



Ministry
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Deep Space Advanced Radar Capability (DARC)

Environmental Statement Volume 3: Appendices

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ES Appendix 7.1: Legislation, Policy and Guidance



Appendix 7.1: Legislation, Policy and Guidance

1. National Legislation

Control of Pollution Act, 1974 (COPA)¹

- 1.1. The Control of Pollution Act 1974 offers protection against disturbance to residents that might be affected by construction activity.
- 1.2. Section 60 of the Act enables a local authority to serve a notice specifying its noise control requirements covering plant or machinery hours of working, and levels of noise that can be emitted.
- 1.3. Section 61 relates to prior consent in which the contractor consults with the local authority and provides an application prior to construction works commencing to obtain approval for the methods to be used and the steps proposed to minimize noise resulting from the works. If the local authority considers that the application contains sufficient information and that “best practicable means” of noise control are being implemented, and if works are being carried out in accordance with the applications, it would not serve a notice under Section 60.

The Environmental Noise (Wales) Regulations 2006²

- 1.4. The Environmental Noise (Wales) Regulations (2006) implement European legislation (Environmental Noise Directive 2002/49/EC) requiring the National Assembly for Wales to develop noise action plans on a five-year rolling programme.
- 1.5. Action plans have to be developed for the major noise sources (including road surfaces) and areas for which maps have been produced and that identified ‘Important Areas’ for future mitigation. The action plans seek to manage noise issues and effects including noise reduction, if necessary, based on the results obtained through the mapping process.

The Environmental Protection Act 1990³

- 1.6. Part III, Section 79, of the Environmental Protection Act 1990 (EPA) defines what activities may constitute a statutory nuisance, and what activities are specifically exempt. The EPA does not apply to road traffic noise and does apply to construction noise.
- 1.7. Sections 79 and 80 of the EPA places a duty on local authorities to serve abatement notices where noise from premises, vehicles and machinery are judged to constitute a statutory nuisance. Section 82 EPA allows any individual to apply to the magistrate's court for a noise abatement notice to be served if the court is convinced that a statutory nuisance exists. Compliance with these controls is required, although the requirements

¹ Control of Pollution Act 1974, c.40. Available at: <https://www.legislation.gov.uk/ukpga/1974/40> (Accessed: 6 June 2025).

² Environmental Noise (Wales) Regulations 2006, SI 2006/2629 (W.225). Available at: <https://www.legislation.gov.uk/wsi/2006/2629> (Accessed: 20 October 2025).

³ Environmental Protection Act 1990. Available at: <https://www.legislation.gov.uk/ukpga/1990/43> (Accessed: 20 October 2025).



fall outside the planning system. The use of best practicable means to control emissions can constitute a ground of defence against charges that such a nuisance arises.

Environment (Air Quality and Soundscapes) (Wales) Act 2024⁴

- 1.8. The provisions in this act place a duty on Welsh Ministers to prepare and publish a national strategy on soundscapes which can incorporate the strategic noise maps and noise actions plans required under regulations 7 and 17 of the Environmental Noise (Wales) Regulations 2006.

2. National Policy

Future Wales: The National Plan 2040, 2021⁵

- 2.1. Future Wales: The National Plan 2040 is the development plan for Wales. It influences all levels of the planning system in Wales and is intended to help to shape Strategic and Local Development Plans prepared by councils and national park authorities.

Planning Policy Wales Edition 12, 2024⁶

- 2.2. The Planning Policy Wales (PPW) 2024 sets out the Welsh Government's planning policy framework for the whole of Wales, including the Welsh Government's expectation for content and quality of planning applications and local plan policy. The PPW sets out the policy which the proposed development should comply with. It is also the basis for informing a judgement on the impacts of a development, for example whether the proposed development is consistent with the requirements of the PPW. Compliance of the proposed development with the PPW is detailed within the Planning Statement. Noise and the acoustic environment are referenced regularly as a determining factor in the decision-making process.

Technical Advice Note (TAN) 11: Noise, 1997⁷

- 2.3. TAN 11 provides guidance on the technical standards and approaches that shall be used when assessing noise impacts for noise sensitive developments and noise generating developments, including during the construction phases.
- 2.4. Annex B provides guidance on the assessment of noise from different sources, including road traffic (with reference to Calculation of Road Traffic Noise (CRTN)⁸), industrial and commercial developments (with reference to the then-current BS 4142:1990⁹), and construction sites (with reference to the then-current BS 5228-1:1984¹⁰).

⁴ Environment (Air Quality and Soundscapes) (Wales) Act 2024. Available at: <https://www.legislation.gov.uk/asc/2024/2> (Accessed 20/10/2025).

⁵ Welsh Government (2021). Future Wales: The National Plan 2040. Welsh Government

⁶ Welsh Government (2024). Planning Policy Wales. Welsh Government.

⁷ Welsh Government (1997). Planning Guidance (Wales), Technical Advice Note (Wales) 11, Noise. Welsh Government

⁸ Department of Transport Welsh Office (1988). Calculation of Road Traffic Noise. HMSO.

⁹ British Standards Institution (1990). BS 4142:1990 Method for rating industrial noise affecting mixed residential and industrial areas. BSI

¹⁰ British Standards Institution (1984) BS 5228-1:1984 Noise and vibration control on construction and open sites – Code of practice for basic information and procedures for noise control. BSI



CL-01-15 Updates to TAN 11 Noise – Noise Action Plan (2013-18) Commitments, 2015¹¹

- 2.5. CL-01-15 provides updates to TAN 11 to bring the guidance in line with current design standards. In particular, reference is made to the environmental permitting regime and the publication of BS 4142:2014.

Noise and Soundscape Action Plan (2018 – 2023)¹²

- 2.6. The noise and soundscape action plan presents a consolidated five-year noise action plan for Wales, with reference to the Environmental Noise Regulations and guidance on country-wide policies relating to the forms of noise not covered by the Regulations. This version is an update to the originally prepared 2013 issue.

Noise and Soundscape plan For Wales, 2024¹³

- 2.7. The Noise and Soundscape Plan 2023-2028 is Wales's national strategy on soundscapes, meaning the sound environment as perceived or experienced and/or understood by a person or people, in context. Amongst wider guidance, the Plan sets out a generalised decision-making framework for determining the appropriate level of noise control for proposed developments, involving the comparison of "noise risk" against the potential for "better outcomes through soundscape interventions".

Noise Policy Statement for England, 2010 (NPSE)¹⁴

- 2.8. The Noise Policy Statement for England (NPSE) was published in March 2010 to "*Promote good health and good quality of life through effective management of noise with the context of Government policy on sustainable development*".
- 2.9. Whilst it is recognised that the NPSE is not directly applicable for Welsh planning policy, no equivalent Welsh guidance has been identified. Therefore, the NPSE has been adopted in this Chapter as a core strategy for the definition and identification of potentially significant effects, in line with the overarching requirements of the Town and Country Planning (Environmental Impact Assessment) (Wales) Regulations 2017¹⁵
- 2.10. The aims of the NPSE in paragraph 1.7 state: "*Through the effective management and control of environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development:*
- *avoid significant adverse impacts on health and quality of life;*
 - *mitigate and minimise adverse impacts on health and quality of life; and*
 - *where possible contribute to the improvement of health and quality of life.*"

¹¹ Minister for Natural Resources (2015). CL-01-15 Updates to Tan 11 Noise – Noise Action Plan (2013-18) Commitments. Welsh Government.

¹² Welsh Government (2018). Noise and Soundscape action plan. Welsh Government.

¹³ Welsh Government (2024). Noise and Soundscape Plan for Wales. Welsh Government.

¹⁴ Department for Environment Food and Rural Affairs (2010). Noise Policy Statement for England. DEFRA.

¹⁵ Welsh Government (2017) The Town and Country Planning (Environmental Impact Assessment) (Wales) Regulations 2017. Available at: The Town and Country Planning (Environmental Impact Assessment) (Wales) Regulations 2017



- 2.11. As part of these aims there are several key phrases that lead to additional concepts now considered in the assessment of noise impact. They are:
- *No Observed Effect Level (NOEL)*
 - This is the level below which no effect can be detected. In simple terms, below this level there is no detectable effect on health and quality of life due to noise.
 - *Lowest Observed Adverse Effect Level (LOAEL)*
 - This is the level above which adverse effects on health and quality of can be detected.
 - *Significant Observed Adverse Effect Level (SOAEL)*
 - This is the level above which significant adverse effects on health and quality of life occur.
- 2.12. The NPSE states that *“it is not possible to have a single objective noise-based measure that defines SOAEL that is applicable to all sources of noise in all situations. Consequently, the SOAEL is likely to be different for different noise sources, for difference receptors and at different times.”*
- 2.13. As such, levels for LOAEL and SOAEL have been defined for this assessment in line with the relevant guidance.

3. Local Policy

Pembrokeshire County Council Local Development Plan, 2013¹⁶

- 3.1. The adopted Local Development Plan provides the framework for decisions to be made up until 2021 on how land is used and developed. However, clarifications published by Pembrokeshire County Council advise that this local development plan will remain in force until a replacement local development plan is adopted.
- 3.2. Policy GN.1 states:
- “Development will be permitted where the following criteria are met: [...] It would not result in a significant detrimental impact on local amenity in terms of visual impact, loss of light or privacy, odours, smoke, fumes, dust, air quality or an increase in noise or vibration levels.”*
- 3.3. A new local plan is due to be adopted by PCC in May 2026. Review of the published ‘Focussed Changes’¹⁷ documentation indicates that policy GN.1 will remain with a wording clarification of *“[Developments] would not cause an unacceptable adverse impact on local amenity that cannot be mitigated, in terms of [...] noise or vibration levels”*. Accordingly, this future requirement has been considered in this chapter where appropriate.

¹⁶ Pembrokeshire County Council (2013). Local Development Plan Planning Pembrokeshire’s Future (up to 2021). Pembrokeshire County Council.

¹⁷ Pembrokeshire County Council (2025). Pembrokeshire Local Development Plan 2 Deposit 2 Focussed Changes Part 1. Pembrokeshire County Council. Available at: <https://www.pembrokeshire.gov.uk/local-development-plan-review/focused-changes> [accessed 13/01/2025]



Pembrokeshire Coast National Park Local Development Plan 2, 2020¹⁸

- 3.4. The application site is neighboured to the south and east by the Pembrokeshire Coast National Park. Therefore, consideration has been given to the planning policy of this adjacent Planning Authority. Policy 30 ‘Amenity’ of the Local Development Plan states:

“Development will not be permitted where it has an unacceptable adverse effect on amenity, particularly where: a) the development would have a detrimental impact on the quality of the environment currently enjoyed by people living, working or visiting the Park; and/or [...] c) the development leads to an increase in traffic or noise or odour or light which has a significant adverse effect”.

4. Guidance

WHO Night Noise Guidelines for Europe, 2009¹⁹

- 4.1. The WHO Night Noise Guidelines (NNG) for Europe 2009 was published for *“the development of future legislation and policy action in the area of assessment and control of night noise exposure”.*
- 4.2. The document states *“There is no sufficient evidence that the biological effects observed at the level below 40dB L_{night, outside} are harmful to health. However, adverse health effects are observed at the level above 40dB L_{night, outside}, such as self-reported sleep disturbance, environmental insomnia, and increased use of somnifacient drugs or sedatives.”*
- 4.3. Further to this: *“An interim target (IT) of 55dB L_{night, outside} is recommended in the situations where the achievement of NNG is not feasible in the short run for various reasons. It should be emphasized that the IT is not a health-based limit value by itself. Vulnerable groups cannot be protected at this level. Therefore, the IT should be considered only as a feasibility-based intermediate target which can be temporarily considered by policy-makers for exceptional local situations.”*

WHO Environmental Noise Guidelines for the European Region, 2018²⁰

- 4.4. The main purpose of these guidelines is to provide recommendations for protecting human health from exposure to environmental noise originating from various sources: transportation (road traffic, railway and aircraft) noise, wind turbine noise and leisure noise. The current guidelines complement the Night Noise Guidelines from 2009.
- 4.5. The guidelines set out to define recommended exposure levels for environmental noise in order to protect population health. Specific recommendations formulated for road traffic noise include the following.
- For average noise exposure, it strongly recommends reducing noise levels produced by road traffic below 53 dB L_{den}, as road traffic noise above this level is associated with adverse health effects.

¹⁸ Pembrokeshire Coast National Park Authority (2020). Local Development Plan 2. Authority (end date 2031). Pembrokeshire Coast National Park Authority

¹⁹ World Health Organization (2009). Night Noise Guidelines for Europe. WHO Regional Office for Europe.

²⁰ World Health Organization (2018). Environmental Noise Guidelines for the European Region. WHO Regional Office for Europe.



- For night noise exposure, it strongly recommends reducing noise levels produced by road traffic during night-time below 45 dB L_{night} , as night-time road traffic noise above this level is associated with adverse effects on sleep.
- To reduce health effects, it strongly recommends that policy-makers implement suitable measures to reduce noise exposure from road traffic in the population exposed to levels above the guideline values for average and night noise exposure. For specific interventions, it recommends reducing noise both at the source and on the route between the source and the affected population by changes in infrastructure.

British Standard (BS) 4142:2014+A1:2019 Methods for rating and assessing industrial and commercial sound ²¹

- 4.6. British Standard (BS) 4142:2014+A1:2019 provides a method of determining rating levels for sources of industrial or commercial sound for the purposes of determining the noise impact from new, modified, or additional sources of sound, and assessing sound at noise sensitive receptors.
- 4.7. The BS 4142:2014+A1:2019 assessment approach, in summary, involves the following:
- The specific sound level, $L_{Aeq,Tr}$, is determined at each assessment location during time intervals that are representative of the period of interest. For a source that is not yet operating this is determined by calculation.
 - The background sound level, $L_{A90,T}$, is measured at each assessment location (or equivalent representative location). A representative value of the background sound level is then determined for each period of interest. Observations and a description of the acoustic environment are required to understand the context in which the specific sound source is being assessed.
 - The rating level, $L_{Ar,Tr}$, of commercial sound is determined at each assessment location accounting for the expected character of the specific sound, by applying corrections for characteristics that attract attention (tonality, impulsivity, intermittency, any other distinctive features). This can be undertaken using objective or subjective methods.
 - The level and potential effects of uncertainty in the assessment are then reported.
- 4.8. BS 4142:2014+A1:2019 states:
- “The significance of sound of an industrial and/or commercial nature depends upon both the margin by which the Rating level of the Specific sound source exceeds the background sound level and the context in which the sound occurs.”*
- 4.9. An estimation of the impact can be obtained by the difference of the rating noise level and the background noise level and considering the following:
- *“Typically, the greater this difference, the greater the magnitude of the impact;*
 - *A difference of around +10dB or more is likely to be an indication of a significant adverse impact, depending on the context;*

²¹ British Standards Institution (2019). BS 4142:2014+A1:2019 Methods for rating and assessing industrial and commercial sound. British Standards Institution.



- *A difference of around +5dB is likely to be an indication of an adverse impact, depending on the context; and*
- *The lower the rating level is relative to the measured background sound level, the less likely it is that the specific sound source will have an adverse impact or a significant adverse impact. Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending on the context.”*

British Standard (BS) 4142:1997 Methods for rating and assessing industrial and commercial sound ²²

- 4.10. British Standard (BS) 4142:1997 Methods for rating and assessing industrial and commercial sound, now superseded by BS 4142:2014+A1:2019, presents a methodology for assessing the impact of commercial and industrial noise at residential receptors.
- 4.11. The standard sets out an approach broadly similar to the updated version, however, allows only a +5 dB fixed penalty where the noise source under review contains audible characteristics.

British Standard (BS) 5228-1:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites – Part 1: Noise ²³

- 4.12. BS 5228-1 Code of practice for noise and vibration control on construction and open sites – Part 1: Noise provides a methodology for predicting and assessing noise levels generated by fixed and mobile plant used for a range of typical construction operations. The standard includes a database of noise levels at a reference distance of 10m from the source and a simple noise propagation that can be used to make allowance for effects such as source-receiver distances, ground properties, and utilisation time.
- 4.13. Annex E, section E.3.2 of the standard also sets criteria to assess the potential significant effect of construction noise at dwellings (example method 1 – The ABC method).

British Standard (BS) 7385-2:1993 Evaluation and measurement for vibration in buildings. Guide to damage levels from groundborne vibration ²⁴

- 4.14. BS 5228-2 Code of practice for noise and vibration control on construction and open sites – Part 2: Vibration provides guidance on the effect of vibration and the likelihood it will cause complaint and cosmetic damage to buildings and gives recommendations for methods of vibration control. Vibration levels are predicted in term of Peak Particle Velocity (PPV).
- 4.15. Annex B, of the standard sets criteria to assess the potential significance of vibration effects. Section B.2 refers to human response to vibration while section B.3 refers to structural response to vibration.

²² British Standards Institution (1997). BS 4142:1997 Method for rating industrial noise affecting mixed residential and industrial areas. British Standards Institution.

²³ British Standards Institution (2014). BS 5228-1:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites – Part 1: Noise. British Standards Institution.

²⁴ British Standards Institution (2014). BS 5228-2:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites – Part 2: Vibration. British Standards Institution.

***Design Manual for Roads and Bridges (DMRB) LA 111 Noise and vibration, Revision 2, 2020***²⁵

- 4.16. DMRB LA 111 Revision 2, dated May 2020, (which supersedes HD 213/11 and the accompanying IAN 185/15) sets out the requirements for noise and vibration assessments from road projects, applying a proportionate and consistent approach using best practice and ensuring compliance with relevant legislation.
- 4.17. It requires that environmental assessments of noise and vibration emissions shall include likely significant effects from construction noise, construction vibration and operational noise. Operational vibration is scoped out of the assessment methodology as a maintained road surface will not have the potential to lead to significant adverse effects.
- 4.18. DMRB LA111 details the assessment methodology for scoping, study areas and baseline. It also sets the criteria to determine the significance of impacts.

Calculation of Road Traffic Noise (CRTN), 1988

- 4.19. CRTN provides procedures for predicting noise levels for a given flow of road traffic at sensitive receptors. These methodologies are used in the determination of entitlement under the Noise Insulation Regulations and for traffic noise change assessments undertaken in accordance with the DMRB guidance noted above.

Guidelines for Noise Impact Assessment (IEMA), 2014²⁶

- 4.20. The Institute of Environmental Management and Assessment (IEMA) Guidelines for Environmental Noise Impact Assessment provide guidance on noise assessment in the EIA context. These define key methodologies used within the noise impact assessment process and provide advice on their limitations. They apply to both minor and major projects.
- 4.21. The IEMA Guidelines provide a table for the generic relationship between noise impact (magnitude) and noise effect (magnitude and sensitivity) including the evaluation of significance. An extract from the table is shown in Table 7.1.
- 4.22. For ease of reference, the magnitude descriptors used in the main Chapter text have been added in brackets alongside the IEMA magnitude descriptors where these differ.

²⁵ Highways England (2020). Design Manual for Roads and Bridges LA 111 Noise and vibration Revision 2. Available at: LA 111 - Noise and vibration (Accessed: 27 November 2024).

²⁶ Institute of Environmental Management & Assessment (2014). Guidelines for Environmental Noise Impact Assessment version 1.2. IEMA.

Table 7.1: Extract from IEMA showing generic relationship between noise impact, effect, and significance

Magnitude		Significance
(nature of impact)	Descriptor	
Negligible	No discernible effect on receptor	Not significant
Slight (minor)	Receptor perception = non-intrusive Noise impact can be heard but does not cause any change in behaviour or attitude, for example turning up the volume of the television, speaking more loudly, closing windows. Can slightly affect the character of the area but not such that there is a perceived change in the quality of life.	Less likely to be significant (greater justification needed based on impact magnitude and receptor sensitivity to justify a significant effect)
Moderate	Receptor perception = intrusive Noise impact can be heard and causes small changes in behaviour and / or attitude, for example turning up volume of television; speaking more loudly, closing windows. Potential for non-awakening sleep disturbance. Affects the character of the area such that there is a perceived change in the quality of life.	
Substantial (Major)	Receptor perception = disruptive Causes a material change in behaviour and / or attitude for example avoiding certain activities during periods of intrusion. Potential for sleep disturbance resulting in difficulty getting back to sleep. Quality of life diminished due to change in character of the area.	More likely to be significant (greater justification needed based on impact magnitude and receptor sensitivity to justify a non-significant effect)

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ES Appendix 7.2: Environmental Noise Survey



Appendix 7.2 Environmental Noise Survey (Methodology and Results)

1. Noise Survey Overview

- 1.1. An environmental noise survey has been undertaken by Sweco UK to determine the prevailing noise climate at the nearest noise sensitive receptors to the proposed scheme. This survey consisted of long-term unattended measurements at four positions.
- 1.2. Long-term unattended measurements were carried out between approximately 12:00 on Wednesday 25 January 2023 and concluded approximately 09:00 on Tuesday 31st January 2023.

2. Noise Survey Methodology

- 2.1. The environmental noise survey was undertaken using suitable measurement instrumentation configured to log sound pressure levels in each octave frequency band every 125 milliseconds (ms). The noise data was then analysed to determine the following parameters for each 15-minute interval (T):
- dB $L_{Aeq,T}$: The A-weighted equivalent continuous sound pressure level over the measurement period, T.
 - dB $L_{AFmax,T}$: The A-weighted maximum sound pressure level that occurred during the measurement period, T.
 - dB $L_{A10,T}$: The A-weighted sound pressure level exceeded for 10% of the measurement period, T.
 - dB $L_{A90,T}$: The A-weighted sound pressure level exceeded for 90% of the measurement period, T, which is commonly described as the “background sound level”.
- 2.2. Environmental noise measurements were taken at the positions described in Table 7.2 and are shown in Figure 7.1. Long-term unattended measurement positions are referenced as MP1, MP2 etc.

Table 7.2: Noise Measurement Positions

Position Reference	Position Description	Microphone above ground level	Conditions
MP1	Located on the boundary fence (north-west corner) of the Barracks. This position is near the dwellings Cherry Tree and Curlew Rise.	1.5m	Free-field
MP2	Located on the boundary fence (east corner) of the Barracks. This position is near Newgale Lodge to the east.	1.5m	Free-field
MP3	Located on the boundary fence (west side) of the barracks. This position is near Rickeston Hall west of the site. An elevated measurement was required to position the microphone in free-field conditions above the site boundary fencing.	2.0m	Free-field



Position Reference	Position Description	Microphone above ground level	Conditions
MP4	Located on the boundary fence (southern corner) of the barracks. This position is near the dwellings of the Old Post Office.	1.5m	Free-field

- 2.3. All acoustic measurement equipment used during the noise survey conformed to Type 1 specification of British Standard 61672-1:2013²⁷. Details of the noise measurement instrumentation used are shown in Table 7.3.
- 2.4. Each meter had been calibrated by a UKAS accredited laboratory within the previous 24 months. The calibration level was also checked at the start and end of the survey using field calibrators.
- 2.5. No significant drift in the calibration was observed over the course of the survey (≤ 0.1 dB). The calibrator used had itself been calibrated by a UKAS accredited calibration laboratory within the twelve months preceding the measurements.
- 2.6. The microphones were fitted with protective windshields for the measurements.

Table 7.3: Inventory of Acoustic Measurement Equipment

Item	Manufacturer/Model Type	Serial Number
Sound Level Meter	Rion NL-52	00620900
Preamplifier	Rion NH-25	31972
Microphone	Rion UC-59	03797
Sound Level Meter	Rion NL-52	01054199
Preamplifier	Rion NH-25	54272
Microphone	Rion UC-59	08655
Sound Level Meter	01dB Fusion	12089
Preamplifier	01dB PRE-22N°	1805176
Microphone	GRAS 40CE	331995
Sound Level Meter	01dB Fusion	11051
Preamplifier	01dB PRE-22N°	1507093
Microphone	GRAS 40CE	330831
Calibrator	Rion NC-74	34662223

- 2.7. Due to the low background noise levels measured in this survey (as presented below), and in accordance with BS 4142:2014+A1:2019 guidance, consideration has also been given to the electrical noise floor of the survey equipment. Manufacturer's published data for the above measurement systems indicates a noise floor ($L_{Aeq,T}$) of 19.5 dB for the 01dB Fusion measurement system and "17 dB or less" for the Rion NL-52 measurement system.

²⁷ British Standard BS EN 61672-1:2013 Electroacoustics. Sound level meters – Specifications, 2013, British Standards Institution (BSI)



3. Observations

- 3.1. The sources of noise that contributed to environmental noise climate were noted during each measurement. The observations are summarised as follows:
- The dominant source of noise during the daytime was light local road traffic using the various roads in the vicinity of the measurement positions and around the barracks.
 - Other noise sources include birdsong and the rustling of foliage in nearby trees.
 - It was noted during the survey that noise levels at position MP4 included contributions from the coast (i.e. wind and water noise) to the southwest and low-level plant noise from nearby Brawdy Business Park.

4. Weather Conditions

- 4.1. The weather conditions during the survey were observed and noted as being generally suitable for environmental noise measurement. Attended observations of weather conditions have been supplemented with historical weather data gathered at local weather stations near to the site.
- 4.2. Meteorological data from a nearby weather station located in Haverfordwest (Weather Underground station reference IBRAWDY2), roughly 1 km away from the nearest measurement position, has been used to supplement on-site observations.
- 4.3. On-site observations and recorded data from the weather station confirms the following periods of rainfall during the survey:
- 2 mm of rain between 14:00 and 16:00 on the 25th January;
 - 1 mm of rain between 21:00 and 11:30 on the 28th January; and
 - 1.27 mm of rain between 01:00 and 06:00 on the 29th January.
- 4.4. On-site observations and recorded data from the weather station confirms the following periods of unsuitable wind during the survey:
- Winds over 5 m/s between 17:00 on the 25th and 04:00 on the 26th January;
 - Winds over 5 m/s between 04:00 and 05:00 on the 30th January; and
 - Winds over 5 m/s between 02:00 and 04:00 on the 31st January.
- 4.5. These periods of unsuitable weather have been omitted from the full survey period summary results presented in the tables below and used in the assessments presented herein. Daily results published in the tables include the effects of the inclement weather for reference.

5. Measurement Results

- 5.1. Table 7.4 to Table 7.7 present the measurement results obtained during the survey at the unattended receiver positions.



Table 7.4: Summary of Measured Noise Levels at MP1

Survey Date	Period (T)	dB L _{Aeq,T}	dB L _{A10,T}	dB L _{AFMax}	dB L _{A90,15min}
25/01/23	Daytime (07:00 – 23:00)	43	42	63	36
	Night-time (23:00 – 07:00)	42	36	63	36
26/01/23	Daytime (07:00 – 23:00)	37	40	55	25
	Night-time (23:00 – 07:00)	27	29	45	19
27/01/23	Daytime (07:00 – 23:00)	36	40	55	18
	Night-time (23:00 – 07:00)	24	27	40	18
28/01/23	Daytime (07:00 – 23:00)	35	38	54	24
	Night-time (23:00 – 07:00)	26	29	44	18
29/01/23	Daytime (07:00 – 23:00)	36	40	56	26
	Night-time (23:00 – 07:00)	34	37	57	26
30/01/23	Daytime (07:00 – 23:00)	37	40	58	24
	Night-time (23:00 – 07:00)	39	43	59	32
Full Survey	Daytime (07:00 – 23:00)	37	41	57	24
Period*	Night-time (23:00 – 07:00)	33	37	55	18

* Excluding periods of poor weather

Table 7.5: Summary of Measured Noise Levels at MP2

Survey Date	Period (T)	dB L _{Aeq,T}	dB L _{A10,T}	dB L _{AFMax}	dB L _{A90,15min}
25/01/23	Daytime (07:00 – 23:00)	44	47	66	36
	Night-time (23:00 – 07:00)	43	47	67	34
26/01/23	Daytime (07:00 – 23:00)	35	39	59	27
	Night-time (23:00 – 07:00)	26	29	46	19
27/01/23	Daytime (07:00 – 23:00)	38	41	60	25
	Night-time (23:00 – 07:00)	28	31	45	21
28/01/23	Daytime (07:00 – 23:00)	38	41	62	21
	Night-time (23:00 – 07:00)	28	31	47	23
29/01/23	Daytime (07:00 – 23:00)	40	43	61	30
	Night-time (23:00 – 07:00)	46	50	65	34
30/01/23	Daytime (07:00 – 23:00)	39	43	60	31
	Night-time (23:00 – 07:00)	49	53	68	36
Full Survey	Daytime (07:00 – 23:00)	42	43	61	25
Period *	Night-time (23:00 – 07:00)	41	47	62	19

* Excluding periods of poor weather



Table 7.6: Summary of Measured Noise Levels at MP3

Survey Date	Period (T)	dB L _{Aeq,T}	dB L _{A10,T}	dB L _{AFMax}	dB L _{A90,15min}
25/01/23	Daytime (07:00 – 23:00)	43	45	62	34
	Night-time (23:00 – 07:00)	45	47	65	37
26/01/23	Daytime (07:00 – 23:00)	36	39	60	30
	Night-time (23:00 – 07:00)	25	29	49	17
27/01/23	Daytime (07:00 – 23:00)	36	39	60	26
	Night-time (23:00 – 07:00)	26	30	48	18
28/01/23	Daytime (07:00 – 23:00)	35	38	59	22
	Night-time (23:00 – 07:00)	27	30	50	19
29/01/23	Daytime (07:00 – 23:00)	39	41	63	29
	Night-time (23:00 – 07:00)	36	38	55	29
30/01/23	Daytime (07:00 – 23:00)	37	39	61	30
	Night-time (23:00 – 07:00)	41	44	56	35
Full Survey	Daytime (07:00 – 23:00)	38	41	61	28
Period*	Night-time (23:00 – 07:00)	34	39	54	17

* Excluding periods of poor weather

Table 7.7: Summary of Measured Noise Levels at MP4

Survey Date	Period (T)	dB L _{Aeq,T}	dB L _{A10,T}	dB L _{AFMax}	dB L _{A90,15min}
25/01/23	Daytime (07:00 – 23:00)	46	48	63	42
	Night-time (23:00 – 07:00)	47	50	63	44
26/01/23	Daytime (07:00 – 23:00)	43	45	63	32
	Night-time (23:00 – 07:00)	34	39	56	19
27/01/23	Daytime (07:00 – 23:00)	44	46	65	33
	Night-time (23:00 – 07:00)	38	41	57	34
28/01/23	Daytime (07:00 – 23:00)	44	47	66	33
	Night-time (23:00 – 07:00)	35	37	56	26
29/01/23	Daytime (07:00 – 23:00)	43	45	67	36
	Night-time (23:00 – 07:00)	40	42	55	35
30/01/23	Daytime (07:00 – 23:00)	44	47	64	35
	Night-time (23:00 – 07:00)	49	52	66	1
Full Survey	Daytime (07:00 – 23:00)	44	46	65	35
Period*	Night-time (23:00 – 07:00)	41	45	60	23

* Excluding periods of poor weather

- 5.2. The published dB L_{A10,T} noise levels have been derived from the 10th percentile L_{Aeq,5min} noise level measured in each time period for each day.
- 5.3. The reported dB L_{AFMax} values are the 90th percentile of the measured values, representing the value that is not regularly exceeded.
- 5.4. Regarding the stated background L_{A90,15min} noise levels, BS 4142:2014+A1:2019 (commentary on 8.1) states:



"the objective is not simply to ascertain a lowest measured background sound level, but rather to quantify what is typical during particular time periods."

5.5. BS 4142:2014+A1:2019 (commentary on 8.1) also recognises that:

"Care is necessary in circumstances where background sound levels are low to ensure that self-generated and electrical noise within the measurement system does not unduly influence reported values, which may be the case if the measured background sound levels are less than 10 dB above the noise floor of the measuring system."

5.6. As such, the background $L_{A90,15min}$ presented above has been determined following statistical analysis of the measurement results for each time period (i.e. each day and night, and for the full survey period). In this case, each value presented is the modal peak recorded in that time period. Where a non-gaussian distribution was noted, or where there were several modal peaks present in each reference time period, further statistical analysis and site context (including the noise floor of the sound level meter) has been used to define an appropriate value.

5.7. The measured noise levels are presented as time histories in Image 7.1 to Image 7.4.

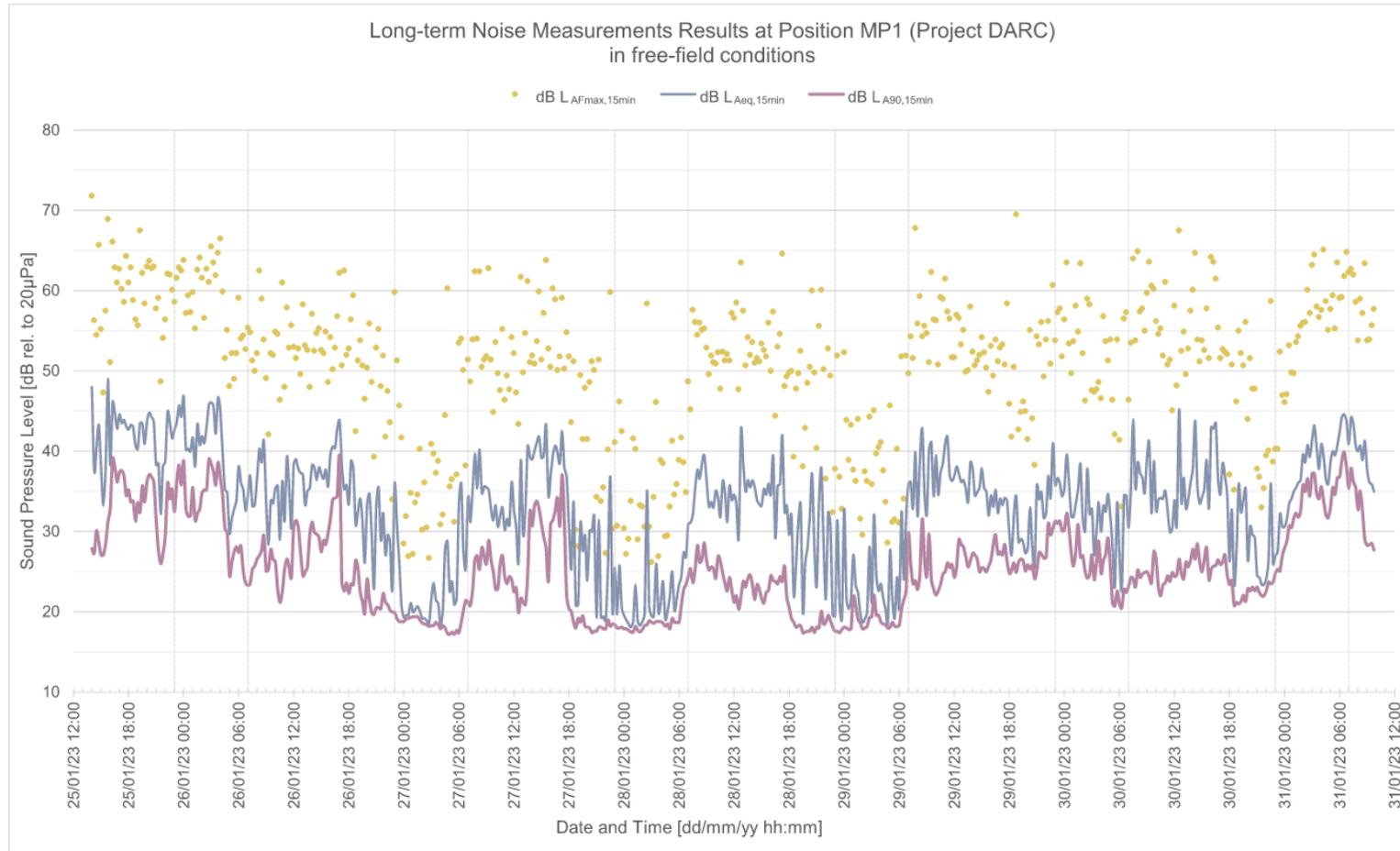


Image 7.1: Noise Measurement Time History at MP1

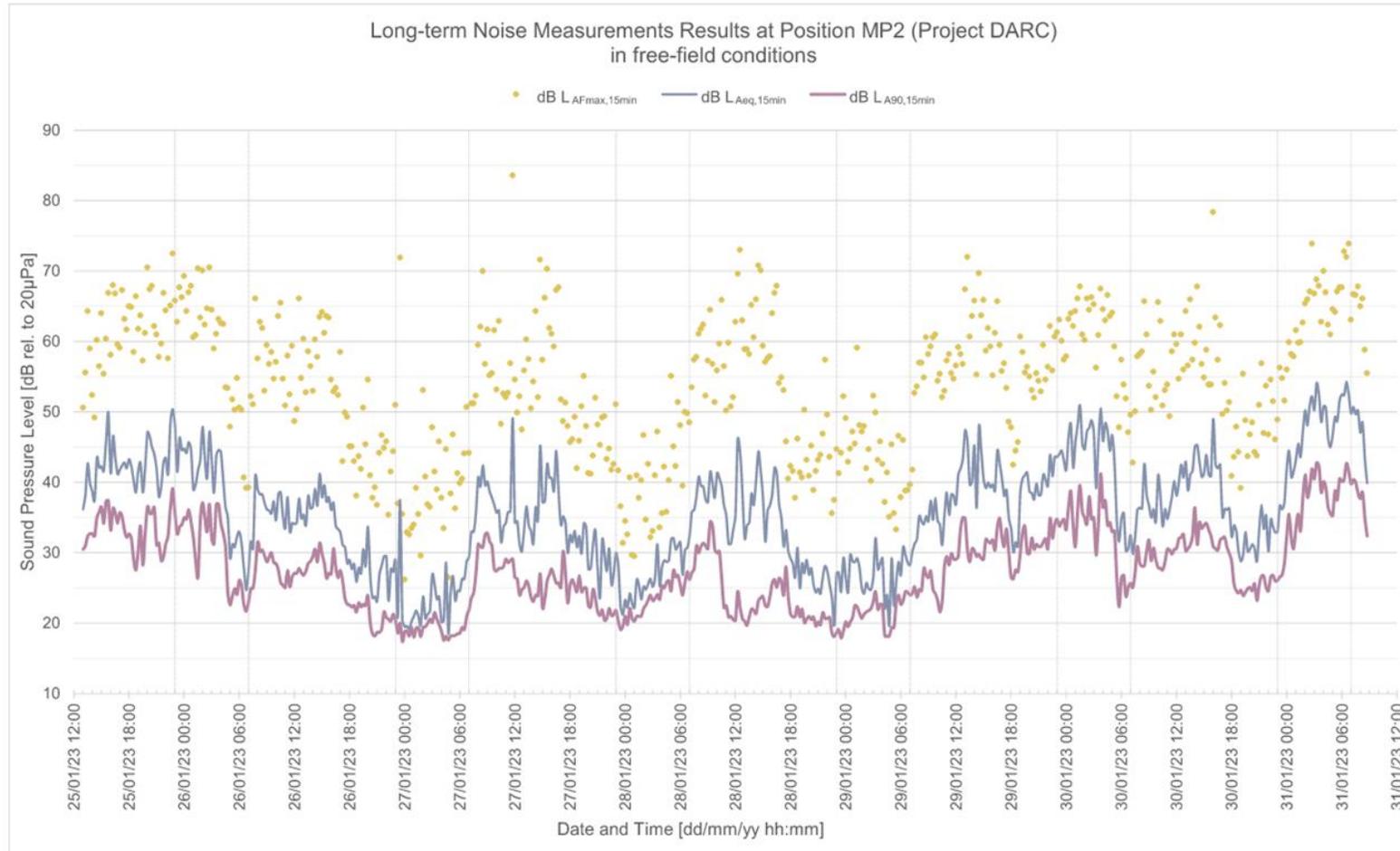


Image 7.2: Noise Measurement Time History at MP2

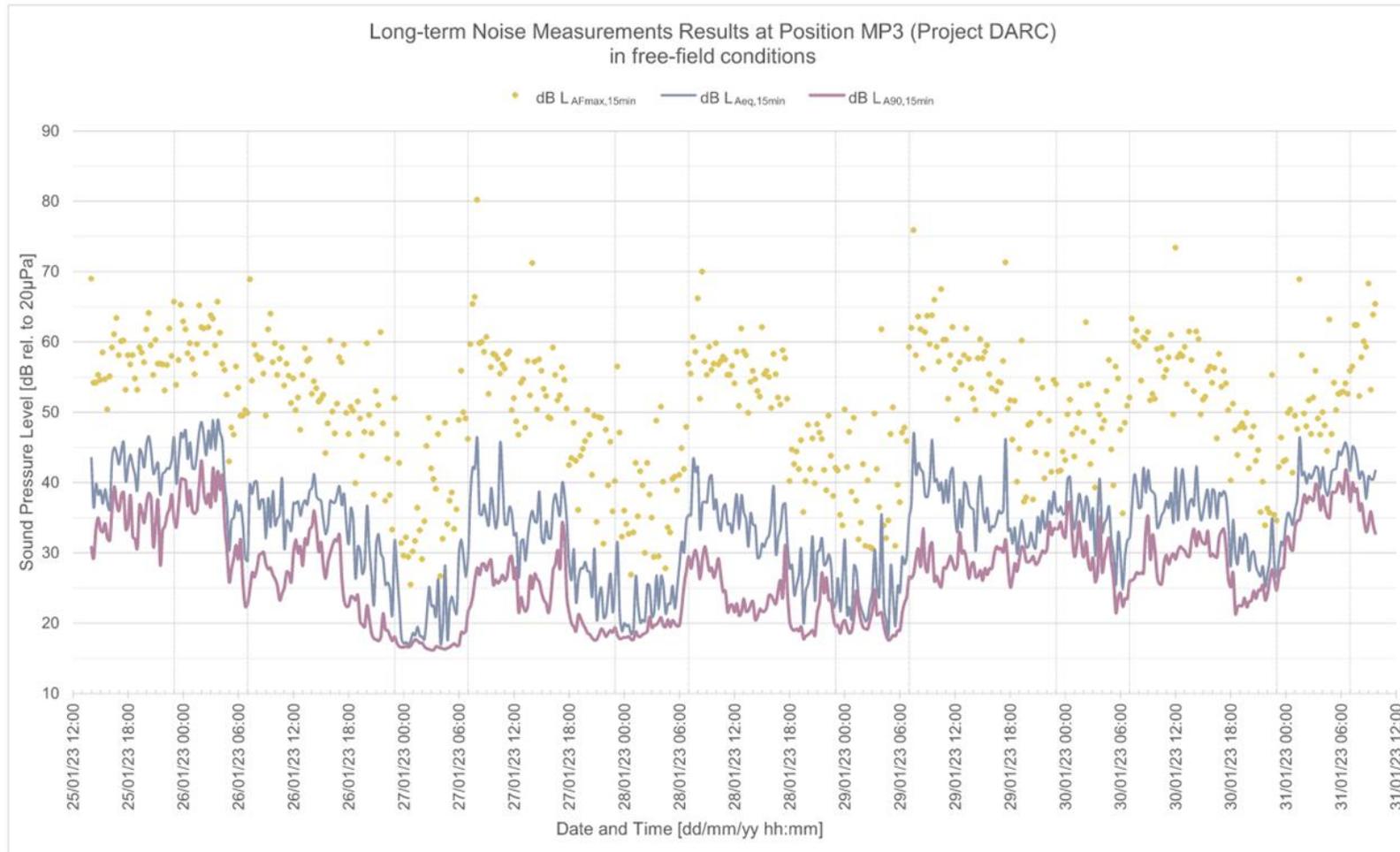


Image 7.3: Noise Measurement Time History at MP3

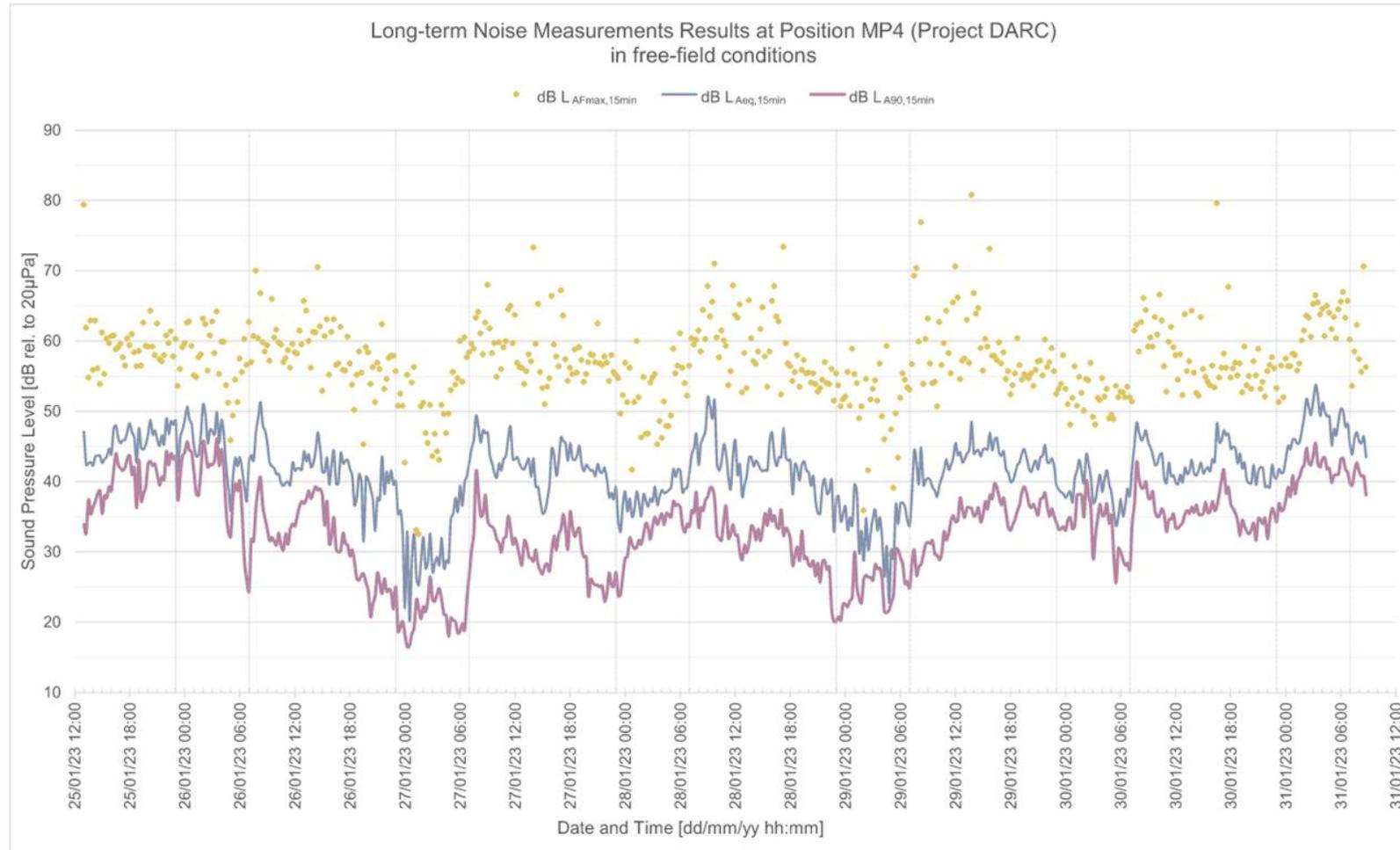


Image 7.4: Noise Measurement Time History at MP4

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ES Appendix 7.3: Construction Noise Assessment



Appendix 7.3 Construction Noise Assessment

1. Construction phases and plant used to inform the assessment

- 1.1. At the time of writing, outline details have been provided regarding the works phasing and equipment schedules for the primary construction tasks.
- 1.2. Table 7.8 provides a summary of the primary construction tasks for which plant assumptions have been provided, which forms the basis of the assessments presented in Chapter 7. The table presents the typical plant/equipment utilised for each task including quantity, on-time and sound pressure level at 10m according to BS 5228-1:2009+A1:2014.

Table 7.8: Primary construction tasks and plant assumptions

Construction Task	Plant and Equipment	No. of Plant	% On time	BS 5228 Ref.	SPL @ 10m	Task SPL at 10m
Site Preparation and Earthworks	Backhoe	2	20	C.2 #8	68	89
	Skid Steer	2	80	C.4 #14	67	
	Dozer	2	25	C.2 #1	75	
	Dump Truck	5	30	C.2 #33	81	
	Excavator	3	40	C.2 #2	77	
	Front End loader	1	5	C.2 #26	79	
	Grader	2	35	C.6 #31	86	
	Generator	6	60	C.6 #39	65	
	Demolition Hammer	2	45	C.1 #19	69	
	Lorry (Unloading)	8	75	C.4 #55	70	
	Water Truck	2	15	C.6 #38	83	
	Ground Compactor	2	35	C.2 #42	78	
	Vibratory Roller	1	5	C.2 #39	74	
Civils and Facilities	Backhoe	3	25	C.2 #8	68	90
	Skid Steer	1	10	C.4 #14	67	
	Concrete Mixer Truck	2	20	C.4 #20	80	
	Concrete Pump Truck	2	50	C.4 #24	67	
	Crane	3	15	C.4 #38	78	
	Dozer	1	25	C.2 #1	75	
	Dump Truck	2	40	C.2 #33	81	
	Excavator	3	20	C.2 #2	77	
	Forklift	2	80	C.4 #54	79	
	Auger	2	35	C.3 #16	79	
	Front End loader	2	25	C.2 #26	79	
	Generator	6	100	C.6 #39	65	
	Grader	1	60	C.6 #31	86	
	Ground Compactor	2	30	C.2 #42	78	



Construction Task	Plant and Equipment	No. of Plant	% On time	BS 5228 Ref.	SPL @ 10m	Task SPL at 10m
	Lorry (Unloading)	12	80	C.4 #55	70	
	Water Truck	2	15	C.6 #38	83	
	Elevated Work Platform	3	45	C.4 #57	67	
	Concrete Vibrator	2	25	C.3 #27	80	
	Air Compressor	2	45	C.5 #5	65	
	Hand Tools	10	40	C.1 #19	69	
	Power Tools	10	25	N/A	74	
	Vibratory Roller	2	30	C.2 #39	74	
Antenna Construction	Concrete Mixer Truck	2	25	C.4 #20	80	86
	Lorry (Unloading)	3	20	C.4 #55	70	
	Generator	2	100	C.6 #39	65	
	Auger	2	30	C.3 #16	79	
	Elevated Work Platform	2	25	C.4 #57	67	
	Mobile Crane Operation	2	65	C.3 #30	70	
	Forklift	3	70	C.4 #54	79	
	Air Compressor	2	45	C.5 #5	65	
	Hand Tools	10	40	C.1 #19	69	
	Power Tools	10	25	N/A	74	

- 1.3. Table 7.9 presents the outline works phasing for the 24-month programme. Each activity presented has been modelled on the basis of the above construction equipment.

Table 7.9: Outline works phasing

Works phase	Indicative construction programme months	Primary construction activities
Site establishment	Month 1	Install site amenities, access road, site offices
Temporary fencing	Month 1	Erection of temporary security fencing around working areas.
Antenna Integration Shelter	Months 2 to 4	Install temporary reflector assembly facility
Construct Buildings	Months 2-10	Excavations for foundations, install foundations, pour floor slabs, erect walls, roofs, interior fitout for all buildings
Auxiliary power compound infrastructure	Months 6 to 9	Install gensets, battery energy storage system (BESS), bulk fuel tanks, load bank
RX Antenna construction	Months 2 to 13	Excavation, install rebar, pour concrete, install electrical infrastructure
TX Antenna construction	Months 8 to 16	Excavation, install rebar, pour concrete, install electrical infrastructure, install cooling infrastructure
Utilities	Months 3 to 9	Installation of electrical, water, foul water, and comms infrastructure
Antenna assembly	Months 4 to 18	Each antenna dish will arrive at the temporary assembly building in pieces, be assembled on site, and transported from the building to be installed on an antenna foundation.
Permanent fencing	Months 2 to 14	Erection of permanent security fencing around arrays and Ops Area, install gates
Building and Equipment Commissioning	Months 12 to 14	Verification and testing of mechanical, electrical and fire alarm systems by a certified third party.
Antenna Site Acceptance Testing, CFE Fitout, and Mission Testing	Months 5 to 24	Testing and Commissioning of antennas
Demobilisation	Month 22	Removal of temporary buildings, equipment, and extra materials.

2. Noise sensitive receptors

- 2.1. A summary of a representative sample of the closest receptors to the construction works used in this assessment and their associated LOAEL (baseline noise level) and SOAEL levels are presented in Table 7.10. The LOAEL and SOAEL levels have been derived from the results of the baseline noise monitoring.
- 2.2. The resultant magnitude of impact has been calculated fully in accordance with BS 5228-1:2009+A1:2014 including Note 2 of Table E.1.
- 2.3. Refer to Figure 7.1 for the location of identified receptors including PRow.



Table 7.10: Sample of noise sensitive receptors and associated LOAEL and SOAEL levels

Receptor reference	Address/Name	Daytime (07:00 – 23:00)			Night-time (23:00 – 07:00)		
		LOAEL	BS 5228 Category	SOAEL	LOAEL	BS 5228 Category	SOAEL
R1	The Old Post Office	44	A	65	41	A	45
R2	Dwellings of Penycwm	44	A	65	41	A	45
R3	Dwellings of Llethr	44	A	65	41	A	45
R4	Dwellings of Brawdy	44	A	65	41	A	45
R5	Dwellings of Rhydgele	44	A	65	41	A	45
R6	Troed Y Rhlw	42	A	65	41	A	45
R7	Hillcroft Escapes	42	A	65	41	A	45
R8	Newgale Lodge	42	A	65	41	A	45
R9	Caldey House	42	A	65	41	A	45
R10	Farmhouse east of Llandeloy	42	A	65	41	A	45
R11	Dwellings of Llandeloy	42	A	65	41	A	45
R12	Rhosfawr	37	A	65	33	A	45
R13	Trafaner Farmhouse	37	A	65	33	A	45
R14	Trevia	37	A	65	33	A	45
R15	Persche	37	A	65	33	A	45
R16	Paran House	37	A	65	33	A	45
R17	Cherry Tree and Gwyndy House	37	A	65	33	A	45
R18	Yr Hen Gof Forge	38	A	65	34	A	45
R19	Maerdy Lodge	38	A	65	34	A	45
R20	Park Hall Village Campsite	38	A	65	34	A	45
R21	147 Castleway	44	A	65	41	A	45
R22	Marlowe St Davids School	44	A	65	41	A	45
R23	Cawdor Barracks	44	A	65	41	A	45



- 2.4. For all identified P_{RoW} included in the construction noise assessment, notated with the prefix 'PP', LOAEL and SOAEL values have been determined in accordance with the '5 dB(A) Change' method described in BS 5228-1:12009+A1:2014. This includes the lower cut-off values of 65 dB $L_{Aeq,T}$ during daytime hours and 45 dB $L_{Aeq,T}$ during night-time hours.
- 2.5. Accordingly, the LOAEL for P_{roW} is considered to be the baseline noise level measured in the vicinity; the SOAEL is considered to be 65 dB $L_{Aeq,T}$ during daytime hours and 45 dB $L_{Aeq,T}$ during night-time hours.

3. Predicted construction noise levels

- 3.1. Table 7.11 sets out the predicted noise levels at receptors that is expected to occur during daytime and night-time works as a result of construction activity, based on the construction information and phasing provided. For P_{roW}, construction noise levels are presented as the free field average level expected over the full P_{roW} alignment in accordance with the guidance of BS 5228-1:2009+A1:2014; for all other receptors, noise levels are presented in façade conditions.
- 3.2. Table 7.12 presents the magnitude of impact for each receptor for each assessed period based on the defined LOAEL and SOAEL and the guidance of BS 5228-1:2009+A1:2014.
- 3.3. Magnitude of impact has been determined as set out in Section 7.2 of this chapter. The relevant LOAEL and SOAEL thresholds are set out in Table 7.10.
- 3.4. For ease of reference, where the SOAEL is exceeded, resulting in a moderate or major impact and a potentially significant effect, the magnitude of impact has been presented in bold.

Table 7.11 Predicted construction noise levels at sensitive receptors (unmitigated) during daytime works (07:00 – 19:00 weekdays, 07:00 – 13:00 Saturdays) and night-time works (23:00 – 07:00)

Predicted construction noise level, dB LAeq,T in each assessment period/programme month

Receptor reference	Predicted construction noise level, dB LAeq,T in each assessment period/programme month												Night-works (months 4 – 18)
	Month 1	Month 2	Month 3	Month 4	Month 5	Month 6 - 7	Month 8 - 9	Month 10	Month 11 - 13	Month 14 - 15	Month 16 - 18	Month 22	18)
R1	49	50	50	50	50	50	55	54	54	53	49	42	34
R2	51	51	52	52	51	52	57	56	56	55	51	43	35
R3	52	52	53	53	53	53	58	58	58	57	53	45	37
R4	53	53	54	54	54	54	58	57	57	55	51	47	40
R5	54	55	56	56	55	56	58	57	56	54	51	49	43
R6	50	54	54	55	54	54	55	55	54	51	49	46	42
R7	50	52	53	53	52	53	54	53	52	50	47	46	43
R8	54	60	60	60	60	60	60	60	59	55	54	50	49
R9	55	61	61	61	61	61	61	61	60	56	55	50	50
R10	41	50	50	50	50	50	50	49	49	44	44	34	34
R11	41	50	50	50	50	50	50	49	49	44	44	31	33
R12	40	48	49	49	48	48	48	48	48	43	43	15	32
R13	42	50	51	51	51	51	51	50	50	45	45	34	34
R14	38	47	47	47	47	47	47	47	47	41	41	0	0
R15	36	45	45	45	45	45	45	45	45	39	39	14	0
R16	38	45	46	46	46	46	46	45	45	39	39	18	0
R17	42	50	50	50	50	50	50	50	49	44	44	37	34
R18	54	61	61	61	61	61	61	61	61	56	55	47	44
R19	46	51	52	52	51	52	53	52	52	48	46	42	37
R20	48	53	53	54	53	54	55	54	54	50	48	44	39

Predicted construction noise level, dB L_{Aeq,T} in each assessment period/programme month

Receptor reference	Month 1	Month 2	Month 3	Month 4	Month 5	Month 6 - 7	Month 8 - 9	Month 10	Month 11 - 13	Month 14 - 15	Month 16 - 18	Month 22	Night-works (months 4 –
													18)
R21	49	51	51	51	51	52	55	54	54	53	49	43	36
R22	47	49	49	50	49	50	53	53	52	51	47	42	35
R23	60	60	61	61	61	61	65	65	65	63	59	52	43
PP39/10/1	37	46	46	46	46	46	46	45	45	40	40	21	29
PP39/11/1	38	46	47	47	47	47	47	46	46	41	41	12	30
PP39/6/1	42	50	50	51	50	50	50	50	50	45	45	34	33
PP39/7/1	39	48	48	48	48	48	48	48	48	43	43	22	31
PP39/8/1	45	54	54	54	54	54	54	53	53	48	48	37	35
PP39/9/1	38	47	47	47	47	47	47	46	46	41	41	22	31
PP39/9/2	37	45	45	45	45	45	45	44	44	38	38	26	28
PP39/9/3	45	53	53	53	53	53	53	53	53	48	48	37	35
PP5/1/1	48	48	48	49	48	49	54	53	53	52	48	41	33
PP5/10/1	48	50	51	51	51	51	54	54	53	51	48	43	36
PP5/17/1	44	51	51	52	51	51	52	51	51	46	46	38	36
PP5/18/2	39	47	48	48	47	48	48	47	47	42	42	26	32
PP5/2/1	51	51	52	52	51	52	56	56	55	54	50	44	37
PP5/2/2	49	49	50	50	49	50	55	54	54	53	49	41	33
PP5/2/3	49	50	50	50	50	50	56	55	55	54	50	42	34
PP5/3/1	44	45	45	45	45	46	50	50	49	48	44	39	32
PP5/30/1	52	59	59	59	59	59	59	59	58	54	53	46	43
PP5/33/1	49	53	54	54	53	54	55	54	53	50	48	45	42
PP5/37/1	49	50	50	50	50	51	54	54	53	52	48	43	35

Predicted construction noise level, dB L_{Aeq,T} in each assessment period/programme month

Receptor reference	Month 1	Month 2	Month 3	Month 4	Month 5	Month 6 - 7	Month 8 - 9	Month 10	Month 11 - 13	Month 14 - 15	Month 16 - 18	Month 22	Night-works (months 4 – 18)
PP5/4/1	39	39	40	40	39	40	44	43	43	42	37	33	26
PP5/43/1	44	45	46	46	45	46	50	50	49	48	44	39	31
PP5/5/1	41	42	42	42	42	42	46	46	45	44	40	36	31
PP5/9/1	48	50	50	50	50	50	54	54	54	52	49	42	34

Table 7.12 Predicted construction noise impact magnitudes at sensitive receptors (unmitigated) during daytime works (07:00 – 19:00 weekdays, 07:00 – 13:00 Saturdays) and night-time works (23:00 – 07:00)

Predicted construction noise impact magnitude in each assessment period/programme month

Receptor reference	Month 1	Month 2	Month 3	Month 4	Month 5	Month 6 - 7	Month 8 - 9	Month 10	Month 11 - 13	Month 14 - 15	Month 16 - 18	Month 22	Night-works (months 4 – 18)
R1	Minor	Minor	Minor	Minor	Minor	Minor	Minor	Minor	Minor	Minor	Minor	Negligible	Negligible
R2	Minor	Minor	Minor	Minor	Minor	Minor	Minor	Minor	Minor	Minor	Minor	Negligible	Negligible
R3	Minor	Minor	Minor	Minor	Minor	Minor	Minor	Minor	Minor	Minor	Minor	Minor	Negligible
R4	Minor	Minor	Minor	Minor	Minor	Minor	Minor	Minor	Minor	Minor	Minor	Minor	Negligible
R5	Minor	Minor	Minor	Minor	Minor	Minor	Minor	Minor	Minor	Minor	Minor	Minor	Negligible
R6	Minor	Minor	Minor	Minor	Minor	Minor	Minor	Minor	Minor	Minor	Minor	Minor	Negligible
R7	Minor	Minor	Minor	Minor	Minor	Minor	Minor	Minor	Minor	Minor	Minor	Minor	Minor
R8	Minor	Minor	Minor	Minor	Minor	Minor	Minor	Minor	Minor	Minor	Minor	Minor	Minor
R9	Minor	Minor	Minor	Minor	Minor	Minor	Minor	Minor	Minor	Minor	Minor	Minor	Minor
R10	Negligible	Minor	Minor	Minor	Minor	Minor	Minor	Minor	Minor	Minor	Minor	Negligible	Negligible
R11	Negligible	Minor	Minor	Minor	Minor	Minor	Minor	Minor	Minor	Minor	Minor	Negligible	Negligible
R12	Minor	Minor	Minor	Minor	Minor	Minor	Minor	Minor	Minor	Minor	Minor	Negligible	Negligible

Predicted construction noise impact magnitude in each assessment period/programme month

Receptor reference	Month 1	Month 2	Month 3	Month 4	Month 5	Month 6 - 7	Month 8 - 9	Month 10	Month 11 - 13	Month 14 - 15	Month 16 - 18	Month 22	Night-works (months 4 – 18)
R13	Minor	Minor	Minor	Minor	Minor	Minor	Minor	Minor	Minor	Minor	Minor	Negligible	Negligible
R14	Minor	Minor	Minor	Minor	Minor	Minor	Minor	Minor	Minor	Minor	Minor	Negligible	Negligible
R15	Negligible	Minor	Minor	Minor	Minor	Minor	Minor	Minor	Minor	Minor	Minor	Negligible	Negligible
R16	Minor	Minor	Minor	Minor	Minor	Minor	Minor	Minor	Minor	Minor	Minor	Negligible	Negligible
R17	Minor	Minor	Minor	Minor	Minor	Minor	Minor	Minor	Minor	Minor	Minor	Minor	Negligible
R18	Minor	Minor	Minor	Minor	Minor	Minor	Minor	Minor	Minor	Minor	Minor	Minor	Minor
R19	Minor	Minor	Minor	Minor	Minor	Minor	Minor	Minor	Minor	Minor	Minor	Minor	Negligible
R20	Minor	Minor	Minor	Minor	Minor	Minor	Minor	Minor	Minor	Minor	Minor	Minor	Minor
R21	Minor	Minor	Minor	Minor	Minor	Minor	Minor	Minor	Minor	Minor	Minor	Negligible	Negligible
R22	Minor	Minor	Minor	Minor	Minor	Minor	Minor	Minor	Minor	Minor	Minor	Negligible	Negligible
R23	Minor	Minor	Minor	Minor	Minor	Minor	Moderate	Minor	Minor	Minor	Minor	Minor	Negligible
PP39/10/1	Negligible	Minor	Minor	Minor	Minor	Minor	Minor	Minor	Minor	Negligible	Negligible	Negligible	Negligible
PP39/11/1	Negligible	Minor	Minor	Minor	Minor	Minor	Minor	Minor	Minor	Negligible	Negligible	Negligible	Negligible
PP39/6/1	Negligible	Minor	Minor	Minor	Minor	Minor	Minor	Minor	Minor	Minor	Minor	Negligible	Negligible
PP39/7/1	Negligible	Minor	Minor	Minor	Minor	Minor	Minor	Minor	Minor	Negligible	Negligible	Negligible	Negligible
PP39/8/1	Minor	Minor	Minor	Minor	Minor	Minor	Minor	Minor	Minor	Minor	Minor	Negligible	Negligible
PP39/9/1	Negligible	Minor	Minor	Minor	Minor	Minor	Minor	Minor	Minor	Negligible	Negligible	Negligible	Negligible
PP39/9/2	Negligible	Minor	Minor	Minor	Minor	Minor	Minor	Minor	Minor	Negligible	Negligible	Negligible	Negligible
PP39/9/3	Minor	Minor	Minor	Minor	Minor	Minor	Minor	Minor	Minor	Minor	Minor	Negligible	Negligible
PP5/1/1	Minor	Minor	Minor	Minor	Minor	Minor	Minor	Minor	Minor	Minor	Minor	Negligible	Negligible
PP5/10/1	Minor	Minor	Minor	Minor	Minor	Minor	Minor	Minor	Minor	Minor	Minor	Negligible	Negligible
PP5/17/1	Negligible	Minor	Minor	Minor	Minor	Minor	Minor	Minor	Minor	Minor	Minor	Negligible	Negligible

Predicted construction noise impact magnitude in each assessment period/programme month

Receptor reference	Predicted construction noise impact magnitude in each assessment period/programme month												Night-works (months 4 – 18)
	Month 1	Month 2	Month 3	Month 4	Month 5	Month 6 - 7	Month 8 - 9	Month 10	Month 11 - 13	Month 14 - 15	Month 16 - 18	Month 22	
PP5/18/2	Negligible	Minor	Minor	Minor	Minor	Minor	Minor	Minor	Minor	Negligible	Negligible	Negligible	Negligible
PP5/2/1	Minor	Minor	Minor	Minor	Minor	Minor	Minor	Minor	Minor	Minor	Minor	Minor	Negligible
PP5/2/2	Minor	Minor	Minor	Minor	Minor	Minor	Minor	Minor	Minor	Minor	Minor	Negligible	Negligible
PP5/2/3	Minor	Minor	Minor	Minor	Minor	Minor	Minor	Minor	Minor	Minor	Minor	Negligible	Negligible
PP5/3/1	Minor	Minor	Minor	Minor	Minor	Minor	Minor	Minor	Minor	Minor	Negligible	Negligible	Negligible
PP5/30/1	Minor	Minor	Minor	Minor	Minor	Minor	Minor	Minor	Minor	Minor	Minor	Minor	Negligible
PP5/33/1	Minor	Minor	Minor	Minor	Minor	Minor	Minor	Minor	Minor	Minor	Minor	Minor	Negligible
PP5/37/1	Minor	Minor	Minor	Minor	Minor	Minor	Minor	Minor	Minor	Minor	Minor	Negligible	Negligible
PP5/4/1	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible
PP5/43/1	Minor	Minor	Minor	Minor	Minor	Minor	Minor	Minor	Minor	Minor	Minor	Negligible	Negligible
PP5/5/1	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible	Minor	Minor	Minor	Minor	Negligible	Negligible	Negligible
PP5/9/1	Minor	Minor	Minor	Minor	Minor	Minor	Minor	Minor	Minor	Minor	Minor	Negligible	Negligible



ES Appendix 7.4: Operational Noise Assessment



Appendix 7.4 Operational Noise Assessment

1. Overview

- 1.1. An assessment of operational noise emissions from the proposed development has been undertaken in accordance with BS 4142:2014+A1:2019 using details provided by the Project Team regarding site layouts, operational noise sources and operational conditions.
- 1.2. Descriptions of the proposed development are provided in Chapter 3 (Proposed Development). Details regarding operational noise sources are provided in Table 7.20 of the main Chapter 7 (Noise & Vibration) text along with the determination of resultant significant from the unmitigated development.
- 1.3. This appendix provides further technical detail and results of the BS 4142:2014+A1:2019 assessment undertaken including the applied character corrections and resultant rating levels at each identified receptor.

2. Predicted Operational Noise Levels

- 2.1. Operational noise levels have been predicted at each of the identified noise sensitive receptors using the methodology and approach set out in the main Chapter text.
- 2.2. The following tables present the predicted specific sound level at each receptor, the overall character correction applied (derived in accordance with the BS 4142:2014+A1:2019 subjective method), the resultant rating level, and the resulting noise impact magnitude during both daytime and night-time hours. As defined in the main Chapter text, the reported specific sound levels affecting each PRoW (identified with a 'PP' prefix) have been presented as the arithmetic average noise level across the extents of the PRoW alignment, reflecting the transient nature of use.
- 2.3. Note: the tables presented below include any embedded mitigation as defined in the main Chapter text but include no allowances for any identified essential mitigation or enhancements.
- 2.4. For ease of reference, where the operational design limits agreed in consultation with PCC are exceeded, resulting in a potentially significant effect, the magnitude of impact has been presented in bold.



Table 7.13: Operational noise assessment – ‘Normal’ condition

Receptor	Predicted specific level, dB L _{Aeq,T}	Applied character correction, dB		Resultant rating level, dB L _{A,r,Tr}		Impact magnitude (refer to ES Chapter 7 Table 7.9)	
		Day	Night	Day	Night	Day	Night
R1 - The Old Post Office	26	0	5	26	31	Negligible	Negligible
R2 - Pencwym	28	0	5	28	33	Negligible	Negligible
R3 - Llethr	29	0	7	29	36	Negligible	Moderate
R4 - Brawdy	30	5	9	35	39	Minor	Moderate
R5 - Rhydgele	30	7	9	37	39	Moderate	Moderate
R6 - Troed Y Rhiw Farmhouse	29	5	9	34	38	Negligible	Moderate
R7 - Hillcroft Escapes	29	5	9	34	38	Negligible	Moderate
R8 - Newgale Lodge	34	9	9	43	43	Major	Major
R9 - Caldey House	35	9	9	44	44	Major	Major
R10 - Farmhouse east of Llandeloy	26	2	9	28	35	Negligible	Minor
R11 - Llandeloy	26	2	9	28	35	Negligible	Minor
R12 - Rhosfawr	24	2	9	26	33	Negligible	Negligible
R13 - Trefaner Farmhouse	27	5	9	32	36	Negligible	Moderate
R14 - Trevia	23	2	9	25	32	Negligible	Negligible
R15 - Persche	22	0	7	22	29	Negligible	Negligible
R16 - Paran House	22	2	7	24	29	Negligible	Negligible
R17 - Cherry Tree & Gwtndy Farmhouse	26	5	9	31	35	Negligible	Minor
R18 - Yr Hen Gof Forge	37	9	9	46	46	Major	Major
R19 - Maerdy Lodge	28	5	9	33	37	Negligible	Moderate
R20 - Park Hall Village	29	5	9	34	38	Negligible	Moderate
R21 - 147 Castleway	28	0	5	28	33	Negligible	Negligible
R22 - Marlowe St Davids School	26	0	5	26	31	Negligible	Negligible
R23 - Cawdor Barracks	36	5	9	41	45	Major	Major
PP39/10/1	21	0	7	21	28	Negligible	Negligible
PP39/11/1	22	0	7	22	29	Negligible	Negligible
PP39/6/1	26	2	9	28	35	Negligible	Minor
PP39/7/1	24	2	9	26	33	Negligible	Negligible
PP39/8/1	29	5	9	34	38	Negligible	Moderate
PP39/9/1	23	2	7	25	30	Negligible	Negligible
PP39/9/2	20	0	7	20	27	Negligible	Negligible
PP39/9/3	28	5	9	33	37	Negligible	Moderate
PP5/1/1	22	2	7	24	29	Negligible	Negligible
PP5/10/1	27	5	9	32	36	Negligible	Moderate
PP5/17/1	27	5	9	32	36	Negligible	Moderate
PP5/18/2	22	0	7	22	29	Negligible	Negligible
PP5/2/1	27	0	5	27	32	Negligible	Negligible
PP5/2/2	26	0	5	26	31	Negligible	Negligible
PP5/2/3	26	5	9	31	35	Negligible	Minor
PP5/3/1	21	0	5	21	26	Negligible	Negligible

Receptor	Predicted specific level, dB L _{Aeq,T}	Applied character correction, dB		Resultant rating level, dB L _{A,r,Tr}		Impact magnitude (refer to ES Chapter 7 Table 7.9)	
		Day	Night	Day	Night	Day	Night
PP5/30/1	33	7	9	40	42	Major	Major
PP5/33/1	26	2	9	28	35	Negligible	Minor
PP5/37/1	0	0	0	0	0	Negligible	Negligible
PP5/4/1	14	0	2	14	16	Negligible	Negligible
PP5/43/1	20	0	5	20	25	Negligible	Negligible
PP5/5/1	13	0	0	13	13	Negligible	Negligible
PP5/9/1	26	2	9	28	35	Negligible	Minor

Table 7.14: Operational noise assessment – ‘Bowtie/Scan High’ condition

Receptor	Predicted specific level, dB L _{Aeq,T}	Applied character correction, dB		Resultant rating level, dB L _{A,r,Tr}		Impact magnitude (refer to ES Chapter 7 Table 7.9)	
		Day	Night	Day	Night	Day	Night
R1 - The Old Post Office	29	0	7	29	36	Negligible	Negligible
R2 - Pencwym	31	2	7	33	38	Negligible	Negligible
R3 - Llethr	33	2	7	35	40	Negligible	Negligible
R4 - Brawdy	33	7	9	40	42	Negligible	Negligible
R5 - Rhydgele	33	7	9	40	42	Negligible	Negligible
R6 - Troed Y Rhiw Farmhouse	32	7	9	39	41	Negligible	Negligible
R7 - Hillcroft Escapes	32	7	9	39	41	Negligible	Negligible
R8 - Newgale Lodge	38	9	9	47	47	Moderate	Moderate
R9 - Caldey House	39	9	9	48	48	Moderate	Moderate
R10 - Farmhouse east of Llandeloy	29	5	9	34	38	Negligible	Negligible
R11 - Llandeloy	29	5	9	34	38	Negligible	Negligible
R12 - Rhosfawr	28	5	9	33	37	Negligible	Negligible
R13 - Trefaner Farmhouse	30	7	9	37	39	Negligible	Negligible
R14 - Trevia	27	5	9	32	36	Negligible	Negligible
R15 - Persche	25	2	9	27	34	Negligible	Negligible
R16 - Paran House	26	2	9	28	35	Negligible	Negligible
R17 - Cherry Tree & Gwndy Farmhouse	30	5	9	35	39	Negligible	Negligible
R18 - Yr Hen Gof Forge	40	9	9	49	49	Moderate	Moderate
R19 - Maerdy Lodge	31	7	9	38	40	Negligible	Negligible
R20 - Park Hall Village	32	7	9	39	41	Negligible	Negligible
R21 - 147 Castleway	31	2	7	33	38	Negligible	Negligible
R22 - Marlowe St Davids School	29	0	5	29	34	Negligible	Negligible
R23 - Cawdor Barracks	39	7	9	46	48	Moderate	Moderate
PP39/10/1	25	2	9	27	34	Negligible	Negligible
PP39/11/1	26	2	9	28	35	Negligible	Negligible
PP39/6/1	29	5	9	34	38	Negligible	Negligible
PP39/7/1	28	5	9	33	37	Negligible	Negligible
PP39/8/1	33	7	9	40	42	Negligible	Negligible

Receptor	Predicted specific level, dB L _{Aeq,T}	Applied character correction, dB		Resultant rating level, dB L _{A,r,Tr}		Impact magnitude (refer to ES Chapter 7 Table 7.9)	
		Day	Night	Day	Night	Day	Night
PP39/9/1	26	5	9	31	35	Negligible	Negligible
PP39/9/2	23	2	9	25	32	Negligible	Negligible
PP39/9/3	32	7	9	39	41	Negligible	Negligible
PP5/1/1	25	2	9	27	34	Negligible	Negligible
PP5/10/1	30	5	9	35	39	Negligible	Negligible
PP5/17/1	30	7	9	37	39	Negligible	Negligible
PP5/18/2	26	2	9	28	35	Negligible	Negligible
PP5/2/1	30	2	7	32	37	Negligible	Negligible
PP5/2/2	29	0	5	29	34	Negligible	Negligible
PP5/2/3	30	5	9	35	39	Negligible	Negligible
PP5/3/1	24	2	7	26	31	Negligible	Negligible
PP5/30/1	37	9	9	46	46	Moderate	Moderate
PP5/33/1	29	5	9	34	38	Negligible	Negligible
PP5/37/1	0	0	0	0	0	Negligible	Negligible
PP5/4/1	17	0	2	17	19	Negligible	Negligible
PP5/43/1	23	2	7	25	30	Negligible	Negligible
PP5/5/1	16	0	2	16	18	Negligible	Negligible
PP5/9/1	29	5	9	34	38	Negligible	Negligible

Table 7.15: Operational noise assessment – ‘Normal + Temporary Auxiliary Power’ condition

Receptor	Predicted specific level, dB L _{Aeq,T}	Applied character correction, dB		Resultant rating level, dB L _{A,r,Tr}		Impact magnitude (refer to ES Chapter 7 Table 7.9)	
		Day	Night	Day	Night	Day	Night
R1 - The Old Post Office	31	2	7	33	38	Negligible	Negligible
R2 - Pencwym	32	2	7	34	39	Negligible	Negligible
R3 - Llethr	34	2	9	36	43	Negligible	Negligible
R4 - Brawdy	36	9	9	45	45	Minor	Minor
R5 - Rhydgele	38	9	9	47	47	Moderate	Moderate
R6 - Troed Y Rhiw Farmhouse	35	9	9	44	44	Negligible	Negligible
R7 - Hillcroft Escapes	35	9	9	44	44	Negligible	Negligible
R8 - Newgale Lodge	40	9	9	49	49	Moderate	Moderate
R9 - Caldey House	40	9	9	49	49	Moderate	Moderate
R10 - Farmhouse east of Llandeloy	29	5	9	34	38	Negligible	Negligible
R11 - Llandeloy	27	5	9	32	36	Negligible	Negligible
R12 - Rhosfawr	24	2	9	26	33	Negligible	Negligible
R13 - Trefaner Farmhouse	29	5	9	34	38	Negligible	Negligible
R14 - Trevia	23	2	9	25	32	Negligible	Negligible
R15 - Persche	22	0	7	22	29	Negligible	Negligible
R16 - Paran House	22	2	7	24	29	Negligible	Negligible
R17 - Cherry Tree & Gwndy Farmhouse	30	5	9	35	39	Negligible	Negligible

Receptor	Predicted specific level, dB L _{Aeq,T}	Applied character correction, dB		Resultant rating level, dB L _{A,r,Tr}		Impact magnitude (refer to ES Chapter 7 Table 7.9)	
		Day	Night	Day	Night	Day	Night
R18 - Yr Hen Gof Forge	39	9	9	48	48	Moderate	Moderate
R19 - Maerdy Lodge	33	7	9	40	42	Negligible	Negligible
R20 - Park Hall Village	33	7	9	40	42	Negligible	Negligible
R21 - 147 Castleway	33	2	7	35	40	Negligible	Negligible
R22 - Marlowe St Davids School	31	2	7	33	38	Negligible	Negligible
R23 - Cawdor Barracks	40	7	9	47	49	Moderate	Moderate
PP39/10/1	21	0	7	21	28	Negligible	Negligible
PP39/11/1	22	0	7	22	29	Negligible	Negligible
PP39/6/1	28	5	9	33	37	Negligible	Negligible
PP39/7/1	24	2	9	26	33	Negligible	Negligible
PP39/8/1	31	7	9	38	40	Negligible	Negligible
PP39/9/1	23	2	7	25	30	Negligible	Negligible
PP39/9/2	21	0	7	21	28	Negligible	Negligible
PP39/9/3	30	7	9	37	39	Negligible	Negligible
PP5/1/1	27	5	9	32	36	Negligible	Negligible
PP5/10/1	31	7	9	38	40	Negligible	Negligible
PP5/17/1	30	5	9	35	39	Negligible	Negligible
PP5/18/2	22	2	7	24	29	Negligible	Negligible
PP5/2/1	31	2	7	33	38	Negligible	Negligible
PP5/2/2	30	0	7	30	37	Negligible	Negligible
PP5/2/3	30	7	9	37	39	Negligible	Negligible
PP5/3/1	26	2	9	28	35	Negligible	Negligible
PP5/30/1	36	9	9	45	45	Minor	Minor
PP5/33/1	31	7	9	38	40	Negligible	Negligible
PP5/37/1	0	0	0	0	0	Negligible	Negligible
PP5/4/1	21	0	5	21	26	Negligible	Negligible
PP5/43/1	25	2	7	27	32	Negligible	Negligible
PP5/5/1	18	0	5	18	23	Negligible	Negligible
PP5/9/1	30	7	9	37	39	Negligible	Negligible

Table 7.16: Operational noise assessment – ‘Bowtie/Scan High + Temporary Auxiliary Power’ condition

Receptor	Predicted specific level, dB L _{Aeq,T}	Applied character correction, dB		Resultant rating level, dB L _{A,r,Tr}		Impact magnitude (refer to ES Chapter 7 Table 7.9)	
		Day	Night	Day	Night	Day	Night
R1 - The Old Post Office	33	2	7	35	40	Negligible	Negligible
R2 - Pencwym	34	2	9	36	43	Negligible	Negligible
R3 - Llethr	35	5	9	40	44	Negligible	Negligible
R4 - Brawdy	36	9	9	45	45	Minor	Minor
R5 - Rhydgele	38	9	9	47	47	Moderate	Moderate
R6 - Troed Y Rhiw Farmhouse	36	9	9	45	45	Minor	Minor

Receptor	Predicted specific level, dB L _{Aeq,T}	Applied character correction, dB		Resultant rating level, dB L _{A,r,Tr}		Impact magnitude (refer to ES Chapter 7 Table 7.9)	
		Day	Night	Day	Night	Day	Night
R7 - Hillcroft Escapes	36	9	9	45	45	Minor	Minor
R8 - Newgale Lodge	41	9	9	50	50	Major	Major
R9 - Caldey House	42	9	9	51	51	Major	Major
R10 - Farmhouse east of Llandeloy	31	7	9	38	40	Negligible	Negligible
R11 - Llandeloy	30	7	9	37	39	Negligible	Negligible
R12 - Rhosfawr	28	5	9	33	37	Negligible	Negligible
R13 - Trefaner Farmhouse	32	7	9	39	41	Negligible	Negligible
R14 - Trevia	27	5	9	32	36	Negligible	Negligible
R15 - Persche	25	2	9	27	34	Negligible	Negligible
R16 - Paran House	26	2	9	28	35	Negligible	Negligible
R17 - Cherry Tree & Gwtdy Farmhouse	32	7	9	39	41	Negligible	Negligible
R18 - Yr Hen Gof Forge	42	9	9	51	51	Major	Major
R19 - Maerdy Lodge	34	7	9	41	43	Negligible	Negligible
R20 - Park Hall Village	35	9	9	44	44	Negligible	Negligible
R21 - 147 Castleway	34	5	9	39	43	Negligible	Negligible
R22 - Marlowe St Davids School	32	2	7	34	39	Negligible	Negligible
R23 - Cawdor Barracks	42	7	9	49	51	Moderate	Major
PP39/10/1	25	2	9	27	34	Negligible	Negligible
PP39/11/1	26	2	9	28	35	Negligible	Negligible
PP39/6/1	31	7	9	38	40	Negligible	Negligible
PP39/7/1	28	5	9	33	37	Negligible	Negligible
PP39/8/1	33	7	9	40	42	Negligible	Negligible
PP39/9/1	26	5	9	31	35	Negligible	Negligible
PP39/9/2	24	2	9	26	33	Negligible	Negligible
PP39/9/3	33	7	9	40	42	Negligible	Negligible
PP5/1/1	29	5	9	34	38	Negligible	Negligible
PP5/10/1	33	7	9	40	42	Negligible	Negligible
PP5/17/1	32	7	9	39	41	Negligible	Negligible
PP5/18/2	26	2	9	28	35	Negligible	Negligible
PP5/2/1	33	2	7	35	40	Negligible	Negligible
PP5/2/2	31	2	7	33	38	Negligible	Negligible
PP5/2/3	32	7	9	39	41	Negligible	Negligible
PP5/3/1	27	5	9	32	36	Negligible	Negligible
PP5/30/1	39	9	9	48	48	Moderate	Moderate
PP5/33/1	32	7	9	39	41	Negligible	Negligible
PP5/37/1	-8	0	0	0	0	Negligible	Negligible
PP5/4/1	21	0	7	21	28	Negligible	Negligible
PP5/43/1	26	5	9	31	35	Negligible	Negligible
PP5/5/1	20	0	5	20	25	Negligible	Negligible
PP5/9/1	32	7	9	39	41	Negligible	Negligible



3. Assessment Uncertainty

- 3.1. Section 10 of BS 4142:2014+A1:2019 requires that consideration is given to the potential uncertainty within data and associated calculations and how this may influence the assessment conclusions. The level and potential effects of uncertainty are to be reported.
- 3.2. The assessments presented to in this appendix and the main Chapter text have been undertaken by a suitably qualified surveyor using environmental noise data captured using Class 1 calibrated noise monitoring equipment. During the survey, observations were also made and reported by the same surveyor, which have subsequently been used to inform the subjective character corrections applied in this assessment. To this end, the uncertainty in the measured survey results and reported observations regarding site context is considered to be low.
- 3.3. It is recognised that the acoustic environment can change over time. Interrogation of the site and surroundings are using publicly available mapping and planning records indicates that no major development has been undertaken in the vicinity of the proposed development that may have materially affected the pre-existing environmental noise levels. Accordingly, any uncertainty arising due to potential changes in the local acoustic environment is considered to be low.
- 3.4. Calculations of operational noise have been undertaken using industry best practice methods in accordance with ISO 9613-2:2024 using the Datakustik CadnaA modelling suite. Details regarding site topography, ground absorption and receptor locations have been taken from reputable publicly available sources (such as Defra, Ordnance Survey and satellite imaging). Therefore, uncertainty resulting from calculation errors are considered to be low; however, it is noted that the CadnaA software package commonly reports an inherent ± 3 dB calculation uncertainty.
- 3.5. Details of operational noise sources have been provided by the Project Team using engineering estimates and records taken at the existing DARC Site 1 (DS1) facility. Uncertainty may arise as a result of the engineering estimates; however, it is understood that these estimates are being taken forward as design limits and as such as-installed equipment will be no louder than modelled. Regarding the antenna noise emissions, measurements undertaken at the existing and functionally identical DS1 facility are considered to be the most accurate means of quantifying operational noise emissions. Interrogation of the DS1 findings indicates that the results align closely with those captured by Sweco during the in-person witnessing and so are considered to be reliable. As such, uncertainty arising from source noise data is considered to be low.
- 3.6. Therefore, it is considered unlikely that the assessment uncertainty could affect the conclusions presented in this noise assessment.