

Superseded

Noise Assessment for Planning Purposes

Job No: 2301002
Report Status: Final
Dated: 17th February 2023

Prepared for: Scully Property Group Ltd
76 Roman Road
Banwen
Wales
SA10 9LH

Site address: Nant y Cafn
Seven Sisters
Neath
SA10 9ES

Acoustics & Noise Limited

55 Malpas Road, Newport, South Wales, NP20 5PJ

TEL: +44(0)1633-850880

FAX: +44(0)1633-850882

www.acousticsandnoise.co.uk

office@acousticsandnoise.co.uk



www.acousticsandnoise.co.uk

Superseded

Document Management					
Issue/Revision	First issue	Revision 1	Revision 2	Revision 3	Final
Job Number	2301002				2301002
Report Number	R01				R01
Remarks	Draft	Updated site plan			Final
Issue Date	10th February 2023				17th February 2023
Prepared by	Chris McDonagh				Chris McDonagh
Signature					
Checked by	Paul Trew				Paul Trew
Signature					
Authorised by	Paul Trew				Paul Trew
Signature					
ANL File Reference	Shared Folders\Job Files\F - J\I Plan Architecture\Nant y Cafn Business Park\Report\2301002R01				

Disclaimer

Acoustics and Noise Ltd prepared and completed this report based on a defined programme of work, terms and conditions agreed with the Client. This report was prepared using all reasonable skill and care within the resources agreed by the client including prevailing site conditions and the degree of manpower and resources allocated to the project. No responsibility is accepted from matters outside the terms and scope of the agreement under which this report was prepared. Recommendations in this report are for acoustics purposes only, and it is the responsibility of the Client, Project Manager or Architect to ensure that all other requirements are met including (but not limited to) structure, fire, planning and Building Control matters. Similarly, no responsibility in any form is accepted for third party use of this report or parts thereof, the contents of which are confidential to the client. If any third party whatsoever comes into possession of this report, they rely on it at their own risk and Acoustics and Noise Ltd accepts no duty or responsibility (including in negligence) to any such third party. Unless specifically assigned or transferred within the terms of the agreement, Acoustics and Noise Ltd retains all copyright and other intellectual property rights, on and over the report and its contents.

© Acoustics and Noise Ltd. 2023

Superseded

CONTENTS

BRIEF FOR CONSULTANCY	5
OBJECTIVE	5
NON TECHNICAL SUMMARY	5
DESCRIPTION OF SITE	7
DISCUSSION	8
IMPACT ASSESSMENT	10
CONCLUSIONS	19
RECOMMENDATIONS	20

APPENDICES

Appendix 1 Survey Details
Appendix 2 View of Measurement Position
Appendix 3 Survey Results
Appendix 4 Proposed Development Layout
Appendix 5 3D Acoustic Model Details
Appendix 6 Modelling Results
Appendix 7 Relevant Guidance
Appendix 8 Range of Typical Noise Levels
Appendix 9 Glossary of Acoustic Terms
Appendix 10 References

TABLES

- Table 1 – Anticipated Assessment Criteria
- Table 2 – Summary of External Noise Levels at Plots 4 and 5
- Table 3 – Minimum Sound Reduction Calculations for Glazing Units to Plots 4 & 5
- Table 4 – Summary of Measured External Free Field Noise Levels
- Table 5 – Windspeed Log
- Table 6 – Subjective Observations from Guard
- Table 7 – Equipment Used
- Table 8 – Meter Details
- Table 9 – Summary of Survey Results (Free-Field Noise Levels)
- Table 10 – Daytime Free-Field Noise Levels (07:00 – 23:00)
- Table 11 – Night Time Free-Field Noise Levels (23:00 – 07:00)
- Table 12 – Calculated External Free-Field Noise Levels at Plots 4 & 5
- Table 13 – Planning Advice as per TAN11
- Table 14 – Free-Field Noise Levels Corresponding to the NECs, $L_{Aeq,T}$ dB
- Table 15 – BS 8233 Internal Noise Level Guidelines
- Table 16 – WHO Guideline Noise Levels for Dwellings

FIGURES

- Figure 1 – Measurement Position
- Figure 2 – View of Survey Equipment
- Figure 3 – Proposed Development Layout
- Figure 4 – Floor Plan, Plot 1
- Figure 5 – Floor Plan, Plots 2 and 3
- Figure 6 – Floor Plan, Plot 4
- Figure 7 – Floor Plan, Plot 5
- Figure 8 – TAN 11, NEC Categories, Daytime
- Figure 9 – TAN 11, NEC Categories, Night Time
- Figure 10 – Daytime Free Field Noise Levels – Outdoor Amenity Spaces
- Figure 11 – Night Time Free Field Noise Levels – Open Window Ventilation Strategy
- Figure 12 – Range of Typical Noise Levels

Superseded

BRIEF FOR CONSULTANCY

This report has been prepared by Acoustics & Noise Limited, Newport, South Wales, for Scully Property Group Ltd, 76 Roman Road, Banwen, Wales, SA10 9LH under the instructions of Carl Quick, c/o iPlan Architecture Ltd.

Purchase Order No: n/a

OBJECTIVES

To investigate the noise climate on the proposed site.

To establish the suitability for developing the land for residential purposes.

NON-TECHNICAL SUMMARY

It is proposed to develop a vacant plot of land at Nant-y-Caffn, Seven Sisters for residential purposes comprising five single storey, detached bungalows. The acoustic climate at the site is characterised by road traffic. The site is considered to be a road noise site as defined in Technical Advice Note 11 (TAN 11) which prescribes the measurement methods and standards to be used for an appropriate noise survey. The results of the survey are separated into day and night periods which are compared with four Noise Exposure Categories (NECs).

A 24-hour noise survey was carried out at the site to allow an assessment of the impact of road traffic noise on the site as per the general requirements of TAN 11 and anticipated criteria from the Local Authority. The results of the survey are used to calibrate a 3D acoustic model for the prediction of the road traffic noise levels across the proposed development site.

The results of the assessment indicate that the external free-field noise levels place the majority of the site into NEC 'A'. For sites categorised as NEC 'A', TAN 11 recommends that:

"Noise need not be considered as a determining factor in granting planning permission, although the noise level at the high end of the category should not be regarded as a desirable level".

However, the results of the 3D modelling identify that Bedrooms 1 and 2 of Plots 4 and 5 are exposed to external noise that would result in the internal ambient noise criteria being exceeded if using an open window for ventilation.

Superseded

Following consideration of good acoustic design principles, an appropriate scheme of mitigation is recommended which requires that the windows are closed to control the noise ingress. A minimum sound reduction performance is also recommended so that the internal ambient noise criteria is achievable. The decision on whether the windows should be permanently closed is outside the scope of this assessment and our technical expertise. This decision should be taken by appropriate authorities.

Manufacturers' data should be used to confirm the minimum sound reduction performance requirements recommended in this report are achievable from any specified glazing units, including any provision for background ventilation if applicable.

All habitable rooms subject to sound mitigation measures would need to be provided with an alternative, effective means of ventilation. Any ventilation scheme should satisfy the requirements of Approved Document F and provide the required ventilation rates. Specialist advice should be obtained to ensure that any ventilation scheme is suitable for purpose. It is important that any scheme is approved by Building Control and does not compromise the internal noise levels. Recommendations for suitable ventilation are outside the scope of this assessment and technical expertise.

All external amenity spaces within the proposed development are exposed to daytime noise levels below the anticipated external noise criteria. No further mitigation is recommended.

Superseded

1.0 DESCRIPTION OF SITE

- 1.1 The site is located at Nant y Cafn, Seven Sisters, Neath, SA10 9ES and is currently a vacant plot of unused land.
- 1.2 The site is located in a mixed commercial/residential area and is bounded by the A4109 at the western boundary.
- 1.3 The acoustic climate at the site is characterised by road traffic.
- 1.4 A satellite view of the site is presented in Appendix 2.

2.0 DISCUSSION

- 2.1 It is proposed to develop the site for residential purposes comprising five, single storey bungalows.
- 2.2 This report is to accompany a planning application which provides full details of the proposed development.
- 2.3 Following receipt of the full planning application and internal consultation with Environmental Health, the following comments were received:
- “...The Developer shall undertake an Environmental Noise Assessment for both internal and external residential amenity areas. The Assessment shall be undertaken in accordance with the methodologies contained in Planning Guidance (Wales), Technical Advice Note (Wales) 11 – Noise, and British Standard 8233:2014 – Guidance on sound insulation and noise reduction for buildings...”.*
- 2.4 Acoustics and Noise Ltd were engaged by Scully Property Group Ltd to undertake an environmental noise assessment for the above proposal in accordance with the above comments from the Local Authority.
- 2.5 **Description of Proposed Development**
- 2.5.1 The development proposal seeks planning permission for the construction of five, single storey bungalows.
- 2.5.2 The proposed residential development will be located in a semi-urban environment and could potentially be exposed to noise that may have an adverse effect on the amenity and health and wellbeing of the future occupants.
- 2.5.3 The primary source of noise at the site is associated with road traffic at the western boundary to the site.
- 2.5.4 A small, uPVC manufacturing factory is located to the east of the site. At the time of the survey, it was confirmed during an informal visit to the factory, that it was operating normally.

Superseded

2.5.5 During the survey, there were no observed audible factory noise emissions on any part of the development site and the factory will therefore not cause an adverse impact on the proposed development.

acoustics & noise limited

3.0 IMPACT ASSESSMENT

3.1 Relevant Guidance

3.1.1 As a matter of best practice, this assessment has been undertaken with reference to relevant guidance on noise. Summary descriptions of the guidance is presented in Appendix 7.

3.2 TAN 11 Road Traffic Assessment

3.2.1 To determine the acoustic conditions across the proposed development site a 24-hour road traffic noise survey was conducted at the centre of the development site. This location enjoyed an uninterrupted view of the road traffic travelling along the A4109.

3.2.2 The results of the survey are used to calibrate a 3D acoustic model and then predict the road traffic noise levels across the proposed development site. Results are displayed in easily understood noise contours representing the Noise Exposure Category (NEC) bands described in TAN 11 [1], overlaid onto a basemap image of the site.

3.2.3 The free-field road traffic noise levels generated by the model can now be compared with the NEC detailed in TAN 11 [1] to determine the suitability of the site for residential purposes.

3.2.4 The resultant NEC noise contours are presented in in Appendix 6 and indicate that the majority of the site is located within NEC 'A' with a small area along the western extent of the site encroaching into NEC 'B'.

3.2.5 During the night time period, there were no instances of $L_{A\max}$ (free-field) exceeding 82 dB and therefore, there is no requirement to further amend the NEC.

3.2.6 For sites categorised as NEC 'A', TAN11 [1] states:

"Noise need not be considered as a determining factor in granting planning permission, although the noise level at the high end of the category should not be regarded as a desirable level".

And for sites categorised as NEC 'B', TAN11 [1] states:

Superseded

“Noise should be taken into account when determining planning applications and, where appropriate, conditions imposed to ensure an adequate level of protection against noise”.

- 3.2.7
- The results of the modelling indicate that the western elevations of plots 4 and 5 would potentially be exposed to noise levels at the lower range of NEC ‘B’ and therefore, the 3D model is used to further assess the efficacy of any required mitigation to ensure an adequate level of protection against noise is provided for these properties.
- 3.2.8
- The remaining plots and all external amenity areas are within NEC ‘A’ and no further mitigation is required.
- 3.2.9
- It is anticipated that for plots 4 and 5, an *‘adequate level of protection against noise’* will be attainable through the consideration of good acoustic design principles.

3.3

Assessment Criteria

- 3.3.1
- The Local Authority pre-app response refers to BS 8233 [5] which, for dwellings, states that *“in general, for steady external noise sources, it is desirable that the internal ambient noise level does not exceed the guideline values”*. These desirable guideline values are interpreted in Table 1 below.

Table 1 – Anticipated Assessment Criteria

Location	07:00 – 23:00 hrs	23:00 – 07:00 hrs
Within Habitable Rooms	35 dB LAeq,16hrs	30 dB LAeq,8hrs
External Amenity Space	50 dB LAeq,16hrs	--

- 3.4
- Prediction of Noise Levels Across Proposed Development Site
- 3.4.1
- The 3D model was updated with the proposed dwellings in place and receivers were placed outside the bedrooms of Plots 4 and 5 to calculate the external noise levels. The results of the modelling are presented in Appendix 6 with the results summarised in Table 2 below.

Table 2 – Summary of External Noise Levels at Plots 4 and 5

Receptor	External free-Field Noise Level Daytime L _{Aeq,16hr} (dB)	External free-Field Noise Level Night Time L _{Aeq,8hr} (dB)
Plot 4, Bedroom 1	54	46
Plot 4, Bedroom 2	53	45
Plot 5, Bedroom 1	54	46
Plot 5, Bedroom 2	54	46

- 3.5
- Good Acoustic Design
- 3.5.1
- Planning Policy Wales [2] recommends that the good acoustic design principles put forward in ProPG, Supplementary Document 2 [4] may also be adopted in Wales.
- 3.5.2
- The principles of good acoustic design follow a hierarchy of noise management measures that Local Planning Authorities should encourage, including the following, in descending order of preference:
- Maximising the spatial separation of noise source(s) and receptor(s).
 - Investigating the necessity and feasibility of reducing existing noise levels and relocating existing noise sources.
 - Using existing topography and existing structures (that are likely to last the expected life of the noise-sensitive scheme) to screen the proposed development site from significant sources of noise.
 - Incorporating noise barriers as part of the scheme to screen the proposed development site from significant sources of noise.
 - Using the layout of the scheme to reduce noise propagation across the site.
 - Using the orientation of buildings to reduce the noise exposure of noise-sensitive rooms.
 - Using the building envelope to mitigate noise to acceptable levels.

Superseded

- 3.5.3 The above measures are considered in the following sections.
- 3.5.4 **Maximising the spatial separation of noise source(s) and receptor(s).**
- 3.5.4.1 Due to the relatively small scale of the development site, there is limited scope to increase the source/receptor distance.
- 3.5.5 **Investigating the necessity and feasibility of reducing existing noise levels and relocating existing noise sources.**
- 3.5.5.1 As the noise source is out of the control of the developer, reducing existing noise levels or relocating existing noise sources is not applicable.
- 3.5.6 **Using existing topography and existing structures to screen the proposed development site from significant sources of noise.**
- 3.5.6.1 There are no existing structures or topographical features between the noise source and the development site that could provide beneficial acoustic screening.
- 3.5.7 **Incorporating noise barriers as part of the scheme to screen the proposed development site from significant sources of noise.**
- 3.5.7.1 For any noise barrier to be effective it will need to interrupt the source to receptor propagation path (line of site). As the proposed residential development is for single storey bungalows, a barrier could provide beneficial acoustic screening to the site.
- 3.5.7.2 However, the local topography at the site dictates that the proposed properties will be located 3m above the A4109 which will require any site boundary barrier to be of significant height to become effective in controlling the noise propagation to the proposed dwellings.
- 3.5.7.3 The massing and extent of any barrier would likely be considered unacceptable to the Local Authority due to its visual impact and effect on the street scene etc. The inclusion of a barrier into the scheme is not considered suitable in this case.

- 3.5.8
- Using the layout of the scheme to reduce noise propagation across the site.
- 3.5.8.1
- Due to the relatively compact extent of the site, there is limited scope for alternative layout options that would materially affect the noise propagation to the habitable rooms.
- 3.5.8.2
- Relocating the bedrooms of plots 4 and 5 to the rear of the dwelling could prove beneficial from a noise perspective but would negatively impact on the natural surveillance planning requirement for all new residential developments.
- 3.5.8.3
- The current layout maximises this natural surveillance principle and therefore, changes to the proposed layout are considered unsuitable in the context of the overall design aims promoted by Planning Policy Wales [2].
- 3.5.9
- Using the orientation of buildings to reduce the noise exposure of noise-sensitive rooms.
- 3.5.9.1
- Due to the relatively compact extent of the site, there is limited scope for alternative orientation options that would materially affect the noise propagation to the habitable rooms.
- 3.5.10
- Using the building envelope to mitigate noise to acceptable levels.
- 3.5.10.1
- As none of the above design measures are neither feasible nor practicable for reducing the road traffic noise emissions across the site, then the final good acoustic design option is the only option available i.e., the assessment of the sound reduction performance of the proposed building envelope to plots 4 and 5.
- 3.6
- Assessment of Development Layout, Plots 4 and 5
- 3.6.1
- The only practicable noise management measure suitable for Plots 4 and 5 is the consideration of the sound reduction performance of the proposed building envelope. The overall sound insulation of the building envelope is typically determined by the weakest acoustic element which would normally be the glazing units.

Superseded

- 3.6.2 Planning Policy Wales [2] states *“The planning system should maximise its contribution to achieving the well-being goals, and in particular a healthier Wales, by aiming to reduce average population exposure to air and noise pollution”*.
- 3.6.3 Proposed development should be designed, wherever possible, to prevent adverse effects to amenity, health and the environment. As a minimum, measures should be implemented to limit or constrain any effects that may occur.
- 3.6.4 The results of the modelling indicate that the western elevations of Plots 4 and 5 are exposed to noise levels that place the dwellings into NEC ‘B’ as per TAN 11 [1], and therefore, appropriate mitigation will be required to ensure an *‘adequate level of protection against noise’*.
- 3.6.5 With reference to the proposed development layout presented in Appendix 4, this report considers the minimum sound reduction performance for glazing units to habitable rooms on the western elevation of plots 4 and 5. These rooms are identified as Bedroom 1 and Bedroom 2 within each of the dwellings.
- 3.7 **Internal Ambient Noise Levels – Open Window Ventilation Strategy**
- 3.7.1 Whenever possible, it is desirable to rely on partially open windows to provide the background ventilation for a property. In this case the sound insulation of a typical façade would be reduced to approximately 15 dB [6].
- 3.7.2 To achieve the internal noise criteria of 35 dB $L_{Aeq,16hrs}$ with an open window during the daytime time period, the external free field noise level would be required to be below $35 + 15 = 50$ dB $L_{Aeq,16hrs}$. To achieve the internal noise criteria of 30 dB $L_{Aeq,8hrs}$ with an open window during the night-time period, the external free field noise level would be required to be below $30 + 15 = 45$ dB $L_{Aeq,8hrs}$. Habitable rooms exposed to external noise levels in excess of the above would not achieve the internal noise criteria without mitigation.
- 3.7.3 To ensure that optimum internal noise levels are achievable, this assessment uses the model to identify any rooms exposed to external free field noise levels in excess of 50 dB $L_{Aeq,16hrs}$ during the daytime period and/or in excess of 45 dB $L_{Aeq,8hrs}$ during the night time period. This will ensure that an effective mitigation strategy can be

determined for any room where an open window ventilation strategy is not appropriate.

3.7.4 The results of the modelling are presented in Appendix 6 as Figure 10 and Figure 11 with details of the calculated external noise levels presented in Table 12.

3.7.5 From inspection of the contour maps it is clear that the majority of habitable rooms are exposed to noise levels of less than 50 dB $L_{Aeq,16hrs}$ during the daytime and below 45 dB $L_{Aeq,8hr}$ during the night time period.

3.7.6 For these rooms, the use of partially open windows to provide background ventilation is acceptable and no further mitigation is recommended.

3.7.7 However, the contour maps reveal that the western elevation to Plots 4 & 5 are exposed to noise levels greater than 50 dB $L_{Aeq,16hrs}$ during the daytime and 45 dB $L_{Aeq,8hr}$ during the night time period. The use of partially open windows to provide background ventilation to the rooms on the western elevations would result in the internal noise criteria detailed in Table 1 being exceeded.

3.7.8 A scheme of mitigation is recommended for these rooms which will require closing the windows to control the internal noise levels.

3.8 **Minimum Sound Reduction Specification, Glazing Units**

3.8.1 The internal noise level in a room is calculated by subtracting the sound reduction performance of the external façade from the noise level outside the room. In this case, to represent worst-case, the sound reduction performance of the external façade is assumed to be equivalent to the weakest acoustic element which will be the glazing units.

3.8.2 For housing design purposes, this outdoor to indoor noise level difference can be described in terms of the sound reduction index of appropriate parts of the building envelope calculated from values of R_w .

3.8.3 However, as stated in BS EN 12354-3, “...the indoor A-weighted sound pressure level can be determined directly from the A-weighted outdoor sound pressure level, provided the level difference is expressed in a single number rating for the relevant outdoor sound spectrum”.

Superseded

- 3.8.4 The relevant outdoor sound spectrum is defined in BS EN ISO 717-1 [8] as a correction term, C or C_{tr} , to be applied to the level difference.
- 3.8.5 When considering road traffic travelling at low speeds (<80 km/h), as is this case for traffic travelling along the A4109, the appropriate correction term is C_{tr} .
- 3.8.6 Therefore, in this case, the level difference of the elements for the building envelope can be described as the single number rating value, $R_w + C_{tr}$, where the element is exposed to road traffic travelling at low speed (<80km/h).
- 3.8.7 The calculated external noise levels at the bedrooms of Plots 4 & 5 are summarised in Table 2.
- 3.8.8 Table 3 below details the calculations for the minimum sound reduction for the glazing units to Bedrooms 1 and 2 of Plots 4 and 5 in order to achieve the anticipated internal ambient noise criteria.

Table 3 – Minimum Sound Reduction Calculations for Glazing Units to Plots 4 & 5

	External Level	Criteria	Minimum Sound Reduction for Glazing Units $R_w + C_{tr}$ (dB)
$L_{Aeq,16hr}$ (dB)	54	35	19
$L_{Aeq,8hr}$ (dB)	46	30	16

- 3.8.9 To achieve desirable internal ambient noise levels for habitable rooms at the most exposed façade of the proposed development, the glazing should have a minimum sound reduction performance of 19 dB $R_w + C_{tr}$.
- 3.8.10 Manufacturers' data should be used to confirm the above minimum sound reduction performance requirements are achievable from any specified glazing units, including any provision for background ventilation if applicable.
- 3.8.11 The windows are required to be in the closed position to effectively control noise ingress. The decision on whether the windows should be permanently closed is outside the scope of this assessment and our technical expertise. This decision should be taken by appropriate authorities.

- 3.8.12 All habitable rooms subject to sound mitigation measures should be provided with an alternative, effective means of ventilation. Any ventilation scheme should satisfy the requirements of Approved Document F and provide the required ventilation rates. Specialist advice should be obtained to ensure that any ventilation scheme is suitable for purpose. It is important that any scheme is approved by Building Control and does not compromise the internal noise levels.
- 3.8.13 Recommendations for suitable ventilation are outside the scope of this assessment and technical expertise.
- 3.9 **External Amenity Spaces**
- 3.9.1 A noise contour grid covering the whole site is constructed to display the external free field noise levels within the proposed amenity areas. The grid represents the calculated free field noise levels at a height of 1.5m.
- 3.9.2 The anticipated criterion for the outdoor living areas, detailed in Table 2, require noise levels to be no greater than 50 dB $L_{Aeq,16hr}$.
- 3.9.3 The relevant noise contour maps are presented in Appendix 6.
- 3.9.4 Figure 9 presents the calculated daytime noise levels at a height of 1.5m and indicates all areas of the development that satisfy this criterion in green. Areas that exceed this criterion are indicated in red.
- 3.9.5 The contour map clearly identifies that the external amenity areas associated with all plots are exposed to noise levels lower than 50 dB $L_{Aeq,16hr}$ and satisfies the anticipated criterion.

4.0 CONCLUSIONS:

Table 4 – Summary of Measured External Free Field Noise Levels

Measurement Period	Period, t (hrs)	L _{Aeq,t} (dB)	L _{ASmax} (dB)
Daytime (07:00 - 23:00 hrs)	16	49	--
Night Time (23:00 - 07:00 hrs)	8	41	65

- 4.1 The results of the assessment indicate that the external free-field noise levels place the majority of the site into NEC 'A'. During the night time period, there were no instances of L_{ASmax} exceeding 82 dB and therefore, there is no requirement to further amend the NEC.
- 4.2 As per TAN11 the majority of site should be categorised as being in NEC 'A' and :-
"Noise need not be considered as a determining factor in granting planning permission, although the noise level at the high end of the category should not be regarded as a desirable level".
- 4.3 However, 3D modelling of the road noise propagation across the proposed development identifies that Bedrooms 1 and 2 of Plots 4 and 5 are exposed to external noise that would result in the internal ambient noise criteria being exceeded if using an open window for ventilation.
- 4.4 Following consideration of good acoustic design principles, an appropriate scheme of mitigation is recommended which requires that the windows are closed to control the noise ingress. A minimum sound reduction performance is also recommended so that the internal ambient noise criteria is achievable.
- 4.5 The decision on whether the windows should be permanently closed is outside the scope of this assessment and our technical expertise. This decision should be taken by appropriate authorities.
- 4.6 All external amenity spaces within the proposed development are exposed to daytime noise levels below the anticipated criteria of 50 dB L_{Aeq,16hr}. No further mitigation is recommended.

Superseded

5.0 RECOMMENDATIONS:

- 5.1 The glazing units to Bedrooms 1&2 of Plots 4&5 should be specified with a minimum sound reduction performance of 19 dB $R_w + C_{tr}$.
- 5.2 Manufacturers' data should be used to confirm the above specifications are achievable from any specified glazing units, including any provision for background ventilation if applicable.
- 5.3 All habitable rooms subject to sound mitigation measures would need to be provided with an alternative, effective means of ventilation. Any ventilation scheme should satisfy the requirements of Approved Document F and provide the required ventilation rates. Specialist advice should be obtained to ensure that any ventilation scheme is suitable for purpose. It is important that any scheme is approved by Building Control and does not compromise the internal noise levels.
- 5.4 Recommendations for suitable ventilation are outside the scope of this assessment and technical expertise.

P.A.T. 17/02/2023

M.Sc., I.Eng., M.I.O.A.,

M.Inst.SCE., M.A.E.S.

Superseded

acoustics & noise limited

Appendix 1 Survey Details

A1.0 SURVEY DETAILS

- A1.1 **Programme of Measurements:**
- A1.1.1 The meter was calibrated at the start of the measurement procedure and checked after each set of measurements. No significant deviation i.e. > 0.5 dB was recorded.
- A1.1.2 Measurements were carried out on 26th January 2023 commencing at 10:27 for a total minimum period of 24 hours.
- A1.1.3 The equipment was monitored by a guard who made notes on any extraneous noise events and weather conditions.
- A1.1.4 The guard regularly logged windspeed measurements throughout the survey period. Samples where the measured windspeed was greater than 5m/s are excluded from the analysis.
- A1.1.5 Weather conditions: Dry, 10% cloud cover, 2°C, slight intermittent breeze (<5m/s).
- A1.2 **Measurement Procedure:**
- A1.2.1 The meter was located in a weather-proof container and powered with heavy duty rechargeable batteries.
- A1.2.2 The microphone was located on a tripod 1.2 m from the ground at the centre of the proposed site. The microphone was inside an approved weather-proof microphone housing (see Appendix 2).
- A1.2.3 The meter was adjusted to log and store in 15-minute periods both L_{Aeq} and L_{A90} . The meter was also set to capture L_{A5max} events greater than 82dB L_{A5max} . See set up details in Table 8.
- A1.2.4 On completion of the survey, the data was downloaded to a computer for further analysis.
- A1.2.5 The analysis consisted of dividing the results into the time periods 07:00–23:00 and 23:00–07:00. Using B & K Evaluator Software the relevant $L_{Aeq,T}$ value was calculated. Also, the number, if any, of L_{A5max} >82dB events during the night period were recorded.

Superseded

A1.3 **Windspeed Log**

A1.3.1 The windspeed was measured by the security guard at regular intervals during the survey period as detailed in Table 5.

Table 5 – Windspeed Log

Time	Windspeed (m/s)	Time	Windspeed (m/s)
10:30	0.5	22:30	0.2
11:30	0.3	23:30	0.1
12:30	0.8	00:30	0.2
13:30	0.2	01:30	0.4
14:30	1.9	02:30	0.5
15:30	0.7	03:30	0.5
16:30	0.6	04:30	0.1
17:30	0.6	05:30	0.1
18:30	1.9	06:30	0.1
19:30	0.2	07:30	0.1
20:30	0.1	08:30	0.2
21:30	0.1	09:30	0.1

A1.4 **Subjective Observations**

A1.4.1 The acoustic climate at the site was characterised by road traffic noise from the A4109 at the western boundary of the site.

A1.4.2 Noise from the nearby uPVC factory was inaudible throughout the site. The factory was observed to be operating normally during an informal visit by the acoustic engineer.

Table 6 – Subjective Observations from Guard

Time	Subjective Comment
03:30	Two police vehicles stopped to check on the welfare of the guard

Superseded

- A1.4.3 The security guard was instructed to keep a log of any unusual noises or activities and to provide subjective comments of the noise climate during the survey. These observations are detailed in Table 6 above.

Superseded

acoustics & noise limited

A1.5 Equipment Used:

Table 7 – Equipment Used

Item	Serial Number	UKAS Calibration Certificate Date (if applicable)
(ANL-M3) B&K 2250 Handheld Analyser	2559188	Certificate: 15913 Date: 25/03/21
(ANPC3) B&K 4231 Calibrator	2162602	Certificate: 15911 Date: 25/03/21

Table 8 – Meter Details

Instrument:		2250
Application:		BZ7224 Version 4.7.6
Start Time:		01/26/2023 10:27:44
End Time:		01/27/2023 10:15:03
Elapsed Time:		23:47:19
Bandwidth:		Broadband
Max Input Level:		140.87
	Time	Frequency
Broadband (excl. Peak):	FSI	AZ
Broadband Peak:		A
Instrument Serial Number:		2559188
Microphone Serial Number:		2556132
Input:		Top Socket
Windscreen Correction:		None
Sound Field Correction:		Free-field
Calibration Time:		01/26/2023 10:25:17
Calibration Type:		External reference
Sensitivity:		50.46 mV/Pa

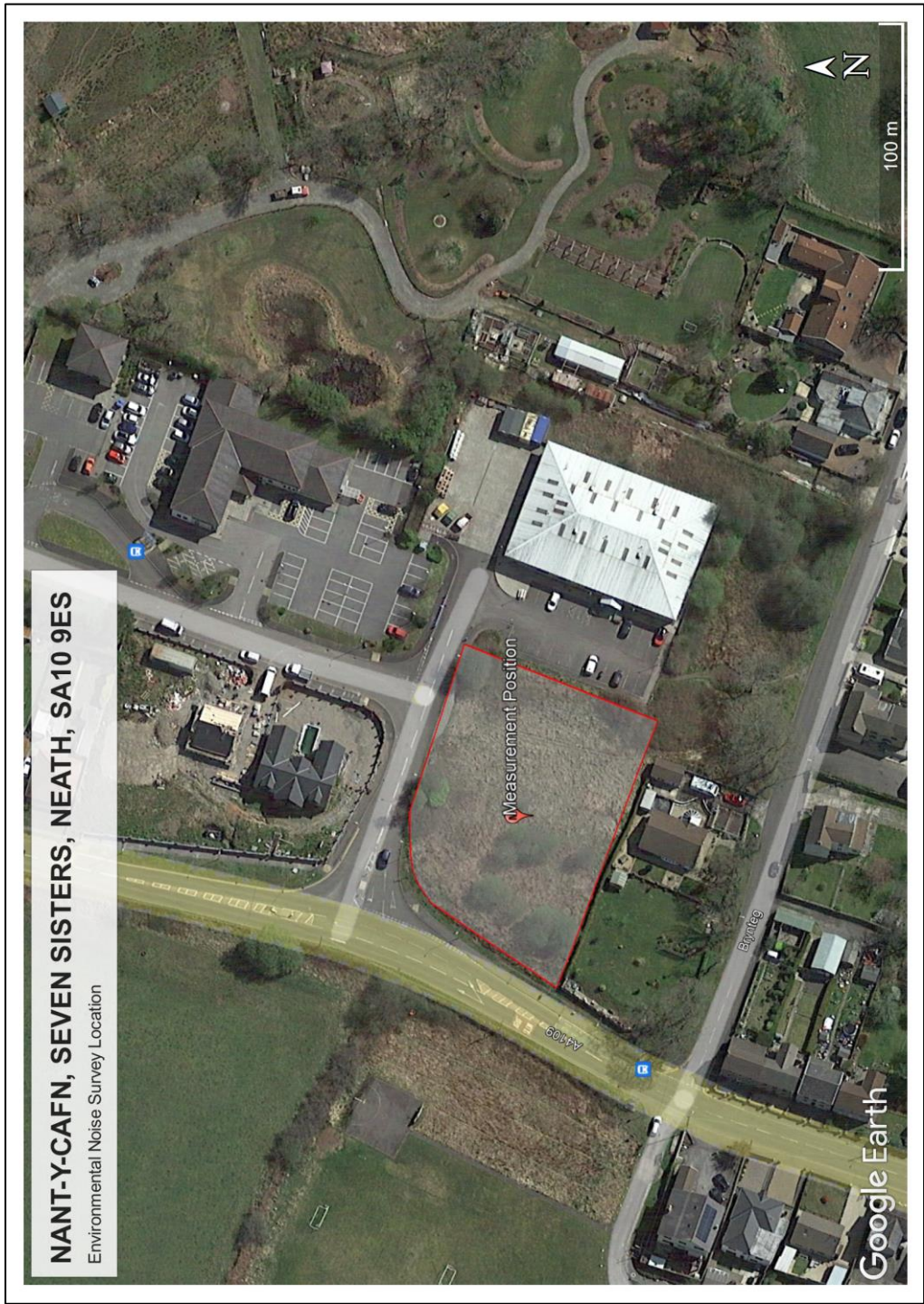
Superseded

acoustics & noise limited

Appendix 2 View of Measurement Position

A2.0 VIEW OF MEASUREMENT POSITION

Figure 1 – Measurement Position



Superseded

acoustics & noise limited

Figure 2 – View of Survey Equipment



Superseded

acoustics & noise limited

Appendix 3 Survey Results

Superseded

A3.0 SURVEY RESULTS

Table 9 – Summary of Survey Results (Free-Field Noise Levels)

Name	Period	Duration, t	L _{Aeq,t} (dB)	L _{AF90,t} (dB)	L _{AFmax} (dB)	L _{ASmax} (dB)
Daytime	07:00 – 23:00	15:45	49.1	36.3	77.3	74.3
Night Time	23:00 – 07:00	08:00	41.4	33.8	65.9	64.6

Table 10 – Daytime Free-Field Noise Levels (07:00 – 23:00)

Start date	Start time	L _{Aeq,15mins} (dB)	L _{AF90,15mins} (dB)	L _{AFmax} (dB)	L _{ASmax} (dB)
27/01/2023	07:00:00	47.2	35.3	63.1	60.5
27/01/2023	07:15:00	46.6	35.7	62.6	60.2
27/01/2023	07:30:00	49.8	37.2	66.5	61.9
27/01/2023	07:45:00	50.8	42.5	70.9	64.2
27/01/2023	08:00:00	50.3	39.2	73.7	67.5
27/01/2023	08:15:00	49.8	39.7	62.4	59.9
27/01/2023	08:30:00	50.9	40.5	63.8	62.3
27/01/2023	08:45:00	50.4	40.4	63.8	61.8
27/01/2023	09:00:00	49.3	39.4	61.1	57.9
27/01/2023	09:15:00	50.0	38.9	62.0	61.3
27/01/2023	09:30:00	48.0	38.6	59.8	57.4
27/01/2023	09:45:00	49.5	38.0	65.1	61.9
27/01/2023	10:00:00	50.2	40.1	68.3	62.8
27/01/2023	10:15:00	49.5	41.4	60.2	60.1
26/01/2023	10:30:00	49.2	40.4	59.8	58.1
26/01/2023	10:45:00	50.0	39.5	62.1	61.2
26/01/2023	11:00:00	50.0	39.7	61.6	59.4
26/01/2023	11:15:00	50.6	39.6	62.3	59.3
26/01/2023	11:30:00	50.0	39.8	60.7	58.9
26/01/2023	11:45:00	48.7	38.8	64.1	60.5

Superseded

scully
property
group
limited

acooustics
& noise
limited

Start date	Start time	L _{Aeq,15mins} (dB)	L _{AF90,15mins} (dB)	L _{AFmax} (dB)	L _{ASmax} (dB)
26/01/2023	12:00:00	50.1	39.1	68.1	63.5
26/01/2023	12:15:00	49.3	39.2	61.6	59.2
26/01/2023	12:30:00	49.4	37.3	66.7	65.8
26/01/2023	12:45:00	50.5	38.7	65.2	62.6
26/01/2023	13:00:00	49.9	38.1	67.3	64.8
26/01/2023	13:15:00	49.9	37.6	64.4	62.2
26/01/2023	13:30:00	49.6	37.0	63.1	61.3
26/01/2023	13:45:00	54.3	38.3	75.8	73.1
26/01/2023	14:00:00	48.2	38.0	62.2	60.7
26/01/2023	14:15:00	49.3	37.9	62.1	59.9
26/01/2023	14:30:00	48.7	37.5	64.1	61.8
26/01/2023	14:45:00	51.1	38.5	77.3	70.9
26/01/2023	15:00:00	50.8	39.2	66.8	65.3
26/01/2023	15:15:00	52.1	40.0	66.7	65.0
26/01/2023	15:30:00	50.5	40.1	65.5	62.9
26/01/2023	15:45:00	50.7	40.5	64.6	62.3
26/01/2023	16:00:00	50.7	40.5	67.9	63.7
26/01/2023	16:15:00	50.1	40.1	66.0	63.1
26/01/2023	16:30:00	49.3	39.9	63.4	58.7
26/01/2023	16:45:00	49.9	38.3	70.9	66.0
26/01/2023	17:00:00	50.6	40.9	63.8	62.7
26/01/2023	17:15:00	48.3	37.9	59.2	57.3
26/01/2023	17:30:00	50.1	40.4	69.4	66.4
26/01/2023	17:45:00	49.0	37.0	66.0	62.9
26/01/2023	18:00:00	46.3	35.9	60.8	57.7
26/01/2023	18:15:00	47.8	37.2	60.4	58.8
26/01/2023	18:30:00	46.5	35.9	59.2	57.0

Superseded

acoustics & noise limited

Start date	Start time	L _{Aeq,15mins} (dB)	L _{AF90,15mins} (dB)	L _{AFmax} (dB)	L _{ASmax} (dB)
26/01/2023	18:45:00	46.0	35.7	60.4	58.3
26/01/2023	19:00:00	46.7	35.6	58.9	56.9
26/01/2023	19:15:00	45.1	34.3	59.5	57.8
26/01/2023	19:30:00	46.2	35.2	61.3	58.9
26/01/2023	19:45:00	45.3	36.1	60.5	57.2
26/01/2023	20:00:00	45.0	35.7	59.2	57.7
26/01/2023	20:15:00	50.0	35.4	76.2	74.3
26/01/2023	20:30:00	41.6	34.8	59.0	57.5
26/01/2023	20:45:00	45.0	35.2	60.9	58.6
26/01/2023	21:00:00	44.3	35.7	59.8	57.0
26/01/2023	21:15:00	43.6	34.8	60.0	57.5
26/01/2023	21:30:00	43.3	34.7	58.6	55.7
26/01/2023	21:45:00	43.8	35.7	60.3	58.6
26/01/2023	22:00:00	41.9	36.8	57.8	56.2
26/01/2023	22:15:00	40.4	33.4	55.2	54.3
26/01/2023	22:30:00	37.9	33.7	56.8	54.9

Superseded

scully property group
limited
& noise
acoustics

Table 11 – Night Time Free-Field Noise Levels (23:00 – 07:00)

Start date	Start time	L _{Aeq,15mins} (dB)	L _{AF90,15mins} (dB)	L _{A5max} (dB)	L _{AFmax} (dB)
26/01/2023	23:00:00	43.3	33.7	63.5	61.0
26/01/2023	23:15:00	36.6	34.0	54.7	53.8
26/01/2023	23:30:00	39.9	33.7	58.6	55.6
26/01/2023	23:45:00	39.7	33.2	61.1	58.2
27/01/2023	00:00:00	42.4	33.9	63.1	61.5
27/01/2023	00:15:00	34.2	33.6	41.1	38.0
27/01/2023	00:30:00	35.5	33.6	56.1	53.9
27/01/2023	00:45:00	39.0	34.0	52.5	51.3
27/01/2023	01:00:00	41.8	34.4	60.6	58.3
27/01/2023	01:15:00	35.2	33.4	53.2	51.9
27/01/2023	01:30:00	35.5	33.4	53.5	52.0
27/01/2023	01:45:00	40.0	33.8	61.4	59.9
27/01/2023	02:00:00	34.5	34.0	48.1	43.5
27/01/2023	02:15:00	37.4	33.5	56.5	55.3
27/01/2023	02:30:00	34.1	33.7	35.8	34.9
27/01/2023	02:45:00	39.3	34.0	55.3	54.1
27/01/2023	03:00:00	42.0	39.6	59.3	57.5
27/01/2023	03:15:00	39.7	39.3	45.8	42.8
27/01/2023	03:30:00	41.3	34.1	60.4	57.5
27/01/2023	03:45:00	36.4	33.8	53.6	52.2
27/01/2023	04:00:00	34.1	33.6	39.3	36.9
27/01/2023	04:15:00	38.2	34.0	55.7	53.3
27/01/2023	04:30:00	38.5	34.3	53.1	51.8
27/01/2023	04:45:00	40.1	34.6	56.0	54.4
27/01/2023	05:00:00	40.2	34.0	63.3	59.9
27/01/2023	05:15:00	44.2	34.4	61.5	58.6
27/01/2023	05:30:00	44.8	36.3	63.1	59.6

Superseded

acoustics & noise limited

Start date	Start time	L _{Aeq,15mins} (dB)	L _{AF90,15mins} (dB)	L _{ASmax} (dB)	L _{AFmax} (dB)
27/01/2023	05:45:00	41.8	34.4	62.2	58.6
27/01/2023	06:00:00	45.9	34.8	61.7	59.4
27/01/2023	06:15:00	46.1	35.3	65.5	62.4
27/01/2023	06:30:00	44.6	35.5	58.9	56.5
27/01/2023	06:45:00	47.2	37.4	65.9	64.6

Superseded

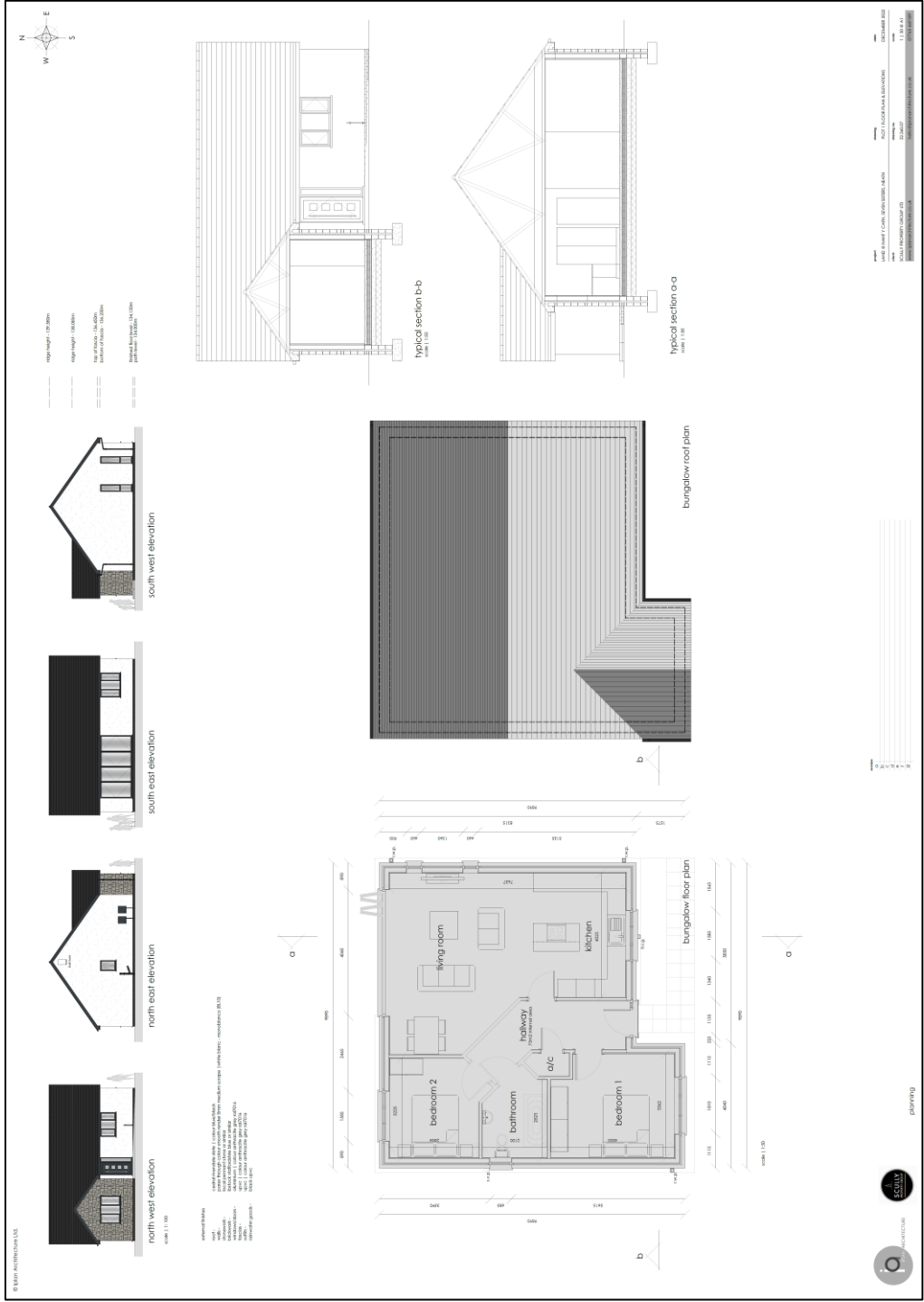
Appendix 4 Proposed Development Layout

A4.0 PROPOSED DEVELOPMENT LAYOUT

Figure 3 – Proposed Development Layout



Figure 4 – Floor Plan, Plot 1



acoustics & noise limited

Figure 5 – Floor Plan, Plots 2 and 3

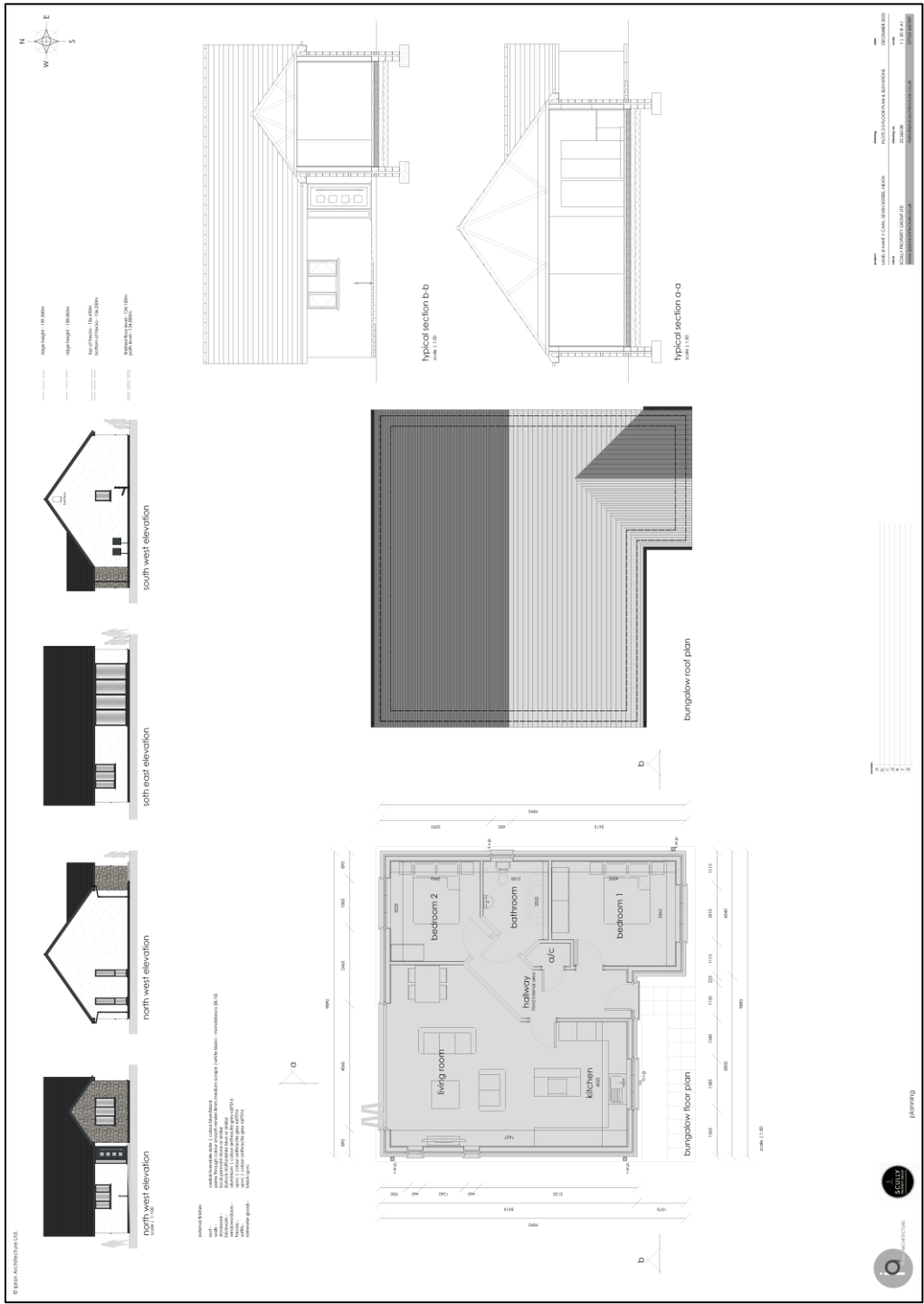


Figure 6 – Floor Plan, Plot 4

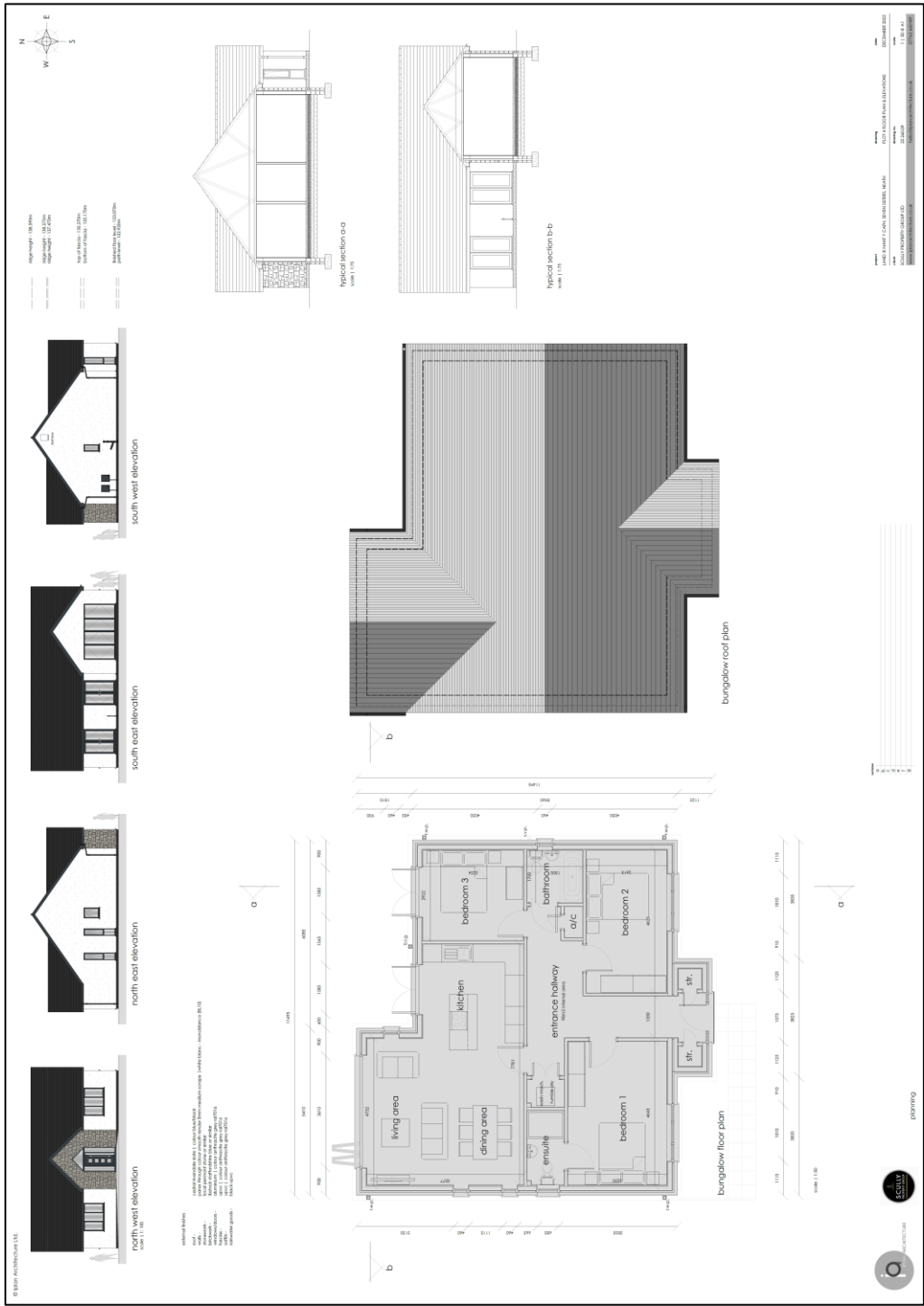
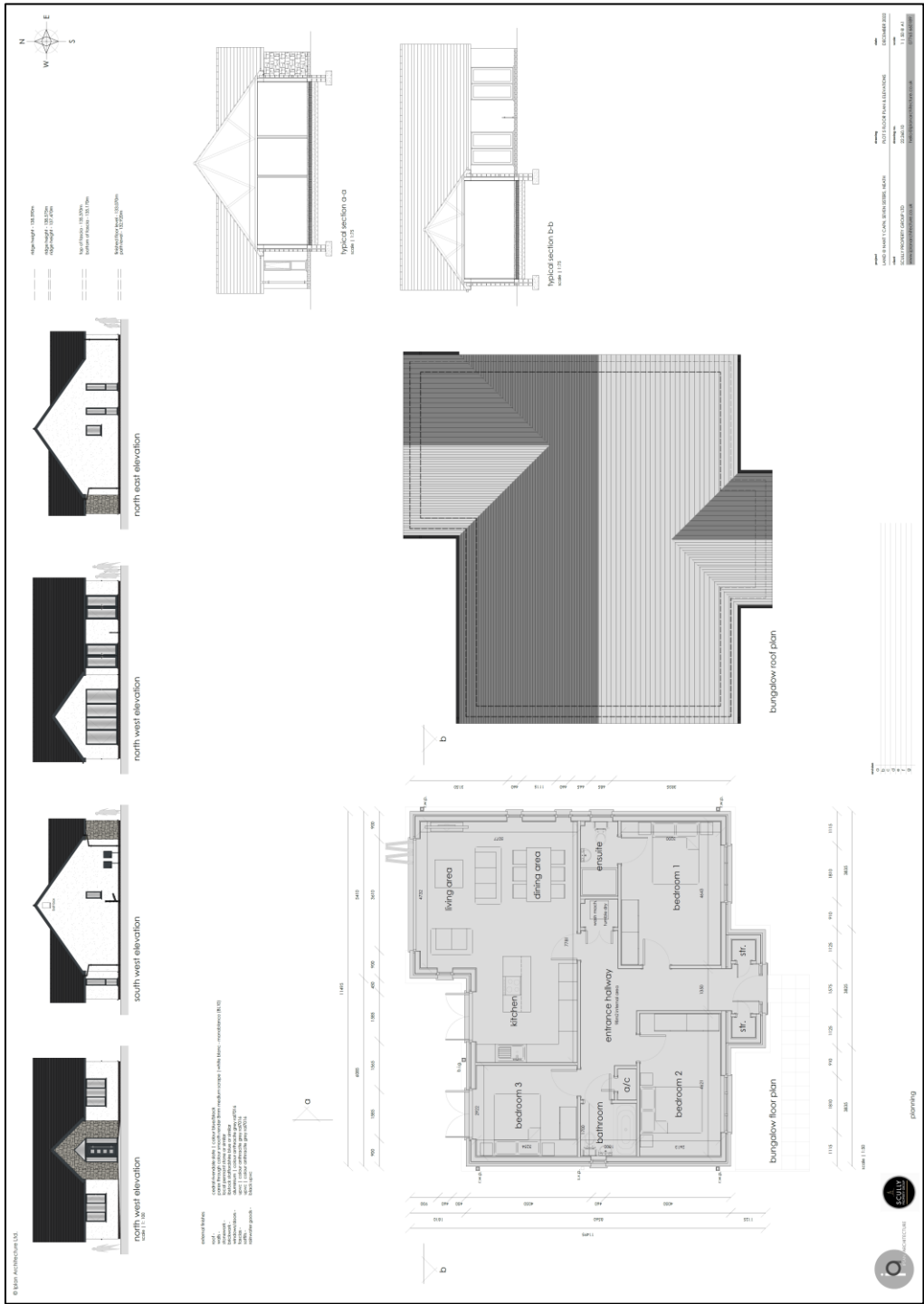


Figure 7 – Floor Plan, Plot 5



Superseded

acoustics & noise limited

DRAFT FOR COMMENT 1

Appendix 5 3D Acoustic Model Details

Superseded

A5.0 3D ACOUSTIC MODEL DETAILS

A5.1 ASSUMPTIONS MADE IN MODEL

A5.1.1 The ground attenuation was modelled as soft with a ground factor value of 1.0.

A5.1.2 Acoustic barriers were modelled as reflective.

A5.1.3 Atmospheric conditions were modelled as

- *Temperature: 293.15 K*
- *Pressure: 101.33*
- *Air Humidity: 60%*

A5.2 PREDICTION OF NOISE LEVELS ACROSS PROPOSED DEVELOPMENT SITE

A5.2.1 As the site comprises multiple dwellings, a 3D acoustic CAD model of the proposed development is constructed to aid in the identification of potential areas or plots that may not meet the stated criteria. This process minimises unnecessary schemes of mitigation.

A5.2.2 EMS B&K Predictor V2019 Software was utilised to model the road traffic noise levels across the whole of site. This noise prediction software allows for the investigation of noise emissions in complex or large outdoor environments. The software can be used to analyse industrial noise sources and traffic measurements to the latest European and U.K. Standards.

A5.2.3 A major advantage of using this method is the ability to remodel changes and alterations to the site and/or sources.

A5.3 CAD MODEL CONSTRUCTION

A5.3.1 Topographical information for the site was obtained from the online site 'Lle Geoportal for Wales' in the form of Digital Terrain Model data (1m resolution). The 'Lle Geo-Portal' has been developed as a partnership between Welsh Government and Natural Resources Wales. Lle serves as a hub for data and information covering a wide spectrum of topics, but primarily around the environment.

Superseded

- A5.3.2 The topographical data was imported into the CAD software and used to construct the 3D terrain for the site.
- A5.3.3 'OS Open Zoomstack' was used as a background image for the model. 'OS Open Zoomstack' provides a single, customisable basemap of Great Britain made freely available in partnership with the UK government. The data was obtained from 'www.ordnancesurvey.co.uk' under the Open Government Licence (OGL) and contains OS data © Crown copyright and database right 2019.
- A5.3.4 A 'road item' was positioned centrally along [road] using the basemap as a guide.
- A5.3.5 The modelling software defines a 'road item' as 'a line source used for modelling the sound level emissions of vehicles on a road'.
- A5.4 **CAD MODEL CALIBRATION**
- A5.4.1 A 24hr noise survey was conducted at the centre of the site.
- A5.4.2 A noise receiver was positioned in the model at the position of the actual measurement location used during the 24hr road traffic noise survey.
- A5.4.3 The model assumes that the measured noise levels during the 24hr survey are attributable to the road traffic. All other noise sources are assumed to be insignificant when compared to the primary noise source.
- A5.4.4 The daytime $L_{Aeq,16hr}$ and night time $L_{Aeq,8hr}$ noise levels at the measurement position are determined from the 24hr survey data using B&K 7820 Evaluator software.
- A5.4.5 The vehicle flow for the 'road item' was then adjusted until the calculated noise level at the receiver equals the period L_{Aeq} level determined using the procedures detailed above.
- A5.4.6 When the calculated noise level at the receiver equals the level determined from the survey data, the noise emission level for the road has been determined.
- A5.4.7 This exercise is conducted for both daytime and night time periods to create two models.
- A5.5 **CAD MODEL PREDICTION**

Superseded

- A5.5.1 Once the model calibration exercise is completed, the proposed development buildings are placed into the model using the design drawing '22.260.06', provided by iPlan Architecture Ltd, as a guide.
- A5.5.2 All proposed buildings are modelled with a height of 5.5m and the modelled site topography was revised to reflect the final floor levels of the proposed dwellings.
- A5.5.3 Each of the proposed residential properties will have habitable rooms located on the ground floor level. The height of the ground floor receptor is modelled at 1.5m.
- A5.5.4 Individual receptors are placed 1m in front of each habitable room within the development to calculate the external free-field noise levels at each room. A noise contour grid covering the whole site is then constructed to display the external free field noise levels within amenity areas. Each grid is a collection of receivers set 1m apart at a height of 1.5m.
- A5.5.5 Using EMS B&K Predictor V2019 software, calculations were made for each receiver using the calibrated noise source emissions as described above. Garden noise levels were calculated using the 1.5m high grid covering the proposed site.
- A5.5.6 Calculations are made for both the daytime and night time periods for all receivers with separate contour maps generated for each assessment period.
- A5.5.7 The results of the assessment are presented in the form of easily understood noise contour maps and are shown in Appendix 6.
- A5.5.8 These contour maps indicate the free field noise levels across the whole of the proposed development with each contour colour boundary assigned a noise level so that areas of the proposed development that comply with each of the criteria can be easily identified.
- A5.6 **NOISE CONTOUR MAPS**
- A5.6.1 Colour coded noise contour maps are generated by the acoustic model to aid identification of the following:
- *External free-field noise levels across the proposed development site at a height of 1.5m. The contours are colour coded to identify each of the TAN 11 NEC bands for easy site categorisation.*

Superseded

- *External free-field noise levels across the proposed development (including buildings) at a height of 1.5m. Areas where the external amenity criteria are satisfied are indicated in green for ease of identification.*
- *Plots where the internal noise criteria will be satisfied if using an open window ventilation strategy. Noise levels within habitable rooms on any façade located within the green area will satisfy the internal noise criteria with a window partially open for ventilation purposes. Contour maps are generated for both the daytime and night time periods.*

Superseded

Appendix 6 Modelling Results

Figure 8 – TAN 11, NEC Categories, Daytime

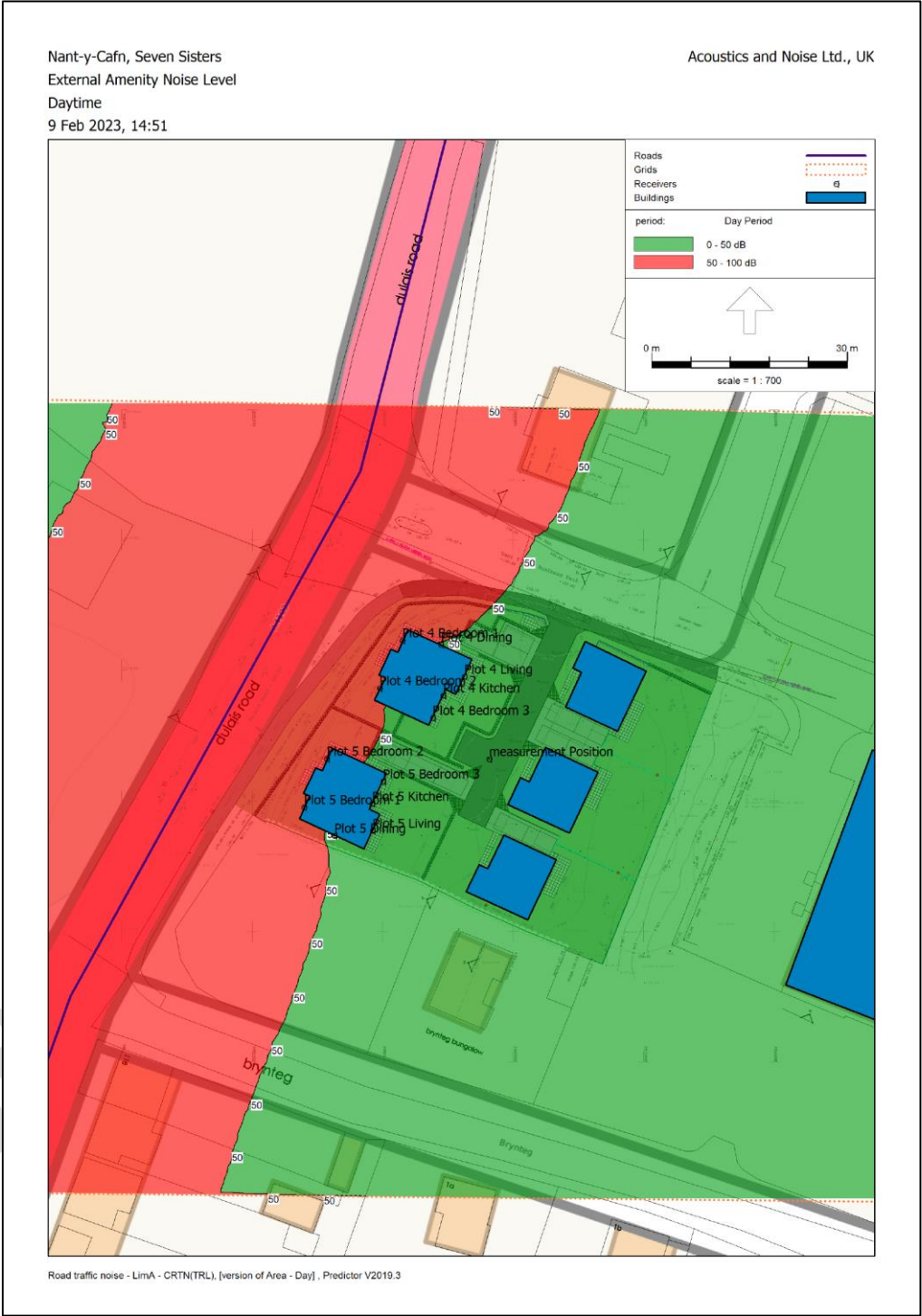
acoustics & noise limited

Figure 9 – TAN 11, NEC Categories, Night Time



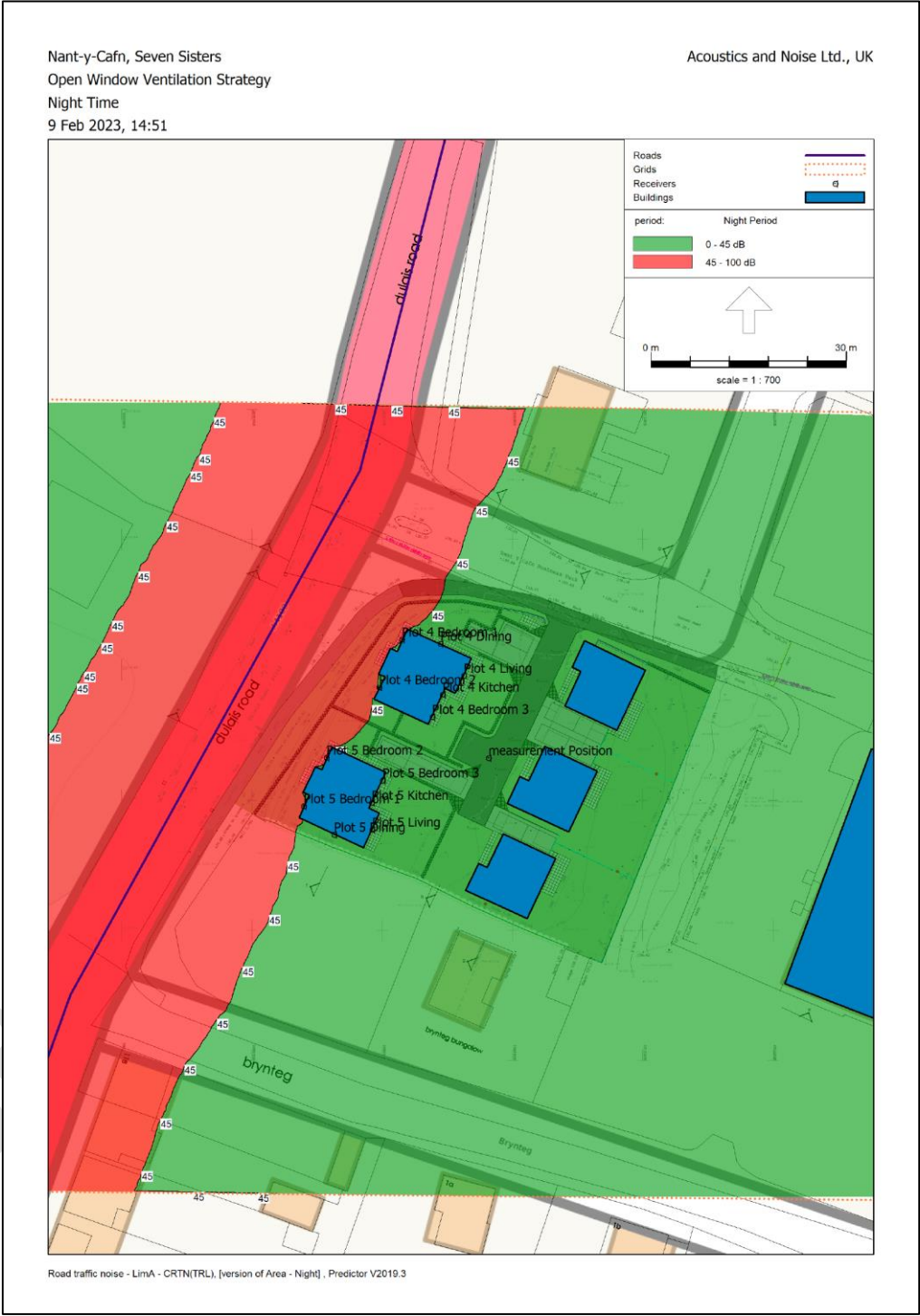
acoustics & noise limited

Figure 10 – Daytime Free Field Noise Levels – Outdoor Amenity Spaces



acoustics & noise limited

Figure 11 – Night Time Free Field Noise Levels – Open Window Ventilation Strategy



Superseded

Table 12 – Calculated External Free-Field Noise Levels at Plots 4 & 5

Receptor	Day L _{Aeq,16hr} (dB)	Night L _{Aeq,8hr} (dB)
Plot 5 Bedroom 2	54.2	46.1
Plot 4 Bedroom 1	53.8	45.7
Plot 5 Bedroom 1	53.7	45.6
Plot 4 Bedroom 2	53.1	45.0
Plot 4 Dining	49.8	42.0
Plot 5 Dining	49.2	41.4
Plot 5 Bedroom 3	33.2	26.3
Plot 5 Kitchen	33.2	26.3
Plot 4 Kitchen	33.0	26.2
Plot 4 Bedroom 3	33.0	26.1
Plot 5 Living	32.9	26.1
Plot 4 Living	32.9	26.1

Superseded

acoustics & noise limited

PREPARED BY ACOUSTICS AND NOISE LTD

Appendix 7
Relevant Guidance

Appendix 7 Relevant Guidance

A7.0 RELEVANT GUIDANCE

A7.1 Technical Advice Note 11 (TAN11) [1]

A7.1.1 The requirements for the assessment of noise impact on a proposed development site are detailed in TAN11 (Noise). This document prescribes the measurement methods and standards to be used for the noise survey. The results of the survey are separated into day and night periods which are compared with four Noise Exposure Categories (NECs).

A7.1.2 Noise Exposure Categories for Dwellings (NECs)

When assessing a proposal for residential development near a source of noise, local planning authorities should determine into which of the four noise exposure categories the proposed site falls, taking account of both day and night-time noise levels. Local planning authorities should then have regard to the advice in the appropriate NEC, as shown in Table 13.

Table 13 – Planning Advice as per TAN11

NEC	Planning Advice
A	Noise need not be considered as a determining factor in granting planning permission, although the noise level at the high end of the category should not be regarded as a desirable level.
B	Noise should be taken into account when determining planning applications and, where appropriate, conditions imposed to ensure an adequate level of protection against noise.
C	Planning permission should not normally be granted. Where it is considered that permission should be given, for example because there are no alternative quieter sites available, conditions should be imposed to ensure a commensurate level of protection against noise.
D	Planning permission should normally be refused.

A7.1.3 The noise exposure category for the site is the measured noise level compared with the range of noise levels as shown in Table 14.

Table 14 – Free-Field Noise Levels Corresponding to the NECs, LAeq,T dB

Superseded

Noise source		Noise Exposure Category			
		A	B	C	D
Road traffic	0700-2300	<55	55-63	63-72	>72
	2300-0700	<45	45-57	57-66	>66
Rail traffic	0700-2300	<55	55-66	66-74	>74
	2300-0700	<45	45-59	59-66	>66
Air traffic	0700-2300	<57	57-66	66-72	>72
	2300-0700	<48	48-57	57-66	>66
Mixed Sources	0700-2300	<55	55-63	63-72	>72
	2300-0700	<45	45-57	57-66	>66

- A7.1.4

Maximum noise event values $L_{A\text{Smax}}$ of 82dB were analysed as per Note 2 [1].

“Note 2: Night-time noise levels 2300-0700): sites where individual noise events regularly exceed 82dBLAmax (S time weighting) several times in any hour should be treated as being in NEC C, regardless of the LAeq,8H (except where the LAeq,8H already puts the site in NEC D)”.
- A7.1.5

Mixed sources refer to any combination of road, rail, air and industrial noise sources. The ‘mixed source’ values detailed in Table 14 are based on the lowest numerical values of the single source limits in the table. The ‘mixed source’ NEC should only be used where no individual noise source is dominant.
- A7.2

Planning Policy Wales [2]
- A7.2.1

The foreword to the Planning Policy Wales (PPW) document states that ‘PPW will help to ensure that the planning decisions taken in Wales, no matter how big, or how small, are going to improve the lives of both our current and future generations. It will support changing the way we live and work, and the buildings and environment of Wales, today, building a better environment to accommodate current and future needs’.

Superseded

acoustics & noise limited

- A7.2.2 PPW sets out the land use planning policies of the Welsh Government. The primary objective is to ensure that the planning system contributes towards the delivery of sustainable development and improves the social, economic, environmental and cultural well-being of Wales, A well functioning planning system is fundamental for sustainable development and achieving sustainable places.
- A7.2.3 The planning system should create sustainable places (Placemaking) which are attractive, sociable, accessible, active, secure, welcoming, healthy and friendly. Development proposals should create the conditions to bring people together, making them want to live, work and play in areas with a sense of place and well-being, creating prosperity for all.
- A7.2.4 Placemaking in development decisions happens at all levels and involves considerations at a global scale, including climate change, down to the very local level, such as considering the amenity impact on neighbouring properties and people. Negative environmental impacts should be avoided in the wider public interest.
- A7.2.5 The environmental impact relevant to this assessment, will be from noise. PPW refers to the term ‘soundscape’ which it describes as ‘*the acoustic environment as perceived or experienced and/or understood by a person or people, in context (ISO definition)*’.
- A7.2.6 An appropriate soundscape contributes to a positive experience of place as well as being necessary for public health, amenity and well-being. Conversely, noise pollution can have negative effects and should be reduced as far as possible.
- A7.2.7 Certain sounds, such as those created by trees, birds or water features, can contribute to a sense of tranquillity whilst others can be reassuring as a consequence of their association with the normality of everyday activities. Problematic forms of sound are generally experienced as noise pollution and can affect amenity and be prejudicial to health or a nuisance. Noise action plans drawn up by public bodies aim to prevent and reduce noise levels where necessary and preserve soundscape quality where it is good. Both high and low levels of noise, depending on context, can be annoying or disruptive and impact on amenity, health

Superseded

and well-being and as such should be protected through the planning process wherever necessary.

- A7.2.8 A key planning policy principle is to consider the effects which proposed developments may have on soundscape quality and the effects which existing soundscape quality may have on proposed developments. Soundscape influences the choice of location and distribution of development and it will be important to consider the relationship of proposed development to existing development and its surrounding area and its potential to exacerbate or create poor or inappropriate soundscapes.
- A7.2.9 The agent of change principle says that a business or person responsible for introducing a change is responsible for managing that change. In practice, for example, this means a developer would have to ensure that solutions to address noise from nearby pre-existing infrastructure, businesses or venues can be found and implemented as part of ensuring development is acceptable.
- A7.2.10 Proposed development should be designed wherever possible to prevent adverse effects to amenity, health and the environment but as a minimum to limit or constrain any effects that do occur.
- A7.3 **Noise and Soundscape Action Plan [3]**
- A7.3.1 This document sets out action plans for each of the three agglomerations in Wales. These are identified as the Cardiff and Penarth agglomeration, the Newport agglomeration and the Swansea and Neath agglomeration.
- A7.4 **ProPG: Planning & Noise [4]**
- A7.4.1 Even though ProPG has been written principally to assist with the planning process in England, PPW recommends that the good acoustic design principles put forward in Supplementary Document 2 may also be adopted in Wales.
- A7.4.2 A good acoustic design process takes a multi-faceted and integrated approach to achieve optimal acoustic conditions, both internally (inside noise-sensitive parts of the building(s)) and externally (in spaces to be used for amenity purposes).

Superseded

scully
property
& noise
limited

- A7.4.3 Good acoustic design should provide the optimum acoustic outcome, without design compromises that will adversely affect living conditions and the quality of life of the inhabitants or other sustainable design objectives and requirements.
- A7.4.4 In requiring good acoustic design, there is a hierarchy of noise management measures that LPAs should encourage, including the following, in descending order of preference:
- *Maximising the spatial separation of noise source(s) and receptor(s).*
 - *Investigating the necessity and feasibility of reducing existing noise levels and relocating existing noise sources.*
 - *Using existing topography and existing structures (that are likely to last the expected life of the noise-sensitive scheme) to screen the proposed development site from significant sources of noise.*
 - *Incorporating noise barriers as part of the scheme to screen the proposed development site from significant sources of noise.*
 - *Using the layout of the scheme to reduce noise propagation across the site.*
 - *Using the orientation of buildings to reduce the noise exposure of noise-sensitive rooms.*
 - *Using the building envelope to mitigate noise to acceptable levels.*
- A7.4.5 It is acknowledged that the inherent challenge of introducing noise-sensitive development in noisy locations can limit the extent to which good acoustic design can be achieved in harmony with the other factors that influence the overall quality of a scheme and that compromises may need to be made e.g. accepting that it may not always be possible to achieve acoustic standards with windows open or accepting that noise levels in parts of the outdoor amenity areas may not be optimal.
- A7.4.6 Where the scheme relies on windows being closed to achieve good internal noise conditions, details should be provided why this approach has arisen and how the use of layout, orientation, spatial design and non-building envelope mitigation has been considered to minimise the need for reliance upon closed windows.

Superseded

acoustics & noise limited

- A7.4.7 Where the LPA accepts that there is a justification that the internal target noise levels can only be practically achieved with windows closed, which may be the case in urban areas and at sites adjacent to transportation noise sources, special care must be taken to design the accommodation so that it provides good standards of acoustics, ventilation and thermal comfort without unduly compromising other aspects of the living environment. Furthermore, in this scenario the internal L_{Aeq} target noise levels should not generally be exceeded.
- A7.4.8 A good acoustic design will be one that continues to minimise noise impacts and to avoid significant noise effects for the lifetime of the development or as long as is practicable taking into account other economic, environmental and social impacts. Ideally new development should also help to mitigate any existing adverse impacts elsewhere, for example by acting as a barrier between noisy infrastructure and any existing noise-sensitive uses that do not benefit from incorporated mitigation.
- A7.5 **BS 8233 - Guidance on Sound Insulation and Noise Reduction for Buildings [5]**
- A7.5.1 For many common situations, BS 8233 suggests criteria, such as suitable sleeping/resting conditions, and proposes noise levels that normally satisfy these criteria for most people.
- A7.5.2 The foreword advises that the information detailed in BS 8233 “...takes the form of guidance and recommendations. It should not be quoted as it were a specification or a code of practice and claims of compliance cannot be made to it.”.
- A7.5.3 Section 7.7.2 details the guideline values for desirable internal ambient noise levels within dwelling houses, flats and rooms in residential use (when unoccupied) when such properties are exposed to steady external noise sources.
- A7.5.4 These guideline values range from 35 - 40 dB $L_{Aeq,16hrs}$ during the daytime period and 30 dB $L_{Aeq,8hrs}$ during the night time period as detailed in Table 15 below.

Superseded

Table 15 – BS 8233 Internal Noise Level Guidelines

Activity	Location	07:00 – 23:00 hrs	23:00 – 07:00 hrs
Resting	Living Room	35 dB LAeq,16hrs	--
Dining	Dining room	40 dB LAeq,16hrs	--
Sleeping (Daytime Resting)	Bedroom	35 dB LAeq,16hrs	30 dB LAeq,8hrs

- A7.5.5
- The guidelines also provide scope for relaxing these values by up to 5 dB and still achieve reasonable internal conditions.
- A7.5.6
- The internal noise level in a room is calculated by subtracting the sound reduction performance of the external façade from the noise level outside the room.
- A7.5.7
- It should be noted that the acoustic performance of the building envelope will be reduced, in the event windows are opened for ventilation or cooling purposes, to no more than 10 to 15 dB(A).
- A7.5.8
- For traditional external areas that are used for amenity space, such as gardens and patios, it is desirable that the external noise level does not exceed 50 dB LAeq,16hrs with an upper guideline value of 55 dB LAeq,16hrs which would be acceptable in noisier environments.
- A7.5.9
- It is recognised that these guideline values may not be achievable in all circumstances where development might be desirable. In higher noise areas, a compromise between elevated noise levels and other factors such as the convenience of living in these locations or making efficient use of land resources to ensure development needs can be met, might be warranted. In such a situation, development should be designed to achieve the lowest practicable levels in these external amenity spaces but should not be prohibited.
- A7.5.10
- The guideline values presented in BS8233, applies to external noise as it affects the internal acoustic environment from sources without a specific character such as road traffic noise.

Superseded

acoustics & noise limited

- A7.5.11 BS 8233 provides both simple and detailed calculation methods for determining the internal ambient noise levels attributable to the external noise level. These methods are based on those given in BS EN 12354-3 [7].
- A7.5.12 The indoor sound pressure level is estimated from the measured or calculated outdoor sound pressure level by using the sound level difference of the façade.
- A7.5.13 The more rigorous calculation method described in BS 8233 uses octave band data to determine the internal noise level and is more appropriate where the external noise may exhibit specific characteristics.
- A7.5.14 BS 8233 also states in section 7.7.2 that “*...regular individual noise events can cause sleep disturbance. A guideline value may be set in terms of SEL of $L_{Amax,F}$ depending on the character and number of events per night...*”
- A7.5.15 However, BS 8233 does not quantify what the L_{Amax} guideline value should be and therefore this assessment anticipates that any L_{Amax} criteria will make reference to the value presented in the W.H.O. guidelines [6].
- A7.6 **Guidelines for Community Noise, W.H.O. [6]**
- A7.6.1 Community noise (also called environmental noise, residential noise or domestic noise) is defined as noise emitted from all sources except noise at the industrial workplace. Main sources of community noise include road, rail and air traffic, industries, construction and public work, and the neighbourhood.
- A7.6.2 The objective of the World Health Organization (WHO) is ‘*the attainment by all peoples of the highest possible level of health*’.
- A7.6.3 WHO defines ‘health’ as ‘*A state of complete physical, mental and social well-being and not merely the absence of disease or infirmity*’. This broad definition of health makes reference to the concept of well-being and thereby includes noise impacts such as annoyance, speech interference, and impaired task performance as ‘health’ issues.
- A7.6.4 The WHO guidelines deal with all aspects of environmental noise impact and provide guideline values for community noise in specific environments. Most of the

Superseded

noise guidelines are given as period L_{Aeq} values. The relevant values for Dwellings are summarized in Table 16 below.

Table 16 – WHO Guideline Noise Levels for Dwellings

Residential Environment	Critical Health Effect(s)	$L_{Aeq,T}$ (dB)	Time Base, T
Outdoor Living Area	Serious Annoyance, daytime and evening	55	07:00 – 23:00 (16 hours)
	Moderate Annoyance, daytime and evening	50	07:00 – 23:00 (16 hours)
Dwelling, indoors	Speech intelligibility & moderate annoyance, daytime & evening	35	07:00 – 23:00 (16 hours)
Inside Bedrooms	Sleep disturbance, night-time	30	23:00 – 07:00 (8 hours)
Outside Bedrooms	Sleep disturbance, window open (outdoor values)	45	23:00 – 07:00 (8 hours)

- A7.6.5

These guideline values consider specific environments and identified health effects. Each value is set at the lowest levels that affect health such as annoyance and were derived from annoyance studies.
- A7.6.6

The guidelines, whilst not having any legal force in the UK, are commonly used by local authorities when setting environmental noise criteria for proposed developments.
- A7.6.7

For a restful sleep, the W.H.O. guidelines further recommend that the indoor sound pressure levels should not exceed approximately 45 dB L_{Amax} more than 10 to 15 times per night.
- A7.6.8

In addition, the Guidelines also state that “...at night, sound pressure levels at the outside façades of the living spaces should not exceed 45 dB L_{Aeq} and 60 dB L_{Amax} So that people may sleep with the windows open...the noise reduction from outside to inside with the windows partly open is 15dB”.
- A7.7

BS EN 12354 Part 3, Airborne Sound Insulation against Outdoor Sound [7]

Superseded

acoustics & noise limited

- A7.7.1 This Standard specifies a calculation model to estimate the sound insulation or the sound pressure level difference of a façade or other external surface of a building. The calculation is based on the sound reduction index of the different elements from which the façade is constructed. Calculations can be carried out for frequency bands or single number ratings.
- A7.7.2 The results of the calculation can be used to determine the indoor sound pressure level due to external sound sources such as road traffic.
- A7.7.3 BS EN 12354 states that ‘The sound level difference refers to a position 2m in front of the façade. If the calculated or measured outdoor sound pressure level refers to other positions or situations, the level at 2m in front of the façade should be deduced from it. It could, for instance, be deduced from the sound pressure level of the incident sound (without the building) by taking into account the façade reflection. For a plain façade this will result in a 3dB higher level, globally for all frequency bands’.
- A7.7.4 The indoor A-weighted sound pressure level can be determined from calculation in frequency bands for the appropriate frequency range, applying the A-weighting.
- A7.7.5 Alternatively, the indoor A-weighted sound pressure level can be determined directly from the A-weighted outdoor sound pressure level, provided the level difference is expressed in a single number rating for the relevant outdoor sound spectrum in accordance with BS EN ISO 717-1 [8], i.e. applying the spectrum adaptation terms C_{tr} or C to describe the level difference as, for example, R_w + C_{tr} when the outdoor sound is road traffic.
- A7.8 **ISO 9613 [9]**
- A7.8.1 Part 1 of this standard specifies an analytical method of calculating the attenuation of sound as a result of atmospheric absorption for a variety of meteorological conditions
- A7.8.2 Part 2 describes a method for calculating the attenuation of sound during propagation outdoors in order to predict the levels of environmental noise at a distance from a variety of sources. The method predicts the equivalent continuous

Superseded

A-weighted sound pressure level (as described in ISO 1996) under meteorological conditions.



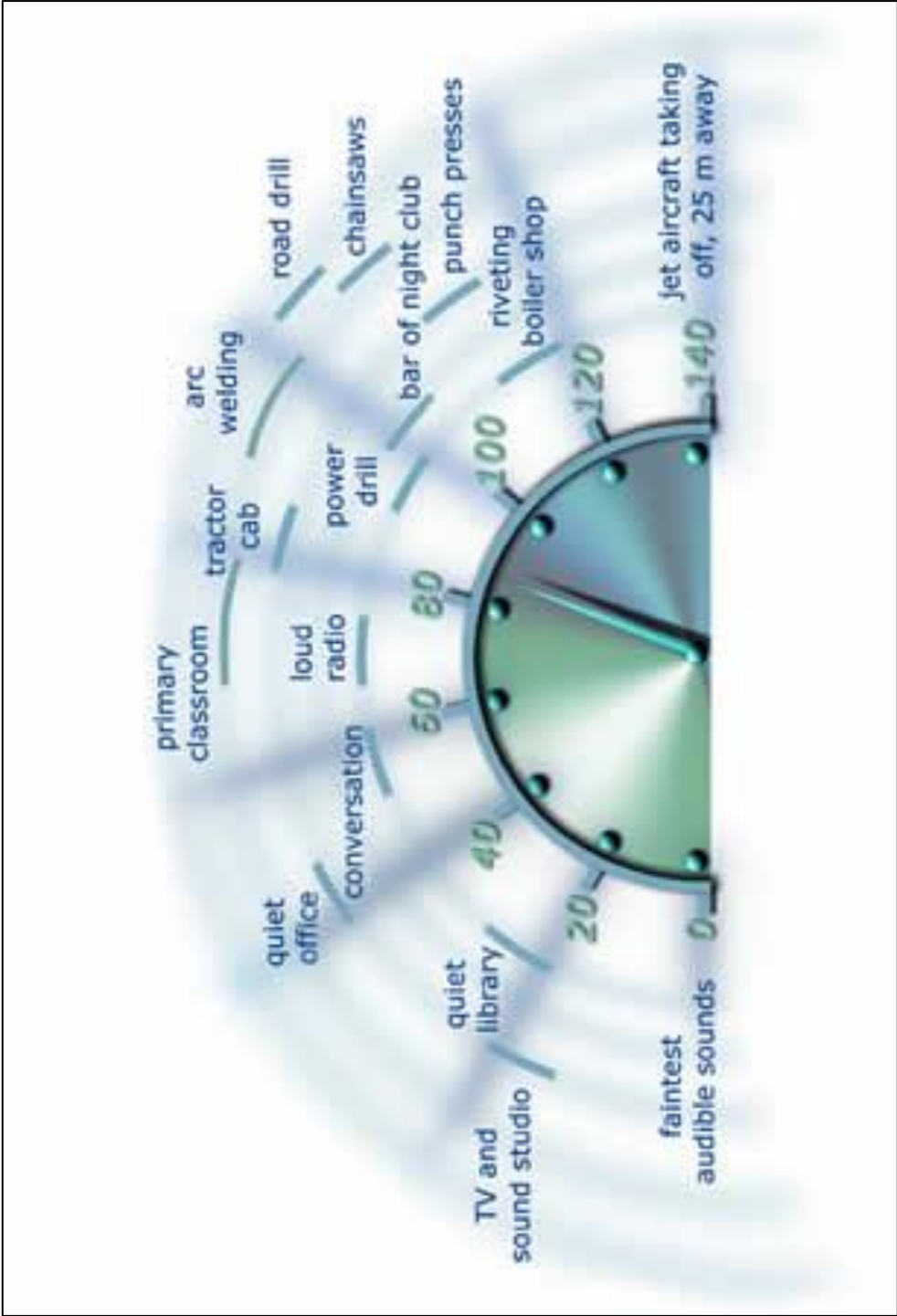
Superseded

acoustics & noise limited

Appendix 8 Range of Typical Noise Levels

A8.0 RANGE OF TYPICAL NOISE LEVELS

Figure 12 – Range of Typical Noise Levels



Superseded

acoustics & noise limited

Appendix 9 Glossary of Acoustic Terms

A9.0 GLOSSARY OF ACOUSTIC TERMS

- A9.1

Acoustic environment:

Sound from all sound sources as modified by the environment [BS ISO 12913-1:2013]
- A9.2

Ambient sound:

Totally encompassing sound in a given situation at a given time, usually composed of sound from many sources near and far

NOTE The ambient sound comprises the residual sound and the specific sound when present.
- A9.3

Ambient sound level, $L_A = L_{Aeq,T}$:

The equivalent continuous A-weighted sound pressure level of the totally encompassing sound in a given situation at a given time, usually from many sources near and far, at the assessment location over a given time interval, T

NOTE the ambient sound level is a measure of the residual sound and the specific sound when present.
- A9.4

Background sound level, $L_{A90,T}$:

A-weighted sound pressure level that is exceeded by the residual sound at the assessment location for 90% of a given time interval, T , measured using time weighting F and quoted to the nearest whole number of decibels
- A9.5

Equivalent continuous A-weighted sound pressure level, $L_{Aeq,T}$:

The value of the A-weighted sound pressure level in decibels of continuous steady sound that, within a specified time interval, $T = t_2 - t_1$, has the same mean-squared sound pressure as a sound that varies with time, and is given by the following equation:

$$L_{Aeq,T} = 10 \lg \left\{ (1/T) \int_{t_1}^{t_2} \left[\frac{p_A(t)^2}{p_0^2} \right] dt \right\}$$

where:

p_0 is the reference sound pressure (20 μ Pa); and

$p_A(t)$ is the instantaneous A-weighted sound pressure (Pa) at time t

Superseded

acoustics & noise limited

NOTE The equivalent continuous A-weighted sound pressure level is quoted to the nearest whole number ofdecibels.

- A9.6

Measurement time interval, T_m :

Total time over which measurements are taken

NOTE This may consist of the sum of a number of non-contiguous, short-term measurement time intervals.
- A9.7

Rating level, L_{A,T_r} :

Specific sound level plus any adjustment for the characteristic features of the sound
- A9.8

Reference time interval, T_r :

Specified interval over which the specific sound level is determined

NOTE this is 1 h during the day from 07:00 h to 23:00 h and a shorter period of15 min at night from 23:00 h to 07:00 h.
- A9.9

Residual sound:

Ambient sound remaining at the assessment location when the specific sound source is suppressed to such a degree that it does not contribute to the ambient sound
- A9.10

Residual sound level, $L_r = L_{Aeq,T}$:

Equivalent continuous A-weighted sound pressure level of the residual sound at the assessment location over a given time interval, T
- A9.11

Specific sound level, $L_s = L_{Aeq,T_r}$:

Equivalent continuous A-weighted sound pressure level produced by the specific sound source at the assessment location over a given reference time interval, T_r
- A9.12

Specific sound source:

Sound source being assessed

Superseded

- A9.13

A-weighting:

Normal hearing covers the frequency (pitch) range from about 20 Hz to 20,000 Hz but sensitivity is greatest between about 500 Hz and 5,000 Hz. The ‘A-weighting’ is an electrical circuit built into noise meters to approximate this characteristic of human hearing.
- A9.14

Decibel (dB):

The logarithmic measure of sound level. 0dB (A) is the threshold of normal hearing. 140 dB (A) is the level at which instantaneous damage to hearing is caused. A change of 1 dB is detectible only under laboratory conditions.
- A9.15

dB(A):

Decibels measured on a sound level meter incorporating a frequency weighting (A-weighting) which differentiates between sounds of different frequency (pitch) in a similar way to the human ear. Measurements in dB(A) broadly agree with an individual’s assessment of loudness. A change of 3 dB (A) is the minimum perceptible under normal conditions and a change of 10 dB(A) corresponds roughly to doubling or halving the loudness of a sound.
- A9.16

Free Field:

A sound field in which no significant sound reflections occur.
- A9.17

L_{Amax}:

The maximum ‘A-weighted’ level of sound recorded during a sound event. The time weighting used (fast or Slow) should be stated.
- A9.18

Tonality:

The degree to which a sound contains audible pure tones. Broadband sound (across a wider range of frequencies) is generally less annoying than sound with identifiable tones.
- A9.19

Frequency:

The number of cycles per second of a vibration usually expressed in units of Hertz, Hz

Superseded

acoustics & noise limited

A9.20

Hertz:

Unit of frequency, equal to one cycle per second. Frequency determines the pitch of a sound.

Superseded

acoustics & noise limited

Appendix 10 References

Superseded

scully
property
group
limited
&
noise
&
acoustics

A10.0 REFERENCES

1	Planning Guidance (Wales) TAN (Wales) 11 Noise, Welsh Office
2	Planning Policy Wales, Edition 10, Welsh Government, December 2018
3	Noise and soundscape action plan 2018 – 2023, Welsh Government, 2018
4	ProPG: Planning & Noise, Professional Practice Guidance on Planning & Noise, New Residential Development, ANC, IOA, CIEH, May 2017
5	BS 8233:2014. ‘Guidance on sound insulation and noise reduction for buildings’, British Standards Institution 2014
6	“Guidelines for Community Noise”, Berglund, Lindvall, Schwela, World Health Organization, 1999
7	BS EN 12354-3, “Building acoustics – Estimation of acoustic performance of buildings from the performance of elements – Part 3: Airborne sound insulation against outdoor sound”, British Standards, 2017
8	BS EN ISO 717-1:1997, ‘Acoustics - Rating of sound insulation in buildings and of building elements, Part 1: Airborne sound insulation’, British Standards
9	ISO 9613 Acoustics – Attenuation of sound propagation outdoors Parts 1 & 2