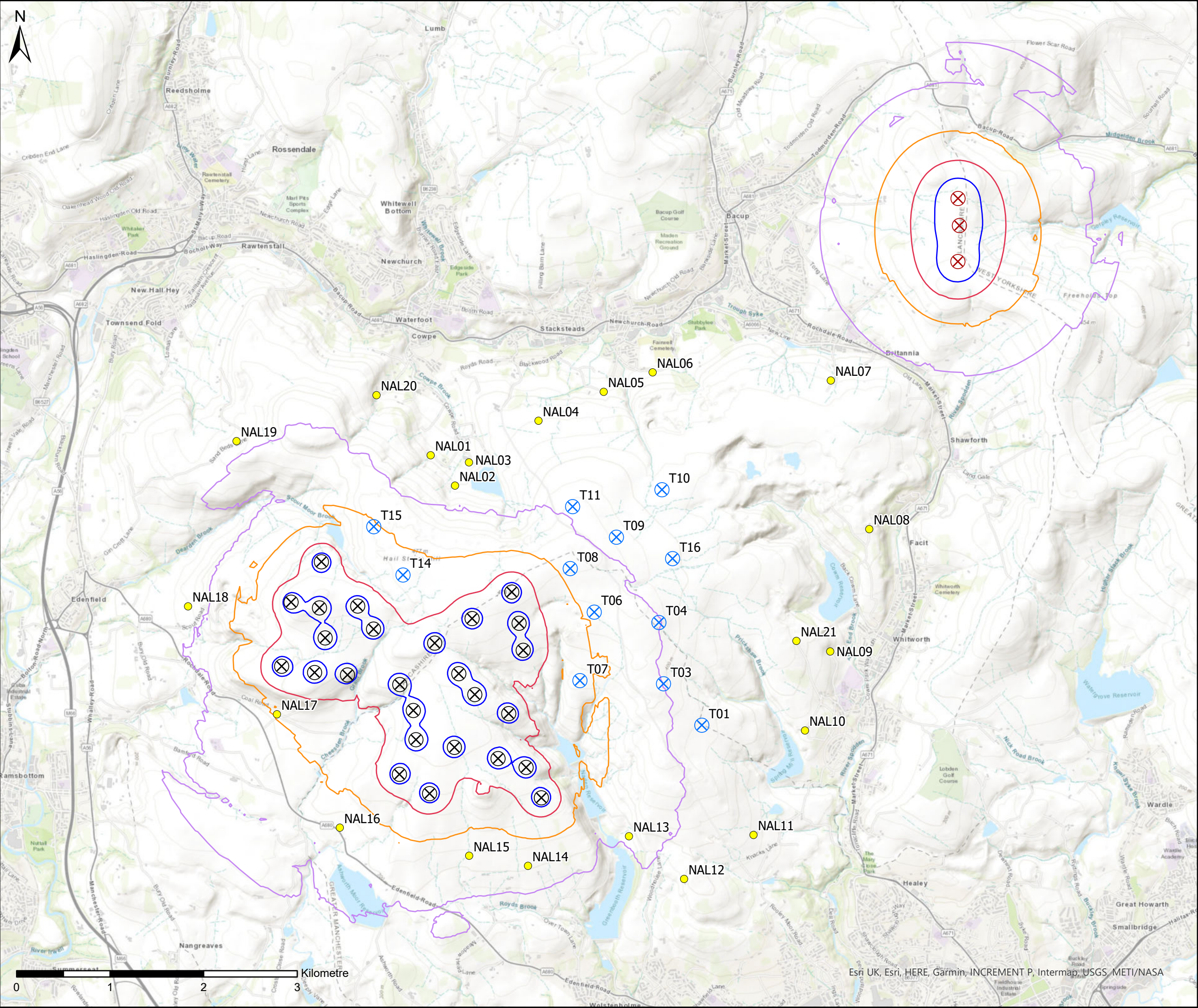
FIGURE A1.1C: NOISE CONTOUR PLOT
(CUMULATIVE INCLUDING PROJECT FOR ASSESSMENT)

Scale:	Original Size:	Spatial Reference:
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Drawing Number:

16647-021

Esri UK, Esri, HERE, Garmin, INCREMENT P, USGS, METI/NASA



LEGEND

- Noise Assessment Locations (NALs)
- Proposed Wind Turbine Locations
- Scout Moor Wind Farm
- Reaps Moss Wind Farm

Predicted Cumulative Noise Levels (Exc. the Proposed Wind Turbines), dBA

- 35
- 40
- 45
- 50

Note: Predicted noise levels are calculated at a height of 4m, a wind speed of 10m/s (standardised) and do not account for wind directivity. As such, predicted noise levels shown here may differ from those presented elsewhere.

1	16/07/2026	FIGURE AMENDMENTS	FL	MT
0	21/05/2026	FIRST ISSUE	GB	MT
Rev.	Date	Amendment Details	Drawn	Approved



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Project Title:

SCOUT MOOR II WIND FARM

Drawing Title:

FIGURE A1.1D: NOISE CONTOUR PLOT
(CUMULATIVE EXCLUDING PROJECT FOR ASSESSMENT)

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Original Size:

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Spatial Reference:

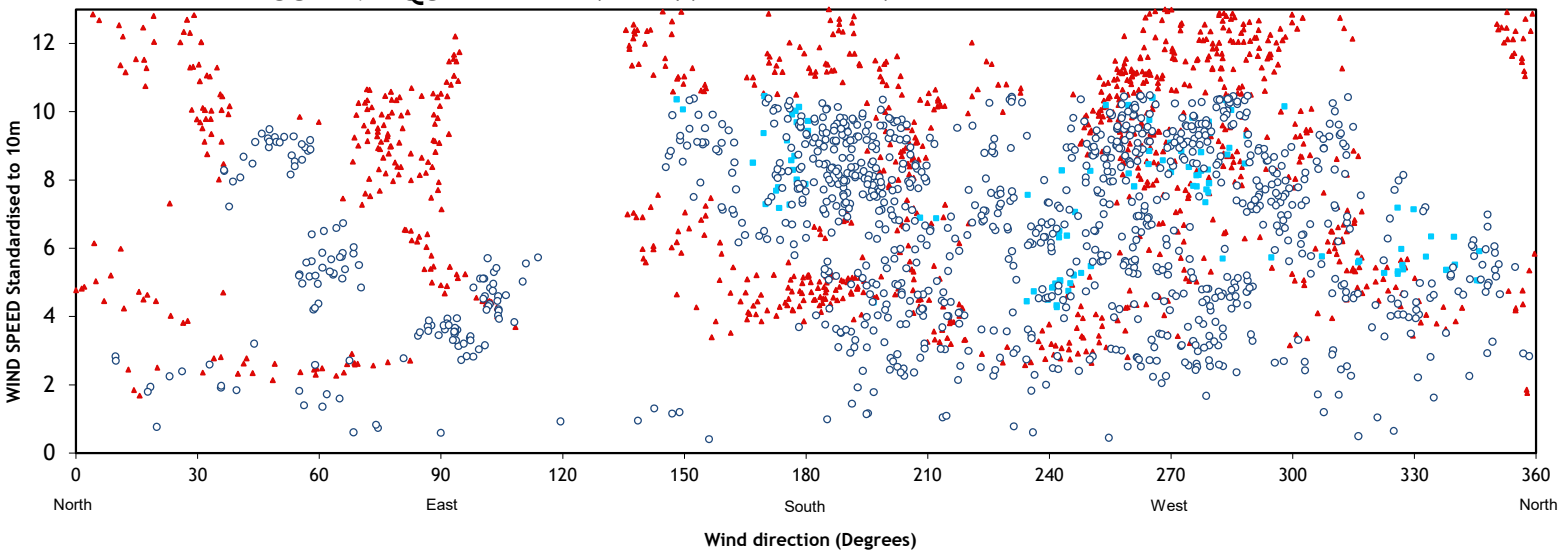
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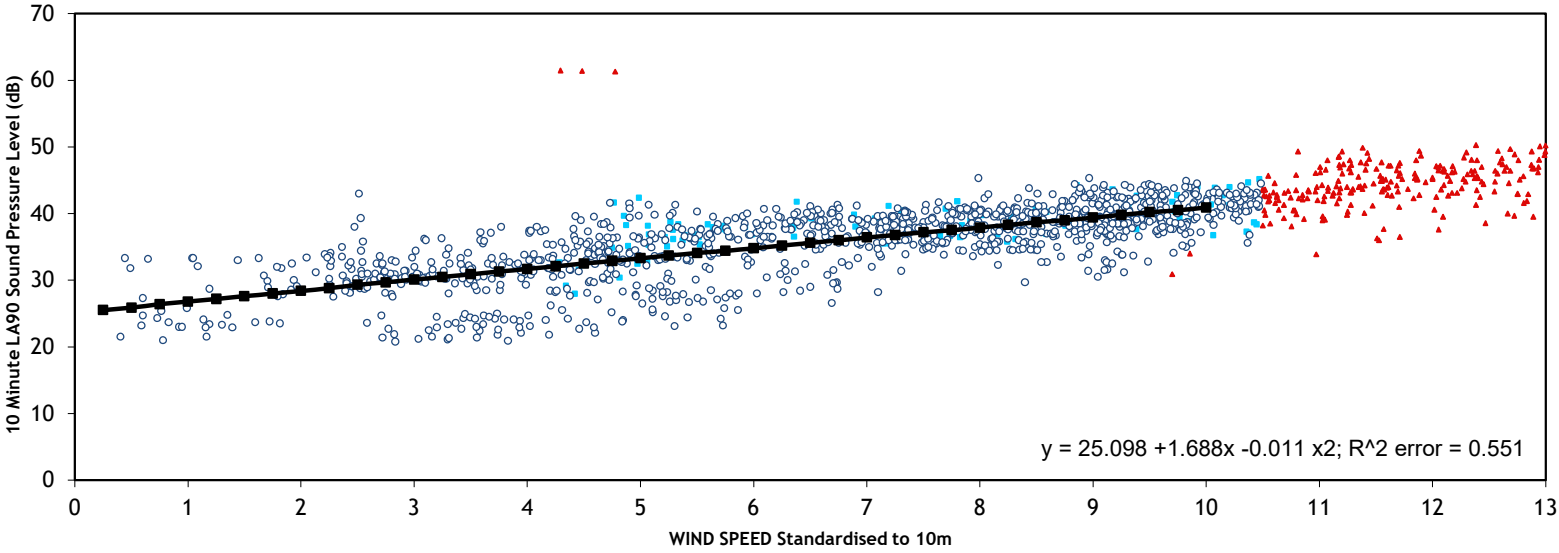
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ETSU-R-97 QUIET DAYTIME - NML1 - Lower Mount Pleasant Farm

Wind Conditions Quiet Daytime



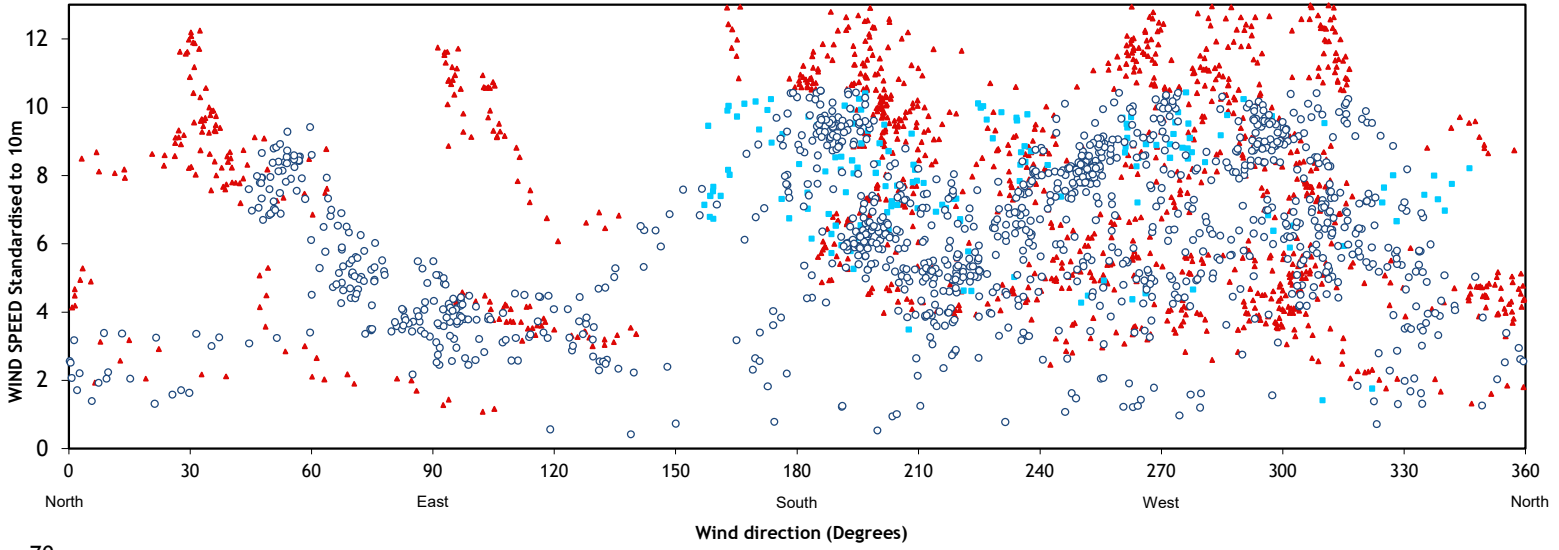
Regression Analysis Quiet Daytime



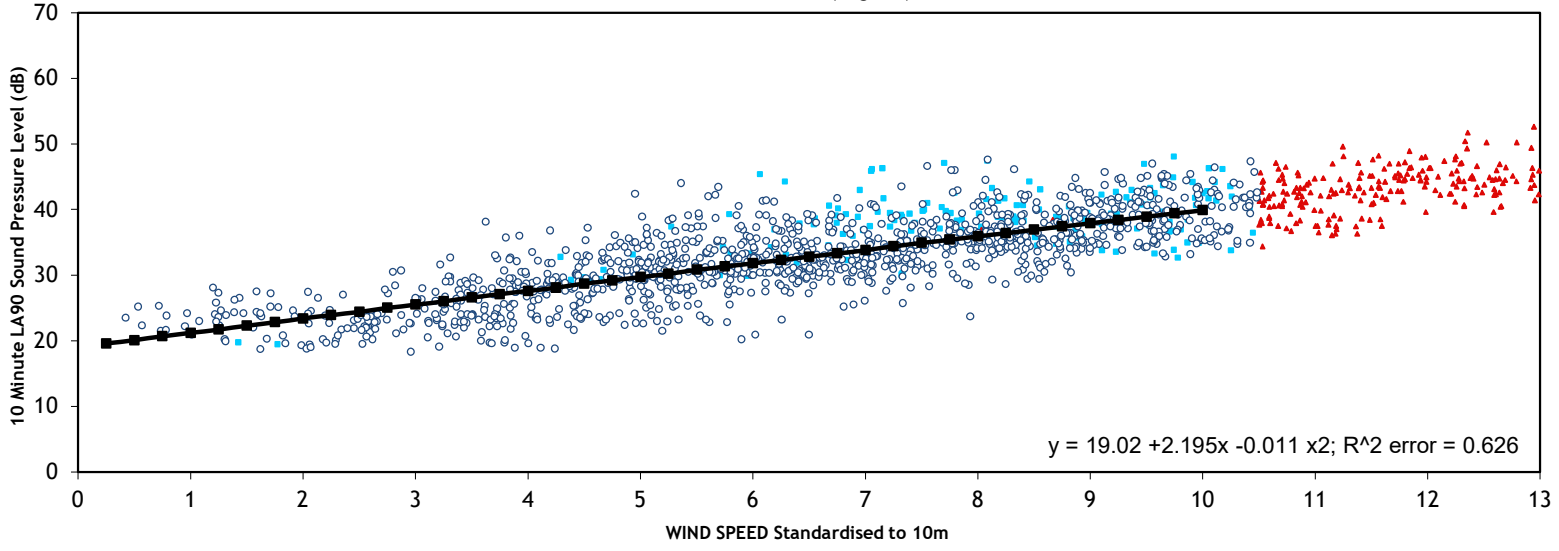
Wind Speed (m/s)	2	3	4	5	6	7	8	9	10			Total
Number of data points	41	99	101	135	96	136	162	192	137			1099
Prevailing Background	28.4	30.1	31.7	33.3	34.8	36.4	37.9	39.4	40.9			

ETSU-R-97 NIGHT-TIME - NML1 - Lower Mount Pleasant Farm

Wind Conditions Night-Time



Regression Analysis Night-Time



Wind Speed (m/s)	2	3	4	5	6	7	8	9	10			Total
Number of data points	38	86	131	174	181	155	161	147	110			1183
Prevailing Background	23.4	25.5	27.6	29.7	31.8	33.8	35.9	37.9	39.9			

Legend:

- L_{A90} 10 Minute Measurement Point - Total Noise
- Line of best fit
- Line of best fit flat lined where appropriate
- Excluded Data-Manual exclusion
- Excluded Data-Rain
- Excluded Data-Filtered Wind Direction

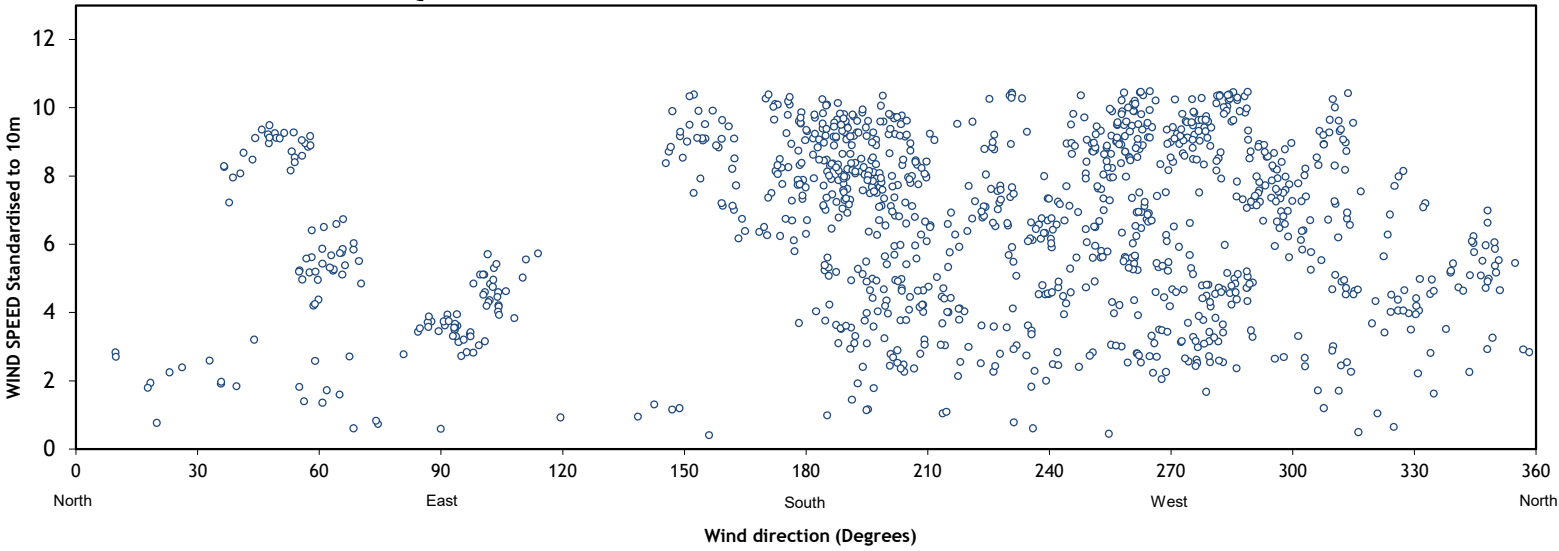
NOTE: Data shown is uncorrected for operational turbine noise and presents total noise levels, rather than background noise levels. Data presented for information only.

Project	Scout Moor II Wind Farm
Client	Cubico UK Development Ltd
Title	Wind Conditions & Regression Analysis
Figure Number	A1.2aa
Drawn	MT
Checked	GC
Date	15/07/2026
Document Reference	16647

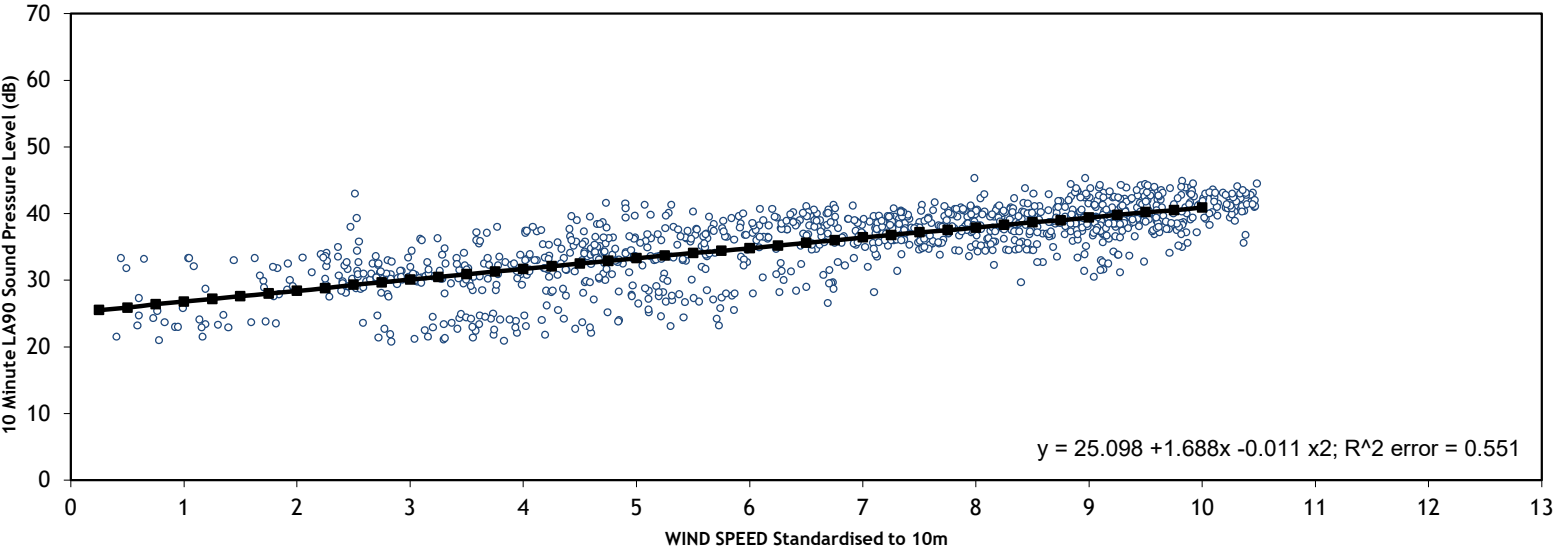


ETSU-R-97 QUIET DAYTIME - NML1 - Lower Mount Pleasant Farm

Wind Conditions Quiet Daytime



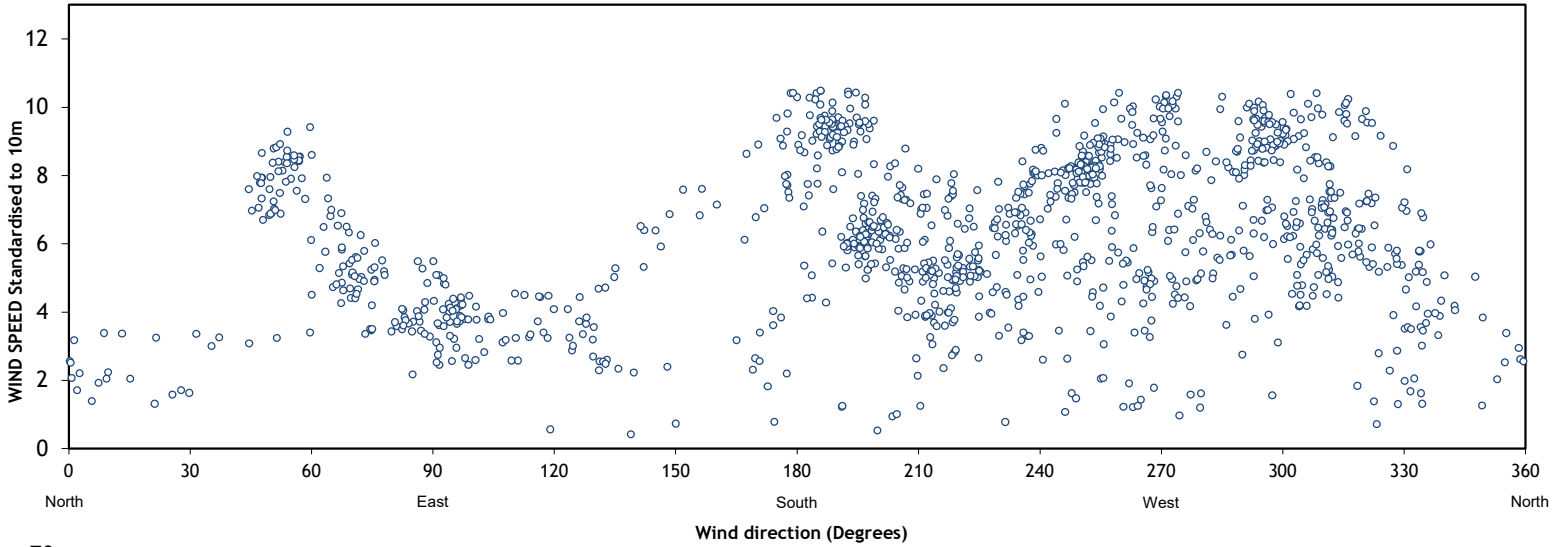
Regression Analysis Quiet Daytime



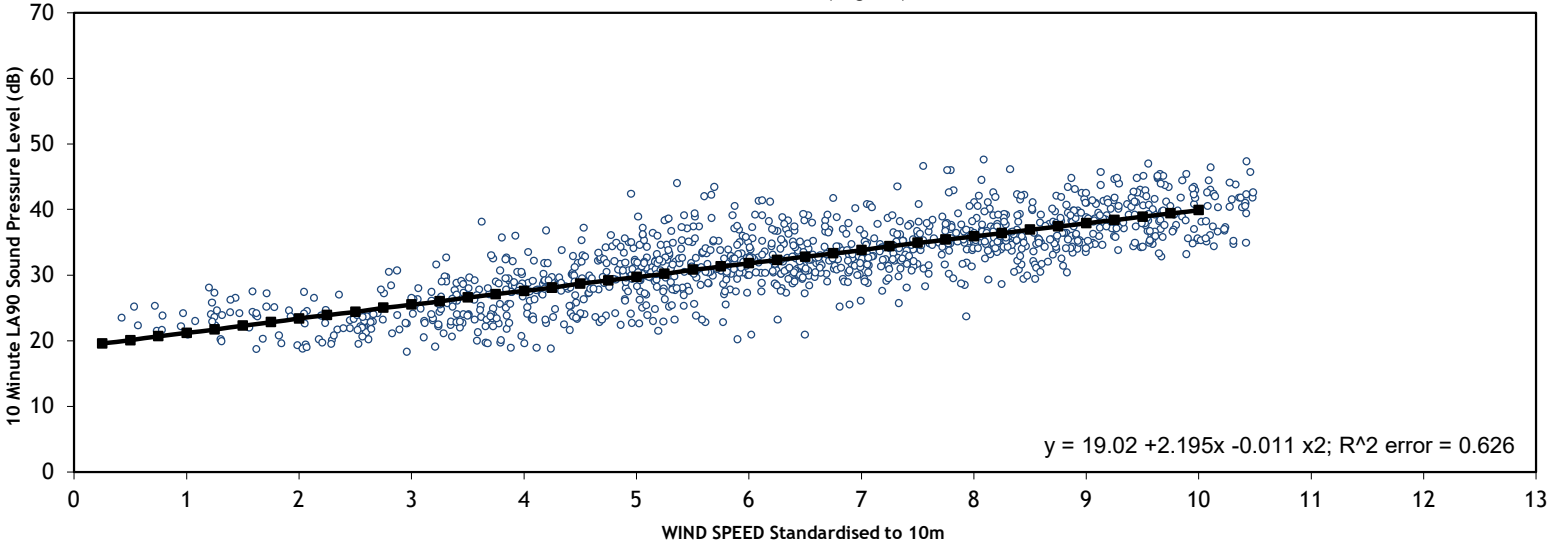
Wind Speed (m/s)	2	3	4	5	6	7	8	9	10			Total
Number of data points	41	99	101	135	96	136	162	192	137			1099
Prevailing Background	28.4	30.1	31.7	33.3	34.8	36.4	37.9	39.4	40.9			

ETSU-R-97 NIGHT-TIME - NML1 - Lower Mount Pleasant Farm

Wind Conditions Night-Time



Regression Analysis Night-Time



Wind Speed (m/s)	2	3	4	5	6	7	8	9	10			Total
Number of data points	38	86	131	174	181	155	161	147	110			1183
Prevailing Background	23.4	25.5	27.6	29.7	31.8	33.8	35.9	37.9	39.9			

- Legend:
-  L_{A90} 10 Minute Measurement Point - Total Noise
 -  Line of best fit
 -  Line of best fit flat lined where appropriate

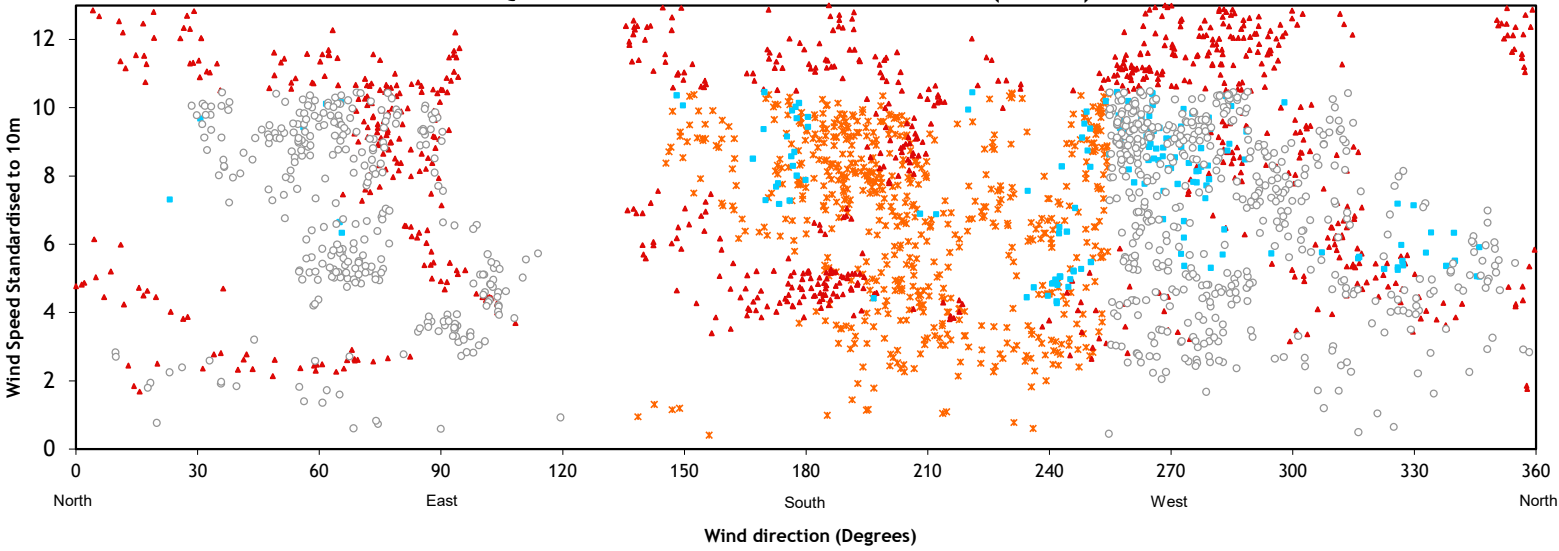
NOTE: Data shown is uncorrected for operational turbine noise and presents total noise levels, rather than background noise levels. Data presented for information only.

Project	Scout Moor II Wind Farm
Client	Cubico UK Development Ltd
Title	Wind Conditions & Regression Analysis
Figure Number	A1.2ab
Drawn	MT
Checked	GC
Date	12/05/2026
Document Reference	16647

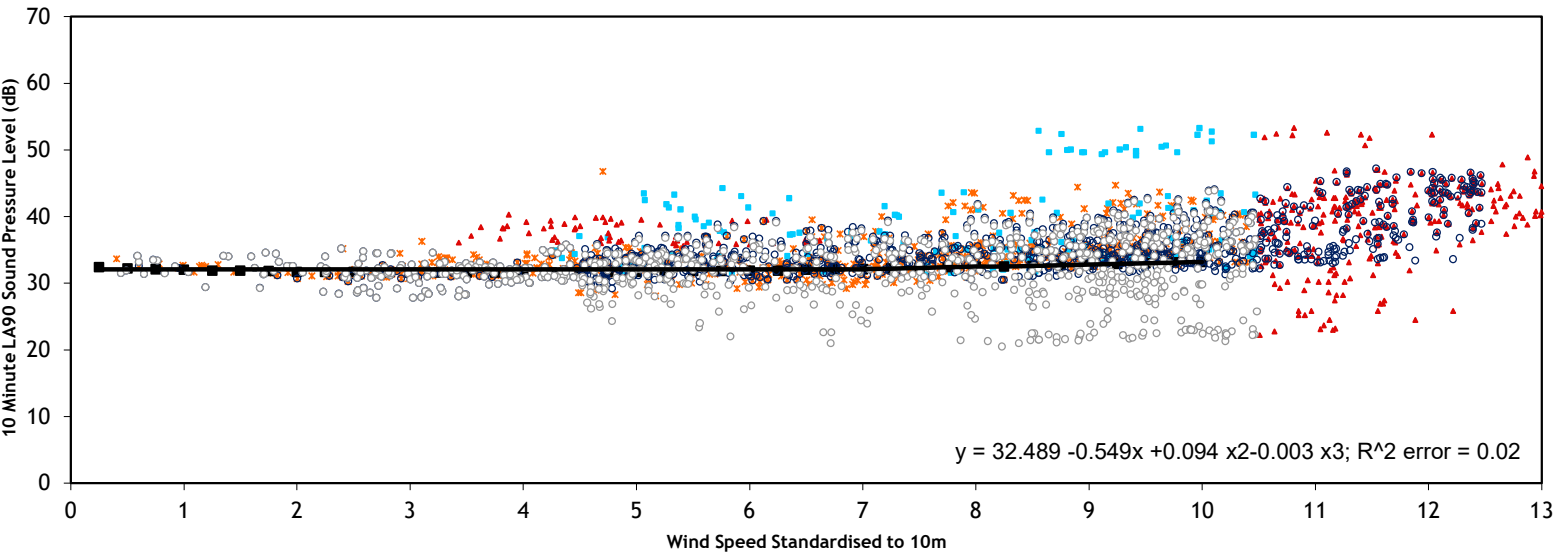


ETSU-R-97 QUIET DAYTIME - Lowerfold Barn (NML2)

Wind Conditions Quiet Daytime



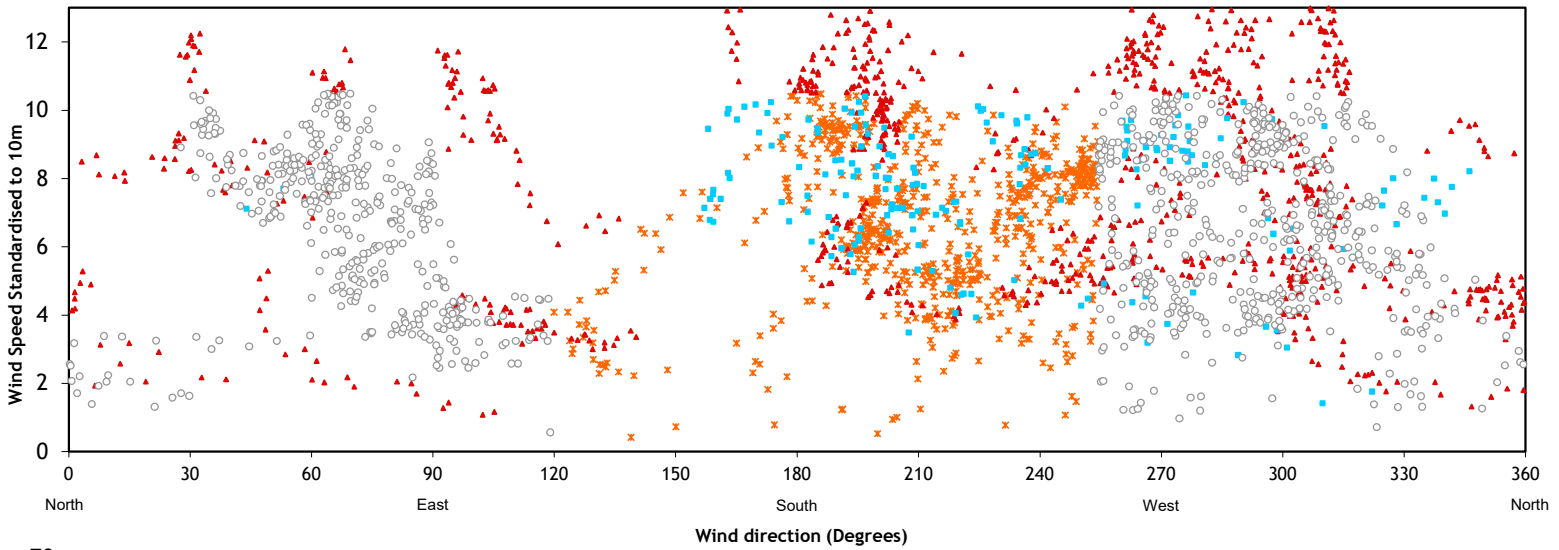
Regression Analysis Quiet Daytime



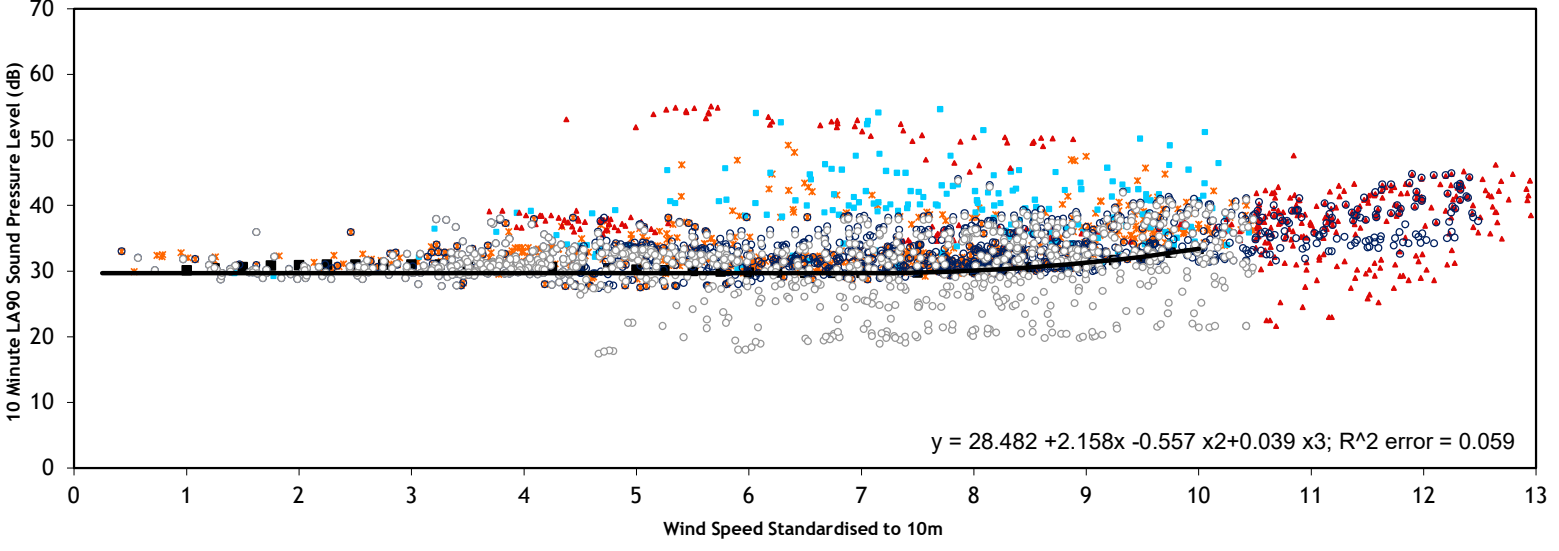
Wind Speed (m/s)	2	3	4	5	6	7	8	9	10			Total
Number of data points	24	72	63	124	67	73	86	164	153			826
Prevailing Background	32.1	32.1	32.1	32.1	32.1	32.1	32.5	32.8	33.2			

ETSU-R-97 NIGHT-TIME - Lowerfold Barn (NML2)

Wind Conditions Night-Time



Regression Analysis Night-Time



Wind Speed (m/s)	2	3	4	5	6	7	8	9	10			Total
Number of data points	27	68	129	101	98	119	140	134	115			931
Prevailing Background	29.7	29.7	29.7	29.7	29.7	29.7	30.1	31.3	33.4			

Legend:

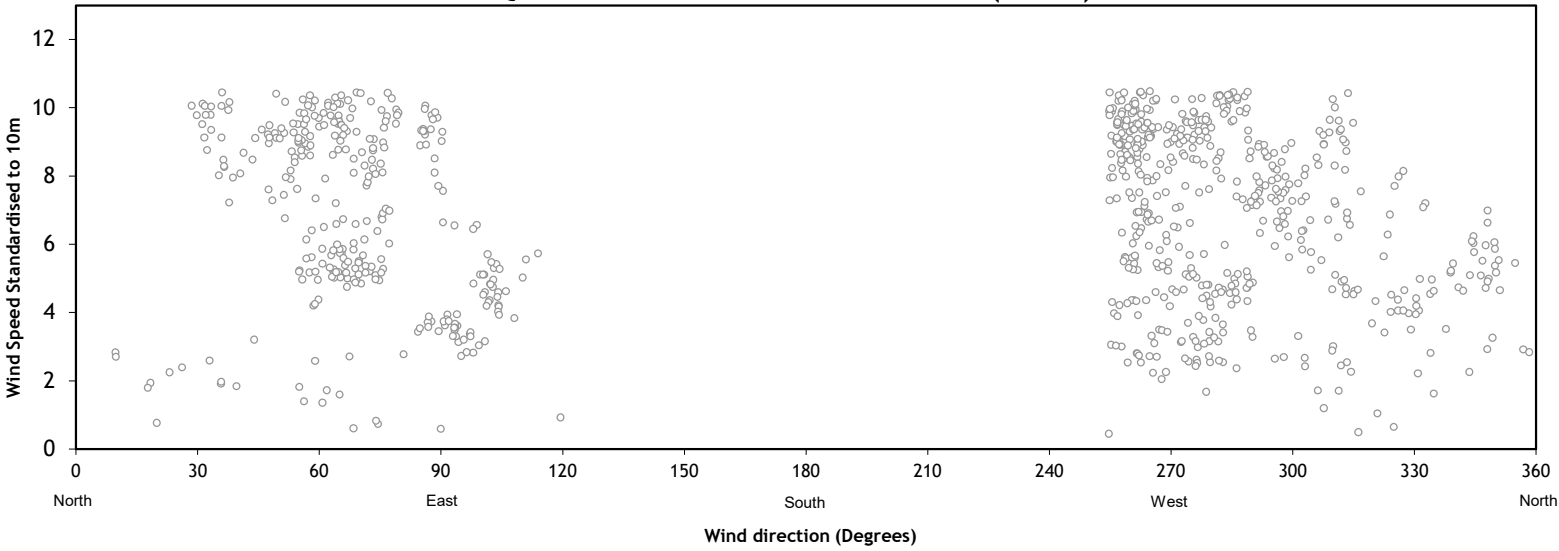
- L_A90 10 Minute Calculated Background Noise
- Line of best fit
- Line of best fit flat lined where appropriate(Prevailing Background)
- Excluded Data-Manual exclusion
- Excluded Data-Rain
- Excluded Data-Filtered Wind Direction
- L_A90 10 Minute Measured Total Noise

Project	Scout Moor II Wind Farm
Client	Cubico UK Development Ltd
Title	Wind Conditions&Regression Analysis
Figure Number	A1.2ba
Drawn	MT
Checked	GC
Date	16/07/2026
Document Reference	16647-Models

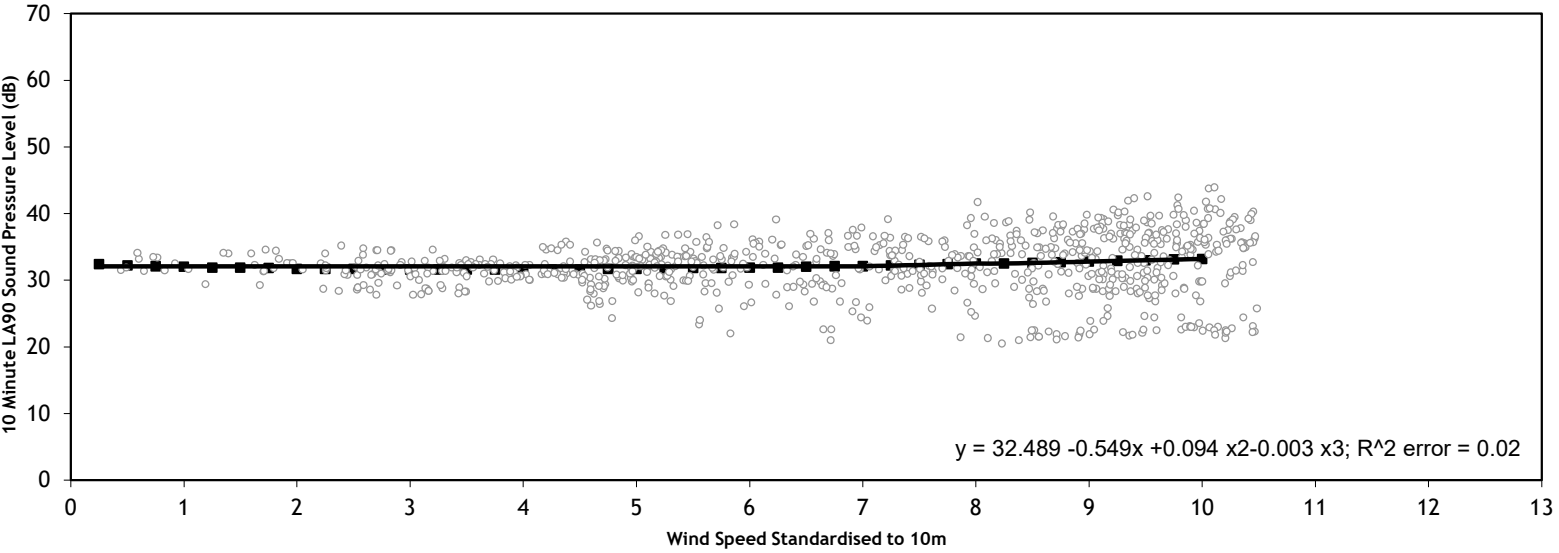


ETSU-R-97 QUIET DAYTIME - Lowerfold Barn (NML2)

Wind Conditions Quiet Daytime



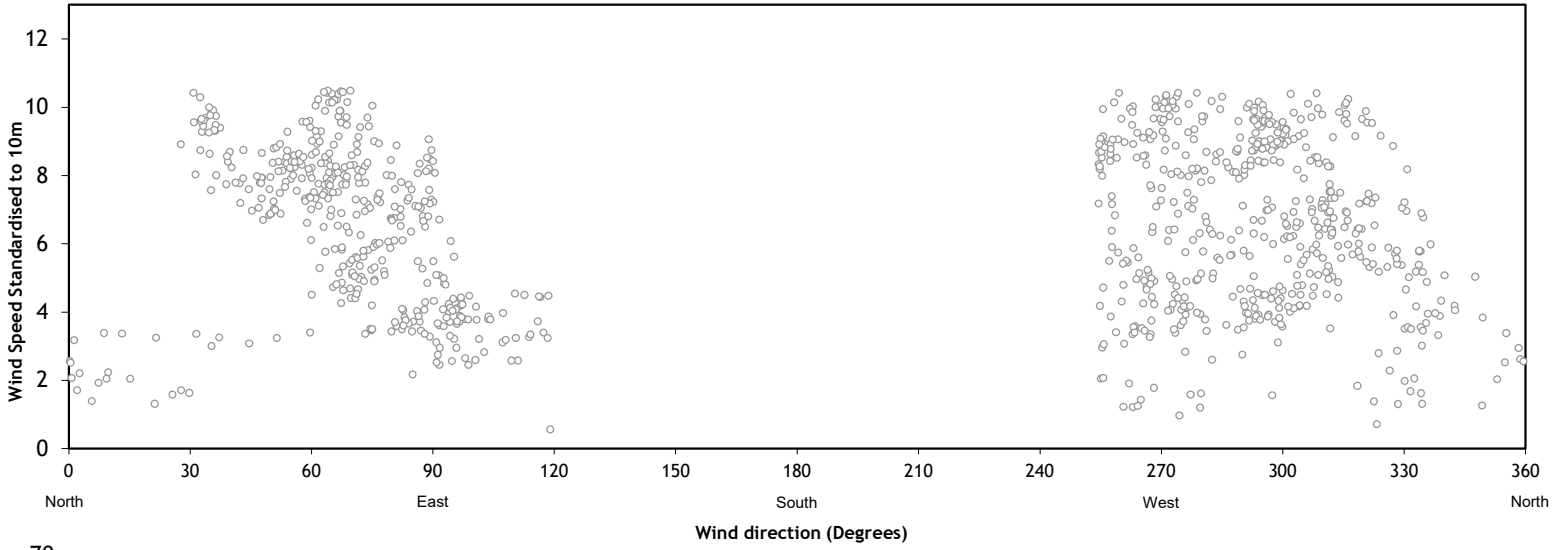
Regression Analysis Quiet Daytime



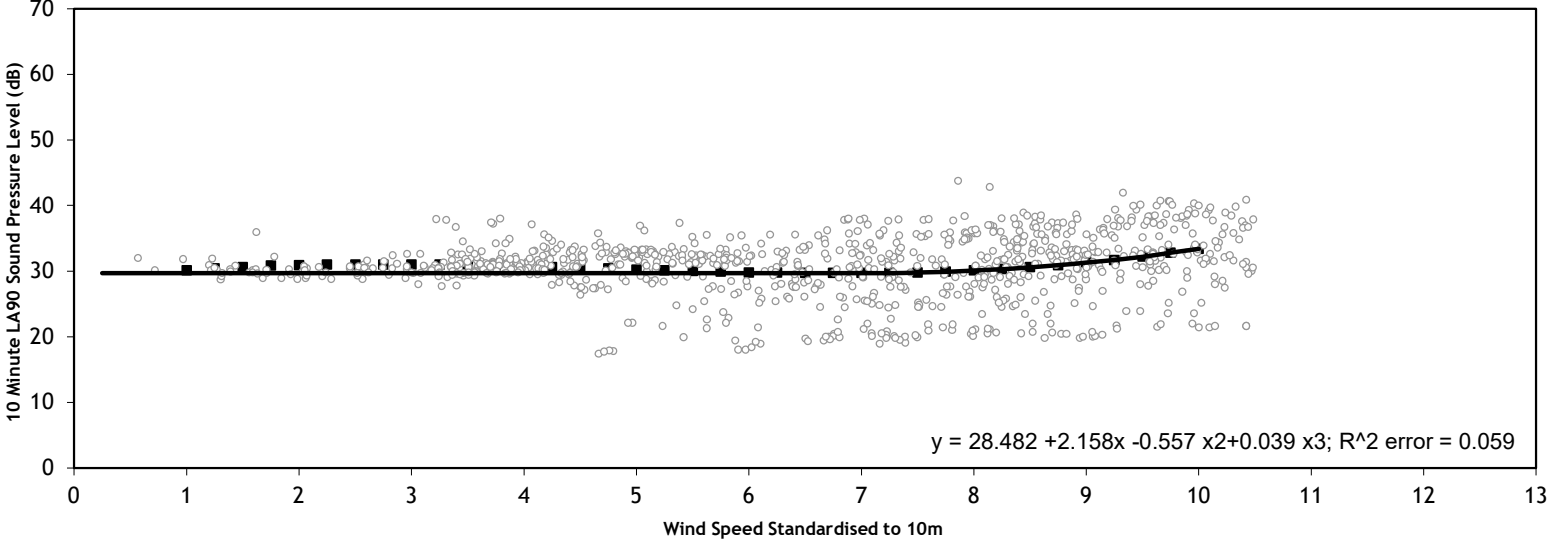
Wind Speed (m/s)	2	3	4	5	6	7	8	9	10			Total
Number of data points	24	72	63	124	67	73	86	164	153			826
Prevailing Background	32.1	32.1	32.1	32.1	32.1	32.1	32.5	32.8	33.2			

ETSU-R-97 NIGHT-TIME - Lowerfold Barn (NML2)

Wind Conditions Night-Time



Regression Analysis Night-Time

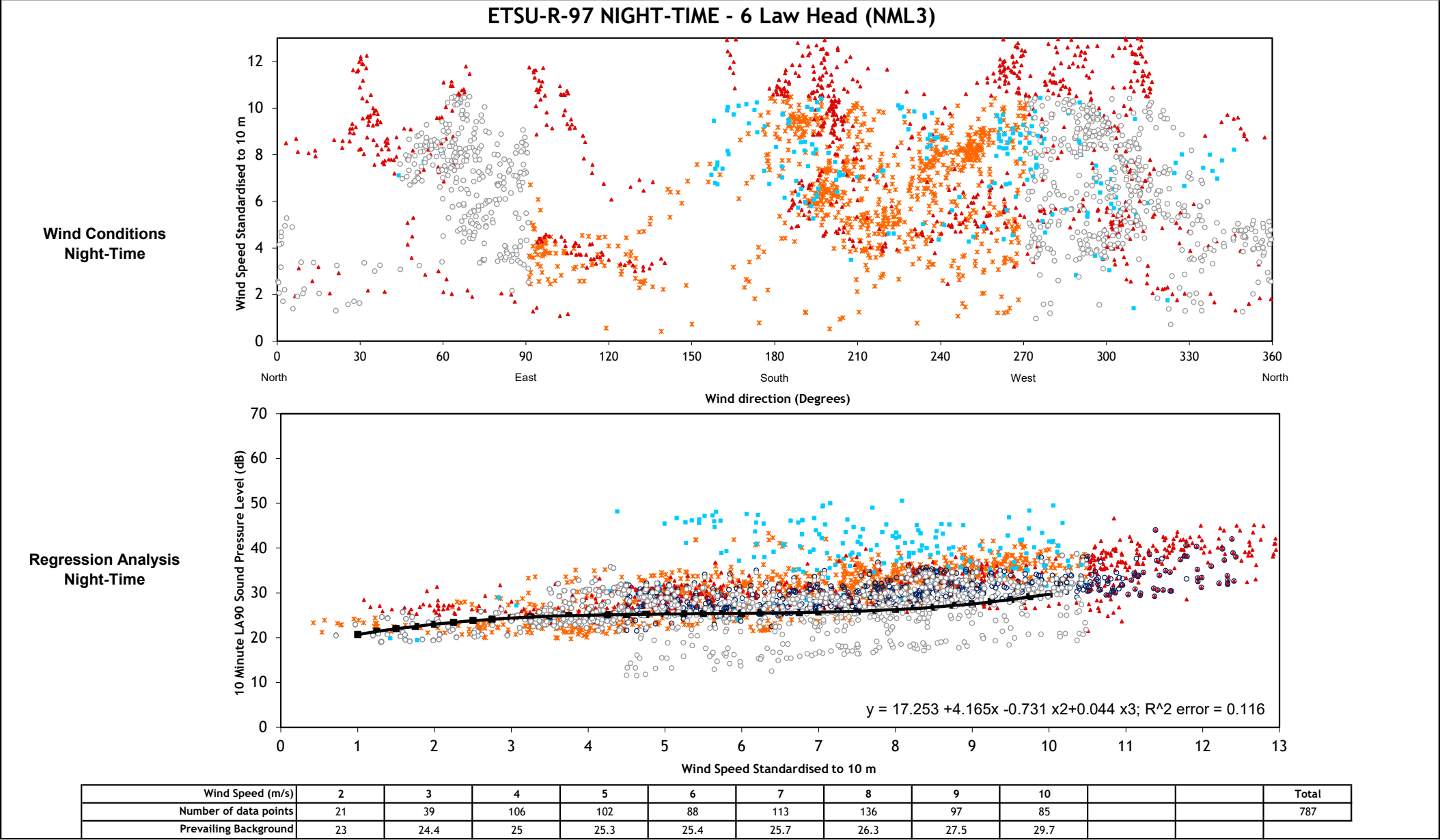
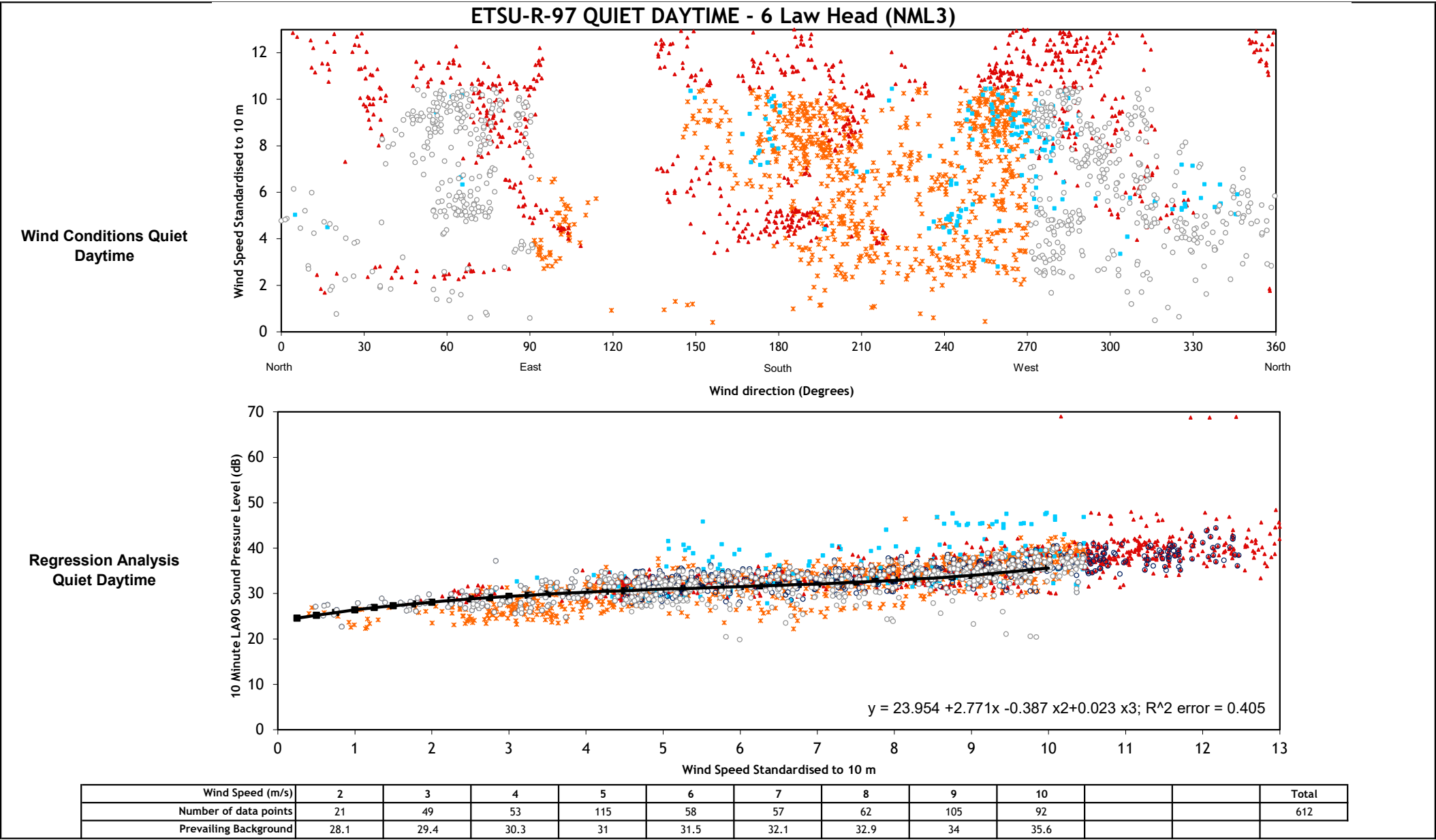


Wind Speed (m/s)	2	3	4	5	6	7	8	9	10			Total
Number of data points	27	68	129	101	98	119	140	134	115			931
Prevailing Background	29.7	29.7	29.7	29.7	29.7	29.7	30.1	31.3	33.4			

- Legend:**
- L_{A90} 10 Minute Calculated Background Noise
 - Line of best fit
 - Line of best fit flat lined where appropriate(Prevailing Background)

Project	Scout Moor II Wind Farm
Client	Cubico UK Development Ltd
Title	Wind Conditions&Regression Analysis
Figure Number	A1.2bb
Drawn	MT
Checked	GC
Date	16/07/2026
Document Reference	16647-Models





Legend:

LA90 10 Minute Calculated Background Noise

Line of best fit

Line of best fit flat lined where appropriate(Prevailing Background)

Excluded Data-Manual exclusion

Excluded Data-Rain

Excluded Data-Filtered Wind Direction

LA90 10 Minute Measured Total Noise

Project	Scout Moor II Wind Farm
Client	Cubico UK Development Ltd
Title	Wind Conditions&Regression Analysis
Figure Number	A1.2ca
Drawn	MT
Checked	GC
Date	16/07/2026
Document Reference	16647-Models

Cubico

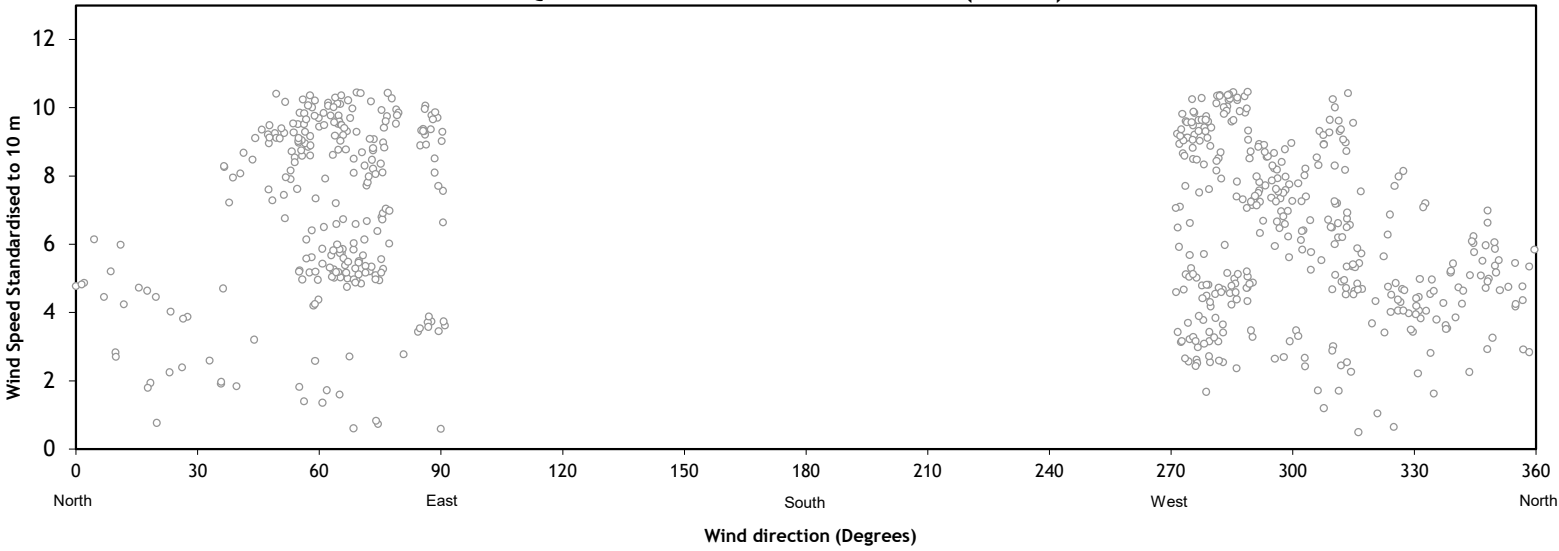
SUSTAINABLE INVESTMENTS



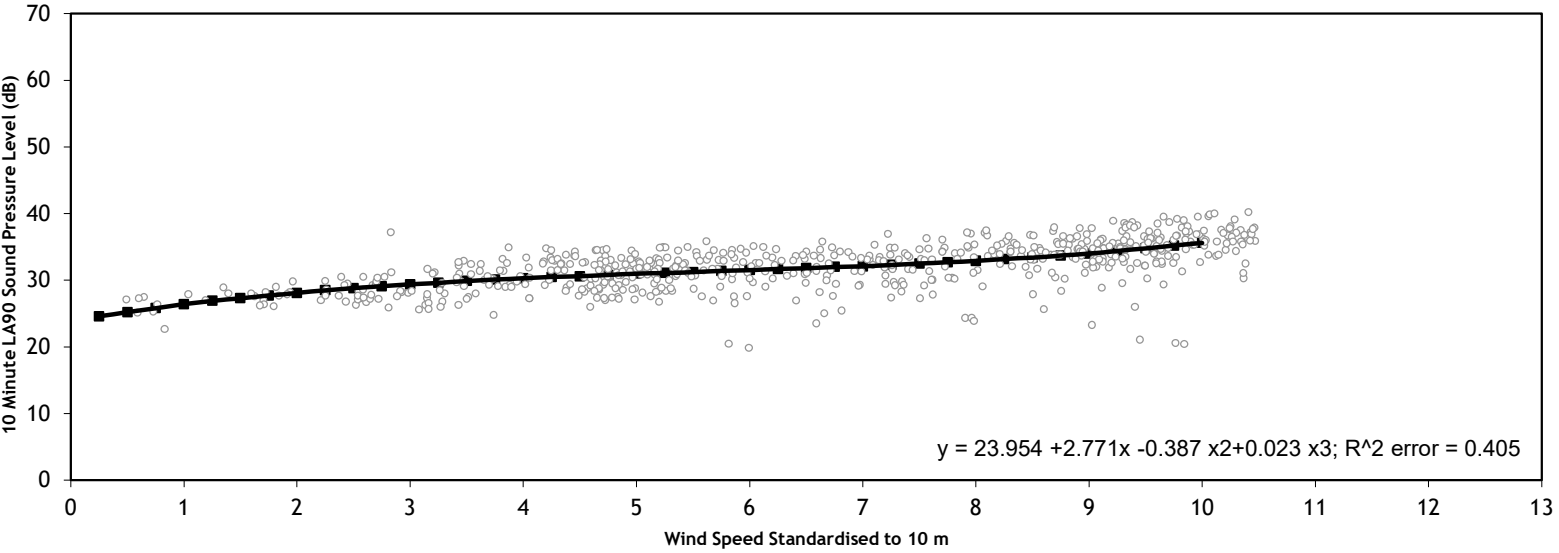


ETSU-R-97 QUIET DAYTIME - 6 Law Head (NML3)

Wind Conditions Quiet Daytime



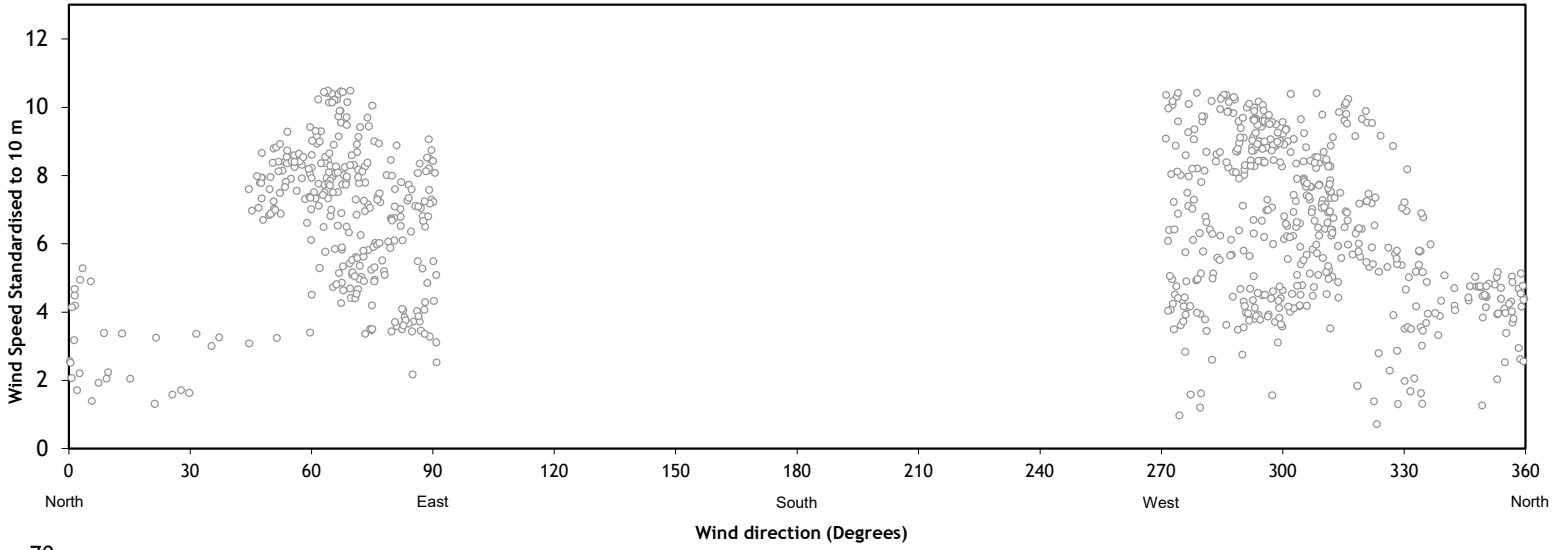
Regression Analysis Quiet Daytime



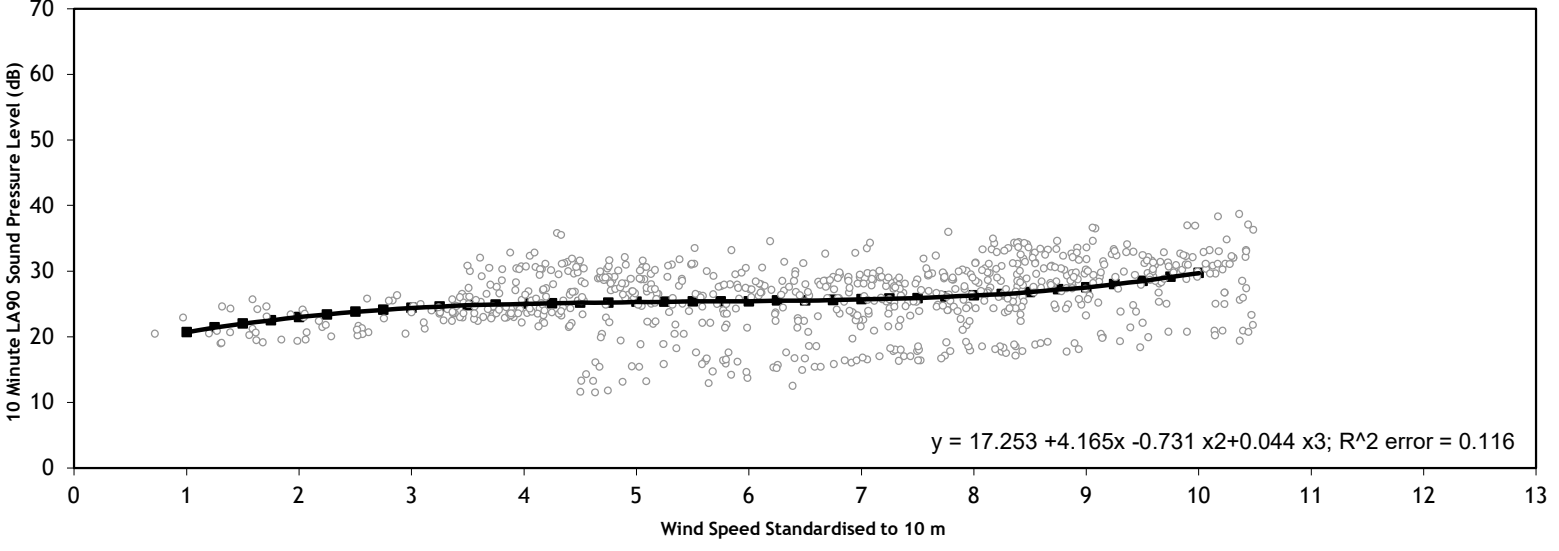
Wind Speed (m/s)	2	3	4	5	6	7	8	9	10			Total
Number of data points	21	49	53	115	58	57	62	105	92			612
Prevailing Background	28.1	29.4	30.3	31	31.5	32.1	32.9	34	35.6			

ETSU-R-97 NIGHT-TIME - 6 Law Head (NML3)

Wind Conditions Night-Time



Regression Analysis Night-Time



Wind Speed (m/s)	2	3	4	5	6	7	8	9	10			Total
Number of data points	21	39	106	102	88	113	136	97	85			787
Prevailing Background	23	24.4	25	25.3	25.4	25.7	26.3	27.5	29.7			

- Legend:**
-  L_{A90} 10 Minute Calculated Background Noise
 -  Line of best fit
 -  Line of best fit flat lined where appropriate(Prevailing Background)

Project Scout Moor II Wind Farm

Client Cubico UK Development Ltd

Title Wind Conditions&Regression Analysis

Figure Number A1.2cb

Drawn MT

Checked GC

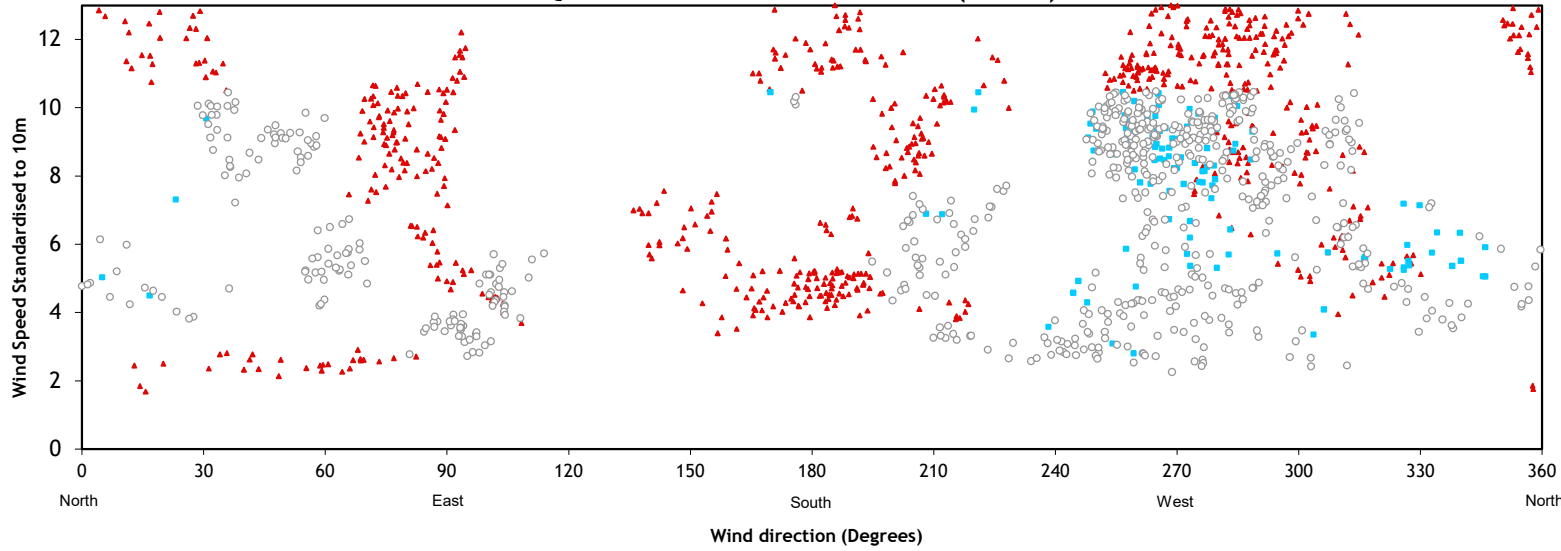
Date 12/05/2026

Document Reference 16647-Models

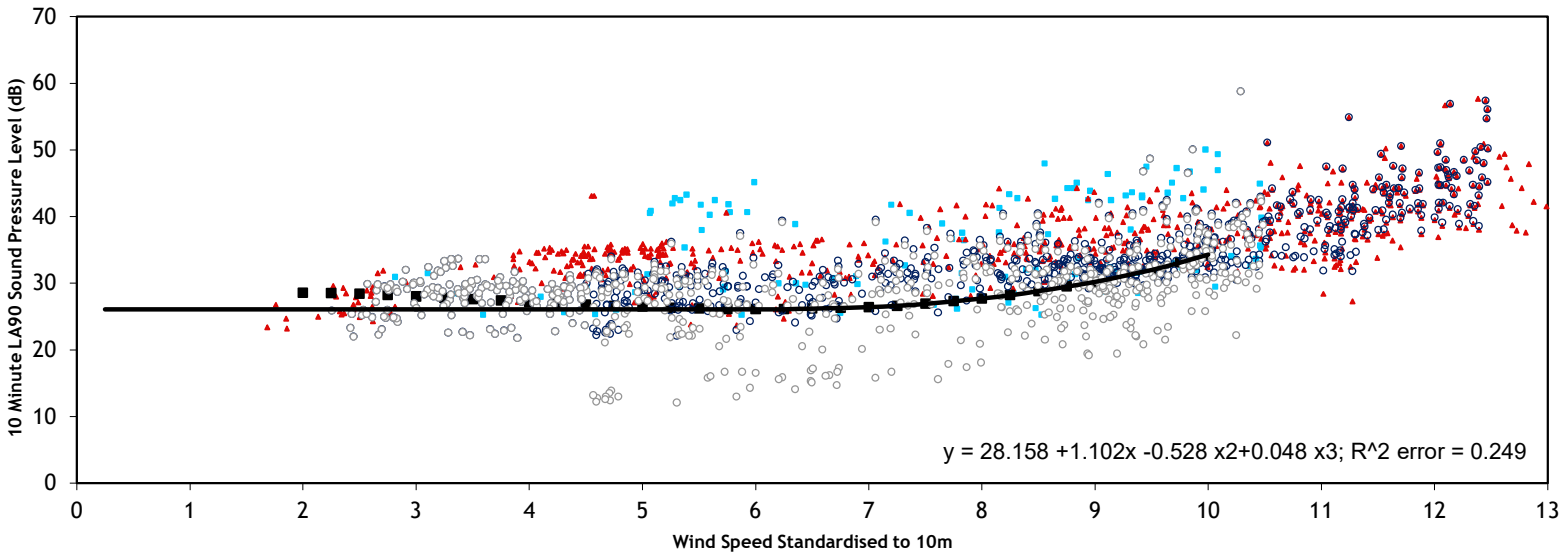


ETSU-R-97 QUIET DAYTIME - New Road (NML4)

Wind Conditions Quiet Daytime



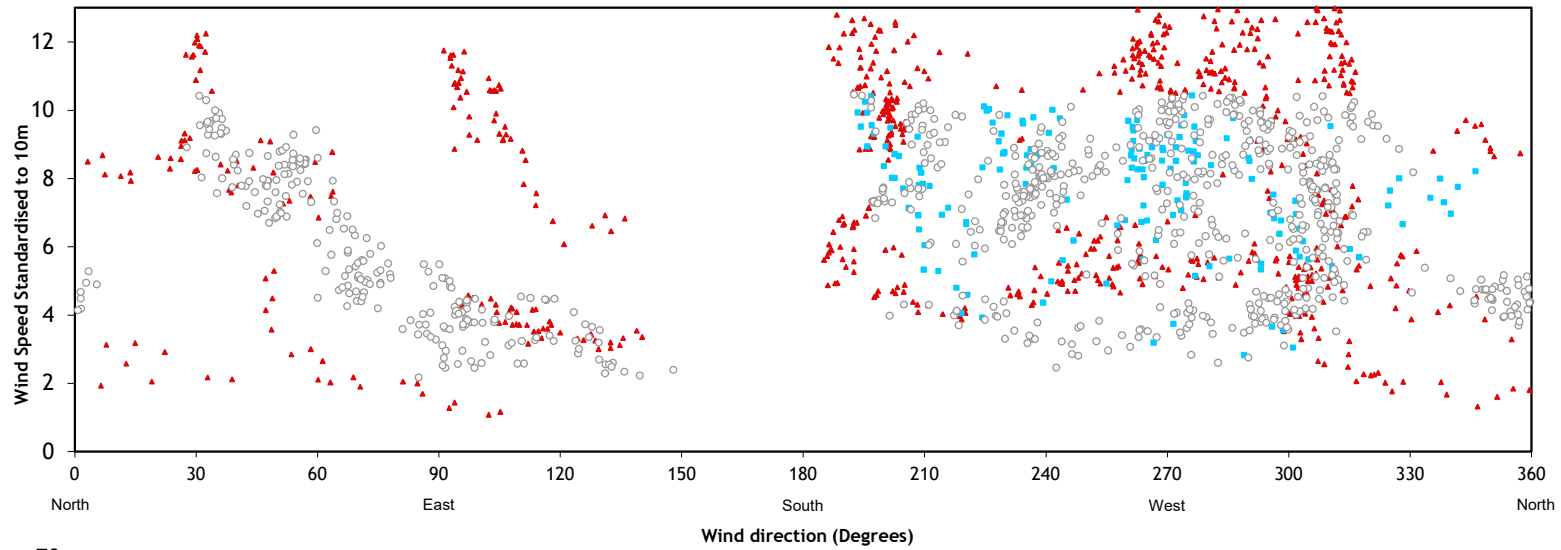
Regression Analysis Quiet Daytime



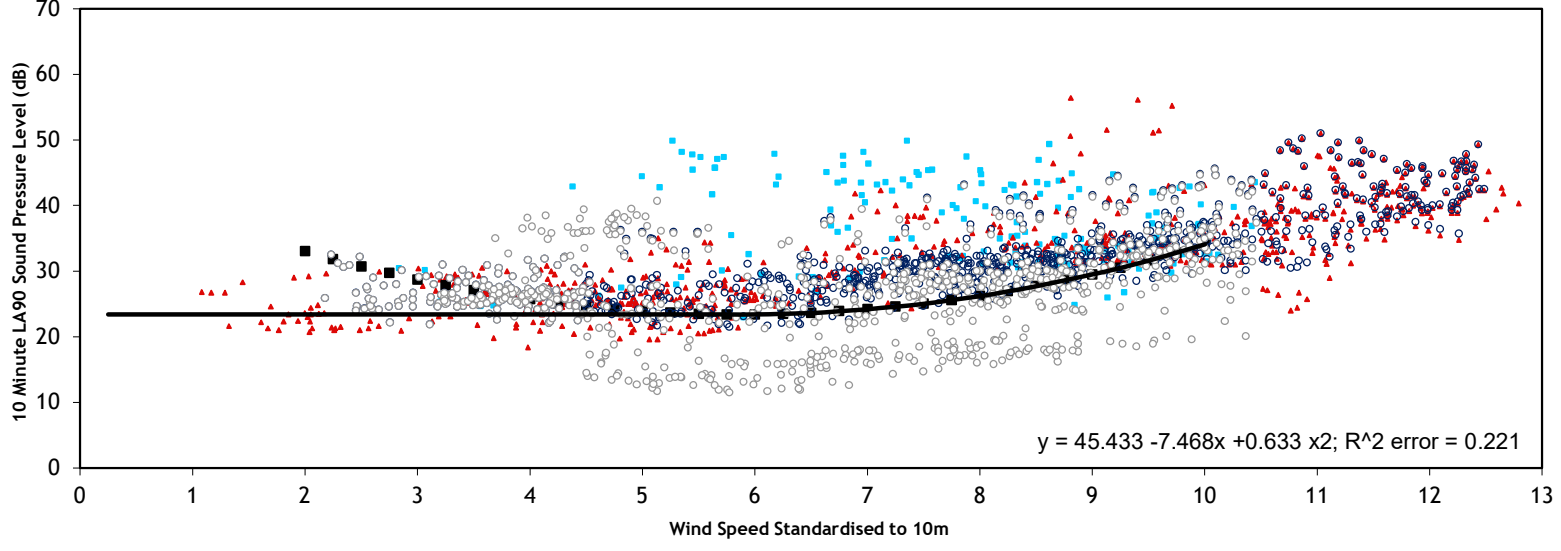
Wind Speed (m/s)	2	3	4	5	6	7	8	9	10			Total
Number of data points	4	73	81	82	47	49	60	130	105			631
Prevailing Background	26.1	26.1	26.1	26.1	26.1	26.4	27.7	30.2	34.3			

ETSU-R-97 NIGHT-TIME - New Road (NML4)

Wind Conditions Night-Time



Regression Analysis Night-Time



Wind Speed (m/s)	2	3	4	5	6	7	8	9	10			Total
Number of data points	9	55	133	91	72	102	140	116	102			820
Prevailing Background	23.4	23.4	23.4	23.4	23.4	24.2	26.2	29.5	34.1			

Legend:

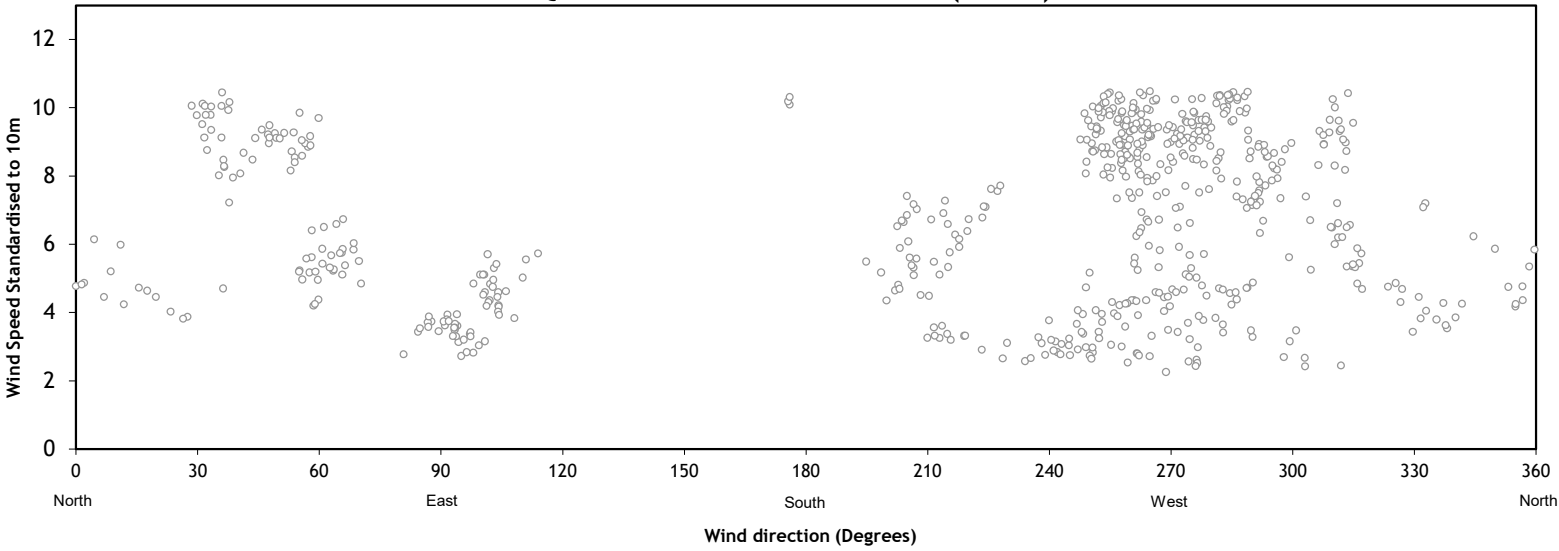
- L_A90 10 Minute Calculated Background Noise
- Line of best fit
- Line of best fit flat lined where appropriate(Prevailing Background)
- Excluded Data-Manual exclusion
- Excluded Data-Rain
- Excluded Data-Filtered Wind Direction
- L_A90 10 Minute Measured Total Noise

Project	Scout Moor II Wind Farm
Client	Cubico UK Development Ltd
Title	Wind Conditions&Regression Analysis
Figure Number	A1.2da
Drawn	MT
Checked	GC
Date	16/07/2026
Document Reference	16647-Models

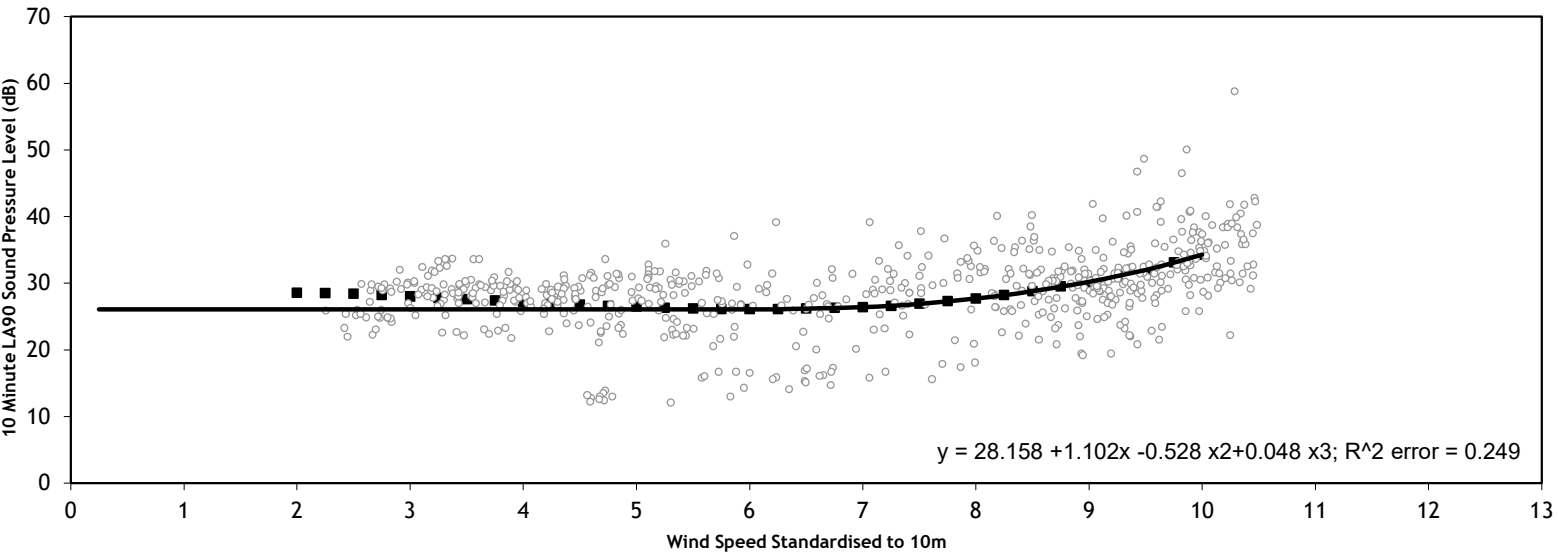


ETSU-R-97 QUIET DAYTIME - New Road (NML4)

Wind Conditions Quiet Daytime



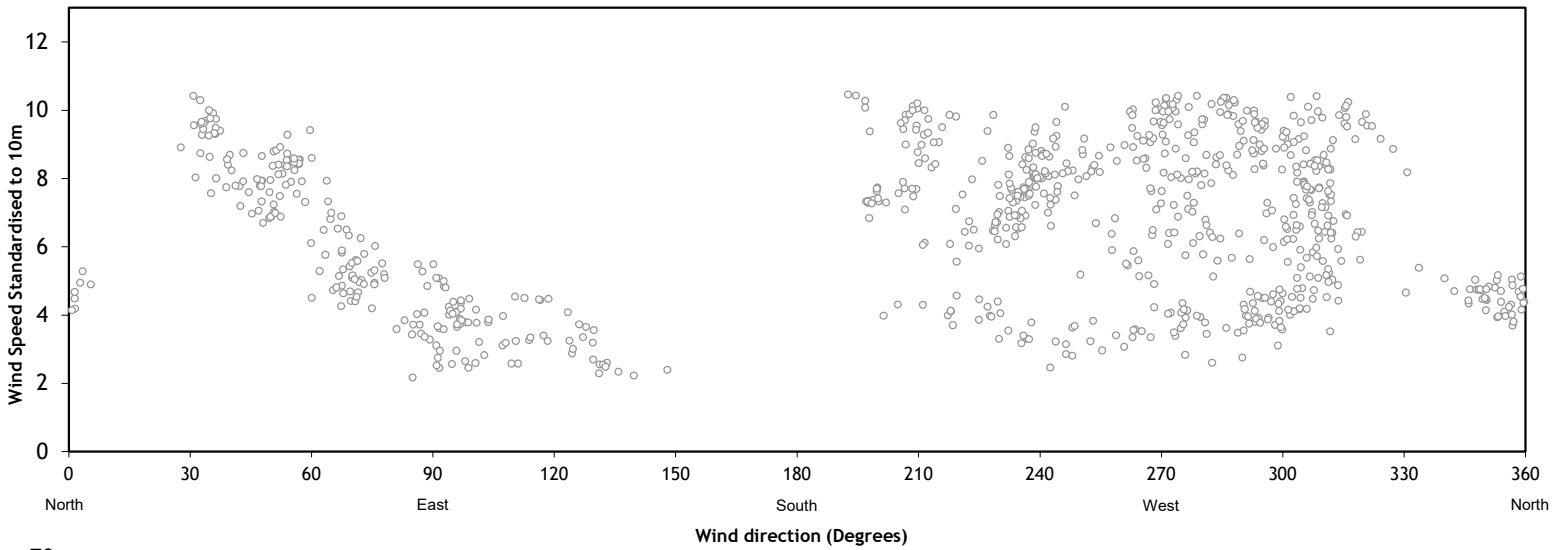
Regression Analysis Quiet Daytime



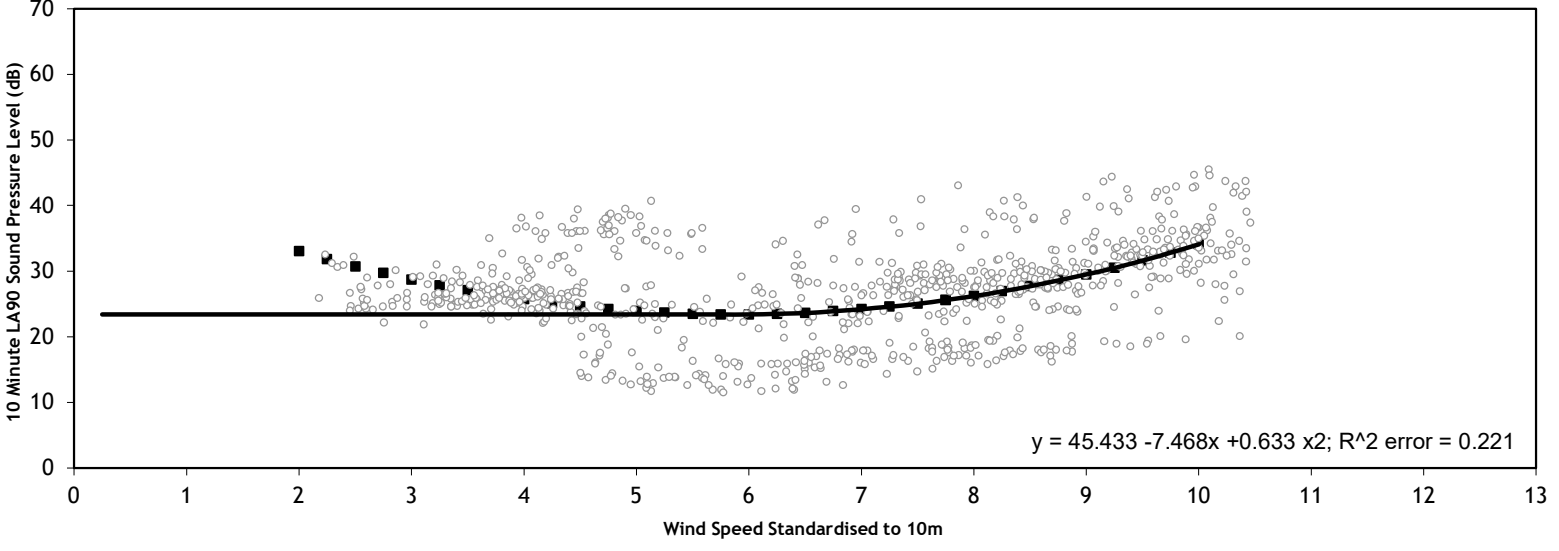
Wind Speed (m/s)	2	3	4	5	6	7	8	9	10			Total
Number of data points	4	73	81	82	47	49	60	130	105			631
Prevailing Background	26.1	26.1	26.1	26.1	26.1	26.4	27.7	30.2	34.3			

ETSU-R-97 NIGHT-TIME - New Road (NML4)

Wind Conditions Night-Time



Regression Analysis Night-Time



Wind Speed (m/s)	2	3	4	5	6	7	8	9	10			Total
Number of data points	9	55	133	91	72	102	140	116	102			820
Prevailing Background	23.4	23.4	23.4	23.4	23.4	24.2	26.2	29.5	34.1			

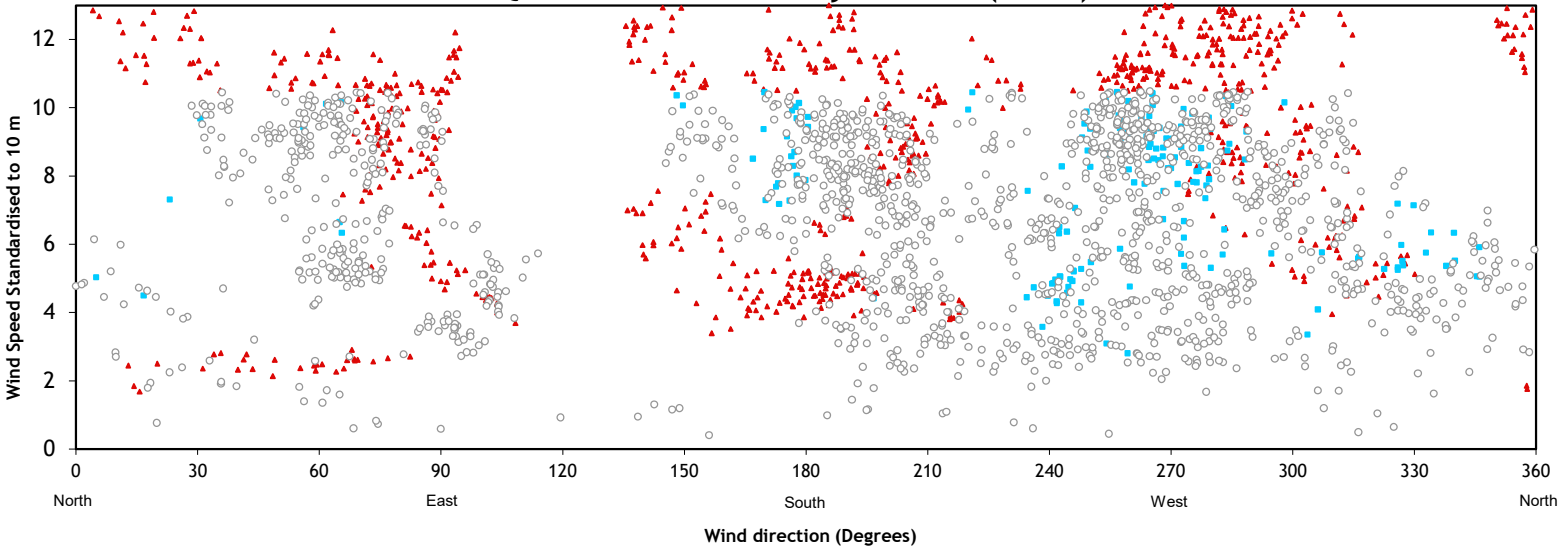
- Legend:
- L_{A90} 10 Minute Calculated Background Noise
 - Line of best fit
 - Line of best fit flat lined where appropriate(Prevailing Background)

Project	Scout Moor II Wind Farm
Client	Cubico UK Development Ltd
Title	Wind Conditions&Regression Analysis
Figure Number	A1.2db
Drawn	MT
Checked	GC
Date	16/07/2026
Document Reference	16647-Models

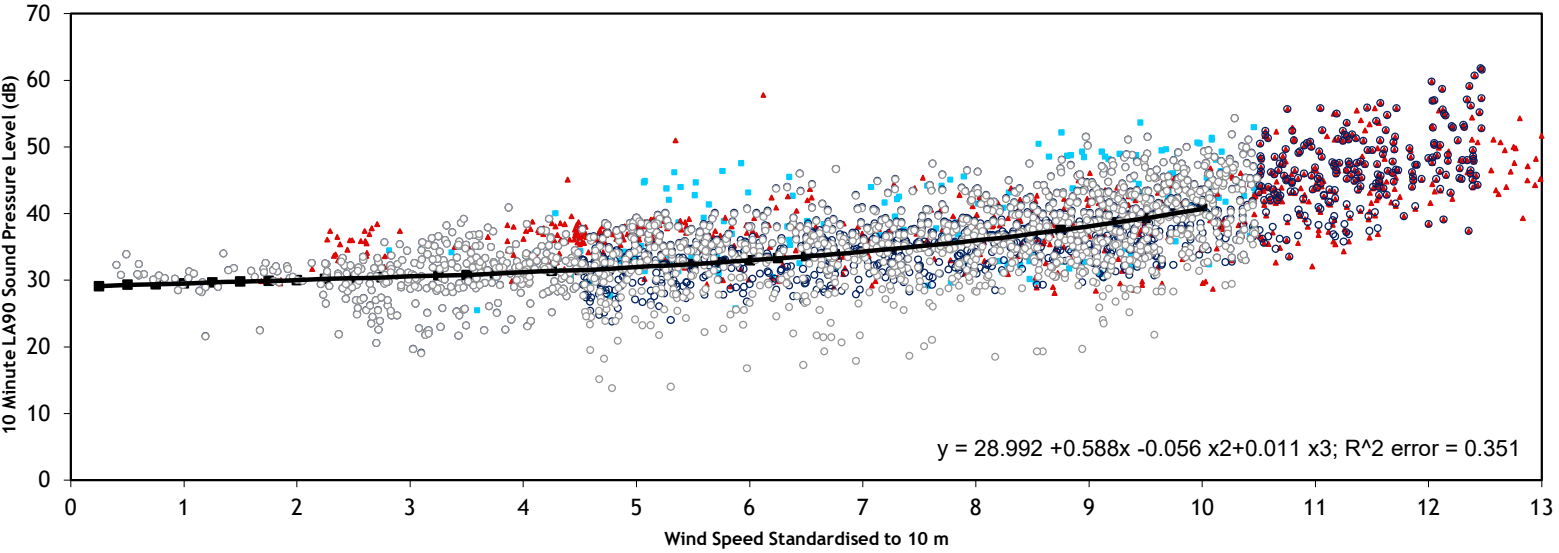


ETSU-R-97 QUIET DAYTIME - Windy Harbour (NML5)

Wind Conditions Quiet Daytime



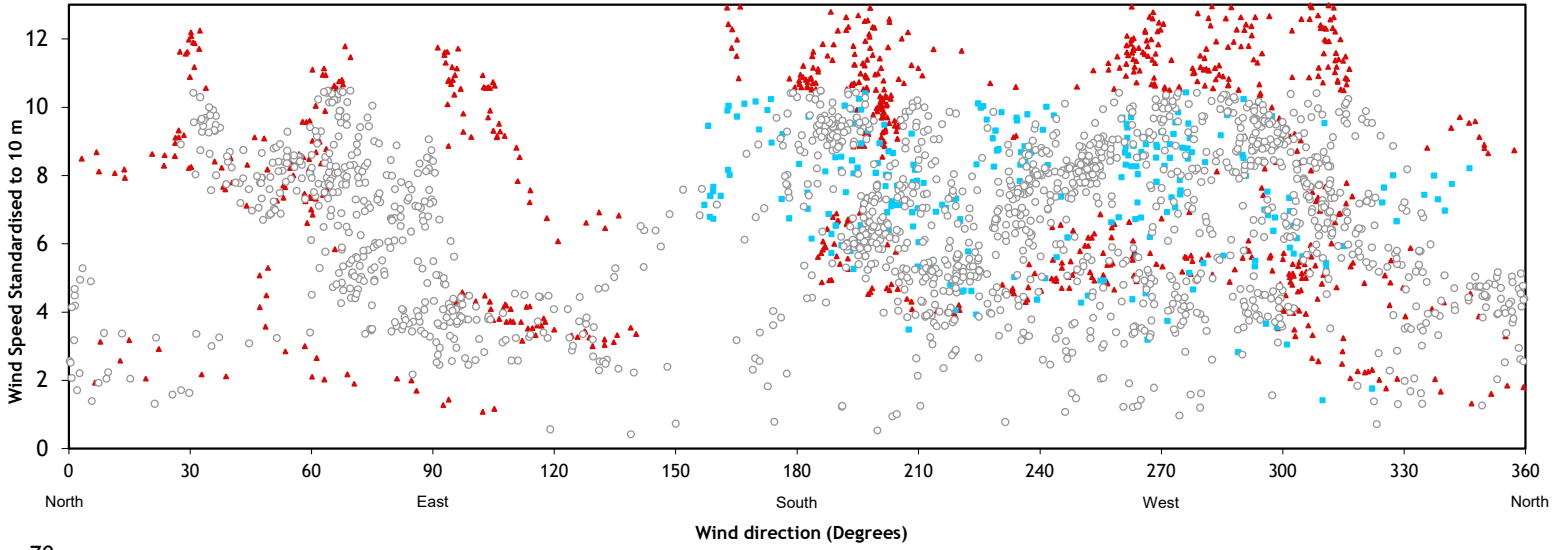
Regression Analysis Quiet Daytime



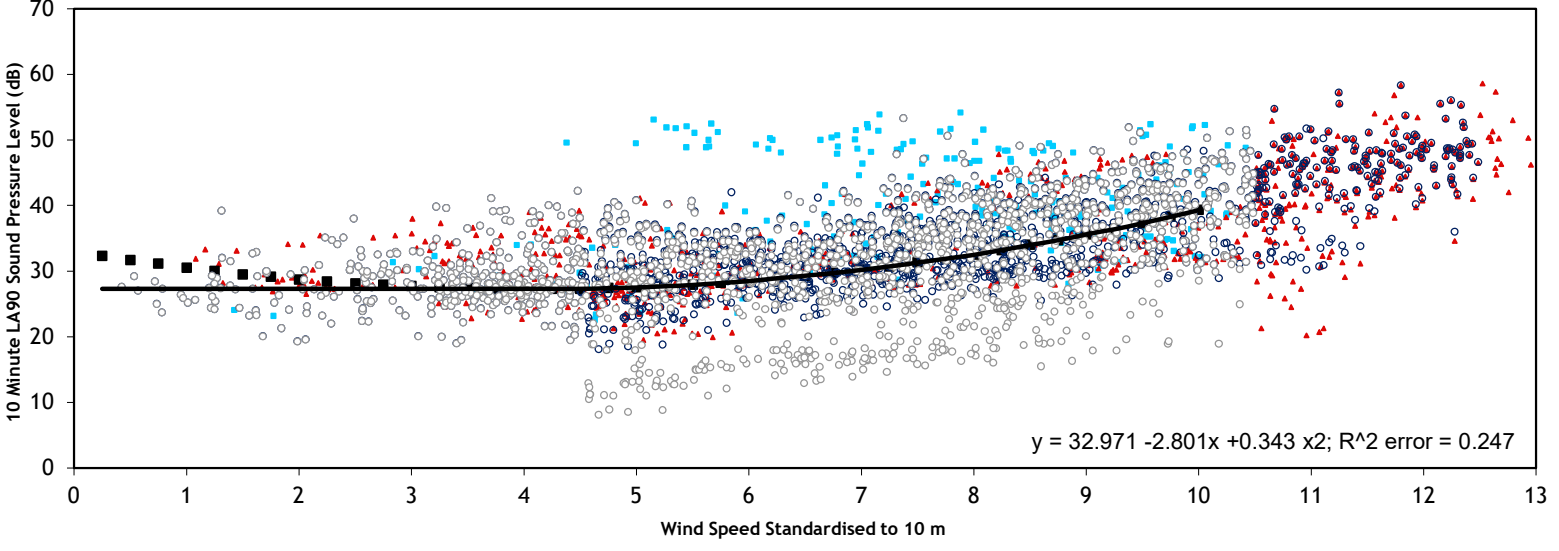
Wind Speed (m/s)	2	3	4	5	6	7	8	9	10			Total
Number of data points	41	136	140	195	120	165	192	262	234			1485
Prevailing Background	30	30.6	31.2	32	33	34.3	36	38.1	40.7			

ETSU-R-97 NIGHT-TIME - Windy Harbour (NML5)

Wind Conditions Night-Time



Regression Analysis Night-Time



Wind Speed (m/s)	2	3	4	5	6	7	8	9	10			Total
Number of data points	39	102	197	192	185	215	280	221	179			1610
Prevailing Background	27.3	27.3	27.3	27.5	28.5	30.2	32.5	35.6	39.3			

Legend:

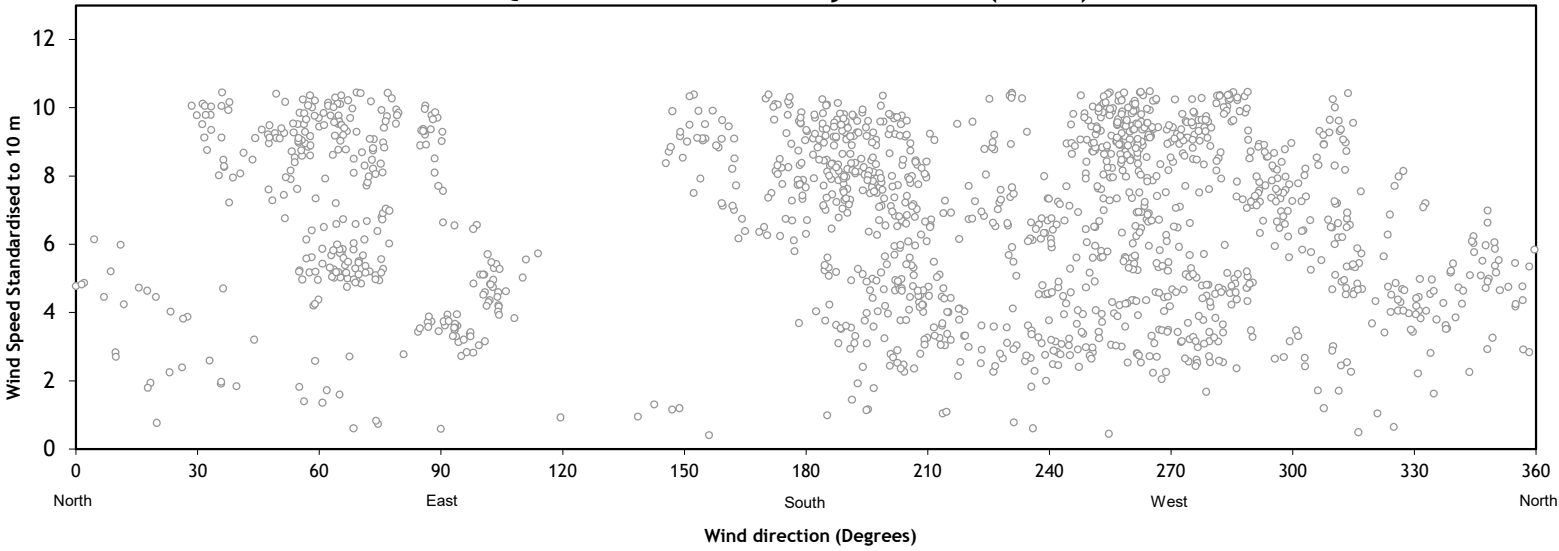
- L_{A90} 10 Minute Calculated Background Noise
- Line of best fit
- Line of best fit flat lined where appropriate(Prevailing Background)
- Excluded Data-Manual exclusion
- Excluded Data-Rain
- Excluded Data-Filtered Wind Direction
- L_{A90} 10 Minute Measured Total Noise

Project	Scout Moor II Wind Farm
Client	Cubico UK Development Ltd
Title	Wind Conditions&Regression Analysis
Figure Number	A1.2ea
Drawn	MT
Checked	GC
Date	16/07/2026
Document Reference	16647-Models

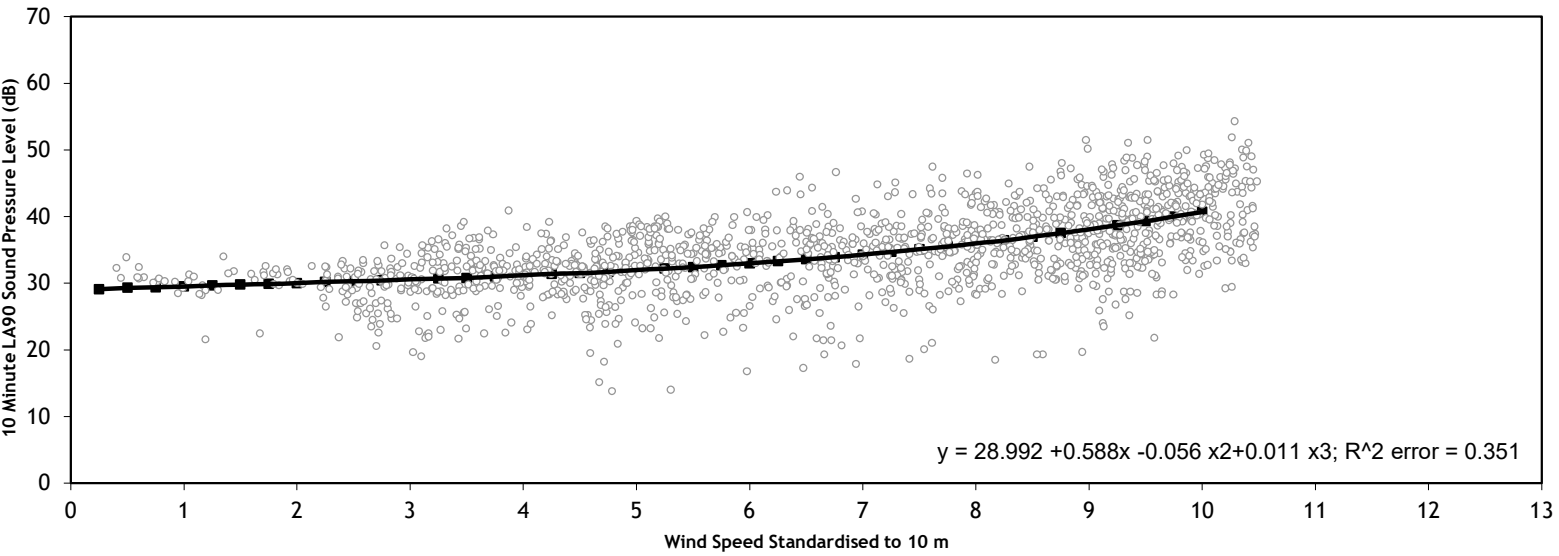


ETSU-R-97 QUIET DAYTIME - Windy Harbour (NML5)

Wind Conditions Quiet Daytime



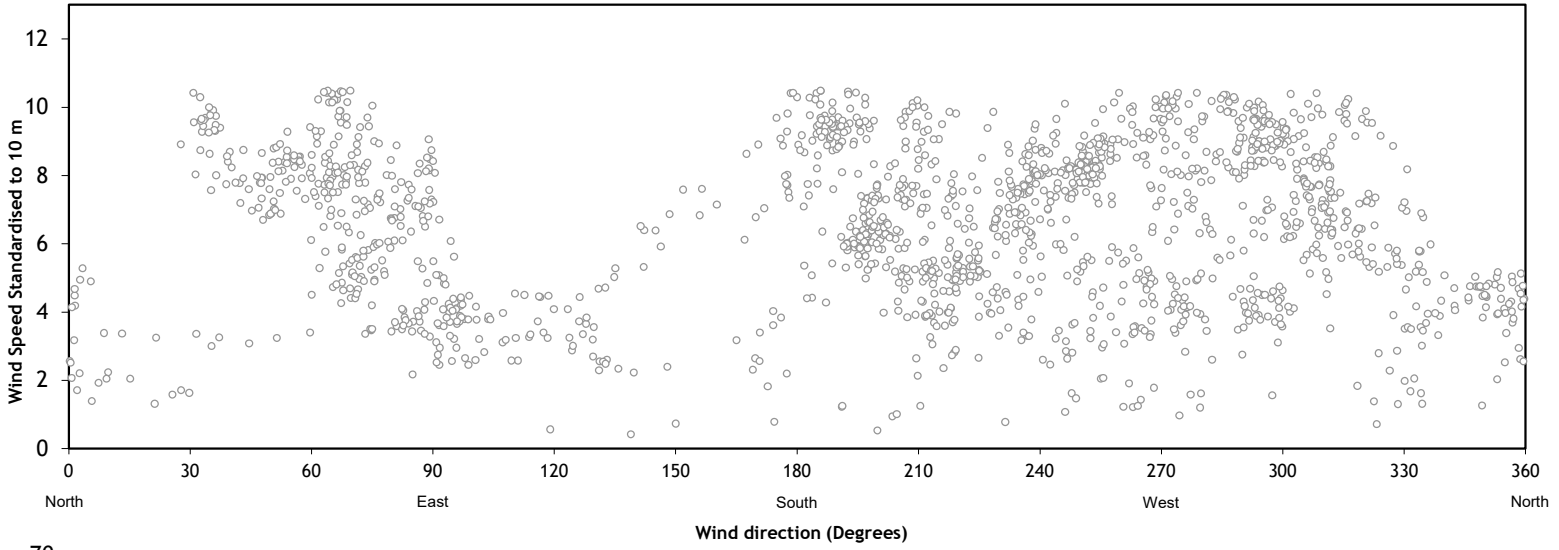
Regression Analysis Quiet Daytime



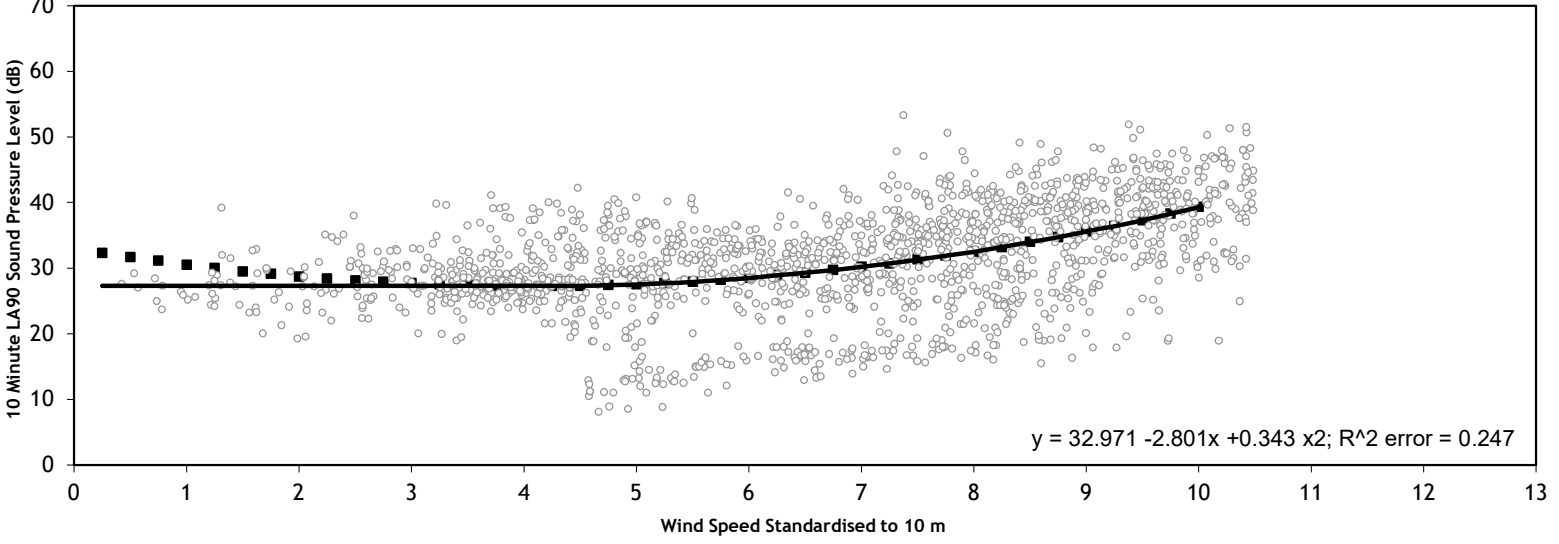
Wind Speed (m/s)	2	3	4	5	6	7	8	9	10			Total
Number of data points	41	136	140	195	120	165	192	262	234			1485
Prevailing Background	30	30.6	31.2	32	33	34.3	36	38.1	40.7			

ETSU-R-97 NIGHT-TIME - Windy Harbour (NML5)

Wind Conditions Night-Time



Regression Analysis Night-Time



Wind Speed (m/s)	2	3	4	5	6	7	8	9	10			Total
Number of data points	39	102	197	192	185	215	280	221	179			1610
Prevailing Background	27.3	27.3	27.3	27.5	28.5	30.2	32.5	35.6	39.3			

Legend:

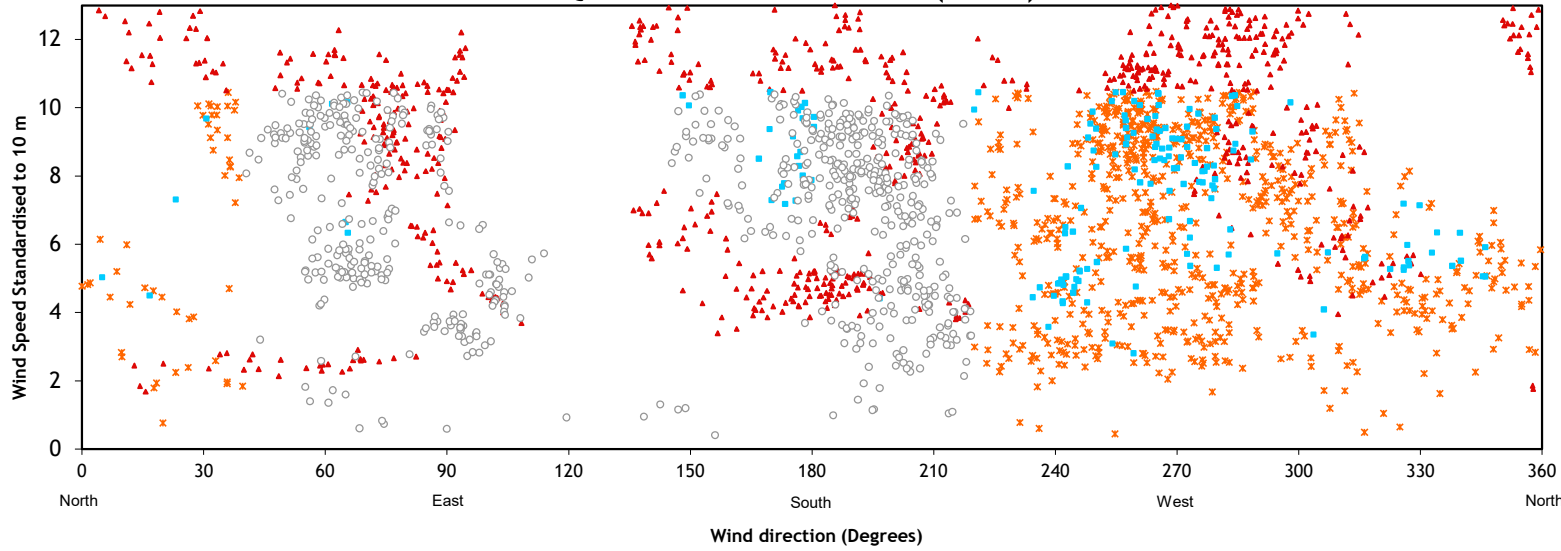
- L_{A90} 10 Minute Calculated Background Noise
- Line of best fit
- Line of best fit flat lined where appropriate(Prevailing Background)

Project	Scout Moor II Wind Farm
Client	Cubico UK Development Ltd
Title	Wind Conditions&Regression Analysis
Figure Number	A1.2eb
Drawn	MT
Checked	GC
Date	16/07/2026
Document Reference	16647-Models

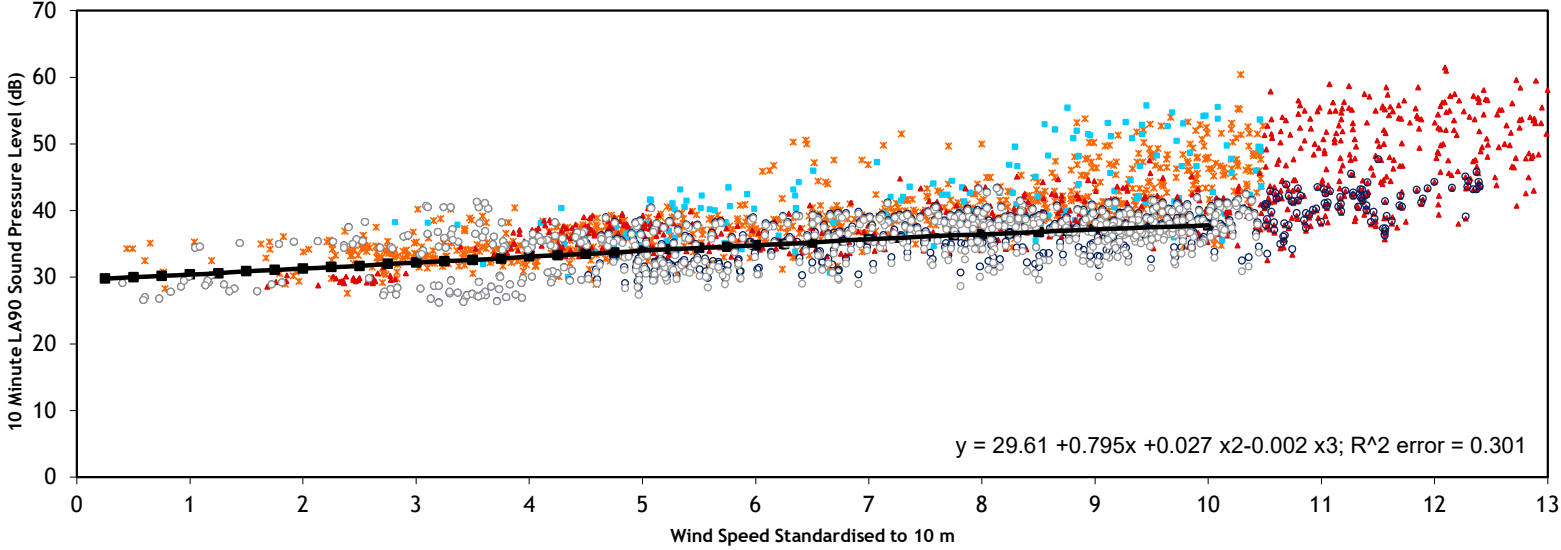


ETSU-R-97 QUIET DAYTIME - Jubarn (NML6)

Wind Conditions Quiet Daytime



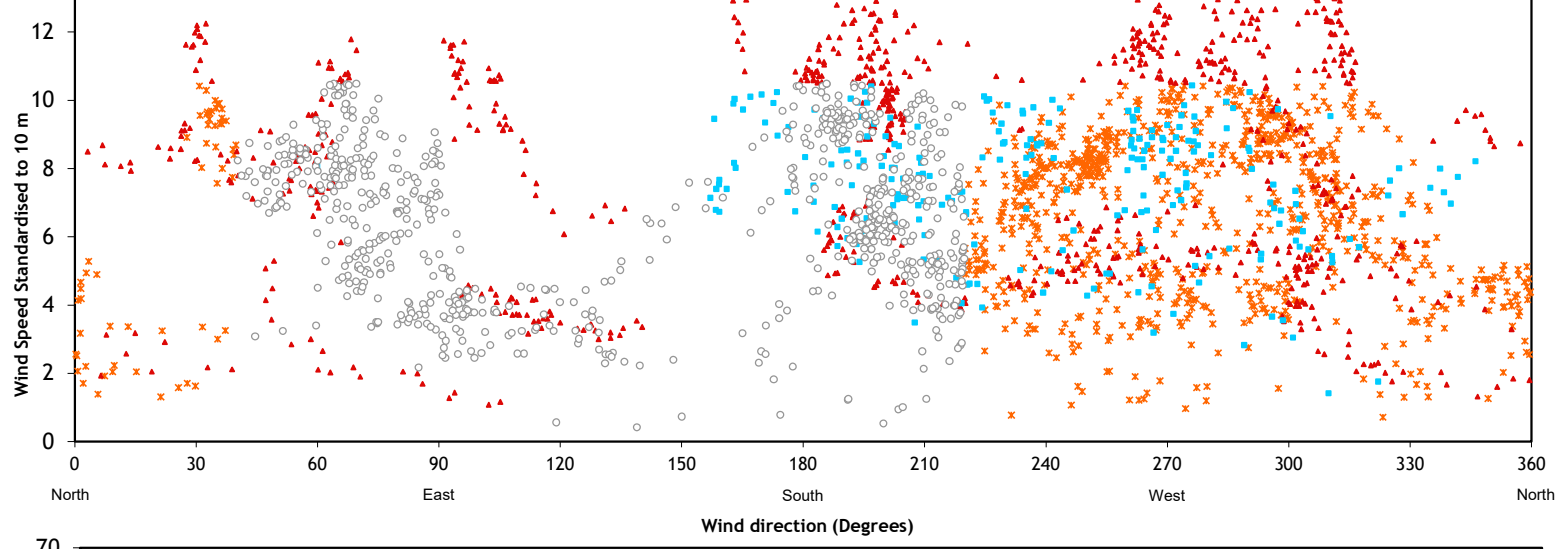
Regression Analysis Quiet Daytime



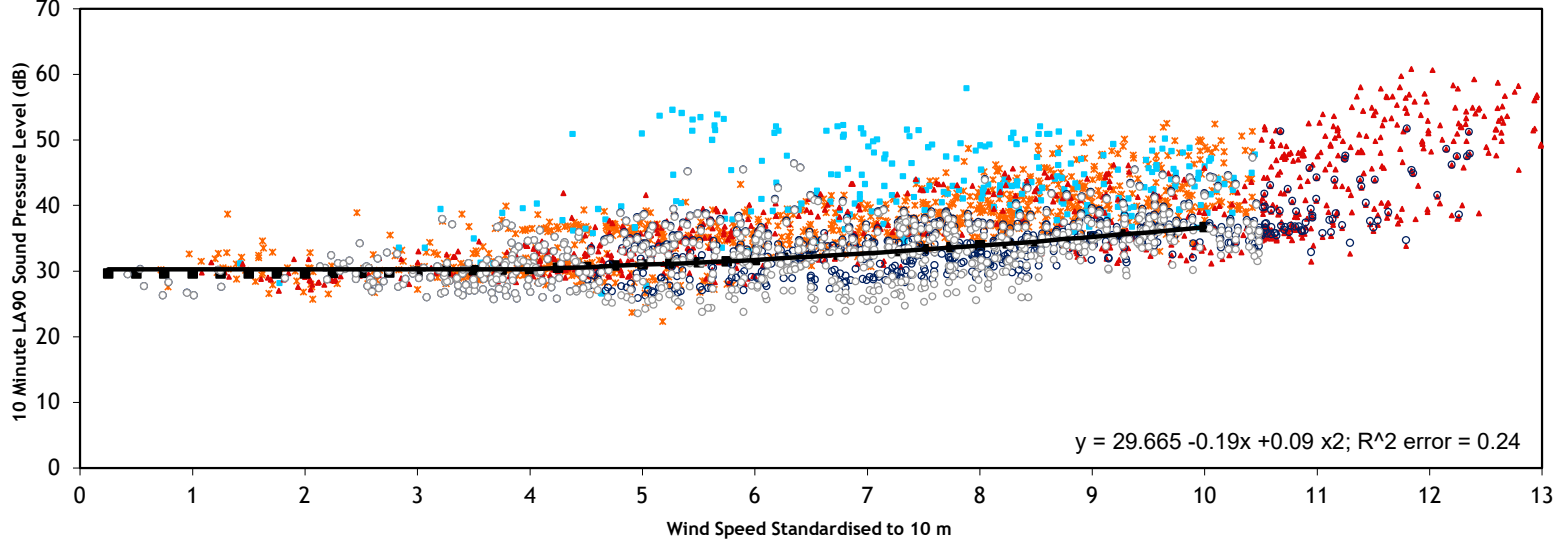
Wind Speed (m/s)	2	3	4	5	6	7	8	9	10			Total
Number of data points	12	42	66	90	48	75	113	127	108			681
Prevailing Background	31.3	32.2	33.1	34	34.8	35.7	36.4	37.2	37.8			

ETSU-R-97 NIGHT-TIME - Jubarn (NML6)

Wind Conditions Night-Time



Regression Analysis Night-Time



Wind Speed (m/s)	2	3	4	5	6	7	8	9	10			Total
Number of data points	13	51	93	89	97	113	116	88	77			737
Prevailing Background	30.3	30.3	30.3	31	31.7	32.7	33.9	35.2	36.7			

- Legend:**
- L_{A90} 10 Minute Calculated Background Noise
 - Line of best fit
 - Line of best fit flat lined where appropriate(Prevailing Background)
 - Excluded Data-Manual exclusion
 - Excluded Data-Rain
 - Excluded Data-Filtered Wind Direction
 - L_{A90} 10 Minute Measured Total Noise

Project Scout Moor II Wind Farm

Client Cubico UK Development Ltd

Title Wind Conditions&Regression Analysis

Figure Number A1.2fa

Drawn MT

Checked GC

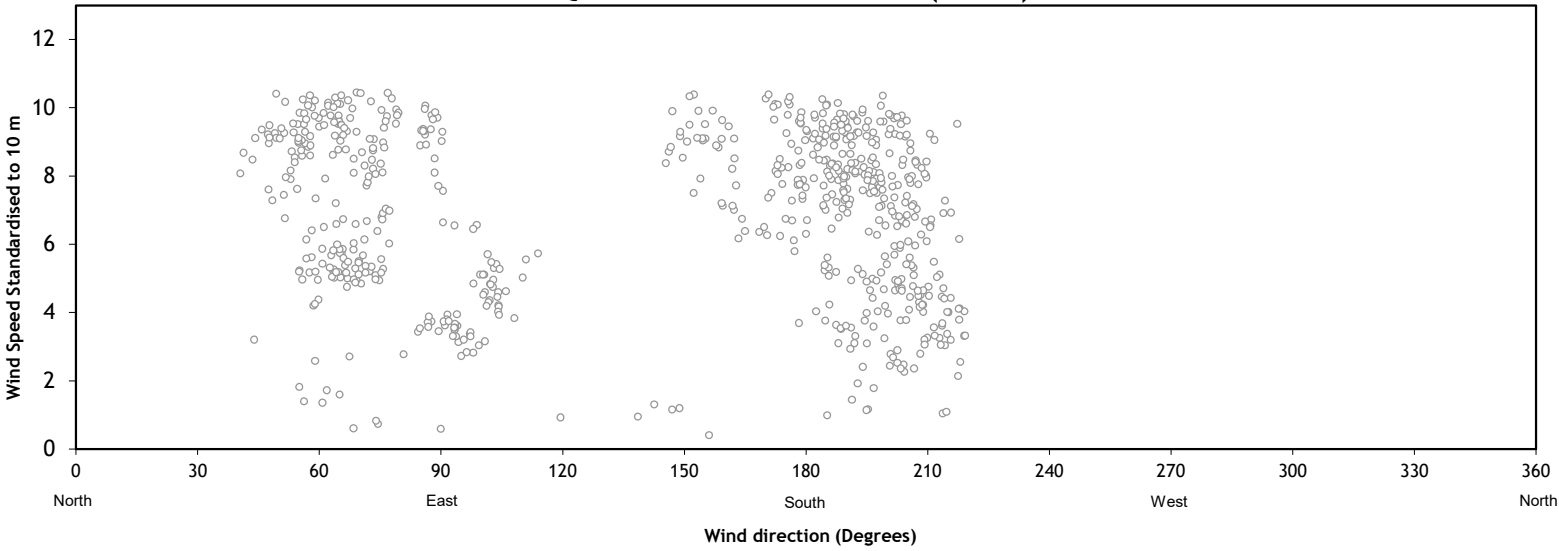
Date 16/07/2026

Document Reference 16647-Models

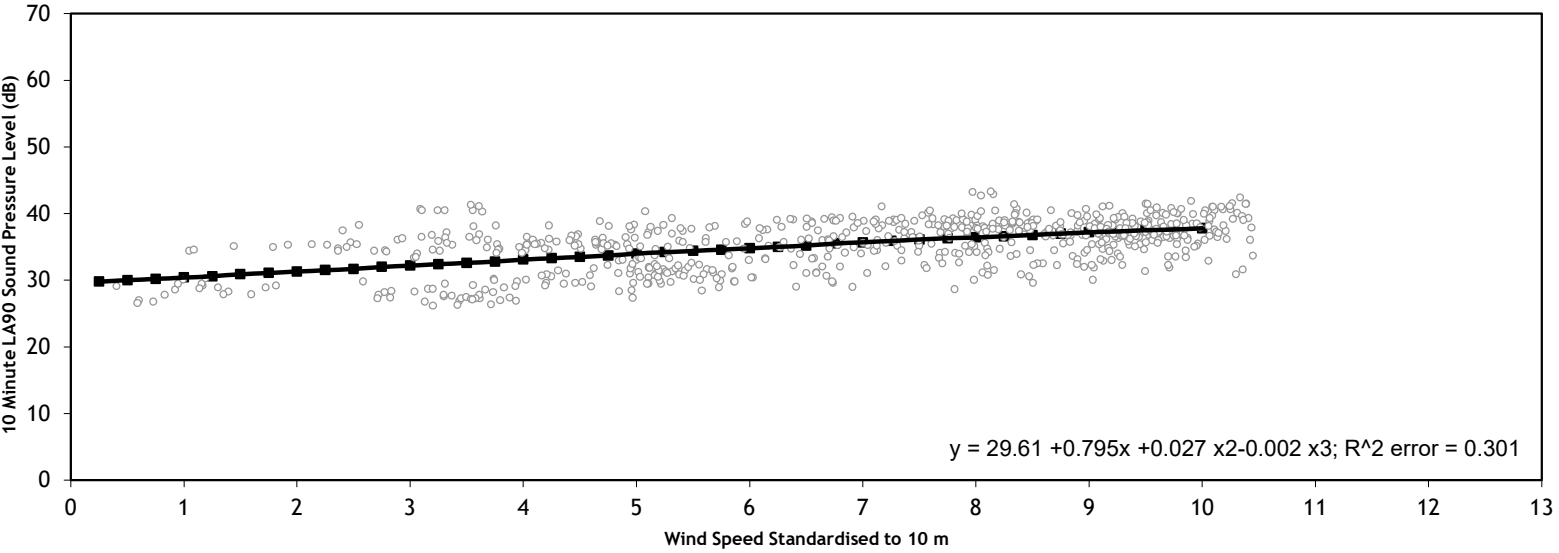


ETSU-R-97 QUIET DAYTIME - Jubarn (NML6)

Wind Conditions Quiet Daytime



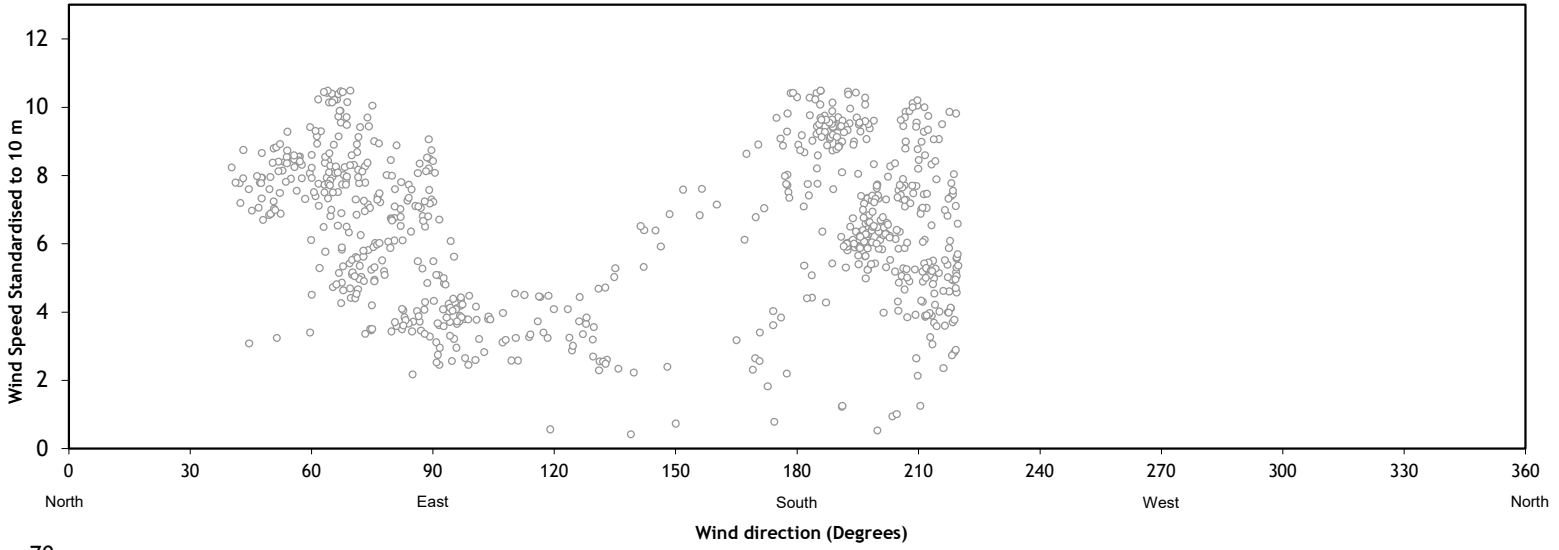
Regression Analysis Quiet Daytime



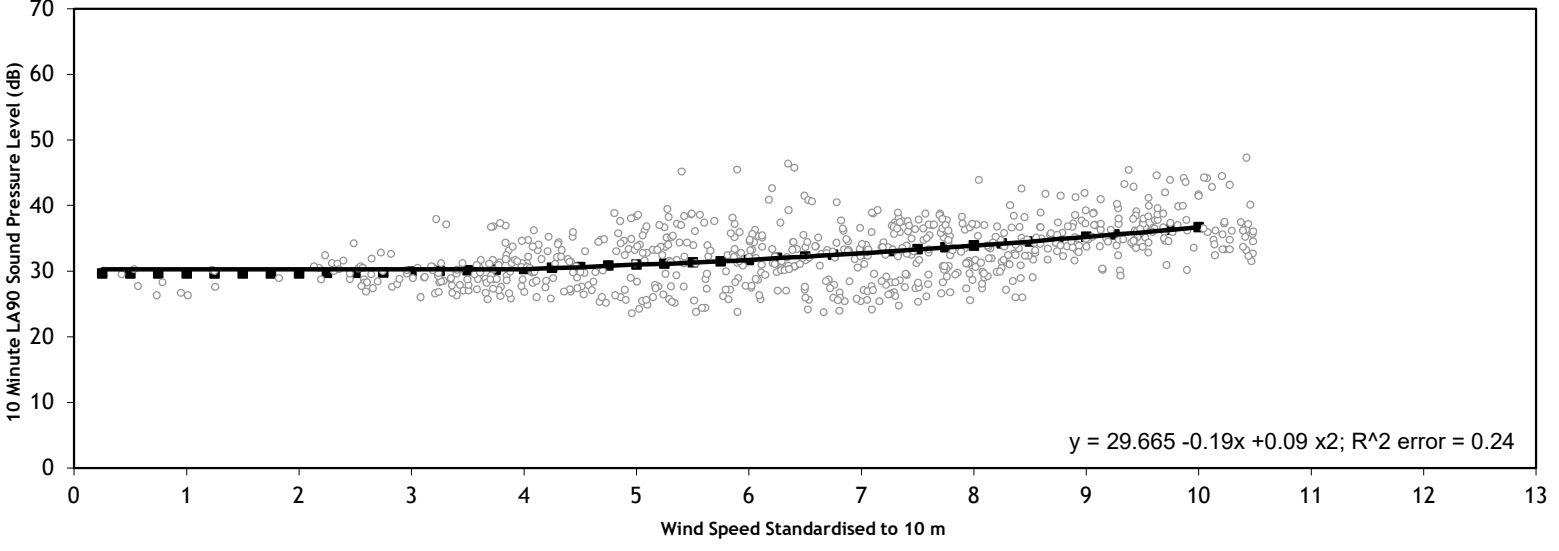
Wind Speed (m/s)	2	3	4	5	6	7	8	9	10			Total
Number of data points	12	42	66	90	48	75	113	127	108			681
Prevailing Background	31.3	32.2	33.1	34	34.8	35.7	36.4	37.2	37.8			

ETSU-R-97 NIGHT-TIME - Jubarn (NML6)

Wind Conditions Night-Time



Regression Analysis Night-Time



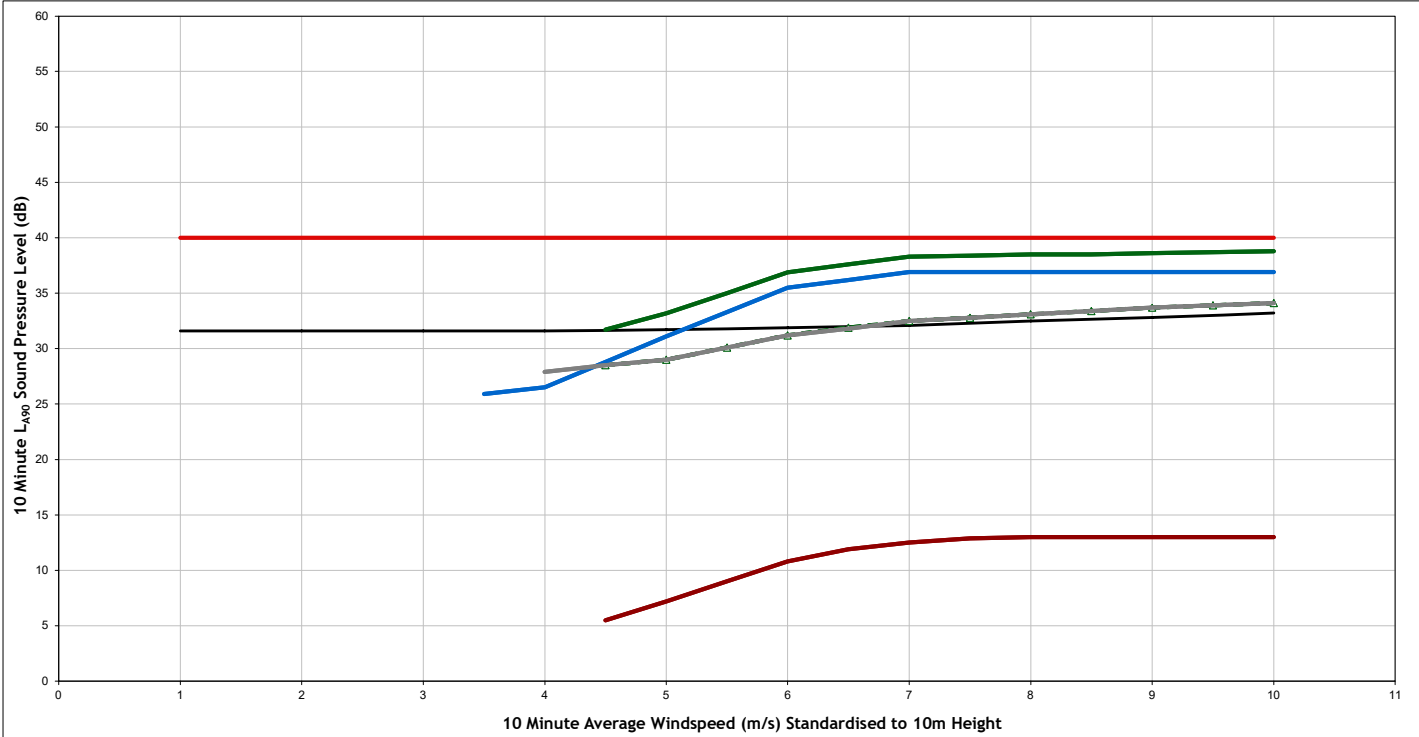
Wind Speed (m/s)	2	3	4	5	6	7	8	9	10			Total
Number of data points	13	51	93	89	97	113	116	88	77			737
Prevailing Background	30.3	30.3	30.3	31	31.7	32.7	33.9	35.2	36.7			

- Legend:**
- L_{A90} 10 Minute Calculated Background Noise
 - Line of best fit
 - Line of best fit flat lined where appropriate(Prevailing Background)

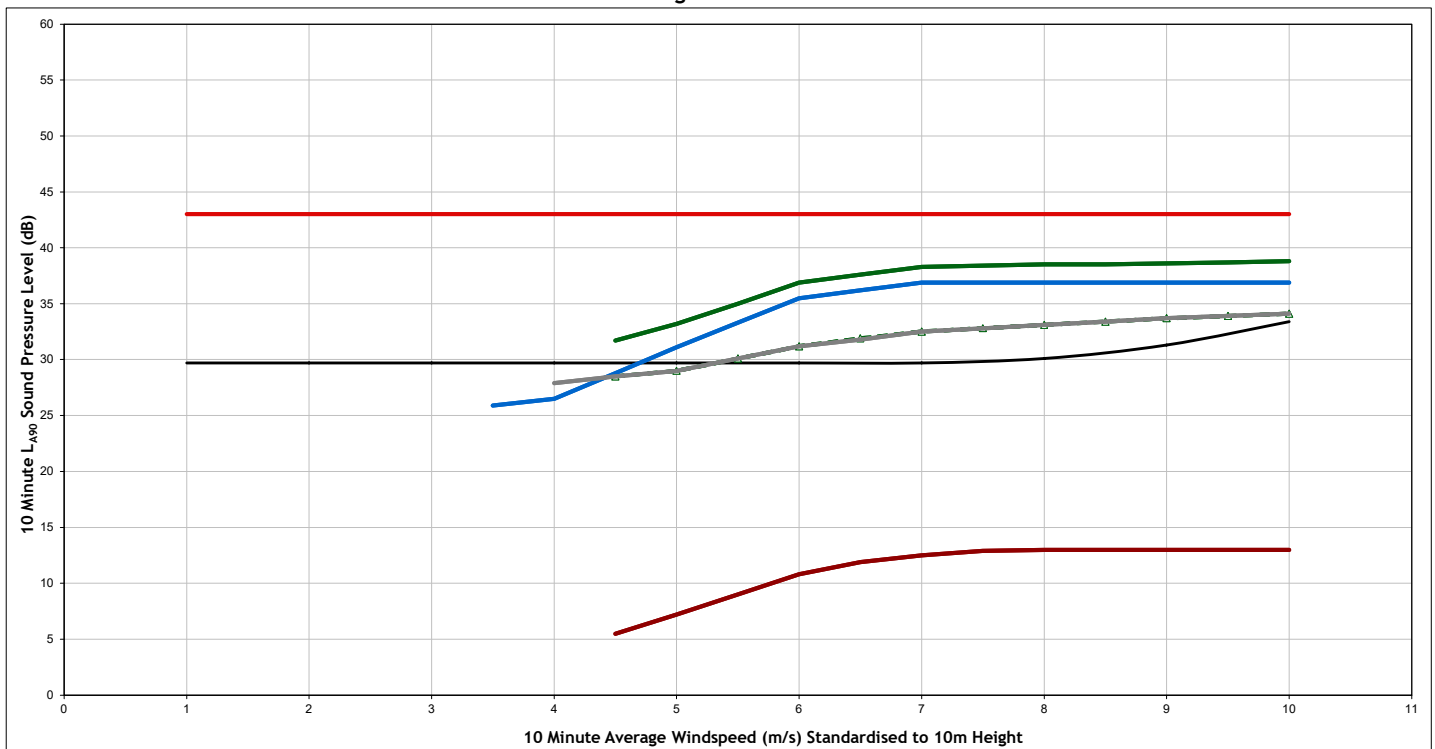
Project	Scout Moor II Wind Farm
Client	Cubico UK Development Ltd
Title	Wind Conditions&Regression Analysis
Figure Number	A1.2fb
Drawn	MT
Checked	GC
Date	16/07/2026
Document Reference	16647-Models



Daytime - NAL1



Night Time - NAL1



Legend:

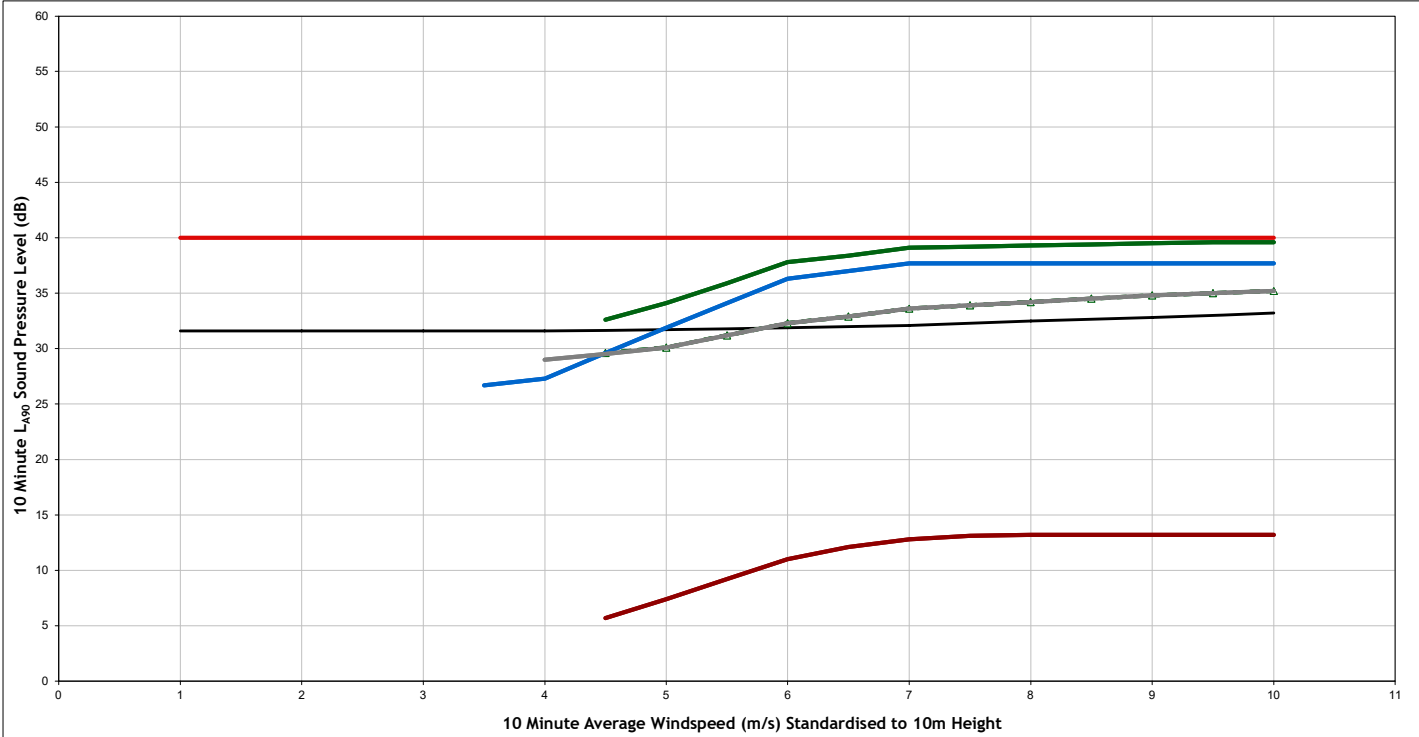
- Background Sound Trendline
- Total Noise Assessment Criteria (TNAC)
- Cumulative (inc. Project for Assessment) (150°)
- Cumulative (exc. Project for Assessment) (150°)
- Project for Assessment (150°)
- Scout Moor Wind Farm (150°)
- Reaps Moss Wind Farm (0°)

Project Scout Moor II Wind Farm
Client Cubico UK Development Ltd
Title Cumulative Noise Assessment
Figure Number Figure A1.3a

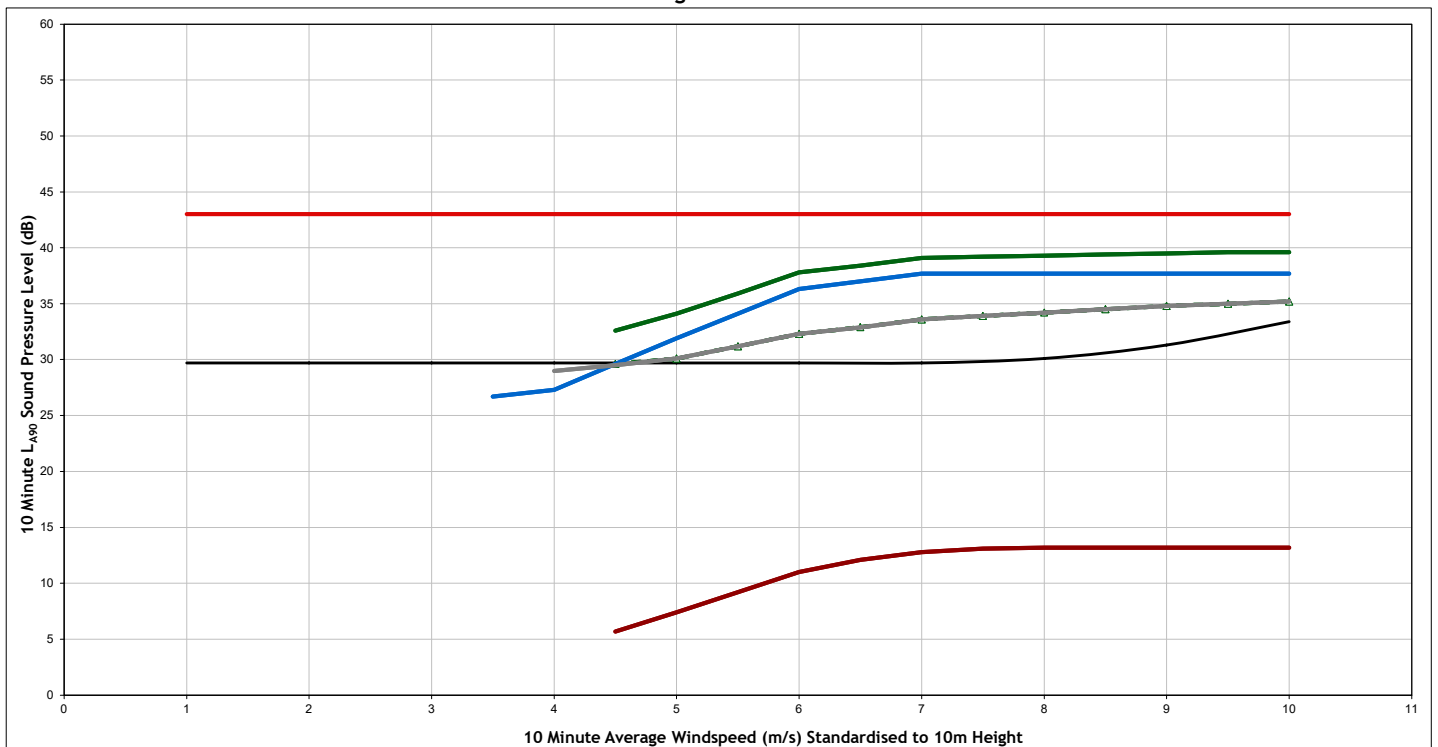
Drawn MT
Checked AB
Date 28/07/2026
Document Reference 16647



Daytime - NAL2



Night Time - NAL2



Legend:

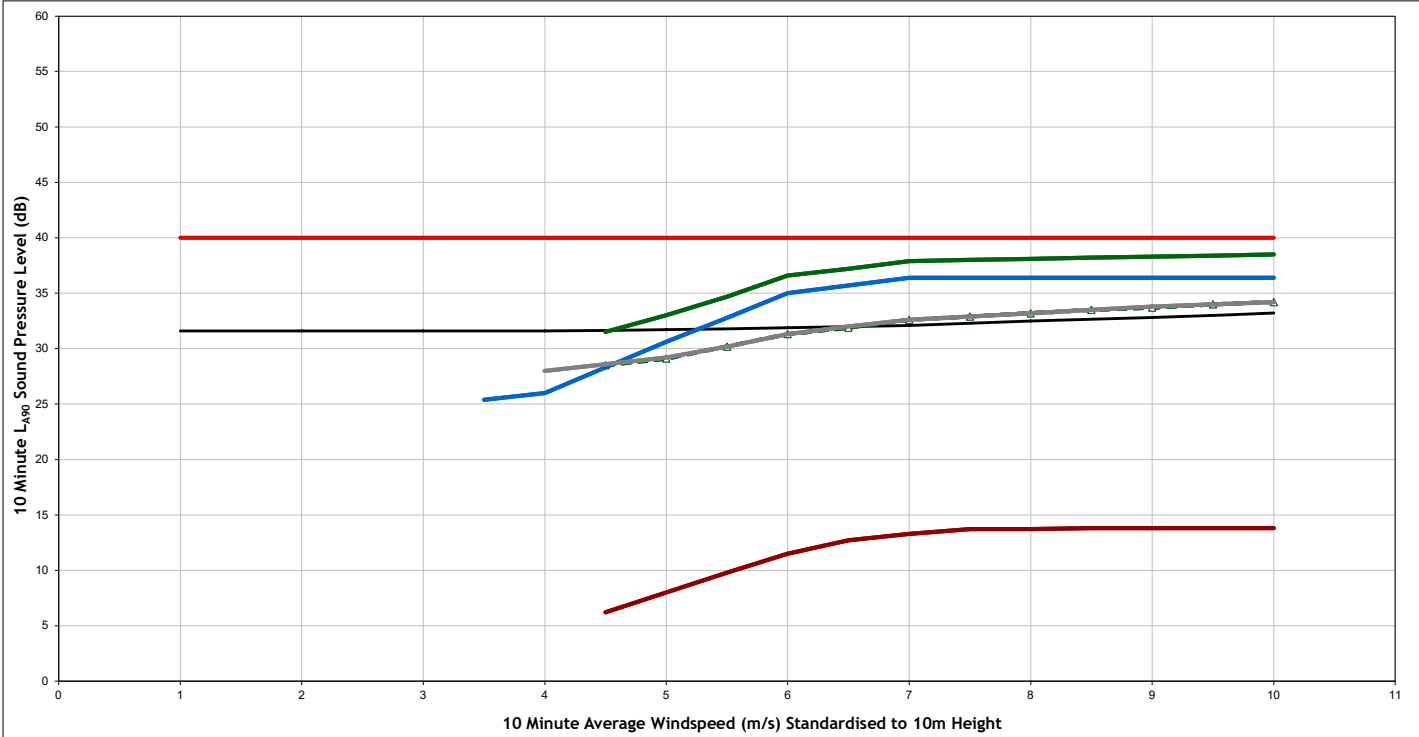
- Background Sound Trendline
- Total Noise Assessment Criteria (TNAC)
- Cumulative (inc. Project for Assessment) (180°)
- Cumulative (exc. Project for Assessment) (180°)
- Project for Assessment (180°)
- Scout Moor Wind Farm (180°)
- Reaps Moss Wind Farm (0°)

Project Scout Moor II Wind Farm
 Client Cubico UK Development Ltd
 Title Cumulative Noise Assessment
 NAL2
 Figure Number Figure A1.3b

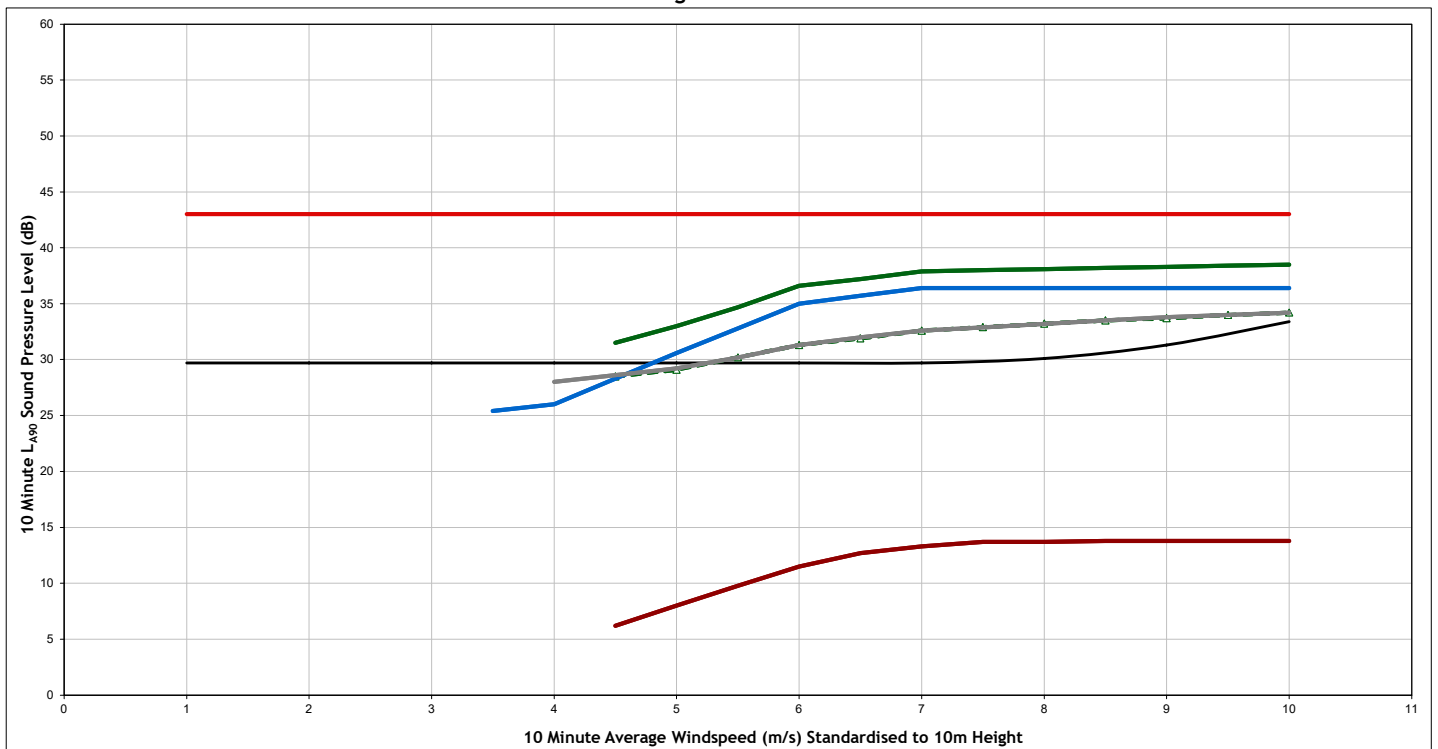
Drawn MT
 Checked AB
 Date 28/07/2026
 Document Reference 16647



Daytime - NAL3



Night Time - NAL3



Legend:

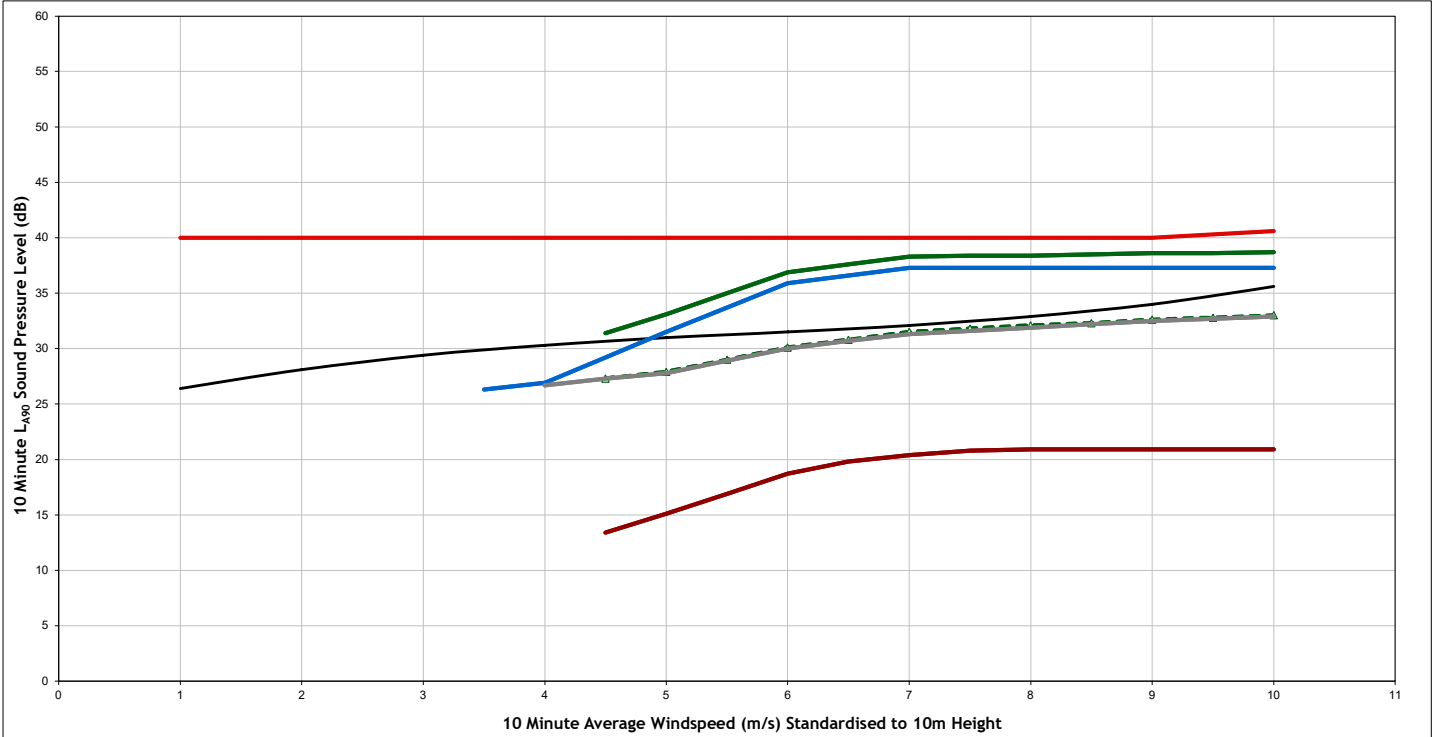
- Background Sound Trendline
- Total Noise Assessment Criteria (TNAC)
- Cumulative (inc. Project for Assessment) (180°)
- Cumulative (exc. Project for Assessment) (150°)
- Project for Assessment (180°)
- Scout Moor Wind Farm (180°)
- Reaps Moss Wind Farm (0°)

Project Scout Moor II Wind Farm
 Client Cubico UK Development Ltd
 Title Cumulative Noise Assessment
 NAL3
 Figure Number Figure A1.3c

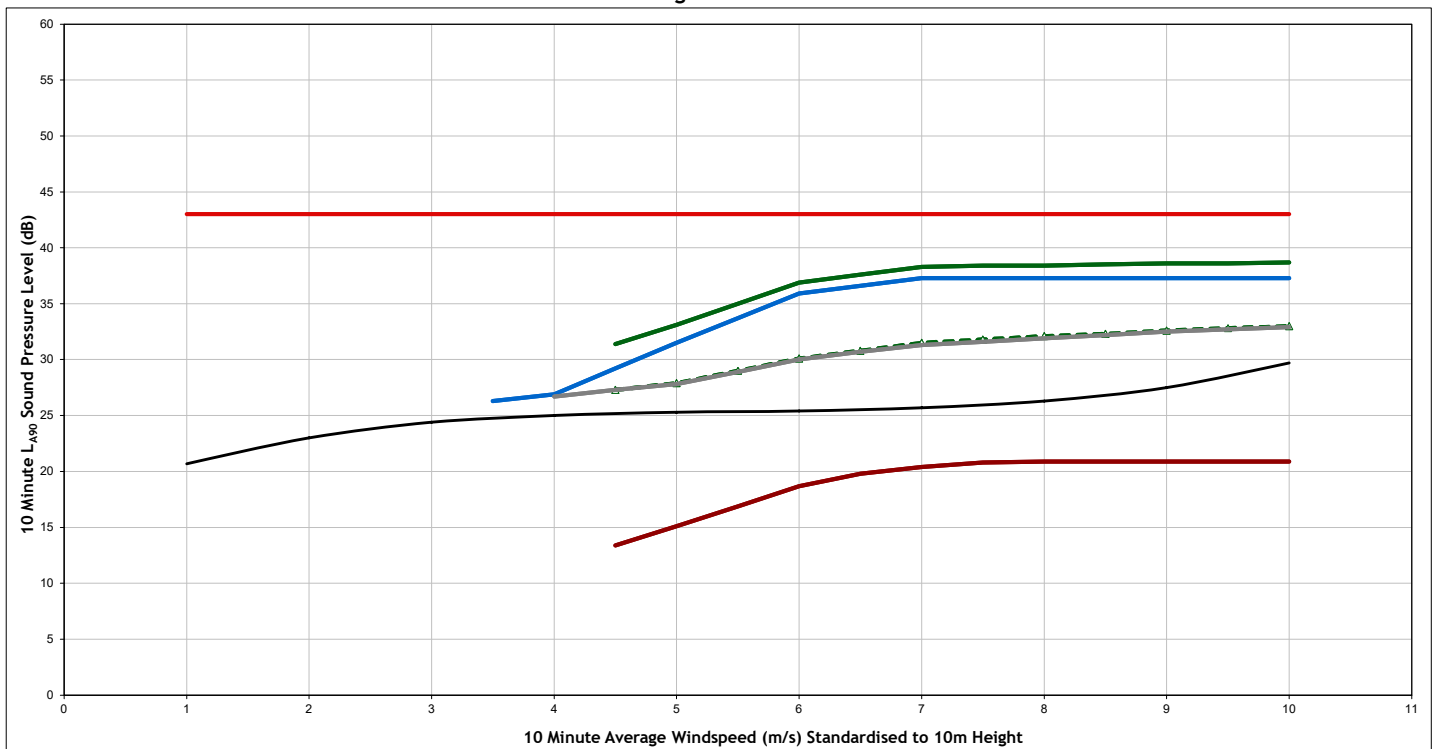
Drawn MT
 Checked AB
 Date 28/07/2026
 Document Reference 16647



Daytime - NAL4



Night Time - NAL4



Legend:

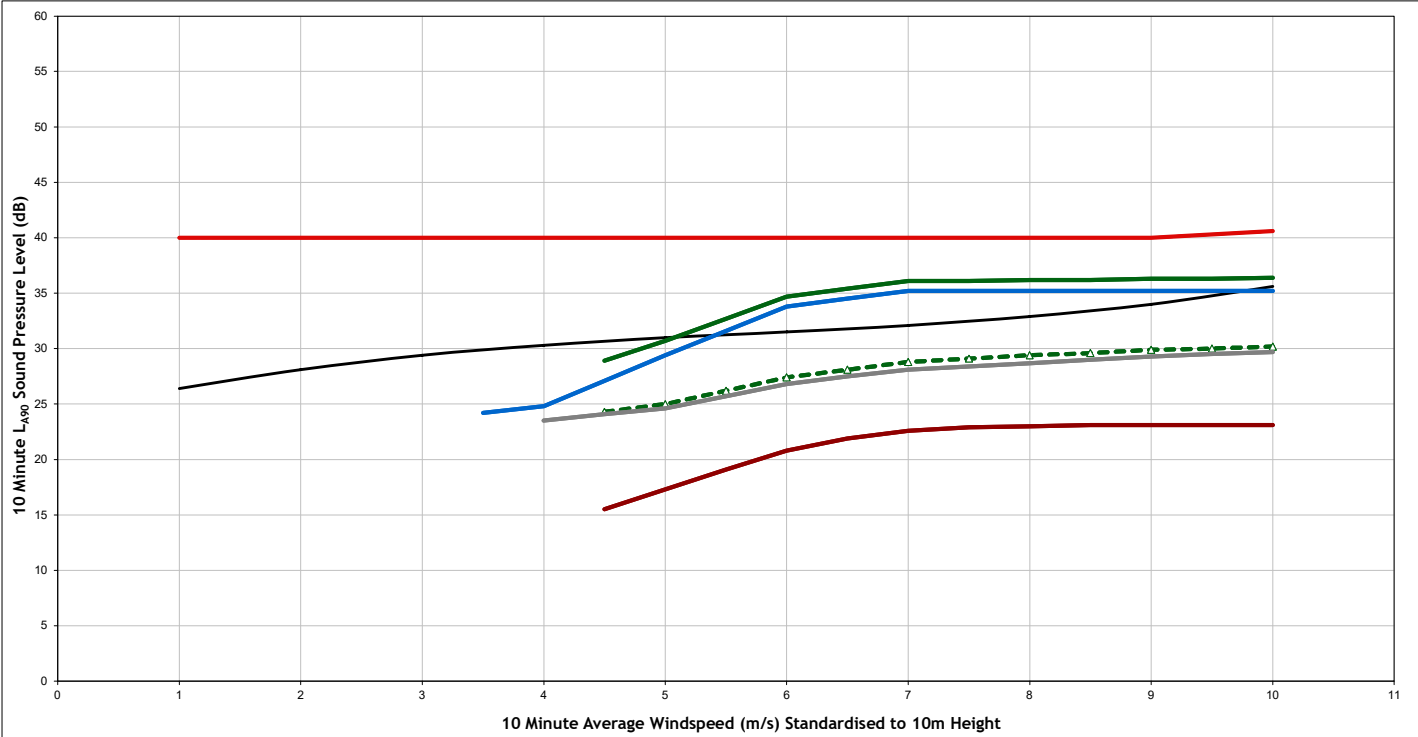
- Background Sound Trendline
- Total Noise Assessment Criteria (TNAC)
- Cumulative (inc. Project for Assessment) (180°)
- Cumulative (exc. Project for Assessment) (150°)
- Project for Assessment (180°)
- Scout Moor Wind Farm (180°)
- Reaps Moss Wind Farm (0°)

Project Scout Moor II Wind Farm
 Client Cubico UK Development Ltd
 Title Cumulative Noise Assessment
 NAL4
 Figure Number Figure A1.3d

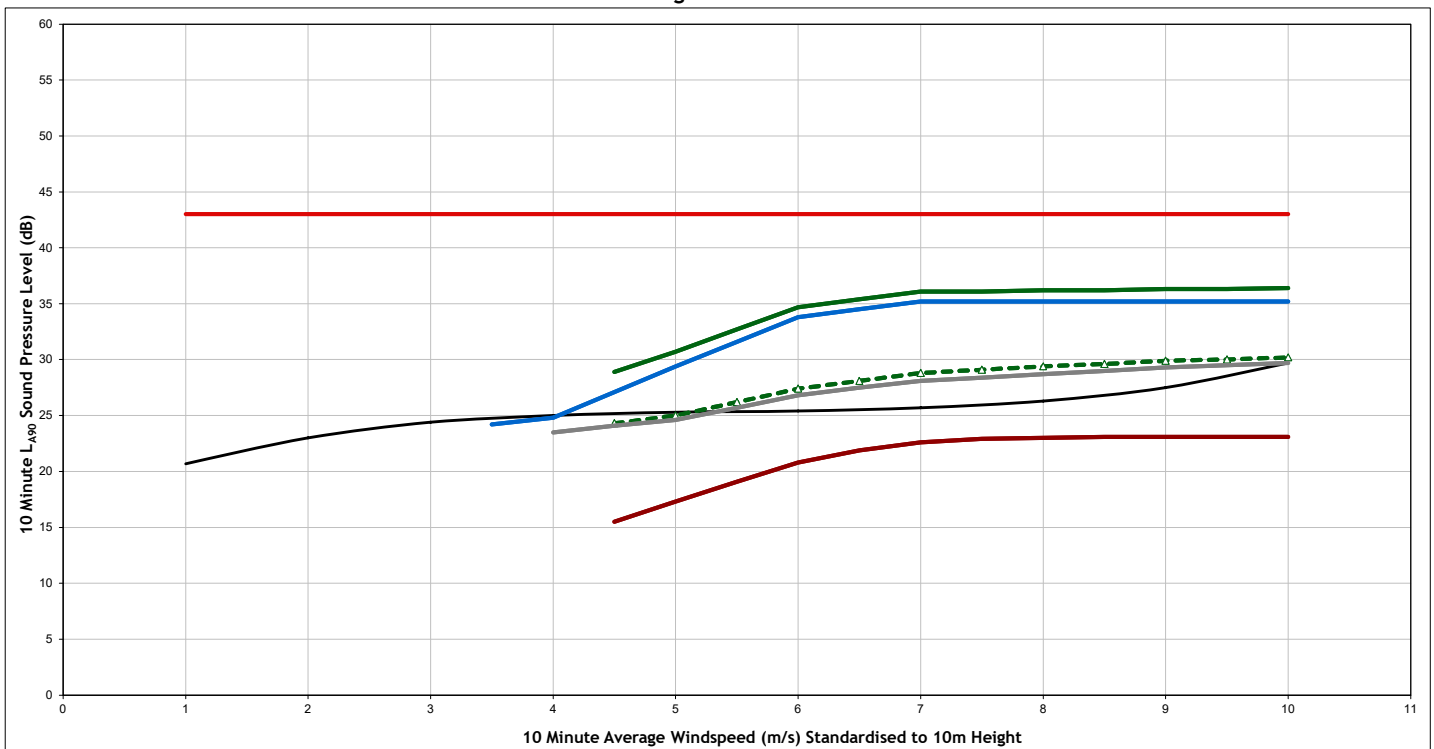
Drawn MT
 Checked AB
 Date 28/07/2026
 Document Reference 16647



Daytime - NAL5



Night Time - NAL5



Legend:

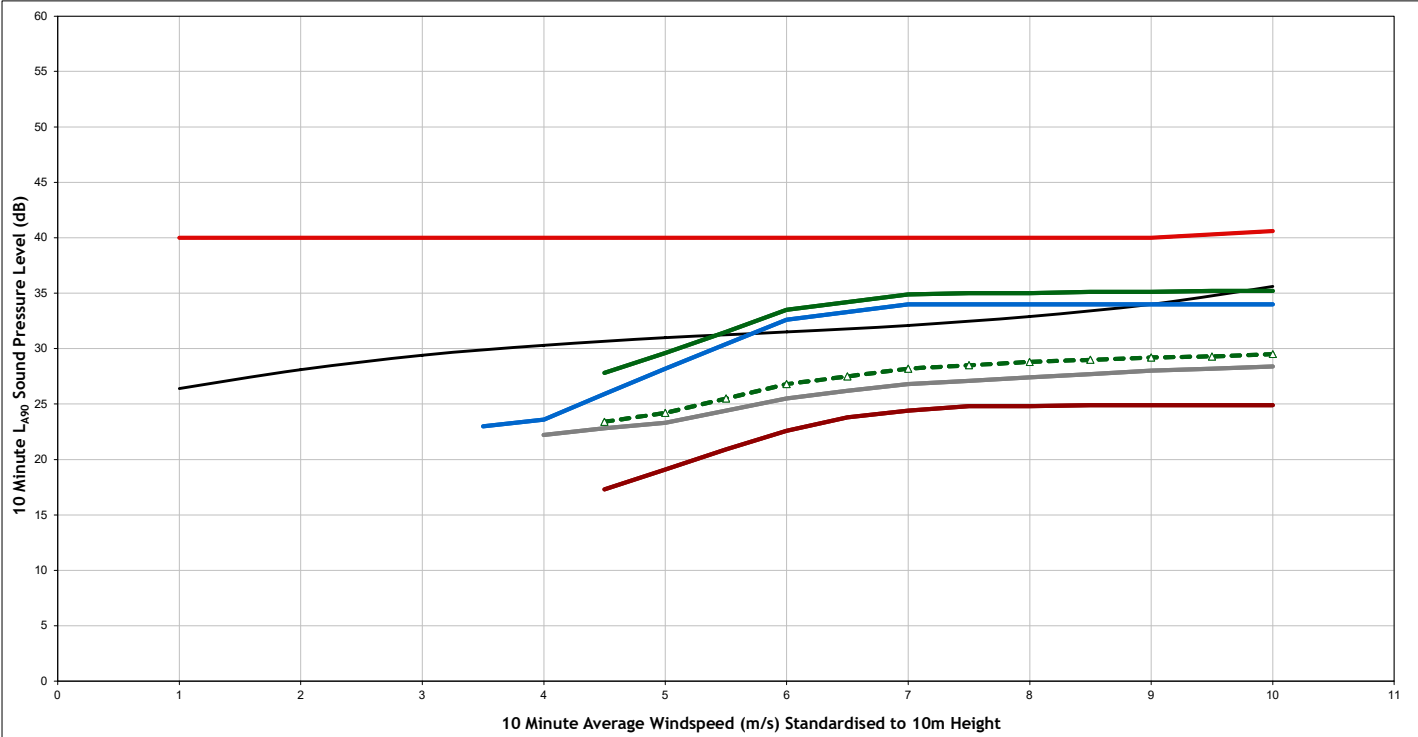
- Background Sound Trendline
- Total Noise Assessment Criteria (TNAC)
- Cumulative (inc. Project for Assessment) (150°)
- Cumulative (exc. Project for Assessment) (150°)
- Project for Assessment (150°)
- Scout Moor Wind Farm (180°)
- Reaps Moss Wind Farm (0°)

Project Scout Moor II Wind Farm
Client Cubico UK Development Ltd
Title Cumulative Noise Assessment
Figure Number Figure A1.3e

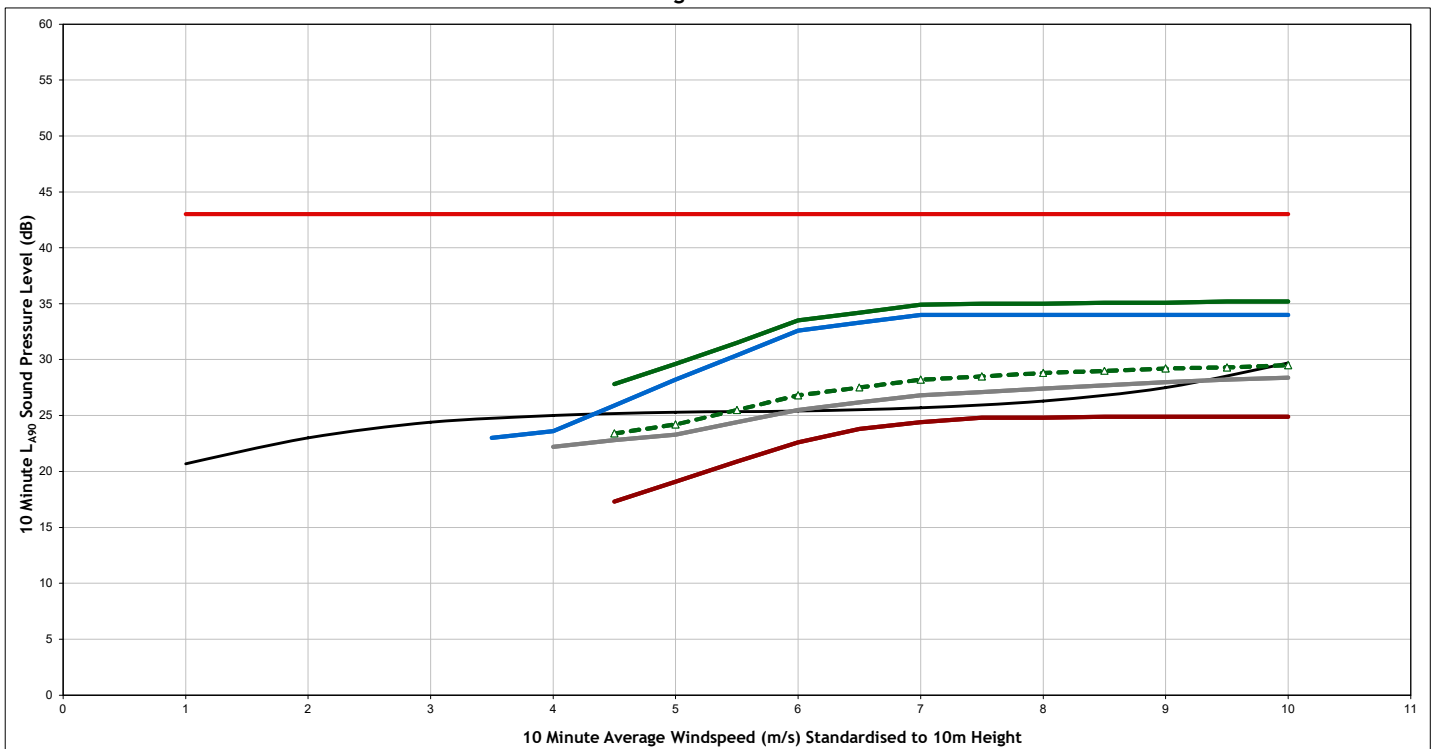
Drawn MT
Checked AB
Date 28/07/2026
Document Reference 16647



Daytime - NAL6



Night Time - NAL6



Legend:

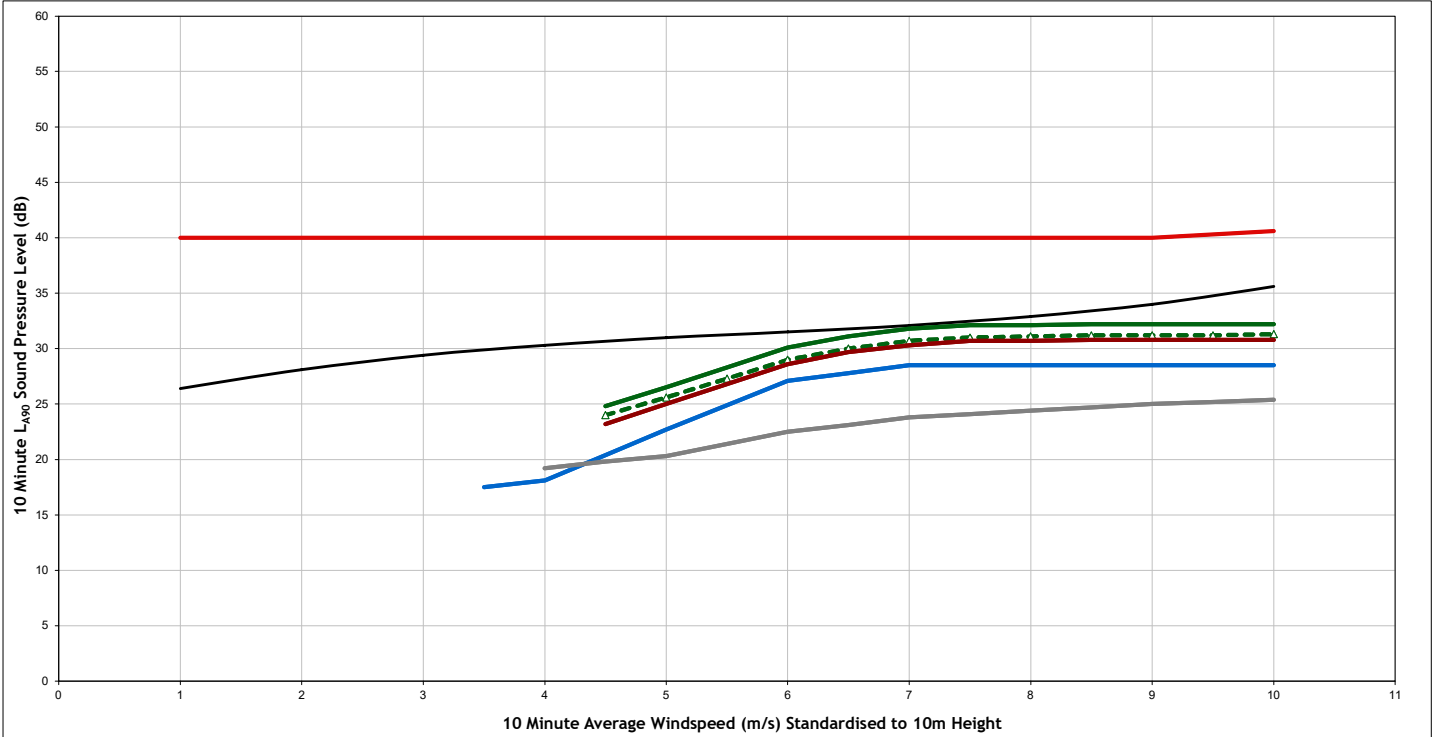
- Background Sound Trendline
- Total Noise Assessment Criteria (TNAC)
- Cumulative (inc. Project for Assessment) (150°)
- Cumulative (exc. Project for Assessment) (150°)
- Project for Assessment (180°)
- Scout Moor Wind Farm (180°)
- Reaps Moss Wind Farm (0°)

Project Scout Moor II Wind Farm
 Client Cubico UK Development Ltd
 Title Cumulative Noise Assessment
 NAL6
 Figure Number Figure A1.3f

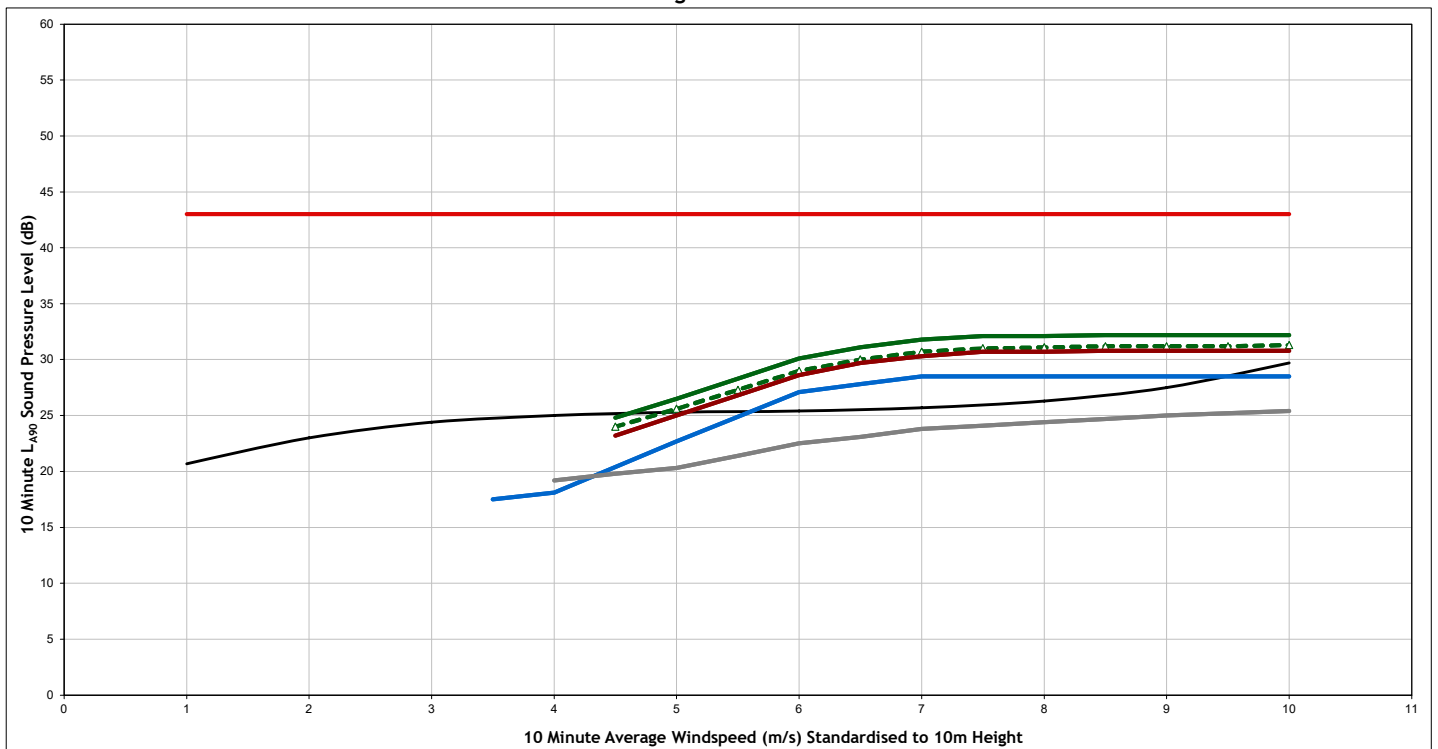
Drawn MT
 Checked AB
 Date 28/07/2026
 Document Reference 16647



Daytime - NAL7



Night Time - NAL7



Legend:

- Background Sound Trendline
- Total Noise Assessment Criteria (TNAC)
- Cumulative (inc. Project for Assessment) (330°)
- Cumulative (exc. Project for Assessment) (330°)
- Project for Assessment (180°)
- Scout Moor Wind Farm (180°)
- Reaps Moss Wind Farm (0°)

Project Scout Moor II Wind Farm

Client Cubico UK Development Ltd

Title Cumulative Noise Assessment
NAL7

Figure Number Figure A1.3g

Drawn MT

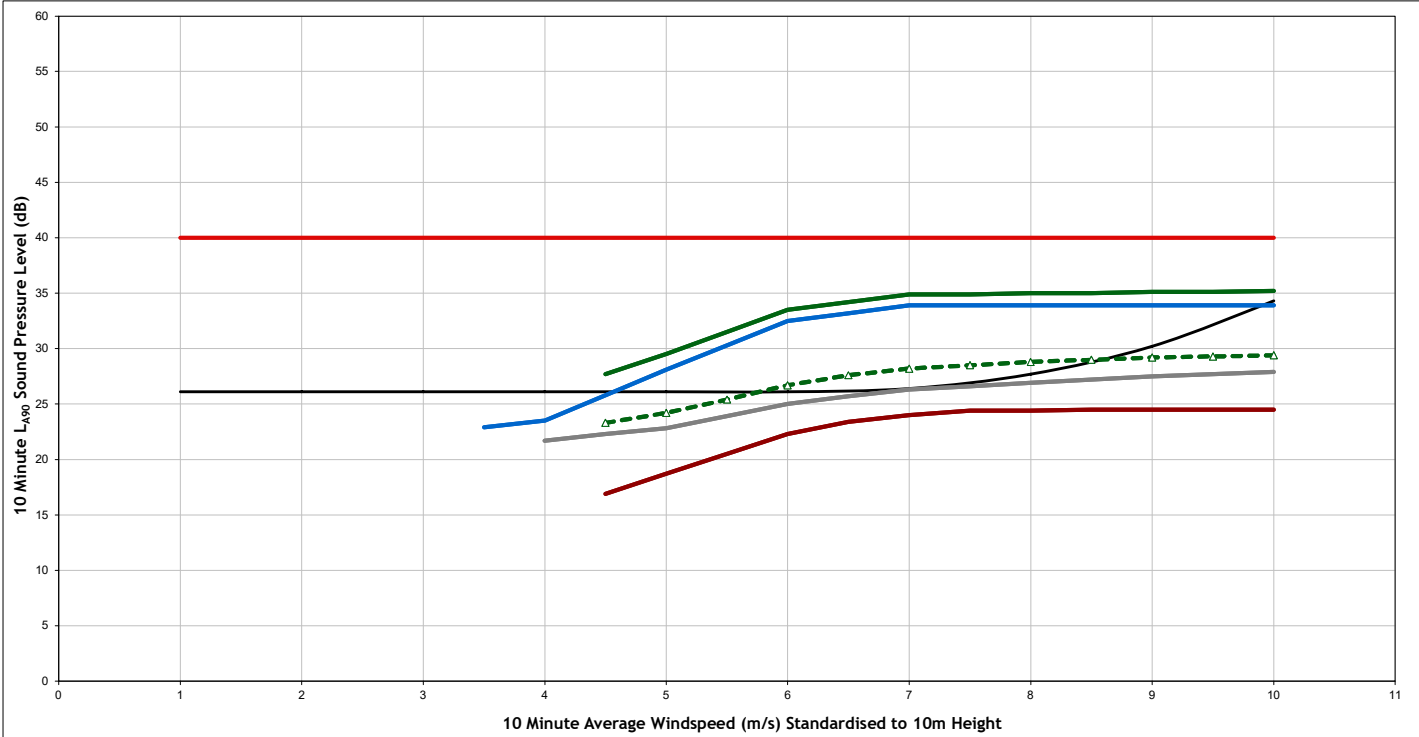
Checked AB

Date 28/07/2026

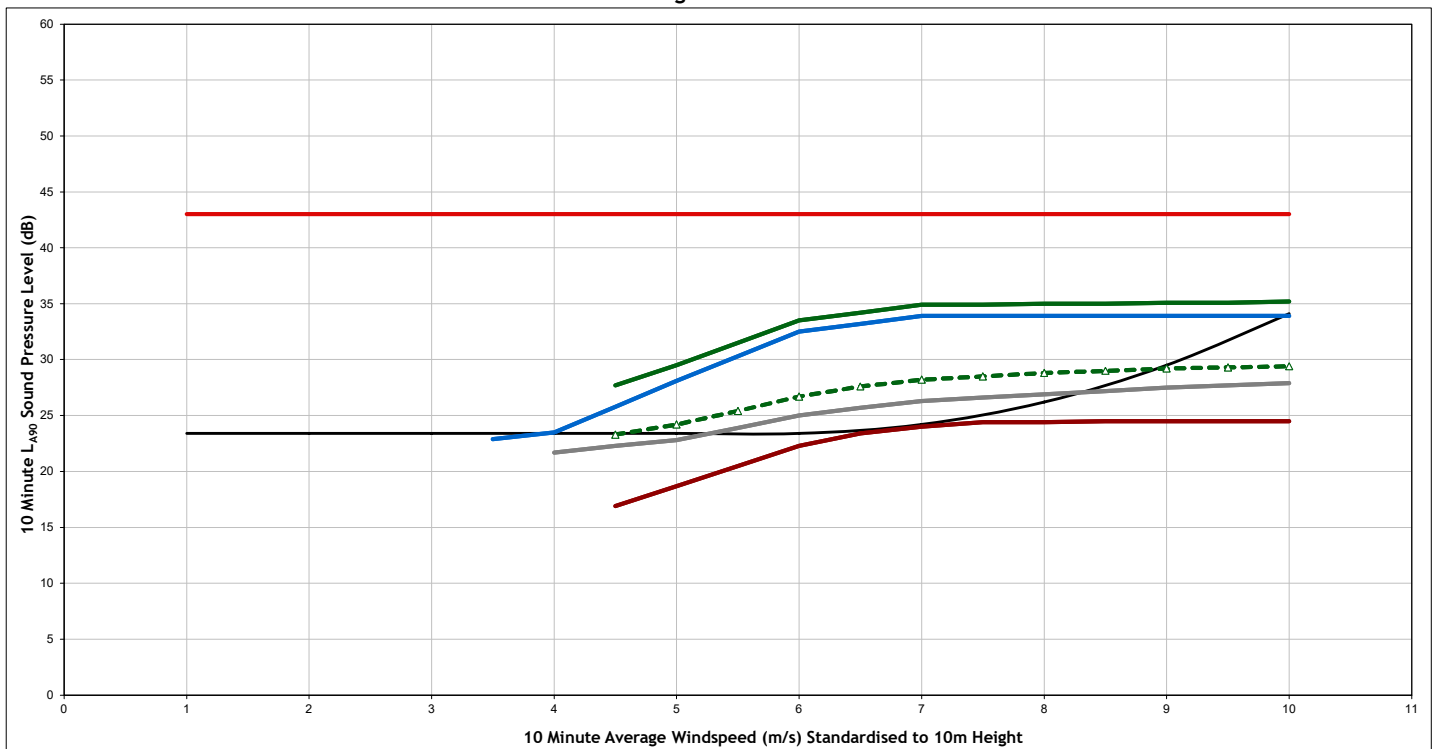
Document Reference 16647



Daytime - NAL8



Night Time - NAL8



Legend:

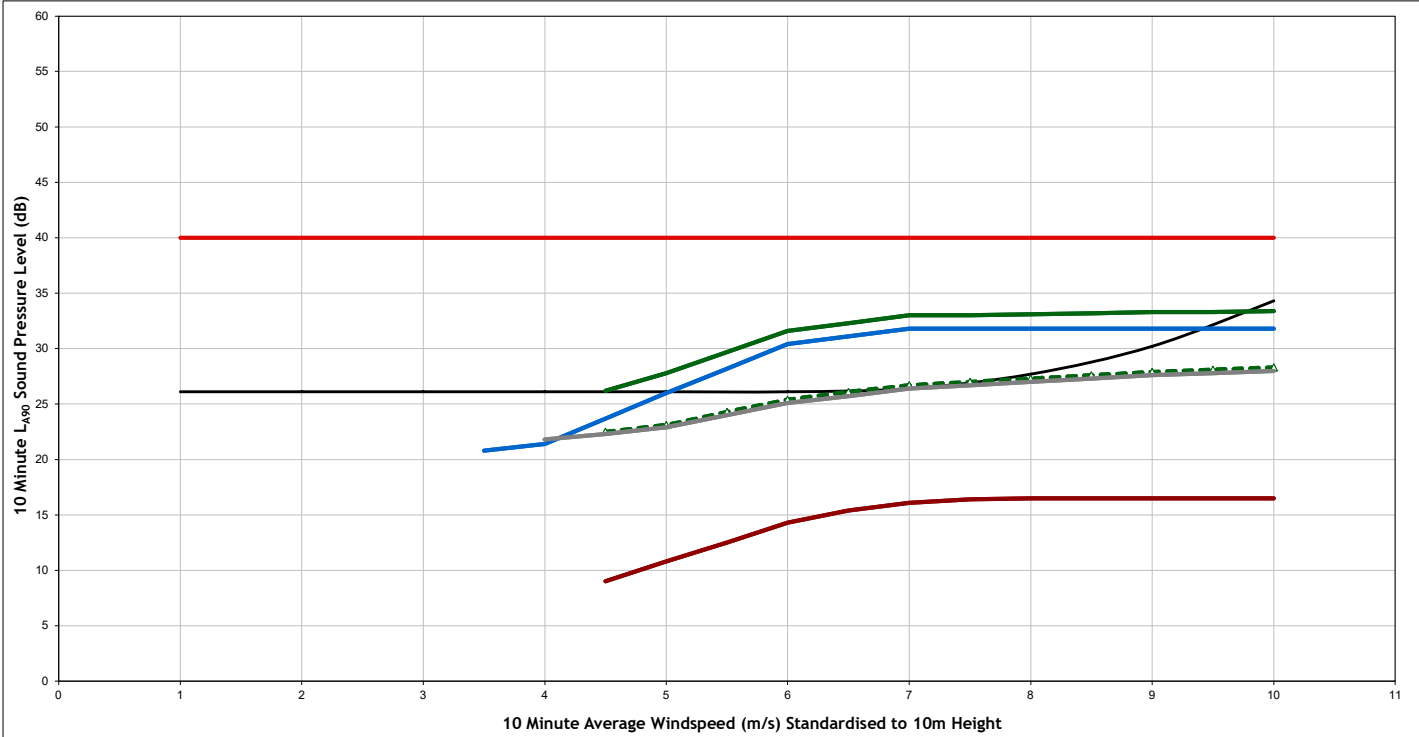
- Background Sound Trendline
- Total Noise Assessment Criteria (TNAC)
- Cumulative (inc. Project for Assessment) (300°)
- Cumulative (exc. Project for Assessment) (300°)
- Project for Assessment (210°)
- Scout Moor Wind Farm (210°)
- Reaps Moss Wind Farm (0°)

Project Scout Moor II Wind Farm
Client Cubico UK Development Ltd
Title Cumulative Noise Assessment
Figure Number Figure A1.3h

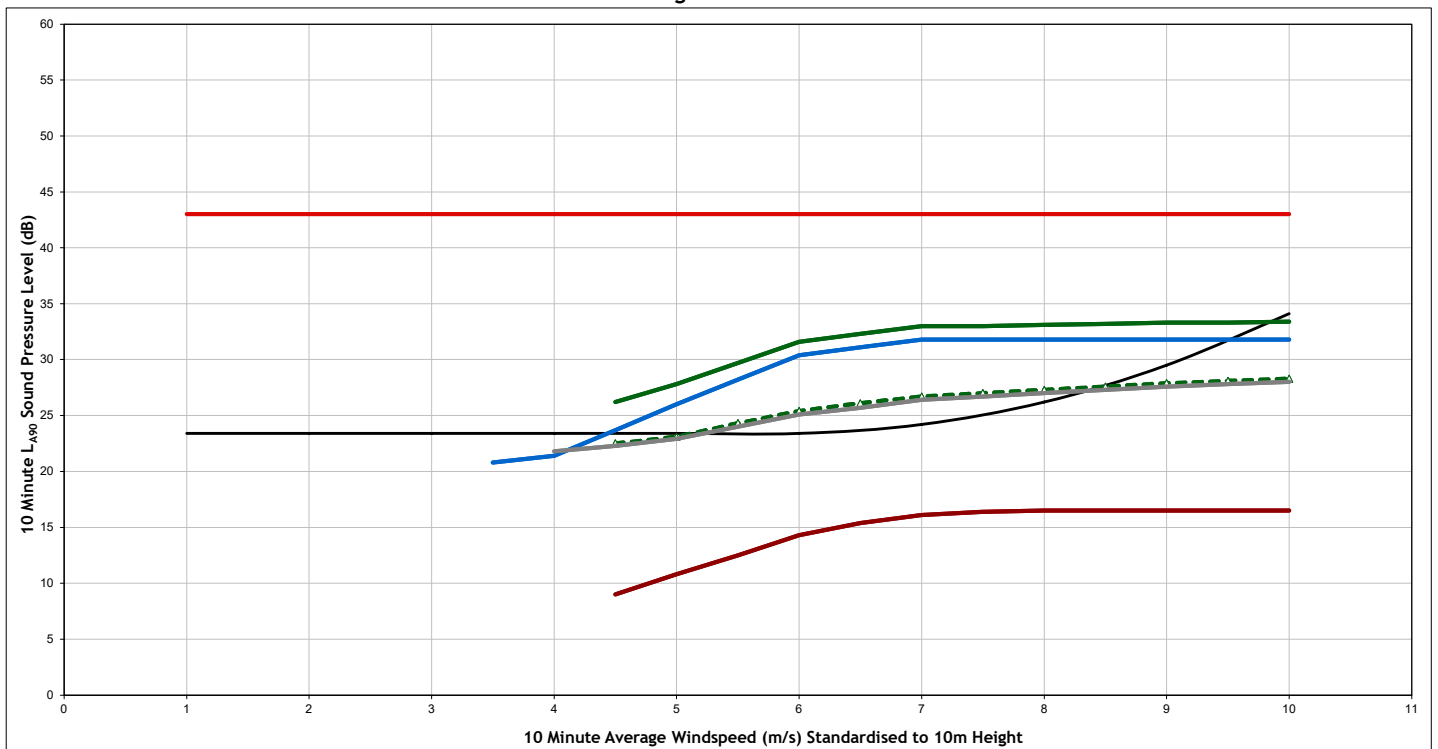
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Checked AB
Date 28/07/2026
Document Reference 16647



Daytime - NAL9



Night Time - NAL9



Legend:

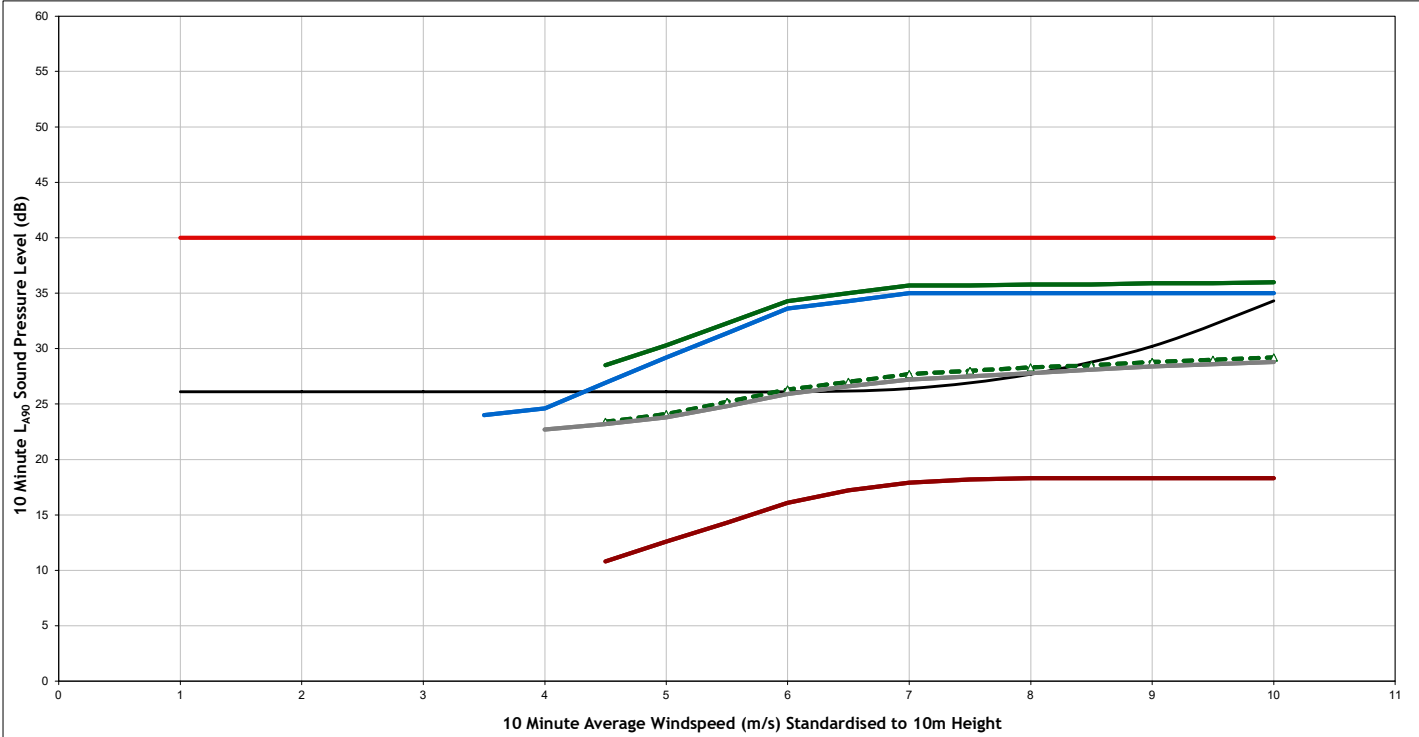
- Background Sound Trendline
- Total Noise Assessment Criteria (TNAC)
- Cumulative (inc. Project for Assessment) (300°)
- Cumulative (exc. Project for Assessment) (300°)
- Project for Assessment (240°)
- Scout Moor Wind Farm (210°)
- Reaps Moss Wind Farm (0°)

Project Scout Moor II Wind Farm
Client Cubico UK Development Ltd
Title Cumulative Noise Assessment
Figure Number Figure A1.3i

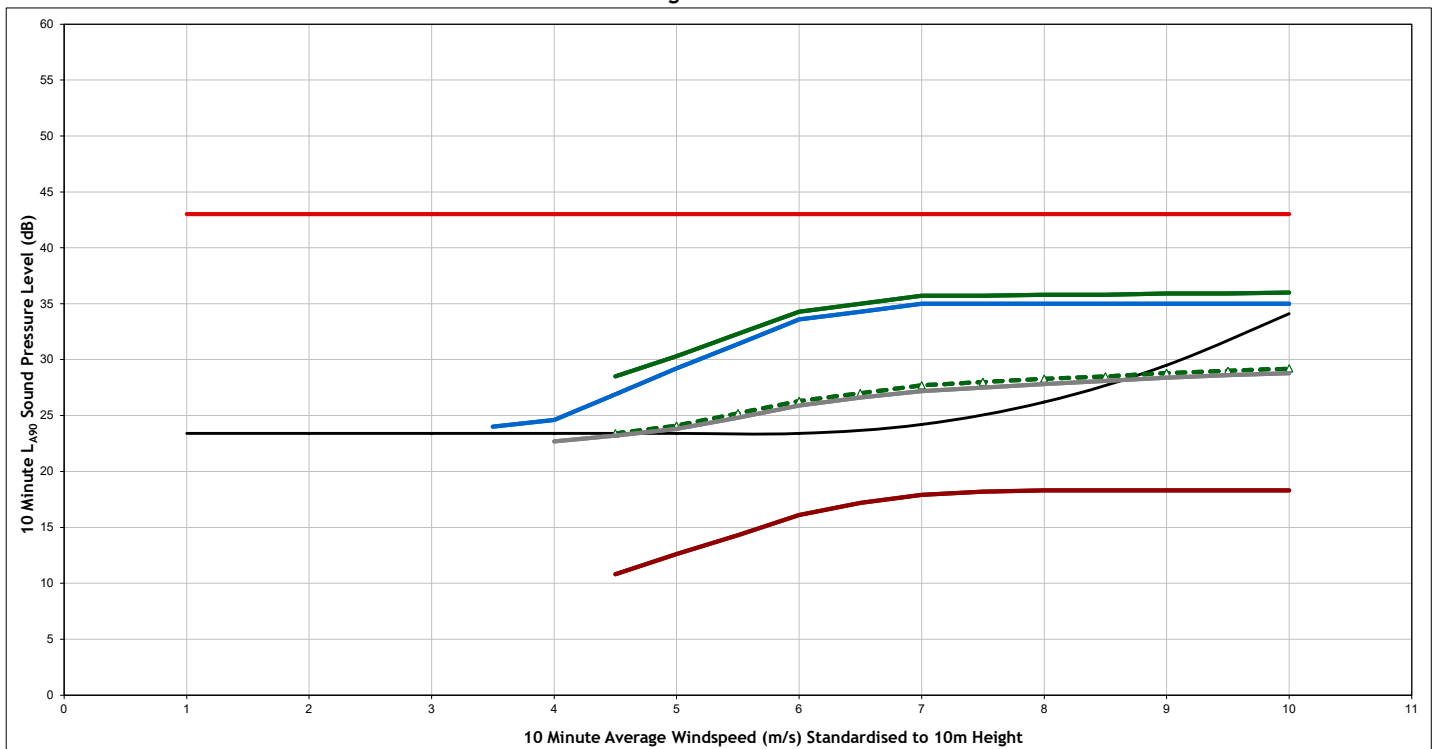
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Checked AB
Date 28/07/2026
Document Reference 16647



Daytime - NAL10



Night Time - NAL10



Legend:

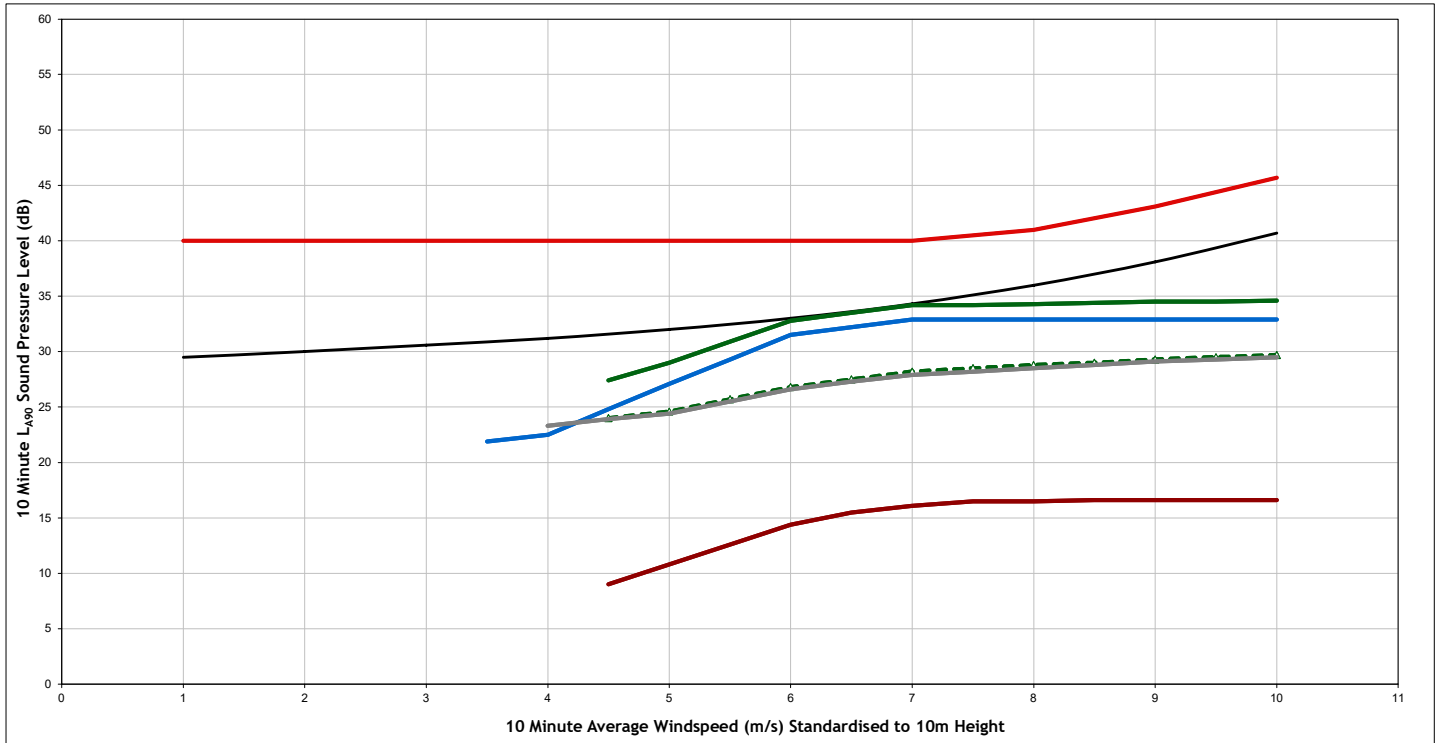
-  Background Sound Trendline
-  Total Noise Assessment Criteria (TNAC)
-  Cumulative (inc. Project for Assessment) (270°)
-  Cumulative (exc. Project for Assessment) (300°)
-  Project for Assessment (270°)
-  Scout Moor Wind Farm (240°)
-  Reaps Moss Wind Farm (0°)

Project Scout Moor II Wind Farm
 Client Cubico UK Development Ltd
 Title Cumulative Noise Assessment
 NAL10
 Figure Number Figure A1.3j

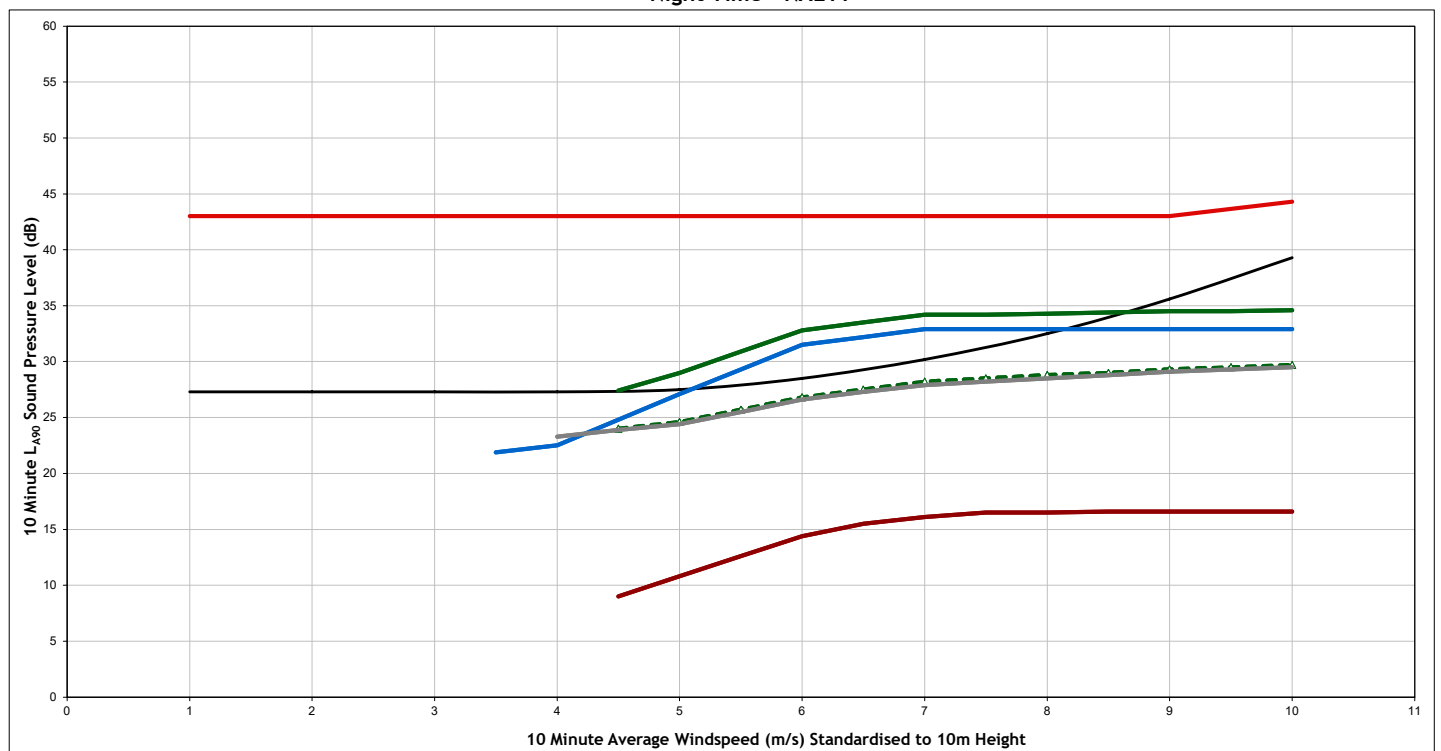
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 Date 28/07/2026
 Document Reference 16647



Daytime - NAL11



Night Time - NAL11



Legend:

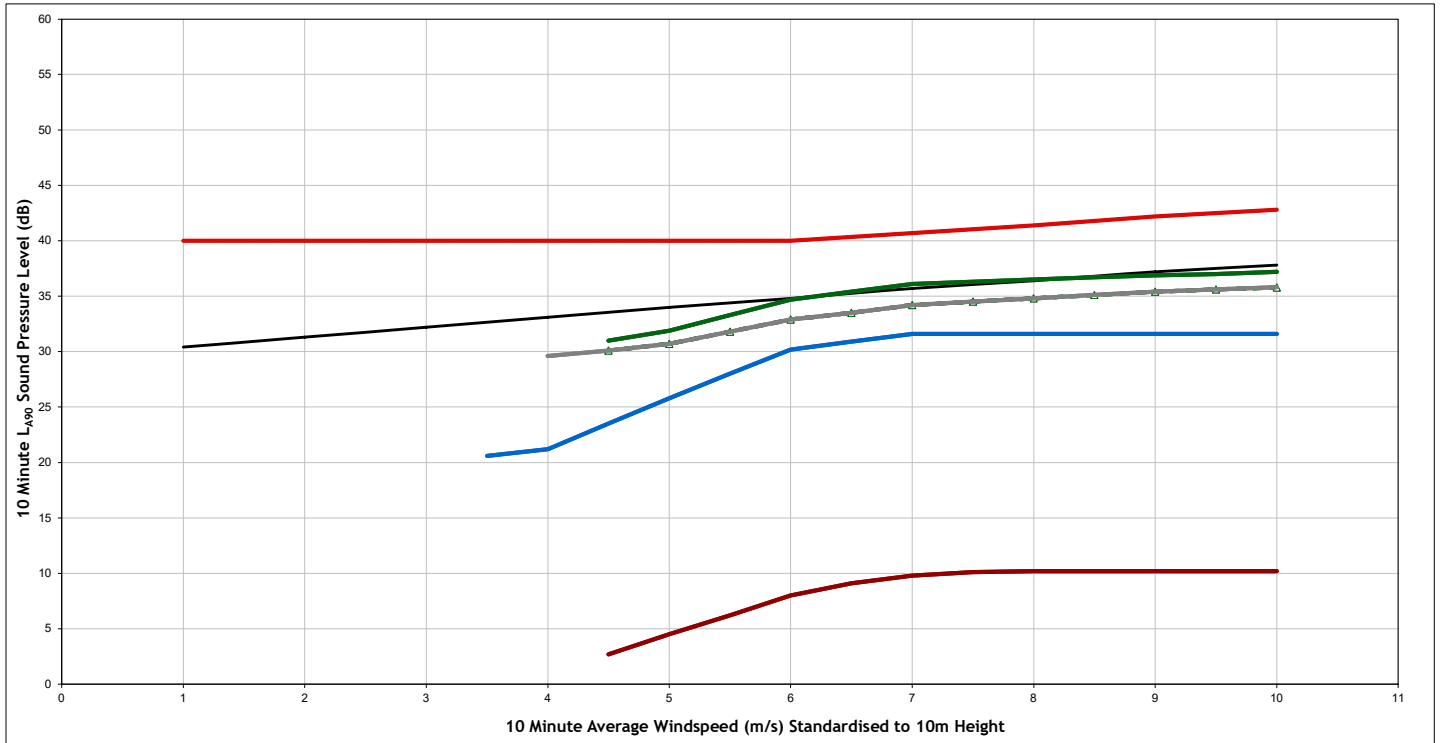
- Background Sound Trendline
- Total Noise Assessment Criteria (TNAC)
- Cumulative (inc. Project for Assessment) (0°)
- Cumulative (exc. Project for Assessment) (300°)
- Project for Assessment (0°)
- Scout Moor Wind Farm (240°)
- Reaps Moss Wind Farm (0°)

Project Scout Moor II Wind Farm
 Client Cubico UK Development Ltd
 Title Cumulative Noise Assessment
 NAL11
 Figure Number Figure A1.3k

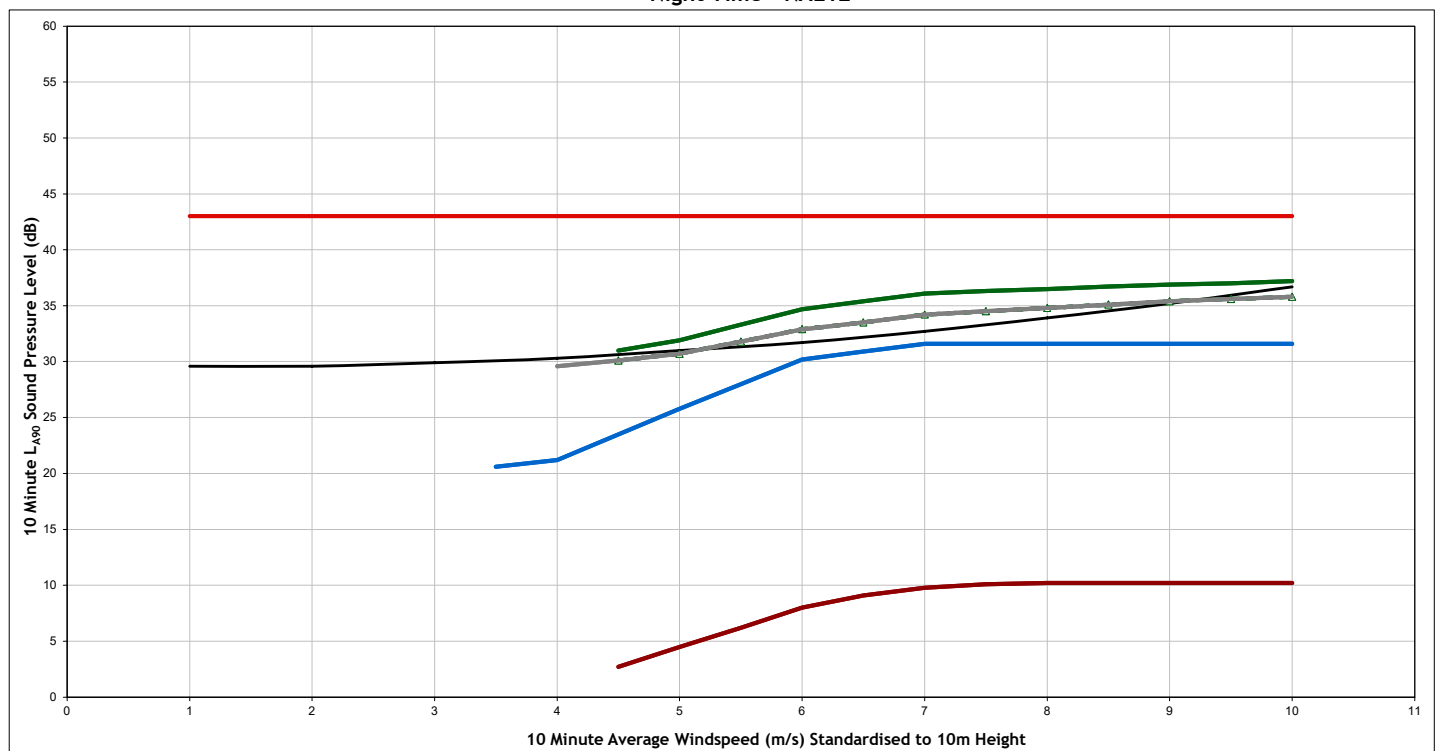
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 Date 28/07/2026
 Document Reference 16647



Daytime - NAL12



Night Time - NAL12



Legend:

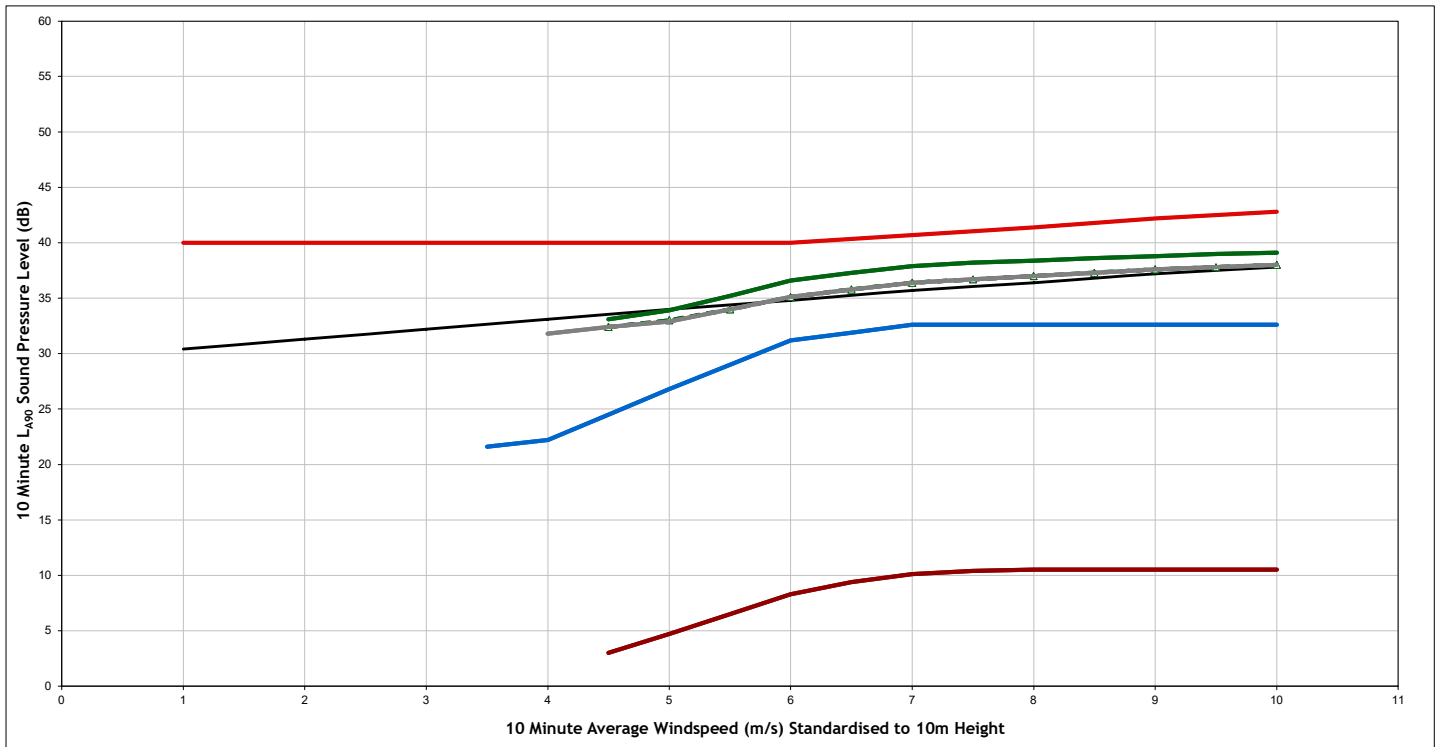
- Background Sound Trendline
- Total Noise Assessment Criteria (TNAC)
- Cumulative (inc. Project for Assessment) (0°)
- Cumulative (exc. Project for Assessment) (0°)
- Project for Assessment (0°)
- Scout Moor Wind Farm (0°)
- Reaps Moss Wind Farm (0°)

Project Scout Moor II Wind Farm
 Client Cubico UK Development Ltd
 Title Cumulative Noise Assessment
 NAL12
 Figure Number Figure A1.3l

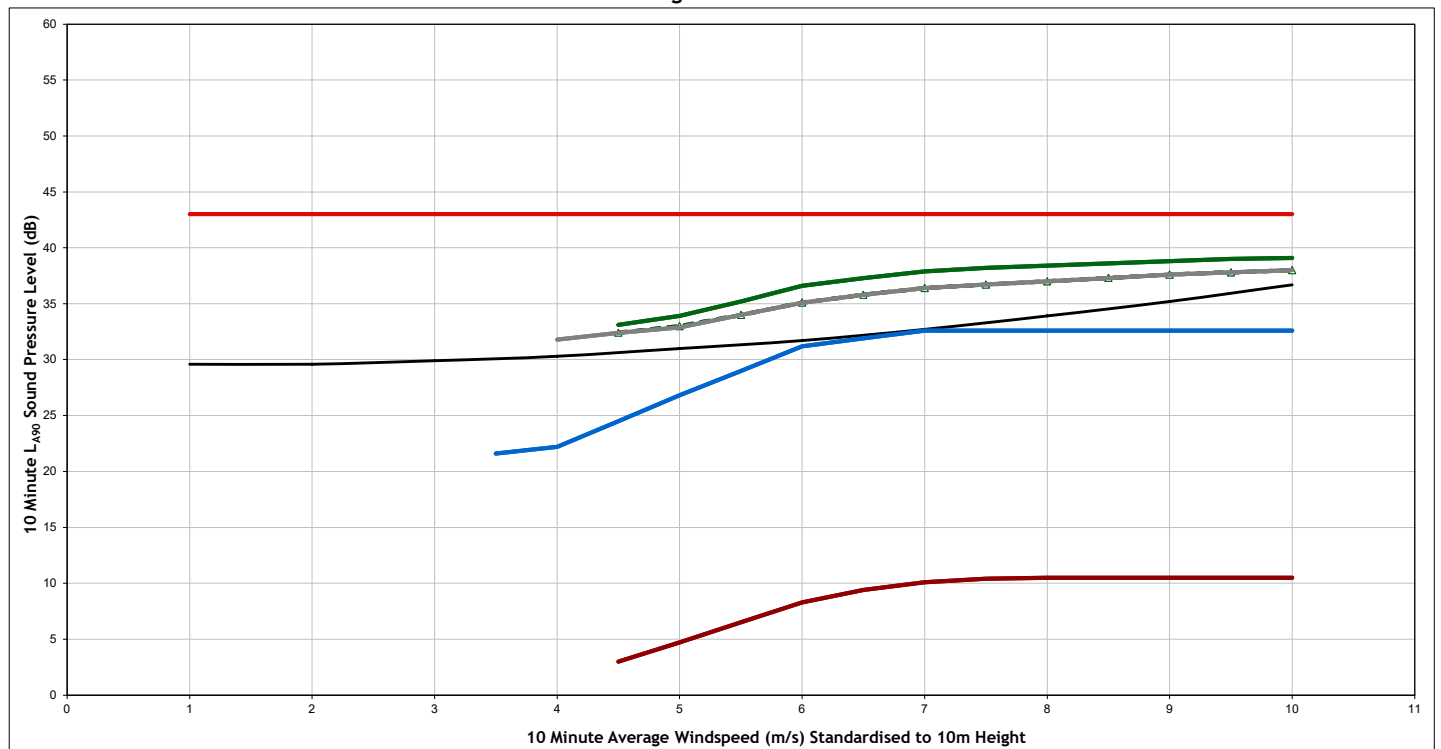
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 Date 28/07/2026
 Document Reference 16647



Daytime - NAL13



Night Time - NAL13



Legend:

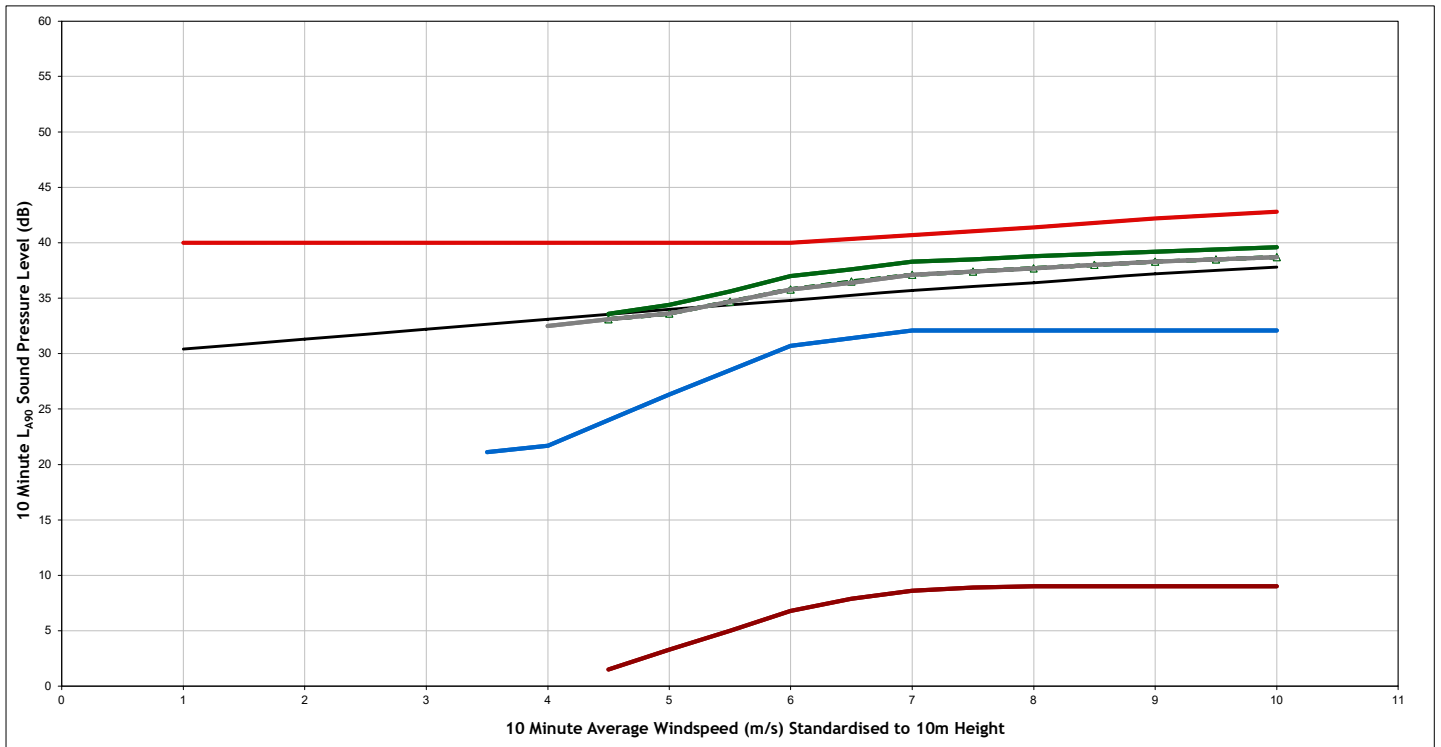
- Background Sound Trendline
- Total Noise Assessment Criteria (TNAC)
- Cumulative (inc. Project for Assessment) (0°)
- Cumulative (exc. Project for Assessment) (0°)
- Project for Assessment (0°)
- Scout Moor Wind Farm (0°)
- Reaps Moss Wind Farm (0°)

Project Scout Moor II Wind Farm
 Client Cubico UK Development Ltd
 Title Cumulative Noise Assessment
 NAL13
 Figure Number Figure A1.3m

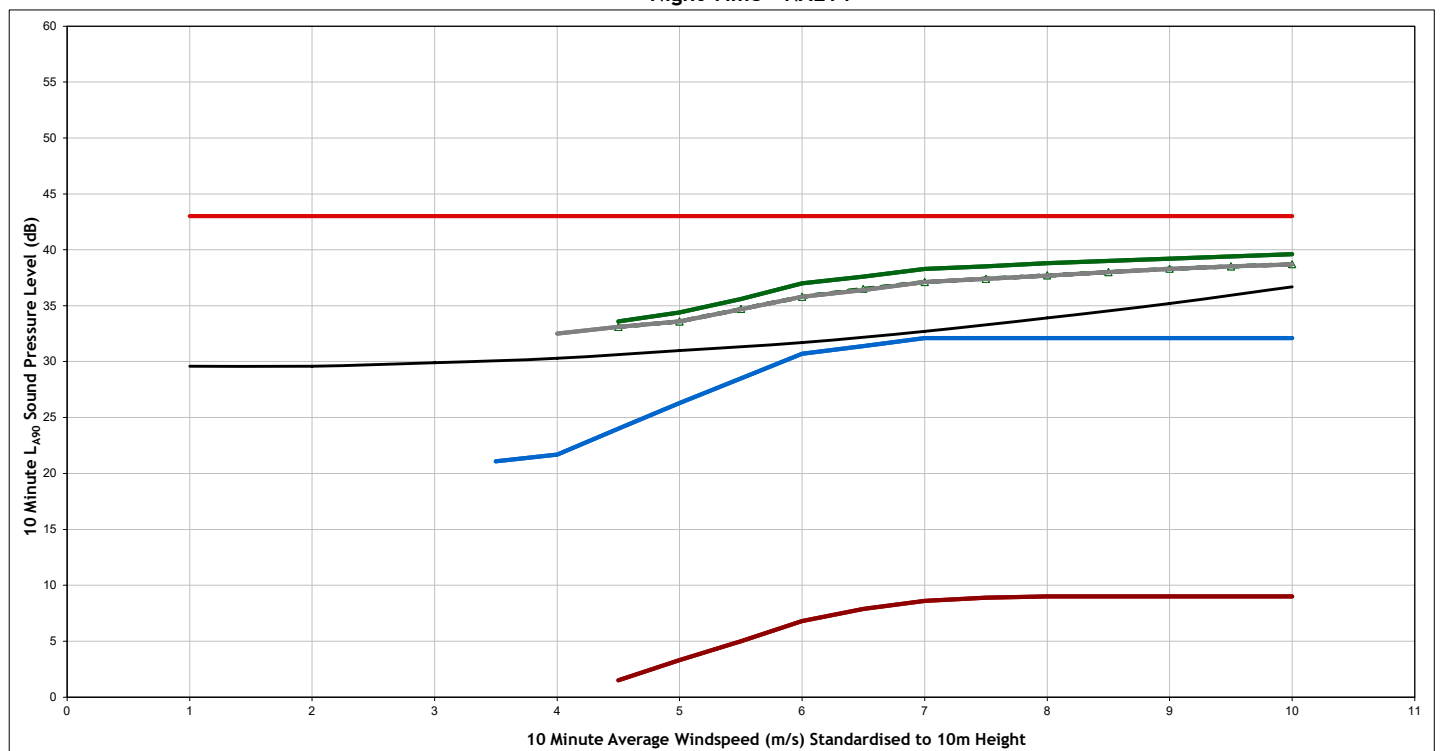
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 Date 28/07/2026
 Document Reference 16647



Daytime - NAL14



Night Time - NAL14



Legend:

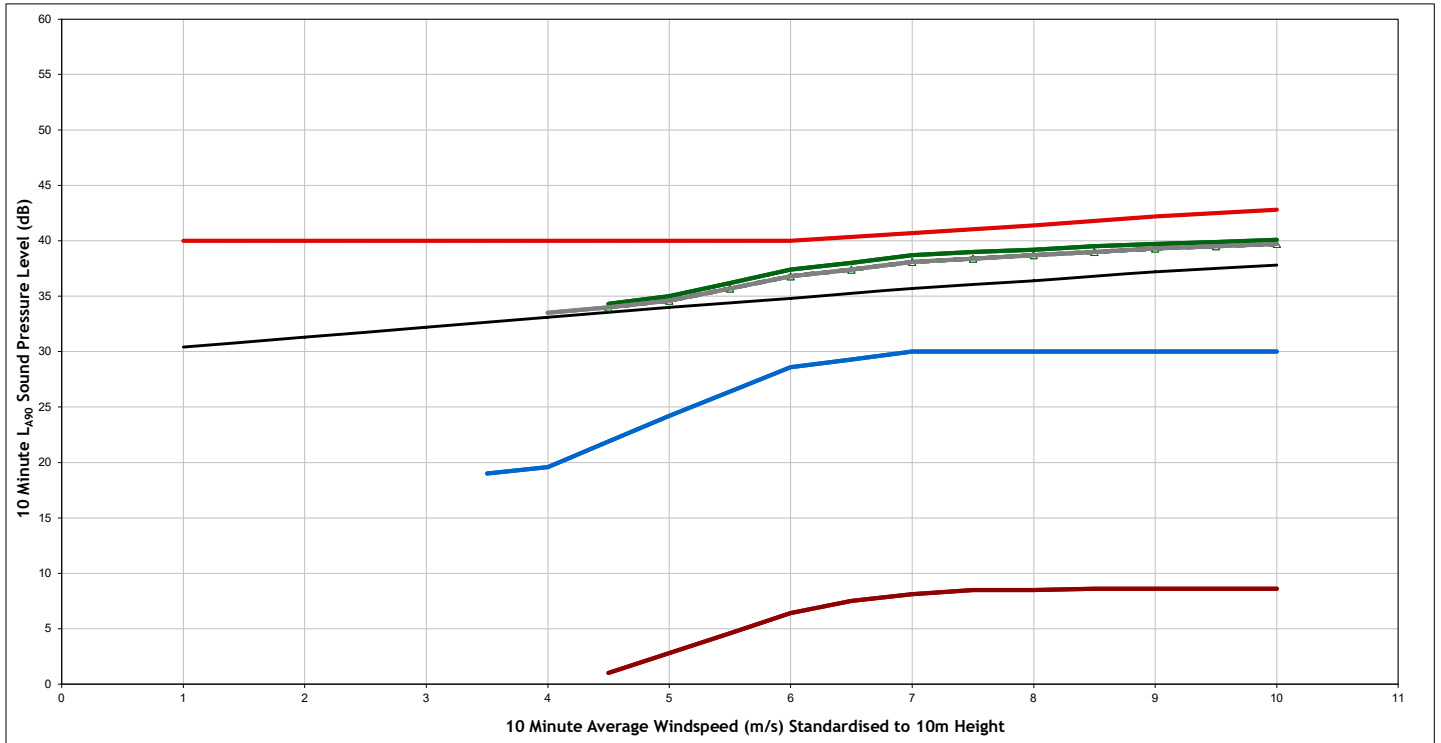
- Background Sound Trendline
- Total Noise Assessment Criteria (TNAC)
- Cumulative (inc. Project for Assessment) (0°)
- Cumulative (exc. Project for Assessment) (0°)
- Project for Assessment (0°)
- Scout Moor Wind Farm (0°)
- Reaps Moss Wind Farm (0°)

Project Scout Moor II Wind Farm
 Client Cubico UK Development Ltd
 Title Cumulative Noise Assessment
 NAL14
 Figure Number Figure A1.3n

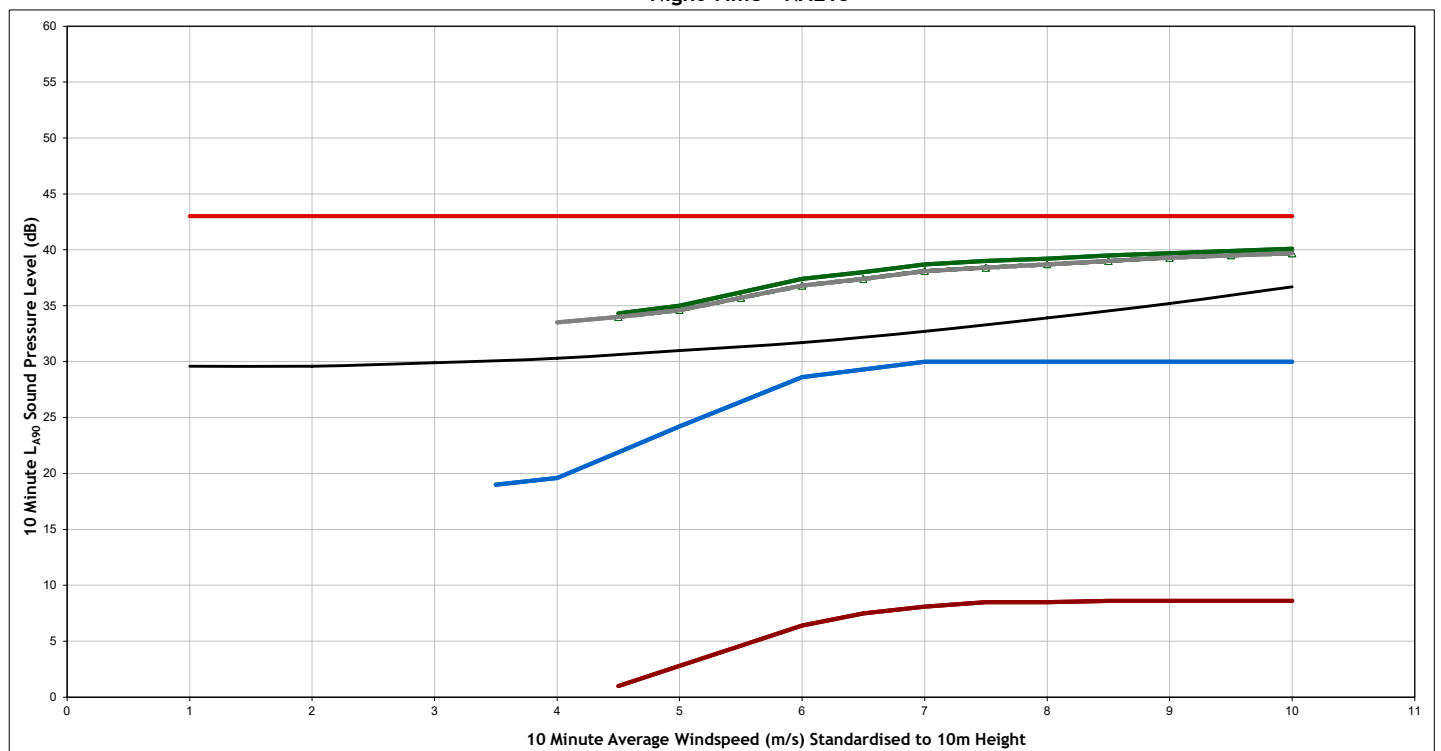
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 Date 28/07/2026
 Document Reference 16647



Daytime - NAL15



Night Time - NAL15



Legend:

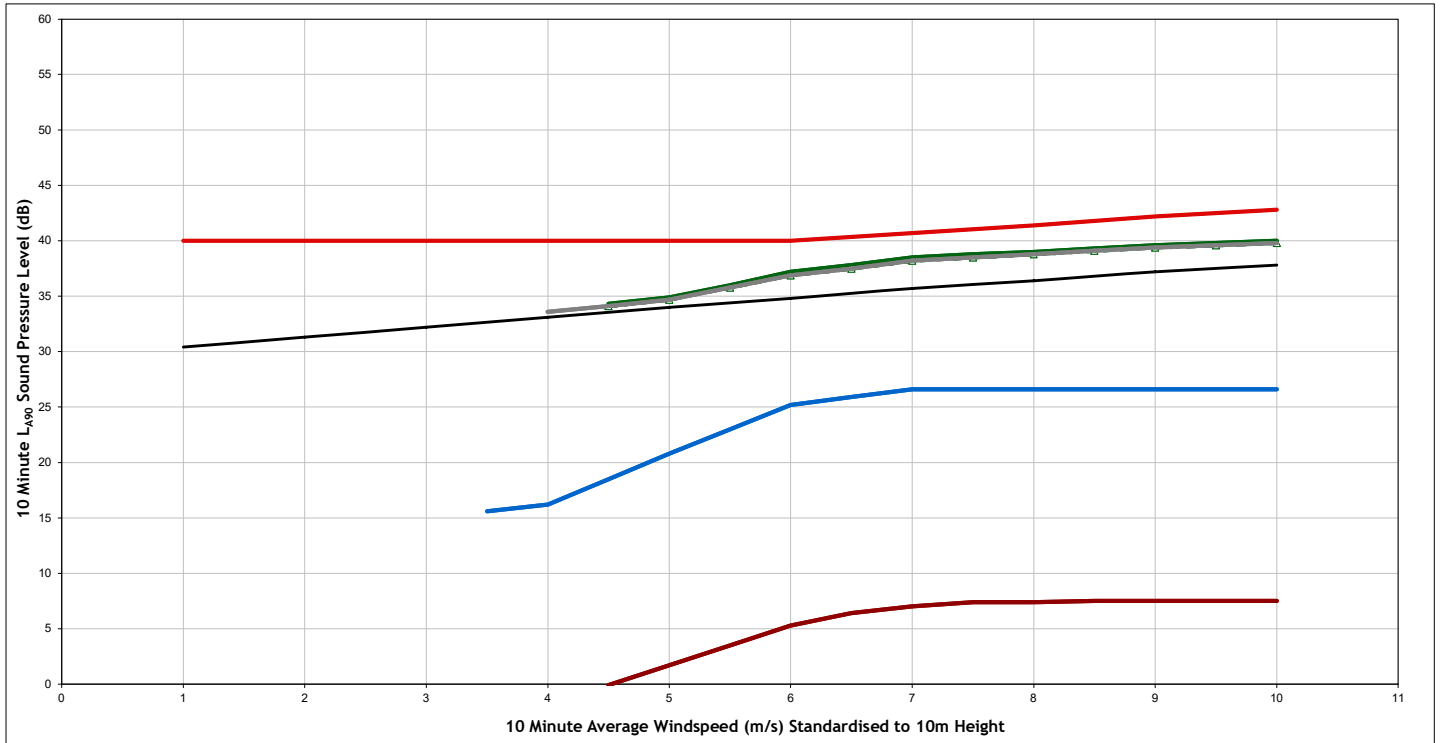
- Background Sound Trendline
- Total Noise Assessment Criteria (TNAC)
- Cumulative (inc. Project for Assessment) (0°)
- Cumulative (exc. Project for Assessment) (0°)
- Project for Assessment (0°)
- Scout Moor Wind Farm (0°)
- Reaps Moss Wind Farm (0°)

Project Scout Moor II Wind Farm
 Client Cubico UK Development Ltd
 Title Cumulative Noise Assessment
 NAL15
 Figure Number Figure A1.3a

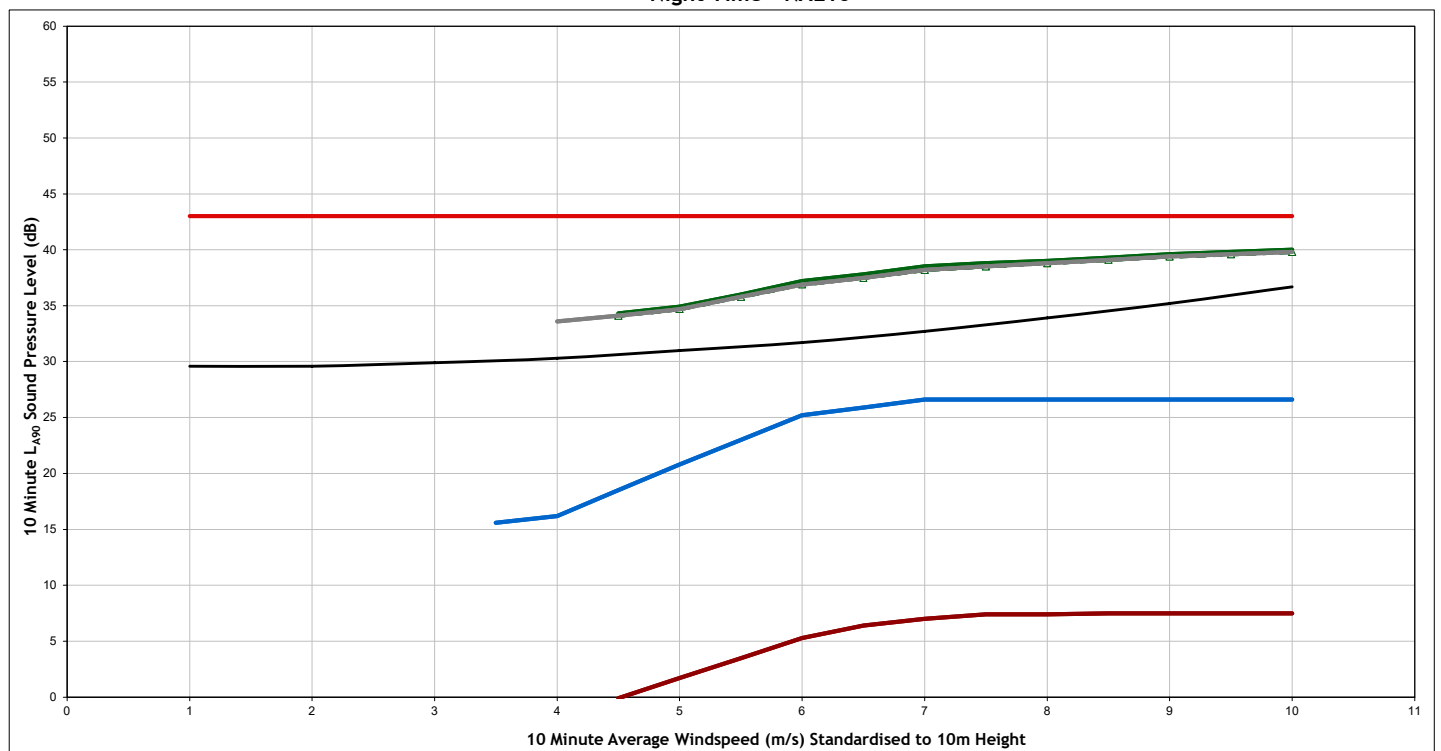
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 Date 28/07/2026
 Document Reference 16647



Daytime - NAL16



Night Time - NAL16



Legend:

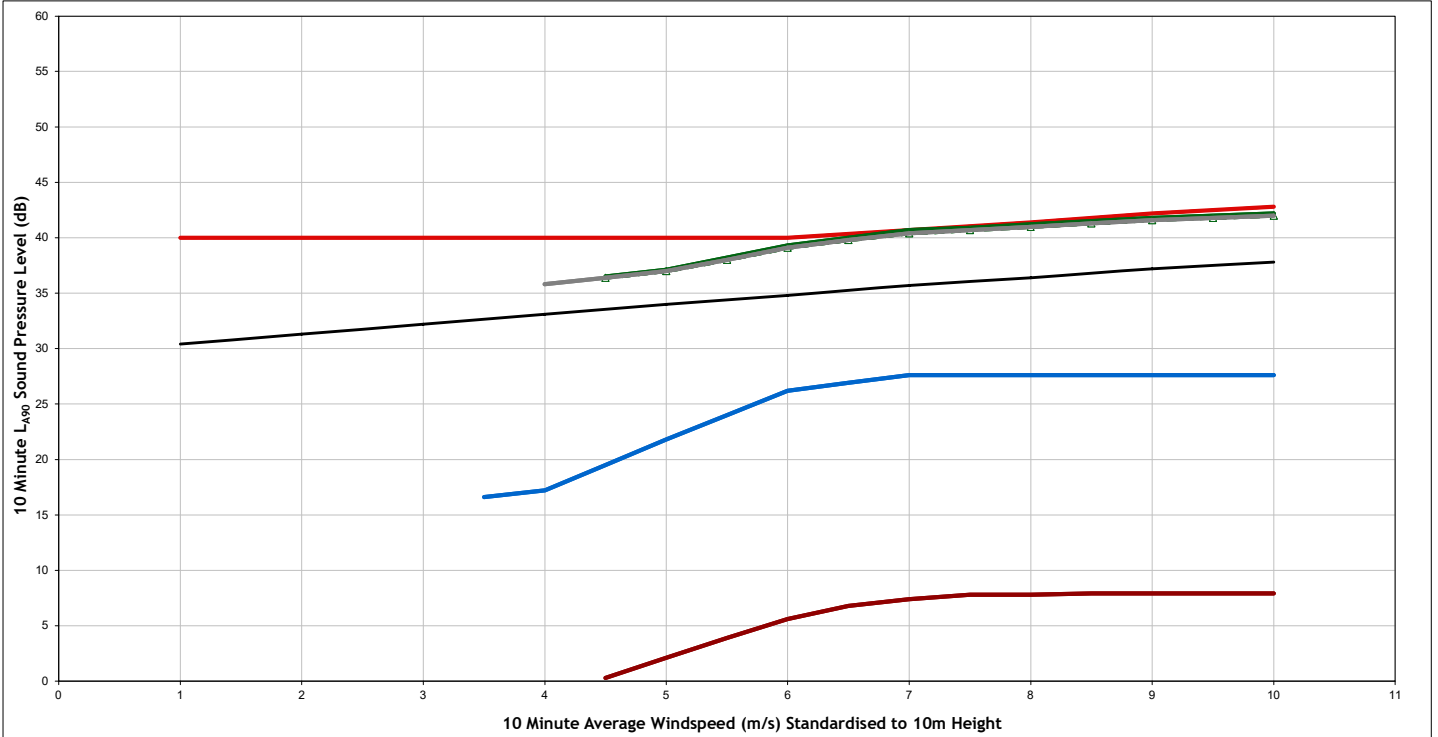
- Background Sound Trendline
- Total Noise Assessment Criteria (TNAC)
- Cumulative (inc. Project for Assessment) (0+)
- Cumulative (exc. Project for Assessment) (0+)
- Project for Assessment (0+)
- Scout Moor Wind Farm (0+)
- Reaps Moss Wind Farm (0+)

Project Scout Moor II Wind Farm
 Client Cubico UK Development Ltd
 Title Cumulative Noise Assessment
 NAL16
 Figure Number Figure A1.3p

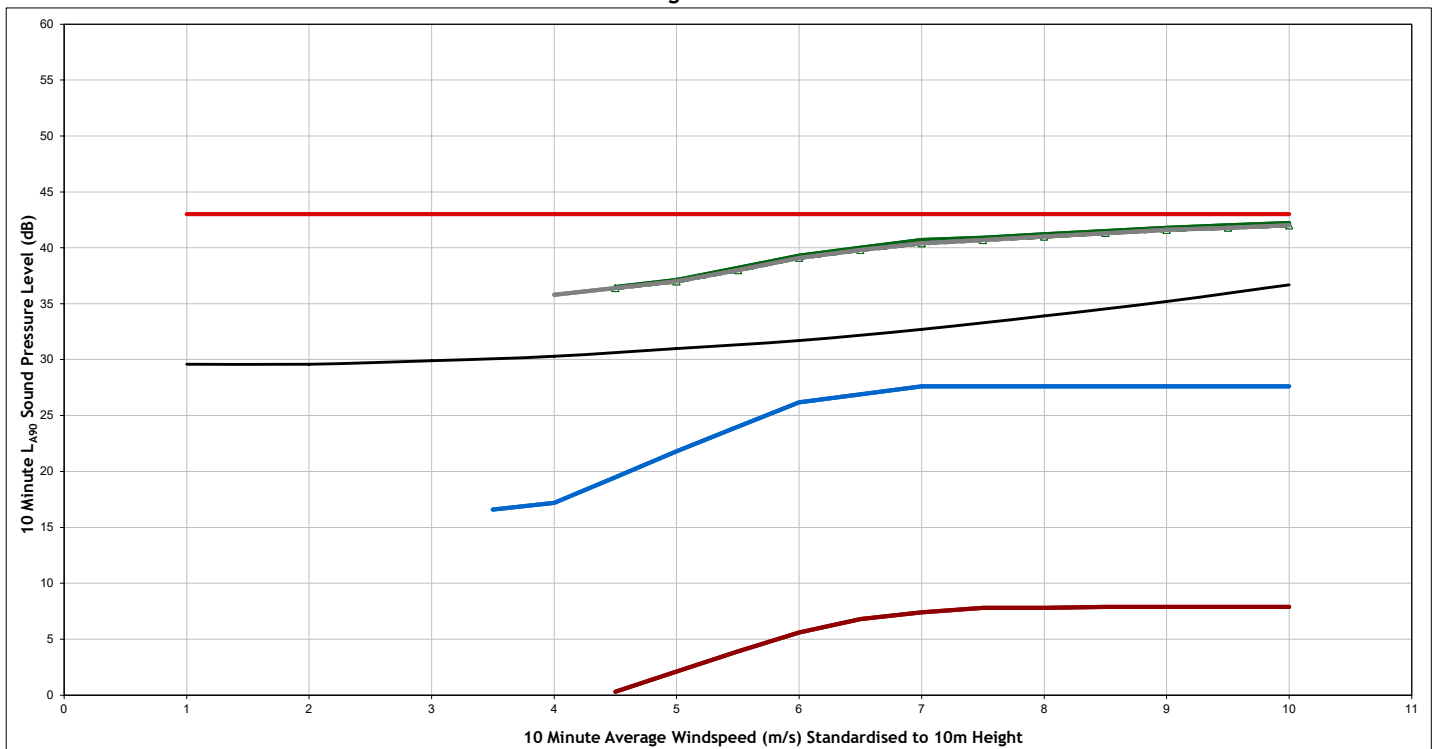
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 Date 28/07/2026
 Document Reference 16647



Daytime - NAL17



Night Time - NAL17



Legend:

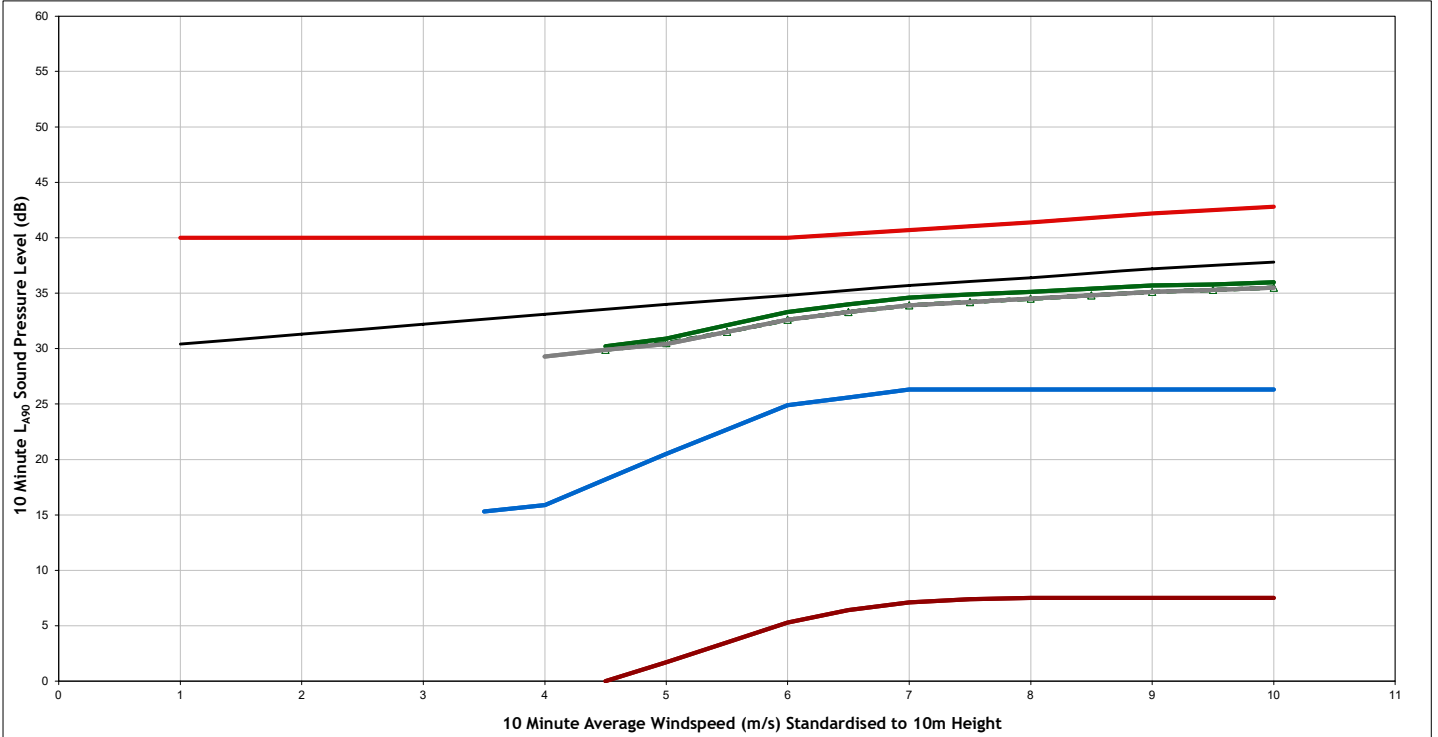
- Background Sound Trendline
- Total Noise Assessment Criteria (TNAC)
- Cumulative (inc. Project for Assessment) (60°)
- Cumulative (exc. Project for Assessment) (60°)
- Project for Assessment (30°)
- Scout Moor Wind Farm (60°)
- Reaps Moss Wind Farm (0°)

Project Scout Moor II Wind Farm
 Client Cubico UK Development Ltd
 Title Cumulative Noise Assessment
 NAL17
 Figure Number Figure A1.3q

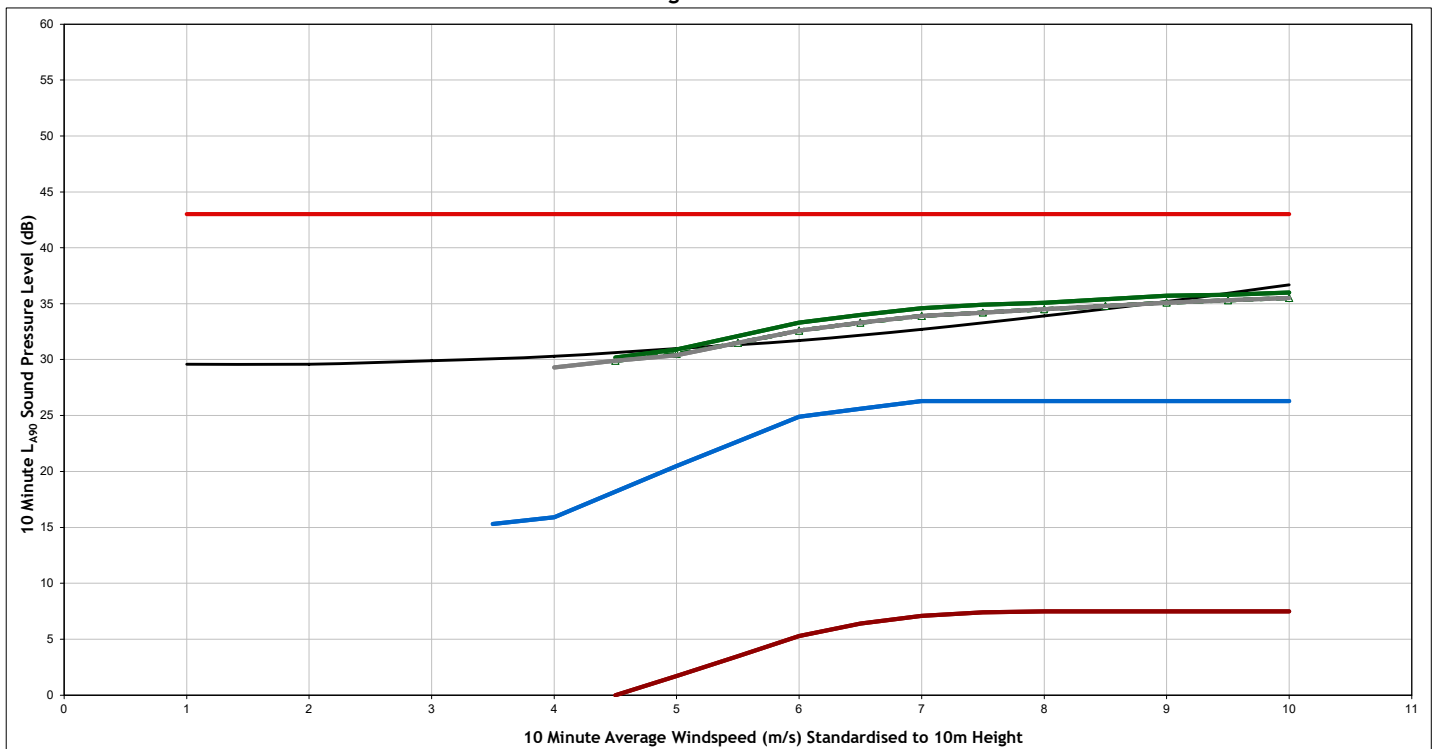
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 Date 28/07/2026
 Document Reference 16647



Daytime - NAL18



Night Time - NAL18



Legend:

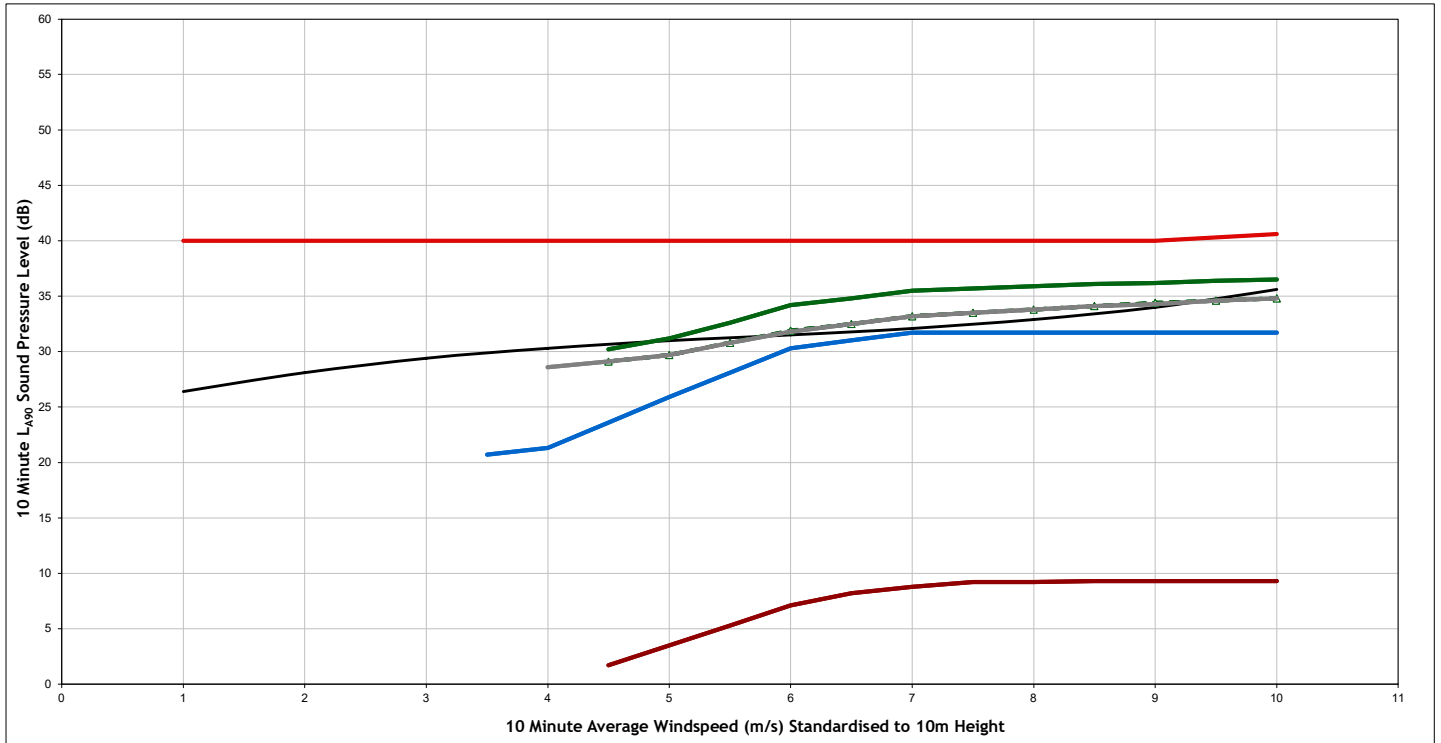
- Background Sound Trendline
- Total Noise Assessment Criteria (TNAC)
- Cumulative (inc. Project for Assessment) (60')
- Cumulative (exc. Project for Assessment) (60')
- Project for Assessment (30')
- Scout Moor Wind Farm (60')
- Reaps Moss Wind Farm (0')

Project Scout Moor II Wind Farm
 Client Cubico UK Development Ltd
 Title Cumulative Noise Assessment
 NAL18
 Figure Number Figure A1.3r

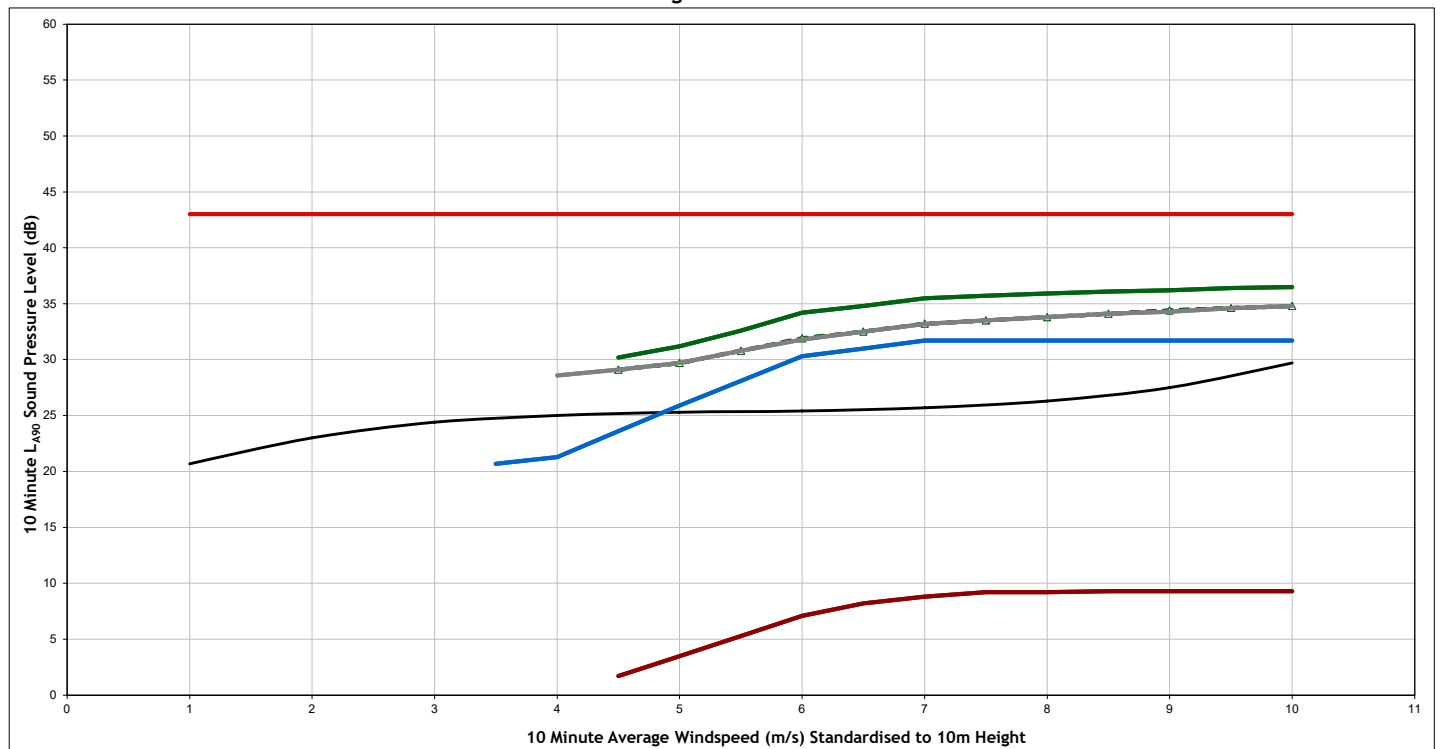
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 Date 28/07/2026
 Document Reference 16647



Daytime - NAL19



Night Time - NAL19



Legend:

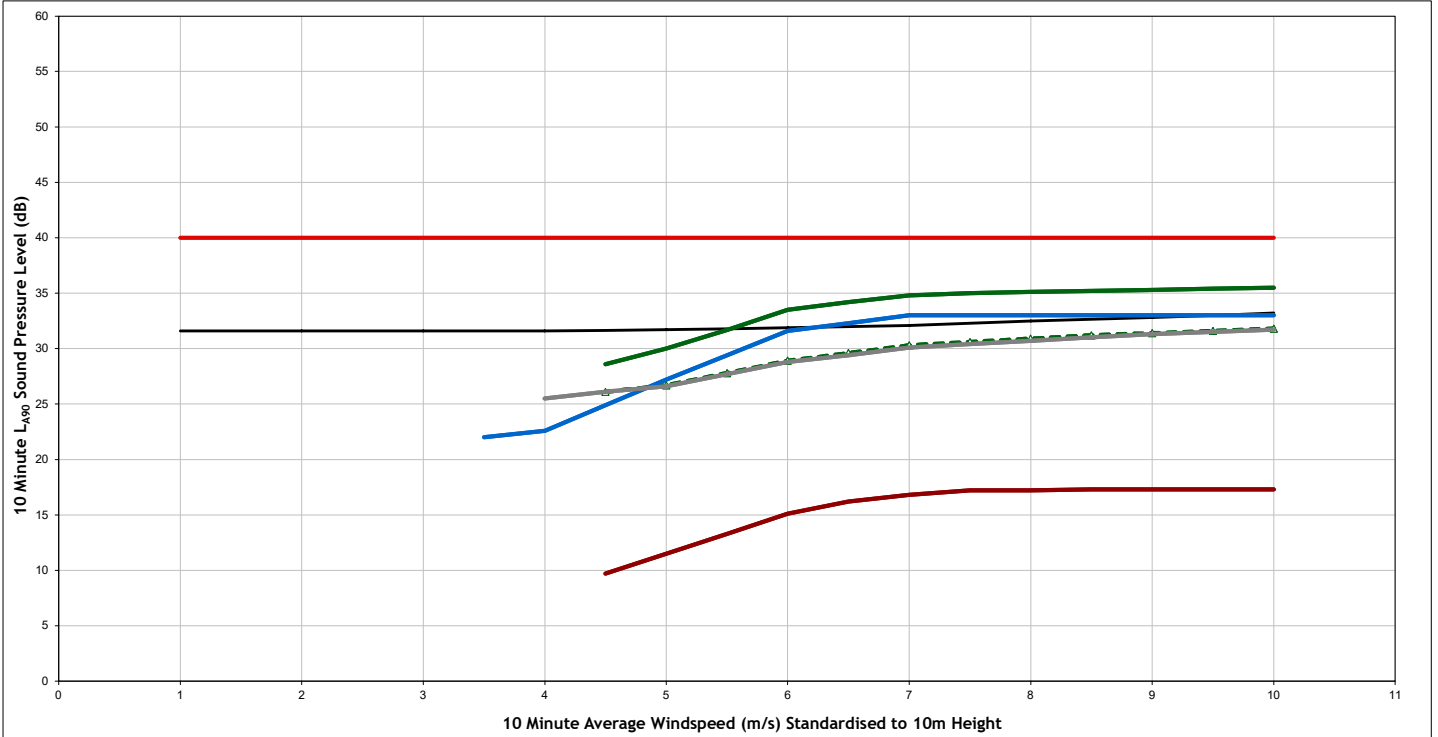
- Background Sound Trendline
- Total Noise Assessment Criteria (TNAC)
- Cumulative (inc. Project for Assessment) (90°)
- Cumulative (exc. Project for Assessment) (90°)
- Project for Assessment (60°)
- Scout Moor Wind Farm (90°)
- Reaps Moss Wind Farm (0°)

Project Scout Moor II Wind Farm
 Client Cubico UK Development Ltd
 Title Cumulative Noise Assessment
 NAL19
 Figure Number Figure A1.3s

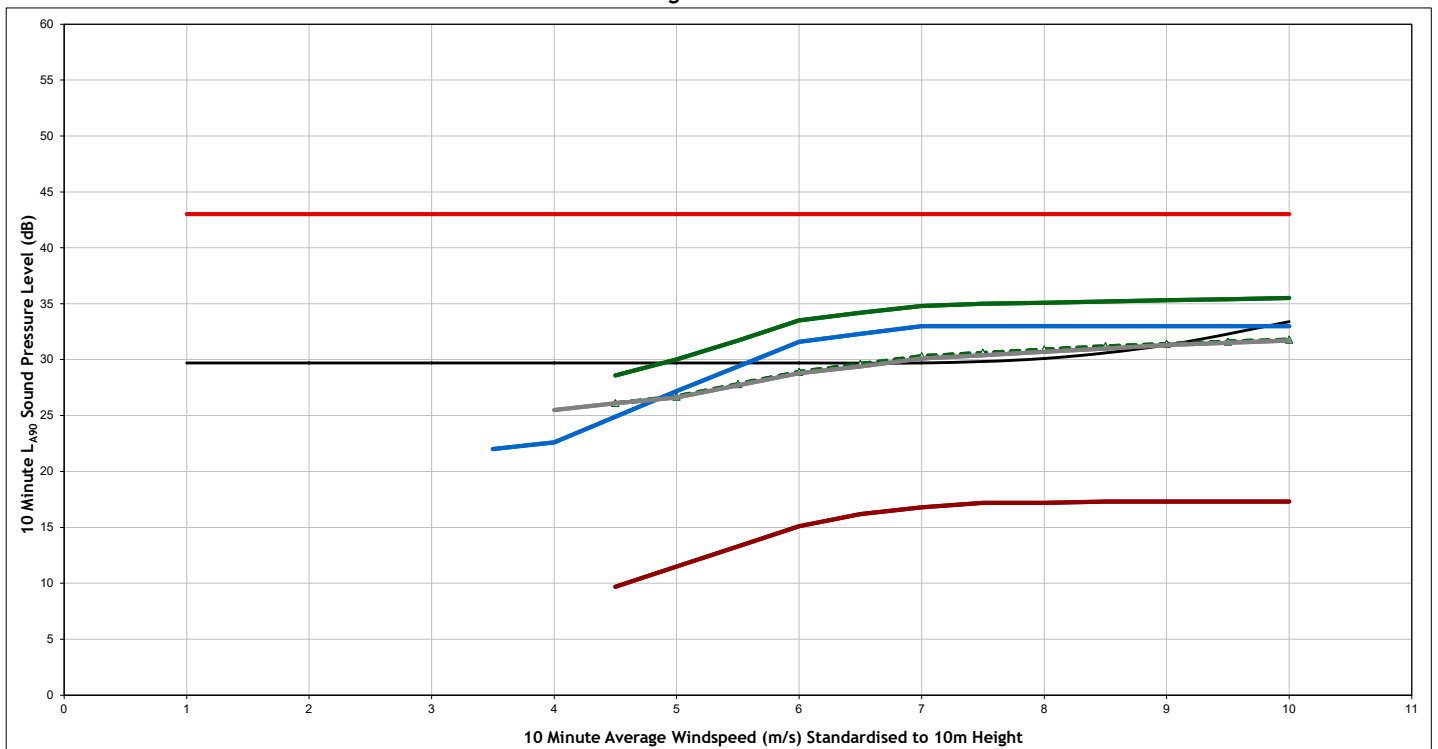
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 Date 28/07/2026
 Document Reference 16647



Daytime - NAL20



Night Time - NAL20



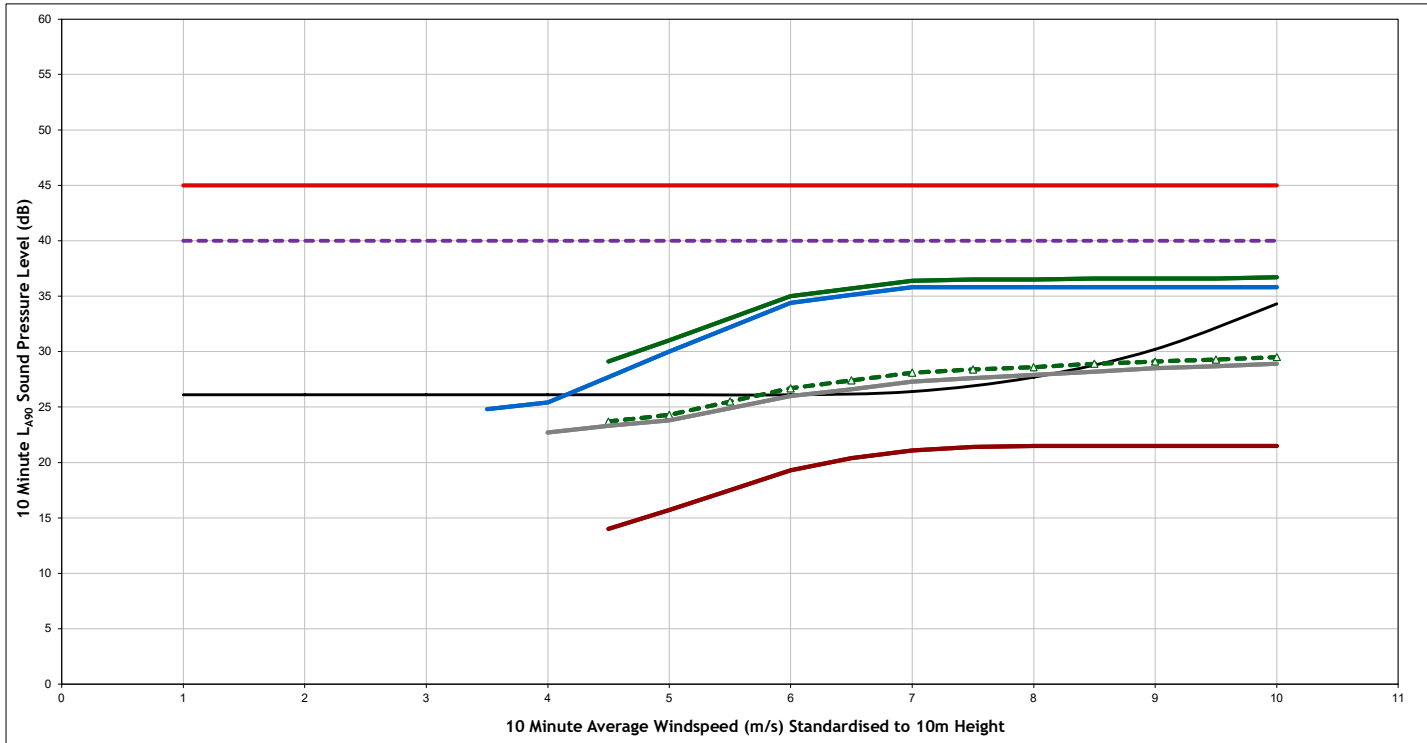
Legend:

- Background Sound Trendline
- Total Noise Assessment Criteria (TNAC)
- Cumulative (inc. Project for Assessment) (150°)
- Cumulative (exc. Project for Assessment) (150°)
- Project for Assessment (120°)
- Scout Moor Wind Farm (150°)
- Reaps Moss Wind Farm (30°)

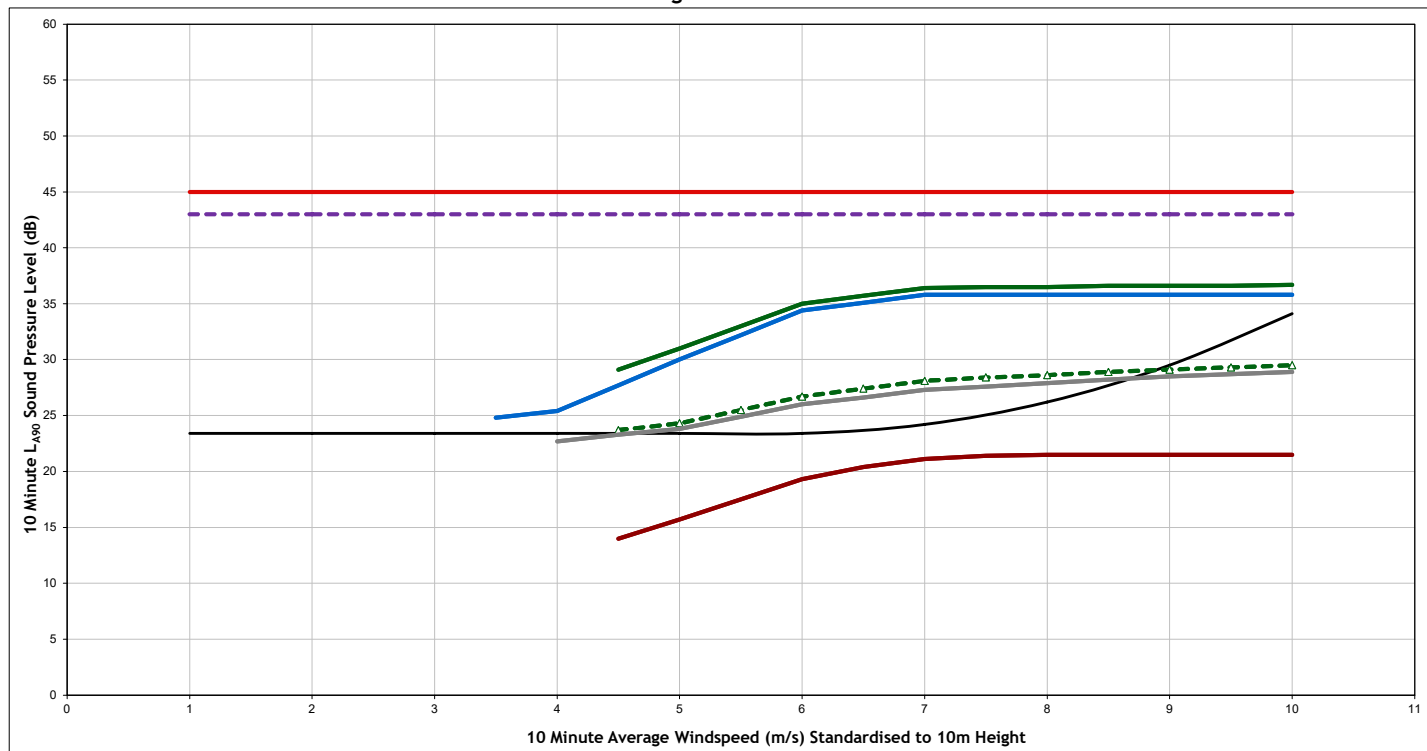
Project Scout Moor II Wind Farm
Client Cubico UK Development Ltd
Title Cumulative Noise Assessment
Figure Number Figure A1.3t
Drawn MT
Checked AB
Date 28/07/2026
Document Reference 16647



Daytime - NAL21



Night Time - NAL21



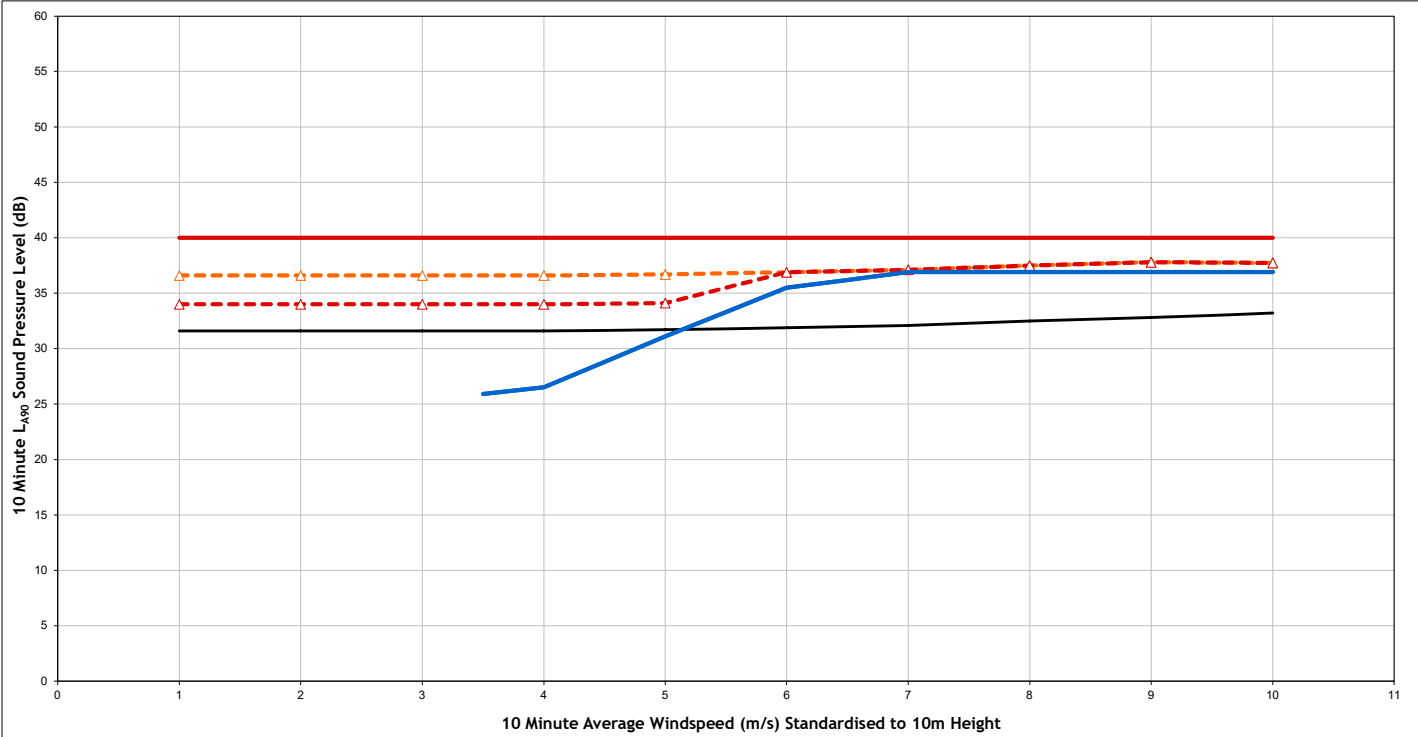
Legend:

	Background Sound Trendline
	Financially Involved TNAC (Cumulative inc. Project for Assessment)
	Non-Financially Involved TNAC (Cumulative exc. Project for Assessment)
	Cumulative (inc. Project for Assessment) (270°)
	Cumulative (exc. Project for Assessment) (300°)
	Project for Assessment (240°)
	Scout Moor Wind Farm (210°)
	Reaps Moss Wind Farm (0°)

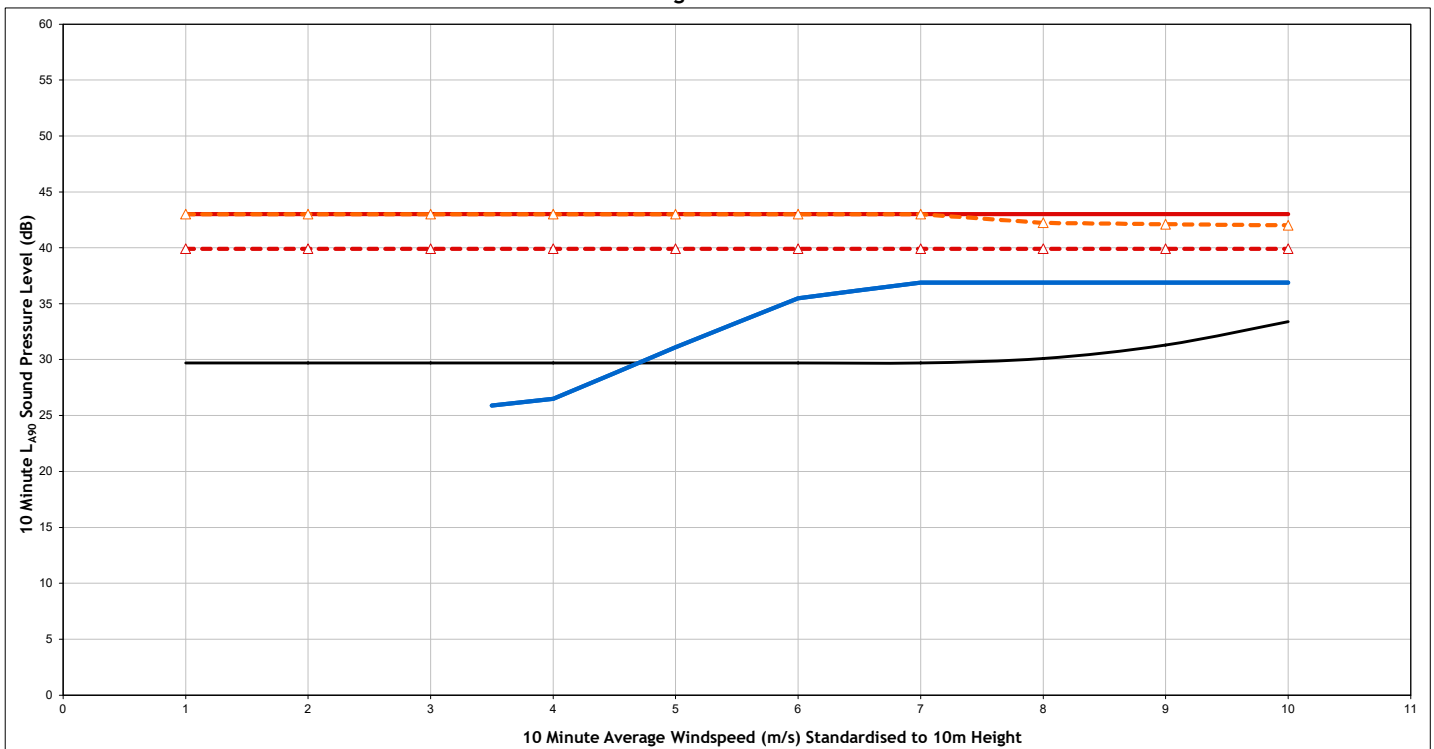
Project	Scout Moor II Wind Farm
Client	Cubico UK Development Ltd
Title	Cumulative Noise Assessment
	NAL21
Figure Number	Figure A1.3u
Drawn	MT
Checked	AB
Date	28/07/2026
Document Reference	16647



Daytime - NAL1



Night Time - NAL1



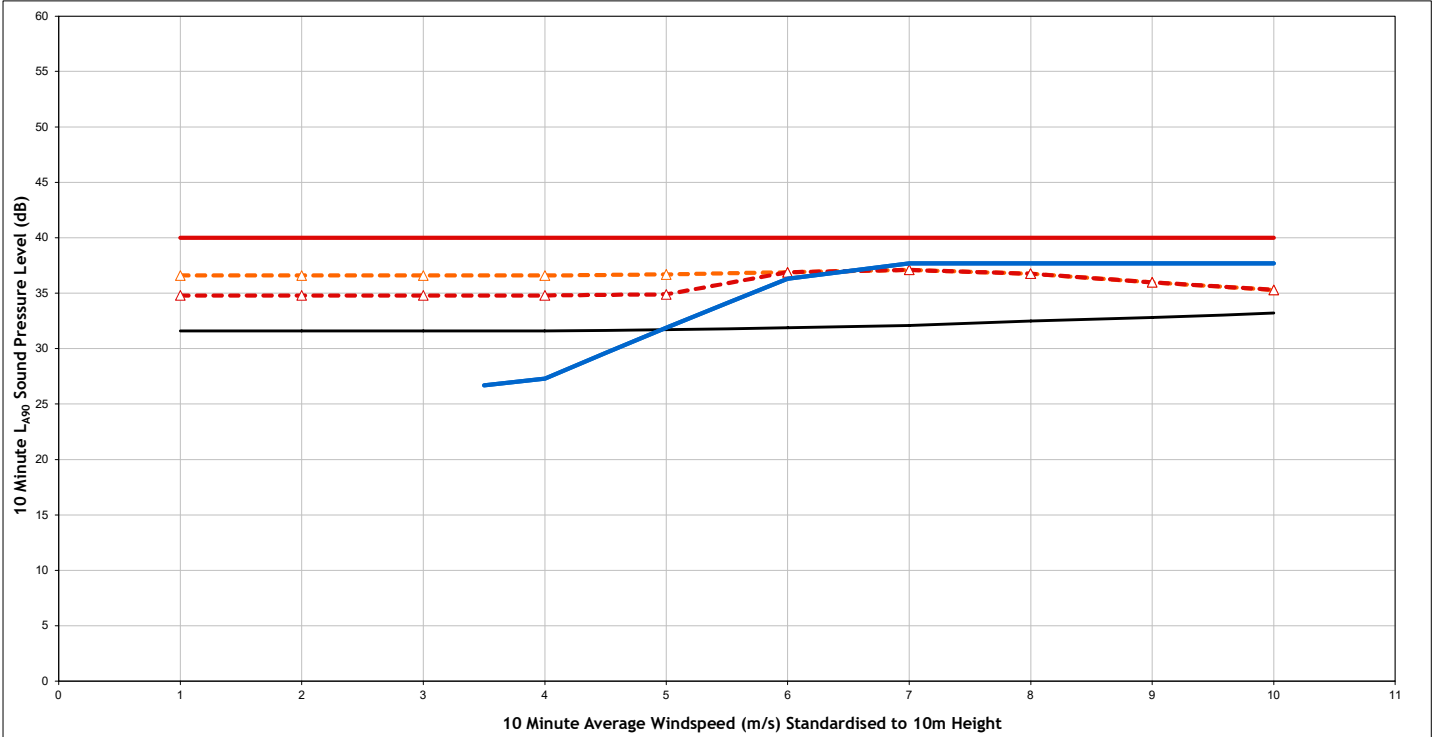
Legend:

	Background Noise Trendline
	Total Noise Assessment Criteria (TNAC)
	Residual Noise Limit
	Site Specific Noise Limit (SSNL)
	Project for Assessment

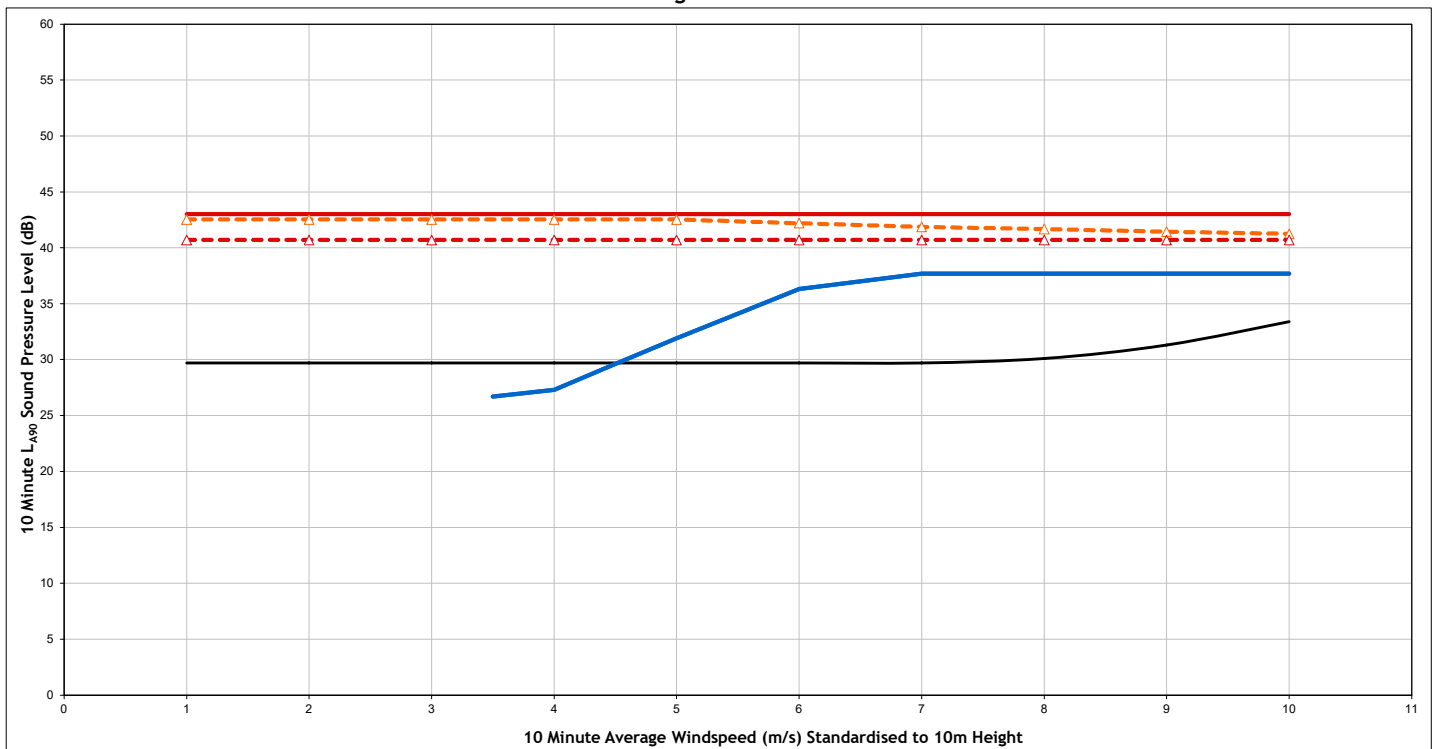
Project	Scout Moor II Wind Farm
Client	Cubico UK Development Ltd
Title	Noise Assessment - Site Specific Noise Limits NAL1
Figure Number	Figure A1.4a
Drawn	MT
Checked	AB
Date	20/07/2026
Document Reference	16647



Daytime - NAL2



Night Time - NAL2



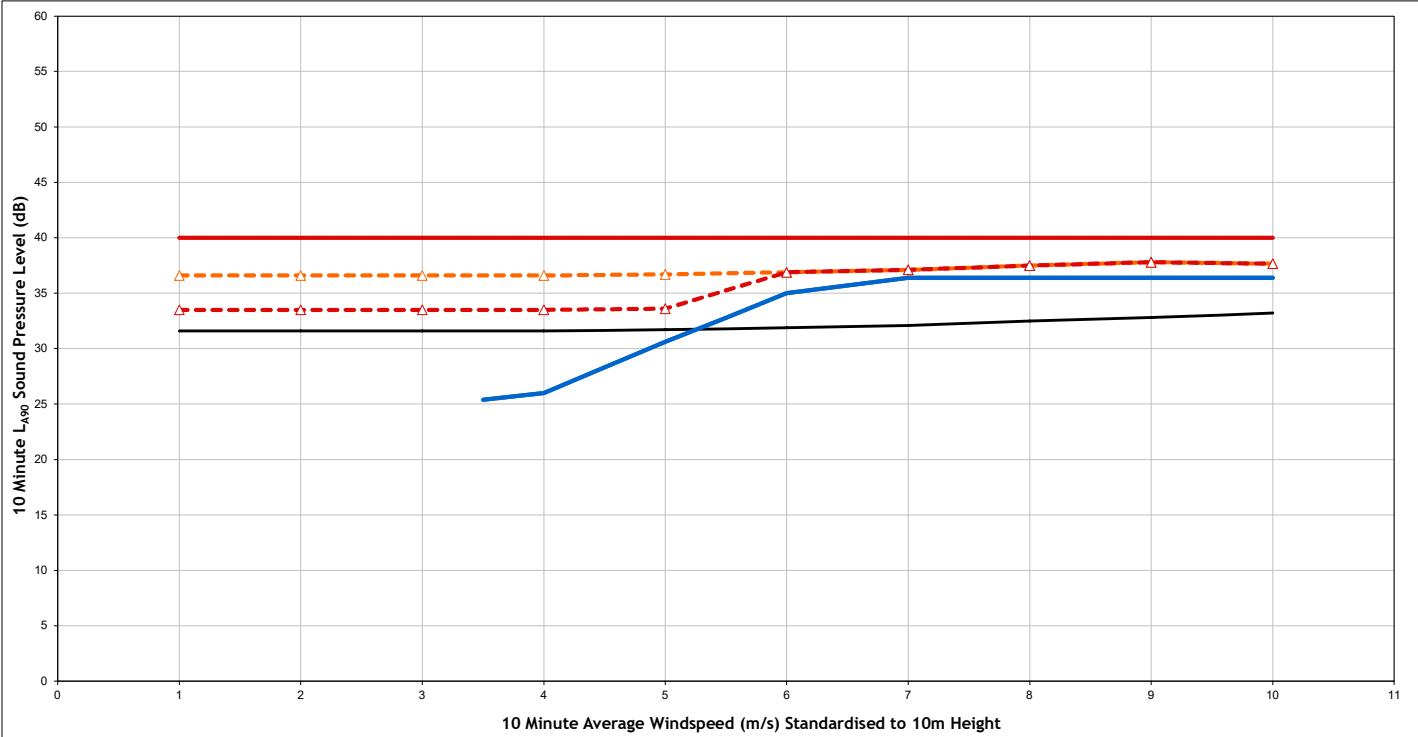
Legend:

	Background Noise Trendline
	Total Noise Assessment Criteria (TNAC)
	Residual Noise Limit
	Site Specific Noise Limit (SSNL)
	Project for Assessment

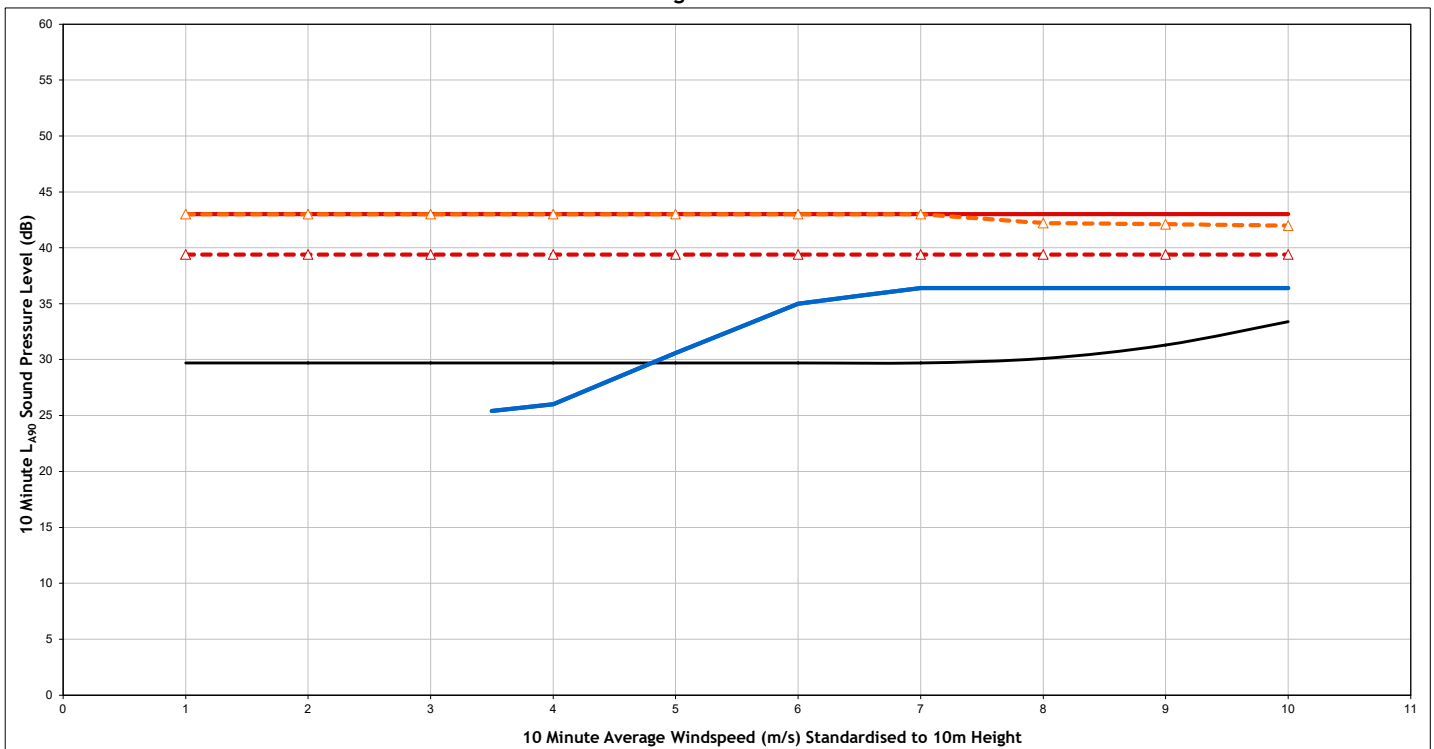
Project	Scout Moor II Wind Farm
Client	Cubico UK Development Ltd
Title	Noise Assessment - Site Specific Noise Limits NAL2
Figure Number	Figure A1.4b
Drawn	MT
Checked	AB
Date	20/07/2026
Document Reference	16647



Daytime - NAL3



Night Time - NAL3



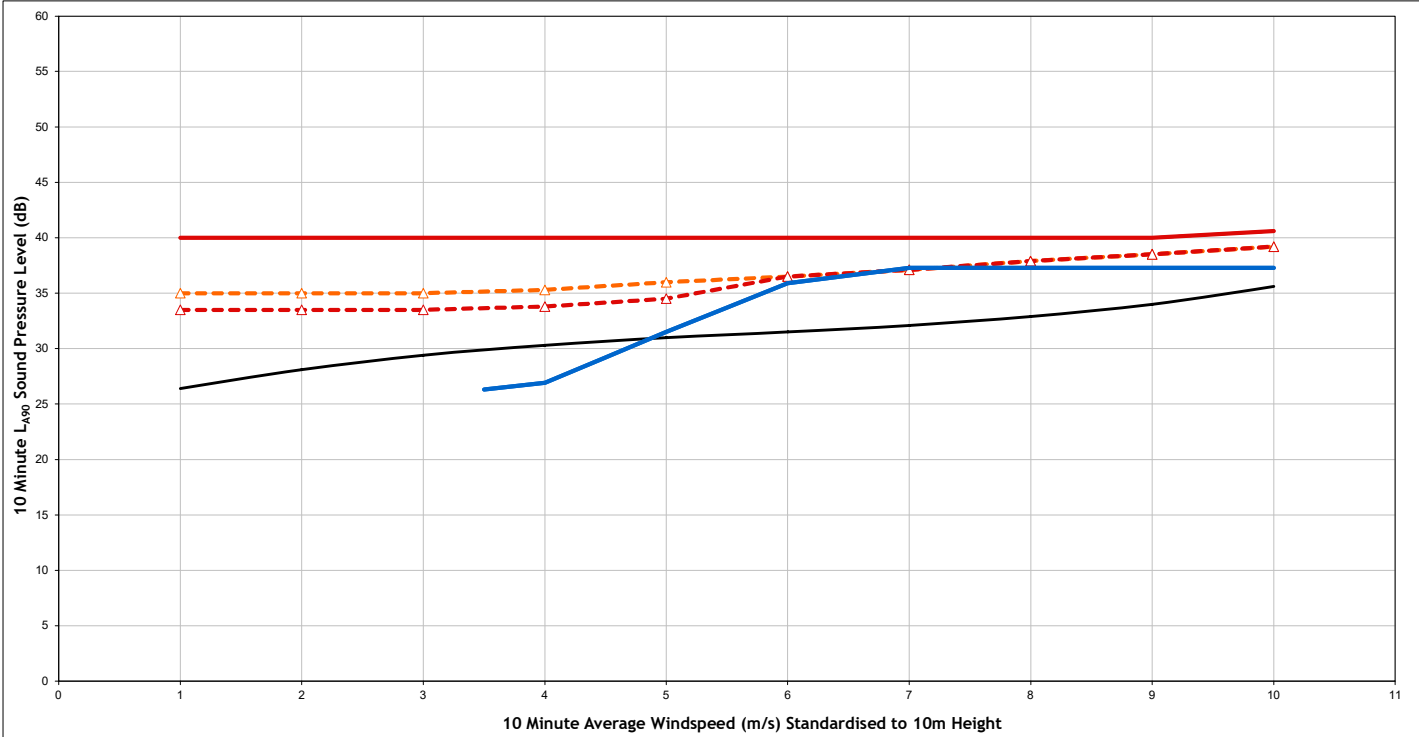
Legend:

	Background Noise Trendline
	Total Noise Assessment Criteria (TNAC)
	Residual Noise Limit
	Site Specific Noise Limit (SSNL)
	Project for Assessment

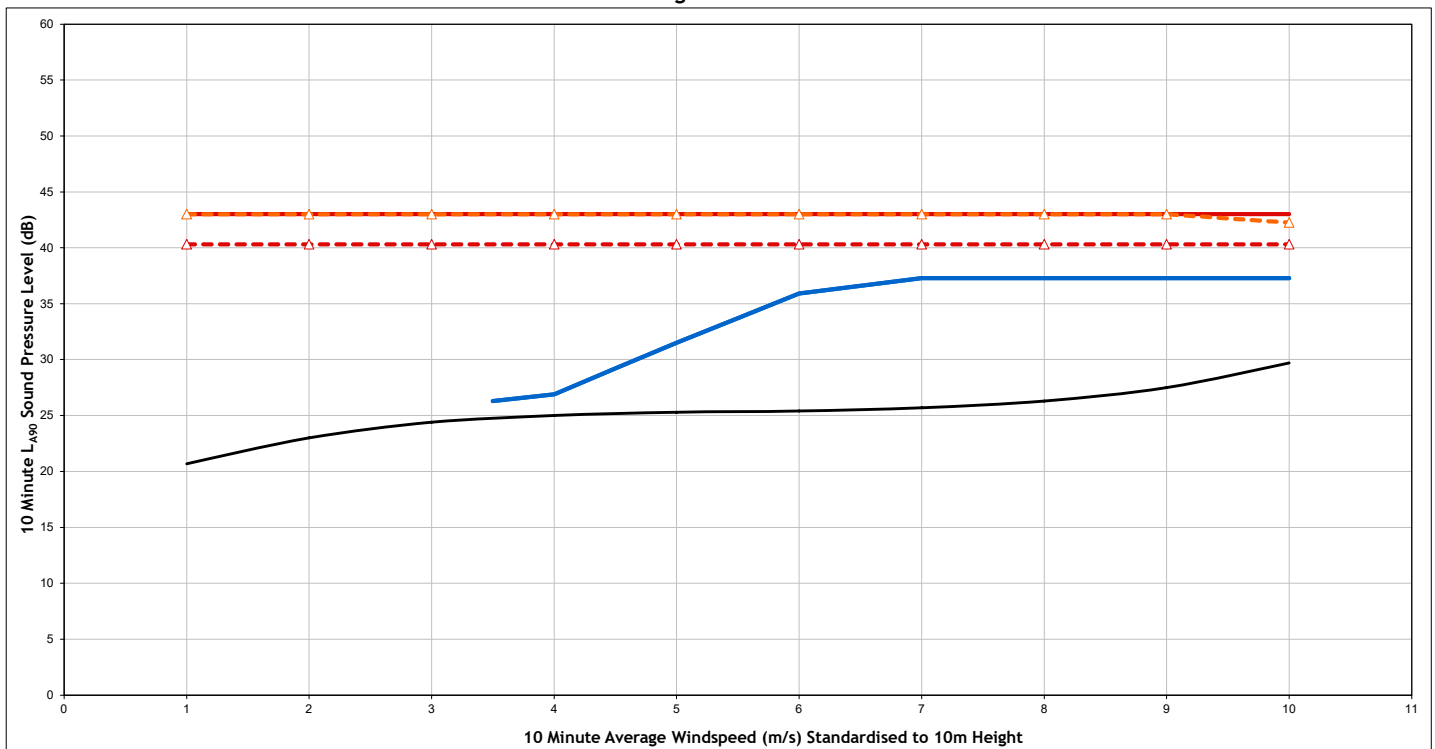
Project	Scout Moor II Wind Farm
Client	Cubico UK Development Ltd
Title	Noise Assessment - Site Specific Noise Limits NAL3
Figure Number	Figure A1.4c
Drawn	MT
Checked	AB
Date	20/07/2026
Document Reference	16647



Daytime - NAL4



Night Time - NAL4



Legend:

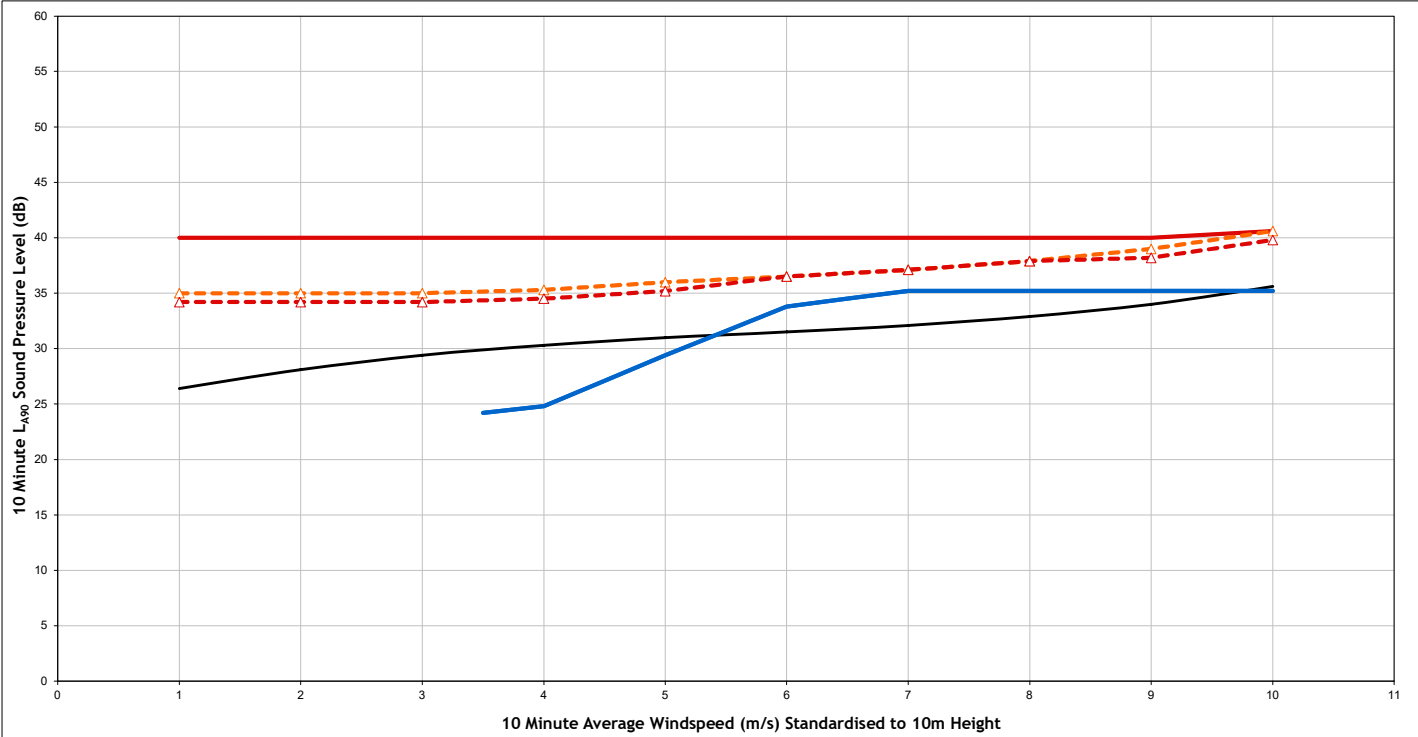
- Background Noise Trendline
- Total Noise Assessment Criteria (TNAC)
- Residual Noise Limit
- Site Specific Noise Limit (SSNL)
- Project for Assessment

Project Scout Moor II Wind Farm
Client Cubico UK Development Ltd
Title Noise Assessment - Site Specific Noise Limits
Figure Number Figure A1.4d

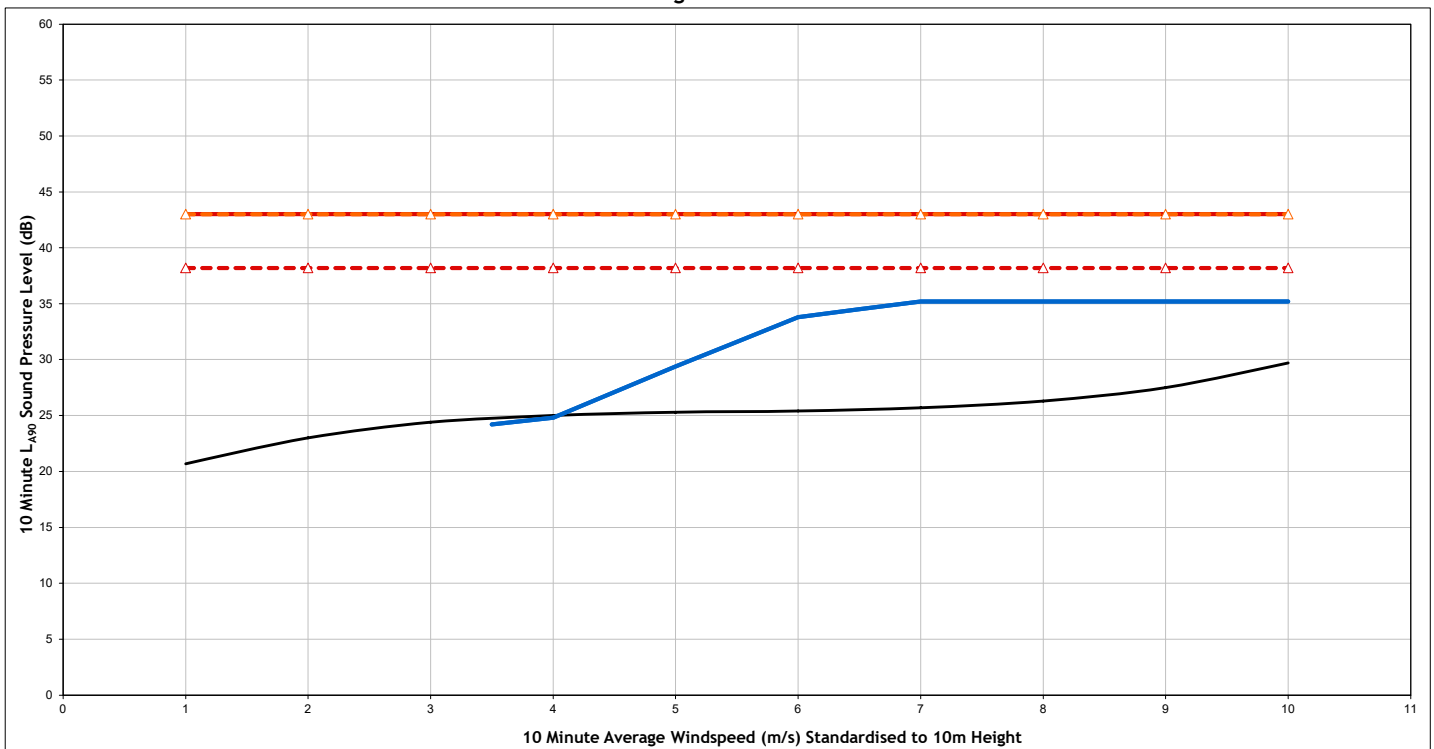
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Checked AB
Date 20/07/2026
Document Reference 16647



Daytime - NAL5



Night Time - NAL5



Legend:

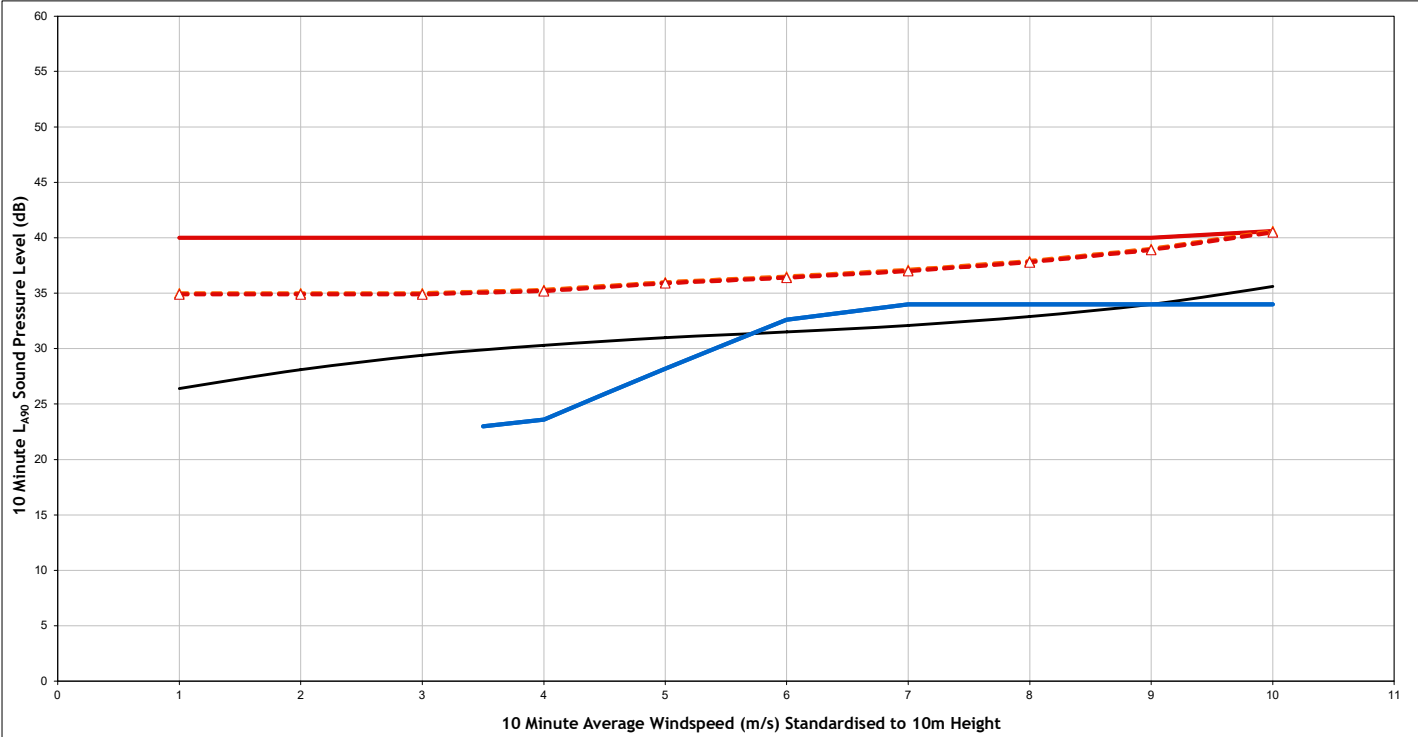
- Background Noise Trendline
- Total Noise Assessment Criteria (TNAC)
- Residual Noise Limit
- Site Specific Noise Limit (SSNL)
- Project for Assessment

Project Scout Moor II Wind Farm
Client Cubico UK Development Ltd
Title Noise Assessment - Site Specific Noise Limits
Figure Number Figure A1.4e

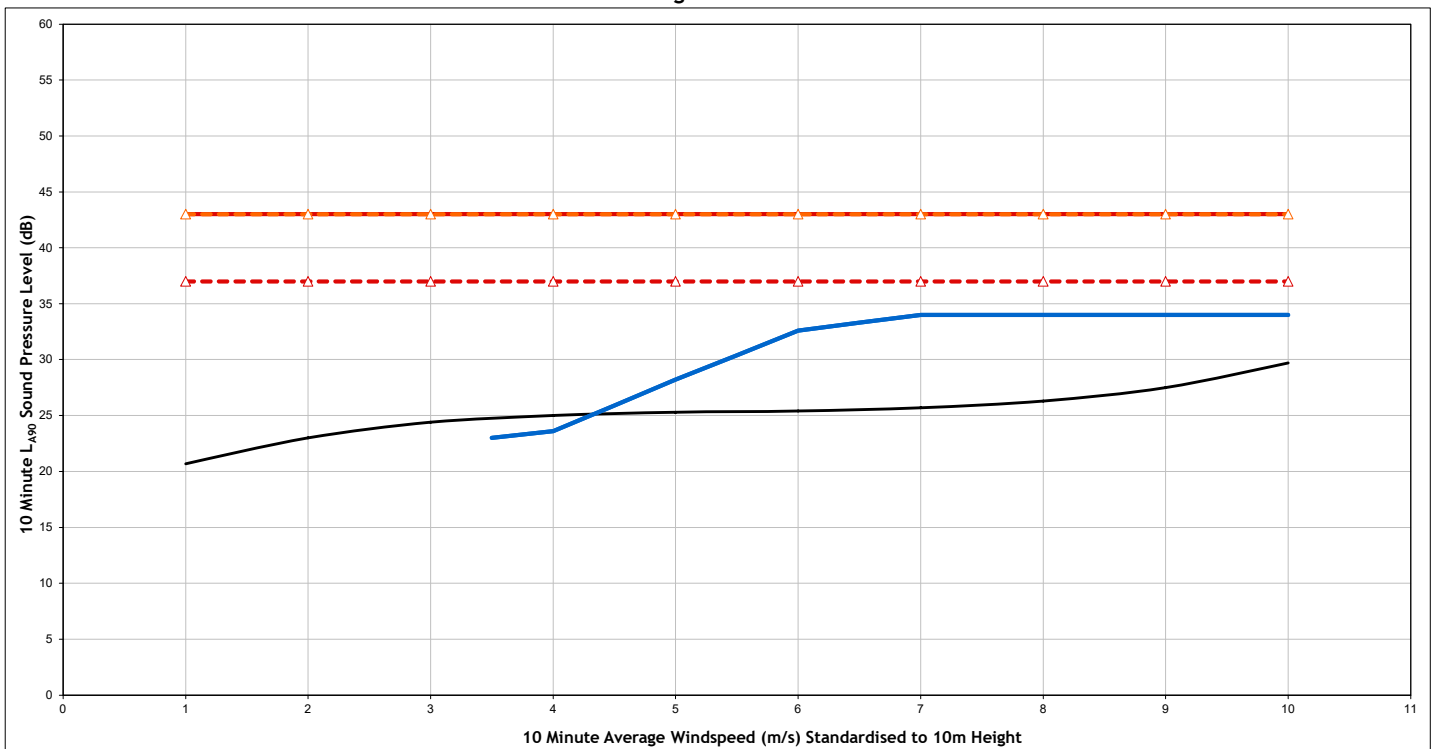
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Checked AB
Date 20/07/2026
Document Reference 16647



Daytime - NAL6



Night Time - NAL6



Legend:

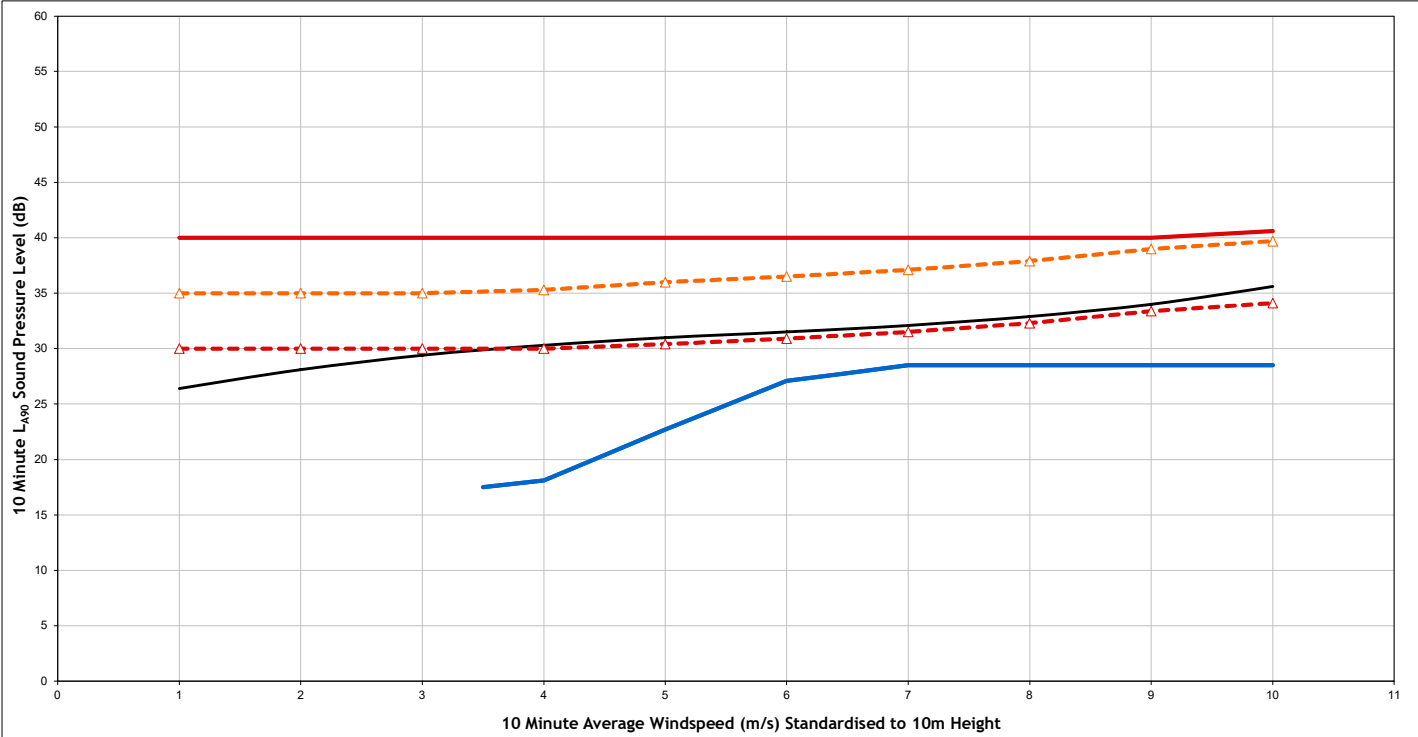
- Background Noise Trendline
- Total Noise Assessment Criteria (TNAC)
- Residual Noise Limit
- Site Specific Noise Limit (SSNL)
- Project for Assessment

Project Scout Moor II Wind Farm
Client Cubico UK Development Ltd
Title Noise Assessment - Site Specific Noise Limits
Figure Number Figure A1.4f

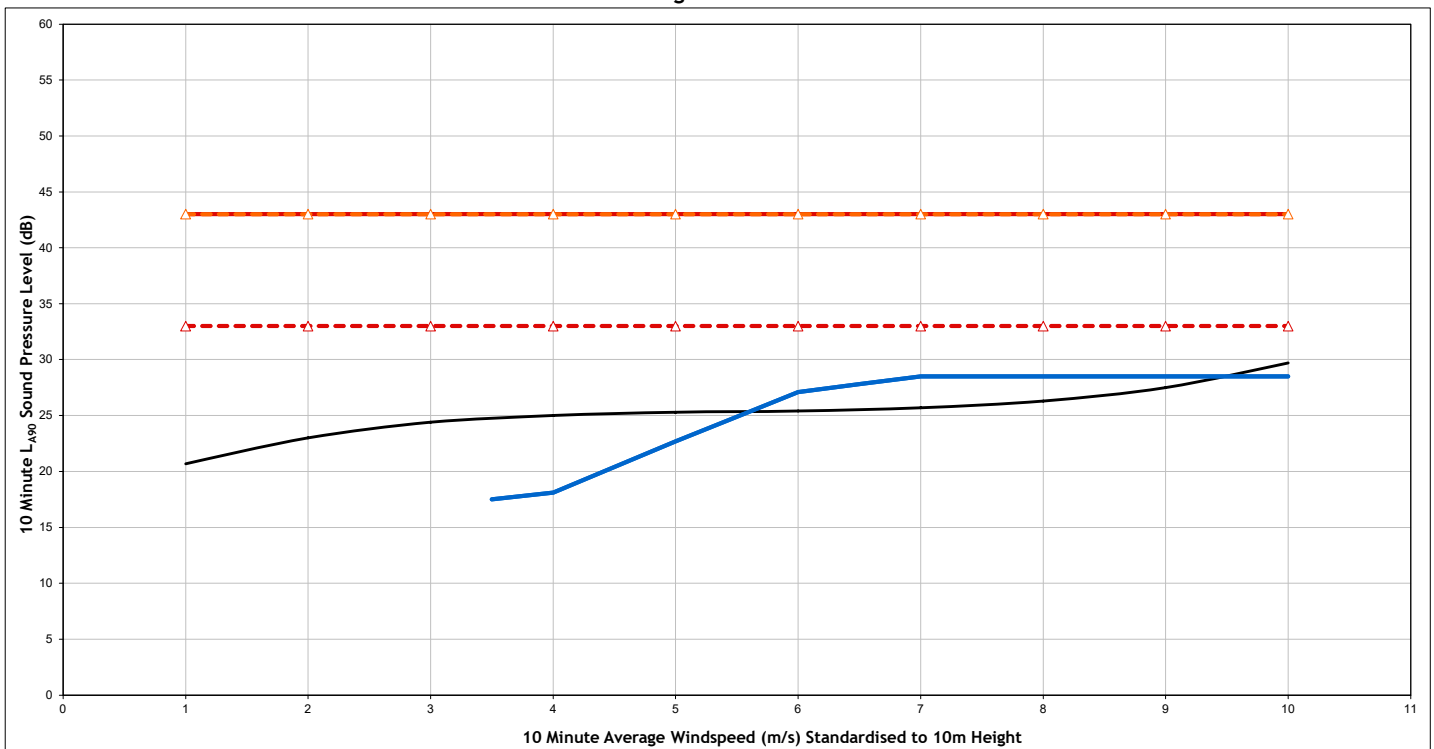
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Date 20/07/2026
Document Reference 16647



Daytime - NAL7



Night Time - NAL7



Legend:

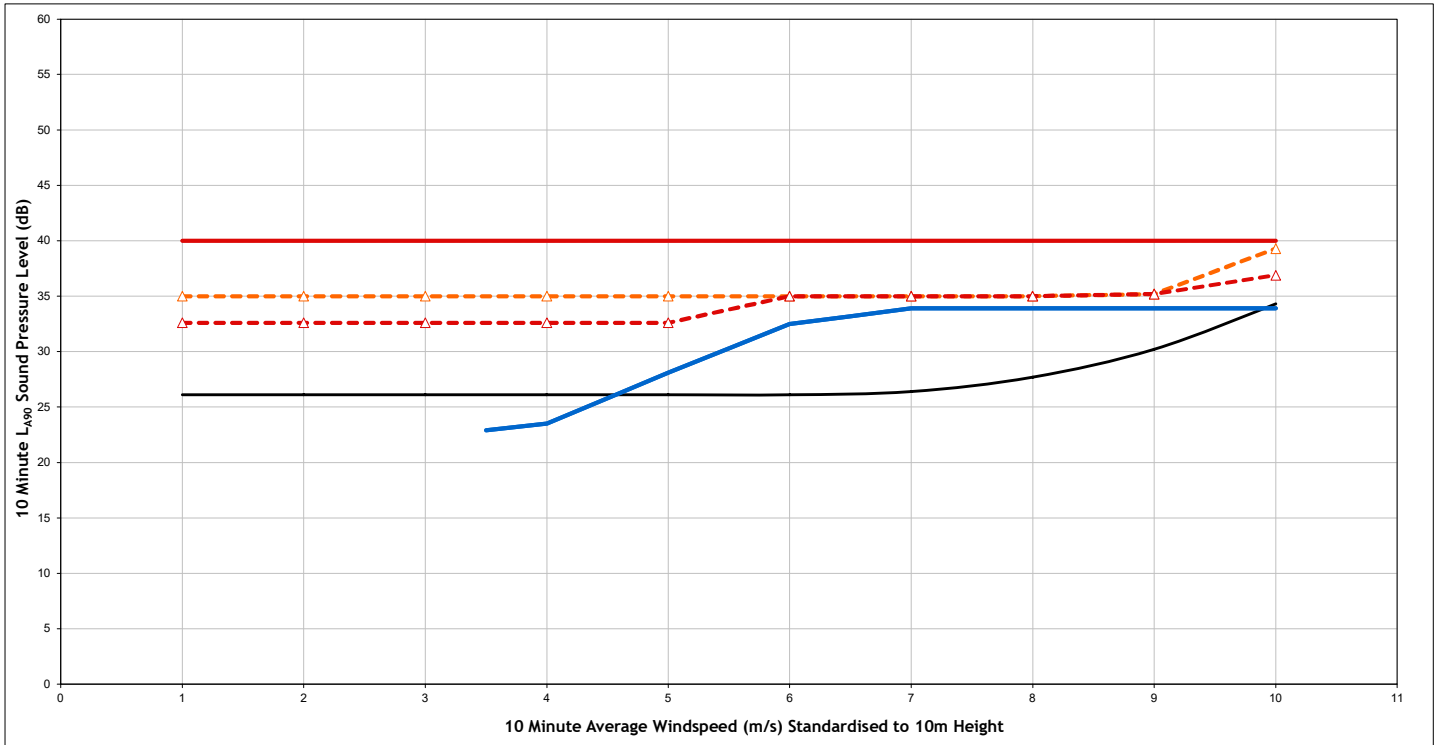
- Background Noise Trendline
- Total Noise Assessment Criteria (TNAC)
- Residual Noise Limit
- Site Specific Noise Limit (SSNL)
- Project for Assessment

Project Scout Moor II Wind Farm
Client Cubico UK Development Ltd
Title Noise Assessment - Site Specific Noise Limits
Figure Number Figure A1.4g

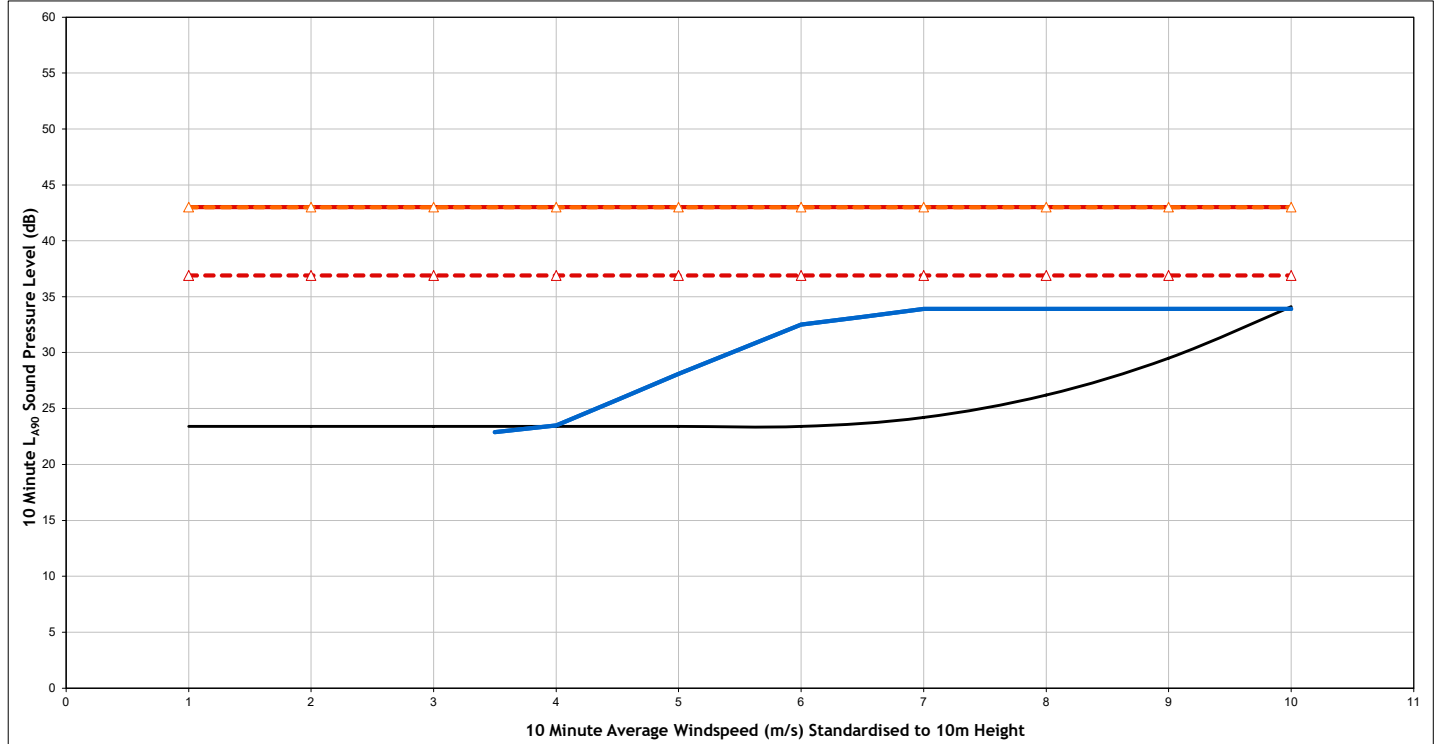
Drawn MT
Checked AB
Date 20/07/2026
Document Reference 16647



Daytime - NAL8



Night Time - NAL8



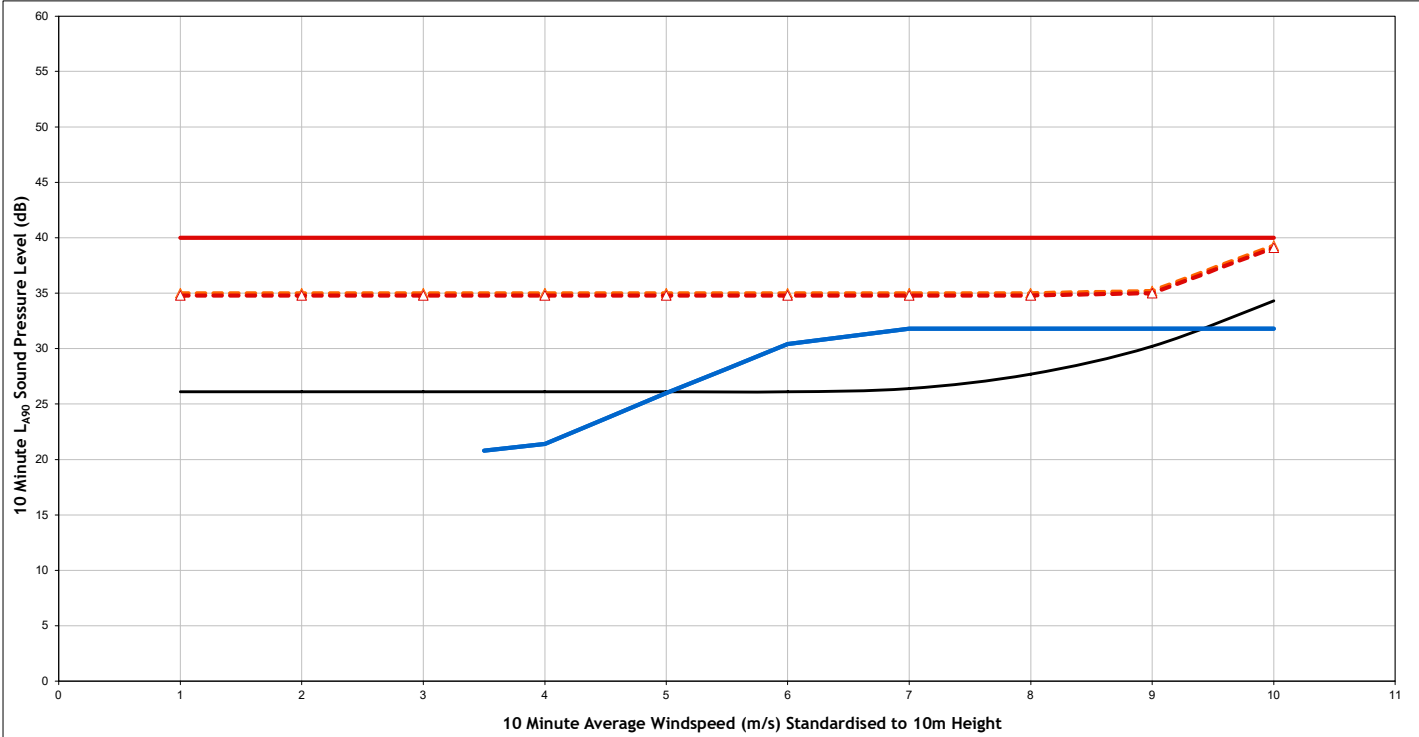
Legend:

- Background Noise Trendline
- Total Noise Assessment Criteria (TNAC)
- Residual Noise Limit
- Site Specific Noise Limit (SSNL)
- Project for Assessment

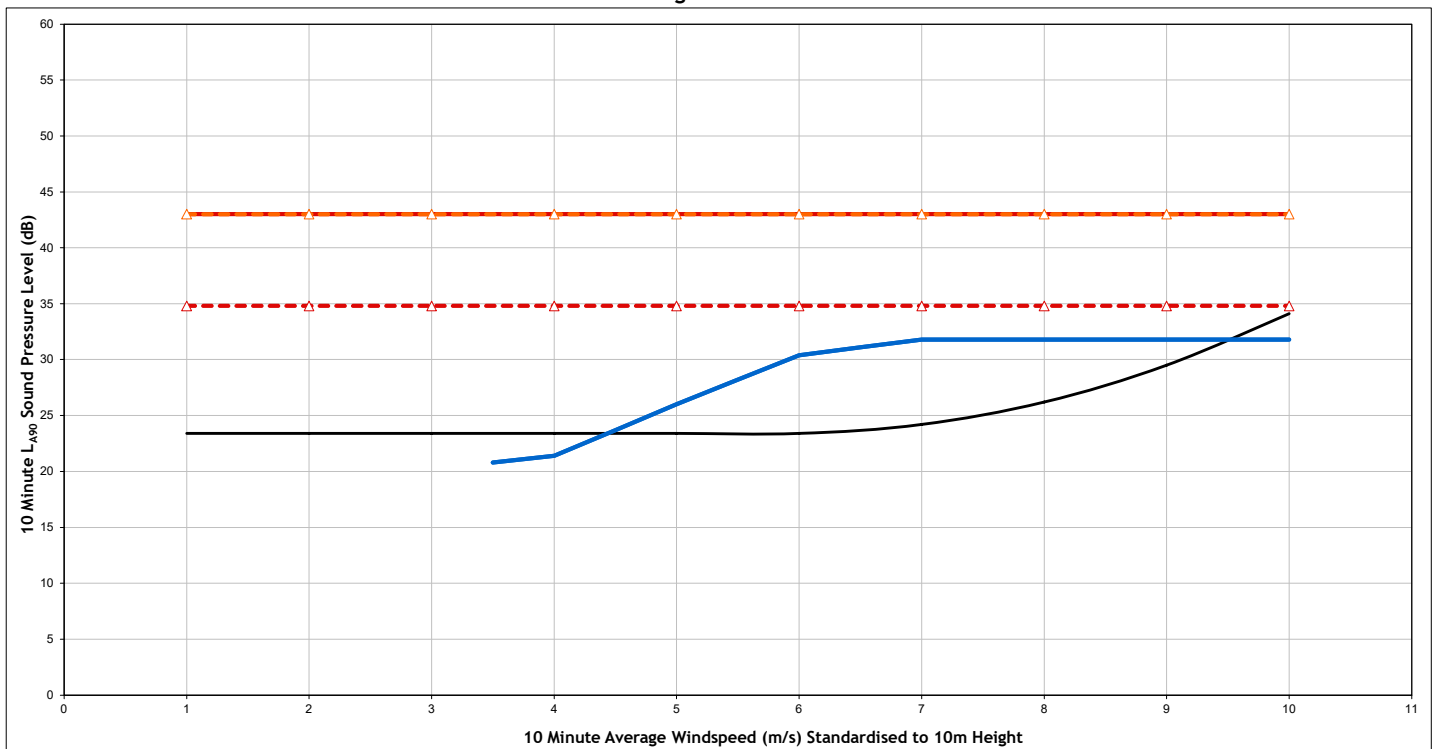
Project	Scout Moor II Wind Farm
Client	Cubico UK Development Ltd
Title	Noise Assessment - Site Specific Noise Limits NAL8
Figure Number	Figure A1.4h
Drawn	MT
Checked	AB
Date	20/07/2026
Document Reference	16647



Daytime - NAL9



Night Time - NAL9



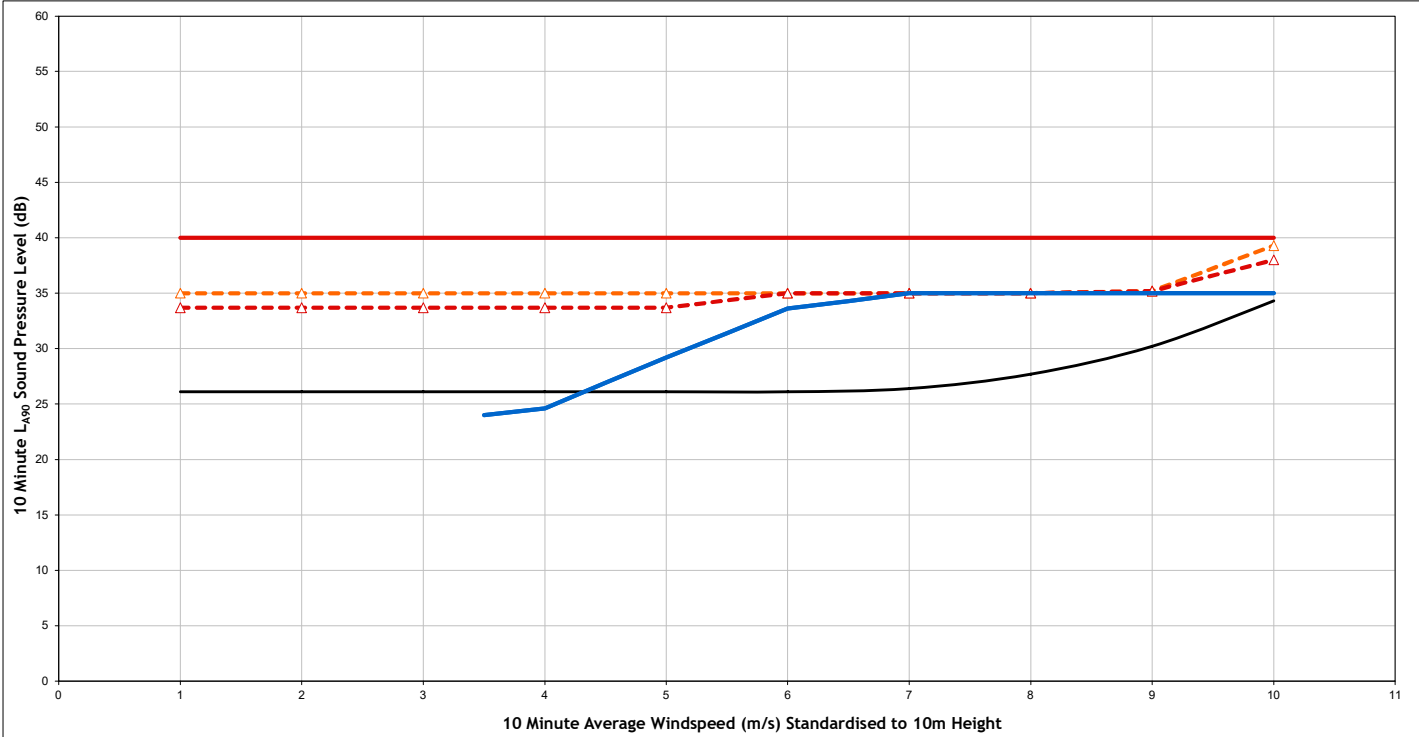
Legend:

- Background Noise Trendline
- Total Noise Assessment Criteria (TNAC)
- Residual Noise Limit
- Site Specific Noise Limit (SSNL)
- Project for Assessment

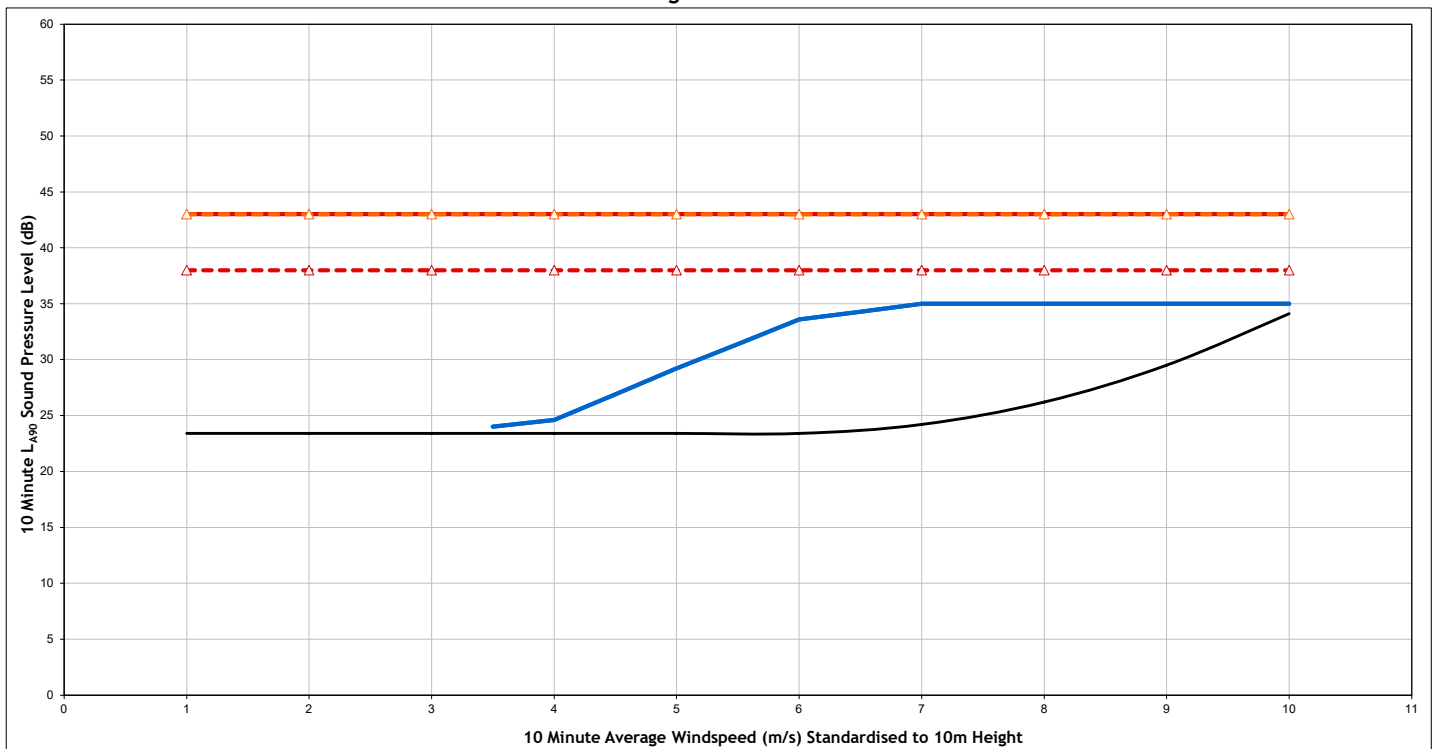
Project Scout Moor II Wind Farm
Client Cubico UK Development Ltd
Title Noise Assessment - Site Specific Noise Limits
Figure Number Figure A1.4i
Drawn MT
Checked AB
Date 20/07/2026
Document Reference 16647



Daytime - NAL10



Night Time - NAL10



Legend:

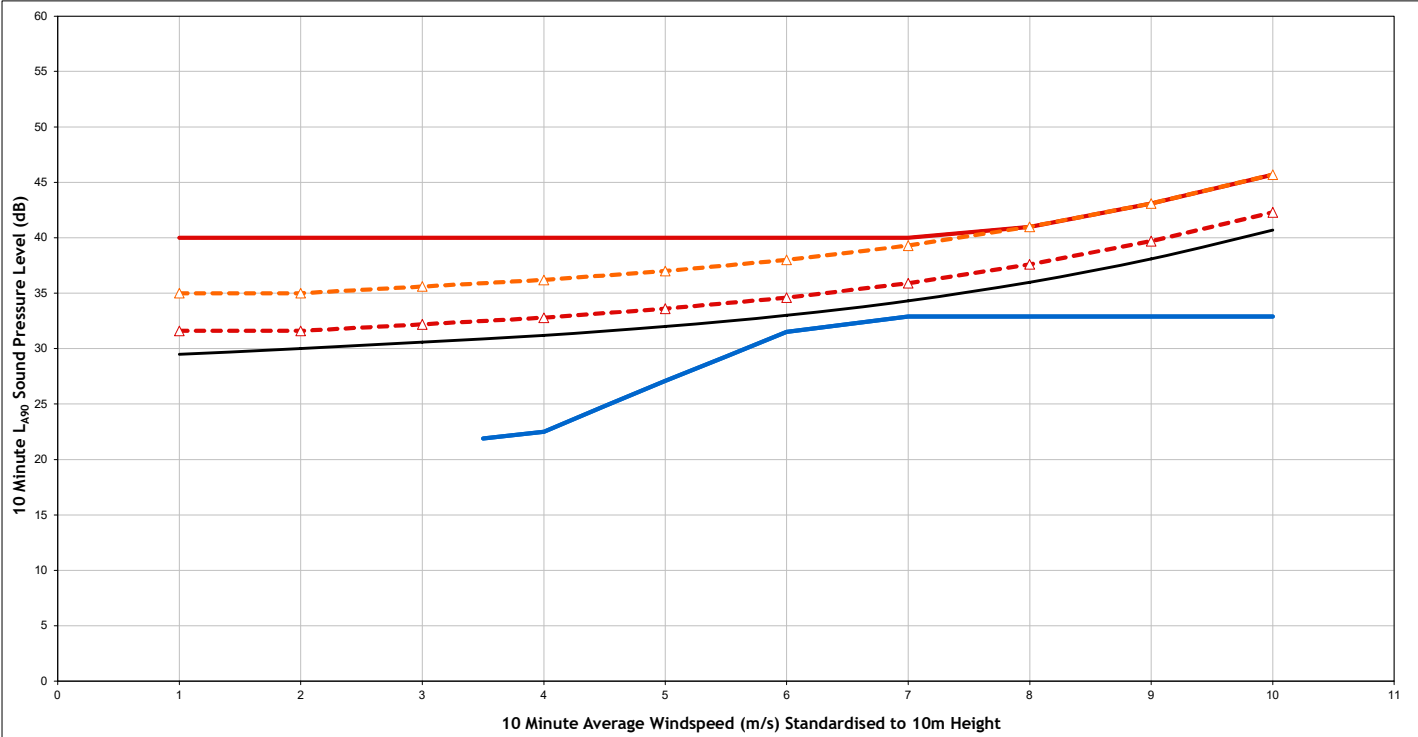
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- Total Noise Assessment Criteria (TNAC)
- Residual Noise Limit
- Site Specific Noise Limit (SSNL)
- Project for Assessment

Project Scout Moor II Wind Farm
Client Cubico UK Development Ltd
Title Noise Assessment - Site Specific Noise Limits
Figure Number Figure A1.4j

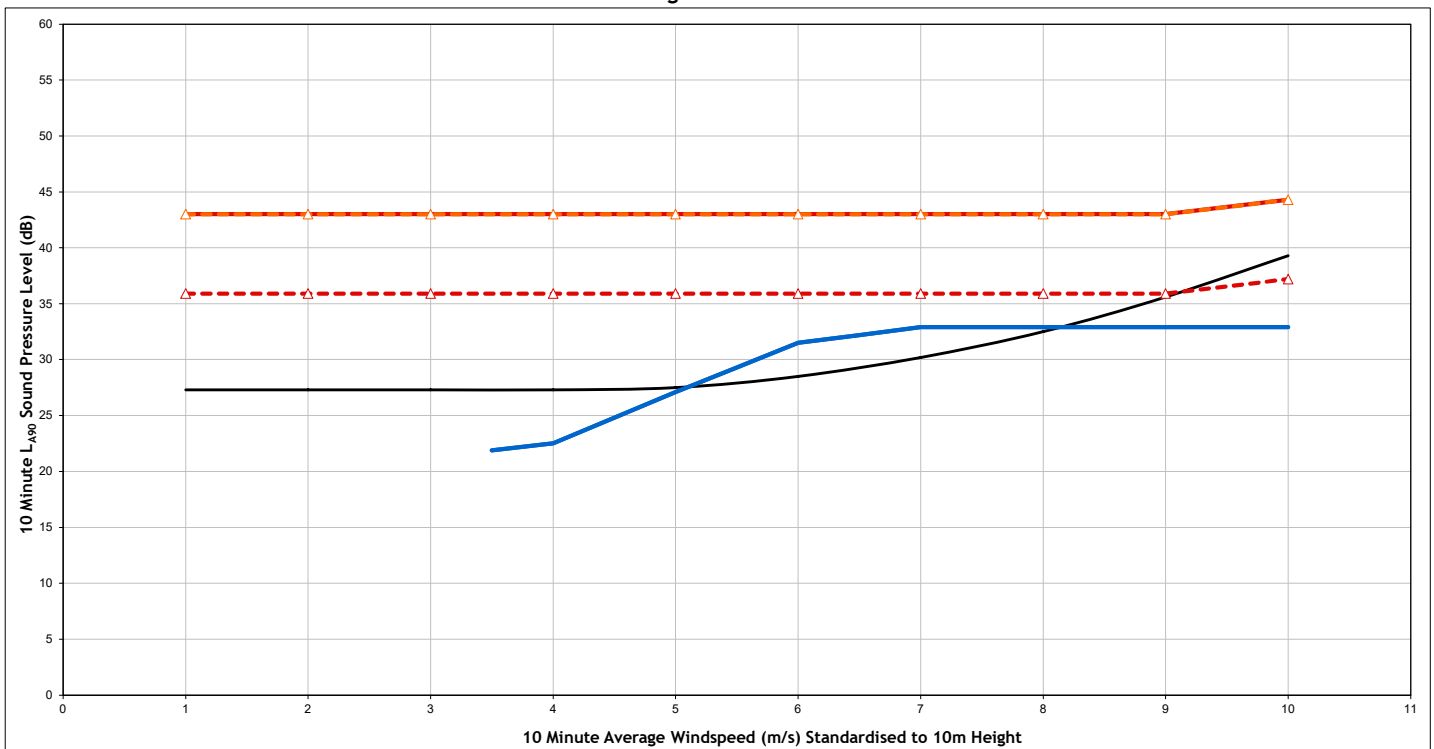
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Checked AB
Date 20/07/2026
Document Reference 16647



Daytime - NAL11



Night Time - NAL11



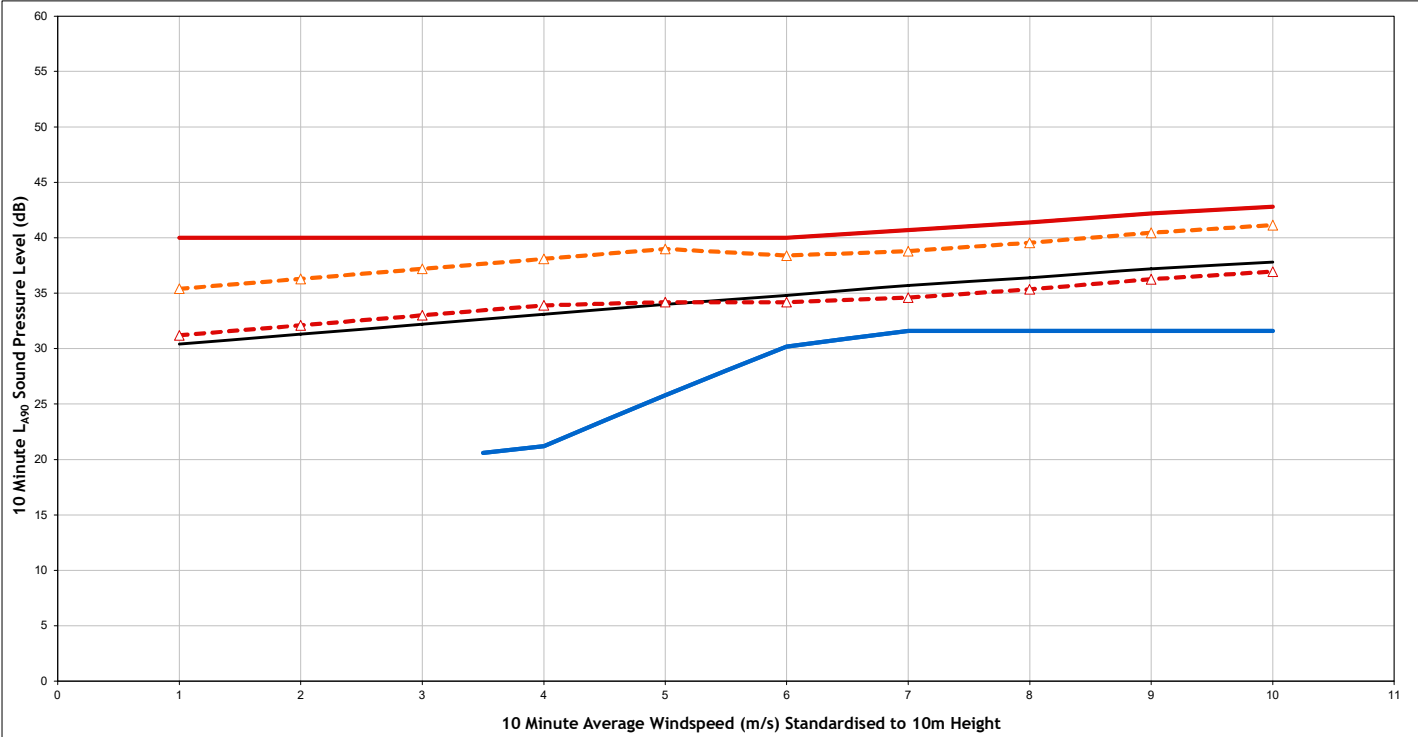
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- Project for Assessment

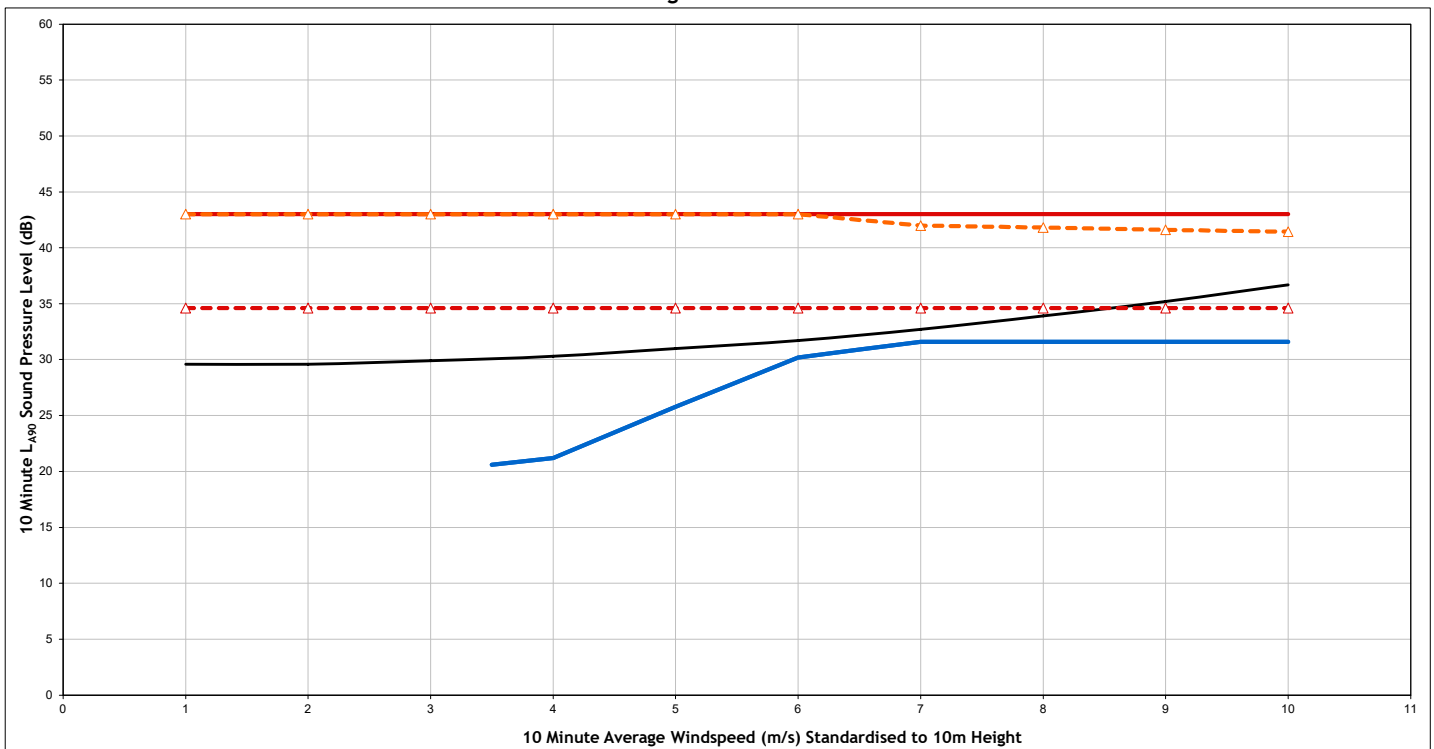
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Client Cubico UK Development Ltd
Title Noise Assessment - Site Specific Noise Limits
Figure Number Figure A1.4k
Drawn MT
Checked AB
Date 20/07/2026
Document Reference 16647



Daytime - NAL12



Night Time - NAL12



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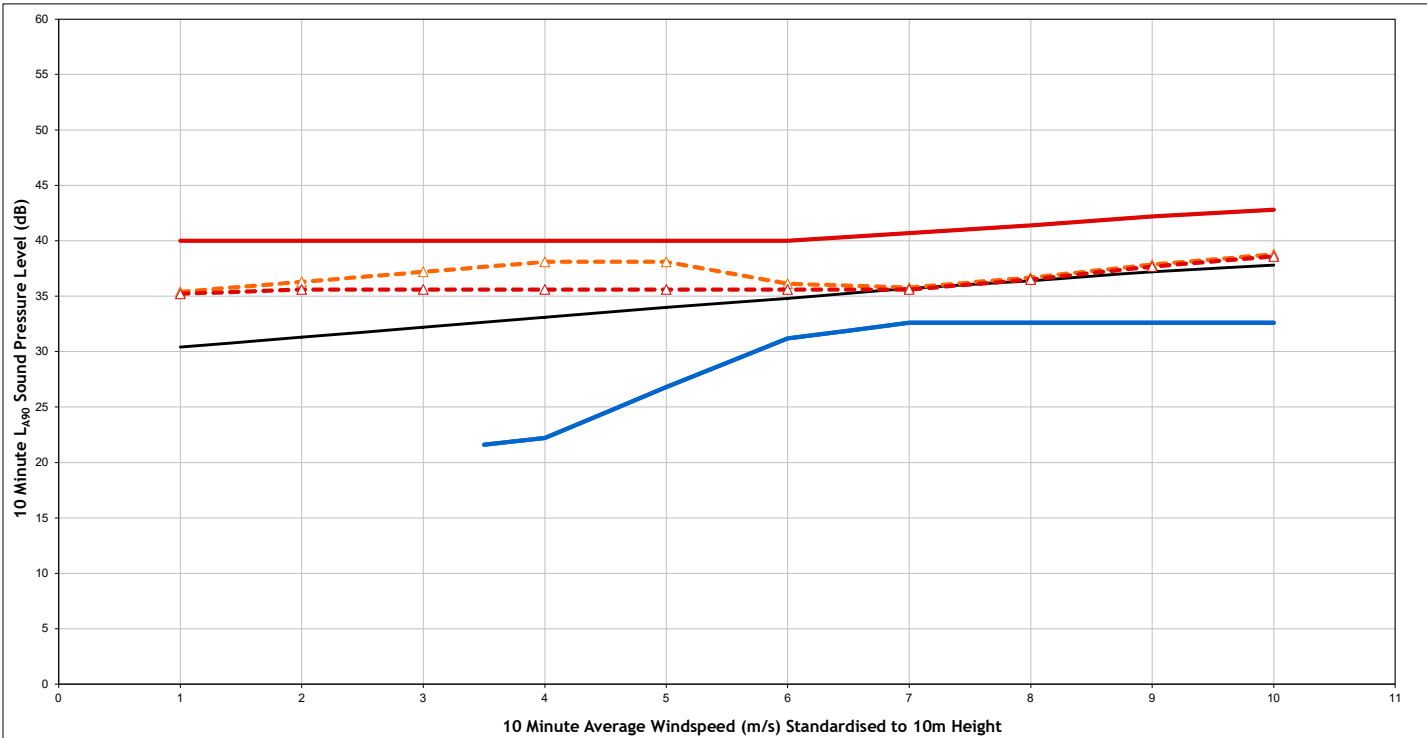
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Project Scout Moor II Wind Farm
 Client Cubico UK Development Ltd
 Title Noise Assessment - Site Specific Noise Limits
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 Figure Number Figure A1.4l

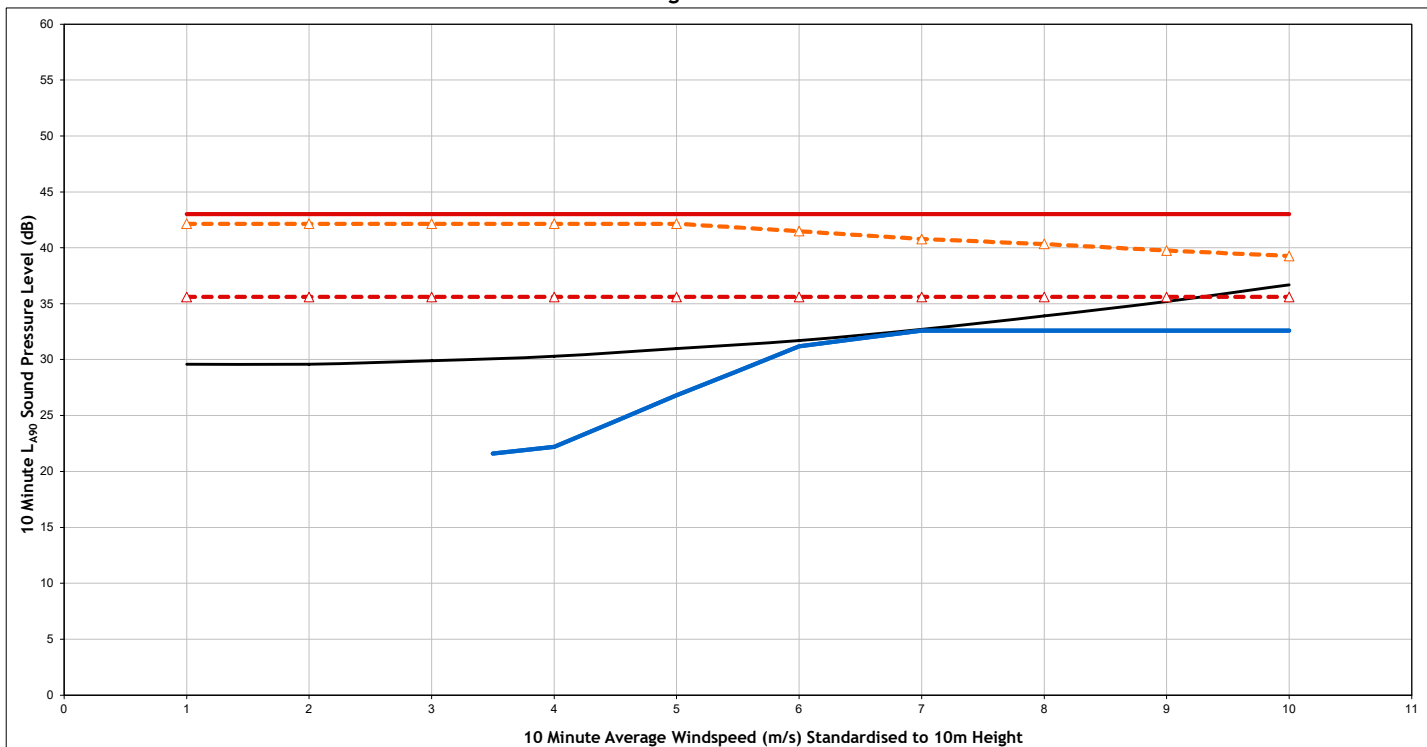
Drawn MT
 Checked AB
 Date 20/07/2026
 Document Reference 16647



Daytime - NAL13



Night Time - NAL13



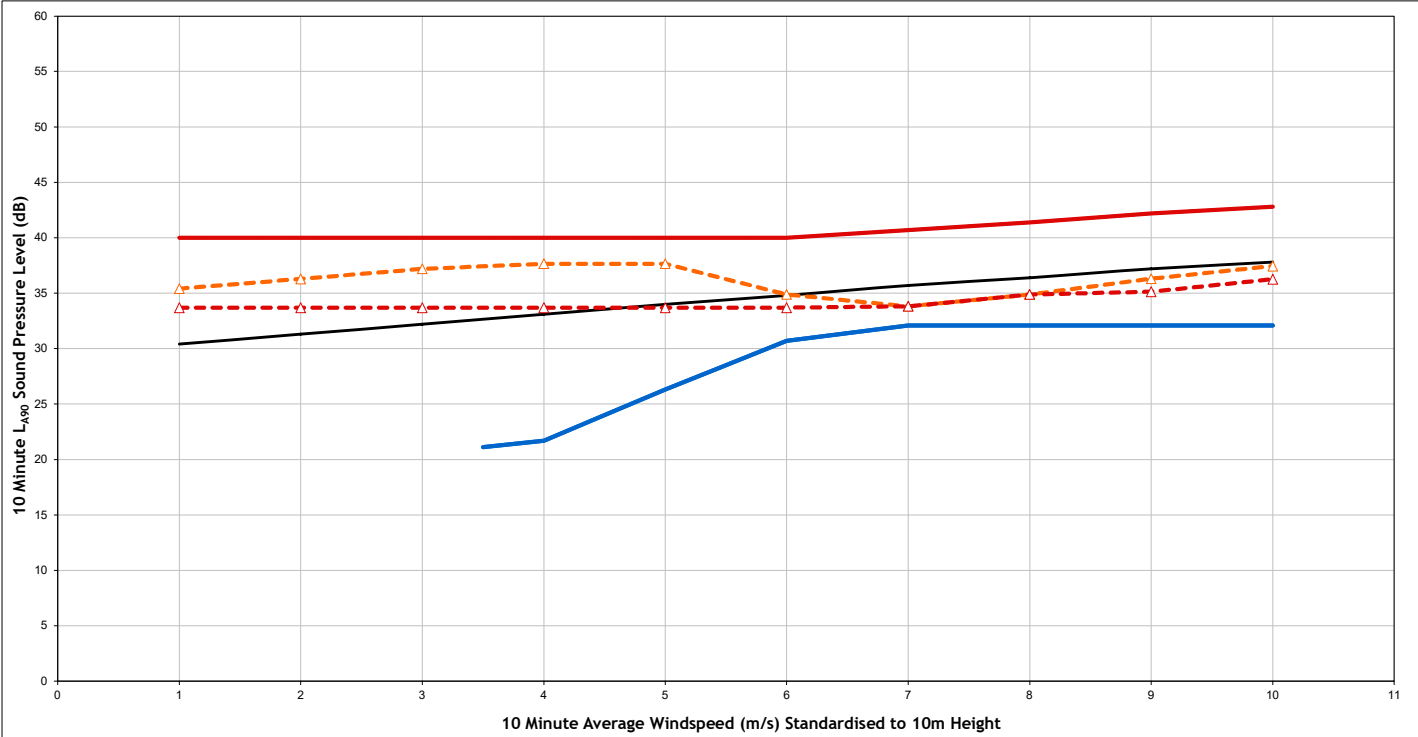
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- Site Specific Noise Limit (SSNL)
- Project for Assessment

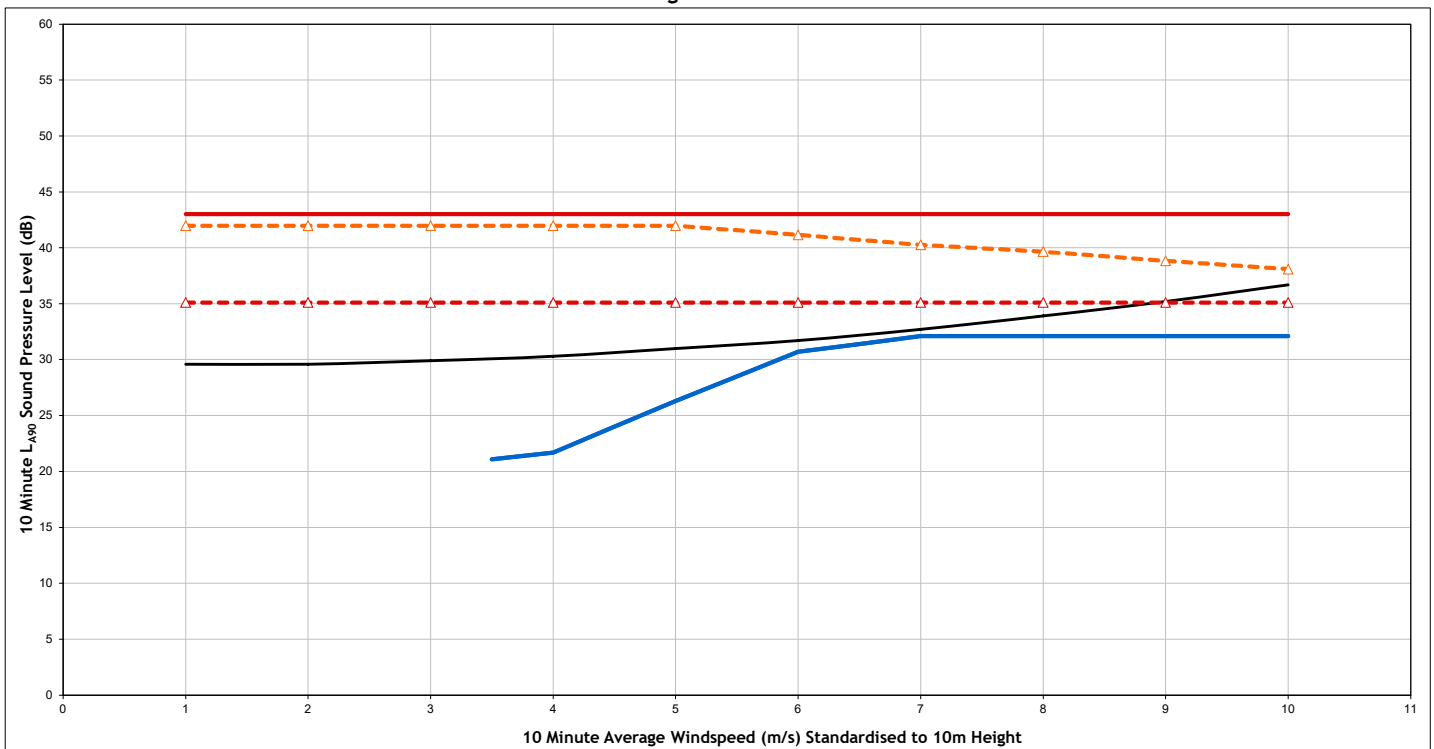
Project Scout Moor II Wind Farm
Client Cubico UK Development Ltd
Title Noise Assessment - Site Specific Noise Limits
Figure Number Figure A1.4m
Drawn MT
Checked AB
Date 20/07/2026
Document Reference 16647



Daytime - NAL14



Night Time - NAL14



Legend:

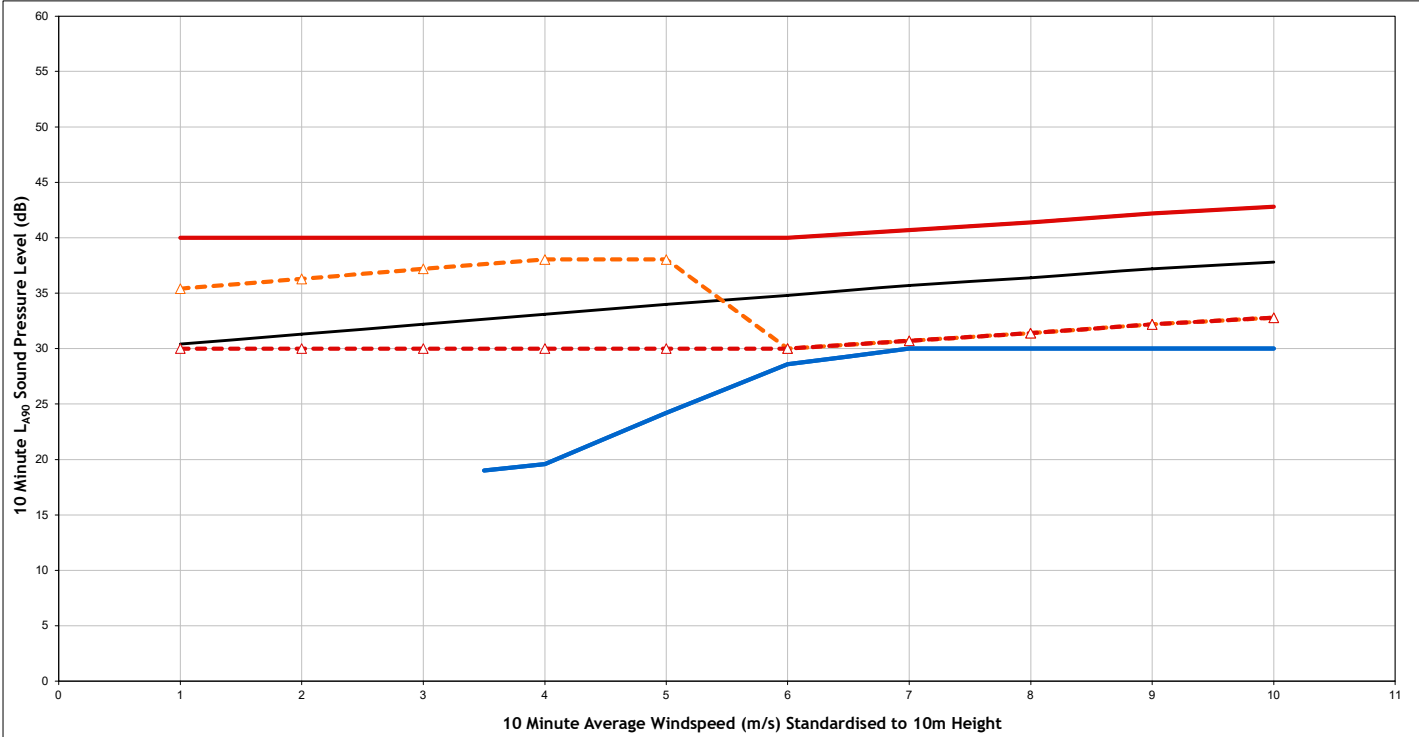
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- Residual Noise Limit
- Site Specific Noise Limit (SSNL)
- Project for Assessment

Project Scout Moor II Wind Farm
 Client Cubico UK Development Ltd
 Title Noise Assessment - Site Specific Noise Limits
 NAL14
 Figure Number Figure A1.4n

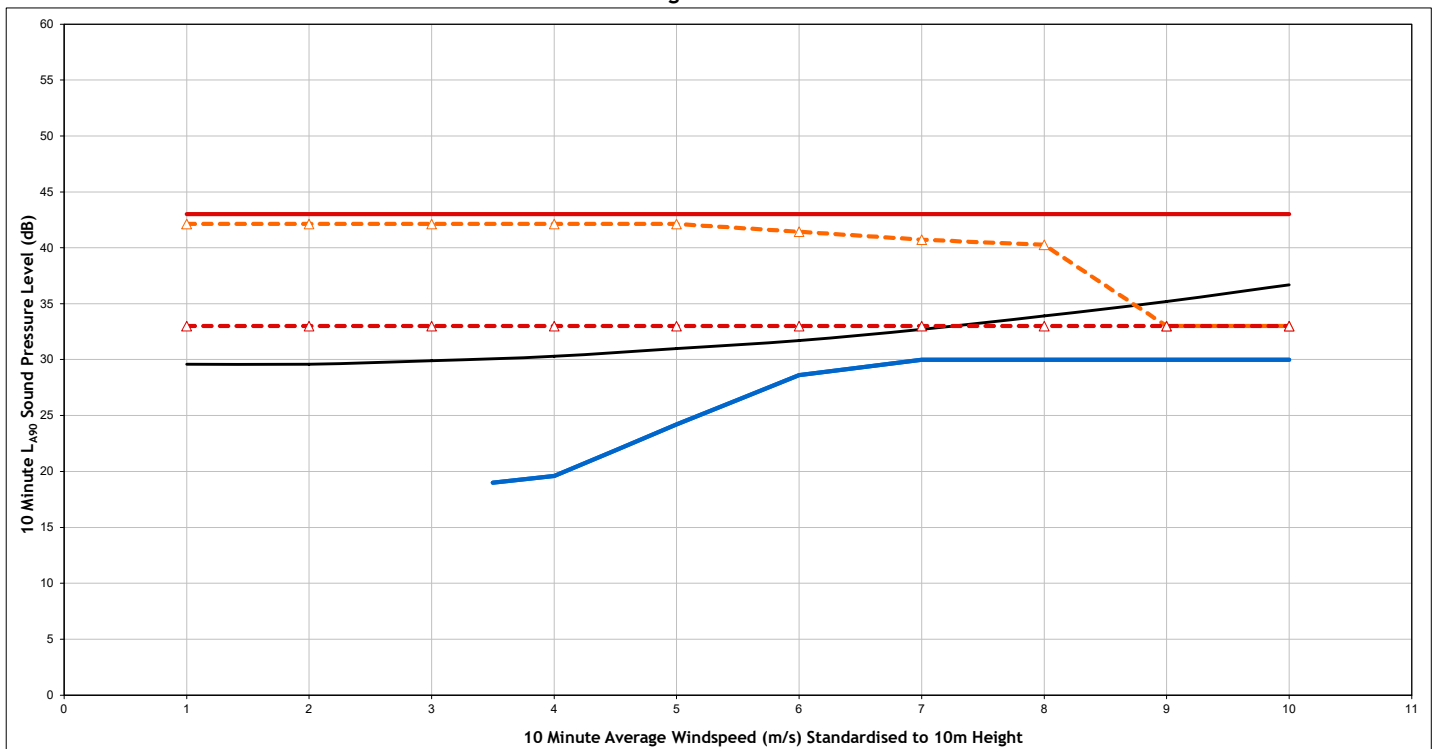
Drawn MT
 Checked AB
 Date 28/07/2026
 Document Reference 16647



Daytime - NAL15



Night Time - NAL15



Legend:

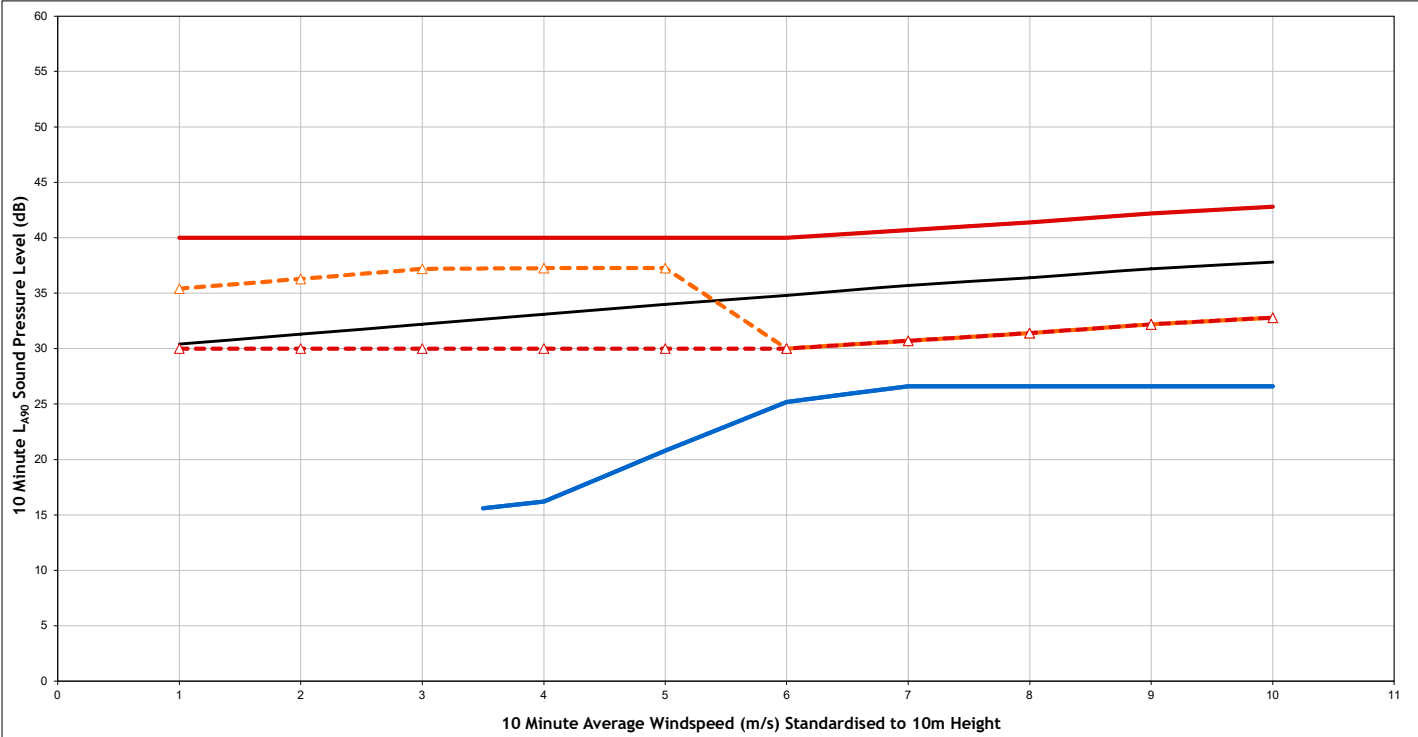
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- Site Specific Noise Limit (SSNL)
- Project for Assessment

Project Scout Moor II Wind Farm
Client Cubico UK Development Ltd
Title Noise Assessment - Site Specific Noise Limits
Figure Number Figure A1.4a

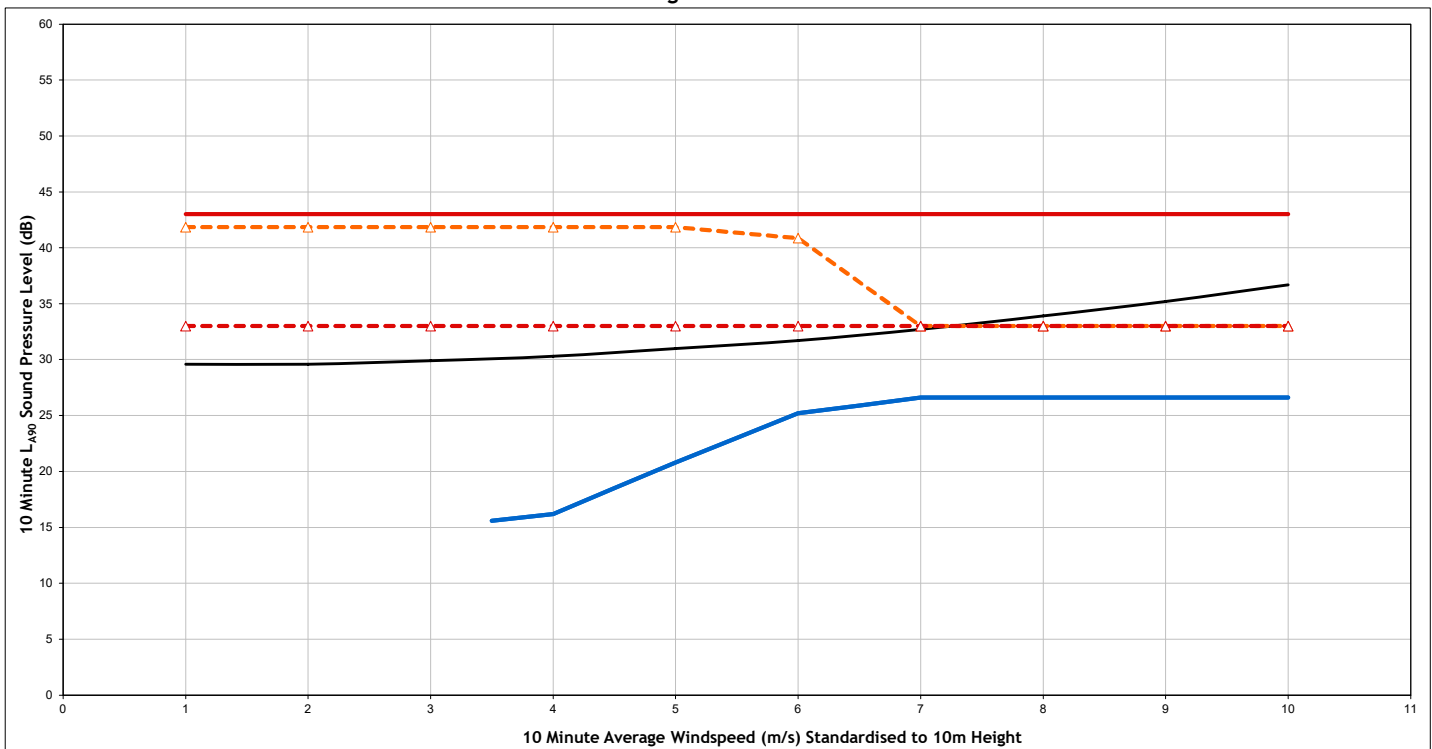
Drawn MT
Checked AB
Date 28/07/2026
Document Reference 16647



Daytime - NAL16



Night Time - NAL16



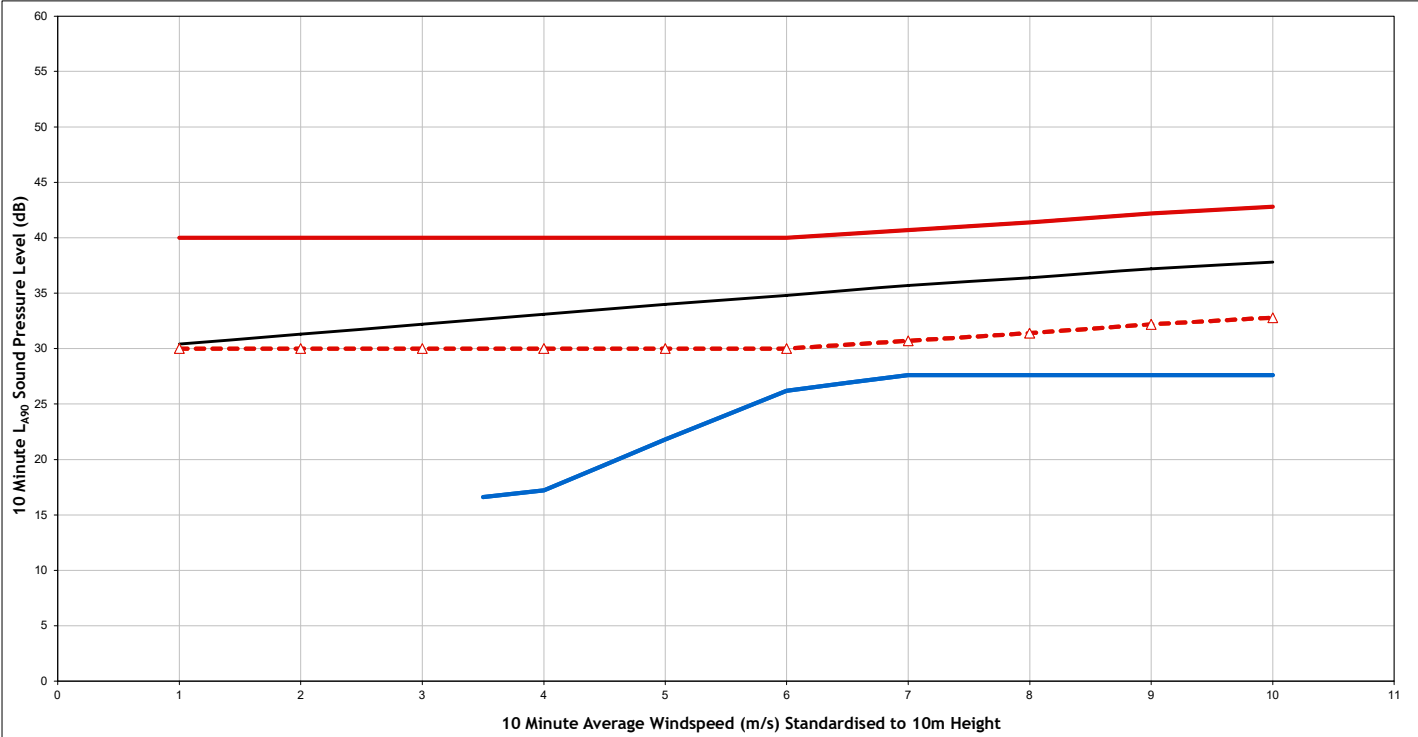
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- Site Specific Noise Limit (SSNL)
- Project for Assessment

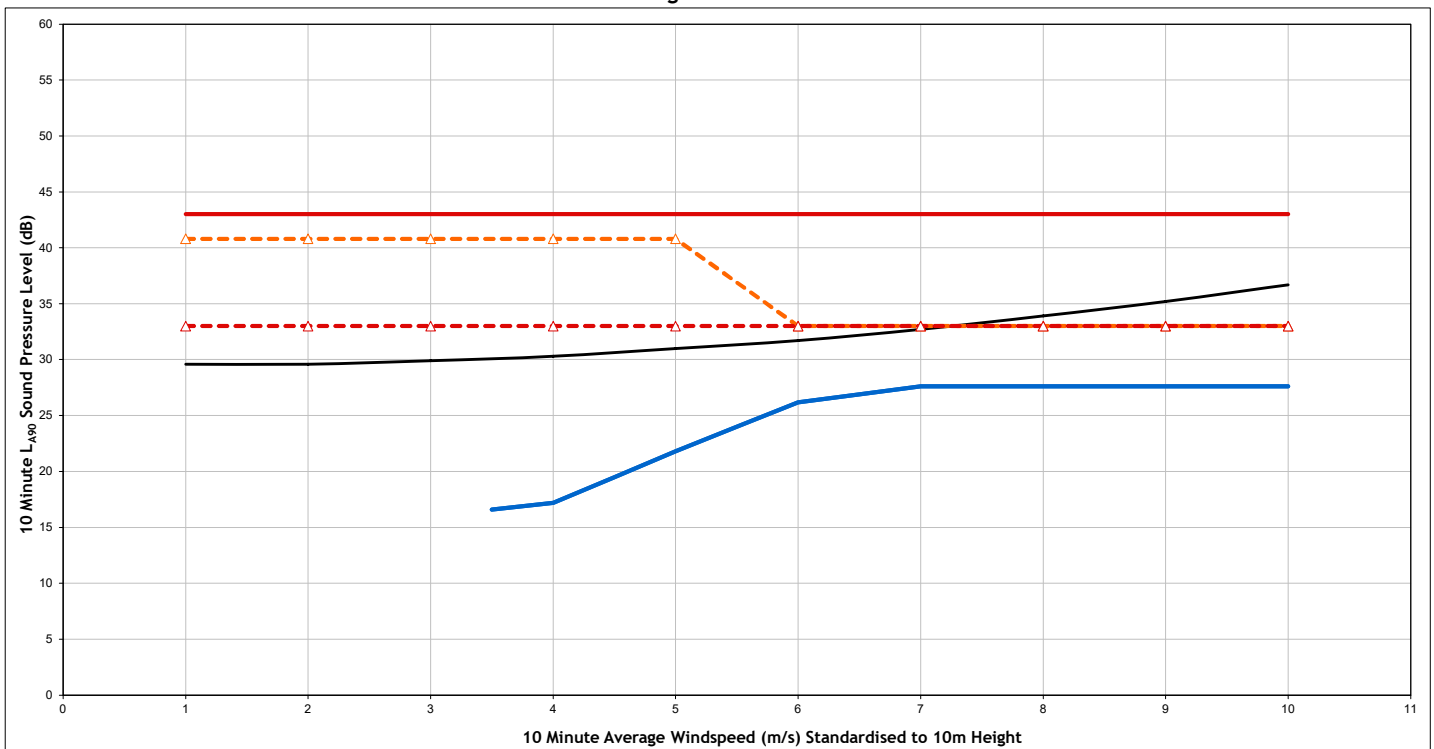
Project Scout Moor II Wind Farm
Client Cubico UK Development Ltd
Title Noise Assessment - Site Specific Noise Limits
Figure Number Figure A1.4p
Drawn MT
Checked AB
Date 20/07/2026
Document Reference 16647



Daytime - NAL17



Night Time - NAL17



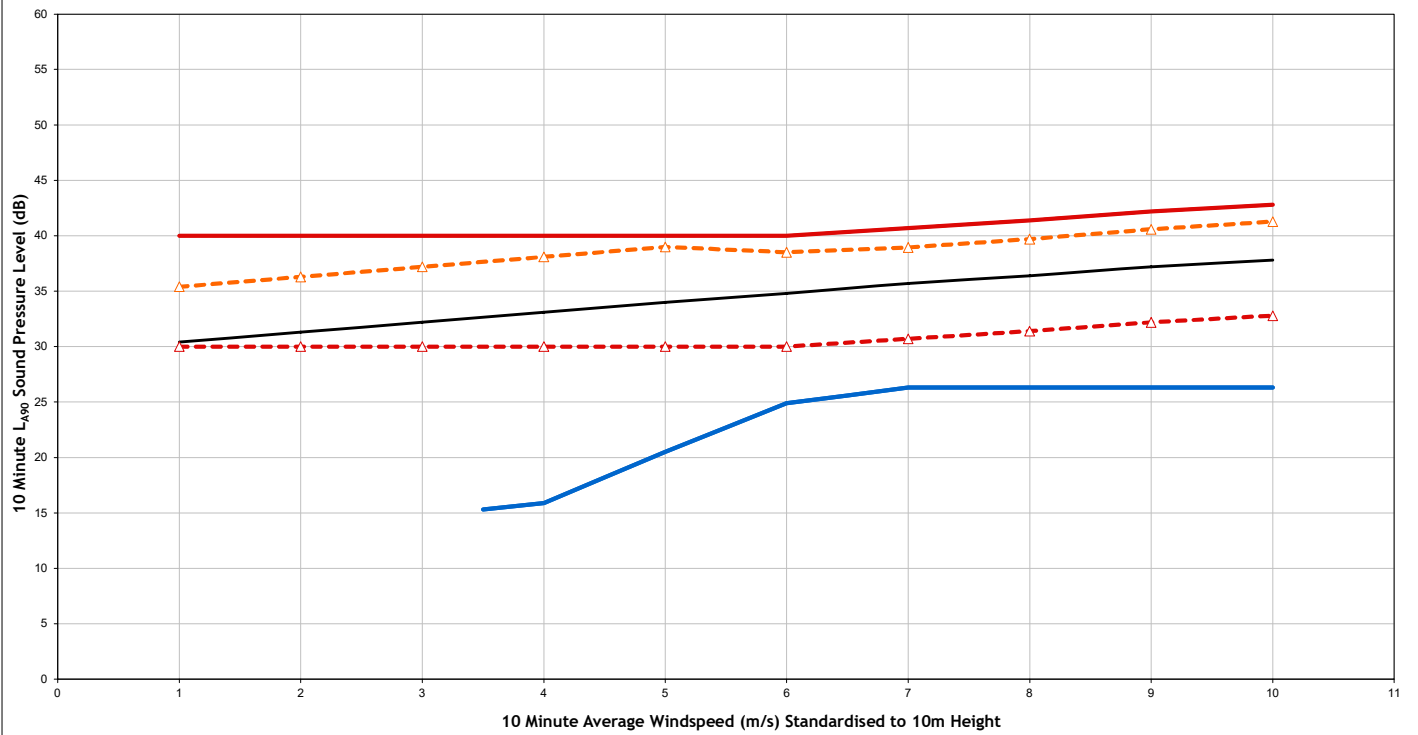
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- Site Specific Noise Limit (SSNL)
- Project for Assessment

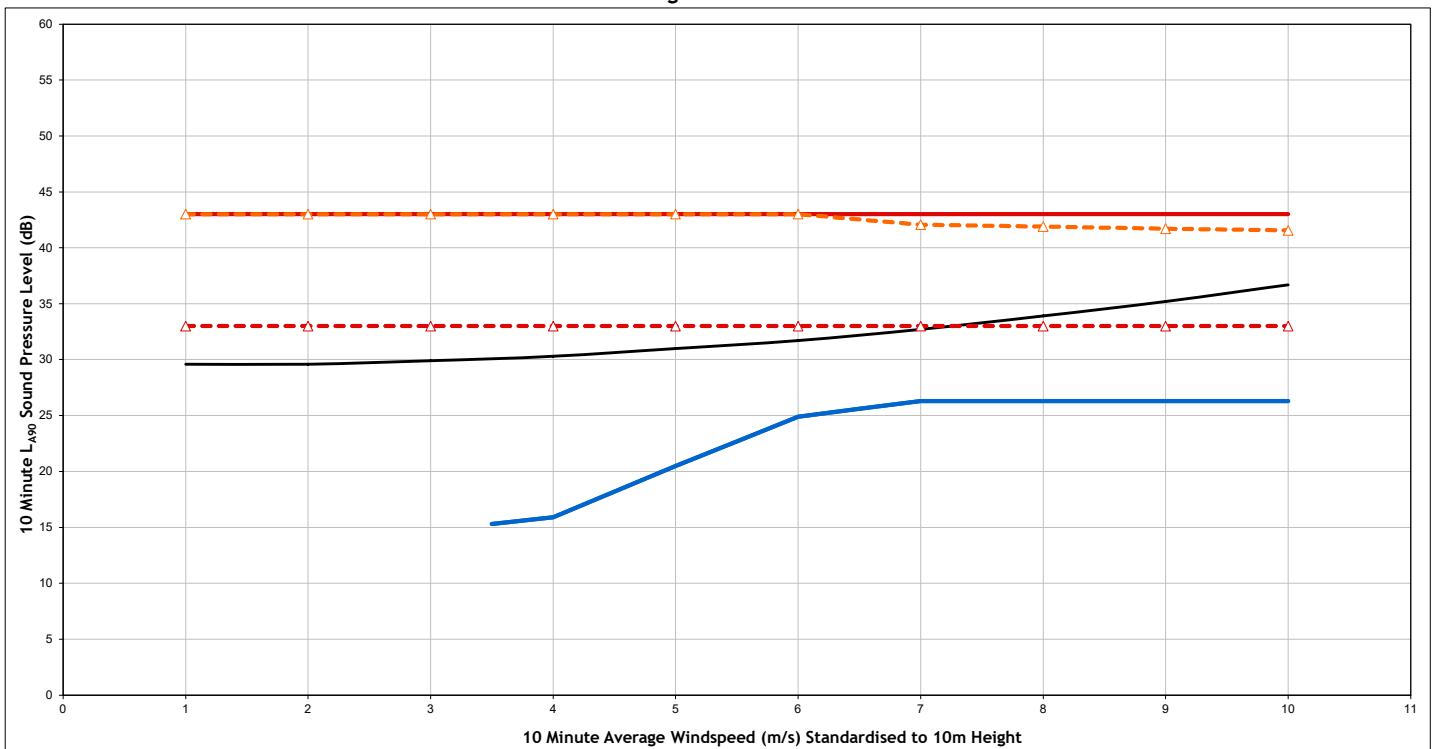
Project Scout Moor II Wind Farm
Client Cubico UK Development Ltd
Title Noise Assessment - Site Specific Noise Limits
Figure Number Figure A1.4q
Drawn MT
Checked AB
Date 20/07/2026
Document Reference 16647



Daytime - NAL18



Night Time - NAL18



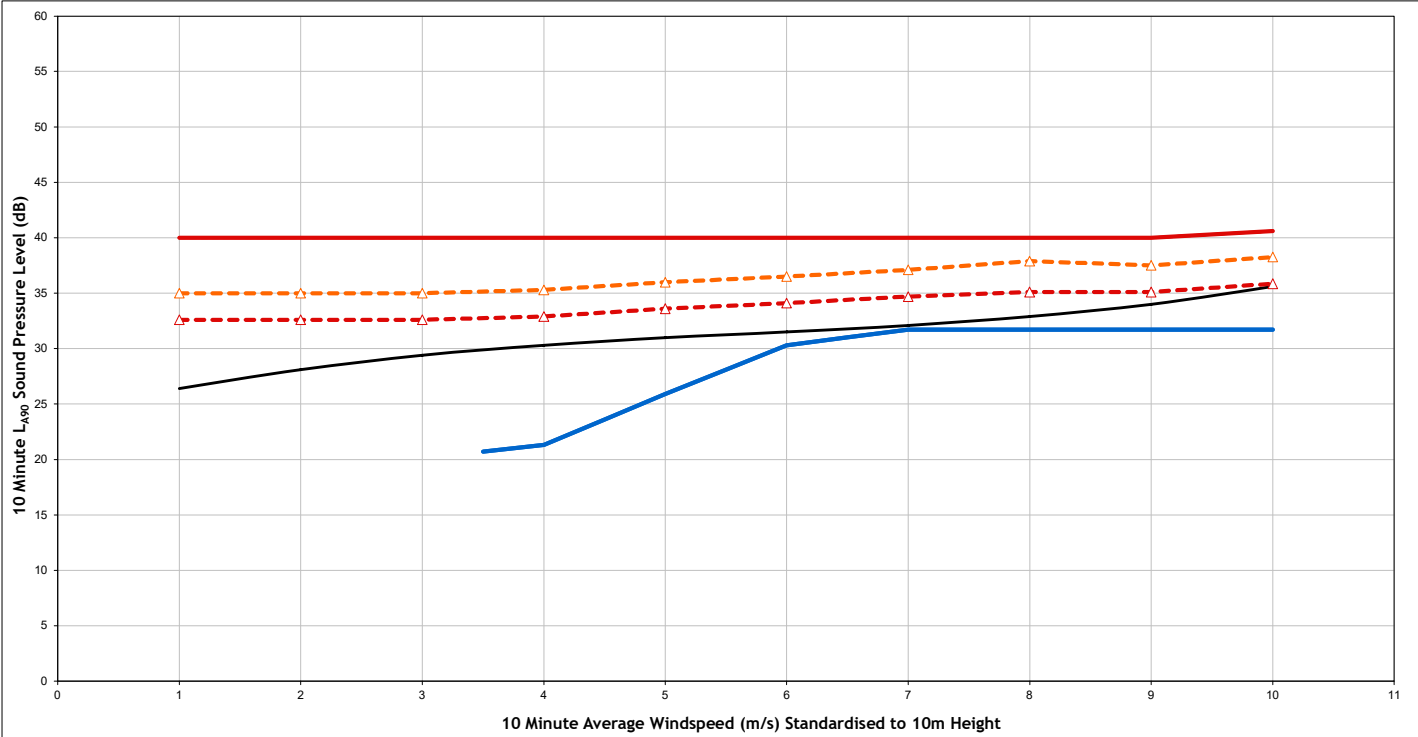
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- Residual Noise Limit
- Site Specific Noise Limit (SSNL)
- Project for Assessment

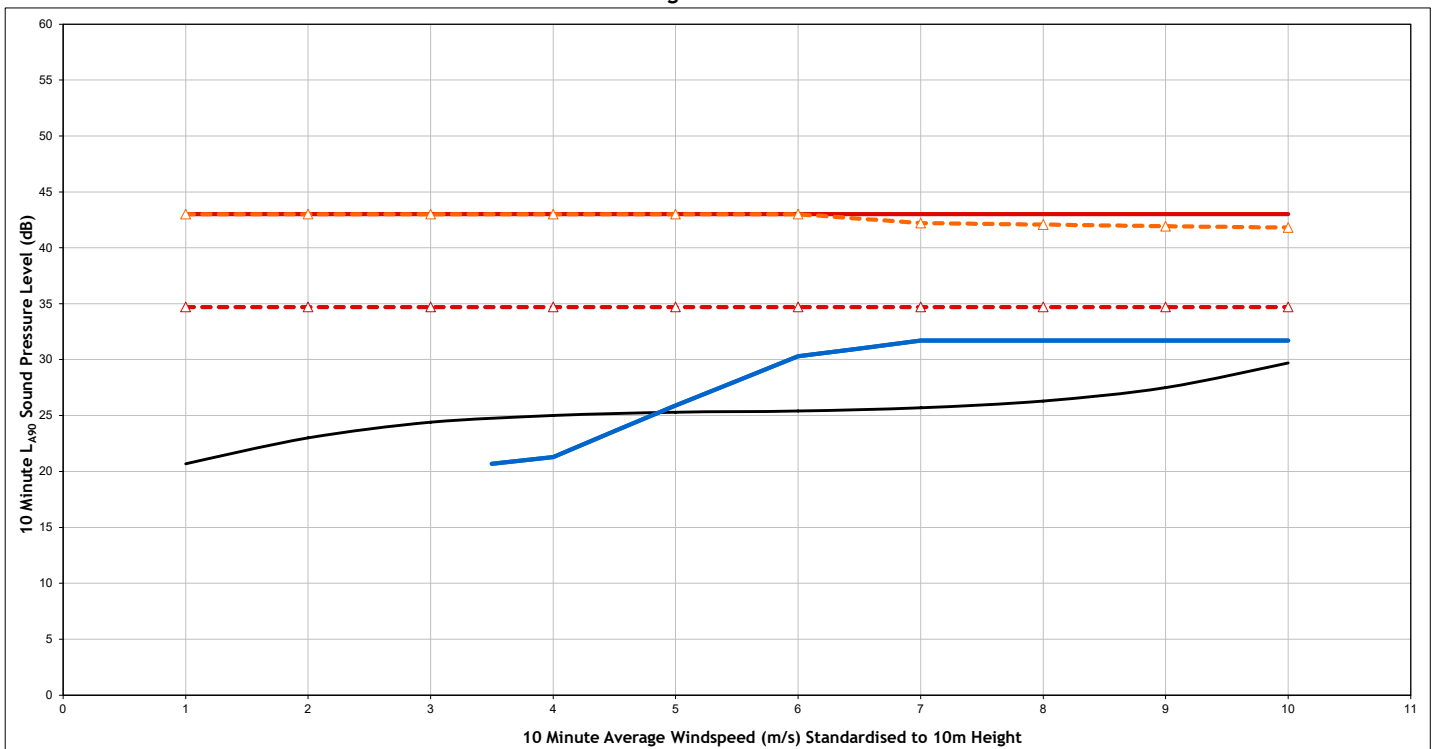
Project Scout Moor II Wind Farm
Client Cubico UK Development Ltd
Title Noise Assessment - Site Specific Noise Limits
Figure Number Figure A1.4r
Drawn MT
Checked AB
Date 20/07/2026
Document Reference 16647



Daytime - NAL19



Night Time - NAL19



Legend:

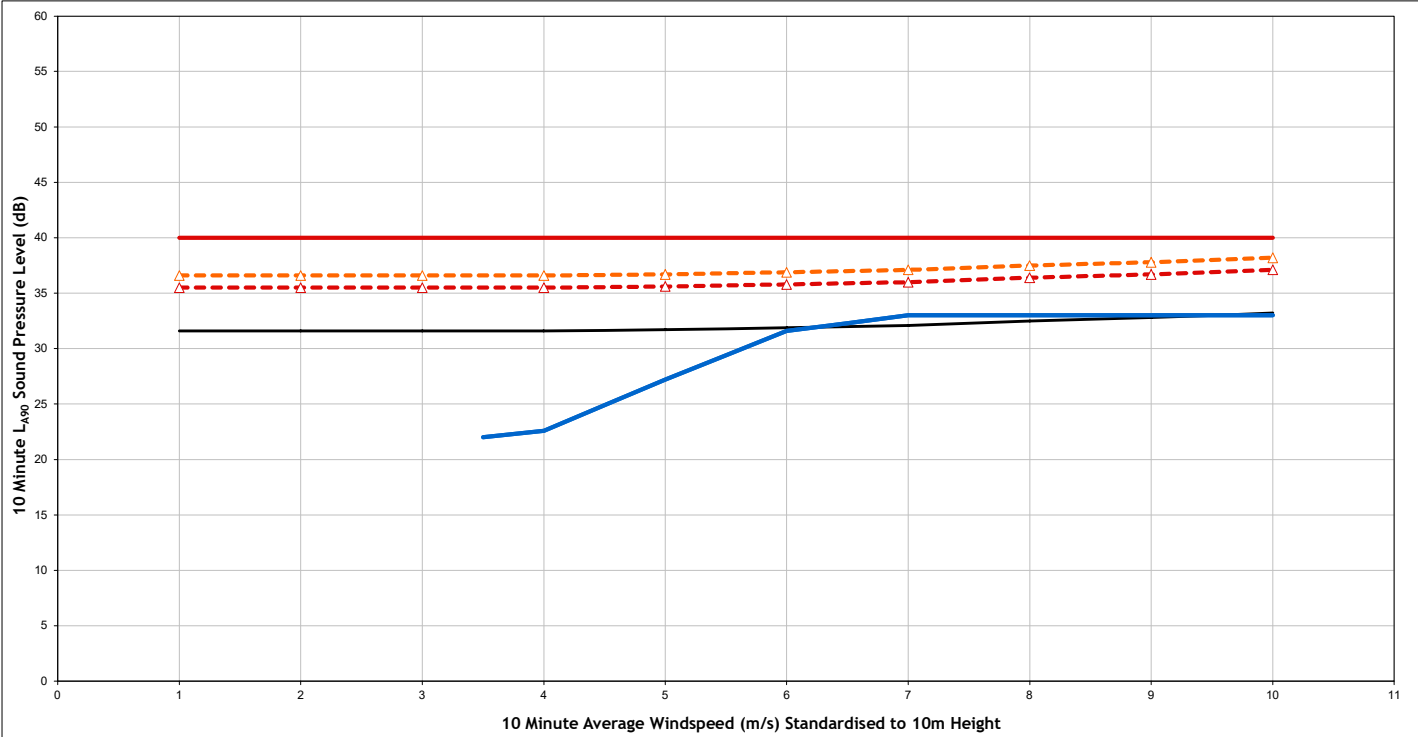
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Project Scout Moor II Wind Farm
 Client Cubico UK Development Ltd
 Title Noise Assessment - Site Specific Noise Limits
 NAL19
 Figure Number Figure A1.4s

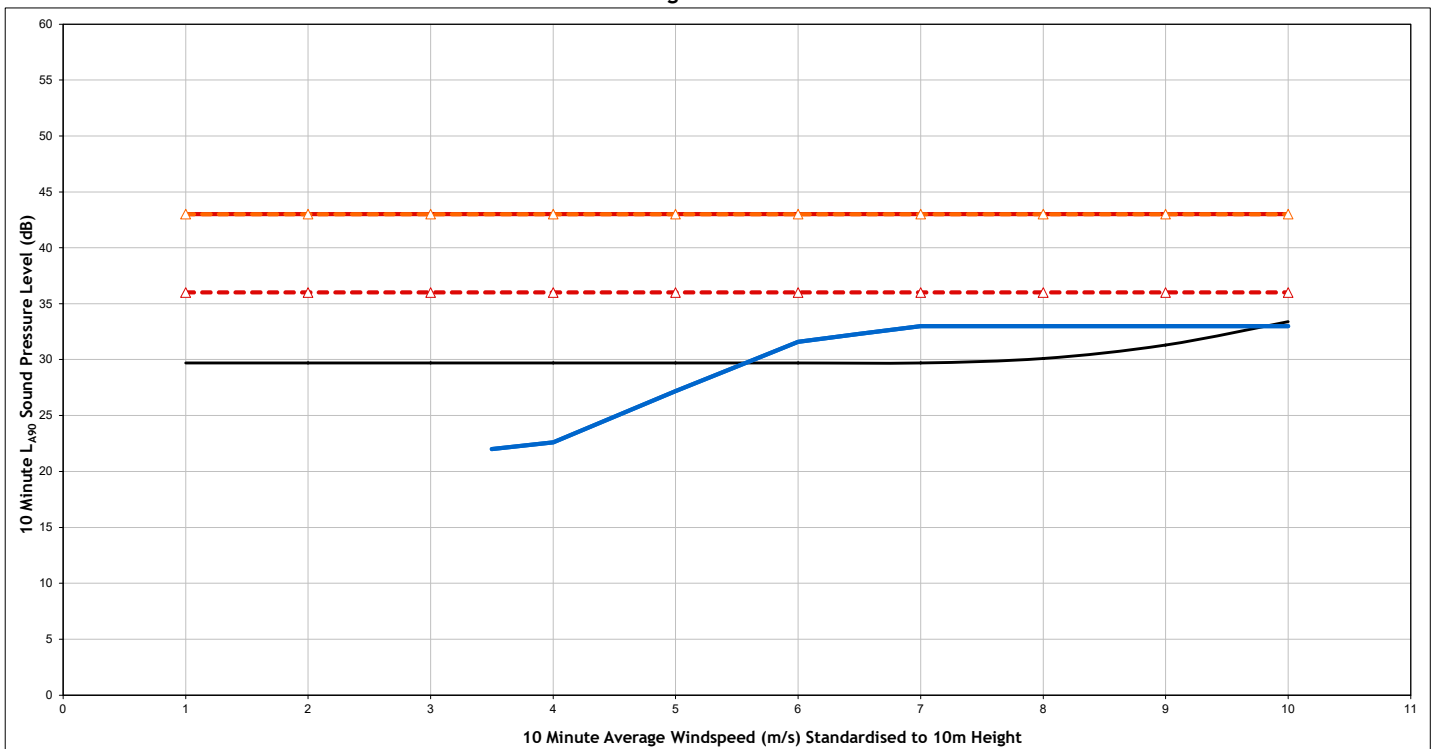
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 Checked AB
 Date 20/07/2026
 Document Reference 16647



Daytime - NAL20



Night Time - NAL20



Legend:

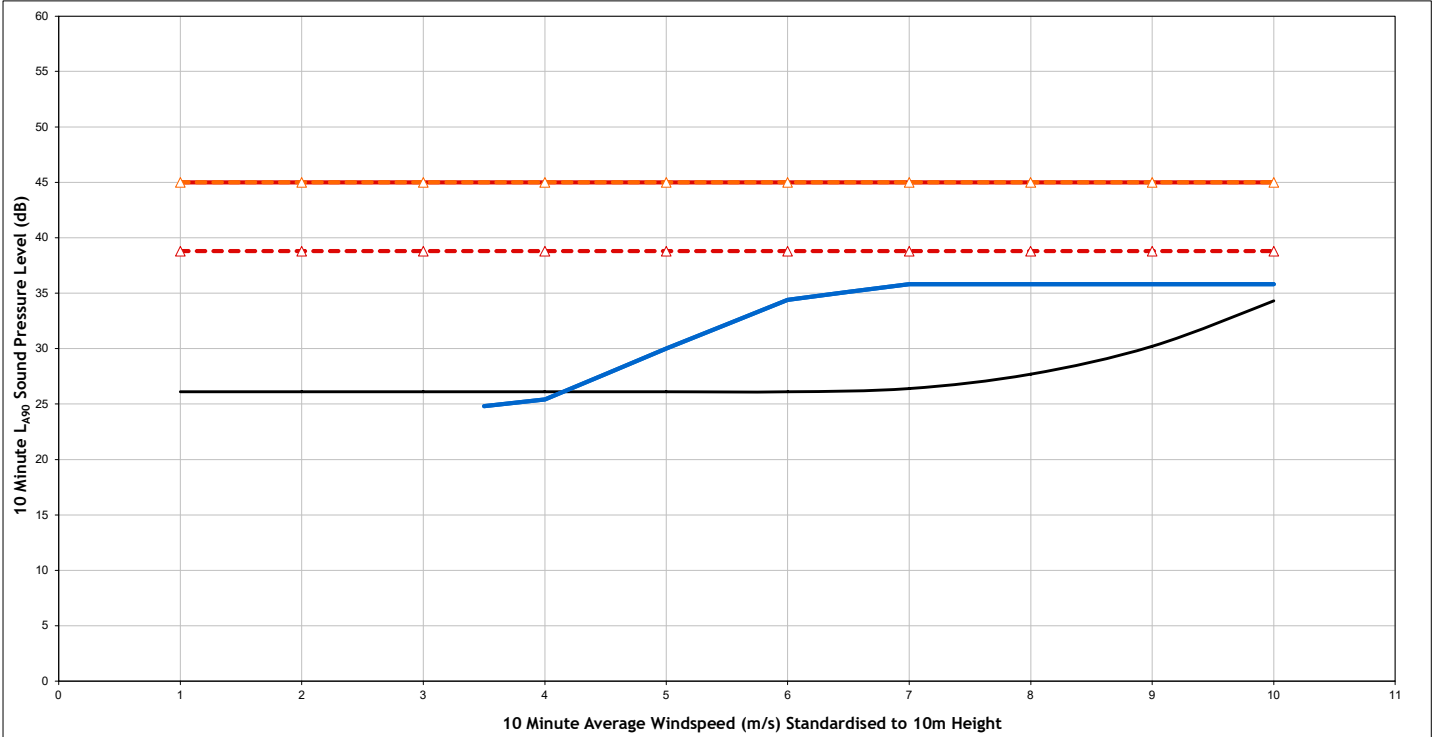
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- Project for Assessment

Project Scout Moor II Wind Farm
Client Cubico UK Development Ltd
Title Noise Assessment - Site Specific Noise Limits
Figure Number Figure A1.4t

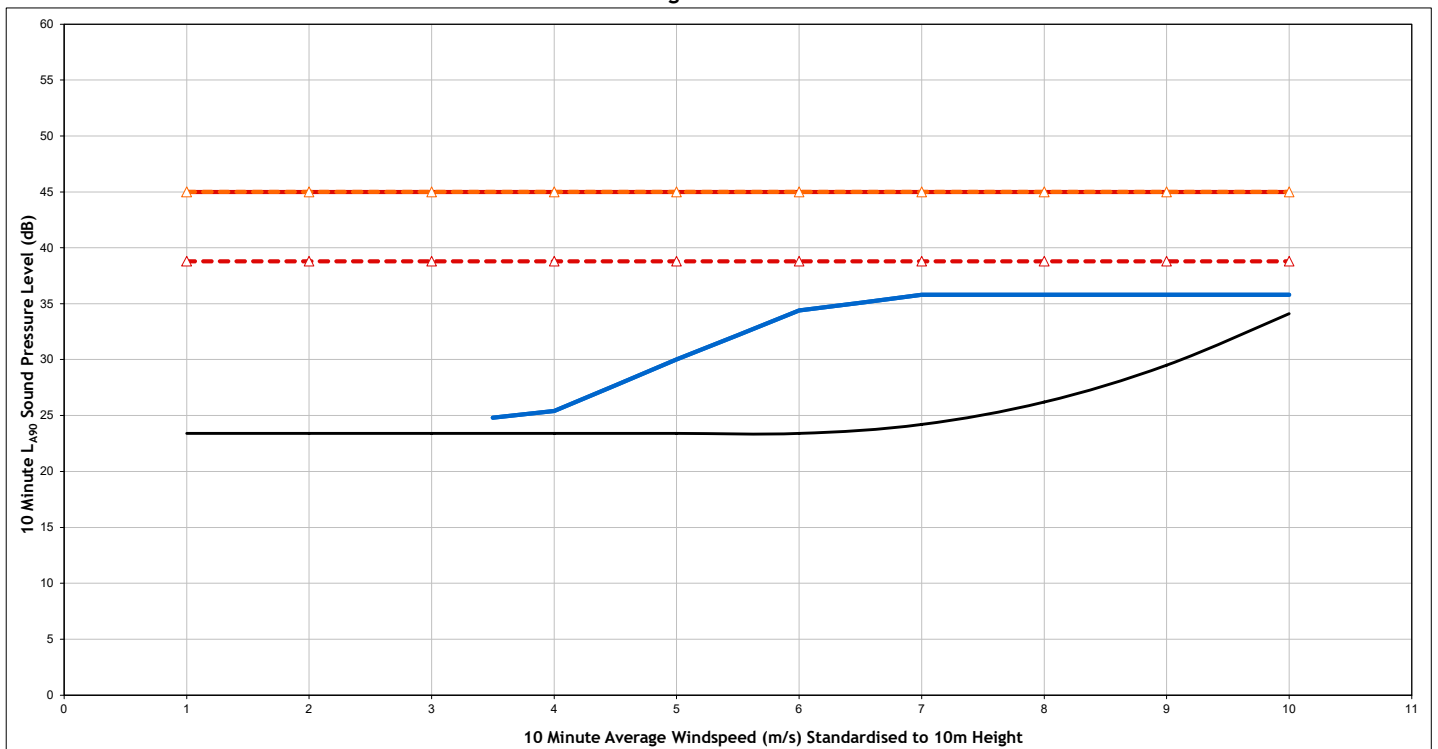
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Date 20/07/2026
Document Reference 16647



Daytime - NAL21



Night Time - NAL21



Legend:

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- Residual Noise Limit
- Site Specific Noise Limit (SSNL)
- Project for Assessment

Project	Scout Moor II Wind Farm
Client	Cubico UK Development Ltd
Title	Noise Assessment - Site Specific Noise Limits NAL21
Figure Number	Figure A1.4u
Drawn	MT
Checked	AB
Date	20/07/2026
Document Reference	16647



Annex 2 – Correspondence with the Environmental Health Department at the Council/ Extracts of Decision Notices

Rossendale Borough Council
APPLICATION FOR PLANNING PERMISSION
Town and Country Planning Act 1990

Applicant Name: Mr Andrew Lyth
Notice Recipient: Mr Sam Dewar
Marston House
Walkers Court
Audby Lane
Wetherby
West Yorkshire
LS22 7FD

Part 1 – Particulars of Application:

Dated Received: **26th March 2015**

Application Number: **2015/0059**

Proposed Works: Erection of 2 no. wind turbines (with a maximum height of 48.01m to blade-tip) and associated track

Location: Sheephouse Farm Greens Lane Stacksteads

Following consideration of the application in respect of the proposal outlined above, it was resolved to **GRANT PLANNING PERMISSION** for the following reasons:-

Summary Reason for Approval

The proposed turbines are acceptable in principle. It is considered that, subject to the conditions, the wider benefits associated with increased production of energy from the turbines will outweigh the limited harm it will cause to the landscape and visual amenity, and the scheme is considered acceptable in terms of neighbour amenity, highway safety and ecology. The proposal accords with the NPPF, and Policies AVP 2, 1, 18, 20, 23 and 24 of the Rossendale Borough Council adopted Core Strategy DPD (2011).

CONDITIONS:

1. The development hereby permitted shall be begun before the expiration of three years from the date of this permission.

Reason: To accord with the requirements of Section 91 of the Town and Country Planning Act 1990.

2. The development shall be carried out in strict accordance with drawings 001 Site Location Plan, 002 Site Layout Plan, 003 Turbine Elevation Plan and shall be finished in an off-white colour with a non-reflective surface, unless otherwise required by the conditions below.

Reason: To ensure the development complies with the approved plans and for the avoidance of doubt.

3. This permission shall expire after 25 years following the date that electricity generated from a turbine is first exported to the grid. The Local Planning Authority shall be notified of such date in writing not later than one month from the making of this event. Within 12 months of the end of the 25 year period, or if a turbine ceases to be operational for a continuous period of 12 months at any time prior to this, the turbine and associated infrastructure shall be removed from the site and the land reinstated to its former condition.

Reason: In the interests of protecting the essentially open and rural character of the Countryside, in accordance with Policies 1 / 18 / 19 / 20 / 24 of the Rossendale Core Strategy.

4. No development shall be begun until a Construction Traffic Management Method Statement has been submitted to and approved by the LPA. The Construction Traffic Management Method Statement shall include details relating to:-

- a. Construction vehicle routing, including swept path analysis from and including the junction of Newchurch Road and Farholme Lane along the route to the top of Greens Lane.
- b. The management of junctions with and crossings of the public highway
- c. The timing of delivery vehicle movements including turbine component delivery vehicles
- d. Details of banksmen/escorts of abnormal loads
- e. Temporary warning signage
- f. Proposed accommodation works and where necessary a programme for their subsequent removal and the reinstatement of street furniture, where required along the route
- g. Traffic management of the existing highway network

The development shall be carried out in accordance with the agreed CTMMS at all times unless otherwise agreed in writing with the local planning authority.

Reason: To maintain the operation of through routes in the area during the period of construction and to ensure the safety of other highway users and in order to comply with Policy 24 of the Rossendale Core Strategy.

5. Prior to commencement of the development and again following completion of the works, a Condition Survey (including photographs) shall be completed for Greens Lane and submitted to the Local Planning Authority. Any damage to the highway identified by the latter Condition Survey shall be reinstated at the Developers expense in accordance with a programme and timescale agreed in writing with the Local Planning Authority.

Reason: To ensure the safety of other highway users and in order to comply with Policy 24 of the Rossendale Core Strategy.

6. During the period of construction a wheel washing facility shall be provided to clean the wheels of the vehicles to ensure that no mud is deposited onto the highway, details of which shall first be submitted to and agreed in writing by the Local Planning Authority.

Reason: To ensure the safety of other highway users and in order to comply with Policy 24 of the Rossendale Core Strategy.

7. Prior to the commencement of development a scheme of intrusive site investigations for the mine entry shall be submitted to and approved in writing by the Local Planning Authority, following which the approved scheme of intrusive site investigations shall be undertaken and a report of findings arising from the intrusive site investigations shall be submitted to the Local Planning Authority, together with a scheme of remedial works and/or mitigation measures for the mine entry for approval in writing by the Local Planning Authority. The development shall be undertaken in accordance with the agreed scheme of remedial works and/or mitigation measures.

Reason: To demonstrate that the application site is, or can be made, safe and stable for the proposed development in accordance with the advice of the Coal Authority and Policy 24 of the Rossendale Core Strategy.

8. All construction and installation activities shall take place outside the peak breeding season for upland nesting species, i.e. 1 March to 31 July inclusive unless a pre-construction nesting bird check is undertaken by a suitably qualified ecologist, covering all affected open ground areas. If active nests are present they shall be retained in situ undisturbed until the nests are no longer active.

Reason: To avoid ecological harm and to accord with the NPPF and Policy 18 of the Rossendale Core Strategy.

9. The turbines hereby permitted shall operate at all times within the level of noise emissions, with correction for any tonal components, that accords with the 'Assessment & Rating of Noise from Wind Farms' (ETSU-R-97), both individually and cumulatively.

Reason: In the interests of protecting neighbour amenity and the rural character of the Countryside, in accordance with Policies 1 / 18 / 20 / 24 of the Council's adopted Core Strategy.

Informative

1. The Local Planning Authority has a Core Strategy (adopted in November 2011) and a series of Supplementary Planning Documents, which can be viewed at http://www.rossendale.gov.uk/a_to_z/service/309/core_strategy, and operates a pre-application planning advice service. All applicants are encouraged to engage with the Local Planning Authority at the pre-application stage. As part of the determination of this planning application the Local Planning Authority has worked pro-actively and positively with the applicant. The Local Planning Authority has considered the application and where necessary considered either the imposition of planning conditions and/or sought reasonable amendments to the application in order to deliver a sustainable form of development in accordance with the National Planning Policy Framework and the local planning policy context.

Date: 12.08.2015

Signed: 

Development Control
First Floor
The Business Centre
Futures Park
Bacup
OL13 0BB

Stephen Stray
Planning Unit Manager 

Please note that this notice does not relieve the applicant from the need to ensure compliance with the appropriate provisions of the Building Act 1984 and the Building Regulations 2000.

IT IS IMPORTANT THAT YOU SHOULD READ THE NOTES ACCOMPANYING THIS NOTICE

DEPARTMENT OF TRADE AND INDUSTRY
ELECTRICITY ACT 1989
TOWN AND COUNTRY PLANNING ACT 1990
CONSTRUCTION AND OPERATION OF A GENERATING STATION AT SCOUT MOOR,
LANCASHIRE

1. Pursuant to section 36 of the Electricity Act 1989 the Secretary of State for Trade and Industry (the Secretary of State) hereby consents to the construction by Scout Moor Wind Farm Limited (the Company), on the area of land outlined red on Drawing Number 627/layout/1a, annexed hereto and duly endorsed on behalf of the Secretary of State, of a wind turbine generating station at Scout Moor in the Boroughs of Rochdale and Rossendale in the County of Lancashire, and to the operation of that generating station.
2. Subject to paragraph 3(1), the development shall be of up to 65 MW capacity and comprise:
 - (a) up to 26 wind turbine generators;
 - (b) up to 2 anemometry masts;
 - (c) underground 33kV electrical cabling;
 - (d) an electricity substation; and
 - (e) the necessary buildings (including administration offices) and civil engineering works.
3. This consent is granted subject to the following conditions:
 - (1) Except where otherwise required by virtue of the planning permission deemed to be granted by paragraph 4 or where the written permission of the Secretary of State has been given to any variation in design, construction or operation of the development, the development shall be constructed and operated in accordance with the details contained in the Company's application of 4 July 2003, as amended by the Company's Supplementary Environmental Information 2004.

- (2) The commencement of the development shall not be later than five years from the date of this consent, or such longer period as the Secretary of State may hereafter direct in writing.

4. The Secretary of State in exercise of the powers conferred on him by section 90(2) of the Town and Country Planning Act 1990 hereby directs that planning permission for the development be deemed to be granted subject to the following conditions, the reasons for which are given in the Public Inquiry Inspector's Report of 11 April 2005:

- (1) The development hereby permitted shall be begun before the expiration of five years from the date of this permission.
- (2) This permission shall expire no later than 25 years from the date that electricity from the development is first exported to the grid. Within 12 months of the expiration of the permission, all elements of the development above ground level (excluding access tracks) shall be removed and the land restored, in accordance with a detailed scheme to be submitted to, approved in writing by and deposited with the two local planning authorities before electricity is first exported to the grid.
- (3) If any turbine ceases to be operational for a continuous period of 12 months it shall, unless otherwise agreed in writing by the relevant local planning authority, be dismantled and removed from the site. That part of the site shall be restored in accordance with a detailed scheme to be submitted to the relevant local planning authority within two months after the said 12 month period and which is subsequently approved in writing by and deposited with that authority.
- (4) Notwithstanding the details submitted with the application, the turbines shall be sited within +/- 40 metres of the grid co-ordinates stated in *Figure 7* of the *Environmental Statement* submitted with the application for which permission is now granted, in positions to be agreed in writing by the two local planning authorities.
- (5) The turbine blades shall rotate in the same direction.
- (6) No development shall take place until details of the size, design and external appearance of the turbines (which shall have a semi-matt finish) have been submitted to, approved in writing by and deposited with the two local planning authorities. The development shall be carried out in accordance with the approved details.
- (7) No development shall take place until details of the size, design and external appearance of the substation building have been submitted to, approved in writing by and deposited with the local planning authority.

The development shall be carried out in accordance with the approved details.

- (8) Notwithstanding the details submitted with the application, construction of any of the turbine masts or of the substation shall not be begun until the means of vehicular access thereto have been constructed in accordance with plans and specifications that have first been submitted to, approved in writing by and deposited with the two local planning authorities. The plans and specifications shall include details of both temporary and permanent works in accordance with the Construction Method Statement to be approved and implemented under Condition (11).
- (9) All cabling on the site shall be underground and shall be installed in accordance with the details of a scheme to be agreed in writing by the two local planning authorities before development takes place.
- (10) The access tracks to, and all areas around, the turbine bases shall remain unfenced. Access for members of the public, and commoners and their grazing stock, shall over and along the access tracks and over the area around the turbine bases be allowed during the lifetime of this permission.
- (11) No development shall take place until a Construction Method Statement covering all construction and access works and all works of land disturbance (including reinstatement where those works are temporary) and which shall include measures to protect wildlife habitats and hydrology, has been submitted to, approved in writing by and deposited with the two local planning authorities. The development shall be carried out in accordance with the approved statement.
- (12) No development shall take place until a survey to establish the presence of badgers in the area to be affected by construction activities has been undertaken. If badgers are found, the Construction Method Statement required to be approved and implemented under Condition (11) shall include mitigation measures to avoid any damaging effects on the badgers.
- (13) The Construction Method Statement required to be approved and implemented under Condition (11) shall also restrict construction activities to a period outside the bird nest season (1 March to 31 July) unless the statement provides alternative safeguards to keep such activities away from nesting birds.
- (14) No development shall take place until a Pollution Incident Response Plan has been submitted to, approved in writing by and deposited with the two

local planning authorities. The approved plan shall be implemented during the construction or installation of the turbines, access tracks, substation, cabling and all other ancillary works.

- (15) No development shall take place until a scheme of archaeological investigation and any subsequent programme of work has been submitted to, approved in writing by and deposited with the two local planning authorities. The approved scheme and programme shall thereafter be implemented.
- (16) No construction works shall be carried out on the site before 0800 hours on weekdays or 0800 hours on Saturdays, nor after 1800 hours on weekdays or 1300 hours on Saturdays, nor at any time on Sundays or Bank or Public Holidays.
- (17) No generation of electricity to the grid from the development hereby permitted shall take place until a scheme has been submitted to, approved in writing by and deposited with the two local planning authorities, providing for the remediation of any interference to domestic television reception caused by the operation of the turbines (such remediation to be at the cost of the Company). The approved scheme shall thereafter be implemented.
- (18) When in operation, noise from the turbines hereby permitted shall be limited to a rating level of 35 dB L_{A90r} or 5 dB above pre-established prevailing background daytime noise level (0700 hours to 1900 hours) whichever is the greater; and 43 dB L_{A90r} or 5 dB above the pre-established prevailing background night-time noise level (1900 hours to 0700 hours); at any residential property lawfully in existence at the date of this permission.
- (19) The rating levels in Condition (18) shall be calculated from the measured noise level plus a correction to account for any tonal components, to be derived from the procedures in *The Assessment and Rating of Noise from Wind Farms (ETSU-R-97)*. The pre-established prevailing background noise levels in Condition (18) shall be those set out in *Table 7.3 of Volume 1 of the Environmental Statement* submitted with the application for which permission is now granted. Noise measurements shall be carried out according to the procedures in *ETSU-R-97 (pages 87-90)*, with the results correlated to wind speed measurements at a height of 10 metres on the site.
- (20) Noise from activities involved in the construction of the development hereby permitted shall be limited to a level of 55 dB $L_{Aeq\ 1hr}$ at any time at

any residential property lawfully in existence at the date of this permission.

Date: 25 May 2005

Richard Mellish
Director
Electricity Consents
Department of Trade and Industry

28 August, 2024

Ref: 16647-004 R0

Copy: Sent by email only

Environmental Health Department
Rochdale Metropolitan Borough Council
Rossendale Borough Council

To whom it may concern,

PRIVATE & CONFIDENTIAL

**PROPOSED SCOUT MOOR II ONSHORE WIND FARM ON LAND TO THE NORTHWEST OF ROCHDALE:
NOISE ASSESSMENT – PRE-APPLICATION ENGAGEMENT**

Cubico UK Development (Wind 1) Ltd ('hereinafter referred to as the Applicant') is proposing to develop a new onshore wind farm ('the proposed development') on land off Rooley Moor Road, to the northwest of Rochdale, adjacent to the existing Scout Moor Wind Farm ('SMWF'). The proposed site boundary is shown on the enclosed Figure 1.

The proposed development will be located within the administrative areas of both Rossendale Borough Council ('RBC') and Rochdale Metropolitan Borough Council ('RMBC'). The Applicant intends to submit a request for an EIA Scoping Opinion to RBC and RMBC in November 2024, which will be followed by the submission of duplicate applications to each Authority for full planning permission in late March 2025.

TNEI Services Ltd (TNEI) has been appointed by the Applicant to undertake the noise assessment for the proposed development, and prior to commencing the noise assessment we would like to agree with you the noise assessment methodology and proposed background noise monitoring locations.

Noise would be emitted from the proposed development during the construction, operation and decommissioning phases. Noise emitted during the construction and decommissioning phases would be temporary and short term in nature and can be minimised through careful construction practices. Operational noise would be controlled through the use of appropriate noise limits, which would be imposed to protect the amenity of neighbouring properties without unduly restricting wind energy development. Operational noise limits need to be derived at an early stage of the development to ensure they are satisfied throughout the design process.

We do not propose to separately consider decommissioning noise from the proposed development as the potential effects associated with this phase of the development are likely to be less than those occurring during construction and are likely to be of shorter duration. Hence, the construction noise assessment is considered to be the worst case.

Newcastle
7th Floor, West One
Forth Banks
Newcastle Upon Tyne
NE1 3PA
Tel: +44(0)191 211 1400

Construction Noise

A construction noise assessment will be undertaken to determine the potential noise impacts during the construction phase of the proposed development. The construction noise assessment will be undertaken in accordance with the methodology outlined in British Standard (BS) 5228-1:2009+A1:2014 and ISO 9613-2:2024 (*'Acoustics - Attenuation of sound during propagation outdoors -Part 2: General method of calculation'*). Impacts will be assessed using criteria contained within BS 5228 and, where appropriate, mitigation measures will be proposed.

Operational Wind Turbine Noise

The UK Government's online Guidance note on Noise states that the management of the noise associated with wind turbines is considered in the *'National planning practice guidance for renewable and low carbon energy'* and the *'Assessment and rating of noise from wind farms (ETSU-R-97)'*.

The online Planning Practice Guidance Note on Renewable and Low Carbon Energy states:

'The report, ETSU-R-97: The assessment and rating of noise from wind farms should be used by local planning authorities when assessing and rating noise from wind energy developments. Good practice guidance on noise assessments of wind farms has been prepared by the Institute of Acoustics [the IOA GPG]. The Department of Energy and Climate Change accept that it represents current industry good practice and endorses it as a supplement to ETSU-R-97. It is available on the Department of Energy and Climate Change's website.'

In February 2023, WSP published *'A review of noise guidance for onshore wind turbines'* ('WSP BEIS report'). The report, which was subsequently re-issued as Revision 4 in May 2023, was commissioned by (the former) UK Government Department for Business, Energy & Industrial Strategy (BEIS). The primary aim of the review was to make a recommendation on whether, in view of government policies on noise and Net Zero, and available evidence, the existing guidance requires updating. The WSP BEIS report concluded that current guidance would benefit from further review and recommends updates in a number of areas.

At present there is no confirmed timeline for any updated guidance to be published, therefore current guidance remains applicable.

ETSU-R-97

ETSU-R-97 describes the findings of the Working Group on Noise from Wind Turbines, the aim of which was to provide information and advice to developers and planners on the environmental assessment of operational noise from wind turbines.

ETSU-R-97 recommends noise limits should be set at 5 dB(A) above existing background noise levels, or a fixed minimum limit of 35-40 dB during the daytime and 43 dB during the night-time periods where background noise levels are low, and that these limits should reflect the variation in background noise with wind speed. Different limits apply to those properties that have a financial interest in the wind energy development (45 dB or background plus 5 dB (whichever is the greater) for both daytime and night-time). There are no financially involved properties at this stage.

The choice of daytime fixed minimum limits should be considered in light of the guidance contained within ETSU-R-97 and the IOA GPG. Extracts of the guidance contained within ETSU-R-97 and the IOA GPG are included in Annex 1. Noise limits established at properties in accordance with ETSU-R-97 shall be applicable to all existing / proposed (in planning) wind farms in the area and will henceforth be referred to as the 'Total ETSU-R-97 Noise Limits'. We would be very keen to work with RMBC and RBC with a view to agreeing suitable daytime fixed minimum limits at an early stage to ensure the development can be designed accordingly.

TNEI propose to set the Total ETSU-R-97 Noise Limits based on the upper daytime fixed minimum noise limit of 40 dB. A Site Specific Noise Limit would then be derived taking account of the noise limits already allocated to, or the limit that may be used by, other wind farm developments in the area.

The Site Specific Noise Limits will be derived using the principles contained within the IOA GPG (which may include the use of the controlling property principal / determining if there is significant headroom etc). The Site Specific Noise Limits will be the limits that the proposed development would have to operate within, should consent be granted. We would welcome the opportunity to discuss the choice of Site Specific daytime fixed minimum limits with you once background noise data becomes available to ensure that the scheme is designed appropriately in light of data measured at the site.

Paragraph 5.4.11 of the IOA GPG states; *"In cases where there is significant headroom (e.g. 5 to 10 dB) between the predicted noise levels from the existing wind farm and the total ETSU-R-97 limits, where there would be no realistic prospect of the existing wind farm producing noise levels up to the total ETSU-R-97 limits, agreement could be sought with the LPA as to a suitable predicted noise level (including an appropriate margin to cover factors such as potential increases in noise) from the existing wind farm to be used to inform the available headroom for the cumulative assessment without the need for negotiation or cumulative conditioning. This may be the case particularly at low wind speeds."*

Where there is significant headroom we propose to utilise the available headroom to derive the Site Specific Noise Limits for the proposed development and consider a +2 dB addition to predicted cumulative levels (excluding the proposed development) to be *"an appropriate margin to cover factors such as potential increases in noise"*. We would be grateful if the Council would confirm its agreement to this approach.

In order to establish Total ETSU-R-97 Noise Limits in accordance with ETSU-R-97, it is necessary to determine the relationship between wind speed measured at the proposed development site and background noise levels measured at the closest noise sensitive receptors. This requires the installation of noise monitoring equipment at representative properties surrounding the site as well as the installation of wind monitoring equipment on the site itself.

It is proposed that a LIDAR unit will be in place on-site for the duration of the noise survey, which will be used to collect wind speed and direction data at various heights. Data from the LIDAR will be used to determine the wind speed at turbine hub height which will then be adjusted to a height of 10 m using a standardised roughness length of 0.05 m to derive 'wind speed as standardised to 10 m height'. Wind speed as standardised to 10 m height will be used in the assessment. This is consistent with method A or B as outlined in the IOA GPG (on page 10 of 40). At least one rain logger will be installed at one (or more) of the noise monitoring locations to record any periods of rainfall. A series

of simultaneous ten-minute measurements will be taken by each piece of equipment over a period of at least two weeks.

Background noise levels will be monitored at a height of between 1.2 m and 1.5 m above ground, in line with the ETSU-R-97 / IOA GPG guidance. The noise monitoring equipment will be located in a free-field position at least 3.5 m away from hard reflective surfaces where practicable and within the residential amenity area.

The following steps summarise the proposed entire noise assessment process for this scheme:

- measure the background noise levels at each receptor. This will involve the continuous logging of the $L_{A90, 10min}$ values at each receptor for a minimum period of two weeks;
- obtain simultaneous ten minute average wind speed data from the proposed development site;
- filter baseline noise data to remove any unrepresentative readings (such as periods of rainfall) and split the data into night-time and quiet daytime hours;
- determine the daytime and night-time criterion curves (i.e. Total ETSU-R-97 Noise Limits) from the measured background noise levels at the nearest neighbours using regression analysis and recommendations within ETSU-R-97 and the IOA GPG;
- specify the type and noise emission characteristics of all existing / proposed wind farms using candidate / operational wind turbine data;
- undertake likely cumulative predictions, where required and compare the total likely cumulative predicted noise levels to the Total ETSU-R-97 Noise Limits;
- derive suitable Site Specific Noise Limits for the proposed development using the guidance in the IOA GPG; and
- compare the predicted wind farm noise immission levels for the proposed development with the Site Specific Noise Limit.

Prior to commencing the noise survey we would like to agree suitable locations at which to monitor background noise levels in order to provide a representative dataset for the area. Figure 1 shows the most current draft layout and the proposed background noise monitoring locations.

We believe noise monitoring equipment installed at six dwellings would provide a sufficient sample of representative background noise data for the area. The proposed monitoring locations are also detailed in Table 1 below.

Table 1 - Proposed Noise Monitoring Locations (NMLs) for the Proposed Development

Property/Location	Justification
NML1	Property located to the far northwest of the Proposed Development, and representative of other properties in that area.
NML2	Property located to the near northwest of the Proposed Development, and representative of other properties in that area.
NML3	Property located to the far north of the Proposed Development, and representative of other properties in that area.
NML4	Property located to the far northeast of the Proposed Development, and representative of other properties in that area.
NML5	Property located to the far east of the Proposed Development, and representative of other properties in that area.
NML6	Property located to the far south of the Proposed Development, and representative of other properties in that area.

Monitoring at the locations listed in Table 1 is subject to consent from the owners/occupiers as well as on-site observations to ensure the properties proposed are suitable and representative. If we are unable to gain access to monitor at the proposed properties, representative alternative locations will be selected and we will inform you of the alternative locations.

The properties identified for the assessment will be the closest ones to the site in each direction. Hence, it can be assumed that if noise limits can be achieved at these locations then limits will also be achieved at other properties located at greater distances from the wind farm.

It should be noted that ETSU-R-97 makes it clear that background noise measurements should not be influenced by noise from operational wind turbines. Given the proximity of existing wind turbines to the proposed development this will need to be considered when deriving the prevailing background noise levels. Additional guidance on this matter is provided in the IOA GPG which states, in Section 5.2.3 that:

“In the presence of an existing wind farm, suitable background noise levels can be derived by one of the following methods:

- switching off the existing wind farm during the background noise level survey (with associated significant cost implications);*
- accounting for the contribution of the existing wind farm in the measurement data e.g. directional filtering (only including background data when it is not influenced by the existing turbines e.g. upwind of the receptor, but mindful of other extraneous noise sources e.g. motorways) or subtracting a prediction of noise from the existing wind farm from the measured noise levels;*
- utilising an agreed proxy location removed from the area acoustically affected by the existing wind farm/s; or*
- utilising background noise level data as presented within the Environmental Statement/s for the original wind farm/s (the suitability of the background noise level data should be established).”*

The assessment will be undertaken with reference to the guidance above and the adopted approach will be clearly outlined in the final report produced to support the planning application.

Cumulative Wind Turbine Noise Assessment

TNEI is aware of a number of other operational wind turbine schemes within 10 km of the Proposed Development, including the existing Scout Moor Wind Farm and the wind farm developments Crook Hill, Reaps Moss, Todmorden Moor, Coal Clough, and Sheep House Farm. A number of single turbine developments have also been identified to the south of the Proposed Development, shown on the accompanying figure. We would be grateful if you could bring to our attention any other wind farm/turbine developments that you are aware of in the area that may merit consideration within the cumulative noise assessment.

If possible, we would be very keen for you or one of your colleagues to attend the installation of the noise monitoring equipment in order for you to agree the exact noise monitoring locations.

Summary

To enable us to progress the assessment I would be very grateful if you confirm whether:

- You are happy with the proposed assessment methods outlined above (BS 5228, ETSU-R-97 and the IOA GPG);
- You agree that decommissioning noise can be scoped out of the EIAR;
- You agree to the use of Total ETSU-R-97 Noise Limits based on the upper daytime fixed minimum noise limit of 40 dB and a fixed limit of 43dB during the night;
- You agree with the proposed approach that, in line with IOA GPG, the cumulative assessment and derivation of Site Specific Noise Limits for the proposed development will utilise available significant headroom with an appropriate margin +2 dB above predicted noise levels;
- You agree with the general monitoring locations proposed (subject to exact siting);
- You or one of your colleagues would like to attend the noise kit installation; and
- If the Council is aware of any schemes which should be included in the cumulative noise assessment or any other dwellings which should be considered in the assessment of noise impacts.

We are proposing to install the noise monitoring equipment in October/ November therefore, we would appreciate a response to this letter at your earliest convenience. If you have any immediate concerns or queries, please do not hesitate to contact me or my colleague Gemma Clark. We look forward to hearing from you soon.

Yours sincerely,



Mark Tideswell
BSc(Hons), PgDip, AMIOA

Senior Consultant



Reviewed and approved by:



James Mackay
BSc(Hons), MSc, MIOA

Director of Environment & Engineering



Enc. Figure 1 – Proposed Noise Monitoring Locations

Annex 1 - Determining the Fixed Part of the Daytime Amenity Noise Limit

Annex 1: Determining the Fixed Part of the Daytime Amenity Noise Limit

In relation to determining the fixed part of the Daytime Amenity Noise Limit the ETSU-R-97 notes (on page 65) that:

“The actual value chosen for the daytime lower limit, within the range of 35-40 dB(A), should depend upon a number of factors:

- *Number of dwellings in the neighbourhood of the wind farm.*

The planning process is trying to balance the benefits arising out of the development of renewable energy sources against the local environmental impact. The more dwellings that are in the vicinity of a wind farm the tighter the limits should be as the total environmental impact will be greater. Conversely if only a few dwellings are affected, then the environmental impact is less and noise limits towards the upper end of the range may be appropriate. Developers still have to consider the interests of individuals as protected under the Environmental Protection Act 1990. It is our belief however, in accordance with the report of the Welsh Affairs Committee [23], that there have been no cases of complaints of noise at levels similar to those caused by wind farms leading to a successful prosecution as a statutory nuisance. It should be noted however that the Welsh Affairs Committee also reports that although the noise may not be a statutory nuisance it can clearly be a cause for distress and disturbance, particularly if residents have been promised inaudibility and the noise has a particular quality leading to complaints.

- *The effect of noise limits on the number of kWh generated.*

Similar arguments can be made when considering the effect of noise limits on uptake of wind energy generated. A single wind turbine causing noise levels of 40 dB(A) at several nearby residences would have less planning merit (noise considerations only) than 30 wind turbines also causing the same amount of noise at several nearby residences.

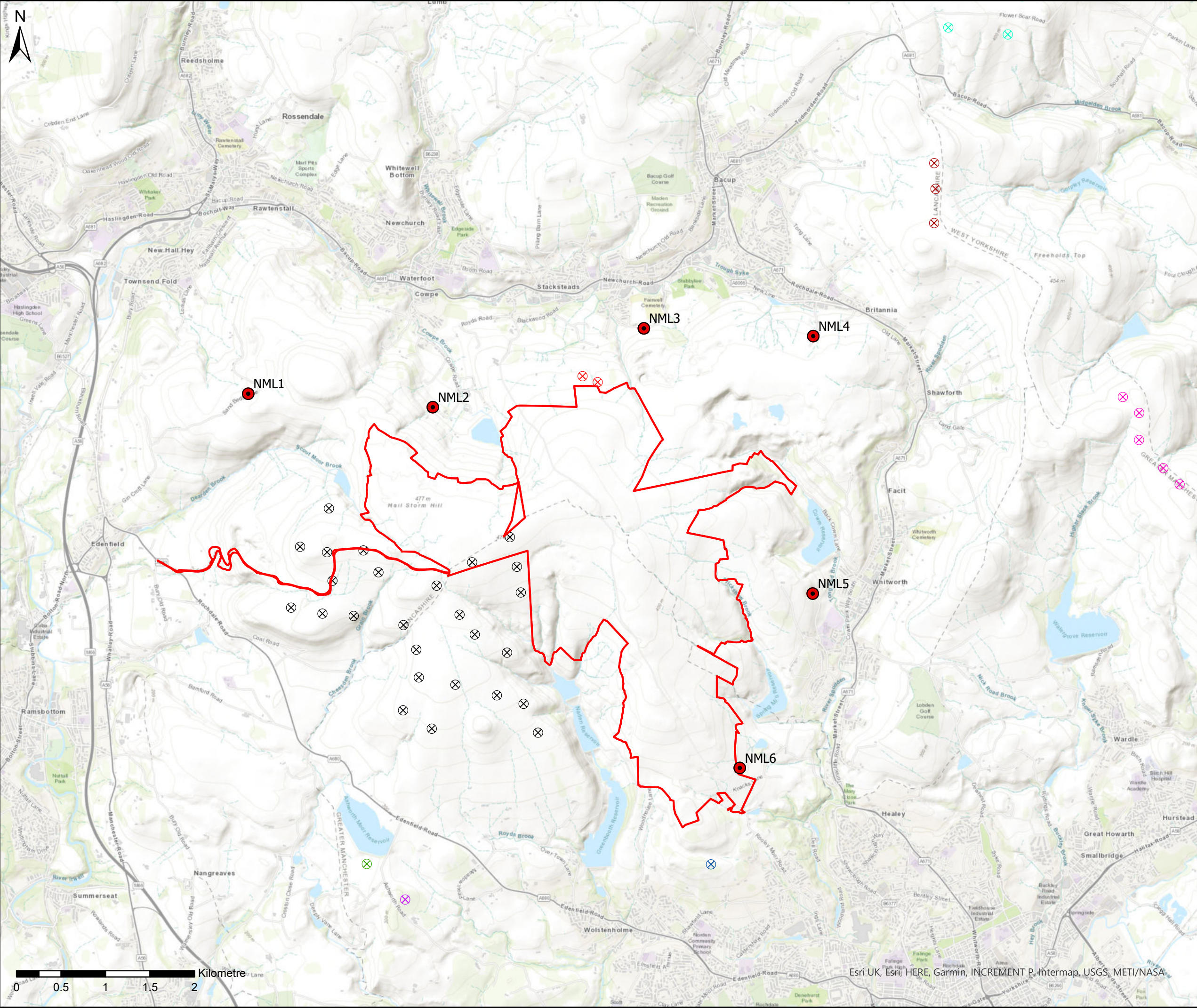
- *Duration and level of exposure.*

The proportion of the time at which background noise levels are low and how low the background noise level gets are both recognised as factors which could affect the setting of an appropriate lower limit. For example, a property which experienced background noise levels below 30 dB(A) for a substantial proportion of the time in which the turbines would be operating could be expected to receive tighter noise limits than a property at which the background noise levels soon increased to levels above 35 dB(A). This approach is difficult to formulate precisely and a degree of judgement should be exercised.”

The IOA GPG adds some further guidance:

“3.2.2 The day amenity noise limits have been set in ETSU-R-97 on the basis of protecting the amenity of residents whilst outside their dwellings in garden areas. The daytime amenity noise limits are formed in two parts: Part 1 is a simple relationship between the prevailing background noise level (with wind speed) with an allowance of +5 dB; Part 2 is a fixed limit during periods of quiet. ETSU-R-97 describes three criteria to consider when determining the fixed part of the limit in the range of 35 dB to 40 dB L_{A90} , all of which should be considered. They are:

- 1) the number of noise-affected properties;
 - 2) the potential impact on the power output of the wind farm; and
 - 3) the likely duration and level of exposure.
- 3.2.3 *The rationale for a choice of this limit, or factors which would assist the determining authority in this respect should be set out in the assessment. It is beneficial to the decision maker to display both sets of limits to illustrate the range available and/or the noise limit for the development if agreed previously with the LPA.*
- 3.2.4 *Current practice on the three criteria is as follows:*
1. *The number of neighbouring properties will depend on the nature of the area, (rural, semi-rural, urban) and is sometimes considered in relation to the size of the scheme and study area. The predicted 35 dB L_{A90} contour (at maximum noise output up to 12 m/s) can provide a guide to the dwellings to be considered in this respect.*
 2. *This is in practice mainly based on the relative generating capacity of the development, as larger schemes have relatively more planning merit (for noise) according to the description in ETSU-R-97. In cases when the amenity fixed limit has little or no impact on the generating capacity (i.e. noise is not a significant design constraint) then a reduced limit may be applied.*
 3. *This last test is more difficult to formulate. But ETSU-R-97 notes that the likely excess of turbine noise relative to background noise levels should be a relevant consideration. In rural areas, this will often be determined by the sheltering of the property relative to the wind farm site. Account can also be taken of the effects of wind directions (including prevailing ones at the site) and likely directional effects. For cumulative developments, in some cases the effective duration of exposure may increase because of cumulative effects.*
- 3.2.5 *It can be argued that assessing these factors do not represent an acoustic consideration but ultimately a planning consideration, and therefore are difficult for noise consultants to fully determine. However this is described as part of ETSU-R-97 and therefore represents a relevant consideration when determining applicable noise limits. Furthermore, it is necessary, as part of the EIA process to evaluate the noise impacts, which is arguably not fully possible without a complete determination of the ETSU-R-97 limits. Finally, consideration of cumulative noise impacts may require the determination of partial noise limits which may be difficult to obtain unless the amenity noise limit is precisely determined.*
- 3.2.6 *Other planning considerations, such as the identification in local planning policy of areas of preferred wind farm development, may also influence or determine the choice of the absolute fixed amenity noise limit."*



LEGEND

Proposed Noise Monitoring Locations (NMLs)

Proposed Site Boundary

Scout Moor Wind Farm (Existing)

Crook Hill Wind Farm

Sheep House Farm Turbines

Shawfield Farm Turbine

Stand Lees Farm Turbine

Wind Hill Farm Turbine

Reaps Moss Wind Farm

Todmorden Moor Wind Farm

0	28/08/2024	FOR INFORMATION	MT	JM
Rev.	Date	Amendment Details	Drawn	Approved

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Client

SUSTAINABLE INVESTMENTS

Drawing Status:

FOR INFORMATION

Project Title:

SCOUT MOOR/ROOLEY MOOR ENERGY PARK

Drawing Title:

PROPOSED NOISE MONITORING LOCATIONS

Scale:

1:40,000

Original Size:

A3

Spatial Reference:

British National Grid

Drawing Number:

16647-005

From: [REDACTED] <[REDACTED]@rossendalebc.gov.uk>
Sent: 09 September 2024 12:22
To: Mark Tideswell
Subject: Proposed wind farm expansion

Follow Up Flag: Follow up
Flag Status: Flagged

Good afternoon we can confirm the following:

- We are happy with the methodology
- That the decommissioning noise can be scoped out of the EIAR
- We agree to the use of the Total ETSU-R-97 noise limits
- We agree with the headroom
- We agree with the general monitoring locations
- Either myself or our trainee EHO would like to attend one of the noise kit installations
- We are not aware of any schemes which may impact or specific properties of concern

Regards

[REDACTED]

Senior Environmental Health Officer

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Scout Moor II Wind Farm
Noise Impact Assessment Review
for Rossendale Borough Council
Robin Woodward, Hayes McKenzie Partnership Ltd
3821_N02_EXT1, 19 November 2025

1. INTRODUCTION

- 1.1 This note details the review of the noise impact assessment contained within the planning application submission for the Scout Moor II Wind Farm. Chapter 7 of the submitted Environmental Impact Assessment Report (EIAR) discusses the assessment of Noise and Vibration and in turn references Appendix 7.2 regarding the operational noise assessment for full details. The EIAR chapter and referenced figures and technical appendices have been downloaded from the Rossendale Borough Council Planning Portal for review pertaining to the operational noise impact assessment.
- 1.2 Appendix A to this note comprises a checklist taken from the Institute of Acoustics (IOA) publication *A Good Practice Guide (GPG) to the Application of ETSU-R-97* (2013) of what information should be provided within a wind farm planning application noise impact assessment and this checklist details where the information is contained and any comments on what information is provided. This note will reference that checklist and draw out any aspects that might require further information, consideration or justification.

2. CONSTRUCTION NOISE ASSESSMENT

- 2.1 The construction noise assessment contained within Appendix 7.1 has been reviewed. It appears to be in line with recommended guidance and good practice and assesses the closest and most impacting activities in a suitable level of detail for this stage in a development.
- 2.2 It identifies that the Weekday daytime/Saturday morning limits are not expected to be exceeded by any of the activities. The hours of working and any mitigation required to deal with any concerns raised when more specific plant is modelled during the pre-construction phase should be dealt with via a suitable Construction Environmental Management Plan agreed with the council.
- 2.3 It should be noted that there is no mention of blasting within the construction noise assessment, this may need clarification and mitigation and good practice adhered to, if required, to minimise impacts.

3. OPERATIONAL NOISE ASSESSMENT - MISSING INFORMATION

3.1 Appendix A shows that the majority of the information recommended for provision in a wind farm noise impact assessment is present. The only missing information of the 41 items suggested are:

- Windshields - Description of the windshields used as part of the baseline monitoring campaign and justification of their appropriateness.
- Noise Contours - There are no noise contours presented for the predicted noise levels detailed within the assessment. This is extremely helpful in visualising the predicted noise levels and understanding what they might be at other locations not selected for specific assessment.
- Tonality - There is no comment on tonality or how it might be avoided or controlled which, if not considered, could leave the scheme open to a 5 dB penalty for tonal content which would have to be factored in when comparing predicted noise levels to noise limits. There is detail of how a tone should be assessed during operation in the proposed planning condition, but not how likely it is or how it could be controlled or prevented.
- Mitigation - There is no detail of example mitigation modes or strategies that could be employed to demonstrate that the proposed development can operate within its proposed limits, despite the need for this to avoid exceedances using the candidate turbine. To be able to assess the impact of this mitigation both on residents and the suitability of the development details of the yield loss and wind speed and directions during which mitigation would need to be applied need to be supplied based on an example mitigation strategy.

4. OPERATIONAL NOISE ASSESSMENT - CONCERNS REGARDING INFORMATION PROVIDED

4.1 The below sections identify aspects where information is provided within the noise impact assessments, but that there are concerns or a lack of sufficient justification or detail.

Noise Limit Lower Limiting Values

4.2 When consulting with the Rossendale Borough Council Environmental Health Officer (EHO) regarding the assessment methodology, the EHO agreed that a 40 dB L_{A90} lower limiting value (or background plus 5 dB, whichever is the higher) would be appropriate when considering cumulative impacts (or the Total ETSU-R-97 noise limits) during day hours, with 35 dB L_{A90} lower limiting value applying to the scheme when considered alone (Site Specific noise limits). A 43 dB L_{A90} lower limiting value (or background plus 5 dB, whichever is the higher) was agreed for night hours in both cases.

4.3 At 4.3.9, which discusses the choice of daytime fixed minimum limit, it states:

“Site Specific Noise Limits have been derived such that they are always at or below the limit established using the lower fixed minimum limit.”

4.4 However at 4.5.6 it is stated that:

“Where predicted wind turbine noise levels from the individual wind farm/ turbine schemes are found to be >10 dB below the Total ETSU-R-97 Noise Limits then it has been deemed appropriate to allocate the entire noise limit to the Proposed Development.”

4.5 These two assertions are contrary.

4.6 It is believed that the former rather than latter statement is what has been adopted for the assessment, which would be appropriate.

Calibrator Calibration Certificates

4.7 The calibration certificates for the acoustic field calibrators are not provided.

Background Noise Data Exclusions, Presentation and Regressions

4.8 The time histories in Annex 5 are difficult to interpret due to the week-wide scale in the time domain and separation between noise and wind speed data in such a compressed dataset. In addition it appears that the noise data in the time histories shows the levels corrected for turbine predicted operational turbine noise levels which creates a chaotic data-set, making it difficult to determine when noise floors or extraneous noise sources may be affecting the noise levels and the resulting trend lines. Despite this it appears that on quiet nights there is a significant early morning noise increase at most locations between about 04:00 and 07:00, likely due to dawn chorus or commuter traffic. It would be appropriate to remove these levels from the dataset used to determine the night hours regression as they're not representative of the quieter night time levels.

4.9 In a similar way, the scatter plots showing the aligned noise and wind data for the quiet daytime and night hours for each location in Annex 1 are very difficult to read due to a combination of a large range on the Y (sound pressure level) axis and the excluded datapoints being more prominent in marking and more numerous than the included datapoints. This makes it almost impossible to give good scrutiny and comment to the regression appropriateness and data spread. It would be helpful to rectify these two aspects as well as include separate plots in addition of just the included data resulting in the regression. There appears to be some potential noise floors at some locations, potentially related to water courses or other non-wind-speed-dependent noise sources, however it is difficult to discern due to the data presentation to give an informed comment.

Assignment of Noise Limits to Assessment Locations

- 4.10 The background noise measurements at NML5 are significantly higher than those at any other location, particularly at higher wind speeds. Whilst it seems appropriate to apply limits based on these backgrounds to NAL 11 as it is in very close proximity to NML5 and in a similar situation, NAL10 is geographically closer to NML4, and it would be more conservative to apply limits based on those background noise levels, which could be considered more appropriate.

Sound Power Levels

- 4.11 There is no source noise data provided for the G80 2 MW turbines installed at Coal Clough Wind Farm, one of the cumulative schemes. The source noise data has been used to model this scheme should be clarified.
- 4.12 The wrong turbine is also indicated for Crook Hill Wind Farm at Annex 8, which appears to have Senvion 3.4M turbines rather than Enercon E70 turbines. It should be clarified which turbine type has been modelled for the scheme.
- 4.13 There is not details of where source noise levels have been sources from, whether there is data available for a closer hub height to the actual turbines (or references to hub height initially), or what justification is given for the uncertainties added where they vary from the default 2 dB.

Predicted Noise Levels

- 4.14 Annex 6 details the barrier attenuation and concave ground profile corrections calculated as part of the predictions. HMPL have carried out verification calculations, and our results show some variation in terrain effects. These are summarised below:
- There are many instances where HMPL don't find barrier attenuations where TNEI have, most notably for NAL7 & 9 where this results in difference in overall cumulative predicted noise level in the region of 1 dB. The reasoning for this is likely one or a combination of:
 - The use of hub rather than tip height to determine line of sight (IOA GPG states to the top of the rotor)
 - The use of 1.5 m rather 4 m height at the receiver (IOA GPG states to use 4 m)
 - The use of alternative terrain data – this is less likely for the number of variations
 - There are instances where TNEI have determined a concave valley profile correction is required when HMPL believe this isn't realistic. This is either because:

- The distances involved are larger than that which the evidence supports – over 2 km and in some cases up to 7 km
 - Possibly the terrain data is significantly different – again, unlikely
 - It appears that no terrain effects have been considered for the smaller turbine schemes. Whilst this might be missing some barrier attenuations, this is generally more conservative. In addition, the concave valley profile correction is very sensitive to false positives for smaller turbines over smaller distances, so this decision, whilst not detailed clearly, is considered appropriate.
- 4.15 Where there are no significant variations in terrain effects, the prediction results between HMPL and TNEI, using the source noise data provided by TNEI within the chapter, are mostly within the rounding errors of varying prediction software (~0.1 dB).
- 4.16 The key examples where there is significant variation between TNEI and HMPL results involve NSL's which have significant contributions from smaller turbines. TNEI appear to have 'flattened off' the sound power levels for these turbines where the wind shear correction to the source data (because it is at a significantly different hub height compared to the installed turbine) has brought the maximum sound power level down to 11 or 10 m/s. This is not appropriate as these are generally stall regulated turbines, with sound power level data described by a slope of increasing sound power level with wind speed, and as such their sound power level will continue to increase with wind speed rather than flatten out when maximum power output is reached. Therefore, the linear increase in sound power level should be maintained where data isn't available as this is the relationship upon which the source noise data is based. In the instance of Lower Mount Pleasant's Evance R9000, the slope of sound power level increase when compared to a standardised 10 m height wind speed based on a hub height of 18 m is 2.33 dB per m/s, making the underestimation at 12 m/s due to the flattening (which occurs from 10.5 m/s) equal 3.5 dB. At NSL19 this turbine is the largest contributor to the cumulative noise levels, and therefore this is a significant underestimation.
- 4.17 It should also be noted that on Figure A1.3s for NSL19 the 'Cumulative (exc. Proposed Development)' line is above the 'Cumulative (inc. Proposed Development)' line for the higher wind speeds, implying that this addition of the proposed development will reduce the overall turbine noise level, which obviously cannot be the case.

Wind Direction Dependant Prediction Results

- 4.18 It is stated that wind direction dependency/directivity is included within the predicted cumulative noise levels at 6.4.7 and this is discussed at 6.4.7 to 6.4.10 and the attenuation factors shown at Table 6.2. However, this is not mentioned further within the report. This creates a large amount of uncertainty as to what reference direction is utilised in the prediction results presented

throughout the assessment, and how this is accounted for when deriving site specific limits. It will also affect the third test within ETSU-R-97 when determining appropriate day hours noise limit lower limiting values as this make it likely that the duration of high exposure is further increased as the impact will change with wind direction, but as one scheme reduces in contribution others will increase. It is suspected that wind direction has only been accounted for in predictions of contribution from operational turbines to background noise measured levels, which would be appropriate.

- 4.19 If in fact directivity has been included in the predicted cumulative noise levels assessed against the cumulative noise limits (rather than just assuming downwind propagation from all turbines) then this needs further detail to be considered appropriately.

Site Specific Noise Limit Derivation

- 4.20 The idea of site specific noise limits is usually to provide limits for just the noise immissions from a particular site at receptor properties to ensure that, if they are met, the overall noise impact of all sites in the area is acceptable assuming they are operating. In addition, this allows for headroom not needed to be left for other future sites assuming the same methodology can be applied and met. As such it is usual to use the **lower** of the noise limits when considering the site operating in isolation (usually the lower limiting value for day hours and council recommended value for night hours unless justified and agree otherwise) and the remaining noise budget when removing the predicted contributions from neighbouring sites from the Total/Maximum/Cumulative noise limits (usually based on a higher limiting value for day, and sometimes night, hours). This approach appears to be the case here, which is appropriate.
- 4.21 It is stated that 'Cumulative Noise Limits' could apply where there is no remaining headroom at a property, with the onus on the operator of the proposed development being to demonstrate that they are giving negligible contribution to the overall wind turbine noise immissions at a property by being at least 10 dB below the combined contribution of other schemes. HMPL do not consider this a 'Cumulative Noise Limit', rather a site specific noise limit at 10 dB below the Total or Cumulative ETSU-R-97 noise limits. Whilst cumulative noise limits are ill advised and not enforceable, the 'Backstop Noise Limits' used to show negligible additional noise impact from the proposed development are an appropriate way to ensure protection of further amenity impact, although the method for demonstrating these noise limits are being met need careful consideration.
- 4.22 It should be noted, however, that the predicted noise levels for the proposed development are more than 6 dB above the 'Backstop Noise Limits' for some locations and wind speeds – this is a significant exceedance which would potentially require turbine shutdowns (in the prevailing wind

direction for relatively common wind speeds) to meet these limits. The level of mitigation required to meet these limits is not specified in the report.

Amplitude Modulation

4.23 Section 7.11 of the EIAR noise chapter states:

'At present, it is possible to identify AM through analysis of measured data, however there is currently no way to predict the effects in advance.'

4.24 Whilst it's agreed that the prediction of AM is not yet reliable (although certain risk factors are known), it is also agreed that there are methods available to identify elevated levels of AM through analysis, and that a method has been developed by the IOA to address UK concerns which has since been adopted within an international Technical Specification (IEC 61400-11-2:2024). The lack of easy predictability of AM does not mean attempts should not be made to set up controls on it if it is demonstrated to occur in excessive levels, as is the case for tonality. Many sites in the UK have been consented with a planning condition relating to AM not tying down to current practice at the time of writing but stating that an appropriate methodology should be agreed if concerns are raised based on best practice at the time of the concern.

Proposed Planning Conditions

4.25 As discussed at [4.73-7](#) above, the setting of cumulative noise limits is not appropriate unless all schemes are owned and operated by the same legal entity and have planning conditions which are varied across the schemes to demonstrate this. It is HMPL's opinion that the cumulative limits in Tables 3 & 4 of the proposed planning conditions (and related reference within the text) should therefore be removed and replaced with the site specific limits detailed within Tables 5 & 6 of the proposed planning conditions.

4.26 It should also be noted that a limit of 30 dB – applied as the Backstop for some locations and wind speeds – would be un-measurable at receptor positions where it is applied as the operational turbine noise level from other operational schemes would be >6 dB higher than this. Therefore, the suggestion of these noise limits and the measurement guidance within the guidance notes for the planning conditions are not compatible or testable, and therefore not appropriate.

4.27 Parts B) and D) of the proposed condition mention using a location closer to the turbines than the complainant's property "(to improve the signal to noise ratio)", although guidance note 1 (b) indicates this is only allowable where consent of the complainant for monitoring has been withheld. In either case, if a proxy location was attempted to be utilised to reduce the concerns of existing operational turbine noise levels as highlighted in [4.263-24](#) above, for several locations

where this is key (NAL04 & NAL05 for instance) to get significantly distant from the operational turbines would be very close to the proposed development and simple prediction model corrections would introduce large and inappropriate uncertainties for any corrections applied. If these limits were deemed appropriate and possible to be met, it may be that a sound power level based condition would minimise the uncertainties involved.

5. REQUESTS FOR FURTHER INFORMATION

5.1 This section sets out areas where it is recommended that clarification is sought on the submitted noise assessment.

Suggested clarifications to be requested

- Description of the wind shields used for the background sound measurements and statement as to whether they comply with the requirements of the IOA GPG
- Clarify or update the following regarding source noise levels used within the analysis:
 - What the sources of sound power level data are
 - What justification there is to apply an uncertainty other than 2 dB for each instance this has been done
 - Justify or update the turbine source noise levels where this has been 'flattened' off where the data is based on a linear slope
 - Clarify the turbine model and sound power level data used for Crook Hill and Coal Clough schemes
- Clarify the method and example ray paths for barrier attenuations where this varies from HMPL findings – a key example being NSL7 and ray paths between it and T3 to T6 and T13 to T17 to provide confidence that the correct heights are being utilised at each end of the ray path.
- Provide a noise contour plot showing predicted operational noise levels for the proposed development alone, the existing operational turbines (and separately all cumulative schemes excluding the proposed development if this would include schemes not yet operational) and cumulative predicted noise levels including the proposed development.
- How has tonality been accounted for in the noise impact assessment? If it is not controlled or guaranteed in some way, then has a degree of tonality been assumed and included in impact assessment?
- Provision of calibration certificates for the field calibrators.
- Provision of time history and scatter charts which allow the scrutiny of individual datapoints, two separate sets showing both raw data and corrected data contributing to derived noise limits.

- Further details on how wind direction has been accounted for in the assessment, and predicted operational noise levels should be supplied showing how they vary with wind direction and what reference directions are used within the tables of results – is it the case that directionality has only been considered in background noise corrections and downwind propagation from all schemes assumed for all assessments against noise limits?
- Details on the level of mitigation applied to meet the proposed site specific (including the 'Backstop') noise limits detailing for each turbine which operational modes are required for which wind speeds and directions in the example mitigation strategy. Furthermore, an indication of the percentage loss of production for the example mitigation strategy assumed in the noise impact assessment – this should demonstrate the effects of meeting the site specific (including 'Backstop') noise limits.

6. SUMMARY

- 6.1 The construction noise impact assessment carried out is suitable and proportionate for this stage of the proposed development and doesn't identify any significant impacts.
- 6.2 In general, the operational noise impact assessment for the proposed development was carried out in line with ETSU-R-97 and good practice.
- 6.3 A list of clarifications regarding how the assessment has been carried out have been suggested, however the most significant aspects of concern are the suggestion of a cumulative noise limit, which is inappropriate and unenforceable, and the lack of detail relating to the mitigation required to meet the site specific noise limits (including those labelled as 'Backstop') to allow the council to form an opinion of whether the scheme is appropriate and justifiable in terms of impact and to understand the noise exposure for those most affected properties.

APPENDIX A - IOA GPG TO APPLICATION OF ETSU-R-97 CHECKLIST

1. REPORTING KEY POINTS CHECK

- 1.1. This document sets out the keys points that should be included in an assessment carried out in line with the IOA GPG as detailed at Table 1, Section 6.1.1, page 28.

2. REVIEWED DOCUMENT DETAILES

Document reviewed	File source
Appendix 7.2, Operational Noise Report, Scout Moor 2 Wind Farm EiAR Chapter 7 and Figures 7.2 & 7.3	Rossendale Borough Council Planning Portal

3. CHECKING TABLE

Section	Key Point	Where referenced/detailed	Comments
Consultations	Consultation with Local Planning Authority	4.2.1 & 4.2.2 & Annex 2	It is stated that there has been no response from Rossendale Borough Council or Rochdale Metropolitan Borough Council following either the EUIA Scoping Report submission in December 2024. RMBC did not respond to direct approaches to the EHD, whilst an RBC senior EHO responded to confirm general agreement with the proposed methodology and general noise monitoring locations described in a

Section	Key Point	Where referenced/detailed	Comments
			consultation letter dates August 2024 included in Annex 2.
	EHO input into selection of Background Noise Measurement Equipment	4.2.1 & 4.2.2 & Annex 2	See above
Background Measurements	Number of Monitoring Locations	5.2.1 & Table 5.1	6 locations.
	Map Showing Monitoring Locations	Figure 7.2	Appear to be away from tall trees and water courses as possible whilst being representative.
	Description of Monitoring Locations	Annex 3	The locations appear to be in appropriate residential amenity areas with specific requests from residents where these are further than normal from the dwelling itself.
	Description of Noise Environment	Annex 3	These are present generally, although missing or minimal for some locations for one of the three visits to site.
	Photos of Monitoring Locations	Annex 3	These are included and show to situation and surroundings of the equipment suitably.
	Monitoring Period	5.2.1 & 5.2.2	Survey was extended due to battery failures during cold period to ensure sufficient data.
	Description of Noise Measurement Equipment Wind Shield	None	There is no description of the wind shields used. There are photographs showing them, but no way of verifying whether or not they meet the stated guidance.
	Certification / Calibration of all Equipment Used & any Calibration Drift	Annex 3 & Annex 4	No calibration certificates have been provided for the field calibrator.
	Wind (speed and direction) & Rainfall Measurement Data Sources	5.4	LiDAR in centre on representative high ground for the proposed turbine layout. Tipping bucket rain gauges at 2 locations.
	Clear Representation of Excluded Data In Time Histories or Scatter Plots	Annex 5 and Annex 1	There are clear charts of wind speed vs wind direction and charts of measured L _{A90} levels vs wind speed which show exclusions due to rainfall, wind direction and manual exclusion.

Section	Key Point	Where referenced/detailed	Comments
			It would be helpful if the Sound Pressure Level axis was limited to the range of interest (10 to 60 dB) to allow better comprehension of the chart data and to have less prominent excluded data symbols to allow easier comprehensive of which data is which. To allow the regression lines to be comprehended and considered a separate set of charts showing just the included data and regression lines on a more easily interpreted axis range would be needed. The time history charts show data included and excluded more easily, but also suffer from having a very large range, this time on the X (time) axis trying to show a week of data at once. This range makes it very difficult to scrutinise accurately individual datapoints in terms of their wind speed and SPL alignment and precise time of day. This can make it difficult to determine is scatter is in line with wind speed and/or time of day factors or not. There appears to be some trends of rapidly increasing noise levels approaching and after dawn at several locations in several instances which could have been considered for exclusion – it's impractical to ascertain the significance of this on the overall trends without the raw data to analyse.
	Chart Showing Distribution of Wind Speeds & Direction	Annex 1	See above
	Cumulative Issues in Background Measurements	5.5, 5.6 & 5.7	A combination of wind direction filtering to exclude downwind propagation from existing schemes and

Section	Key Point	Where referenced/detailed	Comments
			correction of the remaining datapoints based on predicted noise levels for each individual datapoint has been used. There is no indication or way to tell if the filtering used is excluding lower or higher measured levels. It is stated at 5.6.2 that filter sizes of 90, 135 and 180 degrees were trialled in relation to each nearby scheme for each NML and the lowest resulting background noise regression utilised. It's impossible to verify this without the raw data, but it would be simpler to critique if noise contours of the existing operation turbines were provided. It would also allow a better understanding of the measurements if uncorrected data was presented so a comparison could be seen clearly, followed by a separate chart showing only the included corrected data.
Noise Predictions	Prediction Methodology	4.4.3	ISO 9613-2:2024. It is stated regarding that standard that it “<i>supersedes the 1996 edition of the standard. The difference between the two editions of the standard regarding wind turbine noise predictions is negligible. The use of this prediction model accords with current good practice and is considered to provide a realistic impact assessment.</i>” It should be noted that current good practice endorsed by government and the IOA is to use the 1996 version of the 9613-2 standard along with the implementation specifics for wind turbine detailed in the IOA GPG rather than the 2024 version

Section	Key Point	Where referenced/detailed	Comments
			which has not yet been validated for wind turbine noise predictions. Whilst the differences between the 2024 version and IOA GPG recommendations for the 1996 version are relatively minor in most cases, in some instances where barriers and other effects become more significant results can vary, and differences in results between the 1996 and 2024 version without accounting for the IOA GPG changes can be much greater and widely apparent still. At 4.4.10 it is stated that barrier correction have been carried out based on the IOA GPG recommendations rather than the 1996-2 calculations. It is assumed that the reference to “Sections 4.4.10 to 4.4.13” at 4.4.10 should reference 4.4.14.
	Candidate Turbine Model	1.2.2	N149 5.7 MW 105 m HH.
	Turbine Source Noise Data (including noise-reduced modes if used)	Table A8.1 and A8.2	There is no specific justification given where a an uncertainty other than 2 dB (the default) has been applied to turbines. In addition there is no reference to the sources of the data detailed. There is no source noise data provided for the G80 2 MW installed at Coal Clough Wind Farm, one of the cumulative schemes. The wrong turbine is also indicated for Crook Hill Wind Farm, which appears to have Senvion 3.4M turbines rather than Enercon E70 turbines. It appears that the source noise data is often not for the hub height of turbine installed for the cumulative schemes, although closer hub height data is available for several of the turbines.

Section	Key Point	Where referenced/detailed	Comments
	Turbine Source Octave Band Noise Levels	See above	See above
	Description of Noise Propagation/Attenuation Factors	6.4	Clear detail of the parameters used.
	Atmospheric Attenuation - Assumed Temperature and Relative Humidity	6.4.2	70%, 10 °C
	Ground Effects – Assumed Ground Factor	6.4.2	G=0.5
	Assumed Receiver Height	6.4.2	4 m
	Barrier/Screening Attenuation	4.4.14	Included in line with IOA GPG
	Wind Direction Filtering (if considered)	6.4.10 & Table 6.2	Included - it's assumed that this is just utilised in correcting of background noise levels rather than in the predicted noise levels being assessed against limits, but this isn't certain.
	Noise Contours	Not Supplied	Whilst initial contours were supplied to assist with the selection of noise monitoring locations, final contours have not been included based on the submitted layout, turbine model and corresponding prediction results. In addition contours of both the existing operational schemes, total cumulative schemes and total levels including the proposed development would allow the site to be considered more easily in the context of the surrounding schemes.
Assessment	Wind Shear Assessment Method	4.3.5 & 5.4.6	
	Derivation of Prevailing Background Noise	5.9 & Annex 1	As per previous, very difficult to scrutinise the data used to determine the regressions as excluded data is more copious and prominent and the SPL scale is too wide given the plot height to discern the separation and exact values of the data. As discussed at 5.7, the correction for predicted turbine noise level within the measured background noise levels are over-conservative where resulting

Section	Key Point	Where referenced/detailed	Comments
			corrected levels are unrealistically low. It's difficult to ascertain whether or not the general corrections are appropriate and proportionate or not and therefore a cautious approach to applying BG dependant noise limits should be taken.
	Type, Order and Coefficients of Regression Line	Annex 1	2 nd and 3 rd order. Coefficients displayed.
	Scatter Data Shown on Plots	Annex 1	As above, scatter plots are included but almost impossible to read and scrutinise due to formatting.
	Derivation of Noise Limits & Numerical Values	6.5	Details 'Total ETSU-R-97' noise limits.
	Amenity Noise Limit	6.5.1, 6.8 & Annex 1	40 dB lower limiting value for 'Total ETSU-R-97' noise limits agreed with council. 35 dB lower limiting value used for site specific noise limits.
	Justification for Amenity Noise Limit if Chosen	Table 6.11	Out of the three tests discussed in ETSU-R-97 to be considered when setting the amenity noise limit fixed portion, the suggested limit level was rated by TNEI as being at '<i>middle or upper end</i>' for all of the tests, however the highest possible level has been selected. This has also been selected for all locations, whether it is needed or not. In addition is states regarding the third test – relating to exposure: 'A number of the NALs located close to the Proposed Development will be downwind of the turbines infrequently, with a relatively small number of properties located to the north and east of the Proposed Development being most frequently downwind.'

Section	Key Point	Where referenced/detailed	Comments
			There are 20 NAL's selected by TNEI for the site, and of these 12 (60%) are to the north and/or east of the proposed development. In addition these represent settlements with thousands of residents along the A671 and A681. It's difficult to ascertain how significant the impact could be at these slightly more distant settlements as no cumulative noise contours have been provided.
	Night-Time Noise Limit	6.4.2 & 4.3.6	Set at 43 dB both cumulatively and for site specific limits as agreed with council.
	Financially Involved Noise Limit	6.5.2	It is stated that NAL21 is financially involve and has therefore been assigned a lower limiting value of 45 dB for day and night hours in line with ETSU-R-97
	Capping of Noise Limits at Highest Wind Speed Measured	Annex 1	Given the extensive survey length, data has been measured up to 12 m/s standardised 10 m height wind speed for all measurement locations and for day and night hours. Therefore no capping of noise limits it required for high wind speeds. For several locations the limits have been 'flat lined' at low wind speeds to avoid rises in prevailing levels which are likely related to regression artefacts rather than a true trend of rising noise levels as wind speeds decrease (although under some unusual circumstances this can be possible).
	Comparison of Predicted Noise Level with Derived Noise Limits	Table 6.6, 6.7, 6.9 & 6.10	Comparison of cumulative with Total limits and proposed development with site specific limits – exceedances in both cases.
	Correction from L_{Aeq} to L_{A90}	6.3.3	-2 dB
	Potential Tonal Content	None	No statements regarding the likelihood or method of controlling tonality and potential resulting penalty.
	Properties Covered by Assessment	6.1.1 & 6.1.2 plus Figure 7.2 & 7.3 & Table 6.1	Representative worst case receptors were selected.

Section	Key Point	Where referenced/detailed	Comments
	Incorporated Mitigation (Turbines Running in Low Noise Mode) (if relevant)	None	Although it is stated that mitigation can be employed to allow the proposed development to comply with the suggested noise limits, no detail or evidence of this, either in the form of reduced operational modes or an example strategy have been presented.
	Cumulative Issues	6.5 to 6.7 referencing 4.1.2	The method utilised is comprehensively detailed and the basis of this is in line with IOA GPG and good practice. Whilst the method used for cumulative assessment is suitable and conservative by adding a 2 dB uplift to the predicted cumulative noise levels (which in themselves are the upper bound of what would be expected in practice), it should be noted that some schemes could produce higher noise levels than assumed and still be within their planning limits..

7 May, 2026

Ref: 16647-027 R0

[REDACTED]
Hayes McKenzie Partnership

Copy: Sent by email only

Scout Moor II Wind Farm – Noise Assessment Approach

This document is submitted by TNEI Services Ltd (TNEI) following the meeting on the 30th March 2026 to discuss Hayes McKenzie's review of the noise assessment undertaken for the proposed Scout Moor II Wind Farm ES. Prior to the submission of the FEI, we would like to agree the approach to addressing the points raised in the review.

Agreed Topics

The following items were discussed during the meeting on the 30th March, and it is TNEI's understanding that these may all be addressed within the FEI submission without further discussion required.

- **Windshields:** Description to be provided within the FEI to confirm suitability.
- **Noise Contours:** A noise contour plot figure will be included within the Operational Noise Technical Appendix.
- **Tonality:** To be addressed via inclusion of text relating to turbine warranties being sought to protect against tones.
- **Mitigation:** Details will be provided of number of turbines and available modes required to meet noise limits under worst case conditions.
- **Lower Limiting Values:** Text to be amended within Chapter and report to clarify that Site Specific Noise Limits are subject to the lower limiting value.
- **Calibration Certificates:** Missing calibration certificates will be included within report Annexes.
- **Background Noise Data Exclusions, Graphs/Data presentation:** Data exclusions will be reviewed and revised graphs will be provided as per request.
- **Assignment of Noise Data/Limits:** Background noise data from NML4 will be used at NAL10.
- **Sound Power Level data:** Reference to Coal Clough will be removed from the Technical Appendix Annexes (as it is not part of the cumulative assessment), and Crook Hill will be modelled using the Senvion 3.4M. Details of noise data sources will be provided.
- **Small turbine data:** Flat-lining of data present in ES submission will be addressed to ensure levels are extrapolated at higher wind speeds for small stall regulated turbines.

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Topics Requiring Further Discussion/Agreement

Directivity:

As part of the FEI submission, clarification will be provided on use of directivity within the noise prediction modelling. TNEI's approach is to consider the worst-case wind directions (those based on the highest predicted noise level) for each modelling scenario (e.g. individual developments or combined cumulative predictions).

As part of the clarification, the worst-case wind direction for each scenario will be detailed on the noise predictions graphs accompanying the operational noise Technical Appendix.

During their review, Hayes McKenzie had queried the predictions at NAL19, where predictions of cumulative noise excluding the Proposed Development appeared to be greater than cumulative levels including the Proposed Development. This was the result of our noise models method of identifying the worst-case wind direction, which defaults to comparing the directional predicted noise levels at a standardised 10 m wind speed of 10 m/s where turbines are typically at their maximum output.

Due to the near proximity of two small stall regulated turbines at NAL19, whose noise emission does not flat-line at higher wind speeds, the worst-case wind direction changes with wind speed. This can be seen on the example below, showing predicted cumulative noise levels (excluding the Proposed Development) at NAL19 for all wind speed sectors. As you can see, at lower wind speeds Sector 8 is worst-case, however from 10 m/s and up Sector 9 is worst-case.

Wind Sector (°)	5 m/s	6 m/s	7 m/s	8 m/s	9 m/s	10 m/s	11 m/s	12 m/s
S1 (0°)	25.1	27.3	29.1	30.7	32.5	34.3	36.1	38.1
S2 (30°)	26.3	28.5	30.2	31.6	33.1	34.7	36.3	38.2
S3 (60°)	28.4	30.6	32.0	32.8	33.7	34.5	35.3	36.4
S4 (90°)	29.9	32.1	33.4	34.1	34.8	35.3	35.8	36.3
S5 (120°)	29.9	32.1	33.4	34.0	34.7	35.2	35.6	36.0
S6 (150°)	29.8	32.1	33.4	34.0	34.7	35.2	35.6	36.0
S7 (180°)	29.8	32.1	33.4	34.1	34.7	35.3	35.7	36.2
S8 (210°)	29.9	32.1	33.5	34.2	35.0	35.8	36.4	37.2
S9 (240°)	28.8	31.0	32.5	33.6	34.8	36.0	37.4	38.9
S10 (270°)	26.0	28.2	29.9	31.4	33.0	34.6	36.4	38.3
S11 (300°)	24.9	27.0	28.9	30.5	32.3	34.2	36.1	38.1
S12 (330°)	24.7	26.9	28.7	30.4	32.2	34.1	36.0	38.0

To ensure this is addressed, we propose to identify the worst-case wind direction on a per-wind-speed basis, essentially using the green highlighted cells as the predicted cumulative noise level for the purpose of deriving the Site Specific Noise Limit.

Topography corrections:

Hayes McKenzie have flagged that the topographical corrections produced by TNEI do not correlate fully with theirs. One contributing factor may be the distance cutoff incorporated into Hayes McKenzie's approach, which TNEI do not apply as this is not detailed within the IOA GPG, and at greater distances (where the cutoff would come into effect) topographical corrections will be less important.

Where TNEI's calculated corrections suggest valley corrections where HM's do not, we are happy to include these on the basis of it being worst-case. Where HM have queried TNEI's barrier corrections, we will investigate further and, if necessary, make amendments to our corrections to ensure a worst-case approach is maintained.

In order for us to further investigate the cause of the differences between our respective models, we request that Hayes McKenzie provide a copy of their topographical correction outputs for comparison against TNEI's.

Amplitude Modulation (AM):

A revised approach to AM is expected to be set out within the forthcoming ETSU-R-97 replacement, at which time we will follow the approach to AM defined in the new guidance. Until that time, it is TNEI's position to not propose AM conditions and instead for AM to be controlled via statutory nuisance powers. TNEI can provide additional text within the operational noise report to provide further justification for this.

An example of the need for AM conditions discussed recently at Inquiry is Claiuchrie Wind Farm (Case reference: WIN-370-3), for which the Reporter concluded in the Report of Inquiry that: *'There is no basis in current policy to take account of potential infrasound effects, and I am content that no condition is required to address amplitude modulation.'*

Cumulative Conditions:

TNEI consider that cumulative noise conditions can be an appropriate way of controlling wind farm noise, however we acknowledge the complexity and challenges that accompany this approach.

However, during the meeting held in March, it was suggested that the need for cumulative conditions might not be present if different assumptions were used when deriving the Site Specific Noise Limits, specifically with regards to significant headroom.

TNEI have considered the use of controlling properties to identify whether additional headroom exists for receptors where cumulative conditions have been proposed. We have identified several controlling properties for Scout Moor 1, where predicted noise levels are within 2-3 dB of the conditioned noise limit¹ at wind speeds where the margin is smallest. For these properties, adding a margin to the predicted levels from Scout Moor 1 would leave additional headroom available for Scout Moor 2 and reduce the need for Site Specific Noise Limits set 10 dB below the Total Noise Limit.

For receptors where there are no controlling properties, an agreed margin could be added to the predicted noise levels for the sites considered in the cumulative assessment (excluding the Proposed Development) to allow for the possibility that the turbines could be producing higher noise levels than predicted without exceeding their noise limits but that it may be unrealistic to assume that they are operating right up to their noise limits. This is allowed for by the IOA GPG which notes that where significant headroom exists such that there would be no realistic prospect of the existing wind farm producing noise levels up to its conditioned limits, agreement could be sought on an appropriate margin to cover factors such as potential increases in noise. TNEI are aware that some UK Councils (such as The Highland Council) have previously accepted an approach of adding a +2 dB

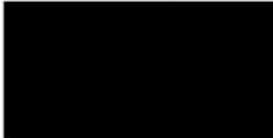
¹ In the absence of available baseline data for Scout Moor 1, limits for this site have been calculated based on the baseline data collected by TNEI.

margin to cumulative predictions, which is in line with the margin identified above for controlling properties.

Can Hayes McKenzie confirm whether the approaches outlined above would be appropriate for the derivation of Site Specific Noise Limits, or suggest an alternative approach?

We would be grateful if you could provide comment on the above at your earliest convenience, and we would be happy to arrange a follow up call next week to hopefully agree any outstanding issues.

Yours sincerely,



Mark Tideswell
BSc(Hons), Dip, MIOA

Principal Consultant



Reviewed and approved by:



Andrew Birchby
MEng, Dip, MIOA

Principal Consultant



Hi Mark,

I'm responding in [REDACTED] absence as he is away until 27th July.

Thank you for your email, and the information you've provided around the Sheep House Farm wind turbine development. It is certainly worth exploring and we'll discuss with the councils and get back to you. I appreciate that you'd like to discuss this at an early opportunity, but note that you have provided limited details at this stage, so it is difficult for us to have a fully informed discussion.

My initial thoughts are that excluding a two-turbine development of 450 kW capacity with a number of (not involved) receptors in the vicinity is certainly pushing the boundaries of the guidance with respect to excluding small wind turbines. Although there are only 4 receptors that you have identified within the 35 dB noise contour, there are a significant number just outside of this contour. The wording around exclusion of 50 kW turbines was necessary as there are instances where there are larger turbines that only have localised effects and it would be reasonable to exclude them, rather than as a lever to exclude ~0.5 MW developments.

In this case, whether it is considered appropriate to exclude these turbines from the assessment will be a matter for Rossendale Borough Council, and would likely take into account residents attitudes towards Sheep House Farm, e.g. whether there have been complaints etc.

For us to have an informed decision, it would be helpful to know:

What are the noise limits for Sheep House Wind Farm?

Are there any receptors in the vicinity of Sheep House Wind Farm that are financially involved with these two turbines?

What are the predicted downwind noise levels at the identified receptors

- Cumulatively
- Scout Moor II in isolation
- Sheep House in isolation

What are your proposed SSNLs at these receptors assuming that the Sheep House Farm wind turbine development is included and with it excluded?

Overall however, it should be noted that your original assessment presented in the ES showed that cumulative predicted operational noise levels were only above the daytime noise limit at NAL4 and NAL5 by a maximum of 0.8 dB (although this is after taking wind direction into account). This could be an indication that it would not necessarily be appropriate for this to result in significant mitigation requirements for Scout Moor II if it is not a dominant wind farm at the receptor locations.

Kind regards,



MEng MIOA

Director | Hayes McKenzie Partnership Ltd

Registered in England and Wales at Unit 3, Oakridge Office Park, Whaddon, Salisbury,
SP5 3HT. Registration No. 5211418

From: Mark Tideswell

Sent: 08 July 2026 09:28

To: [REDACTED]

Subject: RE: Scout Moor II Wind Farm - Noise Assessment

Hello [REDACTED]

Following the correspondence below, our client is progressing with the FEI submission for the proposed Scout Moor II Wind Farm. With the publication of the new ARWTN guidance, there are some further updates that will need to be made to the assessment that weren't covered during previous discussions.

The updated assessment will be based on using Site Specific Noise Limits (SSNLs) at all assessed receptors.

In addition, Section 2.40 of ARWTN discusses the potential exclusion of small scale turbines from the cumulative assessment:

"...the noise impacts of small wind turbines are generally localised and could represent a disproportionate constraint on larger wind energy developments. In such cases, the contribution of these turbines should be excluded from the cumulative noise assessment. For the purposes of this guidance, turbines with generating capacities of 50 kW or less can be considered to have localised noise impacts and can therefore be excluded from cumulative noise assessment. Turbines with generating capacities above 50 kW and less than (for example) a few hundred kilowatts can be excluded from cumulative assessment where it can be demonstrated that noise impacts from these turbines are localised and where including these turbines in a cumulative assessment would result in disproportionate constraints on larger developments. All other wind farm developments must be considered in the cumulative assessment where their individual noise level contribution is within 10 dB of the TNAC."

On this basis, we propose to exclude wind turbines with generating capacities of 50 kW or less from the cumulative noise assessment.

The text quoted above also discusses turbines with generating capacities "above 50 kW and less than (for example) a few hundred kilowatts", noting they can be excluded from assessment where it can be demonstrated:

that noise impacts are "localised", and

where the inclusion of these turbines would result in "disproportionate constraints on larger developments".

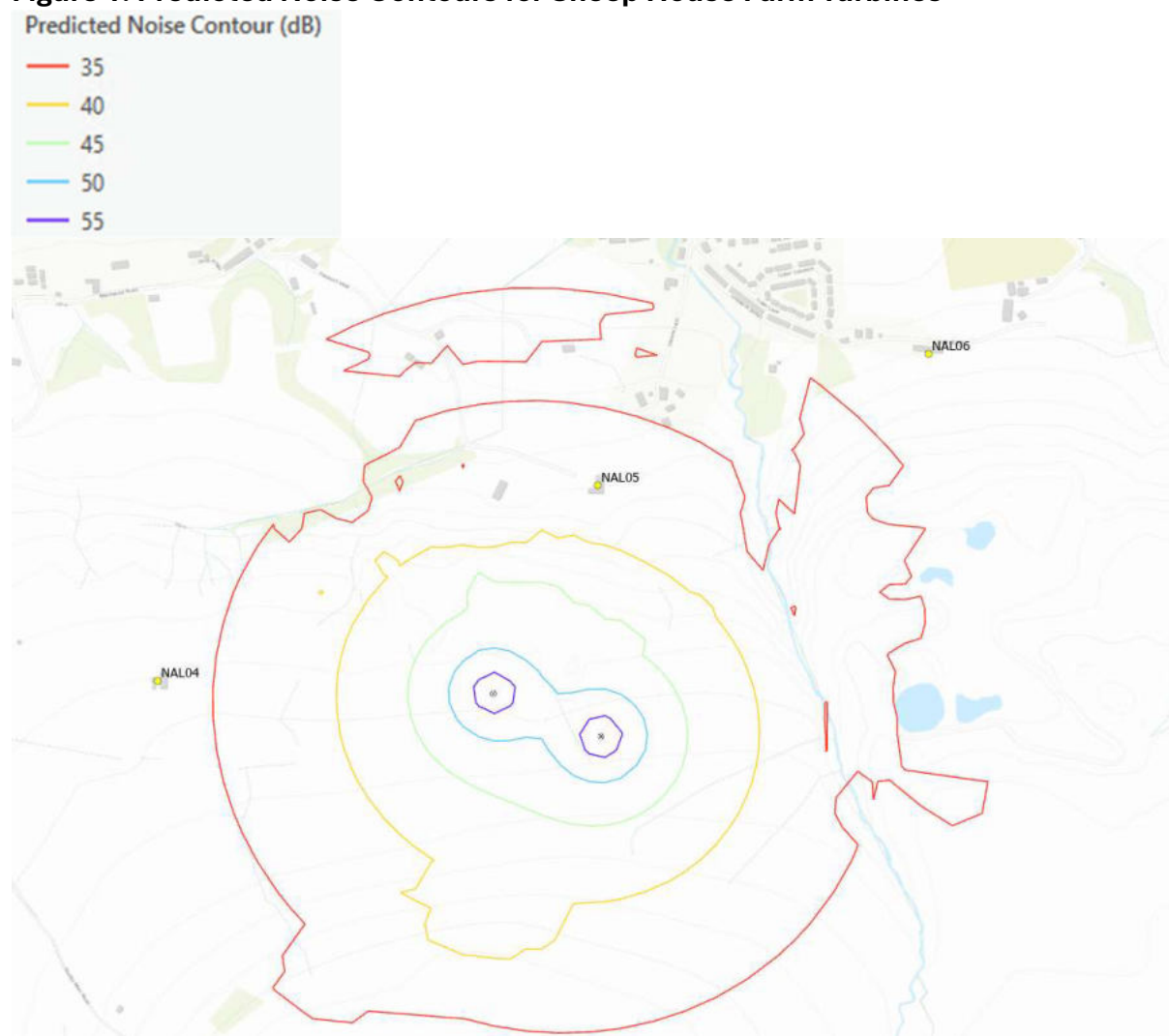
To the immediate north/northeast of the proposed Scout Moor II turbines, there is a development called Sheep House Farm. This development consists of two 225 kW turbines, which are using a large portion of the 'noise budget' at nearby receptors. ARWTN does not provide an exact generation capacity figure for the upper range of turbines which may be excluded, though we would suggest that 225 kW falls into the category of 'less than a few hundred kilowatts'. ARWTN also provides no guidance on whether this text refers to single or multiple turbine developments.

Exactly how the two bullets above should be demonstrated is not addressed within ARWTN. We have provided some information below to address each of these points, and we would be keen to discuss this point with you and understand Hayes McKenzie's view on the subject.

Localised noise impacts

Below are two figures, provided to support the case that the Sheep House Farm turbines have a localised impact.

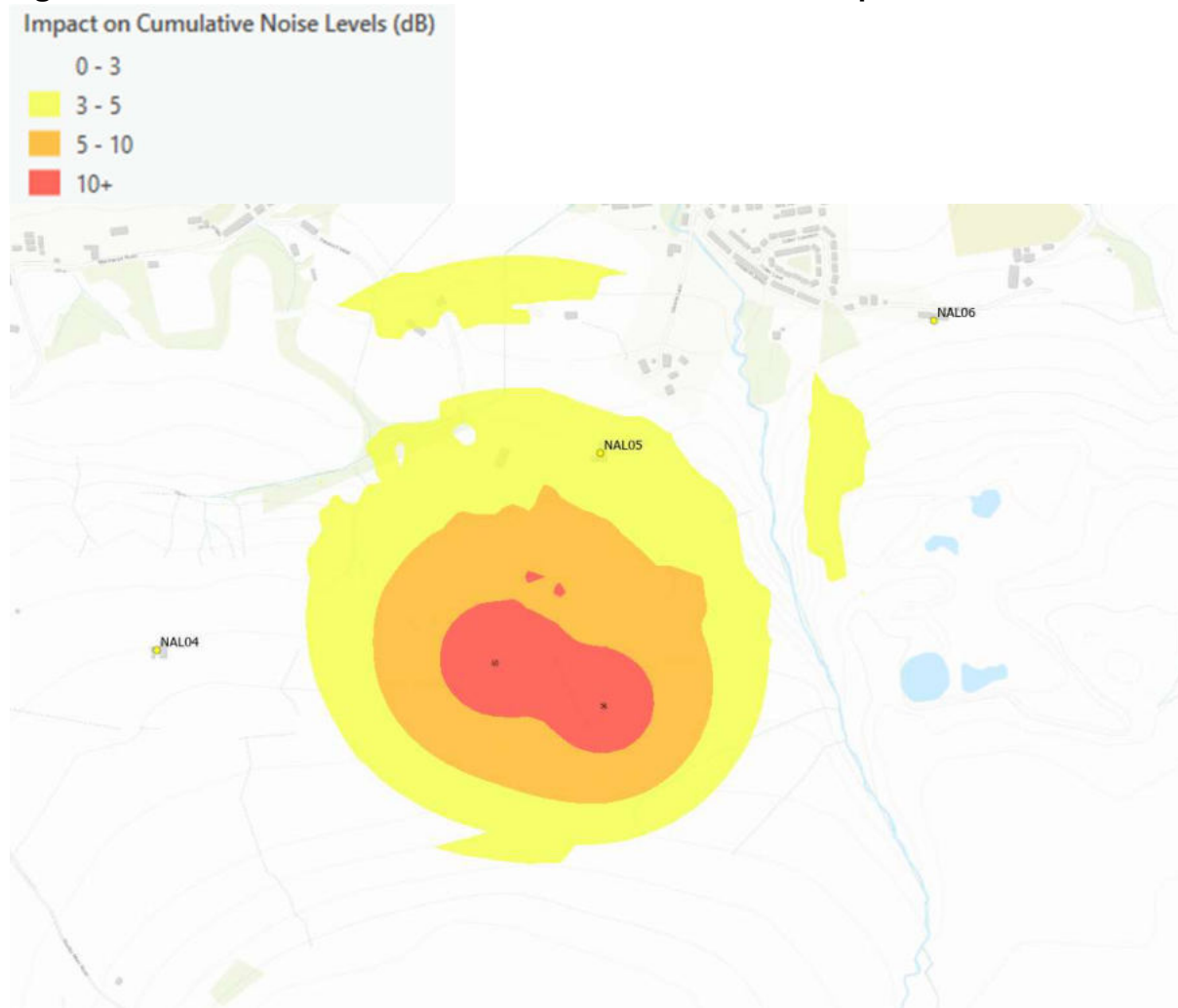
Figure 1: Predicted Noise Contours for Sheep House Farm Turbines



This map shows predicted noise levels from the Sheep House Farm turbines only at a standardised wind speed of 10 m/s, out to a lower value of 35 dB LA90. Also shown are the Noise Assessment Locations (NALs) considered in our assessment, as yellow dots.

There are 4 properties within the 35 dB contour; two at NAL5, and two within the separate section to the north (the result of topographic corrections from the downward slope) which are shown as grey squares on the background mapping. Due to the small number of properties located within the 35 dB contour, it may be argued that the impact of these turbines is “localised”.

Figure 2: Contribution to cumulative noise levels of the Sheep House Farm Turbines



This map shows the difference in total cumulative noise levels with/without Sheep House Farm (this scenario includes the proposed Scout Moor II turbines). The values correspond with the increase in noise level that would result from these turbines being included in the overall cumulative scenario, compared to a scenario where they are removed:

The red band indicates where including SHF would change overall cumulative noise levels by more than 10 dB.

The orange band is where including SHF would change cumulative noise levels by 5-10 dB.

The yellow band shows where including SHF would change cumulative noise levels by 3-5 dB.

Everywhere else, the level of change resulting from the inclusion of SHF would be less than 3 dB.

As a 3 dB change in sound level is generally considered to be the minimum change in level clearly perceptible by the human ear, it could be said that the SHF turbines would only have a clearly perceptible impact on noise levels within the shaded areas; i.e. localised around the immediate vicinity of the turbines. In terms of receptors, the same four properties that are located within the 35 dB contour are located within the 3-5 dB change band.

Both maps shown above are based on standardised wind speeds of 10 m/s to represent the worst case within the wind speed range recommended by ARWTN. It is noted that additional figures for lower wind speeds are likely to highlight that the effects are even more localised and that these lower wind speeds would occur more frequently than standardised wind speeds of 10 m/s.

Disproportionate constraints on larger developments

The two Sheep House Farm turbines are located close to NALs 4 and 5 as shown above, and as such will use up a large amount of the available noise headroom at these NALs. While total cumulative predicted noise levels at these locations are not expected to exceed the TNAC, it passes by only a small margin. As such, the SSNLs we have calculated for the proposed Scout Moor II (incorporating suitable buffers to account for potential future noise increases) are set to 10 dB below the TNAC at some wind speeds. Where this is the case, predicted noise levels from Scout Moor II exceed the SSNL by around 5 dB.

We are currently working with our client to quantify the expected generation impact from mitigating this exceedance, and will provide detail on this in the forthcoming FEI submission – however I'm afraid we do not have any figures to share currently. As an alternative for the time being, we would note that mitigating an exceedance of around 5 dB would (in our experience) likely require a fairly substantial amount of curtailment to achieve.

Considering the proposed candidate turbine for Scout Moor II, the Nordex N149 5.7 MW, a reduction of 5 dB (per turbine) could be achieved using operational Mode 10, rated at 4.29 MW. It is likely that multiple turbines would need to operate in this mode (or lower) in order to reduce noise levels by 5 dB. It should be noted also that both the Sheep House Farm turbines and the nearest receptors are located to the north of the proposed turbines, therefore curtailment would likely be required under prevailing wind conditions. This suggests that the operation of the two 225 kW Sheep House Farm turbines would have a 'disproportionate constraint' on the proposed Scout Moor II development.

As noted, there is some further work to be undertaken, which we are currently engaged with to ensure the FEI submission is fully in accordance with ARWTN. However, we wanted to contact you in advance of that to gauge your initial response and, where possible, incorporate feedback into the revised assessment.

We would be grateful if you could provide feedback on the above. My colleagues and I will be out of the office on Thursday and Friday (9th/10th) this week for our annual company away day, however we would be happy to arrange a call to discuss this if you think it would be useful.

Thank you,
Mark



Mark Tideswell
Principal Consultant



www.tneigroup.com

Annex 3 – Field Data Sheets / Installation Report

Noise Monitoring Record - NML1



Project Title	Scout Moor II Wind Farm	Project Number	16647
Client	Cubico UK Development Ltd	Surveyor(s)	TS, MT

MONITORING LOCATION

Location Number	NML1
Location Name	Lower Mount Pleasant Farm
Location Description	Amenity area located to the east of residential property. Equipment located >3.5m from nearby facades or reflective surfaces.
Latitude	53.682781
Longitude	-2.281055
Noise sources noted during installation, weekly inspection and removal	Farm animals and activity (machinery) audible during visits. Distant road noise and wind induced noise audible. Operational wind turbines inaudible during any visit. On second visit, SLM was found powered off, with last record on 26/12/2024. No physical or software (settings) issue found, issue assumed to be due to cold weather limiting battery life.

NOISE MONITORING EQUIPMENT DETAILS

	Number	Model	Serial Number	Last Calibrated/ Conformance Checked
Sound Level Meter	SLM 71	Rion NL-53	541102	14/08/2024
Calibrator	CAL 2	Rion NC-74	34973250	14/11/2024

Weather Measurement	Rain Gauge - 23
Equipment Notes	

NOISE MONITORING EQUIPMENT SETTINGS

	Frequency Weighting	Index	Interval	Time Weighting	Range	Audio Recording
Parameters Recorded	A	Leq. Lmax. L90. L10	10 Mins	Fast	20-110	No

MEASUREMENTS

File Name	Start Time	End Time	Cal. at Start	Cal. at End	Drift	Observations
101	03/12/2024 14:40	07/12/2024 03:48	94.0	93.8	-0.2	Turbines not audible
102	09/12/2024 12:00	26/12/2024 16:14	94.0	94.1	0.1	The SLM was found to be powered off when the kit was opened. All batteries changed. Last record 26/12/2024. Settings look fine, unsure of reason. Wet with drizzle, very little wind. 8 oktas, 10°. Sounds audible include distant road noise (likely the beginning of rush hour), and running water on either side of property, which appears to be the result of snow melt. Two nearby small turbines not audible.
103	14/01/2025 16:10	11/02/2025 12:50	94.0	93.9	-0.1	Turbines not audible

NML1 Photographs (Part 1)

NORTH



EAST





Noise Monitoring Record - NML2



Project Title	Scout Moor II Wind Farm	Project Number	16647
Client	Cubico UK Development Ltd	Surveyor(s)	TS, MT

MONITORING LOCATION

Location Number	NML2
Location Name	Lowerfold Barn
Location Description	Amenity area to the south of the residential property. Equipment located >3.5m from nearby facades or reflective surfaces.
Latitude	53.67978
Longitude	-2.248696
Noise sources noted during installation, weekly inspection and removal	Distant road traffic, birdsong and wind induced noise. Farm activities to east noted at installation. Location chosen to minimise noise from garden pond (inaudible at measurement location). Small watercourse to south noted as very faintly audible at installation, however not during subsequent visits. On second visit, SLM was found powered off, and last data recorded on 03/01/2025. Equipment and settings checked, assumed loss of power due poor battery performance during cold weather.

NOISE MONITORING EQUIPMENT DETAILS

	Number	Model	Serial Number	Last Calibrated/ Conformance Checked
Sound Level Meter	SLM 72	Rion NL-53	541100	14/08/2024
Calibrator	CAL 2	Rion NC-74	34973250	14/11/2024

Weather Measurement	None -
Equipment Notes	

NOISE MONITORING EQUIPMENT SETTINGS

	Frequency Weighting	Index	Interval	Time Weighting	Range	Audio Recording
Parameters Recorded	A	Leq. L90. L10. Lmax	10 Mins	Fast	20-110	No

MEASUREMENTS

File Name	Start Time	End Time	Cal. at Start	Cal. at End	Drift	Observations
201	03/12/2024 13:30	09/12/2024 11:20	94.0	93.9	-0.1	Water not audible. Wind in foliage. Road noise to the north audible
202	09/12/2024 11:30	03/01/2025 15:23	94.0	94.1	0.1	The SLM was found to be powered off when the kit was opened. Changed all batteries, last data recorded 03/01. Card not full, settings fine, appears to be a battery issue. Weather wet with light drizzle, no wind, sodden ground from snow melt. 8 oktas, 9°. Sounds audible include idling tractor at neighbouring farm, birdsong, and dripping/trickling water sound from trees adjacent to garden.
203	14/01/2025 15:30	11/02/2025 12:00	94.0	94	0.0	Breeze in foliage

NML2 Photographs (Part 1)

NORTH



EAST





Noise Monitoring Record - NML3



Project Title	Scout Moor II Wind Farm	Project Number	16647
Client	Cubico UK Development Ltd	Surveyor(s)	TS, MT

MONITORING LOCATION

Location Number	NML3
Location Name	6 Law Head
Location Description	Amenity area to the south of the residential property. Equipment located >3.5m from nearby facades or reflective surfaces.
Latitude	53.688132
Longitude	-2.224576
Noise sources noted during installation, weekly inspection and removal	Birdsong and farm animals audible. Vehicles audible on nearby and distant roads, and distant machinery audible during installation. One wind turbine to south (Sheep House Farm) turning, and faintly audible during instillation, but not audible during other visits. On second visit, SLM found powered off with last measurement on 11/01/2025. As with NML1 and NML2, cause appears to be a battery issue related to cold weather.

NOISE MONITORING EQUIPMENT DETAILS

	Number	Model	Serial Number	Last Calibrated/ Conformance Checked
Sound Level Meter	SLM 79	Rion NL-53	541059	14/08/2024
Calibrator	CAL 2	Rion NC-74	34973250	14/11/2024

Weather Measurement	None -
Equipment Notes	

NOISE MONITORING EQUIPMENT SETTINGS

	Frequency Weighting	Index	Interval	Time Weighting	Range	Audio Recording
Parameters Recorded	A	Leq. Lmax. L90	10 Mins	Fast	20-110	No

MEASUREMENTS

File Name	Start Time	End Time	Cal. at Start	Cal. at End	Drift	Observations
301	03/12/2024 16:00	09/12/2024 10:40	94.0	94.1	0.1	
302	09/12/2024 10:50	11/01/2025 14:36	94.0	94.1	0.1	The SLM was found to be powered off when the kit was opened, last measurement on 11/01. Changed all batteries. Wet weather, light spitting rain and 8 oktas overcast. Very slight to no wind. Sounds audible include distant wet road noise, birdsong, sheep, and distant plant (reverse beeping).
303	14/01/2025 14:50	11/02/2025 11:30	94.0	93.9	-0.1	Breeze in foliage, noise from overhead lines audible, wind turbine visible and not spinning .





Noise Monitoring Record - NML4



Project Title	Scout Moor II Wind Farm	Project Number	16647
Client	Cubico UK Development Ltd	Surveyor(s)	TS, MT

MONITORING LOCATION

Location Number	NML4
Location Name	New Road Farm
Location Description	Kit installed in amenity area located at the front of the residential property. Equipment located >3.5m from nearby facades or reflective surfaces.
Latitude	53.662224
Longitude	-2.189485
Noise sources noted during installation, weekly inspection and removal	Distant road traffic noise, birdsong and farm animal calls audible. Farm activity and overhead aircraft audible. Faint sound of water from pipe to south of garden. On second visit, sounds of renovation work going on inside property audible.

NOISE MONITORING EQUIPMENT DETAILS

	Number	Model	Serial Number	Last Calibrated/ Conformance Checked
Sound Level Meter	SLM 73	Rion NL-53	541097	14/08/2024
Calibrator	CAL 2	Rion NC-74	34973250	14/11/2024

Weather Measurement	Rain Gauge - 22
Equipment Notes	

NOISE MONITORING EQUIPMENT SETTINGS

	Frequency Weighting	Index	Interval	Time Weighting	Range	Audio Recording
Parameters Recorded	A	Leq, Lmax. L90	10 Mins	Fast	20-110	No

MEASUREMENTS

File Name	Start Time	End Time	Cal. at Start	Cal. at End	Drift	Observations
501	03/12/2024 12:00	09/12/2024 10:00	94.0	93.9	-0.1	Water noise not to the south not audible. General farm activities occurring.
502	09/12/2024 10:10	13/01/2025 13:05	94.0	94.2	0.2	Wet ground, has been spitting rain slightly but just stopped. Recent snowmelt. Very little wind, 8 oktas and ~9°. Sounds audible include activity inside house (radio and sawing, barely audible), distant traffic noise, and water trickling at end of garden. Overall very quiet.
503	14/01/2025 13:30	11/02/2025 10:59	94.0	94.0	0.0	Meter not measuring. Strong wind and rain. Cold.





Noise Monitoring Record - NML5



Project Title	Scout Moor II Wind Farm	Project Number	16647
Client	Cubico UK Development Ltd	Surveyor(s)	TS, MT

MONITORING LOCATION

Location Number	NML5
Location Name	Windy Harbour
Location Description	Residential amenity area to the south of the property. Located at the end of the garden as per residents request. Equipment located >3.5m from nearby facades or reflective surfaces.
Latitude	53.642229
Longitude	-2.194452
Noise sources noted during installation, weekly inspection and removal	Audible sounds include farm animals, birdsong, wind induced noise in foliage, and distant road noise.

NOISE MONITORING EQUIPMENT DETAILS

	Number	Model	Serial Number	Last Calibrated/ Conformance Checked
Sound Level Meter	SLM 60	Rion NL-52	721002	22/08/2024
Calibrator	CAL 2	Rion NC-74	34973250	14/11/2024

Weather Measurement	None -
Equipment Notes	

NOISE MONITORING EQUIPMENT SETTINGS

	Frequency Weighting	Index	Interval	Time Weighting	Range	Audio Recording
Parameters Recorded	A	Leq. Lmax. L90. L10	10 Mins	Fast	20-110	No

MEASUREMENTS

File Name	Start Time	End Time	Cal. at Start	Cal. at End	Drift	Observations
601	04/12/2024 11:10	09/12/2024 13:25	94.0	94	0.0	Wind in foliage
602	09/12/2024 13:30	14/01/2025 12:10	94.0	94	0.0	Wet weather, low cloud, spitting rain and snow melt on ground. 9°, 8 oktas, very little wind. Sounds of rain dripping off trees and foliage, some occasional birdsong, and distant traffic. Generally quiet.
603	14/01/2025 12:20	11/02/2025 13:30	94.0	94	0.0	Light rain and breeze





Noise Monitoring Record - NML6



Project Title	Scout Moor II Wind Farm	Project Number	16647
Client	Cubico UK Development Ltd	Surveyor(s)	TS, MT

MONITORING LOCATION

Location Number	NML6
Location Name	Jubarn
Location Description	Amenity area to the south of the property. Located here so as to not pick up water noise from a pond in the northern garden. Equipment located >3.5m from nearby facades or reflective surfaces.
Latitude	53.638744
Longitude	-2.207381
Noise sources noted during installation, weekly inspection and removal	Audible sounds included birdsong, distant road and construction noise, wind induced noise and nearby livestock. Construction noise noted during multiple visits. Turbines to north west (Scout Moor Wind Farm) visible, but not audible during visits.

NOISE MONITORING EQUIPMENT DETAILS

	Number	Model	Serial Number	Last Calibrated/ Conformance Checked
Sound Level Meter	SLM 36	Rion NL-52	1165338	03/01/2024
Calibrator	CAL 2	Rion NC-74	34973250	14/11/2024

Weather Measurement	None -
Equipment Notes	

NOISE MONITORING EQUIPMENT SETTINGS

	Frequency Weighting	Index	Interval	Time Weighting	Range	Audio Recording
Parameters Recorded	A	Leq. Lmax. L90. L10	10 Mins	Fast	20-110	No

MEASUREMENTS

File Name	Start Time	End Time	Cal. at Start	Cal. at End	Drift	Observations
701	04/12/2024 10:10	09/12/2024 12:45	94.0	93.9	-0.1	Wind in foliage, distant machinery noise, birdsong
702	09/12/2024 13:00	14/01/2025 11:19	94.0	93.9	-0.1	Wet weather and rain due to low cloud and snowmelt. Slight breeze, 8 oktas, 9°. Recent snow almost completely gone, just small patches here and there. Immediate area very quiet, dominant sounds are large plant from what sounds like construction to the south.
703	14/01/2025 11:40	11/02/2025 13:10	94.0	93.9	-0.1	Light rain and wind. Turbines to north west visible but not audible





Noise Monitoring Installation Report

Project: Scout Moor II Wind Farm

Reference: 16647

Client: Cubico UK Development Ltd



Overview of Installed Noise Monitoring Locations



Persons Present During Installation	TS
--	----

General Notes	Noise monitoring equipment was installed at six locations on 03/12/2024. Unless specified, all noise kits were installed at least 3.5 m from any hard-reflecting surface except the ground and less than 20 m from the dwelling and away from obvious noise sources, such as boiler flues.
----------------------	--

Location	Latitude	Longitude
NML1	53.68813163	-2.224576018
NML2	53.6797801	-2.248696477
NML3	53.6387435	-2.207380806
NML4	53.64222948	-2.194452134
NML5	53.66222357	-2.189484825
NML6	53.68278124	-2.281055142

NML1 Lower Mount Pleasant Farm**Description**

Equipment installed in amenity area located to the east of residential property.

Noise Sources Observed During Installation

Farm animal calls audible. Light breeze in foliage. Farm activities audible to the south

North**East****South****West**

NML2 Lowerfold Barn**Description**

Kit installed in amenity area to the south of the residential property.

Noise Sources Observed During Installation

Distant road traffic noise audible. Birdsong. Light breeze in foliage. Farm activities audible to the east. Pond in garden not audible from monitoring location.

North**East****South****West**

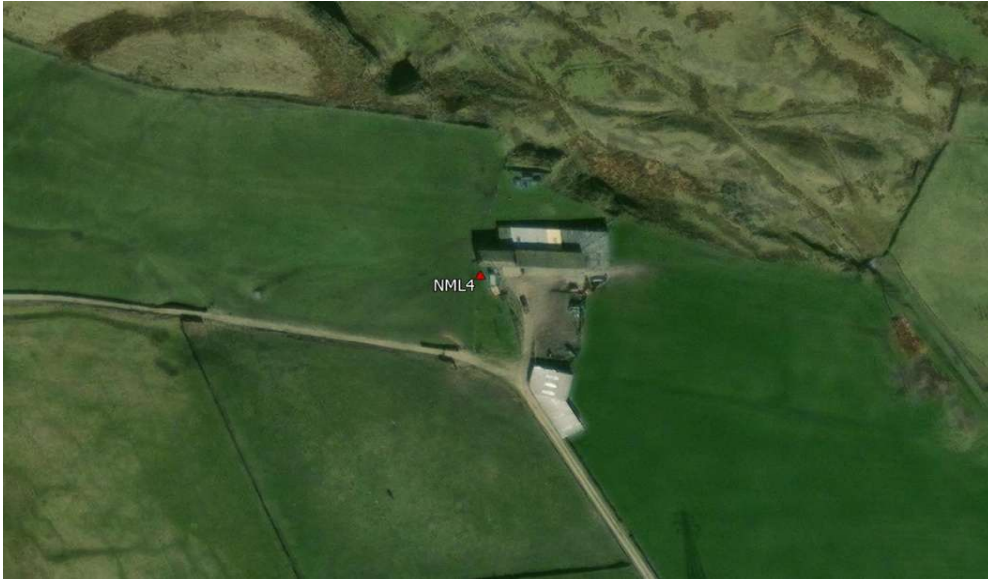
NML3 6 Law Head**Description**

Equipment located in amenity area to the south of the residential property.

Noise Sources Observed During Installation

Birdsong and farm animals audible. Vehicles audible on road nearby. Machinery audible in quarry.
One Wind turbine to the south turning and faintly audible. Overhead aircraft audible.

North**East****South****West**

NML4 New Road Farm**Description**

Distant road traffic noise audible, birdsong and occasional farm animal calls audible, overhead aircraft audible. No breeze. Faint sound of water from pipe to south of garden.

Noise Sources Observed During Installation

Equipment installed in amenity area located at the front of the residential property.

North**East****South****West**

NML5 Windy Harbour



Description

Equipment installed in amenity area to the south of the property. Located at the end of the garden as per residents request.

Noise Sources Observed During Installation

Farm animals audible, birdsong, light breeze in foliage. Distant road noise audible. Cloudy Okta 8, 5°C.

North



East

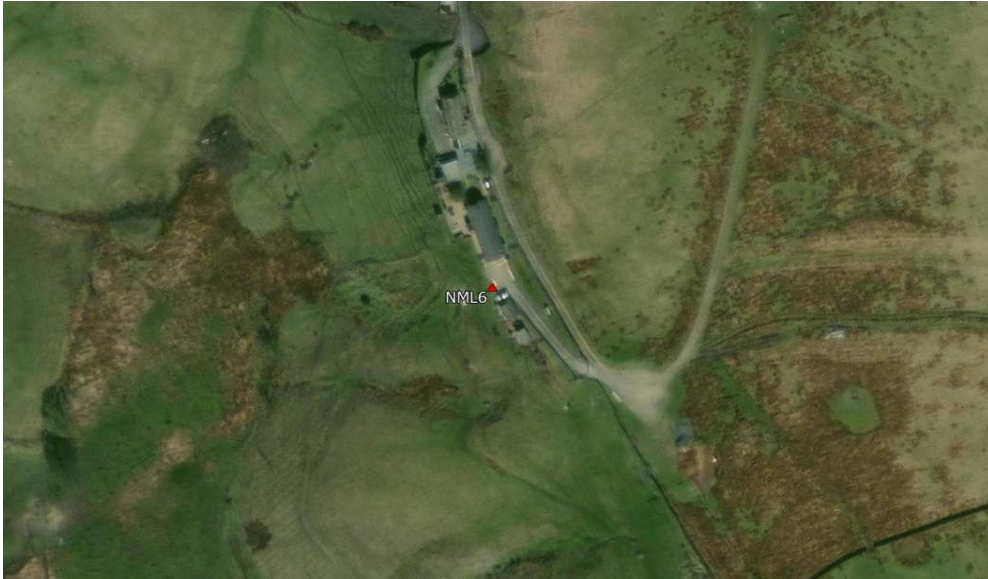


South



West



NML6 Jubarn**Description**

Equipment installed in amenity area to the south of the property. Located here so as to not pick up water noise from a pond in the northern garden.

Noise Sources Observed During Installation

Birdsong audible, distant construction and road noise audible from the west. Light breeze. Occasional livestock and pet calls audible. Cloudy, 5°C.

North**East****South****West**

Annex 4 – Calibration/ Conformance Certificates for Sound Level Meters and Calibrator

SLM 71



CERTIFICATE OF CONFORMANCE

Date of Issue 14 August 2024
Customer TNEI Services Ltd
Certificate Number CONF082410

	Manufacturer	Type	Serial Number
Sound Level Meter	Rion	NL-53	00541102
Preamplifier	Rion	NH-25	34055
Microphone	Rion	UC-59	25636

This is to certify that the instrument was tested and calibrated at the Manufacturer's factory according to their specification and that the product satisfied all the relevant requirements of the following Standards:

IEC 61672-1:2013 Class 1.

The instrument also received a functional check by ANV Measurement Systems prior to despatch in the UK, in accordance with our standard procedures.

Signed.....
K. Zablocki

Position. Calibration Technician Date..... 14/08/2024

BEAUFORT COURT, 17 ROEBUCK WAY, MILTON KEYNES, MK5 8HL

☎ 01908 642846 📠 01908 642814

✉ info@noise-and-vibration.co.uk 🌐 www.noise-and-vibration.co.uk



CERTIFICATE OF CONFORMANCE

Date of Issue 14 August 2024
Customer TNEI Services Ltd
Certificate Number CONF082405

	Manufacturer	Type	Serial Number
Sound Level Meter	Rion	NL-53	00541100
Preamplifier	Rion	NH-25	34053
Microphone	Rion	UC-59	25634

This is to certify that the instrument was tested and calibrated at the Manufacturer's factory according to their specification and that the product satisfied all the relevant requirements of the following Standards:

IEC 61672-1:2013 Class 1.

The instrument also received a functional check by ANV Measurement Systems prior to despatch in the UK, in accordance with our standard procedures.

Signed.....
K. Zablocki

Position. Calibration Technician Date..... 14/08/2024

BEAUFORT COURT, 17 ROEBUCK WAY, MILTON KEYNES, MK5 8HL

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CERTIFICATE OF CONFORMANCE

Date of Issue 14 August 2024
Customer TNEI Services Ltd
Certificate Number CONF082401

	Manufacturer	Type	Serial Number
Sound Level Meter	Rion	NL-53	00541059
Preamplifier	Rion	NH-25	34012
Microphone	Rion	UC-59	25590

This is to certify that the instrument was tested and calibrated at the Manufacturer's factory according to their specification and that the product satisfied all the relevant requirements of the following Standards:

IEC 61672-1:2013 Class 1.

The instrument also received a functional check by ANV Measurement Systems prior to despatch in the UK, in accordance with our standard procedures.

Signed.....
K. Zablocki

Position. Calibration Technician Date..... 14/08/2024

BEAUFORT COURT, 17 ROEBUCK WAY, MILTON KEYNES, MK5 8HL

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CERTIFICATE OF CONFORMANCE

Date of Issue 14 August 2024
Customer TNEI Services Ltd
Certificate Number CONF082402

	Manufacturer	Type	Serial Number
Sound Level Meter	Rion	NL-53	00541097
Preamplifier	Rion	NH-25	34050
Microphone	Rion	UC-59	25631

This is to certify that the instrument was tested and calibrated at the Manufacturer's factory according to their specification and that the product satisfied all the relevant requirements of the following Standards:

IEC 61672-1:2013 Class 1.

The instrument also received a functional check by ANV Measurement Systems prior to despatch in the UK, in accordance with our standard procedures.

Signed.....
K. Zablocki

Position. Calibration Technician Date..... 14/08/2024

BEAUFORT COURT, 17 ROEBUCK WAY, MILTON KEYNES, MK5 8HL

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CERTIFICATE OF CALIBRATION

Date of Issue: 22 August 2024

Certificate Number: TCRT24/1660

Issued by:

ANV Measurement Systems

Beaufort Court

17 Roebuck Way

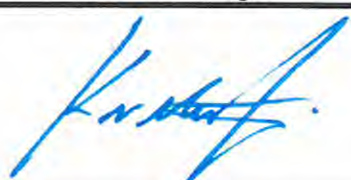
Milton Keynes MK5 8HL

Telephone 01908 642846 Fax 01908 642814

E-Mail: info@noise-and-vibration.co.uk

Web: www.noise-and-vibration.co.uk

Acoustics Noise and Vibration Ltd trading as ANV Measurement Systems

Page 1 of 2 Pages
Approved Signatory

K. Mistry

Customer TNEI Services Ltd
7th Floor
West One
Forth Banks
Newcastle Upon Tyne
NE13PA

Order No. 5001

Description Sound Level Meter / Pre-amp / Microphone / Associated Calibrator

Identification	Manufacturer	Instrument	Type	Serial No. / Version
	Rion	Sound Level Meter	NL-52	00721002
	Rion	Firmware		2.1
	Rion	Pre Amplifier	NH-25	22108
	Rion	Microphone	UC-59	21941
	Rion	Calibrator	NC-74	34762316
		Calibrator adaptor type if applicable		NC-74-002

Performance Class 1

Test Procedure TP 10. SLM 61672-3:2013

Procedures from IEC 61672-3:2013 were used to perform the periodic tests.

Type Approved to IEC 61672-1:2013 Yes

If YES above there is public evidence that the SLM has successfully completed the applicable pattern evaluation tests of IEC 61672-2:2013

Date Received 21 August 2024

ANV Job No. TRAC24/08373

Date Calibrated 22 August 2024

The sound level meter submitted for testing has successfully completed the periodic tests of IEC 61672-3:2013, for the environmental conditions under which the tests were performed. As evidence was publicly available, from an independent testing organisation responsible for approving the results of pattern-evaluation tests performed in accordance with IEC 61672-2:2013, to demonstrate that the model of sound level meter fully conformed to the class 1 specifications in IEC 61672-1:2013, the sound level meter submitted for testing conforms to the class 1 specifications of IEC 61672-1:2013.

Previous Certificate	Dated	Certificate No.	Laboratory
	Initial Calibration		

This certificate provides traceability of measurement to recognised national standards, and to units of measurement realised at the National Physical Laboratory or other recognised national standards laboratories. This certificate may not be reproduced other than in full, except with the prior written approval of the issuing laboratory.

CERTIFICATE OF CALIBRATION



Certificate Number

TCRT24/1660

Page 2 of 2 Pages

Sound Level Meter Instruction manual and data used to adjust the sound levels indicated.

SLM instruction manual title	NL-52/NL-42 Description for IEC 61672-1		
SLM instruction manual ref / issue	No. 56034 21-03	Source	Rion
Date provided or internet download date	19 March 2021		
	Case Corrections	Wind Shield Corrections	Mic Pressure to Free Field Corrections
Uncertainties provided	Yes	Yes	Yes
Total expanded uncertainties within the requirements of IEC 61672-1:2013			YES
Specified or equivalent Calibrator	Specified		
Customer or Lab Calibrator	Customers Calibrator		
Calibrator adaptor type if applicable	NC-74-002		
Calibrator cal. date	14 February 2024		
Calibrator cert. number	UCRT24/1237		
Calibrator cal cert issued by Lab	ANV Measurement Systems		
Calibrator SPL @ STP	94.03	dB	Calibration reference sound pressure level
Calibrator frequency	1002.41	Hz	Calibration check frequency
Reference level range	Single	dB	
Accessories used or corrected for during calibration - Extension Cable & Wind Shield WS-15			
Note - The Extension Cable was used between the SLM and the pre-amp for this calibration.			

Environmental conditions during tests	Start	End	
Temperature	22.98	22.82	± 0.30 °C
Humidity	53.3	53.0	± 3.00 %RH
Ambient Pressure	99.47	99.41	± 0.03 kPa

Indication at the Calibration Check Frequency			
Initial indicated level	94.1	dB	Adjusted indicated level 94.0 dB
Uncertainty of calibrator used for Indication at the Calibration Check Frequency ±		0.10	dB
Self Generated Noise			
Microphone installed -	Less Than	20.0	dB A Weighting
Microphone replaced with electrical input device -		UR = Under Range indicated	
Weighting	A	C	Z
	10.5	14.9	22.3
	dB	dB	dB
	UR	UR	UR

Self Generated Noise reported for information only and not used to assess conformance to a requirement

The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor k=2, providing a coverage probability of approximately 95%. The uncertainty evaluation has been carried out in accordance with the Guide to the Expression of Uncertainty in Measurement published by ISO.

Additional Comments

None

END

Calibrated by: B. Bogdan

R 2



CERTIFICATE OF CALIBRATION



0653

Date of Issue: 03 January 2024

Certificate Number: UCRT24/1016

Calibrated at & Certificate issued by:

ANV Measurement Systems

Beaufort Court

17 Roebuck Way

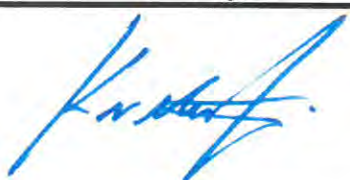
Milton Keynes MK5 8HL

Telephone 01908 642846 Fax 01908 642814

E-Mail: info@noise-and-vibration.co.uk

Web: www.noise-and-vibration.co.uk

Acoustics Noise and Vibration Ltd trading as ANV Measurement Systems

Page 1 of 2 Pages
Approved Signatory

K. Mistry

Customer TNEI
7th Floor West One
Forth Banks
Newcastle Upon Tyne
NE1 3PA

Order No. 5001
Description Sound Level Meter / Pre-amp / Microphone / Associated Calibrator
Identification

Manufacturer	Instrument	Type	Serial No. / Version
Rion	Sound Level Meter	NL-52	01165338
Rion	Firmware		2.0
Rion	Pre Amplifier	NH-25	65565
Rion	Microphone	UC-59	10557
Rion	Calibrator	NC-75	34334830
	Calibrator adaptor type if applicable		NC-75-022

Performance Class 1

Test Procedure TP 10. SLM 61672-3:2013

Procedures from IEC 61672-3:2013 were used to perform the periodic tests.

Type Approved to IEC 61672-1:2013 Yes

If YES above there is public evidence that the SLM has successfully completed the applicable pattern evaluation tests of IEC 61672-2:2013

Date Received 22 December 2023

ANV Job No. UKAS23/12873

Date Calibrated 03 January 2024

The sound level meter submitted for testing has successfully completed the periodic tests of IEC 61672-3:2013, for the environmental conditions under which the tests were performed. As evidence was publicly available, from an independent testing organisation responsible for approving the results of pattern-evaluation tests performed in accordance with IEC 61672-2:2013, to demonstrate that the model of sound level meter fully conformed to the class 1 specifications in IEC 61672-1:2013, the sound level meter submitted for testing conforms to the class 1 specifications of IEC 61672-1:2013.

Previous Certificate	Dated	Certificate No.	Laboratory
	23 February 2022	TCRT22/1163	ANV Measurement Systems

This certificate is issued in accordance with the laboratory accreditation requirements of the United Kingdom Accreditation Service. It provides traceability of measurement to the SI system of units and/or to units of measurement realised at the National Physical Laboratory or other recognised national metrology institutes. This certificate may not be reproduced other than in full, except with the prior written approval of the issuing laboratory.

CERTIFICATE OF CALIBRATION

Certificate Number

UCRT24/1016

UKAS Accredited Calibration Laboratory No. 0653

Page 2 of 2 Pages

Sound Level Meter Instruction manual and data used to adjust the sound levels indicated.

SLM instruction manual title	NL-52/NL-42 Description for IEC 61672-1		
SLM instruction manual ref / issue	No. 56034 21-03	Source	Rion
Date provided or internet download date	19 March 2021		
	Case Corrections	Wind Shield Corrections	Mic Pressure to Free Field Corrections
Uncertainties provided	Yes	Yes	Yes
Total expanded uncertainties within the requirements of IEC 61672-1:2013			YES
Specified or equivalent Calibrator	Specified		
Customer or Lab Calibrator	Lab Calibrator		
Calibrator adaptor type if applicable	NC-75-022		
Calibrator cal. date	18 December 2023		
Calibrator cert. number	UCRT23/2596		
Calibrator cal cert issued by Lab	0653		
Calibrator SPL @ STP	94.01	dB	Calibration reference sound pressure level
Calibrator frequency	1000.00	Hz	Calibration check frequency
Reference level range	Single	dB	
Accessories used or corrected for during calibration - None			

Environmental conditions during tests	Start	End	
Temperature	23.35	22.45	± 0.30 °C
Humidity	51.3	48.9	± 3.00 %RH
Ambient Pressure	97.76	97.78	± 0.03 kPa

Indication at the Calibration Check Frequency			
Initial indicated level	94.2	dB	Adjusted indicated level
			94.0
		dB	
Uncertainty of calibrator used for Indication at the Calibration Check Frequency ±		0.10	
		dB	
Self Generated Noise			
Microphone installed -	Less Than	21.5	dB A Weighting
Microphone replaced with electrical input device - UR = Under Range indicated			
Weighting	A	C	Z
	11.5	15.6	21.0
	dB	dB	dB
	UR	UR	UR

Self Generated Noise reported for information only and not used to assess conformance to a requirement

The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor $k=2$, providing a coverage probability of approximately 95%. The uncertainty evaluation has been carried out in accordance with UKAS requirements.

Additional Comments The results on this certificate only relate to the items calibrated as identified above.

None

END

Calibrated by: K. Zablocki

R 1



CERTIFICATE OF CALIBRATION



0653

Date of Issue: 14 November 2024

Certificate Number: UCRT24/2539

Calibrated at & Certificate issued by:

ANV Measurement Systems

Beaufort Court

17 Roebuck Way

Milton Keynes MK5 8HL

Telephone 01908 642846 Fax 01908 642814

E-Mail: info@noise-and-vibration.co.uk

Web: www.noise-and-vibration.co.uk

Acoustics Noise and Vibration Ltd trading as ANV Measurement Systems

Page 1 of 2 Pages
Approved Signatory

K. Mistry

Customer TNEI
7th Floor West One
Forth Banks
Newcastle Upon Tyne
NE1 3PA

Order No. 5001

Test Procedure Procedure TP 1 Calibration of Sound Calibrators

Description Acoustic Calibrator

Identification	Manufacturer	Instrument	Model	Serial No.
	Rion	Calibrator	NC-74	34973250

The calibrator has been tested as specified in Annex B of IEC 60942:2003. As public evidence was available from a testing organisation (PTB) responsible for approving the results of pattern evaluation tests, to demonstrate that the model of sound calibrator fully conformed to the requirements for pattern evaluation described in Annex A of IEC 60942:2003, the sound calibrator tested is considered to conform to all the class 1 requirements of IEC 60942:2003.

ANV Job No. UKAS24/11834

Date Received 14 November 2024

Date Calibrated 14 November 2024

Previous Certificate

Dated	18 December 2023
Certificate No.	UCRT23/2584
Laboratory	0653

This certificate is issued in accordance with the laboratory accreditation requirements of the United Kingdom Accreditation Service. It provides traceability of measurement to the SI system of units and/or to units of measurement realised at the National Physical Laboratory or other recognised national metrology institutes. This certificate may not be reproduced other than in full, except with the prior written approval of the issuing laboratory.

CERTIFICATE OF CALIBRATION

UKAS Accredited Calibration Laboratory No. 0653

Certificate Number

UCRT24/2539

Page 2 of 2 Pages

Measurements

The sound pressure level generated by the calibrator in its WS2 configuration was measured five times by the Insert Voltage Method using a microphone as detailed below. The mean of the results obtained is shown below. It is corrected to the standard atmospheric pressure of 101.3 kPa (1013 mBar) using original manufacturers information.

Test Microphone	Manufacturer	Type
	Brüel & Kjær	4134

Results

The level of the calibrator output under the conditions outlined above was

94.00 ± 0.10 dB rel 20 µPa

Functional Tests and Observations

The frequency of the sound produced was	1002.84 ± 0.12 Hz
The total distortion was	1.05 ± 0.08 % Distortion

During the measurements environmental conditions were

Temperature	23 to 24 °C
Relative Humidity	44 to 51 %
Barometric Pressure	102.1 to 102.2 kPa

The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor $k=2$, providing a coverage probability of approximately 95%. The uncertainty evaluation has been carried out in accordance with UKAS requirements.

The uncertainties refer to the measured values only with no account being taken of the ability of the instrument to maintain its calibration.

A small correction factor may need to be applied to the sound pressure level quoted above if the device is used to calibrate a sound level meter which is fitted with a free-field response microphone. See manufacturers handbook for details.

END

Note:

Calibrator adjusted prior to calibration?	NO
Initial Level	N/A dB
Initial Frequency	N/A Hz

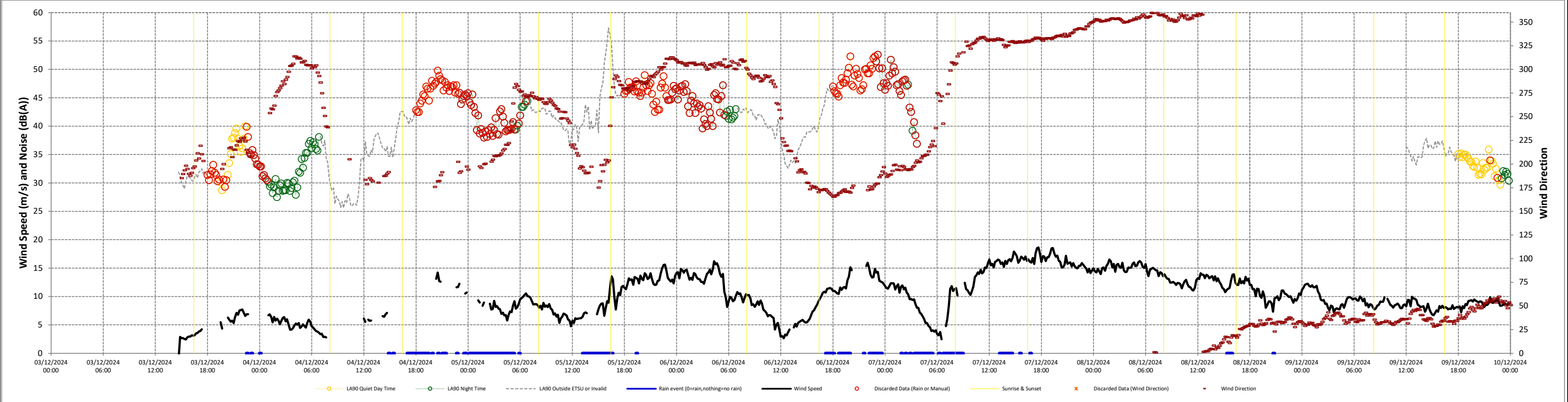
Additional Comments The results on this certificate only relate to the items calibrated as identified above.
None

Calibrated by: B. Bogdan

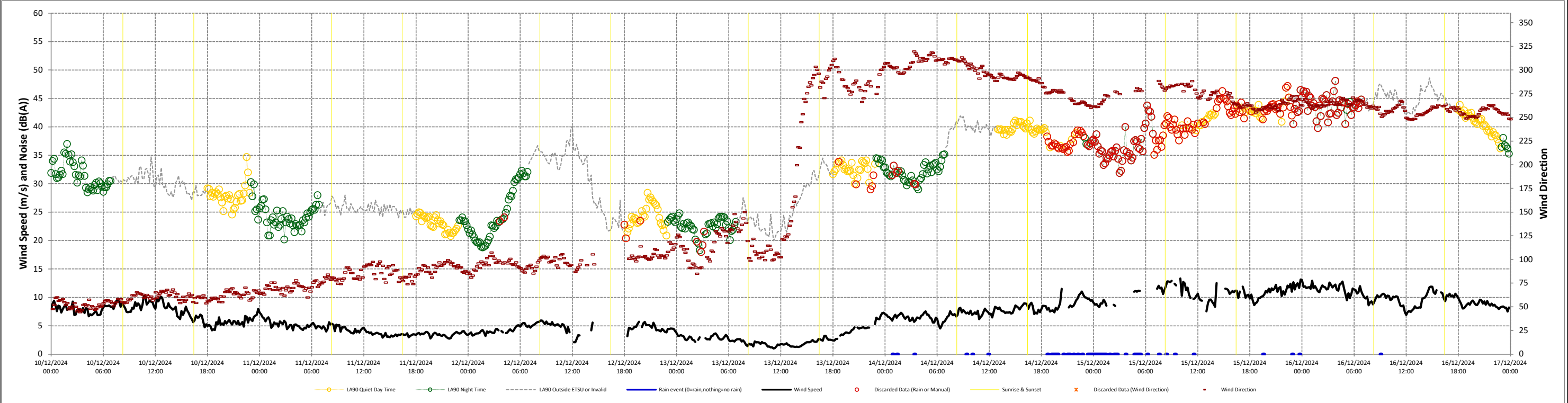
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Annex 5 – Time Series Graphs

03/12/2024 to 10/12/2024



10/12/2024 to 17/12/2024



Project Scout Moor II Wind Farm

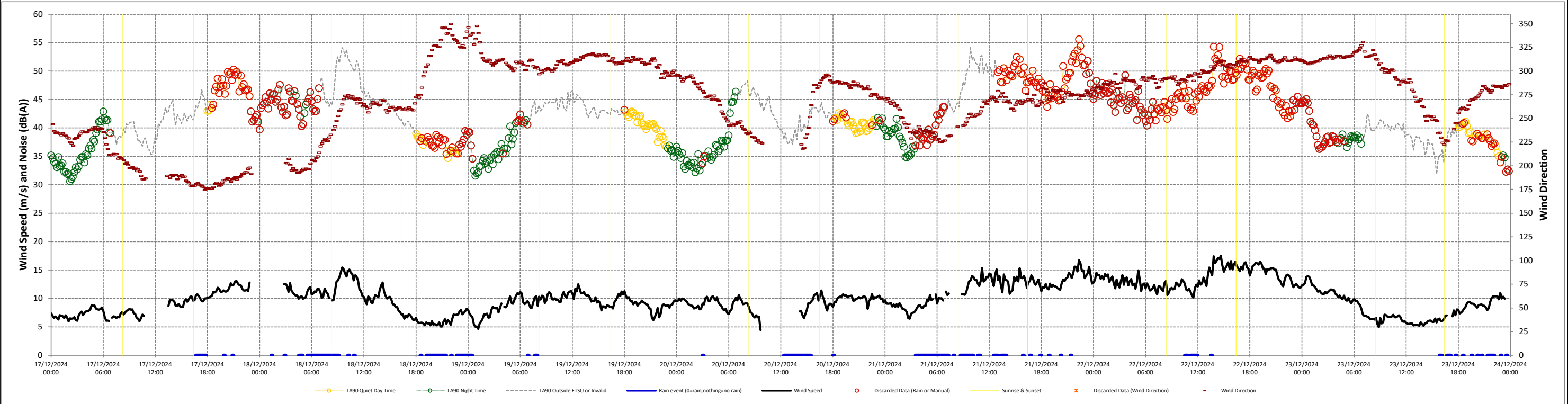
Client Cubico UK Development Ltd

Title Time Series for NML1 - Lower Mount Pleasant Farm Page 1 of 6

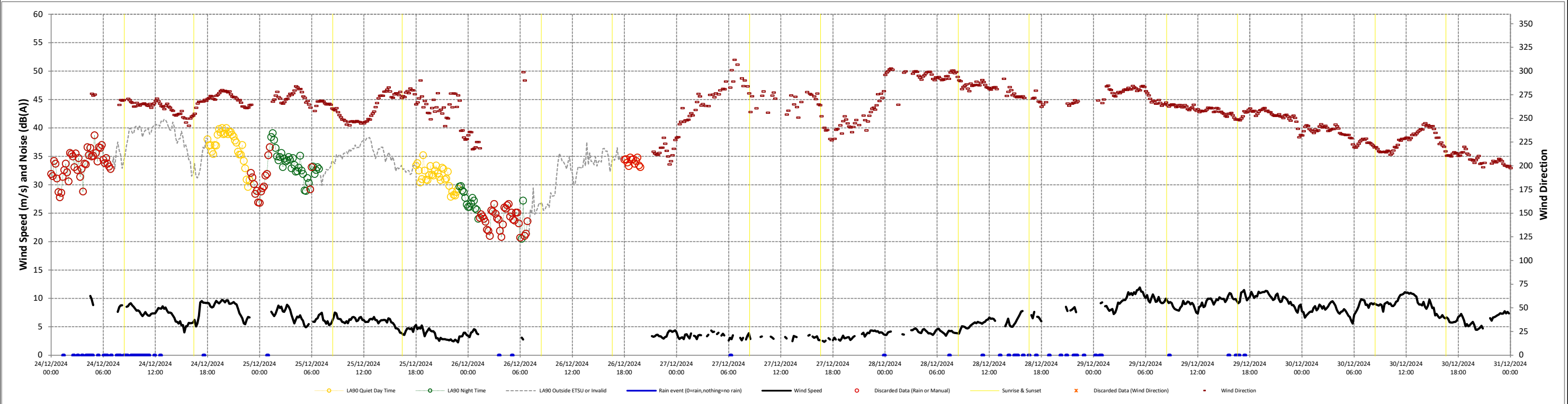
Date 03/07/2026



17/12/2024 to 24/12/2024



24/12/2024 to 31/12/2024



Project Scout Moor II Wind Farm

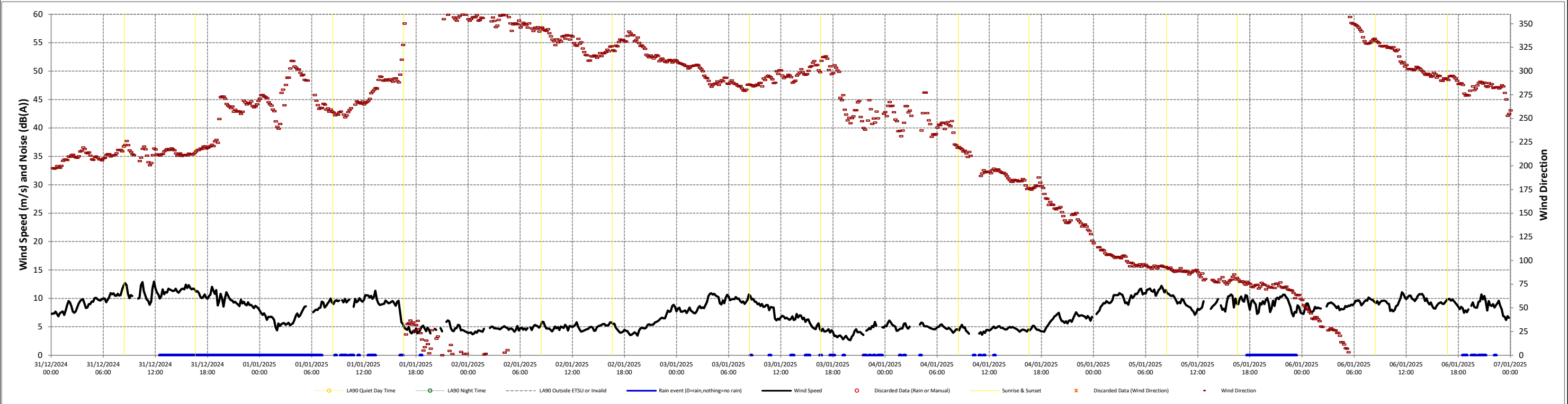
Client Cubico UK Development Ltd

Title Time Series for NML1 - Lower Mount Pleasant Farm Page 2 of 6

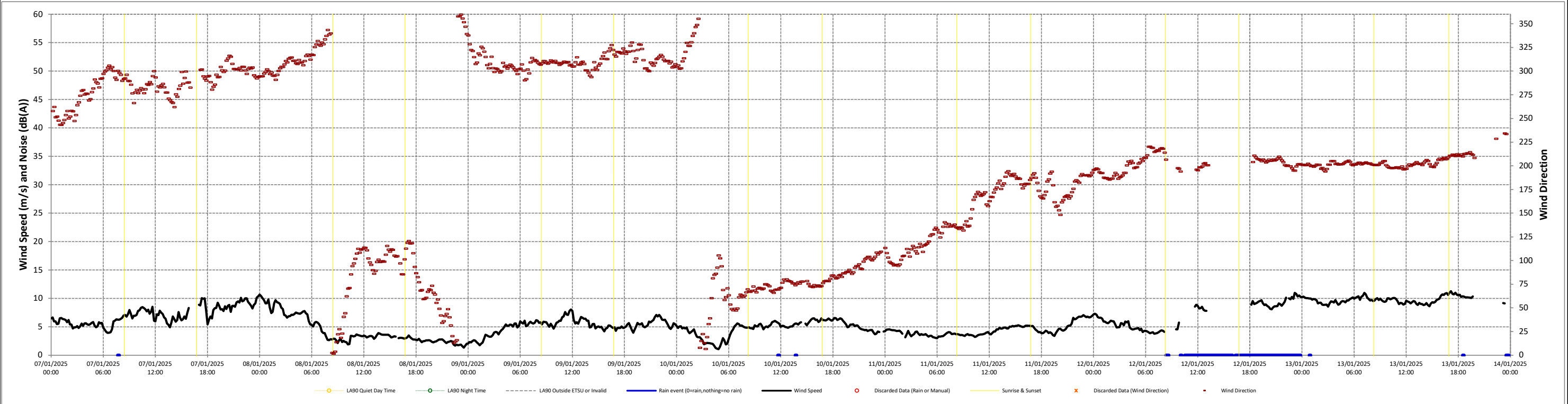
Date 03/07/2026



31/12/2024 to 07/01/2025



07/01/2025 to 14/01/2025



Project Scout Moor II Wind Farm

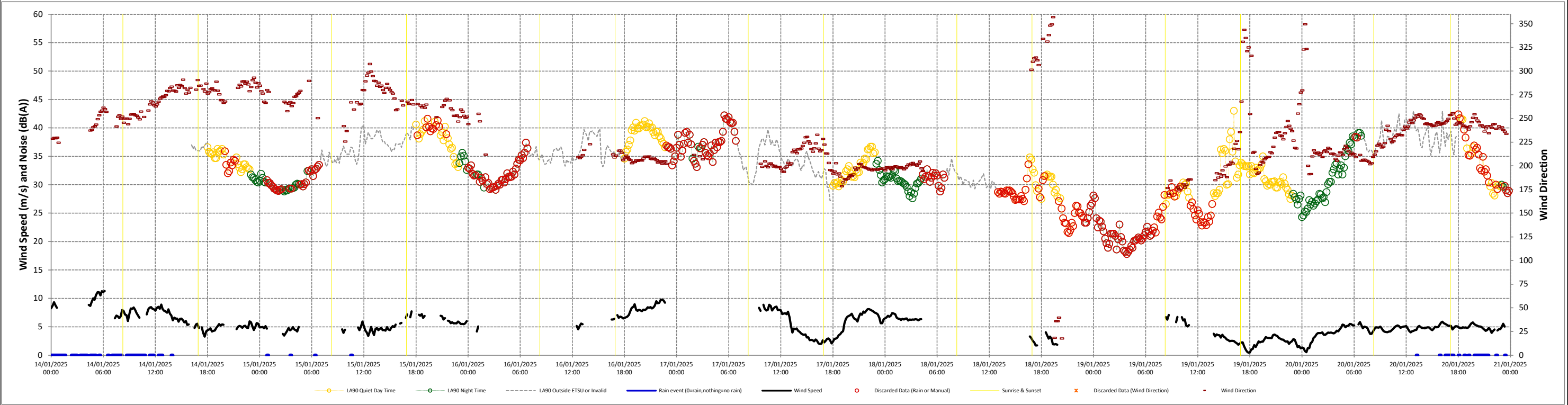
Client Cubico UK Development Ltd

Title Time Series for NML1 - Lower Mount Pleasant Farm Page 3 of 6

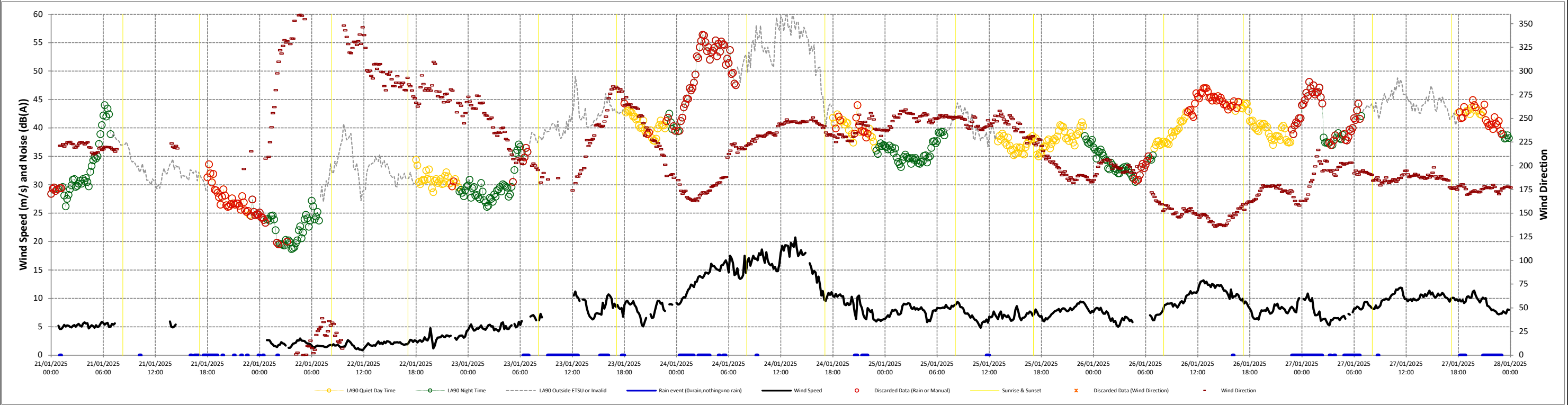
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14/01/2025 to 21/01/2025



21/01/2025 to 28/01/2025



Project Scout Moor II Wind Farm

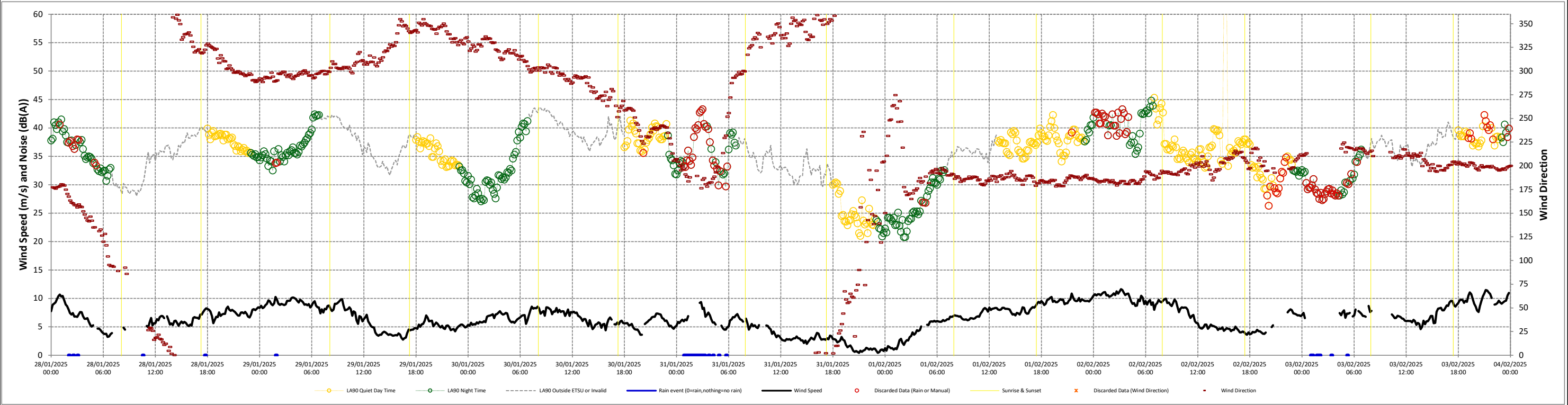
Client Cubico UK Development Ltd

Title Time Series for NML1 - Lower Mount Pleasant Farm Page 4 of 6

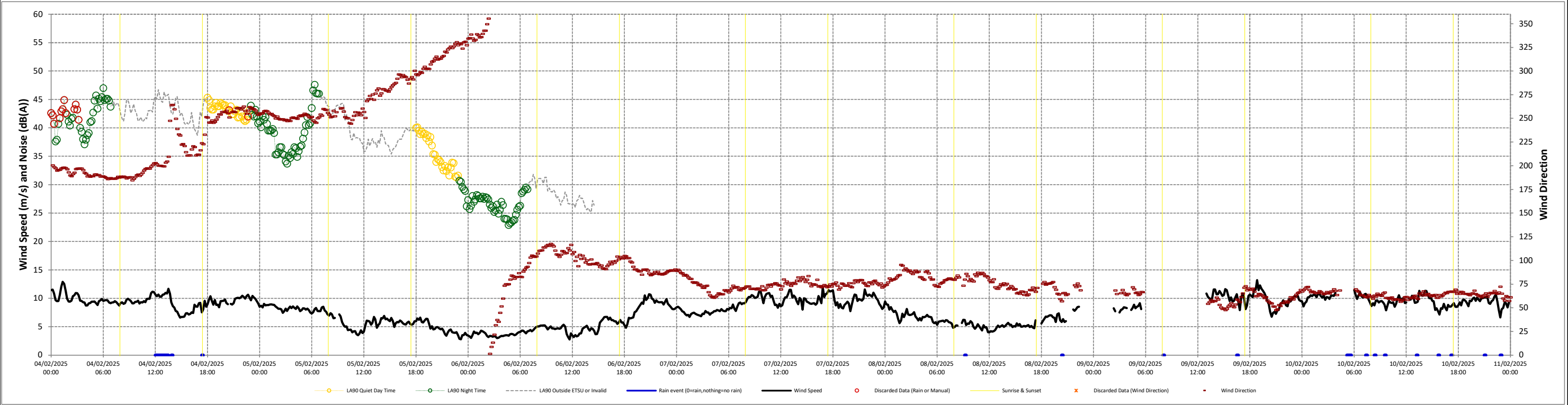
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28/01/2025 to 04/02/2025



04/02/2025 to 11/02/2025



Project Scout Moor II Wind Farm

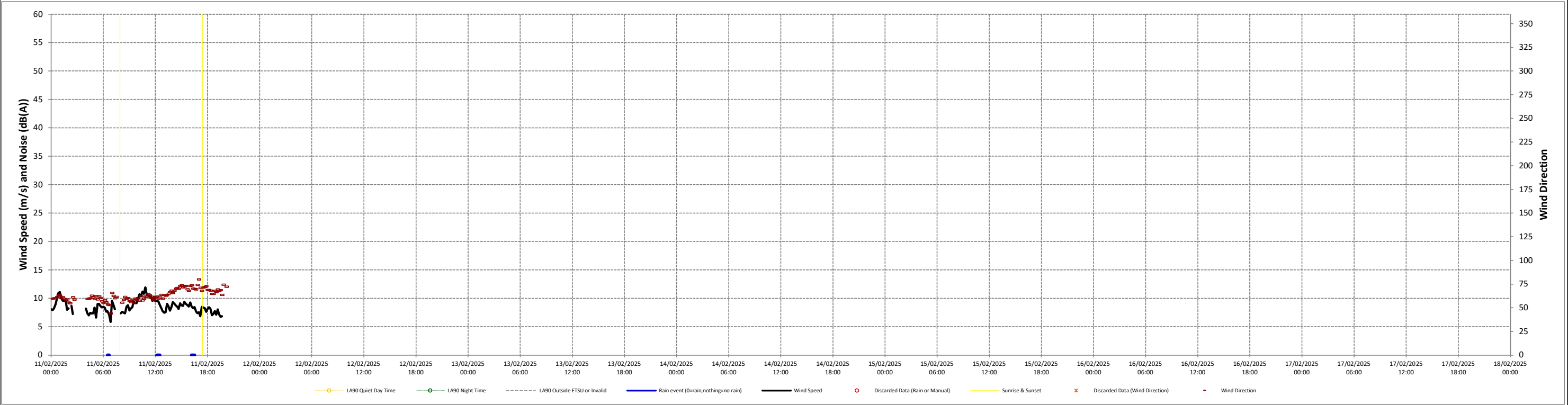
Client Cubico UK Development Ltd

Title Time Series for NML1 - Lower Mount Pleasant Farm Page 5 of 6

Date 03/07/2026



11/02/2025 to 18/02/2025



Project Scout Moor II Wind Farm

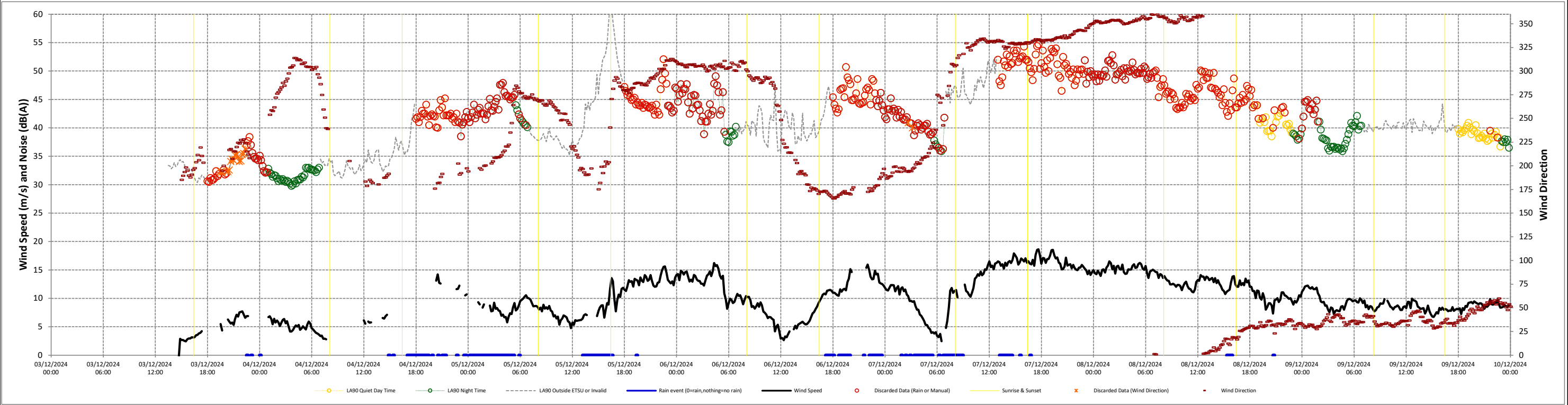
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Title Time Series for NML1 - Lower Mount Pleasant Farm Page 6 of 6

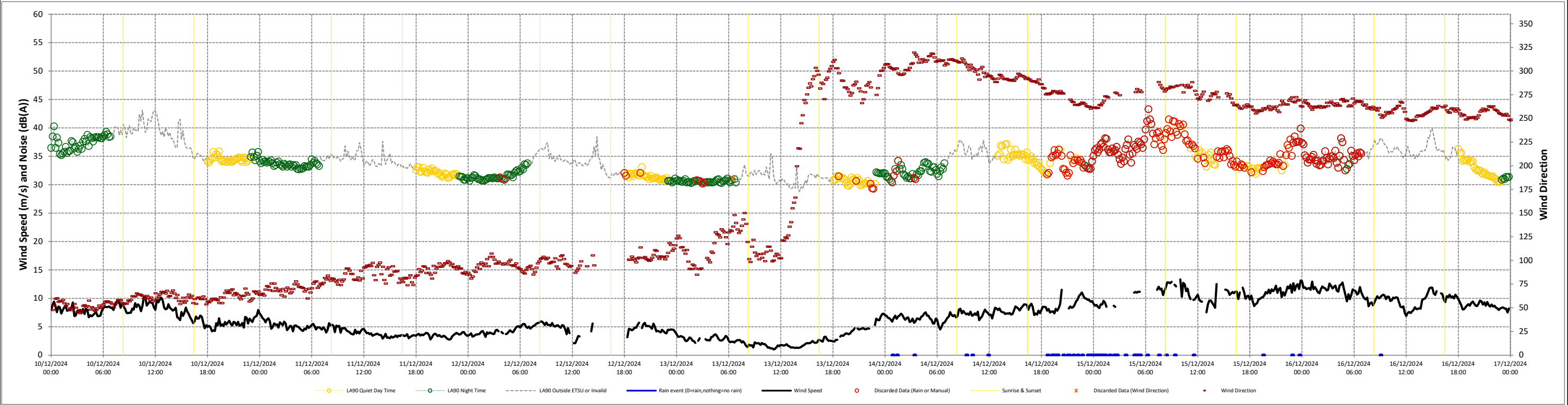
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10/12/2024 to 17/12/2024



Project Scout Moor II Wind Farm

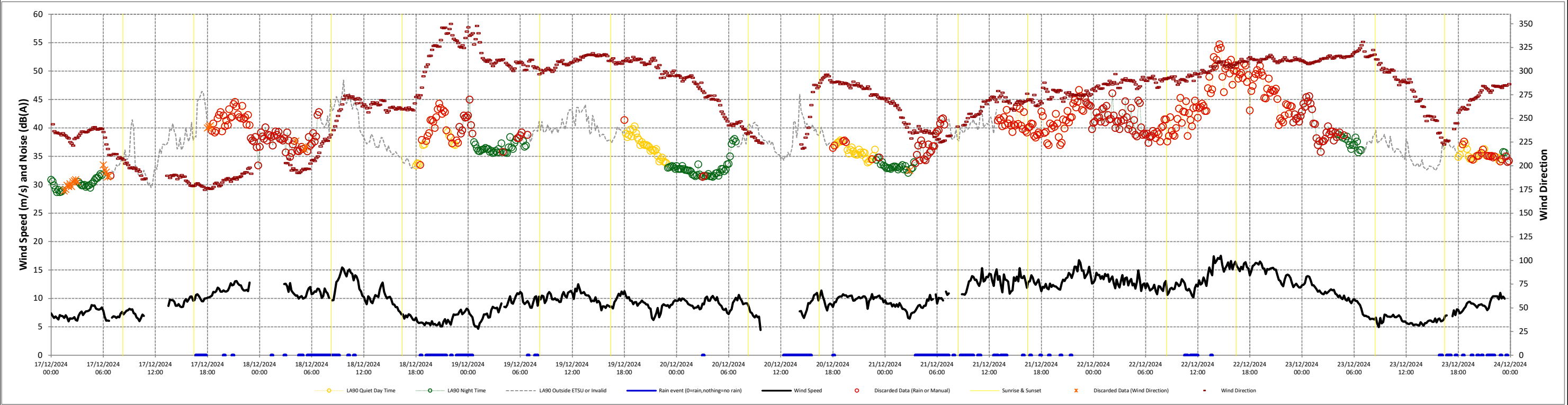
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Title Time Series for NML2 - Lowerfold Barn Page 1 of 6

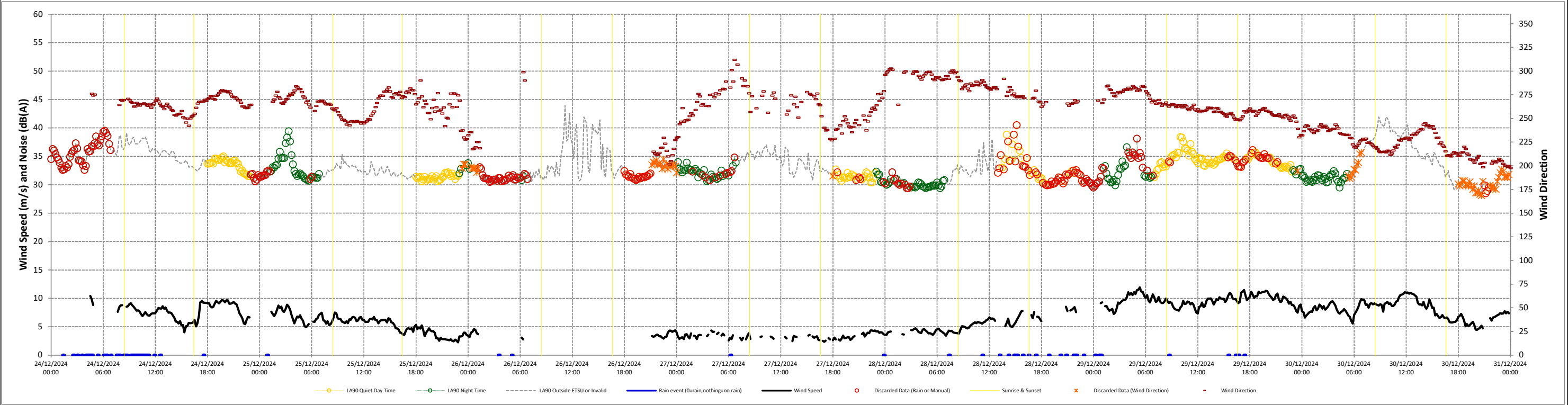
Date 16/07/2026



17/12/2024 to 24/12/2024



24/12/2024 to 31/12/2024



Project Scout Moor II Wind Farm

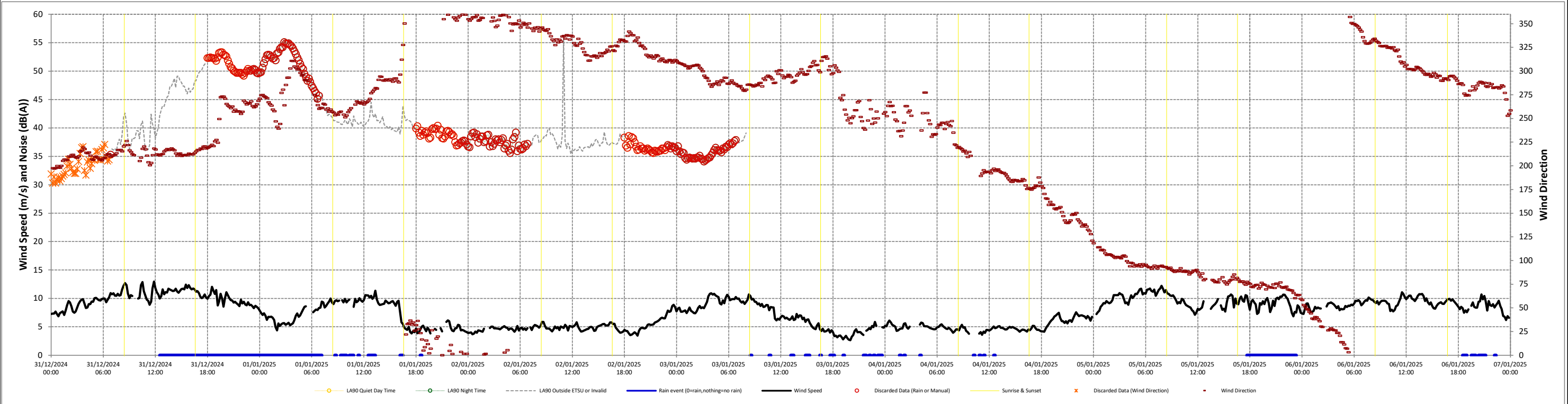
Client Cubico UK Development Ltd

Title Time Series for NML2 - Lowerfold Barn Page 2 of 6

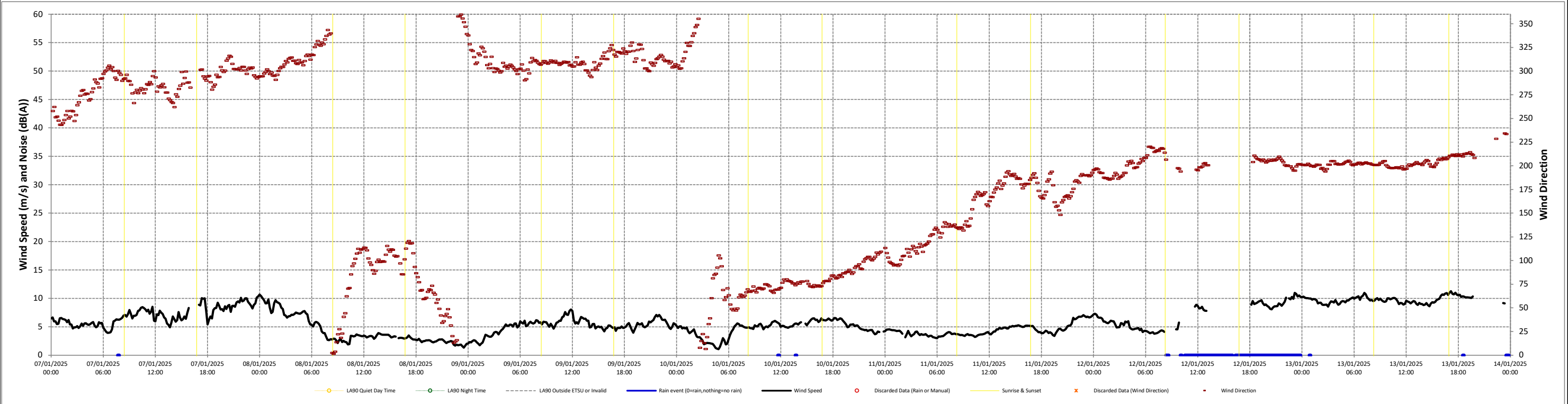
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07/01/2025 to 14/01/2025



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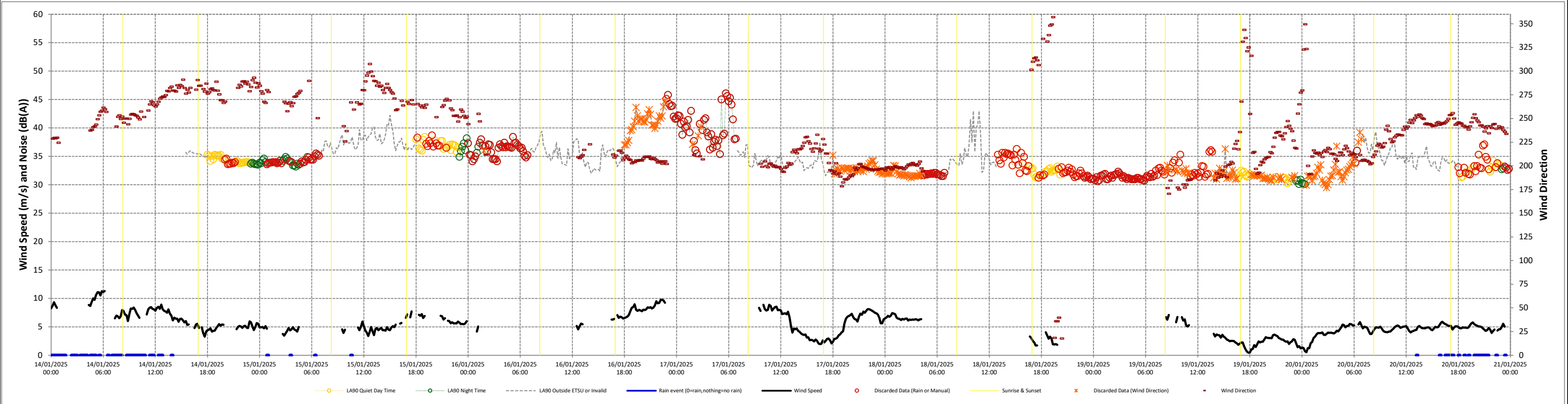
Client Cubico UK Development Ltd

Title Time Series for NML2 - Lowerfold Barn Page 3 of 6

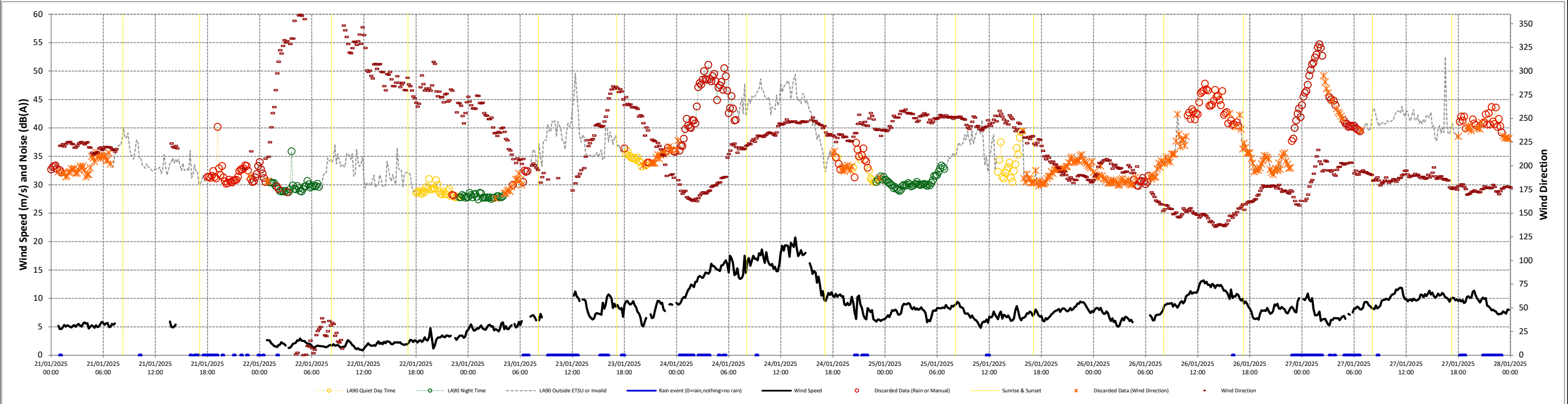
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14/01/2025 to 21/01/2025



21/01/2025 to 28/01/2025



Project Scout Moor II Wind Farm

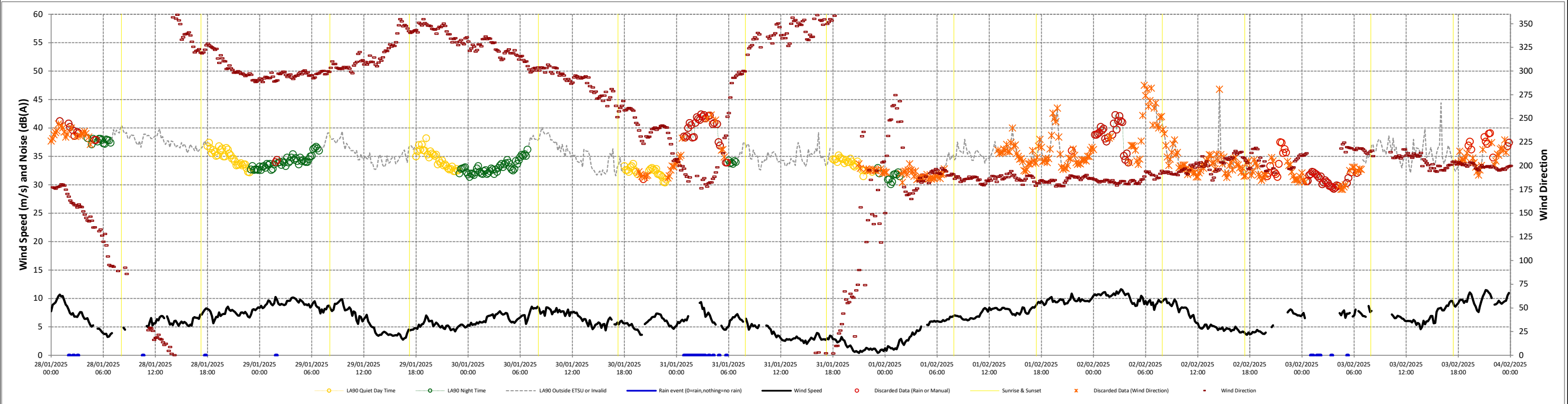
Client Cubico UK Development Ltd

Title Time Series for NML2 - Lowerfold Barn Page 4 of 6

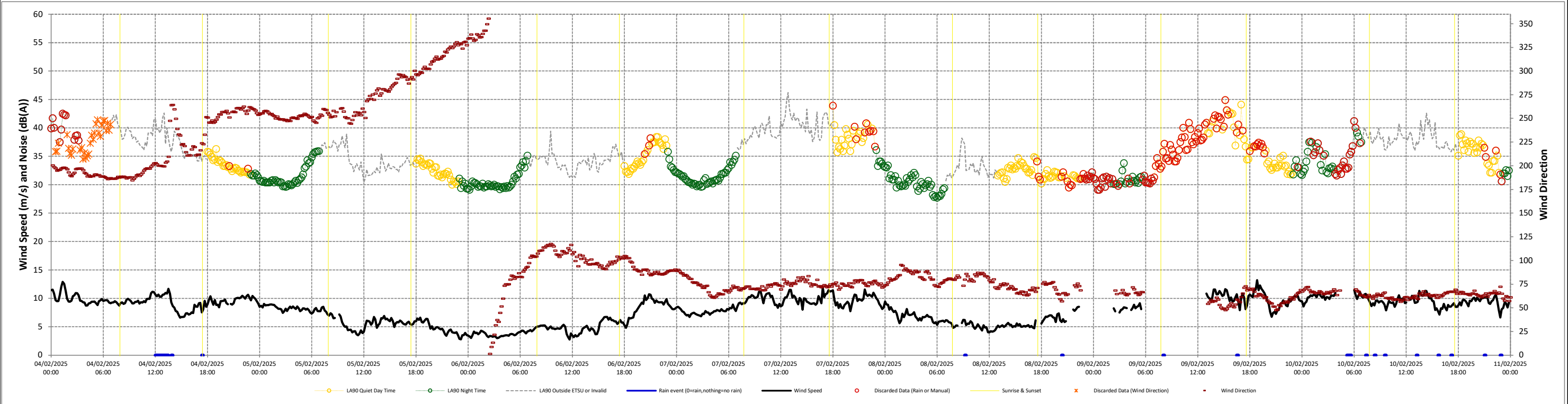
Date 16/07/2026



28/01/2025 to 04/02/2025



04/02/2025 to 11/02/2025



Project Scout Moor II Wind Farm

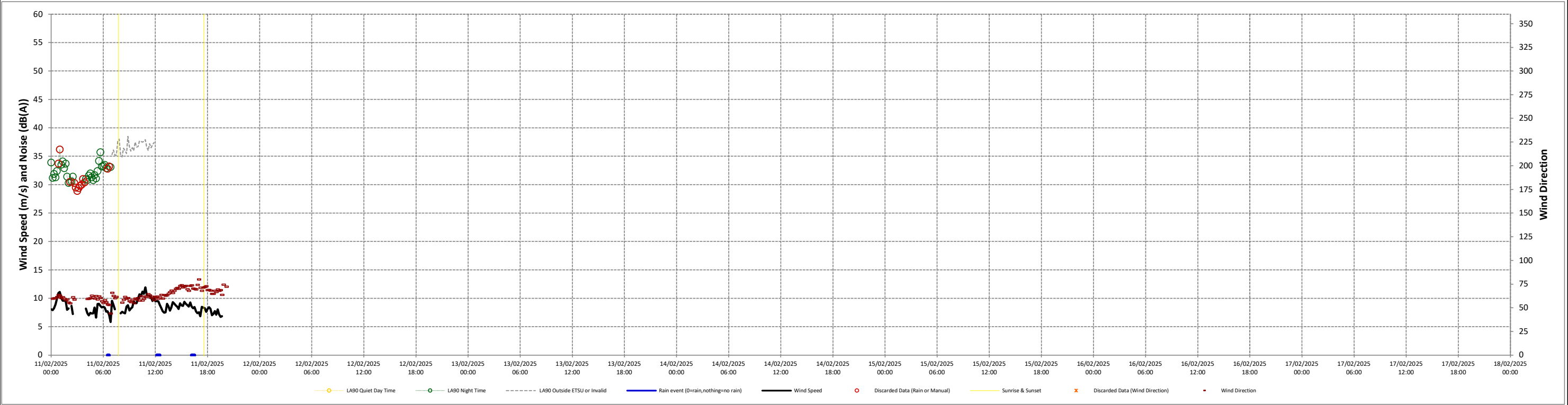
Client Cubico UK Development Ltd

Title Time Series for NML2 - Lowerfold Barn Page 5 of 6

Date 16/07/2026



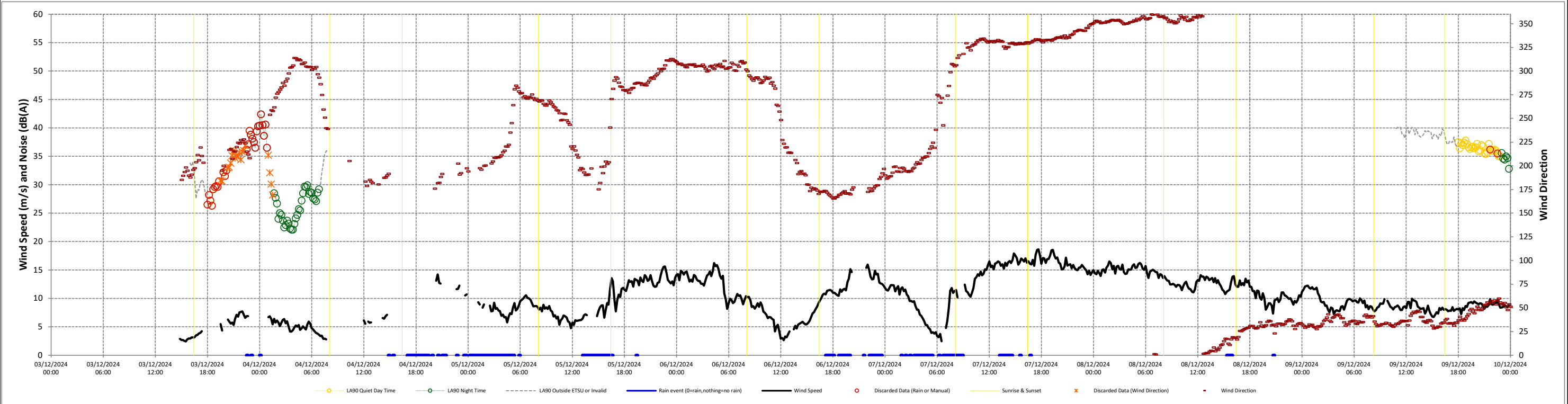
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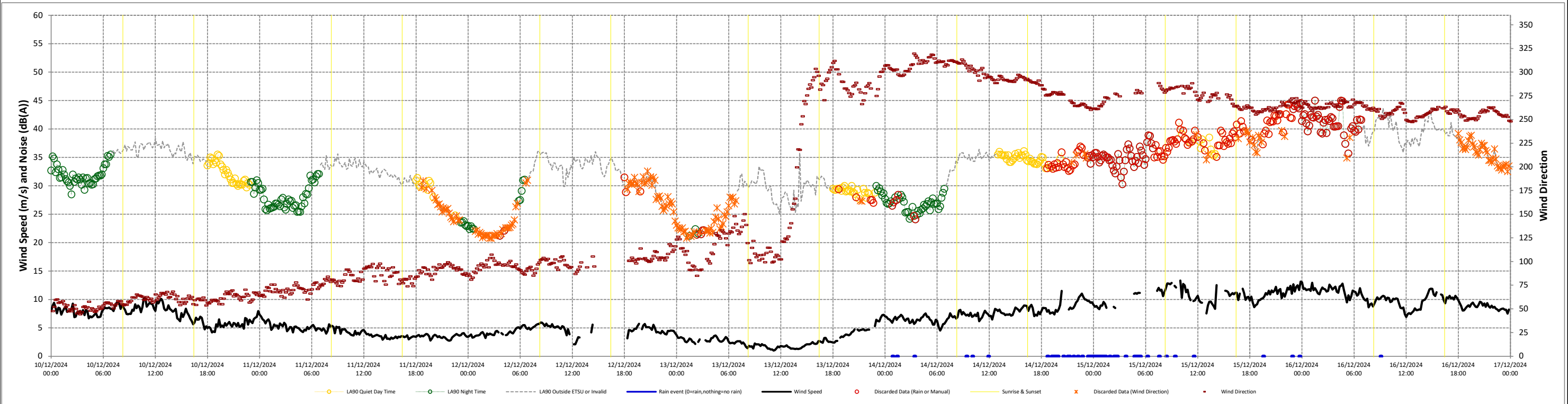
Project	Scout Moor II Wind Farm
Client	Cubico UK Development Ltd
Title	Time Series for NML2 - Lowerfold Barn Page 6 of 6
Date	16/07/2026



03/12/2024 to 10/12/2024



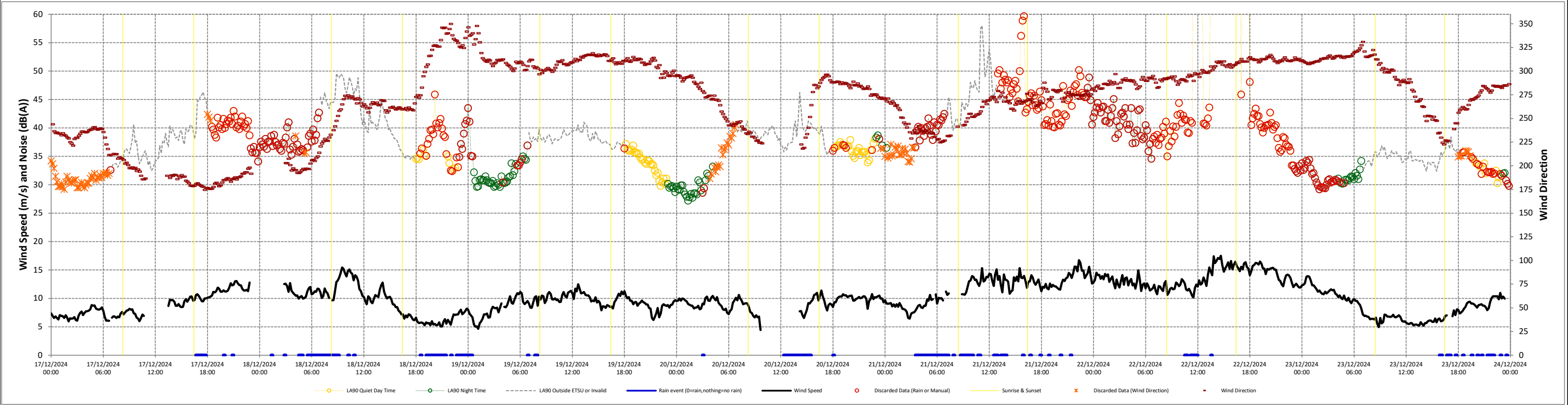
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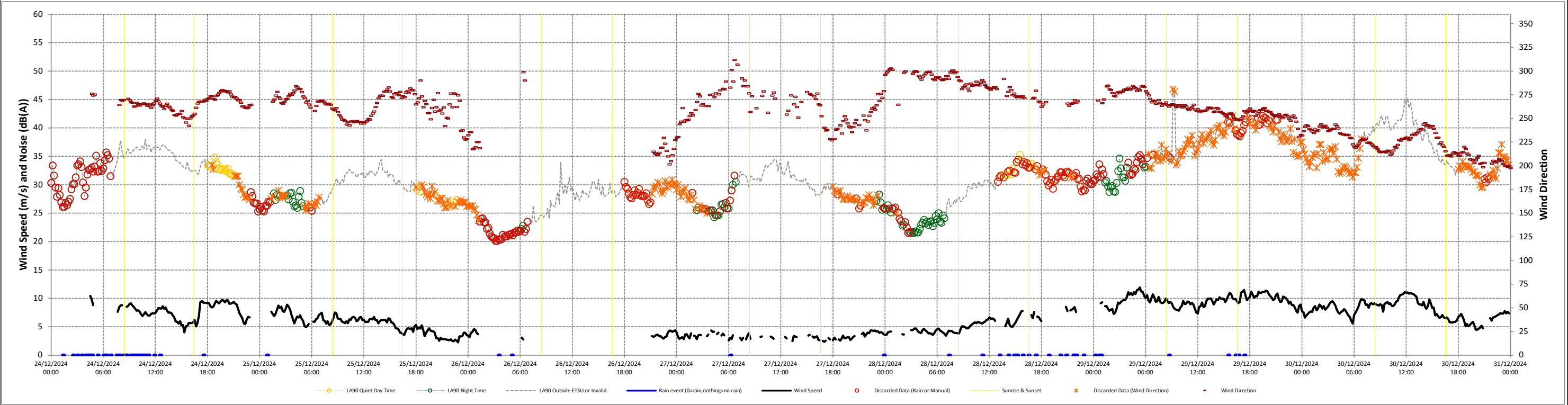
Project	Scout Moor II Wind Farm
Client	Cubico UK Development Ltd
Title	Time Series for NML3 - 6 Law Head Page 1 of 6
Date	16/07/2026



17/12/2024 to 24/12/2024



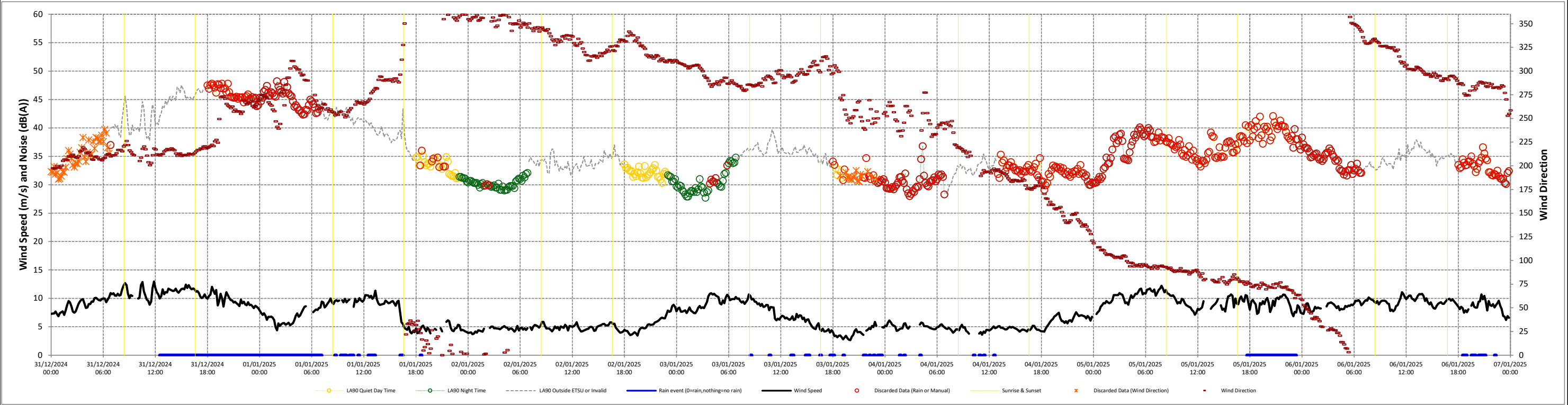
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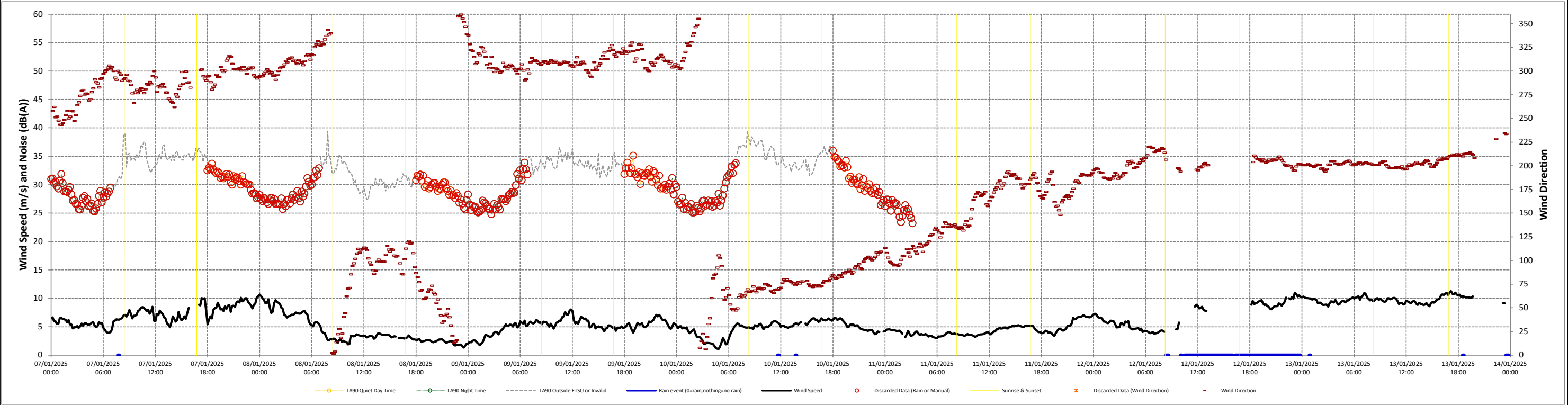
Project	Scout Moor II Wind Farm
Client	Cubico UK Development Ltd
Title	Time Series for NML3 - 6 Law Head Page 2 of 6
Date	16/07/2026



31/12/2024 to 07/01/2025



07/01/2025 to 14/01/2025



Project Scout Moor II Wind Farm

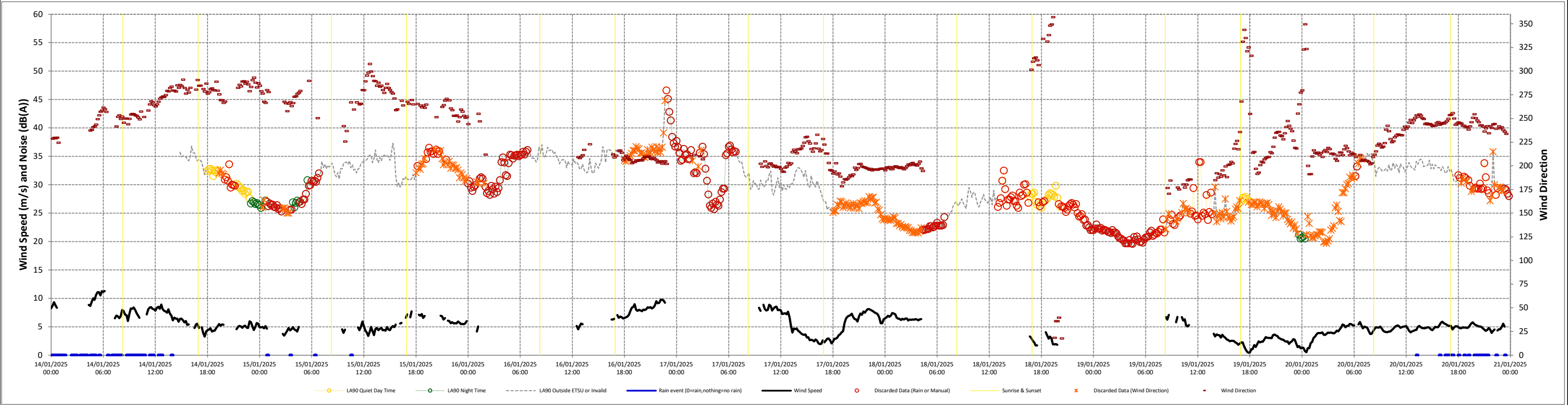
Client Cubico UK Development Ltd

Title Time Series for NML3 - 6 Law Head Page 3 of 6

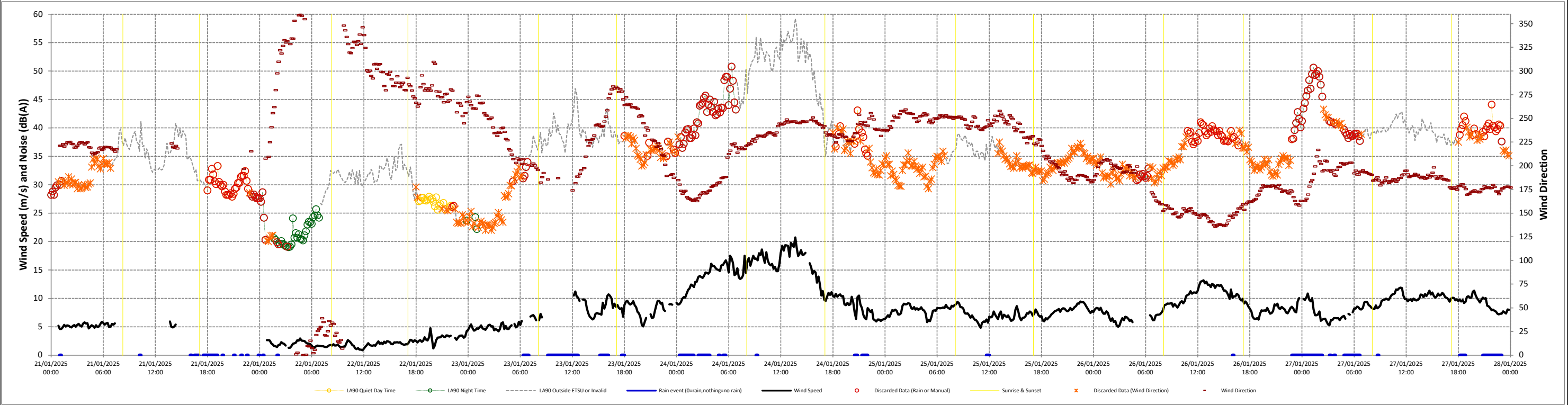
Date 16/07/2026



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21/01/2025 to 28/01/2025



Project Scout Moor II Wind Farm

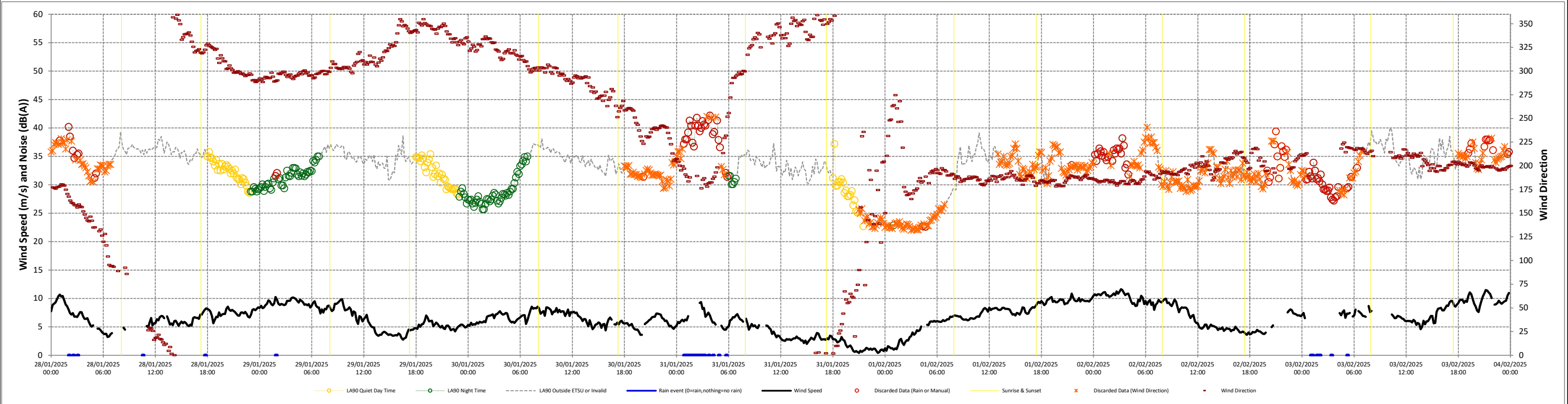
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Title Time Series for NML3 - 6 Law Head Page 4 of 6

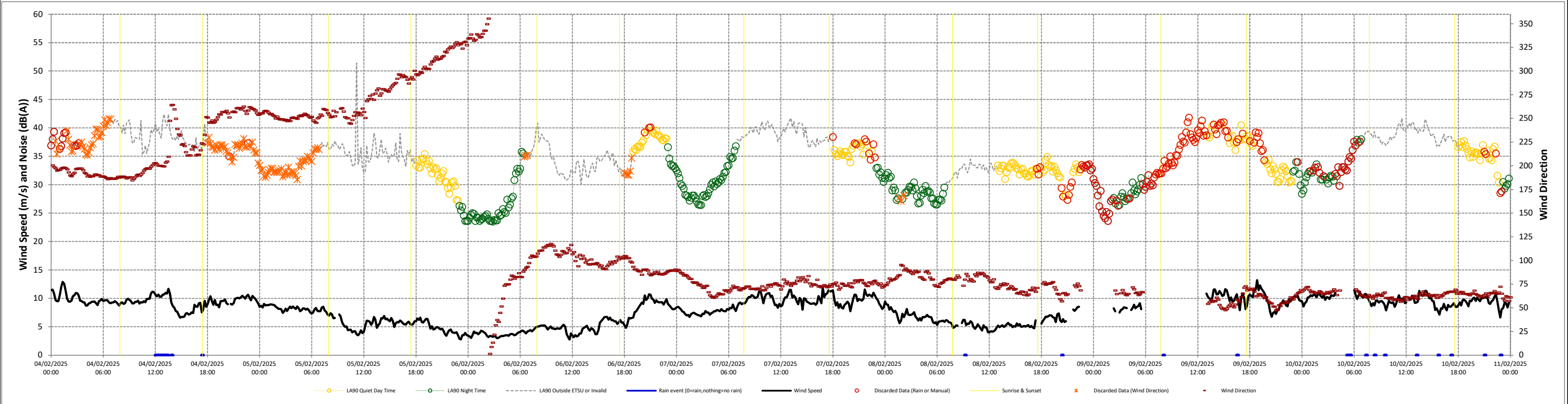
Date 16/07/2026



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Project Scout Moor II Wind Farm

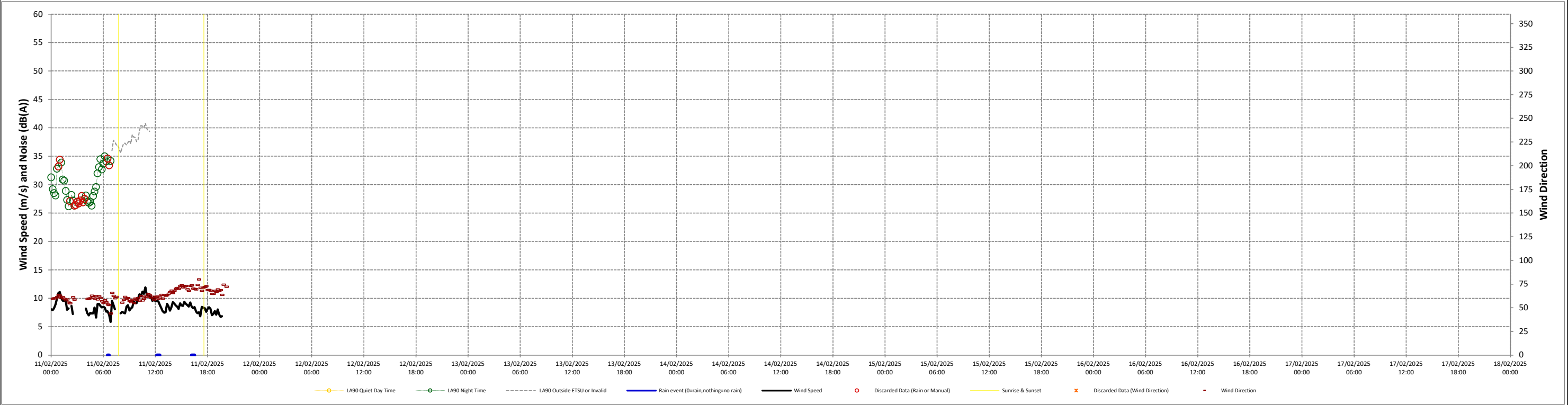
Client Cubico UK Development Ltd

Title Time Series for NML3 - 6 Law Head Page 5 of 6

Date 16/07/2026

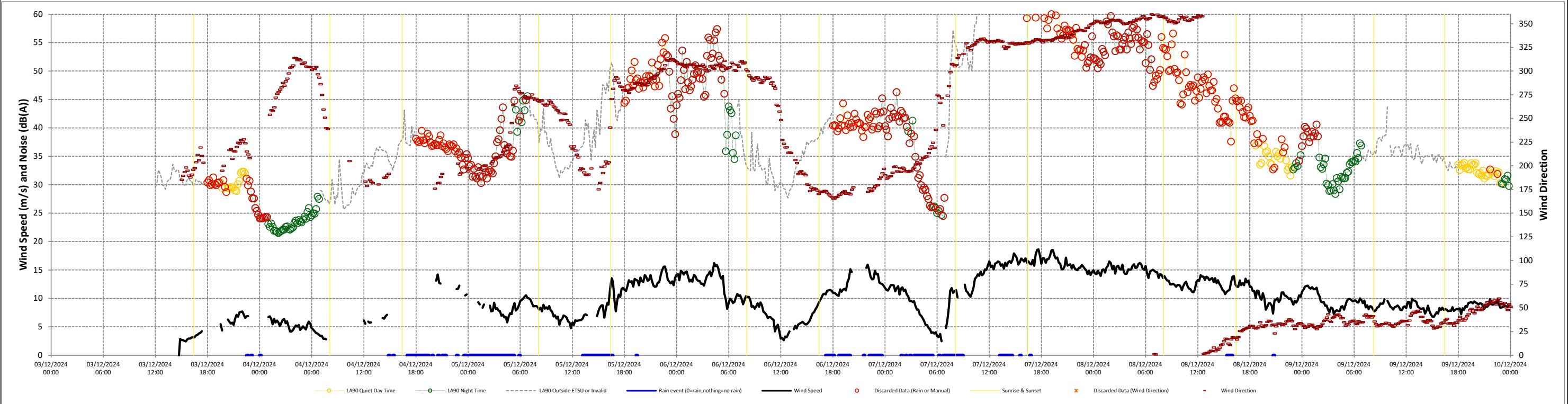


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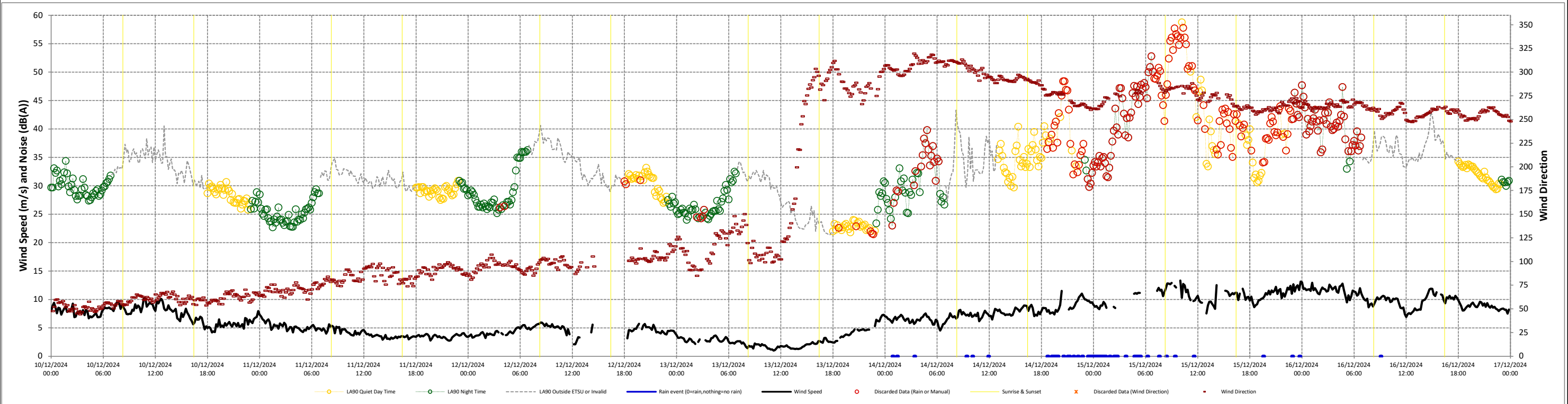


	Project	Scout Moor II Wind Farm	
	Client	Cubico UK Development Ltd	
	Title	Time Series for NML3 - 6 Law Head Page 6 of 6	
	Date	16/07/2026	

03/12/2024 to 10/12/2024



10/12/2024 to 17/12/2024



Project Scout Moor II Wind Farm

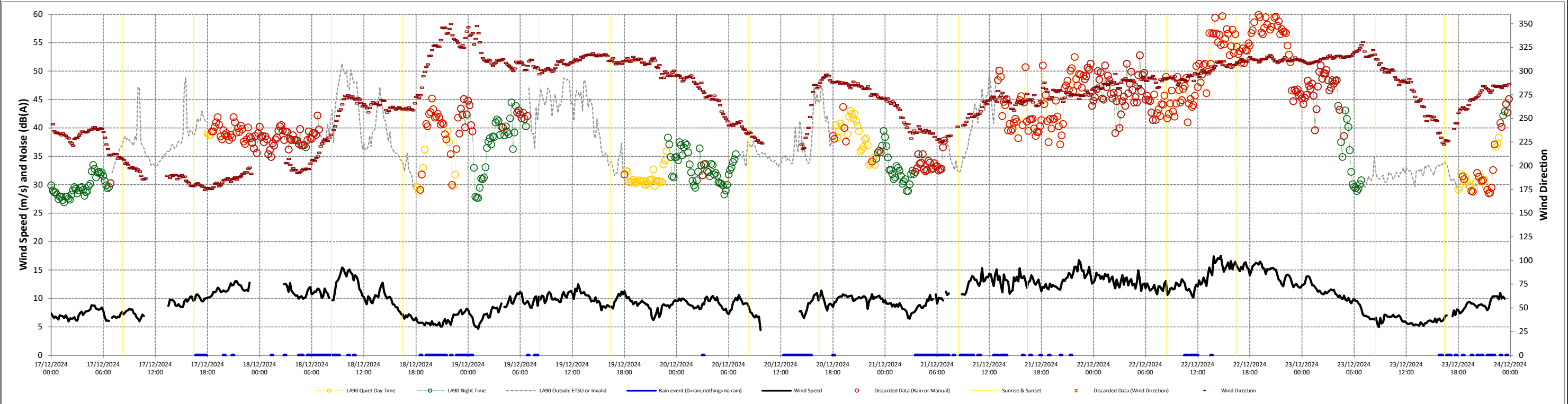
Client Cubico UK Development Ltd

Title Time Series for NML4 - New Road Page 1 of 6

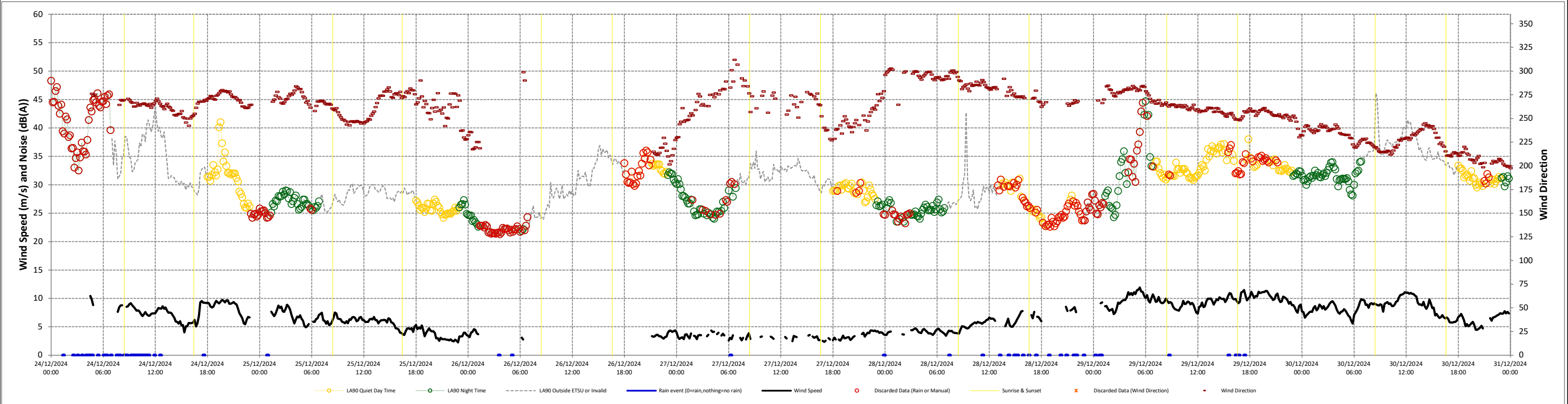
Date 16/07/2026



17/12/2024 to 24/12/2024



24/12/2024 to 31/12/2024



Project Scout Moor II Wind Farm

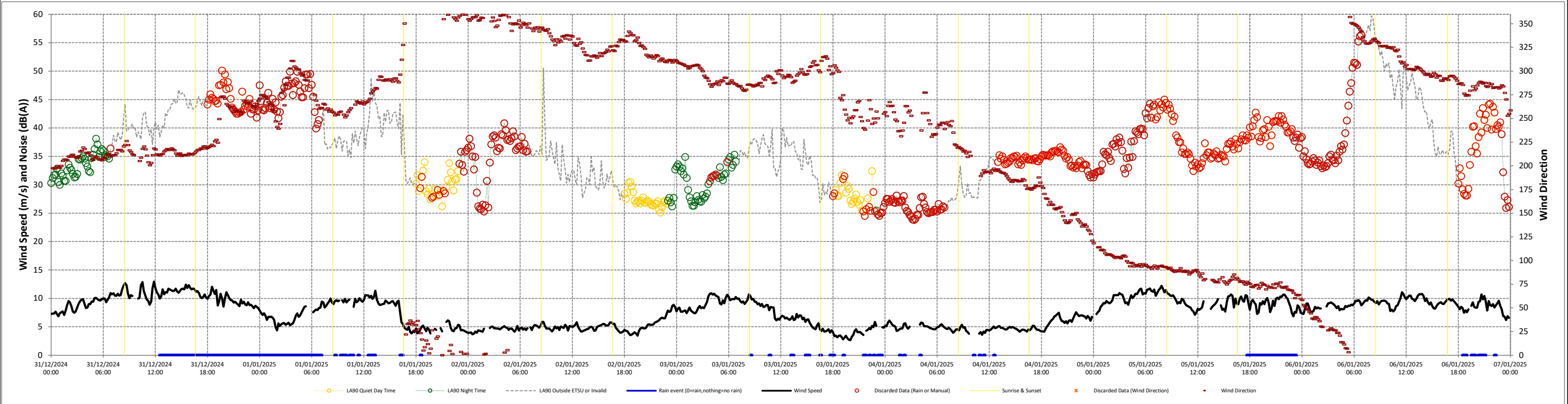
Client Cubico UK Development Ltd

Title Time Series for NML4 - New Road Page 2 of 6

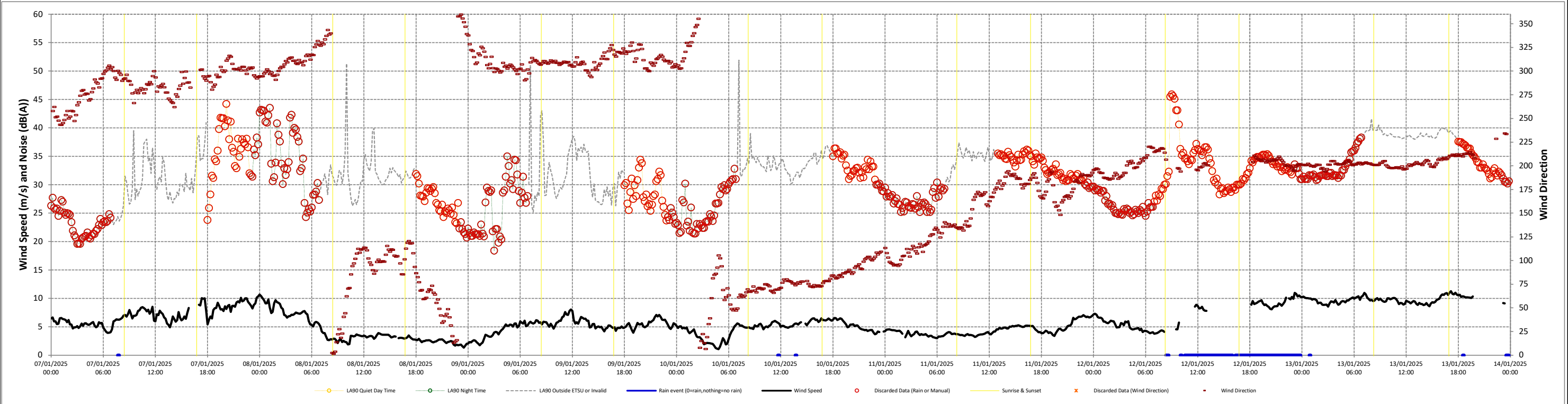
Date 16/07/2026



31/12/2024 to 07/01/2025



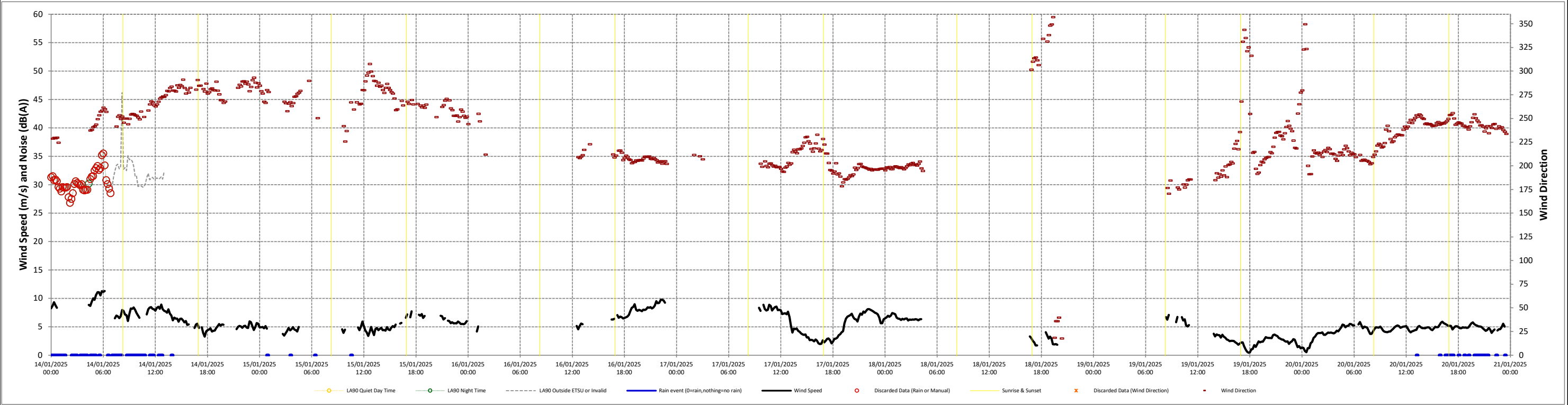
07/01/2025 to 14/01/2025



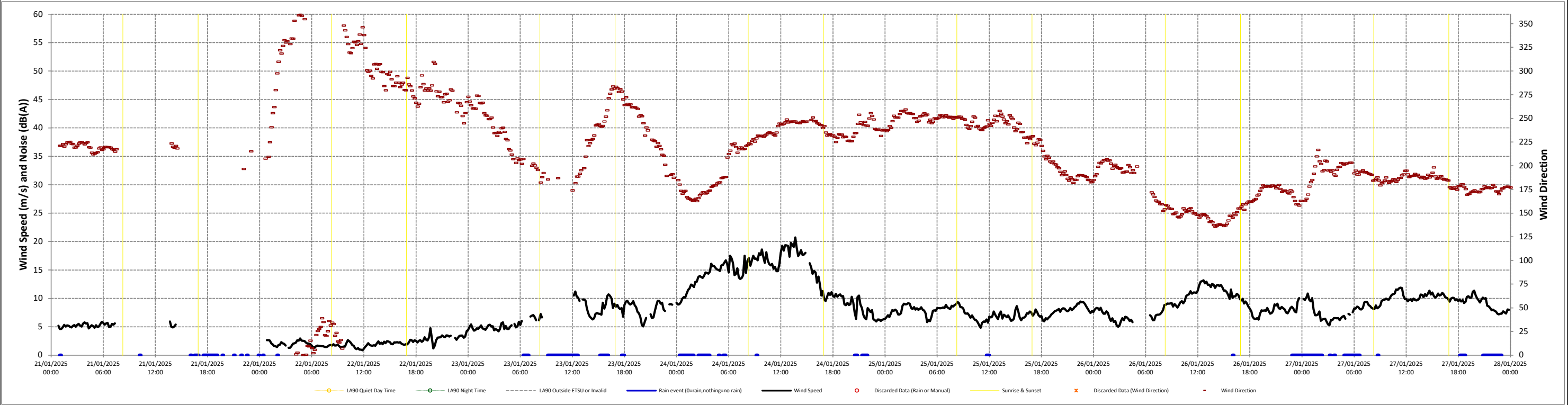
Project	Scout Moor II Wind Farm
Client	Cubico UK Development Ltd
Title	Time Series for NML4 - New Road Page 3 of 6
Date	16/07/2026



14/01/2025 to 21/01/2025



21/01/2025 to 28/01/2025



Project Scout Moor II Wind Farm

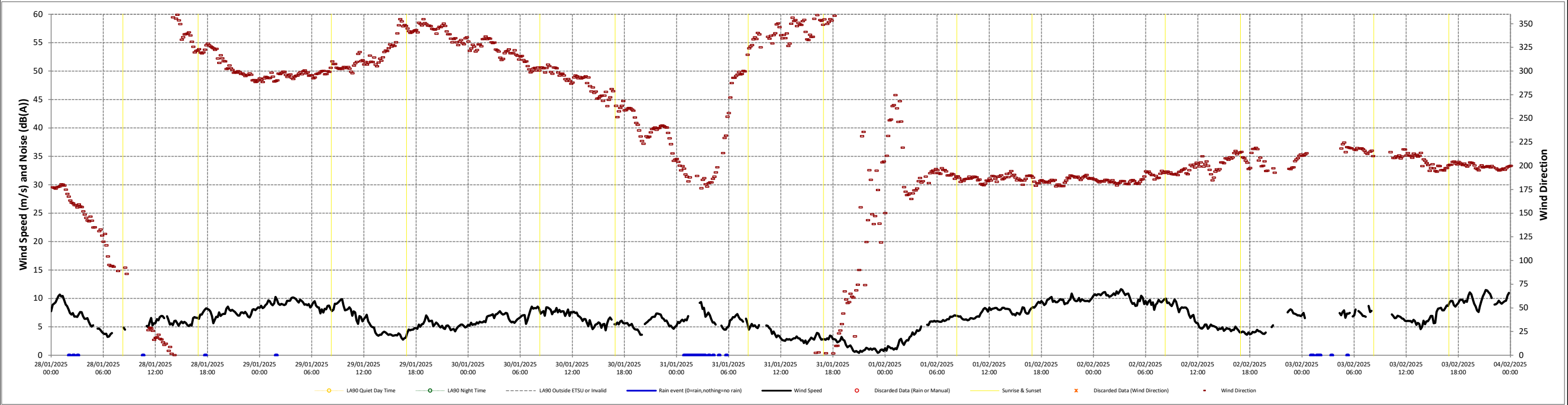
Client Cubico UK Development Ltd

Title Time Series for NML4 - New Road Page 4 of 6

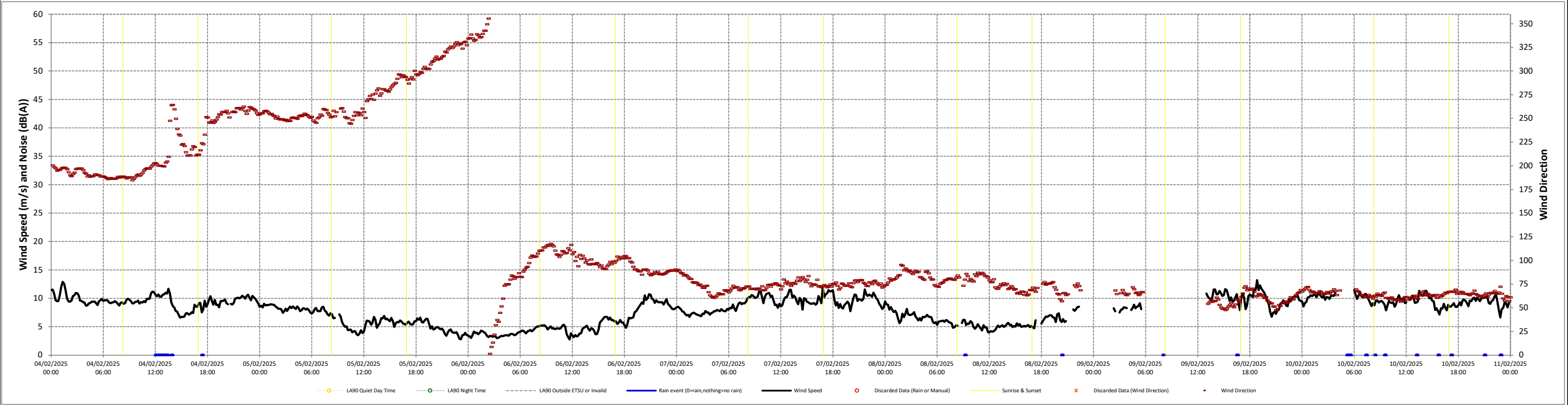
Date 16/07/2026



28/01/2025 to 04/02/2025



04/02/2025 to 11/02/2025



Project Scout Moor II Wind Farm

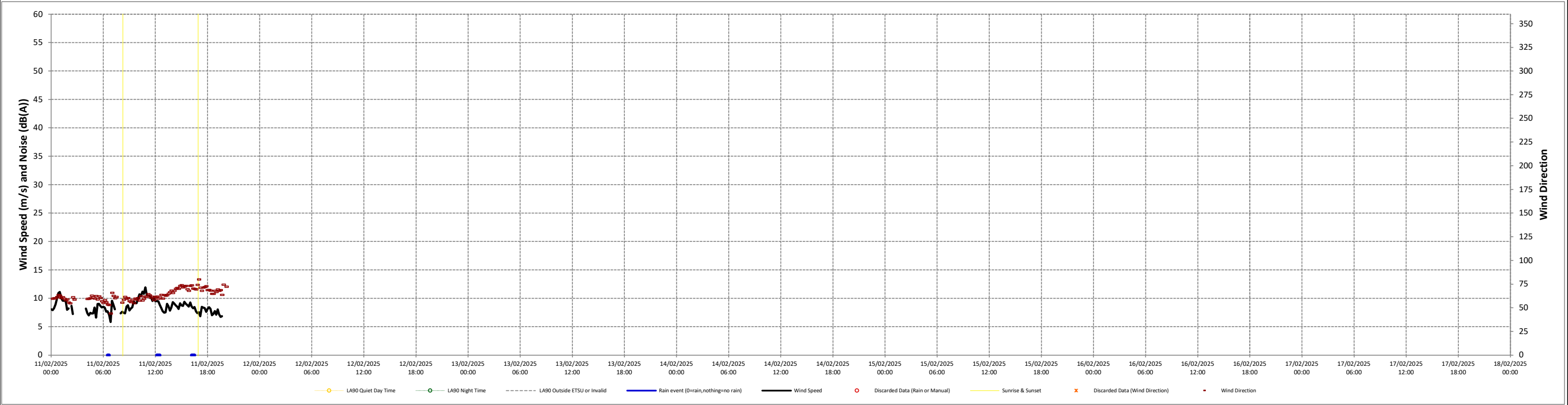
Client Cubico UK Development Ltd

Title Time Series for NML4 - New Road Page 5 of 6

Date 16/07/2026



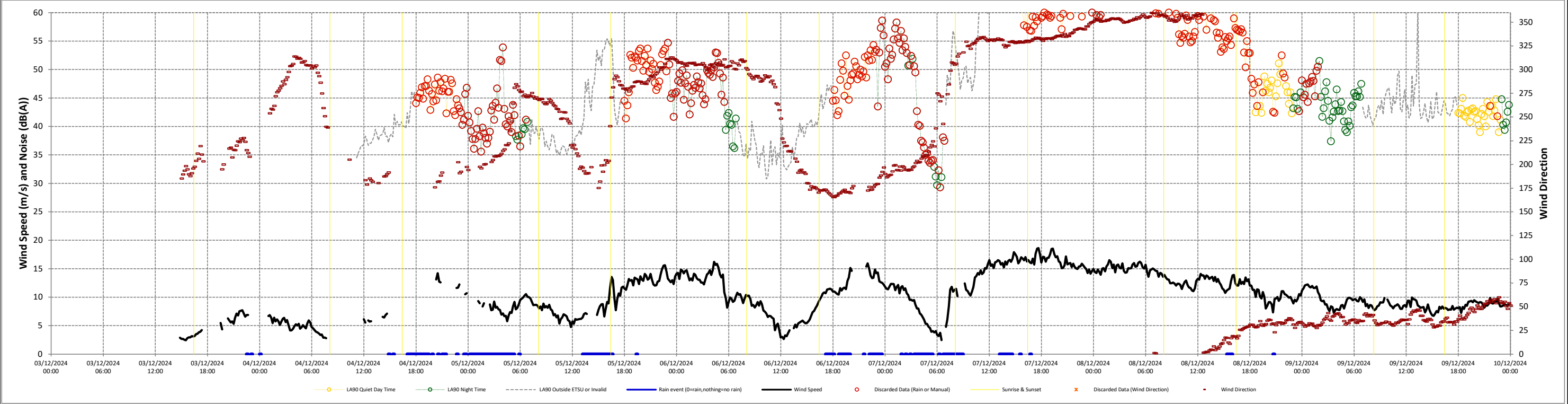
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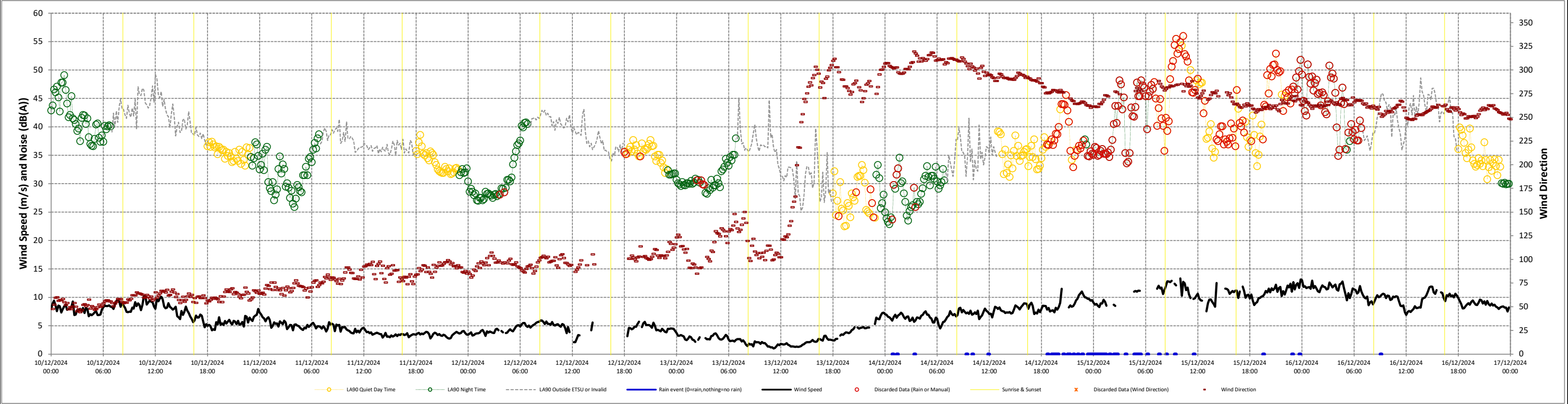
Project	Scout Moor II Wind Farm
Client	Cubico UK Development Ltd
Title	Time Series for NML4 - New Road Page 6 of 6
Date	16/07/2026



03/12/2024 to 10/12/2024



10/12/2024 to 17/12/2024



Project Scout Moor II Wind Farm

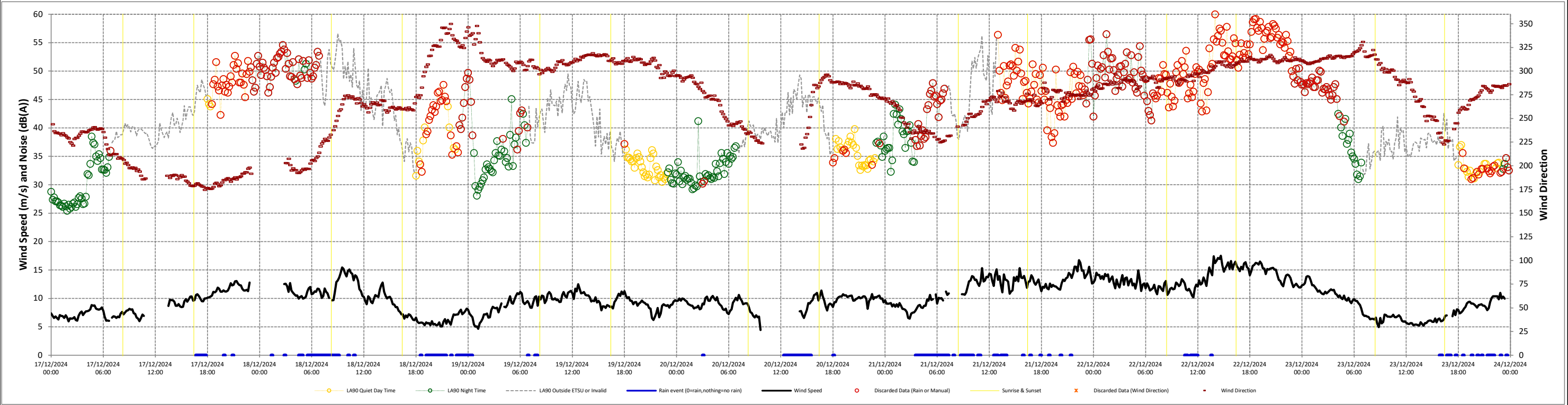
Client Cubico UK Development Ltd

Title Time Series for NML5- Windy Harbour Page 1 of 6

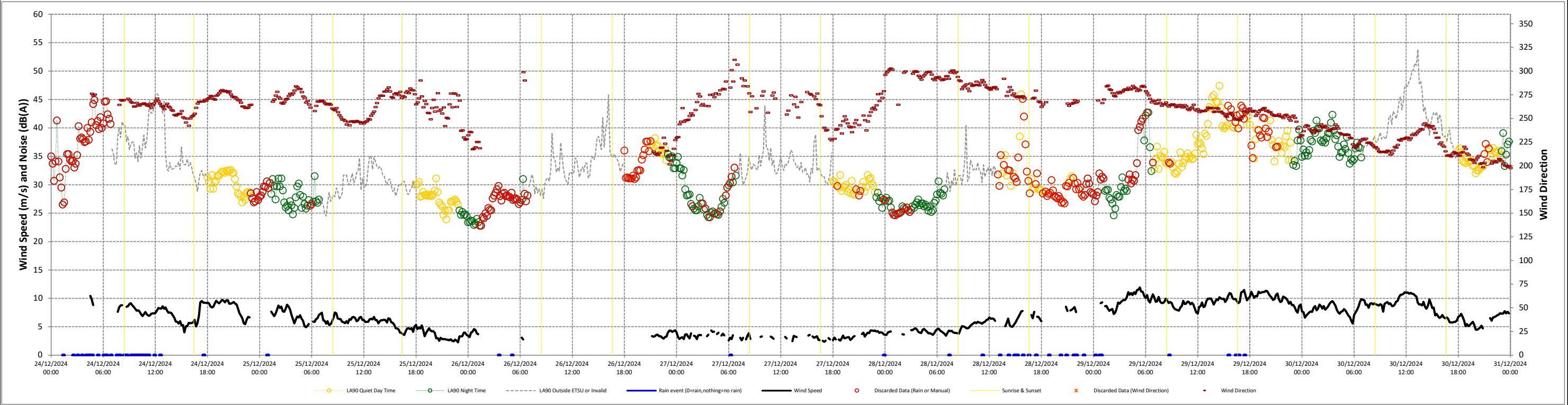
Date 16/07/2026



17/12/2024 to 24/12/2024



24/12/2024 to 31/12/2024



Project Scout Moor II Wind Farm

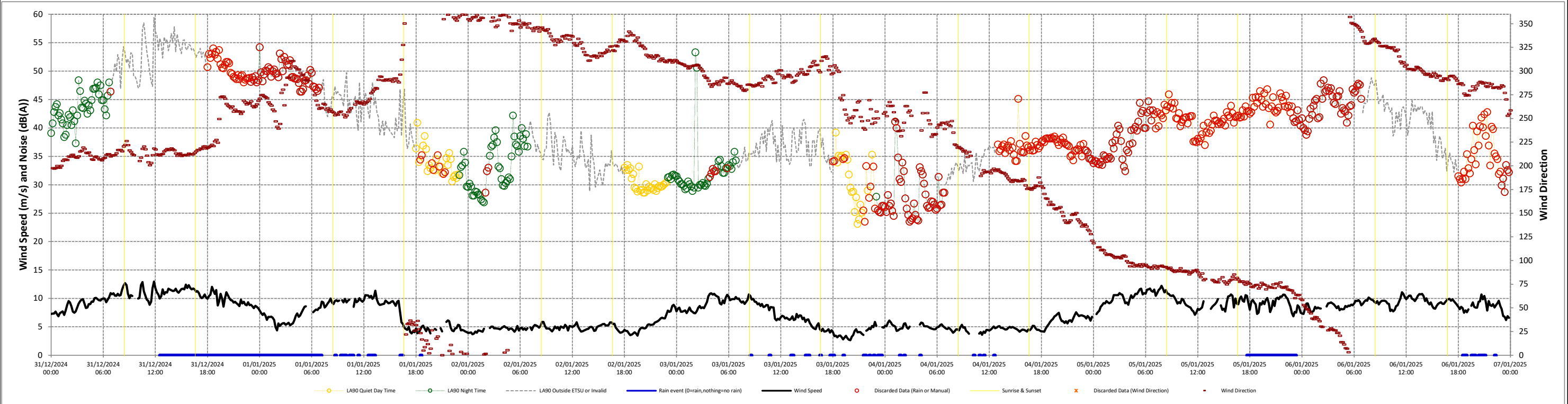
Client Cubico UK Development Ltd

Title Time Series for NML5- Windy Harbour Page 2 of 6

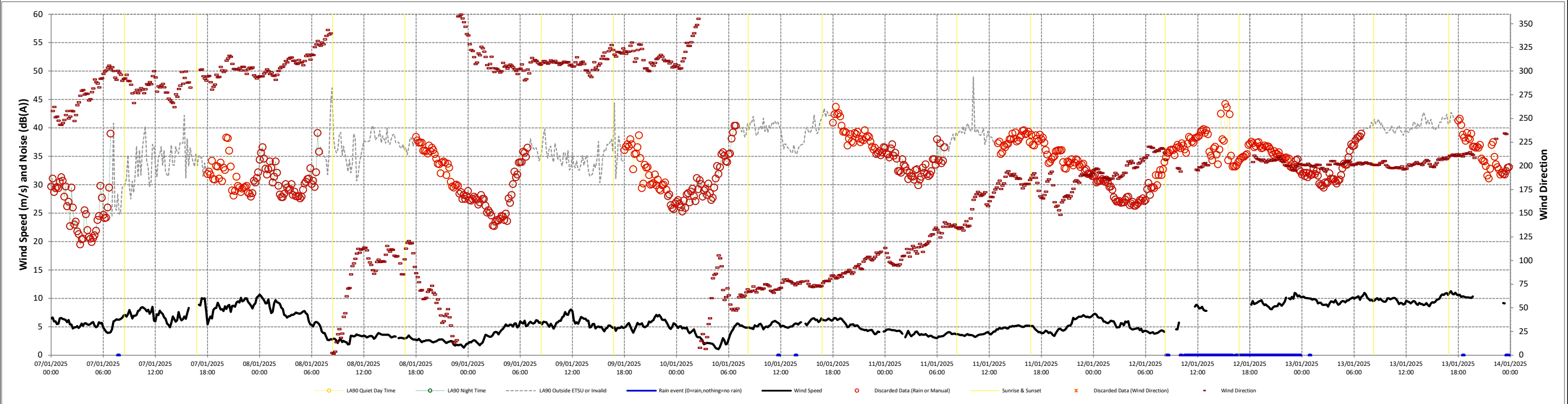
Date 16/07/2026



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07/01/2025 to 14/01/2025



Project Scout Moor II Wind Farm

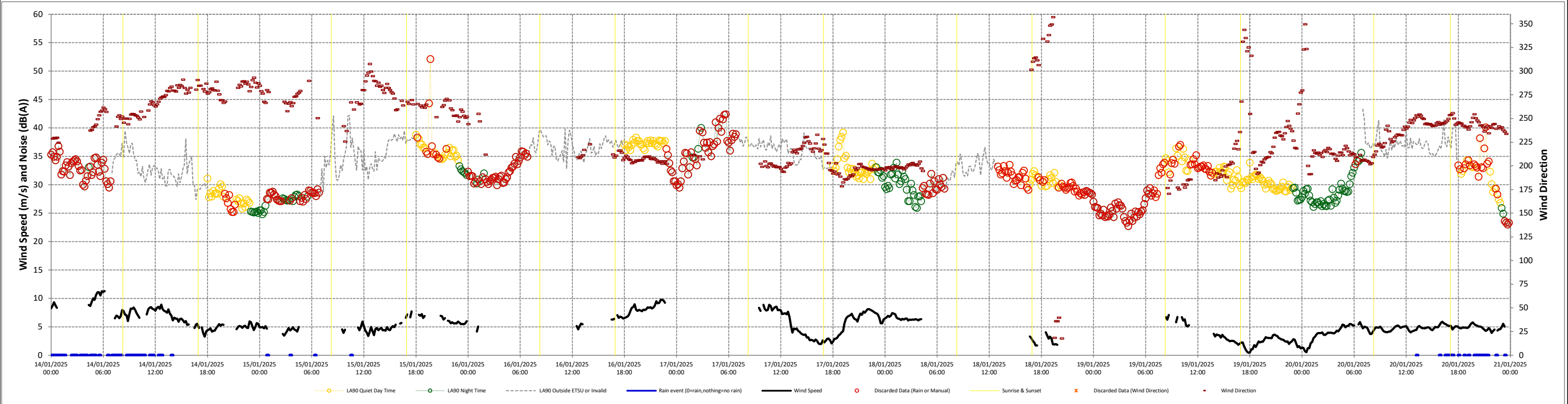
Client Cubico UK Development Ltd

Title Time Series for NML5- Windy Harbour Page 3 of 6

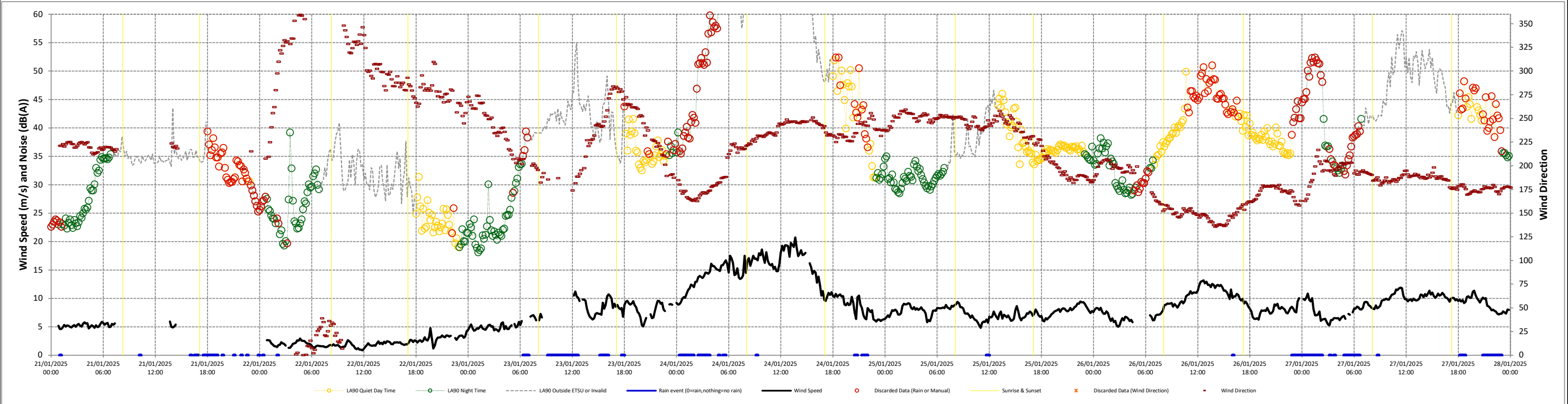
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14/01/2025 to 21/01/2025



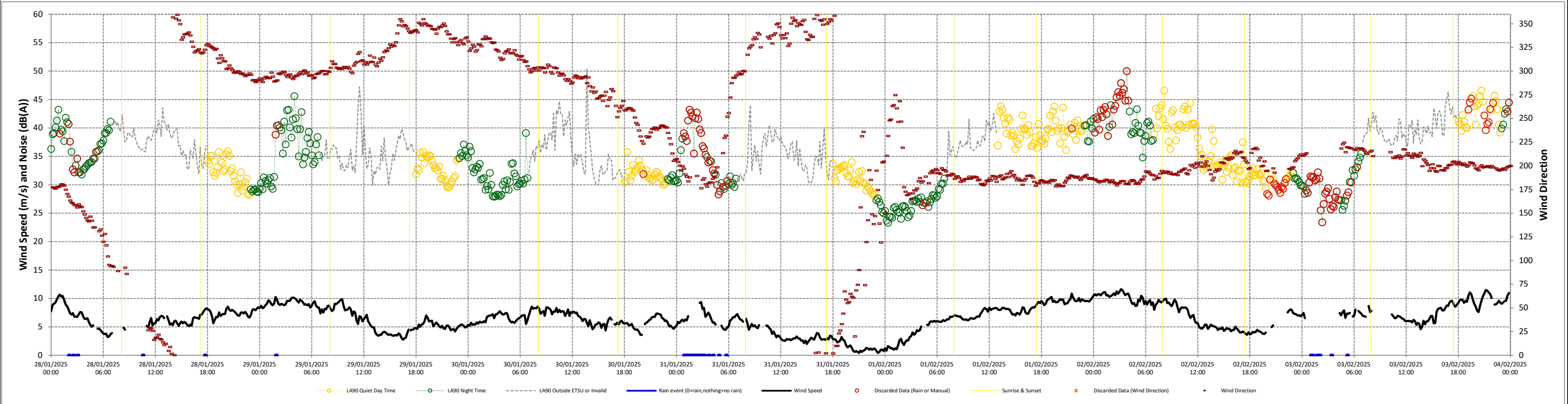
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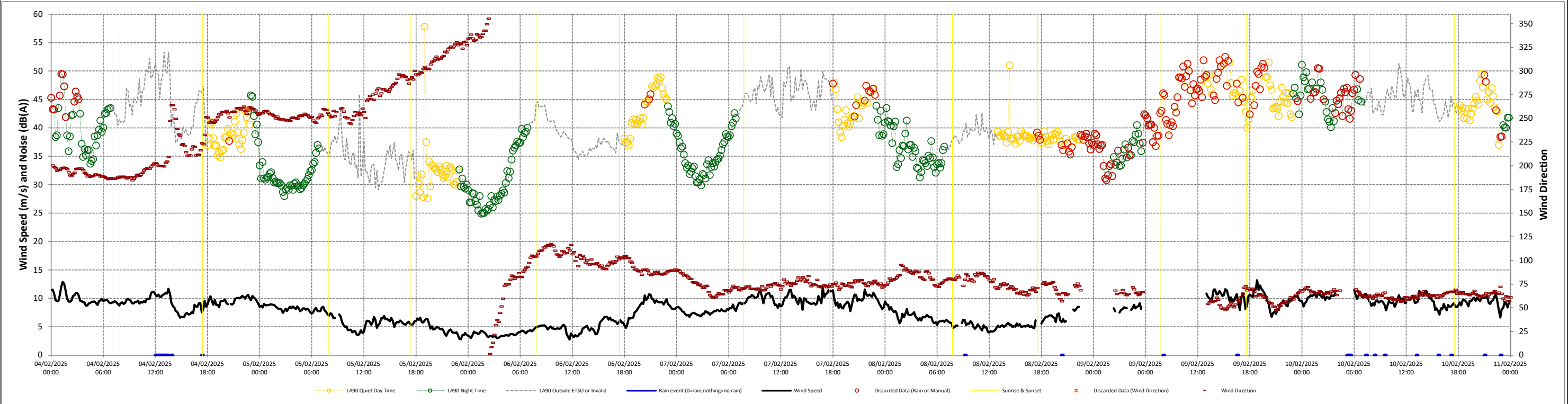
Project	Scout Moor II Wind Farm
Client	Cubico UK Development Ltd
Title	Time Series for NML5- Windy Harbour Page 4 of 6
Date	16/07/2026



28/01/2025 to 04/02/2025



04/02/2025 to 11/02/2025



Project Scout Moor II Wind Farm

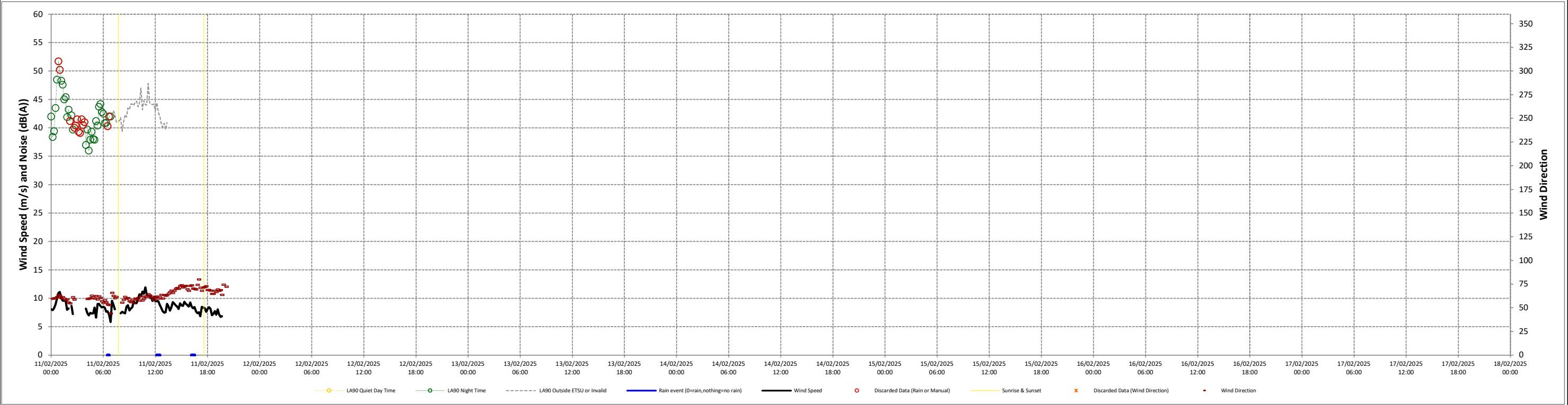
Client Cubico UK Development Ltd

Title Time Series for NML5- Windy Harbour Page 5 of 6

Date 16/07/2026

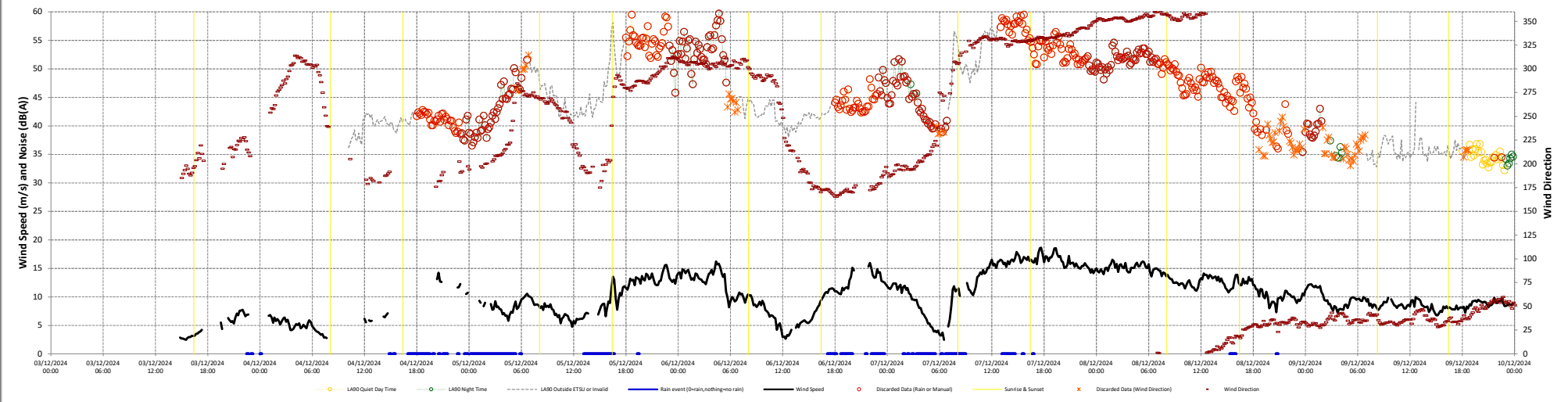


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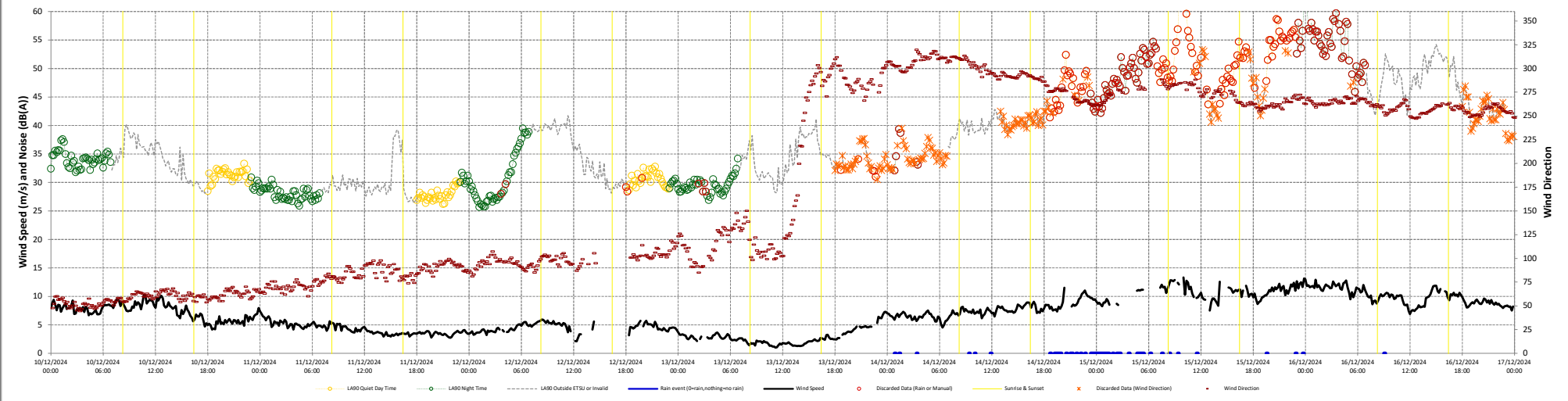


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	Client	Cubico UK Development Ltd	
	Title	Time Series for NML5- Windy Harbour Page 6 of 6	
	Date	16/07/2026	

03/12/2024 to 10/12/2024



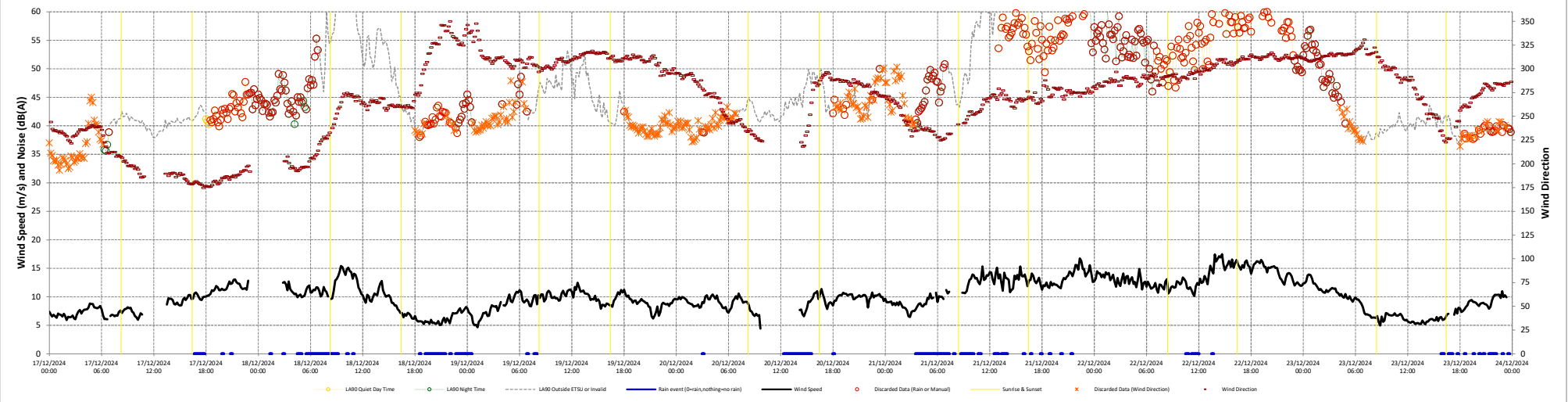
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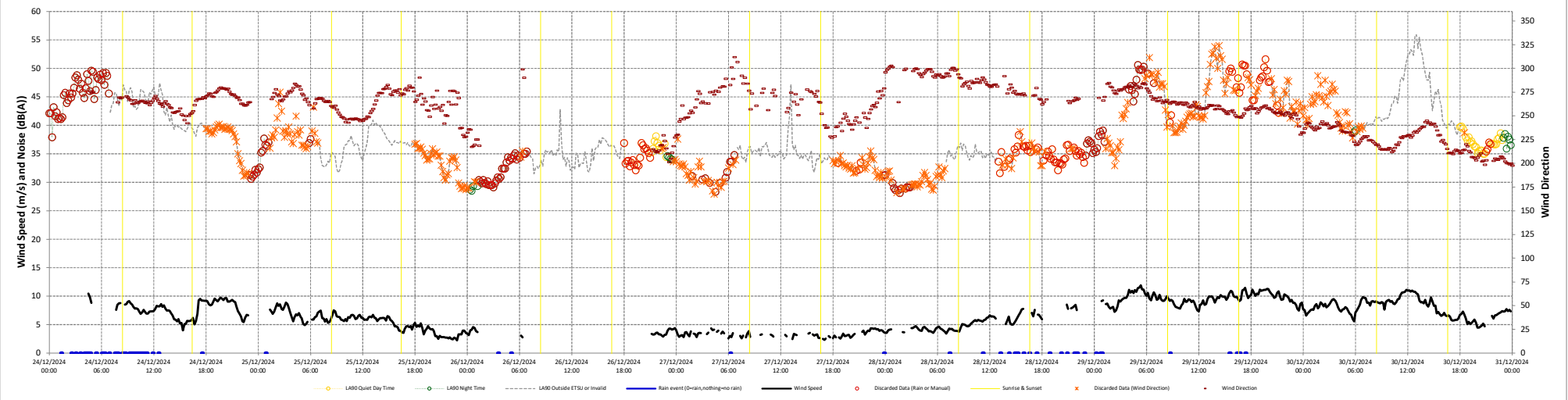
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Client	Cubico UK Development Ltd
Title	Time Serie for NML6 - Jubarn Page 1 of 6
Date	16/07/2026



17/12/2024 to 24/12/2024



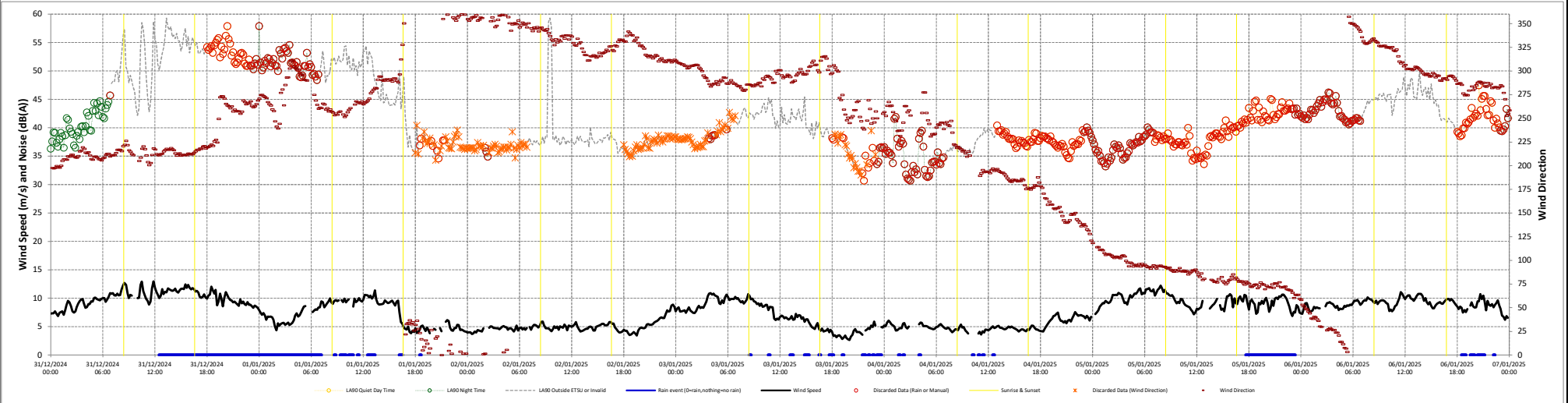
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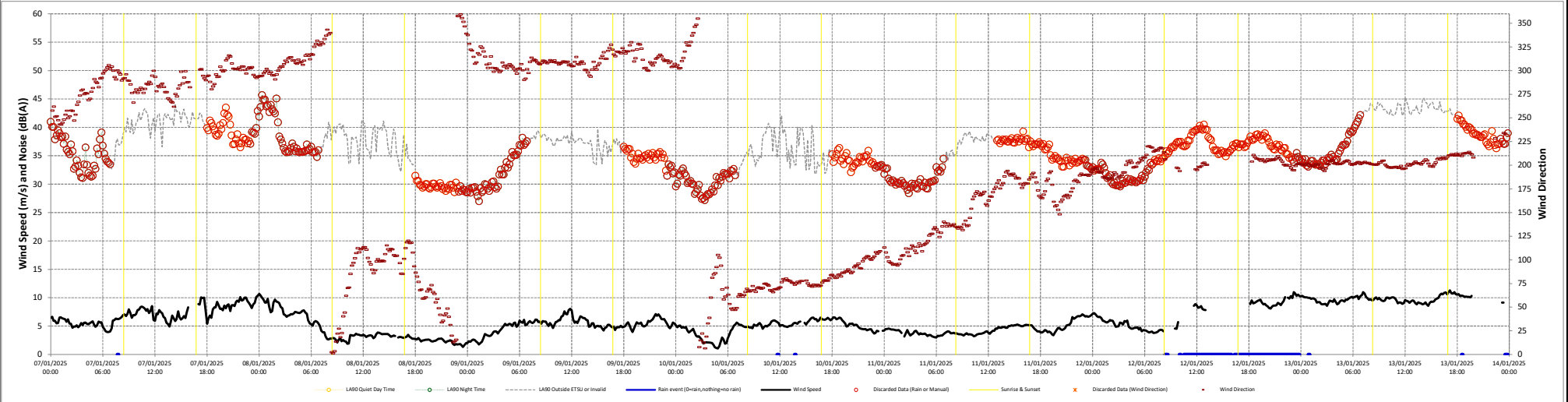
Project	Scout Moor II Wind Farm
Client	Cubico UK Development Ltd
Title	Time Serie for NML6 - Jubarn Page 2 of 6
Date	16/07/2026



31/12/2024 to 07/01/2025



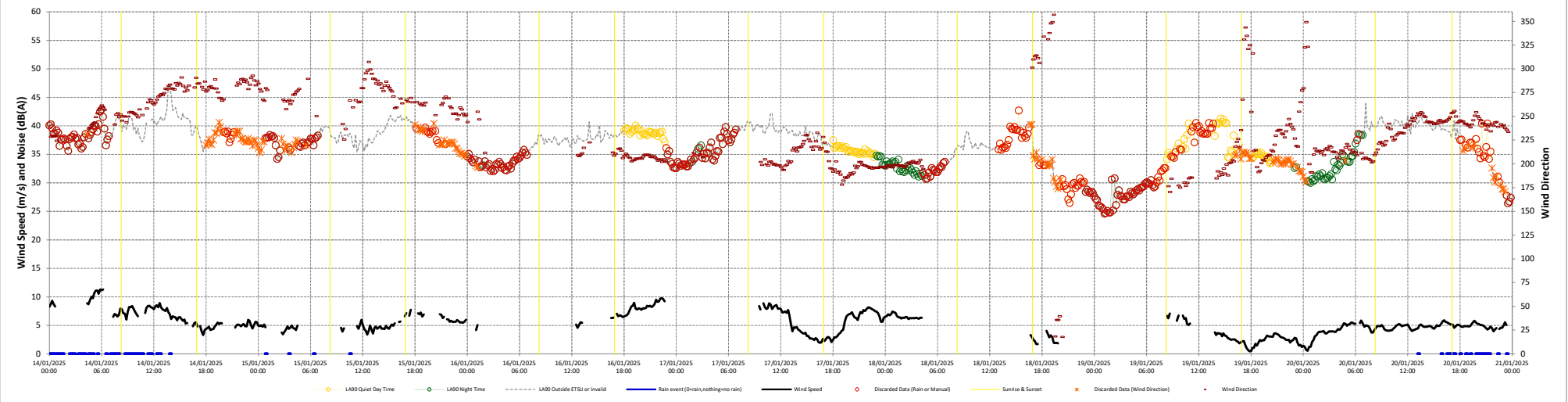
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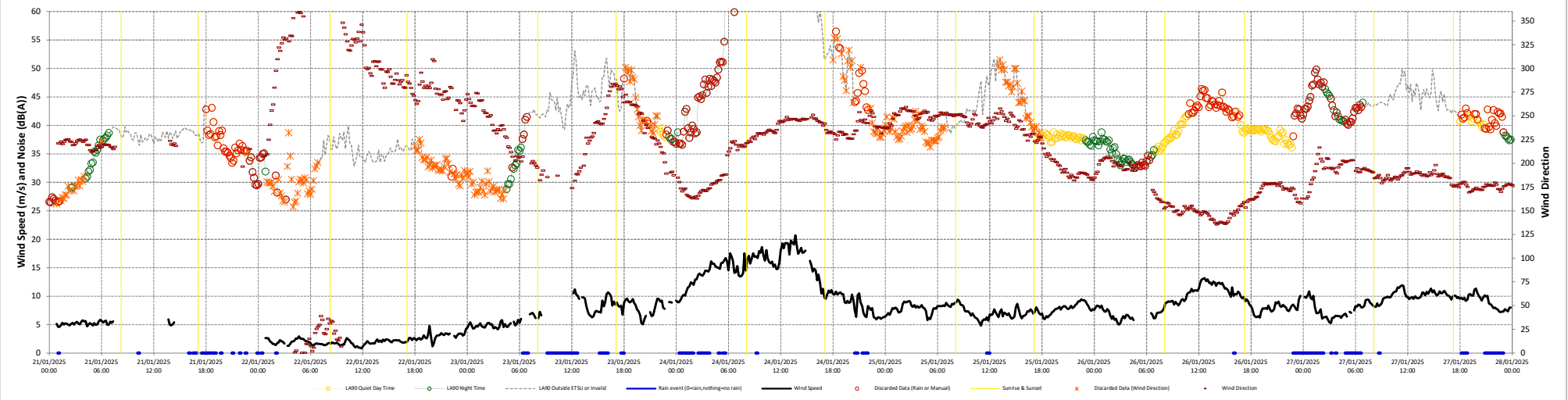
Project	Scout Moor II Wind Farm
Client	Cubico UK Development Ltd
Title	Time Serie for NML6 - Jubarn Page 3 of 6
Date	16/07/2026



14/01/2025 to 21/01/2025



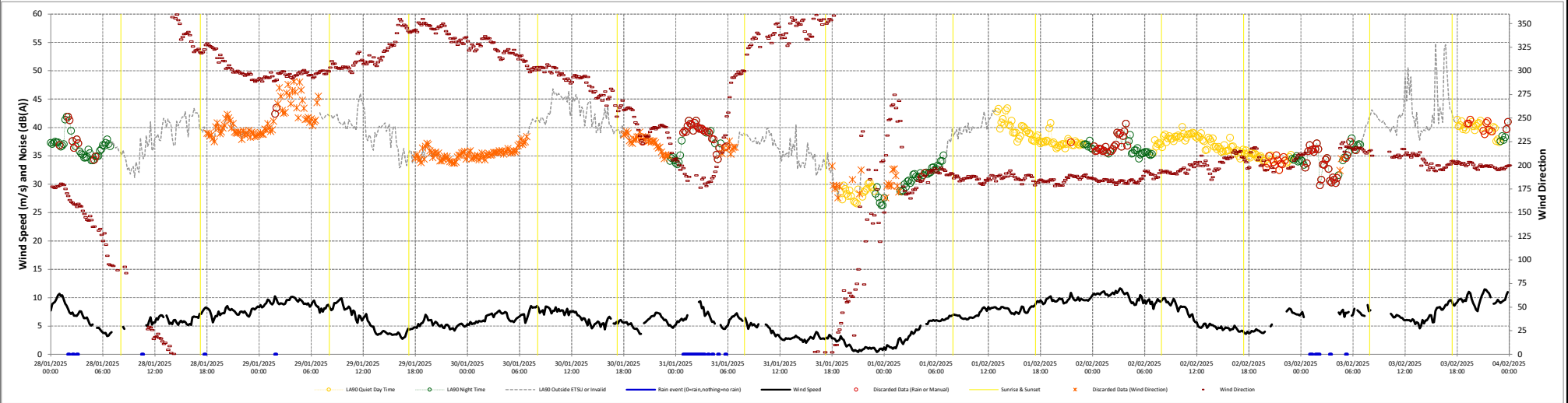
21/01/2025 to 28/01/2025



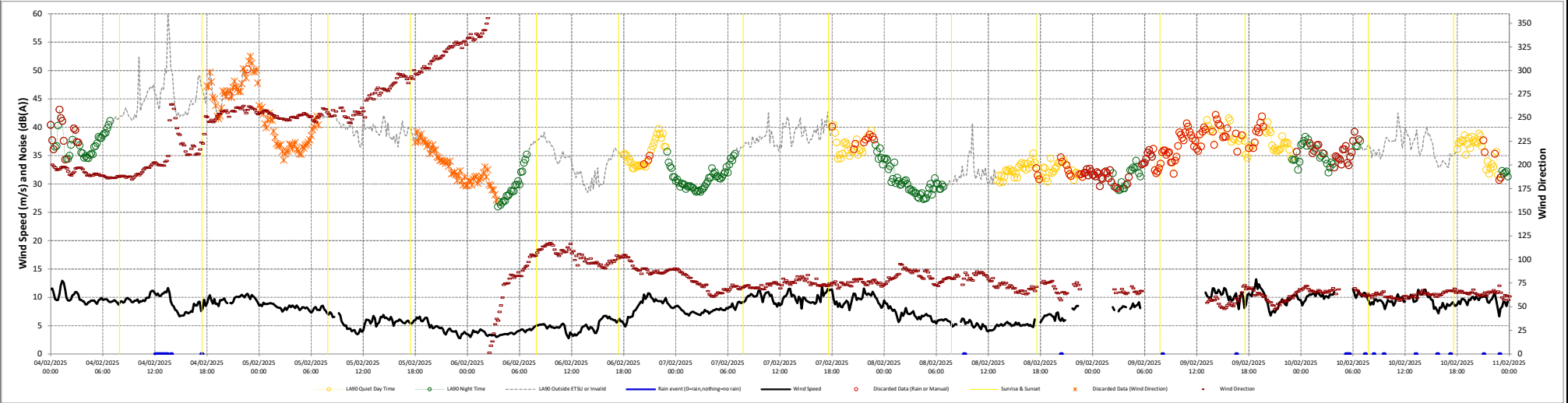
Project	Scout Moor II Wind Farm
Client	Cubico UK Development Ltd
Title	Time Serie for NML6 - Jubarn Page 4 of 6
Date	16/07/2026



28/01/2025 to 04/02/2025



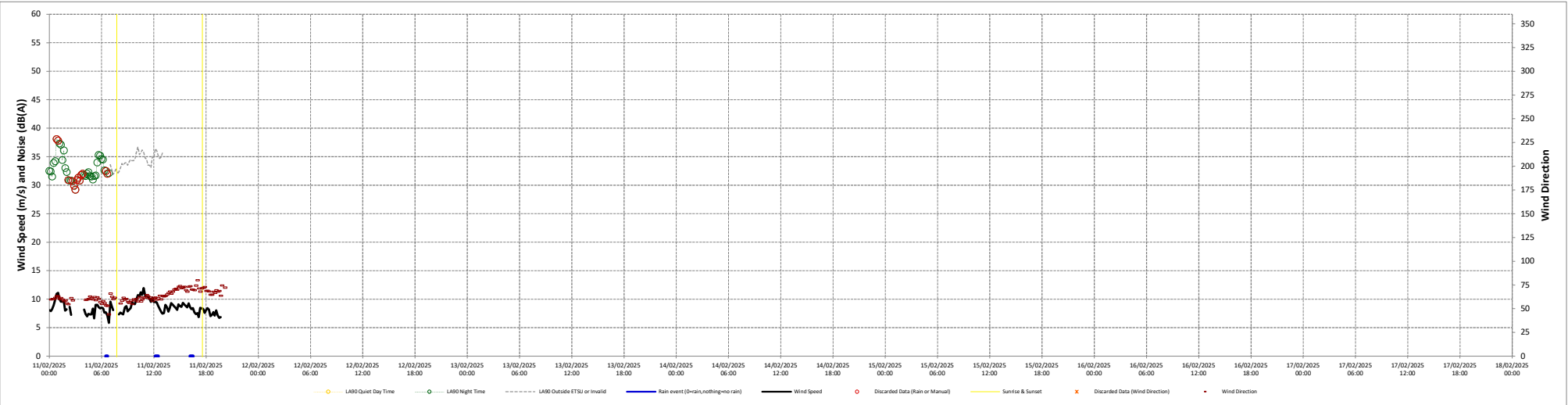
04/02/2025 to 11/02/2025



Project	Scout Moor II Wind Farm
Client	Cubico UK Development Ltd
Title	Time Serie for NML6 - Jubarn Page 5 of 6
Date	16/07/2026



11/02/2025 to 18/02/2025



Project	Scout Moor II Wind Farm
Client	Cubico UK Development Ltd
Title	Time Serie for NML6 - Jubarn Page 6 of 6
Date	16/07/2026



Annex 6 – Topographical Corrections/ Turbine Coordinates/ Cumulative Noise Predictions

Table A6.1: Topographical (concave ground/ barrier) Noise Prediction Adjustment Table

Notes/Comments

Requirement to include a concave ground profile correction of +3dB has been calculated in accordance with section 4.3.9 of the IOA GPG (May 2013)

A barrier correction of -2dB is included where the landform completely obscures a turbine at the noise assessment location

Where analysis indicates that both are required the barrier correction take precedence and a correction of -2dB is applied

Wind Farm	Hub (m)	TID	Noise Sensitive Receptor																				
			1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
1-Scout Moor	60	1	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	0	-2	-2	3	-2	-2
2-Scout Moor	60	2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	3	-2	-2	-2	3	-2	-2	3	-2	-2
3-Scout Moor	60	3	-2	-2	-2	3	-2	-2	-2	-2	-2	-2	-2	3	-2	-2	-2	3	-2	-2	3	-2	-2
4-Scout Moor	60	4	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	0	-2	-2	-2	3	-2	-2	-2	-2	-2
5-Scout Moor	60	5	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	3	0	0	-2	-2	-2
6-Scout Moor	60	6	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	3	-2	-2	3	3	0	-2	-2	-2	-2
7-Scout Moor	60	7	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	0	-2	-2	-2	3	-2	-2	-2	-2	-2
8-Scout Moor	60	8	-2	-2	-2	3	-2	-2	-2	-2	-2	-2	-2	3	-2	-2	-2	3	-2	-2	3	-2	-2
9-Scout Moor	60	9	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	3	-2	-2	-2	3	-2	-2	-2	-2	-2
10-Scout Moor	60	10	-2	-2	-2	0	-2	-2	-2	0	-2	-2	-2	3	3	0	-2	-2	-2	-2	-2	-2	-2
11-Scout Moor	60	11	0	-2	0	0	-2	-2	-2	3	-2	0	-2	3	3	3	-2	-2	-2	-2	-2	-2	-2
12-Scout Moor	60	12	-2	-2	-2	0	-2	-2	-2	0	-2	-2	-2	3	3	0	-2	-2	-2	-2	-2	-2	-2
13-Scout Moor	60	13	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	3	3	0	-2	-2	-2	-2	-2	-2	-2
14-Scout Moor	60	14	-2	-2	-2	0	-2	-2	-2	0	-2	-2	-2	3	0	-2	0	-2	-2	-2	-2	-2	-2
15-Scout Moor	60	15	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	3	3	0	0	-2	-2	-2	-2	-2	-2
16-Scout Moor	60	16	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	3	3	0	0	-2	-2	-2	-2	-2	-2
17-Scout Moor	60	17	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	3	3	0	-2	-2	-2	-2	-2	-2	-2
18-Scout Moor	60	18	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	3	-2	-2	0	3	0	-2	-2	-2	-2
19-Scout Moor	60	19	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	3	-2	-2	0	0	3	-2	-2	-2	-2
20-Scout Moor	60	20	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	3	-2	0	0	0	3	-2	-2	-2	-2
21-Scout Moor	60	21	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	3	-2	0	0	0	3	-2	-2	-2	-2
22-Scout Moor	60	22	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	3	-2	0	0	0	0	-2	-2	-2	-2
23-Scout Moor	60	23	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	3	-2	0	0	0	0	-2	-2	-2	-2
24-Scout Moor	60	24	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	3	0	0	0	0	0	-2	-2	-2	-2
25-Scout Moor	60	25	-2	-2	-2	-2	-2	-2	-2	3	-2	-2	-2	3	3	0	0	0	-2	-2	-2	-2	-2
26-Scout Moor	60	26	-2	-2	-2	-2	-2	-2	-2	3	-2	-2	-2	3	3	0	0	0	-2	-2	-2	-2	-2
1-Reaps Moss	73	38	-2	-2	-2	3	3	3	0	0	-2	-2	3	-2	-2	-2	-2	-2	-2	-2	-2	3	3
2-Reaps Moss	73	39	-2	-2	-2	3	3	3	3	0	-2	3	3	-2	-2	-2	-2	-2	-2	-2	-2	3	3
3-Reaps Moss	73	40	-2	-2	-2	3	3	3	3	-2	3	3	-2	-2	-2	-2	-2	-2	-2	-2	-2	3	3
1-Sheep House Farm	30.8	49	0	-2	-2	0	0	3	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	3	-2
2-Sheep House Farm	30.8	50	0	-2	-2	0	0	3	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	-2	3	-2
Proposed Development - T1	105	58	-2	-2	-2	-2	-2	-2	-2	3	-2	0	0	0	-2	0	0	-2	-2	-2	-2	-2	0
Proposed Development - T3	105	59	-2	-2	-2	-2	-2	-2	-2	3	-2	0	0	0	-2	3	3	-2	-2	-2	-2	-2	0
Proposed Development - T4	105	60	-2	-2	-2	-2	-2	-2	-2	3	-2	0	0	0	-2	3	0	-2	-2	-2	-2	-2	0
Proposed Development - T6	105	61	0	0	-2	0	-2	-2	-2	0	-2	0	0	0	0	3	0	-2	-2	-2	-2	-2	0
Proposed Development - T7	105	62	-2	-2	-2	-2	-2	-2	-2	0	-2	0	-2	0	0	0	0	-2	-2	-2	-2	-2	-2
Proposed Development - T8	105	63	0	0	0	0	-2	-2	-2	3	-2	0	0	0	0	3	-2	-2	-2	-2	-2	3	0
Proposed Development - T9	105	64	0	0	-2	0	-2	-2	-2	3	-2	0	0	0	-2	0	-2	-2	-2	-2	-2	0	0
Proposed Development - T10	105	65	0	0	-2	0	0	0	0	3	-2	0	0	-2	-2	0	-2	-2	-2	-2	-2	0	0
Proposed Development - T11	105	66	3	0	0	0	0	0	0	3	-2	0	0	0	-2	0	-2	-2	-2	-2	-2	3	0
Proposed Development - T14	105	67	0	0	0	3	-2	0	-2	0	-2	-2	-2	3	0	0	0	0	-2	-2	3	0	-2
Proposed Development - T15	105	68	0	0	0	3	-2	3	-2	0	-2	-2	-2	0	0	-2	-2	0	-2	-2	3	0	-2
Proposed Development - T16	105	69	0	-2	-2	0	-2	-2	-2	3	-2	0	0	0	-2	0	-2	-2	-2	-2	-2	0	0

Note: As per Section 1.2.4 of Appendix 7.2, Sheep House Farm is not included within the cumulative assessment, and is considered within Annex 12 only.

Table A6.2: Wind Farms/ Turbines Modelled

Wind Farm/Turbine	Easting (OS Grid)	Northing (OS Grid)	Height (m AOD)	Hub Height Modelled (m)
1-Scout Moor	382497	419278	411	60
2-Scout Moor	382173	418846	454	60
3-Scout Moor	382477	418785	456	60
4-Scout Moor	382537	418465	422	60
5-Scout Moor	382072	418162	396	60
6-Scout Moor	382424	418095	410	60
7-Scout Moor	382776	418069	400	60
8-Scout Moor	382885	418805	451	60
9-Scout Moor	383054	418559	431	60
10-Scout Moor	384107	418672	462	60
11-Scout Moor	384531	418955	473	60
12-Scout Moor	384610	418621	439	60
13-Scout Moor	384654	418332	410	60
14-Scout Moor	383708	418409	446	60
15-Scout Moor	383965	418083	428	60
16-Scout Moor	384136	417860	418	60
17-Scout Moor	384499	417656	395	60
18-Scout Moor	383335	417966	402	60
19-Scout Moor	383479	417689	404	60
20-Scout Moor	383508	417377	407	60
21-Scout Moor	383331	417008	388	60
22-Scout Moor	383653	416801	380	60
23-Scout Moor	383919	417296	408	60
24-Scout Moor	384385	417176	390	60
25-Scout Moor	384685	417081	375	60
26-Scout Moor	384848	416756	353	60
1-Reaps Moss	389301	423159	413	73
2-Reaps Moss	389315	422870	414	73
3-Reaps Moss	389299	422485	422	73
1-Sheep House Farm	385349	420769	349	30.8
2-Sheep House Farm	385519	420699	356	30.8
Proposed Development - T1	386563	417532	356	105
Proposed Development - T3	386153	417975	405	105
Proposed Development - T4	386104	418629	430	105
Proposed Development - T6	385413	418740	436	105
Proposed Development - T7	385260	418009	368	105
Proposed Development - T8	385156	419206	464	105
Proposed Development - T9	385650	419541	434	105
Proposed Development - T10	386137	420048	391	105
Proposed Development - T11	385182	419867	447	105
Proposed Development - T14	383369	419137	469	105
Proposed Development - T15	383057	419653	461	105
Proposed Development - T16	386250	419312	407	105

Note: As per Section 1.2.4 of Appendix 7.2, Sheep House Farm is not included within the cumulative assessment, and is considered within Annex 12 only.

Table A6.3 - Comparison of Project for Assessment to Cumulative Predictions

Location		Wind Speed (ms ⁻¹) as standardised to 10m height									
		1	2	3	4	5	6	7	8	9	10
NAL1 - Cowpe Hall Farm	Predicted Wind Turbine Noise LA90 Project for Assessment	-	-	25.3	26.5	31.1	35.5	36.9	36.9	36.9	36.9
	Predicted Wind Turbine Noise LA90 Cumulative Developments	-	-	-	-	29.0	31.2	32.5	33.1	33.7	34.1
	Difference	-	-	-	-	2.1	4.3	4.4	3.8	3.2	2.8
NAL2 - Willowfield Farm	Predicted Wind Turbine Noise LA90 Project for Assessment	-	-	26.1	27.3	31.9	36.3	37.7	37.7	37.7	37.7
	Predicted Wind Turbine Noise LA90 Cumulative Developments	-	-	-	-	30.1	32.3	33.6	34.2	34.8	35.2
	Difference	-	-	-	-	1.8	4.0	4.1	3.5	2.9	2.5
NAL3 - Cowpe Lodge	Predicted Wind Turbine Noise LA90 Project for Assessment	-	-	24.8	26.0	30.6	35.0	36.4	36.4	36.4	36.4
	Predicted Wind Turbine Noise LA90 Cumulative Developments	-	-	-	-	29.1	31.3	32.6	33.2	33.7	34.2
	Difference	-	-	-	-	1.5	3.7	3.8	3.2	2.7	2.2
NAL4 - Height	Predicted Wind Turbine Noise LA90 Project for Assessment	-	-	25.7	26.9	31.5	35.9	37.3	37.3	37.3	37.3
	Predicted Wind Turbine Noise LA90 Cumulative Developments	-	-	-	-	27.9	30.1	31.5	32.1	32.6	33.0
	Difference	-	-	-	-	3.6	5.8	5.8	5.2	4.7	4.3
NAL5 - Sheep House Farm	Predicted Wind Turbine Noise LA90 Project for Assessment	-	-	23.6	24.8	29.4	33.8	35.2	35.2	35.2	35.2
	Predicted Wind Turbine Noise LA90 Cumulative Developments	-	-	-	-	25.0	27.4	28.8	29.4	29.9	30.2
	Difference	-	-	-	-	4.4	6.4	6.4	5.8	5.3	5.0
NAL6 - Cutler Lane	Predicted Wind Turbine Noise LA90 Project for Assessment	-	-	22.4	23.6	28.2	32.6	34.0	34.0	34.0	34.0
	Predicted Wind Turbine Noise LA90 Cumulative Developments	-	-	-	-	24.2	26.8	28.2	28.8	29.2	29.5
	Difference	-	-	-	-	4.0	5.8	5.8	5.2	4.8	4.5
NAL7 - Deansgreave Road	Predicted Wind Turbine Noise LA90 Project for Assessment	-	-	16.9	18.1	22.7	27.1	28.5	28.5	28.5	28.5
	Predicted Wind Turbine Noise LA90 Cumulative Developments	-	-	-	-	25.6	29.0	30.7	31.1	31.2	31.3
	Difference	-	-	-	-	-2.9	-1.9	-2.2	-2.6	-2.7	-2.8
NAL8 - Cowm Top Farm	Predicted Wind Turbine Noise LA90 Project for Assessment	-	-	22.3	23.5	28.1	32.5	33.9	33.9	33.9	33.9
	Predicted Wind Turbine Noise LA90 Cumulative Developments	-	-	-	-	24.2	26.7	28.2	28.8	29.2	29.4
	Difference	-	-	-	-	3.9	5.8	5.7	5.1	4.7	4.5
NAL9 - The Old Farmhouse	Predicted Wind Turbine Noise LA90 Project for Assessment	-	-	20.2	21.4	26.0	30.4	31.8	31.8	31.8	31.8
	Predicted Wind Turbine Noise LA90 Cumulative Developments	-	-	-	-	23.1	25.4	26.7	27.3	27.9	28.3
	Difference	-	-	-	-	2.9	5.0	5.1	4.5	3.9	3.5
NAL10 - Houses o' Th' Hill	Predicted Wind Turbine Noise LA90 Project for Assessment	-	-	23.4	24.6	29.2	33.6	35.0	35.0	35.0	35.0
	Predicted Wind Turbine Noise LA90 Cumulative Developments	-	-	-	-	24.1	26.3	27.7	28.3	28.8	29.2
	Difference	-	-	-	-	5.1	7.3	7.3	6.7	6.2	5.8
NAL11 - Snipe Barn Farm	Predicted Wind Turbine Noise LA90 Project for Assessment	-	-	21.3	22.5	27.1	31.5	32.9	32.9	32.9	32.9
	Predicted Wind Turbine Noise LA90 Cumulative Developments	-	-	-	-	24.6	26.8	28.2	28.8	29.3	29.7
	Difference	-	-	-	-	2.5	4.7	4.7	4.1	3.6	3.2
NAL12 - Doldrum Farm	Predicted Wind Turbine Noise LA90 Project for Assessment	-	-	20.0	21.2	25.8	30.2	31.6	31.6	31.6	31.6
	Predicted Wind Turbine Noise LA90 Cumulative Developments	-	-	-	-	30.7	32.9	34.2	34.8	35.4	35.8
	Difference	-	-	-	-	-4.9	-2.7	-2.6	-3.2	-3.8	-4.2
NAL13 - Naden House	Predicted Wind Turbine Noise LA90 Project for Assessment	-	-	21.0	22.2	26.8	31.2	32.6	32.6	32.6	32.6
	Predicted Wind Turbine Noise LA90 Cumulative Developments	-	-	-	-	33.0	35.1	36.4	37.0	37.6	38.0
	Difference	-	-	-	-	-6.2	-3.9	-3.8	-4.4	-5.0	-5.4
NAL14 - Knowl Farm	Predicted Wind Turbine Noise LA90 Project for Assessment	-	-	20.5	21.7	26.3	30.7	32.1	32.1	32.1	32.1
	Predicted Wind Turbine Noise LA90 Cumulative Developments	-	-	-	-	33.6	35.8	37.1	37.7	38.3	38.7
	Difference	-	-	-	-	-7.3	-5.1	-5.0	-5.6	-6.2	-6.6

Location		Wind Speed (ms ⁻¹) as standardised to 10m height									
		1	2	3	4	5	6	7	8	9	10
NAL15 - Higher Red Lumb Farm	Predicted Wind Turbine Noise LA90 Project for Assessment	-	-	18.4	19.6	24.2	28.6	30.0	30.0	30.0	30.0
	Predicted Wind Turbine Noise LA90 Cumulative Developments	-	-	-	-	34.6	36.8	38.1	38.7	39.3	39.7
	Difference	-	-	-	-	-10.4	-8.2	-8.1	-8.7	-9.3	-9.7
NAL16 - Edenfield Road	Predicted Wind Turbine Noise LA90 Project for Assessment	-	-	15.0	16.2	20.8	25.2	26.6	26.6	26.6	26.6
	Predicted Wind Turbine Noise LA90 Cumulative Developments	-	-	-	-	34.6	36.8	38.1	38.7	39.3	39.7
	Difference	-	-	-	-	-13.8	-11.6	-11.5	-12.1	-12.7	-13.1
NAL17 - Fecit Farm	Predicted Wind Turbine Noise LA90 Project for Assessment	-	-	16.0	17.2	21.8	26.2	27.6	27.6	27.6	27.6
	Predicted Wind Turbine Noise LA90 Cumulative Developments	-	-	-	-	37.0	39.1	40.4	41.0	41.6	42.0
	Difference	-	-	-	-	-15.2	-12.9	-12.8	-13.4	-14.0	-14.4
NAL18 - Lowes Farm	Predicted Wind Turbine Noise LA90 Project for Assessment	-	-	14.7	15.9	20.5	24.9	26.3	26.3	26.3	26.3
	Predicted Wind Turbine Noise LA90 Cumulative Developments	-	-	-	-	30.5	32.6	33.9	34.5	35.1	35.5
	Difference	-	-	-	-	-10.0	-7.7	-7.6	-8.2	-8.8	-9.2
NAL19 - Higher Mount Pleasant	Predicted Wind Turbine Noise LA90 Project for Assessment	-	-	20.1	21.3	25.9	30.3	31.7	31.7	31.7	31.7
	Predicted Wind Turbine Noise LA90 Cumulative Developments	-	-	-	-	29.7	31.9	33.2	33.8	34.4	34.8
	Difference	-	-	-	-	-3.8	-1.6	-1.5	-2.1	-2.7	-3.1
NAL20 - Lench Fold	Predicted Wind Turbine Noise LA90 Project for Assessment	-	-	21.4	22.6	27.2	31.6	33.0	33.0	33.0	33.0
	Predicted Wind Turbine Noise LA90 Cumulative Developments	-	-	-	-	26.7	28.9	30.3	30.9	31.4	31.8
	Difference	-	-	-	-	0.5	2.7	2.7	2.1	1.6	1.2
NAL21 - Limered Farm	Predicted Wind Turbine Noise LA90 Project for Assessment	-	-	24.2	25.4	30.0	34.4	35.8	35.8	35.8	35.8
	Predicted Wind Turbine Noise LA90 Cumulative Developments	-	-	-	-	24.3	26.7	28.1	28.6	29.1	29.5
	Difference	-	-	-	-	5.7	7.7	7.7	7.2	6.7	6.3

Note: 'Cumulative Developments' refers to the cumulative developments identified in Table 1.1 of Appendix 7.2.

Table A6.4a - Comparison of Project for Assessment to TNAC - Day

Location		Wind Speed (ms ⁻¹) as standardised to 10m height									
		1	2	3	4	5	6	7	8	9	10
NAL1 - Cowpe Hall Farm	Predicted Wind Turbine Noise LA90 Project for Assessment	-	-	25.3	26.5	31.1	35.5	36.9	36.9	36.9	36.9
	TNAC	40	40	40	40	40	40	40	40	40	40
	Difference	-	-	-	-	-8.9	-4.5	-3.1	-3.1	-3.1	-3.1
NAL2 - Willowfield Farm	Predicted Wind Turbine Noise LA90 Project for Assessment	-	-	26.1	27.3	31.9	36.3	37.7	37.7	37.7	37.7
	TNAC	40	40	40	40	40	40	40	40	40	40
	Difference	-	-	-	-	-	-3.7	-2.3	-2.3	-2.3	-2.3
NAL3 - Cowpe Lodge	Predicted Wind Turbine Noise LA90 Project for Assessment	-	-	24.8	26.0	30.6	35.0	36.4	36.4	36.4	36.4
	TNAC	40	40	40	40	40	40	40	40	40	40
	Difference	-	-	-	-	-	-5.0	-3.6	-3.6	-3.6	-3.6
NAL4 - Height	Predicted Wind Turbine Noise LA90 Project for Assessment	-	-	25.7	26.9	31.5	35.9	37.3	37.3	37.3	37.3
	TNAC	40	40	40	40	40	40	40	40	40	40.6
	Difference	-	-	-	-	-	-4.1	-2.7	-2.7	-2.7	-3.3
NAL5 - Sheep House Farm	Predicted Wind Turbine Noise LA90 Project for Assessment	-	-	23.6	24.8	29.4	33.8	35.2	35.2	35.2	35.2
	TNAC	40	40	40	40	40	40	40	40	40	40.6
	Difference	-	-	-	-	-	-6.2	-4.8	-4.8	-4.8	-5.4
NAL6 - Cutter Lane	Predicted Wind Turbine Noise LA90 Project for Assessment	-	-	22.4	23.6	28.2	32.6	34.0	34.0	34.0	34.0
	TNAC	40	40	40	40	40	40	40	40	40	40.6
	Difference	-	-	-	-	-	-7.4	-6.0	-6.0	-6.0	-6.6
NAL7 - Deansgrave Road	Predicted Wind Turbine Noise LA90 Project for Assessment	-	-	16.9	18.1	22.7	27.1	28.5	28.5	28.5	28.5
	TNAC	40	40	40	40	40	40	40	40	40	40.6
	Difference	-	-	-	-	-	-12.9	-11.5	-11.5	-11.5	-12.1
NAL8 - Cowm Top Farm	Predicted Wind Turbine Noise LA90 Project for Assessment	-	-	22.3	23.5	28.1	32.5	33.9	33.9	33.9	33.9
	TNAC	40	40	40	40	40	40	40	40	40	40
	Difference	-	-	-	-	-	-7.5	-6.1	-6.1	-6.1	-6.1
NAL9 - The Old Farmhouse	Predicted Wind Turbine Noise LA90 Project for Assessment	-	-	20.2	21.4	26.0	30.4	31.8	31.8	31.8	31.8
	TNAC	40	40	40	40	40	40	40	40	40	40
	Difference	-	-	-	-	-	-9.6	-8.2	-8.2	-8.2	-8.2
NAL10 - Houses o' Th' Hill	Predicted Wind Turbine Noise LA90 Project for Assessment	-	-	23.4	24.6	29.2	33.6	35.0	35.0	35.0	35.0
	TNAC	40	40	40	40	40	40	40	40	40	40
	Difference	-	-	-	-	-	-6.4	-5.0	-5.0	-5.0	-5.0
NAL11 - Snipe Barn Farm	Predicted Wind Turbine Noise LA90 Project for Assessment	-	-	21.3	22.5	27.1	31.5	32.9	32.9	32.9	32.9
	TNAC	40	40	40	40	40	40	40	41	43.1	45.7
	Difference	-	-	-	-	-	-8.5	-7.1	-8.1	-10.2	-12.8
NAL12 - Doldrum Farm	Predicted Wind Turbine Noise LA90 Project for Assessment	-	-	20.0	21.2	25.8	30.2	31.6	31.6	31.6	31.6
	TNAC	40	40	40	40	40	40	40.7	41.4	42.2	42.8
	Difference	-	-	-	-	-	-9.8	-9.1	-9.8	-10.6	-11.2
NAL13 - Naden House	Predicted Wind Turbine Noise LA90 Project for Assessment	-	-	21.0	22.2	26.8	31.2	32.6	32.6	32.6	32.6
	TNAC	40	40	40	40	40	40	40.7	41.4	42.2	42.8
	Difference	-	-	-	-	-	-8.8	-8.1	-8.8	-9.6	-10.2
NAL14 - Knowl Farm	Predicted Wind Turbine Noise LA90 Project for Assessment	-	-	20.5	21.7	26.3	30.7	32.1	32.1	32.1	32.1
	TNAC	40	40	40	40	40	40	40.7	41.4	42.2	42.8
	Difference	-	-	-	-	-	-9.3	-8.6	-9.3	-10.1	-10.7
NAL15 - Higher Red Lumb Farm	Predicted Wind Turbine Noise LA90 Project for Assessment	-	-	18.4	19.6	24.2	28.6	30.0	30.0	30.0	30.0
	TNAC	40	40	40	40	40	40	40.7	41.4	42.2	42.8
	Difference	-	-	-	-	-	-11.4	-10.7	-11.4	-12.2	-12.8
NAL16 - Edenfield Road	Predicted Wind Turbine Noise LA90 Project for Assessment	-	-	15.0	16.2	20.8	25.2	26.6	26.6	26.6	26.6
	TNAC	40	40	40	40	40	40	40.7	41.4	42.2	42.8
	Difference	-	-	-	-	-	-14.8	-14.1	-14.8	-15.6	-16.2
NAL17 - Fecit Farm	Predicted Wind Turbine Noise LA90 Project for Assessment	-	-	16.0	17.2	21.8	26.2	27.6	27.6	27.6	27.6
	TNAC	40	40	40	40	40	40	40.7	41.4	42.2	42.8
	Difference	-	-	-	-	-	-13.8	-13.1	-13.8	-14.6	-15.2

Location		Wind Speed (ms ⁻¹) as standardised to 10m height									
		1	2	3	4	5	6	7	8	9	10
NAL18 - Lowes Farm	Predicted Wind Turbine Noise LA90 Project for Assessment	-	-	14.7	15.9	20.5	24.9	26.3	26.3	26.3	26.3
	TNAC	40	40	40	40	40	40	40.7	41.4	42.2	42.8
	Difference	-	-	-	-	-	-15.1	-14.4	-15.1	-15.9	-16.5
NAL19 - Higher Mount Pleasant	Predicted Wind Turbine Noise LA90 Project for Assessment	-	-	20.1	21.3	25.9	30.3	31.7	31.7	31.7	31.7
	TNAC	40	40	40	40	40	40	40	40	40	40.6
	Difference	-	-	-	-	-	-9.7	-8.3	-8.3	-8.3	-8.9
NAL20 - Lench Fold	Predicted Wind Turbine Noise LA90 Project for Assessment	-	-	21.4	22.6	27.2	31.6	33.0	33.0	33.0	33.0
	TNAC	40	40	40	40	40	40	40	40	40	40
	Difference	-	-	-	-	-	-8.4	-7.0	-7.0	-7.0	-7.0
NAL21 - Limed Farm	Predicted Wind Turbine Noise LA90 Project for Assessment	-	-	24.2	25.4	30.0	34.4	35.8	35.8	35.8	35.8
	TNAC	45	45	45	45	45	45	45	45	45	45
	Difference	-	-	-	-	-	-10.6	-9.2	-9.2	-9.2	-9.2

Table A6.4b - Comparison of Project for Assessment to TNAC - Night

[illegible]

Location		Wind Speed (ms ⁻¹) as standardised to 10m height									
		1	2	3	4	5	6	7	8	9	10
	Difference	-	-	-	-	-	-11.8	-10.4	-10.4	-10.4	-10.4
NAL14 - Knowl Farm	Predicted Wind Turbine Noise LA90 Project for Assessment	-	-	20.5	21.7	26.3	30.7	32.1	32.1	32.1	32.1
	TNAC	43	43	43	43	43	43	43	43	43	43
	Difference	-	-	-	-	-	-12.3	-10.9	-10.9	-10.9	-10.9
NAL15 - Higher Red Lumb Farm	Predicted Wind Turbine Noise LA90 Project for Assessment	-	-	18.4	19.6	24.2	28.6	30.0	30.0	30.0	30.0
	TNAC	43	43	43	43	43	43	43	43	43	43
	Difference	-	-	-	-	-	-14.4	-13.0	-13.0	-13.0	-13.0
NAL16 - Edenfield Road	Predicted Wind Turbine Noise LA90 Project for Assessment	-	-	15.0	16.2	20.8	25.2	26.6	26.6	26.6	26.6
	TNAC	43	43	43	43	43	43	43	43	43	43
	Difference	-	-	-	-	-	-17.8	-16.4	-16.4	-16.4	-16.4
NAL17 - Fecit Farm	Predicted Wind Turbine Noise LA90 Project for Assessment	-	-	16.0	17.2	21.8	26.2	27.6	27.6	27.6	27.6
	TNAC	43	43	43	43	43	43	43	43	43	43
	Difference	-	-	-	-	-	-16.8	-15.4	-15.4	-15.4	-15.4
NAL18 - Lowes Farm	Predicted Wind Turbine Noise LA90 Project for Assessment	-	-	14.7	15.9	20.5	24.9	26.3	26.3	26.3	26.3
	TNAC	43	43	43	43	43	43	43	43	43	43
	Difference	-	-	-	-	-	-18.1	-16.7	-16.7	-16.7	-16.7
NAL19 - Higher Mount Pleasant	Predicted Wind Turbine Noise LA90 Project for Assessment	-	-	20.1	21.3	25.9	30.3	31.7	31.7	31.7	31.7
	TNAC	43	43	43	43	43	43	43	43	43	43
	Difference	-	-	-	-	-	-12.7	-11.3	-11.3	-11.3	-11.3
NAL20 - Lench Fold	Predicted Wind Turbine Noise LA90 Project for Assessment	-	-	21.4	22.6	27.2	31.6	33.0	33.0	33.0	33.0
	TNAC	43	43	43	43	43	43	43	43	43	43
	Difference	-	-	-	-	-	-11.4	-10.0	-10.0	-10.0	-10.0
NAL21 - Limed Farm	Predicted Wind Turbine Noise LA90 Project for Assessment	-	-	24.2	25.4	30.0	34.4	35.8	35.8	35.8	35.8
	TNAC	45	45	45	45	45	45	45	45	45	45
	Difference	-	-	-	-	-	-10.6	-9.2	-9.2	-9.2	-9.2

Table A6.5a - Comparison of Cumulative Developments to TNAC - Day

Location		Wind Speed (ms ⁻¹) as standardised to 10m height									
		1	2	3	4	5	6	7	8	9	10
NAL1 - Cowpe Hall Farm	Predicted Wind Turbine Noise LA90 Cumulative Developments	-	-	-	-	29.0	31.2	32.5	33.1	33.7	34.1
	TNAC	40	40	40	40	40	40	40	40	40	40
	Difference	-	-	-	-	-11.0	-8.8	-7.5	-6.9	-6.3	-5.9
NAL2 - Willowfield Farm	Predicted Wind Turbine Noise LA90 Cumulative Developments	-	-	-	-	30.1	32.3	33.6	34.2	34.8	35.2
	TNAC	40	40	40	40	40	40	40	40	40	40
	Difference	-	-	-	-	-9.9	-7.7	-6.4	-5.8	-5.2	-4.8
NAL3 - Cowpe Lodge	Predicted Wind Turbine Noise LA90 Cumulative Developments	-	-	-	-	29.1	31.3	32.6	33.2	33.7	34.2
	TNAC	40	40	40	40	40	40	40	40	40	40
	Difference	-	-	-	-	-10.9	-8.7	-7.4	-6.8	-6.3	-5.8
NAL4 - Height	Predicted Wind Turbine Noise LA90 Cumulative Developments	-	-	-	-	27.9	30.1	31.5	32.1	32.6	33.0
	TNAC	40	40	40	40	40	40	40	40	40	40.6
	Difference	-	-	-	-	-12.1	-9.9	-8.5	-7.9	-7.4	-7.6
NAL5 - Sheep House Farm	Predicted Wind Turbine Noise LA90 Cumulative Developments	-	-	-	-	25.0	27.4	28.8	29.4	29.9	30.2
	TNAC	40	40	40	40	40	40	40	40	40	40.6
	Difference	-	-	-	-	-15.0	-12.6	-11.2	-10.6	-10.1	-10.4
NAL6 - Cutter Lane	Predicted Wind Turbine Noise LA90 Cumulative Developments	-	-	-	-	24.2	26.8	28.2	28.8	29.2	29.5
	TNAC	40	40	40	40	40	40	40	40	40	40.6
	Difference	-	-	-	-	-15.8	-13.2	-11.8	-11.2	-10.8	-11.1
NAL7 - Deansgreave Road	Predicted Wind Turbine Noise LA90 Cumulative Developments	-	-	-	-	25.6	29.0	30.7	31.1	31.2	31.3
	TNAC	40	40	40	40	40	40	40	40	40	40.6
	Difference	-	-	-	-	-14.4	-11.0	-9.3	-8.9	-8.8	-9.3
NAL8 - Cowm Top Farm	Predicted Wind Turbine Noise LA90 Cumulative Developments	-	-	-	-	24.2	26.7	28.2	28.8	29.2	29.4
	TNAC	40	40	40	40	40	40	40	40	40	40
	Difference	-	-	-	-	-15.8	-13.3	-11.8	-11.2	-10.8	-10.6
NAL9 - The Old Farmhouse	Predicted Wind Turbine Noise LA90 Cumulative Developments	-	-	-	-	23.1	25.4	26.7	27.3	27.9	28.3
	TNAC	40	40	40	40	40	40	40	40	40	40
	Difference	-	-	-	-	-16.9	-14.6	-13.3	-12.7	-12.1	-11.7
NAL10 - Houses o' Th' Hill	Predicted Wind Turbine Noise LA90 Cumulative Developments	-	-	-	-	24.1	26.3	27.7	28.3	28.8	29.2
	TNAC	40	40	40	40	40	40	40	40	40	40
	Difference	-	-	-	-	-15.9	-13.7	-12.3	-11.7	-11.2	-10.8
NAL11 - Snipe Barn Farm	Predicted Wind Turbine Noise LA90 Cumulative Developments	-	-	-	-	24.6	26.8	28.2	28.8	29.3	29.7
	TNAC	40	40	40	40	40	40	40	41	43.1	45.7
	Difference	-	-	-	-	-15.4	-13.2	-11.8	-12.2	-13.8	-16.0
NAL12 - Doldrum Farm	Predicted Wind Turbine Noise LA90 Cumulative Developments	-	-	-	-	30.7	32.9	34.2	34.8	35.4	35.8
	TNAC	40	40	40	40	40	40	40.7	41.4	42.2	42.8
	Difference	-	-	-	-	-9.3	-7.1	-6.5	-6.6	-6.8	-7.0
NAL13 - Naden House	Predicted Wind Turbine Noise LA90 Cumulative Developments	-	-	-	-	33.0	35.1	36.4	37.0	37.6	38.0
	TNAC	40	40	40	40	40	40	40.7	41.4	42.2	42.8
	Difference	-	-	-	-	-7.0	-4.9	-4.3	-4.4	-4.6	-4.8
NAL14 - Knowl Farm	Predicted Wind Turbine Noise LA90 Cumulative Developments	-	-	-	-	33.6	35.8	37.1	37.7	38.3	38.7
	TNAC	40	40	40	40	40	40	40.7	41.4	42.2	42.8
	Difference	-	-	-	-	-6.4	-4.2	-3.6	-3.7	-3.9	-4.1
NAL15 - Higher Red Lumb Farm	Predicted Wind Turbine Noise LA90 Cumulative Developments	-	-	-	-	34.6	36.8	38.1	38.7	39.3	39.7
	TNAC	40	40	40	40	40	40	40.7	41.4	42.2	42.8
	Difference	-	-	-	-	-5.4	-3.2	-2.6	-2.7	-2.9	-3.1
NAL16 - Edenfield Road	Predicted Wind Turbine Noise LA90 Cumulative Developments	-	-	-	-	34.6	36.8	38.1	38.7	39.3	39.7
	TNAC	40	40	40	40	40	40	40.7	41.4	42.2	42.8
	Difference	-	-	-	-	-5.4	-3.2	-2.6	-2.7	-2.9	-3.1
NAL17 - Fecit Farm	Predicted Wind Turbine Noise LA90 Cumulative Developments	-	-	-	-	37.0	39.1	40.4	41.0	41.6	42.0
	TNAC	40	40	40	40	40	40	40.7	41.4	42.2	42.8
	Difference	-	-	-	-	-3.0	-0.9	-0.3	-0.4	-0.6	-0.8

Location		Wind Speed (ms ⁻¹) as standardised to 10m height									
		1	2	3	4	5	6	7	8	9	10
NAL18 - Loves Farm	Predicted Wind Turbine Noise LA90 Cumulative Developments	-	-	-	-	30.5	32.6	33.9	34.5	35.1	35.5
	TNAC	40	40	40	40	40	40	40.7	41.4	42.2	42.8
	Difference	-	-	-	-	-9.5	-7.4	-6.8	-6.9	-7.1	-7.3
NAL19 - Higher Mount Pleasant	Predicted Wind Turbine Noise LA90 Cumulative Developments	-	-	-	-	29.7	31.9	33.2	33.8	34.4	34.8
	TNAC	40	40	40	40	40	40	40	40	40	40.6
	Difference	-	-	-	-	-10.3	-8.1	-6.8	-6.2	-5.6	-5.8
NAL20 - Lench Fold	Predicted Wind Turbine Noise LA90 Cumulative Developments	-	-	-	-	26.7	28.9	30.3	30.9	31.4	31.8
	TNAC	40	40	40	40	40	40	40	40	40	40
	Difference	-	-	-	-	-13.3	-11.1	-9.7	-9.1	-8.6	-8.2
NAL21 - Limed Farm	Predicted Wind Turbine Noise LA90 Cumulative Developments	-	-	-	-	24.3	26.7	28.1	28.6	29.1	29.5
	TNAC	45	45	45	45	45	45	45	45	45	45
	Difference	-	-	-	-	-20.7	-18.3	-16.9	-16.4	-15.9	-15.5

[illegible]

Location		Wind Speed (ms ⁻¹) as standardised to 10m height									
		1	2	3	4	5	6	7	8	9	10
NAL14 - Knowl Farm	Difference	-	-	-	-	-10.0	-7.9	-6.6	-6.0	-5.4	-5.0
	Predicted Wind Turbine Noise LA90 Cumulative Developments	-	-	-	-	33.6	35.8	37.1	37.7	38.3	38.7
	TNAC	43	43	43	43	43	43	43	43	43	43
	Difference	-	-	-	-	-9.4	-7.2	-5.9	-5.3	-4.7	-4.3
NAL15 - Higher Red Lumb Farm	Predicted Wind Turbine Noise LA90 Cumulative Developments	-	-	-	-	34.6	36.8	38.1	38.7	39.3	39.7
	TNAC	43	43	43	43	43	43	43	43	43	43
	Difference	-	-	-	-	-8.4	-6.2	-4.9	-4.3	-3.7	-3.3
NAL16 - Edenfield Road	Predicted Wind Turbine Noise LA90 Cumulative Developments	-	-	-	-	34.6	36.8	38.1	38.7	39.3	39.7
	TNAC	43	43	43	43	43	43	43	43	43	43
	Difference	-	-	-	-	-8.4	-6.2	-4.9	-4.3	-3.7	-3.3
NAL17 - Fecit Farm	Predicted Wind Turbine Noise LA90 Cumulative Developments	-	-	-	-	37.0	39.1	40.4	41.0	41.6	42.0
	TNAC	43	43	43	43	43	43	43	43	43	43
	Difference	-	-	-	-	-6.0	-3.9	-2.6	-2.0	-1.4	-1.0
NAL18 - Lowes Farm	Predicted Wind Turbine Noise LA90 Cumulative Developments	-	-	-	-	30.5	32.6	33.9	34.5	35.1	35.5
	TNAC	43	43	43	43	43	43	43	43	43	43
	Difference	-	-	-	-	-12.5	-10.4	-9.1	-8.5	-7.9	-7.5
NAL19 - Higher Mount Pleasant	Predicted Wind Turbine Noise LA90 Cumulative Developments	-	-	-	-	29.7	31.9	33.2	33.8	34.4	34.8
	TNAC	43	43	43	43	43	43	43	43	43	43
	Difference	-	-	-	-	-13.3	-11.1	-9.8	-9.2	-8.6	-8.2
NAL20 - Lench Fold	Predicted Wind Turbine Noise LA90 Cumulative Developments	-	-	-	-	26.7	28.9	30.3	30.9	31.4	31.8
	TNAC	43	43	43	43	43	43	43	43	43	43
	Difference	-	-	-	-	-16.3	-14.1	-12.7	-12.1	-11.6	-11.2
NAL21 - Limed Farm	Predicted Wind Turbine Noise LA90 Cumulative Developments	-	-	-	-	24.3	26.7	28.1	28.6	29.1	29.5
	TNAC	45	45	45	45	45	45	45	45	45	45
	Difference	-	-	-	-	-20.7	-18.3	-16.9	-16.4	-15.9	-15.5

Note: 'Cumulative Developments' refers to the cumulative developments identified in Table 1.1 of Appendix 7.2.

Annex 7 – Wind Shear Correction Data

Annex 7 - Wind Shear Correction Data

Site Name	ID	Hub Height (HH) m
Scout Moor II Wind Farm (the Proposed Development)	SM2	105
Scout Moor Wind Farm	SM1	60
Sheep House Farm Turbines	SHF	30.8

Measurement heights used: 70m, 102m

Equations

A - Roughness length (or logarithmic) shear profile:

$$U_1 = U_2 \cdot \frac{\ln\left(\frac{H_1}{z}\right)}{\ln\left(\frac{H_2}{z}\right)}$$

Where:

H1 The height of the wind speed to be calculated (10 m)

H2 The height of the measured wind speed

U1 The wind speed to be calculated

U2 The measured wind speed

z The roughness length

A roughness length of 0.05 m is used to standardise hub height wind speeds to 10m height in the IEC 61400-11:2003 standard, regardless of what the actual roughness length seen on a site may have been. This 'normalisation' procedure was adopted for comparability between test results for different turbines.

B - Shear exponent profile:

$$U = U_{ref} \cdot \left[\frac{H}{H_{ref}} \right]^m$$

Where:

U calculated wind speed.

Uref measured wind speed

H height at which the wind speed will be calculated

Href height at which the wind speed is measured

m shear exponent = log(U/Uref)/log(H/Href)

Shear exponent by wind speed at SM2 between 70m and 102m height

SM2 HH wind speed (m/s)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Quiet daytime	-0.30	0.06	-0.03	0.16	0.17	0.17	0.20	0.20	0.21	0.20	0.22	0.20	0.18	0.17	0.16	0.17	0.15	0.13	0.13	0.12
Night time	-0.55	0.09	0.15	0.14	0.19	0.16	0.22	0.22	0.22	0.23	0.22	0.21	0.20	0.19	0.18	0.16	0.12	0.15	0.12	0.13

Use site-specific shear exponents to determine equivalent wind speed at SM1 and SHF hub heights

Standardised 10m wind speed at SM2 reference location (m/s)	1	2	3	4	5	6	7	8	9	10	11	12
Hub Height (HH) wind speed at SM2 reference location (A)	1.44	2.89	4.33	5.78	7.22	8.66	10.11	11.55	12.99	14.44	15.88	17.33
Existing SM1 HH wind speed at SM2 ref location - Quiet Day (B)	1.70	2.94	3.96	5.24	6.46	7.72	9.02	10.35	11.75	13.16	14.46	15.90
Existing SM1 HH wind speed at SM2 ref location - Night (B)	1.96	2.65	4.00	5.27	6.40	7.67	8.90	10.26	11.63	13.00	14.53	16.20
Existing SHF HH wind speed at SM2 ref location - Quiet Day (B)	2.08	3.00	3.56	4.66	5.65	6.71	7.86	9.06	10.41	11.76	12.90	14.33
Existing SHF HH wind speed at SM2 ref location - Night (B)	2.83	2.40	3.63	4.72	5.53	6.63	7.63	8.88	10.17	11.45	13.06	14.94

Apply speed-up factors to determine average Hub Height (HH) wind speeds at SM1 and SHF turbine locations (m/s)

Standardised 10m wind speed at SM2 reference location (m/s)	1	2	3	4	5	6	7	8	9	10	11	12
Average HH wind speed at SM1 - Quiet Day	1.65	2.78	3.69	4.82	5.96	7.24	8.31	9.54	10.74	12.17	13.14	14.68
Average HH wind speed at SM1 - Night	1.83	2.47	3.72	4.87	5.91	7.20	8.20	9.45	10.68	12.02	13.21	14.96
Average HH wind speed at SHF - Quiet Day	1.87	2.60	3.11	4.04	4.89	5.84	6.74	7.81	9.03	10.16	10.93	12.37
Average HH wind speed at SHF - Night	2.44	2.16	3.17	4.09	4.79	5.77	6.58	7.66	8.81	9.83	11.06	12.71

Average standardised 10m wind speeds at SM1 and SHF turbine locations (m/s)

Standardised 10m wind speed at SM2 reference location (m/s)	1	2	3	4	5	6	7	8	9	10	11	12
Standardised 10m wind speed at SM1 - Quiet Day (A)	1.23	2.08	2.76	3.60	4.46	5.41	6.21	7.13	8.03	9.09	9.82	10.97
Standardised 10m wind speed at SM1 - Night (A)	1.37	1.84	2.78	3.64	4.41	5.38	6.12	7.06	7.98	8.98	9.87	11.18
Standardised 10m wind speed at SHF - Quiet Day (A)	1.54	2.15	2.56	3.33	4.03	4.82	5.56	6.45	7.45	8.38	9.02	10.21
Standardised 10m wind speed at SHF - Night (A)	2.01	1.78	2.61	3.38	3.95	4.76	5.42	6.32	7.27	8.11	9.13	10.48

Acoustic emission data per wind speed (m/s)

Standardised 10m wind speed (m/s)	1	2	3	4	5	6	7	8	9	10	11	12
SM1 - Nordex N80 emission data - 10m Height - Uncorrected	98.5	98.5	98.5	98.5	101.0	103.0	103.7	104.3	104.7	105.0	105.0	105.0
SM1 - Corrected emission data - 10m height - Quiet Day	98.5	98.5	98.5	98.5	99.6	101.8	103.1	103.8	104.3	104.7	104.9	105.0
SM1 - Corrected emission data - 10m height - Night	98.5	98.5	98.5	98.5	99.5	101.7	103.0	103.7	104.3	104.7	104.9	105.0
SHF - Norwin X-29 emission data - 10m Height - Uncorrected	94.5	94.5	94.5	94.5	95.6	96.7	97.8	99.0	100.1	101.2	102.3	103.5
SHF - Corrected emission data - 10m height - Quiet Day	94.5	94.5	94.5	94.5	94.5	95.4	96.2	97.2	98.3	99.4	100.1	101.4
SHF - Corrected emission data - 10m height - Night	94.5	94.5	94.5	94.5	94.5	95.3	96.1	97.1	98.1	99.1	100.2	101.7

Worst case emission data (between day/night) per wind speed (m/s)

Standardised 10m wind speed at SM2 reference location (m/s)	1	2	3	4	5	6	7	8	9	10	11	12
SM1 - Nordex N80 (Corrected)	98.5	98.5	98.5	98.5	99.6	101.8	103.1	103.8	104.3	104.7	104.9	105.0
SHF - Norwin x-29 (Corrected)	94.5	94.5	94.5	94.5	94.5	95.4	96.2	97.2	98.3	99.4	100.2	101.7

Annex 8 – Summary of Wind Turbine Noise Source Data

Table A8.1: Sound Power Level Data

Development	Turbine	Hub height	Uncertainty Included	Reference Wind Speed (ms ⁻¹) Standardised to 10m Height									
				3	4	5	6	7	8	9	10	11	12
Scout Moor	Nordex N80 (shear corrected)	60	2	-	98.5	99.6	101.8	103.1	103.7	104.3	104.7	104.9	105.0
Reaps Moss	Senvion 3.4M 104 3.4MW Generic Blades Normal	93	1	-	97.7	101.3	105.0	106.4	106.5	106.5	106.5	106.5	106.5
Sheep House Farm	Norwin x29 (shear corrected)	30.8	2	-	94.5	94.5	95.4	96.2	97.2	98.3	99.4	100.2	101.7
Proposed Development	Nordex N149 5.7MW Serrated Blades Mode 0	105	2	96.0	97.2	101.8	106.2	107.6	107.6	107.6	107.6	107.6	107.6

Table A8.2: Octave Band Data

Development	Turbine	Wind Speed	Octave									
			31.5	63	125	250	500	1000	2000	4000	8000	
Scout Moor	Nordex N80 (shear corrected)	10	0.0	91.7	98.3	99.1	96.9	96.6	95.7	92.1	84.2	
Reaps Moss	Senvion 3.4M 104 3.4MW Generic Blades Normal	7	0.0	87.4	95.0	98.9	100.8	101.7	96.5	87.8	76.9	
Sheep House Farm	Norwin x29 (shear corrected)	8	66.2	79.1	89.2	92.3	93.9	92.2	89.8	83.6	73.5	
Proposed Development	Nordex N149 5.7MW Serrated Blades Mode 0	8	79.2	89.3	95.5	99.2	101.8	102.5	100.0	92.4	84.4	

Table A8.3: Data Source

Development	Turbine	Data Source	Uncertainty
Scout Moor	Nordex N80 (shear corrected)	Manufacturer Data Sheet	No Uc specified, +2dB added as per IOA GPG
Reaps Moss	Senvion 3.4M 104 3.4MW Generic Blades Normal	Manufacturer Data Sheet	Uc as per manufacturer data sheet
Sheep House Farm	Norwin x29 (shear corrected)	Manufacturer Data Sheet	No Uc specified, +2dB added as per IOA GPG
Proposed Development	Nordex N149 5.7MW Serrated Blades Mode 0	Manufacturer Data Sheet	No Uc specified, +2dB added as per IOA GPG

Annex 9 – Backstop Noise Limits and Suggested Noise Conditions

This annex addresses the points raised by Hayes McKenzie Partnership (HMP) as part of their technical review of the noise assessment undertaken for the 2025 ES, on behalf of Rossendale Borough Council (RBC), discussed in Section 4.2 and presented in Annex 2.

The following items have been addressed within this Technical Appendix:

Windshields:

The make and model of wind shield used for the baseline survey has been noted in Section 5.3.2. The type used was a Rion WS-15, which is compliant with the requirements outlined within Section 2.4.1 of the IOA GPG.

Noise Contours:

Noise contour plot figures have been included within Annex 1 for information for the three requested scenarios:

- Figure A1.1b - Noise Contour Plot (Project for Assessment Only)
- Figure A1.1c - Noise Contour Plot (Cumulative including Project for Assessment)
- Figure A1.1d - Noise Contour Plot (Cumulative excluding Project for Assessment)

Tonality:

Tonality is addressed in Section 6.12 of this report, and a mechanism for identifying tonality and applying a tonal penalty if applicable is provided within the suggested planning conditions included within Annex 9.

Mitigation:

Details of the required mitigation measures to ensure compliance with the proposed Site Specific Noise Limits at NAL2 and NAL4 are provided in Section 6.9.

Given that the turbine modelled within the assessment is a candidate, it is not appropriate to include detailed energy yield calculations at this stage.

Lower Limiting Values:

Clarification of the approach to Site Specific Noise Limits and the choice of Lower Limiting Value (or Fixed Minimum Limit / FML) is included within Section 6.5.

Calibration Certificates:

The missing calibration certificate for the field calibrator used in the baseline noise survey is now included with the calibration certificates for the sound level meters within Annex 4.

Background Noise Data Exclusions, Graphs/Data presentation:

Time histories:

Time history graphs included in Annex 5 have been revised to show measured Total Noise levels, prior to correction for operational turbines.

HMP noted that there was a significant early morning increase in noise levels between 0400 and 0700, likely due to dawn chorus or commuter traffic and that it would be appropriate to remove these levels. Having reviewed the time series graphs again, the increase in noise levels during this period follows the general pattern expected at this time of day and as such no additional datapoints have been

removed. In addition, there are no obvious spikes in the data or banding in the regression charts attributed to dawn chorus which are generally most noticeable during the spring time.

Regression Graphs:

The regression graph/scatter plot figures (A1.2 of Annex 1) have been revised, with two versions produced from each NML. The first graph shows all data as presented previously, including exclusions and measured Total Noise levels (where corrections were undertaken to account for operational turbines present during the survey). The second graph shows only valid background noise data, to allow for the figures to be more clearly interpreted.

Assignment of Noise Data/Limits:

The choice of background noise dataset to represent NAL10 has been updated in line with the suggestion by HMP, as detailed in Table 6.1.

Sound Power Level data:

Reference to Coal Clough within Appendix 7.2 of the 2025 ES has been removed; the site had been excluded from consideration within the cumulative assessment due to large distance (resulting in very low levels of predicted noise from the site), however some references remained within Annexes to the Appendix.

Crook Hill Wind Farm has also been removed from the assessment due to predicted noise levels being greater than 10 dB below the TNAC at all NALs.

Table 8.3 has been added to Annex 8 to indicate the source of the sound power level data used and to provide justification for the level of uncertainty used in the assessment.

Small turbine data:

HMP raised a query over sound power level data used for small-scale stall regulated turbines within the noise predictions presented in the 2025 ES. Following the updated guidance within ARWTN, all turbines of 50 kW or less have been excluded from the assessment.

Directivity:

Additional clarification on the approach taken for wind directivity within the assessment has been included in Section 6.4, and worst-case wind directions for each modelling scenario per NAL have been included on Figures A1.3a-r within Annex 1.

Topography corrections:

As part of their review, HMP noted some differences between the topographical corrections included in the 2025 ES and their calculated corrections. The following summarises TNEI's understanding of the differences between the two approaches:

- Distance cutoff: It is understood that HMP apply a distance cutoff for valley corrections, which TNEI do not. The use of a cutoff is not specified within the IOA GPG, but instead based on conclusions from the research which informed this element of the GPG. Inclusion of the valley corrections at any distance is considered worst-case, and as such the approach has been maintained.
- Valley corrections: HMP identified a number of instances where TNEI had applied +3 dB valley corrections, and they had not. The inclusion of these corrections is considered worst-case, and

as such the approach has been maintained. While there are a small number of instances where HMP have included valley corrections and TNEI have not, TNEI's approach is overall more conservative and as such has not been changed.

- Barrier corrections: HMP identified a number of instances where TNEI had applied -2 dB barrier corrections and they had not. TNEI has undertaken a review of the locations and turbines in question, using multiple height data sources/software packages, and are confident that the calculations used to inform the topography corrections have been undertaken in line with current guidance and good practice.
- An example of the calculated ray paths between NAL7 and the nearest turbines is shown below as Figure A11.1. At this NAL, line of sight (represented by red lines) to the turbine tip heights (labelled 'T#') is interrupted by the terrain immediately adjacent to NAL7.

Figure A11.1: Ray Paths at NAL7



The topographical corrections calculated by TNEI are considered to be generally conservative in nature, and have been undertaken in line with current guidance and good practice. Where there are minor discrepancies between the corrections calculated by HMP and TNEI, these have been reviewed to ensure the approach is correct.

A comparison of topographical corrections for the revised layout of the Project for Assessment has not been possible, however as discussed above TNEI are confident that the corrections calculated for the revised turbine layout are correct.

Amplitude Modulation (AM):

Amplitude Modulation is discussed in relation to the ARWTN guidance in Section 3.3 of Appendix 7.2.

Cumulative Conditions:

Following the release of ARWTN, the assessment has been revised to consider only Site Specific Noise Limits.

Annex 10 – Response to HMP Comments

Annex 12 – Sheep House Farm Turbines

Section 2.40 of ARWTN discusses the potential exclusion of small-scale turbines from the cumulative assessment:

‘...the noise impacts of small wind turbines are generally localised and could represent a disproportionate constraint on larger wind energy developments. In such cases, the contribution of these turbines should be excluded from the cumulative noise assessment. For the purposes of this guidance, turbines with generating capacities of 50 kW or less can be considered to have localised noise impacts and can therefore be excluded from cumulative noise assessment. Turbines with generating capacities above 50 kW and less than (for example) a few hundred kilowatts can be excluded from cumulative assessment where it can be demonstrated that noise impacts from these turbines are localised and where including these turbines in a cumulative assessment would result in disproportionate constraints on larger developments. All other wind farm developments must be considered in the cumulative assessment where their individual noise level contribution is within 10 dB of the TNAC.’

As a result, turbines with generating capacities of 50kW or less can be excluded from cumulative noise assessment without further consideration.

Turbines with generating capacities *‘above 50 kW and less than (for example) a few hundred kilowatts’* can be excluded from cumulative assessment where it can be demonstrated:

- that noise impacts are *‘localised’*, and
- where the inclusion of these turbines would result in *‘disproportionate constraints on larger developments’*.

To the immediate north/northeast of the Project for Assessment, there is a small scale wind development called Sheep House Farm (planning reference 2015/0059). The Decision Notice for Sheep House Farm includes the following noise related Planning Condition:

‘9. The turbines hereby permitted shall operate at all times within the level of noise emissions, with correction for any tonal components, that accords with the ‘Assessment & Rating of Noise from Wind Farms’ (ETSU-R-97), both individually and cumulatively.’

No information is contained within the Decision Notice relating to specific noise level limits, and there is no noise assessment available on Rossendale Borough Council’s planning portal. In the absence of specific noise limits for Sheep House Farm, limits have been assumed based on the background sound levels detailed in Section 5 of TA 7.2, in line with ARWTN and the IOA GPG.

It is assumed that noise limits for Sheep House Farm would be based on the greater of Lower Limiting Values of 35 dB for daytime and 43 dB for night-time, or 5 dB above the measured background sound level. TNEI is not aware of any properties which are Financially Involved with Sheep House Farm.

The Sheep House Farm development consists of two 225 kW turbines, and would use a large portion of the available 'noise budget' at nearby receptors. Whilst ARWTN does not provide an exact upper threshold for the generation capacity of turbines which may be excluded, 225 kW turbines clearly fall below the threshold of 'less than a few hundred kilowatts'. The ARWTN guidance does not distinguish between single turbines or multiple small turbines in a development..

The clear purpose of this part of the ARWTN guidance is to prevent large commercial scale wind farm generation from being thwarted by small turbines which have localised effects. Exactly how the two criteria above (localised impacts and disproportionate constraints) should be demonstrated is not addressed within ARWTN. This Annex provides supporting information to allow these criteria to be evaluated and to demonstrate why it is appropriate for the Sheep House Farm turbines to be excluded from the cumulative operational noise assessment.

Localised noise impacts

Figures A12.1-A12.3 presented below show predicted noise contours from the Sheep House Farm turbines at a range of wind speeds.

Figure A12.1: Predicted Noise Contours for Sheep House Farm Turbines – 10 ms⁻¹

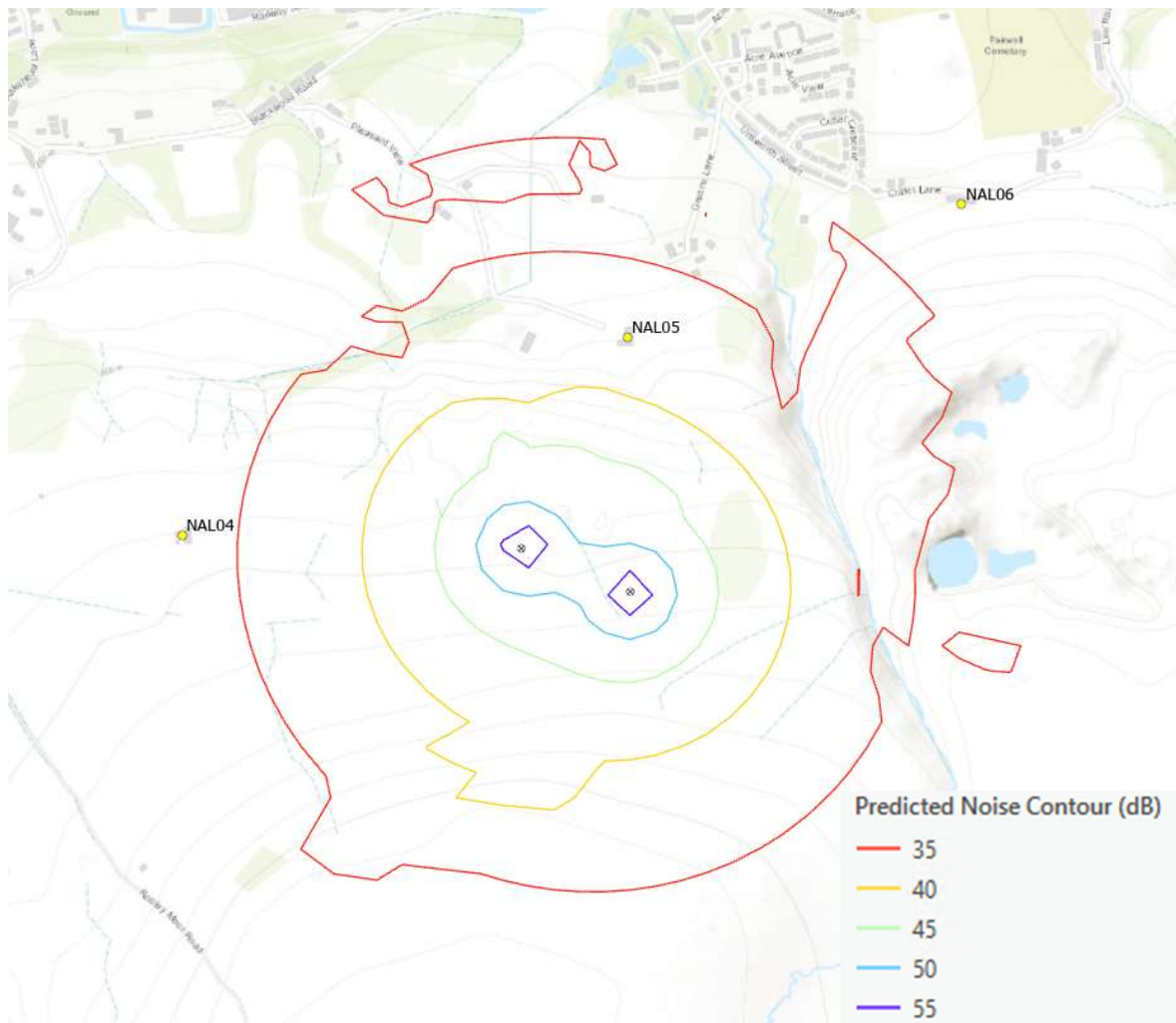


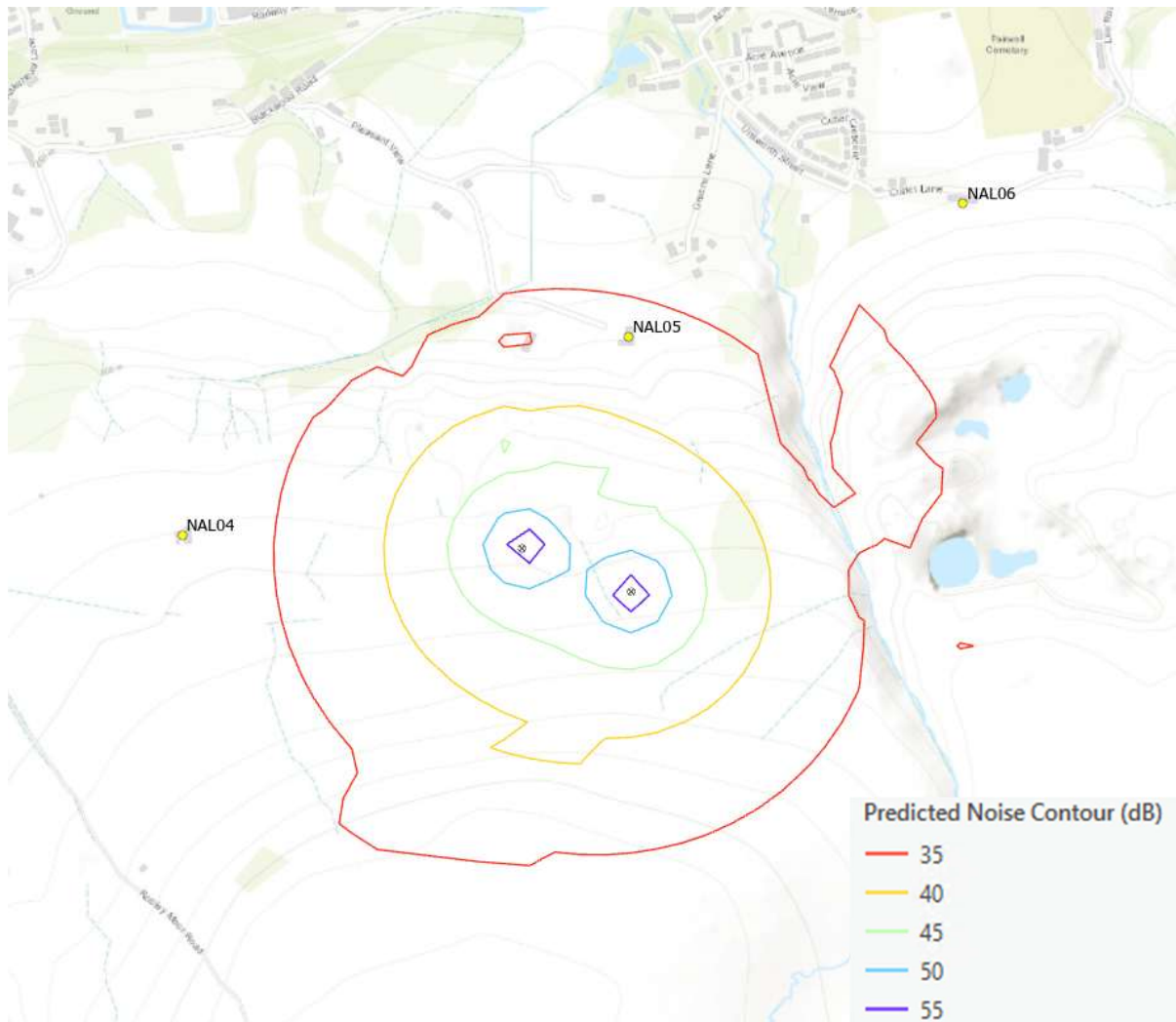
Figure A12.1 shows predicted noise levels from the Sheep House Farm turbines only at a standardised 10 m wind speed of 10 ms⁻¹, out to a lower value of 35 dB LA90. Also shown are the Noise Assessment Locations (NALs) considered the assessment, shown as yellow dots.

There are 4 properties within the 35 dB contour; two at NAL5, and two within the separate section to the north (the result of topographic corrections from the downward sloping terrain) which are shown as grey squares on the background mapping. Due to the small number of properties located within the 35 dB contour, the impact of these turbines could be described as “localised”.

It should be noted that standardised 10 m wind speeds of 10 ms⁻¹ are relatively high such that they would occur less frequently than lower wind speeds. Predicted noise contours at lower wind speeds are therefore also shown to provide additional context by illustrating the noise levels that would be expected from the Sheep House Farm turbines at wind speeds which would occur more frequently. When considering

predicted noise levels at a standardised 10 m wind speed of 9 ms^{-1} , only two properties are located within the 35 dB contour, as shown on Figure A12.2.

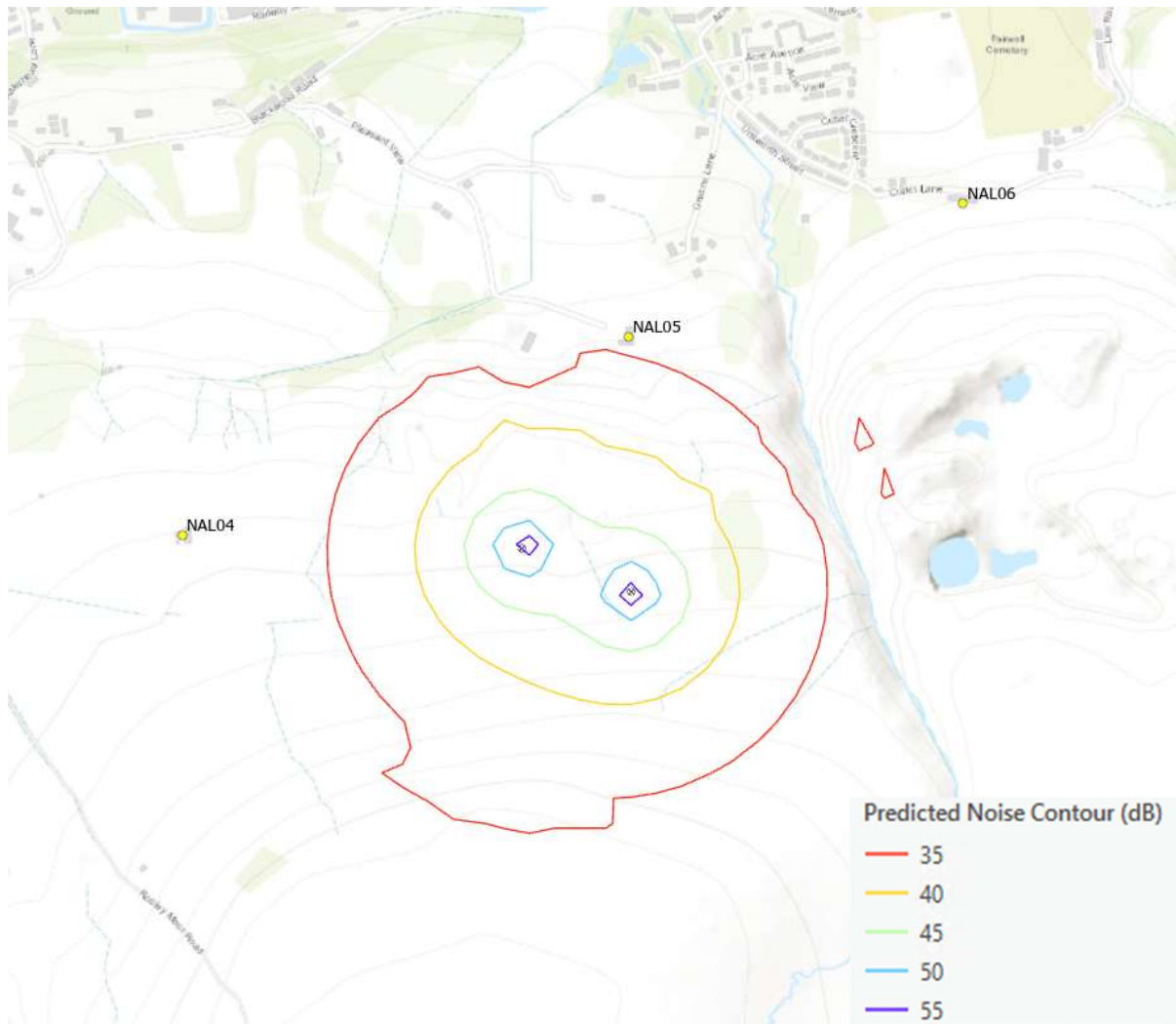
Figure A12.2: Predicted Noise Contours for Sheep House Farm Turbines – 9 ms^{-1}



At a standardised 10 m wind speed of 8 ms^{-1} , predicted noise levels are similar to 9 ms^{-1} , with the two properties at NAL5 located within the 35 dB contour.

At standardised 10 m wind speeds of 7 ms^{-1} there are no properties located within the 35 dB contour as shown on Figure A12.3. This would also be the case for standardised 10 m wind speeds of below 7 ms^{-1} .

Figure A12.3: Predicted Noise Contours for Sheep House Farm Turbines – 7 ms⁻¹



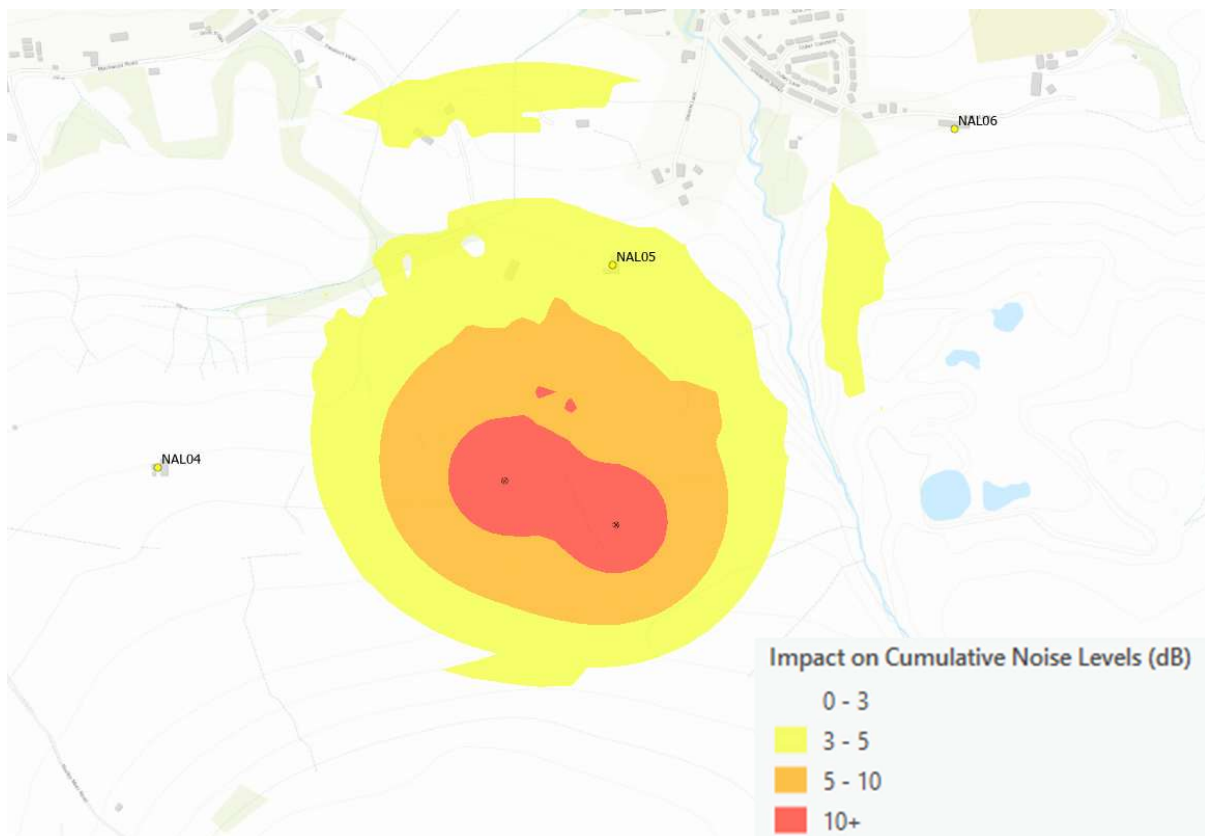
Consideration of predicted noise levels from the Sheep House Farm turbines across a range of wind speeds suggests that the impacts from the turbines may be localised, however this considers only the turbines in isolation.

Figure A12.4 shows the difference in total cumulative noise levels with/without Sheep House Farm (this scenario includes the Project for Assessment), based on standardised 10 m wind speeds of 10 ms⁻¹ to represent the worst case within the wind speed range recommended by ARWTN. The values correspond with the increase in noise level that would result from these turbines being included in the overall cumulative scenario, compared to a scenario where they are removed:

- The red band indicates where including Sheep House Farm (SHF) would change overall cumulative noise levels by more than 10 dB.
- The orange band is where including SHF would change cumulative noise levels by 5-10 dB.

- The yellow band shows where including SHF would change cumulative noise levels by 3-5 dB.
- Everywhere else, the level of change resulting from the inclusion of SHF would be less than 3 dB.

Figure A12.4: Contribution to cumulative noise levels of the Sheep House Farm Turbines



As a 3 dB change in sound level is generally considered to be the minimum change in level clearly perceptible by the human ear, it could be said that the Sheep House Farm turbines would only have a clearly perceptible impact on noise levels within the shaded areas; i.e. localised around the immediate vicinity of the turbines. In terms of receptors, the same four properties that are located within the 35 dB contour are located within the 3-5 dB change band. No receptors are located within the 5-10 dB or >10 dB change bands.

It should be noted, however, that the maps shown above do not consider directivity, and as such may not accurately represent the cumulative noise levels. Tables A12.1 and A12.2 below present predicted noise levels for the worst case wind direction sector at NAL5, and also NAL4 (the next-nearest NAL to the Sheep House Farm turbines, located

to the west). They also demonstrate how the contribution to the cumulative noise levels from the Sheep House Farm turbines varies with wind speed.

Table A12.1: Comparison of Predicted Sound Levels – NAL5

Downwind Predicted Sound Level	Wind Speed (ms ⁻¹)						
	4	5	6	7	8	9	10
Total Cumulative	-	34.8	37.1	38.3	38.8	39.4	40.0
Cumulative Exc. SHF	-	30.7	34.7	36.1	36.2	36.3	36.4
Difference	-	4.1	2.4	2.2	2.6	3.1	3.6
Project for Assessment	24.8	29.4	33.8	35.2	35.2	35.2	35.2
Sheep House Farm	32.6	32.7	33.5	34.3	35.3	36.5	37.5
Difference	-7.8	-3.3	0.3	0.9	-0.1	-1.3	-2.3

The predicted noise levels shown in Table A12.1 show that at wind speeds of 6 – 8 ms⁻¹, there is less than 1 dB difference in the predicted noise levels from Sheep House Farm and the Project for Assessment. Whilst the difference is greater than 3 dB at wind speeds of 5, 9 and 10 ms⁻¹, at wind speeds of 6 - 8 ms⁻¹ there is less than a 3 dB difference between predicted cumulative noise levels with and without Sheep House Farm at NAL5 (the nearest receptor).

Table A12.2: Comparison of Predicted Sound Levels – NAL4

Downwind Predicted Sound Level	Wind Speed (ms ⁻¹)						
	4	5	6	7	8	9	10
Total Cumulative	-	34.3	37.5	38.8	39.1	39.4	39.7
Cumulative Exc. SHF	-	33.0	36.8	38.2	38.4	38.5	38.6
Difference	-	1.3	0.7	0.6	0.7	0.9	1.1
Project for Assessment	26.9	31.5	35.9	37.3	37.3	37.3	37.3
Sheep House Farm	28.4	28.4	29.3	30.1	31.1	32.2	33.3
Difference	-1.5	3.1	6.6	7.2	6.2	5.1	4.0

At NAL4, there is a more substantial difference in the predicted noise levels from the Sheep House Farm turbines and the Project for Assessment. The difference in the predicted cumulative noise levels with and without SHF is less than 3 dB at all assessed wind speeds (5 – 10 ms⁻¹) and less than 1 dB for wind speeds of 6 – 9 ms⁻¹ as shown in Table A12.2.

This suggests that noise impacts from the Sheep House Farm turbines are localised to a small number of receptors located in immediate proximity to the turbines and that it would be appropriate to exclude them from the cumulative assessment if they present a disproportionate constraint to the Project for Assessment.

Disproportionate constraints on larger developments

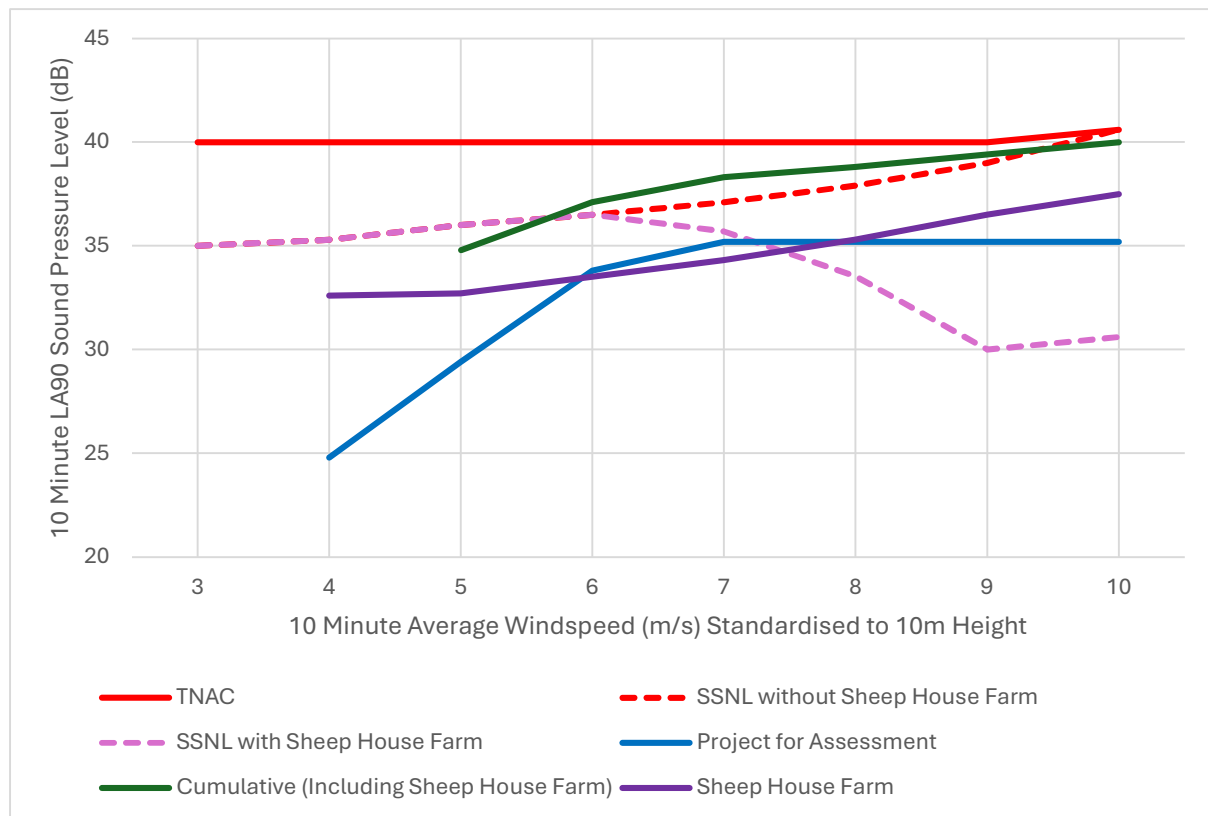
The nearest receptor to Sheep House Farm is NAL5, as shown on the figures above. Due to the close proximity of these turbines to the receptor, Sheep House Farm would use up a large amount of the available noise headroom at this location.

Figure A12.5, below, shows that the total cumulative predicted noise levels (including Sheep House Farm) do not exceed the Total Noise Assessment Criteria (TNAC) at NAL5, but by only a small margin. As such, Significant Headroom (defined as between 5 – 10 dB in Section 5.4.11 of the IOA GPG) is not available for use in the calculation of Site Specific Noise Limits. Consideration of the Controlling Property principle (as discussed in Section 5.4.9 of the IOA GPG) shows that the Sheep House Farm turbines have a maximum of 2.5 dB available headroom at NAL5. The Site Specific Noise Limits have therefore been calculated by scaling the predicted noise levels from the Sheep House Farm turbines by this amount¹.

The resulting Site Specific Noise Limits (shown as a pink dashed line) are set at 10 dB below the TNAC at wind speeds of 9 and 10 ms⁻¹, where the predicted noise level from Sheep House Farm plus the headroom margin were within 0.5 dB of the TNAC. Where this is the case, predicted noise levels from the Project for Assessment exceed the SSNL by around 5 dB.

¹ Calculation of this Site Specific Noise Limit also considers NAL2 as the controlling property for Scout Moor Wind Farm. There is a minimum margin of 3.2 dB between the predicted noise levels for Scout Moor and its conditioned noise limit at NAL2 (this is the available headroom) so the predicted noise levels due to Scout Moor at NAL5 have been increased by this amount.

Figure A12.5: Site Specific Noise Limits with and without Sheep House Farm at NAL5



In order to mitigate an exceedance of this level, it would be necessary to operate seven of the twelve turbines which comprise the Project for Assessment in low noise modes, with the closest turbines to NAL5 (T10 and T11) operating in Modes 16 and 18 during downwind conditions at standardised wind speeds of 9 – 10 ms⁻¹. Modes 16 and 18 are rated at maximum powers of 3.44 MW and 2.96 MW, respectively.

Where the Sheep House Farm turbines are excluded from the assessment, it would not be necessary to mitigate to meet the SSNL (shown as a red dashed line, above), allowing the turbines of the Project for Assessment to operate in Mode 0 (rated at a maximum power of 5.7 MW) under the same conditions.

As such, inclusion of the two 225 kW Sheep House Farm turbines is considered to represent a disproportionate constraint to the Project for Assessment. Accordingly they should and have been excluded from the cumulative operational noise assessment.

Annex 11 – Response to Third Party Comments

Following submission of the 2025 ES, noise consultation responses were provided by the following:

- Norden, Bamford and Heywood Bridleway Association
- Rochdale and Bury Bridleway Association
- Whitworth Town Council
- Alan Rawsterne, Secretary, Rooley Moor Neighbourhood Forum and on behalf of Say No To Scout Moor 2

Having reviewed the consultation responses in respect of the proposed development, the following statement is submitted in response to the matters raised insofar as they relate to TNEI's area of expertise.

Submission 1 – Norden, Bamford and Heywood Bridleway Association

The consultation response states that *“noise coming from both the blades turning and the rotational equipment associated with the wind turbines which will have adverse effects on horses in the vicinity. This will particularly be an issue when the turbines suddenly start to reorientate to better position themselves to the wind direction.”* The response also states that the use of ETSU-R-97 *“is totally unsuitable for these huge turbines.”*

Response 1

Effects on Bridleway users

There is no specific guidance available on the assessment of wind turbine noise for equine animals, however, an advice note written by The British Horse Society (BHS) on Wind Turbines and Equestrian Access (2025)¹ does provide information regarding the effects of operational wind turbine noise on horses being ridden or driven.

Within the document, the BHS recommend that in order to reduce reactions of horses, there should be a minimum separation distance of the blade tip height plus 10 % for any route used by horses.

The advice note states:

“Noise from turbines is strictly controlled and well below noise from motor vehicles, farm machinery and many other commonly occurring noises which do not appear to disturb horses.”

And

“Horses have a slightly greater [frequency] range of hearing than humans and they also hear sounds from further away, but many horses do not appear to be disturbed by the sounds made by turbines, particularly the more modern ones which are much quieter than older units”.

In respect of the second quote, it should be noted that the “greater range of hearing” is in respect of an extended upper frequency range; the BHS notes that horses can hear up to approximately 33.5 kHz, whereas humans can generally hear up to around 20 kHz. Nonetheless, wind turbines do not typically generate high levels of noise in this frequency range², and where noise at higher frequencies may be produced, it is increasingly attenuated with distance and therefore likely to be detectable only in close proximity to wind turbines.

¹ The British Horse Society, Advice on Wind Turbines and Equestrian Access (2025). Available from: <https://www.bhs.org.uk/media/lgwdbp/hr/wind-turbines-0525.pdf> [Accessed 13/05/2026]

² Ultrasonic noise emissions from wind turbines: potential effects on bat Species (2019) Long, Chloe V., Paul A. Lepper, and James A. Flint. Available from: <https://repository.lboro.ac.uk/ndownloader/files/17189321/1>. Accessed 01/06/2026.

For the proposed development T11 is the closest turbine to the Pennine Bridleway at approximately 210 m, whereas the recommended separation distance for a ridden horse is 198 m (based on the maximum consented tip height of 180 m). Therefore, the separation distance from the turbines to the Pennine Bridleway meets the requirements set out by the BHS.

With regards to the movement of wind turbines, the BHS advice note states:

“Blades which start to turn while in a horse’s sight might provoke more reaction than turbines which are already moving as a horse approaches them, but start-up movement of commercial turbines is gradual, and will not affect most horses.”

And:

“Large turbines will adjust to changes in wind speed and direction slowly which will not be apparent unless watching closely. The smaller turbines that work with a tail fin can move more quickly, which is more evident in fitful gusting wind conditions, when they may appear noisier. However, although the quicker movement and sound are more likely to startle a horse, they are less than other hazards in windy conditions such as flapping plastic or flying litter.”

As such, it is likely that visual disturbance resulting from the movement of the proposed wind turbines would be low, and below that of other elements of the environment.

Use of ETSU-R-97 for the assessment of wind turbine noise

On 19th June 2026, the UK Government published updated guidance for the ‘Assessment and Rating of Wind Turbine Noise’ (hereafter referred to as ARWTN). The ARWTN guidance replaces the previous guidance ETSU-R-97 ‘The Assessment and Rating of Noise from Wind Farms’, but is designed to be used alongside the good practice guidance produced by the Institute of Acoustics ‘A good practice guide to the application of ETSU-R-97 for the assessment and rating of wind turbine noise’ (IOA GPG). The guidance contained in ARWTN and the IOA GPG has been used to assess the potential operational noise impact of the Project for Assessment.

The ARWTN document is an update and replacement of the previous guidance ETSU-R-97 ‘The Assessment and Rating of Noise from Wind Farms’, stating in Section 1.12, that:

“Reference to ETSU-R-97 in UK planning policy or guidance should be interpreted to mean a reference to this technical guidance, which replaces ETSU-R-97.”

The ARWTN guidance considers evolutions in turbine technology and developments in wind turbine noise assessment methodologies since 1996, as well as established best practice and the latest available evidence in the field. Further information on ARWTN is provided in Section 2.7 of Appendix 7.2.

Submission 2 – Rochdale and Bury Bridleway Association

Proximity to the Pennine Bridleway

The consultation response references the proximity to the Pennine Bridleway and states ‘We do not think that wind turbines close to The Pennine Bridleway are compatible with being able to refresh your spirit with the wild and romantic terrain of the moorland. The whoosh, whoosh of the turbine blades as they rotate will produce so much noise that it will destroy the tranquillity people are seeking.

Particularly as the turbines are on both sides of the route. The buffer zone must be large enough so that users of The Pennine Bridleway cannot hear the noise of the rotating blades.'

Response 2

The Pennine Bridleway runs through the Assessment Area of the Project for Assessment, as indicated on Figures A12.1 and A12.2, in a broadly northwest to southeast orientation.

There are no UK or English guidelines to suggest appropriate noise limits for operational noise for public footpaths or outdoor amenity areas, therefore in the absence of any guidance, the predicted noise levels attributable to the Project for Assessment have been considered in the context of the existing predicted levels from operational turbines.

Operational noise levels from the proposed wind turbines will depend on the wind conditions and the Pennine Bridleway users position relative to the turbines. Figure A12.1 presents a noise contour plot of predicted existing cumulative operational wind turbine noise (excluding the Project for Assessment), in 5 dB (L_{A90}) increments based on a wind speed of 10 m/s (standardised from hub height to 10 m).

Figure A12.1 – Predicted Noise Levels (Existing)

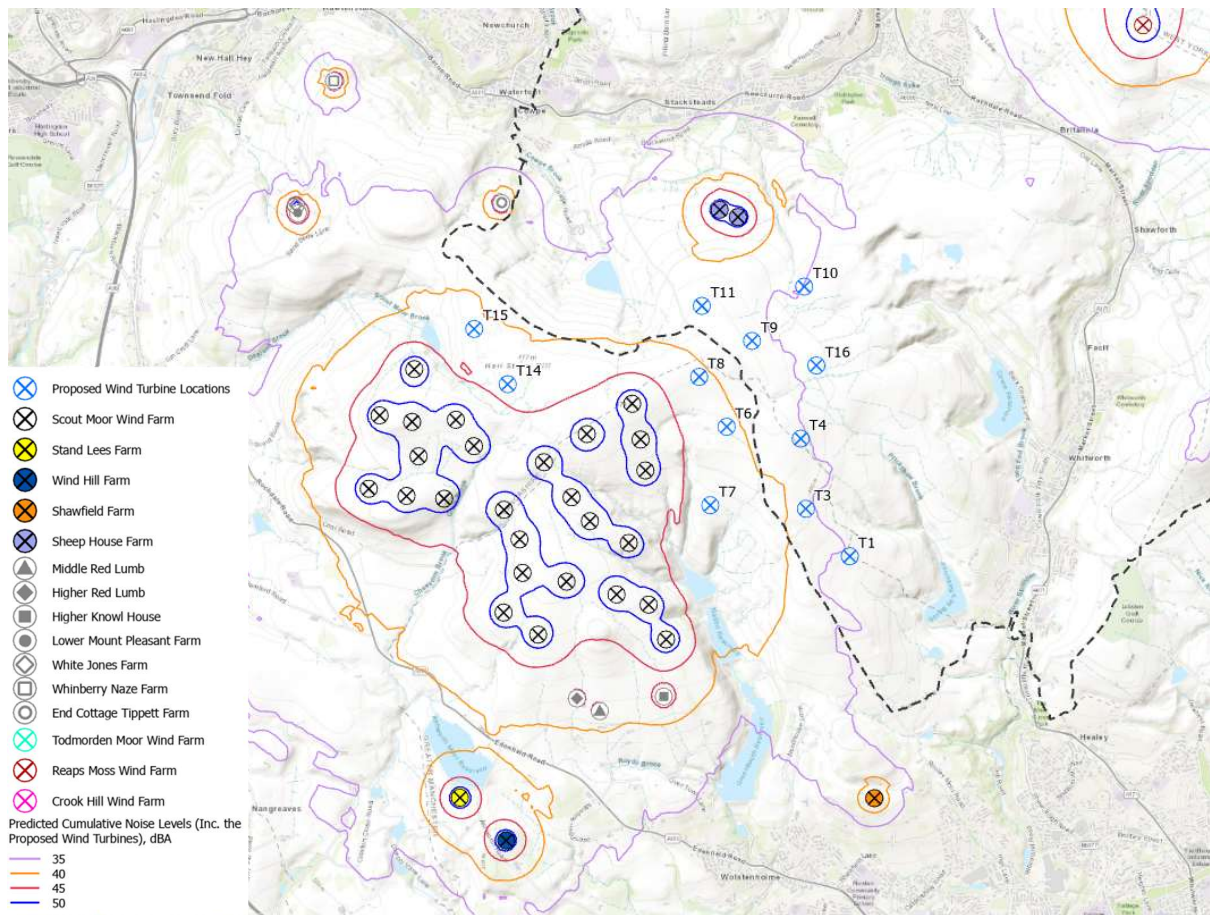


Figure A12.1 shows that, under worst-case conditions, users of the Pennine Bridleway may currently experience noise levels between 35 - 42 dB(A) on sections of the route nearest to the existing Scout Moor Wind Farm turbines. As such, wind turbine noise already forms part of the existing soundscape for certain sections of the route.

Figure A12.2 presents noise contours showing predicted cumulative noise levels including the Project for Assessment. These contours represent the highest predicted levels from the operational and proposed turbines under downwind conditions, based on a wind speed of 10 m/s (standardised from hub height to 10 m). At lower wind speeds, turbine noise levels would be lower than those shown on the figure.

Figure A12.2 – Predicted Noise Levels (Proposed)

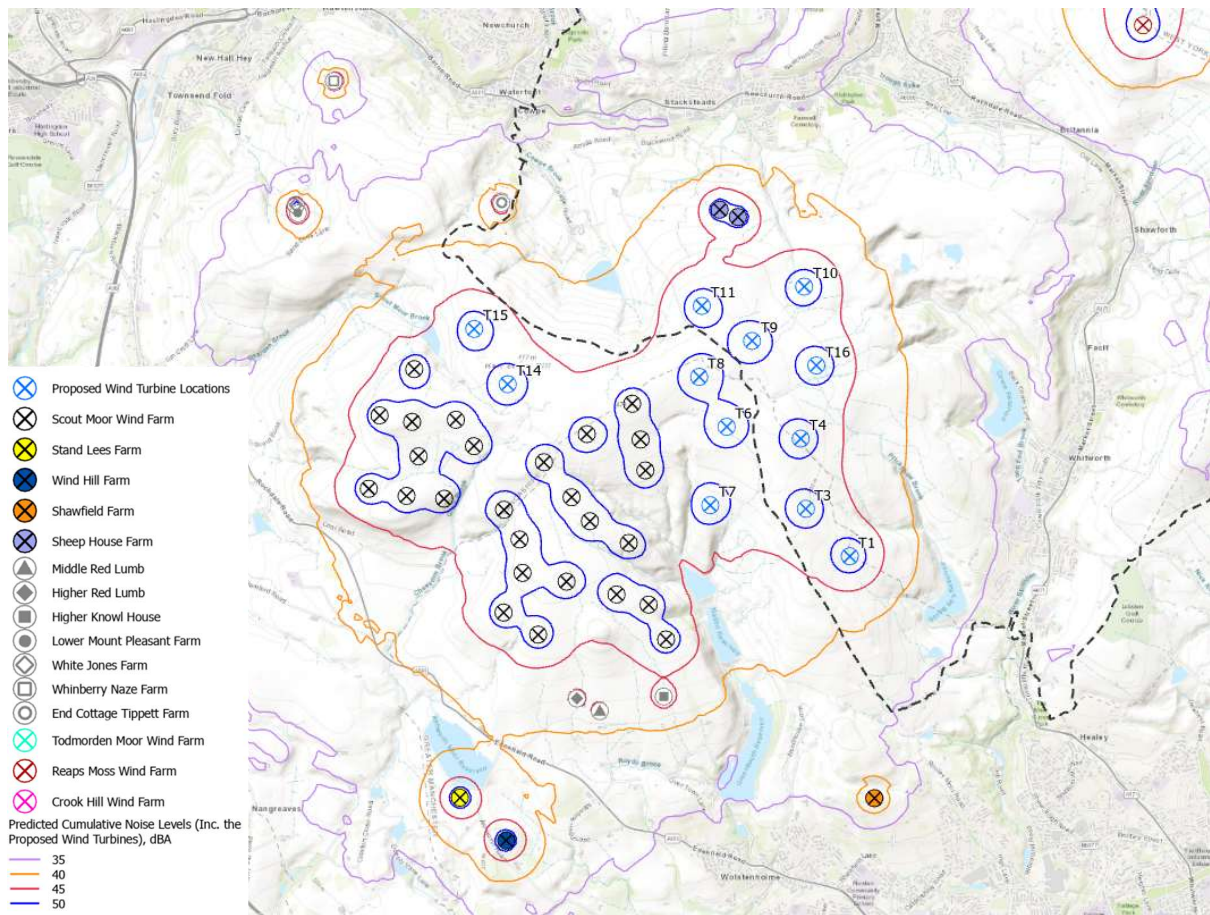


Figure A12.2 shows that, under worst-case conditions, users of the Pennine Bridleway may experience noise levels between 35 – 50 dB(A) on sections of the route nearest to the proposed turbines, with the highest level being reached for a short (100 m) section as the route passes T9.

Table A12.1 below provides a breakdown of the predicted noise levels for the scenarios shown in Figure A12.1 and A12.2, considering the length of the Pennine Bridleway over which these levels may be experienced.

Table A12.1 – Predicted Operational Noise, dB $L_{A90(10mins)}$, levels by distance (m)

Predicted level (dBA)	Existing	Proposed
50 - 55	0	100
45 - 50	0	3,020
40 - 45	1,460	3,380
35 - 40	5,890	2,230
Total	7,350	8,730

Considering a typical walking speed of 5 kilometres per hour (3.1 miles per hour), representative of pedestrians and horse riders, the duration of exposure to the predicted noise levels are detailed in Table A12.2.

Table A12.2 – Predicted Noise Exposure Time (hours:minutes)

Predicted level (dBA)	Existing	Proposed
50 - 55	00:00	00:01
45 - 50	00:00	00:36
40 - 45	00:18	00:41
35 - 40	01:11	00:27
Total	01:29	01:45

As can be seen from Table A12.2, the duration of time that users of the Pennine Bridleway are exposed to wind turbine noise levels above 35 dB(A) is expected to increase, and the level of noise which the users will experience will increase. It should be noted, however, that the existing soundscape includes wind turbine noise from the Scout Moor Wind Farm turbines, as well as other wind farms and small turbines in the area.

Typical users of the Pennine Bridleway would be exposed to wind turbine noise above current levels for a relatively short time while passing the turbines, under worst case conditions. During periods of lower wind speed, or where Pennine Bridleway users are upwind of the turbines, the exposure levels and times would be reduced.

Submission 3 – Whitworth Town Council

In their response the Council raised concerns in relation to *‘The effects on residents’ mental health due to the infrasound of the proposed turbines.’*

Response 3

Section 2.12.165 of EN-3 states: *“There is currently no evidence that ground transmitted vibration, infrasound or low frequency noise from wind turbines occurs at a sufficient level to be harmful to human health. Therefore, the Secretary of State should give no weight to claims of harm to human health as a result of ground transmitted vibration, infrasound or low frequency noise.”*

Further information on Infrasound is provided within Section 3.2 of TA7.1.

Submission 4 - Alan Rawsterne, Secretary, Rooley Moor Neighbourhood Forum and on behalf of Say No To Scout Moor 2 (and accompanying report prepared by Grosvenor Consultancy)

The consultation response from Rooley Moor Neighbourhood Forum (RMNF) comprised a summary document which outlined their key concerns. The RMNF commissioned Grosvenor Consultancy to undertake a review of the noise impact assessment undertaken for the 2025 ES, and this appears to have informed the RMNF’s response. The Grosvenor report comprises 131 pages plus 14 supporting Annexes.

The key noise concerns raised in the summary document from RMNF are outlined below:

- Failure to Protect Residential Amenity in the Round
- Failure of Noise Impact Assessment (NIA) Under ETSU-R-97
- Failure to Assess the Full Acoustic Spectrum (Amplitude Modulation and Infrasound)
 - Amplitude Modulation (AM/EAM)
 - Infrasound and Low Frequency Noise (ILFN)

- Wind Shear
- Sleep Disturbance
- Judicial and Legal Precedent on Nuisance
- Reliance on Statutory Nuisance is Unacceptable

The RMNF document states: *“Following a careful review of the application documents and the accompanying annexes, Grosvenor Consultancy has established substantive and material planning grounds for the refusal of this proposal. They have identified an unacceptable high level of risk of harm to the health and wellbeing of local residents, to the extent that properties may potentially be rendered uninhabitable due to unacceptable levels of operational Wind Turbine Acoustic Pollution (WTAP).”*

Response 4

This response is split into the separate headings contained within the submission, as detailed in the bullets above.

Failure to Protect Residential Amenity in the Round

The submission refers to the ‘Lavender test’, which relates to Residential Visual Amenity and considers whether the presence of turbines is *“unpleasantly overwhelming and unavoidable presence in main views from a house or garden”*, and whether this may make the property an unattractive place to live. The test is frequently referenced within Residential Visual Amenity Assessments (RVAA).

The Landscape Institute’s Technical Guidance Note 2/19 on Residential Visual Amenity Assessments³ discusses the test from the point of view of Residential Visual Amenity, which it defines as *“the overall quality, experience and nature of views and outlook available to occupants of Residential properties including views from gardens, and domestic curtilage.”*

Note 2/19 notes that:

“Residential Amenity comprises a range of visual, aural, olfactory and other sensory components. Development can cause effects on one or more components of Residential Amenity, for example effects of noise, dust, access to daylight, vibration, shadow flicker, outlook and visual amenity. Sometimes this is referred to as ‘living conditions’.”

And:

“RVAA does not consider, or provide information on, the other components of Residential Amenity referred to above such as noise and air quality.”

Residential amenity is considered within ARWTN. The document *“provides guidelines for the control of wind turbine noise, such that wind farm neighbours receive a reasonable degree of protection”*.

Providing protection to wind farm neighbours is also a consideration when determining the daytime Lower Limiting Value, specifically the duration and level of exposure to noise. This is considered within Table 6.3 of Appendix 7.2.

While the submission critiques *“a failure to protect residential amenity in the round”*, it should be noted that the noise impact assessment has been undertaken in line with current guidance and good practice, and that protection of residential amenity forms part of that methodology. The ‘Lavender

³ Landscape Institute (2019) Available from: <https://landscapewpstorage01.blob.core.windows.net/www-landscapeinstitute-org/2019/03/tgn-02-2019-rvaa.pdf> [Accessed 28/05/2026]

test' is recognised within RVAA guidance, and it is outwith the scope of the noise impact assessment to consider visual impacts.

Failure of Noise Impact Assessment (NIA) Under ETSU-R-97

The submission provides criticism of the use of ETSU-R-97 for the assessment of wind farm noise:

*“a. **Outdated Guidance:** ETSU-R-97, published in 1996/97, is **outdated and unfit for purpose** given the exponential increase in turbine size and generation capacity since its inception.”*

As discussed above, ETSU-R-97 was superseded by ARWTN in June 2026. A revised assessment has been undertaken in line with the new guidance.

*“b. **Scale of Turbines:** The proposed Nordex N149 5.7MW turbines have blade lengths of approximately 75m. This results in a **blade swept area increased by nearly 350%** compared to the existing Scout Moor Nordex N80 2.5MW turbines.”*

Neither the blade swept area of the proposed wind turbines or the increase in size compared to existing turbines in the area are relevant components of assessment against ARWTN. The proposed turbines have been assessed based on acoustic emission data for a candidate turbine, in line with relevant guidance and good practice.

*“c. **NIA Deficiencies:** The Applicant has failed to submit **Operational Noise Contour Maps** (for both the proposed scheme and the cumulative scheme), which is considered a significant material failure of the assessment.”*

The wind turbine operational noise assessment considers noise across a range of wind speeds and directions. To ensure a cautious approach, predictions of wind turbine noise are presented based on worst-case wind directions; discounting wind directivity will in many cases lead to an unrealistic over-prediction of wind turbine noise, particularly with regards to cumulative noise for locations which cannot be downwind of all of the turbines simultaneously.

Noise contour plots detailing predicted noise levels are presented in Annex 1 of Appendix 7.2. These figures present predicted noise levels at a standardised wind speed of 10 m/s, and do not include wind directivity; as such, the predicted noise levels presented on these figures may differ from those reported elsewhere. The absence of wind directivity within the figures is likely to result in higher predicted noise levels on the figures, as it assumes all directions are downwind of the turbines at all times, which cannot happen in reality.

*“d. **BNS Compliance Issues:** The Applicant's Background Noise Survey (BNS) is questionable and likely fails to adequately comply with the Institute of Acoustics (IOA) Good Practice Guide (GPG). Concerns are raised regarding the installation of Sound Level Meters (SLMs) at multiple locations (NML 2, 4, 6), some potentially positioned adjacent to boundary fences, which could lead to non-compliant readings due to wind noise interference.”*

The report produced by Grosvenor Consultancy (GC Report) presents a critical review of the baseline noise survey, which TNEI strongly refutes.

Background noise levels and removal of influence of existing turbines

The GC Report provides commentary on the derived background noise levels presented in the ES, questioning the approach taken to analysing the measured data, in particular with regards to the removal of influence of existing turbine noise.

In addition to directional filtering, predictions of existing cumulative wind turbine noise have been logarithmically subtracted from the baseline noise levels to ensure the influence of existing turbines is removed. In instances where the predicted noise levels are equal to or exceed the measured level, it is not possible to perform the subtraction. In these instances, it has been assumed that the background noise levels are 10 dB below the measured value. As noted in Section 5.7 of Appendix 7.2, the correction has resulted in a band of data between 10 – 15 dB, which is below the lower level at which the measurement equipment measured (the dynamic range of the sound level meters used in the survey was 20 – 110 dB, as detailed in Annex 3). This approach is therefore considered extremely cautious, as it effectively assumes that the measured data was entirely wind turbine noise with negligible contribution from background noise, and it has resulted in data below the measurable level.

The GC Report appears to misunderstand this approach, suggesting *“a nominal 10dB noise contribution from all of the existing operational wind turbines”* has been assumed, which is incorrect. Further information describing the subtraction of predicted operational wind turbine noise levels is presented in Section 5.7 of Appendix 7.2.

Choice of Noise Monitoring Locations

The GC Report provides commentary on the Noise Monitoring Locations (NMLs) used for the background noise survey, with particular reference to their compliance with the IOA GPG. This appears to be based solely on a review of aerial imagery, with no visits to site having been undertaken by Grosvenor Consultancy.

The IOA GPG states in Section 2.5:

“Where possible, measurements should be made in the vicinity of a dwelling in an area frequently used for rest and recreation. This is a flexible definition, and the way people use their garden areas varies widely. Identifying the most appropriate measurement positions must be a matter of professional judgment and experience”. The text goes on to make a number of recommendations for the siting of measurement equipment.

The GC Report suggests that the location of measurement equipment at several NMLs is not compliant with the IOA GPG due to their proximity to fences. The IOA GPG recommends siting measurement equipment *“no closer than 3.5 metres to any significant reflecting surface (such as a building or fence), except the ground”*; the specific fences referenced within the GC Report are all 3-rail post and rail type fences, which do not present a significant reflecting surface. This type of fencing is also not considered to result in meaningful levels of wind-induced noise, based on on-site observations. Where noise monitoring equipment has been located in proximity to boundary fences, this is compliant with the IOA GPG and has been reported transparently.

It should be noted that, where the GC Report has flagged equipment located on ‘hard ground’ as being non-compliant with the IOA GPG, the text quoted in the paragraph above clearly excludes the ground from consideration as a reflective surface.

The identification of suitable NMLs and the selection of proxy locations was undertaken by experienced wind farm noise consultants. A detailed desk-based analysis was undertaken initially, and this was followed by a site visit to assess on-site conditions and install equipment. As noted above, Grosvenor Consultancy do not appear to have undertaken any site visits as part of their review.

The GC Report criticises some NMLs for being sited in locations they do not deem to be the main amenity areas of some properties. Section 2.5.2 of the IOA GPG notes that measurement equipment may be located further than 20 m from the main amenity area of a property as long as *“it can reasonably be claimed, from inspection and observation, that there are no other suitable noise-sensitive locations, in the vicinity of any selected location and close to a dwelling, where background noise levels would be expected to be consistently lower than the levels at the selected position”*.

The NMLs were chosen to provide representative measurements of typical background noise levels experienced at the nearest noise sensitive properties. Where it was not possible to locate the equipment within the primary amenity area of a property, due to localised noise sources or access limitations (following discussion with the resident), a suitable alternative location was chosen which was deemed representative based on professional judgement and TNEI’s considerable experience.

Following submission of the 2025 ES, a review of the Noise Impact Assessment was undertaken by Hayes McKenzie on behalf of Rossendale Borough Council. The review is included in full in Annex 2, and is discussed in Section 4.2 of Appendix 7.2.

Regarding the choice of NMLs, the Hayes McKenzie review noted the following:

“[The NMLs] Appear to be away from tall trees and water courses as possible whilst being representative”

And:

“The locations appear to be in appropriate residential amenity areas with specific requests from residents where these are further than normal from the dwelling itself.”

No objections were raised by Hayes McKenzie or Rossendale Borough Council in relation to the choice of NMLs.

“e. Exceedances Identified: *The Applicant’s own data tables confirm potential operational noise exceedances at multiple locations (NAL2, NAL4, NAL5, NAL15, NAL19).”*

The GC Report expresses concern over a number of minor noise limit exceedances reported in the 2025 ES. As detailed in Appendix 7.2, the revised turbine layout presented for the FEI results in a noise limit exceedance at only one property, NAL19, due to the presence of two nearby small-scale turbines. This minor limit exceedance may be mitigated through the use of targeted mode management for a small number of wind speeds and directions, as detailed in Section 6.11 of Appendix 7.2.

“f. Unacceptable Mitigation Strategy: *The reliance on “Secondary mitigation” (wind turbine mode management) to achieve compliance is unacceptable at this planning stage given the tabled exceedances. Furthermore, the proposed “Backstop Noise Limits” option is unsound and unsafe, raising serious concerns regarding the Council’s ability to monitor and enforce compliance against various operators in a cumulative scenario.”*

It is commonplace for modern wind turbines to have the ability to operate in a range of different low noise modes. Utilising such modes ensures that wind turbine noise levels can be controlled whilst limiting the loss of energy generation. There are situations where operating a larger number of turbines in low noise mode to meet a given noise limit will produce significantly more power than a smaller number of turbines in full mode. Furthermore, It should be noted that the predictions presented in the noise assessment are based on a candidate turbine and it is possible that the noise emissions of the final choice of turbine for the site (should consent be granted) would differ from those presented (which in turn could influence whether, and to what extent, the use of low noise modes are necessary). Noise from the wind farm will have to meet the noise conditions contained in any consent regardless of whether low noise modes are used or not.

The Backstop Noise Limits, detailed within Annex 9 of Appendix 7.2, are effectively Site Specific Noise Limits calculated for locations where Cumulative Noise Limits are proposed. These Backstop/Site Specific Noise Limits are derived in accordance with the methodology set out in Section 4.5 of Appendix 7.2. The different name serves to illustrate the purpose of these limits, as a 'backstop' position to be used in the event that cumulative wind turbine noise levels exceed the Cumulative Noise Limits.

In the event that the Backstop Noise Limits are implemented, compliance may be determined through the use of proxy measurement locations positioned near to the turbines in order to increase the signal-to-noise ratio. This is outlined in the proposed noise related Planning Condition contained within Annex 9 of Appendix 7.2.

With regards to the *“serious concerns regarding the Council's ability to monitor and enforce compliance against various operators in a cumulative scenario”* raised in the submission, Section 4.6 of Appendix 7.2 explains that while the Cumulative Noise Limits would apply to all cumulative wind turbine noise, the onus would be on the Applicant to ensure compliance with the limit.

Failure to Assess the Full Acoustic Spectrum (Amplitude Modulation and Infrasound)

Amplitude Modulation

The term Amplitude Modulation (AM) means the variation in noise level over time and is a normal feature of wind turbine noise; for example, observers may describe a 'whoosh whoosh' sound, which can be heard close to a wind turbine as the blades sweep past. The regular variation in noise level between the highest (peak) and lowest (trough) is sometimes quantified in term of modulation depth. AM of wind turbine noise is discussed in Section 3.3 of Appendix 7.2.

As noted in the operational noise report, the Acoustics community has made a distinction between the AM which is a common feature of wind farm noise, and has sometimes been referred to as Normal Amplitude Modulation (NAM), and Other Amplitude Modulation (OAM). The term OAM is used to describe an unusual feature of aerodynamic noise from wind turbines, where a greater than normal degree of regular fluctuation in sound level occurs at blade passing frequency, typically once per second. It should be noted that the noise assessment and rating procedure detailed in ARWTN accounts for the presence of an intrinsic level of NAM when setting acceptable noise limits for wind farms. Unless otherwise stated all references to AM hereinafter relate to OAM.

Current research on the topic of AM was summarised in the WPS BEIS Report, discussed in Section 2.9 of Appendix 7.2. In relation to prediction of AM, the WSP BEIS report noted on page 117 that:

“At present, it seems evident that reliable predictions of AM in the context of development planning and noise assessment guidance are unlikely to be practically feasible in the near future”.

ARWTN confirms (para 2.8) that:

“All wind turbines generate AM (or blade swish, to a limited extent), but the occurrence of elevated levels of AM is a complex phenomenon that is likely to be related to a combination of turbine and site characteristics; the current consensus is that AM cannot be predicted.”

As such, AM has not been considered in further detail within the operational noise assessment.

In relation to control of elevated levels of AM, should they occur, the ARWTN guidance states (para 2.8) that:

“Tonal noise and AM are therefore best controlled through enforcement of planning conditions which include the application of character corrections as described in section 4. The approach set out in this technical guidance is formulated on this basis, and consequently, character corrections should only be applied to compliance measurements and should not be added at the planning/application assessment phase, unless there is strong evidence to do so.”

The Technical Guidance Notes included within ARWTN detail that AM should be measured and quantified in line with the Institute of Acoustics document ‘A Method for Rating Amplitude Modulation in Wind Turbine Noise’ and the example planning condition included within ARWTN includes a penalty for elevated levels of AM (should they occur).

There are measures available which have been shown to mitigate AM should it occur, such as changes to the operation of the relevant wind turbine(s) by changing operational parameters such as blade pitch and RPM. It should be noted that where mitigation is required, it needs to be designed on a site-specific basis.

Therefore, should elevated levels of AM occur due to the Project for Assessment, then there are mitigation measures which can be implemented to reduce the occurrence and severity of AM.

Infrasound and Low Frequency Noise

The submission specifically references a 2019 pilot study by Mehtätalo et al.⁴ on wind turbine infrasound in Finland, which utilized interviews with approximately 200 subjects to analyse symptom propagation. It concluded that harmful effects, like sleep disturbances and fatigue, occurred as far as 15–20 kilometres away, with risks increasing based on turbine size, quantity, and exposure time.

The study suggested a statistically significant correlation between total infrasound exposure and reported symptoms. It concluded that symptom prevalence was notably higher within approximately 15 km of wind farms, with distance and exposure being heavily influenced by turbine height and overall farm efficiency.

Following the study, the Finnish Government commissioned a multidisciplinary, long-term study (led by VTT Technical Research Centre of Finland) to investigate these claims⁵. The VTT study found no

⁴ Mehtatalo et al. (2019) Available from: http://www.na-paw.org/mehtatalo-et-al-pilot-study-2019-summary-fi_en.pdf [Accessed 28/05/2026]

⁵ Government’s Analysis, Assessment and Research Activities (2020). Available from: https://www.researchgate.net/publication/342434513_Infrasound_Does_Not_Explains_Symptoms_Related_to_Wind_Turbines#full-text [Accessed 28/05/2026]

evidence that wind turbine infrasound causes adverse physiological changes or directly explains the symptoms attributed to it. As part of the VTT study, participants were exposed to infrasound. The participants were unable to detect infrasound contents in noise samples, and neither reported annoyance nor autonomic nervous system responses differed between test groups.

The 2019 pilot study findings highlight a correlation between proximity to wind turbines and subjective symptom reporting. However, subsequent studies demonstrate that these reported symptoms are highly subjective—often linked to negative perception of wind turbines (i.e. the ‘nocebo effect’), visual annoyance, or audible noise—rather than direct physical harm caused by infrasound.

A detailed summary of current research on Infrasound and Low Frequency Noise is presented in Section 3.2 of Appendix 7.2, which includes a discussion of the findings from the WSP BEIS report and subsequent research undertaken in Australia. The conclusion drawn from these various studies is that infrasound and low frequency noise do not result in negative impacts upon human health.

ARWTN discusses infrasound and low frequency noise in Section 1.20, noting that there are:

‘a number of aspects of wind turbine noise that do not require assessment at the planning stage because their effects on humans can be considered negligible or suitably controlled by the criteria set out in this guidance. These include infrasound, ground-borne vibration and low frequency sound.’

As such, Infrasound and Low Frequency Noise have not been considered within the noise assessment.

Wind Shear

The submission notes the increase in turbine tip height from 150 m to 180 m in relation to potential increased wind shear across the turbine rotor which is suggested can be a cause of AM. As noted above, there is at present no method with which AM can be predicted, however should AM occur, there are methods to measure and identify its occurrence via measurement. Should AM occur due to the Project for Assessment, then there are mitigation measures which can be implemented to reduce the occurrence and severity of AM.

Sleep Disturbance

The submission, with reference to the GC Report, states *“the most significant contributor to noise complaints is sleep disturbance at night due to the following factors”*, which include AM (with reference to wind shear), low frequency noise, infrasound, and references the Finnish pilot study addressed above.

As discussed above in relation to AM, it is not possible to predict the occurrence of AM effects, however it can be identified through measurement. In the event that AM is identified, it may be controlled via the measures discussed above.

Judicial and Legal Precedent on Nuisance

The submission states that *“Recent judicial decisions demonstrate that compliance with ETSU-derived limits is irrelevant where genuine nuisance occurs, confirming the inadequacy of current planning control for WTN”*, with reference to two Irish High Court decisions relating to wind turbine nuisance.

The submission refers to the High Court decision in *Webster/Rollo v Meenaclogher (Wind) Limited (2014 IEHC 136)* 8th March 2024⁶. This was a private nuisance case in respect of noise received at a dwelling from the operation of a nearby wind turbine development. The GC Report states that *“extracts from this Judgement show WTN [Wind Turbine Noise] compliance cannot be relied upon to protect the amenity of any neighbouring residents to the proposed Scout Moor 2 wind turbine development, in the event of any complaints of Noise Nuisance”*.

In the case of *Webster/Rollo v Meenaclogher (Wind) Limited*, the judge stated that nuisance could be considered irrespective of any compliance with consent conditions. Whilst this is true, it is nothing new, and it is recognised that compliance with a set of conditioned noise limits is not usually sufficient on its own to demonstrate that no nuisance is present. This is the case for all noise generating developments, not just wind turbines. Care needs to be taken, however, not to confuse nuisance with the planning regime.

Nuisance and planning operate under completely different legal frameworks (in both the UK and Ireland) and what is relevant here is the planning system, not nuisance. The following is noted from paragraph 277 of the judgement on this case:

“...cases where the particular aspect of the development complained of is the subject of detailed conditions reflecting modern guidance and best practice. Such permissions (and the planning guidance on which they are based) are likely to constitute a strong indicator of what is objectively reasonable.”

Compared to permissions where *“for example the planning permission is opaque in its rationale, where the science in the area has moved on since the grant of permission or where the particular matter complained is incompletely regulated by the permission”*, or where there is no assessment of the matter complained of.

In this regard we would note that the assessment of operational noise for the Project for Assessment has been undertaken in accordance with recognised best practice and with due regard to the latest science.

Regarding the second High Court decision referenced, that of *Byrne and Moorhead vs ABO Energy Ireland Limited and Wexwind Limited*, the judge specifically states that:

“This conclusion therefore is limited to the circumstances here and including the defendants’ decision to largely ignore and then to fail to engage in any meaningful way with a substantial and serious problem which they have belatedly admitted”.

The judge therefore makes it clear that nuisance should be determined on a case-by-case basis, considering the specific aspects of the noise in question but also the attitude of the defendants in responding to any complaints.

Reliance on Statutory Nuisance is Unacceptable

The statutory nuisance regime is a way to deal with noise issues once a scheme has become operational. Section 79(1)(g) of the Environmental Protection Act 1990 states that *“noise emitted from premises and being prejudicial to health or nuisance”* shall constitute a Statutory Nuisance. Should Statutory Nuisance be confirmed, the local planning authority can issue a noise abatement notice under Section 80 of the Environmental Protection Act 1990. The abatement notice procedure can be

⁶ Ireland, High Court (IEHC), *Webster/Rollo v Meenaclogher (Wind) Limited*, IEHC, 2014.

used to control Statutory Nuisances that are likely to occur or recur, as well as those that are present when the notice is served on the responsible party.

Statutory Nuisance law is therefore reactive in nature, occupying a different place in the regulation of environmental harms than planning decisions, for which the aim is to anticipate these harms and limit them by imposing conditions and other planning controls (noise conditions in this case).

As noted in Wind Farm Noise Statutory Nuisance Complaint Methodology⁷ (NANR 277), when examining case law to wind farm development, *“it is clear that complying with planning permission does not provide an automatic defence against Statutory Nuisance action”*. However, it is also noted that *“for a statutory nuisance to exist the effect normally has to be greater than that which would otherwise be permitted under planning – where protection of amenity is usually the aim”*. The report then goes on to state the following:

“It may be that noise Statutory Nuisance arising from the operation of a wind farm is an indication that something seriously wrong had occurred in the planning process, such as inadequate noise impact assessment, poorly drafted conditions having been attached to the permission or the final scheme not matching what was permitted; there may have been faults in the design of the plant, or operational difficulties may be responsible for the Statutory Nuisance.”

The operational noise assessment has been undertaken against current best practice and national planning policy such that the probability of creating a statutory noise nuisance due to an inadequate noise impact assessment has been minimised. Furthermore, the suggested planning condition included within Annex 9 is intended to reduce the risk of poorly worded planning conditions being applied. Additionally, section 6.12 of Appendix 7.2 discusses turbine warranties to protect against turbine faults, including those which may lead to tonality.

The legal requirements for establishing liability in Statutory Nuisance cases are objective; there must be either a proven material interference with the use of property or personal discomfort or injury to health (in England). Therefore, the case should be examined on its individual merits; and where there is a dispute, then much will depend on the view of the court on the seriousness of the harm.

Determining whether a complaint amounts to a Statutory Nuisance requires a number of factors to be weighed up and assessed thoroughly, with issues often not being clear cut.

The relevant factors which need considering are detailed in the NANR 277, and are summarised below as the following:

- The level and type of noise;
- Duration and how often the noise occurs;
- The time of day or night when the noise occurs;
- Whether any aggravating characteristics are present in the noise;
- What measures could reduce or modify the noise;
- The characteristics of the neighbourhood where the noise occurs;
- Sensitivity of the complainant; and

⁷ DEFRA, (2011). Wind Farm Noise Statutory Nuisance Complaint Methodology.

- The motive of the person responsible.

Therefore, it is acknowledged that determining the above factors may not be particularly expeditious in nature, however, it is essential in establishing liability for statutory noise nuisance. Failure to do so could result in either under-enforcement, which would fail to protect the public, or over-enforcement, which may result in damage to the local economy and may also result in the loss of an appeal in the magistrates' court should over-enforcement be established.

Finally, the Environmental Protection Act 1990 provides for the concept of "best practicable means" to be used as a ground for appealing an abatement notice and/ or a defence against prosecution for not complying with an abatement notice. Should a noise problem be established as amounting to Statutory Nuisance, the local authority will need to consider whether reasonably practicable steps have been taken to mitigate it. Ultimately, even if all reasonable steps to reduce the level of noise have been taken by the operator, the final decision on whether the problem remains a Statutory Nuisance still lies with the local authority. Therefore, should noise nuisance claims be well founded, and best practicable means has been employed but not to adequate effect (in the eyes of the local authority), then the local authority is still within their powers to issue an abatement notice to the operator. If best practicable means is used as a defence at an appeal, then it will be at the courts' discretion as to whether the employment of best practicable means has resulted in an adequate reduction of the statutory nuisance.

Notwithstanding the provisions of the Environmental Protection Act, it should be noted that the Applicant suggested suitably worded noise related planning conditions which have been drafted in accordance with best practice guidance (as set out in the IOA GPG). The conditions were included in Annex 9 of Appendix 7.2 and include a requirement for the operator to undertake noise compliance monitoring if requested by the Council following receipt of a noise complaint.

Annex 12 – Sheep House Farm Turbines

Annex 12 – Sheep House Farm Turbines

Section 2.40 of ARWTN discusses the potential exclusion of small-scale turbines from the cumulative assessment:

‘...the noise impacts of small wind turbines are generally localised and could represent a disproportionate constraint on larger wind energy developments. In such cases, the contribution of these turbines should be excluded from the cumulative noise assessment. For the purposes of this guidance, turbines with generating capacities of 50 kW or less can be considered to have localised noise impacts and can therefore be excluded from cumulative noise assessment. Turbines with generating capacities above 50 kW and less than (for example) a few hundred kilowatts can be excluded from cumulative assessment where it can be demonstrated that noise impacts from these turbines are localised and where including these turbines in a cumulative assessment would result in disproportionate constraints on larger developments. All other wind farm developments must be considered in the cumulative assessment where their individual noise level contribution is within 10 dB of the TNAC.’

The text quoted above discusses turbines with generating capacities ‘above 50 kW and less than (for example) a few hundred kilowatts’, noting they can be excluded from assessment where it can be demonstrated:

- that noise impacts are ‘localised’, and
- where the inclusion of these turbines would result in ‘disproportionate constraints on larger developments’.

To the immediate north/northeast of the Project for Assessment, there is a small scale wind development called Sheep House Farm (planning reference 2015/0059). The Decision Notice for Sheep House Farm includes the following noise related Planning Condition:

‘9. The turbines hereby permitted shall operate at all times within the level of noise emissions, with correction for any tonal components, that accords with the ‘Assessment & Rating of Noise from Wind Farms’ (ETSU-R-97), both individually and cumulatively.’

No information is contained within the Decision Notice relating to specific noise level limits, and there is no noise assessment available on Rossendale Borough Council’s planning portal. In the absence of specific noise limits for Sheep House Farm, limits have been assumed based on the background sound levels detailed in Section 5 of TA 7.2, in line with ARWTN and the IOA GPG. It is assumed that noise limits for Sheep House Farm would be based on the greater of Lower Limiting Values of 35 dB for daytime and 43 dB for night-time, or 5 dB above the measured background sound level.

TNEI are not aware of any properties which are Financially Involved with Sheep House Farm.

The Sheep House Farm development consists of two 225 kW turbines, and would use a large portion of the available 'noise budget' at nearby receptors. ARWTN does not provide an exact generation capacity figure for the upper range of turbines which may be excluded, though 225 kW would fall into the category of 'less than a few hundred kilowatts'. ARWTN also provides no guidance on whether this text refers to single or multiple turbine developments.

Exactly how the two criteria above (localised impacts and disproportionate constraints) should be demonstrated is not addressed within ARWTN. This Annex provides supporting information to allow these criteria to be evaluated in order to determine whether the Sheep House Farm turbines can be excluded from the cumulative operational noise assessment.

Localised noise impacts

Figures A12.1-A12.3 presented below show predicted noise contours from the Sheep House Farm turbines at a range of wind speeds.

Figure A12.1: Predicted Noise Contours for Sheep House Farm Turbines – 10 ms⁻¹

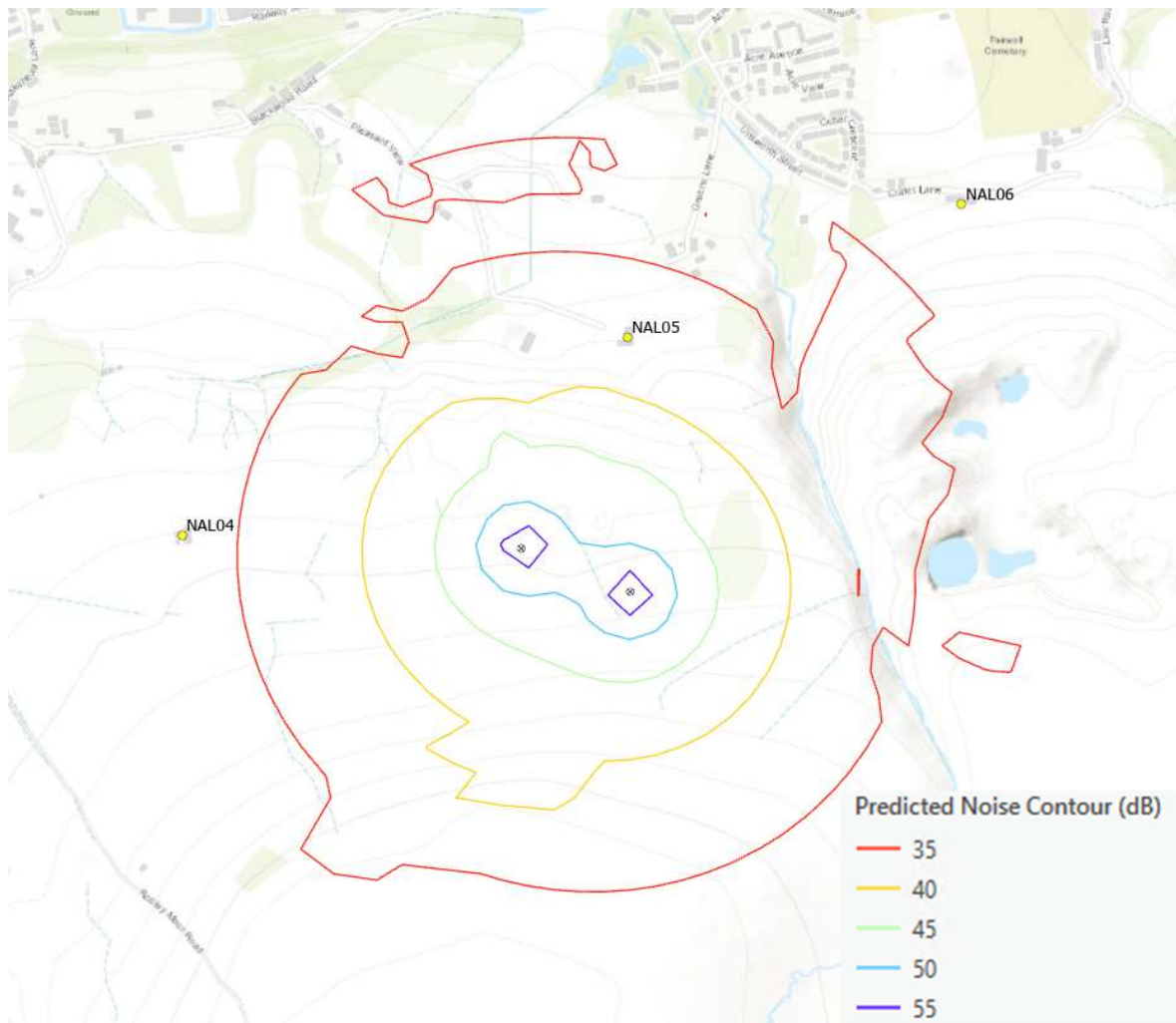


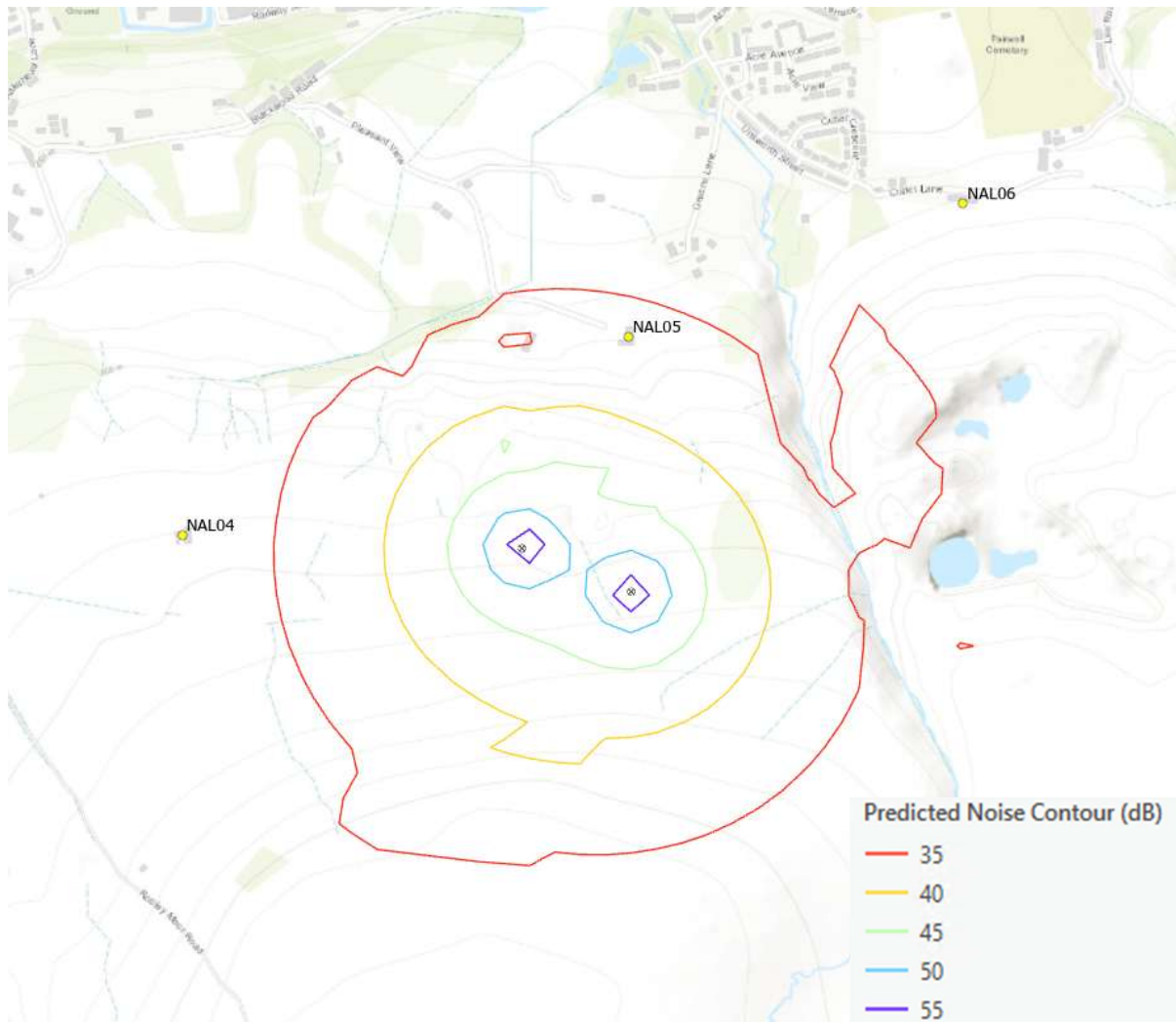
Figure A12.1 shows predicted noise levels from the Sheep House Farm turbines only at a standardised 10 m wind speed of 10 ms⁻¹, out to a lower value of 35 dB LA90. Also shown are the Noise Assessment Locations (NALs) considered the assessment, shown as yellow dots.

There are 4 properties within the 35 dB contour; two at NAL5, and two within the separate section to the north (the result of topographic corrections from the downward sloping terrain) which are shown as grey squares on the background mapping. Due to the small number of properties located within the 35 dB contour, the impact of these turbines could be described as “localised”.

It should be noted that standardised 10 m wind speeds of 10 ms⁻¹ are relatively high such that they would occur less frequently than lower wind speeds. Predicted noise contours at lower wind speeds are therefore also shown to provide additional context by illustrating the noise levels that would be expected from the Sheep House Farm turbines at wind speeds which would occur more frequently. When considering

predicted noise levels at a standardised 10 m wind speed of 9 ms^{-1} , only two properties are located within the 35 dB contour, as shown on Figure A12.2.

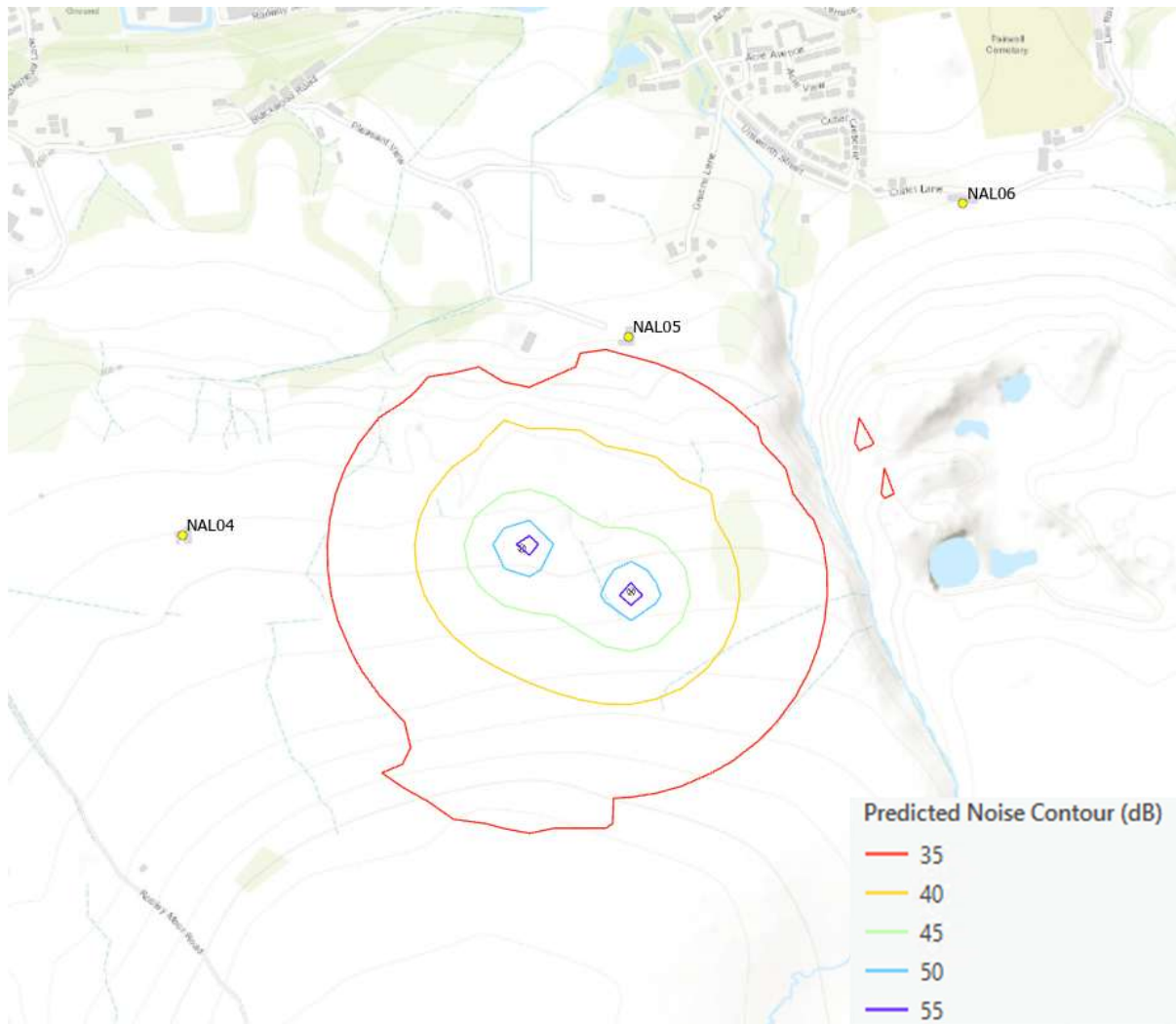
Figure A12.2: Predicted Noise Contours for Sheep House Farm Turbines – 9 ms^{-1}



At a standardised 10 m wind speed of 8 ms^{-1} , predicted noise levels are similar to 9 ms^{-1} , with the two properties at NAL5 located within the 35 dB contour.

At standardised 10 m wind speeds of 7 ms^{-1} there are no properties located within the 35 dB contour as shown on Figure A12.3. This would also be the case for standardised 10 m wind speeds of below 7 ms^{-1} .

Figure A12.3: Predicted Noise Contours for Sheep House Farm Turbines – 7 ms⁻¹



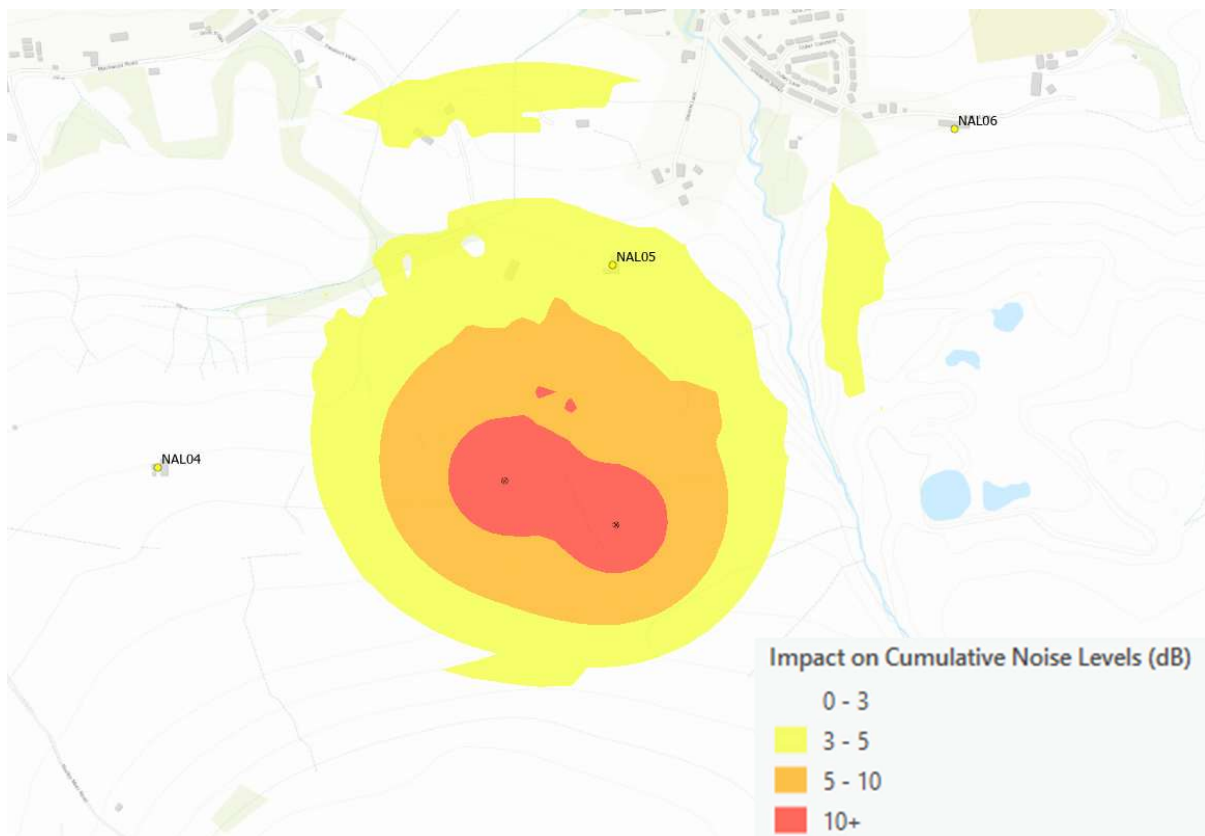
Consideration of predicted noise levels from the Sheep House Farm turbines across a range of wind speeds suggests that the impacts from the turbines may be localised, however this considers only the turbines in isolation.

Figure A12.4 shows the difference in total cumulative noise levels with/without Sheep House Farm (this scenario includes the Project for Assessment), based on standardised 10 m wind speeds of 10 ms⁻¹ to represent the worst case within the wind speed range recommended by ARWTN. The values correspond with the increase in noise level that would result from these turbines being included in the overall cumulative scenario, compared to a scenario where they are removed:

- The red band indicates where including Sheep House Farm (SHF) would change overall cumulative noise levels by more than 10 dB.
- The orange band is where including SHF would change cumulative noise levels by 5-10 dB.

- The yellow band shows where including SHF would change cumulative noise levels by 3-5 dB.
- Everywhere else, the level of change resulting from the inclusion of SHF would be less than 3 dB.

Figure A12.4: Contribution to cumulative noise levels of the Sheep House Farm Turbines



As a 3 dB change in sound level is generally considered to be the minimum change in level clearly perceptible by the human ear, it could be said that the Sheep House Farm turbines would only have a clearly perceptible impact on noise levels within the shaded areas; i.e. localised around the immediate vicinity of the turbines. In terms of receptors, the same four properties that are located within the 35 dB contour are located within the 3-5 dB change band. No receptors are located within the 5-10 dB or >10 dB change bands.

It should be noted, however, that the maps shown above do not consider directivity, and as such may not accurately represent the cumulative noise levels. Tables A12.1 and A12.2 below present predicted noise levels for the worst case wind direction sector at NAL5, and also NAL4 (the next-nearest NAL to the Sheep House Farm turbines, located

to the west). They also demonstrate how the contribution to the cumulative noise levels from the Sheep House Farm turbines varies with wind speed.

Table A12.1: Comparison of Predicted Sound Levels – NAL5

Downwind Predicted Sound Level	Wind Speed (ms ⁻¹)						
	4	5	6	7	8	9	10
Total Cumulative	-	34.8	37.1	38.3	38.8	39.4	40.0
Cumulative Exc. SHF	-	30.7	34.7	36.1	36.2	36.3	36.4
Difference	-	4.1	2.4	2.2	2.6	3.1	3.6
Project for Assessment	24.8	29.4	33.8	35.2	35.2	35.2	35.2
Sheep House Farm	32.6	32.7	33.5	34.3	35.3	36.5	37.5
Difference	-7.8	-3.3	0.3	0.9	-0.1	-1.3	-2.3

The predicted noise levels shown in Table A12.1 show that at wind speeds of 6 – 8 ms⁻¹, there is less than 1 dB difference in the predicted noise levels from Sheep House Farm and the Project for Assessment. Whilst the difference is greater than 3 dB at wind speeds of 5, 9 and 10 ms⁻¹, at wind speeds of 6 - 8 ms⁻¹ there is less than a 3 dB difference between predicted cumulative noise levels with and without Sheep House Farm at NAL5 (the nearest receptor).

Table A12.2: Comparison of Predicted Sound Levels – NAL4

Downwind Predicted Sound Level	Wind Speed (ms ⁻¹)						
	4	5	6	7	8	9	10
Total Cumulative	-	34.3	37.5	38.8	39.1	39.4	39.7
Cumulative Exc. SHF	-	33.0	36.8	38.2	38.4	38.5	38.6
Difference	-	1.3	0.7	0.6	0.7	0.9	1.1
Project for Assessment	26.9	31.5	35.9	37.3	37.3	37.3	37.3
Sheep House Farm	28.4	28.4	29.3	30.1	31.1	32.2	33.3
Difference	-1.5	3.1	6.6	7.2	6.2	5.1	4.0

At NAL4, there is a more substantial difference in the predicted noise levels from the Sheep House Farm turbines and the Project for Assessment. The difference in the predicted cumulative noise levels with and without SHF is less than 3 dB at all assessed wind speeds (5 – 10 ms⁻¹) and less than 1 dB for wind speeds of 6 – 9 ms⁻¹ as shown in Table A12.2.

This suggests that noise impacts from the Sheep House Farm turbines are localised to a small number of receptors located in immediate proximity to the turbines and that it may be appropriate to exclude them from the cumulative assessment if they present a disproportionate constraint to the Project for Assessment.

Disproportionate constraints on larger developments

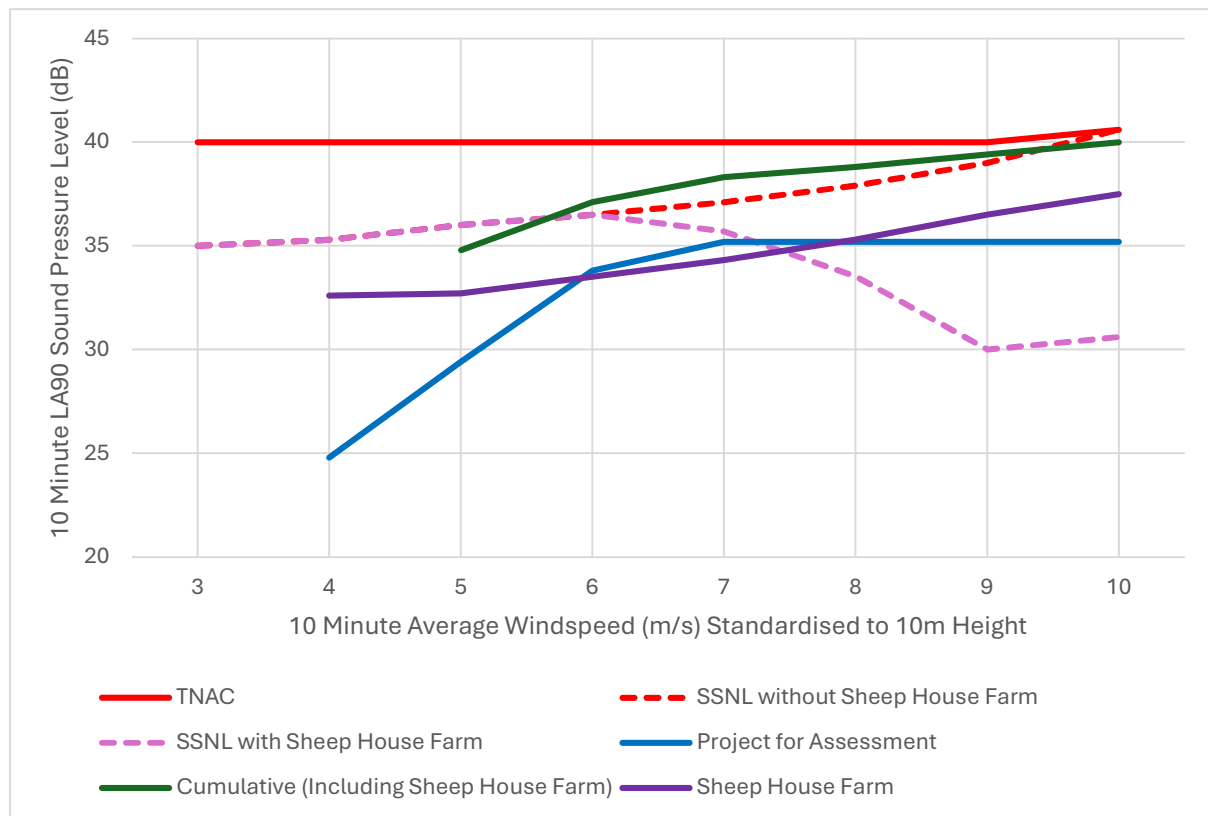
The nearest receptor to Sheep House Farm is NAL5, as shown on the figures above. Due to the close proximity of these turbines to the receptor, Sheep House Farm would use up a large amount of the available noise headroom at this location.

Figure A12.5, below, shows that the total cumulative predicted noise levels (including Sheep House Farm) do not exceed the Total Noise Assessment Criteria (TNAC) at NAL5, but by only a small margin. As such, Significant Headroom (defined as between 5 – 10 dB in Section 5.4.11 of the IOA GPG) is not available for use in the calculation of Site Specific Noise Limits. Consideration of the Controlling Property principle (as discussed in Section 5.4.9 of the IOA GPG) shows that the Sheep House Farm turbines have a maximum of 2.5 dB available headroom at NAL5. The Site Specific Noise Limits have therefore been calculated by scaling the predicted noise levels from the Sheep House Farm turbines by this amount¹.

The resulting Site Specific Noise Limits (shown as a pink dashed line) are set at 10 dB below the TNAC at wind speeds of 9 and 10 ms⁻¹, where the predicted noise level from Sheep House Farm plus the headroom margin were within 0.5 dB of the TNAC. Where this is the case, predicted noise levels from the Project for Assessment exceed the SSNL by around 5 dB.

¹ Calculation of this Site Specific Noise Limit also considers NAL2 as the controlling property for Scout Moor Wind Farm. There is a minimum margin of 3.2 dB between the predicted noise levels for Scout Moor and its conditioned noise limit at NAL2 (this is the available headroom) so the predicted noise levels due to Scout Moor at NAL5 have been increased by this amount.

Figure A12.5: Site Specific Noise Limits with and without Sheep House Farm at NAL5



In order to mitigate an exceedance of this level, it would be necessary to operate seven of the twelve turbines which comprise the Project for Assessment in low noise modes, with the closest turbines to NAL5 (T10 and T11) operating in Modes 16 and 18 during downwind conditions at standardised wind speeds of 9 – 10 ms⁻¹. Modes 16 and 18 are rated at maximum powers of 3.44 MW and 2.96 MW, respectively.

Where the Sheep House Farm turbines are excluded from the assessment, it would not be necessary to mitigate to meet the SSNL (shown as a red dashed line, above), allowing the turbines of the Project for Assessment to operate in Mode 0 (rated at a maximum power of 5.7 MW) under the same conditions.

As such, inclusion of the two 225 kW Sheep House Farm turbines is considered to represent a disproportionate constraint to the Project for Assessment, and accordingly they have been excluded from the cumulative operational noise assessment.