APPENDIX 12-2

OPERATIONAL NOISE REPORT

tnei

A specialist energy consultancy

Appendix 12-2

Operational Noise Report

Proposed Repowering of Kilgarvan Wind Farm

Ørsted Onshore Ireland Midco Ltd

IE00065-005
08 May 2024

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Executive Summary

TNEI Ireland Ltd was commissioned by MKO on behalf of Orsted Onshore Ireland Midco Ltd ('the Applicant') to undertake an operational noise assessment for the Proposed Repowering of the Existing Kilgarvan Wind Farm (hereinafter referred to as 'the Proposed Development'). The noise assessment was undertaken to assess the potential impact of operational noise from the Proposed Development on the nearest noise sensitive receptors.

The Irish Governments '*Wind Energy Development Guidelines, 2006*' (WEDG 2006), produced by the Department of Environment Heritage and Local Government (DoEHLG), are the current guidelines for setting noise limits for wind energy developments. The information relating to noise in the WEDG 2006, is very limited and it is widely agreed that the limits proposed in the WEDG 2006 were drafted to broadly align with the UK guidance ETSU-R-97 *'The Assessment and Rating of Noise from Wind Farms'.* In 2013, the UK guidance was supplemented by a document 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). Reference has therefore been made to guidance contained in ETSU-R-97 and the IOA GPG to supplement the WEDG 2006.

The operational noise assessment has been undertaken in three stages:

1) deriving the Total WEDG Noise Limits (which are applicable to noise generated 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 immissions at noise sensitive receptors will meet the Total WEDG Noise Limits; and

3) deriving Site Specific Noise Limits for the Proposed Development (taking account of the noise limit that has already been allocated to / could realistically be used by other schemes) and undertaking predictions against those limits.

Background noise monitoring was undertaken at five noise sensitive receptors in proximity to the Proposed Development. One set of noise monitoring equipment was repeatedly knocked over during the survey period and the data collected on another was found be influenced by a nearby watercourse therefore those datasets were subsequently discarded and only the data collected at three Noise Monitoring Locations (NMLs) were used in the assessment.

There were 102 buildings (potential Noise Sensitive Receptors (NSRs)) identified within the ~3 km search area defined from the proposed turbine locations within the site. A number of the buildings identified were subsequently classified as derelict (H34 and H42) and therefore were not considered to be noise sensitive for the purposes of this assessment. Of the remaining identified NSRs, a total of fourteen were chosen as Noise Assessment Locations (NALs). The NALs were chosen to represent the NSRs located closest to the Proposed Development. Additional receptors were also included to consider cumulative noise impacts. The modelling results for the NALs have been presented within the main body of this report whilst predicted noise immission levels for all of the NSRs have been included within an Annex to the report. For the assessment locations where no background noise measurements were undertaken, noise data collected at proxy locations deemed representative of the expected background noise environment was used to assess the wind turbine noise impact at those receptors. For clarity, all buildings were labelled with the letter 'H' and numbered to be consistent with the rest of the Environmental Impact Assessment Report (EIAR).

Wind speed and direction data were measured using a LiDAR unit located within the site. The wind data was measured directly at hub height (125 m). These hub height wind speeds were then standardised to a height of 10 m in accordance with the IOA GPG.

Analysis of the measured data has been undertaken in accordance with the WEDG 2006 to determine the pre-existing background noise environment and to establish the daytime and night time noise limits at each of the NALs and NSRs.

Two sets of noise limits have been derived; the Total WEDG Noise limits apply to the cumulative noise level of all turbines operating in the area including the Proposed Development, whilst the Site Specific Noise Limits apply to operational noise from the Proposed Development only.

Based on the guidance in the WEDG 2006 and recent planning permissions issued from An Bord Pleanála, the daytime Total WEDG Noise Limit was set at 40 dB(A) where background noise levels were <30 dB, and 45 dB(A) or background plus 5 dB whichever is the greater where background noise levels were >30 dB. The night time Total WEDG Noise Limit has been set at 43 dB(A) or background plus 5 dB whichever is the greater.

ETSU-R-97 also includes provision for the use of a higher daytime and night time fixed minimum noise limits of 45 dB where the occupiers of a property have a financial interest in the wind farm. Whilst the higher limits are not referenced directly in the WEDG 2006 the higher limits have been presented in a number of wind farm noise assessments in Ireland. It is understood that the occupiers of four receptors to the south of the Proposed Development are financially involved with the Proposed Development and therefore the higher fixed minimum noise limits have been adopted for those receptors.

The 'Site Specific Noise Limits' were derived to take account of the proportion of the Total WEDG Noise Limit that has been allocated to, or could theoretically be used by, other wind farm developments (operational or consented) in proximity to the Proposed Development.

Predictions of wind turbine noise for the Proposed Development were made, based upon the sound power level data for a candidate wind turbine which has a 163 m rotor diameter, a maximum rated output capacity of 7 MW, serrated trailing edge blades and a hub height of 118 m. In order to consider the full design envelope for the site, additional modelling was undertaken using two other candidates, one with a 155 m rotor diameter, a maximum rated output capacity of 6.6 MW, serrated trailing edge blades and a hub height of 122.5 m and a 149 m rotor diameter with a maximum rated output capacity of 5.7 MW, serrated trailing edge blades and a hub height of 125 m. The 163 m rotor turbine has been chosen as the candidate for the main assessment as it resulted in the highest predicted levels of the candidates being considered and therefore provides a worst case. For completeness, predictions for the other two candidates have been included when assessing the Proposed Development against its Site Specific Noise Limits. All candidates modelled are considered to be representative of the type of turbine that could be installed at the Site.

Modelling was undertaken using the noise prediction model ISO 9613: 1996 *'Acoustics – Attenuation of sound during propagation outdoors Part 2: General method of calculation',* which accords with the recommendations in the IOA GPG 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 or a suitable candidate. The models of turbines were identified through an online search.

A cumulative assessment was undertaken at the NALs where predictions from the Proposed Development were found to be within 10 dB of the noise predictions from all other wind farm developments. The likely cumulative assessment undertaken at eleven NALs (NALs 1-6 and 10-14) shows that the Proposed Development can operate concurrently with other wind farm developments in the area, whilst still meeting the Total WEDG Noise Limits at the receptors. At NALs 7-9, predicted noise from all other wind farms already exceeds the Total WEDG Noise Limit for certain wind speeds and wind directions during the daytime and night time periods. In practice, the existing turbines may be operated in a low noise mode to ensure compliance but there is no publicly available information to confirm this. Accordingly, the assessment has assumed that the turbines operate in unconstrainted mode as this represents a worst-case scenario. Where an exceedance was predicted due to the operation of the existing wind farms, noise from the Proposed Development has been reduced such that it is 10 dB below the Total WEDG Noise Limits to ensure that it has a negligible additional impact. In order to achieve the reduction based on the proposed candidate turbines, certain turbines will need to operate in reduced noise mode for certain wind speeds and wind directions.

Site Specific Noise Limits have also been derived that take account (where required) of the other wind farm developments. Where wind turbine immissions from the other wind turbines at a given receptor were found to be at least 10 dB below the Total WEDG Noise Limit, it is considered that they will be using a negligible proportion of the limit, as such it was considered appropriate to allocate the entire noise limit to the Proposed Development. For the receptors where turbine predictions from the other wind farm developments in the area were found to be within 10 dB of the Total WEDG Noise Limit, apportionment of the Total WEDG Noise Limits was undertaken in accordance with the IOA GPG.

Predicted noise levels indicate that at all noise assessment locations wind turbine noise immissions were below the Site Specific Noise Limits. To achieve the noise limits at NALs 7-12 certain wind turbines would need to be operated in a lower noise mode for certain wind directions and wind speeds when considering the candidate turbines modelled in this assessment.

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

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

Should the Proposed Development receive planning permission the final choice of turbine would be subject to a competitive tendering process. As such, predictions of wind turbine noise are for the purposes of assessment only. The final choice of turbine would, however, need to meet the noise limits determined and contained within any planning permission condition imposed.

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1 Introduction

1.1 Brief

1.1.1 TNEI was commissioned by MKO on behalf of Orsted Onshore Ireland Midco Ltd ('the Applicant') to undertake an operational noise assessment for the Proposed Repowering of the Existing Kilgarvan Wind Farm (hereinafter referred to as 'the Proposed Development'). The following steps summarise the noise assessment process:

- Measure and analyse existing background noise levels and present the measured noise data with reference to existing government guidance and the recommendations of the Department of Environment Heritage and Local Government (DoEHLG), which are contained in the '*Wind Energy Development Guidelines, 2006'* [(1)] (WEDG 2006), in conjunction with the guidance produced by the United Kingdom's (former) Department of Trade and Industry Noise Working Group on Noise from Wind Turbines. Reference has also been made to guidance contained within ETSU-R-97 *'The Assessment and Rating of Noise from Wind Farms'* [(2)] and *'A Good Practice Guide to the Application of ETSU-R-97 for the Assessment and Rating of Wind Turbine Noise'* [(3)] (IOA GPG) to supplement the WEDG 2006;
- Determine the Total WEDG 2006 Noise Limits applicable to all wind farms 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 Proposed Development;
- Derive Site Specific Noise Limits for the Proposed Development, suitable for inclusion in a noise related planning condition should An Bord Pleanála be minded to grant planning permission;
- Undertake predictions of the operational wind turbine noise immissions from the Proposed Development that will be incident at neighbouring noise sensitive receptors;
- Compare the predictions of the operational wind turbine noise immissions from the Proposed Development against the Site Specific Noise Limits; and
- Assess the impact of noise from the Proposed Development with reference to existing government guidance and the recommendations of the Department of Environment Heritage and Local Government, which are contained in the WEDG 2006.

1.2 Background

1.2.1 The Proposed Development is located approximately 5.5 km north east of Kilgarvan, Co. Kerry and approximately 6 km west of Coolea, Co. Cork. The approximate Irish Transverse Mercator (ITM) reference for the centre of the site is 508585, 577040 and the proposed layout is shown on Figure A1.1 in Annex 1. Two additional figures are included as Figures A1.1a and A1.1b which include inset maps at a larger scale.

1.2.2 The noise assessment models a candidate wind turbine which has a 163 m rotor diameter, a maximum rated output capacity of 7 MW, serrated trailing edge blades and a hub height of 118 m. In order to consider the full design envelope for the site, additional modelling has been undertaken using two other candidates, one with a 155 m rotor diameter, a maximum

rated output capacity of 6.6 MW, serrated trailing edge blades and a hub height of 122.5 m and a 149 m rotor diameter with a maximum rated output capacity of 5.7 MW, serrated trailing edge blades and a hub height of 125 m. The 163 m rotor turbine has been chosen as the candidate for the main assessment as it results in the highest noise predictions of the candidates being considered and therefore provides a worst case. Predictions for the other two candidates have been included when assessing the Proposed Development against its Site Specific Noise Limits. All candidates modelled are considered to be representative of the type of turbine that could be installed at the Site.

1.2.3 The noise assessment has considered schemes that are operational, consented and proposed (planning application submitted). The schemes considered in the assessment are summarised in Table 1.1.

Table 1.1 Cumulative Wind Farm/ Turbine Developments

Wind Farm/ Wind Turbine	Number of Turbines	Status	Make and Model of Turbine Considered in Modelling
Midas	23	Operational	17 x Vestas V52 and 6 x Vestas V90, standard blade
Silahertane	10	Operational	Vestas V52, standard blade
Grousemount	24	Operational	Vestas V90, standard blade
Barnastooka	14	Operational	Vestas V90, standard blade
Derragh	6	Operational	Vestas V100, standard blade
Gortyrahilly	14	In planning	Nordex N149, serrated blade
Inchamore	5	In planning	Nordex N149, serrated blade

1.2.4 Figure A1.1c in Annex 1 shows the location of the above developments relative to the Proposed Development. The turbine type modelled for each of the schemes detailed in Table 1.1 was chosen using information contained within the Environmental Impacts Statements for the schemes or using information detailed on the specific project websites.

1.2.5 The Site Specific Noise Limits presented in this report for the Proposed Development have taken account of the noise limits that have already been allocated to, or could potentially be used by, the other wind farms in the area.

1.2.6 For the purposes of assessing the other wind farms (detailed in Table 1.1) operating in conjunction with the Proposed Development the following terms have been referred to throughout:

- **'Total WEDG Noise Limits'**; defined as being the limit that should not be exceeded by the cumulative operation of all wind farm developments, including the Proposed Development; and
- **'Site Specific Noise Limits'**; defined as being the limit that is specific to the Proposed Development only, and derived through the apportionment (where required), of the 'Total WEDG Noise Limits' in accordance with current good practice (IOA GPG).

1.2.7 Note that the term 'noise emission' relates to the sound power level emitted from each wind turbine, whereas the term 'noise immission' relates to the sound pressure level received at

any receptor location, due to the operation of the wind turbines. All references to dB are dB(A), wind speeds are standardised to 10 m height and grid coordinates are in Irish Transverse Mercator 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 Proposed Development, the following guidance and policy documents have been considered:

- National Planning Policy;
- Regional Planning Policy;
- Local Policy;
- Department of Environment Heritage and Local Government (DoEHLG) '*Wind Energy Development Guidelines,'* 2006;
- ETSU-R-97 *'The Assessment and Rating of Noise from Wind Farms'*; 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 National Planning Policy

The National Planning Framework 'Project Ireland 2040' [(4)] was adopted on 29 May 2018. The document sets out a number of National Policy Objectives, of which number 65 relates to noise.

2.2.1 National Policy Objective 65 states;

"Promote the pro-active management of noise where it is likely to have significant adverse impacts on health and quality of life and support the aims of the Environmental Noise Regulations through national planning guidance and Noise Action Plans."

The document does not contain specific information relating to the assessment of noise. Rather, it states (page 5):

'The National Planning Framework, is a planning framework to guide development and investment over the coming years. It does not provide every detail for every part of the country; rather it empowers each region to lead in the planning and development of their communities, containing a set of national objectives and key principles from which more detailed and refined plans will follow.'

Accordingly, it is necessary to look at regional and local guidance and policy for further direction.

2.3 Regional Spatial and Economic Strategies (RSES) 2020-2032

2.3.1 The RSES provides a strategy for delivering effective region development in the Southern Regional Assembly of Ireland. In relation to renewable wind energy RPO 99 states (page 137):

'It is an objective to support the sustainable development of renewable wind energy (on shore and off shore) at appropriate locations and related grid infrastructure in the Region in compliance with national Wind Energy Guidelines.'

2.4 Local Policy

2.4.1 Kerry County Development Plan (2022-2028) was adopted on 4 July 2022. Section 2.6.2.1 states that:

'The council, in conjunction with stakeholders will facilitate low-carbon and renewable energy generation (electricity and heat) technologies.'

2.4.2 Section 12.5.4.1 *'Wind Energy'* states:

'It is the policy of the Council to support, in principle and in appropriate locations, the sustainable development of wind energy resources in County Kerry.'

2.4.3 Council objective KCDP 12-18 states that the Council:

'Ensure that projects shall be designed and developed in line with the Draft Revised Wind Energy Development Guidelines (DHPLG, 2019) and any update of these guidelines in terms of siting, layout and environmental assessment.'

2.4.4 The DHPLG, 2019 (hereinafter referred to as 'draft WEDG 2019') remain in draft form and the noise element is due to be re-drafted. On that basis the WEDG 2006 has been adopted for this noise assessment. The 2006 and draft 2019 WEDG are discussed in further detail in the sections below.

2.5 Wind Energy Development Guidelines, 2006

2.5.1 The current guidelines for setting noise limits are detailed in the Department of Environment Heritage and Local Government (DoEHLG), *'Wind Energy Development Guidelines, 2006'* (WEDG 2006).

2.5.2 The information relating to noise in the WEDG 2006 is very limited. For example, there is no guidance on where or how to measure background noise levels and how to correlate these with wind speed on the proposed wind farm site, there is also no mention of how to consider cumulative effects. The WEDG 2006 guidelines do, however, include guidance on how to derive limits for daytime and night time periods.

2.5.3 The daytime limits take account of existing background noise levels and include a fixed limit of 45 dB or background + 5 dB, whichever is the greater, except in low background noise environments where a fixed minimum limit in the range 35-40 dB should be considered. TNEIs interpretation of these limits is that turbine noise should not exceed:

- 45 dB $L_{A90,\,10\,min}$ or background noise + 5 dB, whichever is the greater, for daytime hours (applicable where background noise levels are greater than 30 dB L_{A90}); or,
- 35 to 40 dB $L_{A90,\,10\,min}$ where background noise is less than 30 dB L_{A90}.

2.5.4 The WEDG states that a *"fixed limit of 43dB(A) will protect sleep inside properties during the night",* however, whilst it is not explicit within the WEDG guidance, the addition of a night time 'background noise +5 dB' parameter is commonly applied in wind turbine noise assessments. This is detailed in numerous examples of planning conditions issued by Councils. On that basis, the night time noise limits used in this assessment have been based on 43 dB or background noise + 5 dB, whichever is the greater.

2.5.5 It is widely agreed that the limits proposed in the WEDGs were drafted to broadly align with the UK guidance *ETSU-R-97 'The Assessment and Rating of Noise from Wind Farms'*. The Association of Acoustic Consultants of Ireland (AACI) Environmental Noise Guidance [5] states the following in relation to the WEDG 2006:

'The document includes daytime and night-time noise criteria. As criteria included in the document are evidently derived from ETSU-R-97, it is considered more robust to base noise assessments on the ETSU and IOA documents, particularly as the DOEHLG document is somewhat vague. The document has been undergoing a protracted review process for several years.'

2.5.6 In 2013 this UK guidance was supplemented by a document produced by the Institute of Acoustics' (IOA) *'A good practice guide to the application of ETSU-R-97 for the assessment and rating of wind turbine noise'* (IOA GPG). Given the lack of detail in parts of the WEDG, information contained in ETSU-R-97 and the IOA GPG is often used to supplement the WEDGs and to inform wind farm noise assessments in Ireland.

Draft 2019 WEDG

2.5.7 It is noted that the WEDG are currently under review and a set of 'draft WEDG 2019' were issued for consultation in December 2019. Significant concerns were raised during the public consultation process on the Draft WEDG 2019 Guidelines, including by a group of wind farm acousticians [6], regarding the noise section of the draft guidelines and how the authors had misinterpreted existing guidance and incorporated a number of errors within the technical approaches proposed. In light of these concerns, and the fact that significant changes would need to be made before they could be adopted, an assessment using the Draft WEDG 2019 Guidelines is not, in our opinion, technically feasible or appropriate and has not therefore been undertaken.

2.5.8 Timelines for the conclusion of the WEDG 2019 review are still unclear however the Government of Irelands Climate Action Plan 2024 [7] includes a 2024 Action (EL/24/5) to 'Publish the Revised Wind Energy Development Guidelines for onshore wind.' No timescales for completion are provided.

2.5.9 At time of writing therefore, the DoEHLG 2006 Guidelines remain the relevant statutory guidelines and, as a result, they have been used for this assessment, appropriately supplemented by the guidance in ETSU-R-97 and the IOA GPG, which are considered by TNEI to represent current best practice. This report has been prepared by suitably qualified Acousticians, affiliated with the IOA. Based on our experience of undertaking wind farms noise assessment projects with a combined rated capacity of >5 GW, TNEI consider the use of these documents to represent best available evidence

2.6 ETSU-R-97 The Assessment and Rating of Noise from Wind Farms

2.6.1 As wind farms started to be developed in the UK in the early 1990's, it became apparent that existing noise standards did not fully address the issues associated with the unique characteristics of wind farm developments and there was a need for an agreed methodology for defining acceptable noise limits for wind farm developments. The methodology was developed for the former Department of Trade and Industry (DTI) by the Working Group on Noise from Wind Turbines (WGNWT).

2.6.2 The WGNWT comprised a number of interested parties including, amongst others, Environmental Health Officers, wind farm operators, independent acoustic consultants and legal experts who:

'…between them have a breadth and depth of experience in assessing and controlling the environmental impact of noise from wind farms.'

2.6.3 In this way it represented the views of all the stakeholders that are involved in the assessment of noise impacts of wind farm developments. The recommendations of the WGNWT are presented in the DTI Report – ETSU-R-97 *'The Assessment and Rating of Noise from Wind Farms (1996).'*

2.6.4 The basic aim of the WGNWT in arriving at the recommendations was the intention to provide:

'Indicative noise levels thought to offer a reasonable degree of protection to wind farm neighbours, without placing unreasonable restrictions on wind farm development or adding to the costs and administrative burdens on wind farm developers or local authorities.'

2.6.5 ETSU-R-97 makes it clear from the outset that any noise restrictions placed on a wind farm must balance the environmental impact of the wind farm against the national and global benefits that would arise through the development of renewable energy sources:

'The planning system must therefore seek to control the environmental impacts from a wind farm whilst at the same time recognising the national and global benefits that would arise through the development of renewable energy sources and not be so severe that wind farm development is unduly stifled.'

2.6.6 ETSU-R-97 states that noise limits should reflect the variation in both turbine source noise and background noise with wind speed. Absolute lower limits, different for daytime and night time, are applied where low levels of background noise are measured. The wind speed range that should be considered ranges between the cut-in wind speed for the turbines (usually about 2 to 3 ms^{-1}) and up to 12 ms^{-1}, where all wind speeds are referenced to a 10 metre measurement height.

2.6.7 Separate noise limits apply for daytime and for night time. Daytime limits are chosen to protect a property's external amenity, and night time limits are chosen to prevent sleep disturbance indoors, with windows open.

2.6.8 The daytime noise limit is derived from background noise 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). Multiple samples of 10 minute background noise 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 noise level as a function of wind speed. The ETSU–R-97 daytime noise limit, sometimes referred to as a 'criterion curve', is then set at a level 5 dB(A) above the best fit curve over the desired wind speed range; subject to an appropriate daytime fixed minimum limit.

2.6.9 The night time noise limit is derived from background noise 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 noise limit is also based on a level 5 dB(A) above the best fit curve over the 0 – 12 ms^{-1} wind speed range, with a fixed minimum limit of 43 dB L_{A90}.

2.6.10 The exception to the setting of both the daytime and night time fixed minimum limits occurs where a property occupier has a financial involvement in the wind farm development. Paragraph 24 of ETSU-R-97 states:

'The Noise Working Group recommends that both day and night time lower fixed limits can be increased to 45 dB(A) and that consideration should be given to increasing the permissible margin above background where the occupier of the property has some financial involvement in the wind farm.'

2.6.11 ETSU-R-97 provides a robust basis for determining the noise limits for wind turbine(s) and since its introduction has become the accepted standard for such developments across the UK.

2.6.12 As detailed above, for this assessment reference has also been made to guidance contained within ETSU-R-97. The noise limits have been derived in accordance with WEDG 2006 with the addition of the financially involved limit set out in ETSU-R-97.

2.7 Current Good Practice

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

2.7.1 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 noise data collection, data analysis and limit derivation, noise predictions, cumulative issues, reporting requirements and other matters such as noise related planning conditions.

2.7.2 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."

2.7.3 The guidance document was endorsed by all Governments within the UK but has no official status in Ireland.

2.7.4 As with ETSU-R-97, for this assessment the recommendations included in the IOA GPG have been used to supplement the guidance provided within the WEDG.

2.7.5 The IOA GPG refers to six Supplementary Guidance Notes and where applicable these have also been considered in the assessment.

2.7.6 To summarise, the assessment of operational noise from the Proposed Development has been undertaken in accordance with WEDG 2006, with reference to the guidance presented in ETSU-R-97 and the IOA GPG where appropriate.

2.8 WSP BEIS Report

2.8.1 In February 2023, WSP published *'A review of noise guidance for onshore wind turbines'* [8] ('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 UK guidance (ETSU-R-97) requires updating.

2.8.2 The WSP BEIS report concluded that:

'the guidance would benefit from further review and updating of the aspects identified. This could be supported by currently available evidence, which is summarised in this report. However, the study has also highlighted gaps in the state of knowledge, which should be addressed by further research, to support any updates to the guidance.'

2.8.3 A series of recommendations are made regarding further research whilst some additional suggestions are included regarding the development of new or updated guidance. The following recommendation is included on page 15 of the WSP BEIS report:

'the separation of the 'policy position' (addressing the balance between controlling noise impact and enabling renewable energy development), 'technical guidance' (application of the assessment approach), and 'technical justification' (the supporting evidence) into discrete, linked documents'

2.8.4 The WSP BEIS report notes at the outset that *'Any views expressed within it do not necessarily represent the views of the UK government or the governments of any of the devolved administrations'*. The report does state on page 26 that:

'Consideration should be given to including a clear position statement in guidance confirming the intended policy balance between protection from noise impact, and enabling of renewable energy development (to achieve Net Zero), linked with the wider policies that underpin the government approach to noise management.'

At time of writing there has been no official response to the report from BEIS or any of the new UK Government departments which are being created to replace BEIS. In the event that a decision is made to follow up on the recommendations within the WSP BEIS report, it is unclear how new guidelines would account for the UK Governments' Net Zero targets nor is there any indication of timescales within which updated guidance would be produced.

2.8.5 The guidance contained within ETSU-R-97 and the IOA GPG has therefore been used to supplement the WEDG 2006.

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 either 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 [(9)].

3.1.3 The potential impact assessed in this report consider the overall noise levels of wind farms inclusive of expected Normal Amplitude Modulation (NAM) and tonality, as described in ETSU-R-97. Other topics relating to operational wind farm noise characteristics, such as Low Frequency Noise (LFN) and Other Amplitude Modulation (OAM) are discussed below.

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 [(10)]. 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 [(11)], 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 [(12)]. 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 [(13)] 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 [(14)] 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 [(15)] 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 in the UK (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 The WSP BEIS Report notes on page 115 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[315,316]*, 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 116 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 [(16)] 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 WTS[1]*. High level, but inaudible, infrasound did not appear to perturb any physiological or psychological measure tested in these study participants.'*

3.2.13 It is therefore considered unnecessary to carry out specific assessments of Infrasound, LFN and Vibration, and it has 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 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 the blade passing frequency, typically once per second. In some literature 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 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 [(17)] 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).

[1] WTS stands for Wind Turbine Syndrone which is a term for adverse human health effected related to the proximity of wind turbines.

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 In April 2015, an Amplitude Modulation Working Group (AMWG) formed by 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 was recommended by the IOA in a report called 'Final Report - A Method for Rating Amplitude Modulation in Wind Turbine Noise' dated 9th August 2016, which details a preferred method for practitioners to measure and rate AM near operational wind farms. The method calculates an amplitude modulation depth value in decibel (dB) for any given 10 minute period, and the executive summary states:

'The AMWG has not addressed the question of what level of AM in wind turbine noise (when measured by a specific metric) is likely to result in adverse community response or how that response should be evaluated. The psycho-acoustic aspects of AM are not within the scope of this study, but the proposed metric is intended to assist with such further research.'

3.3.6 On 3 August 2015, the UK Department for Energy and Climate Change (DECC), now the Department for Business, Energy and Industrial Strategy (BEIS), 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:

- *'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 [18], 'Wind Turbine AM Review – Phase 2 Report' was published in August 2016 at the same time as the release of the IOA AMWG Final Report, and 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 IOA, and enforcement action would rely upon professional judgement by Local Authority Environmental Health Officers, based on the duration and frequency of occurrence. It is not clear within the body of the report what 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.'

3.3.8 The report [18] 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, which in Ireland are embodied in Development Management Guidelines 2007 Chapter 7. 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; 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.'*

3.3.9 In 2017 a potential noise related planning condition which included consideration of OAM was published in the Acoustics Bulletin magazine (by the IOA) written by a number of acousticians working in the field of wind farm noise in the UK. The approach outlined in the document was not subject to any wider consultation nor has it been endorsed by the IOA, the UK Government or Scottish Government. The lack of robust information regarding the second element is highlighted in the article itself which notes:

'Whilst local authorities and developers have waited for a planning condition that could be applied to newly consented wind farms, or to those already consented but with a suspensive condition, the report Wind Turbine AM Review (WTAMR) by WSP/Parsons Brinckerhoff for DECC arguably did not provide that. In addition there have been a number of comments on WTAMR that we consider should be addressed. The introductory sections and the conditions

text represent the broad consensus view of those whose names appear below, following a period of discussion, compromise and agreement. This approach is proposed based on the current state of understanding, but may be subject to modification in light of new research and further robust information.'

'As various people before us have discovered, the derivation of a penalty is not easy. There is not sufficient reliable research to be confident that a penalty system would always provide a fair indication of the impact of AM.'

3.3.10 The article goes on to note that:

'However, to do nothing would be unfair on those wind farm neighbours adversely affected by AM and, in any case, there seems to be general agreement amongst many stakeholders on all sides of the debate that a robust condition including AM is required.'

3.3.11 The topic of AM from wind turbine noise was considered again in the UK in 2022, with a review of evidence commissioned by the UK Government published in the WSP BEIS report 'A review of Noise Guidance for Onshore Wind Turbines,' (October 2022). The report notes that the IOA preferred metric provides a suitable approach to measure and quantify AM near operational wind farms (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 can be incorporated into a planning condition. In relation to the potential for 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 2017 [505] should be considered as a starting point.'

3.3.12 Until such a 'further study' is completed, and additional guidance is published, the approach set out in the IOA GPG remains valid, the document states (paragraph 7.2.10):

'The evidence in relation to "Excess" or "Other" Amplitude Modulation (AM) is still developing. At the time of writing, current practice is not to assign a planning condition to deal with AM.'

3.3.13 Persistent OAM can be a source of nuisance to wind farm neighbours. Indeed, in a recent decision of the Irish High Court on the 8th of March 2024, the court found that frequent and sustained periods of OAM arising from the operational Ballyduff Wind Farm was an unreasonable interference with a neighbour's use and enjoyment of their property which was located approximately 359 m from the nearest turbine. The issue of damages and/or an injunction were held over for later determination by the court but in the meantime, the court directed all parties to engage in mediation with a view to devising 'appropriate mitigation measures and if possible, to resolve all outstanding issues between them'. In summary, therefore, where OAM arises mitigation is possible and is the appropriate response.

3.3.14 As a summary, a significant amount of research has been undertaken in relation to OAM and key outcomes of the research are that:

- It is clear that OAM, if it occurs frequently and for sustained periods, it has the potential to result in adverse impacts for wind farm neighbours;
- It is not currently possible to predict if and when OAM will occur at a proposed wind farm site. On sites where OAM has been identified it occurs intermittently and varies in terms of severity;
- There are methodologies available that can be used to measure and quantify OAM, in particular the method produced by the Amplitude Modulation Working Group (AMWG), which was formed by the Institute of Acoustics. The methodology was presented in a report 'Methods for Rating Amplitude Modulation in Wind Turbine Noise' which was published in April 2015;
- Whilst it is possible to measure and quantify OAM using the AMWG methodology (which provides an AM rating for each 10 minute period), further study is still required to help quantify what level of OAM, if any, is acceptable. This is complicated by the fact that it is unclear whether a small amount of OAM that occurs regularly is likely to be more (or less) annoying than a large amount of OAM that occurs very infrequently; and
- Notwithstanding a lack of a defined threshold detailing what level of OAM is acceptable, there are measures available which have been shown to mitigate OAM should it occur. Measures can include:
    - Changes to the operation of the relevant wind turbine(s) by changing parameters such as blade pitch;
    - Addition of blade furniture (such has vortex generators) to alter the flow of air over the wind turbine blades; and, in extreme cases,
    - Targeted wind turbine shutdowns in specific conditions where OAM is found to occur.

3.3.15 Where mitigation is required, it needs to be designed on a site-specific basis.

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 the WEDG, the following steps are required:

- Specify the location of the wind turbines for the Proposed Development;
- Measure the background noise 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 (NSRs) and select a sample of relevant Noise Assessment Locations (NAL). For each NAL, identify the most representative measured background noise dataset;
- Establish for each NAL the Total WEDG Noise Limits on analysis of the measured background noise levels;
- Specify the likely noise emission characteristics of the wind turbines for the Proposed Development 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 Total WEDG Noise Limits;
- Determine the Site Specific Noise Limits, which take account of the noise limit already allocated to, or could theoretically be used by, other wind farm developments in the area; and
- Calculate the likely noise immission levels due to the operation of the Proposed Development on its own and compare it to the Proposed Development's Site Specific Noise Limits.

4.1.2 In order to fully consider cumulative noise, the assessment has been split into three separate stages:

- Stage 1 – determine existing Total WEDG Noise Limits, which are already set for other wind farms within the vicinity of the Proposed Development at each NAL or establish the Total WEDG Noise Limits for each NAL (where noise limits are not already set) based on the measured background noise levels;
- Stage 2 – undertake a cumulative assessment for locations where noise predictions from the Proposed Development are within 10 dB of the total noise predictions from any other wind farms/turbine developments in the area; and
- Stage 3 – establish the Proposed Development's Site Specific Noise Limits (at levels below the Total WEDG Noise Limits, where limit apportionment is required) and compare the noise predictions from the Proposed Development on its own against the proposed Site Specific Noise Limits.

4.2 Consultation

Scoping Opinion

4.2.1 One scoping response was provided in relation to noise from the HSE. This is detailed in the Chapter and included as Appendix 2-2.

4.3 Stage 1 Assessment Methodology - Setting the Total WEDG Noise Limits

Identify Existing Noise Limits

4.3.1 A review of the Decision Notices of the nearby operational schemes indicates that, with the exception of Grousemount Wind Farm and Derragh Wind Farm, no noise limits have been established at any of the closest receptors to the Proposed Development.

4.3.2 Extracts of the noise conditions for Grousemount Wind Farm and Derragh Wind Farm are included in Annex 2.

Wind Shear

4.3.3 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 usually vary, 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.

4.3.4 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 noise 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 noise is measured.

4.3.5 The IOA GPG states that one of three methods of wind speed measurement may be adopted. For this assessment wind speeds were recorded directly at hub height (125 m) in line with 'Method A' of Section 2.6.3 of the IOA GPG to fully take account of wind shear.

Noise Impact Criteria in the WEDG

4.3.6 Analysis of the measured data has been undertaken in accordance with ETSU-R-97 and current good practice to determine the pre-existing background noise environment and to establish the daytime and night time Total WEDG Noise Limits for each NAL.

4.3.7 The Total WEDG Noise Limits for the daytime have been set at;

- 40 dB(A) where background noise levels are below 30 dB; and,
- 45 dB(A) or background noise plus 5 dB, whichever is the greater, where background noise levels are greater than 30 dB.

4.3.8 Total WEDG Noise Limits at night time has been set at;

- 43 dB(A) or background plus 5 dB, whichever is the greater.

4.3.9 Where the occupiers of a property have a financial interest in the Proposed Development the higher daytime and night time fixed minimum noise limit of 45 dB has been adopted.

4.3.10 This 'Total' limit relates to noise from all wind farm developments in the area (including the Proposed Development). The limit was chosen with due regard to the guidance in the WEDG and with due consideration given to the limits already adopted for other wind farm developments in the area.

4.3.11 The acceptable limits for wind turbine operational noise are clearly defined for all time periods by the application of the WEDG methodology. Consequently, the test applied to operational noise is whether or not the predicted wind turbine noise immission levels at nearby noise sensitive properties lie below the WEDG Noise Limits. Depending on the levels of background noise, the satisfaction of the WEDG derived limits can lead to a situation whereby, at some locations under some wind conditions and for a certain proportion of the time, the wind turbine noise would be audible.

4.4 Stage 2 Assessment Methodology - Likely effects & cumulative assessment

4.4.1 The WEDG do not include any information on the assessment of cumulative noise impacts, therefore, the guidance provided within the IOA GPG has been adopted, which contains a detailed section on cumulative noise and 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.'

4.4.2 An assessment was undertaken at each of the NALs proximate to the Proposed Development and other nearby operational, consented and proposed wind farm developments to determine whether the wind turbine noise immissions from the Proposed Development were within 10 dB of the wind turbine noise immissions from other wind farm developments. Where predictions were found to be within 10 dB of each other, a cumulative noise assessment was undertaken, however, if wind turbine immissions were more than 10 dB apart, a cumulative noise assessment was not required.

Noise Prediction / Propagation Model

4.4.3 The ISO 9613-2: 1996 *'Acoustics – Attenuation of sound during propagation outdoors Part 2: General method of calculation'* [19] model algorithm provides a robust prediction method for calculating the noise immission levels at the nearest receptors. A European Commission (EC) research project into wind farm noise propagation over large distances, published as 'Development of a Wind Farm Noise Prediction Model,' JOULE project JOR3-CT95-0051 in

1998, identified a simplified version of ISO 9613-2 as the most suitable at that time, but the full method has been used for this assessment.

4.4.4 Guidance on noise prediction and propagation modelling is not provided within the WEDG, however, the IOA GPG recognises the standard as appropriate for the prediction of wind turbine noise.

4.4.5 There is currently no standard approach to specifying error bands on noise predictions, however, Table 5 of ISO 9613-2 suggests, at best, an estimated of accuracy of ± 3 dB(A). The work undertaken as part of the EC research study concluded that the ISO 9613-2 algorithm reliably predicted noise levels that would generally occur under downwind propagation conditions. The error bands referenced in the ISO standard itself relate to the general application of the standard. Additional, wind farm specific studies, have also been undertaken to validate the use of the standard to predict wind farm noise 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."

4.4.6 TNEIs experience of undertaking compliance monitoring for operational wind farms indicates that the predictions undertaken using the guidance in the IOA GPG show a good correlation with measured levels.

4.4.7 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.

4.4.8 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.

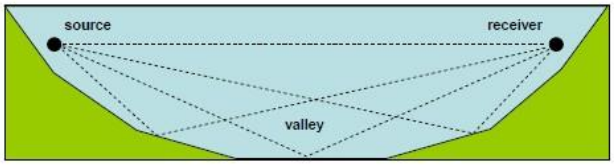
4.4.9 The IOA GPG quotes a comparative study undertaken in Australia that indicated ISO 9613-2 can, in some conditions, under-predict ground attenuation effects and the potential for additional reflection paths 'across a valley', whilst slightly over-predicting on flat terrain. It should be noted, however, that the wind farm layouts studied were untypical for the UK, with rows of turbines spreading over 10 km on an elevated ridge. It also should be noted that no correction for background contribution was undertaken and the monitoring locations were located as far as 1.7 km from the nearest turbine, where turbine noise may be at similar levels to background noise and therefore difficult to differentiate. For the study's modelling work topographic height data was included as an input, which is consistent with ISO 9613-2 methodology generally, but not with the requirements of the IOA GPG.

4.4.10 The model used in this assessment does not model barrier attenuation using the method in ISO 9613-2, but instead uses the guidance in the IOA GPG to consider whether any topographical corrections are required as set out below in Sections 4.4.11 to 4.4.14. Any differences in ground height between the receptors and the turbines are considered when calculating the propagation distance between each source and receiver.

4.4.11 The IOA GPG 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.

4.4.12 The IOA GPG also 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

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

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

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).

4.4.14 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.

4.5 Noise Propagation Parameters

4.5.1 The noise immission levels have been calculated using the full ISO 9613-2 model with a receiver height of 4.0 m above local ground level, mixed ground (G=0.5) and air absorption based on a temperature of 10 °C and 70 % relative humidity. The modelling parameters reflect current good practice as detailed within the IOA GPG.

4.5.2 The wind turbine noise immission levels are based on the $L_{A90,10\ minute}$ noise indicator in accordance with the recommendations in the WEDG, which were obtained by subtracting 2 dB(A) from the turbine sound power level data (L_{Aeq} indicator).

4.5.3 A topographical assessment has been undertaken between each NSR and wind turbine location to determine whether any concave ground profiles exist between the source and receiver. Analysis undertaken using a combination of CadnaA [20] 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 7.

4.5.4 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 NSR 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 7. 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.

4.5.5 The need to include a concave ground/screening 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 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 Proposed Development.

4.5.6 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.

4.5.7 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.

4.5.8 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.

4.5.9 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 4.1 These are based upon the examples given in the IOA GPG (Section 4.4.2), using interpolation where required.

Table 4.1 Wind Directivity Attenuation Factors used in Modelling

Direction (º)	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 (º)	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

4.6 Stage 3 Assessment Methodology - Site Specific Noise Limits

4.6.1 Summary Box 21 of the IOA GPG states:

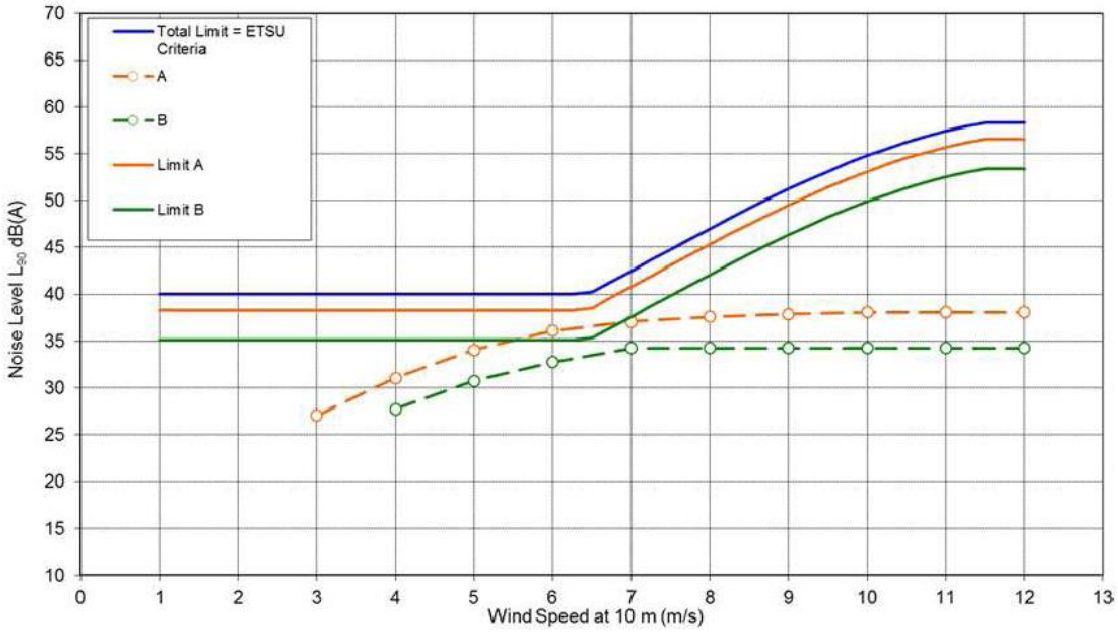
'Whenever a cumulative situation is encountered, the noise limits for an individual wind farm should be determined in such a way that no cumulative excess of the total ETSU-R-97 noise limit would occur.'

4.6.2 In order to determine Site Specific Noise Limits at receptors in proximity to the Proposed Development (where required), the guidance detailed within Section 5.4 of the IOA GPG has been considered. The options detailed within Section 5.4 are summarised below.

Limit Apportionment

4.6.3 Limit apportionment considers the noise limit already allocated to other wind farms in the area (see Annex 2). This approach is demonstrated in Graph 4.1 below which is reproduced from the Section 5.4 of the IOA GPG. In this example the total limit (shown in blue) is shared between two proposed wind farms (A and B). The two noise limits for a given receptor (the solid orange and green lines) when added together equate to the total noise limit, and the predicted levels for each wind farm (the dashed lines) meet the specific limits established for each wind farm.

Graph 4.1: Limit Apportionment Example



Significant Headroom

4.6.4 The limit derivation can also be undertaken with consideration of the amount of headroom between another schemes'(s) predictions and the Total Noise Limit. 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.'

4.6.5 With this in mind, and where appropriate, an additional 2 dB buffer has been added to the cumulative turbine noise predictions from the other wind farm 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 wind farm developments.

10 dB Rule

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

4.6.7 Further information on the approaches adopted for the setting of the Site Specific Noise Limits is provided in Section 6.5 below.

5 Baseline

5.1 Identification of Potential Noise Receptors

5.1.1 A desk based review was undertaken to identify potential NSRs within proximity to the Proposed Development. Of the identified receptors, a total of five Noise Monitoring Locations (NMLs) were selected as being appropriate locations to determine a representative baseline for all of the identified NSRs. The NMLs were located to the north, east and west of the Proposed Development.

5.1.2 The NMLs were selected following a detailed review of the area using aerial photography and following a site visit. Where possible, locations were selected to ensure that they were subject to minimal influence from the existing operational wind farms in the area and other noise sources, such as local watercourses and vegetation.

5.2 Background Noise Survey

5.2.1 Background noise monitoring was undertaken for the purposes of setting the Total WEDG Noise Limits. Data was recorded over the period 16 June 2022 to 22 September 2022 at each of the NMLs simultaneously.

5.2.2 The noise meter at NML1 suffered an intermittent fault and therefore 4 days worth of data was lost during the first week of the survey. The noise monitoring equipment at the other NMLs functioned correctly for the full duration of the survey.

5.2.3 The equipment at NML2 was repeatedly knocked over by animals during the survey period. The exact periods when it occurred could not be determined therefore the data collected at the property was discarded. At NML3, the noise equipment had been moved to the roadside during the third month of the survey therefore for security reasons it was removed. At NML5, the noise data was found to have been affected by a local watercourse which resulted in elevated noise levels therefore the noise data collected at that property has not been used in the assessment.

5.2.4 Details of the exact monitoring periods, the rationale behind the exact kit location and the dominant noise sources observed at each of the NMLs are detailed in the Field Data Sheets (FDS) and installation report included in Annex 3.

5.2.5 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	X (ITM)	Y (ITM)
NML1	505304	577152
NML2	507373	579647
NML3	511865	577355
NML4	512648	575374

NML	X (ITM)	Y (ITM)
NML5	514819	574092

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 that should be used for background noise 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 noise survey meets with the requirements of the IOA GPG. 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.

5.3.3 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.

5.3.4 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 dwelling and were located where possible *'in an area frequently used for rest and relaxation'* (Section 2.5.1 of IOA GPG), and 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.

5.3.5 All measurement systems were set to log the L_{A90} and L_{Aeq} noise levels in ten minute intervals continuously over the deployment period.

5.4 Meteorological Data

5.4.1 The WEDG state on Page 29 that:

'Noise limits should be applied to external locations, and should reflect the variation in both turbine source noise and background noise with wind speed.'

5.4.2 ETSU-R-97 states on Page 84 that:

'background noise measurements should be correlated with wind speed measurements performed at the proposed site, such that the actual operating noise levels from the turbines may be compared with the noise levels that would otherwise be experienced at a dwelling.'

5.4.3 The preferred methodologies for measuring or calculating wind shear are detailed in Section 4.3.3. Concurrent wind speed and direction were recorded using a LIDAR unit, which was located within the site (grid reference 508124, 577319). The meteorological data was

collected and provided by the MKO. The installation report and calibration information for the LIDAR is included within Annex 3. Average 10 minute wind speed and direction data were collected over the same time-scale as the noise data to provide the analysis of the measured background noise as a function of wind speed and direction.

5.4.4 A tipping bucket rain gauge was installed at NML5 for the duration of the noise survey to record periods of rainfall, time synchronised to the sound measurements. As per the recommendations in Section 3.1.9 of the IOA GPG, the rain data were analysed and any 10 minute periods that contained registered rainfall events, plus the preceding 10 minute periods, were excluded. All excluded rainfall periods are shown on Figures A1.2a-A1.2c (Annex 1) as blue squares.

5.5 Influence of Existing Turbines on Background Measurements

5.5.1 ETSU-R-97 states that background noise levels should be determined such that they are not influenced by existing turbine noise, whilst 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 noise assessments undertaken before the wind turbines were operational, providing the equipment and both noise and meteorological data obtained are appropriate.

5.5.2 There are a number of operational wind farms (including the existing Kilgarvan Wind Farm (comprising Inchincoosh, Lettercannon and Coomagearlaghy I) located in proximity to the Proposed Development. It was not possible to shut down the turbines during the baseline noise survey therefore the NMLs were carefully selected such that they were located away from operational wind turbines wherever possible.

5.5.3 The wind farms were not audible at any of the NMLs detailed in Table 5.1 above during the installation of the noise monitoring equipment or on any subsequent site visits. However, the datasets were analysed in detail to determine whether the existing operational turbines could have influenced measured noise levels.

5.5.4 The measured datasets were filtered based on the downwind direction from the operational turbines, with various filter angles[2] considered at each NML. A comparison was undertaken of the filtered and unfiltered datasets and the quietest datasets (at the key wind speed ranges) were used in the assessment. The directional filtering comparisons, and justification for the final choice of dataset used in the assessment are included in Annex 5. At all locations it was concluded that the operational turbines were having a minimal impact and as such

[2] Comparisons were undertaken using 90°, 180°, and 270° filtering angle widths, which relate to the removal of data when the monitoring locations were downwind, and crosswind of the operational turbines.

the full datasets were used for the purposes of deriving noise limits for the Proposed Development.

5.6 Directional Filtering of Background Noise

5.6.1 In Section 3.1.22 of the IOA GPG the need to directionally filter background noise 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 noise data particularly when this corresponds to the prevailing wind direction.

5.6.2 For this site there are no dominant local noise sources, therefore no directional filtering was undertaken.

5.7 Analysis of Measured Data

5.7.1 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 (dawn chorus) or manual exclusions due to atypical data.

5.7.2 Following the detailed analysis of the dataset collected at NML5, the background noise data was found to have been affected by a nearby watercourse which resulted in the collection of elevated noise levels. As detailed above, the noise kit at NML2 was also repeatedly knocked over therefore the data collected at NML2 and NML5 has not been used to set noise limits at any NSRs and the locations are not discussed further in this report.

5.8 Prevailing Background Noise Level

5.8.1 Table 5.2 and Table 5.3 summarise the derived prevailing background noise levels from the baseline survey.

Table 5.2 Summary of Prevailing Background Noise Levels during Quiet Daytime Periods (dB(A))

NML	Prevailing Background Noise Level $L_{A90,10\ min}$											
	1	2	3	4	5	6	7	8	9	10	11	12
NML1	25.6	26.3	27.2	28.4	29.7	31.3	33.1	35.3	37.7	40.4	43.5	46.9
NML3	22.6	24.8	26.5	27.9	29.2	30.5	32.0	33.8	36.2	39.2	43.1	48.0
NML4	22.8	24.5	26.0	27.4	28.8	30.2	31.9	33.8	36.1	38.8	42.0	45.8

Table 5.3 Summary of Prevailing Background Noise Levels during Night time Periods (dB(A))

NML	Prevailing Background Noise Level $L_{A90,10\ min}$											
	1	2	3	4	5	6	7	8	9	10	11	12
NML1	19.2	19.2	19.6	20.6	22.2	24.3	27.0	30.4	34.4	39.1	39.1*	39.1*

NML	Prevailing Background Noise Level $L_{A90,10\ min}$											
	1	2	3	4	5	6	7	8	9	10	11	12
NML3	23.4	25.1	26.1	26.8	27.4	28.2	29.5	31.5	34.5	38.9	38.9*	38.9*
NML4	22.9	23.7	24.7	25.7	26.7	27.4	27.9	27.9*	27.9*	27.9*	27.9*	27.9*

**flatlined at the higher wind speeds. See Section 5.8.5.*

5.8.2 A series of graphs are presented for each of the NMLs to illustrate the data collected, these are included as Figures A1.2a - A1.2c (Annex 1). There is a set of graphs for each NML, which show the range of wind speeds and directions recorded during the survey, the 10 minute average wind speed plotted against the recorded $L_{A90,\ 10min}$ noise level, and a calculated 'best fit' polynomial regression line for both quiet daytime and night time periods. Each Figure also includes a table with the number of measured data points per integer wind speed bin and the prevailing measured background noise level.

5.8.3 The background noise 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 ETSU-R-97 and the IOA GPG.

5.8.4 In line with the recommendations included in Section 3.1.21 of the IOA GPG, for all NMLs the polynomial background curve for low wind speed conditions have been restricted at wind speeds below that where the derived minimum occurs.

5.8.5 ETSU-R-97 states (Page 101) that data may not be extrapolated beyond the measured range of wind speeds. It is, however, reasonable to assume that background noise levels will not decrease at higher wind speeds. As such, in the interest of protecting residential amenity, the noise levels for wind speeds higher than the maximum where noise levels were measured have been set equal to those derived for lower wind speeds, as per Section 3.1.20 of the IOA GPG.

5.8.6 This is presented on the Figures, where the final regression analysis curve is shown as a continuous black line and the original polynomial line of best fit is shown as a dashed black line. A summary is also included in Table 5.4 below.

Table 5.4 Analysis of Measured Datasets

NML	Quiet Daytime	Night Time
NML1	No adjustments required	Flatlined above 10 ms^{-1} maximum level recorded).
NML3	No adjustments required	Flatlined above 10 ms^{-1} maximum level recorded)
NML4	No adjustments required	Flatlined above 7 ms^{-1} maximum level recorded)

5.8.7 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, which was achieved at all NMLs during the daytime

periods. During the night time period , <5 valid data points were recorded within the 11 and 12 ms^{-1} bins at all NMLs.

5.8.8 The number of data points measured in each wind speed bin for each receptor, once exclusions were applied, are summarised in Figures A1.2a - A1.2c (Annex 1). The Figures also show the final prevailing background noise levels which have been determined following the analysis detailed above.

6 Noise Assessment Results

6.1 Noise Sensitive Receptors and Noise Assessment Locations

6.1.1 A total of 14 NSRs were chosen as Noise Assessment Locations (NALs) to represent the individual or clusters of NSRs located closest to the Proposed Development. The modelling results for the NALs are presented within the main body of this report, however, an assessment for the individual NSR has also been included within Annex 6 for completeness.

6.1.2 Each NAL and NSR are shown on Figure A1.1 (Annex 1). A set of inset maps (Figures A1.1a-b) have also been included for clarity. All NALs and NSRs are labelled with the letter 'H' and are numbered to ensure consistency with the labelling of these receptors within the rest of the Environmental Impact Assessment Report (EIAR).

6.1.3 Two of the buildings included within the original 102 buildings identified have subsequently been classified as derelict (H34 and H42). These locations are not considered to be noise sensitive for the purposes of this assessment and have not been considered further. The derelict properties are shown on Figures A1.1 and A1.1a-b.

6.1.4 Predictions of noise at the NALs ensures that the assessment reports the noise immission levels expected at each group of NSRs. If predicted noise levels meet the noise limits at the NALs then it infers compliance at other NSRs located further away from the Proposed Development. For completeness, an assessment for all NSRs is included within Annex 6. Table 6.1 details which NML has been used to set noise limits for each NAL and a similar table detailing which NML has been used to set limits at each NSR has also been included within Annex 6.

Table 6.1 Noise Assessment Locations

Noise Assessment Location (NAL)	X (ITM) (m)	Y (ITM) (m)	Elevation (m AOD)	Background Noise Data Used
NAL1 (H14)	505296	577210	149	NML3
NAL2 (H9)	508019	579110	190	NML3
NAL3 (H97)	510461	579590	212	NML3
NAL4 (H17)	511821	577236	252	NML3
NAL5 (H16)	511783	575938	240	NML3
NAL6 (H73)	512633	575387	236	NML3
NAL7 (H1)	509205	575221	317	NML3
NAL8 (H2)	509035	575259	298	NML3
NAL9 (H4)	509059	575212	299	NML4

Noise Assessment Location (NAL)	X (ITM) (m)	Y (ITM) (m)	Elevation (m AOD)	Background Noise Data Used
NAL10 (H3)	508647	575524	288	NML3
NAL11 (H6)	507766	574676	201	NML3
NAL12 (H10)	507755	574547	194	NML3
NAL13 (H7)	506736	575142	160	NML3
NAL14 (H8)	506715	575165	160	NML1

6.2 Noise Emission Characteristics of the Wind Turbines

6.2.1 This noise assessment has modelled three candidate wind turbines, a 163 m rotor diameter turbine with a maximum rated output capacity of 7 MW, serrated trailing edge blades and a hub height of 118 m, a 155 m rotor diameter turbine with a maximum rated output capacity of 6.6 MW, serrated trailing edge blades and a hub height of 122.5 m and a 149 m rotor diameter turbine with a maximum rated output capacity of 5.7 MW, serrated trailing edge blades and a hub height of 125 m.

6.2.2 For the cumulative assessment the turbines considered are summarised in Table 1.1 in Annex 7. The location of the wind turbines are shown on Figures A1.1a and grid references are included in Annex 7.

6.2.3 Due to the differences in the way in which levels are provided by different manufacturers, TNEI has accounted for uncertainty using the guidance contained within Section 4.2 of the IOA GPG (2013). Details of the sound power level, octave data and measurement uncertainty used for the candidate turbines are available upon request following completion of the relevant Non-Disclosure Agreement. Data for the other operational schemes which is publicly available is included within Appendix 8.

6.2.4 Manufacturer noise level data is usually supplied based on a turbine of a specific hub height although the noise levels are presented as standardised to 10 m height. Accordingly, the noise data used in this assessment corrects the published turbine noise data following the guidance detailed in Section 4.3 of IOA GPG Supplementary Guidance Note 4, where applicable.

6.3 Stage 1 – Setting the Total WEDG Noise Limits

6.3.1 The WEDG Noise Limits have been established for each of the NALs as detailed in Table 6.2 and Table 6.3 below. The Total WEDG Noise Limits for the other NSRs are detailed in Annex 6. It is understood that the occupiers of NALs 7-10 are financially involved with the Proposed Development and as such the higher fixed minimum noise limit of 45 dB (as set out in ETSU-R-97) has been adopted at those NALs for both daytime and night time.

Table 6.2 Total WEDG Noise Limits Daytime

Location	Wind Speed (ms^{-1}) as standardised to 10m height											
	1	2	3	4	5	6	7	8	9	10	11	12
NAL1 (H14)	40	40	40	40	40	45	45	45	45	45.4	48.5	51.9
NAL2 (H9)	40	40	40	40	40	45	45	45	45	45	47	50.8
NAL3 (H97)	40	40	40	40	40	45	45	45	45	45	47	50.8
NAL4 (H17)	40	40	40	40	40	45	45	45	45	45	47	50.8
NAL5 (H16)	40	40	40	40	40	45	45	45	45	45	47	50.8
NAL6 (H73)	40	40	40	40	40	45	45	45	45	45	47	50.8
NAL7 (H1)	45	45	45	45	45	45	45	45	45	45	48.1	53
NAL8 (H2)	45	45	45	45	45	45	45	45	45	45	48.1	53
NAL9 (H4)	45	45	45	45	45	45	45	45	45	45	48.1	53
NAL10 (H3)	45	45	45	45	45	45	45	45	45	45	48.1	53
NAL11 (H6)	40	40	40	40	40	45	45	45	45	45	48.1	53
NAL12 (H10)	40	40	40	40	40	45	45	45	45	45	48.1	53
NAL13 (H7)	40	40	40	40	40	45	45	45	45	45	48.1	53
NAL14 (H8)	40	40	40	40	40	45	45	45	45	45	48.1	53

Table 6.3 Total WEDG Noise Limits Night Time

Location	Wind Speed (ms^{-1}) as standardised to 10m height											
	1	2	3	4	5	6	7	8	9	10	11	12
NAL1 (H14)	43	43	43	43	43	43	43	43	43	44.1	44.1	44.1
NAL2 (H9)	43	43	43	43	43	43	43	43	43	43	43	43
NAL3 (H97)	43	43	43	43	43	43	43	43	43	43	43	43
NAL4 (H17)	43	43	43	43	43	43	43	43	43	43	43	43
NAL5 (H16)	43	43	43	43	43	43	43	43	43	43	43	43
NAL6 (H73)	43	43	43	43	43	43	43	43	43	43	43	43
NAL7 (H1)	45	45	45	45	45	45	45	45	45	45	45	45
NAL8 (H2)	45	45	45	45	45	45	45	45	45	45	45	45
NAL9 (H4)	45	45	45	45	45	45	45	45	45	45	45	45
NAL10 (H3)	45	45	45	45	45	45	45	45	45	45	45	45
NAL11 (H6)	43	43	43	43	43	43	43	43	43	43.9	43.9	43.9
NAL12 (H10)	43	43	43	43	43	43	43	43	43	43.9	43.9	43.9
NAL13 (H7)	43	43	43	43	43	43	43	43	43	43.9	43.9	43.9
NAL14 (H8)	43	43	43	43	43	43	43	43	43	43.9	43.9	43.9

6.3.2

6.3.3 Table 6.5 and Table 6.6 show the daytime and night time WEDG Noise Limits, noise predictions for the Proposed Development and the exceedance level. A negative exceedence demonstrates compliance with the WEDG Noise Limits.

6.4 Stage 2 – Likely Effects and Cumulative Assessment

6.4.1 A comparison has been undertaken of the predicted wind turbine noise immission levels from the Proposed Development operating alongside other wind farm developments to

determine whether predictions are within 10 dB of each other. All turbines have been assumed to be operating in full mode.

6.4.2 Table 6.4 summarises the results and whether a cumulative noise assessment is required (as detailed in Section 4.4).

Table 6.4 Cumulative Assessment Requirement

Noise Assessment Location (NAL)	Are predicted wind turbine noise levels within 10 dB?	Is a cumulative assessment required?
NAL1 (H14)	YES	YES
NAL2 (H9)	YES	YES
NAL3 (H97)	YES	YES
NAL4 (H17)	YES	YES
NAL5 (H16)	YES	YES
NAL6 (H73)	YES	YES
NAL7 (H1)	YES	YES
NAL8 (H2)	YES	YES
NAL9 (H4)	YES	YES
NAL10 (H3)	YES	YES
NAL11 (H6)	YES	YES
NAL12 (H10)	YES	YES
NAL13 (H7)	YES	YES
NAL14 (H8)	YES	YES

6.4.3 A likely cumulative noise assessment was undertaken at all NALs and the results are summarised in

6.4.4 Table 6.5 and Table 6.6. The result of the likely cumulative noise assessment show that the Proposed Development can operate concurrently with the operational and proposed wind farms near to the NALs, whilst still meeting the Total WEDG Noise Limits established in accordance with WEDG 2006 at NALs 1-6, and 10-14. At NALs 7 -9 predicted noise from all other wind farms already exceeds the Total WEDG Noise Limit for certain wind speeds and wind directions during the daytime and night time periods. In practice, the existing turbines may be operated in a low noise mode to ensure compliance but there is no publicly available information to confirm this. Accordingly, the assessment has assumed that the turbines operate in unconstrainted mode as this represents a worst-case scenario.

6.4.5 Where an exceedance of the Total WEDG Noise Limit has been predicted due to the operation of the existing wind farms, noise from the Proposed Development has been reduced such that it is 10 dB below the Total WEDG Noise Limits to ensure that it has a negligible additional impact; this is reflected in the calculation of the Site Specific Noise Limits which is discussed further below. In order to achieve the reduction based on the proposed candidate turbines, certain turbines will need to operate in reduced noise mode for certain wind speeds and wind directions.

6.4.6 The predicted 'likely' cumulative levels are the actual 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. For this assessment the uncertainty level added was 2 dB.

6.4.7 Figures A1.3a-n (Annex 1) show predictions at each NAL from the cumulative operation of all wind farms (including the Proposed Development) against the 'Total WEDG Noise Limits'. The individual contribution of all wind farms are also shown.

6.4.8 Notwithstanding the detailed assessment presented in the sections below, a simple comparison has been undertaken which compares predicted noise levels from the Existing Kilgarvan Wind Farm turbines and those turbines associated with the Proposed Development at the 14 NALs considered in this assessment. The predictions are presented in Table 6.7 below, and the change in predicted levels has also been quantified. Predictions for the existing turbines have been undertaken in accordance with the methodology set out in section 4 using sound power level data detailed in Annex 8.

Table 6.5 Total WEDG Compliance Table – Daytime

Location		Wind Speed (ms^{-1}) as standardised to 10 m height											
		1	2	3	4	5	6	7	8	9	10	11	12
NAL1 (H14)	Total WEDG Noise Limit, L_{A90}	40	40	40	40	40	45	45	45	45	45.4	48.5	51.9
	Predicted Cumulative Wind Turbine Noise L_{A90}	-	-	-	-	-	32.3	33.4	33.6	33.6	33.6	33.6	33.6
	Exceedance Level	-	-	-	-	-	-12.7	-11.6	-11.4	-11.4	-11.8	-14.9	-18.3
NAL2 (H9)	Total WEDG Noise Limit, L_{A90}	40	40	40	40	40	45	45	45	45	45	47	50.8
	Predicted Cumulative Wind Turbine Noise L_{A90}	-	-	-	-	-	34.7	35.6	35.8	35.8	35.8	35.8	35.8
	Exceedance Level	-	-	-	-	-	-10.3	-9.4	-9.2	-9.2	-9.2	-11.2	-15
NAL3 (H97)	Total WEDG Noise Limit, L_{A90}	40	40	40	40	40	45	45	45	45	45	47	50.8
	Predicted Cumulative Wind Turbine Noise L_{A90}	-	-	-	-	-	31.3	32.6	32.8	32.9	32.9	32.9	32.9
	Exceedance Level	-	-	-	-	-	-13.7	-12.4	-12.2	-12.1	-12.1	-14.1	-17.9
NAL4 (H17)	Total WEDG Noise Limit, L_{A90}	40	40	40	40	40	45	45	45	45	45	47	50.8
	Predicted Cumulative Wind Turbine Noise L_{A90}	-	-	-	-	-	33.1	34.5	34.8	34.8	34.8	34.8	34.8
	Exceedance Level	-	-	-	-	-	-11.9	-10.5	-10.2	-10.2	-10.2	-12.2	-16
NAL5 (H16)	Total WEDG Noise Limit, L_{A90}	40	40	40	40	40	45	45	45	45	45	47	50.8
	Predicted Cumulative Wind Turbine Noise L_{A90}	-	-	-	-	-	34.6	36.5	37	37.2	37.2	37.2	37.2
	Exceedance Level	-	-	-	-	-	-10.4	-8.5	-8	-7.8	-7.8	-9.8	-13.6
NAL6 (H73)	Total WEDG Noise Limit, L_{A90}	40	40	40	40	40	45	45	45	45	45	47	50.8
	Predicted Cumulative Wind Turbine Noise L_{A90}	-	-	-	-	-	33	35	35.5	35.6	35.6	35.6	35.6

Location		Wind Speed (ms^{-1}) as standardised to 10 m height											
		1	2	3	4	5	6	7	8	9	10	11	12
	Exceedance Level	-	-	-	-	-	-12	-10	-9.5	-9.4	-9.4	-11.4	-15.2
NAL7 (H1)	Total WEDG Noise Limit, L_{A90}	45	45	45	45	45	45	45	45	45	45	48.1	53
	Predicted Cumulative Wind Turbine Noise L_{A90}	-	-	-	-	-	44.4	47	47.7	47.9	47.9	47.9	47.9
	Exceedance Level	-	-	-	-	-	-0.6	**2***	**2.7***	**2.9***	**2.9***	-0.2	-5.1
NAL8 (H2)	Total WEDG Noise Limit, L_{A90}	45	45	45	45	45	45	45	45	45	45	48.1	53
	Predicted Cumulative Wind Turbine Noise L_{A90}	-	-	-	-	-	43.2	45.7	46.4	46.6	46.6	46.6	46.6
	Exceedance Level	-	-	-	-	-	-1.8	**0.7***	**1.4***	**1.6***	**1.6***	-1.5	-6.4
NAL9 (H4)	Total WEDG Noise Limit, L_{A90}	45	45	45	45	45	45	45	45	45	45	48.1	53
	Predicted Cumulative Wind Turbine Noise L_{A90}	-	-	-	-	-	43.1	45.6	46.3	46.5	46.5	46.5	46.5
	Exceedance Level	-	-	-	-	-	-1.9	**0.6***	**1.3***	**1.5***	**1.5***	-1.6	-6.5
NAL10 (H3)	Total WEDG Noise Limit, L_{A90}	45	45	45	45	45	45	45	45	45	45	48.1	53
	Predicted Cumulative Wind Turbine Noise L_{A90}	-	-	-	-	-	41.4	43.4	43.9	44.1	44.1	44.1	44.1
	Exceedance Level	-	-	-	-	-	-3.6	-1.6	-1.1	-0.9	-0.9	-4	-8.9
NAL11 (H6)	Total WEDG Noise Limit, L_{A90}	40	40	40	40	40	45	45	45	45	45	48.1	53
	Predicted Cumulative Wind Turbine Noise L_{A90}	-	-	-	-	-	37.9	40	40.7	40.9	40.9	40.9	40.9
	Exceedance Level	-	-	-	-	-	-7.1	-5	-4.3	-4.1	-4.1	-7.2	-12.1
NAL12 (H10)	Total WEDG Noise Limit, L_{A90}	40	40	40	40	40	45	45	45	45	45	48.1	53
	Predicted Cumulative Wind Turbine Noise L_{A90}	-	-	-	-	-	37.7	39.9	40.6	40.7	40.7	40.7	40.7

Location		Wind Speed (ms^{-1}) as standardised to 10 m height											
		1	2	3	4	5	6	7	8	9	10	11	12
	Exceedance Level	-	-	-	-	-	-7.3	-5.1	-4.4	-4.3	-4.3	-7.4	-12.3
NAL13 (H7)	Total WEDG Noise Limit, L_{A90}	40	40	40	40	40	45	45	45	45	45	48.1	53
	Predicted Cumulative Wind Turbine Noise L_{A90}	-	-	-	-	-	37.3	38.7	39.1	39.2	39.2	39.2	39.2
	Exceedance Level	-	-	-	-	-	-7.7	-6.3	-5.9	-5.8	-5.8	-8.9	-13.8
NAL14 (H8)	Total WEDG Noise Limit, L_{A90}	40	40	40	40	40	45	45	45	45	45	48.1	53
	Predicted Cumulative Wind Turbine Noise L_{A90}	-	-	-	-	-	37.3	38.8	39.1	39.2	39.2	39.2	39.2
	Exceedance Level	-	-	-	-	-	-7.7	-6.2	-5.9	-5.8	-5.8	-8.9	-13.8

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 6 ms^{-1} therefore no cumulative predictions are included for wind speeds less than 6 ms^{-1}.

*cumulative noise exceeds the noise limits but this is due to the contribution of the existing wind farms in the area as detailed in the section above. At these wind speeds predicted noise from the Proposed Development will be at least 10 dB below the Total WEDG Noise Limits and will therefore have a negligible additional contribution. To ensure noise from the Proposed Development is at least 10 dB below certain turbines will need to be operated in low noise mode for certain wind speeds and wind directions.

Table 6.6 Total WEDG 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	11	12
NAL1 (H14)	Total WEDG Noise Limit, L_{A90}	43	43	43	43	43	43	43	43	43	44.1	44.1	44.1
	Predicted Cumulative Wind Turbine Noise L_{A90}	-	-	-	-	-	32.3	33.4	33.6	33.6	33.6	33.6	33.6
	Exceedance Level	-	-	-	-	-	-10.7	-9.6	-9.4	-9.4	-10.5	-10.5	-10.5
NAL2 (H9)	Total WEDG Noise Limit, L_{A90}	43	43	43	43	43	43	43	43	43	43	43	43
	Predicted Cumulative Wind Turbine Noise L_{A90}	-	-	-	-	-	34.7	35.6	35.8	35.8	35.8	35.8	35.8
	Exceedance Level	-	-	-	-	-	-8.3	-7.4	-7.2	-7.2	-7.2	-7.2	-7.2
NAL3 (H97)	Total WEDG Noise Limit, L_{A90}	43	43	43	43	43	43	43	43	43	43	43	43
	Predicted Cumulative Wind Turbine Noise L_{A90}	-	-	-	-	-	31.3	32.6	32.8	32.9	32.9	32.9	32.9
	Exceedance Level	-	-	-	-	-	-11.7	-10.4	-10.2	-10.1	-10.1	-10.1	-10.1
NAL4 (H17)	Total WEDG Noise Limit, L_{A90}	43	43	43	43	43	43	43	43	43	43	43	43
	Predicted Cumulative Wind Turbine Noise L_{A90}	-	-	-	-	-	33.1	34.5	34.8	34.8	34.8	34.8	34.8
	Exceedance Level	-	-	-	-	-	-9.9	-8.5	-8.2	-8.2	-8.2	-8.2	-8.2
NAL5 (H16)	Total WEDG Noise Limit, L_{A90}	43	43	43	43	43	43	43	43	43	43	43	43
	Predicted Cumulative Wind Turbine Noise L_{A90}	-	-	-	-	-	34.6	36.5	37	37.2	37.2	37.2	37.2
	Exceedance Level	-	-	-	-	-	-8.4	-6.5	-6	-5.8	-5.8	-5.8	-5.8
NAL6 (H73)	Total WEDG Noise Limit, L_{A90}	43	43	43	43	43	43	43	43	43	43	43	43
	Predicted Cumulative Wind Turbine Noise L_{A90}	-	-	-	-	-	33	35	35.5	35.6	35.6	35.6	35.6
	Exceedance Level	-	-	-	-	-	-10	-8	-7.5	-7.4	-7.4	-7.4	-7.4

Location		Wind Speed (ms^{-1}) as standardised to 10 m height											
		1	2	3	4	5	6	7	8	9	10	11	12
NAL7 (H1)	Total WEDG Noise Limit, L_{A90}	45	45	45	45	45	45	45	45	45	45	45	45
	Predicted Cumulative Wind Turbine Noise L_{A90}	-	-	-	-	-	44.4	47	47.7	47.9	47.9	47.9	47.9
	Exceedance Level	-	-	-	-	-	-0.6	**2***	**2.7***	**2.9***	**2.9***	**2.9***	**2.9***
NAL8 (H2)	Total WEDG Noise Limit, L_{A90}	45	45	45	45	45	45	45	45	45	45	45	45
	Predicted Cumulative Wind Turbine Noise L_{A90}	-	-	-	-	-	43.2	45.7	46.4	46.6	46.6	46.6	46.6
	Exceedance Level	-	-	-	-	-	-1.8	**0.7***	**1.4***	**1.6***	**1.6***	**1.6***	**1.6***
NAL9 (H4)	Total WEDG Noise Limit, L_{A90}	45	45	45	45	45	45	45	45	45	45	45	45
	Predicted Cumulative Wind Turbine Noise L_{A90}	-	-	-	-	-	43.1	45.6	46.3	46.5	46.5	46.5	46.5
	Exceedance Level	-	-	-	-	-	-1.9	**0.6***	**1.3***	**1.5***	**1.5***	**1.5***	**1.5***
NAL10 (H3)	Total WEDG Noise Limit, L_{A90}	45	45	45	45	45	45	45	45	45	45	45	45
	Predicted Cumulative Wind Turbine Noise L_{A90}	-	-	-	-	-	41.4	43.4	43.9	44.1	44.1	44.1	44.1
	Exceedance Level	-	-	-	-	-	-3.6	-1.6	-1.1	-0.9	-0.9	-0.9	-0.9
NAL11 (H6)	Total WEDG Noise Limit, L_{A90}	43	43	43	43	43	43	43	43	43	43.9	43.9	43.9
	Predicted Cumulative Wind Turbine Noise L_{A90}	-	-	-	-	-	37.9	40	40.7	40.9	40.9	40.9	40.9
	Exceedance Level	-	-	-	-	-	-5.1	-3	-2.3	-2.1	-3	-3	-3
NAL12 (H10)	Total WEDG Noise Limit, L_{A90}	43	43	43	43	43	43	43	43	43	43.9	43.9	43.9
	Predicted Cumulative Wind Turbine Noise L_{A90}	-	-	-	-	-	37.7	39.9	40.6	40.7	40.7	40.7	40.7
	Exceedance Level	-	-	-	-	-	-5.3	-3.1	-2.4	-2.3	-3.2	-3.2	-3.2

Location		Wind Speed (ms^{-1}) as standardised to 10 m height											
		1	2	3	4	5	6	7	8	9	10	11	12
NAL13 (H7)	Total WEDG Noise Limit, L_{A90}	43	43	43	43	43	43	43	43	43	43.9	43.9	43.9
	Predicted Cumulative Wind Turbine Noise L_{A90}	-	-	-	-	-	37.3	38.7	39.1	39.2	39.2	39.2	39.2
	Exceedance Level	-	-	-	-	-	-5.7	-4.3	-3.9	-3.8	-4.7	-4.7	-4.7
NAL14 (H8)	Total WEDG Noise Limit, L_{A90}	43	43	43	43	43	43	43	43	43	43.9	43.9	43.9
	Predicted Cumulative Wind Turbine Noise L_{A90}	-	-	-	-	-	37.3	38.8	39.1	39.2	39.2	39.2	39.2
	Exceedance Level	-	-	-	-	-	-5.7	-4.2	-3.9	-3.8	-4.7	-4.7	-4.7

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 6 ms^{-1} therefore no cumulative predictions are included for wind speeds less than 6 ms^{-1}.
*cumulative noise exceeds the noise limits but this is due to the contribution of the existing wind farms in the area as detailed in the section above. At these wind speeds predicted noise from the Proposed Development will be at least 10 dB below the Total WEDG Noise Limits and will therefore have a negligible additional contribution. To ensure noise from the Proposed Development is at least 10 dB below certain turbines will need to be operated in low noise mode for certain wind speeds and wind directions.

Table 6.7 Comparison of predicted noise from Kilgarvan Original to Proposed Development

Location		Wind Speed (ms^{-1}) as standardised to 10 m height											
		1	2	3	4	5	6	7	8	9	10	11	12
NAL1 (H14)	Predicted Kilgarvan Repowering Wind Turbine Noise, L_{A90}	-	-	20.6	22.2	27	31.4	32.2	32.2	32.2	32.2	32.2	32.2
	Predicted Kilgarvan Original Wind Turbine Noise L_{A90}	-	-	-	-	30.7	33.7	34.9	35.5	35.5	35.5	35.5	35.5
	Difference	-	-	-	-	-3.7	-2.3	-2.7	-3.3	-3.3	-3.3	-3.3	-3.3
NAL2 (H9)	Predicted Kilgarvan Repowering Wind Turbine Noise, L_{A90}	-	-	23.4	25	29.8	34.2	35	35	35	35	35	35
	Predicted Kilgarvan Original Wind Turbine Noise L_{A90}	-	-	-	-	31.7	34.8	36.1	36.7	36.7	36.7	36.7	36.7
	Difference	-	-	-	-	-1.9	-0.6	-1.1	-1.7	-1.7	-1.7	-1.7	-1.7
NAL3 (H97)	Predicted Kilgarvan Repowering Wind Turbine Noise, L_{A90}	-	-	17.8	19.4	24.3	28.6	29.4	29.4	29.4	29.4	29.4	29.4
	Predicted Kilgarvan Original Wind Turbine Noise L_{A90}	-	-	-	-	25.6	28.8	30.4	31.2	31.2	31.2	31.2	31.2
	Difference	-	-	-	-	-1.3	-0.2	-1	-1.8	-1.8	-1.8	-1.8	-1.8
NAL4 (H17)	Predicted Kilgarvan Repowering Wind Turbine Noise, L_{A90}	-	-	19.4	21	25.8	30.2	31	31	31	31	31	31
	Predicted Kilgarvan Original Wind Turbine Noise L_{A90}	-	-	-	-	27.7	30.9	32.7	33.6	33.6	33.6	33.6	33.6
	Difference	-	-	-	-	-1.9	-0.7	-1.7	-2.6	-2.6	-2.6	-2.6	-2.6
NAL5 (H16)	Predicted Kilgarvan Repowering Wind Turbine Noise, L_{A90}	-	-	19.9	21.5	26.3	30.7	31.5	31.5	31.5	31.5	31.5	31.5
	Predicted Kilgarvan Original Wind Turbine Noise L_{A90}	-	-	-	-	28.2	31.4	33.3	34.1	34.2	34.2	34.2	34.2
	Difference	-	-	-	-	-1.9	-0.7	-1.8	-2.6	-2.7	-2.7	-2.7	-2.7
NAL6 (H73	Predicted Kilgarvan Repowering Wind Turbine Noise, L_{A90}	-	-	16.4	18	22.9	27.2	28	28	28	28	28	28

Location		Wind Speed (ms^{-1}) as standardised to 10 m height											
		1	2	3	4	5	6	7	8	9	10	11	12
	Predicted Kilgarvan Original Wind Turbine Noise L_{A90}	-	-	-	-	25.9	29.2	31	31.8	31.9	31.9	31.9	31.9
	Difference	-	-	-	-	-3	-2	-3	-3.8	-3.9	-3.9	-3.9	-3.9
NAL7 (H1)	Predicted Kilgarvan Repowering Wind Turbine Noise, L_{A90}	-	-	28	29.6	34.4	35	35	35	35	35	38.1	39.6
	Predicted Kilgarvan Original Wind Turbine Noise L_{A90}	-	-	-	-	37.7	40.9	42.6	43.5	43.5	43.5	43.5	43.5
	Difference	-	-	-	-	-3.3	-5.9	-7.6	-8.5	-8.5	-8.5	-5.4	-3.9
NAL8 (H2)	Predicted Kilgarvan Repowering Wind Turbine Noise, L_{A90}	-	-	28	29.6	34.4	35	35	35	35	35	38.1	39.6
	Predicted Kilgarvan Original Wind Turbine Noise L_{A90}	-	-	-	-	37.8	41	42.7	43.6	43.6	43.6	43.6	43.6
	Difference	-	-	-	-	-3.4	-6	-7.7	-8.6	-8.6	-8.6	-5.5	-4
NAL9 (H4)	Predicted Kilgarvan Repowering Wind Turbine Noise, L_{A90}	-	-	27.7	29.3	34.1	35	35	35	35	35	38.1	39.3
	Predicted Kilgarvan Original Wind Turbine Noise L_{A90}	-	-	-	-	37.5	40.7	42.4	43.3	43.4	43.4	43.4	43.4
	Difference	-	-	-	-	-3.4	-5.7	-7.4	-8.3	-8.4	-8.4	-5.3	-4.1
NAL10 (H3)	Predicted Kilgarvan Repowering Wind Turbine Noise, L_{A90}	-	-	29.6	31.2	36	40.4	35	35	35	35	38.1	41.2
	Predicted Kilgarvan Original Wind Turbine Noise L_{A90}	-	-	-	-	38.9	42.1	43.8	44.6	44.7	44.7	44.7	44.7
	Difference	-	-	-	-	-2.9	-1.7	-8.8	-9.6	-9.7	-9.7	-6.6	-3.5
NAL11 (H6)	Predicted Kilgarvan Repowering Wind Turbine Noise, L_{A90}	-	-	24.4	26	30.8	35.2	36	35	35	35	36	36
	Predicted Kilgarvan Original Wind Turbine Noise L_{A90}	-	-	-	-	35.1	38.1	39.4	40	40.1	40.1	40.1	40.1
	Difference	-	-	-	-	-4.3	-2.9	-3.4	-5	-5.1	-5.1	-4.1	-4.1

Location		Wind Speed (ms^{-1}) as standardised to 10 m height											
		1	2	3	4	5	6	7	8	9	10	11	12
NAL12 (H10)	Predicted Kilgarvan Repowering Wind Turbine Noise, L_{A90}	-	-	23.5	25.2	30	34.3	35.1	35	35	35	35.1	35.1
	Predicted Kilgarvan Original Wind Turbine Noise L_{A90}	-	-	-	-	34.4	37.4	38.7	39.3	39.3	39.3	39.3	39.3
	Difference	-	-	-	-	-4.4	-3.1	-3.6	-4.3	-4.3	-4.3	-4.2	-4.2
NAL13 (H7)	Predicted Kilgarvan Repowering Wind Turbine Noise, L_{A90}	-	-	24.7	26.3	31.1	35.5	36.3	36.3	36.3	36.3	36.3	36.3
	Predicted Kilgarvan Original Wind Turbine Noise L_{A90}	-	-	-	-	38.2	41.2	42.3	42.9	42.9	42.9	42.9	42.9
	Difference	-	-	-	-	-7.1	-5.7	-6	-6.6	-6.6	-6.6	-6.6	-6.6
NAL14 (H8)	Predicted Kilgarvan Repowering Wind Turbine Noise, L_{A90}	-	-	24.8	26.4	31.2	35.6	36.3	36.3	36.3	36.3	36.3	36.3
	Predicted Kilgarvan Original Wind Turbine Noise L_{A90}	-	-	-	-	38.3	41.4	42.5	43	43	43	43	43
	Difference	-	-	-	-	-7.1	-5.8	-6.2	-6.7	-6.7	-6.7	-6.7	-6.7

6.4.9 The predictions and assessment of noise for all identified NSRs is included in Annex 6.

6.4.10 A series of graphs to show the predicted wind turbine noise from the Proposed Development compared to WEDG Noise Limits are included as Figures A1.3a - A1.3n (Annex 1).

6.5 Stage 3 - Derivation of Site Specific Noise Limits

6.5.1 In order to protect residential amenity, the recommendations are that cumulatively, all wind farms (including the Proposed Development) operate within the Total WEDG Noise Limits.

6.5.2 To allow this to occur a set of Site Specific Noise limits for the Proposed Development are required and these have been derived for each NAL. Table 6.88 summarises the approach adopted at each NAL to derive the Site Specific Noise Limits.

6.5.3 The Site Specific Noise Limits have been derived to take account of the proportion of the noise limit that has been allocated to, or could theoretically be used by, other wind farm developments (operational or consented) in proximity to the Proposed Development. Extracts of the planning permissions are included within Annex 2 and are summarised below.

6.5.4 The cumulative noise model assumes that the proposed Gortyrahilly and Inchamore turbines are consented and built, and that the existing operational schemes continue to operate for the lifetime of their consents.

Table 6.8 Limit Derivation Strategy

NAL	Limit Derivation Strategy
NALs 1-4	The predicted likely cumulative noise levels from the other wind farm developments were found to be more than 10 dB below the Total WEDG Noise Limits and as such the entire noise limit has been allocated to the Proposed Development.
NALs 5-6 and 13-14	There is significant headroom between the cumulative noise predictions from the other wind farm developments and the Total WEDG Noise Limit. A 2 dB buffer was added to the turbine noise predictions from the other wind farm developments. The resulting 'cautious' predictions of cumulative wind turbine noise from the other wind farms were then logarithmically subtracted from the Total WEDG Noise Limits to determine the Site Specific Noise Limits for the Proposed Development.
NALs 7-9	The cumulative noise predictions from the existing wind farms exceed the Total WEDG Noise Limits and as such the Site Specific Noise Limits have been set 10 dB below such that the Proposed Development would have a negligible impact.
NALs 10-12	There is not significant headroom between the cumulative noise predictions from the other wind farm developments and the Total WEDG Noise Limit therefore the Site Specific Noise Limits for the Proposed Development have been set 10 dB below the Total WEDG Noise Limits.

6.5.5 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.

6.5.6 As summarised in Table 6.88 above, it is proposed that the full WEDG Noise Limits be allocated to the Proposed Development at a number of NALs, as the cumulative predictions from other wind farm developments do not need a portion of the limit (NALs 1-4). For NALs 5-6 and 13-14, apportionment was required in order to allow the Proposed Development and the other wind farm developments to co-exist within the Total WEDG Noise Limits. At all other NALs the Site Specific Noise Limits have been set at 10 dB below the Total WEDG Noise Limits as the existing wind farms are using, or could theoretically use, the Total WEDG Noise Limit. By setting the limit 10 dB below this ensures that the Proposed Development will use a ngeligable proportion of the noise limit.

6.5.7 **Error! Reference source not found.** and **Error! Reference source not found.** show the daytime and night time Site Specific Noise Limits, noise predictions for the Proposed Development and the exceedance level. A negative exceedance demonstrates compliance with the Site Specific Noise Limits.

6.5.8 **Error! Reference source not found.** and **Error! Reference source not found.** show that the predicted wind turbine noise immission levels meet the Site Specific Noise Limits under all conditions and at all locations for both the daytime and night time periods at NALs 1-6 and 13-14.

6.5.9 In order to meet the Site Specific Noise Limits at NAL7-12 certain wind turbines will need to be operated in low noise mode for a limited range of wind speeds and wind directions when considering the candidate wind turbines modelled in the noise assessment.

6.5.10 A series of graphs to show the predicted wind turbine noise from the Proposed Development compared to the Site Specific Noise Limits are included as Figures A1.5a - A1.5n (Annex 1).

6.5.11 In the event that planning permission is granted for the Proposed Development it would be appropriate to set noise limits equal to the Site Specific Noise Limits presented in **Error! Reference source not found.** and **Error! Reference source not found.**.

Table 6.9 Site Specific Noise Compliance Table – Daytime

Location		Wind Speed (ms^{-1}) as standardised to 10 m height											
		1	2	3	4	5	6	7	8	9	10	11	12
NAL1 (H14)	Site Specific Noise Limit	40.0	40.0	40.0	40.0	40.0	45.0	45.0	45.0	45.0	45.4	48.5	51.9
	Predicted Wind Turbine Noise L_{A90}	-	-	20.6	22.2	27.0	31.4	32.2	32.2	32.2	32.2	32.2	32.2
	Exceedance Level	-	-	-19.4	-17.8	-13.0	-13.6	-12.8	-12.8	-12.8	-13.2	-16.3	-19.7
NAL2 (H9)	Site Specific Noise Limit	40.0	40.0	40.0	40.0	40.0	45.0	45.0	45.0	45.0	45.0	47.0	50.8
	Predicted Wind Turbine Noise L_{A90}	-	-	23.4	25.0	29.8	34.2	35.0	35.0	35.0	35.0	35.0	35.0
	Exceedance Level	-	-	-16.6	-15.0	-10.2	-10.8	-10.0	-10.0	-10.0	-10.0	-12.0	-15.8
NAL3 (H97)	Site Specific Noise Limit	40.0	40.0	40.0	40.0	40.0	45.0	45.0	45.0	45.0	45.0	47.0	50.8
	Predicted Wind Turbine Noise L_{A90}	-	-	17.8	19.4	24.3	28.6	29.4	29.4	29.4	29.4	29.4	29.4
	Exceedance Level	-	-	-22.2	-20.6	-15.7	-16.4	-15.6	-15.6	-15.6	-15.6	-17.6	-21.4
NAL4 (H17)	Site Specific Noise Limit	40.0	40.0	40.0	40.0	40.0	45.0	45.0	45.0	45.0	45.0	47.0	50.8
	Predicted Wind Turbine Noise L_{A90}	-	-	19.4	21.0	25.8	30.2	31.0	31.0	31.0	31.0	31.0	31.0
	Exceedance Level	-	-	-20.6	-19.0	-14.2	-14.8	-14.0	-14.0	-14.0	-14.0	-16.0	-19.8
NAL5 (H16)	Site Specific Noise Limit	40.0	40.0	40.0	40.0	40.0	45.0	44.3	44.1	44.1	44.1	47.0	50.8
	Predicted Wind Turbine Noise L_{A90}	-	-	19.9	21.5	26.3	30.7	31.5	31.5	31.5	31.5	31.5	31.5
	Exceedance Level	-	-	-20.1	-18.5	-13.7	-14.3	-12.8	-12.6	-12.6	-12.6	-15.5	-19.3
NAL6 (H73)	Site Specific Noise Limit	40.0	40.0	40.0	40.0	40.0	45.0	45.0	45.0	45.0	45.0	47.0	50.8
	Predicted Wind Turbine Noise L_{A90}	-	-	16.4	18.0	22.9	27.2	28.0	28.0	28.0	28.0	28.0	28.0
	Exceedance Level	-	-	-23.6	-22.0	-17.1	-17.8	-17.0	-17.0	-17.0	-17.0	-19.0	-22.8

Location		Wind Speed (ms^{-1}) as standardised to 10 m height											
		1	2	3	4	5	6	7	8	9	10	11	12
NAL7 (H1)	Site Specific Noise Limit	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0	38.1	50.3
	Predicted Wind Turbine Noise L_{A90}	-	-	28.0	29.6	34.4	35*	35*	35*	35*	35*	38.1*	39.6
	Exceedance Level	-	-	-7.0	-5.4	-0.6	0.0	0.0	0.0	0.0	0.0	0.0	-10.7
NAL8 (H2)	Site Specific Noise Limit	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0	38.1	51.2
	Predicted Wind Turbine Noise L_{A90}	-	-	28.0	29.6	34.4	35*	35*	35*	35*	35*	38.1*	39.6
	Exceedance Level	-	-	-7.0	-5.4	-0.6	0.0	0.0	0.0	0.0	0.0	0.0	-11.6
NAL9 (H4)	Site Specific Noise Limit	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0	38.1	51.2
	Predicted Wind Turbine Noise L_{A90}	-	-	27.7	29.3	34.1	35*	35*	35*	35*	35*	38.1*	39.3
	Exceedance Level	-	-	-7.3	-5.7	-0.9	0.0	0.0	0.0	0.0	0.0	0.0	-11.9
NAL10 (H3)	Site Specific Noise Limit	42.3	42.3	42.3	42.3	42.3	42.3	35.0	35.0	35.0	35.0	38.1	52.2
	Predicted Wind Turbine Noise L_{A90}	-	-	29.6	31.2	36.0	40.4	35*	35*	35*	35*	38.1*	41.2
	Exceedance Level	-	-	-12.7	-11.1	-6.3	-1.9	0.0	0.0	0.0	0.0	0.0	-11.0
NAL11 (H6)	Site Specific Noise Limit	38.7	38.7	38.7	38.7	38.7	43.7	42.5	35.0	35.0	35.0	46.8	53.0
	Predicted Wind Turbine Noise L_{A90}	-	-	24.4	26.0	30.8	35.2	36.0	35*	35*	35*	36.0	36.0
	Exceedance Level	-	-	-14.3	-12.7	-7.9	-8.5	-6.5	0.0	0.0	0.0	-10.8	-17.0
NAL12 (H10)	Site Specific Noise Limit	38.7	38.7	38.7	38.7	38.7	43.7	42.6	35.0	35.0	35.0	46.8	53.0
	Predicted Wind Turbine Noise L_{A90}	-	-	23.5	25.2	30.0	34.3	35.1	35*	35*	35*	35.1	35.1
	Exceedance Level	-	-	-15.2	-13.5	-8.7	-9.4	-7.5	0.0	0.0	0.0	-11.7	-17.9

Location		Wind Speed (ms^{-1}) as standardised to 10 m height											
		1	2	3	4	5	6	7	8	9	10	11	12
NAL13 (H7)	Site Specific Noise Limit	40.0	40.0	40.0	40.0	40.0	45.0	44.1	43.9	43.9	43.9	48.1	53.0
	Predicted Wind Turbine Noise L_{A90}	-	-	24.7	26.3	31.1	35.5	36.3	36.3	36.3	36.3	36.3	36.3
	Exceedance Level	-	-	-15.3	-13.7	-8.9	-9.5	-7.8	-7.6	-7.6	-7.6	-11.8	-16.7
NAL14 (H8)	Site Specific Noise Limit	40.0	40.0	40.0	40.0	40.0	45.0	44.2	44.0	43.9	43.9	48.1	53.0
	Predicted Wind Turbine Noise L_{A90}	-	-	24.8	26.4	31.2	35.6	36.3	36.3	36.3	36.3	36.3	36.3
	Exceedance Level	-	-	-15.2	-13.6	-8.8	-9.4	-7.9	-7.7	-7.6	-7.6	-11.8	-16.7
**Predicted levels assume mode management is applied to meet the Site Specific Noise Limit. This would only apply for certain wind directions.*													

Table 6.10 Site Specific Noise 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	11	12
NAL1 (H14)	Site Specific Noise Limit	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	44.1	44.1	44.1
	Predicted Wind Turbine Noise L_{A90}	-	-	20.6	22.2	27.0	31.4	32.2	32.2	32.2	32.2	32.2	32.2
	Exceedance Level	-	-	-22.4	-20.8	-16.0	-11.6	-10.8	-10.8	-10.8	-11.9	-11.9	-11.9
NAL2 (H9)	Site Specific Noise Limit	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0
	Predicted Wind Turbine Noise L_{A90}	-	-	23.4	25.0	29.8	34.2	35.0	35.0	35.0	35.0	35.0	35.0
	Exceedance Level	-	-	-19.6	-18.0	-13.2	-8.8	-8.0	-8.0	-8.0	-8.0	-8.0	-8.0
NAL3 (H97)	Site Specific Noise Limit	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0
	Predicted Wind Turbine Noise L_{A90}	-	-	17.8	19.4	24.3	28.6	29.4	29.4	29.4	29.4	29.4	29.4
	Exceedance Level	-	-	-25.2	-23.6	-18.7	-14.4	-13.6	-13.6	-13.6	-13.6	-13.6	-13.6
NAL4 (H17)	Site Specific Noise Limit	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0
	Predicted Wind Turbine Noise L_{A90}	-	-	19.4	21.0	25.8	30.2	31.0	31.0	31.0	31.0	31.0	31.0
	Exceedance Level	-	-	-23.6	-22.0	-17.2	-12.8	-12.0	-12.0	-12.0	-12.0	-12.0	-12.0
NAL5 (H16)	Site Specific Noise Limit	43.0	43.0	43.0	43.0	43.0	43.0	41.7	41.5	41.4	41.4	41.4	41.4
	Predicted Wind Turbine Noise L_{A90}	-	-	19.9	21.5	26.3	30.7	31.5	31.5	31.5	31.5	31.5	31.5
	Exceedance Level	-	-	-23.1	-21.5	-16.7	-12.3	-10.2	-10.0	-9.9	-9.9	-9.9	-9.9
NAL6 (H73)	Site Specific Noise Limit	43.0	43.0	43.0	43.0	43.0	43.0	42.0	41.8	41.8	41.8	41.8	41.8
	Predicted Wind Turbine Noise L_{A90}	-	-	16.4	18.0	22.9	27.2	28.0	28.0	28.0	28.0	28.0	28.0
	Exceedance Level	-	-	-26.6	-25.0	-20.1	-15.8	-14.0	-13.8	-13.8	-13.8	-13.8	-13.8

Location		Wind Speed (ms^{-1}) as standardised to 10 m height											
		1	2	3	4	5	6	7	8	9	10	11	12
NAL7 (H1)	Site Specific Noise Limit	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0
	Predicted Wind Turbine Noise L_{A90}	-	-	28.0	29.6	34.4	35*	35*	35*	35*	35*	35*	35*
	Exceedance Level	-	-	-7.0	-5.4	-0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NAL8 (H2)	Site Specific Noise Limit	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0
	Predicted Wind Turbine Noise L_{A90}	-	-	28.0	29.6	34.4	35*	35*	35*	35*	35*	35*	35*
	Exceedance Level	-	-	-7.0	-5.4	-0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NAL9 (H4)	Site Specific Noise Limit	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0	35.0
	Predicted Wind Turbine Noise L_{A90}	-	-	27.7	29.3	34.1	35*	35*	35*	35*	35*	35*	35*
	Exceedance Level	-	-	-7.3	-5.7	-0.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NAL10 (H3)	Site Specific Noise Limit	42.3	42.3	42.3	42.3	42.3	42.3	35.0	35.0	35.0	35.0	35.0	35.0
	Predicted Wind Turbine Noise L_{A90}	-	-	29.6	31.2	36.0	40.4	35*	35*	35*	35*	35*	35*
	Exceedance Level	-	-	-12.7	-11.1	-6.3	-1.9	0.0	0.0	0.0	0.0	0.0	0.0
NAL11 (H6)	Site Specific Noise Limit	40.8	40.8	40.8	40.8	40.8	40.8	33.0	33.0	33.0	33.9	33.9	33.9
	Predicted Wind Turbine Noise L_{A90}	-	-	24.4	26.0	30.8	35.2	33*	33*	33*	33.9*	33.9*	33.9*
	Exceedance Level	-	-	-16.4	-14.8	-10.0	-5.6	0.0	0.0	0.0	0.0	0.0	0.0
NAL12 (H10)	Site Specific Noise Limit	40.8	40.8	40.8	40.8	40.8	40.8	33.0	33.0	33.0	33.9	33.9	33.9
	Predicted Wind Turbine Noise L_{A90}	-	-	23.5	25.2	30.0	34.3	33*	33*	33*	33.9*	33.9*	33.9*
	Exceedance Level	-	-	-17.3	-15.6	-10.8	-6.5	0.0	0.0	0.0	0.0	0.0	0.0

Location		Wind Speed (ms^{-1}) as standardised to 10 m height											
		1	2	3	4	5	6	7	8	9	10	11	12
NAL13 (H7)	Site Specific Noise Limit	42.2	42.2	42.2	42.2	42.2	42.2	41.5	41.2	41.1	42.4	42.4	42.4
	Predicted Wind Turbine Noise L_{A90}	-	-	24.7	26.3	31.1	35.5	36.3	36.3	36.3	36.3	36.3	36.3
	Exceedance Level	-	-	-17.5	-15.9	-11.1	-6.7	-5.2	-4.9	-4.8	-6.1	-6.1	-6.1
NAL14 (H8)	Site Specific Noise Limit	42.2	42.2	42.2	42.2	42.2	42.2	41.6	41.2	41.2	42.5	42.5	42.5
	Predicted Wind Turbine Noise L_{A90}	-	-	24.8	26.4	31.2	35.6	36.3	36.3	36.3	36.3	36.3	36.3
	Exceedance Level	-	-	-17.4	-15.8	-11.0	-6.6	-5.3	-4.9	-4.9	-6.2	-6.2	-6.2
**Predicted levels assume mode management is applied to meet the Site Specific Noise Limit. This would only apply for certain wind directions.*													

7 Summary and Conclusions

7.1.1 This report has assessed the potential impact of operational noise from the Proposed Development on nearby Noise Sensitive Receptors (NSRs) using the guidance contained within the WEDG 2006. Reference was also made to guidance contained in ETSU-R-97 and the IOA GPG to supplement the WEDG 2006.

7.1.2 Background noise monitoring was undertaken by TNEI at or in proximity to five NSRs neighbouring the Proposed Development. Two of the measured background noise datasets were subsequently discarded due to one set of noise monitoring equipment being repeatedly knocked over during the course of the noise survey and the other being adversely affected by a nearby watercourse.

7.1.3 A total of 102 NSRs were identified, of which 14 were chosen as Noise Assessment Locations (NALs). For the assessment locations where no background noise measurements were undertaken, noise data collected at proxy locations considered representative of the background noise environment was used to assess the noise impact at those receptors.

7.1.4 Wind speed data was collected using a LIDAR unit located within the Wind Farm Site. The data collected directly at hub height (125 m), were then standardised to 10 m height in accordance with current good practice.

7.1.5 Analysis of the measured data was undertaken to determine the pre-existing background noise environment and to establish the daytime and night time noise limits for each of the assessment locations. A Total WEDG Noise Limit of 40 dB(A), where background noise levels are below 30 dB, and 45 dB or background noise plus 5 dB, whichever is the greater, where background noise levels are above 30 dB was set for the daytime. A limit of 43 dB(A) or background noise plus 5 dB, whichever is the greater, was used for night time. The higher fixed minimum noise limit of 45 dB was adopted where the occupiers of a receptor are financially involved with the Proposed Development.

7.1.6 There are a number of operational and proposed wind farms in proximity to the Proposed Development. A cumulative assessment was undertaken where predicted levels from the Proposed Development were found to be within 10 dB of the predicted cumulative levels from other wind farm developments in the area. The results show that the predicted cumulative wind farm noise immission levels from all wind farms operating concurrently would meet the Total WEDG Noise Limits at all NALs during both the daytime and night time periods except NALs 7-9. At NALs 7 -9 predicted noise from all other wind farms already exceeds the Total WEDG Noise Limit for certain wind speeds and wind directions during the daytime and night time periods. In practice, the existing turbines may be operated in a low noise mode to ensure compliance but there is no publicly available information to confirm this. Accordingly, the assessment has assumed that the turbines operate in unconstrainted mode as this represents a worst-case scenario. At these NALs the noise immissions from the Proposed Development has been reduced such that they will 10 dB below the Total WEDG Noise Limits to ensure that the Proposed Development has a negligible additional impact. In order to achieve the reduction based on the proposed candidate turbines, certain turbines will need to operate in reduced noise mode for certain wind speeds and wind directions.

7.1.7 Site Specific Noise Limits were derived for the proposed Development. In deriving the Site Specific Noise Limits consideration was given to the noise limit already allocated to or could

theoretically be used by other operational and consented wind farms in proximity to the Proposed Development. Where immissions from other wind farm developments were found to be at least 10 dB below the 'Total WEDG Noise Limit'; then the other wind farm developments would be using a negligible proportion of the limit. As such it is considered appropriate to allocate the entire noise limit to the Proposed Development. This was applicable at NALs 1-4.

7.1.8 At NALs 7-12, where cumulative turbine predictions from the other wind farm developments were found to be within 5 dB or exceeding the Total WEDG Noise Limits, the Site Specific Noise Limits have been set at 10 dB below the Total WEDG Noise Limits to ensure that the Proposed Development has negligible additional impact.

7.1.9 At all other NALs apportionment of the Total WEDG Noise Limits was undertaken (required at NAL5, NAL6, NAL13 and NAL14).

7.1.10 An assessment was undertaken to determine whether the Proposed Development could operate within the Site Specific Noise Limits and it was found that at all receptors wind turbine noise immissions were below the Site Specific Noise Limits when considering the three candidate turbines. In order to meet the Site Specific Noise Limits at NALs 7-12 some turbines would need to operate in a lower noise mode for certain wind directions and wind speeds.

7.1.11 There are a range of potential turbine models that could be installed on the site should consent be granted. The turbine is considered to be representative of the type of turbine that could be installed on the site.

7.1.12 Should the proposal receive planning permission, the final choice of turbine would be subject to a competitive tendering process. The final choice of turbine would, however, would have to meet the noise limits determined and contained within any condition imposed.

8 Glossary of Terms

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 Noise: 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 noise 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 noise level. The $L_{A90,10min}$ is the A-weighted background noise 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: ETSU-R-97 defines the night time hours as 23.00 to 07.00 every day.

Quiet Daytime Hours: ETSU-R-97 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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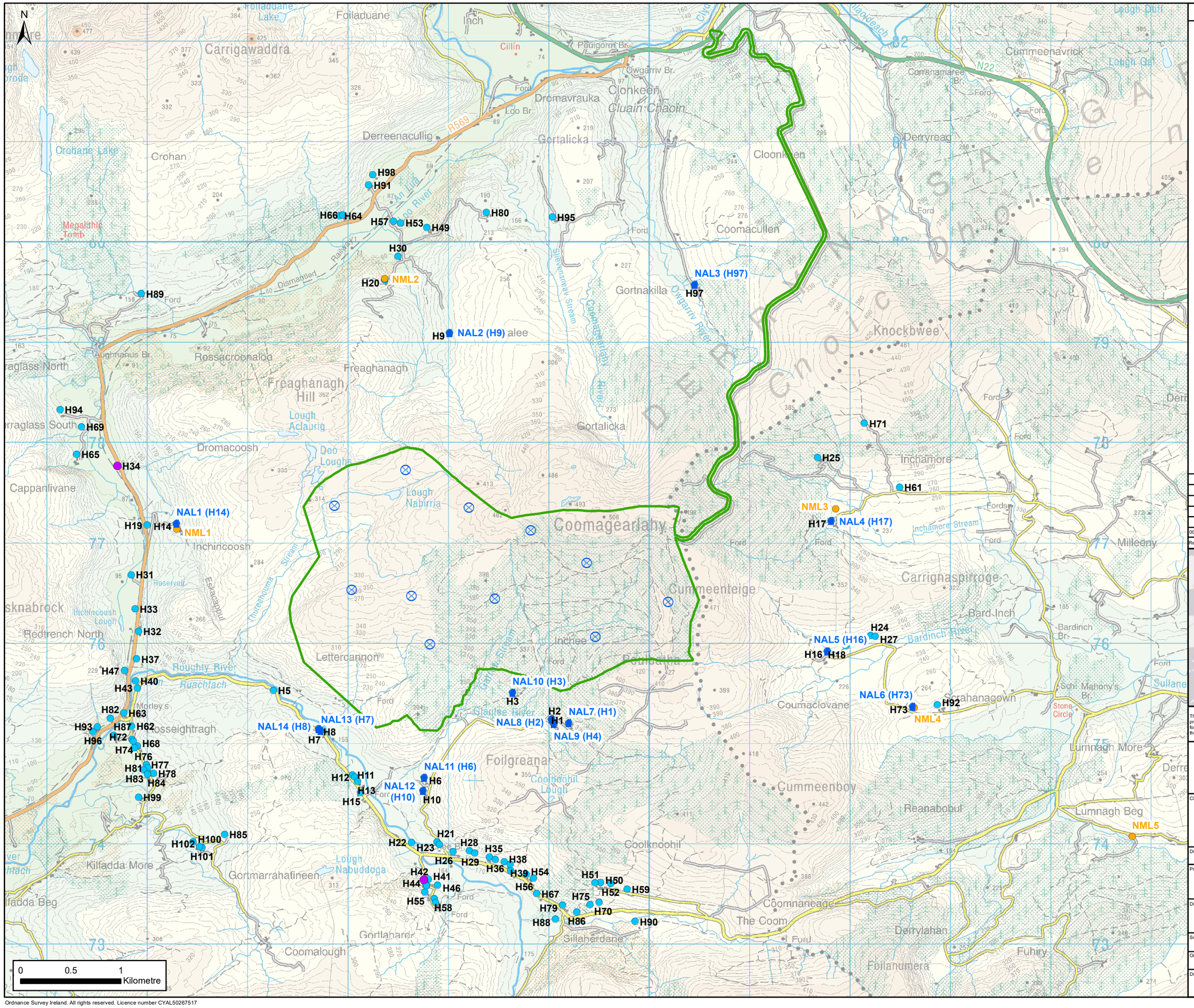
Annex 1 – Figures

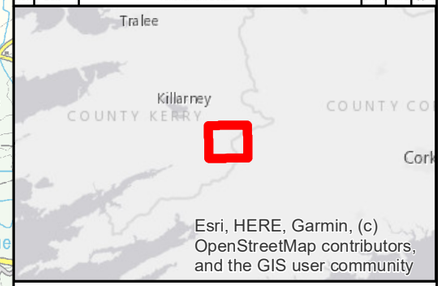


NOTES

Legend

- EIAR Site Boundary
- Proposed Turbine Location
- Noise Monitoring Location (NML)
- Noise Assessment Location (NAL)
- Noise Sensitive Receptor (NSR)
- Derelict Property

Rev.	Date	Amendment Details	Drw'n	Chk'd	App'd
00	15/02/23	First Issue	GC	JB	JB



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Client: Orsted Onshore Ireland Midco Ltd

Drawing Status: FOR PLANNING

Project Title: Proposed Repowering of Kilgarvan Wind Farm

Drawing Title: Figure A1.1 – Noise Monitoring and Assessment Locations

Scale	Designed	Drawn	Checked	Approved
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Original Size	**Date**	**Date**	**Date**	**Date**
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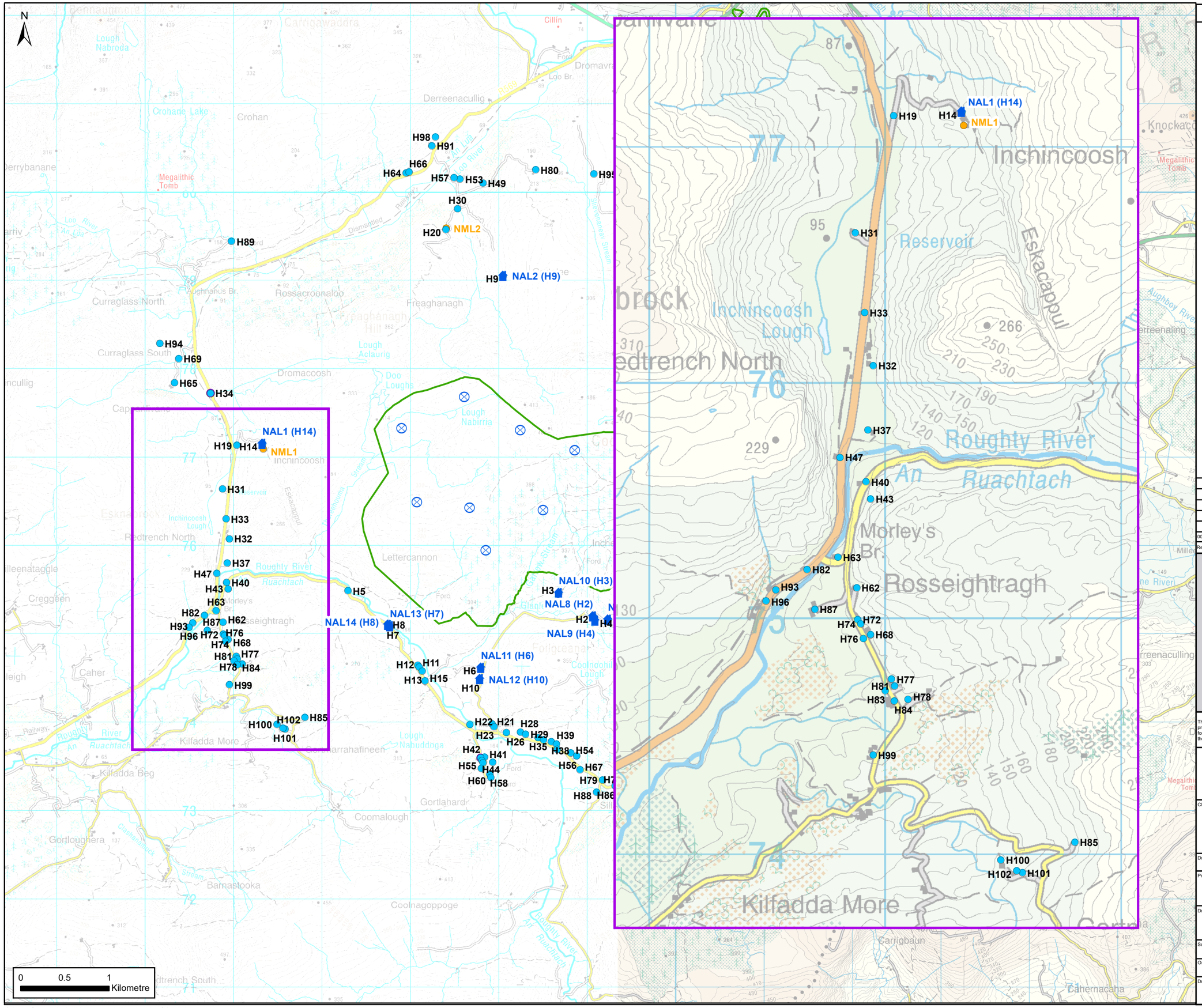
Drawing Number: IE00065-007

Revision: 0



LEGEND

- EIAR Site Boundary
- Proposed Turbine Location
- Noise Assessment Location (NAL)
- Noise Sensitive Receptor (NSR)
- Derelict Property
- Noise Monitoring Location (NML)

Rev.	Date	Amendment Details	Drw'n	Chk'd	App'd
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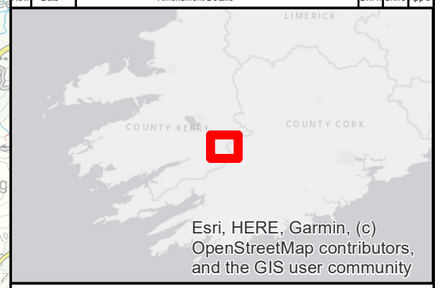

Client: Orsted Onshore Ireland Midco Ltd

Drawing Status: FOR PLANNING

Project Title: Proposed Repowering of Kilgarvan Wind Farm

Drawing Title: Figure A1.1a – Noise Sensitive Receptors (Inset Map A)

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Original Size	**Date**	**Date**	**Date**	**Date**
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Drawing Number: IE00065-012

Revision: 0

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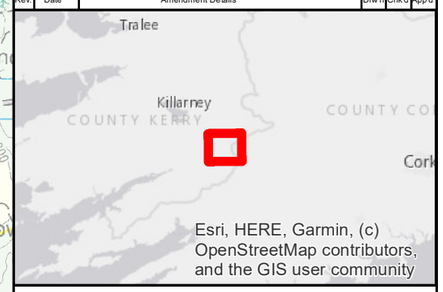
0 0.5 1 Kilometre

NOTES

Legend

- EIAR Site Boundary
- Proposed Turbine Location
- Noise Assessment Location (NAL)
- Noise Sensitive Receptor (NSR)
- Derelict Property
- Noise Monitoring Location (NML)

Rev.	Date	Amendment Details	Drw'n	Chk'd	App'd
00	15/02/23	First Issue	GC	JB	JB



tnei

Client: Orsted Onshore Ireland Midco Ltd

Drawing Status: FOR PLANNING

Project Title: Proposed Repowering of Kilgarvan Wind Farm

Drawing Title: Figure A1.1b – Noise Sensitive Receptors - Inset Map B

Scale	Designed	Drawn	Checked	Approved
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Original Size	**Date**	**Date**	**Date**	**Date**
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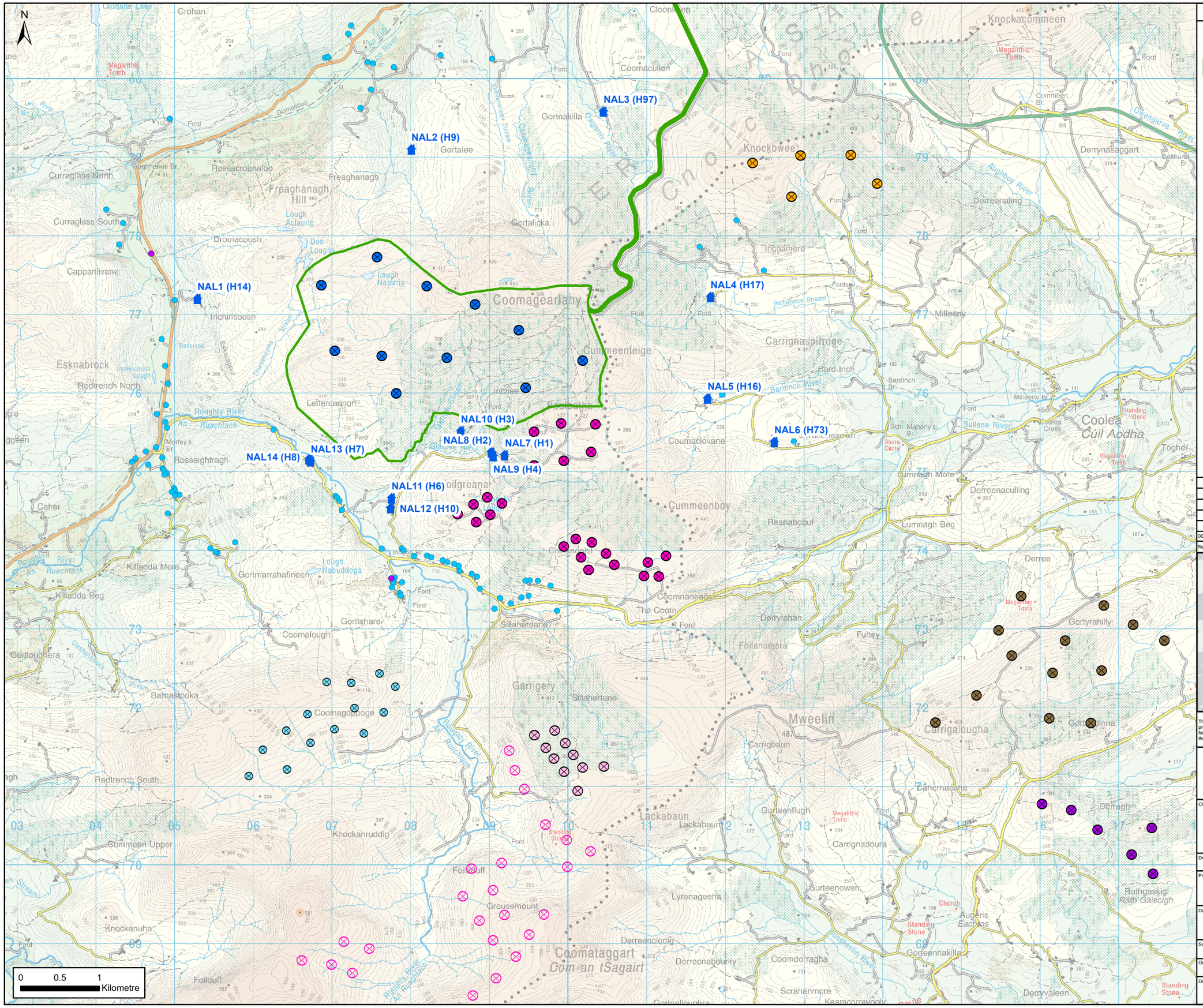
Drawing Number: IE00065-009

Revision: 0



NOTES

Legend

- EIAR Site Boundary
- Noise Assessment Location (NAL)
- Noise Sensitive Receptor (NSR)
- Derelict Property
- Kigarvan
- Barnastooka
- Derragh
- Gortyrahilly
- Grousemount
- Midas
- Sillahertane
- Inchamore

Rev.	Date	Amendment Details	Drw'n	Chk'd	App'd
00	15/02/23	First Issue	GC	JB	JB

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Client: Orsted Onshore Ireland Midco Ltd

Drawing Status: FOR PLANNING

Project Title: Proposed Repowering of Kilgarvan Wind Farm

Drawing Title: Figure A1.1 – Cumulative Turbine Locations

Scale	Designed	Drawn	Checked	Approved
1:45,000	GC	GC	JB	JB
Original Size	**Date**	**Date**	**Date**	**Date**
A3	15/02/2023	15/02/2023	15/02/2023	15/02/2023

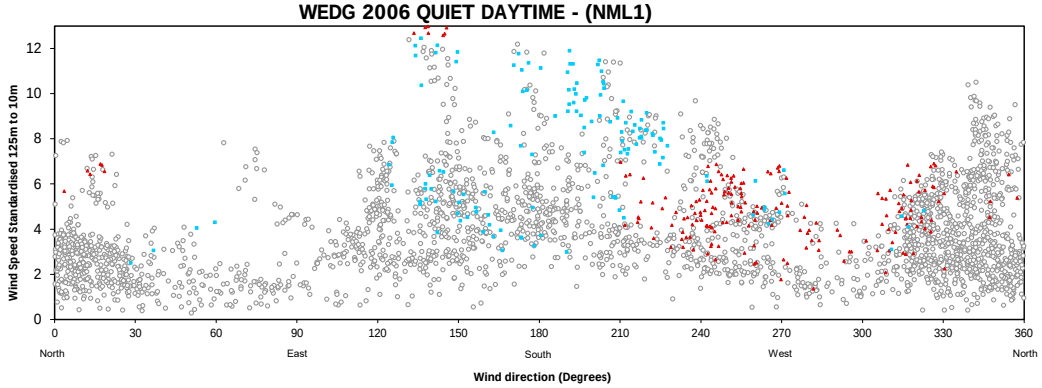
Drawing Number: IE00065-010

Revision: 0

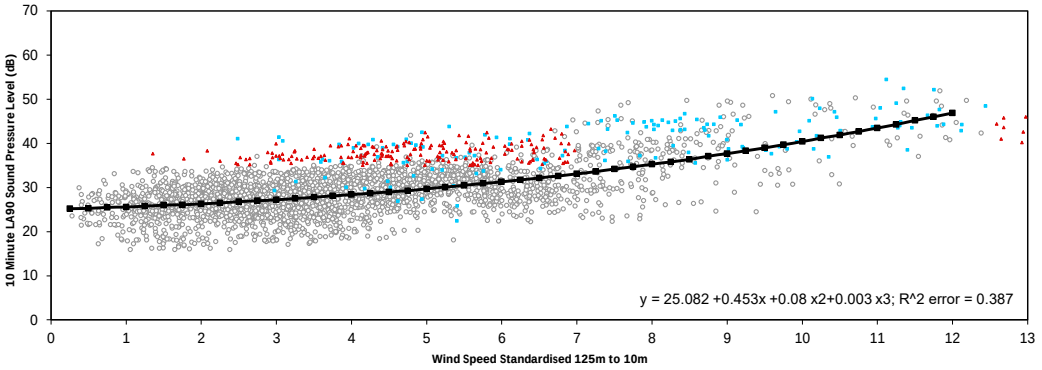
Figures A1.2 – Regression Analysis Graphs

WEDG 2006 QUIET DAYTIME - (NML1)

Wind Conditions Quiet Daytime



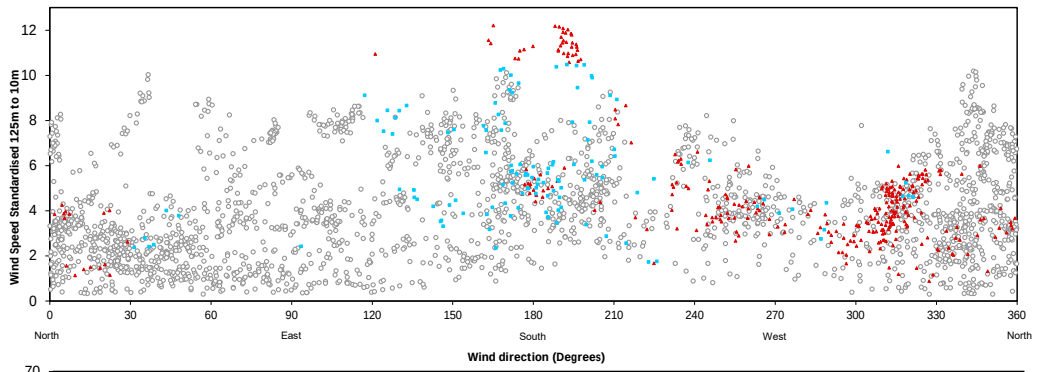
Regression Analysis Quiet Daytime



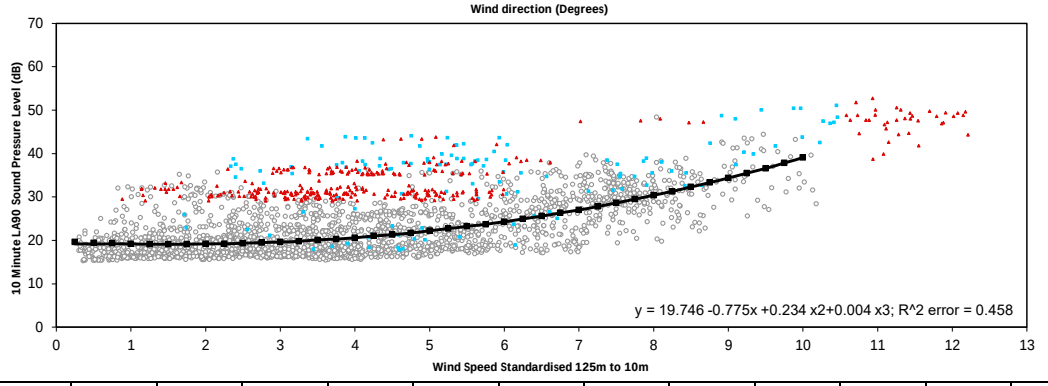
Wind Speed (m/s)	2	3	4	5	6	7	8	9	10	11	12	Total
Number of data points	502	583	446	334	238	156	93	43	23	12	12	2442
Prevailing Background	26.3	27.2	28.4	29.7	31.3	33.1	35.3	37.7	40.4	43.5	46.9	

WEDG 2006 NIGHT-TIME - (NML1)

Wind Conditions Night-Time



Regression Analysis Night-Time



Wind Speed (m/s)	2	3	4	5	6	7	8	9	10	11	12	Total
Number of data points	370	389	410	258	163	207	140	48	14	0	0	1999
Prevailing Background	19.2	19.6	20.6	22.2	24.3	27	30.4	34.4	39.1	-	-	

Legend:

- L_{A90} 10 Minute Measurement Point
- Line of best fit
- Line of best fit flat lined where appropriate(Prevailing Background)
- Excluded Data-Manual exclusion
- Excluded Data-Rain

Project	Proposed Repowering of Kilgarvan Wind Farm
Client	Orsted Onshore Ireland Midco Ltd
Title	Wind Conditions&Regression Analysis
Figure Number	A1.2a
Drawn	CB
Checked	JB
Date	18/04/2023
Document Reference	IE00065-015-Op Noise Models

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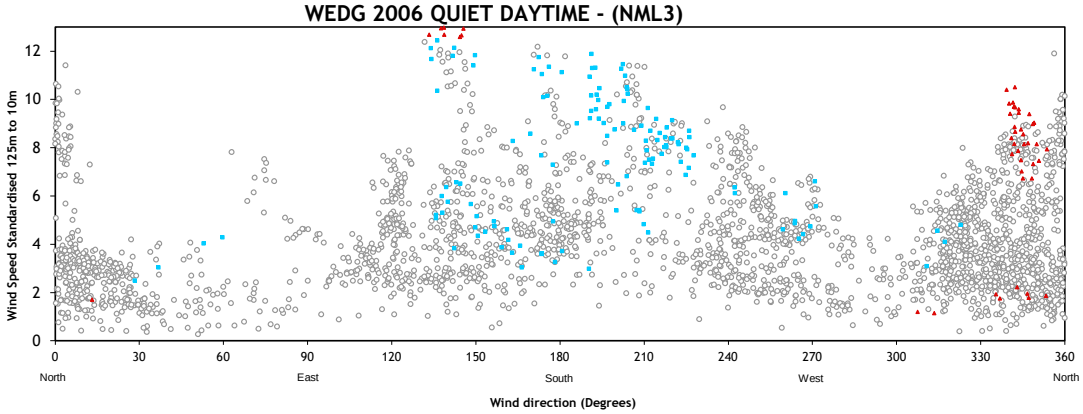
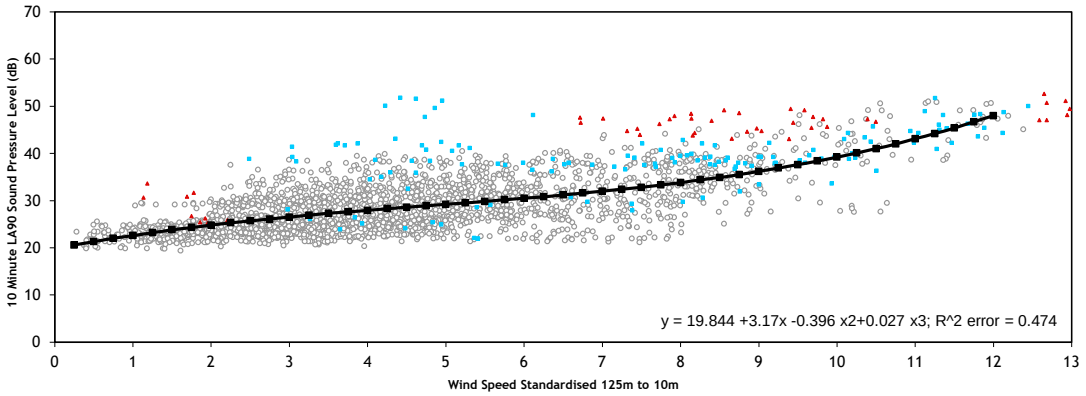
WEDG 2006 QUIET DAYTIME - (NML3)

Wind Conditions Quiet Daytime



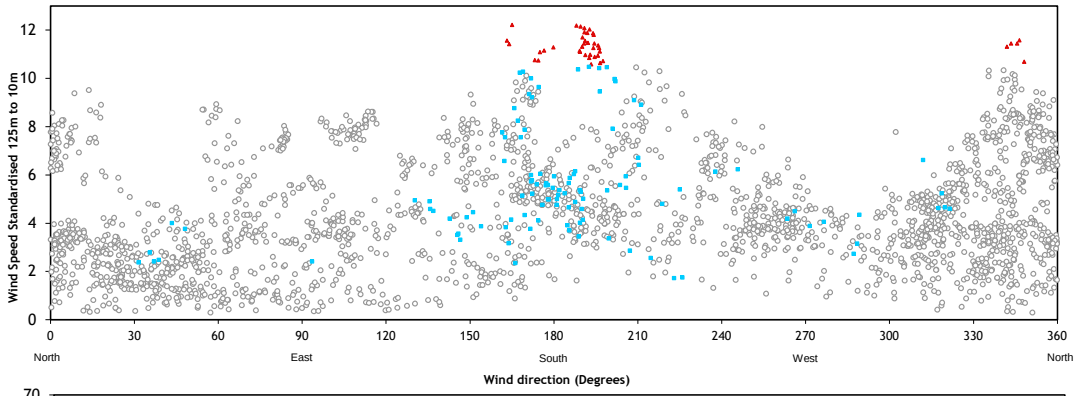
Regression Analysis Quiet Daytime



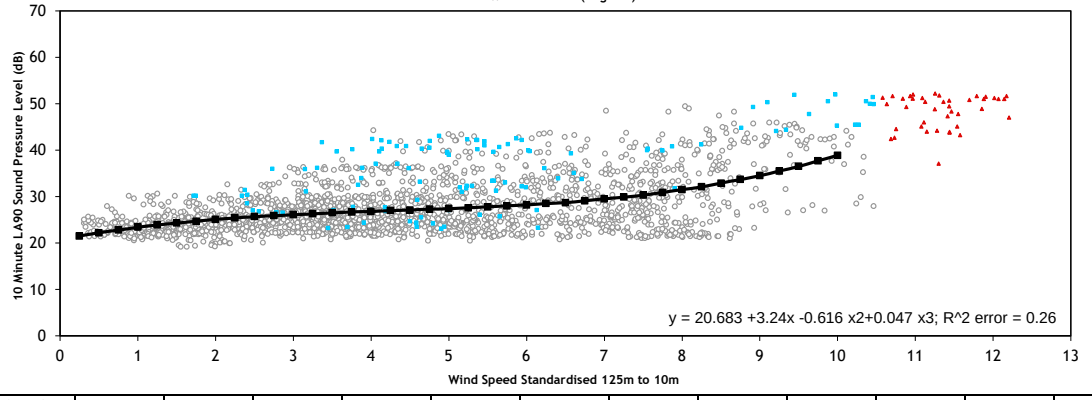
Wind Speed (m/s)	2	3	4	5	6	7	8	9	10	11	12	Total
Number of data points	406	546	453	339	231	145	149	60	30	17	13	2389
Prevailing Background	24.8	26.5	27.9	29.2	30.5	32	33.8	36.2	39.2	43.1	48	

WEDG 2006 NIGHT-TIME - (NML3)

Wind Conditions Night-Time



Regression Analysis Night-Time



Wind Speed (m/s)	2	3	4	5	6	7	8	9	10	11	12	Total
Number of data points	306	405	439	276	182	192	186	65	24	0	0	2075
Prevailing Background	25.1	26.1	26.8	27.4	28.2	29.5	31.5	34.5	38.9	-	-	

Legend:

- L_{A90} 10 Minute Measurement Point
- Line of best fit
- Line of best fit flat lined where appropriate(Prevailing Background)
- Excluded Data-Manual exclusion
- Excluded Data-Rain

Project	Proposed Repowering of Kilgarvan Wind Farm
Client	Orsted Onshore Ireland Midco Ltd
Title	Wind Conditions&Regression Analysis
Figure Number	A1.2b
Drawn	CB
Checked	JB
Date	17/04/2023
Document Reference	IE00065-015-Op Noise Models

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WEDG 2006 QUIET DAYTIME - (NML4)

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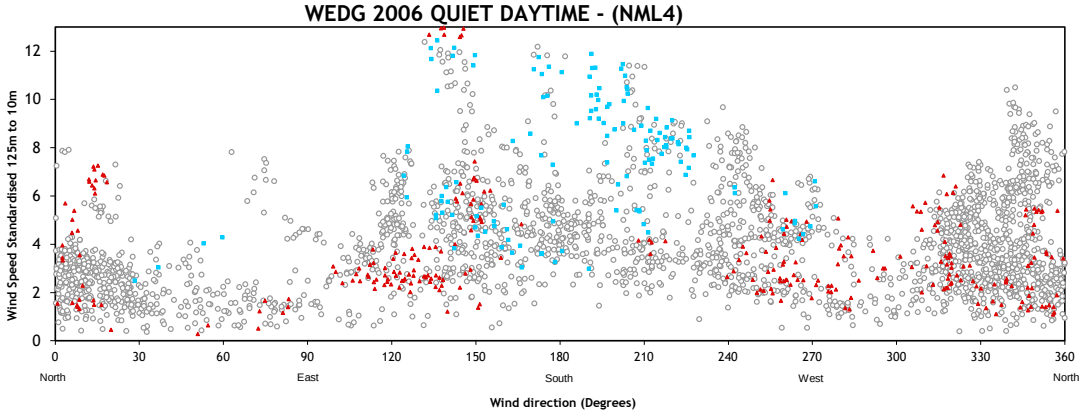
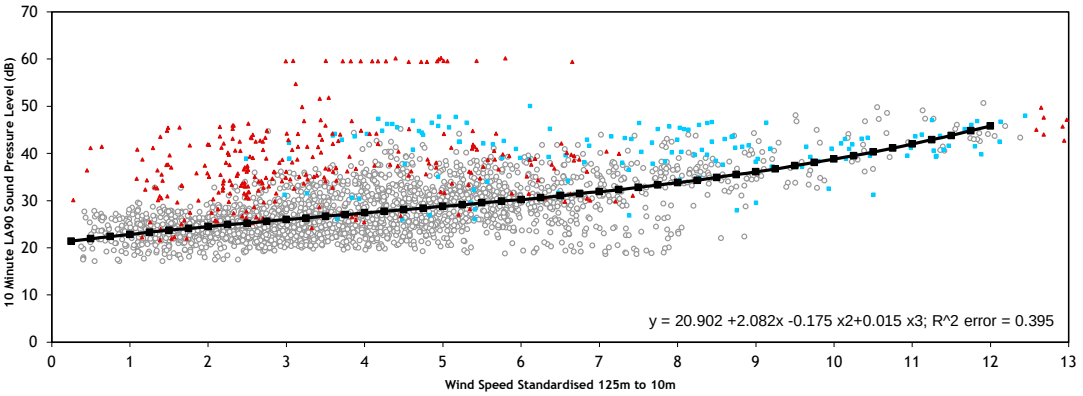


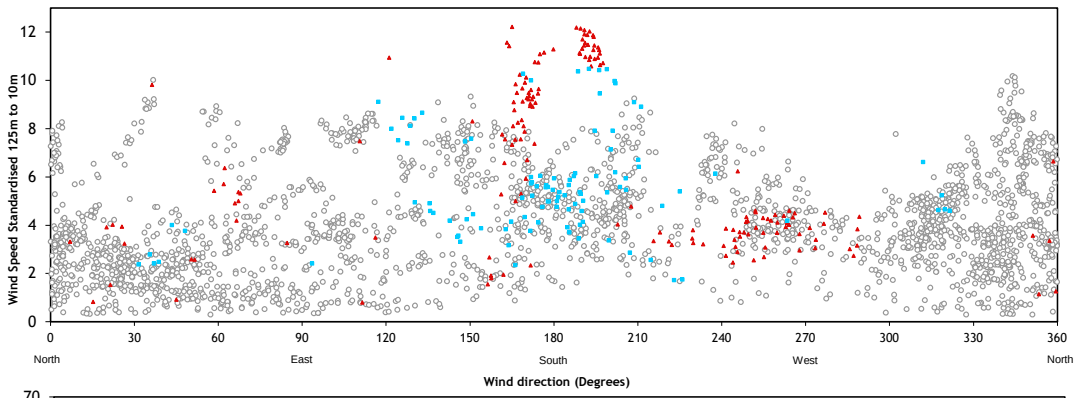
Regression Analysis Quiet Daytime



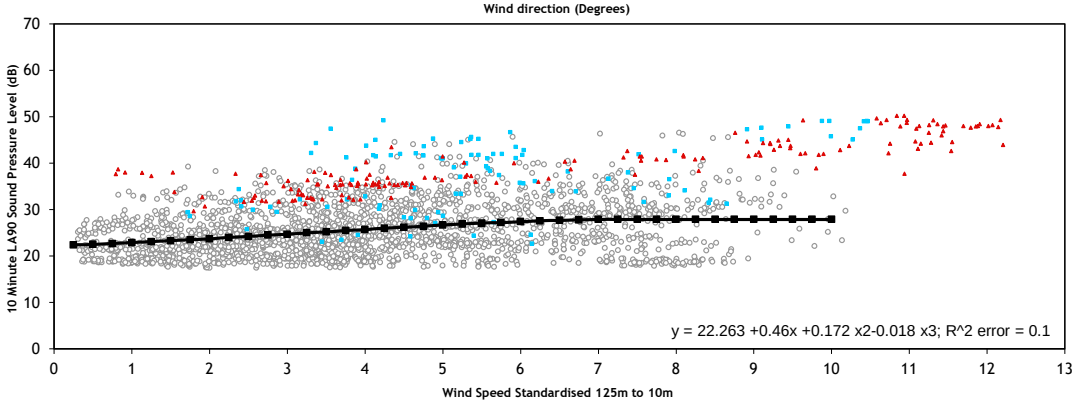
Wind Speed (m/s)	2	3	4	5	6	7	8	9	10	11	12	Total
Number of data points	438	533	452	349	255	151	88	39	21	12	12	2350
Prevailing Background	24.5	26	27.4	28.8	30.2	31.9	33.8	36.1	38.8	42	45.8	

WEDG 2006 NIGHT-TIME - (NML4)

Wind Conditions Night-Time



Regression Analysis Night-Time



Wind Speed (m/s)	2	3	4	5	6	7	8	9	10	11	12	Total
Number of data points	364	427	456	310	183	204	138	37	8	0	0	2127
Prevailing Background	23.7	24.7	25.7	26.7	27.4	27.9	27.9	27.9	27.9	-	-	

Legend:

- L_{A90} 10 Minute Measurement Point
- Line of best fit
- Line of best fit flat lined where appropriate(Prevailing Background)
- Excluded Data-Manual exclusion
- Excluded Data-Rain

Project	Proposed Repowering of Kilgarvan Wind Farm
Client	Orsted Onshore Ireland Midco Ltd
Title	Wind Conditions&Regression Analysis
Figure Number	A1.2c
Drawn	CB
Checked	JB
Date	18/04/2023
Document Reference	IE00065-015-Op Noise Models

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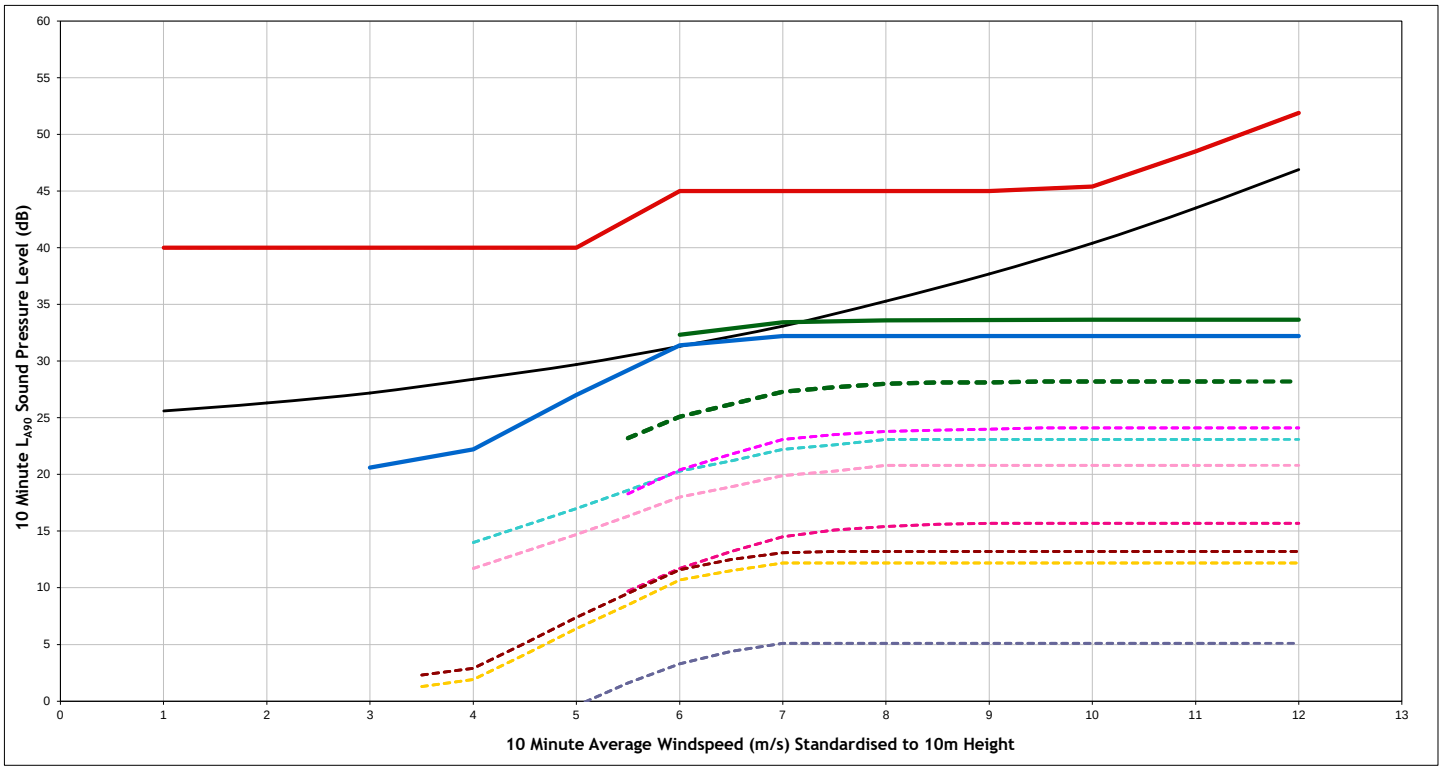
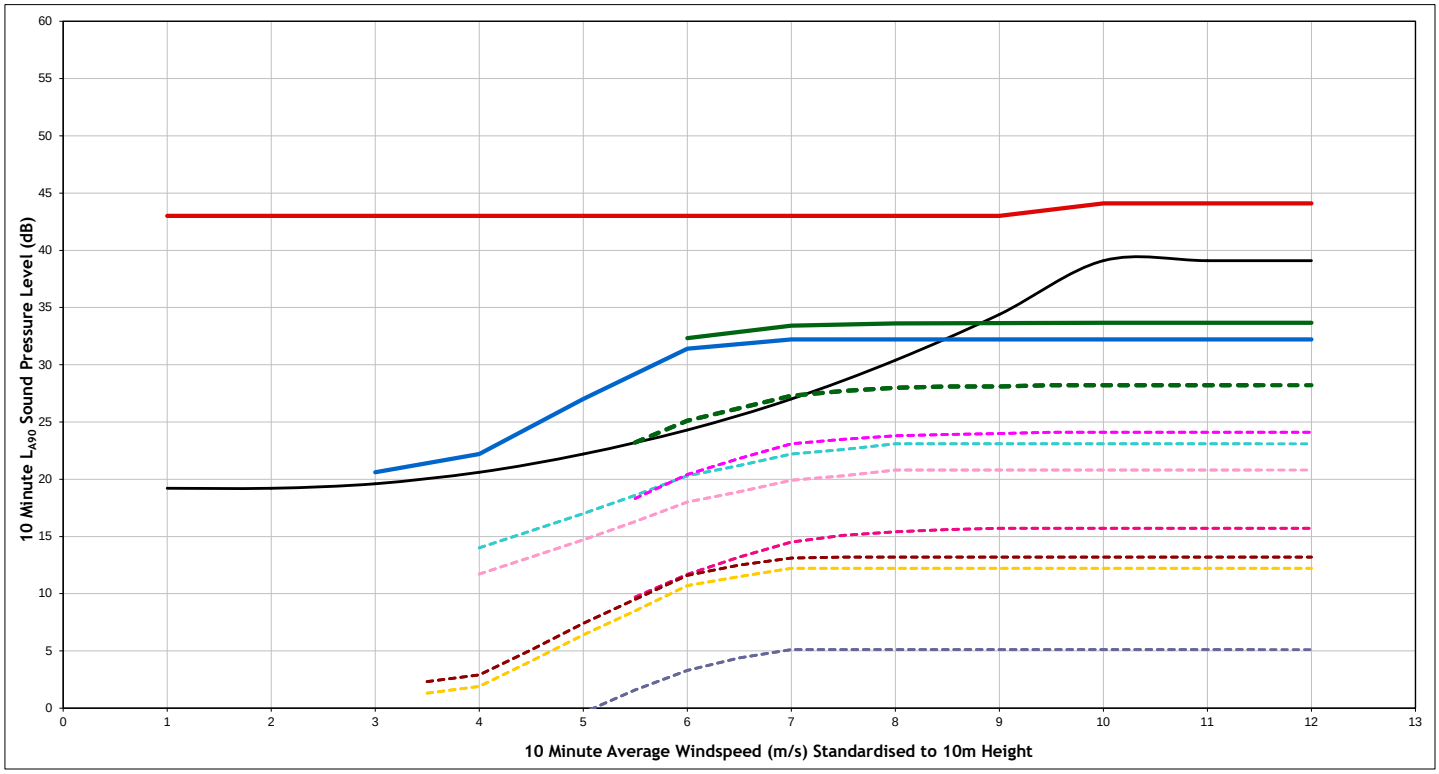
Figures A1.3 – Likely Noise Predictions

Daytime - NAL1 (H14)



Night Time - NAL1 (H14)



Legend:

- Background Noise Trendline
- Total WEDG 2006 Noise Limit
- Extended Cumulative (including Kilgarvan Repowering)
- Kilgarvan Repowering Only
- Cumulative (excluding Kilgarvan Repowering)
- Barnastooka Only
- Sillahertane Only
- Grousemount Only
- Midas Only
- Gortyrahilly Only
- Inchamore Only
- Derragh Only

Project	Proposed Repowering of Kilgarvan Wind Farm
Client	Orsted Onshore Ireland Midco Ltd
Title	Noise Assessment - Likely Predictions NAL1 (H14)
Figure Number	Figure A1.3a
Scale	NTS
Drawn	JB
Checked	JM
Date	14/04/2023
Document Reference	IE00065-015-Op Noise Models

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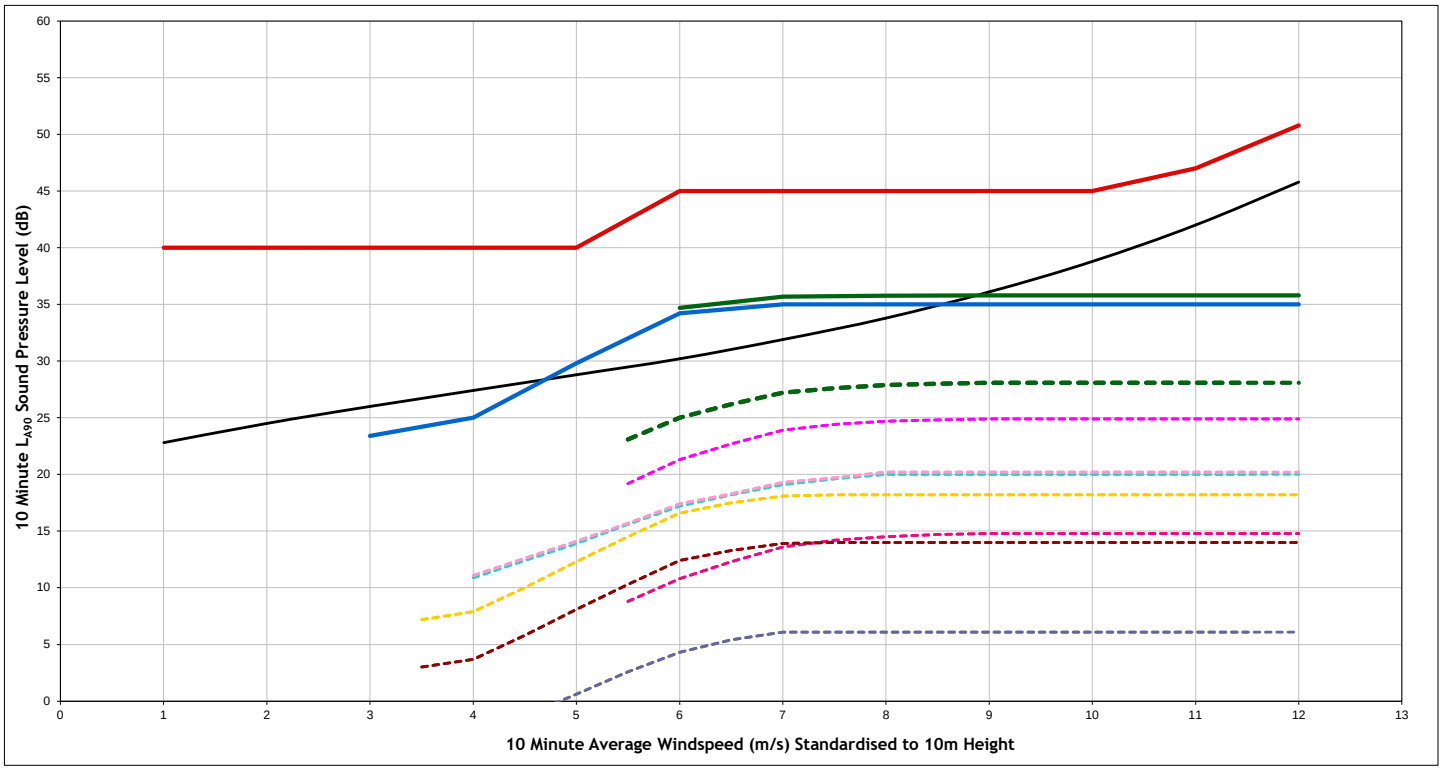
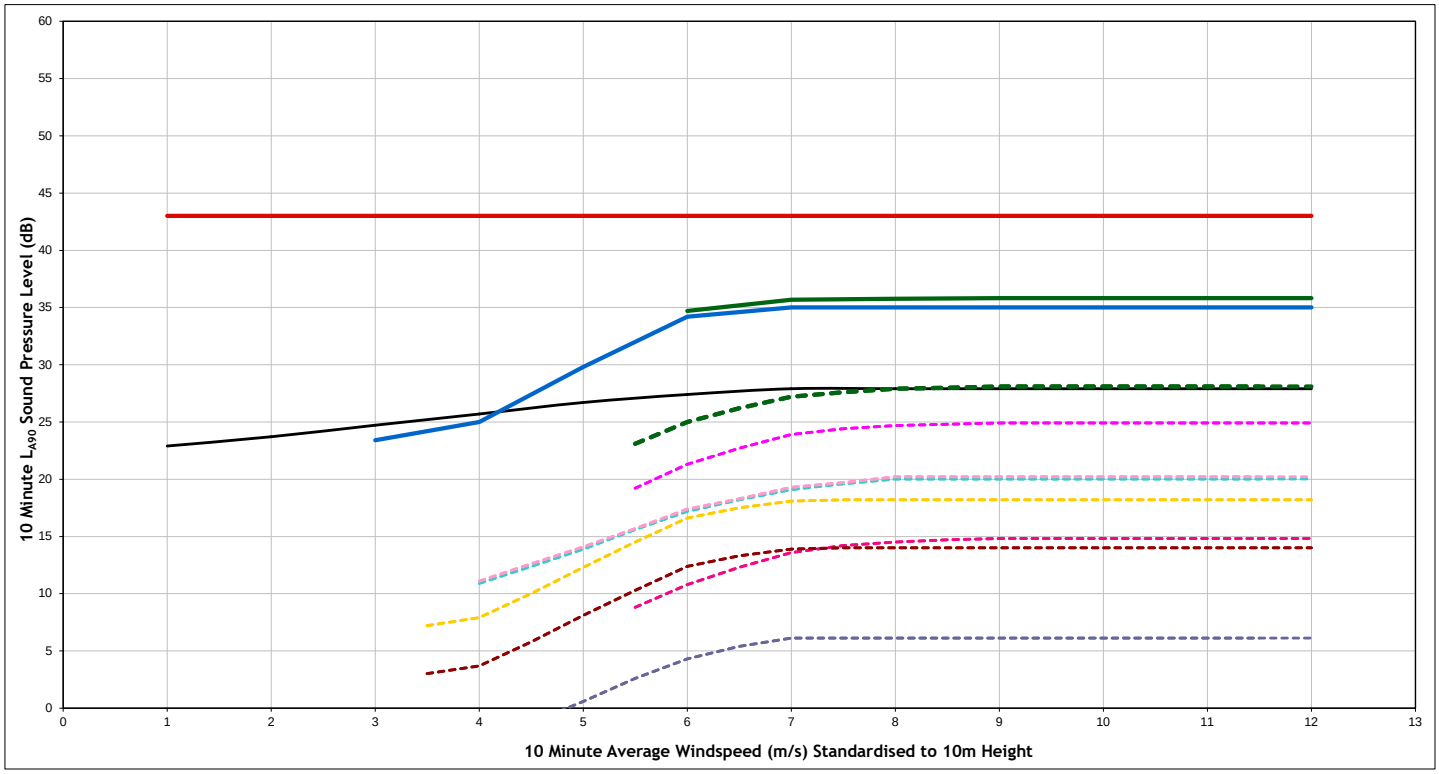
Daytime - NAL2 (H9)



Night Time - NAL2 (H9)



Legend:

- Background Noise Trendline
- Total WEDG 2006 Noise Limit
- Extended Cumulative (including Kilgarvan Repowering)
- Kilgarvan Repowering Only
- Cumulative (excluding Kilgarvan Repowering)
- Barnastooka Only
- Sillahertane Only
- Grousemount Only
- Midas Only
- Gortyrahilly Only
- Inchamore Only
- Derragh Only

Project	Proposed Repowering of Kilgarvan Wind Farm
Client	Orsted Onshore Ireland Midco Ltd
Title	Noise Assessment - Likely Predictions NAL2 (H9)
Figure Number	Figure A1.3b
Scale	NTS
Drawn	JB
Checked	JM
Date	14/04/2023
Document Reference	IE00065-015-Op Noise Models

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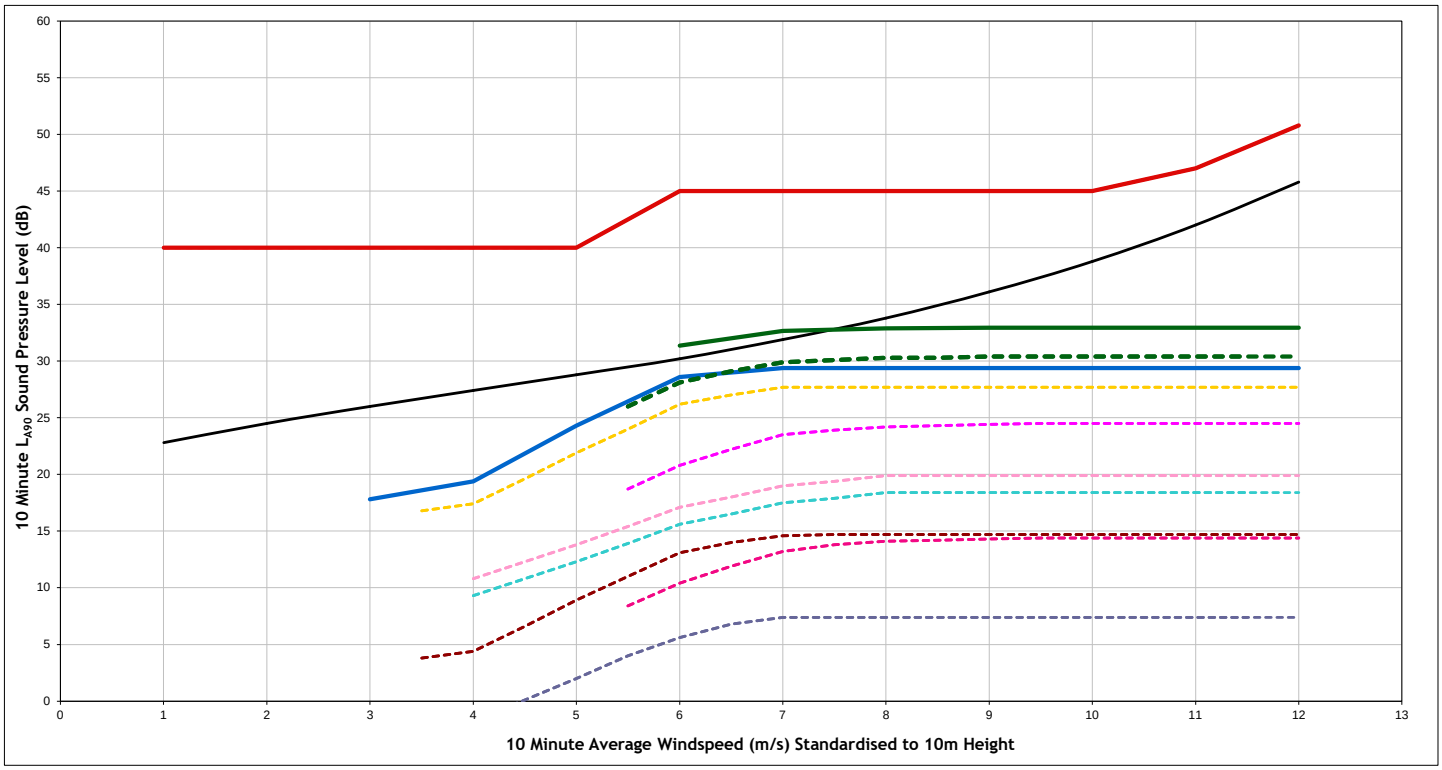
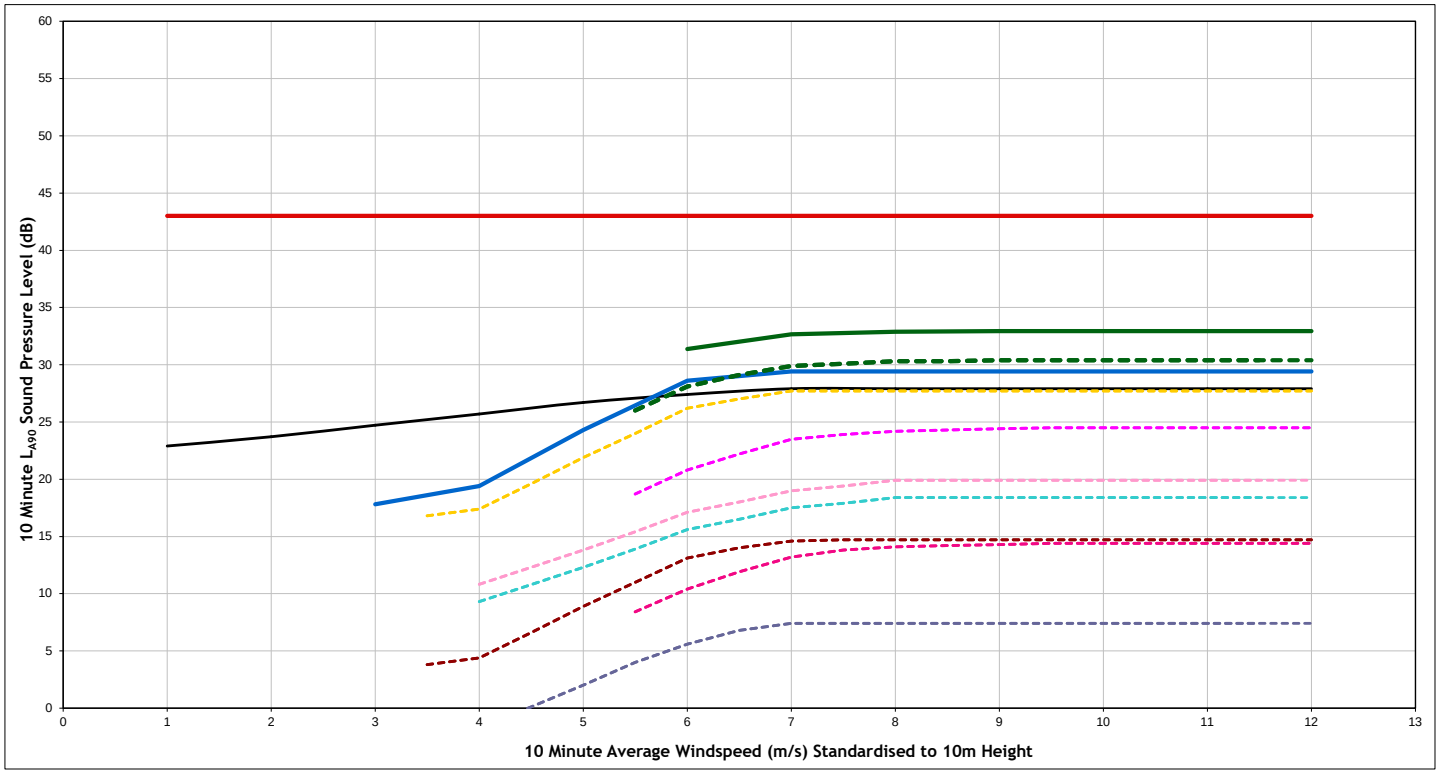
Daytime - NAL3 (H97)



Night Time - NAL3 (H97)



Legend:

- Background Noise Trendline
- Total WEDG 2006 Noise Limit
- Extended Cumulative (including Kilgarvan Repowering)
- Kilgarvan Repowering Only
- Cumulative (excluding Kilgarvan Repowering)
- Barnastooka Only
- Sillahertane Only
- Grousemount Only
- Midas Only
- Gortyrahilly Only
- Inchamore Only
- Derragh Only

Project	Proposed Repowering of Kilgarvan Wind Farm
Client	Orsted Onshore Ireland Midco Ltd
Title	Noise Assessment - Likely Predictions NAL3 (H97)
Figure Number	Figure A1.3c
Scale	NTS
Drawn	JB
Checked	JM
Date	14/04/2023
Document Reference	IE00065-015-Op Noise Models

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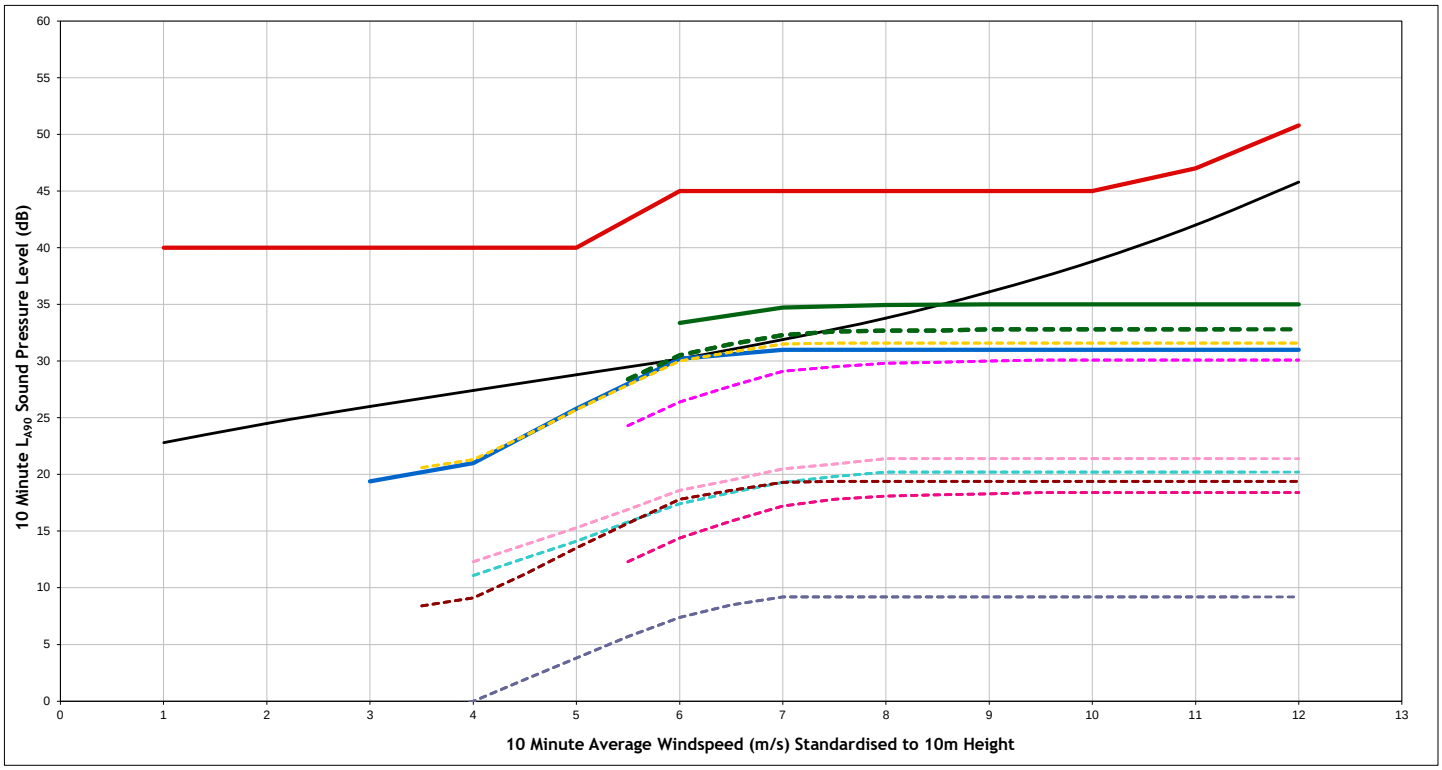
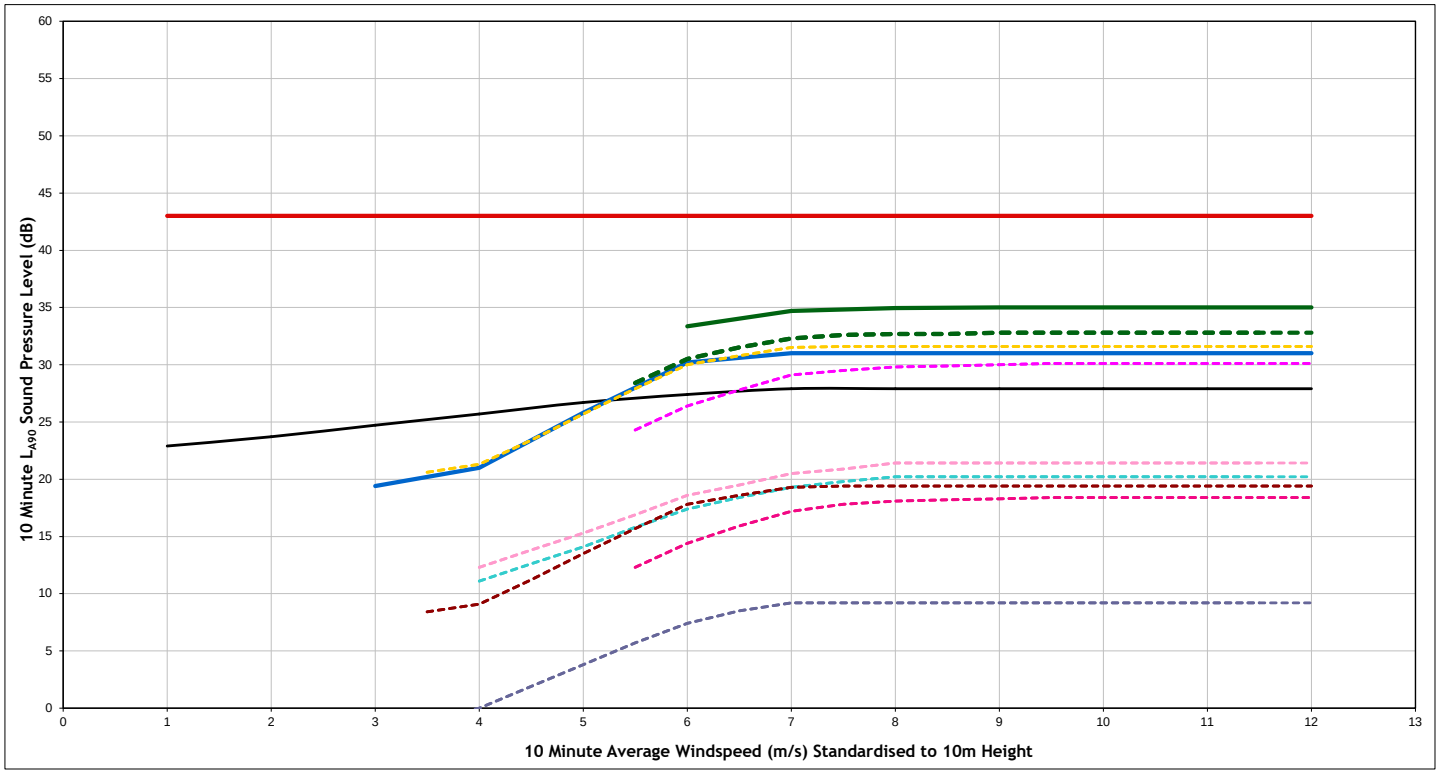
Daytime - NAL4 (H17)



Night Time - NAL4 (H17)



Legend:

- Background Noise Trendline
- Total WEDG 2006 Noise Limit
- Extended Cumulative (including Kilgarvan Repowering)
- Kilgarvan Repowering Only
- Cumulative (excluding Kilgarvan Repowering)
- Barnastooka Only
- Sillahertane Only
- Grousemount Only
- Midas Only
- Gortyrahilly Only
- Inchamore Only
- Derragh Only

Project	Proposed Repowering of Kilgarvan Wind Farm
Client	Orsted Onshore Ireland Midco Ltd
Title	Noise Assessment - Likely Predictions NAL4 (H17)
Figure Number	Figure A1.3d
Scale	NTS
Drawn	JB
Checked	JM
Date	14/04/2023
Document Reference	IE00065-015-Op Noise Models

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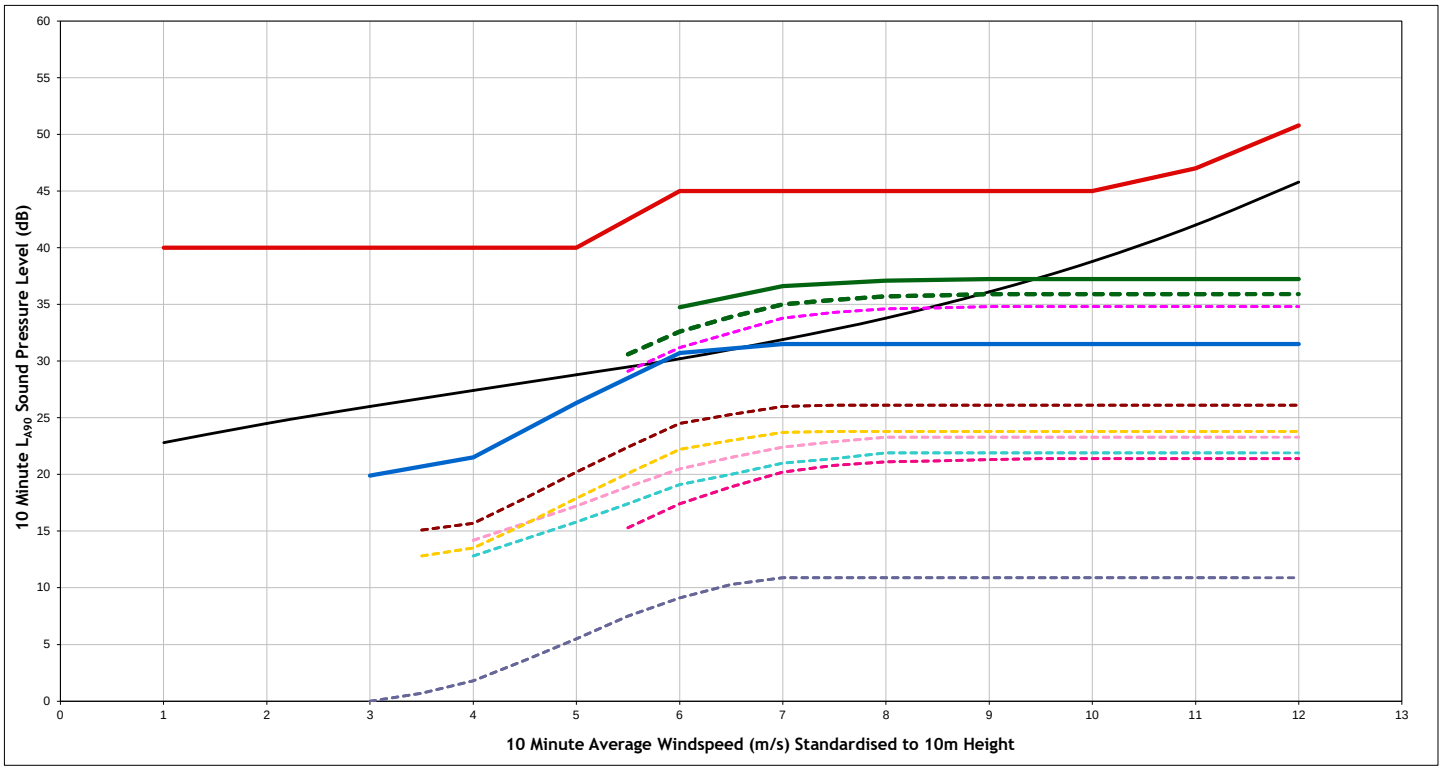
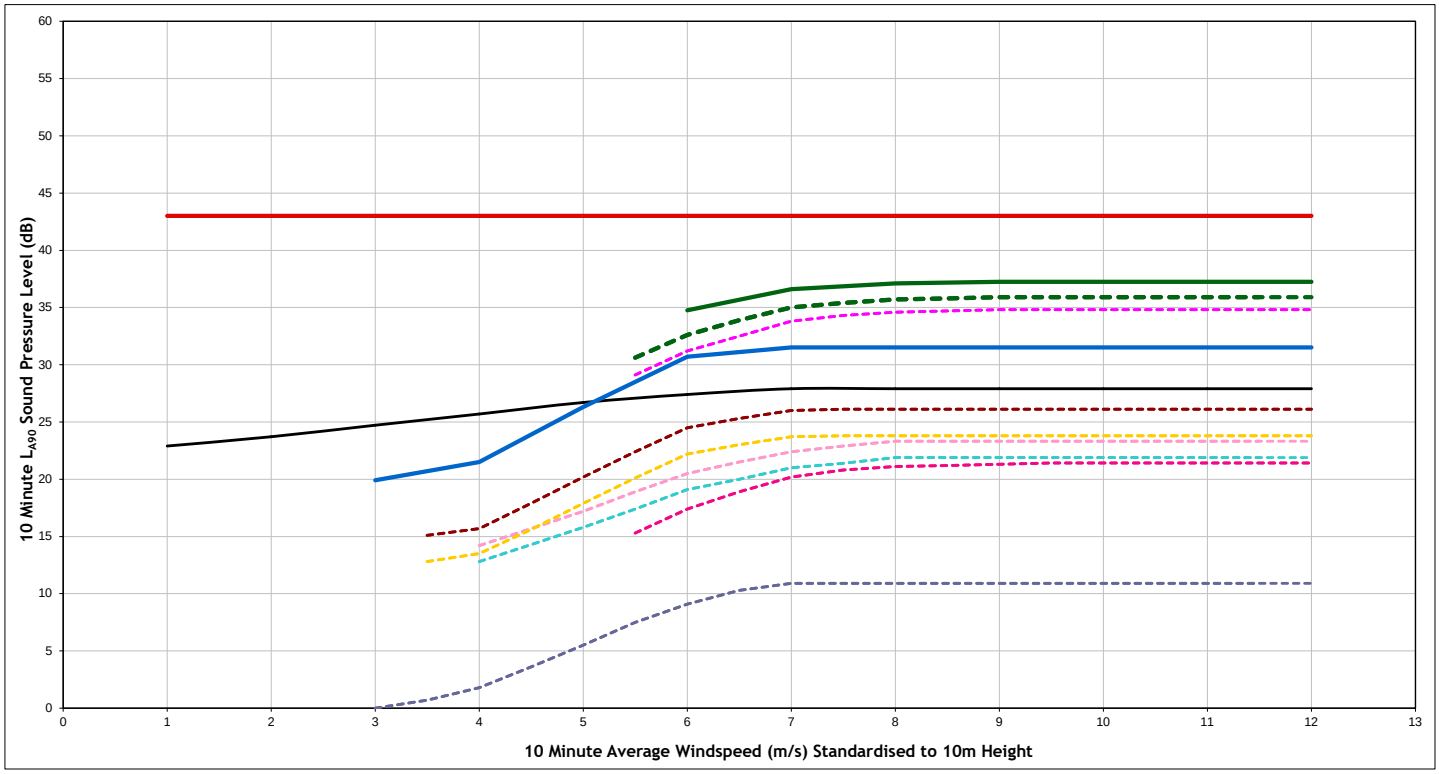
Daytime - NAL5 (H16)



Night Time - NAL5 (H16)



Legend:

- Background Noise Trendline
- Total WEDG 2006 Noise Limit
- Extended Cumulative (including Kilgarvan Repowering)
- Kilgarvan Repowering Only
- Cumulative (excluding Kilgarvan Repowering)
- Barnastooka Only
- Sillahertane Only
- Grousemount Only
- Midas Only
- Gortyrahilly Only
- Inchamore Only
- Derragh Only

Project	Proposed Repowering of Kilgarvan Wind Farm
Client	Orsted Onshore Ireland Midco Ltd
Title	Noise Assessment - Likely Predictions
	NAL5 (H16)
Figure Number	Figure A1.3e
Scale	NTS
Drawn	JB
Checked	JM
Date	14/04/2023
Document Reference	IE00065-015-Op Noise Models

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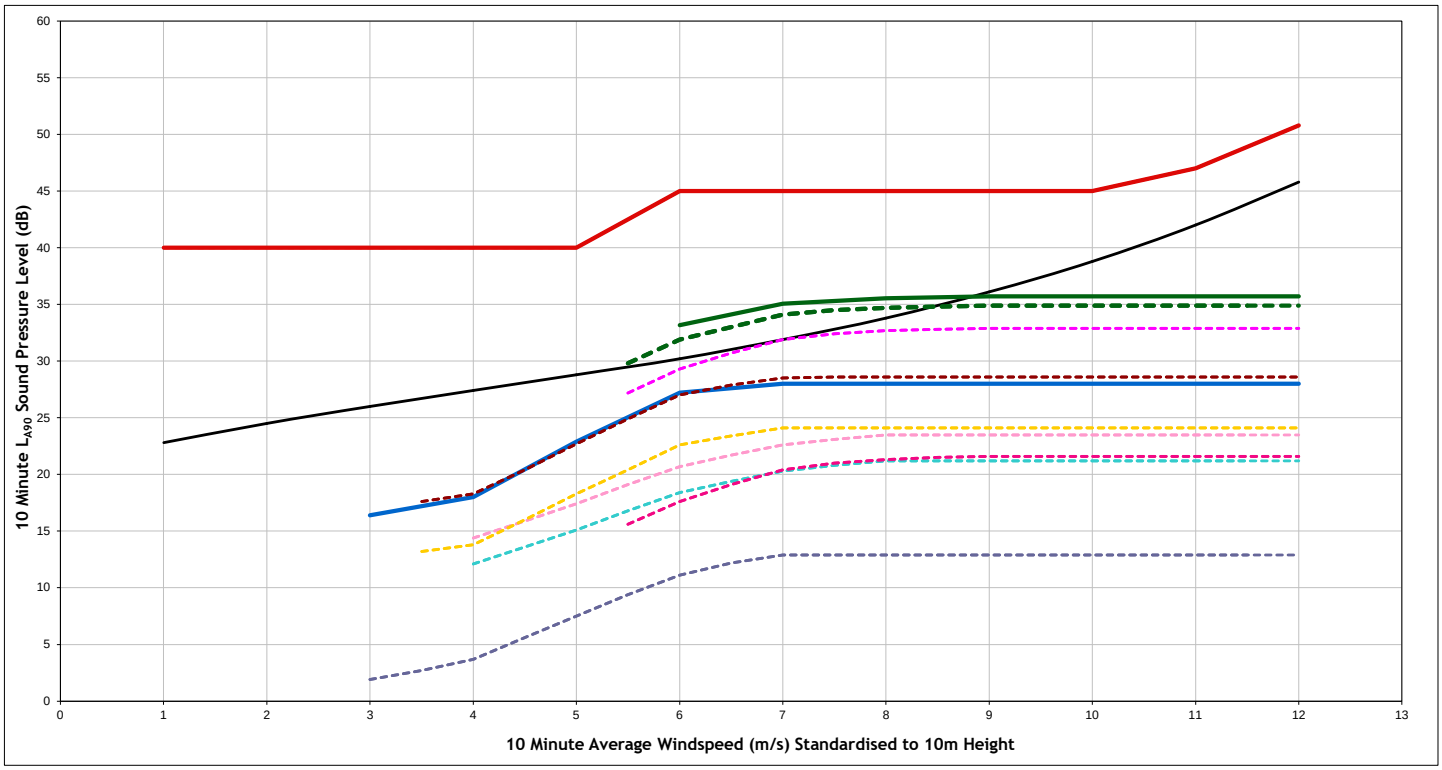
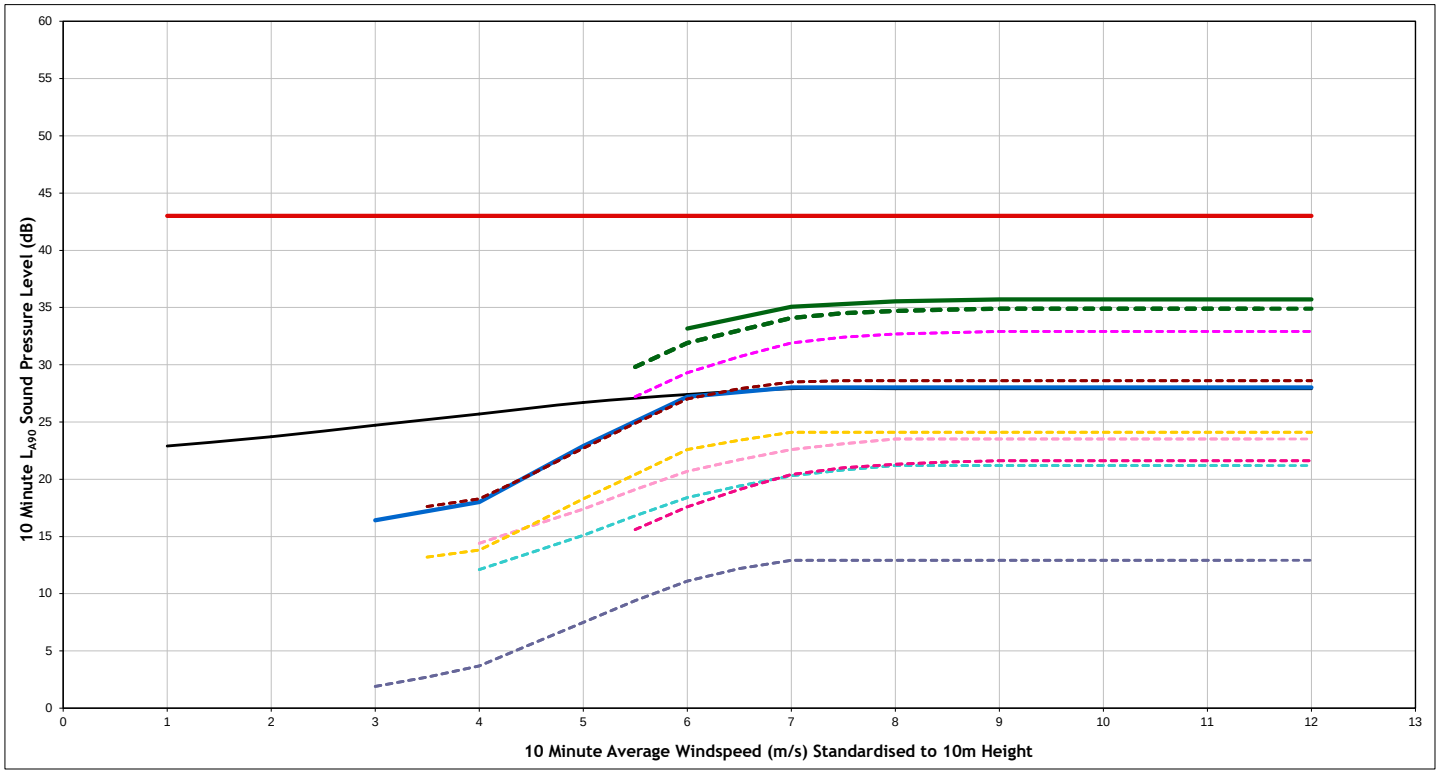
Daytime - NAL6 (H73)



Night Time - NAL6 (H73)



Legend:

- Background Noise Trendline
- Total WEDG 2006 Noise Limit
- Extended Cumulative (including Kilgarvan Repowering)
- Kilgarvan Repowering Only
- Cumulative (excluding Kilgarvan Repowering)
- Barnastooka Only
- Sillahertane Only
- Grousemount Only
- Midas Only
- Gortyrahilly Only
- Inchamore Only
- Derragh Only

Project	Proposed Repowering of Kilgarvan Wind Farm
Client	Orsted Onshore Ireland Midco Ltd
Title	Noise Assessment - Likely Predictions NAL6 (H73)
Figure Number	Figure A1.3f
Scale	NTS
Drawn	JB
Checked	JM
Date	14/04/2023
Document Reference	IE00065-015-Op Noise Models

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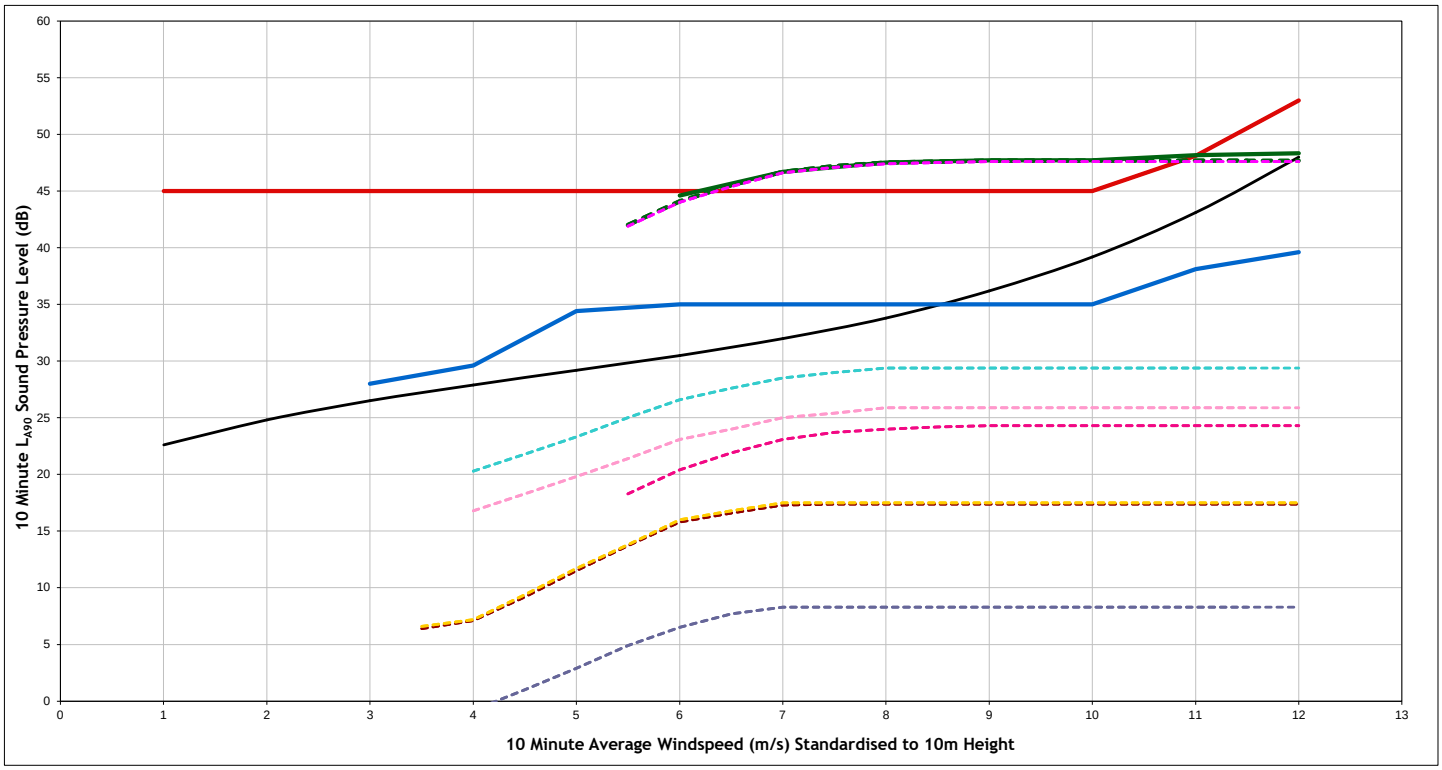
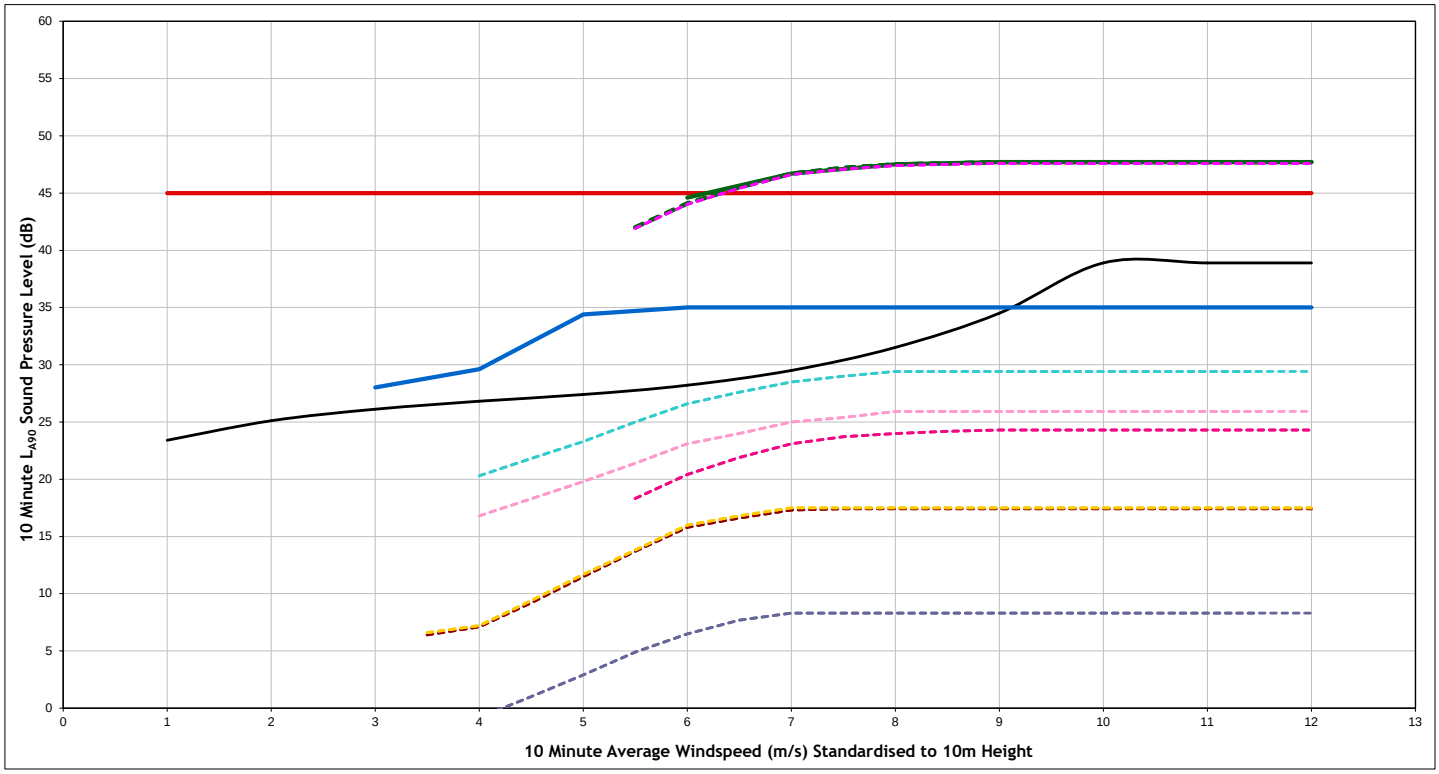
Daytime - NAL7 (H1)



Night Time - NAL7 (H1)



Legend:

- Background Noise Trendline
- Total WEDG 2006 Noise Limit
- Extended Cumulative (including Kilgarvan Repowering)
- Kilgarvan Repowering Only
- Cumulative (excluding Kilgarvan Repowering)
- Barnastooka Only
- Sillahertane Only
- Grousemount Only
- Midas Only
- Gortyrahilly Only
- Inchamore Only
- Derragh Only

Project	Proposed Repowering of Kilgarvan Wind Farm
Client	Orsted Onshore Ireland Midco Ltd
Title	Noise Assessment - Likely Predictions
	NAL7 (H1)
Figure Number	Figure A1.3g
Scale	NTS
Drawn	JB
Checked	JM
Date	14/04/2023
Document Reference	IE00065-015-Op Noise Models

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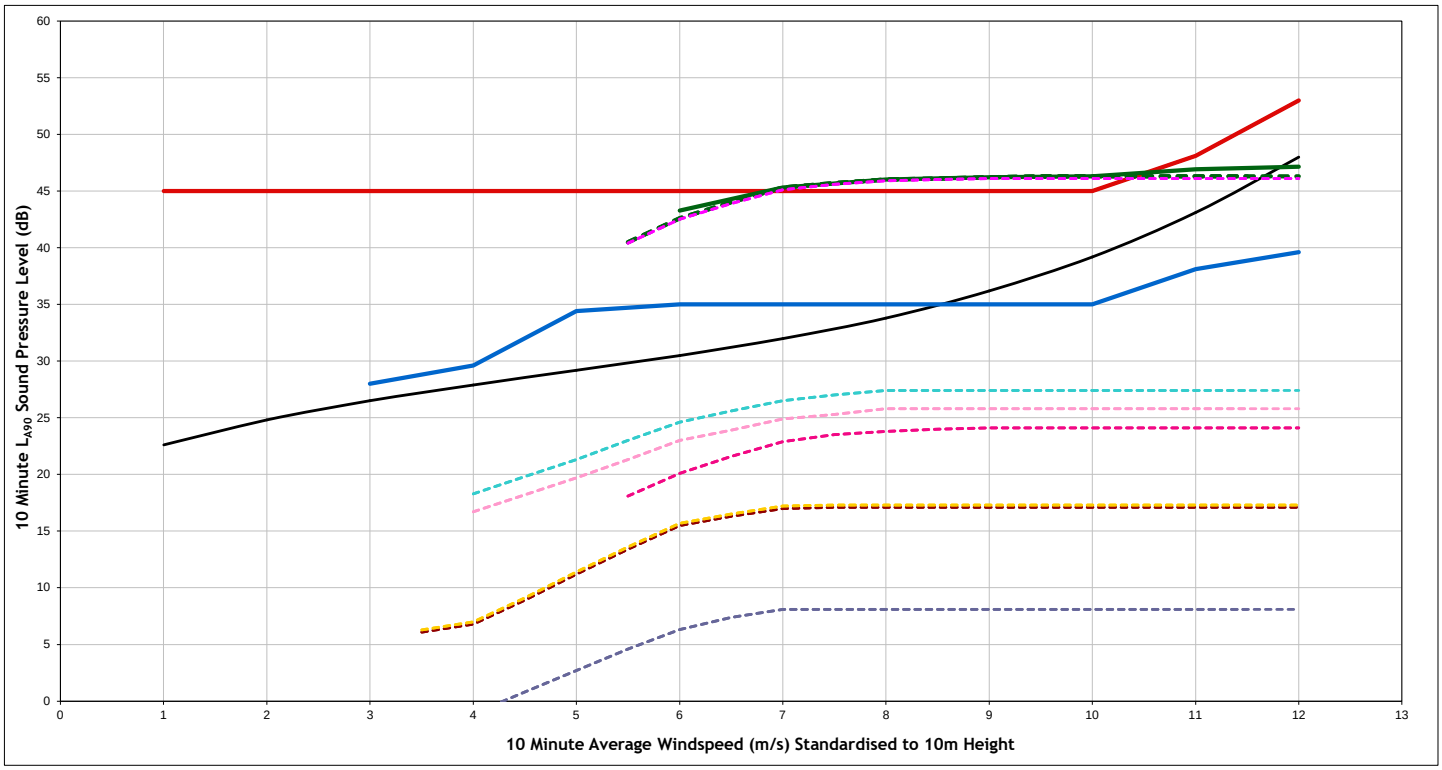
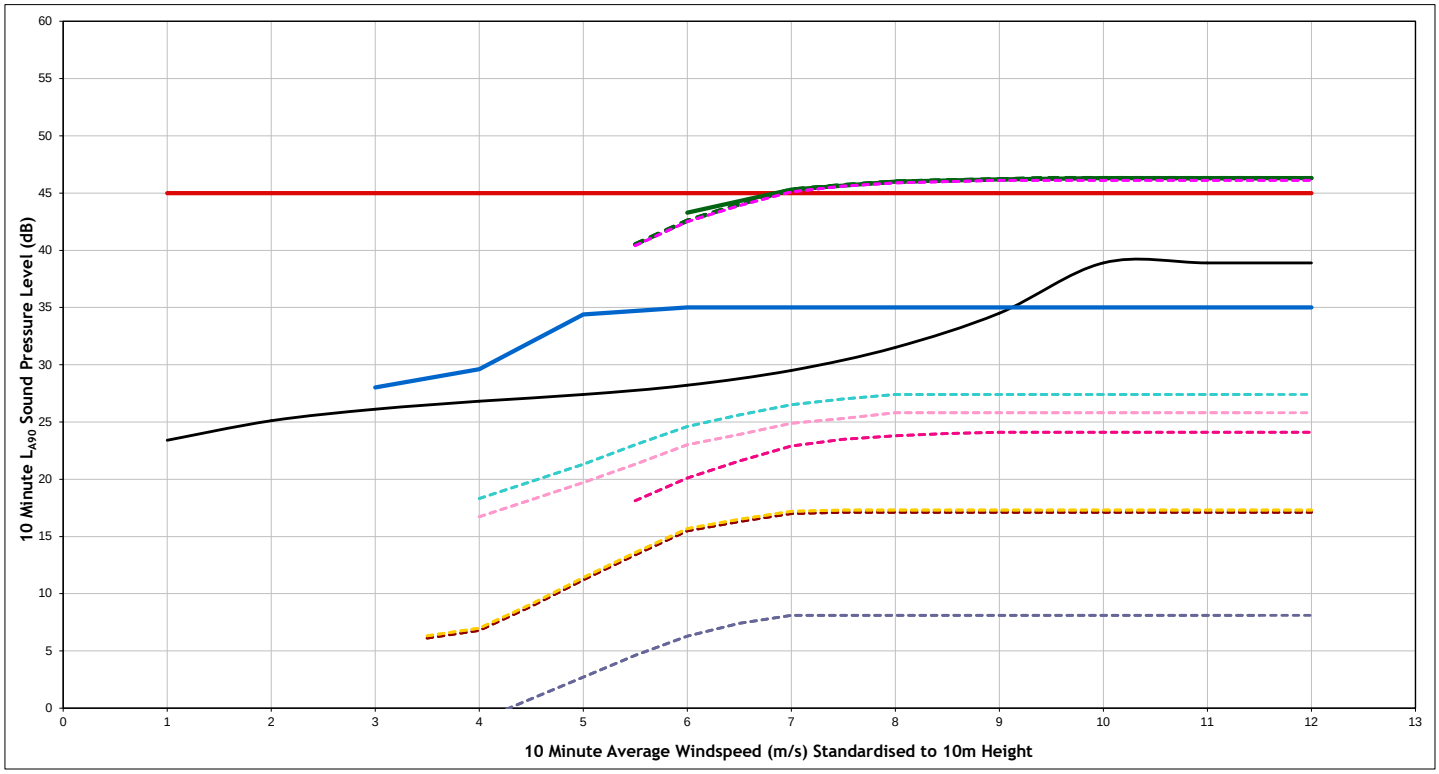
Daytime - NAL8 (H2)



Night Time - NAL8 (H2)



Legend:

- Background Noise Trendline
- Total WEDG 2006 Noise Limit
- Extended Cumulative (including Kilgarvan Repowering)
- Kilgarvan Repowering Only
- Cumulative (excluding Kilgarvan Repowering)
- Barnastooka Only
- Sillahertane Only
- Grousemount Only
- Midas Only
- Gortyrahilly Only
- Inchamore Only
- Derragh Only

Project	Proposed Repowering of Kilgarvan Wind Farm
Client	Orsted Onshore Ireland Midco Ltd
Title	Noise Assessment - Likely Predictions NAL8 (H2)
Figure Number	Figure A1.3h
Scale	NTS
Drawn	JB
Checked	JM
Date	14/04/2023
Document Reference	IE00065-015-Op Noise Models

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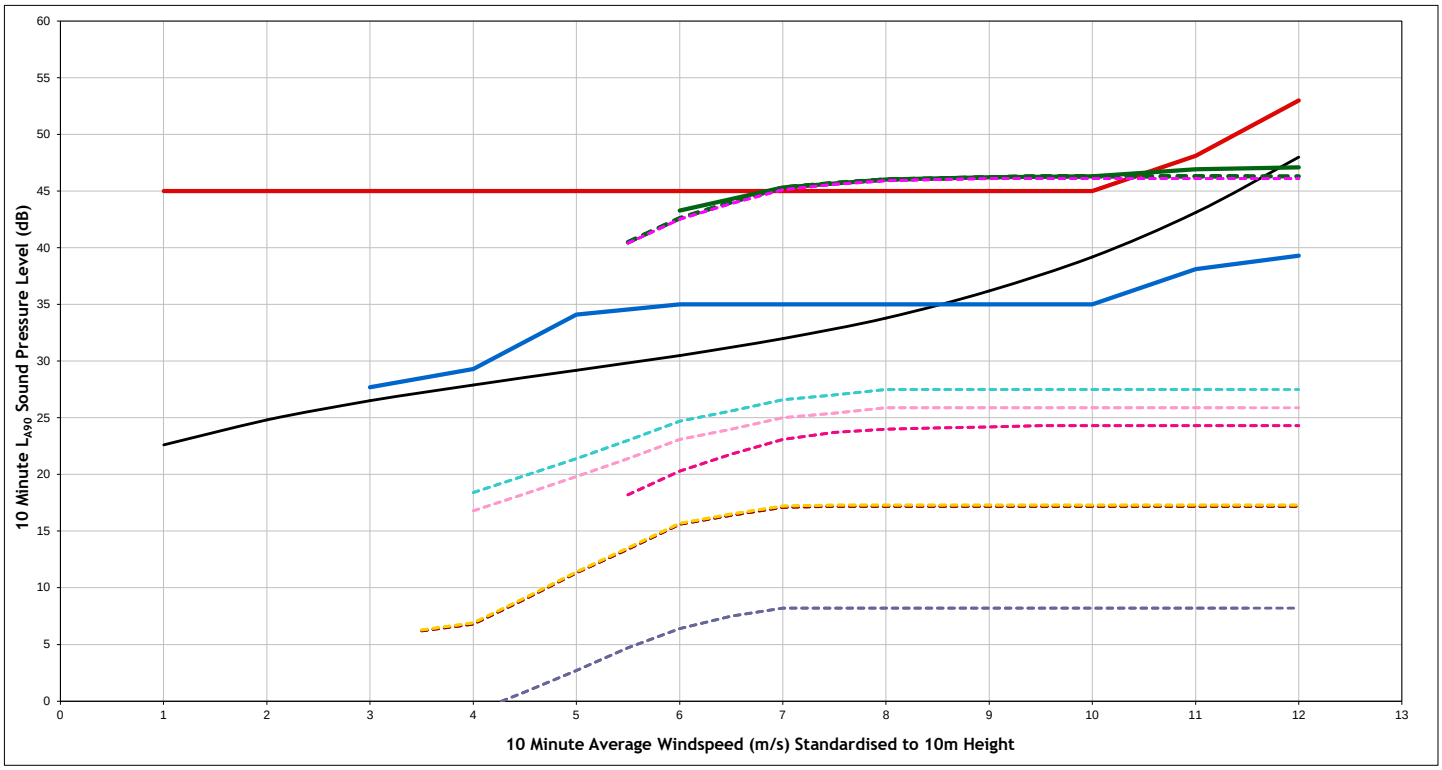
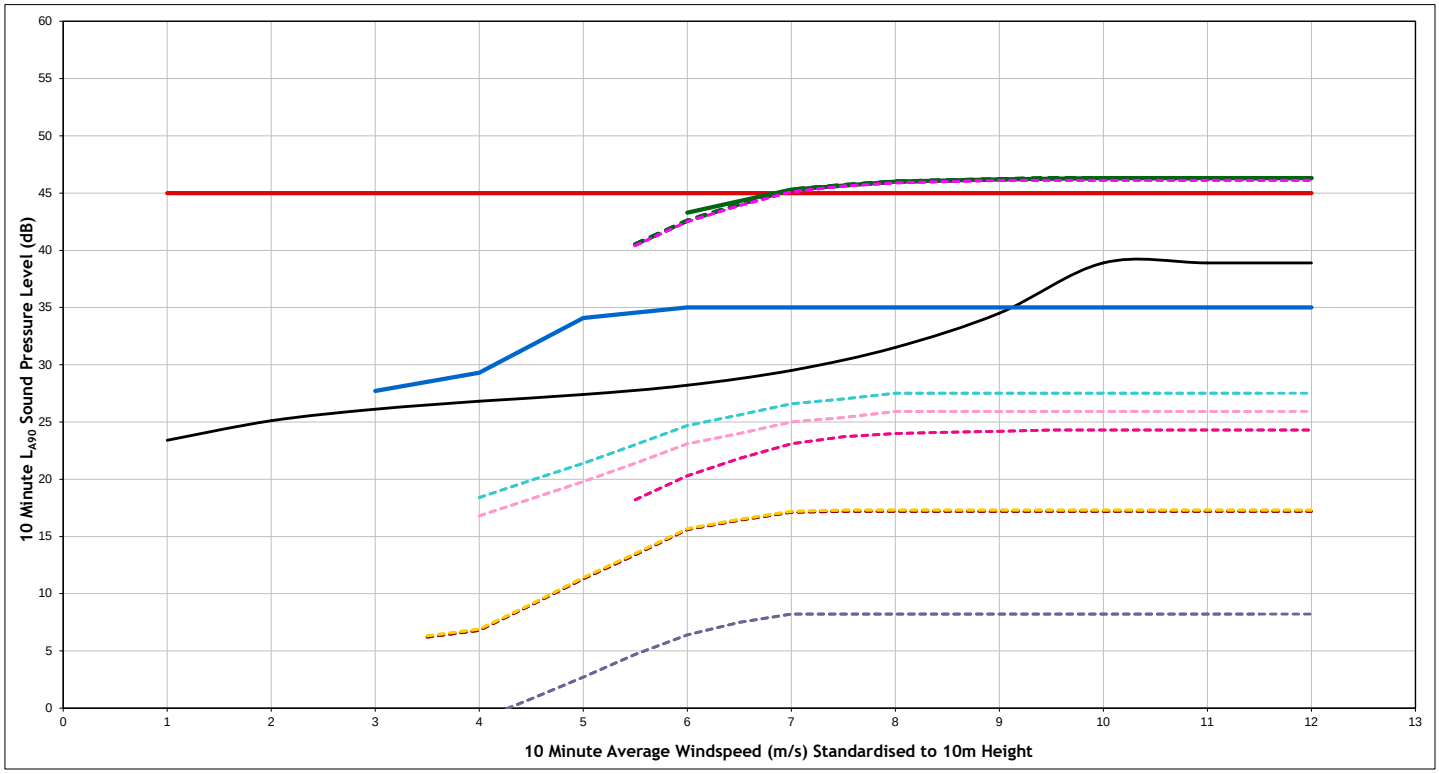
Daytime - NAL9 (H4)



Night Time - NAL9 (H4)



Legend:

- Background Noise Trendline
- Total WEDG 2006 Noise Limit
- Extended Cumulative (including Kilgarvan Repowering)
- Kilgarvan Repowering Only
- Cumulative (excluding Kilgarvan Repowering)
- Barnastooka Only
- Sillahertane Only
- Grousemount Only
- Midas Only
- Gortyrahilly Only
- Inchamore Only
- Derragh Only

Project	Proposed Repowering of Kilgarvan Wind Farm
Client	Orsted Onshore Ireland Midco Ltd
Title	Noise Assessment - Likely Predictions
	NAL9 (H4)
Figure Number	Figure A1.3i
Scale	NTS
Drawn	JB
Checked	JM
Date	14/04/2023
Document Reference	IE00065-015-Op Noise Models

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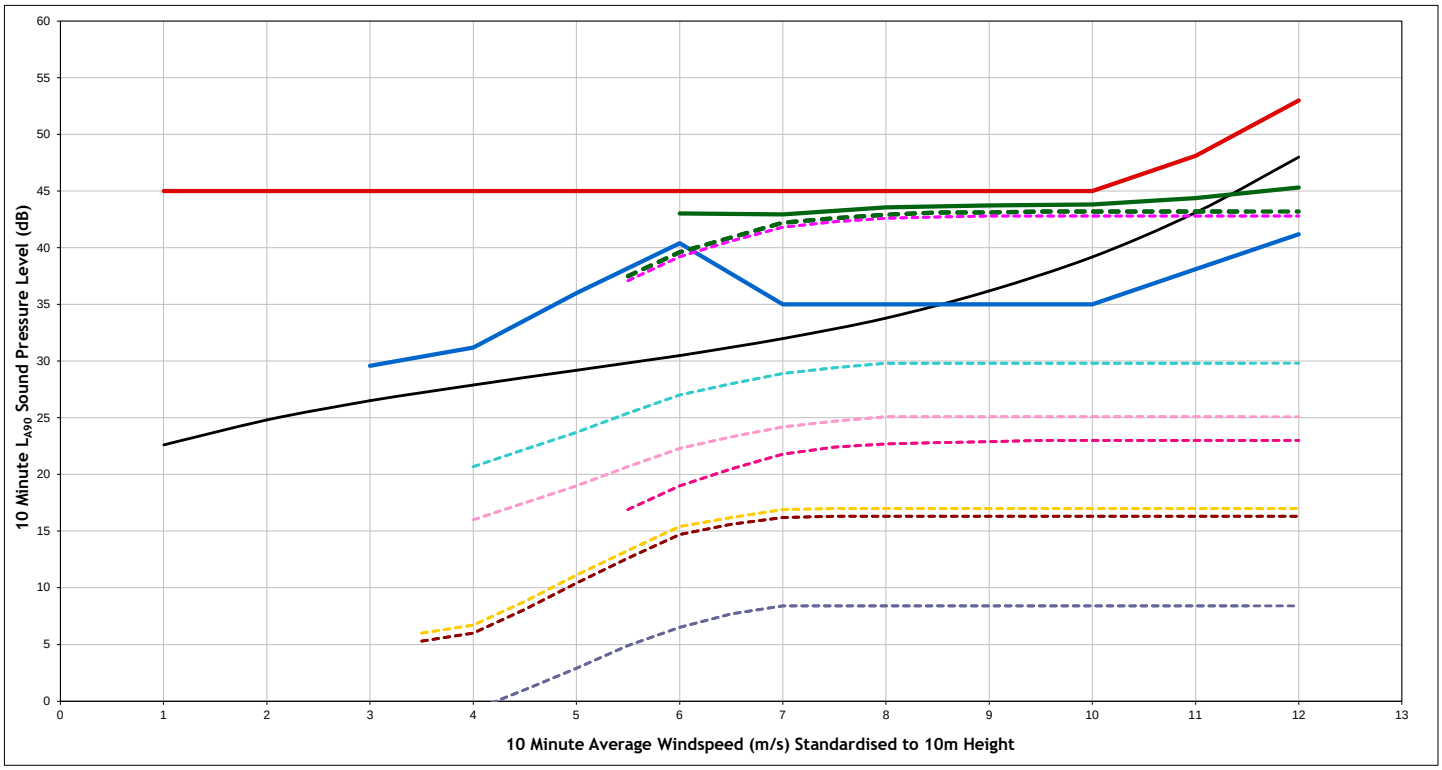
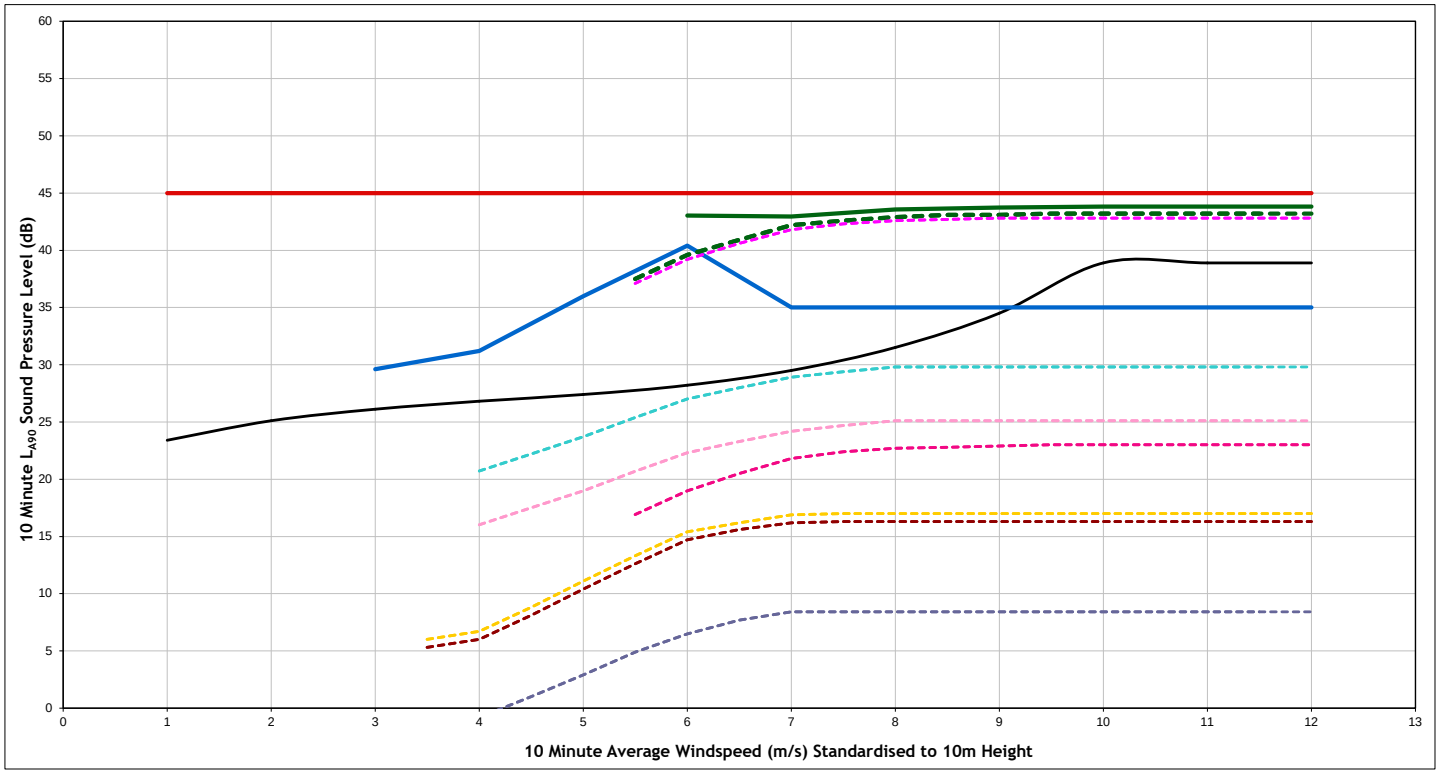
Daytime - NAL10 (H3)



Night Time - NAL10 (H3)



Legend:

- Background Noise Trendline
- Total WEDG 2006 Noise Limit
- Extended Cumulative (including Kilgarvan Repowering)
- Kilgarvan Repowering Only
- Cumulative (excluding Kilgarvan Repowering)
- Barnastooka Only
- Sillahertane Only
- Grousemount Only
- Midas Only
- Gortyrahilly Only
- Inchamore Only
- Derragh Only

Project	Proposed Repowering of Kilgarvan Wind Farm
Client	Orsted Onshore Ireland Midco Ltd
Title	Noise Assessment - Likely Predictions NAL10 (H3)
Figure Number	Figure A1.3j
Scale	NTS
Drawn	JB
Checked	JM
Date	14/04/2023
Document Reference	IE00065-015-Op Noise Models

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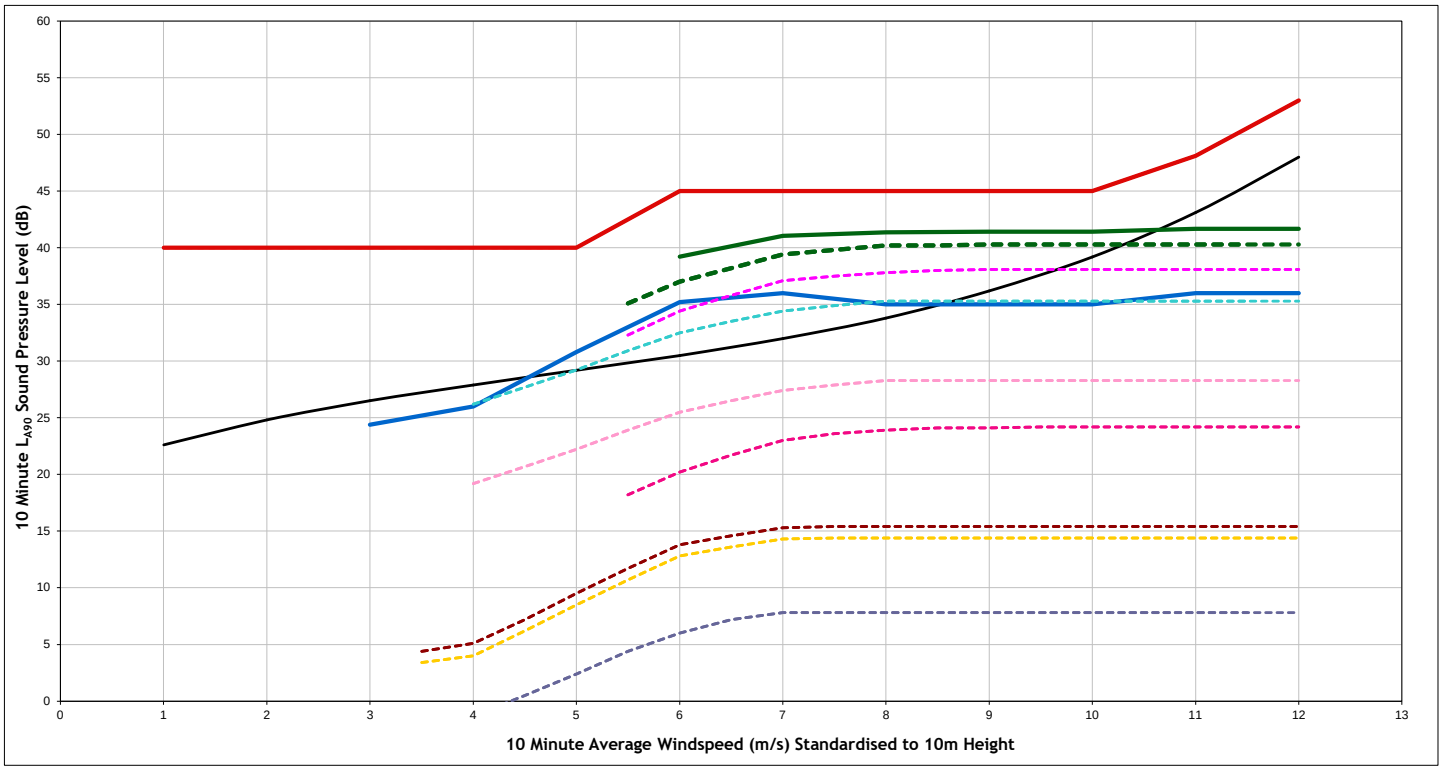
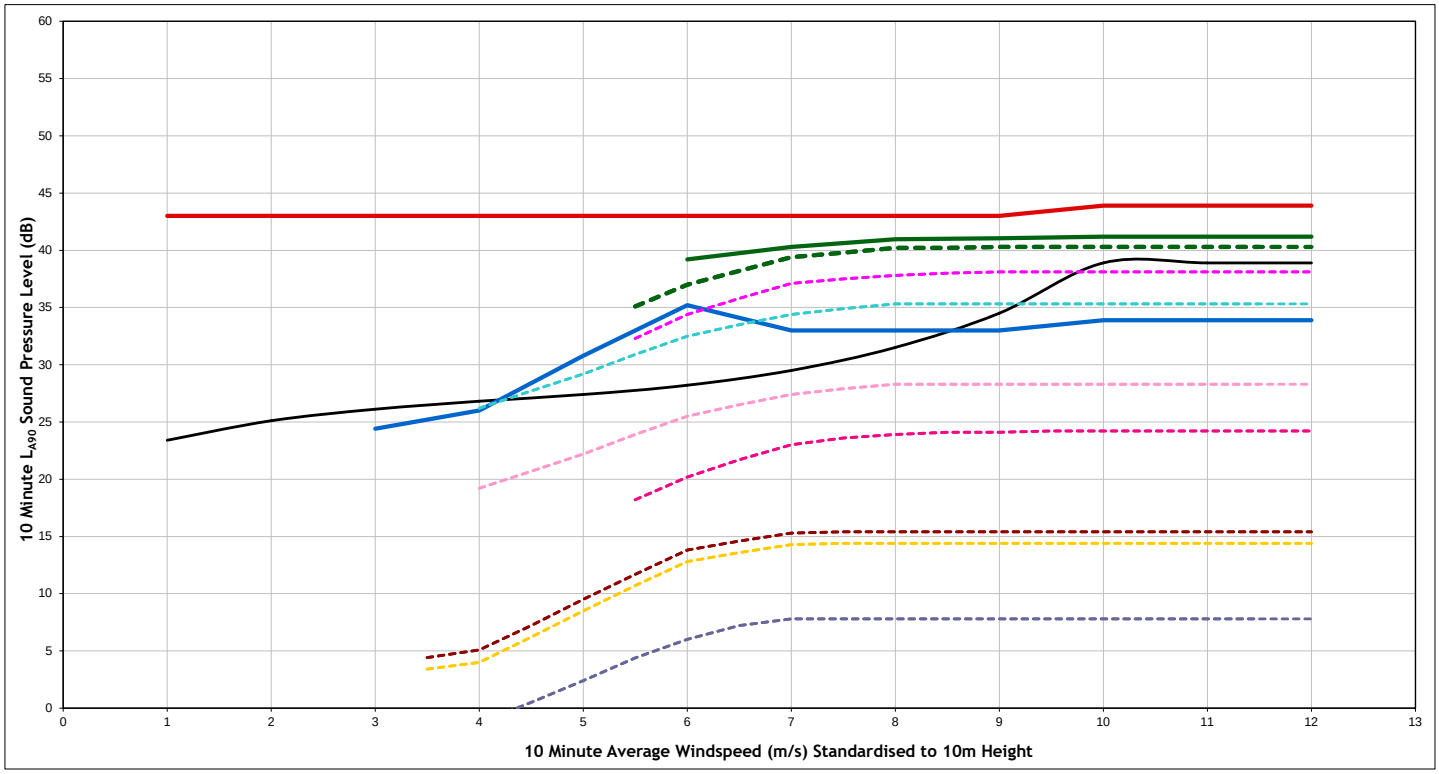
Daytime - NAL11 (H6)



Night Time - NAL11 (H6)



Legend:

- Background Noise Trendline
- Total WEDG 2006 Noise Limit
- Extended Cumulative (including Kilgarvan Repowering)
- Kilgarvan Repowering Only
- Cumulative (excluding Kilgarvan Repowering)
- Barnastooka Only
- Sillahertane Only
- Grousemount Only
- Midas Only
- Gortyrahilly Only
- Inchamore Only
- Derragh Only

Project	Proposed Repowering of Kilgarvan Wind Farm
Client	Orsted Onshore Ireland Midco Ltd
Title	Noise Assessment - Likely Predictions NAL11 (H6)
Figure Number	Figure A1.3k
Scale	NTS
Drawn	JB
Checked	JM
Date	14/04/2023
Document Reference	IE00065-015-Op Noise Models

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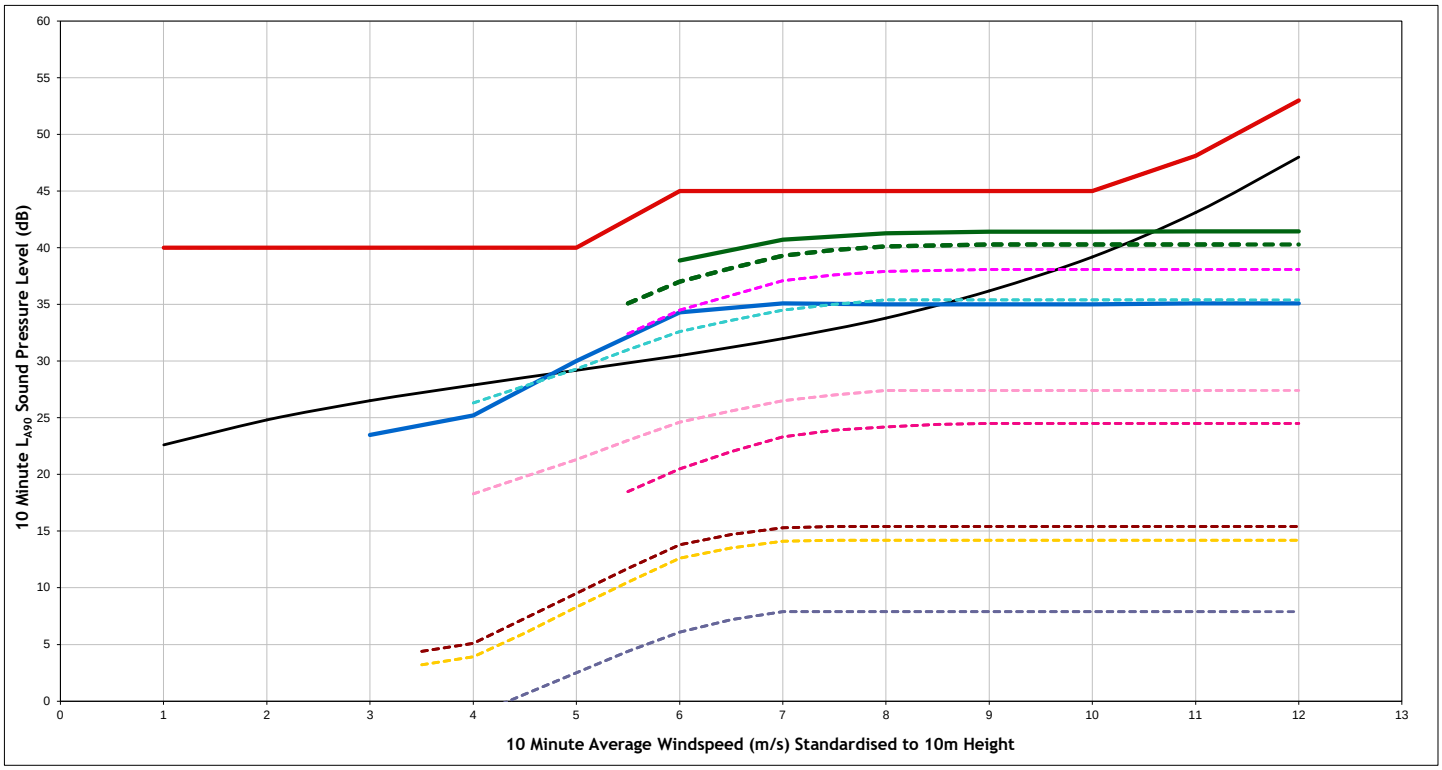
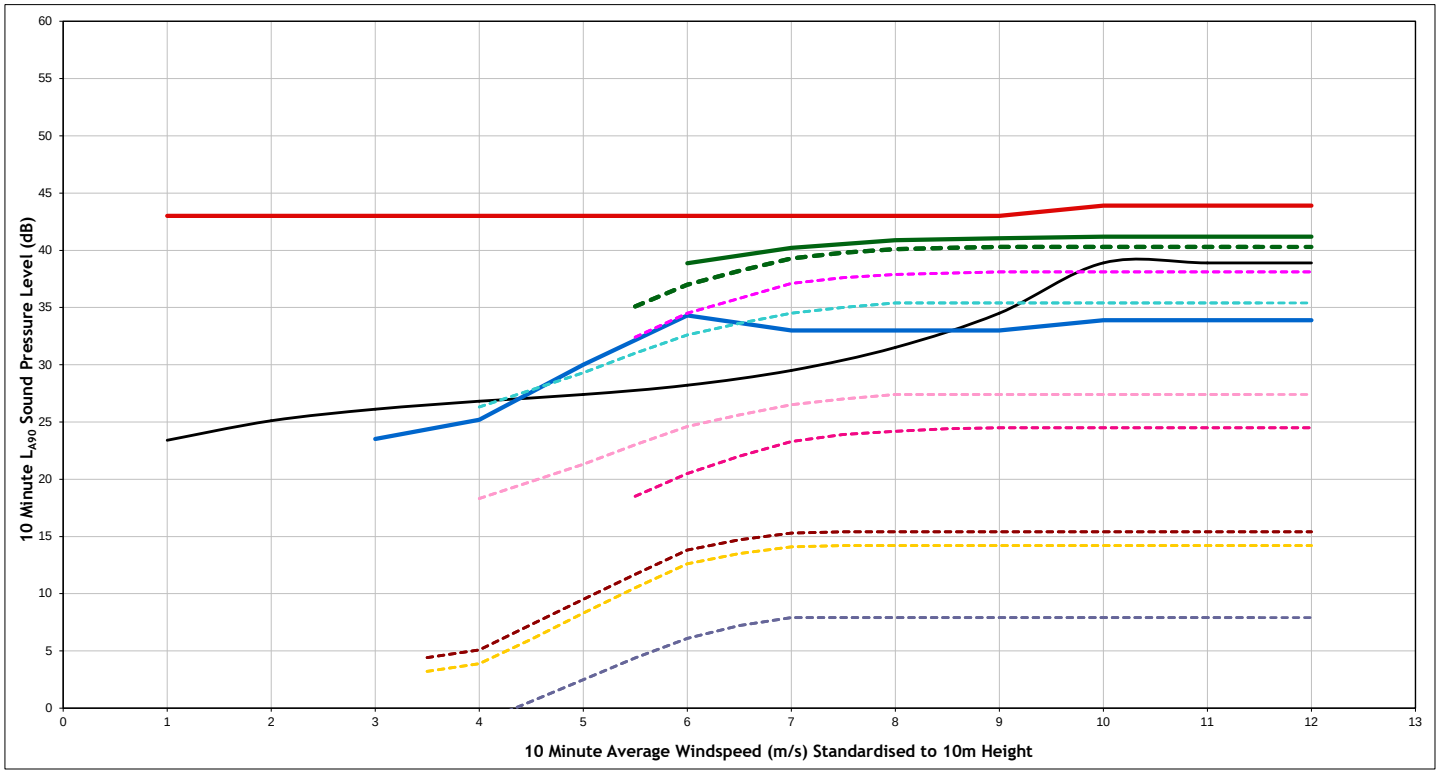
Daytime - NAL12 (H10)



Night Time - NAL12 (H10)



Legend:

- Background Noise Trendline
- Total WEDG 2006 Noise Limit
- Extended Cumulative (including Kilgarvan Repowering)
- Kilgarvan Repowering Only
- Cumulative (excluding Kilgarvan Repowering)
- Barnastooka Only
- Sillahertane Only
- Grousemount Only
- Midas Only
- Gortyrahilly Only
- Inchamore Only
- Derragh Only

Project	Proposed Repowering of Kilgarvan Wind Farm
Client	Orsted Onshore Ireland Midco Ltd
Title	Noise Assessment - Likely Predictions NAL12 (H10)
Figure Number	Figure A1.3l
Scale	NTS
Drawn	JB
Checked	JM
Date	14/04/2023
Document Reference	IE00065-015-Op Noise Models

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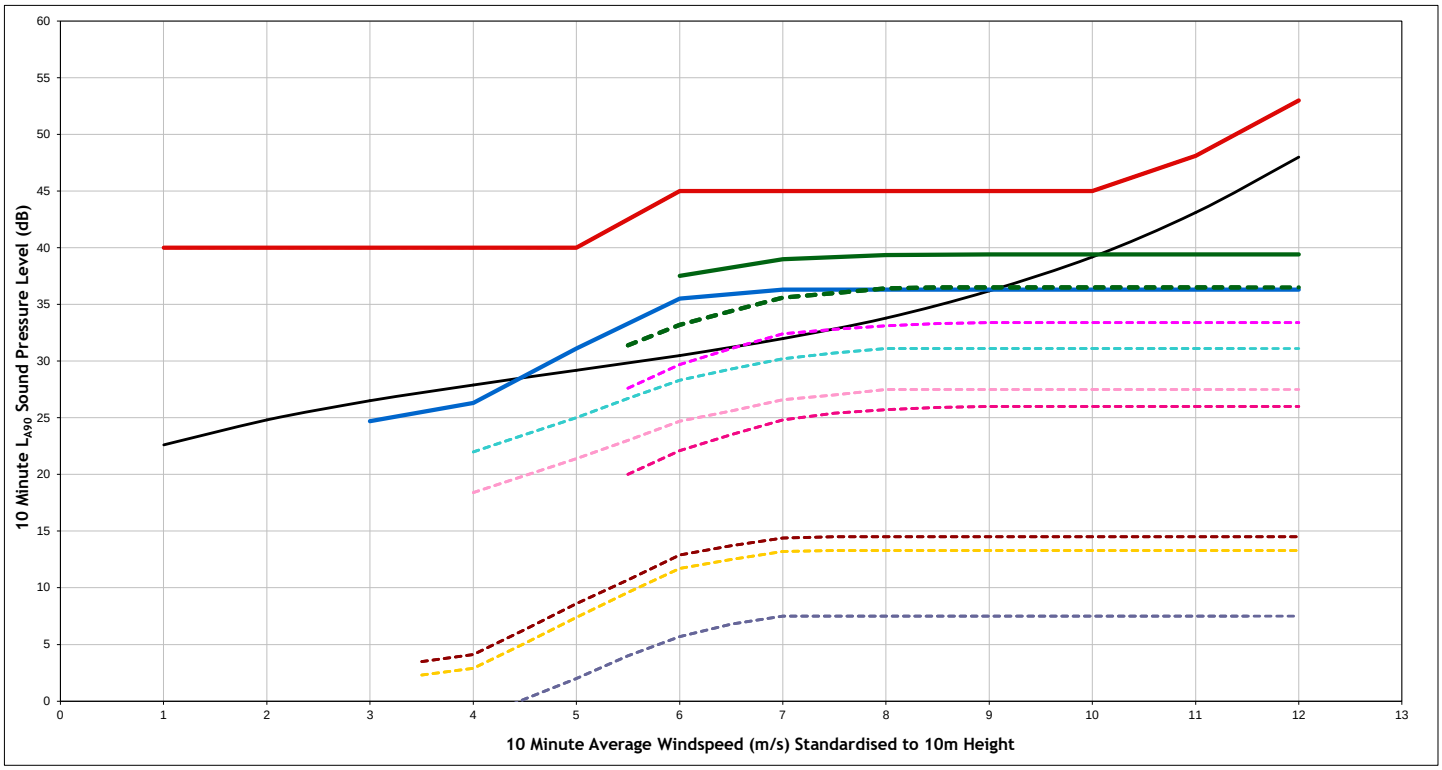
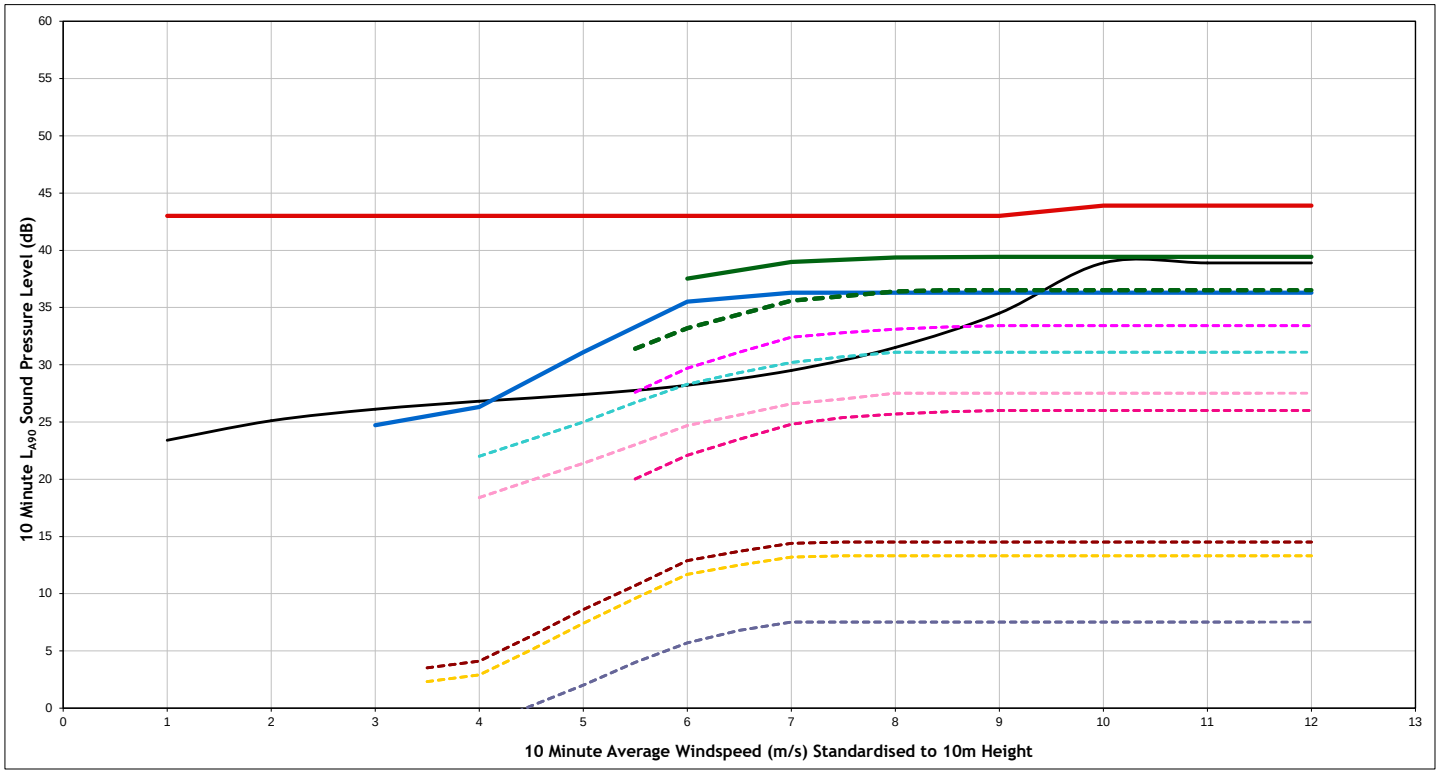
Daytime - NAL13 (H7)



Night Time - NAL13 (H7)



Legend:

- Background Noise Trendline
- Total WEDG 2006 Noise Limit
- Extended Cumulative (including Kilgarvan Repowering)
- Kilgarvan Repowering Only
- Cumulative (excluding Kilgarvan Repowering)
- Barnastooka Only
- Sillahertane Only
- Grousemount Only
- Midas Only
- Gortyrahilly Only
- Inchamore Only
- Derragh Only

Project	Proposed Repowering of Kilgarvan Wind Farm
Client	Orsted Onshore Ireland Midco Ltd
Title	Noise Assessment - Likely Predictions NAL13 (H7)
Figure Number	Figure A1.3m
Scale	NTS
Drawn	JB
Checked	JM
Date	14/04/2023
Document Reference	IE00065-015-Op Noise Models

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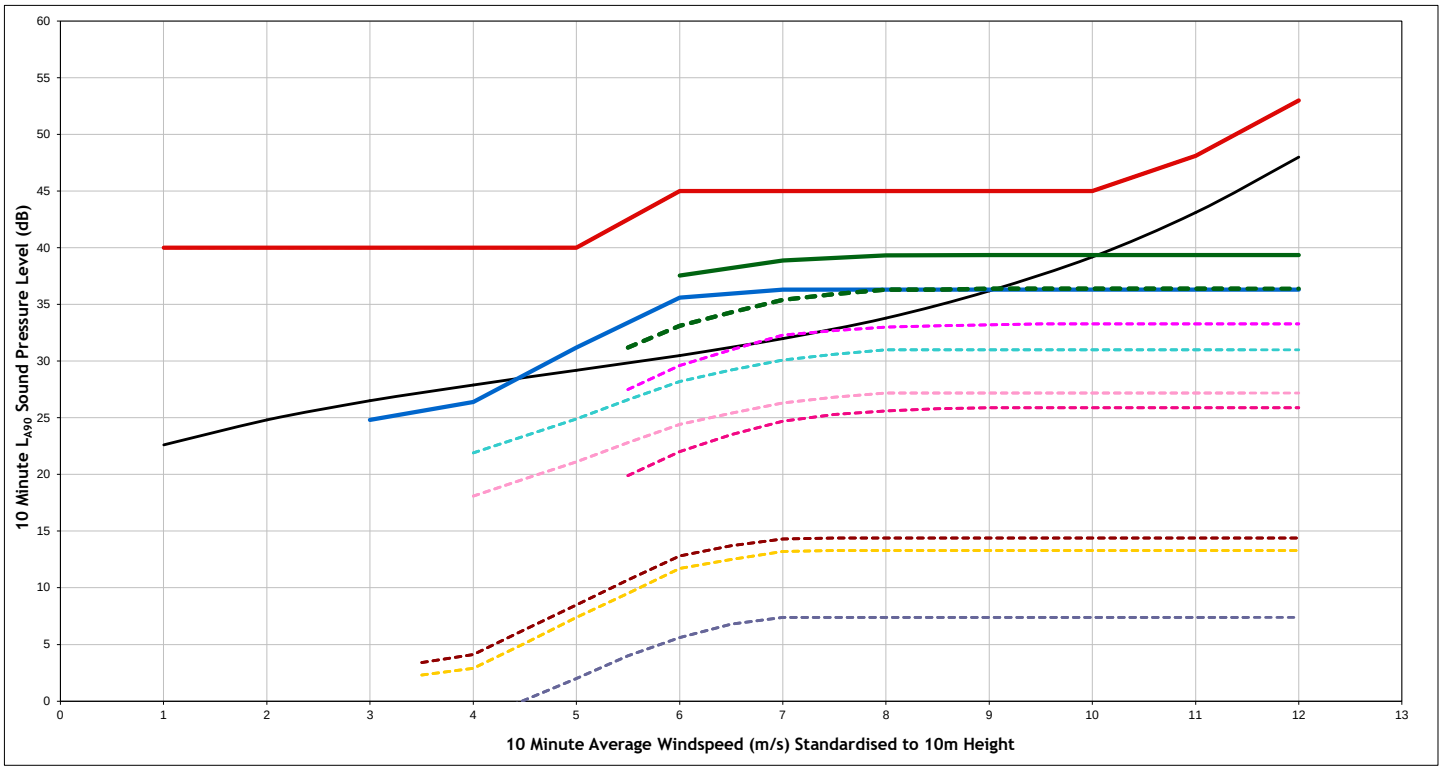
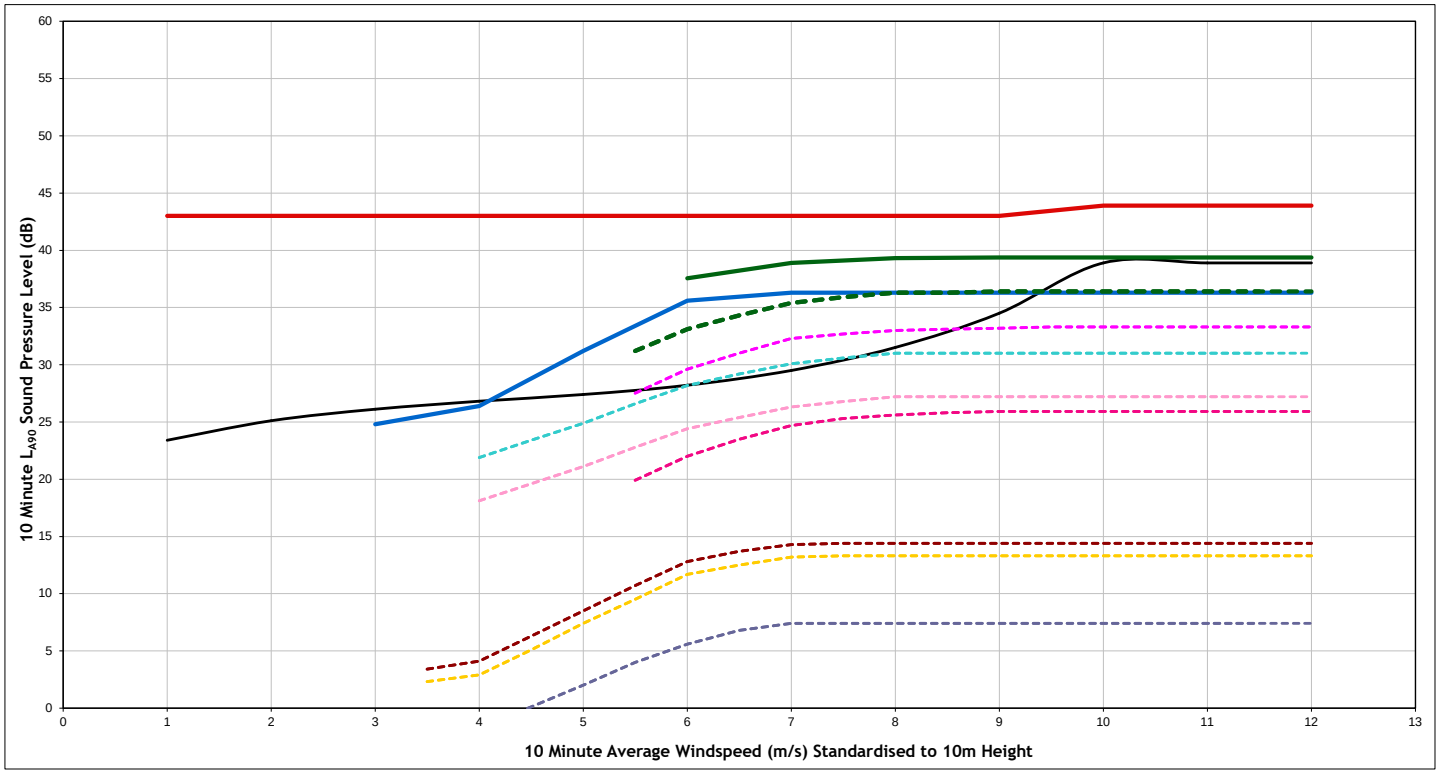
Daytime - NAL14 (H8)



Night Time - NAL14 (H8)



Legend:

- Background Noise Trendline
- Total WEDG 2006 Noise Limit
- Extended Cumulative (including Kilgarvan Repowering)
- Kilgarvan Repowering Only
- Cumulative (excluding Kilgarvan Repowering)
- Barnastooka Only
- Sillahertane Only
- Grousemount Only
- Midas Only
- Gortyrahilly Only
- Inchamore Only
- Derragh Only

Project	Proposed Repowering of Kilgarvan Wind Farm
Client	Orsted Onshore Ireland Midco Ltd
Title	Noise Assessment - Likely Predictions
	NAL14 (H8)
Figure Number	Figure A1.3n
Scale	NTS
Drawn	JB
Checked	JM
Date	14/04/2023
Document Reference	IE00065-015-Op Noise Models

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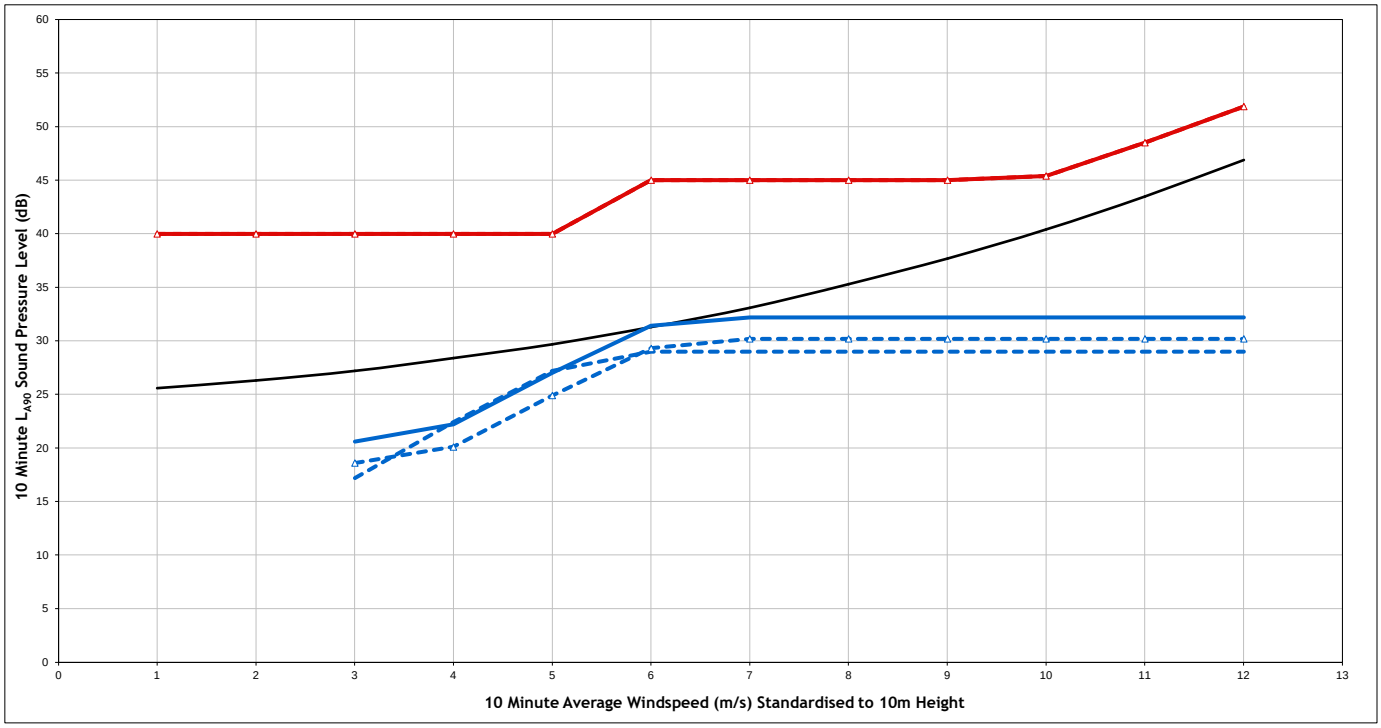
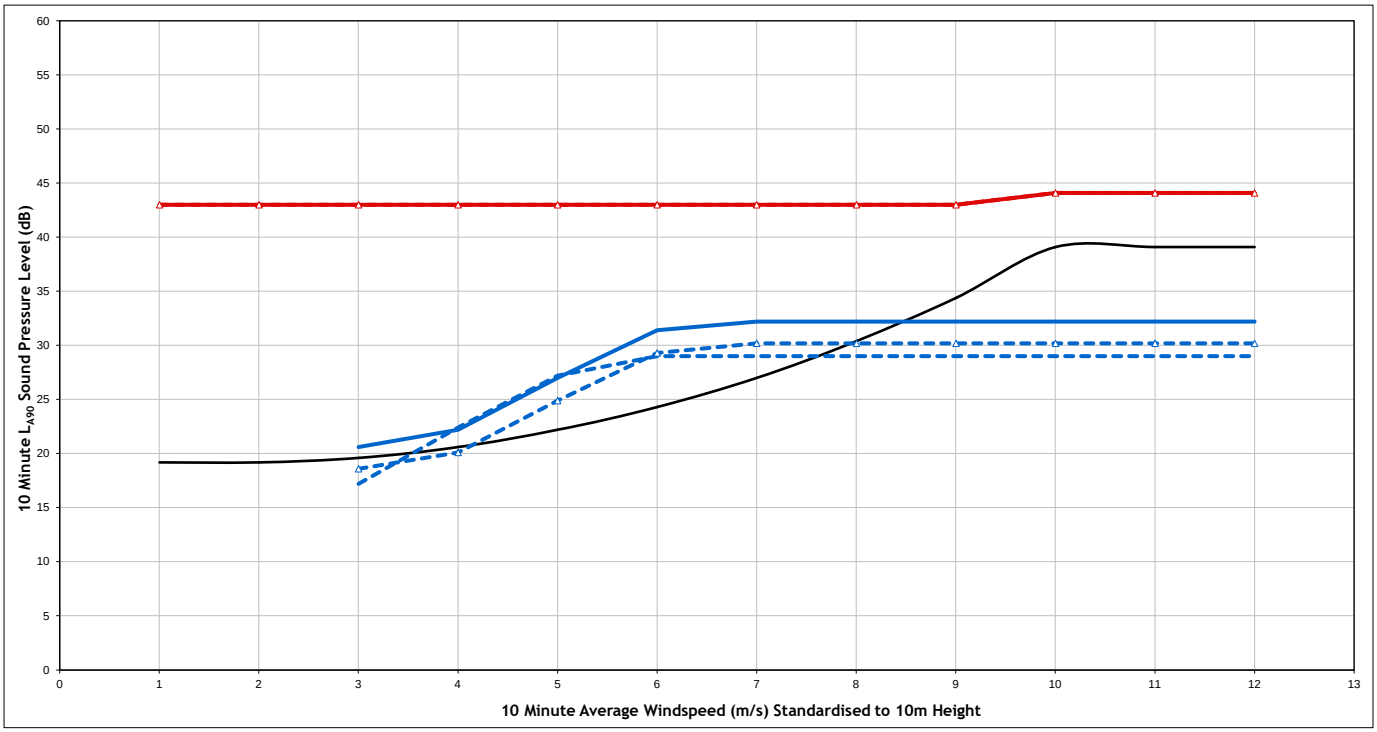
Figures A1.4 – Site Specific Noise Predictions

Daytime - NAL1 (H14)



Night Time - NAL1 (H14)

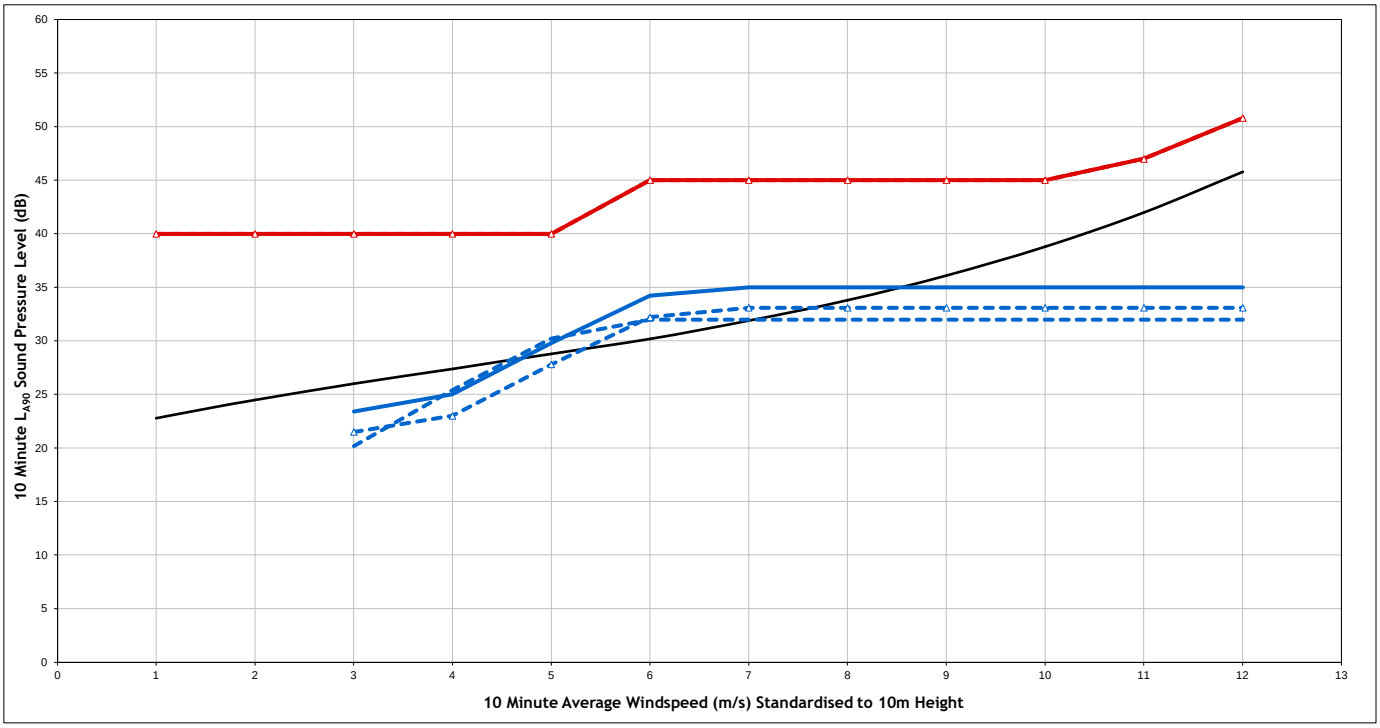


Legend:

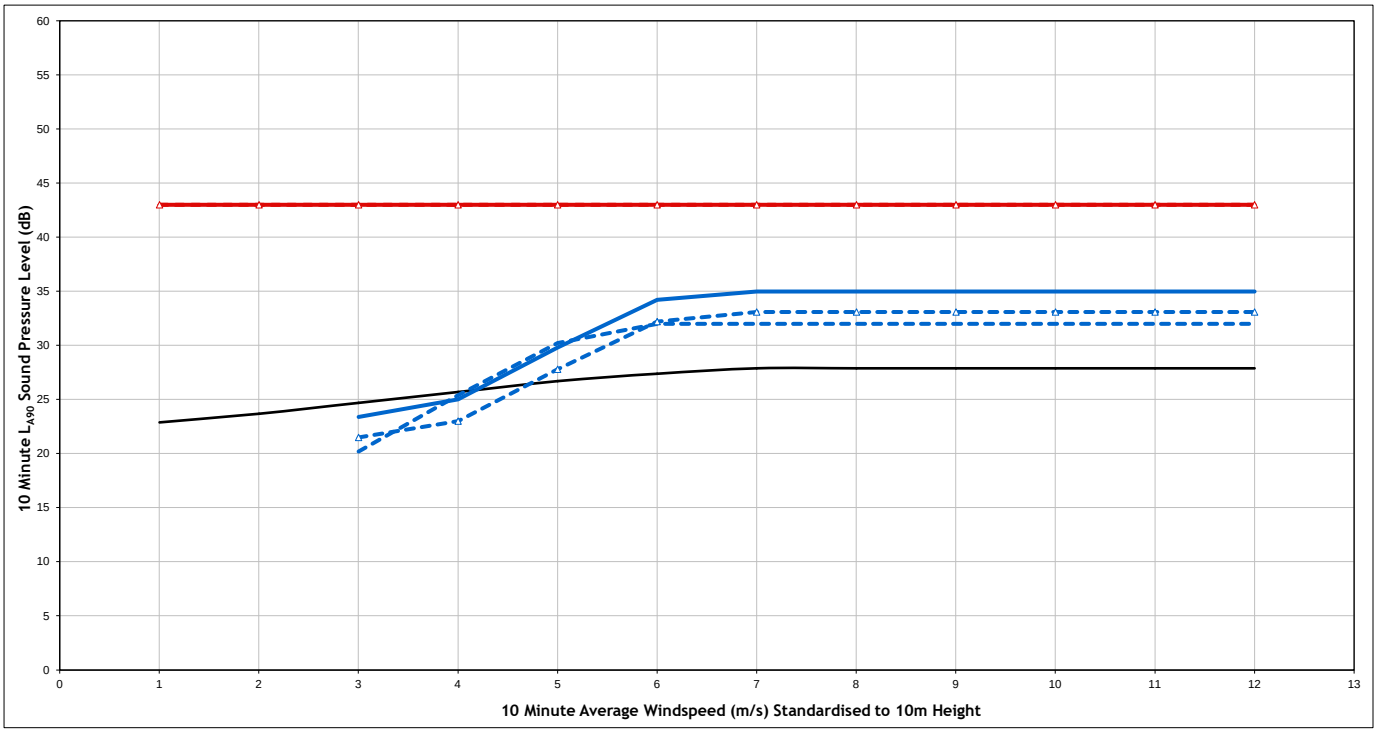
- Background Noise Trendline
- Total WEDG 2006 Noise Limit
- Site Specific Limits
- Kilgarvan Repowering Only - Nordex N163
- Kilgarvan Repowering Only - Siemens Gamesa SG 6.6 155
- Kilgarvan Repowering Only - Nordex N149

Project	Proposed Repowering of Kilgarvan Wind Farm
Client	Orsted Onshore Ireland Midco Ltd
Title	Noise Assessment - Site Specific Noise Predictions NAL1 (H14)
Figure Number	Figure A1.4a
Scale	NTS
Drawn	JB
Checked	JM
Date	14/04/2023
Document Reference	IE00065-015-Op Noise Models

Daytime - NAL2 (H9)



Night Time - NAL2 (H9)



Legend:

- Background Noise Trendline
- Total WEDG 2006 Noise Limit
- Site Specific Limits
- Kilgarvan Repowering Only - Nordex N163
- Kilgarvan Repowering Only - Siemens Gamesa SG 6.6 155
- Kilgarvan Repowering Only - Nordex N149

Project	Proposed Repowering of Kilgarvan Wind Farm
Client	Orsted Onshore Ireland Midco Ltd
Title	Noise Assessment - Site Specific Noise Predictions NAL2 (H9)
Figure Number	Figure A1.4b
Scale	NTS
Drawn	JB
Checked	JM
Date	14/04/2023
Document Reference	IE00065-015-Op Noise Models

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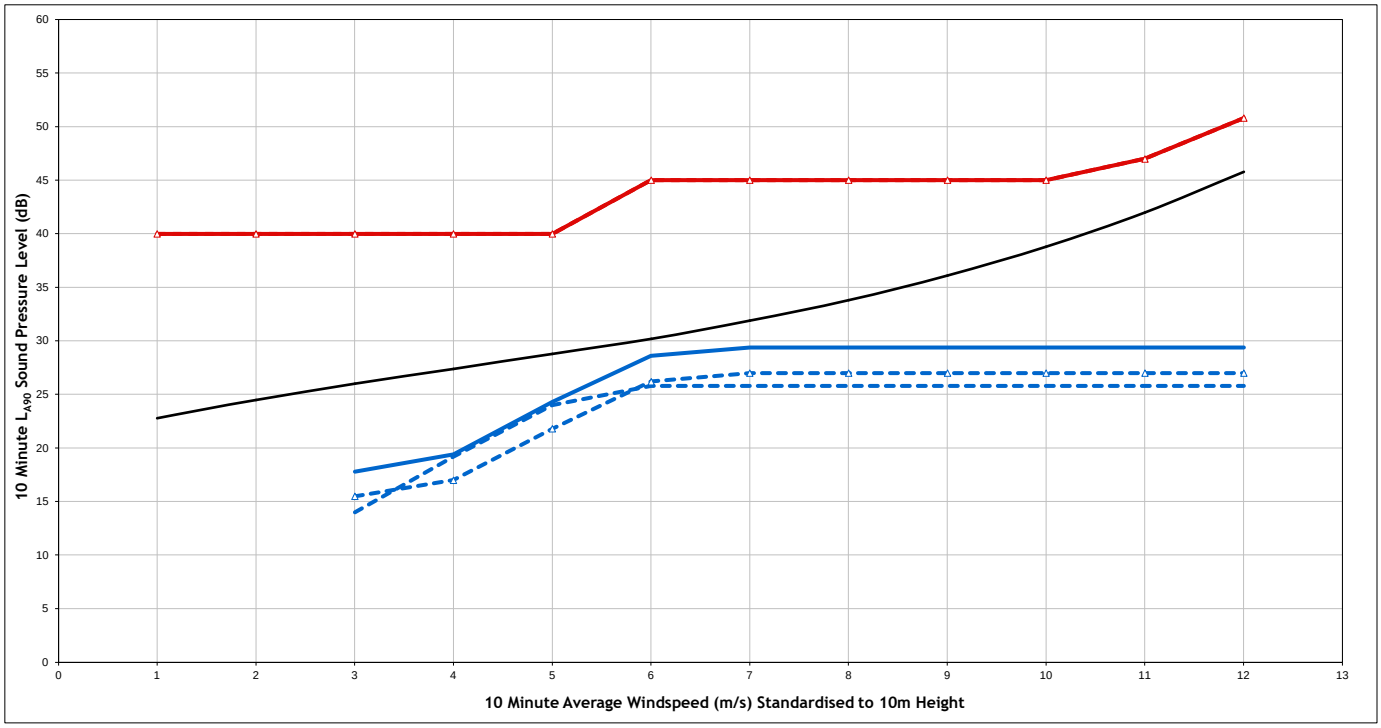
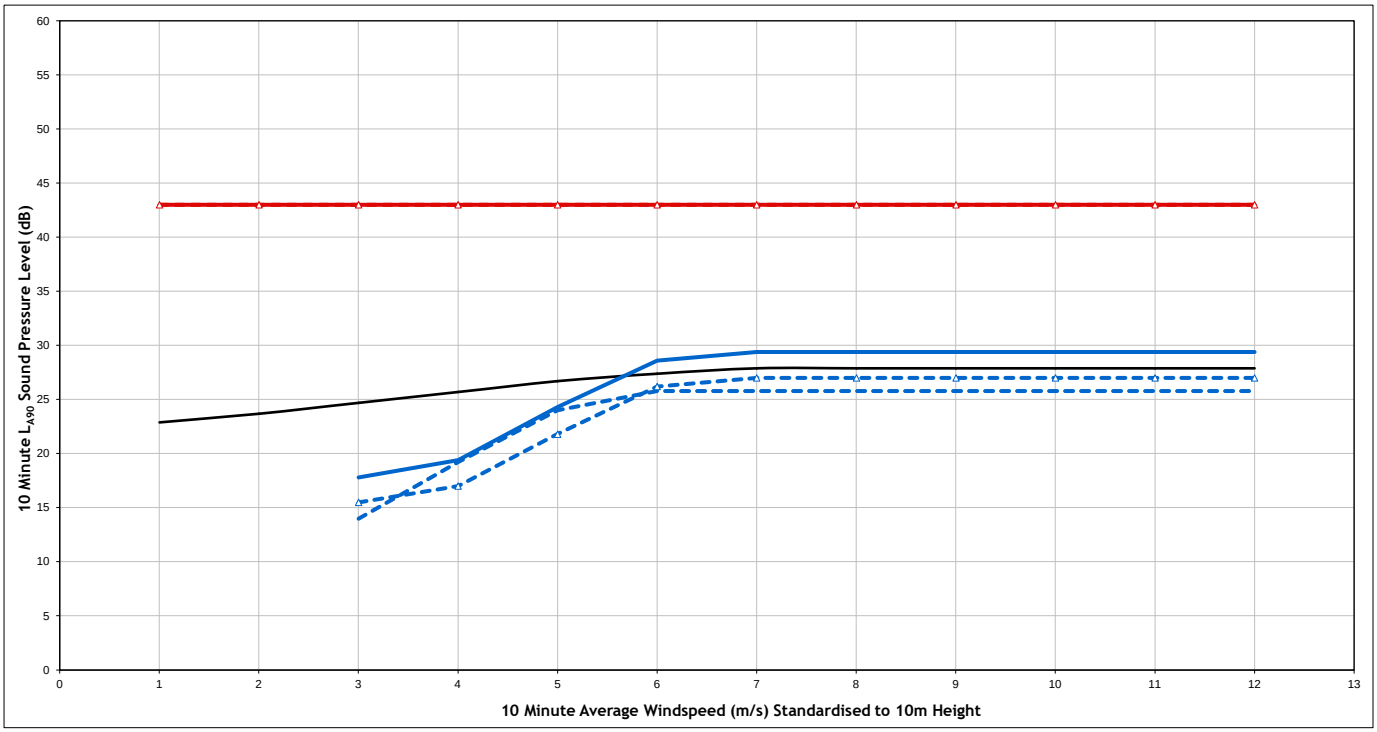
Daytime - NAL3 (H97)



Night Time - NAL3 (H97)



Legend:

- Background Noise Trendline
- Total WEDG 2006 Noise Limit
- Site Specific Limits
- Kilgarvan Repowering Only - Nordex N163
- Kilgarvan Repowering Only - Siemens Gamesa SG 6.6 155
- Kilgarvan Repowering Only - Nordex N149

Project	Proposed Repowering of Kilgarvan Wind Farm
Client	Orsted Onshore Ireland Midco Ltd
Title	Noise Assessment - Site Specific Noise Predictions NAL3 (H97)
Figure Number	Figure A1.4c
Scale	NTS
Drawn	JB
Checked	JM
Date	14/04/2023
Document Reference	IE00065-015-Op Noise Models

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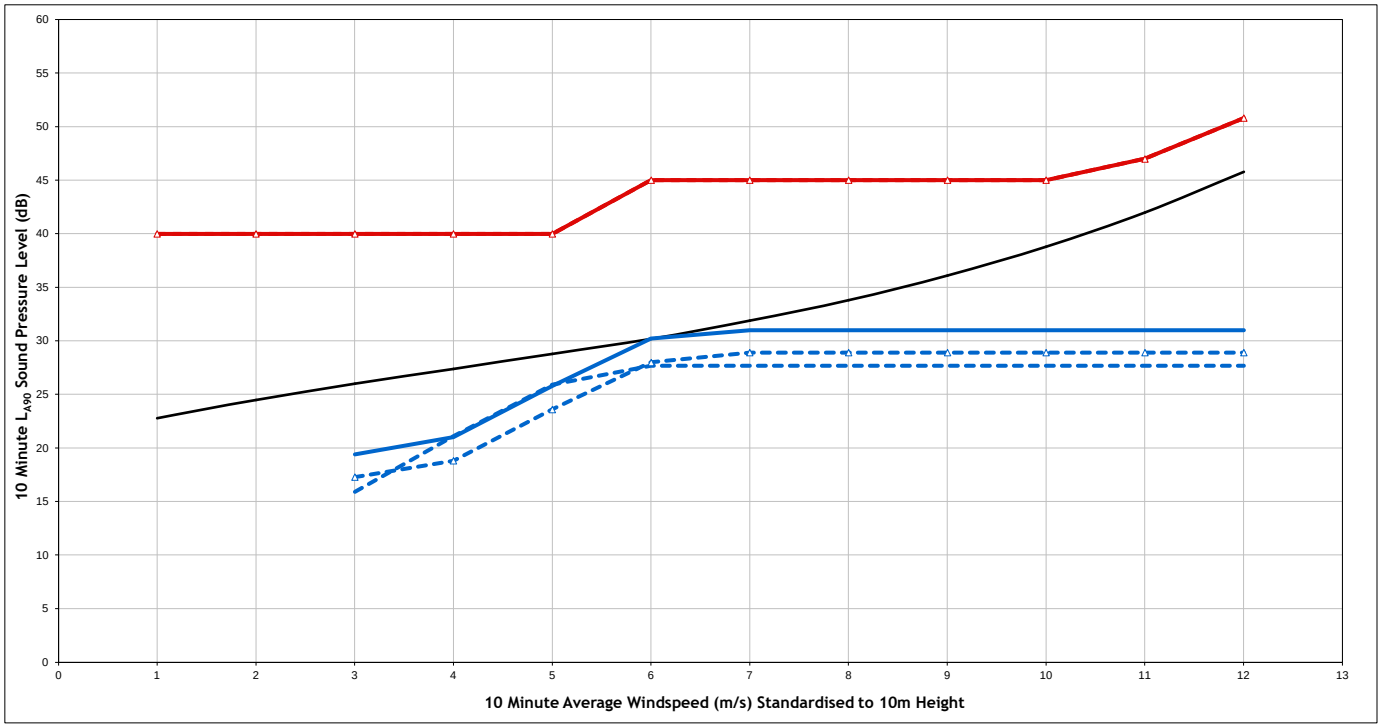
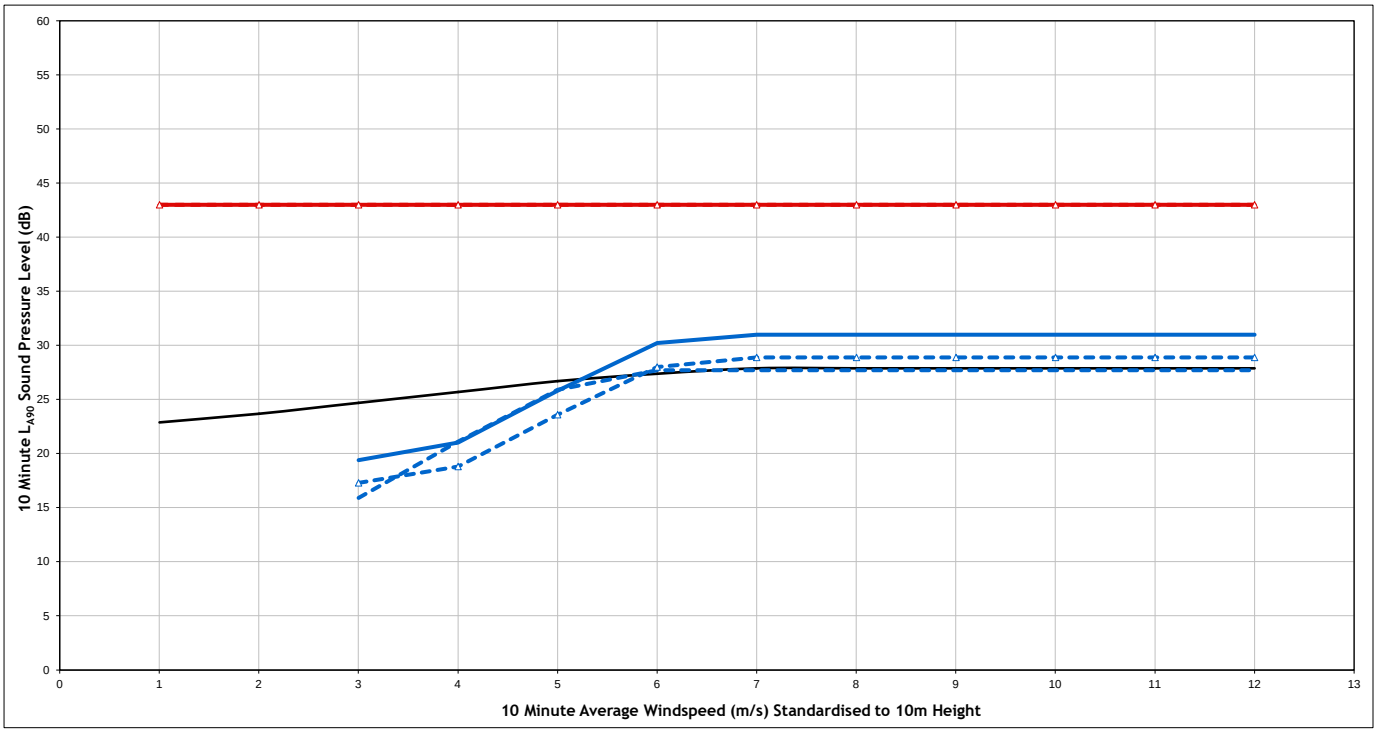
Daytime - NAL4 (H17)



Night Time - NAL4 (H17)



Legend:

- Background Noise Trendline
- Total WEDG 2006 Noise Limit
- Site Specific Limits
- Kilgarvan Repowering Only - Nordex N163
- Kilgarvan Repowering Only - Siemens Gamesa SG 6.6 155
- Kilgarvan Repowering Only - Nordex N149

Project	Proposed Repowering of Kilgarvan Wind Farm
Client	Orsted Onshore Ireland Midco Ltd
Title	Noise Assessment - Site Specific Noise Predictions NAL4 (H17)
Figure Number	Figure A1.4d
Scale	NTS
Drawn	JB
Checked	JM
Date	14/04/2023
Document Reference	IE00065-015-Op Noise Models

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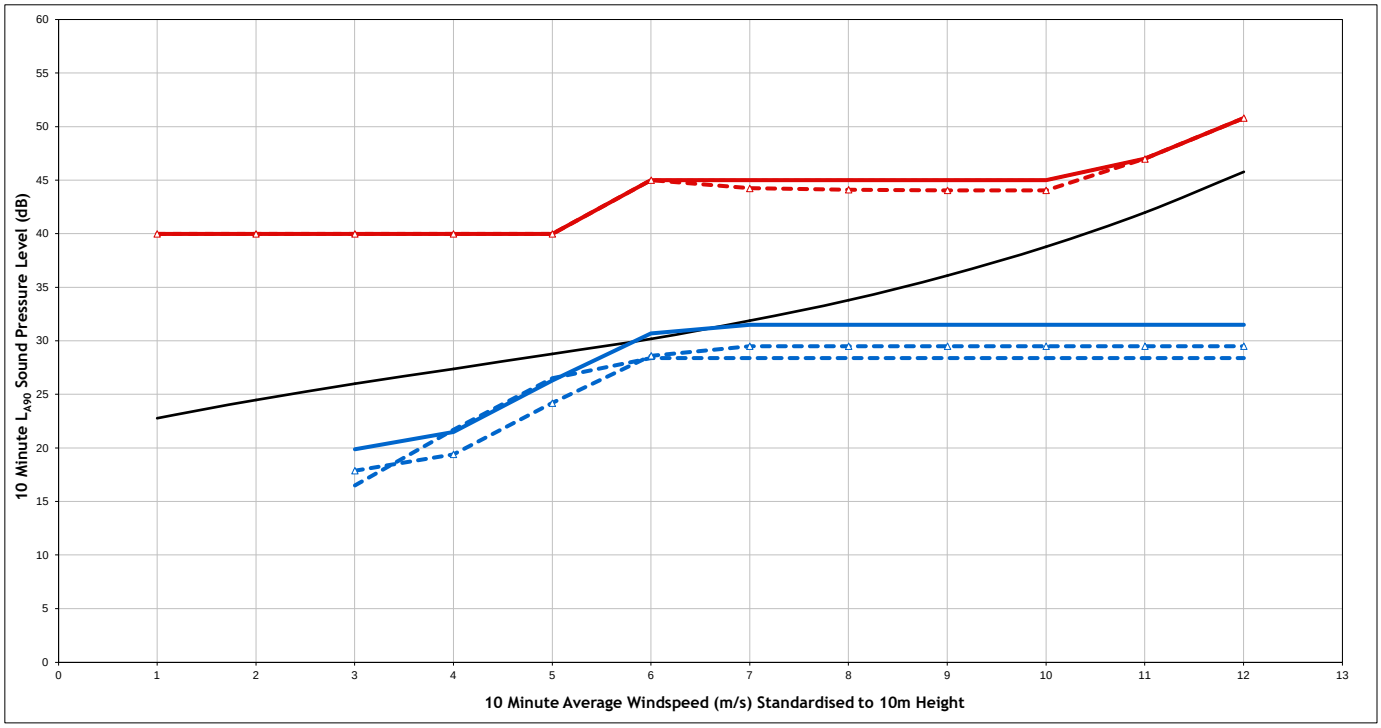
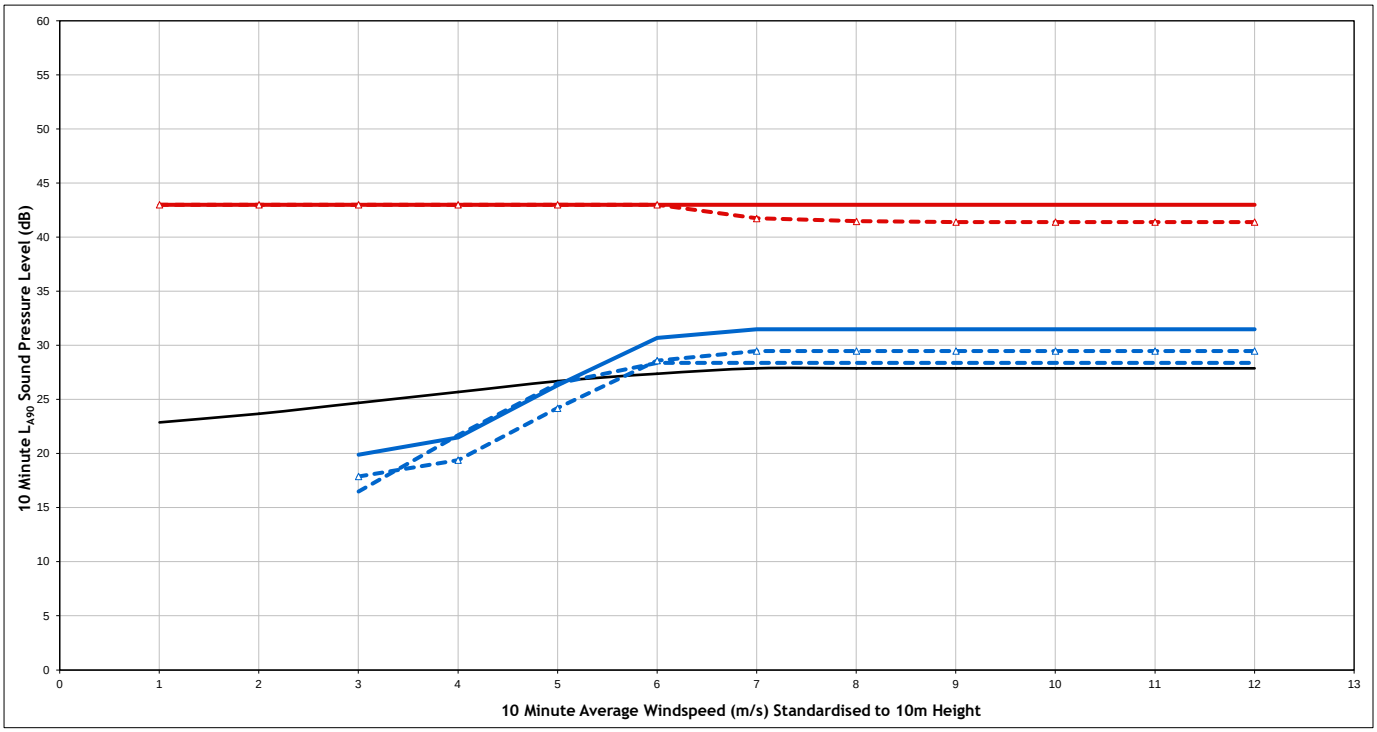
Daytime - NAL5 (H16)



Night Time - NAL5 (H16)



Legend:

- Background Noise Trendline
- Total WEDG 2006 Noise Limit
- Site Specific Limits
- Kilgarvan Repowering Only - Nordex N163
- Kilgarvan Repowering Only - Siemens Gamesa SG 6.6 155
- Kilgarvan Repowering Only - Nordex N149

Project	Proposed Repowering of Kilgarvan Wind Farm
Client	Orsted Onshore Ireland Midco Ltd
Title	Noise Assessment - Site Specific Noise Predictions NAL5 (H16)
Figure Number	Figure A1.4e
Scale	NTS
Drawn	JB
Checked	JM
Date	14/04/2023
Document Reference	IE00065-015-Op Noise Models

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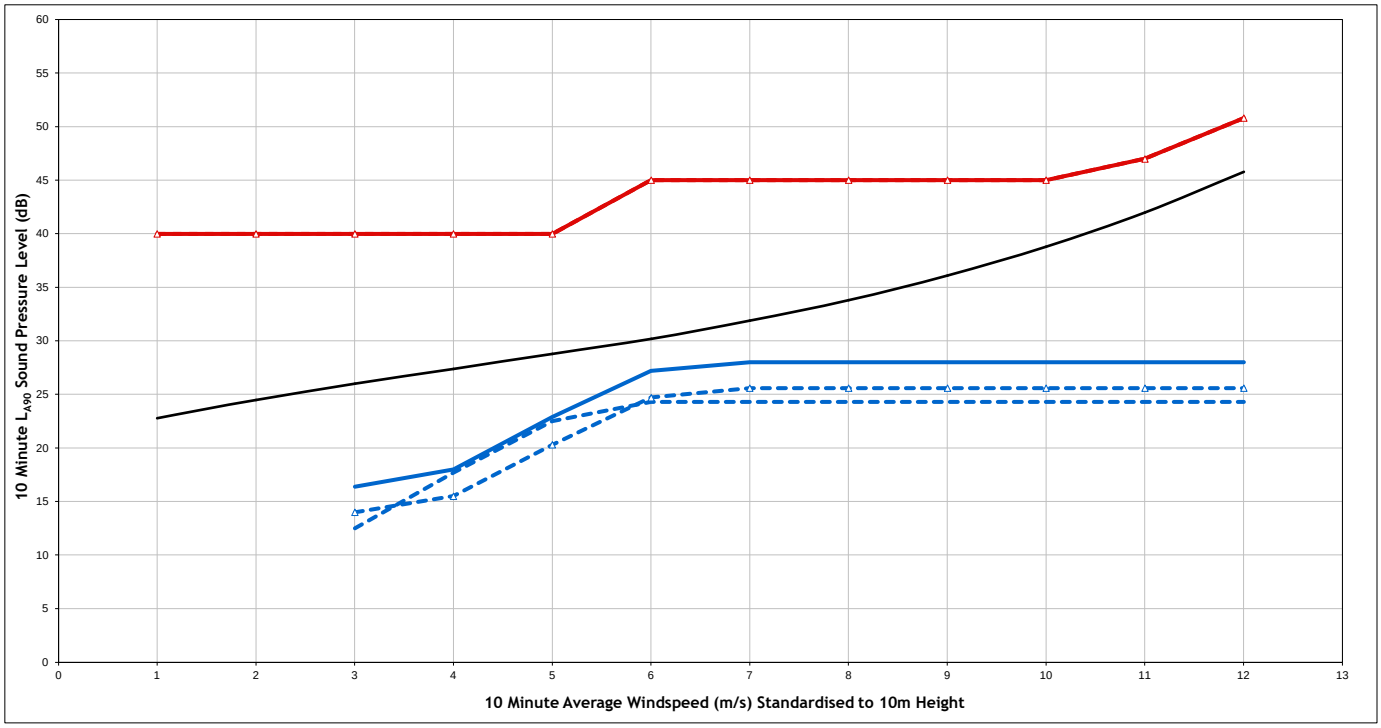
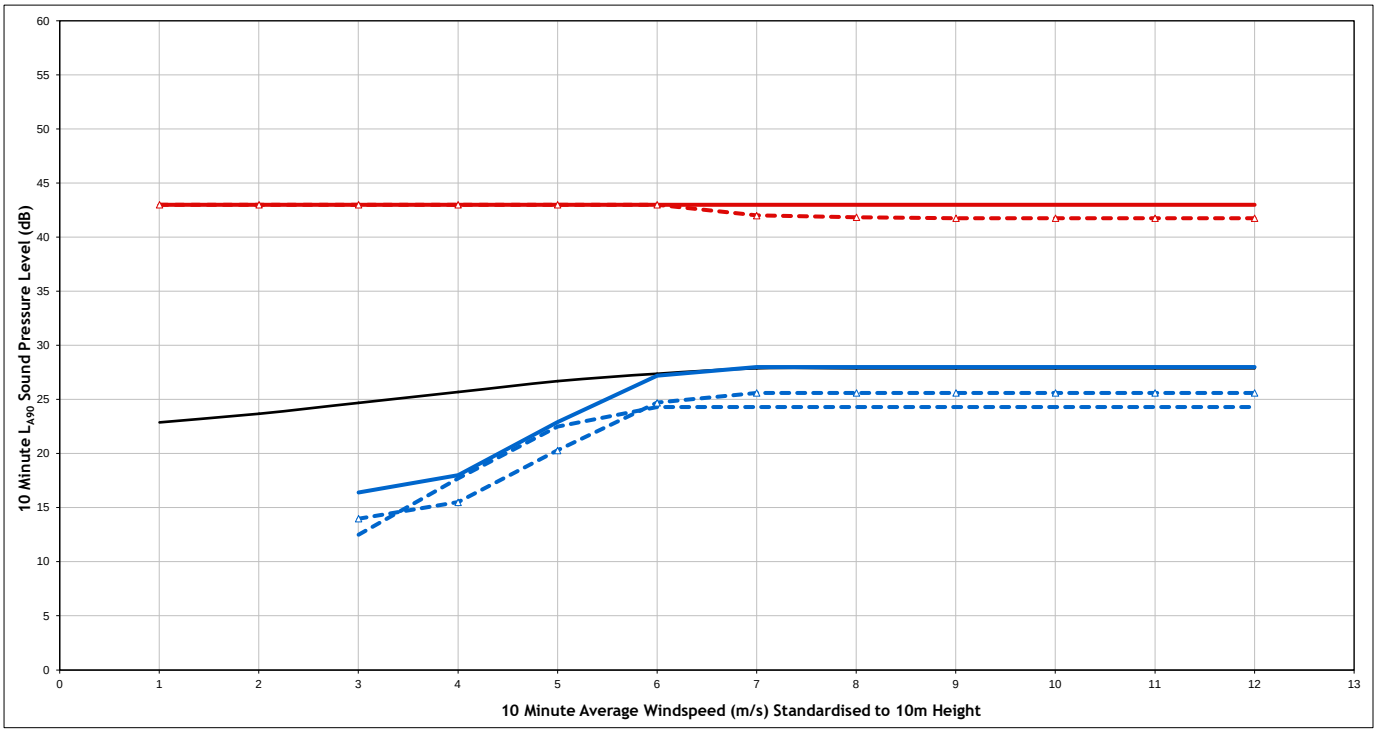
Daytime - NAL6 (H73)



Night Time - NAL6 (H73)



Legend:

- Background Noise Trendline
- Total WEDG 2006 Noise Limit
- Site Specific Limits
- Kilgarvan Repowering Only - Nordex N163
- Kilgarvan Repowering Only - Siemens Gamesa SG 6.6 155
- Kilgarvan Repowering Only - Nordex N149

Project	Proposed Repowering of Kilgarvan Wind Farm
Client	Orsted Onshore Ireland Midco Ltd
Title	Noise Assessment - Site Specific Noise Predictions NAL6 (H73)
Figure Number	Figure A1.4f
Scale	NTS
Drawn	JB
Checked	JM
Date	14/04/2023
Document Reference	IE00065-015-Op Noise Models

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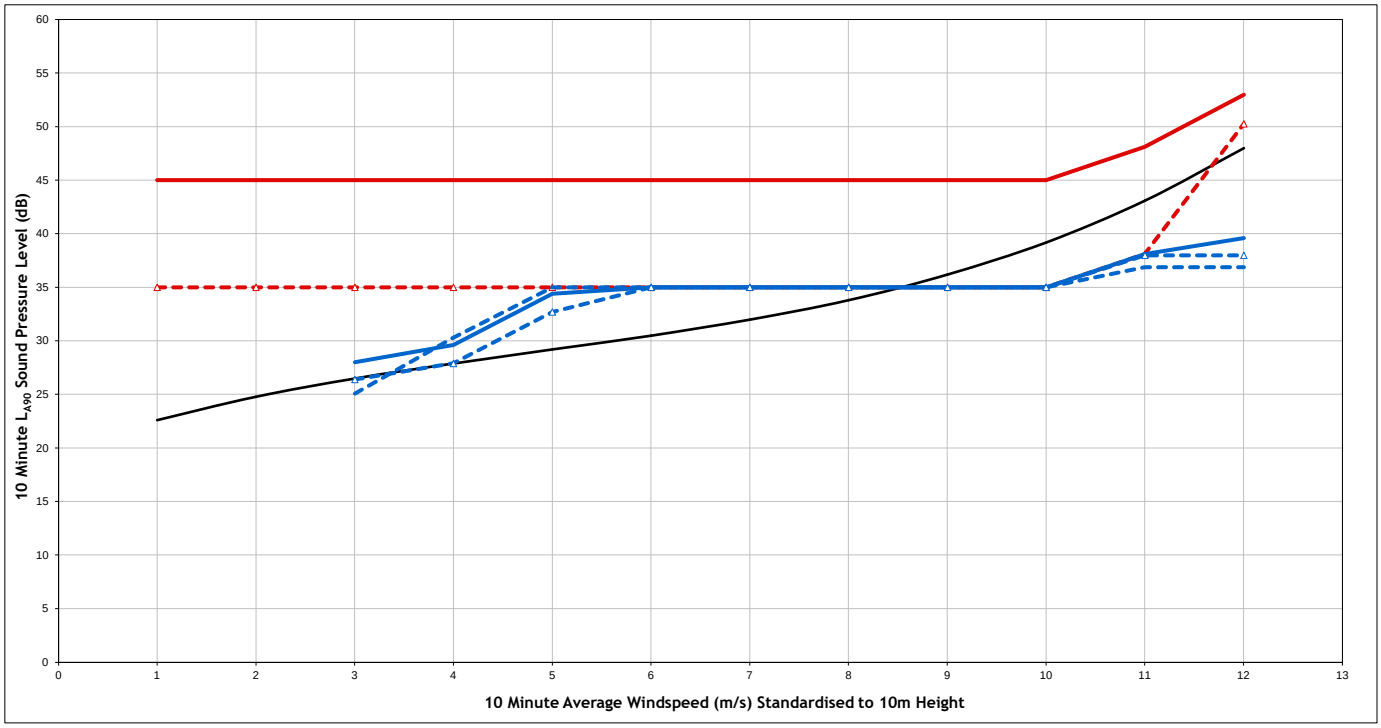
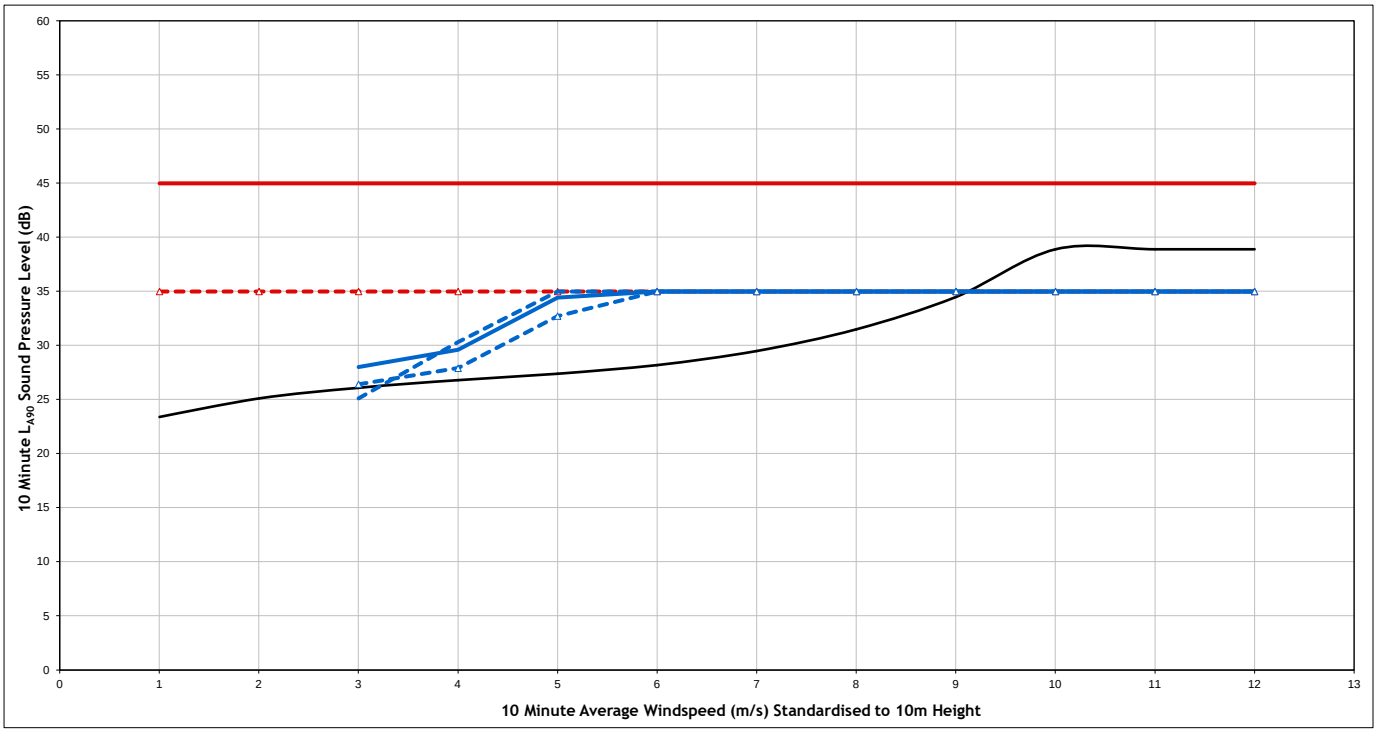
Daytime - NAL7 (H1)



Night Time - NAL7 (H1)



Legend:

- Background Noise Trendline
- Total WEDG 2006 Noise Limit
- Site Specific Limits
- Kilgarvan Repowering Only - Nordex N163
- Kilgarvan Repowering Only - Siemens Gamesa SG 6.6 155
- Kilgarvan Repowering Only - Nordex N149

Project	Proposed Repowering of Kilgarvan Wind Farm
Client	Orsted Onshore Ireland Midco Ltd
Title	Noise Assessment - Site Specific Noise Predictions NAL7 (H1)
Figure Number	Figure A1.4g
Scale	NTS
Drawn	JB
Checked	JM
Date	14/04/2023
Document Reference	IE00065-015-Op Noise Models

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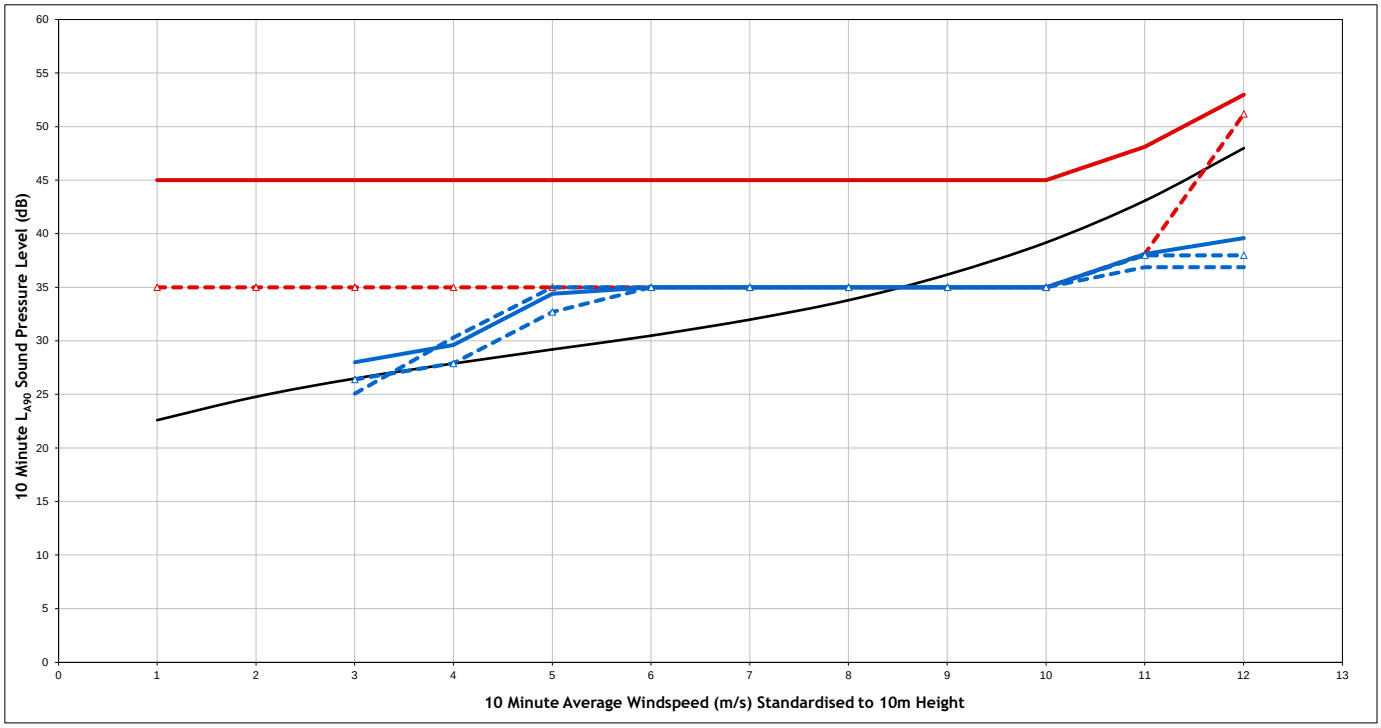
Daytime - NAL8 (H2)



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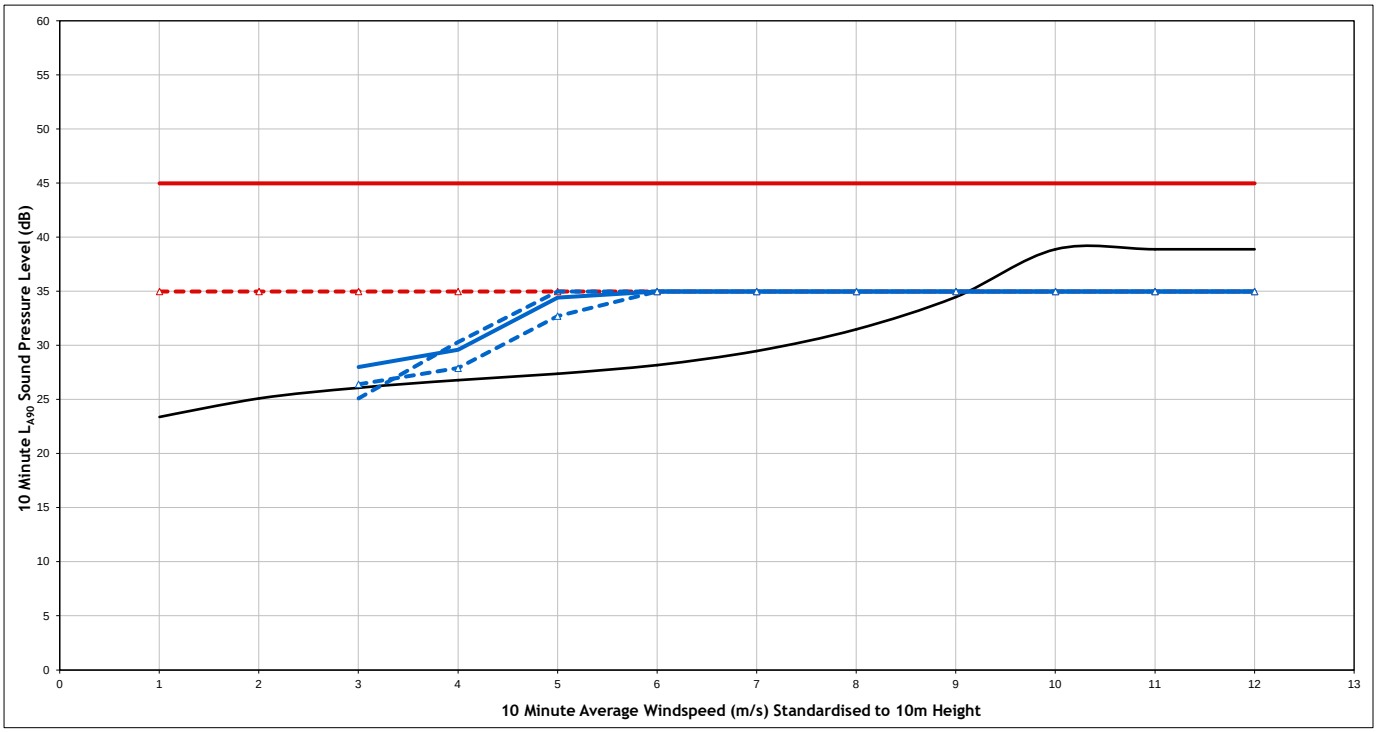

Legend:

- Background Noise Trendline
- Total WEDG 2006 Noise Limit
- Site Specific Limits
- Kilgarvan Repowering Only - Nordex N163
- Kilgarvan Repowering Only - Siemens Gamesa SG 6.6 155
- Kilgarvan Repowering Only - Nordex N149

Project	Proposed Repowering of Kilgarvan Wind Farm
Client	Orsted Onshore Ireland Midco Ltd
Title	Noise Assessment - Site Specific Noise Predictions NAL8 (H2)
Figure Number	Figure A1.4h
Scale	NTS
Drawn	JB
Checked	JM
Date	14/04/2023
Document Reference	IE00065-015-Op Noise Models

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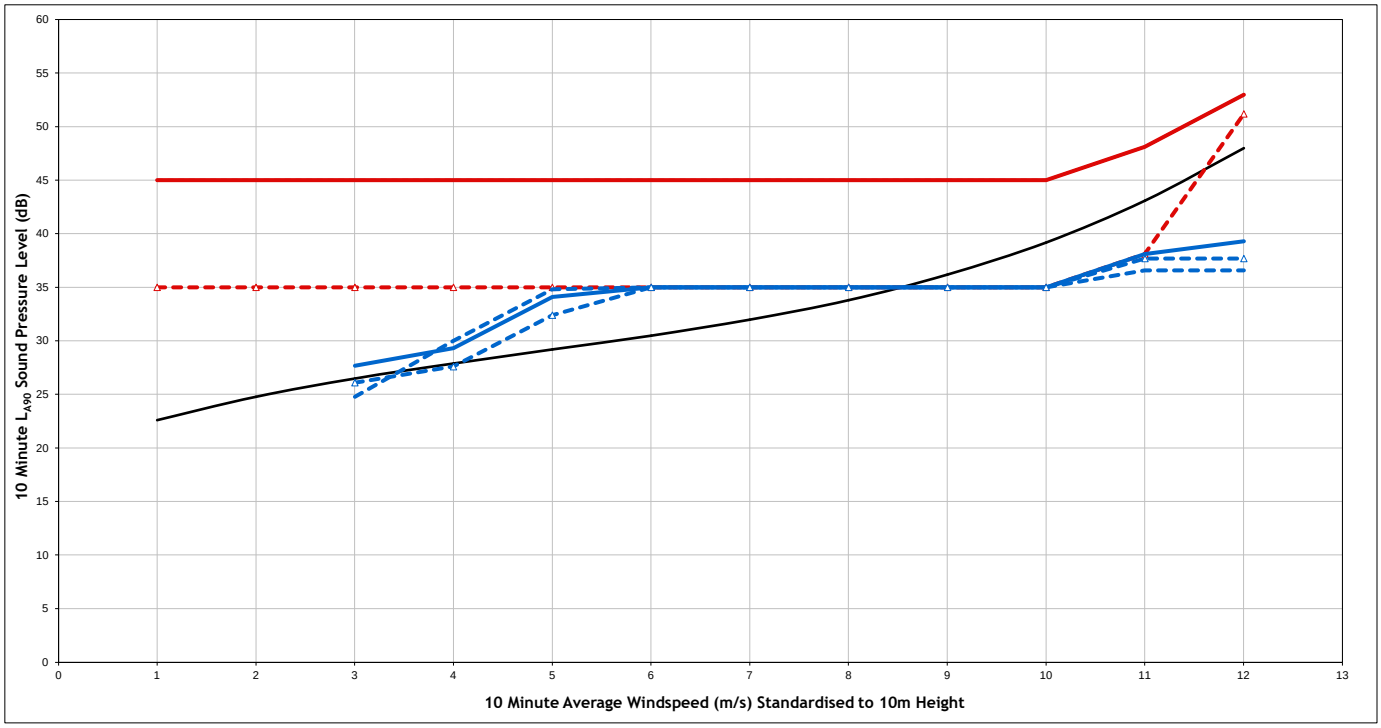
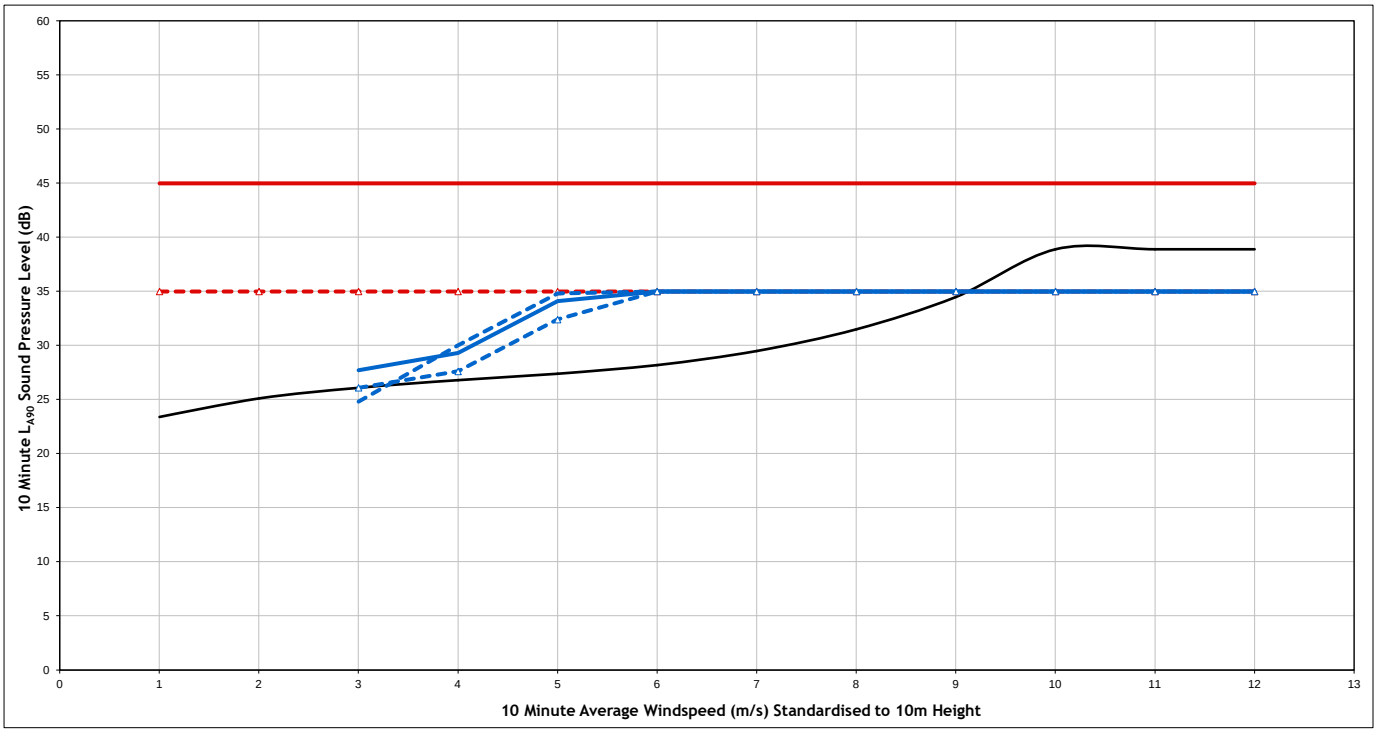
Daytime - NAL9 (H4)



Night Time - NAL9 (H4)



Legend:

- Background Noise Trendline
- Total WEDG 2006 Noise Limit
- Site Specific Limits
- Kilgarvan Repowering Only - Nordex N163
- Kilgarvan Repowering Only - Siemens Gamesa SG 6.6 155
- Kilgarvan Repowering Only - Nordex N149

Project	Proposed Repowering of Kilgarvan Wind Farm
Client	Orsted Onshore Ireland Midco Ltd
Title	Noise Assessment - Site Specific Noise Predictions NAL9 (H4)
Figure Number	Figure A1.4i
Scale	NTS
Drawn	JB
Checked	JM
Date	14/04/2023
Document Reference	IE00065-015-Op Noise Models

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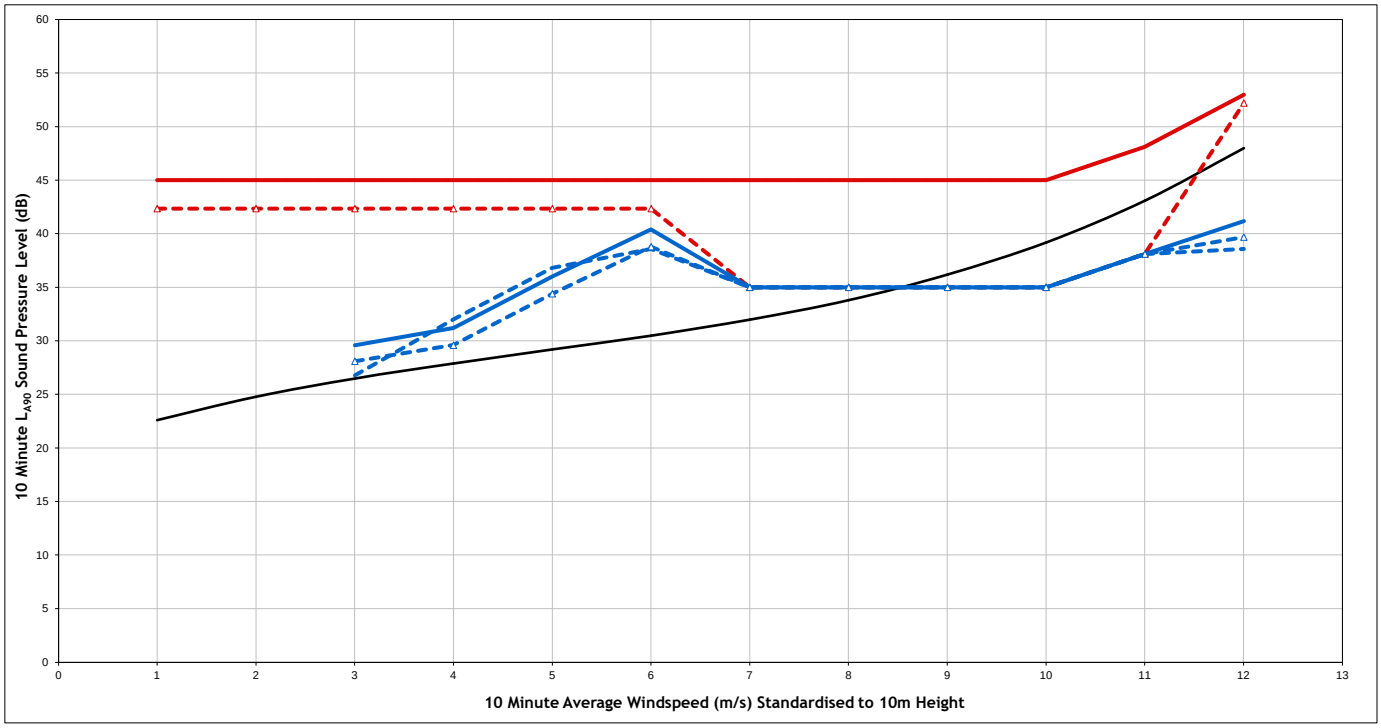
Daytime - NAL10 (H3)



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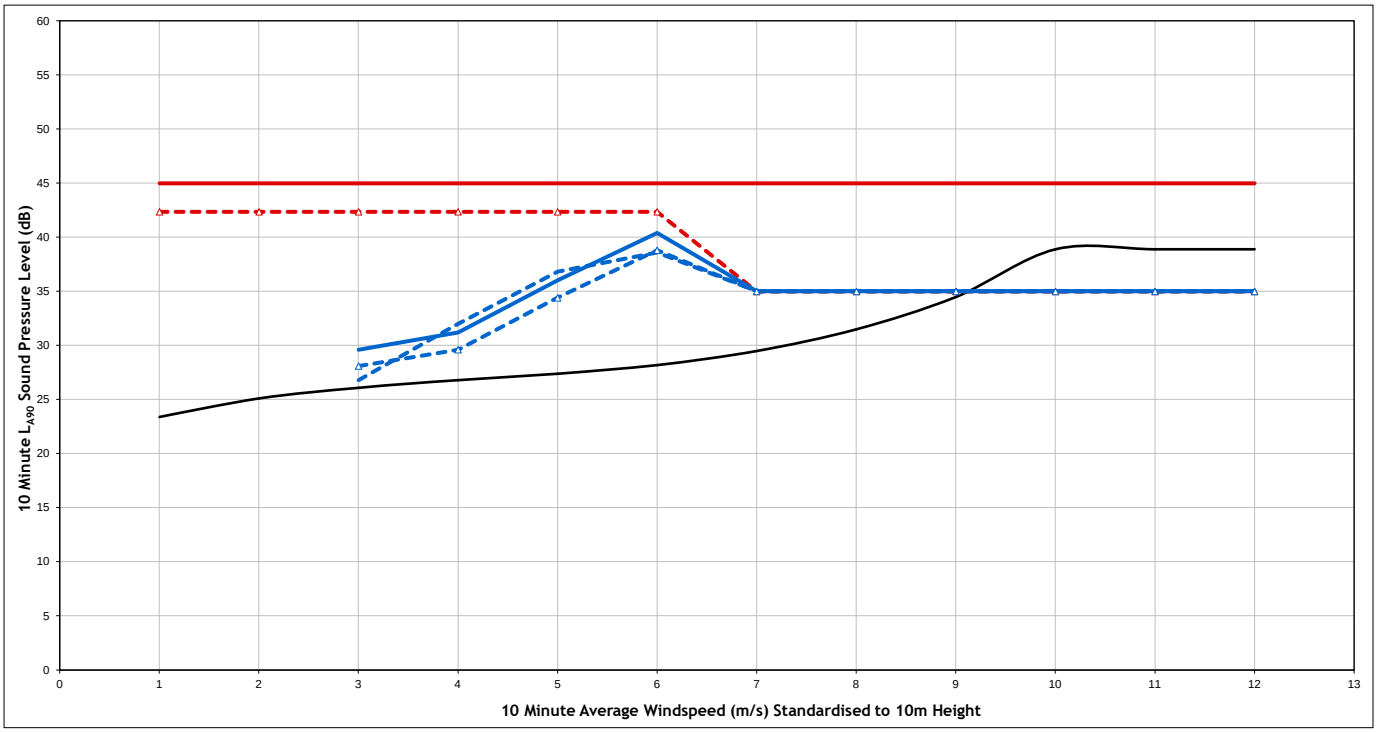
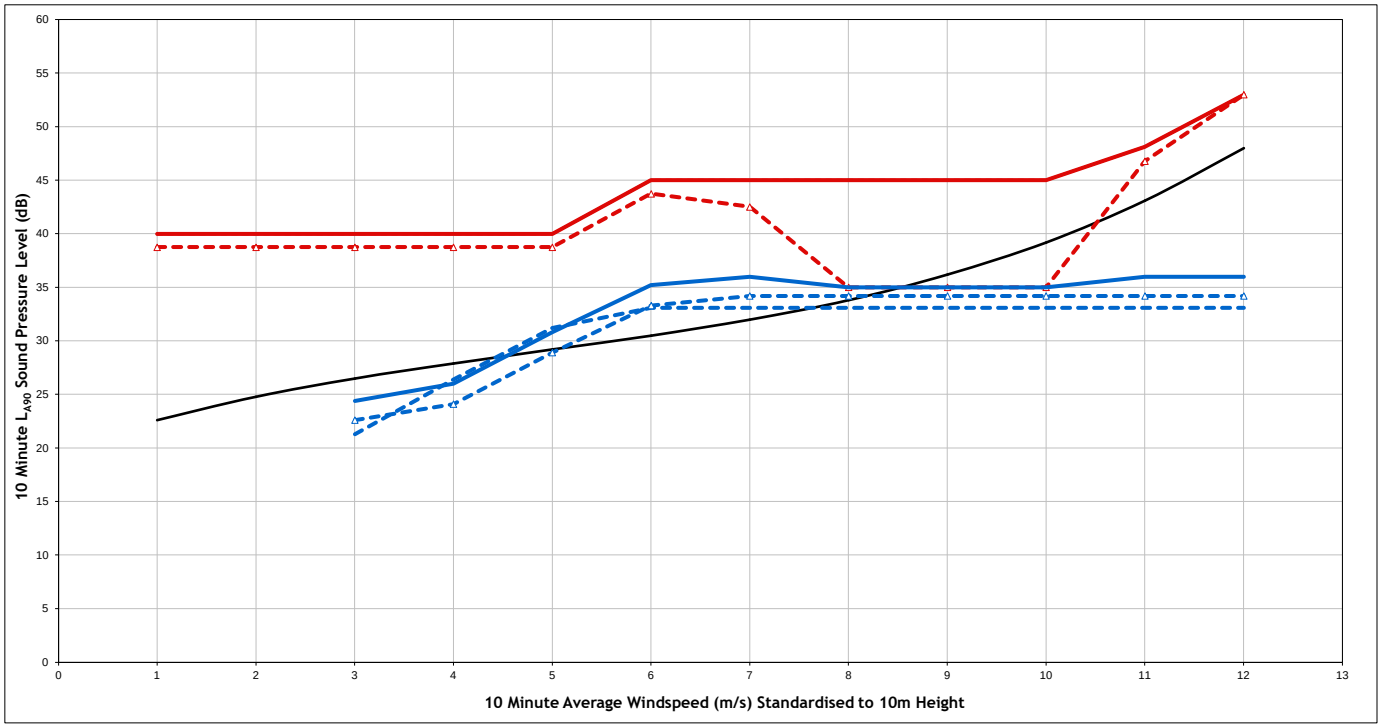


Legend:

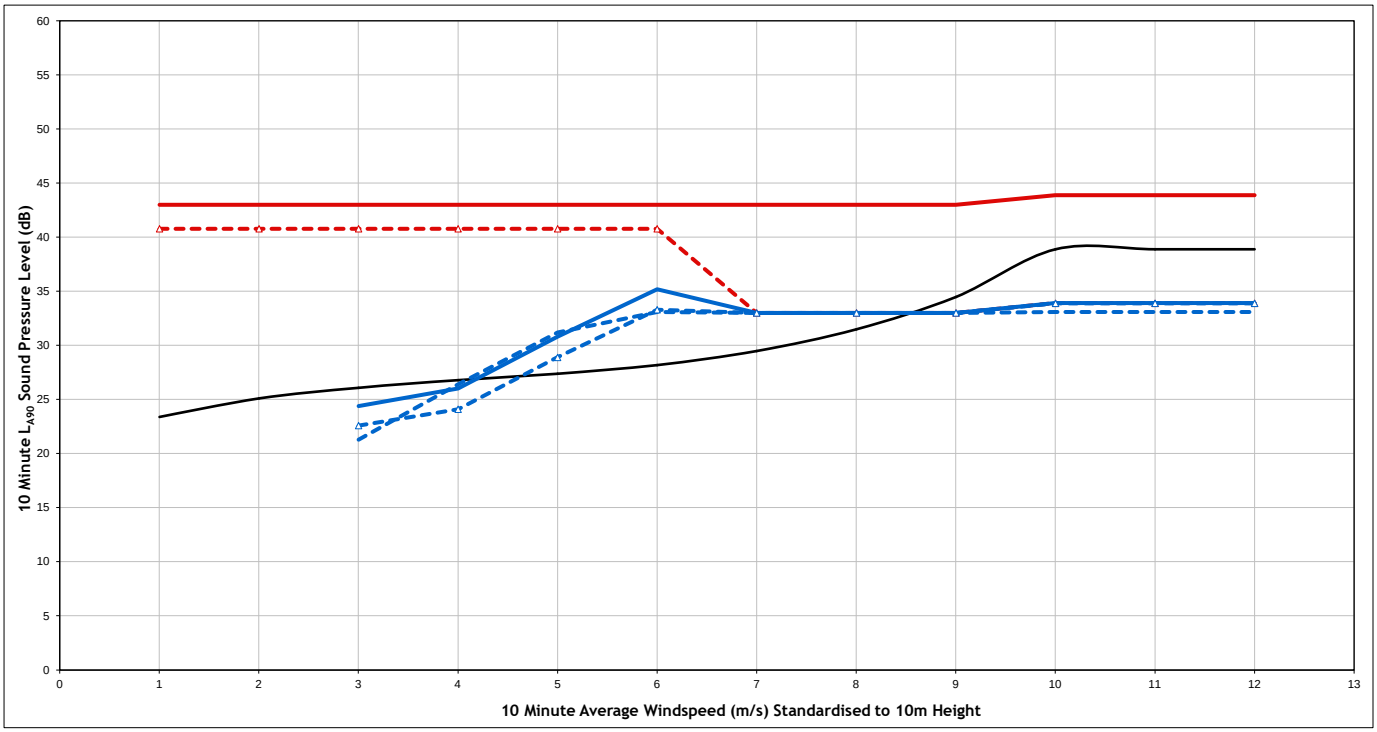
- Background Noise Trendline
- Total WEDG 2006 Noise Limit
- Site Specific Limits
- Kilgarvan Repowering Only - Nordex N163
- Kilgarvan Repowering Only - Siemens Gamesa SG 6.6 155
- Kilgarvan Repowering Only - Nordex N149

Project	Proposed Repowering of Kilgarvan Wind Farm
Client	Orsted Onshore Ireland Midco Ltd
Title	Noise Assessment - Site Specific Noise Predictions NAL10 (H3)
Figure Number	Figure A1.4j
Scale	NTS
Drawn	JB
Checked	JM
Date	14/04/2023
Document Reference	IE00065-015-Op Noise Models

Daytime - NAL11 (H6)



Night Time - NAL11 (H6)



Legend:

- Background Noise Trendline
- Total WEDG 2006 Noise Limit
- Site Specific Limits
- Kilgarvan Repowering Only - Nordex N163
- Kilgarvan Repowering Only - Siemens Gamesa SG 6.6 155
- Kilgarvan Repowering Only - Nordex N149

Project	Proposed Repowering of Kilgarvan Wind Farm
Client	Orsted Onshore Ireland Midco Ltd
Title	Noise Assessment - Site Specific Noise Predictions NAL11 (H6)
Figure Number	Figure A1.4k
Scale	NTS
Drawn	JB
Checked	JM
Date	14/04/2023
Document Reference	IE00065-015-Op Noise Models

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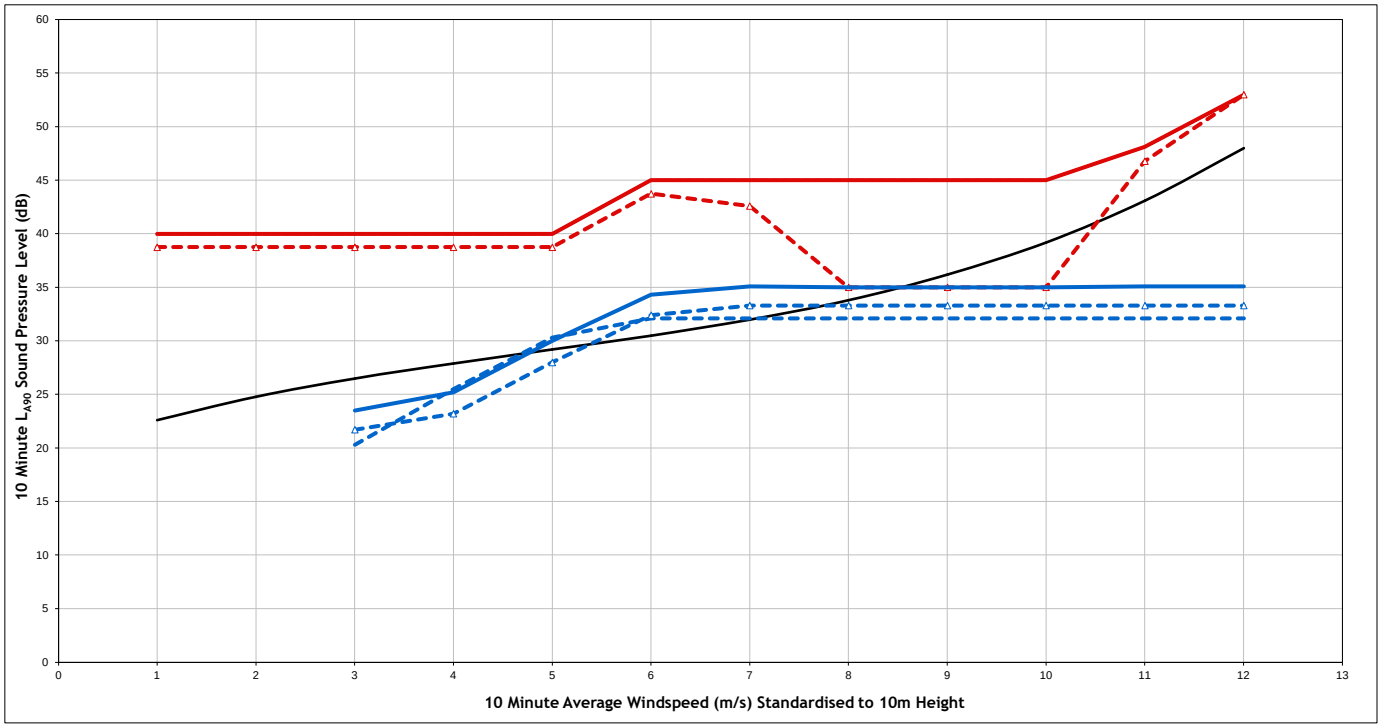
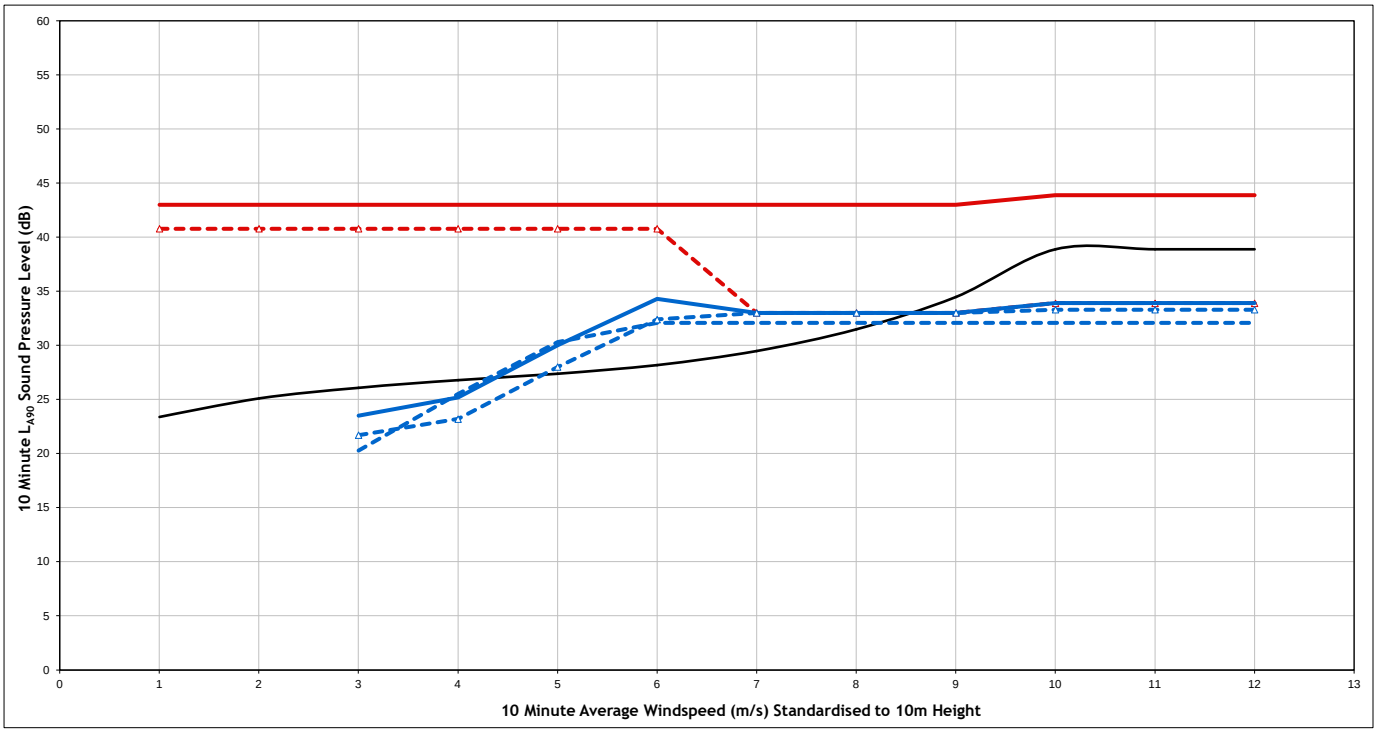
Daytime - NAL12 (H10)



Night Time - NAL12 (H10)

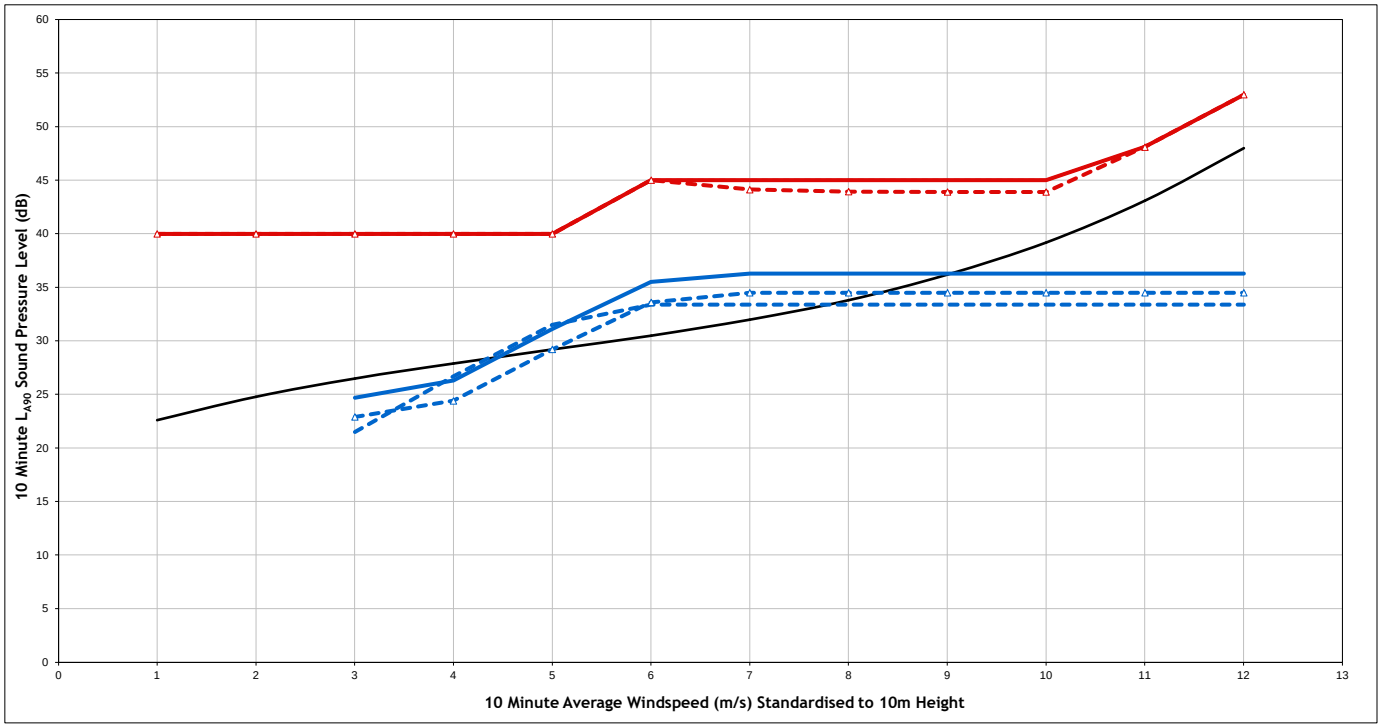


Legend:

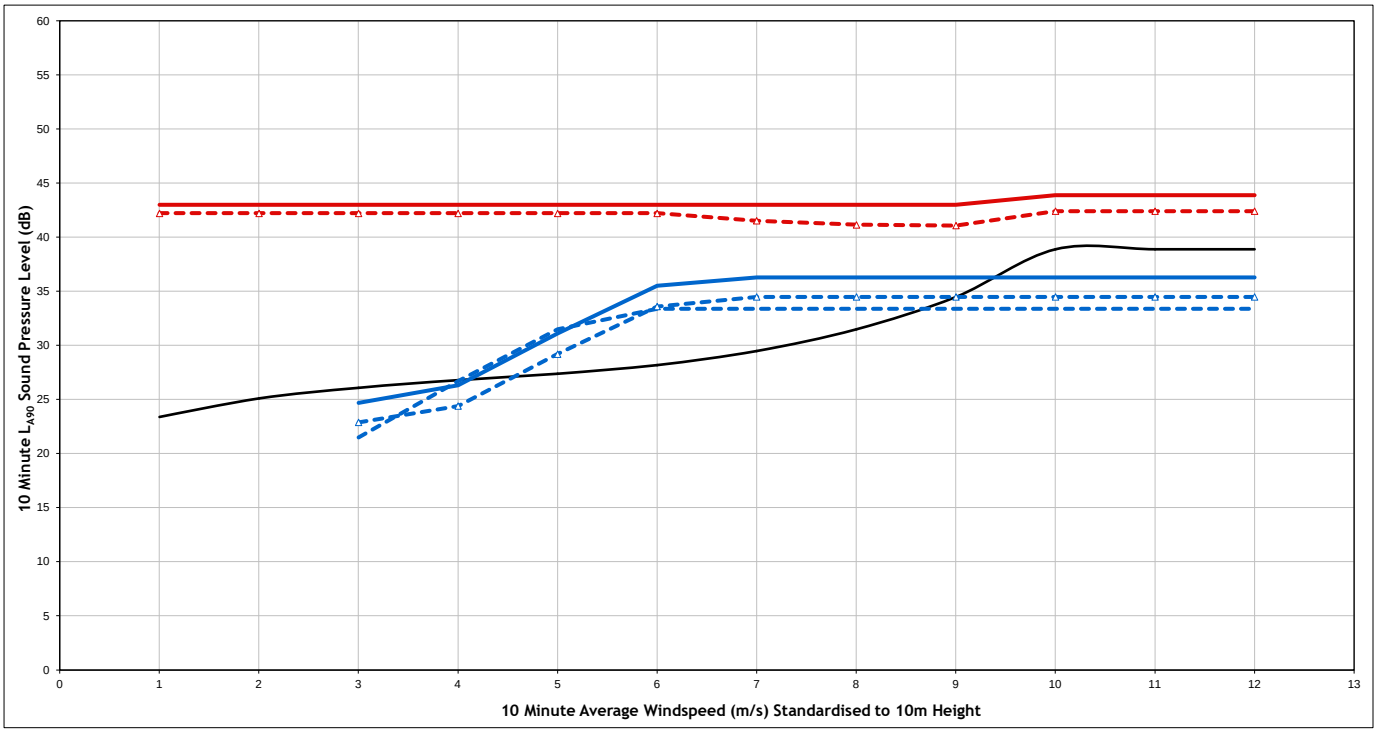
- Background Noise Trendline
- Total WEDG 2006 Noise Limit
- Site Specific Limits
- Kilgarvan Repowering Only - Nordex N163
- Kilgarvan Repowering Only - Siemens Gamesa SG 6.6 155
- Kilgarvan Repowering Only - Nordex N149

Project	Proposed Repowering of Kilgarvan Wind Farm
Client	Orsted Onshore Ireland Midco Ltd
Title	Noise Assessment - Site Specific Noise Predictions NAL12 (H10)
Figure Number	Figure A1.4l
Scale	NTS
Drawn	JB
Checked	JM
Date	14/04/2023
Document Reference	IE00065-015-Op Noise Models

Daytime - NAL13 (H7)



Night Time - NAL13 (H7)

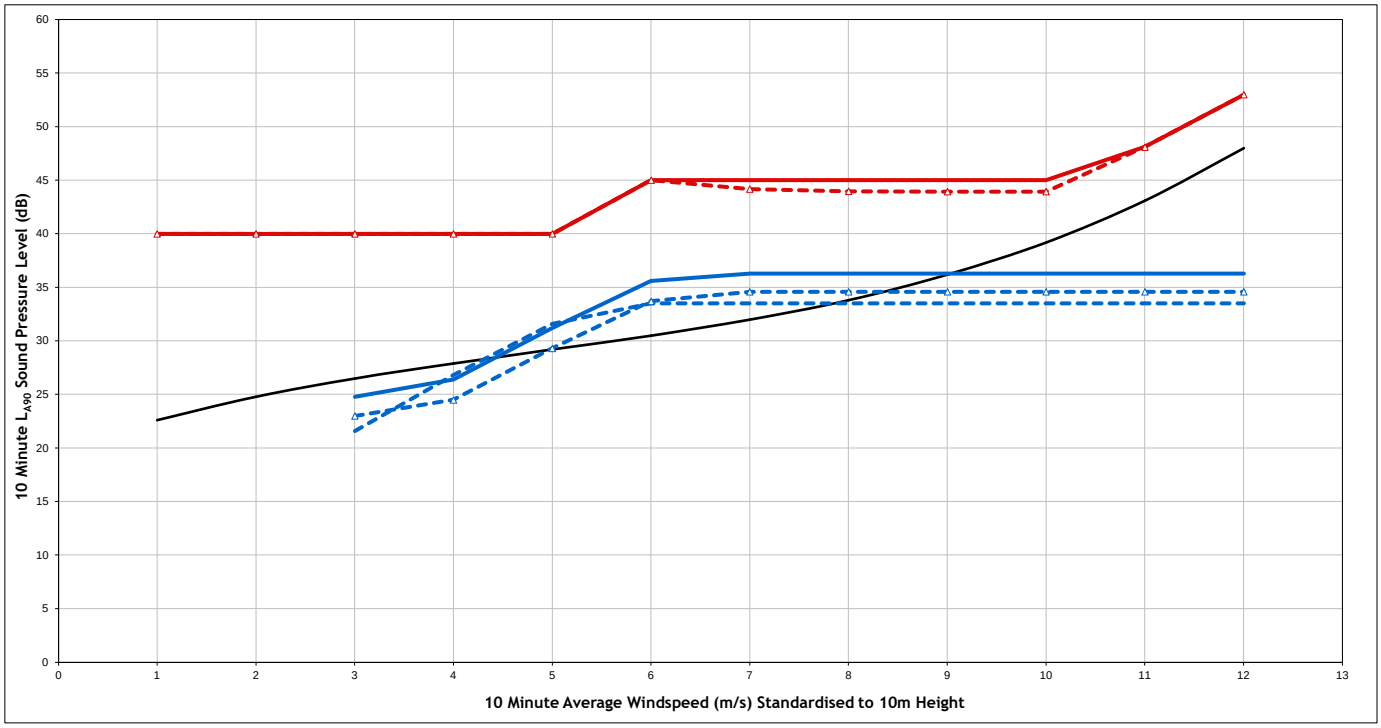


Legend:

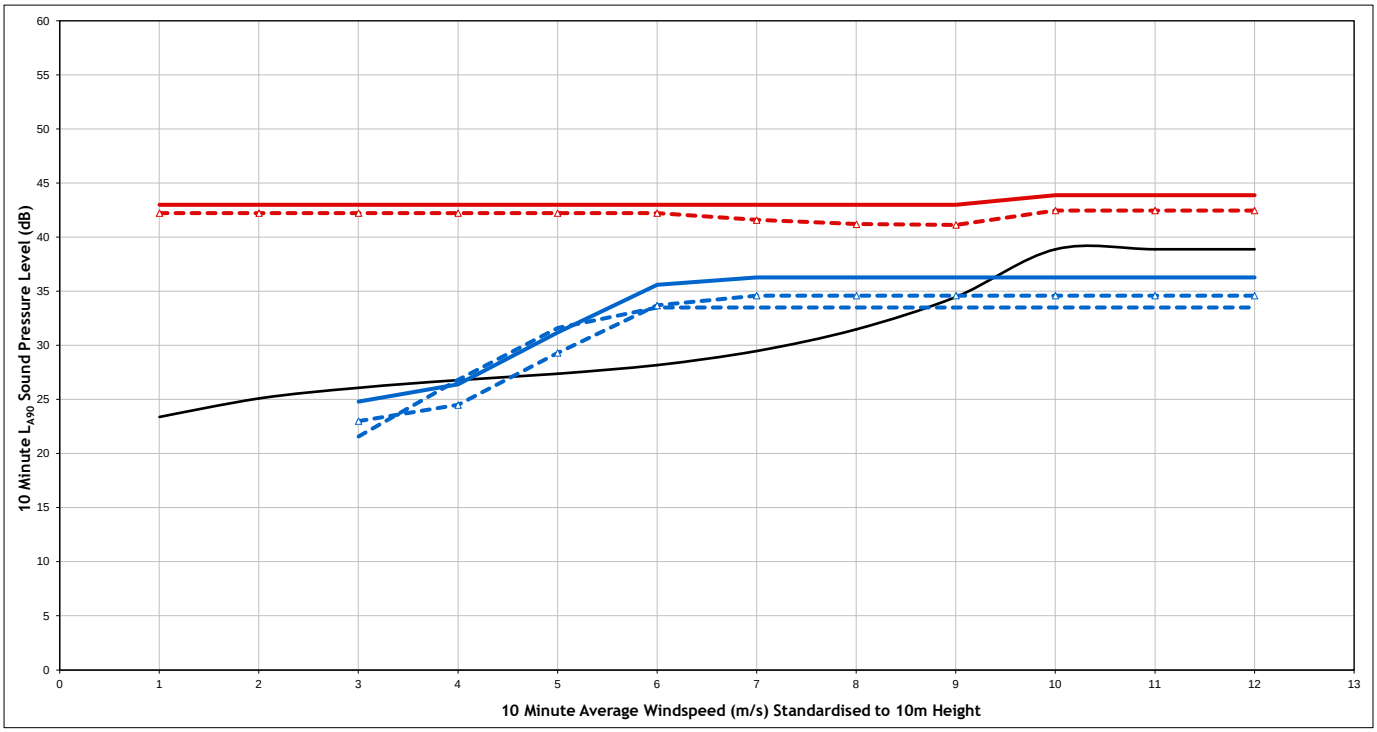
- Background Noise Trendline
- Total WEDG 2006 Noise Limit
- Site Specific Limits
- Kilgarvan Repowering Only - Nordex N163
- Kilgarvan Repowering Only - Siemens Gamesa SG 6.6 155
- Kilgarvan Repowering Only - Nordex N149

Project	Proposed Repowering of Kilgarvan Wind Farm
Client	Orsted Onshore Ireland Midco Ltd
Title	Noise Assessment - Site Specific Noise Predictions NAL13 (H7)
Figure Number	Figure A1.4m
Scale	NTS
Drawn	JB
Checked	JM
Date	14/04/2023
Document Reference	IE00065-015-Op Noise Models

Daytime - NAL14 (H8)



Night Time - NAL14 (H8)



Legend:

- Background Noise Trendline
- Total WEDG 2006 Noise Limit
- Site Specific Limits
- Kilgarvan Repowering Only - Nordex N163
- Kilgarvan Repowering Only - Siemens Gamesa SG 6.6 155
- Kilgarvan Repowering Only - Nordex N149

Project	Proposed Repowering of Kilgarvan Wind Farm
Client	Orsted Onshore Ireland Midco Ltd
Title	Noise Assessment - Site Specific Noise Predictions NAL14 (H8)
Figure Number	Figure A1.4n
Scale	NTS
Drawn	JB
Checked	JM
Date	14/04/2023
Document Reference	IE00065-015-Op Noise Models

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Annex 2 – Extracts of Decision Notices

An Bord Pleanála

Inspector's Report – Addendum

Development: 10-year planning permission for development of a six-turbine wind farm (13.8MW), electricity sub-station, borrow pit, access roads, cables and associated site works at the townlands of Derragh, Rathgaskig & Lack Beg near Ballingeary, Co. Cork. [Revised description subsequently submitted].

Planning Application

Planning Authority	: Cork County Council
Planning Authority Register Ref.	: 12/05270
Applicant	: Framore Ltd.
Type of Application	: Permission
Planning Authority Decision	: Grant Permission

Planning Appeal

Appellant(s)	: Pól Ó Grianna and Others
Type of Appeal	: 3rd Party v Grant
Observer(s)	: Caoimhghín & Joan Ó Buachalla agus Con Lucey : Cecily O'Connell and Others : Diarmuid Ó Ceallacháin : Joan Uí Chéilleachair : Siobhán Uí Chéilleachair : Diarmuid Ó Céilleachair

Statement and Natura impact statement to the planning authority for its written agreement.

Reason: To safeguard the amenities of the area and in the interest of orderly development.

7. Details of aeronautical requirements shall be submitted to, and agreed in writing with, the planning authority prior to commencement of development, following consultation with the Irish Aviation Authority. Prior to commissioning of the turbines, the developer shall inform the planning authority and the Irish Aviation Authority of the as-constructed tip heights and co-ordinates of the turbines.

Reason: In the interest of air traffic safety.

8. Wind turbine noise arising from the proposed development, by itself or in combination with any other permitted wind energy development in the vicinity, shall not exceed the greater of:

(a) 5 dB(A) above background noise levels or,

(b) 43 dB(A) $L_{90,10min}$

when measured externally at dwellings or other sensitive receptors.

Prior to commencement of development, the developer shall submit to and agree in writing with the planning authority a noise compliance monitoring programme for the subject development. All noise measurements shall be carried out in accordance with ISO Recommendation R 1996 "Assessment of Noise with Respect to Community Response," as amended by ISO Recommendations R 1996-1. The results of the initial noise compliance monitoring shall be submitted to, and agreed in writing with, the planning authority within six months of commissioning of the wind farm.

Reason: In the interest of residential amenity.

9. (a) Shadow flicker arising from the proposed development, by itself or in combination with other existing or permitted wind energy development in the vicinity, shall not exceed 30 hours per year or 30 minutes per day at existing or permitted dwellings or other sensitive receptors.

(b) Within 12 months of commissioning of the proposed wind farm, a report shall be prepared by a suitably qualified person in accordance with the requirements of the planning authority and submitted to the planning authority for its written approval. The

An Bord Pleanála

FORBAIRT BONNEAGAIR STRAITÉISIGH
STRATEGIC INFRASTRUCTURE DEVELOPMENT

NA hACHTANNA UM PLEANÁIL AGUS FORBAIRT 2000 go 2015

PLANNING AND DEVELOPMENT ACTS 2000 to 2015

Uimhir Thagartha an Bhoird Pleanála: 08.PA0044

An Bord Pleanála Reference Number: 08.PA0044

(Údarás Pleanála: Comhairle Contae Chiarraí agus Comhairle Contae Chorcaí)

(Planning Authorities: Kerry County Council and Cork County Council)

IARRATAS ar cheadú faoi alt 37E den Acht um Pleanáil agus Forbairt, 2000, arna leasú, de réir pleananna agus sonraí, ráiteas tionchair timpeallachta san áireamh, taiscthe leis An mBord Pleanála ar an 7ú lá de mhí Mheán Fómhair, 2015, ó E.S.B. Wind Development Limited, faoi chúram E.S.B. International ó Stephen Court, 18-21 Faiche Stiabhna, Baile Átha Cliath.

APPLICATION for permission under section 37E of the Planning and Development Act, 2000, as amended, in accordance with plans and particulars, including an environmental impact statement, lodged with An Bord Pleanála on the 7th day of September, 2015 by E.S.B. Wind Development Limited care of E.S.B. International of Stephen Court, 18-21 Saint Stephen's Green, Dublin.

AN FHORBAIRT BHEARTAITHE:

i) Tógáil feirm ghaoithe ina mbeidh 38 tuirbín gaoithe agus na bunsraitheanna agus na limistéir dhromchla chrua uile lena mbaineann. Beidh airde moil suas le 80 méadar agus trastomhas rótair suas le 112 méadar ag baint leis na tuirbíní gaoithe. Beidh airde iomlán na struchtúr (i.e. airde rinne) suas le 126 méadar.

ii) An cáblú leictreach agus cumarsáide uile faoin talamh lena mbaineann.

iii) Tógáil bealaigh isteach nua chuig an suíomh.

iv) Cruthú thart ar 28 km de rianta rochtana, lena n-áirítear nascrian idir an dá fheirm ghaoithe a toilíodh roimhe seo mar a thuairiscítear thíos.

v) Cruthú poill carta/stórais ábhair.

vi) Tógáil 4 chrann nua saorsheasaimh meitéareolaíochta atá suas le 80 méadar ar airde.

vii) Córais draenála ghaolmhara.

viii) Tá siad seo a leanas na forbairtí breise gaolmhara agus coimhdeacha atá ag teastáil d'fhonn comhpháirteanna tuirbín gaoithe a sheachadadh:

- Bealach Seachadta 1: Suiteáil droichid shealadaigh trasna an tSuláin i sráidbhaile Bhaile Bhuirne (Contae Chorcaí). Maidir leis an droichead sin, ní mór bealach isteach sealadach ón N22 agus ón L3400 (iad araon i sráidbhaile Bhaile Bhuirne) a thógáil agus bóithre poiblí a fheabhsú ag láithreacha aitheanta feadh an L3400 i dtreo an tsuímh.
- Bealach Seachadta 2: Cruthú thart ar 500 méadar de rian rochtana laistigh de thailte Choillte atá ann cheana féin i mbaile fearainn Chúil Chnóchoille (Contae Chiarraí) chun rianta atá ann cheana féin ar an mbealach seachadta seo a nascadh chomh maith le hathailíniú an bhealaigh isteach atá ann cheana féin chuig suíomh Everwind leis an mbóthar poiblí L3400.

ix) Tá cead 10 mbliana agus saolré oibríoch 25 bliain ó chríochnú na feirme gaoithe ar fad á lorg le haghaidh na forbartha a bheartaítear.

Tá an t-iarratas seo ina athbhreithniú agus ina chónascadh idir an dá chead pleanála atá ann cheana ar an suíomh mar seo a leanas:

- Comhairle Contae Chiarraí, Tagairt Chlárúcháin 10/0197 a deonaíodh cead pleanála ar an 25ú lá de mhí Shamhain, 2010 – cead 10 bliana le haghaidh 14 thuirbín gaoithe agus oibreacha forbartha lena mbaineann.
- Comhairle Contae Chiarraí, Tagairt Chlárúcháin 10/1333 a deonaíodh cead pleanála ar an 26ú lá de mhí Eanáir, 2012 – cead 10 bliana le haghaidh 24 tuirbín gaoithe agus oibreacha forbartha lena mbaineann.

Dé réir mar a leasaíodh é i gcomhar le tuilleadh eolais a fuair An Bord Pleanála ar an 1 Aibreáin, 2016.

Forbairt feirm ghaoithe a bheartaítear agus na hoibreacha gaolmhara uile sna bailte fearainn seo a leanas i gContae Chiarraí: an Bealach (Toghroinn Ghleann Lao), Barr na Stuaice, Cluain Chaoin, Cúil na gCopóg (Toghroinn Ghleann Locha), Cúil Chnóchoille, Com an Chuilinn, Com Uí Chlúmháin, an Coimín Uachtarach, Doire an Chladaigh, Doire an Longaigh, Gort Leathard, Gort Maraithe Fínín, Cnocán an Phóna, an Inse Mhór, na hInsí, Cnoc an Rodaigh, Cnoc an Fhotha, an Leaca Bhán, Ladhar na Gaoithe, Redtrench South, Ros an Locha, Sailcheartán; agus sna bailte fearainn seo a leanas i gContae Chorcaí: Cúil Aodha, Doire an Chuilinn, an Doirín Álainn, an Doire Leathan, Doire na Sagart, Gort na Tiobratan, an Lománach Mhór, an Muirneach Beag, Ré na bPobal, an Sliabh Riabhach, Contae Chorcaí.

PROPOSED DEVELOPMENT:

i) Construction of a wind farm comprising 38 number wind turbines and all associated foundations and hard standing areas. The wind turbines will have a hub height of up to 80 metres and a rotor diameter of up to 112 metres. The overall height of the structures (that is, tip height) will be up to 126 metres.

ii) All associated underground electrical and communications cabling.

iii) Creation of a new site entrance.

iv) Creation of approximately 28 kilometres of access tracks, including a link track between the two previously consented wind farms as described below.

v) Creation of borrow pits/material repositories.

vi) Construction of four number new free standing meteorological masts up to 80 metres height.

vii) Associated drainage systems.

viii) Additional associated and ancillary developments required to facilitate the delivery of wind turbine components including:

- Delivery Route 1: Installation of a temporary bridge traversing the Sullane River in Ballyvourney village (County Cork) - the bridge requires the creation of a temporary entrance from the N22 and from the L3400 (both within Ballyvourney village) and public road improvements at identified locations along the L3400 towards the site.
- Delivery Route 2: Creation of approximately 500 metres of access track within existing Coillte lands in the townland of Coolknoohil (County Kerry) to link existing tracks located along this delivery route along with a realignment of existing Everwind site entrance with public road L3400.

ix) A 10-year permission and a 25-year operational life from completion of the entire wind farm are sought for the proposed development.

This application represents a revision and amalgamation of the two existing planning permissions on the site as follows:

- Kerry County Council register reference number 10/0197 granted permission on the 25th day of November, 2010 – a 10-year permission for 14 wind turbines and associated development.
- Kerry County Council register reference number 10/1333 granted permission on the 26th day of January, 2012 – a 10-year permission for 24 wind turbines and associated development.

As amended by the further information received by An Bord Pleanála on the 1st day of April, 2016.

The proposed development and all associated works will be located in the townlands of: Ballagh (ED Glanlee), Barnastooka, Clonkeen, Coolnagoppoge (ED Glanlough), Coolknoohil, Coomacullen, Coumaclovane, Cummeen Upper, Derreenclodig, Derreenlunnig, Gortlahard, Gortmarrahafineen, Grousemount, Inchamore, Inchee, Knockanruddig, Knockanuha, Lackabaun, Lyrenageeha, Redtrench South, Rossalougha, Sillahertane, County Kerry and in the townlands of Coolea, Derreenaculling, Derreenaling, Derrylahan, Derrynasaggart, Gortnatubbrid, Lumnagh More, Murnaghbeg, Reanabobul, Slievereagh, County Cork.

AN CINNEADH

Cead pleanála faoi alt 37G den Acht um Pleanáil agus Forbairt, 2000, arna leasú, A CHEADÚ don fhorbairt bheartaithe thuasluaite, de réir pleananna agus sonraí thuasluaite mar gheall ar na cúiseanna agus ar na breithnithe atá ráite thíos agus faoi réir na gcoinníollacha a shonraítear seo a leanas.

CINNEADH a dhéanamh faoi alt 37H(2)(c) cibé suim a n-íocfaidh an t-iarratasóir maidir le costais an iarratais, mar atá leagtha amach i Sceideal na gCostas thíos.

DECISION

GRANT permission under section 37G of Planning and Development Act, 2000, as amended, for the above proposed development in accordance with the said plans and particulars based on the reasons and considerations under and subject to the conditions set out below.

DETERMINE under section 37H(2)(c) the sum to be paid by the applicant in respect of costs associated with the application as set out in the Schedule of Costs below.

NA hÁBHAIR A BHÍ CURTHA SAN ÁIREAMH

Ag déanamh a chinnidh, thug an Bord aird do na nithe áirithe atá dualgas air, de bhua na n-Achtanna um Pleanáil agus Forbairt agus na Rialachán arna ndéanamh fúthu, aird a thabhairt dóibh. San áireamh bhí aon aighneacht agus tuairim a fuair an Bord faoi réir forálacha reachtúla.

MATTERS CONSIDERED

In making its decision, the Board had regard to those matters to which, by virtue of the Planning and Development Acts and Regulations made thereunder, it was required to have regard. Such matters included any submissions and observations received by it in accordance with statutory provisions.

7. (1) Nuair a chuirfear an fhorbairt bheartaithe i bhfeidhm ní bheidh leibhéal an torainn ina aonar nó i gcomhar le haon fhorbairt fuinnimh gaoithe eile atá ceadaithe nó atá ann cheana féin sa cheantar níos mó ná 43 dB(A) $L_{90,10\text{nóiméad}}$ nó 5 dB(A) thar leibhéal an torainn chúlra cé acu ba mhó, nuair a thomhaistear iad ag áiteanna eile atá íogair do thorann.

(2) Déanfar na tomhais mar gheall ar an leibhéal torainn leis na treoirlínte atá leagtha amach sa Mholadh 1996 – Fuaimíocht - Cur Síos agus Tomhas de Fuaimeanna Chomhshaoil, déanta ag an Eagraíocht Idirnáisiúnta na gCaighdeán (ISO).

Cúis: Ar mhaithe le cosaint a thabhairt do thaitneamhachtaí an cheantair.

(1) Noise levels emanating from the proposed development following commissioning, by itself or in combination with other existing or permitted wind energy development in the vicinity, when measured externally at third party noise-sensitive locations, shall not exceed the greater of 43dB(A)$L_{90,10\text{ min}}$ or 5 dB(A) above background levels.

(2) All sound measurements shall be made in accordance with ISO 1996: Acoustics – Description and Measurement of Environmental Noise.

Reason: To protect the amenities of property in the vicinity.

8. Cloífear leis na riachtanais seo a leanas mar gheall ar chaochaíl scáileanna:

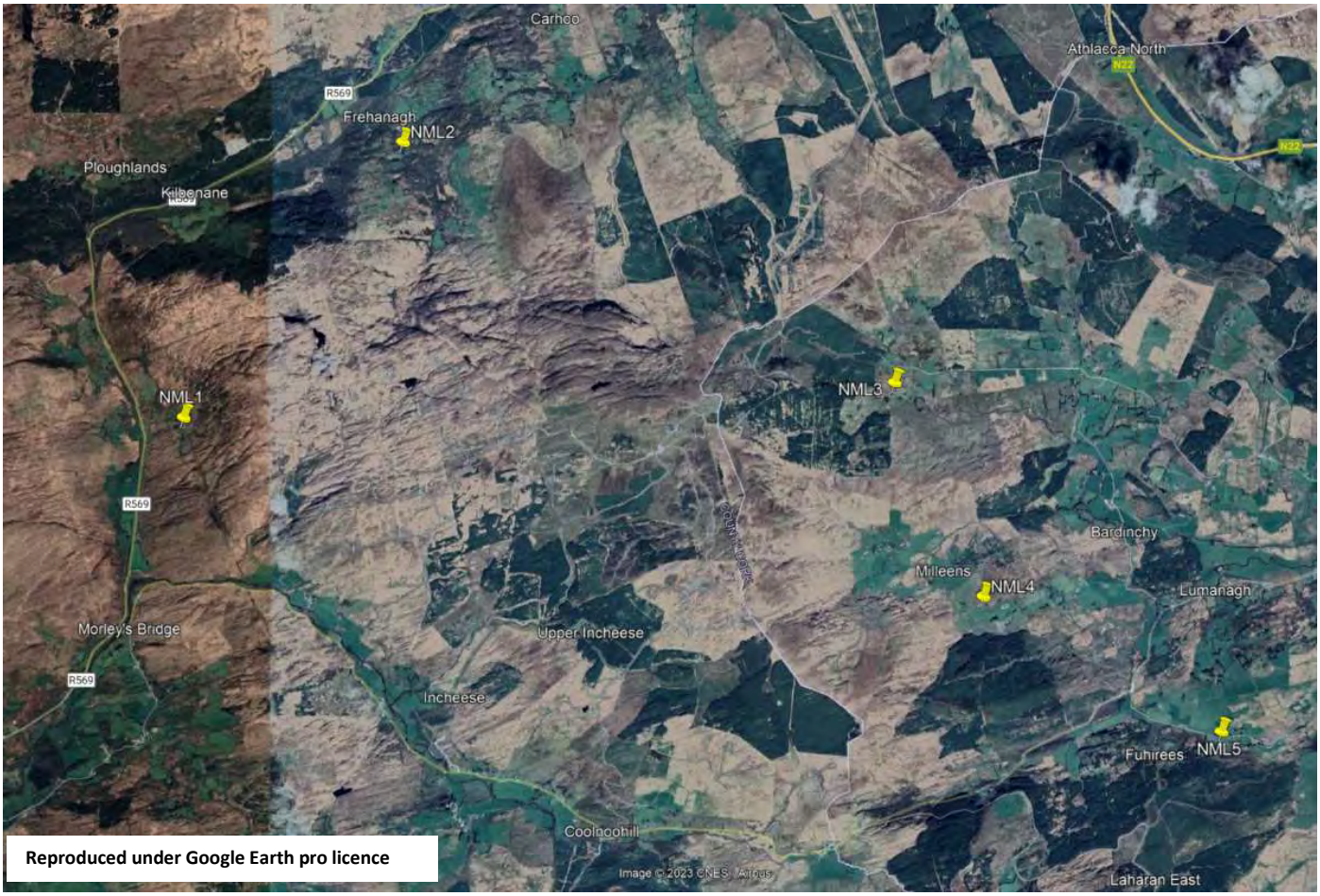
(a) Ní bheidh méid caochaíola scáileanna na forbartha atá beartaithe níos mó ná 30 nóiméad sa lá nó níos mó ná 30 uair sa bhliain ag aon teach.

(b) Cuirfear trealamh agus bogearraí oiriúnach leis an bhforbairt bheartaithe ionas gur féidir smacht a choimeád ar an gcaochaíl scáileanna maidir leis na tithe.

(c) Sula gcuirfear tús leis an bhforbairt caithfidh saineolaí plean monatóireachta a chur le chéile maidir le caochaíl scáileanna,

Annex 3 – Field Data Sheets / Installation Reports for Noise Monitoring Equipment and LIDAR

Kilgarvan Wind Farm Noise Survey - Installed Noise Monitoring Locations



Present during the course of the installation:

- Colum Breslin, TNEI Ireland Ltd

Unless specified, all noise meters 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.

Detailed information and pictures for each of the installed locations are provided below. The original full-size pictures are available on request.

Noise Monitoring Location (NML) - Latitude/ Longitudes

NML	Lat Long	ITM (X, Y)
NML01	51.938783"N, -9.377596”W	505304, 577152
NML02	51.960961”N, -9.348149”W	507373, 579647
NML03	51.923632”N, -9.270003”W	511865, 577355
NML04	51.912277”N, -9.237969”W	512648, 575374
NML05	51.941438”N, -9.280808”W	514819, 574092

NML01	
	
North	**South**
	
East	**West**
	

Description
The noise monitoring equipment was installed to the south of the property. The location was chosen due to its proximity to the west of the proposed development. The kit was positioned in what was considered to be the residents amenity area, on the more sheltered side of the house in relation to the trees. The location was seen to be representative of the other properties in the area to the north and south. The predominant sounds that were audible during the installation were road traffic, birdsong and wind induced noise from the trees. When windy, the road traffic was not audible but when the wind speeds were low the road was quite audible. The noise meter was located in a free field position, greater than 3.5m from any hard reflecting surface except the ground.

NML02

North	South
	
East	**West**
	

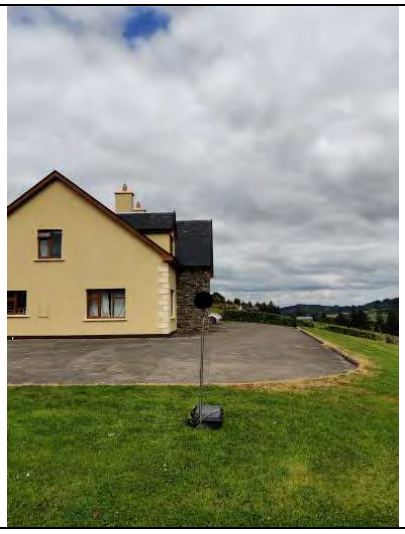
Description
The noise monitoring equipment was installed in front of the property which was to the east of the house. The location was chosen due to its proximity to the north of the proposed development and was seen to be representative of other properties in the area. The kit was installed away from the stream to minimise any potential influence. The predominant sounds that were audible during the installation were birdsong and a faint sound from the stream down in the valley. Secondary noises were tree and vegetation noise that was wind induced and road traffic far away in the distance. The noise meter was located in a free field position, greater than 3.5m from any hard reflecting surface except the ground. A rain gauge (RG 008) was installed at this location.

NML03

North	South
	
East	**West**
	

Description
The noise monitoring equipment was installed in a location considered to provide representative data for the property to the south. Access to monitor at the property itself could not be gained. The location was chosen due to its proximity to the east of the proposed development and was also seen to be representative of the other properties in the area to the north, south and east. The predominant sounds that were audible during the installation were birdsong, vegetation and rustling from the nearby woodland to the south and west. The noise meter was located in a free field position, greater than 3.5m from any hard reflecting surface except the ground.

NML04

North	South
	
East	**West**
	

Description
The noise monitoring equipment was within the amenity area to the west of the property. This location was chosen to maximise the distance from potential noise sources at the dwelling i.e. boiler flue and workshop/shed. The location was chosen due to its proximity to the east of the proposed development and was also seen to be representative of the other properties in the area to the north, east and multiple properties situated in the Southern Kilgarvan Valley. The predominant sounds that were audible during the installation were the cutting/ felling of trees in the forest to the south along with heavy machinery and birdsong. The noise meter was located in a free field position, greater than 3.5m from any hard reflecting surface except the ground.

NML05

North	South
	
East	**West**
	

Description
The noise monitoring equipment was installed in the amenity area to the south of the property and away from sources that could contaminate the noise data i.e. boiler flue and workshop/ shed. The location was chosen due to its proximity to the south east of the proposed development, and was also seen to be representative of the other properties in the area to the west within the Southern Kilgarvan Valley. The predominant sounds that were audible during the installation were birdsong and a faint stream in the distance to the south of the property. Otherwise, very quiet. The noise meter was located on a grass patch area adjacent to the property, greater than 3.5m from any hard reflecting surface except the ground. A rain gauge (RG 004) was installed at this location.

Noise Monitoring Field Data Sheet

Project Title	Proposed Repowering of Kilgarvan Wind Farm	**Project Number**	IE00065
Client	Orsted Onshore Ireland Midco Ltd	**Surveyor**	CB

MONITORING LOCATION

Location Name	Noise Monitoring Location (NML) 1
Description	The noise kit was installed to the south of the property. The location was to the west of the proposed development. The kit was placed greater than 3.5 m away from any reflective surfaces (excluding the ground).
Approximate Irish Transverse Mercator (ITM) Reference	505304, 577152
Noise sources noted during installation, weekly inspection and removal	Birdsong, sheep, road traffic noise and wind induced noise from vegetation and trees.

NOISE MONITORING EQUIPMENT DETAILS

Survey	Kit Number	Model	Serial Number	Last Calibrated/ Conformance Checked
Sound Level Meter	SLM 12	NL31	01273087	16/04/21
Pre Amplifier	Rion	NH-21	26006	16/04/21
Microphone	Rion	UC-53A	313365	16/04/21
Calibrator	Cal 003	NC-74	35173441	01/04/22

NOISE MONITORING EQUIPMENT SETTINGS

	Network (A,B,Z)	Index and Time	Time Weighting (Slow, Fast)	Range (dB)	Audio
Parameters Recorded	A	$L_{A9010min}$, $L_{Aeq10min}$	Fast	20-110	No

DATA

File Name	Start Time	End Time	Cal. at Start	Cal. at End	Drift	Observations
0101	17:10 16/06/22	14:50 14/07/22	94.0	93.9	-0.1	**16/06: Installation:** Lots of sheep around. Very windy. Wind induced noise from vegetation and trees.
0102	15:10 14/07/22	12:04 19/07/22	94.0	93.9	-0.1	**14/07: Maintenance:** Birdsong. Sheep. Distant road traffic noise from road in the valley. Generally quiet.
0103	12:50 19/07/22	13:01 11/08/22	94.0	94.0	0.0	**19/07: Maintenance:** Birdsong.
0104	13:20 11/08/22	13:15 08/09/22	94.0	94.0	0.0	**11/08: Maintenance:** Birdsong. Road traffic noise. Very sunny, low winds and relatively quiet.
0105	13:30 08/09/22	09:00 22/09/22	94.0	94.0	0.0	**08/09: Maintenance:** Birdsong. Heavy rainfall. Resident explained that more streams are audible during the winter months. **22/09: Kit decommissioned**

PHOTOGRAPHS

North

South

East

West

Noise Monitoring Field Data Sheet

Project Title	Proposed Repowering of Kilgarvan Wind Farm	**Project Number**	IE00065
Client	Orsted Onshore Ireland Midco Ltd	**Surveyor**	CB

MONITORING LOCATION

Location Name	Noise Monitoring Location (NML) 2
Description	The noise kit was installed to the east of the dwelling away from reflective surfaces and vegetation. The dwelling is to the north of the proposed wind farm and is unoccupied. A rain gauge was also installed at this location.
Approximate Irish Transverse Mercator (ITM) Reference	507373, 579647
Noise sources noted during installation, weekly inspection and removal	Birdsong was the dominant noise source. Wind induced noise from vegetation and trees in the surrounding environment, distant stream noise and road traffic noise.

NOISE MONITORING EQUIPMENT DETAILS

Survey	Kit Number	Model	Serial Number	Last Calibrated/ Conformance Checked
Sound Level Meter	SLM 11	NL31	01273082	16/04/21
Pre Amplifier	Rion	NH-21	26001	16/04/21
Microphone	Rion	UC-53A	313385	16/04/21
Calibrator	Cal 003	NC-74	35173441	01/04/22

NOISE MONITORING EQUIPMENT SETTINGS

	Network (A,B,Z)	Index and Time	Time Weighting (Slow, Fast)	Range (dB)	Audio
Parameters Recorded	A	$L_{A9010min}$, $L_{Aeq10min}$	Fast	20-110	No

DATA

File Name	Start Time	End Time	Cal. at Start	Cal. at End	Drift	Observations
0201	11:40 16/06/22	12:12 14/07/22	94.0	93.9	-0.1	**16/06: Installation:** Birdsong dominant. Wind induced noise from nearby trees and vegetation. Distant road traffic noise. Stream in the distance slightly audible.
0202	15:40 14/07/22	13:50 11/08/22	94.0	94.1	+0.1	**14/07: Maintenance:** Birdsong dominant. Wind induced noise from nearby trees and vegetation. Stream in the distance slightly audible. * Noise kit and rain gauge had been knocked over.
0203	14:10 11/08/22	13:55 08/09/22	94.0	93.9	-0.1	**11/08: Maintenance**: Stream in distance slightly louder on previous visits. Road traffic noise clearly audible. Birdsong and insects audible. * Noise kit and rain gauge had been knocked over.
0204	14:20 08/09/22	10:00 22/09/22	94.0	94.0	0.0	**08/09: Maintenance:** Heavy rainfall. Rain gauge had been knocked over. **22/09: Kit decommissioned**

PHOTOGRAPHS

North

East

South

West

Noise Monitoring Field Data Sheet

Project Title	Proposed Repowering of Kilgarvan Wind Farm	**Project Number**	IE00065
Client	Orsted Onshore Ireland Midco Ltd	**Surveyor**	CB

MONITORING LOCATION

Location Name	Noise Monitoring Location (NML) 3
Description	Access could not be gained to the closest property to the east of the proposed development therefore noise monitoring equipment was installed in a field approximately 100 m to the north of the property.
Approximate Irish Transverse Mercator (ITM) Reference	511865, 577355
Noise sources noted during installation, weekly inspection and removal	Wind induced noise from the nearby forestry/ trees, vegetation, insects and birdsong.

NOISE MONITORING EQUIPMENT DETAILS

Survey	Kit Number	Model	Serial Number	Last Calibrated/ Conformance Checked
Sound Level Meter	SLM 018	NL31	01283554	04/08/21
Pre Amplifier	Rion	NH-21	29311	04/08/21
Microphone	Rion	UC-53A	315581	04/08/21
Calibrator	Cal 003	NC-74	35173441	01/04/22

NOISE MONITORING EQUIPMENT SETTINGS

	Network (A,B,Z)	Index and Time	Time Weighting (Slow, Fast)	Range (dB)	Audio
Parameters Recorded	A	$L_{A9010min}$, $L_{Aeq10min}$	Fast	20-110	No

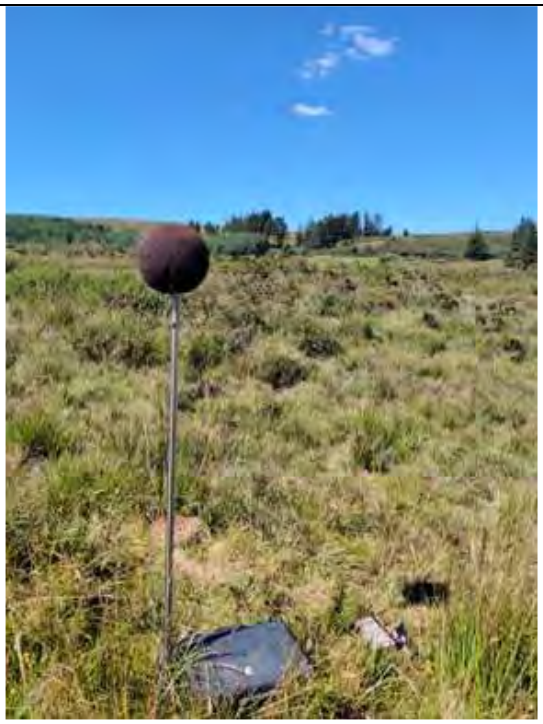
DATA

File Name	Start Time	End Time	Cal. at Start	Cal. at End	Drift	Observations
0701	15:10 16/06/22	17:10 14/07/22	94.0	93.9	-0.1	**16/06: Installation:** Wind induced noise from surrounding vegetation and forestry to the south west. Very windy.
0702	17:20 14/07/22	15:40 11/08/22	94.0	93.8	-0.2	**14/07: Maintenance:** Birdsong. Trees swaying and rustling loudly. Crows in the distance.
0703	16:00 11/08/22	15:30 08/09/22	94.0	93.9	-0.1	**11/08: Maintenance:** Insects very loud surrounding kit. In the distance construction works taking place. Low winds. Sheep bleating. **08/09: Equipment Decommissioned** Noise equipment had been moved to the roadside. Very wet and windy. Wind induced noise from forestry/ trees and vegetation. Distant road traffic noise.

PHOTOGRAPHS

South

East



North

West

Noise Monitoring Field Data Sheet

Project Title	Proposed Repowering of Kilgarvan Wind Farm	**Project Number**	IE00065
Client	Orsted Onshore Ireland Midco Ltd	**Surveyor**	CB

MONITORING LOCATION

Location Name	Noise Monitoring Location (NML) 4
Description	The noise monitoring equipment was installed in the amenity area to the south west of the dwelling. The kit was placed greater than 3.5 m away from any reflective surfaces (excluding the ground).
Approximate Irish Transverse Mercator (ITM) Reference	512648, 575374
Noise sources noted during installation, weekly inspection and removal	Noise from digger and deforestation activity which is in front of the property. Secondary noise; birdsong, dogs barking and playing in front amenity area.

NOISE MONITORING EQUIPMENT DETAILS

Survey	Kit Number	Model	Serial Number	Last Calibrated/ Conformance Checked
Sound Level Meter	SLM 01	NL32	00661767	06/01/22
Pre Amplifier	Rion	NH-21	19771	06/01/22
Microphone	Rion	UC-53A	310458	06/01/22
Calibrator	Cal 003	NC-74	35173441	01/04/22

NOISE MONITORING EQUIPMENT SETTINGS

	Network (A,B,Z)	Index and Time	Time Weighting (Slow, Fast)	Range (dB)	Audio
Parameters Recorded	A	$L_{A9010min}$, $L_{Aeq10min}$	Fast	20-110	No

DATA

File Name	Start Time	End Time	Cal. at Start	Cal. at End	Drift	Observations
0301	16:10 22/06/22	16:39 14/07/22	94.0	93.9	-0.1	**16/06: Installation:** Audible forestry works to the south. Birdsong. Dogs barking.
0302	16:50 14/07/22	16:21 11/08/22	94.0	94.0	0.0	**14/07: Maintenance –** Audible forestry works to the south. Sheep.
0303	16:40 11/08/22	15:55 08/09/22	94.0	94.2	+0.2	**11/08: Maintenance –** Audible forestry works to the south. Dogs barking Low winds.
0304	16:10 08/09/22	14:06 22/09/22	94.0	94.0	0.0	**08/09: Maintenance** - Very windy and wet No forestry works audible. Wind induced noise from forestry to the south. **22/09: Equipment Decommissioned**

PHOTOGRAPHS

South

West

North

East

Noise Monitoring Field Data Sheet

Project Title	Proposed Repowering of Kilgarvan Wind Farm	**Project Number**	IE00065
Client	Orsted Onshore Ireland Midco Ltd	**Surveyor**	CB

MONITORING LOCATION

Location Name	Noise Monitoring Location (NML) 5
Description	The noise kit was installed in the amenity area to the front of the property. The kit was not located in the main amenity area to the rear of the property because of the workshop and it also was the main play area for the children (football pitch and trampoline). The kit was placed greater than 3.5 m away from any reflective surfaces (excluding the ground). A rain gauge was installed at this location.
Approximate Irish Transverse Mercator (ITM) Reference	514819, 574092
Noise sources noted during installation, weekly inspection and removal	Local watercourse, birdsong, wind induced noise.

NOISE MONITORING EQUIPMENT DETAILS

Survey	Kit Number	Model	Serial Number	Last Calibrated/ Conformance Checked
Sound Level Meter	SLM 06	NL32	0482652	06/01/22
Pre Amplifier	Rion	NH-21	27756	06/01/22
Microphone	Rion	UC-53A	314027	06/01/22
Calibrator	Cal 003	NC-74	35173441	01/04/22

NOISE MONITORING EQUIPMENT SETTINGS

	Network (A,B,Z)	Index and Time	Time Weighting (Slow, Fast)	Range (dB)	Audio
Parameters Recorded	A	$L_{A9010min}$, $L_{Aeq10min}$	Fast	20-110	No

DATA

File Name	Start Time	End Time	Cal. at Start	Cal. at End	Drift	Observations
0601	13:20 16/06/22	16:15 14/07/22	94.0	93.9	-0.1	**16/06: Installation:** Birdsong. Stream audible. Quiet otherwise.
0602	16:30 14/07/22	14:50 11/08/22	94.0	94.0	0.0	**14/07: Maintenance:** Stream audible Dog barking Sheep bleating
0603	15:10 11/08/22	14:55 08/09/22	94.0	94.0	0.0	**11/08: Maintenance:** Insects Stream audible Birdsong Low wind speeds
0604	15:10 08/09/22	17:00 22/09/22	94.0	94.0	0.0	**08/09: Maintenance:** Windy and very wet Stream audible **22/09: Equipment Decommissioned**

PHOTOGRAPHS

East

South

West

North

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

NSAI

National Metrology Laboratory

Certificate of Calibration

Issued to	TNEI Ireland Limited Unit S12 Synergy Centre Technological University Campus Tallaght Dublin 24
Attention of	Ewan Watson

Certificate Number	221332
Item Calibrated	RION NC-74 Sound Level Calibrator
Serial Number	35173441
ID Number	None
Order Number	6
Date Received	24 Mar 2022
NML Procedure Number	AP-NM-13
Method	The above calibrator was allowed to stabilize for a suitable period in laboratory conditions. It was then calibrated by measuring the sound pressure level generated in its measuring cavity. The calibrator's operating frequency was also measured.
Calibration Standards	Norsonic 1504A Calibration System incorporating: Agilent 34401A Digital Multimeter, File No. 0736 [Cal Due: 10 Jun 2022] B & K 4134 Measuring Microphone, File No. 0744 [Cal Due: 03 Jun 2023] B & K 4228 Pistonphone, File No. 0740 [Cal Due: 04 Jun 2023]

Calibrated by David Fleming

Approved by Paul Hetherington

Date of Calibration 01 Apr 2022

Date of Issue 01 Apr 2022

CIPM MRA

This certificate is consistent with Calibration and Measurement Capabilities (CMC's) that are included in Appendix C of the Mutual Recognition Arrangement (MRA) drawn up by the International Committee for Weights and Measures. Under the MRA, all participating institutes recognize the validity of each other's calibration certificates and measurement reports for quantities, ranges and measurement uncertainties specified in Appendix C (for details see www.bipm.org)

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5. This contract is governed by the laws of Ireland whose courts shall have exclusive jurisdiction.

Decision Rule and Compliance Statement

The rule that describes how measurement uncertainty is accounted for when stating conformity with a specified requirement is known as a decision rule. The rule used by NSAI NML follows the guidelines set out in the document ILAC-G8:09/2019 published by the International Laboratory Accreditation Co-operation. Further information on the decision rule is available on the NSAI website:
(https://www.nsai.ie/images/uploads/metrology/Decision_Rule.pdf).

The symbols used to indicate the state of compliance of the instrument calibration and their meanings are given in the following table.

Statement of compliance and associated symbol	Description
PASS	The absence of a symbol indicates that the measurement result is inside the specification limit by a margin greater than its associated expanded uncertainty; the instrument meets its accuracy specification.
Conditional PASS Symbol: £	The measurement result is inside the specification limit by a margin less than or equal to its associated expanded measurement uncertainty; it is therefore not possible to state compliance. There is a risk that the instrument fails to meet its specification.
Conditional FAIL Symbol: &	The measurement result is on the specification limit or is outside the specification limit by a margin less than or equal to its associated expanded measurement uncertainty; it is therefore not possible to state non-compliance.
FAIL Symbol: $	The measurement result is outside the specification limit by a margin greater than its associated measurement uncertainty; the instrument fails to meet its accuracy specification.
Unc. > Spec Symbol: #	The expanded measurement uncertainty is greater than the instrument's accuracy specification. It is not possible to determine compliance or otherwise with the specification. The user should expand the in-use accuracy specification to make allowance for the calibration uncertainty.
Outside CIPM MRA Symbol: ¢	Indicates that the calibration result is traceable to SI units but is not currently included in the table of NSAI NML's calibration and measurement capabilities approved under the CIPM MRA.

Where no specification exists, and none is prescribed by the client, the Decision Rule policy of the NSAI NML does not apply and results are provided without a statement of compliance.

Measuring Conditions:

Ambient Pressure:	(102.0 ± 0.5) kPa
Ambient Temperature:	(21.5 ± 1.0) °C
Ambient Rel. Humidity:	(32 ± 5) %RH

Results:

The measured sound pressure levels (SPL) reported below refer to the ambient laboratory conditions at the time of calibration.

Calibrator Setting	Measured Parameter	Measured Value (1)		Tolerance (3)	Meas. Uncertainty
		Before Adj.	After Adj.	(±)	(±)
94 dB	Sound Pressure Level(2)	93.95 dB	*	0.40 dB	0.15 dB
	Frequency	1001.8 Hz	*	10 Hz	0.25 Hz

Notes: (1) * indicates that no calibration adjustment was made.
(2) The measured sound pressure level was that generated in the calibrator's cavity when loaded by the microphone specified on page 1 of this certificate (including protection grid).
(3) Tolerance limits set out in IEC 60942:2003, Sound Calibrators, Class 1.

Comments:

Where used in the results table, further information on the meaning of symbols is given in the table on page 2 of this certificate.

The instrument was found to comply with the requirements of IEC 60942 (2003), Class 1, for the sound pressure level and frequency outputs measured at the time of calibration.

Note that for acoustic calibrators which meet IEC 60942 (2003), the instrument is considered out of tolerance if the measured deviation from the set level, extended by it associated uncertainty, exceeds the specified tolerance limits.

Note that the measured values refer to the ambient conditions given above.

When using the calibrator with a sound level meter any manufacturer's guidelines regarding free-field corrections should be observed.

The reported measurement results are traceable, via national standards maintained by NSAI National Metrology Laboratory (NML) or by other national metrology institutes, to internationally accepted realisations of the SI units.

The reported expanded uncertainty is based on the standard uncertainty multiplied by a coverage factor $k = 2$ which, for a normal probability distribution, corresponds to a coverage probability of approximately 95%. It has been determined in accordance with the "Guide to the Expression of Uncertainty in Measurement (GUM)". These uncertainties apply only to the measured values and do not carry any implication regarding the long-term stability of the instrument.

NSAI
National Metrology Laboratory

Certificate of Calibration

Issued to	TNEI Ireland Limited Unit S12 Synergy Centre Technological University Dublin Campus Tallaght Dublin D24 A386
Attention of	Ewan Watson

Certificate Number	**215237**
Item Calibrated	Rion NL-32 Sound Level Meter, complete with Rion UC53A Microphone
Serial Numbers	00661767 (Sound Level Meter) and 310458 (Microphone)
ID Number	SLM001
Order Number	4
Date Received	14 Dec 2021
NML Procedure Number	AP-NM-09
Method	The above sound level meter was allowed to stabilise for a suitable period in laboratory conditions. It was then calibrated by carrying out the verification tests detailed in IEC 61672-3 (2006), *Periodic tests, specification for the verification of sound level meters*. This standard specifies a procedure for the periodic verification of conformance of a sound level meter or integrating-averaging meter to IEC 61672-1 (2003).
Calibration Standards	Norsonic 1504A Calibration System incorporating: SR DS360 Signal Generator, No. 0735 [Cal Due Date: 10 Jun 2022] Agilent 34401A Digital Multimeter, No. 0736 [Cal Due Date: 10 Jun 2022] B&K 4134 Measuring Microphone, No. 0744 [Cal Due Date: 03 Jun 2023] B&K 4228 Pistonphone, No. 0740 [Cal Due Date: 04 Jun 2023] B&K 4226 Acoustical Calibrator, No. 0150 [Cal Due Date: 07 Oct 2022]

Calibrated by	David Fleming	**Approved by**	Paul Hetherington
Date of Calibration	06 Jan 2022	**Date of Issue**	06 Jan 2022

CIPM MRA

This certificate is consistent with Calibration and Measurement Capabilities (CMC's) that are included in Appendix C of the Mutual Recognition Arrangement (MRA) drawn up by the International Committee for Weights and Measures. Under the MRA, all participating institutes recognize the validity of each other's calibration certificates and measurement reports for quantities, ranges and measurement uncertainties specified in Appendix C (for details see www.bipm.org)

Standard Terms & Conditions for Calibration, Testing and Consultancy Assignments

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2. No action or legal proceeding shall be taken (except in the case of wilful neglect or default) against NSAI or the Board or any member of the Board or any committee appointed by the Board or any officer or servant of NSAI, by reason of or arising out of the carrying out of any research, investigation, test or analysis or the publication of the results thereof in the name of NSAI.
3. NSAI will not release any information received from or provided to the client in relation to this report except as may be required by law, including the Freedom of Information Act 1997, or as specified by the client.
4. This certificate relates only to the item(s) described on the front page and shall not be reproduced, except in full.
5. This contract is governed by the laws of Ireland whose courts shall have exclusive jurisdiction.

Decision Rule and Compliance Statement

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(https://www.nsai.ie/images/uploads/metrology/Decision_Rule.pdf).

The symbols used to indicate the state of compliance of the instrument calibration and their meanings are given in the following table.

Statement of compliance and associated symbol	Description
PASS	The absence of a symbol indicates that the measurement result is inside the specification limit by a margin greater than its associated expanded uncertainty; the instrument meets its accuracy specification.
Conditional PASS Symbol: **£**	The measurement result is inside the specification limit by a margin less than or equal to its associated expanded measurement uncertainty; it is therefore not possible to state compliance. There is a risk that the instrument fails to meet its specification.
Conditional FAIL Symbol: **&**	The measurement result is on the specification limit or is outside the specification limit by a margin less than or equal to its associated expanded measurement uncertainty; it is therefore not possible to state non-compliance.
FAIL Symbol: **$**	The measurement result is outside the specification limit by a margin greater than its associated measurement uncertainty; the instrument fails to meet its accuracy specification.
Unc. > Spec Symbol: **#**	The expanded measurement uncertainty is greater than the instrument's accuracy specification. It is not possible to determine compliance or otherwise with the specification. The user should expand the in-use accuracy specification to make allowance for the calibration uncertainty.
Outside CIPM MRA Symbol: **¢**	Indicates that the calibration result is traceable to SI units but is not currently included in the table of NSAI NML's calibration and measurement capabilities approved under the CIPM MRA.

Where no specification exists, and none is prescribed by the client, the Decision Rule policy of the NSAI NML does not apply and results are provided without a statement of compliance.

Ambient laboratory conditions:

Barometric Pressure:	100.0 kPa ± 0.5 kPa
Temperature:	20.7 °C ± 1 °C
Relative Humidity:	35 %RH ± 5%RH

Summary of Results:

The following table summarises the results of the verification tests. The detailed results are given in the subsequent tables.

IEC 61672 Test	Test Title	Status
10	Self-generated Noise (Electrical)	/
11	Acoustical Signal	PASS
12	Frequency Weighting	PASS
13	Frequency and Time Weighting @ 1 kHz	PASS
14	Level Linearity Test on Reference Level Range	PASS
15	Level Linearity including Range Control	PASS
16	Toneburst Response	PASS
17	Peak C	PASS
18	Overload Indication	PASS

Detailed Results.

Prior to carrying out the verification tests the sound level meter was confirmed to be reading correctly for pressure response through application of a reference acoustical calibrator.

Self-generated Noise Test (Electrical Input) (Test #10) (1)

Range: 20 - 80 dB
Mode: Leq

SLM Configuration	Freq. Weighting Network	SLM Reading(2)
Microphone installed	A	20.2 dB (U/R)(3)
Microphone replaced by electrical signal device and Fitted with a short-circuit	A	17.4 (U/R)(3)
	C	21.4
	Z (Linear)	25.1

Acoustical signal test of a frequency weighting (Test #11) (1)

Range: 40 - 130 dB
Frequency Weighting setting: C
Time Weighting response: Slow

Input Level(4)	Input Freq.	SLM Error of Indication(5)	Tolerance(6) (±)	Uncertainty of Measurement (±)
94.0 dB	1000 Hz	0.0 dB (Ref)	1.1 dB	0.3 dB
	125	+0.2	1.5	0.3
	4000(7)	+0.9	1.6	0.5

Electrical signal tests of frequency weightings (Test #12)[1]

Range: 40 - 130 dB

Freq. (nominal)	Input Level[4]	SLM Reading	SLM Error of Indication[5]	Tolerance[6] (±)	Uncertainty of Measurement (±)
A-Weighting					
63 Hz	93 dB	92.7 dB	-0.3 dB	1.5 dB	0.20 dB
125	93	92.8	-0.2	1.5	0.20
250	93	92.8	-0.2	1.4	0.20
500	93	92.9	-0.1	1.4	0.20
1000	93	93.0	0.0	1.1	0.20
2000	93	93.1	+0.1	1.6	0.20
4000	93	93.1	+0.1	1.6	0.20
8000	93	93.1	+0.1	2.1, -3.1	0.20
16000	93	93.2	+0.2	3.5, -17	0.20
C-Weighting					
63 Hz	93 dB	92.6 dB	-0.4 dB	1.5 dB	0.20 dB
125	93	93.0	0.0	1.5	0.20
250	93	93.0	0.0	1.4	0.20
500	93	93.0	0.0	1.4	0.20
1000	93	93.0	0.0	1.1	0.20
2000	93	93.1	+0.1	1.6	0.20
4000	93	93.1	+0.1	1.6	0.20
8000	93	93.1	+0.1	2.1, -3.1	0.20
16000	93	93.2	+0.2	3.5, -17	0.20
LIN Weighting					
63 Hz	93 dB	92.6 dB	-0.4 dB	1.5 dB	0.20 dB
125	93	92.9	-0.1	1.5	0.20
250	93	92.9	-0.1	1.4	0.20
500	93	92.9	-0.1	1.4	0.20
1000	93	93.0	0.0	1.1	0.20
2000	93	93.0	0.0	1.6	0.20
4000	93	93.1	+0.1	1.6	0.20
8000	93	92.9	-0.1	2.1, -3.1	0.20
16000	93	92.4	-0.6	3.5, -17	0.20

Frequency and time weightings at 1 kHz (Test #13)[1]

Range: 40 - 130 dB

Time Weighting Setting	Frequency Weighting Setting	Input Level[4]	Deviation from Reference	Tolerance[6] (±)	Uncertainty. of Measurement (±)
Fast	A	94.0 dB	0.0 dB	0.4 dB	0.20 dB
	C		+0.2	0.4	0.20
	Z		+0.2	0.4	0.20
Slow	A	94.0 dB	0.0 dB	0.3 dB	0.20 dB
Leq.	A	94.0 dB	0.0 dB	0.3 dB	0.20 dB
SEL	A	114.0 dB	0.0 dB	0.3 dB	0.20 dB

Linearity level on the reference range (Test #14)[1]

Range: 40 to 130 dB
Input Frequency: 1 kHz
SLM Measuring Mode: SPL

Range	Input Level[4]	SLM Reading	SLM Error of Indication[5]	Tolerance[6] (±)	Uncertainty of Measurement (±)
130 dB	94 dB	94.0 dB	0.0 dB	1.1 dB	0.20 dB
	99	99.0	0.0	1.1	0.20
	104	103.9	-0.1	1.1	0.20
	109	108.9	-0.1	1.1	0.20
	114	113.9	-0.1	1.1	0.20
	119	118.9	-0.1	1.1	0.20
	124	123.9	-0.1	1.1	0.20
	129	128.9	-0.1	1.1	0.20
	131	131.0	0.0	1.1	0.20
	132	132.0	0.0	1.1	0.20
	133	133.0	0.0	1.1	0.20
	134	134.0	0.0	1.1	0.20
	135	135.0	0.0	1.1	0.20
	136	136.0	0.0	1.1	0.20
	94	94.0	0.0	1.1	0.20
	89	89.0	0.0	1.1	0.21
	84	84.0	0.0	1.1	0.21
	79	78.9	-0.1	1.1	0.21
	74	74.0	0.0	1.1	0.21
	69	68.9	-0.1	1.1	0.21
	64	63.9	-0.1	1.1	0.21
	59	58.9	-0.1	1.1	0.21
	54	54.0	0.0	1.1	0.21
	49	49.0	0.0	1.1	0.21
	44	44.0	0.0	1.1	0.21

Level Linearity including Range Control (Test #15)[1]

Input Frequency: 1 kHz
SLM Measuring Mode: SPL

Range	Input Level[3]	SLM Reading	SLM Error of Indication[5]	Tolerance[6] (±)	Uncertainty of Measurement (±)
130 dB	94.0 dB	94.0 dB	0.0 dB	1.1 dB	0.20 dB
	125.0	125.0	0.0	1.1	0.20
120 dB	94.0 dB	93.9 dB	-0.1 dB	1.1 dB	0.20 dB
	115.0	114.9	-0.1	1.1	0.20
110 dB	94.0 dB	94.0 dB	0.0 dB	1.1 dB	0.20 dB
	105.0	105.0	0.0	1.1	0.20
100 dB	94.0 dB	94.0 dB	0.0 dB	1.1 dB	0.20 dB
	95.0	95.0	0.0	1.1	0.20
90 dB	85.0 dB	84.9 dB	-0.1 dB	1.1 dB	0.20 dB
80 dB	75.0 dB	75.0 dB	0.0 dB	1.1 dB	0.20 dB

Toneburst response (Test #16)[1]

Range: 40 to 130 dB

Burst Type	SLM Mode	Input Level[4]	SLM Error of Indication[5]	Tolerance[6] (±)	Uncertainty of Measurement (±)
200 ms	LAF	135.0 dB	0.0 dB	0.8 dB	0.3 dB
2.0 ms	LAF	118.0	0.0	1.3	0.3
0.25 msec	LAF	109.0	-0.1	1.3, -3.3	0.3
200 ms	LAS	128.6 dB	-0.1 dB	0.8 dB	0.3 dB
2.0 ms	LAS	109.0	-0.1	1.3, -1.8	0.3
200 ms	SEL	129.0 dB	0.0 dB	0.8 dB	0.3 dB
2 .0 ms	SEL	109.3	0.0	1.3	0.3
0.25 ms	SEL	100.0	-0.1	1.3, -3.3	0.3

Peak C sound level (Test #17)[1]

Range: 40 to 130 dB

Pulse Type	Pulse Frequency	Input Level[4] (peak value)	SLM Error of Indication[5]	Tolerance[6] (±)	Uncertainty of Measurement (±)
1 cycle	8 kHz	130.4 dB	-0.1 dB	2.4 dB	0.35 dB
Pos. ½ cycle	500 Hz	132.4 dB	-0.4 dB	1.4 dB	0.35 dB
Neg. ½ cycle	500 Hz	132.4 dB	-0.3 dB	1.4 dB	0.35 dB

Overload indication (Test #18)[1]

Range: 40 to 130 dB
SLM Measuring Mode: LAEq

Test description	Overload occurred at (±)	Meas. Diff. (Pos – Neg)	Tolerance[6] (±)	Uncertainty of Measurement (±)
Positive ½ cycle at 4 kHz	139.1 dB	-	-	-
Negative ½ cycle at 4 kHz	139.1 dB	-	-	-
Level difference of positive & negative pulses	-	0.0 dB	1.8 dB	0.30 dB

Notes:

(1) The test number, given in parentheses after the section heading, refers to the relevant clause in IEC 61672-3 (2006).

(2) SLM denotes Sound Level Meter

(3) U/R denotes Under Range

(4) All input levels are given in dB relative to a 20 µPa reference level.

(5) The SLM Error of Indication is defined as follows:
SLM Error of Indication = SLM Reading - Input Level

(6) The figures in the column labelled 'Tolerance' are the acceptance limits given in IEC 61672-1(2003). These tolerance limits include an allowance for the maximum expanded uncertainty of the test laboratory. The criteria for compliance with the tolerance is that the measurement result, extended by its associated uncertainty, lies within the specified limits.

(7) Microphone response at 4 kHz was measured using an electrostatic actuator. A Free Field correction of +1.2 dB was applied to the measured actuator response.
This measurement is not included in NML's tables of Calibration and Measurement Capabilities, approved under the CIPM MRA.
For information, the measured sensitivity and frequency response of the microphone is given in an addendum to this certificate.

Comments:

Where used in the results table, further information on the meaning of symbols is given in the table on page 2 of this certificate.

The instrument was found to meet the requirements of IEC 61672-1 (2003) in accordance with the verification procedures set out in IEC 61672-3 (2006) at the time of calibration.

The reported measurement results are traceable, via national standards maintained by NSAI National Metrology Laboratory (NML) or by other national metrology institutes, to internationally accepted realisations of the SI units.

The reported expanded uncertainty is based on the standard uncertainty multiplied by a coverage factor $k = 2$ which, for a normal probability distribution, corresponds to a coverage probability of approximately 95%. It has been determined in accordance with the "Guide to the Expression of Uncertainty in Measurement (GUM)". These uncertainties apply only to the measured values and do not carry any implication regarding the long-term stability of the instrument.

NSAI
National Metrology Laboratory

Addendum to Certificate 215237

Rion
Type: UC-53A

Serial no: 310458

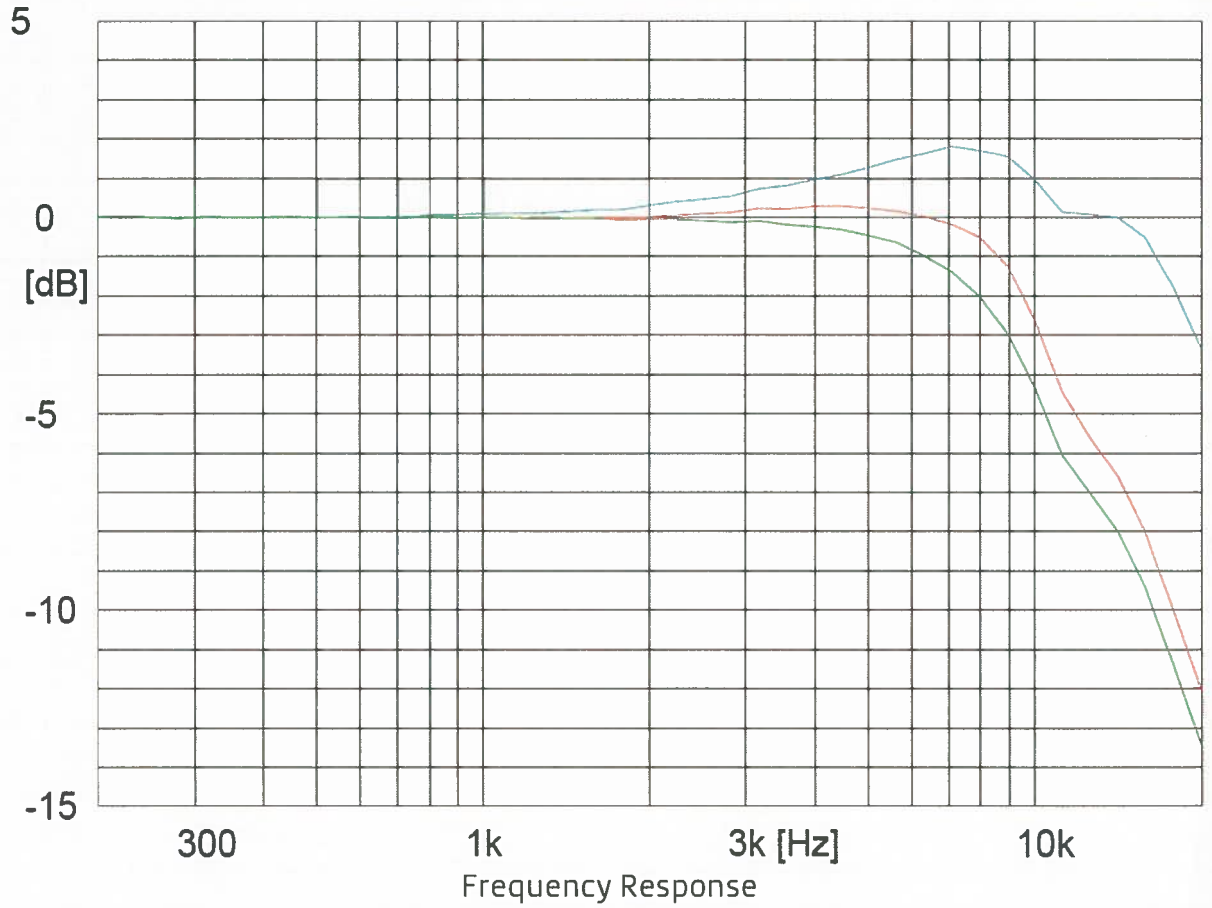
Sensitivity: 40.0 mV/Pa
-28.0 ±0.01 dB re. 1 V/Pa

Date: 06/01/2022

Measurement conditions:	
Polarisation voltage:	0.0 V
Pressure:	100.02 ±0.01 kPa
Temperature:	20.7 ±1.1 °C
Relative humidity:	35.2 ±2.4 %RH

Results are normalized to the reference conditions.

Free field response
Diffuse field response
Pressure (Actuator) response



NSAI

National Metrology Laboratory

Certificate of Calibration

Issued to	TNEI Ireland Limited Unit S12 Synergy Centre Technological University Dublin Campus Tallaght Dublin D24 A386
Attention of	Ewan Watson

Certificate Number	**215238**
Item Calibrated	Rion NL-32 Sound Level Meter, complete with Rion UC53A Microphone
Serial Numbers	00482652 (Sound Level Meter) and 314027 (Microphone)
ID Number	SLM006
Order Number	4
Date Received	14 Dec 2021
NML Procedure Number	AP-NM-09
Method	The above sound level meter was allowed to stabilise for a suitable period in laboratory conditions. It was then calibrated by carrying out the verification tests detailed in IEC 61672-3 (2006), *Periodic tests, specification for the verification of sound level meters*. This standard specifies a procedure for the periodic verification of conformance of a sound level meter or integrating-averaging meter to IEC 61672-1 (2003).
Calibration Standards	Norsonic 1504A Calibration System incorporating: SR DS360 Signal Generator, No. 0735 [Cal Due Date: 10 Jun 2022] Agilent 34401A Digital Multimeter, No. 0736 [Cal Due Date: 10 Jun 2022] B&K 4134 Measuring Microphone, No. 0744 [Cal Due Date: 03 Jun 2023] B&K 4228 Pistonphone, No. 0740 [Cal Due Date: 04 Jun 2023] B&K 4226 Acoustical Calibrator, No. 0150 [Cal Due Date: 07 Oct 2022]

Calibrated by	David Fleming	**Approved by**	Paul Hetherington
Date of Calibration	06 Jan 2022	**Date of Issue**	06 Jan 2022

CIPM MRA

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3. NSAI will not release any information received from or provided to the client in relation to this report except as may be required by law, including the Freedom of Information Act 1997, or as specified by the client.
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(https://www.nsai.ie/images/uploads/metrology/Decision_Rule.pdf).

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Conditional FAIL Symbol: &	The measurement result is on the specification limit or is outside the specification limit by a margin less than or equal to its associated expanded measurement uncertainty; it is therefore not possible to state non-compliance.
FAIL Symbol: $	The measurement result is outside the specification limit by a margin greater than its associated measurement uncertainty; the instrument fails to meet its accuracy specification.
Unc. > Spec Symbol: #	The expanded measurement uncertainty is greater than the instrument's accuracy specification. It is not possible to determine compliance or otherwise with the specification. The user should expand the in-use accuracy specification to make allowance for the calibration uncertainty.
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Where no specification exists, and none is prescribed by the client, the Decision Rule policy of the NSAI NML does not apply and results are provided without a statement of compliance.

Ambient laboratory conditions:

Barometric Pressure:	99.8 kPa ± 0.5 kPa
Temperature:	20.6 °C ± 1 °C
Relative Humidity:	40 %RH ± 5%RH

Summary of Results:

The following table summarises the results of the verification tests. The detailed results are given in the subsequent tables.

IEC 61672 Test	Test Title	Status
10	Self-generated Noise (Electrical)	/
11	Acoustical Signal	PASS
12	Frequency Weighting	PASS
13	Frequency and Time Weighting @ 1 kHz	PASS
14	Level Linearity Test on Reference Level Range	PASS
15	Level Linearity including Range Control	PASS
16	Toneburst Response	PASS
17	Peak C	PASS
18	Overload Indication	PASS

Detailed Results.

Prior to carrying out the verification tests the sound level meter was confirmed to be reading correctly for pressure response through application of a reference acoustical calibrator.

Self-generated Noise Test (Electrical Input) (Test #10) [1]

Range: 20 - 80 dB
Mode: Leq

SLM Configuration	Freq. Weighting Network	SLM Reading[2]
Microphone installed	A	21.1 dB
Microphone replaced by electrical signal device and Fitted with a short-circuit	A	17.9 (U/R)[3]
	C	21.9
	Z (Linear)	25.8

Acoustical signal test of a frequency weighting (Test #11) [1]

Range: 40 - 130 dB
Frequency Weighting setting: C
Time Weighting response: Slow

Input Level[4]	Input Freq.	SLM Error of Indication[5]	Tolerance[6] (±)	Uncertainty of Measurement (±)
94.0 dB	1000 Hz	0.0 dB (Ref)	1.1 dB	0.3 dB
	125	+0.2	1.5	0.3
	4000[7]	+0.5	1.6	0.5

Electrical signal tests of frequency weightings (Test #12)[1]

Range: 40 - 130 dB

Freq. (nominal)	Input Level[4]	SLM Reading	SLM Error of Indication[5]	Tolerance[6] (±)	Uncertainty of Measurement (±)
A-Weighting					
63 Hz	93 dB	92.8 dB	-0.2 dB	1.5 dB	0.20 dB
125	93	92.9	-0.1	1.5	0.20
250	93	92.8	-0.2	1.4	0.20
500	93	92.9	-0.1	1.4	0.20
1000	93	93.0	0.0	1.1	0.20
2000	93	93.1	+0.1	1.6	0.20
4000	93	93.1	+0.1	1.6	0.20
8000	93	93.1	+0.1	2.1, -3.1	0.20
16000	93	93.2	+0.2	3.5, -17	0.20
C-Weighting					
63 Hz	93 dB	92.9 dB	-0.1 dB	1.5 dB	0.20 dB
125	93	92.9	-0.1	1.5	0.20
250	93	92.9	-0.1	1.4	0.20
500	93	93.0	0.0	1.4	0.20
1000	93	93.0	0.0	1.1	0.20
2000	93	93.0	0.0	1.6	0.20
4000	93	93.0	0.0	1.6	0.20
8000	93	93.2	+0.2	2.1, -3.1	0.20
16000	93	93.3	+0.3	3.5, -17	0.20
LIN Weighting					
63 Hz	93 dB	92.7 dB	-0.3 dB	1.5 dB	0.20 dB
125	93	92.8	-0.2	1.5	0.20
250	93	92.9	-0.1	1.4	0.20
500	93	92.9	-0.1	1.4	0.20
1000	93	93.0	0.0	1.1	0.20
2000	93	93.0	0.0	1.6	0.20
4000	93	93.1	+0.1	1.6	0.20
8000	93	92.9	-0.1	2.1, -3.1	0.20
16000	93	92.5	-0.5	3.5, -17	0.20

Frequency and time weightings at 1 kHz (Test #13)[1]

Range: 40 - 130 dB

Time Weighting Setting	Frequency Weighting Setting	Input Level[4]	Deviation from Reference	Tolerance[6] (±)	Uncertainty. of Measurement (±)
Fast	A	94.0 dB	0.0 dB	0.4 dB	0.20 dB
	C		+0.2	0.4	0.20
	Z		+0.2	0.4	0.20
Slow	A	94.0 dB	0.0 dB	0.3 dB	0.20 dB
Leq.	A	94.0 dB	0.0 dB	0.3 dB	0.20 dB
SEL	A	114.0 dB	0.0 dB	0.3 dB	0.20 dB

Linearity level on the reference range (Test #14)[1]

Range: 40 to 130 dB
Input Frequency: 1 kHz
SLM Measuring Mode: SPL

Range	Input Level[4]	SLM Reading	SLM Error of Indication[5]	Tolerance[6] (±)	Uncertainty of Measurement (±)
130 dB	94 dB	94.0 dB	0.0 dB	1.1 dB	0.20 dB
	99	99.0	0.0	1.1	0.20
	104	103.9	-0.1	1.1	0.20
	109	108.9	-0.1	1.1	0.20
	114	113.9	-0.1	1.1	0.20
	119	118.9	-0.1	1.1	0.20
	124	123.9	-0.1	1.1	0.20
	129	128.9	-0.1	1.1	0.20
	131	130.9	-0.1	1.1	0.20
	132	132.0	0.0	1.1	0.20
	133	132.9	-0.1	1.1	0.20
	134	134.0	0.0	1.1	0.20
	135	135.0	0.0	1.1	0.20
	136	136.0	0.0	1.1	0.20
	94	94.0	0.0	1.1	0.20
	89	89.0	0.0	1.1	0.21
	84	84.0	0.0	1.1	0.21
	79	79.0	0.0	1.1	0.21
	74	74.0	0.0	1.1	0.21
	69	68.9	-0.1	1.1	0.21
	64	64.0	0.0	1.1	0.21
	59	58.9	-0.1	1.1	0.21
	54	53.9	-0.1	1.1	0.21
	49	49.0	0.0	1.1	0.21
	44	44.0	0.0	1.1	0.21

Level Linearity including Range Control (Test #15)[1]

Input Frequency: 1 kHz
SLM Measuring Mode: SPL

Range	Input Level[3]	SLM Reading	SLM Error of Indication[5]	Tolerance[6] (±)	Uncertainty of Measurement (±)
130 dB	94.0 dB	94.0 dB	0.0 dB	1.1 dB	0.20 dB
	125.0	125.0	0.0	1.1	0.20
120 dB	94.0 dB	94.0 dB	0.0 dB	1.1 dB	0.20 dB
	115.0	114.9	-0.1	1.1	0.20
110 dB	94.0 dB	94.0 dB	0.0 dB	1.1 dB	0.20 dB
	105.0	105.0	0.0	1.1	0.20
100 dB	94.0 dB	94.0 dB	0.0 dB	1.1 dB	0.20 dB
	95.0	95.0	0.0	1.1	0.20
90 dB	85.0 dB	85.0 dB	0.0 dB	1.1 dB	0.20 dB
80 dB	75.0 dB	75.0 dB	0.0 dB	1.1 dB	0.20 dB

Toneburst response (Test #16)[1]

Range: 40 to 130 dB

Burst Type	SLM Mode	Input Level[4]	SLM Error of Indication[5]	Tolerance[6] (±)	Uncertainty of Measurement (±)
200 ms	LAF	134.0 dB	0.0 dB	0.8 dB	0.3 dB
2.0 ms	LAF	117.0	0.0	1.3	0.3
0.25 msec	LAF	108.0	-0.1	1.3, -3.3	0.3
200 ms	LAS	127.6 dB	-0.1 dB	0.8 dB	0.3 dB
2.0 ms	LAS	108.0	-0.1	1.3, -1.8	0.3
200 ms	SEL	128.0 dB	0.0 dB	0.8 dB	0.3 dB
2.0 ms	SEL	108.0	0.0	1.3	0.3
0.25 ms	SEL	99.0	-0.2	1.3, -3.3	0.3

Peak C sound level (Test #17)[1]

Range: 40 to 130 dB

Pulse Type	Pulse Frequency	Input Level[4] (peak value)	SLM Error of Indication[5]	Tolerance[6] (±)	Uncertainty of Measurement (±)
1 cycle	8 kHz	133.4 dB	-0.6 dB	2.4 dB	0.35 dB
Pos. ½ cycle	500 Hz	135.4 dB	-0.3 dB	1.4 dB	0.35 dB
Neg. ½ cycle	500 Hz	135.4 dB	-0.3 dB	1.4 dB	0.35 dB

Overload indication (Test #18)[1]

Range: 40 to 130 dB
SLM Measuring Mode: LAEq

Test description	Overload occurred at (±)	Meas. Diff. (Pos – Neg)	Tolerance[6] (±)	Uncertainty of Measurement (±)
Positive ½ cycle at 4 kHz	139.3 dB	-	-	-
Negative ½ cycle at 4 kHz	139.2 dB	-	-	-
Level difference of positive & negative pulses	-	0.1 dB	1.8 dB	0.30 dB

Notes:

(1) The test number, given in parentheses after the section heading, refers to the relevant clause in IEC 61672-3 (2006).

(2) SLM denotes Sound Level Meter

(3) U/R denotes Under Range

(4) All input levels are given in dB relative to a 20 µPa reference level.

(5) The SLM Error of Indication is defined as follows:
SLM Error of Indication = SLM Reading - Input Level

(6) The figures in the column labelled 'Tolerance' are the acceptance limits given in IEC 61672-1(2003). These tolerance limits include an allowance for the maximum expanded uncertainty of the test laboratory. The criteria for compliance with the tolerance is that the measurement result, extended by its associated uncertainty, lies within the specified limits.

(7) Microphone response at 4 kHz was measured using an electrostatic actuator. A Free Field correction of +1.2 dB was applied to the measured actuator response.
This measurement is not included in NML's tables of Calibration and Measurement Capabilities, approved under the CIPM MRA.
For information, the measured sensitivity and frequency response of the microphone is given in an addendum to this certificate.

Comments:

Where used in the results table, further information on the meaning of symbols is given in the table on page 2 of this certificate.

The instrument was found to meet the requirements of IEC 61672-1 (2003) in accordance with the verification procedures set out in IEC 61672-3 (2006) at the time of calibration.

The reported measurement results are traceable, via national standards maintained by NSAI National Metrology Laboratory (NML) or by other national metrology institutes, to internationally accepted realisations of the SI units.

The reported expanded uncertainty is based on the standard uncertainty multiplied by a coverage factor $k = 2$ which, for a normal probability distribution, corresponds to a coverage probability of approximately 95%. It has been determined in accordance with the "Guide to the Expression of Uncertainty in Measurement (GUM)". These uncertainties apply only to the measured values and do not carry any implication regarding the long-term stability of the instrument.

NSAI
National Metrology Laboratory

Addendum to Certificate 215238

Rion
Type: UC-53A

Serial no: 314027

Sensitivity: 39.4 mV/Pa
-28.1 ±0.01 dB re. 1 V/Pa

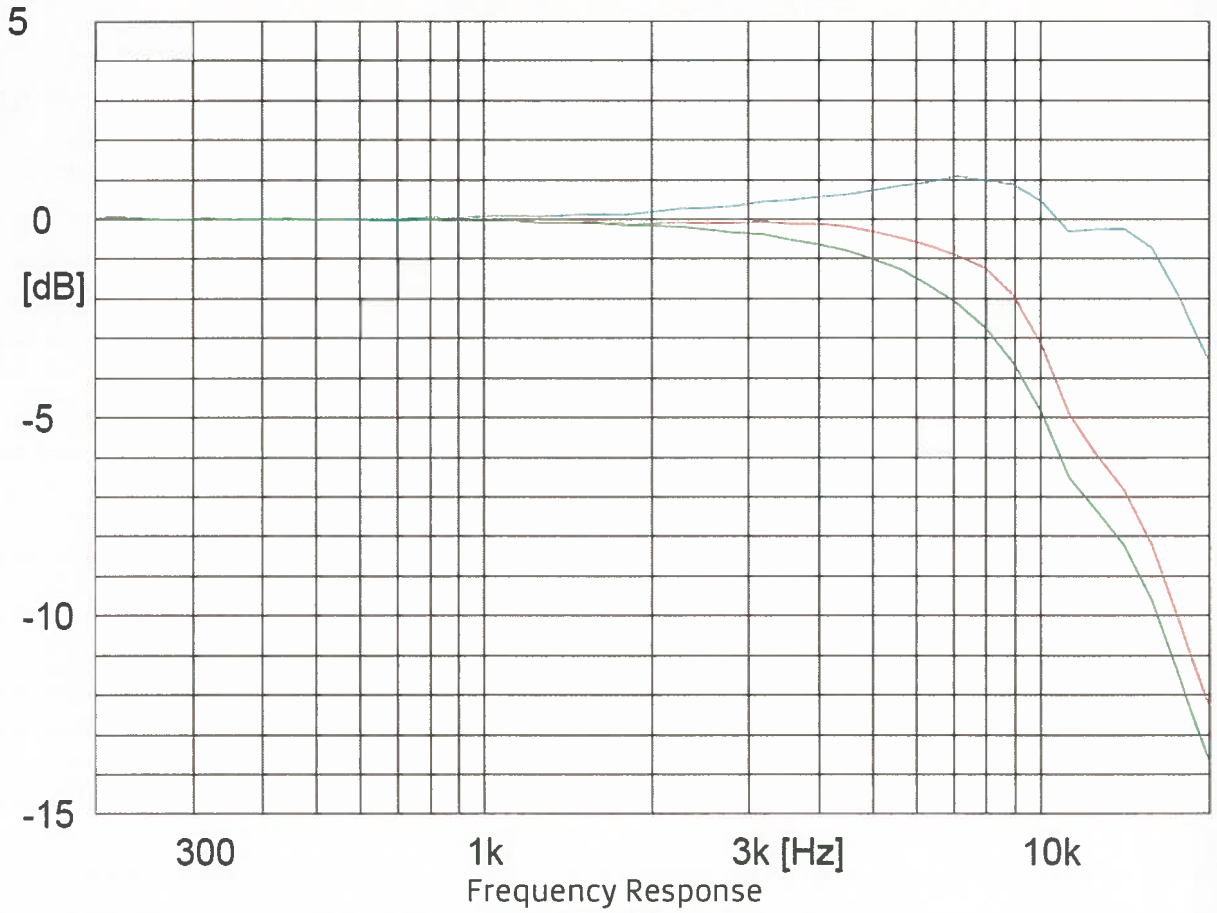
Date: 06/01/2022

Measurement conditions:

Polarisation voltage:	0.0 V
Pressure:	99.87 ±0.01 kPa
Temperature:	21.4 ±1.1 °C
Relative humidity:	48.9 ±11.8 %RH

Results are normalized to the reference conditions.

Free field response
Diffuse field response
Pressure (Actuator) response



NSAI

National Metrology Laboratory

Certificate of Calibration

Issued to	TNEI Group Floor 7 West One Forth Banks Newcastle Upon Tyne England
Attention of	Ewan Watson

Certificate Number	**211433**
Item Calibrated	Rion NL-31 Sound Level Meter, complete with Rion UC53A Microphone
Serial Numbers	01273082 (Sound Level Meter) and 313385 (Microphone)
ID Number	SLM011
Order Number	1684
Date Received	13 Apr 2021
NML Procedure Number	AP-NM-09
Method	The above sound level meter was allowed to stabilise for a suitable period in laboratory conditions. It was then calibrated by carrying out the verification tests detailed in IEC 61672-3 (2006), *Periodic tests, specification for the verification of sound level meters*. This standard specifies a procedure for the periodic verification of conformance of a sound level meter or integrating-averaging meter to IEC 61672-1 (2003).
Calibration Standards	Norsonic 1504A Calibration System incorporating: SR DS360 Signal Generator, No. 0735 [Cal Due Date: 21 May 2021] Agilent 34401A Digital Multimeter, No. 0736 [Cal Due Date: 21 May 2021] B&K 4134 Measuring Microphone, No. 0743 [Cal Due Date: 27 May 2022] B&K 4228 Pistonphone, No. 0741 [Cal Due Date: 26 May 2022] B&K 4226 Acoustical Calibrator, No. 0150 [Cal Due Date: 02 Sep 2021]

Calibrated by	David Fleming	**Approved by**	Paul Hetherington
Date of Calibration	16 Apr 2021	**Date of Issue**	16 Apr 2021

CIPM MRA

This certificate is consistent with Calibration and Measurement Capabilities (CMC's) that are included in Appendix C of the Mutual Recognition Arrangement (MRA) drawn up by the International Committee for Weights and Measures. Under the MRA, all participating institutes recognize the validity of each other's calibration certificates and measurement reports for quantities, ranges and measurement uncertainties specified in Appendix C (for details see www.bipm.org)

Standard Terms & Conditions for Calibration, Testing and Consultancy Assignments

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5. This contract is governed by the laws of Ireland whose courts shall have exclusive jurisdiction.

Decision Rule and Compliance Statement

The rule that describes how measurement uncertainty is accounted for when stating conformity with a specified requirement is known as a decision rule. The rule used by NSAI NML follows the guidelines set out in the document ILAC-G8:09/2019 published by the International Laboratory Accreditation Co-operation. Further information on the decision rule is available on the NSAI website:

(https://www.nsai.ie/images/uploads/metrology/Decision_Rule.pdf).

The symbols used to indicate the state of compliance of the instrument calibration and their meanings are given in the following table.

Statement of compliance and associated symbol	Description
PASS	The absence of a symbol indicates that the measurement result is inside the specification limit by a margin greater than its associated expanded uncertainty; the instrument meets its accuracy specification.
Conditional PASS Symbol: **£**	The measurement result is inside the specification limit by a margin less than or equal to its associated expanded measurement uncertainty; it is therefore not possible to state compliance. There is a risk that the instrument fails to meet its specification.
Conditional FAIL Symbol: **&**	The measurement result is on the specification limit or is outside the specification limit by a margin less than or equal to its associated expanded measurement uncertainty; it is therefore not possible to state non-compliance.
FAIL Symbol: **$**	The measurement result is outside the specification limit by a margin greater than its associated measurement uncertainty; the instrument fails to meet its accuracy specification.
Unc. > Spec Symbol: **#**	The expanded measurement uncertainty is greater than the instrument's accuracy specification. It is not possible to determine compliance or otherwise with the specification. The user should expand the in-use accuracy specification to make allowance for the calibration uncertainty.
Outside CIPM MRA Symbol: **¢**	Indicates that the calibration result is traceable to SI units but is not currently included in the table of NSAI NML's calibration and measurement capabilities approved under the CIPM MRA.

Where no specification exists, and none is prescribed by the client, the Decision Rule policy of the NSAI NML does not apply and results are provided without a statement of compliance.

Ambient laboratory conditions:

Barometric Pressure:	102.5 kPa ± 0.5 kPa
Temperature:	22.8 °C ± 1 °C
Relative Humidity:	45 %RH ± 5%RH

Summary of Results:

The following table summarises the results of the verification tests. The detailed results are given in the subsequent tables.

IEC 61672 Test	Test Title	Status
10	Self-generated Noise (Electrical)	/
11	Acoustical Signal	PASS
12	Frequency Weighting	PASS
13	Frequency and Time Weighting @ 1 kHz	PASS
14	Level Linearity Test on Reference Level Range	PASS
15	Level Linearity including Range Control	PASS
16	Toneburst Response	PASS
17	Peak C	PASS
18	Overload Indication	PASS

Detailed Results.

Prior to carrying out the verification tests the sound level meter was confirmed to be reading correctly for pressure response through application of a reference acoustical calibrator.

Self-generated Noise Test (Electrical Input) (Test #10) (1)

Range: 20 - 80 dB
Mode: Leq

SLM Configuration	Freq. Weighting Network	SLM Reading(2)
Microphone installed	A	20.5 dB
Microphone replaced by electrical signal device and Fitted with a short-circuit	A	16.5 (U/R)(3)
	C	23.4
	Z (Linear)	29.9

Acoustical signal test of a frequency weighting (Test #11) (1)

Range: 20 - 110 dB
Frequency Weighting setting: C
Time Weighting response: Slow

Input Level(4)	Input Freq.	SLM Error of Indication(5)	Tolerance(6) (±)	Uncertainty of Measurement (±)
94.0 dB	1000 Hz	0.0 dB (Ref)	1.1 dB	0.3 dB
	125	+0.2	1.5	0.3
	4000(7)	+0.2	1.6	0.5

Electrical signal tests of frequency weightings (Test #12)[1]

Range: 20 - 110 dB

Freq. (nominal)	Input Level[4]	SLM Reading	SLM Error of Indication[5]	Tolerance[6] (±)	Uncertainty of Measurement (±)
A-Weighting					
63 Hz	93 dB	92.8 dB	-0.2 dB	1.5 dB	0.20 dB
125	93	92.9	-0.1	1.5	0.20
250	93	92.9	-0.1	1.4	0.20
500	93	93.0	0.0	1.4	0.20
1000	93	93.0	0.0	1.1	0.20
2000	93	93.0	0.0	1.6	0.20
4000	93	93.1	+0.1	1.6	0.20
8000	93	93.1	+0.1	2.1, -3.1	0.20
16000	93	93.3	+0.3	3.5, -17	0.20
C-Weighting					
63 Hz	93 dB	92.8 dB	-0.2 dB	1.5 dB	0.20 dB
125	93	93.0	0.0	1.5	0.20
250	93	93.0	0.0	1.4	0.20
500	93	93.0	0.0	1.4	0.20
1000	93	93.0	0.0	1.1	0.20
2000	93	93.1	+0.1	1.6	0.20
4000	93	93.1	+0.1	1.6	0.20
8000	93	93.1	+0.1	2.1, -3.1	0.20
16000	93	93.3	+0.3	3.5, -17	0.20
LIN Weighting					
63 Hz	93 dB	92.9 dB	-0.1 dB	1.5 dB	0.20 dB
125	93	93.0	0.0	1.5	0.20
250	93	93.0	0.0	1.4	0.20
500	93	93.0	0.0	1.4	0.20
1000	93	93.1	+0.1	1.1	0.20
2000	93	93.1	+0.1	1.6	0.20
4000	93	93.2	+0.2	1.6	0.20
8000	93	93.0	0.0	2.1, -3.1	0.20
16000	93	92.5	-0.5	3.5, -17	0.20

Frequency and time weightings at 1 kHz (Test #13)[1]

Range: 30 - 120 dB

Time Weighting Setting	Frequency Weighting Setting	Input Level[4]	Deviation from Reference	Tolerance[6] (±)	Uncertainty. of Measurement (±)
Fast	A	94.0 dB	0.0 dB	0.4 dB	0.20 dB
	C		0.0	0.4	0.20
	Z		+0.1	0.4	0.20
Slow	A	94.0 dB	0.0 dB	0.3 dB	0.20 dB
Leq.	A	94.0 dB	0.0 dB	0.3 dB	0.20 dB
SEL	A	114.0 dB	0.0 dB	0.3 dB	0.20 dB

Linearity level on the reference range (Test #14)[1]

Range: 40 to 130 dB
Input Frequency: 1 kHz
SLM Measuring Mode: SPL

Range	Input Level[4]	SLM Reading	SLM Error of Indication[5]	Tolerance[6] (±)	Uncertainty of Measurement (±)
130 dB	94 dB	94.0 dB	0.0 dB	1.1 dB	0.20 dB
	99	99.0	0.0	1.1	0.20
	104	104.0	0.0	1.1	0.20
	109	109.0	0.0	1.1	0.20
	114	113.9	-0.1	1.1	0.20
	119	118.9	-0.1	1.1	0.20
	124	123.9	-0.1	1.1	0.20
	129	129.0	0.0	1.1	0.20
	94	94.0	0.0	1.1	0.20
	89	89.0	0.0	1.1	0.20
	84	84.0	0.0	1.1	0.20
	79	79.0	0.0	1.1	0.20
	74	74.0	0.0	1.1	0.20
	69	69.0	0.0	1.1	0.20
	64	64.0	0.0	1.1	0.20
	59	58.9	-0.1	1.1	0.21
	54	54.0	0.0	1.1	0.21
	49	49.0	0.0	1.1	0.21
	44	43.9	-0.1	1.1	0.21

Level Linearity including Range Control (Test #15)[1]

Input Frequency: 1 kHz
SLM Measuring Mode: SPL

Range	Input Level[3]	SLM Reading	SLM Error of Indication[5]	Tolerance[6] (±)	Uncertainty of Measurement (±)
130 dB	94.0 dB	94.0 dB	0.0 dB	1.1 dB	0.20 dB
	125.0	125.0	0.0	1.1	0.20
120 dB	94.0 dB	93.9 dB	-0.1 dB	1.1 dB	0.20 dB
	115.0	114.9	-0.1	1.1	0.20
110 dB	94.0 dB	94.0 dB	0.0 dB	1.1 dB	0.20 dB
	105.0	105.0	0.0	1.1	0.20
100 dB	94.0 dB	94.0 dB	0.0 dB	1.1 dB	0.20 dB
	95.0	95.0	0.0	1.1	0.20
90 dB	85.0 dB	85.0 dB	0.0 dB	1.1 dB	0.20 dB
80 dB	75.0 dB	74.9 dB	-0.1 dB	1.1 dB	0.20 dB

Toneburst response (Test #16)[1]

Range: 40 to 130 dB

Burst Type	SLM Mode	Input Level[4]	SLM Error of Indication[5]	Tolerance[6] (±)	Uncertainty of Measurement (±)
200 ms	LAF	116.0 dB	-0.1 dB	0.8 dB	0.3 dB
2.0 ms	LAF	99.0	-0.1	1.3	0.3
0.25 msec	LAF	90.0	-0.2	1.3, -3.3	0.3
200 ms	LAS	109.6 dB	-0.1 dB	0.8 dB	0.3 dB
2.0 ms	LAS	90.0	-0.1	1.3, -1.8	0.3
200 ms	SEL	110.0 dB	-0.1 dB	0.8 dB	0.3 dB
2 .0 ms	SEL	90.3	-0.1	1.3	0.3
0.25 ms	SEL	81.0	-0.2	1.3, -3.3	0.3

Peak C sound level (Test #17)[1]

Range: 40 to 130 dB

Pulse Type	Pulse Frequency	Input Level[4] (peak value)	SLM Error of Indication[5]	Tolerance[6] (±)	Uncertainty of Measurement (±)
1 cycle	8 kHz	133.4 dB	0.0 dB	2.4 dB	0.35 dB
Pos. ½ cycle	500 Hz	132.4 dB	-0.3 dB	1.4 dB	0.35 dB
Neg. ½ cycle	500 Hz	132.4 dB	-0.3 dB	1.4 dB	0.35 dB

Overload indication (Test #18)[1]

Range: 40 to 130 dB
SLM Measuring Mode: LAEq

Test description	Overload occurred at (±)	Meas. Diff. (Pos – Neg)	Tolerance[6] (±)	Uncertainty of Measurement (±)
Positive ½ cycle at 4 kHz	139.3 dB	-	-	-
Negative ½ cycle at 4 kHz	139.1 dB	-	-	-
Level difference of positive & negative pulses	-	0.2 dB	1.8 dB	0.30 dB

Notes:

(1) The test number, given in parentheses after the section heading, refers to the relevant clause in IEC 61672-3 (2006).

(2) SLM denotes Sound Level Meter

(3) U/R denotes Under Range

(4) All input levels are given in dB relative to a 20 µPa reference level.

(5) The SLM Error of Indication is defined as follows:
SLM Error of Indication = SLM Reading - Input Level

(6) The figures in the column labelled 'Tolerance' are the acceptance limits given in IEC 61672-1(2003). These tolerance limits include an allowance for the maximum expanded uncertainty of the test laboratory. The criteria for compliance with the tolerance is that the measurement result, extended by its associated uncertainty, lies within the specified limits.

(7) Microphone response at 4 kHz was measured using an electrostatic actuator. A Free Field correction of +1.2 dB was applied to the measured actuator response.
This measurement is not included in NML's tables of Calibration and Measurement Capabilities, approved under the CIPM MRA.
For information, the measured sensitivity and frequency response of the microphone is given in an addendum to this certificate.

Comments:

Where used in the results table, further information on the meaning of symbols is given in the table on page 2 of this certificate.

The instrument was found to meet the requirements of IEC 61672-1 (2003) in accordance with the verification procedures set out in IEC 61672-3 (2006) at the time of calibration.

The reported measurement results are traceable, via national standards maintained by NSAI National Metrology Laboratory (NML) or by other national metrology institutes, to internationally accepted realisations of the SI units.

The reported expanded uncertainty is based on the standard uncertainty multiplied by a coverage factor $k = 2$ which, for a normal probability distribution, corresponds to a coverage probability of approximately 95%. It has been determined in accordance with the "Guide to the Expression of Uncertainty in Measurement (GUM)". These uncertainties apply only to the measured values and do not carry any implication regarding the long-term stability of the instrument.

NSAI
National Metrology Laboratory

Addendum to Certificate 211433

Rion
Type: UC53A

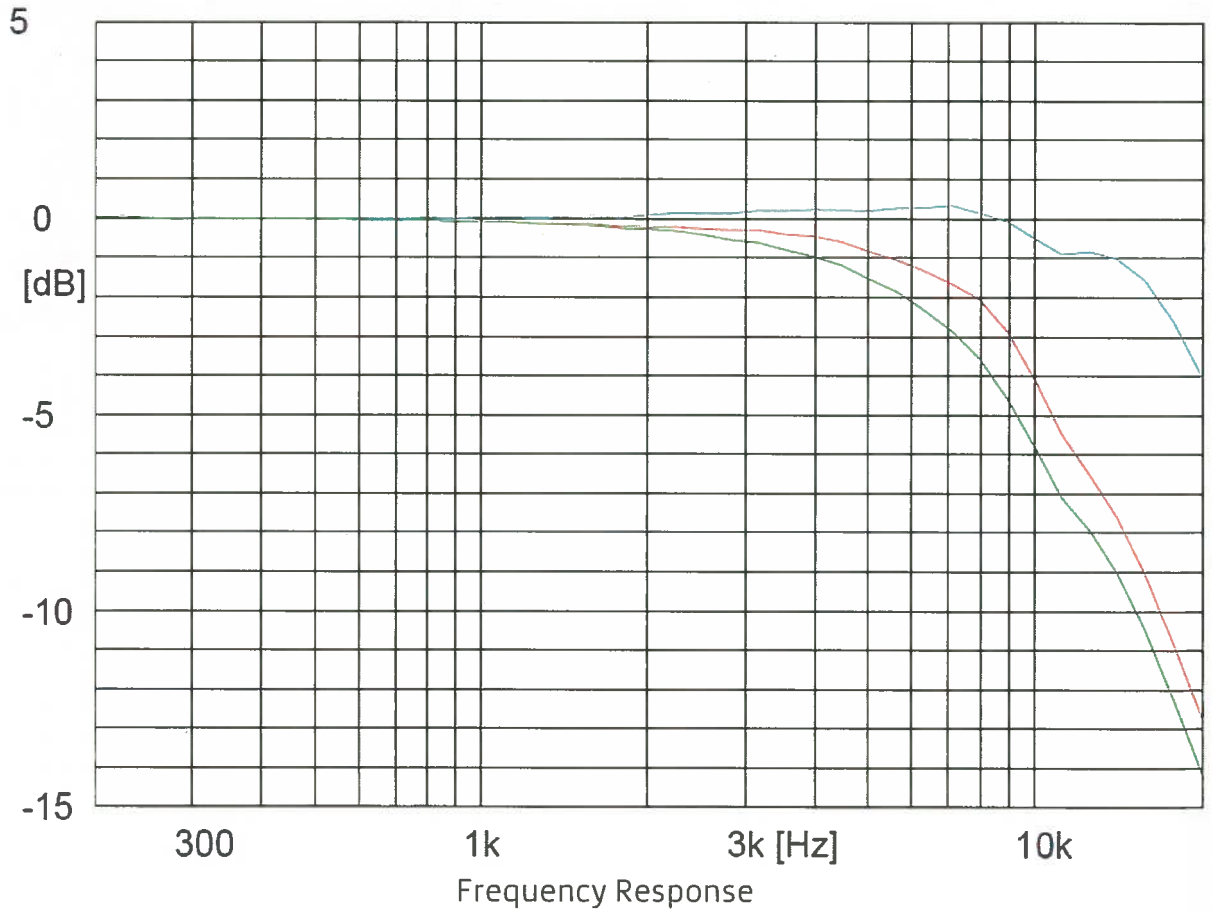
Serial no: 313385

Sensitivity: 46.0 mV/Pa
-26.7 ±0.10 dB re. 1 V/Pa

Date: 16/04/2021

Measurement conditions:	
Polarisation voltage:	0.0 V
Pressure:	102.50 ±0.02 kPa
Temperature:	22.9 ±1.1 °C
Relative humidity:	46.5 ±7.9 %RH
Results are normalized to the reference conditions.	

Free field response
Diffuse field response
Pressure (Actuator) response



NSAI

National Metrology Laboratory

Certificate of Calibration

Issued to	TNEI Group Floor 7 West One Forth Banks Newcastle Upon Tyne England
Attention of	Ewan Watson

Certificate Number	**211432**
Item Calibrated	Rion NL-31 Sound Level Meter, complete with Rion UC53A Microphone
Serial Numbers	01273087 (Sound Level Meter) and 313365 (Microphone)
ID Number	SLM012
Order Number	1684
Date Received	13 Apr 2021
NML Procedure Number	AP-NM-09
Method	The above sound level meter was allowed to stabilise for a suitable period in laboratory conditions. It was then calibrated by carrying out the verification tests detailed in IEC 61672-3 (2006), *Periodic tests, specification for the verification of sound level meters.* This standard specifies a procedure for the periodic verification of conformance of a sound level meter or integrating-averaging meter to IEC 61672-1 (2003).
Calibration Standards	Norsonic 1504A Calibration System incorporating: SR DS360 Signal Generator, No. 0735 [Cal Due Date: 21 May 2021] Agilent 34401A Digital Multimeter, No. 0736 [Cal Due Date: 21 May 2021] B&K 4134 Measuring Microphone, No. 0743 [Cal Due Date: 27 May 2022] B&K 4228 Pistonphone, No. 0741 [Cal Due Date: 26 May 2022] B&K 4226 Acoustical Calibrator, No. 0150 [Cal Due Date: 02 Sep 2021]

Calibrated by	David Fleming	**Approved by**	Paul Hetherington
Date of Calibration	16 Apr 2021	**Date of Issue**	16 Apr 2021

CIPM MRA

This certificate is consistent with Calibration and Measurement Capabilities (CMC's) that are included in Appendix C of the Mutual Recognition Arrangement (MRA) drawn up by the International Committee for Weights and Measures. Under the MRA, all participating institutes recognize the validity of each other's calibration certificates and measurement reports for quantities, ranges and measurement uncertainties specified in Appendix C (for details see www.bipm.org)

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4. This certificate relates only to the item(s) described on the front page and shall not be reproduced, except in full.
5. This contract is governed by the laws of Ireland whose courts shall have exclusive jurisdiction.

Decision Rule and Compliance Statement

The rule that describes how measurement uncertainty is accounted for when stating conformity with a specified requirement is known as a decision rule. The rule used by NSAI NML follows the guidelines set out in the document ILAC-G8:09/2019 published by the International Laboratory Accreditation Co-operation. Further information on the decision rule is available on the NSAI website:

(https://www.nsai.ie/images/uploads/metrology/Decision_Rule.pdf).

The symbols used to indicate the state of compliance of the instrument calibration and their meanings are given in the following table.

Statement of compliance and associated symbol	Description
PASS	The absence of a symbol indicates that the measurement result is inside the specification limit by a margin greater than its associated expanded uncertainty; the instrument meets its accuracy specification.
Conditional PASS Symbol: £	The measurement result is inside the specification limit by a margin less than or equal to its associated expanded measurement uncertainty; it is therefore not possible to state compliance. There is a risk that the instrument fails to meet its specification.
Conditional FAIL Symbol: &	The measurement result is on the specification limit or is outside the specification limit by a margin less than or equal to its associated expanded measurement uncertainty; it is therefore not possible to state non-compliance.
FAIL Symbol: $	The measurement result is outside the specification limit by a margin greater than its associated measurement uncertainty; the instrument fails to meet its accuracy specification.
Unc. > Spec Symbol: #	The expanded measurement uncertainty is greater than the instrument's accuracy specification. It is not possible to determine compliance or otherwise with the specification. The user should expand the in-use accuracy specification to make allowance for the calibration uncertainty.
Outside CIPM MRA Symbol: ¢	Indicates that the calibration result is traceable to SI units but is not currently included in the table of NSAI NML's calibration and measurement capabilities approved under the CIPM MRA.

Where no specification exists, and none is prescribed by the client, the Decision Rule policy of the NSAI NML does not apply and results are provided without a statement of compliance.

Ambient laboratory conditions:

Barometric Pressure:	102.6 kPa ± 0.5 kPa
Temperature:	22.2 °C ± 1 °C
Relative Humidity:	37 %RH ± 5%RH

Summary of Results:

The following table summarises the results of the verification tests. The detailed results are given in the subsequent tables.

IEC 61672 Test	Test Title	Status
10	Self-generated Noise (Electrical)	/
11	Acoustical Signal	PASS
12	Frequency Weighting	PASS
13	Frequency and Time Weighting @ 1 kHz	PASS
14	Level Linearity Test on Reference Level Range	PASS
15	Level Linearity including Range Control	PASS
16	Toneburst Response	PASS
17	Peak C	PASS
18	Overload Indication	PASS

Detailed Results.

Prior to carrying out the verification tests the sound level meter was confirmed to be reading correctly for pressure response through application of a reference acoustical calibrator.

Self-generated Noise Test (Electrical Input) (Test #10) (1)

Range: 20 - 80 dB
Mode: Leq

SLM Configuration	Freq. Weighting Network	SLM Reading(2)
Microphone installed	A	20.1 dB
Microphone replaced by electrical signal device and Fitted with a short-circuit	A	17.1 (U/R)(3)
	C	24.1
	Z (Linear)	31.1

Acoustical signal test of a frequency weighting (Test #11) (1)

Range: 20 - 110 dB
Frequency Weighting setting: C
Time Weighting response: Slow

Input Level(4)	Input Freq.	SLM Error of Indication(5)	Tolerance(6) (±)	Uncertainty of Measurement (±)
94.0 dB	1000 Hz	0.0 dB (Ref)	1.1 dB	0.3 dB
	125	+0.2	1.5	0.3
	4000(7)	-0.1	1.6	0.5

Electrical signal tests of frequency weightings (Test #12)[1]

Range: 20 - 110 dB

Freq. (nominal)	Input Level[4]	SLM Reading	SLM Error of Indication[5]	Tolerance[6] (±)	Uncertainty of Measurement (±)
A-Weighting					
63 Hz	93 dB	92.8 dB	-0.2 dB	1.5 dB	0.20 dB
125	93	92.8	-0.2	1.5	0.20
250	93	92.8	-0.2	1.4	0.20
500	93	92.9	-0.1	1.4	0.20
1000	93	93.0	0.0	1.1	0.20
2000	93	93.0	0.0	1.6	0.20
4000	93	93.1	+0.1	1.6	0.20
8000	93	93.1	+0.1	2.1, -3.1	0.20
16000	93	93.3	+0.3	3.5, -17	0.20
C-Weighting					
63 Hz	93 dB	92.9 dB	-0.1 dB	1.5 dB	0.20 dB
125	93	92.9	-0.1	1.5	0.20
250	93	92.9	-0.1	1.4	0.20
500	93	93.0	0.0	1.4	0.20
1000	93	93.0	0.0	1.1	0.20
2000	93	93.0	0.0	1.6	0.20
4000	93	93.1	+0.1	1.6	0.20
8000	93	93.1	+0.1	2.1, -3.1	0.20
16000	93	93.4	+0.4	3.5, -17	0.20
LIN Weighting					
63 Hz	93 dB	92.7 dB	-0.3 dB	1.5 dB	0.20 dB
125	93	92.9	-0.1	1.5	0.20
250	93	92.9	-0.1	1.4	0.20
500	93	92.9	-0.1	1.4	0.20
1000	93	93.0	0.0	1.1	0.20
2000	93	93.0	0.0	1.6	0.20
4000	93	93.1	+0.1	1.6	0.20
8000	93	92.9	-0.1	2.1, -3.1	0.20
16000	93	92.4	-0.6	3.5, -17	0.20

Frequency and time weightings at 1 kHz (Test #13)[1]

Range: 30 - 120 dB

Time Weighting Setting	Frequency Weighting Setting	Input Level[4]	Deviation from Reference	Tolerance[6] (±)	Uncertainty. of Measurement (±)
Fast	A	94.0 dB	0.0 dB	0.4 dB	0.20 dB
	C		0.0	0.4	0.20
	Z		0.0	0.4	0.20
Slow	A	94.0 dB	0.0 dB	0.3 dB	0.20 dB
Leq.	A	94.0 dB	0.0 dB	0.3 dB	0.20 dB
SEL	A	114.0 dB	0.0 dB	0.3 dB	0.20 dB

Linearity level on the reference range (Test #14)[1]

Range: 40 to 130 dB
Input Frequency: 1 kHz
SLM Measuring Mode: SPL

Range	Input Level[4]	SLM Reading	SLM Error of Indication[5]	Tolerance[6] (±)	Uncertainty of Measurement (±)
130 dB	94 dB	94.0 dB	0.0 dB	1.1 dB	0.20 dB
	99	99.0	0.0	1.1	0.20
	104	104.0	0.0	1.1	0.20
	109	109.0	0.0	1.1	0.20
	114	114.0	0.0	1.1	0.20
	119	119.0	0.0	1.1	0.20
	124	124.0	0.0	1.1	0.20
	129	129.0	0.0	1.1	0.20
	94	94.0	0.0	1.1	0.20
	89	89.0	0.0	1.1	0.20
	84	84.0	0.0	1.1	0.20
	79	79.0	0.0	1.1	0.20
	74	74.0	0.0	1.1	0.20
	69	69.0	0.0	1.1	0.20
	64	64.0	0.0	1.1	0.20
	59	59.0	0.0	1.1	0.21
	54	54.0	0.0	1.1	0.21
	49	49.0	0.0	1.1	0.21
	44	44.0	0.0	1.1	0.21

Level Linearity including Range Control (Test #15)[1]

Input Frequency: 1 kHz
SLM Measuring Mode: SPL

Range	Input Level[3]	SLM Reading	SLM Error of Indication[5]	Tolerance[6] (±)	Uncertainty of Measurement (±)
130 dB	94.0 dB	94.0 dB	0.0 dB	1.1 dB	0.20 dB
	125.0	125.0	0.0	1.1	0.20
120 dB	94.0 dB	93.9 dB	-0.1 dB	1.1 dB	0.20 dB
	115.0	114.9	-0.1	1.1	0.20
110 dB	94.0 dB	93.9 dB	-0.1 dB	1.1 dB	0.20 dB
	105.0	104.9	-0.1	1.1	0.20
100 dB	94.0 dB	94.0 dB	0.0 dB	1.1 dB	0.20 dB
	95.0	95.0	0.0	1.1	0.20
90 dB	85.0 dB	85.0 dB	0.0 dB	1.1 dB	0.20 dB
80 dB	75.0 dB	74.9 dB	-0.1 dB	1.1 dB	0.20 dB

Toneburst response (Test #16)[1]

Range: 40 to 130 dB

Burst Type	SLM Mode	Input Level[4]	SLM Error of Indication[5]	Tolerance[6] (±)	Uncertainty of Measurement (±)
200 ms	LAF	116.0 dB	0.0 dB	0.8 dB	0.3 dB
2.0 ms	LAF	99.0	0.0	1.3	0.3
0.25 msec	LAF	90.0	-0.1	1.3, -3.3	0.3
200 ms	LAS	109.6 dB	-0.1 dB	0.8 dB	0.3 dB
2.0 ms	LAS	90.0	-0.1	1.3, -1.8	0.3
200 ms	SEL	110.0 dB	0.0 dB	0.8 dB	0.3 dB
2 .0 ms	SEL	90.3	0.0	1.3	0.3
0.25 ms	SEL	81.0	-0.2	1.3, -3.3	0.3

Peak C sound level (Test #17)[1]

Range: 40 to 130 dB

Pulse Type	Pulse Frequency	Input Level[4] (peak value)	SLM Error of Indication[5]	Tolerance[6] (±)	Uncertainty of Measurement (±)
1 cycle	8 kHz	133.4 dB	-0.2 dB	2.4 dB	0.35 dB
Pos. ½ cycle	500 Hz	132.4 dB	-0.4 dB	1.4 dB	0.35 dB
Neg. ½ cycle	500 Hz	132.4 dB	-0.4 dB	1.4 dB	0.35 dB

Overload indication (Test #18)[1]

Range: 40 to 130 dB
SLM Measuring Mode: LAEq

Test description	Overload occurred at (±)	Meas. Diff. (Pos – Neg)	Tolerance[6] (±)	Uncertainty of Measurement (±)
Positive ½ cycle at 4 kHz	139.3 dB	-	-	-
Negative ½ cycle at 4 kHz	139.2 dB	-	-	-
Level difference of positive & negative pulses	-	0.1 dB	1.8 dB	0.30 dB

Notes:

(1) The test number, given in parentheses after the section heading, refers to the relevant clause in IEC 61672-3 (2006).

(2) SLM denotes Sound Level Meter

(3) U/R denotes Under Range

(4) All input levels are given in dB relative to a 20 µPa reference level.

(5) The SLM Error of Indication is defined as follows:
SLM Error of Indication = SLM Reading - Input Level

(6) The figures in the column labelled 'Tolerance' are the acceptance limits given in IEC 61672-1(2003). These tolerance limits include an allowance for the maximum expanded uncertainty of the test laboratory. The criteria for compliance with the tolerance is that the measurement result, extended by its associated uncertainty, lies within the specified limits.

(7) Microphone response at 4 kHz was measured using an electrostatic actuator. A Free Field correction of +1.2 dB was applied to the measured actuator response.
This measurement is not included in NML's tables of Calibration and Measurement Capabilities, approved under the CIPM MRA.
For information, the measured sensitivity and frequency response of the microphone is given in an addendum to this certificate.

Comments:

Where used in the results table, further information on the meaning of symbols is given in the table on page 2 of this certificate.

The instrument was found to meet the requirements of IEC 61672-1 (2003) in accordance with the verification procedures set out in IEC 61672-3 (2006) at the time of calibration.

The reported measurement results are traceable, via national standards maintained by NSAI National Metrology Laboratory (NML) or by other national metrology institutes, to internationally accepted realisations of the SI units.

The reported expanded uncertainty is based on the standard uncertainty multiplied by a coverage factor $k = 2$ which, for a normal probability distribution, corresponds to a coverage probability of approximately 95%. It has been determined in accordance with the "Guide to the Expression of Uncertainty in Measurement (GUM)". These uncertainties apply only to the measured values and do not carry any implication regarding the long-term stability of the instrument.

NSAI
National Metrology Laboratory

Addendum to Certificate 211432

Rion
Type: UC53A

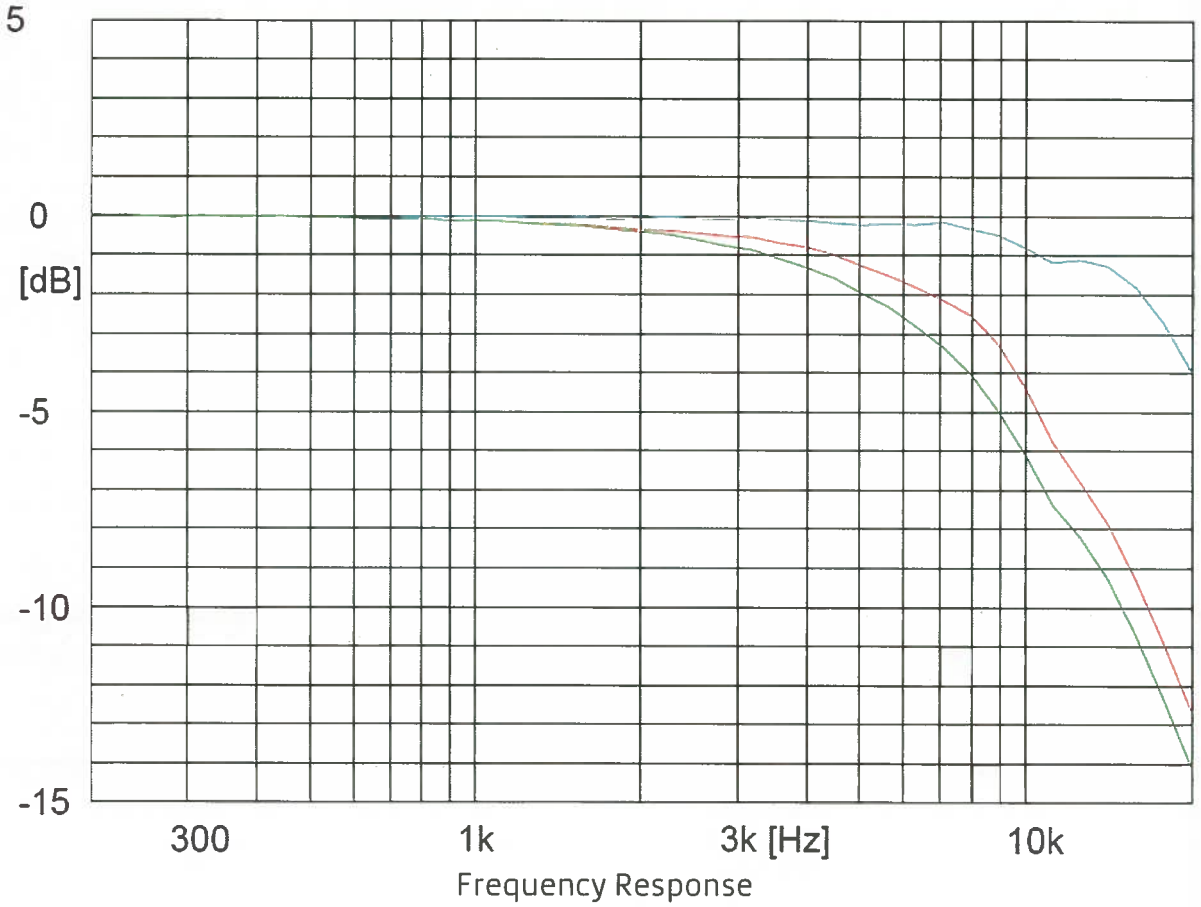
Serial no: 313365

Sensitivity: 46.1 mV/Pa
-26.7 ±0.10 dB re. 1 V/Pa

Date: 16/04/2021

Measurement conditions:	
Polarisation voltage:	0.0 V
Pressure:	102.62 ±0.03 kPa
Temperature:	22.2 ±1.1 °C
Relative humidity:	43.5 ±5.4 %RH
Results are normalized to the reference conditions.	

Free field response
Diffuse field response
Pressure (Actuator) response



NSAI

National Metrology Laboratory

Certificate of Calibration

Issued to	TNEI Group Floor 7 West One Forth Banks Newcastle Upon Tyne England
Attention of	Ewan Watson

Certificate Number	**212989**
Item Calibrated	Rion NL-31 Sound Level Meter, complete with Rion UC53A Microphone
Serial Numbers	01283554 (Sound Level Meter) and 315581 (Microphone)
ID Number	SLM018
Order Number	1696
Date Received	20 Jul 2021
NML Procedure Number	AP-NM-09
Method	The above sound level meter was allowed to stabilise for a suitable period in laboratory conditions. It was then calibrated by carrying out the verification tests detailed in IEC 61672-3 (2006), *Periodic tests, specification for the verification of sound level meters.* This standard specifies a procedure for the periodic verification of conformance of a sound level meter or integrating-averaging meter to IEC 61672-1 (2003).
Calibration Standards	Norsonic 1504A Calibration System incorporating: SR DS360 Signal Generator, No. 0735 [Cal Due Date: 10 Jun 2022] Agilent 34401A Digital Multimeter, No. 0736 [Cal Due Date: 10 Jun 2022] B&K 4134 Measuring Microphone, No. 0743 [Cal Due Date: 27 May 2022] B&K 4228 Pistonphone, No. 0741 [Cal Due Date: 26 May 2022] B&K 4226 Acoustical Calibrator, No. 0150 [Cal Due Date: 02 Sep 2021]

Calibrated by	David Fleming	**Approved by**	Paul Hetherington
Date of Calibration	04 Aug 2021	**Date of Issue**	04 Aug 2021

CIPM MRA

This certificate is consistent with Calibration and Measurement Capabilities (CMC's) that are included in Appendix C of the Mutual Recognition Arrangement (MRA) drawn up by the International Committee for Weights and Measures. Under the MRA, all participating institutes recognize the validity of each other's calibration certificates and measurement reports for quantities, ranges and measurement uncertainties specified in Appendix C (for details see www.bipm.org).

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(https://www.nsai.ie/images/uploads/metrology/Decision_Rule.pdf).

The symbols used to indicate the state of compliance of the instrument calibration and their meanings are given in the following table.

Statement of compliance and associated symbol	Description
PASS	The absence of a symbol indicates that the measurement result is inside the specification limit by a margin greater than its associated expanded uncertainty; the instrument meets its accuracy specification.
Conditional PASS Symbol: **£**	The measurement result is inside the specification limit by a margin less than or equal to its associated expanded measurement uncertainty; it is therefore not possible to state compliance. There is a risk that the instrument fails to meet its specification.
Conditional FAIL Symbol: **&**	The measurement result is on the specification limit or is outside the specification limit by a margin less than or equal to its associated expanded measurement uncertainty; it is therefore not possible to state non-compliance.
FAIL Symbol: **$**	The measurement result is outside the specification limit by a margin greater than its associated measurement uncertainty; the instrument fails to meet its accuracy specification.
Unc. > Spec Symbol: **#**	The expanded measurement uncertainty is greater than the instrument's accuracy specification. It is not possible to determine compliance or otherwise with the specification. The user should expand the in-use accuracy specification to make allowance for the calibration uncertainty.
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Where no specification exists, and none is prescribed by the client, the Decision Rule policy of the NSAI NML does not apply and results are provided without a statement of compliance.

Ambient laboratory conditions:

Barometric Pressure:	100.6 kPa ± 0.5 kPa
Temperature:	22.4 °C ± 1 °C
Relative Humidity:	53 %RH ± 5%RH

Summary of Results:

The following table summarises the results of the verification tests. The detailed results are given in the subsequent tables.

IEC 61672 Test	Test Title	Status
10	Self-generated Noise (Electrical)	/
11	Acoustical Signal	PASS
12	Frequency Weighting	PASS
13	Frequency and Time Weighting @ 1 kHz	PASS
14	Level Linearity Test on Reference Level Range	PASS
15	Level Linearity including Range Control	PASS
16	Toneburst Response	PASS
17	Peak C	PASS
18	Overload Indication	PASS

Detailed Results.

Prior to carrying out the verification tests the sound level meter was adjusted to read correctly for pressure response through application of a reference acoustical calibrator.

Self-generated Noise Test (Electrical Input) (Test #10) (1)

Range: 20 - 80 dB
Mode: Leq

SLM Configuration	Freq. Weighting Network	SLM Reading(2)
Microphone installed	A	12.9 dB
Microphone replaced by electrical signal device and Fitted with a short-circuit	A	16.8 (U/R)(3)
	C	24.1
	Z (Linear)	29.1

Acoustical signal test of a frequency weighting (Test #11) (1)

Range: 20 - 110 dB
Frequency Weighting setting: C
Time Weighting response: Slow

Input Level(4)	Input Freq.	SLM Error of Indication(5)	Tolerance(6) (±)	Uncertainty of Measurement (±)
94.0 dB	1000 Hz	0.0 dB (Ref)	1.1 dB	0.3 dB
	125	+0.1	1.5	0.3
	4000(7)	+0.5	1.6	0.5

Electrical signal tests of frequency weightings (Test #12)[1]

Range: 20 - 110 dB

Freq. (nominal)	Input Level[4]	SLM Reading	SLM Error of Indication[5]	Tolerance[6] (±)	Uncertainty of Measurement (±)
A-Weighting					
63 Hz	93 dB	92.7 dB	-0.3 dB	1.5 dB	0.20 dB
125	93	92.9	-0.1	1.5	0.20
250	93	92.9	-0.1	1.4	0.20
500	93	93.0	0.0	1.4	0.20
1000	93	93.1	+0.1	1.1	0.20
2000	93	93.1	+0.1	1.6	0.20
4000	93	93.2	+0.2	1.6	0.20
8000	93	93.2	+0.2	2.1, -3.1	0.20
16000	93	93.4	+0.4	3.5, -17	0.20
C-Weighting					
63 Hz	93 dB	92.9 dB	-0.1 dB	1.5 dB	0.20 dB
125	93	93.1	+0.1	1.5	0.20
250	93	93.1	+0.1	1.4	0.20
500	93	93.2	+0.2	1.4	0.20
1000	93	93.2	+0.2	1.1	0.20
2000	93	93.2	+0.2	1.6	0.20
4000	93	93.3	+0.3	1.6	0.20
8000	93	93.3	+0.3	2.1, -3.1	0.20
16000	93	93.5	+0.5	3.5, -17	0.20
LIN Weighting					
63 Hz	93 dB	92.7 dB	-0.3 dB	1.5 dB	0.20 dB
125	93	92.9	-0.1	1.5	0.20
250	93	93.0	0.0	1.4	0.20
500	93	93.1	+0.1	1.4	0.20
1000	93	93.1	+0.1	1.1	0.20
2000	93	93.2	+0.2	1.6	0.20
4000	93	93.3	+0.3	1.6	0.20
8000	93	93.1	+0.1	2.1, -3.1	0.20
16000	93	92.6	-0.4	3.5, -17	0.20

Frequency and time weightings at 1 kHz (Test #13)[1]

Range: 30 - 120 dB

Time Weighting Setting	Frequency Weighting Setting	Input Level[4]	Deviation from Reference	Tolerance[6] (±)	Uncertainty. of Measurement (±)
Fast	A	94.0 dB	0.0 dB	0.4 dB	0.20 dB
	C		+0.1	0.4	0.20
	Z		+0.1	0.4	0.20
Slow	A	94.0 dB	0.0 dB	0.3 dB	0.20 dB
Leq.	A	94.0 dB	0.0 dB	0.3 dB	0.20 dB
SEL	A	114.0 dB	0.0 dB	0.3 dB	0.20 dB

Linearity level on the reference range (Test #14) [1]

Range: 40 to 130 dB
Input Frequency: 1 kHz
SLM Measuring Mode: SPL

Range	Input Level[4]	SLM Reading	SLM Error of Indication[5]	Tolerance[6] (±)	Uncertainty of Measurement (±)
130 dB	94 dB	94.0 dB	0.0 dB	1.1 dB	0.20 dB
	99	99.0	0.0	1.1	0.20
	104	104.0	0.0	1.1	0.20
	109	109.0	0.0	1.1	0.20
	114	114.0	0.0	1.1	0.20
	119	119.0	0.0	1.1	0.20
	124	124.0	0.0	1.1	0.20
	129	129.0	0.0	1.1	0.20
	132	132.0	0.0	1.1	0.20
	133	133.0	0.0	1.1	0.20
	134	134.0	0.0	1.1	0.20
	135	135.0	0.0	1.1	0.20
	136	136.0	0.0	1.1	0.20
	94	94.0	0.0	1.1	0.20
	89	89.0	0.0	1.1	0.20
	84	84.0	0.0	1.1	0.20
	79	79.0	0.0	1.1	0.20
	74	74.0	0.0	1.1	0.20
	69	69.0	0.0	1.1	0.20
	64	64.0	0.0	1.1	0.20
	59	59.0	0.0	1.1	0.21
	54	54.0	0.0	1.1	0.21
	49	49.0	0.0	1.1	0.21
	44	44.0	0.0	1.1	0.21

Level Linearity including Range Control (Test #15)[1]

Input Frequency: 1 kHz
SLM Measuring Mode: SPL

Range	Input Level[3]	SLM Reading	SLM Error of Indication[5]	Tolerance[6] (±)	Uncertainty of Measurement (±)
130 dB	94.0 dB	94.0 dB	0.0 dB	1.1 dB	0.20 dB
	125.0	125.0	0.0	1.1	0.20
120 dB	94.0 dB	94.0 dB	0.0 dB	1.1 dB	0.20 dB
	115.0	115.1	+0.1	1.1	0.20
110 dB	94.0 dB	94.0 dB	0.0 dB	1.1 dB	0.20 dB
	105.0	105.0	0.0	1.1	0.20
100 dB	94.0 dB	94.0 dB	0.0 dB	1.1 dB	0.20 dB
	95.0	95.0	0.0	1.1	0.20
90 dB	85.0 dB	84.9 dB	-0.1 dB	1.1 dB	0.20 dB
80 dB	75.0 dB	74.9 dB	-0.1 dB	1.1 dB	0.20 dB

Toneburst response (Test #16)[1]

Range: 40 to 130 dB

Burst Type	SLM Mode	Input Level[4]	SLM Error of Indication[5]	Tolerance[6] (±)	Uncertainty of Measurement (±)
200 ms	LAF	116.0 dB	0.0 dB	0.8 dB	0.3 dB
2.0 ms	LAF	99.0	0.0	1.3	0.3
0.25 msec	LAF	90.0	-0.1	1.3, -3.3	0.3
200 ms	LAS	109.6 dB	-0.1 dB	0.8 dB	0.3 dB
2.0 ms	LAS	90.0	-0.1	1.3, -1.8	0.3
200 ms	SEL	110.0 dB	0.0 dB	0.8 dB	0.3 dB
2 .0 ms	SEL	90.3	0.0	1.3	0.3
0.25 ms	SEL	81.0	0.0	1.3, -3.3	0.3

Peak C sound level (Test #17)[1]

Range: 40 to 130 dB

Pulse Type	Pulse Frequency	Input Level[4] (peak value)	SLM Error of Indication[5]	Tolerance[6] (±)	Uncertainty of Measurement (±)
1 cycle	8 kHz	133.4 dB	-0.7 dB	2.4 dB	0.35 dB
Pos. ½ cycle	500 Hz	132.4 dB	-0.4 dB	1.4 dB	0.35 dB
Neg. ½ cycle	500 Hz	132.4 dB	-0.3 dB	1.4 dB	0.35 dB

Overload indication (Test #18)[1]

Range: 40 to 130 dB
SLM Measuring Mode: LAEq

Test description	Overload occurred at (±)	Meas. Diff. (Pos – Neg)	Tolerance[6] (±)	Uncertainty of Measurement (±)
Positive ½ cycle at 4 kHz	139.1 dB	-	-	-
Negative ½ cycle at 4 kHz	139.1 dB	-	-	-
Level difference of positive & negative pulses	-	0.0 dB	1.8 dB	0.30 dB

Notes:

(1) The test number, given in parentheses after the section heading, refers to the relevant clause in IEC 61672-3 (2006).

(2) SLM denotes Sound Level Meter

(3) U/R denotes Under Range

(4) All input levels are given in dB relative to a 20 µPa reference level.

(5) The SLM Error of Indication is defined as follows:
SLM Error of Indication = SLM Reading - Input Level

(6) The figures in the column labelled 'Tolerance' are the acceptance limits given in IEC 61672-1(2003). These tolerance limits include an allowance for the maximum expanded uncertainty of the test laboratory. The criteria for compliance with the tolerance is that the measurement result, extended by its associated uncertainty, lies within the specified limits.

(7) Microphone response at 4 kHz was measured using an electrostatic actuator. A Free Field correction of +1.2 dB was applied to the measured actuator response.
This measurement is not included in NML's tables of Calibration and Measurement Capabilities, approved under the CIPM MRA.
For information, the measured sensitivity and frequency response of the microphone is given in an addendum to this certificate.

Comments:

Where used in the results table, further information on the meaning of symbols is given in the table on page 2 of this certificate.

The instrument was found to meet the requirements of IEC 61672-1 (2003) in accordance with the verification procedures set out in IEC 61672-3 (2006) at the time of calibration.

The reported measurement results are traceable, via national standards maintained by NSAI National Metrology Laboratory (NML) or by other national metrology institutes, to internationally accepted realisations of the SI units.

The reported expanded uncertainty is based on the standard uncertainty multiplied by a coverage factor $k = 2$ which, for a normal probability distribution, corresponds to a coverage probability of approximately 95%. It has been determined in accordance with the "Guide to the Expression of Uncertainty in Measurement (GUM)". These uncertainties apply only to the measured values and do not carry any implication regarding the long-term stability of the instrument.

NSAI
National Metrology Laboratory

Addendum to Certificate 212989

Rion
Type: UC53A

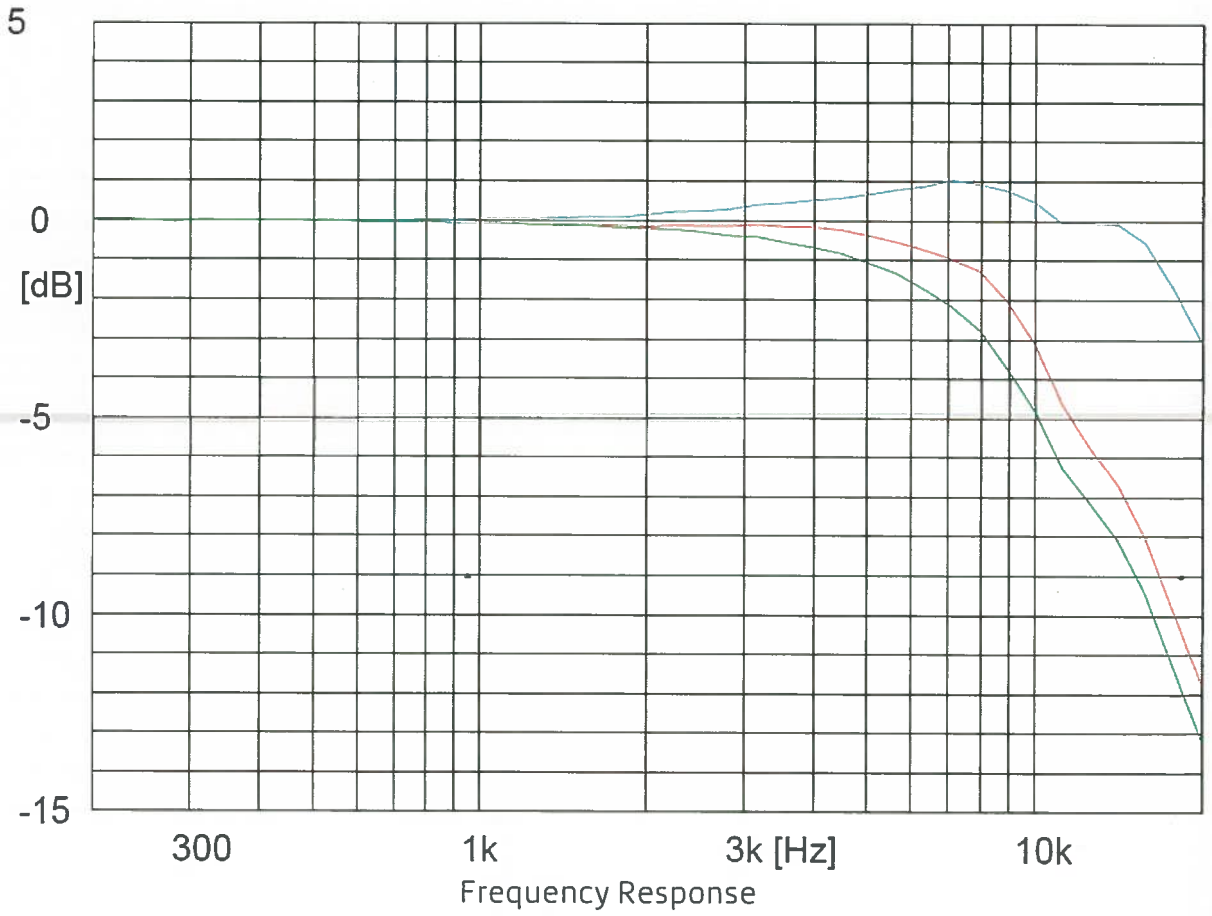
Serial no: 315581

Sensitivity: 42.0 mV/Pa
-27.5 ±0.10 dB re. 1 V/Pa

Date: 04/08/2021

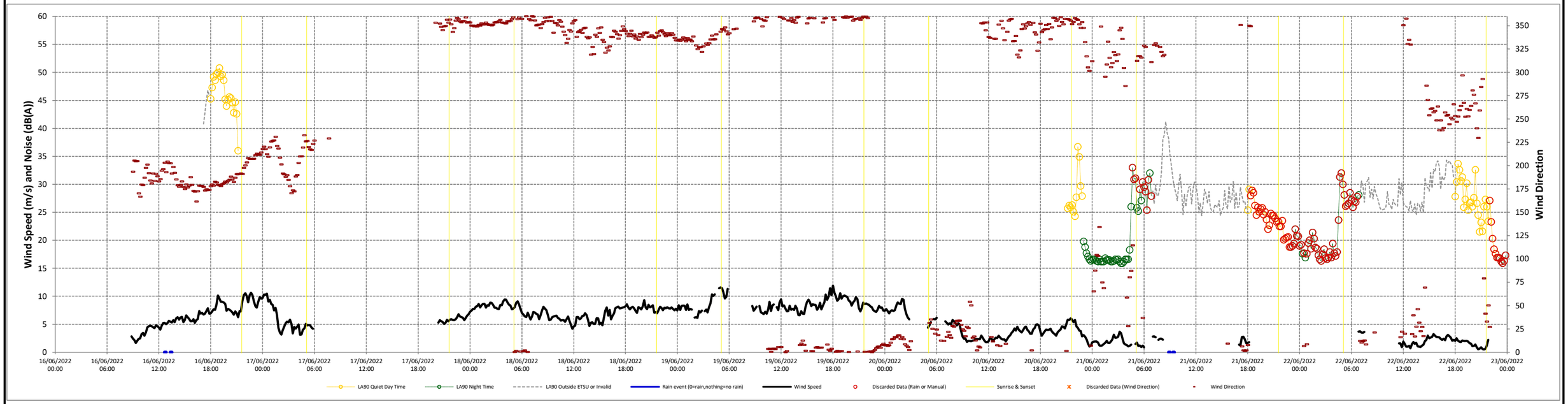
Measurement conditions:	
Polarisation voltage:	0.0 V
Pressure:	100.72 ±0.02 kPa
Temperature:	21.9 ±1.1 °C
Relative humidity:	53.5 ±2.4 %RH
Results are normalized to the reference conditions.	

Free field response
Diffuse field response
Pressure (Actuator) response

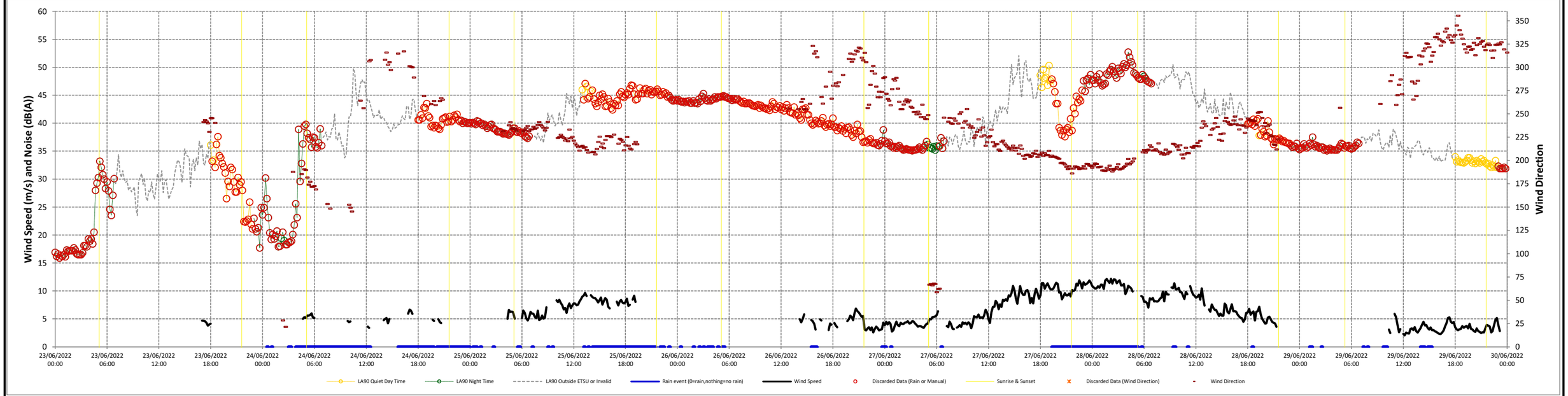


Annex 5 – Time Series Graphs

16/06/2022 to 23/06/2022

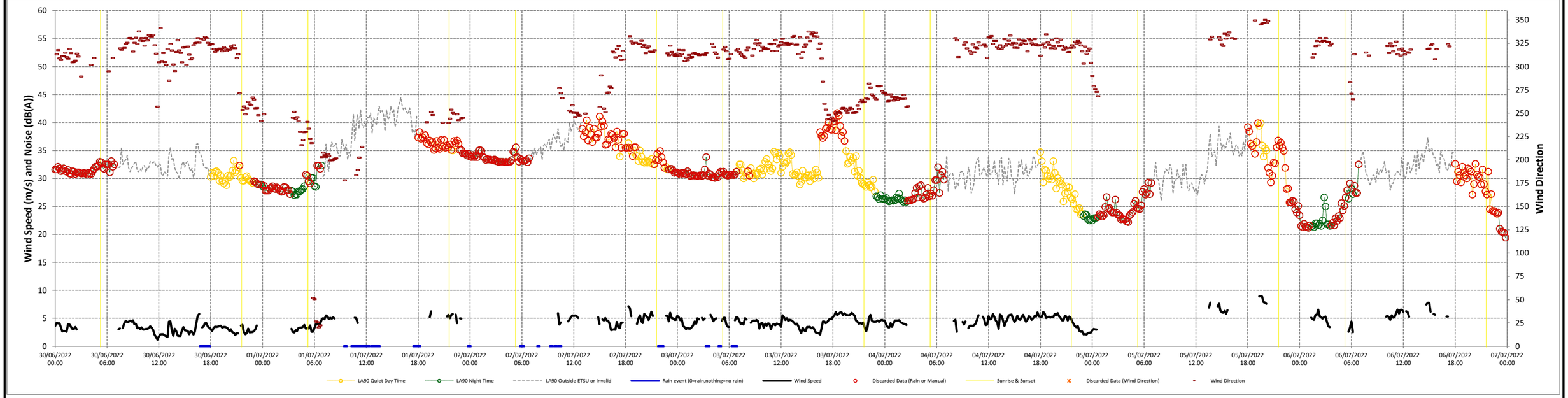


23/06/2022 to 30/06/2022

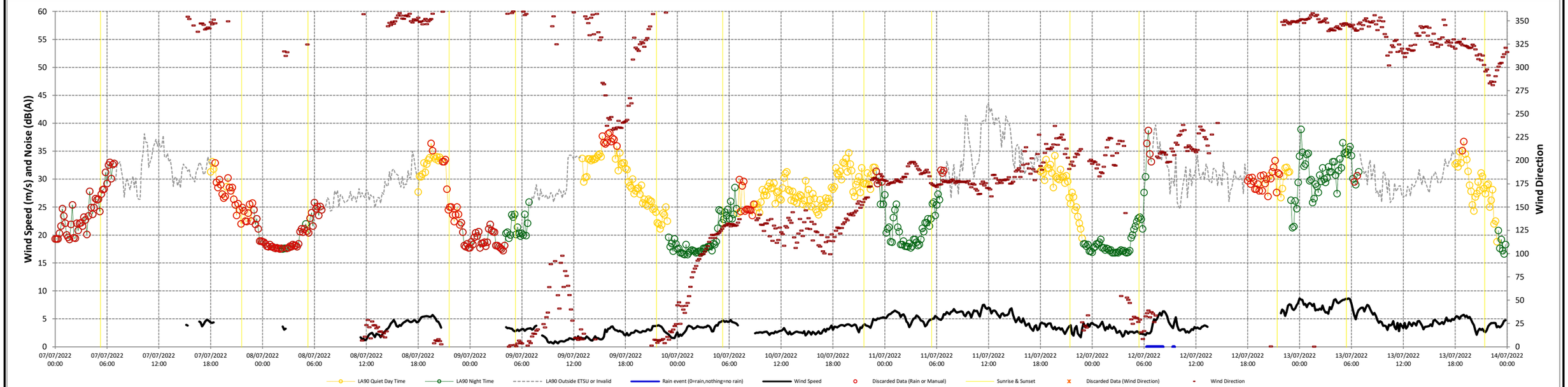


Project	Proposed Repowering of Kilgarvan Wind Farm
Client	Orsted Onshore Ireland Midco Ltd
Title	Time Series for NML1 - Page 1 of 8
Date	18/04/2023

30/06/2022 to 07/07/2022

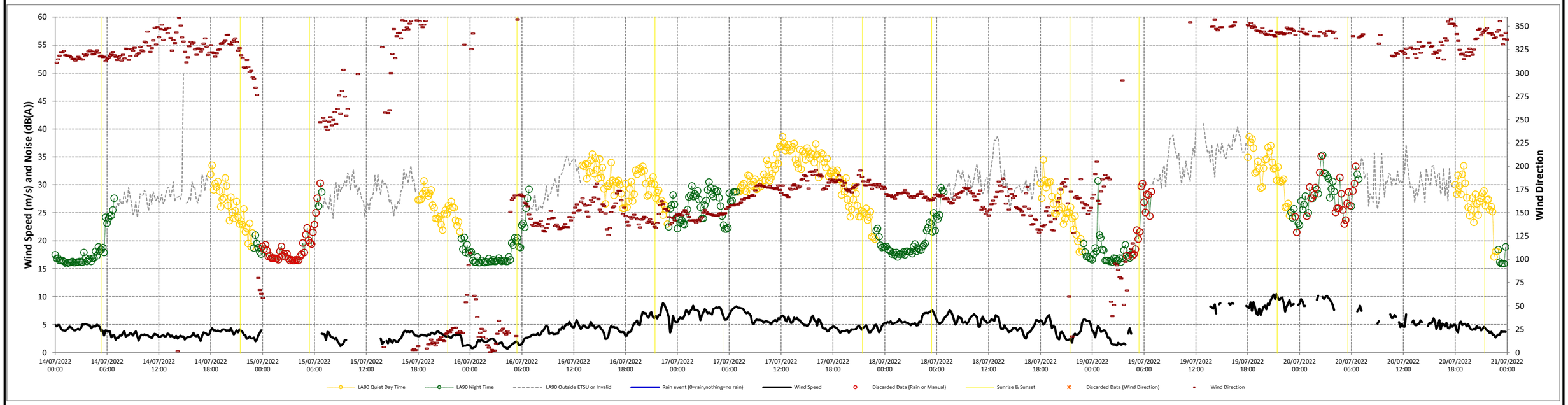


07/07/2022 to 14/07/2022

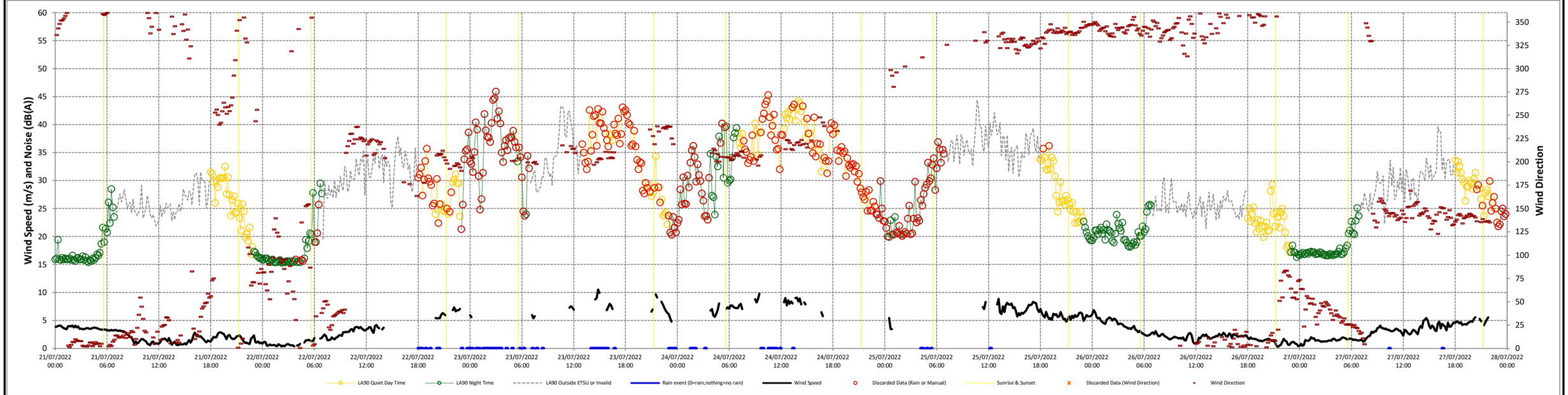


Project	Proposed Repowering of Kilgarvan Wind Farm
Client	Orsted Onshore Ireland Midco Ltd
Title	Time Series for NML1 - Page 2 of 8
Date	18/04/2023

14/07/2022 to 21/07/2022

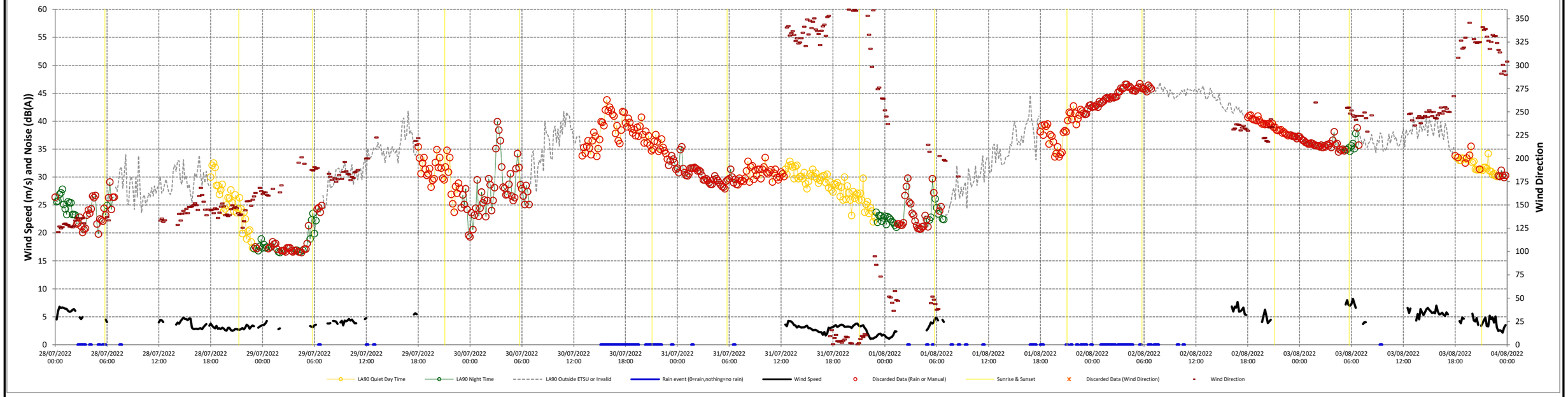


21/07/2022 to 28/07/2022

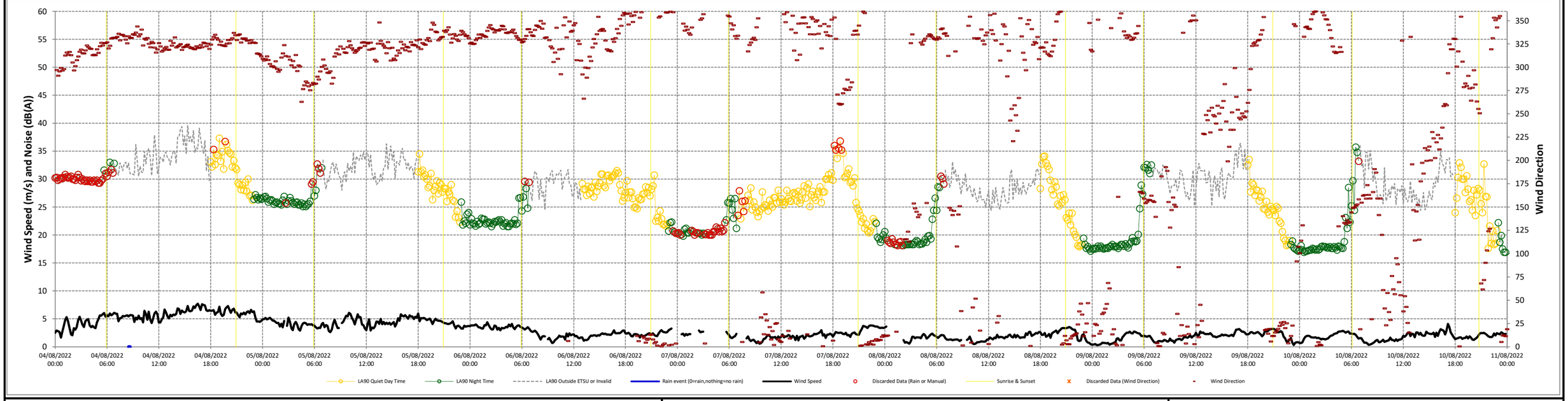


Project	Proposed Repowering of Kilgarvan Wind Farm
Client	Orsted Onshore Ireland Midco Ltd
Title	Time Series for NML1 - Page 3 of 8
Date	18/04/2023

28/07/2022 to 04/08/2022

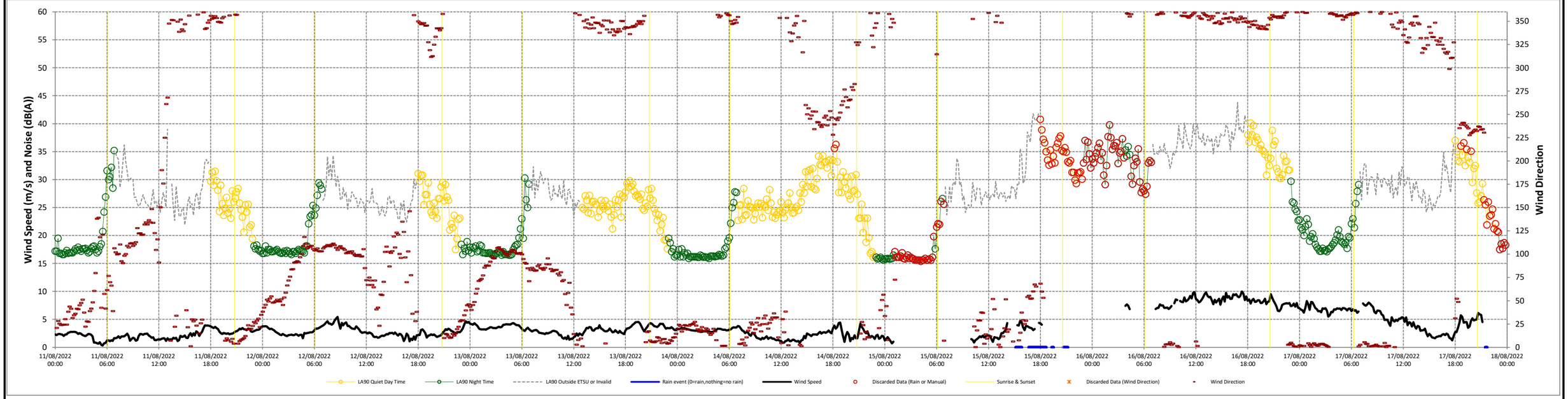


04/08/2022 to 11/08/2022

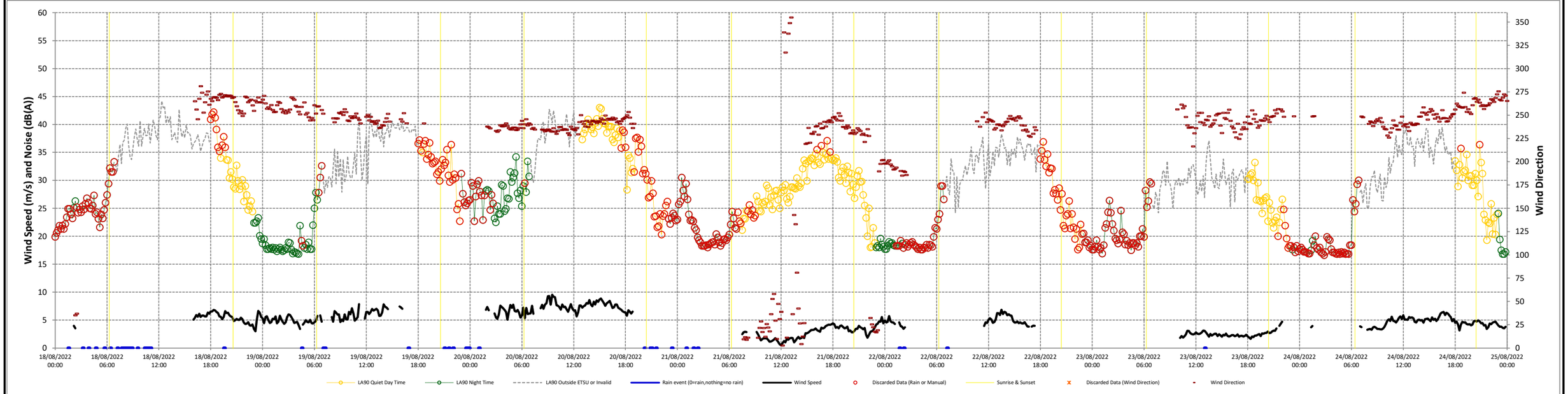


Project	Proposed Repowering of Kilgarvan Wind Farm
Client	Orsted Onshore Ireland Midco Ltd
Title	Time Series for NML1 - Page 4 of 8
Date	18/04/2023

11/08/2022 to 18/08/2022

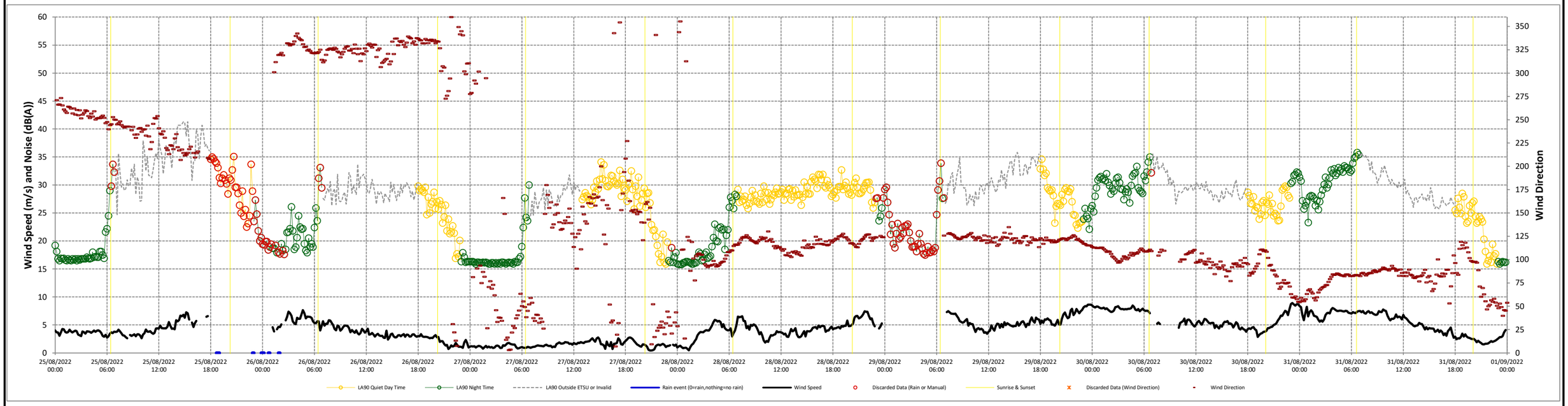


18/08/2022 to 25/08/2022

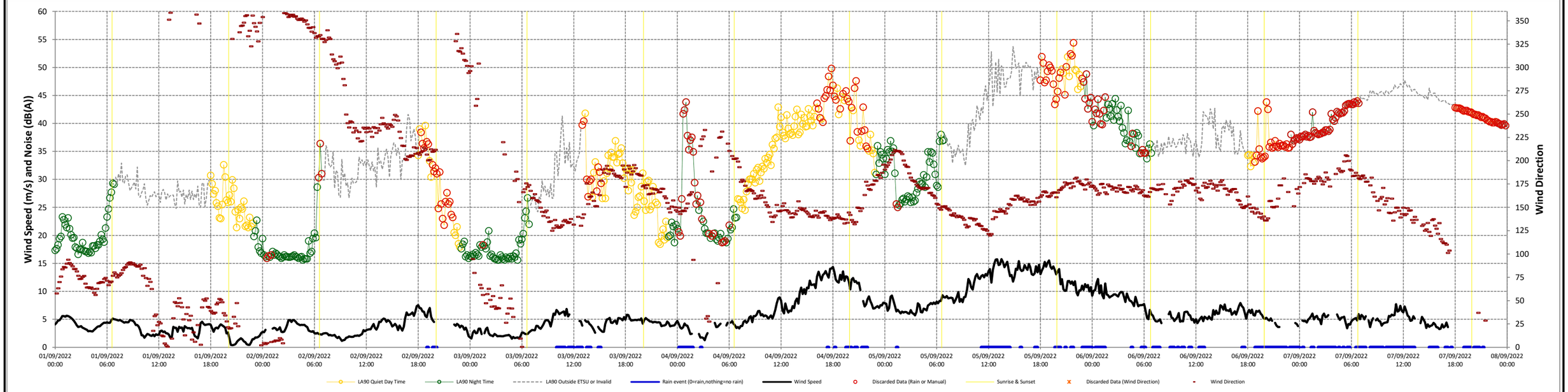


Project	Proposed Repowering of Kilgarvan Wind Farm
Client	Orsted Onshore Ireland Midco Ltd
Title	Time Series for NML1 - Page 5 of 8
Date	18/04/2023

25/08/2022 to 01/09/2022

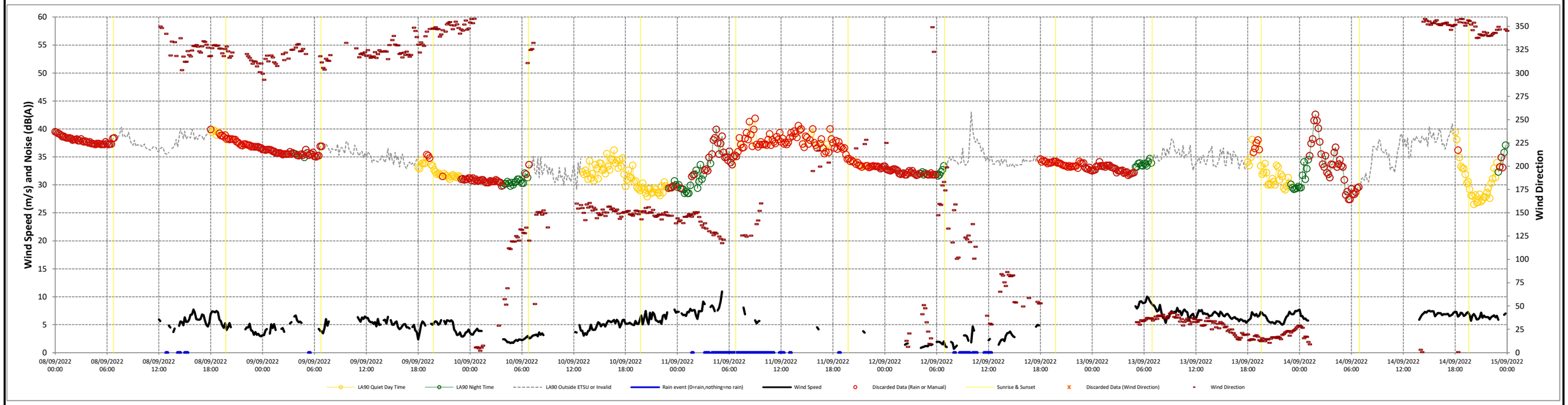


01/09/2022 to 08/09/2022

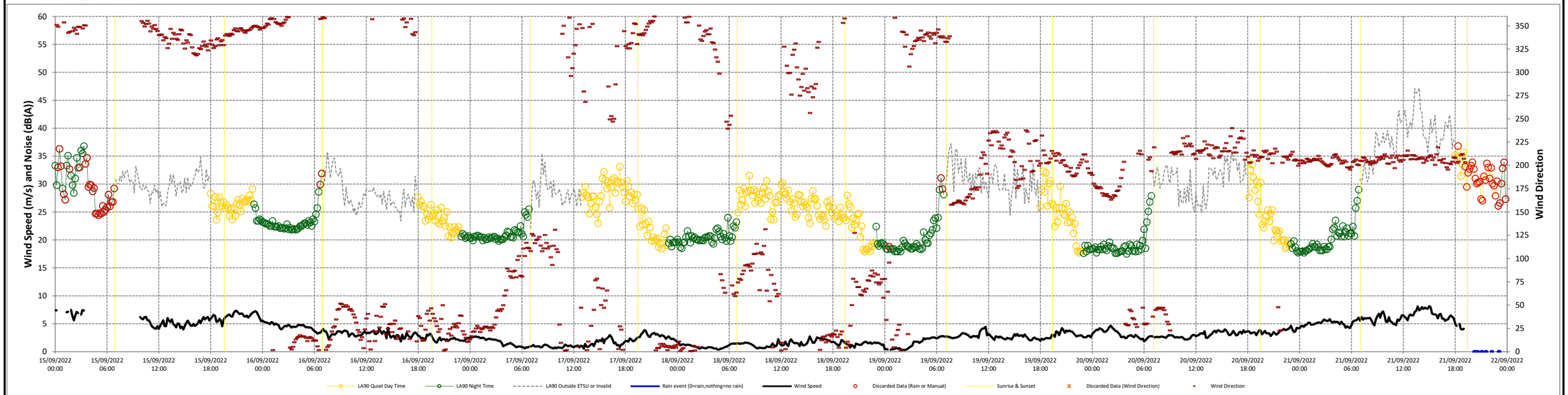


Project	Proposed Repowering of Kilgarvan Wind Farm
Client	Orsted Onshore Ireland Midco Ltd
Title	Time Series for NML1 - Page 6 of 8
Date	18/04/2023

08/09/2022 to 15/09/2022

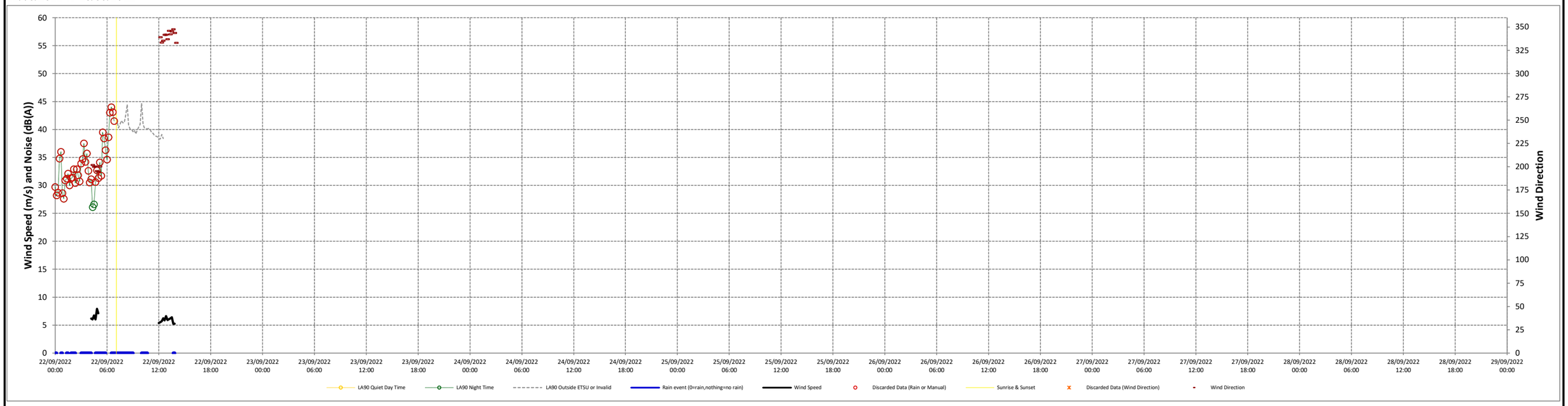


15/09/2022 to 22/09/2022



Project	Proposed Repowering of Kilgarvan Wind Farm
Client	Orsted Onshore Ireland Midco Ltd
Title	Time Series for NML1 - Page 7 of 8
Date	18/04/2023

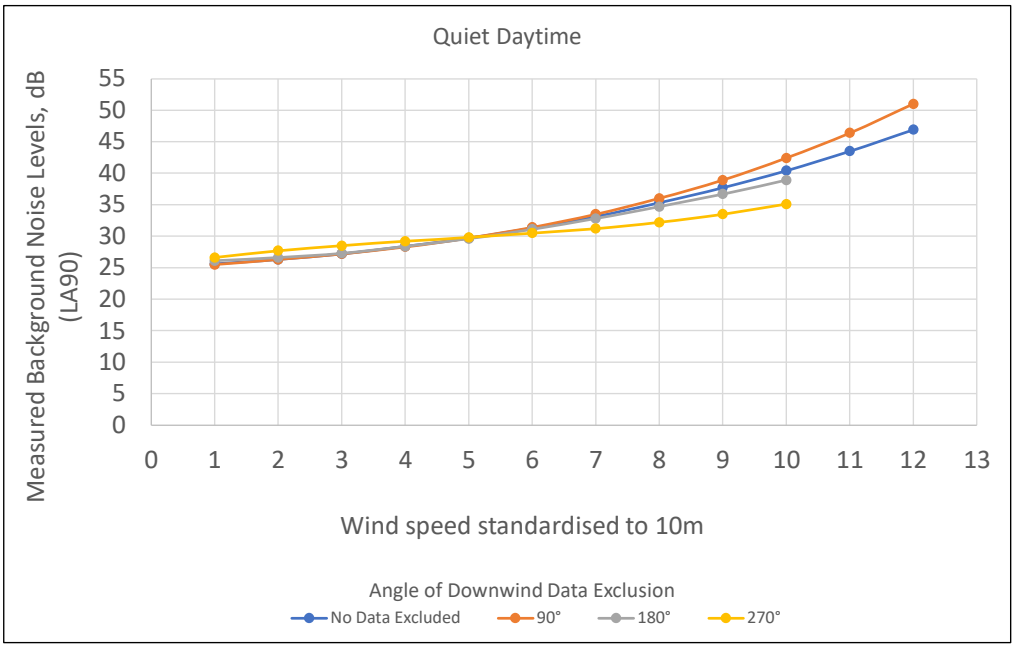
22/09/2022 to 29/09/2022



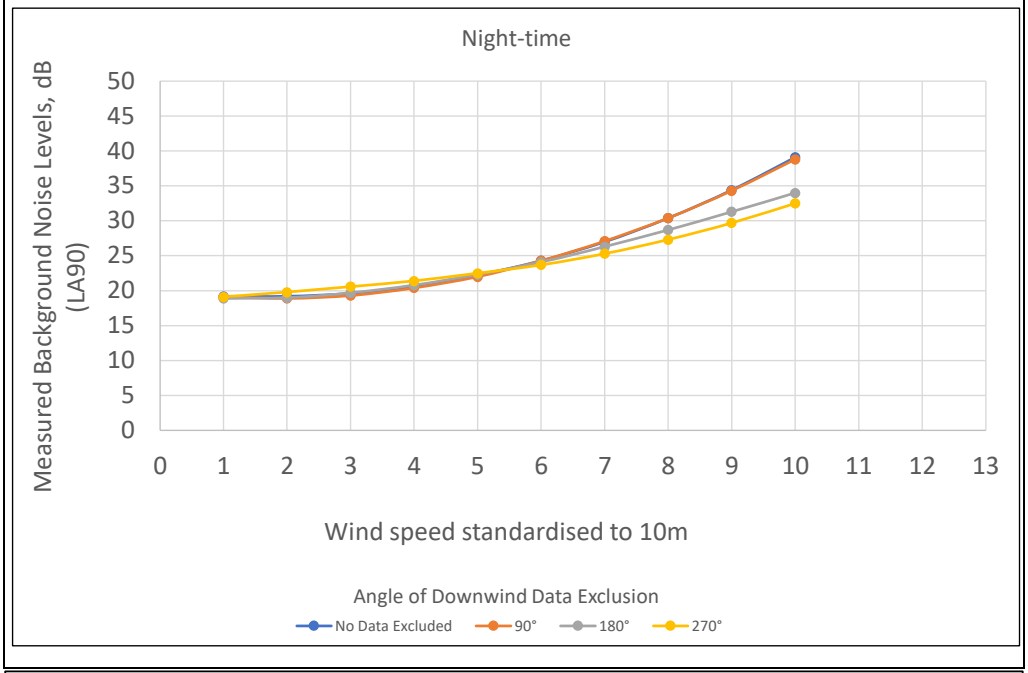
Project	Proposed Repowering of Kilgarvan Wind Farm	
Client	Orsted Onshore Ireland Midco Ltd	
Title	Time Series for NML1 - Page 8 of 8	
Date	18/04/2023	

NML1 - Directional Filtering Comparison

Day (TN)	1	2	3	4	5	6	7	8	9	10	11	12
No Data Excluded	25.6	26.3	27.2	28.4	29.7	31.3	33.1	35.3	37.7	40.4	43.5	46.9
90°	25.5	26.3	27.2	28.3	29.7	31.4	33.5	36	38.9	42.4	46.4	51
180°	26.1	26.6	27.3	28.4	29.6	31.1	32.8	34.7	36.7	38.9		
270°	26.6	27.7	28.5	29.2	29.8	30.5	31.2	32.2	33.5	35.1		

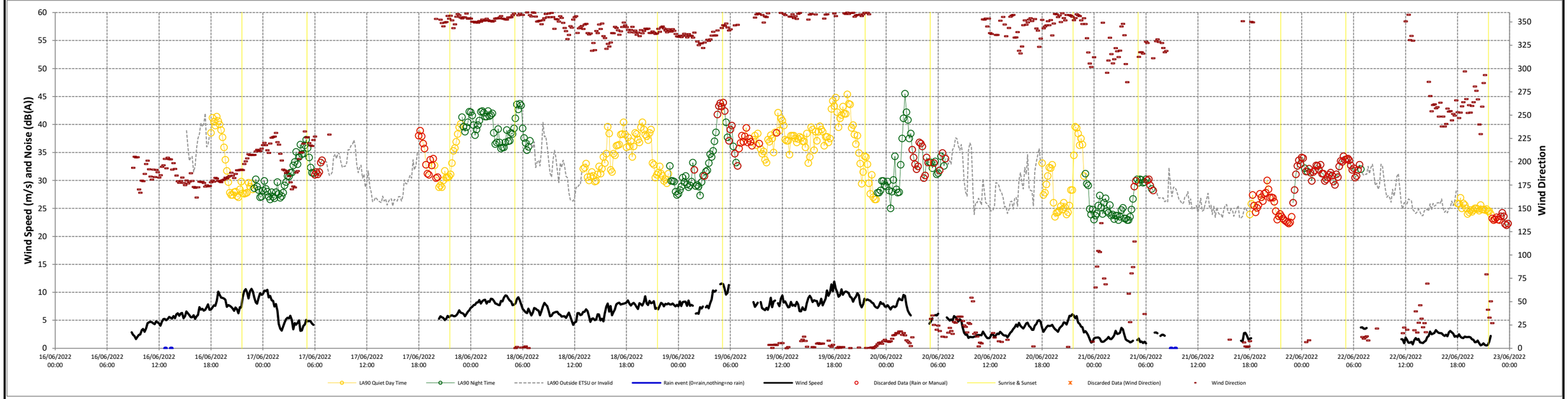


Night (TN)	1	2	3	4	5	6	7	8	9	10	11	12
No Data Excluded	19.2	19.2	19.6	20.6	22.2	24.3	27	30.4	34.4	39.1		
90°	19.1	18.9	19.3	20.4	22	24.3	27.1	30.4	34.3	38.8		
180°	18.9	19	19.7	20.8	22.3	24.1	26.3	28.7	31.3	34		
270°	19.1	19.8	20.6	21.4	22.5	23.7	25.3	27.3	29.7	32.5		

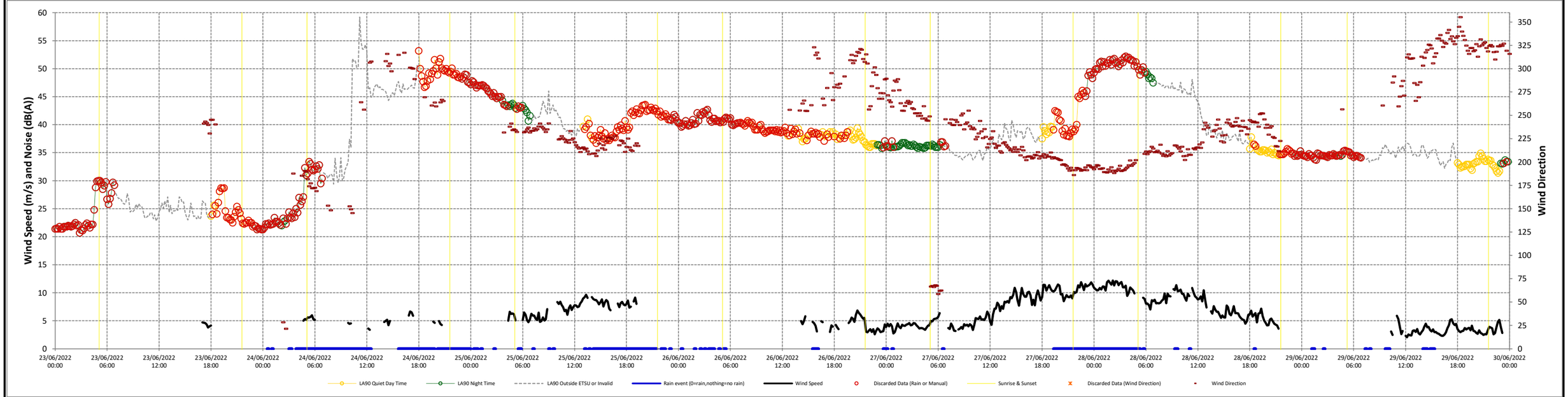


The filtering comparison shows that there is very little difference in the wind sectors which suggests that the operational wind farms were having very little influence on measured levels therefore the unfiltered dataset has been used. There are some differences at the higher wind speeds, but this is most likely due to there being less available data points in the filtered datasets. The Regression Analysis graphs for the unfiltered datasets are included within Annex 1.

16/06/2022 to 23/06/2022

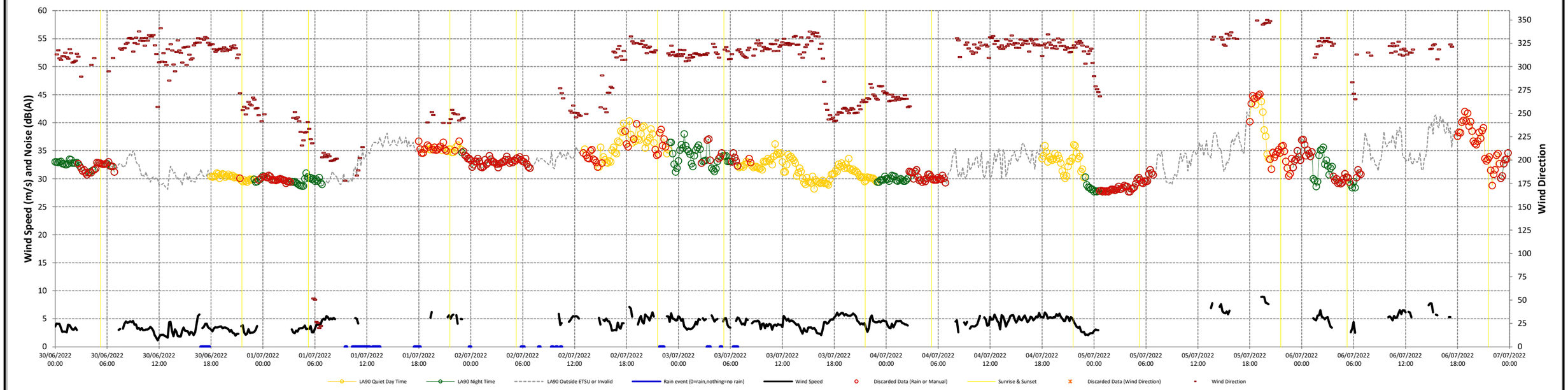


23/06/2022 to 30/06/2022

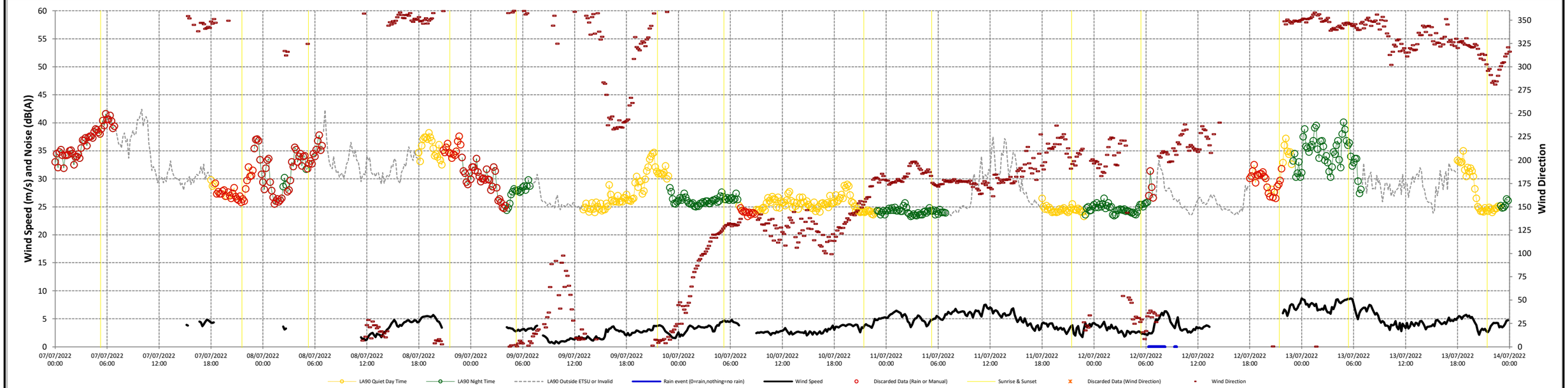


Project	Proposed Repowering of Kilgarvan Wind Farm
Client	Orsted Onshore Ireland Midco Ltd
Title	Time Series for NML3 - Page 1 of 7
Date	17/04/2023

30/06/2022 to 07/07/2022

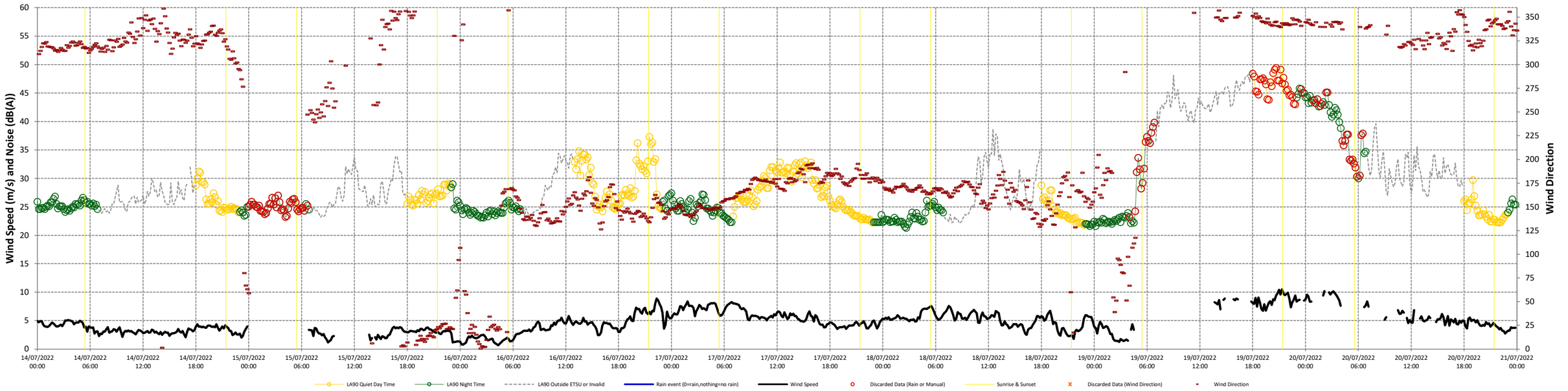


07/07/2022 to 14/07/2022

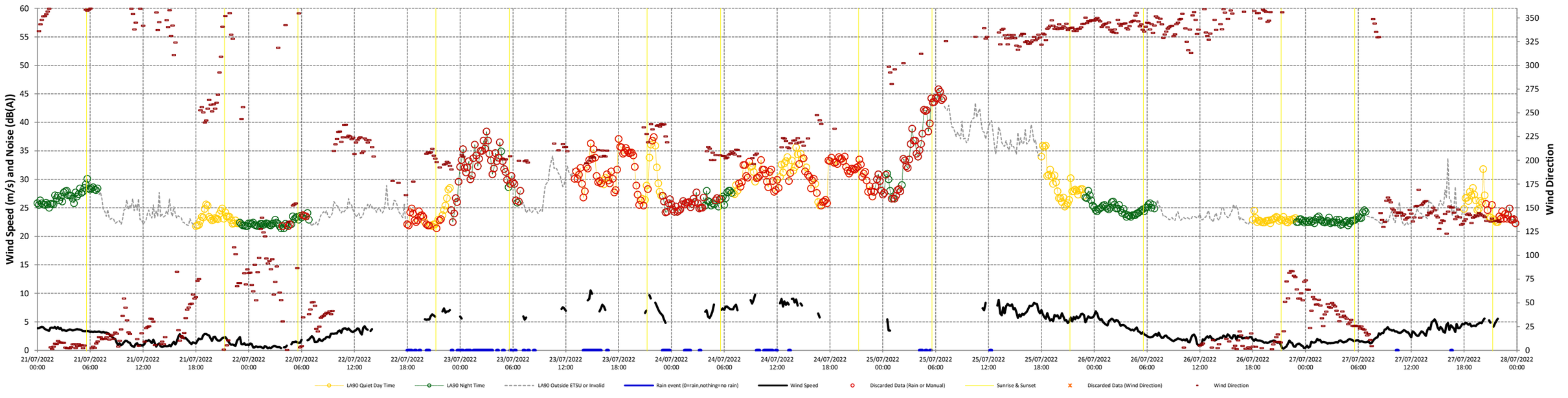


Project	Proposed Repowering of Kilgarvan Wind Farm
Client	Orsted Onshore Ireland Midco Ltd
Title	Time Series for NML3 - Page 2 of 7
Date	17/04/2023

14/07/2022 to 21/07/2022

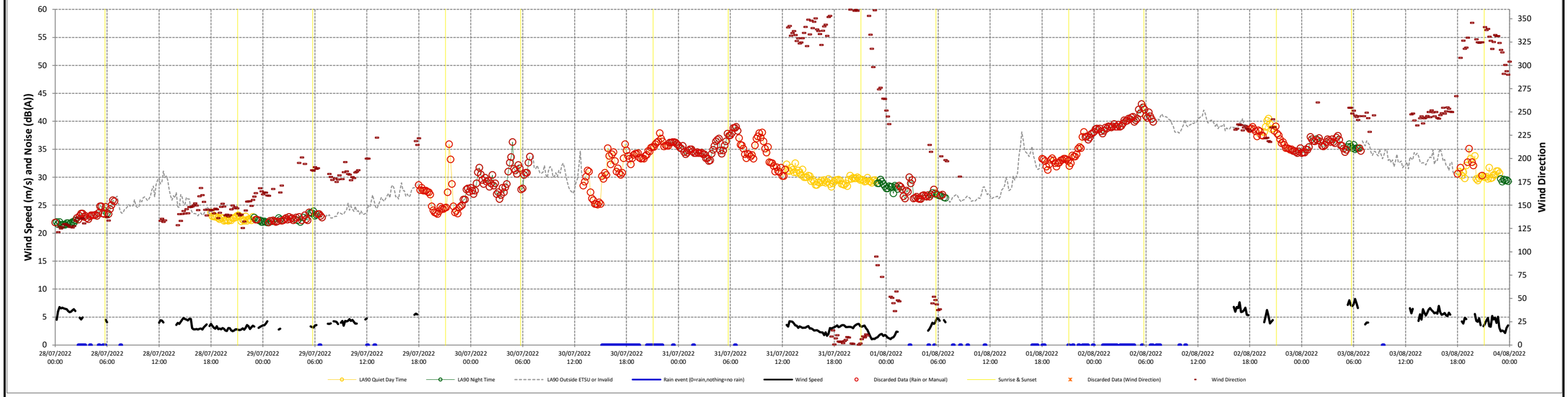


21/07/2022 to 28/07/2022

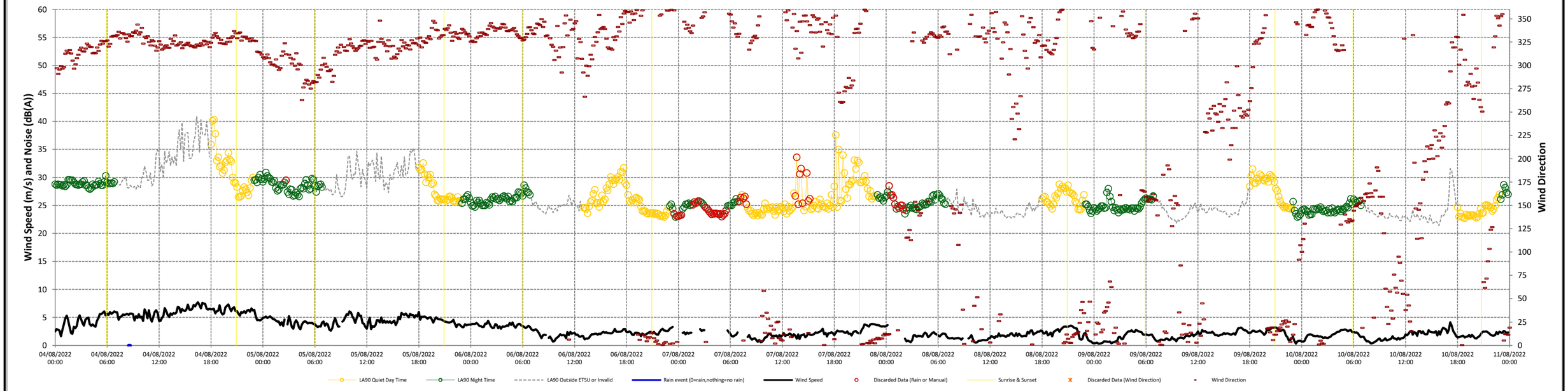


Project	Proposed Repowering of Kilgarvan Wind Farm
Client	Orsted Onshore Ireland Midco Ltd
Title	Time Series for NML3 Page 3 of 7
Date	17/04/2023

28/07/2022 to 04/08/2022

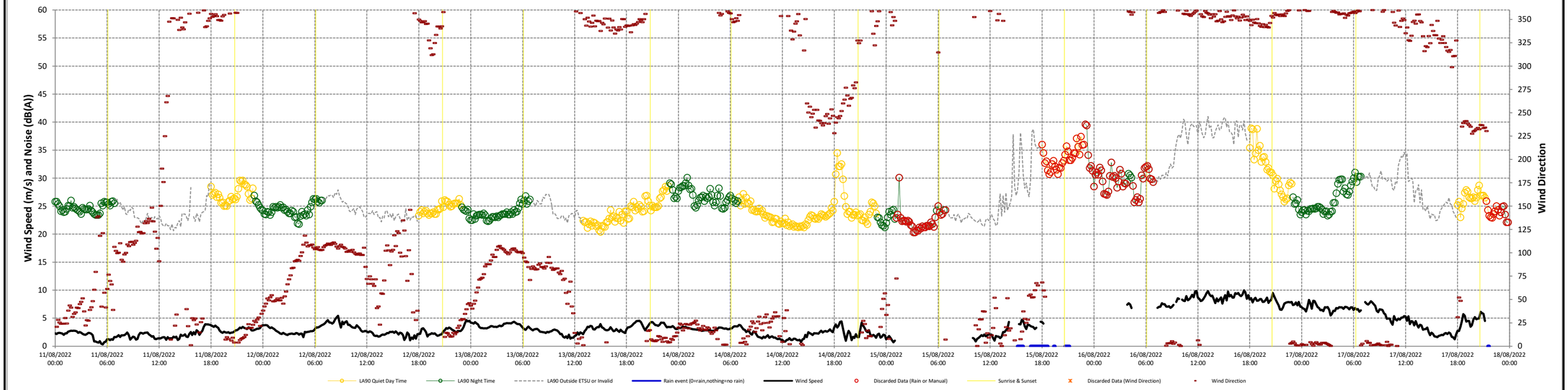


04/08/2022 to 11/08/2022

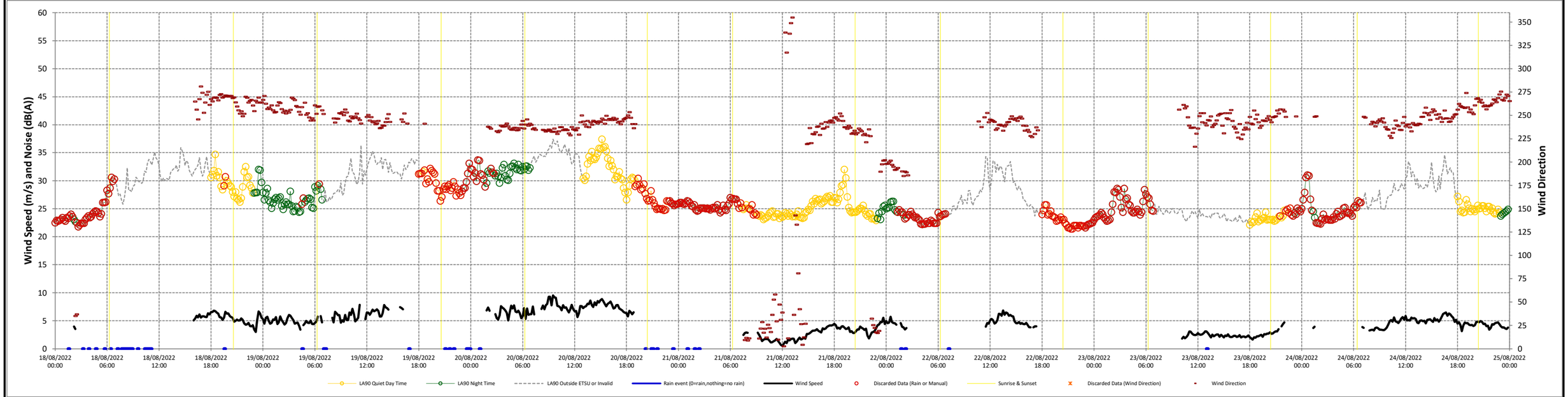


Project	Proposed Repowering of Kilgarvan Wind Farm
Client	Orsted Onshore Ireland Midco Ltd
Title	Time Series for NML3 - Page 4 of 7
Date	17/04/2023

11/08/2022 to 18/08/2022

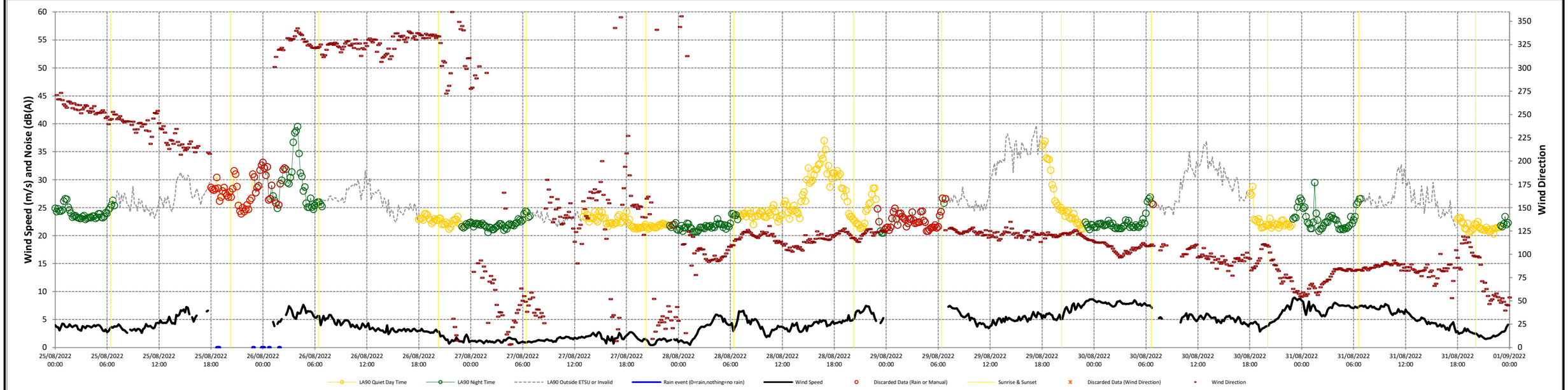


18/08/2022 to 25/08/2022

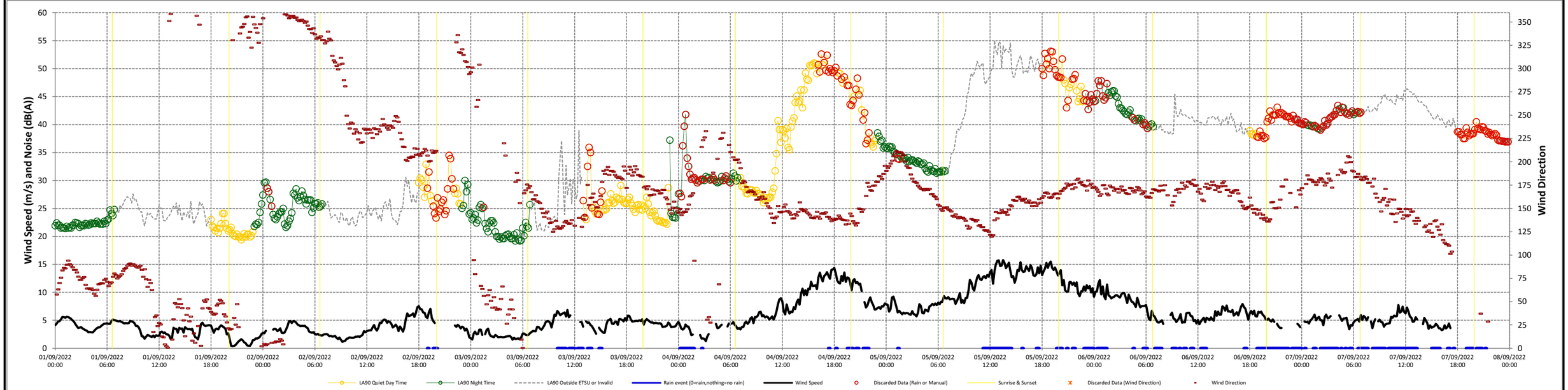


Project	Proposed Repowering of Kilgarvan Wind Farm
Client	Orsted Onshore Ireland Midco Ltd
Title	Time Series for NML3 - Page 5 of 7
Date	17/04/2023

25/08/2022 to 01/09/2022

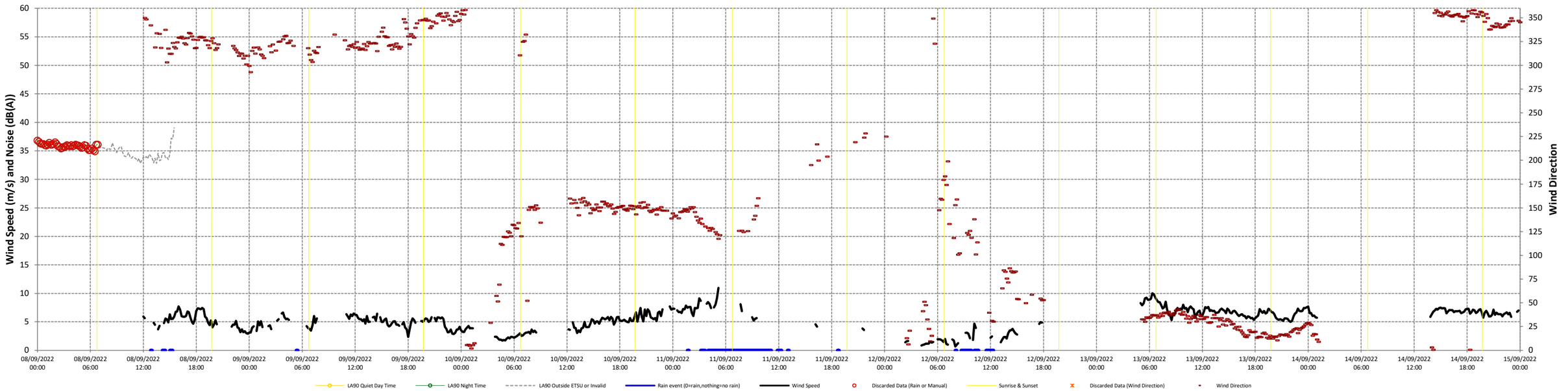


01/09/2022 to 08/09/2022

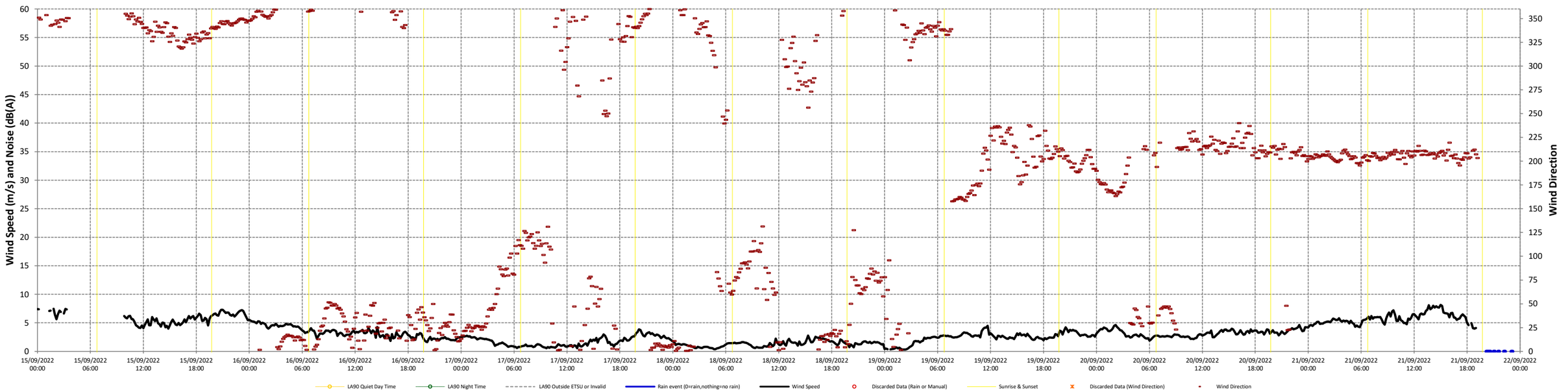


Project	Proposed Repowering of Kilgarvan Wind Farm
Client	Orsted Onshore Ireland Midco Ltd
Title	Time Series for NML3 - Page 6 of 7
Date	17/04/2023

08/09/2022 to 15/09/2022

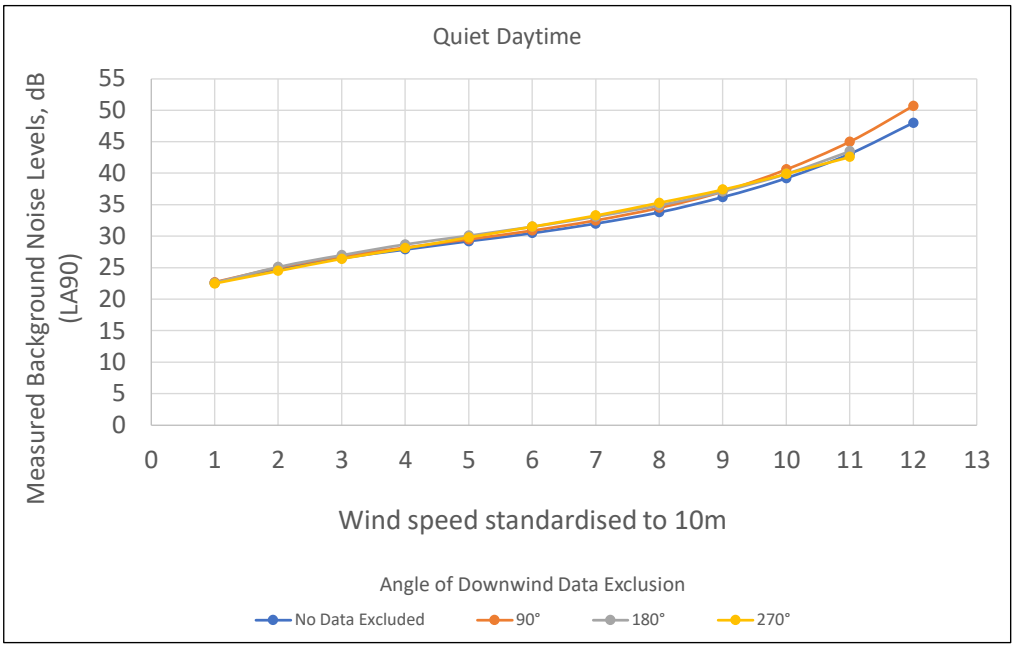


15/09/2022 to 22/09/2022

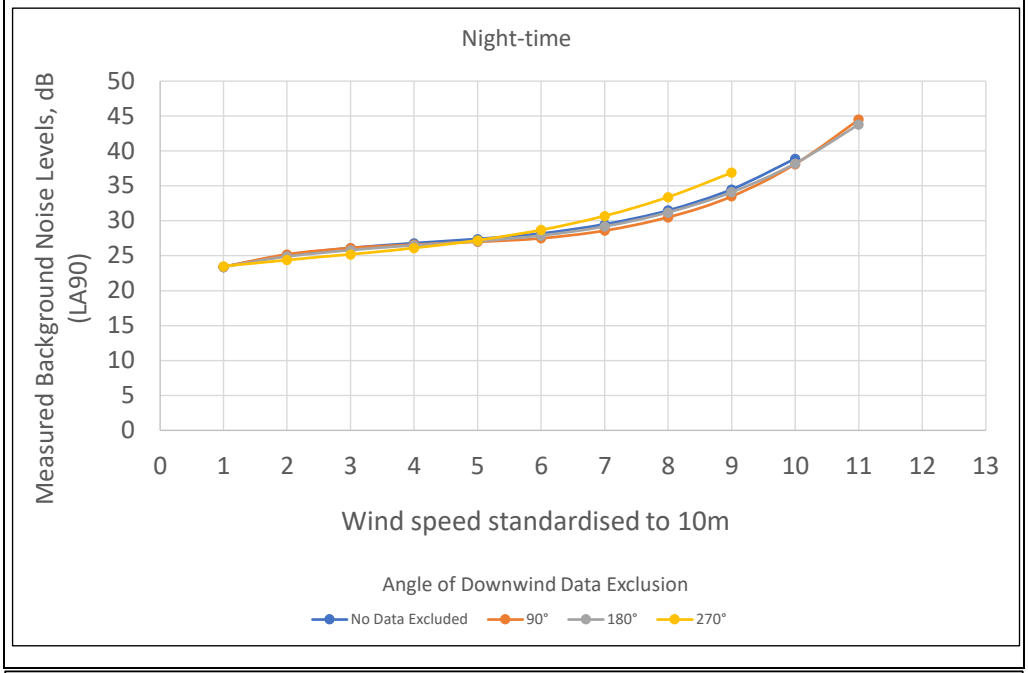


Project	Proposed Repowering of Kilgarvan Wind Farm
Client	Orsted Onshore Ireland Midco Ltd
Title	Time Series for NML3 - Page 7 of 7
Date	17/04/2023

NML3 - Directional Filtering Comparison												
Day (TN)	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
No Data Excluded	22.6	24.8	26.5	27.9	29.2	30.5	32	33.8	36.2	39.2	43.1	48
90°	22.7	25	26.8	28.2	29.5	30.9	32.5	34.5	37.1	40.6	45	50.7
180°	22.6	25.1	27	28.7	30.1	31.5	33.1	34.9	37.1	39.9	43.5	
270°	22.5	24.5	26.4	28.1	29.8	31.5	33.3	35.3	37.4	39.9	42.6	

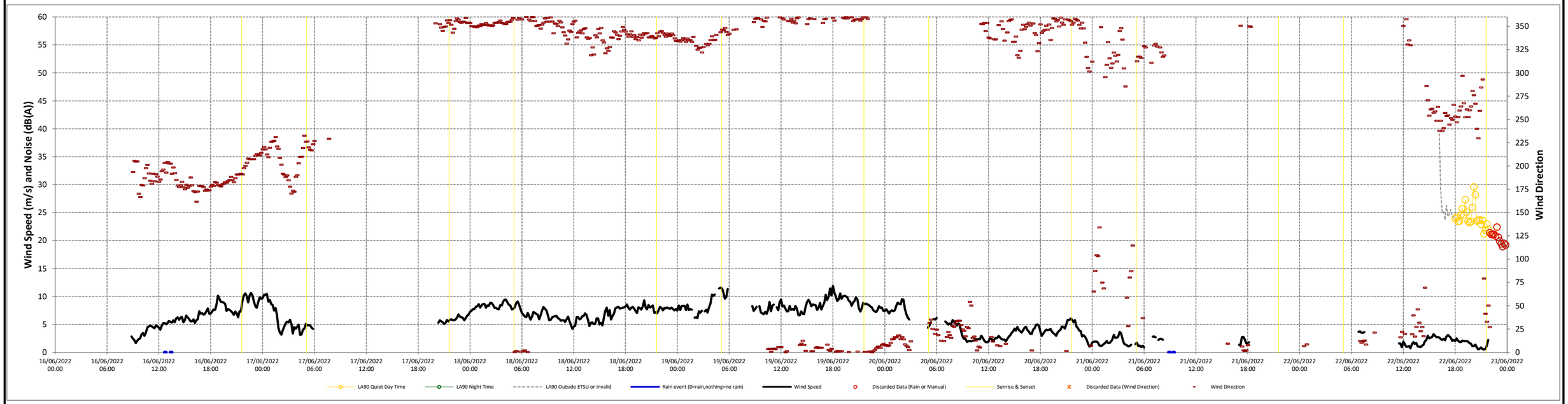


Night (TN)	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
No Data Excluded	23.4	25.1	26.1	26.8	27.4	28.2	29.5	31.5	34.5	38.9		
90°	23.4	25.2	26.1	26.6	27	27.5	28.6	30.5	33.5	38.1	44.5	
180°	23.4	24.9	25.8	26.5	27.1	27.9	29.2	31.2	34.1	38.2	43.8	
270°	23.5	24.4	25.2	26.1	27.2	28.7	30.7	33.4	36.9			

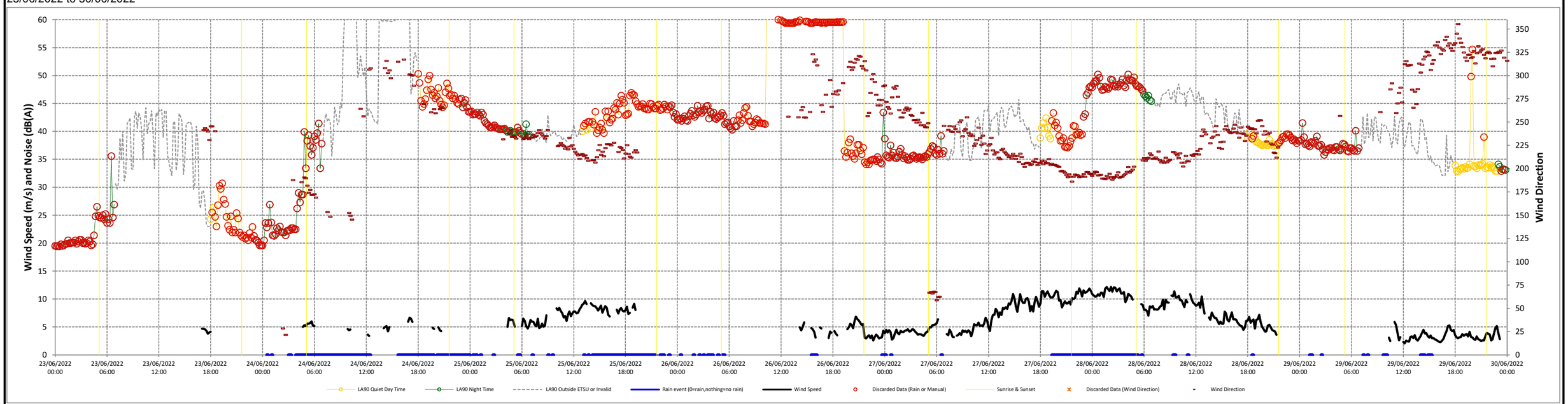


The filtering comparison shows that there is very little difference in the wind sectors which suggests that the operational wind farms were having very little influence on measured levels therefore the unfiltered dataset has been used. The Regression Analysis graphs for the unfiltered datasets are included within Annex 1.

16/06/2022 to 23/06/2022

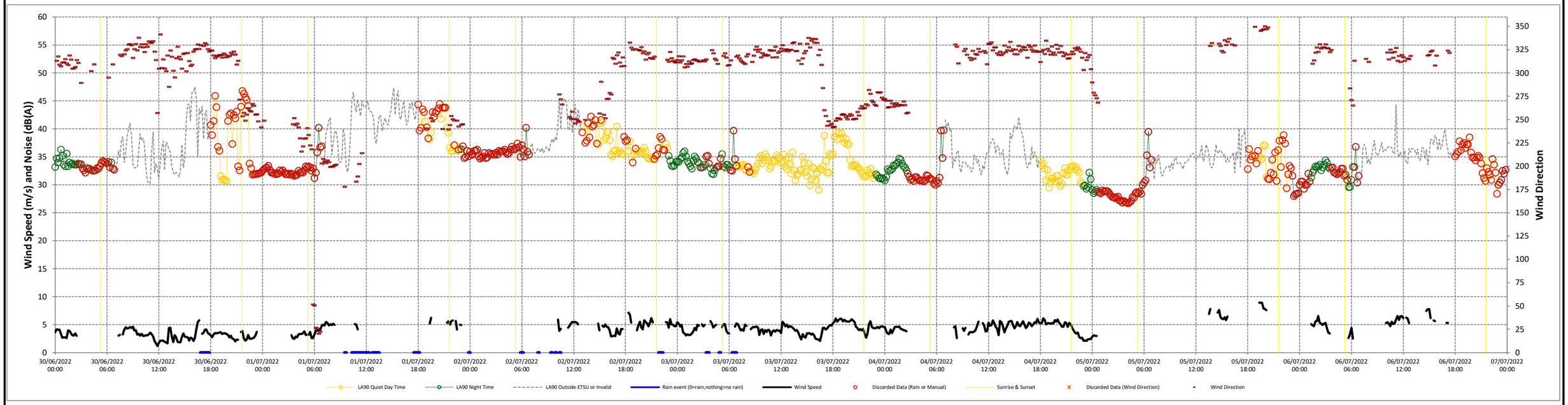


23/06/2022 to 30/06/2022

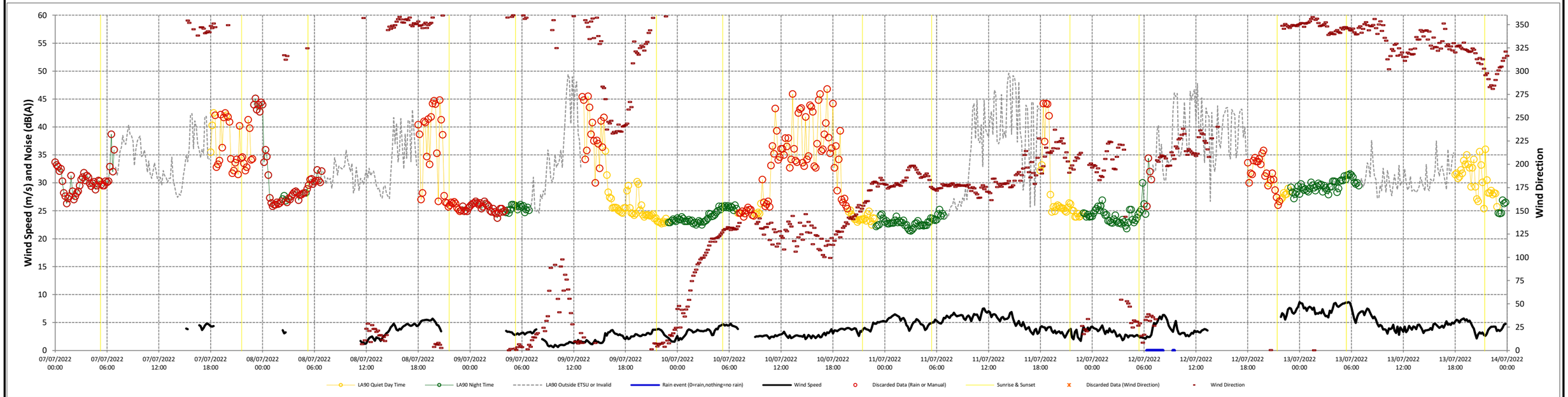


Project	Proposed Repowering of Kilgarvan Wind Farm
Client	Orsted Onshore Ireland Midco Ltd
Title	Time Series for NML4 - Page 1 of 8
Date	18/04/2023

30/06/2022 to 07/07/2022

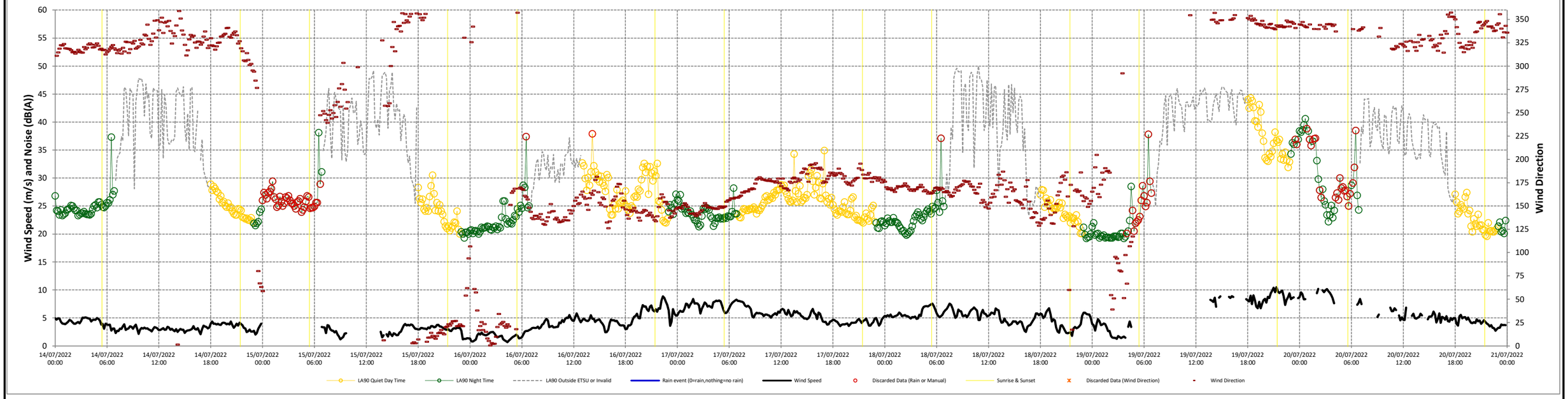


07/07/2022 to 14/07/2022

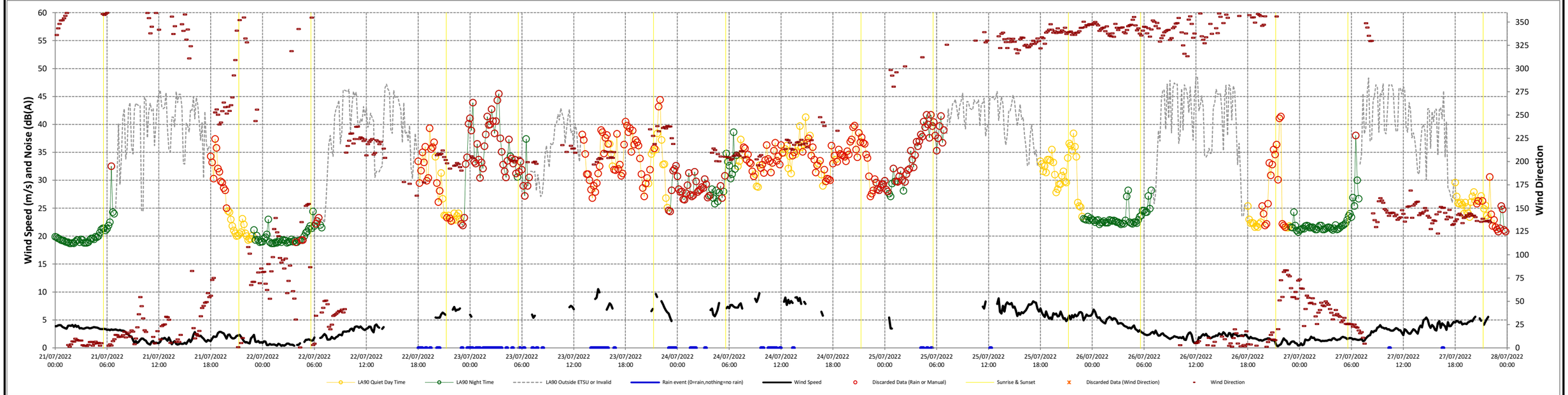


Project	Proposed Repowering of Kilgarvan Wind Farm
Client	Orsted Onshore Ireland Midco Ltd
Title	Time Series for NML4 - Page 2 of 8
Date	18/04/2023

14/07/2022 to 21/07/2022

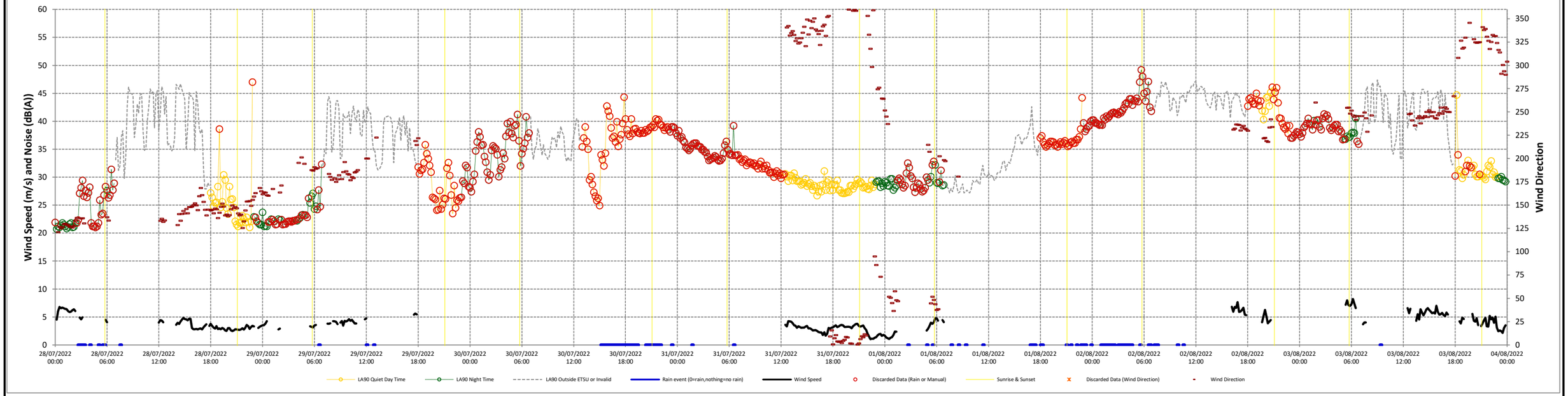


21/07/2022 to 28/07/2022

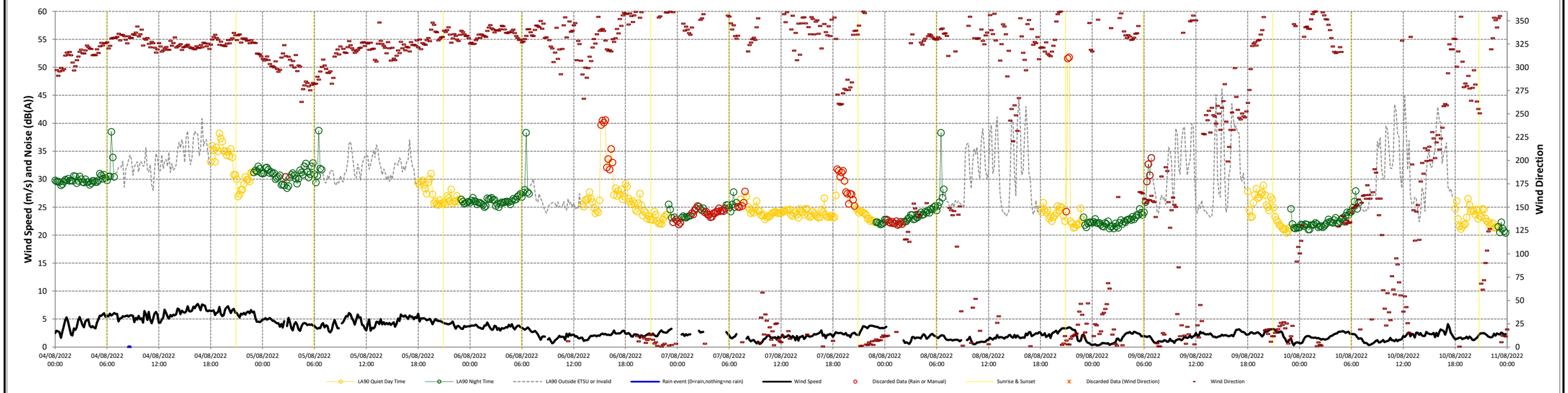


Project	Proposed Repowering of Kilgarvan Wind Farm
Client	Orsted Onshore Ireland Midco Ltd
Title	Time Series for NML4 - Page 3 of 8
Date	18/04/2023

28/07/2022 to 04/08/2022

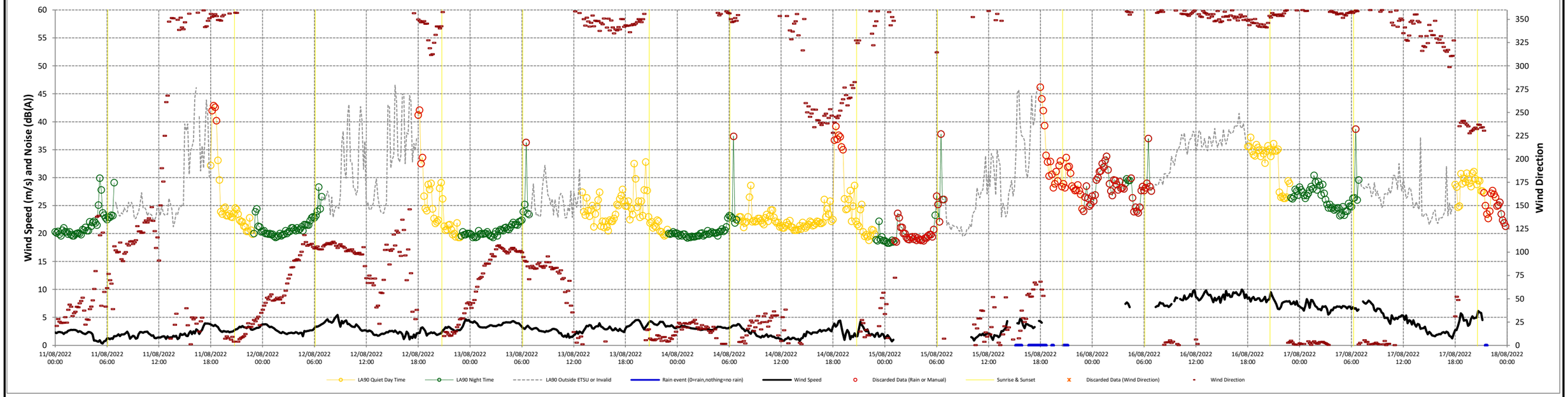


04/08/2022 to 11/08/2022

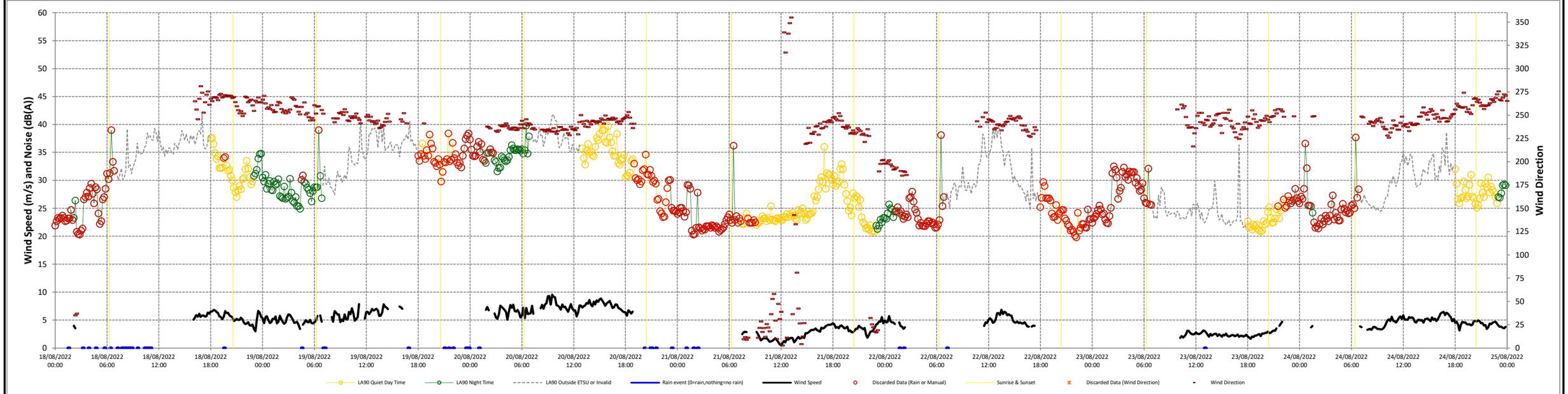


Project	Proposed Repowering of Kilgarvan Wind Farm
Client	Orsted Onshore Ireland Midco Ltd
Title	Time Series for NML4 - Page 4 of 8
Date	18/04/2023

11/08/2022 to 18/08/2022

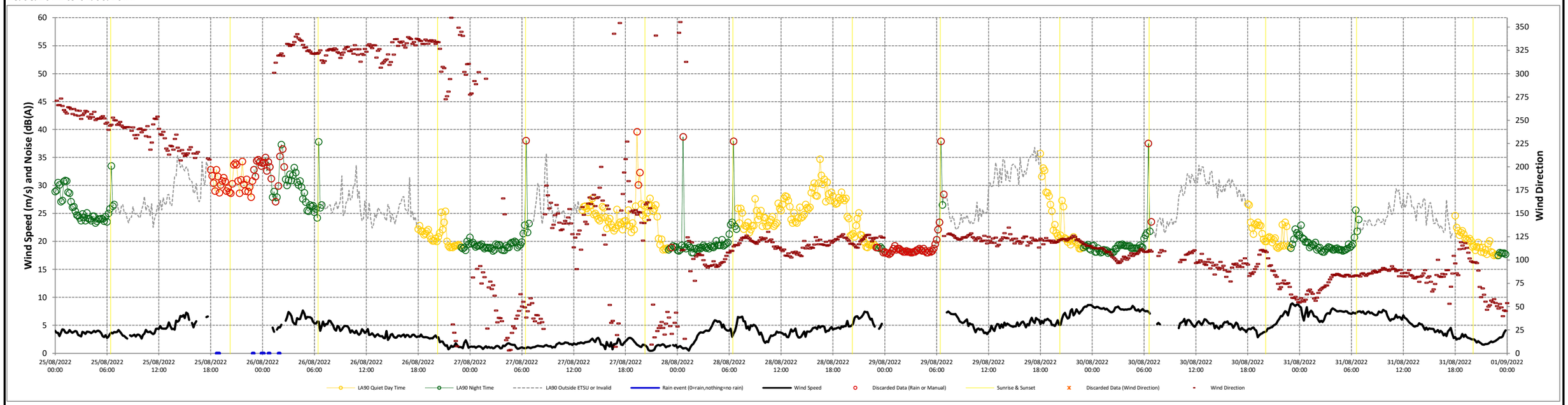


18/08/2022 to 25/08/2022

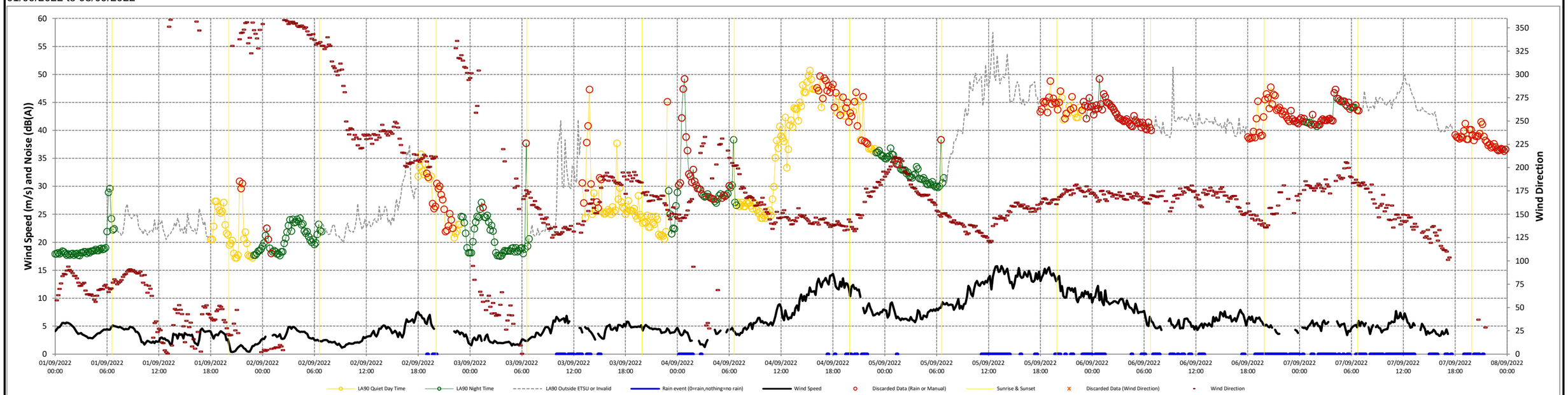


Project	Proposed Repowering of Kilgarvan Wind Farm
Client	Orsted Onshore Ireland Midco Ltd
Title	Time Series for NML4 - Page 5 of 8
Date	18/04/2023

25/08/2022 to 01/09/2022

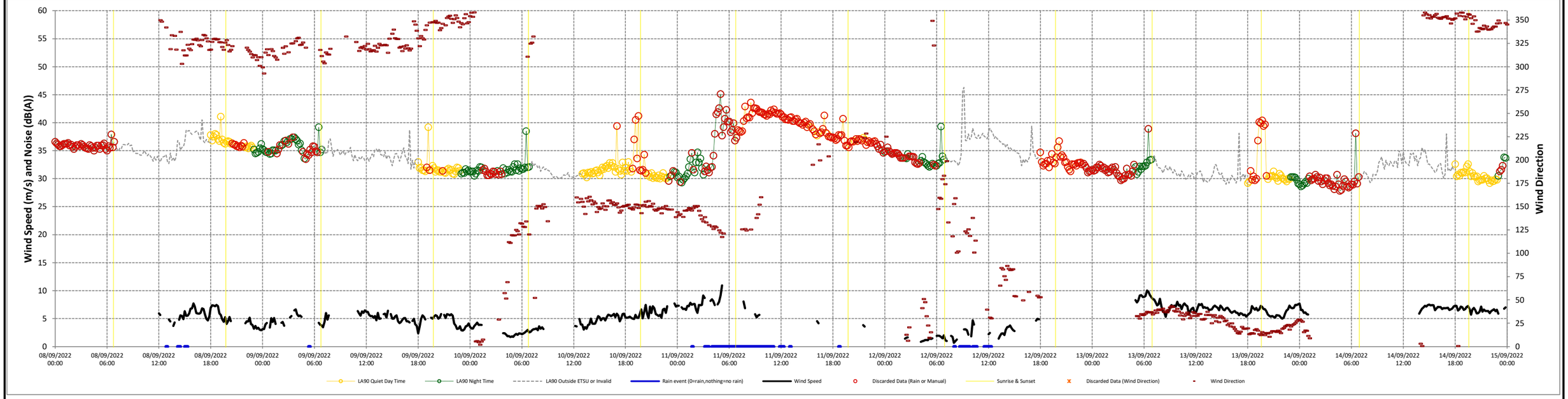


01/09/2022 to 08/09/2022

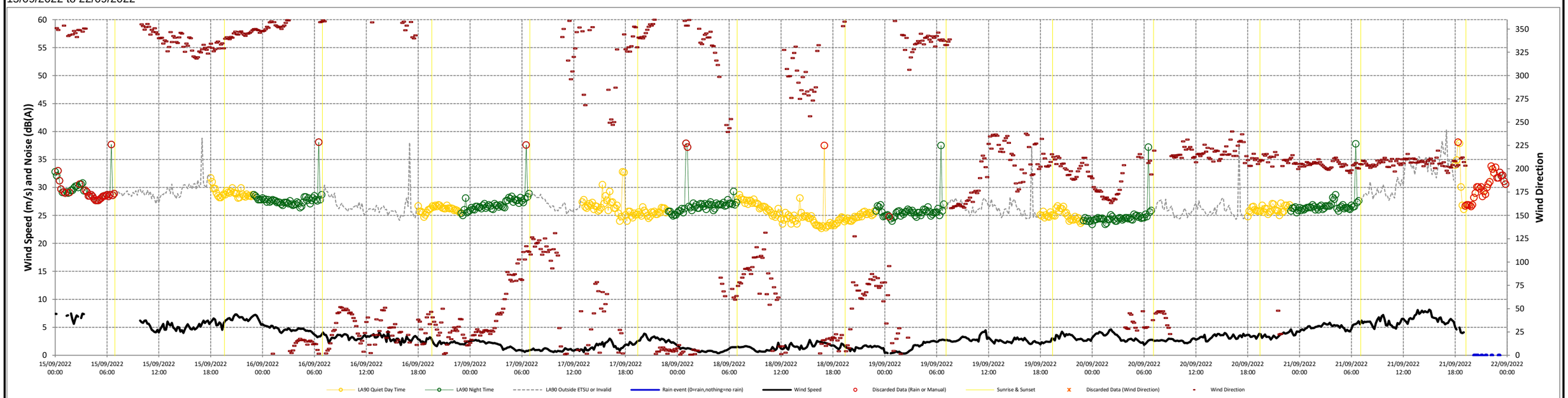


Project	Proposed Repowering of Kilgarvan Wind Farm
Client	Orsted Onshore Ireland Midco Ltd
Title	Time Series for NML4 - Page 6 of 8
Date	18/04/2023

08/09/2022 to 15/09/2022

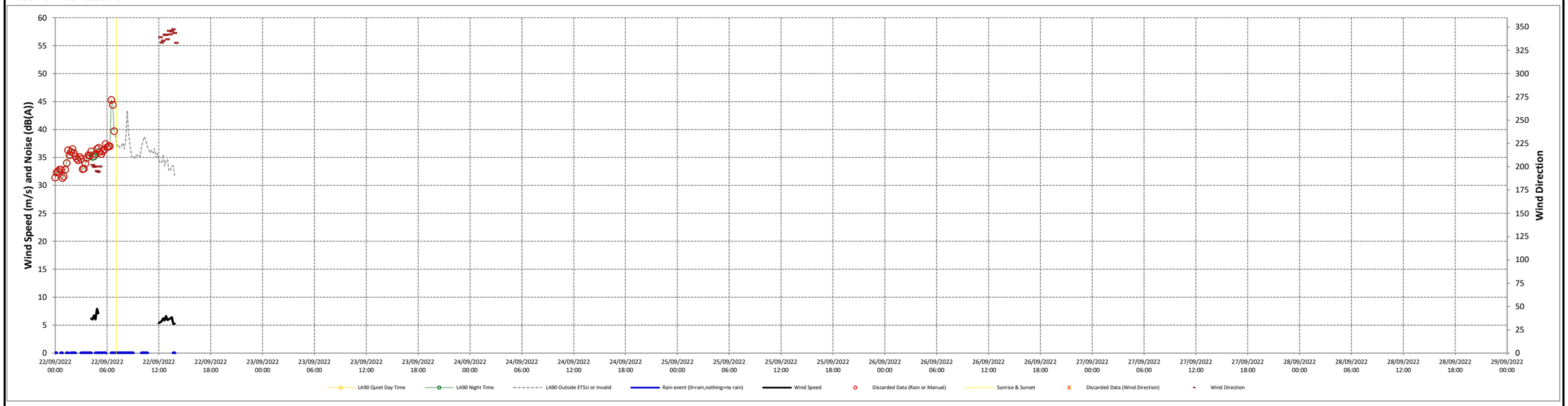


15/09/2022 to 22/09/2022



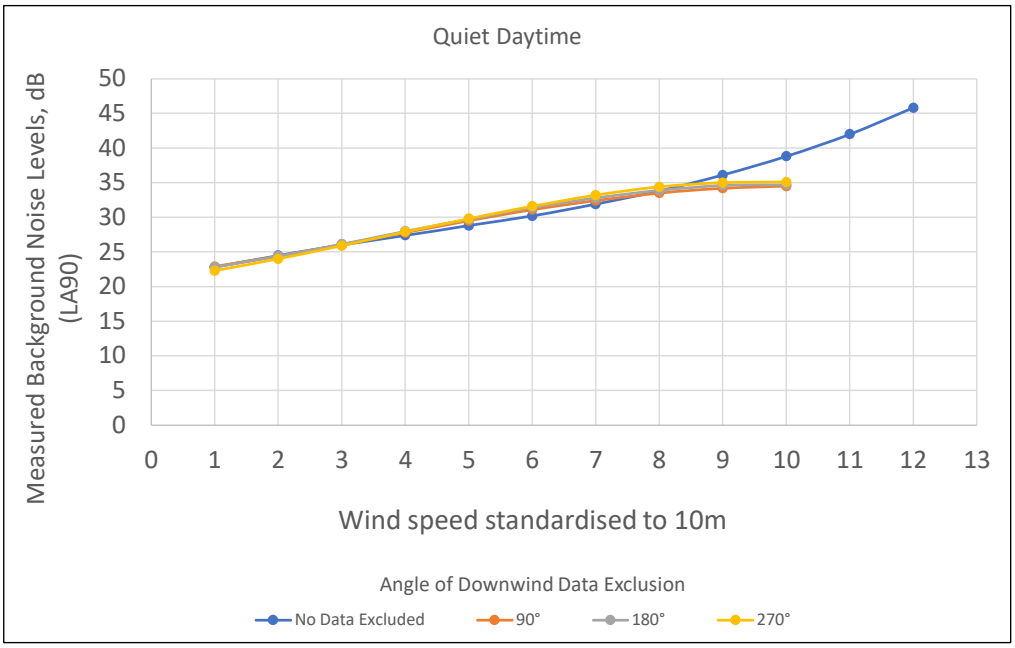
Project	Proposed Repowering of Kilgarvan Wind Farm
Client	Orsted Onshore Ireland Midco Ltd
Title	Time Series for NML4 - Page 7 of 8
Date	18/04/2023

22/09/2022 to 29/09/2022

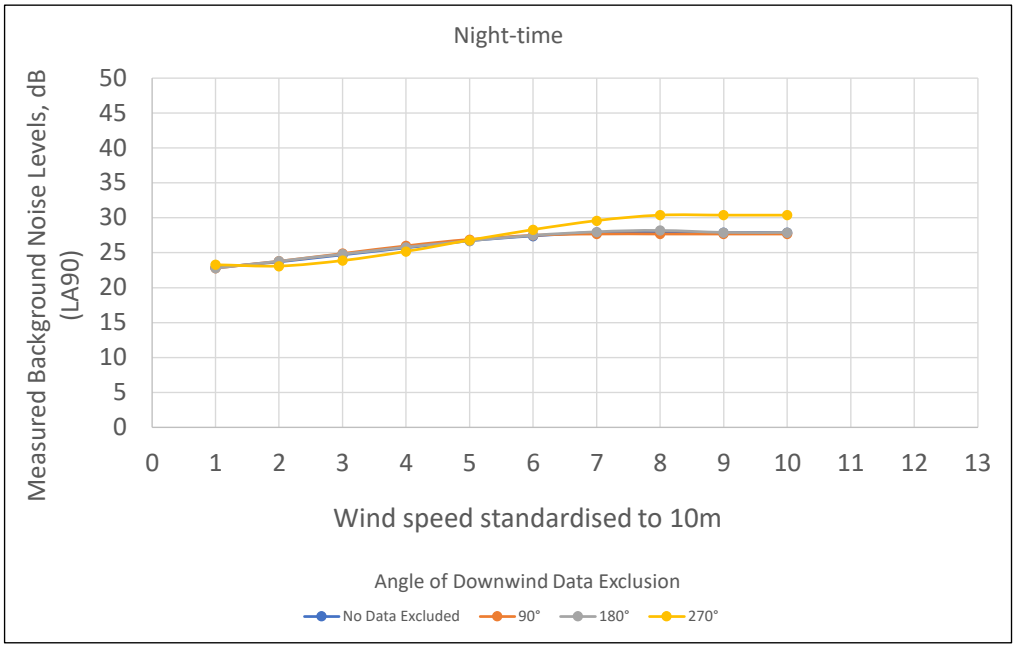


Project	Proposed Repowering of Kilgarvan Wind Farm	
Client	Orsted Onshore Ireland Midco Ltd	
Title	Time Series for NML4 - Page 8 of 8	
Date	18/04/2023	

NML4 - Directional Filtering Comparison												
Day (TN)	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
No Data Excluded	22.8	24.5	26	27.4	28.8	30.2	31.9	33.8	36.1	38.8	42	45.8
90°	22.9	24.4	26.1	27.8	29.5	31.1	32.4	33.5	34.2	34.5		
180°	22.8	24.4	26.1	28	29.7	31.4	32.8	33.9	34.6	34.7		
270°	22.3	24	25.9	27.9	29.8	31.6	33.2	34.4	35	35.1		



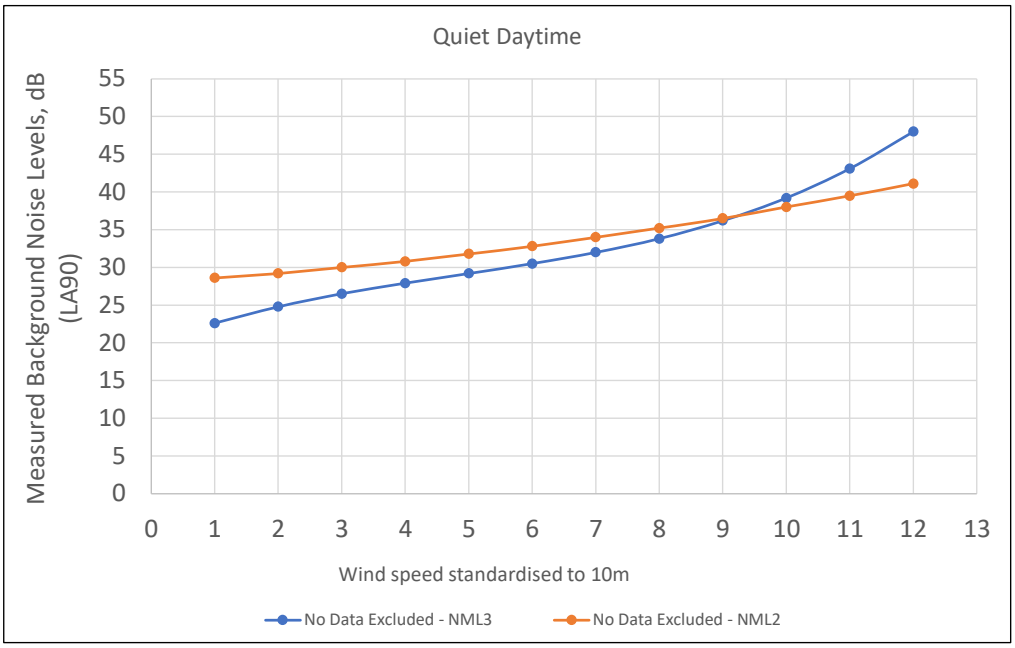
Night (TN)	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
No Data Excluded	22.9	23.7	24.7	25.7	26.7	27.4	27.9	27.9	27.9	27.9		
90°	22.8	23.8	24.9	26	26.9	27.5	27.7	27.7	27.7	27.7		
180°	22.8	23.8	24.8	25.8	26.7	27.5	28	28.2	27.9	27.9		
270°	23.3	23.1	23.9	25.2	26.8	28.3	29.6	30.4	30.4	30.4		



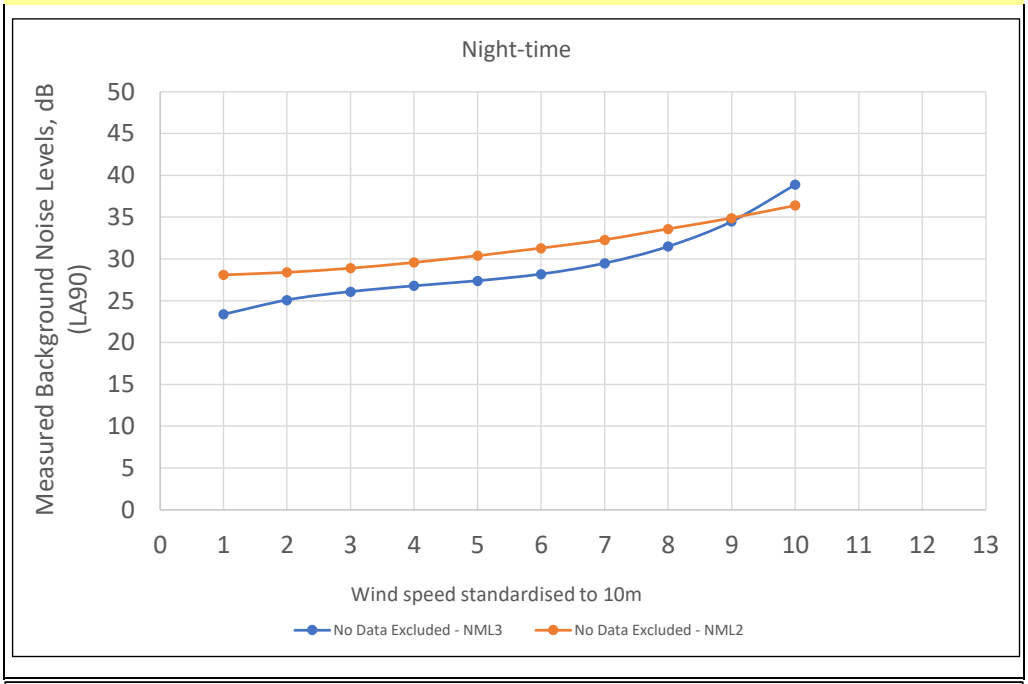
The filtering comparison shows that there is very little difference in the wind sectors which suggests that the operational wind farms are having very little influence on measured levels therefore the unfiltered dataset has been used. The Regression Analysis graphs for the unfiltered datasets are included within Annex 1.

NML3 and NML2 data comparison

Day (TN)	1	2	3	4	5	6	7	8	9	10	11	12
No Data Excluded - NML3	22.6	24.8	26.5	27.9	29.2	30.5	32	33.8	36.2	39.2	43.1	48
No Data Excluded - NML2	28.6	29.2	30	30.8	31.8	32.8	34	35.2	36.5	38	39.5	41.1



Night (TN)	1	2	3	4	5	6	7	8	9	10	11	12
No Data Excluded - NML3	23.4	25.1	26.1	26.8	27.4	28.2	29.5	31.5	34.5	38.9		
No Data Excluded - NML2	28.1	28.4	28.9	29.6	30.4	31.3	32.3	33.6	34.9	36.4		



Due to the issues with the noise monitoring equipment installed at NML2, the data was discarded. The data collected at NML3 was used as proxy data for NML2. The graphs above show the difference in the two datasets. The dataset collected at NML3 was found to be quieter across the majority of wind speed range. The Regression Analysis graphs for NML3 are included within Annex 1.

Annex 6 – NSR Coordinates and Prediction Modelling Results

Table A7.1: Noise Sensitive Receptors

Noise Sensitive Receptor (H)	Easting (m)	Northing (m)	Elevation (m AOD)	Background Noise Data Used **	Building Status - Dwelling/ Derelict ***	Is this NSR also an NAL?
H1	509205	575221	317	3	Dwelling	Yes - NAL7
H2	509035	575259	298	3	Dwelling	Yes - NAL8
H3	508647	575524	288	3	Dwelling	Yes - NAL10
H4	509059	575212	299	3	Dwelling	Yes - NAL9
H5	506263	575547	152	3	Dwelling	No
H6	507766	574676	201	3	Dwelling	Yes - NAL11
H7	506736	575142	160	3	Dwelling	Yes - NAL13
H8	506715	575165	160	3	Dwelling	Yes - NAL14
H9	508019	579110	190	4	Dwelling	Yes - NAL2
H10	507755	574547	194	3	Dwelling	Yes - NAL12
H11	507052	574704	160	3	TBC Dwelling	No
H12	507071	574684	160	3	Dwelling	No
H13	507102	574638	160	3	Dwelling	No
H14	505296	577210	149	1	Dwelling	Yes - NAL1
H15	507133	574527	160	3	Dwelling	No
H16	511783	575938	240	4	Dwelling	Yes - NAL5
H17	511821	577236	252	4	Dwelling	Yes - NAL4
H18	511969	575990	236	4	Dwelling	No
H19	505008	577194	100	1	Dwelling	No
H20	507371	579636	117	4	Dwelling	No
H21	507893	574038	170	3	Dwelling	No
H22	507641	574033	161	3	Dwelling	No
H23	507917	574010	169	3	Dwelling	No
H24	512214	576090	230	4	TBC Planning App Submitted awaiting decision	No
H25	511684	577866	305	4	Dwelling	No
H26	508054	573940	176	3	Dwelling	No
H27	512260	576085	228	4	Dwelling	No
H28	508216	573948	188	3	Dwelling	No
H29	508271	573925	187	3	Dwelling	No
H30	507505	579870	80	4	TBC Dwelling	No
H31	504845	576697	98	1	Dwelling	No
H32	504921	576134	100	1	Dwelling	No
H33	504884	576358	100	1	Dwelling	No
H34	504709	577782	90	1	Derelict	No
H35	508415	573885	194	3	Dwelling	No
H36	508474	573861	195	3	Dwelling	No
H37	504898	575860	93	1	Dwelling	No
H38	508563	573838	202	3	Dwelling	No
H39	508621	573814	204	3	Dwelling	No
H40	504891	575641	99	1	Dwelling	No
H41	507807	573664	178	3	Dwelling	No
H42	507764	573658	179	3	Derelict	No
H43	504909	575568	106	1	Dwelling	No
H44	507779	573624	184	3	Dwelling	No

Table A7.1: Noise Sensitive Receptors

Noise Sensitive Receptor (H)	Easting (m)	Northing (m)	Elevation (m AOD)	Background Noise Data Used **	Building Status - Dwelling/ Derelict ***	Is this NSR also an NAL?
H45	508630	573750	194	3	Dwelling	No
H46	507901	573606	178	3	Dwelling	No
H47	504780	575744	87	1	Dwelling	No
H48	507791	573600	185	3	Dwelling	No
H49	507792	580159	90	4	Dwelling	No
H50	509523	573630	279	3	Dwelling	No
H51	509467	573628	276	3	Dwelling	No
H52	509625	573621	286	3	Dwelling	No
H53	507532	580204	80	4	Dwelling	No
H54	508783	573712	206	3	Dwelling	No
H55	507772	573537	190	3	Dwelling	No
H56	508852	573677	213	3	Dwelling	No
H57	507462	580221	80	4	Dwelling	No
H58	507868	573471	190	3	Dwelling	No
H59	509787	573565	285	3	Dwelling	No
H60	507880	573434	192	3	Dwelling	No
H61	512501	577569	262	4	Dwelling	No
H62	504851	575191	99	1	Dwelling	No
H63	504771	575321	85	1	Dwelling	No
H64	506921	580274	80	4	Dwelling	No
H65	504303	577900	90	1	Dwelling	No
H66	506953	580284	80	4	Dwelling	No
H67	508887	573522	193	3	Dwelling	No
H68	504909	574993	100	1	Dwelling	No
H69	504350	578173	90	1	Dwelling	No
H70	509508	573433	231	3	Dwelling	No
H71	512151	578207	344	4	Dwelling	No
H72	504855	575056	97	1	Dwelling	No
H73	512633	575387	236	4	Dwelling	Yes - NAL6
H74	504867	575038	99	1	Dwelling	No
H75	509416	573413	224	3	Dwelling	No
H76	504879	574975	96	1	TBC Dwelling	No
H77	504999	574804	99	1	Dwelling	No
H78	505069	574718	100	1	Dwelling	No
H79	509144	573407	207	3	Dwelling	No
H80	508386	580309	190	4	Dwelling	No
H81	505011	574775	99	1	Dwelling	No
H82	504640	575269	77	1	Dwelling	No
H83	504972	574755	96	1	Dwelling	No
H84	505010	574711	97	1	Dwelling	No
H85	505776	574112	167	1	Dwelling	No
H86	509285	573338	210	3	Dwelling	No
H87	504673	575100	81	1	Dwelling	No
H88	509075	573266	198	3	Dwelling	No
H89	504947	579499	150	4	Dwelling	No
H90	509868	573242	235	3	Dwelling	No

Table A7.1: Noise Sensitive Receptors

Noise Sensitive Receptor (H)	Easting (m)	Northing (m)	Elevation (m AOD)	Background Noise Data Used **	Building Status - Dwelling/ Derelict ***	Is this NSR also an NAL?
H91	507213	580582	80	4	Dwelling	No
H92	512879	575400	225	4	Dwelling	No
H93	504508	575183	70	1	Dwelling	No
H94	504137	578345	94	1	Dwelling	No
H95	509044	580262	190	4	Dwelling	No
H96	504466	575135	71	1	Dwelling	No
H97	510461	579590	212	4	Dwelling	Yes - NAL3
H98	507253	580683	80	4	Dwelling	No
H99	504921	574481	98	1	Dwelling	No
H100	505462	574037	140	1	Dwelling	No
H101	505553	573982	152	1	Dwelling	No
H102	505529	573991	149	1	Dwelling	No

* The assessment results for these receptors are included within Tables 6.4 and 6.5 of the main report.

** Shown on Figures A1.1 and A1.1a-b, Annex 1

*** Predictions have not been undertaken at buildings classified as derelict, and are marked as grey text

Table A7.2 Total WEDG 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**	**11**	**12**
H1	Total WEDG Noise Limit L_{A90}	45.0	45.0	45.0	45.0	45.0	45.0	45.0	45.0	45.0	45.0	48.1	53.0
	Predicted Cumulative Wind Turbine Noise L_{A90}	-	-	-	-	-	44.4	47.0	47.7	47.9	47.9	47.9	47.9
	Exceedance Level	-	-	-	-	-	-0.6	**2***	**2.7***	**2.9***	**2.9***	-0.2	-5.1
H2	Total WEDG Noise Limit L_{A90}	45.0	45.0	45.0	45.0	45.0	45.0	45.0	45.0	45.0	45.0	48.1	53.0
	Predicted Cumulative Wind Turbine Noise L_{A90}	-	-	-	-	-	43.2	45.7	46.4	46.6	46.6	46.6	46.6
	Exceedance Level	-	-	-	-	-	-1.8	**0.7***	**1.4***	**1.6***	**1.6***	-1.5	-6.4
H3	Total WEDG Noise Limit L_{A90}	45.0	45.0	45.0	45.0	45.0	45.0	45.0	45.0	45.0	45.0	48.1	53.0
	Predicted Cumulative Wind Turbine Noise L_{A90}	-	-	-	-	-	41.4	43.4	43.9	44.1	44.1	44.1	44.1
	Exceedance Level	-	-	-	-	-	-3.6	-1.6	-1.1	-0.9	-0.9	-4.0	-8.9
H4	Total WEDG Noise Limit L_{A90}	45.0	45.0	45.0	45.0	45.0	45.0	45.0	45.0	45.0	45.0	48.1	53.0
	Predicted Cumulative Wind Turbine Noise L_{A90}	-	-	-	-	-	43.1	45.6	46.3	46.5	46.5	46.5	46.5
	Exceedance Level	-	-	-	-	-	-1.9	**0.6***	**1.3***	**1.5***	**1.5***	-1.6	-6.5
H5	Total WEDG Noise Limit L_{A90}	40.0	40.0	40.0	40.0	40.0	45.0	45.0	45.0	45.0	45.0	48.1	53.0
	Predicted Cumulative Wind Turbine Noise L_{A90}	-	-	-	-	-	36.4	37.7	38.0	38.0	38.0	38.0	38.0
	Exceedance Level	-	-	-	-	-	-8.6	-7.3	-7.0	-7.0	-7.0	-10.1	-15.0
H6	Total WEDG Noise Limit L_{A90}	40.0	40.0	40.0	40.0	40.0	45.0	45.0	45.0	45.0	45.0	48.1	53.0
	Predicted Cumulative Wind Turbine Noise L_{A90}	-	-	-	-	-	37.9	40.0	40.7	40.9	40.9	40.9	40.9
	Exceedance Level	-	-	-	-	-	-7.1	-5.0	-4.3	-4.1	-4.1	-7.2	-12.1
H7	Total WEDG Noise Limit L_{A90}	40.0	40.0	40.0	40.0	40.0	45.0	45.0	45.0	45.0	45.0	48.1	53.0
	Predicted Cumulative Wind Turbine Noise L_{A90}	-	-	-	-	-	37.3	38.7	39.1	39.2	39.2	39.2	39.2
	Exceedance Level	-	-	-	-	-	-7.7	-6.3	-5.9	-5.8	-5.8	-8.9	-13.8
H8	Total WEDG Noise Limit L_{A90}	40.0	40.0	40.0	40.0	40.0	45.0	45.0	45.0	45.0	45.0	48.1	53.0
	Predicted Cumulative Wind Turbine Noise L_{A90}	-	-	-	-	-	37.3	38.8	39.1	39.2	39.2	39.2	39.2
	Exceedance Level	-	-	-	-	-	-7.7	-6.2	-5.9	-5.8	-5.8	-8.9	-13.8
H9	Total WEDG Noise Limit L_{A90}	40.0	40.0	40.0	40.0	40.0	45.0	45.0	45.0	45.0	45.0	47.0	50.8
	Predicted Cumulative Wind Turbine Noise L_{A90}	-	-	-	-	-	34.7	35.6	35.8	35.8	35.8	35.8	35.8
	Exceedance Level	-	-	-	-	-	-10.3	-9.4	-9.2	-9.2	-9.2	-11.2	-15.0

Location		Wind Speed (ms^{-1}) as standardised to 10 m height											
		1	2	3	4	5	6	7	8	9	10	11	12
H10	Total WEDG Noise Limit L_{A90}	40.0	40.0	40.0	40.0	40.0	45.0	45.0	45.0	45.0	45.0	48.1	53.0
	Predicted Cumulative Wind Turbine Noise L_{A90}	-	-	-	-	-	37.7	39.9	40.6	40.7	40.7	40.7	40.7
	Exceedance Level	-	-	-	-	-	-7.3	-5.1	-4.4	-4.3	-4.3	-7.4	-12.3
H11	Total WEDG Noise Limit L_{A90}	40.0	40.0	40.0	40.0	40.0	45.0	45.0	45.0	45.0	45.0	48.1	53.0
	Predicted Cumulative Wind Turbine Noise L_{A90}	-	-	-	-	-	36.9	38.6	39.1	39.2	39.2	39.2	39.2
	Exceedance Level	-	-	-	-	-	-8.1	-6.4	-5.9	-5.8	-5.8	-8.9	-13.8
H12	Total WEDG Noise Limit L_{A90}	40.0	40.0	40.0	40.0	40.0	45.0	45.0	45.0	45.0	45.0	48.1	53.0
	Predicted Cumulative Wind Turbine Noise L_{A90}	-	-	-	-	-	36.9	38.5	39.0	39.1	39.1	39.1	39.1
	Exceedance Level	-	-	-	-	-	-8.1	-6.5	-6.0	-5.9	-5.9	-9.0	-13.9
H13	Total WEDG Noise Limit L_{A90}	40.0	40.0	40.0	40.0	40.0	45.0	45.0	45.0	45.0	45.0	48.1	53.0
	Predicted Cumulative Wind Turbine Noise L_{A90}	-	-	-	-	-	37.0	38.7	39.2	39.3	39.3	39.3	39.3
	Exceedance Level	-	-	-	-	-	-8.0	-6.3	-5.8	-5.7	-5.7	-8.8	-13.7
H14	Total WEDG Noise Limit L_{A90}	40.0	40.0	40.0	40.0	40.0	45.0	45.0	45.0	45.0	45.4	48.5	51.9
	Predicted Cumulative Wind Turbine Noise L_{A90}	-	-	-	-	-	32.3	33.4	33.6	33.6	33.6	33.6	33.6
	Exceedance Level	-	-	-	-	-	-12.7	-11.6	-11.4	-11.4	-11.8	-14.9	-18.3
H15	Total WEDG Noise Limit L_{A90}	40.0	40.0	40.0	40.0	40.0	45.0	45.0	45.0	45.0	45.0	48.1	53.0
	Predicted Cumulative Wind Turbine Noise L_{A90}	-	-	-	-	-	37.0	38.7	39.3	39.4	39.4	39.4	39.4
	Exceedance Level	-	-	-	-	-	-8.0	-6.3	-5.7	-5.6	-5.6	-8.7	-13.6
H16	Total WEDG Noise Limit L_{A90}	40.0	40.0	40.0	40.0	40.0	45.0	45.0	45.0	45.0	45.0	47.0	50.8
	Predicted Cumulative Wind Turbine Noise L_{A90}	-	-	-	-	-	34.6	36.5	37.0	37.2	37.2	37.2	37.2
	Exceedance Level	-	-	-	-	-	-10.4	-8.5	-8.0	-7.8	-7.8	-9.8	-13.6
H17	Total WEDG Noise Limit L_{A90}	40.0	40.0	40.0	40.0	40.0	45.0	45.0	45.0	45.0	45.0	47.0	50.8
	Predicted Cumulative Wind Turbine Noise L_{A90}	-	-	-	-	-	33.1	34.5	34.8	34.8	34.8	34.8	34.8
	Exceedance Level	-	-	-	-	-	-11.9	-10.5	-10.2	-10.2	-10.2	-12.2	-16.0
H18	Total WEDG Noise Limit L_{A90}	40.0	40.0	40.0	40.0	40.0	45.0	45.0	45.0	45.0	45.0	47.0	50.8
	Predicted Cumulative Wind Turbine Noise L_{A90}	-	-	-	-	-	34.0	35.9	36.4	36.5	36.5	36.5	36.5
	Exceedance Level	-	-	-	-	-	-11.0	-9.1	-8.6	-8.5	-8.5	-10.5	-14.3

Location		Wind Speed (ms^{-1}) as standardised to 10 m height											
		1	2	3	4	5	6	7	8	9	10	11	12
H19	Total WEDG Noise Limit L_{A90}	40.0	40.0	40.0	40.0	40.0	45.0	45.0	45.0	45.0	45.4	48.5	51.9
	Predicted Cumulative Wind Turbine Noise L_{A90}	-	-	-	-	-	31.4	32.6	32.8	32.8	32.8	32.8	32.8
	Exceedance Level	-	-	-	-	-	-13.6	-12.4	-12.2	-12.2	-12.6	-15.7	-19.1
H20	Total WEDG Noise Limit L_{A90}	40.0	40.0	40.0	40.0	40.0	45.0	45.0	45.0	45.0	45.0	47.0	50.8
	Predicted Cumulative Wind Turbine Noise L_{A90}	-	-	-	-	-	31.5	32.5	32.7	32.7	32.7	32.7	32.7
	Exceedance Level	-	-	-	-	-	-13.5	-12.5	-12.3	-12.3	-12.3	-14.3	-18.1
H21	Total WEDG Noise Limit L_{A90}	40.0	40.0	40.0	40.0	40.0	45.0	45.0	45.0	45.0	45.0	48.1	53.0
	Predicted Cumulative Wind Turbine Noise L_{A90}	-	-	-	-	-	38.7	41.0	41.8	41.9	41.9	41.9	41.9
	Exceedance Level	-	-	-	-	-	-6.3	-4.0	-3.2	-3.1	-3.1	-6.2	-11.1
H22	Total WEDG Noise Limit L_{A90}	40.0	40.0	40.0	40.0	40.0	45.0	45.0	45.0	45.0	45.0	48.1	53.0
	Predicted Cumulative Wind Turbine Noise L_{A90}	-	-	-	-	-	37.9	40.1	40.9	41.0	41.0	41.0	41.0
	Exceedance Level	-	-	-	-	-	-7.1	-4.9	-4.1	-4.0	-4.0	-7.1	-12.0
H23	Total WEDG Noise Limit L_{A90}	40.0	40.0	40.0	40.0	40.0	45.0	45.0	45.0	45.0	45.0	48.1	53.0
	Predicted Cumulative Wind Turbine Noise L_{A90}	-	-	-	-	-	38.8	41.1	41.9	42.0	42.0	42.0	42.0
	Exceedance Level	-	-	-	-	-	-6.2	-3.9	-3.1	-3.0	-3.0	-6.1	-11.0
H24	Total WEDG Noise Limit L_{A90}	40.0	40.0	40.0	40.0	40.0	45.0	45.0	45.0	45.0	45.0	47.0	50.8
	Predicted Cumulative Wind Turbine Noise L_{A90}	-	-	-	-	-	33.2	35.0	35.5	35.6	35.6	35.6	35.6
	Exceedance Level	-	-	-	-	-	-11.8	-10.0	-9.5	-9.4	-9.4	-11.4	-15.2
H25	Total WEDG Noise Limit L_{A90}	40.0	40.0	40.0	40.0	40.0	45.0	45.0	45.0	45.0	45.0	47.0	50.8
	Predicted Cumulative Wind Turbine Noise L_{A90}	-	-	-	-	-	33.9	35.5	35.7	35.8	35.8	35.8	35.8
	Exceedance Level	-	-	-	-	-	-11.1	-9.5	-9.3	-9.2	-9.2	-11.2	-15.0
H26	Total WEDG Noise Limit L_{A90}	40.0	40.0	40.0	40.0	40.0	45.0	45.0	45.0	45.0	45.0	48.1	53.0
	Predicted Cumulative Wind Turbine Noise L_{A90}	-	-	-	-	-	39.3	41.6	42.4	42.5	42.6	42.6	42.6
	Exceedance Level	-	-	-	-	-	-5.7	-3.4	-2.6	-2.5	-2.4	-5.5	-10.4
H27	Total WEDG Noise Limit L_{A90}	40.0	40.0	40.0	40.0	40.0	45.0	45.0	45.0	45.0	45.0	47.0	50.8
	Predicted Cumulative Wind Turbine Noise L_{A90}	-	-	-	-	-	33.2	35.1	35.6	35.8	35.8	35.8	35.8
	Exceedance Level	-	-	-	-	-	-11.8	-9.9	-9.4	-9.2	-9.2	-11.2	-15.0

Location		Wind Speed (ms^{-1}) as standardised to 10 m height											
		1	2	3	4	5	6	7	8	9	10	11	12
H28	Total WEDG Noise Limit L_{A90}	40.0	40.0	40.0	40.0	40.0	45.0	45.0	45.0	45.0	45.0	48.1	53.0
	Predicted Cumulative Wind Turbine Noise L_{A90}	-	-	-	-	-	39.8	42.2	43.0	43.2	43.2	43.2	43.2
	Exceedance Level	-	-	-	-	-	-5.2	-2.8	-2.0	-1.8	-1.8	-4.9	-9.8
H29	Total WEDG Noise Limit L_{A90}	40.0	40.0	40.0	40.0	40.0	45.0	45.0	45.0	45.0	45.0	48.1	53.0
	Predicted Cumulative Wind Turbine Noise L_{A90}	-	-	-	-	-	39.6	42.0	42.8	42.9	43.0	43.0	43.0
	Exceedance Level	-	-	-	-	-	-5.4	-3.0	-2.2	-2.1	-2.0	-5.1	-10.0
H30	Total WEDG Noise Limit L_{A90}	40.0	40.0	40.0	40.0	40.0	45.0	45.0	45.0	45.0	45.0	47.0	50.8
	Predicted Cumulative Wind Turbine Noise L_{A90}	-	-	-	-	-	31.0	32.1	32.3	32.3	32.3	32.3	32.3
	Exceedance Level	-	-	-	-	-	-14.0	-12.9	-12.7	-12.7	-12.7	-14.7	-18.5
H31	Total WEDG Noise Limit L_{A90}	40.0	40.0	40.0	40.0	40.0	45.0	45.0	45.0	45.0	45.4	48.5	51.9
	Predicted Cumulative Wind Turbine Noise L_{A90}	-	-	-	-	-	31.5	32.7	33.0	33.0	33.0	33.0	33.0
	Exceedance Level	-	-	-	-	-	-13.5	-12.3	-12.0	-12.0	-12.4	-15.5	-18.9
H32	Total WEDG Noise Limit L_{A90}	40.0	40.0	40.0	40.0	40.0	45.0	45.0	45.0	45.0	45.4	48.5	51.9
	Predicted Cumulative Wind Turbine Noise L_{A90}	-	-	-	-	-	30.8	32.1	32.5	32.5	32.5	32.5	32.5
	Exceedance Level	-	-	-	-	-	-14.2	-12.9	-12.5	-12.5	-12.9	-16.0	-19.4
H33	Total WEDG Noise Limit L_{A90}	40.0	40.0	40.0	40.0	40.0	45.0	45.0	45.0	45.0	45.4	48.5	51.9
	Predicted Cumulative Wind Turbine Noise L_{A90}	-	-	-	-	-	31.1	32.4	32.8	32.9	32.9	32.9	32.9
	Exceedance Level	-	-	-	-	-	-13.9	-12.6	-12.2	-12.1	-12.5	-15.6	-19.0
H34	Total WEDG Noise Limit L_{A90}	-	-	-	-	-	-	-	-	-	-	-	-
	Predicted Cumulative Wind Turbine Noise L_{A90}	-	-	-	-	-	-	-	-	-	-	-	-
	Exceedance Level	-	-	-	-	-	-	-	-	-	-	-	-
H35	Total WEDG Noise Limit L_{A90}	40.0	40.0	40.0	40.0	40.0	45.0	45.0	45.0	45.0	45.0	48.1	53.0
	Predicted Cumulative Wind Turbine Noise L_{A90}	-	-	-	-	-	40.3	42.7	43.5	43.7	43.7	43.7	43.7
	Exceedance Level	-	-	-	-	-	-4.7	-2.3	-1.5	-1.3	-1.3	-4.4	-9.3
H36	Total WEDG Noise Limit L_{A90}	40.0	40.0	40.0	40.0	40.0	45.0	45.0	45.0	45.0	45.0	48.1	53.0
	Predicted Cumulative Wind Turbine Noise L_{A90}	-	-	-	-	-	40.3	42.8	43.5	43.7	43.7	43.7	43.7
	Exceedance Level	-	-	-	-	-	-4.7	-2.2	-1.5	-1.3	-1.3	-4.4	-9.3

Location		Wind Speed (ms^{-1}) as standardised to 10 m height											
		1	2	3	4	5	6	7	8	9	10	11	12
H37	Total WEDG Noise Limit L_{A90}	40.0	40.0	40.0	40.0	40.0	45.0	45.0	45.0	45.0	45.4	48.5	51.9
	Predicted Cumulative Wind Turbine Noise L_{A90}	-	-	-	-	-	31.4	32.8	33.2	33.2	33.2	33.2	33.2
	Exceedance Level	-	-	-	-	-	-13.6	-12.2	-11.8	-11.8	-12.2	-15.3	-18.7
H38	Total WEDG Noise Limit L_{A90}	40.0	40.0	40.0	40.0	40.0	45.0	45.0	45.0	45.0	45.0	48.1	53.0
	Predicted Cumulative Wind Turbine Noise L_{A90}	-	-	-	-	-	40.3	42.8	43.5	43.7	43.7	43.7	43.7
	Exceedance Level	-	-	-	-	-	-4.7	-2.2	-1.5	-1.3	-1.3	-4.4	-9.3
H39	Total WEDG Noise Limit L_{A90}	40.0	40.0	40.0	40.0	40.0	45.0	45.0	45.0	45.0	45.0	48.1	53.0
	Predicted Cumulative Wind Turbine Noise L_{A90}	-	-	-	-	-	40.3	42.8	43.5	43.7	43.7	43.7	43.7
	Exceedance Level	-	-	-	-	-	-4.7	-2.2	-1.5	-1.3	-1.3	-4.4	-9.3
H40	Total WEDG Noise Limit L_{A90}	40.0	40.0	40.0	40.0	40.0	45.0	45.0	45.0	45.0	45.4	48.5	51.9
	Predicted Cumulative Wind Turbine Noise L_{A90}	-	-	-	-	-	30.9	32.3	32.7	32.7	32.7	32.7	32.7
	Exceedance Level	-	-	-	-	-	-14.1	-12.7	-12.3	-12.3	-12.7	-15.8	-19.2
H41	Total WEDG Noise Limit L_{A90}	40.0	40.0	40.0	40.0	40.0	45.0	45.0	45.0	45.0	45.0	48.1	53.0
	Predicted Cumulative Wind Turbine Noise L_{A90}	-	-	-	-	-	39.6	41.8	42.6	42.8	42.8	42.8	42.8
	Exceedance Level	-	-	-	-	-	-5.4	-3.2	-2.4	-2.2	-2.2	-5.3	-10.2
H42	Total WEDG Noise Limit L_{A90}	-	-	-	-	-	-	-	-	-	-	-	-
	Predicted Cumulative Wind Turbine Noise L_{A90}	-	-	-	-	-	-	-	-	-	-	-	-
	Exceedance Level	-	-	-	-	-	-	-	-	-	-	-	-
H43	Total WEDG Noise Limit L_{A90}	40.0	40.0	40.0	40.0	40.0	45.0	45.0	45.0	45.0	45.4	48.5	51.9
	Predicted Cumulative Wind Turbine Noise L_{A90}	-	-	-	-	-	31.1	32.4	32.8	32.9	32.9	32.9	32.9
	Exceedance Level	-	-	-	-	-	-13.9	-12.6	-12.2	-12.1	-12.5	-15.6	-19.0
H44	Total WEDG Noise Limit L_{A90}	40.0	40.0	40.0	40.0	40.0	45.0	45.0	45.0	45.0	45.0	48.1	53.0
	Predicted Cumulative Wind Turbine Noise L_{A90}	-	-	-	-	-	39.6	41.9	42.7	42.8	42.8	42.8	42.8
	Exceedance Level	-	-	-	-	-	-5.4	-3.1	-2.3	-2.2	-2.2	-5.3	-10.2
H45	Total WEDG Noise Limit L_{A90}	40.0	40.0	40.0	40.0	40.0	45.0	45.0	45.0	45.0	45.0	48.1	53.0
	Predicted Cumulative Wind Turbine Noise L_{A90}	-	-	-	-	-	39.7	42.2	42.9	43.1	43.2	43.2	43.2
	Exceedance Level	-	-	-	-	-	-5.3	-2.8	-2.1	-1.9	-1.8	-4.9	-9.8

Location		Wind Speed (ms^{-1}) as standardised to 10 m height											
		1	2	3	4	5	6	7	8	9	10	11	12
H46	Total WEDG Noise Limit L_{A90}	40.0	40.0	40.0	40.0	40.0	45.0	45.0	45.0	45.0	45.0	48.1	53.0
	Predicted Cumulative Wind Turbine Noise L_{A90}	-	-	-	-	-	39.8	42.1	42.9	43.0	43.0	43.0	43.0
	Exceedance Level	-	-	-	-	-	-5.2	-2.9	-2.1	-2.0	-2.0	-5.1	-10.0
H47	Total WEDG Noise Limit L_{A90}	40.0	40.0	40.0	40.0	40.0	45.0	45.0	45.0	45.0	45.4	48.5	51.9
	Predicted Cumulative Wind Turbine Noise L_{A90}	-	-	-	-	-	31.1	32.4	32.8	32.8	32.8	32.8	32.8
	Exceedance Level	-	-	-	-	-	-13.9	-12.6	-12.2	-12.2	-12.6	-15.7	-19.1
H48	Total WEDG Noise Limit L_{A90}	40.0	40.0	40.0	40.0	40.0	45.0	45.0	45.0	45.0	45.0	48.1	53.0
	Predicted Cumulative Wind Turbine Noise L_{A90}	-	-	-	-	-	39.6	41.9	42.7	42.8	42.8	42.8	42.8
	Exceedance Level	-	-	-	-	-	-5.4	-3.1	-2.3	-2.2	-2.2	-5.3	-10.2
H49	Total WEDG Noise Limit L_{A90}	40.0	40.0	40.0	40.0	40.0	45.0	45.0	45.0	45.0	45.0	47.0	50.8
	Predicted Cumulative Wind Turbine Noise L_{A90}	-	-	-	-	-	30.1	31.2	31.4	31.5	31.5	31.5	31.5
	Exceedance Level	-	-	-	-	-	-14.9	-13.8	-13.6	-13.5	-13.5	-15.5	-19.3
H50	Total WEDG Noise Limit L_{A90}	40.0	40.0	40.0	40.0	40.0	45.0	45.0	45.0	45.0	45.0	48.1	53.0
	Predicted Cumulative Wind Turbine Noise L_{A90}	-	-	-	-	-	40.9	43.4	44.2	44.4	44.4	44.4	44.4
	Exceedance Level	-	-	-	-	-	-4.1	-1.6	-0.8	-0.6	-0.6	-3.7	-8.6
H51	Total WEDG Noise Limit L_{A90}	40.0	40.0	40.0	40.0	40.0	45.0	45.0	45.0	45.0	45.0	48.1	53.0
	Predicted Cumulative Wind Turbine Noise L_{A90}	-	-	-	-	-	40.5	43.1	43.8	44.0	44.0	44.0	44.0
	Exceedance Level	-	-	-	-	-	-4.5	-1.9	-1.2	-1.0	-1.0	-4.1	-9.0
H52	Total WEDG Noise Limit L_{A90}	40.0	40.0	40.0	40.0	40.0	45.0	45.0	45.0	45.0	45.0	48.1	53.0
	Predicted Cumulative Wind Turbine Noise L_{A90}	-	-	-	-	-	41.7	44.3	45.0	45.2	45.2	45.2	45.2
	Exceedance Level	-	-	-	-	-	-3.3	-0.7	0.0	0.2	0.2	-2.9	-7.8
H53	Total WEDG Noise Limit L_{A90}	40.0	40.0	40.0	40.0	40.0	45.0	45.0	45.0	45.0	45.0	47.0	50.8
	Predicted Cumulative Wind Turbine Noise L_{A90}	-	-	-	-	-	31.5	32.6	32.7	32.7	32.7	32.7	32.7
	Exceedance Level	-	-	-	-	-	-13.5	-12.4	-12.3	-12.3	-12.3	-14.3	-18.1
H54	Total WEDG Noise Limit L_{A90}	40.0	40.0	40.0	40.0	40.0	45.0	45.0	45.0	45.0	45.0	48.1	53.0
	Predicted Cumulative Wind Turbine Noise L_{A90}	-	-	-	-	-	39.5	42.0	42.7	42.9	42.9	42.9	42.9
	Exceedance Level	-	-	-	-	-	-5.5	-3.0	-2.3	-2.1	-2.1	-5.2	-10.1

Location		Wind Speed (ms^{-1}) as standardised to 10 m height											
		1	2	3	4	5	6	7	8	9	10	11	12
H55	Total WEDG Noise Limit L_{A90}	40.0	40.0	40.0	40.0	40.0	45.0	45.0	45.0	45.0	45.0	48.1	53.0
	Predicted Cumulative Wind Turbine Noise L_{A90}	-	-	-	-	-	39.9	42.1	42.9	43.0	43.0	43.0	43.0
	Exceedance Level	-	-	-	-	-	-5.1	-2.9	-2.1	-2.0	-2.0	-5.1	-10.0
H56	Total WEDG Noise Limit L_{A90}	40.0	40.0	40.0	40.0	40.0	45.0	45.0	45.0	45.0	45.0	48.1	53.0
	Predicted Cumulative Wind Turbine Noise L_{A90}	-	-	-	-	-	39.5	42.0	42.7	42.9	43.0	43.0	43.0
	Exceedance Level	-	-	-	-	-	-5.5	-3.0	-2.3	-2.1	-2.0	-5.1	-10.0
H57	Total WEDG Noise Limit L_{A90}	40.0	40.0	40.0	40.0	40.0	45.0	45.0	45.0	45.0	45.0	47.0	50.8
	Predicted Cumulative Wind Turbine Noise L_{A90}	-	-	-	-	-	30.8	31.8	32.0	32.0	32.0	32.0	32.0
	Exceedance Level	-	-	-	-	-	-14.2	-13.2	-13.0	-13.0	-13.0	-15.0	-18.8
H58	Total WEDG Noise Limit L_{A90}	40.0	40.0	40.0	40.0	40.0	45.0	45.0	45.0	45.0	45.0	48.1	53.0
	Predicted Cumulative Wind Turbine Noise L_{A90}	-	-	-	-	-	39.9	42.1	42.9	43.1	43.1	43.1	43.1
	Exceedance Level	-	-	-	-	-	-5.1	-2.9	-2.1	-1.9	-1.9	-5.0	-9.9
H59	Total WEDG Noise Limit L_{A90}	40.0	40.0	40.0	40.0	40.0	45.0	45.0	45.0	45.0	45.0	48.1	53.0
	Predicted Cumulative Wind Turbine Noise L_{A90}	-	-	-	-	-	42.5	45.1	45.9	46.1	46.1	46.1	46.1
	Exceedance Level	-	-	-	-	-	-2.5	0.1	0.9	1.1	1.1	-2.0	-6.9
H60	Total WEDG Noise Limit L_{A90}	40.0	40.0	40.0	40.0	40.0	45.0	45.0	45.0	45.0	45.0	48.1	53.0
	Predicted Cumulative Wind Turbine Noise L_{A90}	-	-	-	-	-	39.5	41.7	42.5	42.6	42.6	42.6	42.6
	Exceedance Level	-	-	-	-	-	-5.5	-3.3	-2.5	-2.4	-2.4	-5.5	-10.4
H61	Total WEDG Noise Limit L_{A90}	40.0	40.0	40.0	40.0	40.0	45.0	45.0	45.0	45.0	45.0	47.0	50.8
	Predicted Cumulative Wind Turbine Noise L_{A90}	-	-	-	-	-	35.2	36.7	36.8	36.8	36.8	36.8	36.8
	Exceedance Level	-	-	-	-	-	-9.8	-8.3	-8.2	-8.2	-8.2	-10.2	-14.0
H62	Total WEDG Noise Limit L_{A90}	40.0	40.0	40.0	40.0	40.0	45.0	45.0	45.0	45.0	45.4	48.5	51.9
	Predicted Cumulative Wind Turbine Noise L_{A90}	-	-	-	-	-	30.4	31.9	32.4	32.5	32.5	32.5	32.5
	Exceedance Level	-	-	-	-	-	-14.6	-13.1	-12.6	-12.5	-12.9	-16.0	-19.4
H63	Total WEDG Noise Limit L_{A90}	40.0	40.0	40.0	40.0	40.0	45.0	45.0	45.0	45.0	45.4	48.5	51.9
	Predicted Cumulative Wind Turbine Noise L_{A90}	-	-	-	-	-	30.3	31.8	32.3	32.3	32.3	32.3	32.3
	Exceedance Level	-	-	-	-	-	-14.7	-13.2	-12.7	-12.7	-13.1	-16.2	-19.6

Location		Wind Speed (ms^{-1}) as standardised to 10 m height											
		1	2	3	4	5	6	7	8	9	10	11	12
H64	Total WEDG Noise Limit L_{A90}	40.0	40.0	40.0	40.0	40.0	45.0	45.0	45.0	45.0	45.0	47.0	50.8
	Predicted Cumulative Wind Turbine Noise L_{A90}	-	-	-	-	-	29.6	30.7	30.9	30.9	30.9	30.9	30.9
	Exceedance Level	-	-	-	-	-	-15.4	-14.3	-14.1	-14.1	-14.1	-16.1	-19.9
H65	Total WEDG Noise Limit L_{A90}	40.0	40.0	40.0	40.0	40.0	45.0	45.0	45.0	45.0	45.4	48.5	51.9
	Predicted Cumulative Wind Turbine Noise L_{A90}	-	-	-	-	-	29.5	30.7	31.0	31.1	31.1	31.1	31.1
	Exceedance Level	-	-	-	-	-	-15.5	-14.3	-14.0	-13.9	-14.3	-17.4	-20.8
H66	Total WEDG Noise Limit L_{A90}	40.0	40.0	40.0	40.0	40.0	45.0	45.0	45.0	45.0	45.0	47.0	50.8
	Predicted Cumulative Wind Turbine Noise L_{A90}	-	-	-	-	-	29.6	30.7	30.9	30.9	30.9	30.9	30.9
	Exceedance Level	-	-	-	-	-	-15.4	-14.3	-14.1	-14.1	-14.1	-16.1	-19.9
H67	Total WEDG Noise Limit L_{A90}	40.0	40.0	40.0	40.0	40.0	45.0	45.0	45.0	45.0	45.0	48.1	53.0
	Predicted Cumulative Wind Turbine Noise L_{A90}	-	-	-	-	-	38.7	41.1	41.9	42.1	42.1	42.1	42.1
	Exceedance Level	-	-	-	-	-	-6.3	-3.9	-3.1	-2.9	-2.9	-6.0	-10.9
H68	Total WEDG Noise Limit L_{A90}	40.0	40.0	40.0	40.0	40.0	45.0	45.0	45.0	45.0	45.4	48.5	51.9
	Predicted Cumulative Wind Turbine Noise L_{A90}	-	-	-	-	-	31.3	32.9	33.5	33.6	33.6	33.6	33.6
	Exceedance Level	-	-	-	-	-	-13.7	-12.1	-11.5	-11.4	-11.8	-14.9	-18.3
H69	Total WEDG Noise Limit L_{A90}	40.0	40.0	40.0	40.0	40.0	45.0	45.0	45.0	45.0	45.4	48.5	51.9
	Predicted Cumulative Wind Turbine Noise L_{A90}	-	-	-	-	-	29.4	30.6	30.9	30.9	30.9	30.9	30.9
	Exceedance Level	-	-	-	-	-	-15.6	-14.4	-14.1	-14.1	-14.5	-17.6	-21.0
H70	Total WEDG Noise Limit L_{A90}	40.0	40.0	40.0	40.0	40.0	45.0	45.0	45.0	45.0	45.0	48.1	53.0
	Predicted Cumulative Wind Turbine Noise L_{A90}	-	-	-	-	-	39.5	42.0	42.8	43.0	43.0	43.0	43.0
	Exceedance Level	-	-	-	-	-	-5.5	-3.0	-2.2	-2.0	-2.0	-5.1	-10.0
H71	Total WEDG Noise Limit L_{A90}	40.0	40.0	40.0	40.0	40.0	45.0	45.0	45.0	45.0	45.0	47.0	50.8
	Predicted Cumulative Wind Turbine Noise L_{A90}	-	-	-	-	-	38.3	39.9	40.0	40.0	40.0	40.0	40.0
	Exceedance Level	-	-	-	-	-	-6.7	-5.1	-5.0	-5.0	-5.0	-7.0	-10.8
H72	Total WEDG Noise Limit L_{A90}	40.0	40.0	40.0	40.0	40.0	45.0	45.0	45.0	45.0	45.4	48.5	51.9
	Predicted Cumulative Wind Turbine Noise L_{A90}	-	-	-	-	-	31.2	32.8	33.4	33.4	33.4	33.4	33.4
	Exceedance Level	-	-	-	-	-	-13.8	-12.2	-11.6	-11.6	-12.0	-15.1	-18.5

Location		Wind Speed (ms^{-1}) as standardised to 10 m height											
		1	2	3	4	5	6	7	8	9	10	11	12
H73	Total WEDG Noise Limit L_{A90}	40.0	40.0	40.0	40.0	40.0	45.0	45.0	45.0	45.0	45.0	47.0	50.8
	Predicted Cumulative Wind Turbine Noise L_{A90}	-	-	-	-	-	33.0	35.0	35.5	35.6	35.6	35.6	35.6
	Exceedance Level	-	-	-	-	-	-12.0	-10.0	-9.5	-9.4	-9.4	-11.4	-15.2
H74	Total WEDG Noise Limit L_{A90}	40.0	40.0	40.0	40.0	40.0	45.0	45.0	45.0	45.0	45.4	48.5	51.9
	Predicted Cumulative Wind Turbine Noise L_{A90}	-	-	-	-	-	31.2	32.8	33.4	33.5	33.5	33.5	33.5
	Exceedance Level	-	-	-	-	-	-13.8	-12.2	-11.6	-11.5	-11.9	-15.0	-18.4
H75	Total WEDG Noise Limit L_{A90}	40.0	40.0	40.0	40.0	40.0	45.0	45.0	45.0	45.0	45.0	48.1	53.0
	Predicted Cumulative Wind Turbine Noise L_{A90}	-	-	-	-	-	39.1	41.6	42.3	42.6	42.6	42.6	42.6
	Exceedance Level	-	-	-	-	-	-5.9	-3.4	-2.7	-2.4	-2.4	-5.5	-10.4
H76	Total WEDG Noise Limit L_{A90}	40.0	40.0	40.0	40.0	40.0	45.0	45.0	45.0	45.0	45.4	48.5	51.9
	Predicted Cumulative Wind Turbine Noise L_{A90}	-	-	-	-	-	31.4	32.9	33.5	33.5	33.5	33.5	33.5
	Exceedance Level	-	-	-	-	-	-13.6	-12.1	-11.5	-11.5	-11.9	-15.0	-18.4
H77	Total WEDG Noise Limit L_{A90}	40.0	40.0	40.0	40.0	40.0	45.0	45.0	45.0	45.0	45.4	48.5	51.9
	Predicted Cumulative Wind Turbine Noise L_{A90}	-	-	-	-	-	31.9	33.4	34.0	34.0	34.0	34.0	34.0
	Exceedance Level	-	-	-	-	-	-13.1	-11.6	-11.0	-11.0	-11.4	-14.5	-17.9
H78	Total WEDG Noise Limit L_{A90}	40.0	40.0	40.0	40.0	40.0	45.0	45.0	45.0	45.0	45.4	48.5	51.9
	Predicted Cumulative Wind Turbine Noise L_{A90}	-	-	-	-	-	31.9	33.5	34.0	34.1	34.1	34.1	34.1
	Exceedance Level	-	-	-	-	-	-13.1	-11.5	-11.0	-10.9	-11.3	-14.4	-17.8
H79	Total WEDG Noise Limit L_{A90}	40.0	40.0	40.0	40.0	40.0	45.0	45.0	45.0	45.0	45.0	48.1	53.0
	Predicted Cumulative Wind Turbine Noise L_{A90}	-	-	-	-	-	38.4	40.9	41.6	41.8	41.8	41.8	41.8
	Exceedance Level	-	-	-	-	-	-6.6	-4.1	-3.4	-3.2	-3.2	-6.3	-11.2
H80	Total WEDG Noise Limit L_{A90}	40.0	40.0	40.0	40.0	40.0	45.0	45.0	45.0	45.0	45.0	47.0	50.8
	Predicted Cumulative Wind Turbine Noise L_{A90}	-	-	-	-	-	31.8	32.9	33.0	33.1	33.1	33.1	33.1
	Exceedance Level	-	-	-	-	-	-13.2	-12.1	-12.0	-11.9	-11.9	-13.9	-17.7
H81	Total WEDG Noise Limit L_{A90}	40.0	40.0	40.0	40.0	40.0	45.0	45.0	45.0	45.0	45.4	48.5	51.9
	Predicted Cumulative Wind Turbine Noise L_{A90}	-	-	-	-	-	31.8	33.4	34.0	34.0	34.0	34.0	34.0
	Exceedance Level	-	-	-	-	-	-13.2	-11.6	-11.0	-11.0	-11.4	-14.5	-17.9

Location		Wind Speed (ms^{-1}) as standardised to 10 m height											
		1	2	3	4	5	6	7	8	9	10	11	12
H82	Total WEDG Noise Limit L_{A90}	40.0	40.0	40.0	40.0	40.0	45.0	45.0	45.0	45.0	45.4	48.5	51.9
	Predicted Cumulative Wind Turbine Noise L_{A90}	-	-	-	-	-	31.0	32.5	33.0	33.1	33.1	33.1	33.1
	Exceedance Level	-	-	-	-	-	-14.0	-12.5	-12.0	-11.9	-12.3	-15.4	-18.8
H83	Total WEDG Noise Limit L_{A90}	40.0	40.0	40.0	40.0	40.0	45.0	45.0	45.0	45.0	45.4	48.5	51.9
	Predicted Cumulative Wind Turbine Noise L_{A90}	-	-	-	-	-	31.9	33.4	34.0	34.1	34.1	34.1	34.1
	Exceedance Level	-	-	-	-	-	-13.1	-11.6	-11.0	-10.9	-11.3	-14.4	-17.8
H84	Total WEDG Noise Limit L_{A90}	40.0	40.0	40.0	40.0	40.0	45.0	45.0	45.0	45.0	45.4	48.5	51.9
	Predicted Cumulative Wind Turbine Noise L_{A90}	-	-	-	-	-	31.8	33.4	34.0	34.0	34.0	34.0	34.0
	Exceedance Level	-	-	-	-	-	-13.2	-11.6	-11.0	-11.0	-11.4	-14.5	-17.9
H85	Total WEDG Noise Limit L_{A90}	40.0	40.0	40.0	40.0	40.0	45.0	45.0	45.0	45.0	45.4	48.5	51.9
	Predicted Cumulative Wind Turbine Noise L_{A90}	-	-	-	-	-	32.7	34.4	35.1	35.1	35.1	35.1	35.1
	Exceedance Level	-	-	-	-	-	-12.3	-10.6	-9.9	-9.9	-10.3	-13.4	-16.8
H86	Total WEDG Noise Limit L_{A90}	40.0	40.0	40.0	40.0	40.0	45.0	45.0	45.0	45.0	45.0	48.1	53.0
	Predicted Cumulative Wind Turbine Noise L_{A90}	-	-	-	-	-	38.5	40.9	41.7	41.9	41.9	41.9	41.9
	Exceedance Level	-	-	-	-	-	-6.5	-4.1	-3.3	-3.1	-3.1	-6.2	-11.1
H87	Total WEDG Noise Limit L_{A90}	40.0	40.0	40.0	40.0	40.0	45.0	45.0	45.0	45.0	45.4	48.5	51.9
	Predicted Cumulative Wind Turbine Noise L_{A90}	-	-	-	-	-	30.9	32.4	33.0	33.0	33.0	33.0	33.0
	Exceedance Level	-	-	-	-	-	-14.1	-12.6	-12.0	-12.0	-12.4	-15.5	-18.9
H88	Total WEDG Noise Limit L_{A90}	40.0	40.0	40.0	40.0	40.0	45.0	45.0	45.0	45.0	45.0	48.1	53.0
	Predicted Cumulative Wind Turbine Noise L_{A90}	-	-	-	-	-	38.7	40.9	41.6	41.7	41.8	41.8	41.8
	Exceedance Level	-	-	-	-	-	-6.3	-4.1	-3.4	-3.3	-3.2	-6.3	-11.2
H89	Total WEDG Noise Limit L_{A90}	40.0	40.0	40.0	40.0	40.0	45.0	45.0	45.0	45.0	45.0	47.0	50.8
	Predicted Cumulative Wind Turbine Noise L_{A90}	-	-	-	-	-	30.0	31.1	31.2	31.3	31.3	31.3	31.3
	Exceedance Level	-	-	-	-	-	-15.0	-13.9	-13.8	-13.7	-13.7	-15.7	-19.5
H90	Total WEDG Noise Limit L_{A90}	40.0	40.0	40.0	40.0	40.0	45.0	45.0	45.0	45.0	45.0	48.1	53.0
	Predicted Cumulative Wind Turbine Noise L_{A90}	-	-	-	-	-	40.1	42.7	43.4	43.6	43.7	43.7	43.7
	Exceedance Level	-	-	-	-	-	-4.9	-2.3	-1.6	-1.4	-1.3	-4.4	-9.3

Location		Wind Speed (ms^{-1}) as standardised to 10 m height											
		1	2	3	4	5	6	7	8	9	10	11	12
H91	Total WEDG Noise Limit L_{A90}	40.0	40.0	40.0	40.0	40.0	45.0	45.0	45.0	45.0	45.0	47.0	50.8
	Predicted Cumulative Wind Turbine Noise L_{A90}	-	-	-	-	-	30.6	31.6	31.8	31.8	31.8	31.8	31.8
	Exceedance Level	-	-	-	-	-	-14.4	-13.4	-13.2	-13.2	-13.2	-15.2	-19.0
H92	Total WEDG Noise Limit L_{A90}	40.0	40.0	40.0	40.0	40.0	45.0	45.0	45.0	45.0	45.0	47.0	50.8
	Predicted Cumulative Wind Turbine Noise L_{A90}	-	-	-	-	-	32.3	34.3	34.8	34.9	35.0	35.0	35.0
	Exceedance Level	-	-	-	-	-	-12.7	-10.7	-10.2	-10.1	-10.0	-12.0	-15.8
H93	Total WEDG Noise Limit L_{A90}	40.0	40.0	40.0	40.0	40.0	45.0	45.0	45.0	45.0	45.4	48.5	51.9
	Predicted Cumulative Wind Turbine Noise L_{A90}	-	-	-	-	-	30.8	32.3	32.8	32.9	32.9	32.9	32.9
	Exceedance Level	-	-	-	-	-	-14.2	-12.7	-12.2	-12.1	-12.5	-15.6	-19.0
H94	Total WEDG Noise Limit L_{A90}	40.0	40.0	40.0	40.0	40.0	45.0	45.0	45.0	45.0	45.4	48.5	51.9
	Predicted Cumulative Wind Turbine Noise L_{A90}	-	-	-	-	-	28.7	29.8	30.1	30.1	30.1	30.1	30.1
	Exceedance Level	-	-	-	-	-	-16.3	-15.2	-14.9	-14.9	-15.3	-18.4	-21.8
H95	Total WEDG Noise Limit L_{A90}	40.0	40.0	40.0	40.0	40.0	45.0	45.0	45.0	45.0	45.0	47.0	50.8
	Predicted Cumulative Wind Turbine Noise L_{A90}	-	-	-	-	-	30.5	31.7	31.9	31.9	31.9	31.9	31.9
	Exceedance Level	-	-	-	-	-	-14.5	-13.3	-13.1	-13.1	-13.1	-15.1	-18.9
H96	Total WEDG Noise Limit L_{A90}	40.0	40.0	40.0	40.0	40.0	45.0	45.0	45.0	45.0	45.4	48.5	51.9
	Predicted Cumulative Wind Turbine Noise L_{A90}	-	-	-	-	-	30.8	32.3	32.8	32.9	32.9	32.9	32.9
	Exceedance Level	-	-	-	-	-	-14.2	-12.7	-12.2	-12.1	-12.5	-15.6	-19.0
H97	Total WEDG Noise Limit L_{A90}	40.0	40.0	40.0	40.0	40.0	45.0	45.0	45.0	45.0	45.0	47.0	50.8
	Predicted Cumulative Wind Turbine Noise L_{A90}	-	-	-	-	-	31.3	32.6	32.8	32.9	32.9	32.9	32.9
	Exceedance Level	-	-	-	-	-	-13.7	-12.4	-12.2	-12.1	-12.1	-14.1	-17.9
H98	Total WEDG Noise Limit L_{A90}	40.0	40.0	40.0	40.0	40.0	45.0	45.0	45.0	45.0	45.0	47.0	50.8
	Predicted Cumulative Wind Turbine Noise L_{A90}	-	-	-	-	-	30.4	31.4	31.6	31.6	31.6	31.6	31.6
	Exceedance Level	-	-	-	-	-	-14.6	-13.6	-13.4	-13.4	-13.4	-15.4	-19.2
H99	Total WEDG Noise Limit L_{A90}	40.0	40.0	40.0	40.0	40.0	45.0	45.0	45.0	45.0	45.4	48.5	51.9
	Predicted Cumulative Wind Turbine Noise L_{A90}	-	-	-	-	-	32.3	33.9	34.4	34.5	34.5	34.5	34.5
	Exceedance Level	-	-	-	-	-	-12.7	-11.1	-10.6	-10.5	-10.9	-14.0	-17.4

Location		Wind Speed (ms^{-1}) as standardised to 10 m height											
		1	2	3	4	5	6	7	8	9	10	11	12
H100	Total WEDG Noise Limit L_{A90}	40.0	40.0	40.0	40.0	40.0	45.0	45.0	45.0	45.0	45.4	48.5	51.9
	Predicted Cumulative Wind Turbine Noise L_{A90}	-	-	-	-	-	33.0	34.7	35.3	35.4	35.4	35.4	35.4
	Exceedance Level	-	-	-	-	-	-12.0	-10.3	-9.7	-9.6	-10.0	-13.1	-16.5
H101	Total WEDG Noise Limit L_{A90}	40.0	40.0	40.0	40.0	40.0	45.0	45.0	45.0	45.0	45.4	48.5	51.9
	Predicted Cumulative Wind Turbine Noise L_{A90}	-	-	-	-	-	33.2	34.9	35.5	35.6	35.6	35.6	35.6
	Exceedance Level	-	-	-	-	-	-11.8	-10.1	-9.5	-9.4	-9.8	-12.9	-16.3
H102	Total WEDG Noise Limit L_{A90}	40.0	40.0	40.0	40.0	40.0	45.0	45.0	45.0	45.0	45.4	48.5	51.9
	Predicted Cumulative Wind Turbine Noise L_{A90}	-	-	-	-	-	33.1	34.8	35.5	35.5	35.5	35.5	35.5
	Exceedance Level	-	-	-	-	-	-11.9	-10.2	-9.5	-9.5	-9.9	-13.0	-16.4

*cumulative noise exceeds the noise limits but this is due to the contribution of the existing wind farms in the area as detailed in the section above. At these wind speeds predicted noise from the Proposed Development will be at least 10 dB below the Total WEDG Noise Limits and will therefore have a negligible additional contribution. To ensure noise from the Proposed Development is at least 10 dB below certain turbines will need to be operated in low noise mode for certain wind speeds and wind directions.

Table A7.3 Total WEDG 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**	**11**	**12**
H1	Total WEDG Noise Limit L_{A90}	45.0	45.0	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 L_{A90}	-	-	-	-	-	44.4	47.0	47.7	47.9	47.9	47.9	47.9
	Exceedance Level	-	-	-	-	-	-0.6	**2***	**2.7***	**2.9***	**2.9***	**2.9***	**2.9***
H2	Total WEDG Noise Limit L_{A90}	45.0	45.0	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 L_{A90}	-	-	-	-	-	43.2	45.7	46.4	46.6	46.6	46.6	46.6
	Exceedance Level	-	-	-	-	-	-1.8	**0.7***	**1.4***	**1.6***	**1.6***	**1.6***	**1.6***
H3	Total WEDG Noise Limit L_{A90}	45.0	45.0	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 L_{A90}	-	-	-	-	-	41.4	43.4	43.9	44.1	44.1	44.1	44.1
	Exceedance Level	-	-	-	-	-	-3.6	-1.6	-1.1	-0.9	-0.9	-0.9	-0.9
H4	Total WEDG Noise Limit L_{A90}	45.0	45.0	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 L_{A90}	-	-	-	-	-	43.1	45.6	46.3	46.5	46.5	46.5	46.5
	Exceedance Level	-	-	-	-	-	-1.9	**0.6***	**1.3***	**1.5***	**1.5***	**1.5***	**1.5***
H5	Total WEDG Noise Limit L_{A90}	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.9	43.9	43.9
	Predicted Cumulative Wind Turbine Noise L_{A90}	-	-	-	-	-	36.4	37.7	38.0	38.0	38.0	38.0	38.0
	Exceedance Level	-	-	-	-	-	-6.6	-5.3	-5.0	-5.0	-5.9	-5.9	-5.9
H6	Total WEDG Noise Limit L_{A90}	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.9	43.9	43.9
	Predicted Cumulative Wind Turbine Noise L_{A90}	-	-	-	-	-	37.9	40.0	40.7	40.9	40.9	40.9	40.9
	Exceedance Level	-	-	-	-	-	-5.1	-3.0	-2.3	-2.1	-3.0	-3.0	-3.0
H7	Total WEDG Noise Limit L_{A90}	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.9	43.9	43.9
	Predicted Cumulative Wind Turbine Noise L_{A90}	-	-	-	-	-	37.3	38.7	39.1	39.2	39.2	39.2	39.2
	Exceedance Level	-	-	-	-	-	-5.7	-4.3	-3.9	-3.8	-4.7	-4.7	-4.7
H8	Total WEDG Noise Limit L_{A90}	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.9	43.9	43.9
	Predicted Cumulative Wind Turbine Noise L_{A90}	-	-	-	-	-	37.3	38.8	39.1	39.2	39.2	39.2	39.2
	Exceedance Level	-	-	-	-	-	-5.7	-4.2	-3.9	-3.8	-4.7	-4.7	-4.7
H9	Total WEDG Noise Limit L_{A90}	43.0	43.0	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}	-	-	-	-	-	34.7	35.6	35.8	35.8	35.8	35.8	35.8
	Exceedance Level	-	-	-	-	-	-8.3	-7.4	-7.2	-7.2	-7.2	-7.2	-7.2

Location		Wind Speed (ms^{-1}) as standardised to 10 m height											
		1	2	3	4	5	6	7	8	9	10	11	12
H10	Total WEDG Noise Limit L_{A90}	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.9	43.9	43.9
	Predicted Cumulative Wind Turbine Noise L_{A90}	-	-	-	-	-	37.7	39.9	40.6	40.7	40.7	40.7	40.7
	Exceedance Level	-	-	-	-	-	-5.3	-3.1	-2.4	-2.3	-3.2	-3.2	-3.2
H11	Total WEDG Noise Limit L_{A90}	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.9	43.9	43.9
	Predicted Cumulative Wind Turbine Noise L_{A90}	-	-	-	-	-	36.9	38.6	39.1	39.2	39.2	39.2	39.2
	Exceedance Level	-	-	-	-	-	-6.1	-4.4	-3.9	-3.8	-4.7	-4.7	-4.7
H12	Total WEDG Noise Limit L_{A90}	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.9	43.9	43.9
	Predicted Cumulative Wind Turbine Noise L_{A90}	-	-	-	-	-	36.9	38.5	39.0	39.1	39.1	39.1	39.1
	Exceedance Level	-	-	-	-	-	-6.1	-4.5	-4.0	-3.9	-4.8	-4.8	-4.8
H13	Total WEDG Noise Limit L_{A90}	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.9	43.9	43.9
	Predicted Cumulative Wind Turbine Noise L_{A90}	-	-	-	-	-	37.0	38.7	39.2	39.3	39.3	39.3	39.3
	Exceedance Level	-	-	-	-	-	-6.0	-4.3	-3.8	-3.7	-4.6	-4.6	-4.6
H14	Total WEDG Noise Limit L_{A90}	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	44.1	44.1	44.1
	Predicted Cumulative Wind Turbine Noise L_{A90}	-	-	-	-	-	32.3	33.4	33.6	33.6	33.6	33.6	33.6
	Exceedance Level	-	-	-	-	-	-10.7	-9.6	-9.4	-9.4	-10.5	-10.5	-10.5
H15	Total WEDG Noise Limit L_{A90}	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.9	43.9	43.9
	Predicted Cumulative Wind Turbine Noise L_{A90}	-	-	-	-	-	37.0	38.7	39.3	39.4	39.4	39.4	39.4
	Exceedance Level	-	-	-	-	-	-6.0	-4.3	-3.7	-3.6	-4.5	-4.5	-4.5
H16	Total WEDG Noise Limit L_{A90}	43.0	43.0	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}	-	-	-	-	-	34.6	36.5	37.0	37.2	37.2	37.2	37.2
	Exceedance Level	-	-	-	-	-	-8.4	-6.5	-6.0	-5.8	-5.8	-5.8	-5.8
H17	Total WEDG Noise Limit L_{A90}	43.0	43.0	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	34.5	34.8	34.8	34.8	34.8	34.8
	Exceedance Level	-	-	-	-	-	-9.9	-8.5	-8.2	-8.2	-8.2	-8.2	-8.2
H18	Total WEDG Noise Limit L_{A90}	43.0	43.0	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}	-	-	-	-	-	34.0	35.9	36.4	36.5	36.5	36.5	36.5
	Exceedance Level	-	-	-	-	-	-9.0	-7.1	-6.6	-6.5	-6.5	-6.5	-6.5

Location		Wind Speed (ms^{-1}) as standardised to 10 m height											
		1	2	3	4	5	6	7	8	9	10	11	12
H19	Total WEDG Noise Limit L_{A90}	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	44.1	44.1	44.1
	Predicted Cumulative Wind Turbine Noise L_{A90}	-	-	-	-	-	31.4	32.6	32.8	32.8	32.8	32.8	32.8
	Exceedance Level	-	-	-	-	-	-11.6	-10.4	-10.2	-10.2	-11.3	-11.3	-11.3
H20	Total WEDG Noise Limit L_{A90}	43.0	43.0	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}	-	-	-	-	-	31.5	32.5	32.7	32.7	32.7	32.7	32.7
	Exceedance Level	-	-	-	-	-	-11.5	-10.5	-10.3	-10.3	-10.3	-10.3	-10.3
H21	Total WEDG Noise Limit L_{A90}	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.9	43.9	43.9
	Predicted Cumulative Wind Turbine Noise L_{A90}	-	-	-	-	-	38.7	41.0	41.8	41.9	41.9	41.9	41.9
	Exceedance Level	-	-	-	-	-	-4.3	-2.0	-1.2	-1.1	-2.0	-2.0	-2.0
H22	Total WEDG Noise Limit L_{A90}	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.9	43.9	43.9
	Predicted Cumulative Wind Turbine Noise L_{A90}	-	-	-	-	-	37.9	40.1	40.9	41.0	41.0	41.0	41.0
	Exceedance Level	-	-	-	-	-	-5.1	-2.9	-2.1	-2.0	-2.9	-2.9	-2.9
H23	Total WEDG Noise Limit L_{A90}	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.9	43.9	43.9
	Predicted Cumulative Wind Turbine Noise L_{A90}	-	-	-	-	-	38.8	41.1	41.9	42.0	42.0	42.0	42.0
	Exceedance Level	-	-	-	-	-	-4.2	-1.9	-1.1	-1.0	-1.9	-1.9	-1.9
H24	Total WEDG Noise Limit L_{A90}	43.0	43.0	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	35.0	35.5	35.6	35.6	35.6	35.6
	Exceedance Level	-	-	-	-	-	-9.8	-8.0	-7.5	-7.4	-7.4	-7.4	-7.4
H25	Total WEDG Noise Limit L_{A90}	43.0	43.0	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	35.5	35.7	35.8	35.8	35.8	35.8
	Exceedance Level	-	-	-	-	-	-9.1	-7.5	-7.3	-7.2	-7.2	-7.2	-7.2
H26	Total WEDG Noise Limit L_{A90}	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.9	43.9	43.9
	Predicted Cumulative Wind Turbine Noise L_{A90}	-	-	-	-	-	39.3	41.6	42.4	42.5	42.6	42.6	42.6
	Exceedance Level	-	-	-	-	-	-3.7	-1.4	-0.6	-0.5	-1.3	-1.3	-1.3
H27	Total WEDG Noise Limit L_{A90}	43.0	43.0	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	35.1	35.6	35.8	35.8	35.8	35.8
	Exceedance Level	-	-	-	-	-	-9.8	-7.9	-7.4	-7.2	-7.2	-7.2	-7.2

Location		Wind Speed (ms^{-1}) as standardised to 10 m height											
		1	2	3	4	5	6	7	8	9	10	11	12
H28	Total WEDG Noise Limit L_{A90}	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.9	43.9	43.9
	Predicted Cumulative Wind Turbine Noise L_{A90}	-	-	-	-	-	39.8	42.2	43.0	43.2	43.2	43.2	43.2
	Exceedance Level	-	-	-	-	-	-3.2	-0.8	0.0	0.2	-0.7	-0.7	-0.7
H29	Total WEDG Noise Limit L_{A90}	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.9	43.9	43.9
	Predicted Cumulative Wind Turbine Noise L_{A90}	-	-	-	-	-	39.6	42.0	42.8	42.9	43.0	43.0	43.0
	Exceedance Level	-	-	-	-	-	-3.4	-1.0	-0.2	-0.1	-0.9	-0.9	-0.9
H30	Total WEDG Noise Limit L_{A90}	43.0	43.0	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}	-	-	-	-	-	31.0	32.1	32.3	32.3	32.3	32.3	32.3
	Exceedance Level	-	-	-	-	-	-12.0	-10.9	-10.7	-10.7	-10.7	-10.7	-10.7
H31	Total WEDG Noise Limit L_{A90}	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	44.1	44.1	44.1
	Predicted Cumulative Wind Turbine Noise L_{A90}	-	-	-	-	-	31.5	32.7	33.0	33.0	33.0	33.0	33.0
	Exceedance Level	-	-	-	-	-	-11.5	-10.3	-10.0	-10.0	-11.1	-11.1	-11.1
H32	Total WEDG Noise Limit L_{A90}	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	44.1	44.1	44.1
	Predicted Cumulative Wind Turbine Noise L_{A90}	-	-	-	-	-	30.8	32.1	32.5	32.5	32.5	32.5	32.5
	Exceedance Level	-	-	-	-	-	-12.2	-10.9	-10.5	-10.5	-11.6	-11.6	-11.6
H33	Total WEDG Noise Limit L_{A90}	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	44.1	44.1	44.1
	Predicted Cumulative Wind Turbine Noise L_{A90}	-	-	-	-	-	31.1	32.4	32.8	32.9	32.9	32.9	32.9
	Exceedance Level	-	-	-	-	-	-11.9	-10.6	-10.2	-10.1	-11.2	-11.2	-11.2
H34	Total WEDG Noise Limit L_{A90}	-	-	-	-	-	-	-	-	-	-	-	-
	Predicted Cumulative Wind Turbine Noise L_{A90}	-	-	-	-	-	-	-	-	-	-	-	-
	Exceedance Level	-	-	-	-	-	-	-	-	-	-	-	-
H35	Total WEDG Noise Limit L_{A90}	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.9	43.9	43.9
	Predicted Cumulative Wind Turbine Noise L_{A90}	-	-	-	-	-	40.3	42.7	43.5	43.7	43.7	43.7	43.7
	Exceedance Level	-	-	-	-	-	-2.7	-0.3	0.5	0.7	-0.2	-0.2	-0.2
H36	Total WEDG Noise Limit L_{A90}	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.9	43.9	43.9
	Predicted Cumulative Wind Turbine Noise L_{A90}	-	-	-	-	-	40.3	42.8	43.5	43.7	43.7	43.7	43.7
	Exceedance Level	-	-	-	-	-	-2.7	-0.2	0.5	0.7	-0.2	-0.2	-0.2

Location		Wind Speed (ms^{-1}) as standardised to 10 m height											
		1	2	3	4	5	6	7	8	9	10	11	12
H37	Total WEDG Noise Limit L_{A90}	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	44.1	44.1	44.1
	Predicted Cumulative Wind Turbine Noise L_{A90}	-	-	-	-	-	31.4	32.8	33.2	33.2	33.2	33.2	33.2
	Exceedance Level	-	-	-	-	-	-11.6	-10.2	-9.8	-9.8	-10.9	-10.9	-10.9
H38	Total WEDG Noise Limit L_{A90}	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.9	43.9	43.9
	Predicted Cumulative Wind Turbine Noise L_{A90}	-	-	-	-	-	40.3	42.8	43.5	43.7	43.7	43.7	43.7
	Exceedance Level	-	-	-	-	-	-2.7	-0.2	0.5	0.7	-0.2	-0.2	-0.2
H39	Total WEDG Noise Limit L_{A90}	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.9	43.9	43.9
	Predicted Cumulative Wind Turbine Noise L_{A90}	-	-	-	-	-	40.3	42.8	43.5	43.7	43.7	43.7	43.7
	Exceedance Level	-	-	-	-	-	-2.7	-0.2	0.5	0.7	-0.2	-0.2	-0.2
H40	Total WEDG Noise Limit L_{A90}	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	44.1	44.1	44.1
	Predicted Cumulative Wind Turbine Noise L_{A90}	-	-	-	-	-	30.9	32.3	32.7	32.7	32.7	32.7	32.7
	Exceedance Level	-	-	-	-	-	-12.1	-10.7	-10.3	-10.3	-11.4	-11.4	-11.4
H41	Total WEDG Noise Limit L_{A90}	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.9	43.9	43.9
	Predicted Cumulative Wind Turbine Noise L_{A90}	-	-	-	-	-	39.6	41.8	42.6	42.8	42.8	42.8	42.8
	Exceedance Level	-	-	-	-	-	-3.4	-1.2	-0.4	-0.2	-1.1	-1.1	-1.1
H42	Total WEDG Noise Limit L_{A90}	-	-	-	-	-	-	-	-	-	-	-	-
	Predicted Cumulative Wind Turbine Noise L_{A90}	-	-	-	-	-	-	-	-	-	-	-	-
	Exceedance Level	-	-	-	-	-	-	-	-	-	-	-	-
H43	Total WEDG Noise Limit L_{A90}	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	44.1	44.1	44.1
	Predicted Cumulative Wind Turbine Noise L_{A90}	-	-	-	-	-	31.1	32.4	32.8	32.9	32.9	32.9	32.9
	Exceedance Level	-	-	-	-	-	-11.9	-10.6	-10.2	-10.1	-11.2	-11.2	-11.2
H44	Total WEDG Noise Limit L_{A90}	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.9	43.9	43.9
	Predicted Cumulative Wind Turbine Noise L_{A90}	-	-	-	-	-	39.6	41.9	42.7	42.8	42.8	42.8	42.8
	Exceedance Level	-	-	-	-	-	-3.4	-1.1	-0.3	-0.2	-1.1	-1.1	-1.1
H45	Total WEDG Noise Limit L_{A90}	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.9	43.9	43.9
	Predicted Cumulative Wind Turbine Noise L_{A90}	-	-	-	-	-	39.7	42.2	42.9	43.1	43.2	43.2	43.2
	Exceedance Level	-	-	-	-	-	-3.3	-0.8	-0.1	0.1	-0.7	-0.7	-0.7

Location		Wind Speed (ms^{-1}) as standardised to 10 m height											
		1	2	3	4	5	6	7	8	9	10	11	12
H46	Total WEDG Noise Limit L_{A90}	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.9	43.9	43.9
	Predicted Cumulative Wind Turbine Noise L_{A90}	-	-	-	-	-	39.8	42.1	42.9	43.0	43.0	43.0	43.0
	Exceedance Level	-	-	-	-	-	-3.2	-0.9	-0.1	0.0	-0.9	-0.9	-0.9
H47	Total WEDG Noise Limit L_{A90}	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	44.1	44.1	44.1
	Predicted Cumulative Wind Turbine Noise L_{A90}	-	-	-	-	-	31.1	32.4	32.8	32.8	32.8	32.8	32.8
	Exceedance Level	-	-	-	-	-	-11.9	-10.6	-10.2	-10.2	-11.3	-11.3	-11.3
H48	Total WEDG Noise Limit L_{A90}	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.9	43.9	43.9
	Predicted Cumulative Wind Turbine Noise L_{A90}	-	-	-	-	-	39.6	41.9	42.7	42.8	42.8	42.8	42.8
	Exceedance Level	-	-	-	-	-	-3.4	-1.1	-0.3	-0.2	-1.1	-1.1	-1.1
H49	Total WEDG Noise Limit L_{A90}	43.0	43.0	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}	-	-	-	-	-	30.1	31.2	31.4	31.5	31.5	31.5	31.5
	Exceedance Level	-	-	-	-	-	-12.9	-11.8	-11.6	-11.5	-11.5	-11.5	-11.5
H50	Total WEDG Noise Limit L_{A90}	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.9	43.9	43.9
	Predicted Cumulative Wind Turbine Noise L_{A90}	-	-	-	-	-	40.9	43.4	44.2	44.4	44.4	44.4	44.4
	Exceedance Level	-	-	-	-	-	-2.1	0.4	1.2	1.4	0.5	0.5	0.5
H51	Total WEDG Noise Limit L_{A90}	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.9	43.9	43.9
	Predicted Cumulative Wind Turbine Noise L_{A90}	-	-	-	-	-	40.5	43.1	43.8	44.0	44.0	44.0	44.0
	Exceedance Level	-	-	-	-	-	-2.5	0.1	0.8	1.0	0.1	0.1	0.1
H52	Total WEDG Noise Limit L_{A90}	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.9	43.9	43.9
	Predicted Cumulative Wind Turbine Noise L_{A90}	-	-	-	-	-	41.7	44.3	45.0	45.2	45.2	45.2	45.2
	Exceedance Level	-	-	-	-	-	-1.3	1.3	2.0	2.2	1.3	1.3	1.3
H53	Total WEDG Noise Limit L_{A90}	43.0	43.0	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}	-	-	-	-	-	31.5	32.6	32.7	32.7	32.7	32.7	32.7
	Exceedance Level	-	-	-	-	-	-11.5	-10.4	-10.3	-10.3	-10.3	-10.3	-10.3
H54	Total WEDG Noise Limit L_{A90}	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.9	43.9	43.9
	Predicted Cumulative Wind Turbine Noise L_{A90}	-	-	-	-	-	39.5	42.0	42.7	42.9	42.9	42.9	42.9
	Exceedance Level	-	-	-	-	-	-3.5	-1.0	-0.3	-0.1	-1.0	-1.0	-1.0

Location		Wind Speed (ms^{-1}) as standardised to 10 m height											
		1	2	3	4	5	6	7	8	9	10	11	12
H55	Total WEDG Noise Limit L_{A90}	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.9	43.9	43.9
	Predicted Cumulative Wind Turbine Noise L_{A90}	-	-	-	-	-	39.9	42.1	42.9	43.0	43.0	43.0	43.0
	Exceedance Level	-	-	-	-	-	-3.1	-0.9	-0.1	0.0	-0.9	-0.9	-0.9
H56	Total WEDG Noise Limit L_{A90}	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.9	43.9	43.9
	Predicted Cumulative Wind Turbine Noise L_{A90}	-	-	-	-	-	39.5	42.0	42.7	42.9	43.0	43.0	43.0
	Exceedance Level	-	-	-	-	-	-3.5	-1.0	-0.3	-0.1	-0.9	-0.9	-0.9
H57	Total WEDG Noise Limit L_{A90}	43.0	43.0	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}	-	-	-	-	-	30.8	31.8	32.0	32.0	32.0	32.0	32.0
	Exceedance Level	-	-	-	-	-	-12.2	-11.2	-11.0	-11.0	-11.0	-11.0	-11.0
H58	Total WEDG Noise Limit L_{A90}	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.9	43.9	43.9
	Predicted Cumulative Wind Turbine Noise L_{A90}	-	-	-	-	-	39.9	42.1	42.9	43.1	43.1	43.1	43.1
	Exceedance Level	-	-	-	-	-	-3.1	-0.9	-0.1	0.1	-0.8	-0.8	-0.8
H59	Total WEDG Noise Limit L_{A90}	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.9	43.9	43.9
	Predicted Cumulative Wind Turbine Noise L_{A90}	-	-	-	-	-	42.5	45.1	45.9	46.1	46.1	46.1	46.1
	Exceedance Level	-	-	-	-	-	-0.5	2.1	2.9	3.1	2.2	2.2	2.2
H60	Total WEDG Noise Limit L_{A90}	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.9	43.9	43.9
	Predicted Cumulative Wind Turbine Noise L_{A90}	-	-	-	-	-	39.5	41.7	42.5	42.6	42.6	42.6	42.6
	Exceedance Level	-	-	-	-	-	-3.5	-1.3	-0.5	-0.4	-1.3	-1.3	-1.3
H61	Total WEDG Noise Limit L_{A90}	43.0	43.0	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}	-	-	-	-	-	35.2	36.7	36.8	36.8	36.8	36.8	36.8
	Exceedance Level	-	-	-	-	-	-7.8	-6.3	-6.2	-6.2	-6.2	-6.2	-6.2
H62	Total WEDG Noise Limit L_{A90}	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	44.1	44.1	44.1
	Predicted Cumulative Wind Turbine Noise L_{A90}	-	-	-	-	-	30.4	31.9	32.4	32.5	32.5	32.5	32.5
	Exceedance Level	-	-	-	-	-	-12.6	-11.1	-10.6	-10.5	-11.6	-11.6	-11.6
H63	Total WEDG Noise Limit L_{A90}	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	44.1	44.1	44.1
	Predicted Cumulative Wind Turbine Noise L_{A90}	-	-	-	-	-	30.3	31.8	32.3	32.3	32.3	32.3	32.3
	Exceedance Level	-	-	-	-	-	-12.7	-11.2	-10.7	-10.7	-11.8	-11.8	-11.8

Location		Wind Speed (ms^{-1}) as standardised to 10 m height											
		1	2	3	4	5	6	7	8	9	10	11	12
H64	Total WEDG Noise Limit L_{A90}	43.0	43.0	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	30.7	30.9	30.9	30.9	30.9	30.9
	Exceedance Level	-	-	-	-	-	-13.4	-12.3	-12.1	-12.1	-12.1	-12.1	-12.1
H65	Total WEDG Noise Limit L_{A90}	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	44.1	44.1	44.1
	Predicted Cumulative Wind Turbine Noise L_{A90}	-	-	-	-	-	29.5	30.7	31.0	31.1	31.1	31.1	31.1
	Exceedance Level	-	-	-	-	-	-13.5	-12.3	-12.0	-11.9	-13.0	-13.0	-13.0
H66	Total WEDG Noise Limit L_{A90}	43.0	43.0	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	30.7	30.9	30.9	30.9	30.9	30.9
	Exceedance Level	-	-	-	-	-	-13.4	-12.3	-12.1	-12.1	-12.1	-12.1	-12.1
H67	Total WEDG Noise Limit L_{A90}	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.9	43.9	43.9
	Predicted Cumulative Wind Turbine Noise L_{A90}	-	-	-	-	-	38.7	41.1	41.9	42.1	42.1	42.1	42.1
	Exceedance Level	-	-	-	-	-	-4.3	-1.9	-1.1	-0.9	-1.8	-1.8	-1.8
H68	Total WEDG Noise Limit L_{A90}	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	44.1	44.1	44.1
	Predicted Cumulative Wind Turbine Noise L_{A90}	-	-	-	-	-	31.3	32.9	33.5	33.6	33.6	33.6	33.6
	Exceedance Level	-	-	-	-	-	-11.7	-10.1	-9.5	-9.4	-10.5	-10.5	-10.5
H69	Total WEDG Noise Limit L_{A90}	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	44.1	44.1	44.1
	Predicted Cumulative Wind Turbine Noise L_{A90}	-	-	-	-	-	29.4	30.6	30.9	30.9	30.9	30.9	30.9
	Exceedance Level	-	-	-	-	-	-13.6	-12.4	-12.1	-12.1	-13.2	-13.2	-13.2
H70	Total WEDG Noise Limit L_{A90}	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.9	43.9	43.9
	Predicted Cumulative Wind Turbine Noise L_{A90}	-	-	-	-	-	39.5	42.0	42.8	43.0	43.0	43.0	43.0
	Exceedance Level	-	-	-	-	-	-3.5	-1.0	-0.2	0.0	-0.9	-0.9	-0.9
H71	Total WEDG Noise Limit L_{A90}	43.0	43.0	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}	-	-	-	-	-	38.3	39.9	40.0	40.0	40.0	40.0	40.0
	Exceedance Level	-	-	-	-	-	-4.7	-3.1	-3.0	-3.0	-3.0	-3.0	-3.0
H72	Total WEDG Noise Limit L_{A90}	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	44.1	44.1	44.1
	Predicted Cumulative Wind Turbine Noise L_{A90}	-	-	-	-	-	31.2	32.8	33.4	33.4	33.4	33.4	33.4
	Exceedance Level	-	-	-	-	-	-11.8	-10.2	-9.6	-9.6	-10.7	-10.7	-10.7

Location		Wind Speed (ms^{-1}) as standardised to 10 m height											
		1	2	3	4	5	6	7	8	9	10	11	12
H73	Total WEDG Noise Limit L_{A90}	43.0	43.0	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	35.0	35.5	35.6	35.6	35.6	35.6
	Exceedance Level	-	-	-	-	-	-10.0	-8.0	-7.5	-7.4	-7.4	-7.4	-7.4
H74	Total WEDG Noise Limit L_{A90}	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	44.1	44.1	44.1
	Predicted Cumulative Wind Turbine Noise L_{A90}	-	-	-	-	-	31.2	32.8	33.4	33.5	33.5	33.5	33.5
	Exceedance Level	-	-	-	-	-	-11.8	-10.2	-9.6	-9.5	-10.6	-10.6	-10.6
H75	Total WEDG Noise Limit L_{A90}	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.9	43.9	43.9
	Predicted Cumulative Wind Turbine Noise L_{A90}	-	-	-	-	-	39.1	41.6	42.3	42.6	42.6	42.6	42.6
	Exceedance Level	-	-	-	-	-	-3.9	-1.4	-0.7	-0.4	-1.3	-1.3	-1.3
H76	Total WEDG Noise Limit L_{A90}	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	44.1	44.1	44.1
	Predicted Cumulative Wind Turbine Noise L_{A90}	-	-	-	-	-	31.4	32.9	33.5	33.5	33.5	33.5	33.5
	Exceedance Level	-	-	-	-	-	-11.6	-10.1	-9.5	-9.5	-10.6	-10.6	-10.6
H77	Total WEDG Noise Limit L_{A90}	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	44.1	44.1	44.1
	Predicted Cumulative Wind Turbine Noise L_{A90}	-	-	-	-	-	31.9	33.4	34.0	34.0	34.0	34.0	34.0
	Exceedance Level	-	-	-	-	-	-11.1	-9.6	-9.0	-9.0	-10.1	-10.1	-10.1
H78	Total WEDG Noise Limit L_{A90}	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	44.1	44.1	44.1
	Predicted Cumulative Wind Turbine Noise L_{A90}	-	-	-	-	-	31.9	33.5	34.0	34.1	34.1	34.1	34.1
	Exceedance Level	-	-	-	-	-	-11.1	-9.5	-9.0	-8.9	-10.0	-10.0	-10.0
H79	Total WEDG Noise Limit L_{A90}	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.9	43.9	43.9
	Predicted Cumulative Wind Turbine Noise L_{A90}	-	-	-	-	-	38.4	40.9	41.6	41.8	41.8	41.8	41.8
	Exceedance Level	-	-	-	-	-	-4.6	-2.1	-1.4	-1.2	-2.1	-2.1	-2.1
H80	Total WEDG Noise Limit L_{A90}	43.0	43.0	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}	-	-	-	-	-	31.8	32.9	33.0	33.1	33.1	33.1	33.1
	Exceedance Level	-	-	-	-	-	-11.2	-10.1	-10.0	-9.9	-9.9	-9.9	-9.9
H81	Total WEDG Noise Limit L_{A90}	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	44.1	44.1	44.1
	Predicted Cumulative Wind Turbine Noise L_{A90}	-	-	-	-	-	31.8	33.4	34.0	34.0	34.0	34.0	34.0
	Exceedance Level	-	-	-	-	-	-11.2	-9.6	-9.0	-9.0	-10.1	-10.1	-10.1

Location		Wind Speed (ms^{-1}) as standardised to 10 m height											
		1	2	3	4	5	6	7	8	9	10	11	12
H82	Total WEDG Noise Limit L_{A90}	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	44.1	44.1	44.1
	Predicted Cumulative Wind Turbine Noise L_{A90}	-	-	-	-	-	31.0	32.5	33.0	33.1	33.1	33.1	33.1
	Exceedance Level	-	-	-	-	-	-12.0	-10.5	-10.0	-9.9	-11.0	-11.0	-11.0
H83	Total WEDG Noise Limit L_{A90}	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	44.1	44.1	44.1
	Predicted Cumulative Wind Turbine Noise L_{A90}	-	-	-	-	-	31.9	33.4	34.0	34.1	34.1	34.1	34.1
	Exceedance Level	-	-	-	-	-	-11.1	-9.6	-9.0	-8.9	-10.0	-10.0	-10.0
H84	Total WEDG Noise Limit L_{A90}	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	44.1	44.1	44.1
	Predicted Cumulative Wind Turbine Noise L_{A90}	-	-	-	-	-	31.8	33.4	34.0	34.0	34.0	34.0	34.0
	Exceedance Level	-	-	-	-	-	-11.2	-9.6	-9.0	-9.0	-10.1	-10.1	-10.1
H85	Total WEDG Noise Limit L_{A90}	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	44.1	44.1	44.1
	Predicted Cumulative Wind Turbine Noise L_{A90}	-	-	-	-	-	32.7	34.4	35.1	35.1	35.1	35.1	35.1
	Exceedance Level	-	-	-	-	-	-10.3	-8.6	-7.9	-7.9	-9.0	-9.0	-9.0
H86	Total WEDG Noise Limit L_{A90}	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.9	43.9	43.9
	Predicted Cumulative Wind Turbine Noise L_{A90}	-	-	-	-	-	38.5	40.9	41.7	41.9	41.9	41.9	41.9
	Exceedance Level	-	-	-	-	-	-4.5	-2.1	-1.3	-1.1	-2.0	-2.0	-2.0
H87	Total WEDG Noise Limit L_{A90}	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	44.1	44.1	44.1
	Predicted Cumulative Wind Turbine Noise L_{A90}	-	-	-	-	-	30.9	32.4	33.0	33.0	33.0	33.0	33.0
	Exceedance Level	-	-	-	-	-	-12.1	-10.6	-10.0	-10.0	-11.1	-11.1	-11.1
H88	Total WEDG Noise Limit L_{A90}	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.9	43.9	43.9
	Predicted Cumulative Wind Turbine Noise L_{A90}	-	-	-	-	-	38.7	40.9	41.6	41.7	41.8	41.8	41.8
	Exceedance Level	-	-	-	-	-	-4.3	-2.1	-1.4	-1.3	-2.1	-2.1	-2.1
H89	Total WEDG Noise Limit L_{A90}	43.0	43.0	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}	-	-	-	-	-	30.0	31.1	31.2	31.3	31.3	31.3	31.3
	Exceedance Level	-	-	-	-	-	-13.0	-11.9	-11.8	-11.7	-11.7	-11.7	-11.7
H90	Total WEDG Noise Limit L_{A90}	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.9	43.9	43.9
	Predicted Cumulative Wind Turbine Noise L_{A90}	-	-	-	-	-	40.1	42.7	43.4	43.6	43.7	43.7	43.7
	Exceedance Level	-	-	-	-	-	-2.9	-0.3	0.4	0.6	-0.2	-0.2	-0.2

Location		Wind Speed (ms^{-1}) as standardised to 10 m height											
		1	2	3	4	5	6	7	8	9	10	11	12
H91	Total WEDG Noise Limit L_{A90}	43.0	43.0	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}	-	-	-	-	-	30.6	31.6	31.8	31.8	31.8	31.8	31.8
	Exceedance Level	-	-	-	-	-	-12.4	-11.4	-11.2	-11.2	-11.2	-11.2	-11.2
H92	Total WEDG Noise Limit L_{A90}	43.0	43.0	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}	-	-	-	-	-	32.3	34.3	34.8	34.9	35.0	35.0	35.0
	Exceedance Level	-	-	-	-	-	-10.7	-8.7	-8.2	-8.1	-8.0	-8.0	-8.0
H93	Total WEDG Noise Limit L_{A90}	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	44.1	44.1	44.1
	Predicted Cumulative Wind Turbine Noise L_{A90}	-	-	-	-	-	30.8	32.3	32.8	32.9	32.9	32.9	32.9
	Exceedance Level	-	-	-	-	-	-12.2	-10.7	-10.2	-10.1	-11.2	-11.2	-11.2
H94	Total WEDG Noise Limit L_{A90}	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	44.1	44.1	44.1
	Predicted Cumulative Wind Turbine Noise L_{A90}	-	-	-	-	-	28.7	29.8	30.1	30.1	30.1	30.1	30.1
	Exceedance Level	-	-	-	-	-	-14.3	-13.2	-12.9	-12.9	-14.0	-14.0	-14.0
H95	Total WEDG Noise Limit L_{A90}	43.0	43.0	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}	-	-	-	-	-	30.5	31.7	31.9	31.9	31.9	31.9	31.9
	Exceedance Level	-	-	-	-	-	-12.5	-11.3	-11.1	-11.1	-11.1	-11.1	-11.1
H96	Total WEDG Noise Limit L_{A90}	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	44.1	44.1	44.1
	Predicted Cumulative Wind Turbine Noise L_{A90}	-	-	-	-	-	30.8	32.3	32.8	32.9	32.9	32.9	32.9
	Exceedance Level	-	-	-	-	-	-12.2	-10.7	-10.2	-10.1	-11.2	-11.2	-11.2
H97	Total WEDG Noise Limit L_{A90}	43.0	43.0	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}	-	-	-	-	-	31.3	32.6	32.8	32.9	32.9	32.9	32.9
	Exceedance Level	-	-	-	-	-	-11.7	-10.4	-10.2	-10.1	-10.1	-10.1	-10.1
H98	Total WEDG Noise Limit L_{A90}	43.0	43.0	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}	-	-	-	-	-	30.4	31.4	31.6	31.6	31.6	31.6	31.6
	Exceedance Level	-	-	-	-	-	-12.6	-11.6	-11.4	-11.4	-11.4	-11.4	-11.4
H99	Total WEDG Noise Limit L_{A90}	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	44.1	44.1	44.1
	Predicted Cumulative Wind Turbine Noise L_{A90}	-	-	-	-	-	32.3	33.9	34.4	34.5	34.5	34.5	34.5
	Exceedance Level	-	-	-	-	-	-10.7	-9.1	-8.6	-8.5	-9.6	-9.6	-9.6

Location		Wind Speed (ms^{-1}) as standardised to 10 m height											
		1	2	3	4	5	6	7	8	9	10	11	12
H100	Total WEDG Noise Limit L_{A90}	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	44.1	44.1	44.1
	Predicted Cumulative Wind Turbine Noise L_{A90}	-	-	-	-	-	33.0	34.7	35.3	35.4	35.4	35.4	35.4
	Exceedance Level	-	-	-	-	-	-10.0	-8.3	-7.7	-7.6	-8.7	-8.7	-8.7
H101	Total WEDG Noise Limit L_{A90}	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	44.1	44.1	44.1
	Predicted Cumulative Wind Turbine Noise L_{A90}	-	-	-	-	-	33.2	34.9	35.5	35.6	35.6	35.6	35.6
	Exceedance Level	-	-	-	-	-	-9.8	-8.1	-7.5	-7.4	-8.5	-8.5	-8.5
H102	Total WEDG Noise Limit L_{A90}	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	43.0	44.1	44.1	44.1
	Predicted Cumulative Wind Turbine Noise L_{A90}	-	-	-	-	-	33.1	34.8	35.5	35.5	35.5	35.5	35.5
	Exceedance Level	-	-	-	-	-	-9.9	-8.2	-7.5	-7.5	-8.6	-8.6	-8.6

*cumulative noise exceeds the noise limits but this is due to the contribution of the existing wind farms in the area as detailed in the section above. At these wind speeds predicted noise from the Proposed Development will be at least 10 dB below the Total WEDG Noise Limits and will therefore have a negligible additional contribution. To ensure noise from the Proposed Development is at least 10 dB below certain turbines will need to be operated in low noise mode for certain wind speeds and wind directions.

Table A7.4 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	11	12
H1	Site Specific Noise Limit L_{A90}	35	35	35	35	35	35	35	35	35	35	38.1	50.3
	Predicted Wind Turbine Noise L_{A90}	-	-	28	29.6	34.4	35*	35*	35*	35*	35*	38.1 *	39.6
	Exceedance Level	-	-	-7	-5.4	-0.6	0	0	0	0	0	0	-10.7
H2	Site Specific Noise Limit L_{A90}	35	35	35	35	35	35	35	35	35	35	38.1	51.2
	Predicted Wind Turbine Noise L_{A90}	-	-	28	29.6	34.4	35*	35*	35*	35*	35*	38.1 *	39.6
	Exceedance Level	-	-	-7	-5.4	-0.6	0	0	0	0	0	0	-11.6
H3	Site Specific Noise Limit L_{A90}	42.3	42.3	42.3	42.3	42.3	42.3	35	35	35	35	38.1	52.2
	Predicted Wind Turbine Noise L_{A90}	-	-	29.6	31.2	36	40.4	35*	35*	35*	35*	38.1 *	41.2
	Exceedance Level	-	-	-12.7	-11.1	-6.3	-1.9	0	0	0	0	0	-11
H4	Site Specific Noise Limit L_{A90}	35	35	35	35	35	35	35	35	35	35	38.1	51.2
	Predicted Wind Turbine Noise L_{A90}	-	-	27.7	29.3	34.1	35*	35*	35*	35*	35*	38.1 *	39.3
	Exceedance Level	-	-	-7.3	-5.7	-0.9	0	0	0	0	0	0	-11.9
H5	Site Specific Noise Limit L_{A90}	40	40	40	40	40	45	45	45	45	45	48.1	53
	Predicted Wind Turbine Noise L_{A90}	-	-	24.2	25.8	30.6	35	35.8	35.8	35.8	35.8	35.8	35.8
	Exceedance Level	-	-	-15.8	-14.2	-9.4	-10	-9.2	-9.2	-9.2	-9.2	-12.3	-17.2
H6	Site Specific Noise Limit L_{A90}	38.7	38.7	38.7	38.7	38.7	43.7	42.5	35	35	35	46.8	53
	Predicted Wind Turbine Noise L_{A90}	-	-	24.4	26	30.8	35.2	36	35*	35*	35*	36	36
	Exceedance Level	-	-	-14.3	-12.7	-7.9	-8.5	-6.5	0	0	0	-10.8	-17
H7	Site Specific Noise Limit L_{A90}	40	40	40	40	40	45	44.1	43.9	43.9	43.9	48.1	53
	Predicted Wind Turbine Noise L_{A90}	-	-	24.7	26.3	31.1	35.5	36.3	36.3	36.3	36.3	36.3	36.3
	Exceedance Level	-	-	-15.3	-13.7	-8.9	-9.5	-7.8	-7.6	-7.6	-7.6	-11.8	-16.7
H8	Site Specific Noise Limit L_{A90}	40	40	40	40	40	45	44.2	44	43.9	43.9	48.1	53
	Predicted Wind Turbine Noise L_{A90}	-	-	24.8	26.4	31.2	35.6	36.3	36.3	36.3	36.3	36.3	36.3
	Exceedance Level	-	-	-15.2	-13.6	-8.8	-9.4	-7.9	-7.7	-7.6	-7.6	-11.8	-16.7
H9	Site Specific Noise Limit L_{A90}	40	40	40	40	40	45	45	45	45	45	47	50.8
	Predicted Wind Turbine Noise L_{A90}	-	-	23.4	25	29.8	34.2	35	35	35	35	35	35
	Exceedance Level	-	-	-16.6	-15	-10.2	-10.8	-10	-10	-10	-10	-12	-15.8

Location		Wind Speed (ms^{-1}) as standardised to 10 m height											
		1	2	3	4	5	6	7	8	9	10	11	12
H10	Site Specific Noise Limit L_{A90}	38.7	38.7	38.7	38.7	38.7	43.7	42.6	35	35	35	46.8	53
	Predicted Wind Turbine Noise L_{A90}	-	-	23.5	25.2	30	34.3	35.1	35*	35*	35*	35.1	35.1
	Exceedance Level	-	-	-15.2	-13.5	-8.7	-9.4	-7.5	0	0	0	-11.7	-17.9
H11	Site Specific Noise Limit L_{A90}	40	40	40	40	40	45	43.8	43.6	43.5	43.5	48.1	53
	Predicted Wind Turbine Noise L_{A90}	-	-	23.5	25.1	29.9	34.3	35.1	35.1	35.1	35.1	35.1	35.1
	Exceedance Level	-	-	-16.5	-14.9	-10.1	-10.7	-8.7	-8.5	-8.4	-8.4	-13	-17.9
H12	Site Specific Noise Limit L_{A90}	40	40	40	40	40	45	43.9	43.6	43.5	43.5	48.1	53
	Predicted Wind Turbine Noise L_{A90}	-	-	23.5	25.1	29.9	34.3	35.1	35.1	35.1	35.1	35.1	35.1
	Exceedance Level	-	-	-16.5	-14.9	-10.1	-10.7	-8.8	-8.5	-8.4	-8.4	-13	-17.9
H13	Site Specific Noise Limit L_{A90}	40	40	40	40	40	45	43.8	43.5	43.4	43.4	48.1	53
	Predicted Wind Turbine Noise L_{A90}	-	-	23.8	25.4	30.2	34.6	35.4	35.4	35.4	35.4	35.4	35.4
	Exceedance Level	-	-	-16.2	-14.6	-9.8	-10.4	-8.4	-8.1	-8	-8	-12.7	-17.6
H14	Site Specific Noise Limit L_{A90}	40	40	40	40	40	45	45	45	45	45.4	48.5	51.9
	Predicted Wind Turbine Noise L_{A90}	-	-	20.6	22.2	27	31.4	32.2	32.2	32.2	32.2	32.2	32.2
	Exceedance Level	-	-	-19.4	-17.8	-13	-13.6	-12.8	-12.8	-12.8	-13.2	-16.3	-19.7
H15	Site Specific Noise Limit L_{A90}	40	40	40	40	40	45	43.7	43.4	43.3	43.3	47.4	53
	Predicted Wind Turbine Noise L_{A90}	-	-	23.5	25.1	29.9	34.3	35.1	35.1	35.1	35.1	35.1	35.1
	Exceedance Level	-	-	-16.5	-14.9	-10.1	-10.7	-8.6	-8.3	-8.2	-8.2	-12.3	-17.9
H16	Site Specific Noise Limit L_{A90}	40	40	40	40	40	45	44.3	44.1	44.1	44.1	47	50.8
	Predicted Wind Turbine Noise L_{A90}	-	-	19.9	21.5	26.3	30.7	31.5	31.5	31.5	31.5	31.5	31.5
	Exceedance Level	-	-	-20.1	-18.5	-13.7	-14.3	-12.8	-12.6	-12.6	-12.6	-15.5	-19.3
H17	Site Specific Noise Limit L_{A90}	40	40	40	40	40	45	45	45	45	45	47	50.8
	Predicted Wind Turbine Noise L_{A90}	-	-	19.4	21	25.8	30.2	31	31	31	31	31	31
	Exceedance Level	-	-	-20.6	-19	-14.2	-14.8	-14	-14	-14	-14	-16	-19.8
H18	Site Specific Noise Limit L_{A90}	40	40	40	40	40	45	45	44.2	44.2	44.2	47	50.8
	Predicted Wind Turbine Noise L_{A90}	-	-	19.1	20.7	25.5	29.9	30.7	30.7	30.7	30.7	30.7	30.7
	Exceedance Level	-	-	-20.9	-19.3	-14.5	-15.1	-14.3	-13.5	-13.5	-13.5	-16.3	-20.1

Location		Wind Speed (ms^{-1}) as standardised to 10 m height											
		1	2	3	4	5	6	7	8	9	10	11	12
H19	Site Specific Noise Limit L_{A90}	40	40	40	40	40	45	45	45	45	45.4	48.5	51.9
	Predicted Wind Turbine Noise L_{A90}	-	-	19.6	21.2	26	30.4	31.2	31.2	31.2	31.2	31.2	31.2
	Exceedance Level	-	-	-20.4	-18.8	-14	-14.6	-13.8	-13.8	-13.8	-14.2	-17.3	-20.7
H20	Site Specific Noise Limit L_{A90}	40	40	40	40	40	45	45	45	45	45	47	50.8
	Predicted Wind Turbine Noise L_{A90}	-	-	19.9	21.5	26.3	30.7	31.5	31.5	31.5	31.5	31.5	31.5
	Exceedance Level	-	-	-20.1	-18.5	-13.7	-14.3	-13.5	-13.5	-13.5	-13.5	-15.5	-19.3
H21	Site Specific Noise Limit L_{A90}	38.1	38.1	38.1	38.1	38.1	43.1	35	35	35	35	46.1	53
	Predicted Wind Turbine Noise L_{A90}	-	-	19.8	21.4	26.2	30.6	31.4	31.4	31.4	31.4	31.4	31.4
	Exceedance Level	-	-	-18.3	-16.7	-11.9	-12.5	-3.6	-3.6	-3.6	-3.6	-14.7	-21.6
H22	Site Specific Noise Limit L_{A90}	38.6	38.6	38.6	38.6	38.6	43.6	42.2	35	35	35	46.6	53
	Predicted Wind Turbine Noise L_{A90}	-	-	21.5	23.1	27.9	32.3	33.1	33.1	33.1	33.1	33.1	33.1
	Exceedance Level	-	-	-17.1	-15.5	-10.7	-11.3	-9.1	-1.9	-1.9	-1.9	-13.5	-19.9
H23	Site Specific Noise Limit L_{A90}	38	38	38	38	38	43	35	35	35	35	46	53
	Predicted Wind Turbine Noise L_{A90}	-	-	19.7	21.3	26.1	30.5	31.3	31.3	31.3	31.3	31.3	31.3
	Exceedance Level	-	-	-18.3	-16.7	-11.9	-12.5	-3.7	-3.7	-3.7	-3.7	-14.7	-21.7
H24	Site Specific Noise Limit L_{A90}	40	40	40	40	40	45	45	45	45	45	47	50.8
	Predicted Wind Turbine Noise L_{A90}	-	-	18.1	19.7	24.5	28.9	29.7	29.7	29.7	29.7	29.7	29.7
	Exceedance Level	-	-	-21.9	-20.3	-15.5	-16.1	-15.3	-15.3	-15.3	-15.3	-17.3	-21.1
H25	Site Specific Noise Limit L_{A90}	40	40	40	40	40	45	44.2	44.2	44.1	44.1	47	50.8
	Predicted Wind Turbine Noise L_{A90}	-	-	18.7	20.3	25.1	29.5	30.3	30.3	30.3	30.3	30.3	30.3
	Exceedance Level	-	-	-21.3	-19.7	-14.9	-15.5	-13.9	-13.9	-13.8	-13.8	-16.7	-20.5
H26	Site Specific Noise Limit L_{A90}	37.7	37.7	37.7	37.7	37.7	42.7	35	35	35	35	45.6	53
	Predicted Wind Turbine Noise L_{A90}	-	-	19.4	21	25.8	30.2	31	31	31	31	31	31
	Exceedance Level	-	-	-18.3	-16.7	-11.9	-12.5	-4	-4	-4	-4	-14.6	-22
H27	Site Specific Noise Limit L_{A90}	40	40	40	40	40	45	45	45	45	45	47	50.8
	Predicted Wind Turbine Noise L_{A90}	-	-	17.9	19.5	24.3	28.7	29.5	29.5	29.5	29.5	29.5	29.5
	Exceedance Level	-	-	-22.1	-20.5	-15.7	-16.3	-15.5	-15.5	-15.5	-15.5	-17.5	-21.3

Location		Wind Speed (ms^{-1}) as standardised to 10 m height											
		1	2	3	4	5	6	7	8	9	10	11	12
H28	Site Specific Noise Limit L_{A90}	37.3	37.3	37.3	37.3	37.3	42.3	35	35	35	35	45.1	52.2
	Predicted Wind Turbine Noise L_{A90}	-	-	19.3	20.9	25.7	30.1	30.9	30.9	30.9	30.9	30.9	30.9
	Exceedance Level	-	-	-18	-16.4	-11.6	-12.2	-4.1	-4.1	-4.1	-4.1	-14.2	-21.3
H29	Site Specific Noise Limit L_{A90}	37.4	37.4	37.4	37.4	37.4	42.4	35	35	35	35	45.3	53
	Predicted Wind Turbine Noise L_{A90}	-	-	19.2	20.8	25.6	30	30.8	30.8	30.8	30.8	30.8	30.8
	Exceedance Level	-	-	-18.2	-16.6	-11.8	-12.4	-4.2	-4.2	-4.2	-4.2	-14.5	-22.2
H30	Site Specific Noise Limit L_{A90}	40	40	40	40	40	45	45	45	45	45	47	50.8
	Predicted Wind Turbine Noise L_{A90}	-	-	19.4	21	25.8	30.2	31	31	31	31	31	31
	Exceedance Level	-	-	-20.6	-19	-14.2	-14.8	-14	-14	-14	-14	-16	-19.8
H31	Site Specific Noise Limit L_{A90}	40	40	40	40	40	45	45	45	45	45.4	48.5	51.9
	Predicted Wind Turbine Noise L_{A90}	-	-	19.4	21	25.8	30.2	31	31	31	31	31	31
	Exceedance Level	-	-	-20.6	-19	-14.2	-14.8	-14	-14	-14	-14.4	-17.5	-20.9
H32	Site Specific Noise Limit L_{A90}	40	40	40	40	40	45	45	45	45	45.4	48.5	51.9
	Predicted Wind Turbine Noise L_{A90}	-	-	18.3	19.9	24.7	29.1	29.9	29.9	29.9	29.9	29.9	29.9
	Exceedance Level	-	-	-21.7	-20.1	-15.3	-15.9	-15.1	-15.1	-15.1	-15.5	-18.6	-22
H33	Site Specific Noise Limit L_{A90}	40	40	40	40	40	45	45	45	45	45.4	48.5	51.9
	Predicted Wind Turbine Noise L_{A90}	-	-	18.4	20	24.8	29.2	30	30	30	30	30	30
	Exceedance Level	-	-	-21.6	-20	-15.2	-15.8	-15	-15	-15	-15.4	-18.5	-21.9
H34	Site Specific Noise Limit L_{A90}	-	-	-	-	-	-	-	-	-	-	-	-
	Predicted Wind Turbine Noise L_{A90}	-	-	-	-	-	-	-	-	-	-	-	-
	Exceedance Level	-	-	-	-	-	-	-	-	-	-	-	-
H35	Site Specific Noise Limit L_{A90}	37	37	37	37	37	42	35	35	35	35	38.1	52.1
	Predicted Wind Turbine Noise L_{A90}	-	-	19	20.6	25.4	29.8	30.6	30.6	30.6	30.6	30.6	30.6
	Exceedance Level	-	-	-18	-16.4	-11.6	-12.2	-4.4	-4.4	-4.4	-4.4	-7.5	-21.5
H36	Site Specific Noise Limit L_{A90}	37	37	37	37	37	42	35	35	35	35	38.1	52.1
	Predicted Wind Turbine Noise L_{A90}	-	-	18.9	20.5	25.3	29.7	30.5	30.5	30.5	30.5	30.5	30.5
	Exceedance Level	-	-	-18.1	-16.5	-11.7	-12.3	-4.5	-4.5	-4.5	-4.5	-7.6	-21.6

Location		Wind Speed (ms^{-1}) as standardised to 10 m height											
		1	2	3	4	5	6	7	8	9	10	11	12
H37	Site Specific Noise Limit L_{A90}	40	40	40	40	40	45	45	45	45	45.4	48.5	51.9
	Predicted Wind Turbine Noise L_{A90}	-	-	18.7	20.3	25.1	29.5	30.2	30.2	30.2	30.2	30.2	30.2
	Exceedance Level	-	-	-21.3	-19.7	-14.9	-15.5	-14.8	-14.8	-14.8	-15.2	-18.3	-21.7
H38	Site Specific Noise Limit L_{A90}	37	37	37	37	37	42	35	35	35	35	38.1	52.1
	Predicted Wind Turbine Noise L_{A90}	-	-	18.8	20.4	25.2	29.6	30.4	30.4	30.4	30.4	30.4	30.4
	Exceedance Level	-	-	-18.2	-16.6	-11.8	-12.4	-4.6	-4.6	-4.6	-4.6	-7.7	-21.7
H39	Site Specific Noise Limit L_{A90}	37.1	37.1	37.1	37.1	37.1	42.1	35	35	35	35	38.1	52.1
	Predicted Wind Turbine Noise L_{A90}	-	-	18.7	20.3	25.1	29.5	30.3	30.3	30.3	30.3	30.3	30.3
	Exceedance Level	-	-	-18.4	-16.8	-12	-12.6	-4.7	-4.7	-4.7	-4.7	-7.8	-21.8
H40	Site Specific Noise Limit L_{A90}	40	40	40	40	40	45	45	45	45	45.4	48.5	51.9
	Predicted Wind Turbine Noise L_{A90}	-	-	18.1	19.7	24.5	28.9	29.7	29.7	29.7	29.7	29.7	29.7
	Exceedance Level	-	-	-21.9	-20.3	-15.5	-16.1	-15.3	-15.3	-15.3	-15.7	-18.8	-22.2
H41	Site Specific Noise Limit L_{A90}	37.5	37.5	37.5	37.5	37.5	42.5	35	35	35	35	45.4	53
	Predicted Wind Turbine Noise L_{A90}	-	-	20.6	22.2	27	31.4	32.2	32.2	32.2	32.2	32.2	32.2
	Exceedance Level	-	-	-16.9	-15.3	-10.5	-11.1	-2.8	-2.8	-2.8	-2.8	-13.2	-20.8
H42	Site Specific Noise Limit L_{A90}	-	-	-	-	-	-	-	-	-	-	-	-
	Predicted Wind Turbine Noise L_{A90}	-	-	-	-	-	-	-	-	-	-	-	-
	Exceedance Level	-	-	-	-	-	-	-	-	-	-	-	-
H43	Site Specific Noise Limit L_{A90}	40	40	40	40	40	45	45	45	45	45.4	48.5	51.9
	Predicted Wind Turbine Noise L_{A90}	-	-	18.2	19.8	24.6	29	29.7	29.7	29.7	29.7	29.7	29.7
	Exceedance Level	-	-	-21.8	-20.2	-15.4	-16	-15.3	-15.3	-15.3	-15.7	-18.8	-22.2
H44	Site Specific Noise Limit L_{A90}	37.5	37.5	37.5	37.5	37.5	42.5	35	35	35	35	45.4	53
	Predicted Wind Turbine Noise L_{A90}	-	-	20.4	22	26.8	31.2	32	32	32	32	32	32
	Exceedance Level	-	-	-17.1	-15.5	-10.7	-11.3	-3	-3	-3	-3	-13.4	-21
H45	Site Specific Noise Limit L_{A90}	37.6	37.6	37.6	37.6	37.6	42.6	35	35	35	35	45.2	52.3
	Predicted Wind Turbine Noise L_{A90}	-	-	18.5	20.1	24.9	29.3	30.1	30.1	30.1	30.1	30.1	30.1
	Exceedance Level	-	-	-19.1	-17.5	-12.7	-13.3	-4.9	-4.9	-4.9	-4.9	-15.1	-22.2

Location		Wind Speed (ms^{-1}) as standardised to 10 m height											
		1	2	3	4	5	6	7	8	9	10	11	12
H46	Site Specific Noise Limit L_{A90}	37.3	37.3	37.3	37.3	37.3	42.3	35	35	35	35	45.3	53
	Predicted Wind Turbine Noise L_{A90}	-	-	20.3	21.9	26.7	31.1	31.9	31.9	31.9	31.9	31.9	31.9
	Exceedance Level	-	-	-17	-15.4	-10.6	-11.2	-3.1	-3.1	-3.1	-3.1	-13.4	-21.1
H47	Site Specific Noise Limit L_{A90}	40	40	40	40	40	45	45	45	45	45.4	48.5	51.9
	Predicted Wind Turbine Noise L_{A90}	-	-	18.5	20.1	24.9	29.3	30.1	30.1	30.1	30.1	30.1	30.1
	Exceedance Level	-	-	-21.5	-19.9	-15.1	-15.7	-14.9	-14.9	-14.9	-15.3	-18.4	-21.8
H48	Site Specific Noise Limit L_{A90}	37.5	37.5	37.5	37.5	37.5	42.5	35	35	35	35	45.4	53
	Predicted Wind Turbine Noise L_{A90}	-	-	20.4	22	26.8	31.2	31.9	31.9	31.9	31.9	31.9	31.9
	Exceedance Level	-	-	-17.1	-15.5	-10.7	-11.3	-3.1	-3.1	-3.1	-3.1	-13.5	-21.1
H49	Site Specific Noise Limit L_{A90}	40	40	40	40	40	45	45	45	45	45	47	50.8
	Predicted Wind Turbine Noise L_{A90}	-	-	18.2	19.8	24.6	29	29.8	29.8	29.8	29.8	29.8	29.8
	Exceedance Level	-	-	-21.8	-20.2	-15.4	-16	-15.2	-15.2	-15.2	-15.2	-17.2	-21
H50	Site Specific Noise Limit L_{A90}	30	30	30	30	30	35	35	35	35	35	38.1	52
	Predicted Wind Turbine Noise L_{A90}	-	-	17.6	19.2	24	28.4	29.2	29.2	29.2	29.2	29.2	29.2
	Exceedance Level	-	-	-12.4	-10.8	-6	-6.6	-5.8	-5.8	-5.8	-5.8	-8.9	-22.8
H51	Site Specific Noise Limit L_{A90}	30	30	30	30	30	35	35	35	35	35	38.1	52.1
	Predicted Wind Turbine Noise L_{A90}	-	-	17.7	19.3	24.1	28.5	29.2	29.2	29.2	29.2	29.2	29.2
	Exceedance Level	-	-	-12.3	-10.7	-5.9	-6.5	-5.8	-5.8	-5.8	-5.8	-8.9	-22.9
H52	Site Specific Noise Limit L_{A90}	30	30	30	30	30	35	35	35	35	35	38.1	51.7
	Predicted Wind Turbine Noise L_{A90}	-	-	17.5	19.1	23.9	28.3	29.1	29.1	29.1	29.1	29.1	29.1
	Exceedance Level	-	-	-12.5	-10.9	-6.1	-6.7	-5.9	-5.9	-5.9	-5.9	-9	-22.6
H53	Site Specific Noise Limit L_{A90}	40	40	40	40	40	45	45	45	45	45	47	50.8
	Predicted Wind Turbine Noise L_{A90}	-	-	20.1	21.7	26.5	30.9	31.7	31.7	31.7	31.7	31.7	31.7
	Exceedance Level	-	-	-19.9	-18.3	-13.5	-14.1	-13.3	-13.3	-13.3	-13.3	-15.3	-19.1
H54	Site Specific Noise Limit L_{A90}	37.7	37.7	37.7	37.7	37.7	42.7	35	35	35	35	45.4	53
	Predicted Wind Turbine Noise L_{A90}	-	-	18.3	19.9	24.7	29.1	29.9	29.9	29.9	29.9	29.9	29.9
	Exceedance Level	-	-	-19.4	-17.8	-13	-13.6	-5.1	-5.1	-5.1	-5.1	-15.5	-23.1

Location		Wind Speed (ms^{-1}) as standardised to 10 m height											
		1	2	3	4	5	6	7	8	9	10	11	12
H55	Site Specific Noise Limit L_{A90}	37.3	37.3	37.3	37.3	37.3	42.3	35	35	35	35	45.3	53
	Predicted Wind Turbine Noise L_{A90}	-	-	21.9	23.5	28.3	32.7	33.5	33.5	33.5	33.5	33.5	33.5
	Exceedance Level	-	-	-15.4	-13.8	-9	-9.6	-1.5	-1.5	-1.5	-1.5	-11.8	-19.5
H56	Site Specific Noise Limit L_{A90}	37.7	37.7	37.7	37.7	37.7	42.7	35	35	35	35	45.4	53
	Predicted Wind Turbine Noise L_{A90}	-	-	18.2	19.8	24.6	29	29.8	29.8	29.8	29.8	29.8	29.8
	Exceedance Level	-	-	-19.5	-17.9	-13.1	-13.7	-5.2	-5.2	-5.2	-5.2	-15.6	-23.2
H57	Site Specific Noise Limit L_{A90}	40	40	40	40	40	45	45	45	45	45	47	50.8
	Predicted Wind Turbine Noise L_{A90}	-	-	19.1	20.8	25.6	29.9	30.7	30.7	30.7	30.7	30.7	30.7
	Exceedance Level	-	-	-20.9	-19.2	-14.4	-15.1	-14.3	-14.3	-14.3	-14.3	-16.3	-20.1
H58	Site Specific Noise Limit L_{A90}	37.3	37.3	37.3	37.3	37.3	42.3	35	35	35	35	45.3	53
	Predicted Wind Turbine Noise L_{A90}	-	-	21.2	22.8	27.6	32	32.7	32.7	32.7	32.7	32.7	32.7
	Exceedance Level	-	-	-16.1	-14.5	-9.7	-10.3	-2.3	-2.3	-2.3	-2.3	-12.6	-20.3
H59	Site Specific Noise Limit L_{A90}	30	30	30	30	30	35	35	35	35	35	38.1	51.3
	Predicted Wind Turbine Noise L_{A90}	-	-	17.2	18.8	23.6	28	28.8	28.8	28.8	28.8	28.8	28.8
	Exceedance Level	-	-	-12.8	-11.2	-6.4	-7	-6.2	-6.2	-6.2	-6.2	-9.3	-22.5
H60	Site Specific Noise Limit L_{A90}	37.7	37.7	37.7	37.7	37.7	42.7	35	35	35	35	45.6	53
	Predicted Wind Turbine Noise L_{A90}	-	-	21.3	22.9	27.7	32.1	32.9	32.9	32.9	32.9	32.9	32.9
	Exceedance Level	-	-	-16.4	-14.8	-10	-10.6	-2.1	-2.1	-2.1	-2.1	-12.7	-20.1
H61	Site Specific Noise Limit L_{A90}	40	40	40	40	40	45	44	44	44	44	47	50.8
	Predicted Wind Turbine Noise L_{A90}	-	-	16.9	18.5	23.3	27.7	28.5	28.5	28.5	28.5	28.5	28.5
	Exceedance Level	-	-	-23.1	-21.5	-16.7	-17.3	-15.5	-15.5	-15.5	-15.5	-18.5	-22.3
H62	Site Specific Noise Limit L_{A90}	40	40	40	40	40	45	45	45	45	45.4	48.5	51.9
	Predicted Wind Turbine Noise L_{A90}	-	-	16.7	18.3	23.1	27.5	28.3	28.3	28.3	28.3	28.3	28.3
	Exceedance Level	-	-	-23.3	-21.7	-16.9	-17.5	-16.7	-16.7	-16.7	-17.1	-20.2	-23.6
H63	Site Specific Noise Limit L_{A90}	40	40	40	40	40	45	45	45	45	45.4	48.5	51.9
	Predicted Wind Turbine Noise L_{A90}	-	-	16.6	18.2	23	27.4	28.2	28.2	28.2	28.2	28.2	28.2
	Exceedance Level	-	-	-23.4	-21.8	-17	-17.6	-16.8	-16.8	-16.8	-17.2	-20.3	-23.7

Location		Wind Speed (ms^{-1}) as standardised to 10 m height											
		1	2	3	4	5	6	7	8	9	10	11	12
H64	Site Specific Noise Limit L_{A90}	40	40	40	40	40	45	45	45	45	45	47	50.8
	Predicted Wind Turbine Noise L_{A90}	-	-	17.7	19.3	24.1	28.5	29.3	29.3	29.3	29.3	29.3	29.3
	Exceedance Level	-	-	-22.3	-20.7	-15.9	-16.5	-15.7	-15.7	-15.7	-15.7	-17.7	-21.5
H65	Site Specific Noise Limit L_{A90}	40	40	40	40	40	45	45	45	45	45.4	48.5	51.9
	Predicted Wind Turbine Noise L_{A90}	-	-	17.3	18.9	23.7	28.1	28.9	28.9	28.9	28.9	28.9	28.9
	Exceedance Level	-	-	-22.7	-21.1	-16.3	-16.9	-16.1	-16.1	-16.1	-16.5	-19.6	-23
H66	Site Specific Noise Limit L_{A90}	40	40	40	40	40	45	45	45	45	45	47	50.8
	Predicted Wind Turbine Noise L_{A90}	-	-	17.7	19.3	24.1	28.5	29.3	29.3	29.3	29.3	29.3	29.3
	Exceedance Level	-	-	-22.3	-20.7	-15.9	-16.5	-15.7	-15.7	-15.7	-15.7	-17.7	-21.5
H67	Site Specific Noise Limit L_{A90}	38.2	38.2	38.2	38.2	38.2	43.2	35	35	35	35	46	53
	Predicted Wind Turbine Noise L_{A90}	-	-	17.6	19.2	24	28.4	29.2	29.2	29.2	29.2	29.2	29.2
	Exceedance Level	-	-	-20.6	-19	-14.2	-14.8	-5.8	-5.8	-5.8	-5.8	-16.8	-23.8
H68	Site Specific Noise Limit L_{A90}	40	40	40	40	40	45	45	45	45	45.4	48.5	51.9
	Predicted Wind Turbine Noise L_{A90}	-	-	16.5	18.1	22.9	27.3	28.1	28.1	28.1	28.1	28.1	28.1
	Exceedance Level	-	-	-23.5	-21.9	-17.1	-17.7	-16.9	-16.9	-16.9	-17.3	-20.4	-23.8
H69	Site Specific Noise Limit L_{A90}	40	40	40	40	40	45	45	45	45	45.4	48.5	51.9
	Predicted Wind Turbine Noise L_{A90}	-	-	17.2	18.8	23.6	28	28.8	28.8	28.8	28.8	28.8	28.8
	Exceedance Level	-	-	-22.8	-21.2	-16.4	-17	-16.2	-16.2	-16.2	-16.6	-19.7	-23.1
H70	Site Specific Noise Limit L_{A90}	37.7	37.7	37.7	37.7	37.7	42.7	35	35	35	35	45.4	53
	Predicted Wind Turbine Noise L_{A90}	-	-	16.9	18.5	23.4	27.7	28.5	28.5	28.5	28.5	28.5	28.5
	Exceedance Level	-	-	-20.8	-19.2	-14.3	-15	-6.5	-6.5	-6.5	-6.5	-16.9	-24.5
H71	Site Specific Noise Limit L_{A90}	38.2	38.2	38.2	38.2	38.2	43.2	42.2	42.1	42.1	42.1	45.4	50.8
	Predicted Wind Turbine Noise L_{A90}	-	-	17.5	19.1	23.9	28.3	29.1	29.1	29.1	29.1	29.1	29.1
	Exceedance Level	-	-	-20.7	-19.1	-14.3	-14.9	-13.1	-13	-13	-13	-16.3	-21.7
H72	Site Specific Noise Limit L_{A90}	40	40	40	40	40	45	45	45	45	45.4	48.5	51.9
	Predicted Wind Turbine Noise L_{A90}	-	-	16.4	18	22.8	27.2	28	28	28	28	28	28
	Exceedance Level	-	-	-23.6	-22	-17.2	-17.8	-17	-17	-17	-17.4	-20.5	-23.9

Location		Wind Speed (ms^{-1}) as standardised to 10 m height											
		1	2	3	4	5	6	7	8	9	10	11	12
H73	Site Specific Noise Limit L_{A90}	40	40	40	40	40	45	45	45	45	45	47	50.8
	Predicted Wind Turbine Noise L_{A90}	-	-	16.4	18	22.9	27.2	28	28	28	28	28	28
	Exceedance Level	-	-	-23.6	-22	-17.1	-17.8	-17	-17	-17	-17	-19	-22.8
H74	Site Specific Noise Limit L_{A90}	40	40	40	40	40	45	45	45	45	45.4	48.5	51.9
	Predicted Wind Turbine Noise L_{A90}	-	-	16.4	18	22.8	27.2	28	28	28	28	28	28
	Exceedance Level	-	-	-23.6	-22	-17.2	-17.8	-17	-17	-17	-17.4	-20.5	-23.9
H75	Site Specific Noise Limit L_{A90}	37.9	37.9	37.9	37.9	37.9	42.9	35	35	35	35	45.7	53
	Predicted Wind Turbine Noise L_{A90}	-	-	16.9	18.5	23.3	27.7	28.5	28.5	28.5	28.5	28.5	28.5
	Exceedance Level	-	-	-21	-19.4	-14.6	-15.2	-6.5	-6.5	-6.5	-6.5	-17.2	-24.5
H76	Site Specific Noise Limit L_{A90}	40	40	40	40	40	45	45	45	45	45.4	48.5	51.9
	Predicted Wind Turbine Noise L_{A90}	-	-	16.9	18.5	23.3	27.7	28.5	28.5	28.5	28.5	28.5	28.5
	Exceedance Level	-	-	-23.1	-21.5	-16.7	-17.3	-16.5	-16.5	-16.5	-16.9	-20	-23.4
H77	Site Specific Noise Limit L_{A90}	40	40	40	40	40	45	45	45	45	45.4	48.5	51.9
	Predicted Wind Turbine Noise L_{A90}	-	-	17.5	19.1	23.9	28.3	29	29	29	29	29	29
	Exceedance Level	-	-	-22.5	-20.9	-16.1	-16.7	-16	-16	-16	-16.4	-19.5	-22.9
H78	Site Specific Noise Limit L_{A90}	40	40	40	40	40	45	45	45	45	45.4	48.5	51.9
	Predicted Wind Turbine Noise L_{A90}	-	-	17.4	19	23.8	28.2	29	29	29	29	29	29
	Exceedance Level	-	-	-22.6	-21	-16.2	-16.8	-16	-16	-16	-16.4	-19.5	-22.9
H79	Site Specific Noise Limit L_{A90}	38.3	38.3	38.3	38.3	38.3	43.3	35	35	35	35	46.2	53
	Predicted Wind Turbine Noise L_{A90}	-	-	17.1	18.7	23.5	27.9	28.7	28.7	28.7	28.7	28.7	28.7
	Exceedance Level	-	-	-21.2	-19.6	-14.8	-15.4	-6.3	-6.3	-6.3	-6.3	-17.5	-24.3
H80	Site Specific Noise Limit L_{A90}	40	40	40	40	40	45	45	45	45	45	47	50.8
	Predicted Wind Turbine Noise L_{A90}	-	-	20.1	21.8	26.6	30.9	31.7	31.7	31.7	31.7	31.7	31.7
	Exceedance Level	-	-	-19.9	-18.2	-13.4	-14.1	-13.3	-13.3	-13.3	-13.3	-15.3	-19.1
H81	Site Specific Noise Limit L_{A90}	40	40	40	40	40	45	45	45	45	45.4	48.5	51.9
	Predicted Wind Turbine Noise L_{A90}	-	-	17.1	18.7	23.5	27.9	28.7	28.7	28.7	28.7	28.7	28.7
	Exceedance Level	-	-	-22.9	-21.3	-16.5	-17.1	-16.3	-16.3	-16.3	-16.7	-19.8	-23.2

Location		Wind Speed (ms^{-1}) as standardised to 10 m height											
		1	2	3	4	5	6	7	8	9	10	11	12
H82	Site Specific Noise Limit L_{A90}	40	40	40	40	40	45	45	45	45	45.4	48.5	51.9
	Predicted Wind Turbine Noise L_{A90}	-	-	17	18.6	23.4	27.8	28.6	28.6	28.6	28.6	28.6	28.6
	Exceedance Level	-	-	-23	-21.4	-16.6	-17.2	-16.4	-16.4	-16.4	-16.8	-19.9	-23.3
H83	Site Specific Noise Limit L_{A90}	40	40	40	40	40	45	45	45	45	45.4	48.5	51.9
	Predicted Wind Turbine Noise L_{A90}	-	-	17.4	19	23.8	28.2	29	29	29	29	29	29
	Exceedance Level	-	-	-22.6	-21	-16.2	-16.8	-16	-16	-16	-16.4	-19.5	-22.9
H84	Site Specific Noise Limit L_{A90}	40	40	40	40	40	45	45	45	45	45.4	48.5	51.9
	Predicted Wind Turbine Noise L_{A90}	-	-	17	18.6	23.4	27.8	28.6	28.6	28.6	28.6	28.6	28.6
	Exceedance Level	-	-	-23	-21.4	-16.6	-17.2	-16.4	-16.4	-16.4	-16.8	-19.9	-23.3
H85	Site Specific Noise Limit L_{A90}	40	40	40	40	40	45	45	45	45	45.4	48.5	51.9
	Predicted Wind Turbine Noise L_{A90}	-	-	16.7	18.3	23.1	27.5	28.3	28.3	28.3	28.3	28.3	28.3
	Exceedance Level	-	-	-23.3	-21.7	-16.9	-17.5	-16.7	-16.7	-16.7	-17.1	-20.2	-23.6
H86	Site Specific Noise Limit L_{A90}	38.3	38.3	38.3	38.3	38.3	43.3	35	35	35	35	46.1	53
	Predicted Wind Turbine Noise L_{A90}	-	-	16.8	18.4	23.2	27.6	28.4	28.4	28.4	28.4	28.4	28.4
	Exceedance Level	-	-	-21.5	-19.9	-15.1	-15.7	-6.6	-6.6	-6.6	-6.6	-17.7	-24.6
H87	Site Specific Noise Limit L_{A90}	40	40	40	40	40	45	45	45	45	45.4	48.5	51.9
	Predicted Wind Turbine Noise L_{A90}	-	-	16.5	18.1	22.9	27.3	28.1	28.1	28.1	28.1	28.1	28.1
	Exceedance Level	-	-	-23.5	-21.9	-17.1	-17.7	-16.9	-16.9	-16.9	-17.3	-20.4	-23.8
H88	Site Specific Noise Limit L_{A90}	38.4	38.4	38.4	38.4	38.4	43.4	35	35	35	35	46.3	53
	Predicted Wind Turbine Noise L_{A90}	-	-	17.8	19.4	24.2	28.6	29.3	29.3	29.3	29.3	29.3	29.3
	Exceedance Level	-	-	-20.6	-19	-14.2	-14.8	-5.7	-5.7	-5.7	-5.7	-17	-23.7
H89	Site Specific Noise Limit L_{A90}	40	40	40	40	40	45	45	45	45	45	47	50.8
	Predicted Wind Turbine Noise L_{A90}	-	-	18.3	19.9	24.7	29.1	29.9	29.9	29.9	29.9	29.9	29.9
	Exceedance Level	-	-	-21.7	-20.1	-15.3	-15.9	-15.1	-15.1	-15.1	-15.1	-17.1	-20.9
H90	Site Specific Noise Limit L_{A90}	37.1	37.1	37.1	37.1	37.1	42.1	35	35	35	35	38.1	52.1
	Predicted Wind Turbine Noise L_{A90}	-	-	16	17.7	22.5	26.8	27.6	27.6	27.6	27.6	27.6	27.6
	Exceedance Level	-	-	-21.1	-19.4	-14.6	-15.3	-7.4	-7.4	-7.4	-7.4	-10.5	-24.5

Location		Wind Speed (ms^{-1}) as standardised to 10 m height											
		1	2	3	4	5	6	7	8	9	10	11	12
H91	Site Specific Noise Limit L_{A90}	40	40	40	40	40	45	45	45	45	45	47	50.8
	Predicted Wind Turbine Noise L_{A90}	-	-	19	20.7	25.5	29.8	30.6	30.6	30.6	30.6	30.6	30.6
	Exceedance Level	-	-	-21	-19.3	-14.5	-15.2	-14.4	-14.4	-14.4	-14.4	-16.4	-20.2
H92	Site Specific Noise Limit L_{A90}	40	40	40	40	40	45	45	45	45	45	47	50.8
	Predicted Wind Turbine Noise L_{A90}	-	-	14.5	16.1	20.9	25.3	26.1	26.1	26.1	26.1	26.1	26.1
	Exceedance Level	-	-	-25.5	-23.9	-19.1	-19.7	-18.9	-18.9	-18.9	-18.9	-20.9	-24.7
H93	Site Specific Noise Limit L_{A90}	40	40	40	40	40	45	45	45	45	45.4	48.5	51.9
	Predicted Wind Turbine Noise L_{A90}	-	-	16.9	18.5	23.3	27.7	28.5	28.5	28.5	28.5	28.5	28.5
	Exceedance Level	-	-	-23.1	-21.5	-16.7	-17.3	-16.5	-16.5	-16.5	-16.9	-20	-23.4
H94	Site Specific Noise Limit L_{A90}	40	40	40	40	40	45	45	45	45	45.4	48.5	51.9
	Predicted Wind Turbine Noise L_{A90}	-	-	16.6	18.2	23	27.4	28.2	28.2	28.2	28.2	28.2	28.2
	Exceedance Level	-	-	-23.4	-21.8	-17	-17.6	-16.8	-16.8	-16.8	-17.2	-20.3	-23.7
H95	Site Specific Noise Limit L_{A90}	40	40	40	40	40	45	45	45	45	45	47	50.8
	Predicted Wind Turbine Noise L_{A90}	-	-	18.1	19.7	24.5	28.9	29.7	29.7	29.7	29.7	29.7	29.7
	Exceedance Level	-	-	-21.9	-20.3	-15.5	-16.1	-15.3	-15.3	-15.3	-15.3	-17.3	-21.1
H96	Site Specific Noise Limit L_{A90}	40	40	40	40	40	45	45	45	45	45.4	48.5	51.9
	Predicted Wind Turbine Noise L_{A90}	-	-	16.8	18.4	23.2	27.6	28.4	28.4	28.4	28.4	28.4	28.4
	Exceedance Level	-	-	-23.2	-21.6	-16.8	-17.4	-16.6	-16.6	-16.6	-17	-20.1	-23.5
H97	Site Specific Noise Limit L_{A90}	40	40	40	40	40	45	45	45	45	45	47	50.8
	Predicted Wind Turbine Noise L_{A90}	-	-	17.8	19.4	24.3	28.6	29.4	29.4	29.4	29.4	29.4	29.4
	Exceedance Level	-	-	-22.2	-20.6	-15.7	-16.4	-15.6	-15.6	-15.6	-15.6	-17.6	-21.4
H98	Site Specific Noise Limit L_{A90}	40	40	40	40	40	45	45	45	45	45	47	50.8
	Predicted Wind Turbine Noise L_{A90}	-	-	18.8	20.4	25.2	29.6	30.4	30.4	30.4	30.4	30.4	30.4
	Exceedance Level	-	-	-21.2	-19.6	-14.8	-15.4	-14.6	-14.6	-14.6	-14.6	-16.6	-20.4
H99	Site Specific Noise Limit L_{A90}	40	40	40	40	40	45	45	45	45	45.4	48.5	51.9
	Predicted Wind Turbine Noise L_{A90}	-	-	18	19.6	24.4	28.8	29.6	29.6	29.6	29.6	29.6	29.6
	Exceedance Level	-	-	-22	-20.4	-15.6	-16.2	-15.4	-15.4	-15.4	-15.8	-18.9	-22.3

Location		Wind Speed (ms^{-1}) as standardised to 10 m height											
		1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
H100	Site Specific Noise Limit L_{A90}	40	40	40	40	40	45	45	45	45	45.4	48.5	51.9
	Predicted Wind Turbine Noise L_{A90}	-	-	17.2	18.8	23.6	28	28.8	28.8	28.8	28.8	28.8	28.8
	Exceedance Level	-	-	-22.8	-21.2	-16.4	-17	-16.2	-16.2	-16.2	-16.6	-19.7	-23.1
H101	Site Specific Noise Limit L_{A90}	40	40	40	40	40	45	45	45	45	45.4	48.5	51.9
	Predicted Wind Turbine Noise L_{A90}	-	-	17.3	18.9	23.7	28.1	28.9	28.9	28.9	28.9	28.9	28.9
	Exceedance Level	-	-	-22.7	-21.1	-16.3	-16.9	-16.1	-16.1	-16.1	-16.5	-19.6	-23
H102	Site Specific Noise Limit L_{A90}	40	40	40	40	40	45	45	45	45	45.4	48.5	51.9
	Predicted Wind Turbine Noise L_{A90}	-	-	17.3	18.9	23.7	28.1	28.9	28.9	28.9	28.9	28.9	28.9
	Exceedance Level	-	-	-22.7	-21.1	-16.3	-16.9	-16.1	-16.1	-16.1	-16.5	-19.6	-23

**Predicted levels assume mode management is applied to meet the Site Specific Noise Limit. This would only apply for certain wind directions.*

Table A7.5 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	11	12
H1	Site Specific Noise Limit L_{A90}	35	35	35	35	35	35	35	35	35	35	35	35
	Predicted Wind Turbine Noise L_{A90}	-	-	28	29.6	34.4	35*	35*	35*	35*	35*	35*	35*
	Exceedance Level	-	-	-7	-5.4	-0.6	0	0	0	0	0	0	0
H2	Site Specific Noise Limit L_{A90}	35	35	35	35	35	35	35	35	35	35	35	35
	Predicted Wind Turbine Noise L_{A90}	-	-	28	29.6	34.4	35*	35*	35*	35*	35*	35*	35*
	Exceedance Level	-	-	-7	-5.4	-0.6	0	0	0	0	0	0	0
H3	Site Specific Noise Limit L_{A90}	42.3	42.3	42.3	42.3	42.3	42.3	35	35	35	35	35	35
	Predicted Wind Turbine Noise L_{A90}	-	-	29.6	31.2	36	40.4	35*	35*	35*	35*	35*	35*
	Exceedance Level	-	-	-12.7	-11.1	-6.3	-1.9	0	0	0	0	0	0
H4	Site Specific Noise Limit L_{A90}	35	35	35	35	35	35	35	35	35	35	35	35
	Predicted Wind Turbine Noise L_{A90}	-	-	27.7	29.3	34.1	35*	35*	35*	35*	35*	35*	35*
	Exceedance Level	-	-	-7.3	-5.7	-0.9	0	0	0	0	0	0	0
H5	Site Specific Noise Limit L_{A90}	43	43	43	43	43	43	42.2	42	42	43.1	43.1	43.1
	Predicted Wind Turbine Noise L_{A90}	-	-	24.2	25.8	30.6	35	35.8	35.8	35.8	35.8	35.8	35.8
	Exceedance Level	-	-	-18.8	-17.2	-12.4	-8	-6.4	-6.2	-6.2	-7.3	-7.3	-7.3
H6	Site Specific Noise Limit L_{A90}	40.8	40.8	40.8	40.8	40.8	40.8	33	33	33	33.9	33.9	33.9
	Predicted Wind Turbine Noise L_{A90}	-	-	24.4	26	30.8	35.2	33*	33*	33*	33.9 *	33.9 *	33.9 *
	Exceedance Level	-	-	-16.4	-14.8	-10	-5.6	0	0	0	0	0	0
H7	Site Specific Noise Limit L_{A90}	42.2	42.2	42.2	42.2	42.2	42.2	41.5	41.2	41.1	42.4	42.4	42.4
	Predicted Wind Turbine Noise L_{A90}	-	-	24.7	26.3	31.1	35.5	36.3	36.3	36.3	36.3	36.3	36.3
	Exceedance Level	-	-	-17.5	-15.9	-11.1	-6.7	-5.2	-4.9	-4.8	-6.1	-6.1	-6.1
H8	Site Specific Noise Limit L_{A90}	42.2	42.2	42.2	42.2	42.2	42.2	41.6	41.2	41.2	42.5	42.5	42.5
	Predicted Wind Turbine Noise L_{A90}	-	-	24.8	26.4	31.2	35.6	36.3	36.3	36.3	36.3	36.3	36.3
	Exceedance Level	-	-	-17.4	-15.8	-11	-6.6	-5.3	-4.9	-4.9	-6.2	-6.2	-6.2
H9	Site Specific Noise Limit L_{A90}	43	43	43	43	43	43	43	43	43	43	43	43
	Predicted Wind Turbine Noise L_{A90}	-	-	23.4	25	29.8	34.2	35	35	35	35	35	35
	Exceedance Level	-	-	-19.6	-18	-13.2	-8.8	-8	-8	-8	-8	-8	-8

Location		Wind Speed (ms^{-1}) as standardised to 10 m height											
		1	2	3	4	5	6	7	8	9	10	11	12
H10	Site Specific Noise Limit L_{A90}	40.8	40.8	40.8	40.8	40.8	40.8	33	33	33	33.9	33.9	33.9
	Predicted Wind Turbine Noise L_{A90}	-	-	23.5	25.2	30	34.3	33*	33*	33*	33.9 *	33.9 *	33.9 *
	Exceedance Level	-	-	-17.3	-15.6	-10.8	-6.5	0	0	0	0	0	0
H11	Site Specific Noise Limit L_{A90}	42	42	42	42	42	42	41	40.4	40.3	41.9	41.9	41.9
	Predicted Wind Turbine Noise L_{A90}	-	-	23.5	25.1	29.9	34.3	35.1	35.1	35.1	35.1	35.1	35.1
	Exceedance Level	-	-	-18.5	-16.9	-12.1	-7.7	-5.9	-5.3	-5.2	-6.8	-6.8	-6.8
H12	Site Specific Noise Limit L_{A90}	42	42	42	42	42	42	41	40.5	40.3	41.9	41.9	41.9
	Predicted Wind Turbine Noise L_{A90}	-	-	23.5	25.1	29.9	34.3	35.1	35.1	35.1	35.1	35.1	35.1
	Exceedance Level	-	-	-18.5	-16.9	-12.1	-7.7	-5.9	-5.4	-5.2	-6.8	-6.8	-6.8
H13	Site Specific Noise Limit L_{A90}	41.9	41.9	41.9	41.9	41.9	41.9	40.9	40.3	40.2	41.8	41.8	41.8
	Predicted Wind Turbine Noise L_{A90}	-	-	23.8	25.4	30.2	34.6	35.4	35.4	35.4	35.4	35.4	35.4
	Exceedance Level	-	-	-18.1	-16.5	-11.7	-7.3	-5.5	-4.9	-4.8	-6.4	-6.4	-6.4
H14	Site Specific Noise Limit L_{A90}	43	43	43	43	43	43	43	43	43	44.1	44.1	44.1
	Predicted Wind Turbine Noise L_{A90}	-	-	20.6	22.2	27	31.4	32.2	32.2	32.2	32.2	32.2	32.2
	Exceedance Level	-	-	-22.4	-20.8	-16	-11.6	-10.8	-10.8	-10.8	-11.9	-11.9	-11.9
H15	Site Specific Noise Limit L_{A90}	41.8	41.8	41.8	41.8	41.8	41.8	40.7	40.1	33	41.6	41.6	41.6
	Predicted Wind Turbine Noise L_{A90}	-	-	23.5	25.1	29.9	34.3	35.1	35.1	33*	35.1	35.1	35.1
	Exceedance Level	-	-	-18.3	-16.7	-11.9	-7.5	-5.6	-5	0	-6.5	-6.5	-6.5
H16	Site Specific Noise Limit L_{A90}	43	43	43	43	43	43	41.7	41.5	41.4	41.4	41.4	41.4
	Predicted Wind Turbine Noise L_{A90}	-	-	19.9	21.5	26.3	30.7	31.5	31.5	31.5	31.5	31.5	31.5
	Exceedance Level	-	-	-23.1	-21.5	-16.7	-12.3	-10.2	-10	-9.9	-9.9	-9.9	-9.9
H17	Site Specific Noise Limit L_{A90}	43	43	43	43	43	43	43	43	43	43	43	43
	Predicted Wind Turbine Noise L_{A90}	-	-	19.4	21	25.8	30.2	31	31	31	31	31	31
	Exceedance Level	-	-	-23.6	-22	-17.2	-12.8	-12	-12	-12	-12	-12	-12
H18	Site Specific Noise Limit L_{A90}	43	43	43	43	43	43	41.9	41.7	41.7	41.7	41.7	41.7
	Predicted Wind Turbine Noise L_{A90}	-	-	19.1	20.7	25.5	29.9	30.7	30.7	30.7	30.7	30.7	30.7
	Exceedance Level	-	-	-23.9	-22.3	-17.5	-13.1	-11.2	-11	-11	-11	-11	-11

Location		Wind Speed (ms^{-1}) as standardised to 10 m height											
		1	2	3	4	5	6	7	8	9	10	11	12
H19	Site Specific Noise Limit L_{A90}	43	43	43	43	43	43	43	43	43	44.1	44.1	44.1
	Predicted Wind Turbine Noise L_{A90}	-	-	19.6	21.2	26	30.4	31.2	31.2	31.2	31.2	31.2	31.2
	Exceedance Level	-	-	-23.4	-21.8	-17	-12.6	-11.8	-11.8	-11.8	-12.9	-12.9	-12.9
H20	Site Specific Noise Limit L_{A90}	43	43	43	43	43	43	43	43	43	43	43	43
	Predicted Wind Turbine Noise L_{A90}	-	-	19.9	21.5	26.3	30.7	31.5	31.5	31.5	31.5	31.5	31.5
	Exceedance Level	-	-	-23.1	-21.5	-16.7	-12.3	-11.5	-11.5	-11.5	-11.5	-11.5	-11.5
H21	Site Specific Noise Limit L_{A90}	33	33	33	33	33	33	33	33	33	33.9	33.9	33.9
	Predicted Wind Turbine Noise L_{A90}	-	-	19.8	21.4	26.2	30.6	31.4	31.4	31.4	31.4	31.4	31.4
	Exceedance Level	-	-	-13.2	-11.6	-6.8	-2.4	-1.6	-1.6	-1.6	-2.5	-2.5	-2.5
H22	Site Specific Noise Limit L_{A90}	40.4	40.4	40.4	40.4	40.4	40.4	33	33	33	33.9	33.9	33.9
	Predicted Wind Turbine Noise L_{A90}	-	-	21.5	23.1	27.9	32.3	33*	33*	33*	33.1	33.1	33.1
	Exceedance Level	-	-	-18.9	-17.3	-12.5	-8.1	0	0	0	-0.8	-0.8	-0.8
H23	Site Specific Noise Limit L_{A90}	33	33	33	33	33	33	33	33	33	33.9	33.9	33.9
	Predicted Wind Turbine Noise L_{A90}	-	-	19.7	21.3	26.1	30.5	31.3	31.3	31.3	31.3	31.3	31.3
	Exceedance Level	-	-	-13.3	-11.7	-6.9	-2.5	-1.7	-1.7	-1.7	-2.6	-2.6	-2.6
H24	Site Specific Noise Limit L_{A90}	43	43	43	43	43	43	42.1	42	41.9	41.9	41.9	41.9
	Predicted Wind Turbine Noise L_{A90}	-	-	18.1	19.7	24.5	28.9	29.7	29.7	29.7	29.7	29.7	29.7
	Exceedance Level	-	-	-24.9	-23.3	-18.5	-14.1	-12.4	-12.3	-12.2	-12.2	-12.2	-12.2
H25	Site Specific Noise Limit L_{A90}	42.1	42.1	42.1	42.1	42.1	42.1	41.7	41.6	41.6	41.6	41.6	41.6
	Predicted Wind Turbine Noise L_{A90}	-	-	18.7	20.3	25.1	29.5	30.3	30.3	30.3	30.3	30.3	30.3
	Exceedance Level	-	-	-23.4	-21.8	-17	-12.6	-11.4	-11.3	-11.3	-11.3	-11.3	-11.3
H26	Site Specific Noise Limit L_{A90}	33	33	33	33	33	33	33	33	33	33.9	33.9	33.9
	Predicted Wind Turbine Noise L_{A90}	-	-	19.4	21	25.8	30.2	31	31	31	31	31	31
	Exceedance Level	-	-	-13.6	-12	-7.2	-2.8	-2	-2	-2	-2.9	-2.9	-2.9
H27	Site Specific Noise Limit L_{A90}	43	43	43	43	43	43	42.1	41.9	41.9	41.9	41.9	41.9
	Predicted Wind Turbine Noise L_{A90}	-	-	17.9	19.5	24.3	28.7	29.5	29.5	29.5	29.5	29.5	29.5
	Exceedance Level	-	-	-25.1	-23.5	-18.7	-14.3	-12.6	-12.4	-12.4	-12.4	-12.4	-12.4

Location		Wind Speed (ms^{-1}) as standardised to 10 m height											
		1	2	3	4	5	6	7	8	9	10	11	12
H28	Site Specific Noise Limit L_{A90}	33	33	33	33	33	33	33	33	33	33.9	33.9	33.9
	Predicted Wind Turbine Noise L_{A90}	-	-	19.3	20.9	25.7	30.1	30.9	30.9	30.9	30.9	30.9	30.9
	Exceedance Level	-	-	-13.7	-12.1	-7.3	-2.9	-2.1	-2.1	-2.1	-3	-3	-3
H29	Site Specific Noise Limit L_{A90}	33	33	33	33	33	33	33	33	33	33.9	33.9	33.9
	Predicted Wind Turbine Noise L_{A90}	-	-	19.2	20.8	25.6	30	30.8	30.8	30.8	30.8	30.8	30.8
	Exceedance Level	-	-	-13.8	-12.2	-7.4	-3	-2.2	-2.2	-2.2	-3.1	-3.1	-3.1
H30	Site Specific Noise Limit L_{A90}	43	43	43	43	43	43	43	43	43	43	43	43
	Predicted Wind Turbine Noise L_{A90}	-	-	19.4	21	25.8	30.2	31	31	31	31	31	31
	Exceedance Level	-	-	-23.6	-22	-17.2	-12.8	-12	-12	-12	-12	-12	-12
H31	Site Specific Noise Limit L_{A90}	43	43	43	43	43	43	43	43	43	44.1	44.1	44.1
	Predicted Wind Turbine Noise L_{A90}	-	-	19.4	21	25.8	30.2	31	31	31	31	31	31
	Exceedance Level	-	-	-23.6	-22	-17.2	-12.8	-12	-12	-12	-13.1	-13.1	-13.1
H32	Site Specific Noise Limit L_{A90}	43	43	43	43	43	43	43	43	43	44.1	44.1	44.1
	Predicted Wind Turbine Noise L_{A90}	-	-	18.3	19.9	24.7	29.1	29.9	29.9	29.9	29.9	29.9	29.9
	Exceedance Level	-	-	-24.7	-23.1	-18.3	-13.9	-13.1	-13.1	-13.1	-14.2	-14.2	-14.2
H33	Site Specific Noise Limit L_{A90}	43	43	43	43	43	43	43	43	43	44.1	44.1	44.1
	Predicted Wind Turbine Noise L_{A90}	-	-	18.4	20	24.8	29.2	30	30	30	30	30	30
	Exceedance Level	-	-	-24.6	-23	-18.2	-13.8	-13	-13	-13	-14.1	-14.1	-14.1
H34	Site Specific Noise Limit L_{A90}	-	-	-	-	-	-	-	-	-	-	-	-
	Predicted Wind Turbine Noise L_{A90}	-	-	-	-	-	-	-	-	-	-	-	-
	Exceedance Level	-	-	-	-	-	-	-	-	-	-	-	-
H35	Site Specific Noise Limit L_{A90}	33	33	33	33	33	33	33	33	33	33.9	33.9	33.9
	Predicted Wind Turbine Noise L_{A90}	-	-	19	20.6	25.4	29.8	30.6	30.6	30.6	30.6	30.6	30.6
	Exceedance Level	-	-	-14	-12.4	-7.6	-3.2	-2.4	-2.4	-2.4	-3.3	-3.3	-3.3
H36	Site Specific Noise Limit L_{A90}	33	33	33	33	33	33	33	33	33	33.9	33.9	33.9
	Predicted Wind Turbine Noise L_{A90}	-	-	18.9	20.5	25.3	29.7	30.5	30.5	30.5	30.5	30.5	30.5
	Exceedance Level	-	-	-14.1	-12.5	-7.7	-3.3	-2.5	-2.5	-2.5	-3.4	-3.4	-3.4

Location		Wind Speed (ms^{-1}) as standardised to 10 m height											
		1	2	3	4	5	6	7	8	9	10	11	12
H37	Site Specific Noise Limit L_{A90}	43	43	43	43	43	43	43	43	43	44.1	44.1	44.1
	Predicted Wind Turbine Noise L_{A90}	-	-	18.7	20.3	25.1	29.5	30.2	30.2	30.2	30.2	30.2	30.2
	Exceedance Level	-	-	-24.3	-22.7	-17.9	-13.5	-12.8	-12.8	-12.8	-13.9	-13.9	-13.9
H38	Site Specific Noise Limit L_{A90}	33	33	33	33	33	33	33	33	33	33.9	33.9	33.9
	Predicted Wind Turbine Noise L_{A90}	-	-	18.8	20.4	25.2	29.6	30.4	30.4	30.4	30.4	30.4	30.4
	Exceedance Level	-	-	-14.2	-12.6	-7.8	-3.4	-2.6	-2.6	-2.6	-3.5	-3.5	-3.5
H39	Site Specific Noise Limit L_{A90}	33	33	33	33	33	33	33	33	33	33.9	33.9	33.9
	Predicted Wind Turbine Noise L_{A90}	-	-	18.7	20.3	25.1	29.5	30.3	30.3	30.3	30.3	30.3	30.3
	Exceedance Level	-	-	-14.3	-12.7	-7.9	-3.5	-2.7	-2.7	-2.7	-3.6	-3.6	-3.6
H40	Site Specific Noise Limit L_{A90}	43	43	43	43	43	43	43	43	43	44.1	44.1	44.1
	Predicted Wind Turbine Noise L_{A90}	-	-	18.1	19.7	24.5	28.9	29.7	29.7	29.7	29.7	29.7	29.7
	Exceedance Level	-	-	-24.9	-23.3	-18.5	-14.1	-13.3	-13.3	-13.3	-14.4	-14.4	-14.4
H41	Site Specific Noise Limit L_{A90}	33	33	33	33	33	33	33	33	33	33.9	33.9	33.9
	Predicted Wind Turbine Noise L_{A90}	-	-	20.6	22.2	27	31.4	32.2	32.2	32.2	32.2	32.2	32.2
	Exceedance Level	-	-	-12.4	-10.8	-6	-1.6	-0.8	-0.8	-0.8	-1.7	-1.7	-1.7
H42	Site Specific Noise Limit L_{A90}	-	-	-	-	-	-	-	-	-	-	-	-
	Predicted Wind Turbine Noise L_{A90}	-	-	-	-	-	-	-	-	-	-	-	-
	Exceedance Level	-	-	-	-	-	-	-	-	-	-	-	-
H43	Site Specific Noise Limit L_{A90}	43	43	43	43	43	43	43	43	43	44.1	44.1	44.1
	Predicted Wind Turbine Noise L_{A90}	-	-	18.2	19.8	24.6	29	29.7	29.7	29.7	29.7	29.7	29.7
	Exceedance Level	-	-	-24.8	-23.2	-18.4	-14	-13.3	-13.3	-13.3	-14.4	-14.4	-14.4
H44	Site Specific Noise Limit L_{A90}	33	33	33	33	33	33	33	33	33	33.9	33.9	33.9
	Predicted Wind Turbine Noise L_{A90}	-	-	20.4	22	26.8	31.2	32	32	32	32	32	32
	Exceedance Level	-	-	-12.6	-11	-6.2	-1.8	-1	-1	-1	-1.9	-1.9	-1.9
H45	Site Specific Noise Limit L_{A90}	33	33	33	33	33	33	33	33	33	33.9	33.9	33.9
	Predicted Wind Turbine Noise L_{A90}	-	-	18.5	20.1	24.9	29.3	30.1	30.1	30.1	30.1	30.1	30.1
	Exceedance Level	-	-	-14.5	-12.9	-8.1	-3.7	-2.9	-2.9	-2.9	-3.8	-3.8	-3.8

Location		Wind Speed (ms^{-1}) as standardised to 10 m height											
		1	2	3	4	5	6	7	8	9	10	11	12
H46	Site Specific Noise Limit L_{A90}	33	33	33	33	33	33	33	33	33	33.9	33.9	33.9
	Predicted Wind Turbine Noise L_{A90}	-	-	20.3	21.9	26.7	31.1	31.9	31.9	31.9	31.9	31.9	31.9
	Exceedance Level	-	-	-12.7	-11.1	-6.3	-1.9	-1.1	-1.1	-1.1	-2	-2	-2
H47	Site Specific Noise Limit L_{A90}	43	43	43	43	43	43	43	43	43	44.1	44.1	44.1
	Predicted Wind Turbine Noise L_{A90}	-	-	18.5	20.1	24.9	29.3	30.1	30.1	30.1	30.1	30.1	30.1
	Exceedance Level	-	-	-24.5	-22.9	-18.1	-13.7	-12.9	-12.9	-12.9	-14	-14	-14
H48	Site Specific Noise Limit L_{A90}	33	33	33	33	33	33	33	33	33	33.9	33.9	33.9
	Predicted Wind Turbine Noise L_{A90}	-	-	20.4	22	26.8	31.2	31.9	31.9	31.9	31.9	31.9	31.9
	Exceedance Level	-	-	-12.6	-11	-6.2	-1.8	-1.1	-1.1	-1.1	-2	-2	-2
H49	Site Specific Noise Limit L_{A90}	43	43	43	43	43	43	43	43	43	43	43	43
	Predicted Wind Turbine Noise L_{A90}	-	-	18.2	19.8	24.6	29	29.8	29.8	29.8	29.8	29.8	29.8
	Exceedance Level	-	-	-24.8	-23.2	-18.4	-14	-13.2	-13.2	-13.2	-13.2	-13.2	-13.2
H50	Site Specific Noise Limit L_{A90}	33	33	33	33	33	33	33	33	33	33.9	33.9	33.9
	Predicted Wind Turbine Noise L_{A90}	-	-	17.6	19.2	24	28.4	29.2	29.2	29.2	29.2	29.2	29.2
	Exceedance Level	-	-	-15.4	-13.8	-9	-4.6	-3.8	-3.8	-3.8	-4.7	-4.7	-4.7
H51	Site Specific Noise Limit L_{A90}	33	33	33	33	33	33	33	33	33	33.9	33.9	33.9
	Predicted Wind Turbine Noise L_{A90}	-	-	17.7	19.3	24.1	28.5	29.2	29.2	29.2	29.2	29.2	29.2
	Exceedance Level	-	-	-15.3	-13.7	-8.9	-4.5	-3.8	-3.8	-3.8	-4.7	-4.7	-4.7
H52	Site Specific Noise Limit L_{A90}	33	33	33	33	33	33	33	33	33	33.9	33.9	33.9
	Predicted Wind Turbine Noise L_{A90}	-	-	17.5	19.1	23.9	28.3	29.1	29.1	29.1	29.1	29.1	29.1
	Exceedance Level	-	-	-15.5	-13.9	-9.1	-4.7	-3.9	-3.9	-3.9	-4.8	-4.8	-4.8
H53	Site Specific Noise Limit L_{A90}	43	43	43	43	43	43	43	43	43	43	43	43
	Predicted Wind Turbine Noise L_{A90}	-	-	20.1	21.7	26.5	30.9	31.7	31.7	31.7	31.7	31.7	31.7
	Exceedance Level	-	-	-22.9	-21.3	-16.5	-12.1	-11.3	-11.3	-11.3	-11.3	-11.3	-11.3
H54	Site Specific Noise Limit L_{A90}	33	33	33	33	33	33	33	33	33	33.9	33.9	33.9
	Predicted Wind Turbine Noise L_{A90}	-	-	18.3	19.9	24.7	29.1	29.9	29.9	29.9	29.9	29.9	29.9
	Exceedance Level	-	-	-14.7	-13.1	-8.3	-3.9	-3.1	-3.1	-3.1	-4	-4	-4

Location		Wind Speed (ms^{-1}) as standardised to 10 m height											
		1	2	3	4	5	6	7	8	9	10	11	12
H55	Site Specific Noise Limit L_{A90}	33	33	33	33	33	33	33	33	33	33.9	33.9	33.9
	Predicted Wind Turbine Noise L_{A90}	-	-	21.9	23.5	28.3	32.7	33*	33*	33*	33.5	33.5	33.5
	Exceedance Level	-	-	-11.1	-9.5	-4.7	-0.3	0	0	0	-0.4	-0.4	-0.4
H56	Site Specific Noise Limit L_{A90}	33	33	33	33	33	33	33	33	33	33.9	33.9	33.9
	Predicted Wind Turbine Noise L_{A90}	-	-	18.2	19.8	24.6	29	29.8	29.8	29.8	29.8	29.8	29.8
	Exceedance Level	-	-	-14.8	-13.2	-8.4	-4	-3.2	-3.2	-3.2	-4.1	-4.1	-4.1
H57	Site Specific Noise Limit L_{A90}	43	43	43	43	43	43	43	43	43	43	43	43
	Predicted Wind Turbine Noise L_{A90}	-	-	19.1	20.8	25.6	29.9	30.7	30.7	30.7	30.7	30.7	30.7
	Exceedance Level	-	-	-23.9	-22.2	-17.4	-13.1	-12.3	-12.3	-12.3	-12.3	-12.3	-12.3
H58	Site Specific Noise Limit L_{A90}	33	33	33	33	33	33	33	33	33	33.9	33.9	33.9
	Predicted Wind Turbine Noise L_{A90}	-	-	21.2	22.8	27.6	32	32.7	32.7	32.7	32.7	32.7	32.7
	Exceedance Level	-	-	-11.8	-10.2	-5.4	-1	-0.3	-0.3	-0.3	-1.2	-1.2	-1.2
H59	Site Specific Noise Limit L_{A90}	33	33	33	33	33	33	33	33	33	33.9	33.9	33.9
	Predicted Wind Turbine Noise L_{A90}	-	-	17.2	18.8	23.6	28	28.8	28.8	28.8	28.8	28.8	28.8
	Exceedance Level	-	-	-15.8	-14.2	-9.4	-5	-4.2	-4.2	-4.2	-5.1	-5.1	-5.1
H60	Site Specific Noise Limit L_{A90}	33	33	33	33	33	33	33	33	33	33.9	33.9	33.9
	Predicted Wind Turbine Noise L_{A90}	-	-	21.3	22.9	27.7	32.1	32.9	32.9	32.9	32.9	32.9	32.9
	Exceedance Level	-	-	-11.7	-10.1	-5.3	-0.9	-0.1	-0.1	-0.1	-1	-1	-1
H61	Site Specific Noise Limit L_{A90}	41.8	41.8	41.8	41.8	41.8	41.8	41.3	41.2	41.2	41.2	41.2	41.2
	Predicted Wind Turbine Noise L_{A90}	-	-	16.9	18.5	23.3	27.7	28.5	28.5	28.5	28.5	28.5	28.5
	Exceedance Level	-	-	-24.9	-23.3	-18.5	-14.1	-12.8	-12.7	-12.7	-12.7	-12.7	-12.7
H62	Site Specific Noise Limit L_{A90}	43	43	43	43	43	43	43	43	43	44.1	44.1	44.1
	Predicted Wind Turbine Noise L_{A90}	-	-	16.7	18.3	23.1	27.5	28.3	28.3	28.3	28.3	28.3	28.3
	Exceedance Level	-	-	-26.3	-24.7	-19.9	-15.5	-14.7	-14.7	-14.7	-15.8	-15.8	-15.8
H63	Site Specific Noise Limit L_{A90}	43	43	43	43	43	43	43	43	43	44.1	44.1	44.1
	Predicted Wind Turbine Noise L_{A90}	-	-	16.6	18.2	23	27.4	28.2	28.2	28.2	28.2	28.2	28.2
	Exceedance Level	-	-	-26.4	-24.8	-20	-15.6	-14.8	-14.8	-14.8	-15.9	-15.9	-15.9

Location		Wind Speed (ms^{-1}) as standardised to 10 m height											
		1	2	3	4	5	6	7	8	9	10	11	12
H64	Site Specific Noise Limit L_{A90}	43	43	43	43	43	43	43	43	43	43	43	43
	Predicted Wind Turbine Noise L_{A90}	-	-	17.7	19.3	24.1	28.5	29.3	29.3	29.3	29.3	29.3	29.3
	Exceedance Level	-	-	-25.3	-23.7	-18.9	-14.5	-13.7	-13.7	-13.7	-13.7	-13.7	-13.7
H65	Site Specific Noise Limit L_{A90}	43	43	43	43	43	43	43	43	43	44.1	44.1	44.1
	Predicted Wind Turbine Noise L_{A90}	-	-	17.3	18.9	23.7	28.1	28.9	28.9	28.9	28.9	28.9	28.9
	Exceedance Level	-	-	-25.7	-24.1	-19.3	-14.9	-14.1	-14.1	-14.1	-15.2	-15.2	-15.2
H66	Site Specific Noise Limit L_{A90}	43	43	43	43	43	43	43	43	43	43	43	43
	Predicted Wind Turbine Noise L_{A90}	-	-	17.7	19.3	24.1	28.5	29.3	29.3	29.3	29.3	29.3	29.3
	Exceedance Level	-	-	-25.3	-23.7	-18.9	-14.5	-13.7	-13.7	-13.7	-13.7	-13.7	-13.7
H67	Site Specific Noise Limit L_{A90}	33	33	33	33	33	33	33	33	33	33.9	33.9	33.9
	Predicted Wind Turbine Noise L_{A90}	-	-	17.6	19.2	24	28.4	29.2	29.2	29.2	29.2	29.2	29.2
	Exceedance Level	-	-	-15.4	-13.8	-9	-4.6	-3.8	-3.8	-3.8	-4.7	-4.7	-4.7
H68	Site Specific Noise Limit L_{A90}	43	43	43	43	43	43	43	43	43	44.1	44.1	44.1
	Predicted Wind Turbine Noise L_{A90}	-	-	16.5	18.1	22.9	27.3	28.1	28.1	28.1	28.1	28.1	28.1
	Exceedance Level	-	-	-26.5	-24.9	-20.1	-15.7	-14.9	-14.9	-14.9	-16	-16	-16
H69	Site Specific Noise Limit L_{A90}	43	43	43	43	43	43	43	43	43	44.1	44.1	44.1
	Predicted Wind Turbine Noise L_{A90}	-	-	17.2	18.8	23.6	28	28.8	28.8	28.8	28.8	28.8	28.8
	Exceedance Level	-	-	-25.8	-24.2	-19.4	-15	-14.2	-14.2	-14.2	-15.3	-15.3	-15.3
H70	Site Specific Noise Limit L_{A90}	33	33	33	33	33	33	33	33	33	33.9	33.9	33.9
	Predicted Wind Turbine Noise L_{A90}	-	-	16.9	18.5	23.4	27.7	28.5	28.5	28.5	28.5	28.5	28.5
	Exceedance Level	-	-	-16.1	-14.5	-9.6	-5.3	-4.5	-4.5	-4.5	-5.4	-5.4	-5.4
H71	Site Specific Noise Limit L_{A90}	33	33	33	33	33	33	33	33	33	33	33	33
	Predicted Wind Turbine Noise L_{A90}	-	-	17.5	19.1	23.9	28.3	29.1	29.1	29.1	29.1	29.1	29.1
	Exceedance Level	-	-	-15.5	-13.9	-9.1	-4.7	-3.9	-3.9	-3.9	-3.9	-3.9	-3.9
H72	Site Specific Noise Limit L_{A90}	43	43	43	43	43	43	43	43	43	44.1	44.1	44.1
	Predicted Wind Turbine Noise L_{A90}	-	-	16.4	18	22.8	27.2	28	28	28	28	28	28
	Exceedance Level	-	-	-26.6	-25	-20.2	-15.8	-15	-15	-15	-16.1	-16.1	-16.1

Location		Wind Speed (ms^{-1}) as standardised to 10 m height											
		1	2	3	4	5	6	7	8	9	10	11	12
H73	Site Specific Noise Limit L_{A90}	43	43	43	43	43	43	42	41.8	41.8	41.8	41.8	41.8
	Predicted Wind Turbine Noise L_{A90}	-	-	16.4	18	22.9	27.2	28	28	28	28	28	28
	Exceedance Level	-	-	-26.6	-25	-20.1	-15.8	-14	-13.8	-13.8	-13.8	-13.8	-13.8
H74	Site Specific Noise Limit L_{A90}	43	43	43	43	43	43	43	43	43	44.1	44.1	44.1
	Predicted Wind Turbine Noise L_{A90}	-	-	16.4	18	22.8	27.2	28	28	28	28	28	28
	Exceedance Level	-	-	-26.6	-25	-20.2	-15.8	-15	-15	-15	-16.1	-16.1	-16.1
H75	Site Specific Noise Limit L_{A90}	33	33	33	33	33	33	33	33	33	33.9	33.9	33.9
	Predicted Wind Turbine Noise L_{A90}	-	-	16.9	18.5	23.3	27.7	28.5	28.5	28.5	28.5	28.5	28.5
	Exceedance Level	-	-	-16.1	-14.5	-9.7	-5.3	-4.5	-4.5	-4.5	-5.4	-5.4	-5.4
H76	Site Specific Noise Limit L_{A90}	43	43	43	43	43	43	43	43	43	44.1	44.1	44.1
	Predicted Wind Turbine Noise L_{A90}	-	-	16.9	18.5	23.3	27.7	28.5	28.5	28.5	28.5	28.5	28.5
	Exceedance Level	-	-	-26.1	-24.5	-19.7	-15.3	-14.5	-14.5	-14.5	-15.6	-15.6	-15.6
H77	Site Specific Noise Limit L_{A90}	43	43	43	43	43	43	43	43	43	44.1	44.1	44.1
	Predicted Wind Turbine Noise L_{A90}	-	-	17.5	19.1	23.9	28.3	29	29	29	29	29	29
	Exceedance Level	-	-	-25.5	-23.9	-19.1	-14.7	-14	-14	-14	-15.1	-15.1	-15.1
H78	Site Specific Noise Limit L_{A90}	43	43	43	43	43	43	43	43	43	44.1	44.1	44.1
	Predicted Wind Turbine Noise L_{A90}	-	-	17.4	19	23.8	28.2	29	29	29	29	29	29
	Exceedance Level	-	-	-25.6	-24	-19.2	-14.8	-14	-14	-14	-15.1	-15.1	-15.1
H79	Site Specific Noise Limit L_{A90}	40	40	40	40	40	40	33	33	33	33.9	33.9	33.9
	Predicted Wind Turbine Noise L_{A90}	-	-	17.1	18.7	23.5	27.9	28.7	28.7	28.7	28.7	28.7	28.7
	Exceedance Level	-	-	-22.9	-21.3	-16.5	-12.1	-4.3	-4.3	-4.3	-5.2	-5.2	-5.2
H80	Site Specific Noise Limit L_{A90}	43	43	43	43	43	43	43	43	43	43	43	43
	Predicted Wind Turbine Noise L_{A90}	-	-	20.1	21.8	26.6	30.9	31.7	31.7	31.7	31.7	31.7	31.7
	Exceedance Level	-	-	-22.9	-21.2	-16.4	-12.1	-11.3	-11.3	-11.3	-11.3	-11.3	-11.3
H81	Site Specific Noise Limit L_{A90}	43	43	43	43	43	43	43	43	43	44.1	44.1	44.1
	Predicted Wind Turbine Noise L_{A90}	-	-	17.1	18.7	23.5	27.9	28.7	28.7	28.7	28.7	28.7	28.7
	Exceedance Level	-	-	-25.9	-24.3	-19.5	-15.1	-14.3	-14.3	-14.3	-15.4	-15.4	-15.4

Location		Wind Speed (ms^{-1}) as standardised to 10 m height											
		1	2	3	4	5	6	7	8	9	10	11	12
H82	Site Specific Noise Limit L_{A90}	43	43	43	43	43	43	43	43	43	44.1	44.1	44.1
	Predicted Wind Turbine Noise L_{A90}	-	-	17	18.6	23.4	27.8	28.6	28.6	28.6	28.6	28.6	28.6
	Exceedance Level	-	-	-26	-24.4	-19.6	-15.2	-14.4	-14.4	-14.4	-15.5	-15.5	-15.5
H83	Site Specific Noise Limit L_{A90}	43	43	43	43	43	43	43	43	43	44.1	44.1	44.1
	Predicted Wind Turbine Noise L_{A90}	-	-	17.4	19	23.8	28.2	29	29	29	29	29	29
	Exceedance Level	-	-	-25.6	-24	-19.2	-14.8	-14	-14	-14	-15.1	-15.1	-15.1
H84	Site Specific Noise Limit L_{A90}	43	43	43	43	43	43	43	43	43	44.1	44.1	44.1
	Predicted Wind Turbine Noise L_{A90}	-	-	17	18.6	23.4	27.8	28.6	28.6	28.6	28.6	28.6	28.6
	Exceedance Level	-	-	-26	-24.4	-19.6	-15.2	-14.4	-14.4	-14.4	-15.5	-15.5	-15.5
H85	Site Specific Noise Limit L_{A90}	43	43	43	43	43	43	42.2	42	42	43.3	43.3	43.3
	Predicted Wind Turbine Noise L_{A90}	-	-	16.7	18.3	23.1	27.5	28.3	28.3	28.3	28.3	28.3	28.3
	Exceedance Level	-	-	-26.3	-24.7	-19.9	-15.5	-13.9	-13.7	-13.7	-15	-15	-15
H86	Site Specific Noise Limit L_{A90}	33	33	33	33	33	33	33	33	33	33.9	33.9	33.9
	Predicted Wind Turbine Noise L_{A90}	-	-	16.8	18.4	23.2	27.6	28.4	28.4	28.4	28.4	28.4	28.4
	Exceedance Level	-	-	-16.2	-14.6	-9.8	-5.4	-4.6	-4.6	-4.6	-5.5	-5.5	-5.5
H87	Site Specific Noise Limit L_{A90}	43	43	43	43	43	43	43	43	43	44.1	44.1	44.1
	Predicted Wind Turbine Noise L_{A90}	-	-	16.5	18.1	22.9	27.3	28.1	28.1	28.1	28.1	28.1	28.1
	Exceedance Level	-	-	-26.5	-24.9	-20.1	-15.7	-14.9	-14.9	-14.9	-16	-16	-16
H88	Site Specific Noise Limit L_{A90}	40.1	40.1	40.1	40.1	40.1	40.1	33	33	33	33.9	33.9	33.9
	Predicted Wind Turbine Noise L_{A90}	-	-	17.8	19.4	24.2	28.6	29.3	29.3	29.3	29.3	29.3	29.3
	Exceedance Level	-	-	-22.3	-20.7	-15.9	-11.5	-3.7	-3.7	-3.7	-4.6	-4.6	-4.6
H89	Site Specific Noise Limit L_{A90}	43	43	43	43	43	43	43	43	43	43	43	43
	Predicted Wind Turbine Noise L_{A90}	-	-	18.3	19.9	24.7	29.1	29.9	29.9	29.9	29.9	29.9	29.9
	Exceedance Level	-	-	-24.7	-23.1	-18.3	-13.9	-13.1	-13.1	-13.1	-13.1	-13.1	-13.1
H90	Site Specific Noise Limit L_{A90}	33	33	33	33	33	33	33	33	33	33.9	33.9	33.9
	Predicted Wind Turbine Noise L_{A90}	-	-	16	17.7	22.5	26.8	27.6	27.6	27.6	27.6	27.6	27.6
	Exceedance Level	-	-	-17	-15.3	-10.5	-6.2	-5.4	-5.4	-5.4	-6.3	-6.3	-6.3

Location		Wind Speed (ms^{-1}) as standardised to 10 m height											
		1	2	3	4	5	6	7	8	9	10	11	12
H91	Site Specific Noise Limit L_{A90}	43	43	43	43	43	43	43	43	43	43	43	43
	Predicted Wind Turbine Noise L_{A90}	-	-	19	20.7	25.5	29.8	30.6	30.6	30.6	30.6	30.6	30.6
	Exceedance Level	-	-	-24	-22.3	-17.5	-13.2	-12.4	-12.4	-12.4	-12.4	-12.4	-12.4
H92	Site Specific Noise Limit L_{A90}	43	43	43	43	43	43	42.1	42	41.9	41.9	41.9	41.9
	Predicted Wind Turbine Noise L_{A90}	-	-	14.5	16.1	20.9	25.3	26.1	26.1	26.1	26.1	26.1	26.1
	Exceedance Level	-	-	-28.5	-26.9	-22.1	-17.7	-16	-15.9	-15.8	-15.8	-15.8	-15.8
H93	Site Specific Noise Limit L_{A90}	43	43	43	43	43	43	43	43	43	44.1	44.1	44.1
	Predicted Wind Turbine Noise L_{A90}	-	-	16.9	18.5	23.3	27.7	28.5	28.5	28.5	28.5	28.5	28.5
	Exceedance Level	-	-	-26.1	-24.5	-19.7	-15.3	-14.5	-14.5	-14.5	-15.6	-15.6	-15.6
H94	Site Specific Noise Limit L_{A90}	43	43	43	43	43	43	43	43	43	44.1	44.1	44.1
	Predicted Wind Turbine Noise L_{A90}	-	-	16.6	18.2	23	27.4	28.2	28.2	28.2	28.2	28.2	28.2
	Exceedance Level	-	-	-26.4	-24.8	-20	-15.6	-14.8	-14.8	-14.8	-15.9	-15.9	-15.9
H95	Site Specific Noise Limit L_{A90}	43	43	43	43	43	43	43	43	43	43	43	43
	Predicted Wind Turbine Noise L_{A90}	-	-	18.1	19.7	24.5	28.9	29.7	29.7	29.7	29.7	29.7	29.7
	Exceedance Level	-	-	-24.9	-23.3	-18.5	-14.1	-13.3	-13.3	-13.3	-13.3	-13.3	-13.3
H96	Site Specific Noise Limit L_{A90}	43	43	43	43	43	43	43	43	43	44.1	44.1	44.1
	Predicted Wind Turbine Noise L_{A90}	-	-	16.8	18.4	23.2	27.6	28.4	28.4	28.4	28.4	28.4	28.4
	Exceedance Level	-	-	-26.2	-24.6	-19.8	-15.4	-14.6	-14.6	-14.6	-15.7	-15.7	-15.7
H97	Site Specific Noise Limit L_{A90}	43	43	43	43	43	43	43	43	43	43	43	43
	Predicted Wind Turbine Noise L_{A90}	-	-	17.8	19.4	24.3	28.6	29.4	29.4	29.4	29.4	29.4	29.4
	Exceedance Level	-	-	-25.2	-23.6	-18.7	-14.4	-13.6	-13.6	-13.6	-13.6	-13.6	-13.6
H98	Site Specific Noise Limit L_{A90}	43	43	43	43	43	43	43	43	43	43	43	43
	Predicted Wind Turbine Noise L_{A90}	-	-	18.8	20.4	25.2	29.6	30.4	30.4	30.4	30.4	30.4	30.4
	Exceedance Level	-	-	-24.2	-22.6	-17.8	-13.4	-12.6	-12.6	-12.6	-12.6	-12.6	-12.6
H99	Site Specific Noise Limit L_{A90}	43	43	43	43	43	43	43	43	43	44.1	44.1	44.1
	Predicted Wind Turbine Noise L_{A90}	-	-	18	19.6	24.4	28.8	29.6	29.6	29.6	29.6	29.6	29.6
	Exceedance Level	-	-	-25	-23.4	-18.6	-14.2	-13.4	-13.4	-13.4	-14.5	-14.5	-14.5

Location		Wind Speed (ms^{-1}) as standardised to 10 m height											
		1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
H100	Site Specific Noise Limit L_{A90}	43	43	43	43	43	43	42.2	42	42	43.3	43.3	43.3
	Predicted Wind Turbine Noise L_{A90}	-	-	17.2	18.8	23.6	28	28.8	28.8	28.8	28.8	28.8	28.8
	Exceedance Level	-	-	-25.8	-24.2	-19.4	-15	-13.4	-13.2	-13.2	-14.5	-14.5	-14.5
H101	Site Specific Noise Limit L_{A90}	43	43	43	43	43	43	42.1	41.9	41.9	43.2	43.2	43.2
	Predicted Wind Turbine Noise L_{A90}	-	-	17.3	18.9	23.7	28.1	28.9	28.9	28.9	28.9	28.9	28.9
	Exceedance Level	-	-	-25.7	-24.1	-19.3	-14.9	-13.2	-13	-13	-14.3	-14.3	-14.3
H102	Site Specific Noise Limit L_{A90}	43	43	43	43	43	43	42.1	41.9	41.9	43.3	43.3	43.3
	Predicted Wind Turbine Noise L_{A90}	-	-	17.3	18.9	23.7	28.1	28.9	28.9	28.9	28.9	28.9	28.9
	Exceedance Level	-	-	-25.7	-24.1	-19.3	-14.9	-13.2	-13	-13	-14.4	-14.4	-14.4

**Predicted levels assume mode management is applied to meet the Site Specific Noise Limit. This would only apply for certain wind directions.*

Annex 7 – Topographical Corrections / Turbine Coordinates

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 (July 2011)

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	T ID	Noise Senstive Receptor 1–102
Barnastooka T1	80	1	[illegible]
Barnastooka T2	80	2	[illegible]
Barnastooka T3	80	3	[illegible]
Barnastooka T4	80	4	[illegible]
Barnastooka T5	80	5	[illegible]
Barnastooka T6	80	6	[illegible]
Barnastooka T7	80	7	[illegible]
Barnastooka T8	80	8	[illegible]
Barnastooka T9	80	9	[illegible]
Barnastooka T10	80	10	[illegible]
Barnastooka T11	80	11	[illegible]
Barnastooka T12	80	12	[illegible]
Barnastooka T13	80	13	[illegible]
Barnastooka T14	80	14	[illegible]
Sillahertane T1	55	15	[illegible]
Sillahertane T2	55	16	[illegible]
Sillahertane T3	55	17	[illegible]
Sillahertane T4	55	18	[illegible]
Sillahertane T5	55	19	[illegible]
Sillahertane T6	55	20	[illegible]
Sillahertane T7	55	21	[illegible]
Sillahertane T8	55	22	[illegible]
Sillahertane T9	55	23	[illegible]
Sillahertane T10	55	24	[illegible]
Grousemount T1	80	25	[illegible]
Grousemount T2	80	26	[illegible]
Grousemount T3	80	27	[illegible]
Grousemount T4	80	28	[illegible]
Grousemount T5	80	29	[illegible]
Grousemount T6	80	30	[illegible]
Grousemount T7	80	31	[illegible]
Grousemount T8	80	32	[illegible]
Grousemount T9	80	33	[illegible]
Grousemount T10	80	34	[illegible]
Grousemount T11	80	35	[illegible]
Grousemount T12	80	36	[illegible]
Grousemount T13	80	37	[illegible]
Grousemount T14	80	38	[illegible]
Grousemount T15	80	39	[illegible]
Grousemount T16	80	40	[illegible]
Grousemount T17	80	41	[illegible]
Grousemount T18	80	42	[illegible]
Grousemount T19	80	43	[illegible]
Grousemount T20	80	44	[illegible]
Grousemount T21	80	45	[illegible]
Grousemount T22	80	46	[illegible]
Grousemount T23	80	47	[illegible]
Grousemount T24	80	48	[illegible]
Midas T1	60	49	[illegible]
Midas T2	60	50	[illegible]
Midas T3	60	51	[illegible]
Midas T4	60	52	[illegible]
Midas T5	60	53	[illegible]
Midas T6	60	54	[illegible]
Midas T7	60	55	[illegible]
Midas T8	60	56	[illegible]
Midas T9	60	57	[illegible]
Midas T10	60	58	[illegible]
Midas T11	60	59	[illegible]
Midas T12	60	60	[illegible]
Midas T13	60	61	[illegible]
Midas T14	60	62	[illegible]
Midas T15	60	63	[illegible]
Midas T16	60	64	[illegible]
Midas T17	60	65	[illegible]
Midas T18	60	66	[illegible]
Midas T19	60	67	[illegible]
Midas T20	60	68	[illegible]
Midas T21	60	69	[illegible]
Midas T22	60	70	[illegible]
Midas T23	60	71	[illegible]
Gortyrahilly T1	103	107	[illegible]
Gortyrahilly T2	103	108	[illegible]
Gortyrahilly T3	103	109	[illegible]
Gortyrahilly T4	103	110	[illegible]
Gortyrahilly T5	103	111	[illegible]
Gortyrahilly T6	103	112	[illegible]
Gortyrahilly T7	103	113	[illegible]
Gortyrahilly T8	103	114	[illegible]
Gortyrahilly T9	103	115	[illegible]
Gortyrahilly T10	103	116	[illegible]
Gortyrahilly T11	103	117	[illegible]
Gortyrahilly T12	103	118	[illegible]
Gortyrahilly T13	103	119	[illegible]
Derragh T1	100	120	[illegible]
Derragh T2	100	121	[illegible]
Derragh T3	100	122	[illegible]
Derragh T4	100	123	[illegible]
Derragh T5	100	124	[illegible]
Derragh T6	100	125	[illegible]
Inchamore T1	103	126	[illegible]
Inchamore T2	103	127	[illegible]
Inchamore T3	103	128	[illegible]
Inchamore T4	103	129	[illegible]
Inchamore T5	103	130	[illegible]
Kilgarvan Repowering T1	99	137	[illegible]
Kilgarvan Repowering T2	99	138	[illegible]
Kilgarvan Repowering T3	99	139	[illegible]
Kilgarvan Repowering T4	99	140	[illegible]
Kilgarvan Repowering T5	99	141	[illegible]
Kilgarvan Repowering T6	99	142	[illegible]
Kilgarvan Repowering T7	99	143	[illegible]
Kilgarvan Repowering T8	99	144	[illegible]
Kilgarvan Repowering T9	99	145	[illegible]
Kilgarvan Repowering T10	99	146	[illegible]
Kilgarvan Repowering T11	99	147	[illegible]

Table 2: Wind Farms/ Turbines Modelled

Wind Farm	Easting	Northing	Height	Hub Height Modelled
Barnastooka T1	505948	571143	359	80
Barnastooka T2	506437	571225	333	80
Barnastooka T3	506129	571476	383	80
Barnastooka T4	506425	571723	382	80
Barnastooka T5	506730	571560	342	80
Barnastooka T6	506696	571932	382	80
Barnastooka T7	507037	571735	344	80
Barnastooka T8	507812	572278	321	80
Barnastooka T9	507292	572006	374	80
Barnastooka T10	507662	571953	338	80
Barnastooka T11	507411	571686	335	80
Barnastooka T12	507609	572446	360	80
Barnastooka T13	507251	572327	397	80
Barnastooka T14	506939	572339	400	80
Sillahertane T1	509582	571661	390	55
Sillahertane T2	509841	571723	385	55
Sillahertane T3	509724	571499	391	55
Sillahertane T4	509973	571562	388	55
Sillahertane T5	509829	571361	393	55
Sillahertane T6	510077	571408	392	55
Sillahertane T7	509958	571200	393	55
Sillahertane T8	510195	571252	400	55
Sillahertane T9	510466	571262	395	55
Sillahertane T10	510133	570950	390	55
Grousemount T1	506624	568798	511	80
Grousemount T2	507002	568740	459	80
Grousemount T3	507265	568635	415	80
Grousemount T4	507157	569036	468	80
Grousemount T5	507481	568948	415	80
Grousemount T6	508800	568340	477	80
Grousemount T7	509093	568573	459	80
Grousemount T8	509344	568845	470	80
Grousemount T9	509514	569124	490	80
Grousemount T10	509703	569379	497	80
Grousemount T11	509054	569052	423	80
Grousemount T12	509198	569375	444	80
Grousemount T13	508883	569305	416	80
Grousemount T14	508669	569609	385	80
Grousemount T15	509054	569690	396	80
Grousemount T16	508780	569963	384	80
Grousemount T17	509167	570035	339	80
Grousemount T18	510001	569988	363	80
Grousemount T19	510291	570185	427	80
Grousemount T20	509991	570327	395	80

Grousemount T21	509722	570520	362	80
Grousemount T22	509455	570978	302	80
Grousemount T23	509333	571215	339	80
Grousemount T24	509261	571464	328	80
Midas T1	511162	573674	367	60
Midas T2	511252	573937	380	60
Midas T3	511026	573859	371	60
Midas T4	510975	573683	360	60
Midas T5	510597	573829	384	60
Midas T6	510490	573960	400	60
Midas T7	510270	573763	363	60
Midas T8	510173	573925	376	60
Midas T9	510311	574114	401	60
Midas T10	510107	574157	395	60
Midas T11	509955	574056	377	60
Midas T12	509169	574605	348	60
Midas T13	509021	574463	345	60
Midas T14	508841	574371	328	60
Midas T15	508980	574685	346	60
Midas T16	508808	574595	350	60
Midas T17	508606	574467	333	60
Midas T18	509578	575090	329	60
Midas T19	509953	575148	354	60
Midas T20	510302	575265	377	60
Midas T21	510358	575612	399	60
Midas T22	509920	575625	401	60
Midas T23	509578	575522	371	60
Gortyrahilly T1	514680	571824	414	103
Gortyrahilly T2	515203	572167	395	103
Gortyrahilly T3	516129	571873	346	103
Gortyrahilly T4	516658	571817	340	103
Gortyrahilly T5	516169	572451	341	103
Gortyrahilly T6	515652	572675	365	103
Gortyrahilly T7	515484	572994	303	103
Gortyrahilly T8	515769	573427	290	103
Gortyrahilly T9	516329	572863	380	103
Gortyrahilly T10	516794	572484	306	103
Gortyrahilly T11	516819	573308	329	103
Gortyrahilly T12	517195	573067	286	103
Gortyrahilly T13	517592	572862	257	103
Derragh T1	517446	569894	242	100
Derragh T2	516405	570706	286	100
Derragh T3	516741	570457	285	100
Derragh T4	517175	570142	285	100
Derragh T5	517429	570484	310	100
Derragh T6	516034	570784	317	100
Inchamore T1	512355	578938	447	103

Inchamore T2	512849	578505	372	103
Inchamore T3	512964	579035	399	103
Inchamore T4	513604	579039	367	103
Inchamore T5	513939	578677	368	103
Kilgarvan Repowering T1	510195	576422	433	119
Kilgarvan Repowering T2	509471	576080	383	119
Kilgarvan Repowering T3	509384	576814	423	119
Kilgarvan Repowering T4	508826	577136	428	119
Kilgarvan Repowering T5	508211	577367	415	119
Kilgarvan Repowering T6	507578	577739	348	119
Kilgarvan Repowering T7	506871	577385	302	119
Kilgarvan Repowering T8	508469	576459	364	119
Kilgarvan Repowering T9	507639	576486	364	119
Kilgarvan Repowering T10	507043	576549	365	119
Kilgarvan Repowering T11	507822	576004	305	119

Annex 8 – Wind Turbine Noise Data

Wind Turbine Noise Data assumptions

Table A8.1: Sound Power Level Data

Wind Farm	Turbine	Hub height of source data provided	Uncertainty added by TNEI on top of manufacturer data	Reference Wind Speed (ms^{-1}) Standardised to 10m Height									
				3	4	5	6	7	8	9	10	11	12
Barnastooka	Vestas V90 3MW Standard Blades 80 m hub Mode 0	80	2	x	99.9	102.9	106.2	108.1	109	109	109	109	109
Sillahertane	Vestas V52 850kW Generic Blades 65 m hub Normal	65	2	x	x	98.9087	103.112	105.707	106.301	106.5	106.5	106.5	106.5
Lettercannon	Nordex N90 2.5MW standard Blades 80 m hub Normal	80	2	x	99.5	103	106	107	107.5	107.5	107.5	107.5	107.5
Knocknamork	Vestas V150 5.6 MW Serrated Blades 100 m hub Mode 0	100	2	Data Restricted by NDA - Available on request									
Gortyrahilly	Nordex N149 5.7MW Serrated Blades 110 m hub Mode 0	110	2	Data Restricted by NDA - Available on request									
Derragh	Vestas-V100 2.0MW-Generic blade-Full mode-80hub	80	2	Data Restricted by NDA - Available on request									

Table A8.2: Octave Band Data

Wind Farm	Turbine	Reference Wind Speed (m/s)	Octave Band (Hz)								
			63	125	250	500	1000	2000	4000	8000	Overall
Barnastooka	Vestas V90 3MW Standard Blades 80 m hub Mode 0	8	93.9	96	99.3	101.6	103.8	102.5	98.7	88.7	109
Sillahertane	Vestas V52 850kW Generic Blades 65 m hub Normal	8	88.20143871	93.9014	98.9014	100.901	100.401	98.2014	92.4014	77.3014	106.3
Lettercannon	Nordex N90 2.5MW standard Blades 80 m hub Normal	8	92.7	96.8	101.2	101.6	100.1	99	95	87.4	107.5
Knocknamork	Vestas V150 5.6 MW Serrated Blades 100 m hub Mode 0	8	Data Restricted by NDA - Available on request								
Gortyrahilly	Nordex N149 5.7MW Serrated Blades 110 m hub Mode 0	8	Data Restricted by NDA - Available on request								
Derragh	Vestas-V100 2.0MW-Generic blade-Full mode-80hub	7	Data Restricted by NDA - Available on request								