Armstrong House
3 Bassett Avenue
Southampton
SO16 7DP

T: 02381 555 000
E: info@24acoustics.co.uk

ROMAN FIELDS, CAMPDOWN
NOISE IMPACT ASSESSMENT

Technical Report: R9838-2 Rev 1

Date: 12th June 2023

For: Dandara Southern Ltd
Roman House
Eddystone Road
Totton
Southampton
SO40 3SA

24 Acoustics Document Control Sheet

Project Title: Roman Fields, Campdown –Noise Impact Assessment

Report Ref: R9838-2 Rev 1

Date: 12th June 2023

	Name	Position	Signature	Date
Prepared by	Aileen Reed BEng MIOA	Consultant	[redacted]	12/6/2023
Approved by	Stephen Gosling BEng MIOA	Principal Consultant	[redacted]	12/6/2023
Approved by	Stephen Gosling BEng MIOA	Principal Consultant	[redacted]	12/6/2023
For and on behalf of 24 Acoustics Ltd				

Document Status and Approval Schedule

Revision	Description	Prepared By	Reviewed By	Approved By
0	Approved for issue	Aileen Reed	Stephen Gosling	Stephen Gosling
1	Minor revision	Aileen Reed	Stephen Gosling	Stephen Gosling

DISCLAIMER

This report was completed by 24 Acoustics Ltd on the basis of a defined programme of work and terms and conditions agreed with the Client. The report has been prepared with all reasonable skill, care and diligence within the terms of the Contract with the Client and taking into account the project objectives, the agreed scope of works, prevailing site conditions and the degree of resources allocated to the project.

24 Acoustics Ltd accepts no responsibility whatsoever, following the issue of the report, for any matters arising outside the agreed scope of the works.

This report is issued in confidence to the Client and 24 Acoustics Ltd has no responsibility of whatsoever nature to third parties to whom this report, or any part thereof, is made known. Any such party relies upon the report at their own risk.

Unless specifically assigned or transferred within the terms of the agreement, 24 Acoustics Ltd retains all copyright and other intellectual property rights, on and over the report and its contents.

© 24 Acoustics Ltd 2023

CONTENTS

1.0 INTRODUCTION	4
2.0 SITE DESCRIPTION AND PROPOSED DEVELOPMENT	4
3.0 CRITERIA	4
4.0 NOISE MEASUREMENTS	8
5.0 NOISE IMPACT ASSESSMENT	10
6.0 CONCLUSIONS	13
FIGURES	16
APPENDIX A – ACOUSTIC TERMINOLOGY	24
APPENDIX B – NOISE MEASUREMENT RESULTS	25

1.0 INTRODUCTION

1.1 24 Acoustics Ltd has been instructed by Dandara Southern Ltd to undertake a noise impact assessment for a proposed development at Roman Fields, Campdown, Waterlooville. The assessment has included:

Ambient noise monitoring on the proposed site;
Assessment of the noise arising from the A3(M) motorway and College Road;
Production of noise contour maps;
Proposed noise mitigation measures.

1.2 All sound pressure levels quoted in this report are in dB relative to 20 µPa.

2.0 SITE DESCRIPTION AND PROPOSED DEVELOPMENT

2.1 The site is located west of the A3(M) motorway in Waterlooville and south of South Downs College. College Road lies along the western site boundary with Portsmouth Golf Club to the south-west. The site is currently open scrubland.

2.2 Dandara intends to submit a planning application for 628 dwellings along with public open space. The site location can be seen in Figure 1 with the layout for the proposed residential development shown in Figure 2.

3.0 CRITERIA

<u>National Planning Policy Framework and Noise Policy Statement for England</u>

3.1 Paragraph 185 of the National Planning Policy Framework (NPPF) [Reference 1] states that planning policies and decisions should:

a) mitigate and reduce to a minimum potential adverse impacts resulting from noise from new development – and avoid noise giving rise to significant adverse impacts on health and the quality of life;
b) identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason.

3.2 The NPPF also refers to the Noise Policy Statement for England (NPSE) [Reference 2] which is intended to apply to all forms of noise, including environmental noise, neighbour noise and neighbourhood noise. The NPSE sets out the Government's long-term vision to 'promote good health and a good quality of life through the effective management of noise within the context of Government policy on sustainable development' which is supported by the following aims.

> Avoid significant adverse impacts on health and quality of life;
> Mitigate and minimise adverse impacts on health and quality of life.

3.3 The NPSE defines the concept of a 'significant observed adverse effect level' (SOAEL) as 'the level above which significant adverse effects on health and quality of life occur'. The following guidance is provided within the NPSE:

> "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 different receptors and at different times. It is acknowledged that further research is required to increase our understanding of what may constitute a significant adverse impact on health and quality of life from noise. However, not having specific SOAEL values in the NPSE provides the necessary policy flexibility until further evidence and suitable guidance is available."

3.4 The Planning Practice Guidance (PPG) [Reference 3] is written to support the NPPF with more specific planning guidance. The PPG reflects the NPSE and states that noise needs to be considered when new developments may create additional noise and when new developments would be sensitive to the prevailing acoustic environment. It also states that opportunities should be taken, where practicable, to achieve improvements to the acoustic environment. The PPG states that noise can over-ride other planning concerns but should be considered in the context of the wider characteristics of the development proposal, its likely users and its surroundings.

3.5 The PPG expands upon the concept of SOAEL (together with Lowest Observable Adverse Effect Level, LOAEL and No Observed Effect Level, NOEL) as introduced in the NPSE and provides a table of noise exposure hierarchy for use in noise impact assessments in the planning system.

3.6 The NPPF, NPSE and PPG documents do not refer to specific noise criteria. For residential developments 24 Acoustics considers that the spirit of the requirements of the NPPF and NPSE will be complied with if criteria from British Standard 8233: 2014 and guidance from the World Health Organisation are adopted for internal noise levels within dwellings.

Professional Practice Guidance on Planning & Noise (ProPG)

3.7 The Professional Practice Guidance on Planning and Noise (ProPG) [Reference 4] was published jointly by the Association of Noise Consultants, Institute of Acoustics and Chartered Institute of Environmental Health in May 2017. The guidance relates to the consideration of existing sources of transportation noise upon proposed new residential development and strives to:

Advocate full consideration of the acoustic environment from the earliest possible stage of the development control process;

Encourage the process of good acoustic design in and around new residential developments;

Determine what should be taken into account in deciding planning applications for new noise-sensitive developments;

Improve understanding of how to determine the extent of potential noise impact and effect; and

Assist the delivery of sustainable development.

3.8 It is important to note that the guidance in ProPG does not constitute an official government code of practice and neither replaces nor provides an authoritative interpretation of the law or government policy.

BS 8233:2014 and WHO Guidelines

3.9 BS 8233:2014 [Reference 5] provides design guidance for dwelling houses, flats and rooms in residential use and recommends that internal noise levels in dwellings do not exceed 35 dB $L_{Aeq,16hr}$ in living rooms and bedrooms during the day, 40 dB $L_{Aeq,16hr}$ in dining rooms during the day and 30 dB $L_{Aeq,8hr}$ in bedrooms at night. A relaxation of 5 dBA in the above figures is given in the standard for rooms which are naturally ventilated (by opening windows).

3.10 BS 8233:2014 also notes that "Regular individual noise events (for example, scheduled aircraft or passing trains) can cause sleep disturbance. A guideline value may be set in terms of SEL or $L_{Amax,F}$, depending on the character and number of events per night."

3.11 Although the guidelines have no formal standing, the World Health Organisation (WHO) provides guidance on desirable internal noise levels to minimise the risk of sleep disturbance. The WHO 2000 guidelines [Reference 6] suggest internal night-time noise levels not exceeding 30 dB $L_{Aeq,8hr}$ or regularly (10 – 15 times per night) exceeding 45 dB $L_{Amax,f}$ for 'a good night's sleep'.

3.12 BS 8233:2014 suggests an upper guideline value of 55 dB $L_{Aeq,16hr}$ for noise levels in external amenity spaces such as gardens. This is considered an aspirational limit and BS 8233 recognises that the desirable noise levels for external amenity areas are not always achievable in certain locations. BS 8233 also states that development should not be prohibited on the basis of noise levels within external amenity areas.

ADO

3.13 Approved Document O requires all new dwellings to provide mitigation to control overheating. The overheating mitigation strategy must be usable, and Section 3 of the approved document provides thresholds for night-time noise levels within bedrooms. The document states:

"Windows are likely to be closed during sleeping hours if noise within bedrooms exceeds the following limits:

a. 40dB $L_{Aeq,T}$, averaged over 8 hours (between 11pm and 7am).

b. 55dB L_{AFmax}, more than 10 times a night (between 11pm and 7am)."

Local Plan

3.14 The Havant Borough Council Local Plan 2011 is under review but includes the following.

"E22: Amenity and pollution: Development proposals will be permitted where:

Projected levels of noise, odour, vibration, light, water or air pollution do not have a likely significant negative effect on the amenity of existing and future users of the site, nearby occupiers or the winder environment; or

Measures are provided which are suitable for the purposes intended and will ensure than any likely significant negative effect on receptor(s) are mitigated to an acceptable level."

3.15 The Havant Borough Design Guide SPD includes the following:

"Policy CS16 High Quality Design

Planning permission will be granted for development that is designed to a high standard, which helps to create places where people want to live, work and relax. All development should demonstrate that its design…does not cause unacceptable harm to the amenity of neighbours through smell, the loss of privacy, outlook, noise and overlooking."

3.16 Policy DM10 of the Havant Core Strategy requires that for development that may cause pollution through noise will only be permitted where "The health and safety of existing and future users of the site, or nearby occupiers and residents is not put at risk."

Pre-Application Response

3.17 A pre-application response has been provided by Mr Mark Moss, Environmental Health Regulatory Officer, Havant Borough Council, dated 23rd September 2022. In this he refers to compliance with the guideline noise levels specified in BS8233:2014. He concludes "In short, if this application were to proceed to an outline or even full application, I would expect that an acoustic assessment will be provided at this time, with all recommended mitigation measures that may be required, along with an overheating assessment."

Summary

3.18 The impact of road traffic noise upon the proposed development has been assessed using the following recommended maximum noise levels,:

35 dB $L_{Aeq,16hr}$ daytime noise level for living rooms;
30 dB $L_{Aeq,8hr}$ night-time noise level for bedrooms;
45 dB $L_{Amax,f}$ night-time noise levels in bedrooms for regular events;
Aspirational target limit of 55 dB $L_{Aeq,16hr}$ in external amenity areas.

4.0 NOISE MEASUREMENTS

4.1 Environmental noise measurements were obtained to the east of the site between 2nd and 7th December 2022. In addition, a noise survey was undertaken over a 3 hour (shortened CRTN) period near the boundary of College Road on 7th December 2022.

4.2 The following equipment was utilised:

Rion precision sound level meter	Type NL-52;
Svantek (Class 1) precision sound & vibration level meter	Type 958;
Brüel & Kjær acoustic calibrator	Type 4231.

4.3 The noise monitoring equipment was located as follows (see also Figure 1):

Location 1 – to the east of the site, facing the A3(M) motorway at a high of 1.5 m above ground level;

Location 2 – to the west of the site, facing College Road at a high of 1.5 m above ground level and a distance of 50 m from the edge of the College Road carriageway.

4.4 Measurements were undertaken in 5 minute samples in terms of the overall free-field A-weighted L_{eq}, L_{10}, L_{90} and $L_{max,f}$ noise levels. Measurements were made in accordance with BS 7445:1991 "Description and measurement of environmental noise Part 2 - Acquisition of data pertinent to land use" [Reference7].

4.5 Calibration was checked before and after the survey in accordance with the manufacturer's instructions. No significant drift in calibration was recorded. Calibration of 24 Acoustics' equipment is traceable to National Standards.

4.6 Each instrument was fitted with an environmental weather shield during the survey. Weather conditions during the surveys were typically fine and dry with wind speeds typically lower than 5 m/s.

4.7 The results of the ambient noise survey at Location 1 is shown graphically in Appendix B and are summarised below in Table 1.

Day and Date	Sound Pressure Level		
	Daytime Level (07:00 - 23:00) dB $L_{Aeq,\,16\ hour}$	Night-time Level (23:00 – 07:00) dB$L_{Aeq,\,8\ hour}$	Night-time Typical $L_{Amax,\,f}$
Friday 2/12/2022	77*	70	82
Saturday 3/12/2022	77	69	81
Sunday 4/12/2022	76	71	80
Monday 5/12/2022	77	71	82
Tuesday 6/12/2022	77	71	81
Wednesday 7/12/2022	77	84	--
Representative	77	71	81

Table 1: Summary of Ambient Noise Levels – Location 1. (* = incomplete period)

4.8 At Location 2, the survey was undertaken in accordance with the shortened method described in CRTN (Department of Transport. Calculation of Road Traffic Noise, 1988) [Reference 8]. The $L_{A10, 3 hour}$ has been calculated to be 63 dB. The measured $L_{A10, 3 hour}$ value has been converted to a daytime figure of 60 dB $L_{Aeq 16 hour}$.

5.0 NOISE IMPACT ASSESSMENT

Site Layout

5.1 The proposed residential properties on the western site boundary are oriented to face towards College Road, allowing rear gardens to be screened from road traffic noise.

5.2 To the east of the site a 3 to 4 m high acoustic fence (minimum surface density 15 kg/m^2) has been incorporated into the design to ensure that road traffic noise from the A3(M) is minimised. The extent of this can be seen at Figure 3.

5.3 In addition, apartment blocks are proposed along the eastern site boundary and these will provide screening to more westerly parts of the site.

Calculated Noise Levels – Road Traffic Noise

5.4 An acoustic model of the site has been developed to determine the noise levels across the site from the existing roads. The model has been produced using IMMI 2030 noise mapping software and has used the propagation methodology of CRTN which takes into account the effects of which takes into account the effects of distance, geometric divergence and acoustic screening. The software incorporates the latest revisions to CRTN issued in LA 111.

5.5 Figures 4 and 5 show the predicted L_{Aeq} noise contours across the proposed development site for the day and night-time periods. The model of daytime noise levels assumes a receiver height of 1.5 m whereas the night-time model assumes a receiver height of 4 m to represent bedroom height.

Internal Noise Levels

5.6 The analysis given below has been based on 24 Acoustics' understanding of the envelope construction to be used for this scheme (based on a cavity masonry construction). Calculations have been undertaken utilising drawings showing internal layouts and elevations of the various house and apartment types provided by Dandara Southern Limited.

5.7 Results of acoustic modelling have been used to determine the glazing and ventilation requirements for the proposed residential scheme which will ensure that the noise levels inside the properties do not exceed 35 dB $L_{Aeq,\ 16\ hour}$ during the day and 30 dB $L_{Aeq,\ 8\ hour}$ at night and also do not regularly exceed 45 dB $L_{Amax.f}$ at night.

5.8 The calculations assume that a mechanical ventilation and heat recovery (MVHR) system will be utilised for apartments along the eastern site boundary with the A3(M) and for the apartment block on the south-western site boundary with College Road.

5.9 Calculations have identified minimum required acoustic window and background ventilator specifications for proposed residential properties. The window specifications for habitable rooms are described below in Table 4 and relevant Zone locations identified in Figure 6.

Zone	Room	Glazing Type
G1	Lounge	A
	Bedroom	A
All Other Areas	Lounges & Bedrooms	B

Table 4: Acoustic Window Requirements

5.10 Windows when installed should be capable of achieving the performance stated below in Table 5.

Window	Minimum SRI (dB) per Octave Band Centre Frequency (Hz)					
	125	250	500	1k	2k	4k
Type A	24	25	31	42	44	49
Type B	21	17	25	35	37	31

Table 5: Required Window Performance

5.11 In making a comparison with the values in Table 5, it is important that the glazing figures used are the result of tests in accordance with ISO 10140, Part 2: 2010 and that the quoted minimum sound reduction specifications are met by the entire glazing system as a whole, including frames, seals, any insulated panels and not just the glass. The requirements also apply to any external glazed doors to habitable rooms.

5.12 In order to assist with the selection process, the following suggested glazing configurations, if installed properly, would be capable of achieving the required sound reduction performance. These configurations should not be used for design purposes:

Glazing Type A: 6 mm glass: 12 mm cavity (minimum): 6.4 mm Stadip Silence glass, Minimum 36 dB R_w;
Glazing Type B: 4 mm glass: 6-16 mm cavity (minimum): 4 mm glass, Minimum 29 dB R_w.

5.13 The acoustic performance criteria for background ventilators whilst in the open position are shown in Table 6 below and can be seen in Figure 7.

Ventilator	Minimum Vent Weighted Normalised element weighted level difference, $D_{ne,w}$, dB	Example of Type of Vent
V1	-	MVHR
V2	42	Greenwood 5000EAW.AC2
V3	39	Greenwood 5000EAW.AC1

Table 6: Acoustically Rated Vent Specification

5.14 In making a comparison with the specifications in Table 6, it is important that the figures used are the result of laboratory tests with the vent in the open position. Note that the stated minimum performance values assume two ventilators per habitable room. All ventilators must comply with the requirements of Part F of the Building Regulations [Reference 9].

5.15 It is considered that with the proposed mitigation measures as detailed above, suitable internal noise levels can be achieved for the proposed dwellings. If the site layout / housing types change then these calculations should be revised accordingly.

Overheating

5.16 A detailed overheating assessment will be undertaken during the Building Regulations purposes. This will ensure control of overheating in bedrooms at night, in order to comply with the requirements of Approved Document O.

5.17 It is considered that as apartments are at higher risk of overheating than houses, provision of MVHR to apartments in the noisiest parts of the site will assist in minimising that risk.

External Noise Levels

5.18 For the vast majority of the site, noise levels in external amenity areas during the day are predicted to be no greater than 50 - 55 dB $L_{Aeq, 16hr}$ and as such will meet the aspirational limit of 55 dB $L_{Aeq, 16hr}$ specified in BS 8233.

5.19 For gardens where it is not possible to achieve this level, noise levels will be mitigated and reduced to a minimum via provision of 1.8 m high close board garden fences (minimum surface density 12 kg/m^2) in the areas identified in Figure 2.

5.20 Apartments to the east of the site are to be provided with balconies and noise levels there will be in excess of 55 dB $L_{Aeq, 16hr.}$ In relation to such a situation, BS 8233 states the following:

> "It is also recognized that these guideline values are not achievable in all circumstances where development might be desirable. In higher noise areas, such as city centres, urban areas adjoining the strategic transport network, a compromise between elevated noise levels and other factors...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."

5.21 Furthermore, the PPG states that "noise impacts may be partially offset if residents have access to...a relatively quiet, protected, external publicly accessible amenity space...that is nearby (e.g. within a 5 minute walking distance)".

5.22 It is confirmed that occupiers of these apartments will have access to public open spaces within 5 minutes walking distance and noise levels in these are anticipated to be less than 55 dB $L_{Aeq, 16hr.}$ This is therefore considered to be acceptable in planning terms.

6.0 CONCLUSIONS

6.1 Dandara Southern Limited intends to submit a planning application to develop land west of the A3(M) for residential use. The site is subject to noise from road traffic on the A3(M) and College Road which lies to the west of the site.

6.2 24 Acoustics Ltd has been retained to provide an assessment of the impact of the existing sources of noise on the proposed new dwellings.

6.3 For internal noise, recommendations in terms of glazing and alternative means of ventilation have been provided to ensure that noise within habitable rooms, due to road traffic, would comply with maximum internal levels of 35 dB L_{Aeq} during the daytime and 30 dB L_{Aeq} and 45 dB $L_{Amax,\,f}$ at night.

6.4 Noise levels in external amenity areas during the day are predicted to be less than 55 dB $L_{Aeq,\,16hr}$ across the vast majority of the site. Recommendations are made for suitable garden fences in some areas which is considered acceptable in planning terms.

6.5 On the above basis, it is considered that an appropriate acoustic environment can be provided to the proposed residential properties, both externally and internally.

REFERENCES

1. Department for Communities and Local Government. National Planning Policy Framework, updated 2021.

2. DEFRA, Noise Policy Statement for England, March 2010.

3. National Planning Practice Guidance, Department of Communities and Local Government (revised July 2019).

4. ProPG: Planning and Noise. Professional Practice Guidance on Planning & Noise, New Residential Development, May 2017. Association of Noise Consultants, Institute of Acoustics, Chartered Institute of Environmental Health.

5. British Standards Institution. British Standard 8233: Guidance on sound insulation and noise reduction for buildings, 2014.

6. World Health Organisation. Guidelines for Community Noise, 2000.

7. British Standards Institution. British Standard 7445: 1991 'Description and measurement of environmental noise Part 2 - Acquisition of data pertinent to land use'

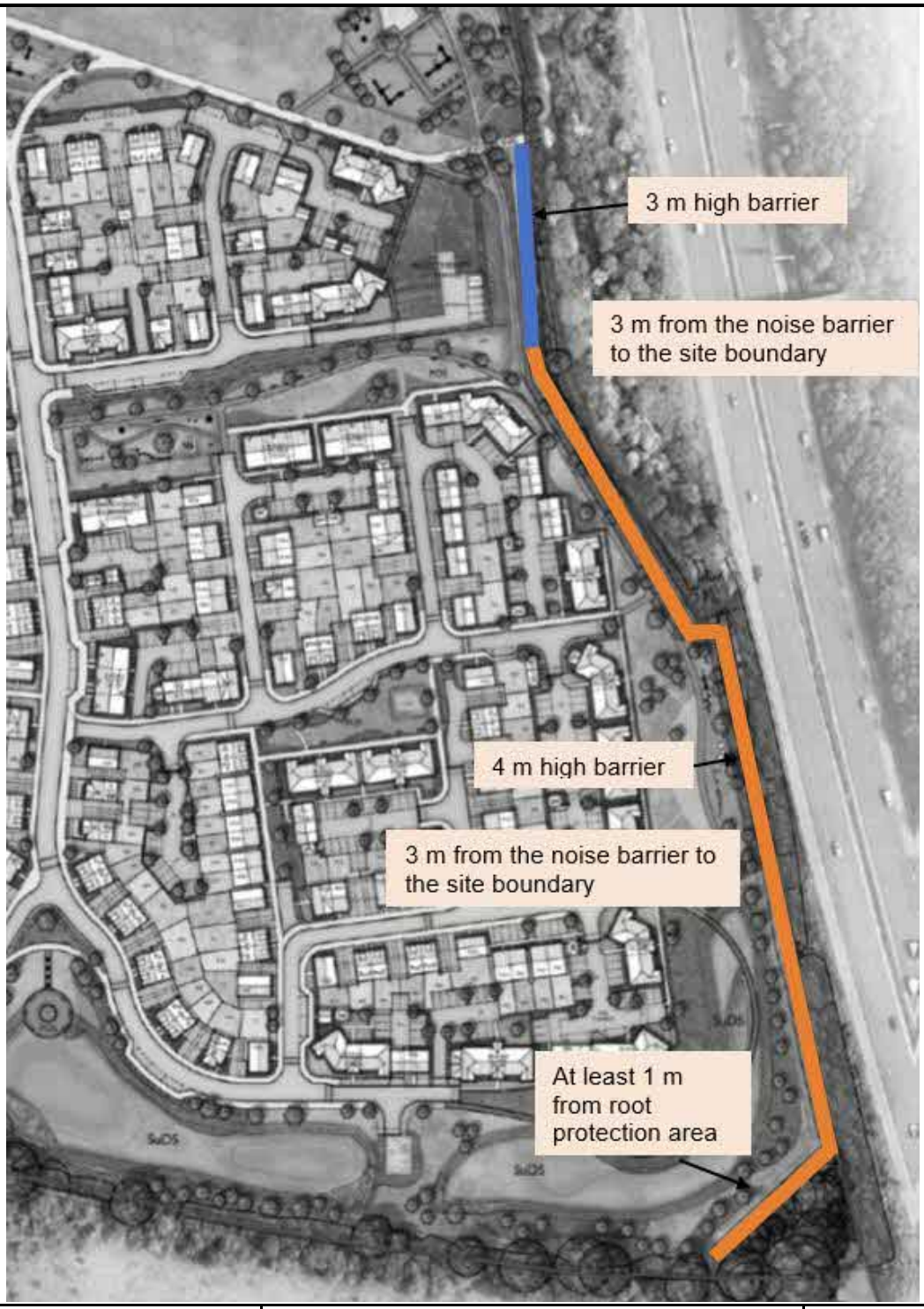
8. Calculation of Road Traffic Noise (CRTN), Department of Transport, 1988.

9. Building Regulations. Approved Document F - Ventilation, June 2022.

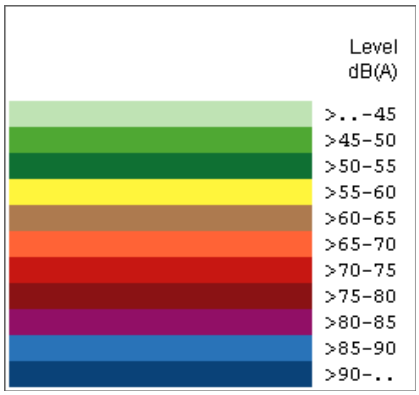
Project: Roman Fields, Campdown	Title: Site Boundary and Noise Measurement Locations	
DWG No: Figure 1	Scale: N.T.S.	Rev: -
Date: May 2023	Drawn By: AP	Job No: 9838-2

Properties with 1.8 m garden fences

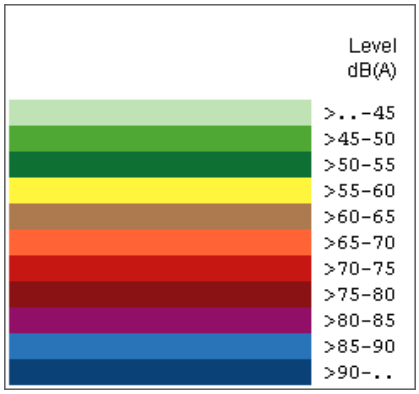
Project: Roman Fields, Campdown	Title: Proposed Layout	
DWG No: Figure 2	Scale: N.T.S.	Rev: A
Date: June 2023	Drawn By: AP	Job No: 9838-2



Project: Roman Fields, Campdown	Title: Noise Barrier Location	
DWG No: Figure 3	Scale: N.T.S.	Rev: A
Date: June 2023	Drawn By: AP	Job No: 9838-2



Project: Roman Fields, Campdown	Title: Daytime (07:00–23:00) Noise Contours, dB $L_{Aeq,\ 16\ hr}$	
DWG No: Figure 4	Scale: N.T.S.	Rev: -
Date: May 2023	Drawn By: AP	Job No: 9838-2



Project: Roman Fields, Campdown	Title: Night time (23:00–07:00) Noise Contours, dB $L_{Aeq,\ 8\ hr}$	
DWG No: Figure 5	Scale: N.T.S.	Rev: -
Date: May 2023	Drawn By: AP	Job No: 9838-2

Type A Windows

Project: Roman Fields, Campdown	Title: Proposed Layout showing Window Requirements for Dwellings to West of Site	
DWG No: Figure 6	Scale: N.T.S.	Rev: A
Date: June 2023	Drawn By: AR	Job No: 9838-2

Project: Roman Fields, Campdown	Title: Proposed Layout showing Window Requirements for Dwellings to East of Site	
DWG No: Figure 7	Scale: N.T.S.	Rev: A
Date: June 2023	Drawn By: AR	Job No: 9838-2

Zone V1	MVHR
Zone V2	Sound attenuated trickle vents, Minimum $D_{ne,w}$, 42 dB
Zone V3	Sound attenuated trickle vents, Minimum $D_{ne,w}$, 39 dB

Project: Roman Fields, Campdown	Title: Proposed Layout showing Ventilator Requirements for Dwellings	
DWG No: Figure 8	Scale: N.T.S.	Rev: A
Date: June 2023	Drawn By: AR	Job No: 9838-2

APPENDIX A – ACOUSTIC TERMINOLOGY

Noise is defined as unwanted sound. The range of audible sound is from 0 to 140 dB. The frequency response of the ear is usually taken to be around 18 Hz (number of oscillations per second) to 18000 Hz. The ear does not respond equally to different frequencies at the same level. It is more sensitive in the mid-frequency range than the lower and higher frequencies and because of this, the low and high frequency components of a sound are reduced in importance by applying a weighting (filtering) circuit to the noise measuring instrument. The weighting which is most widely used and which correlates best with subjective response to noise is the dBA weighting. This is an internationally accepted standard for noise measurements.

For variable sources, such as traffic, a difference of 3 dB is just distinguishable. In addition, a doubling of traffic flow will increase the overall noise by 3 dB. The 'loudness' of a noise is a purely subjective parameter, but it is generally accepted that an increase/ decrease of 10 dB corresponds to a doubling/ halving in perceived loudness.

External noise levels are rarely steady, but rise and fall according to activities within an area. In attempt to produce a figure that relates this variable noise level to subjective response, a number of noise indices have been developed. These include:

i) The L_{Amax} noise level

This is the maximum noise level recorded over the measurement period.

ii) The L_{Aeq} noise level

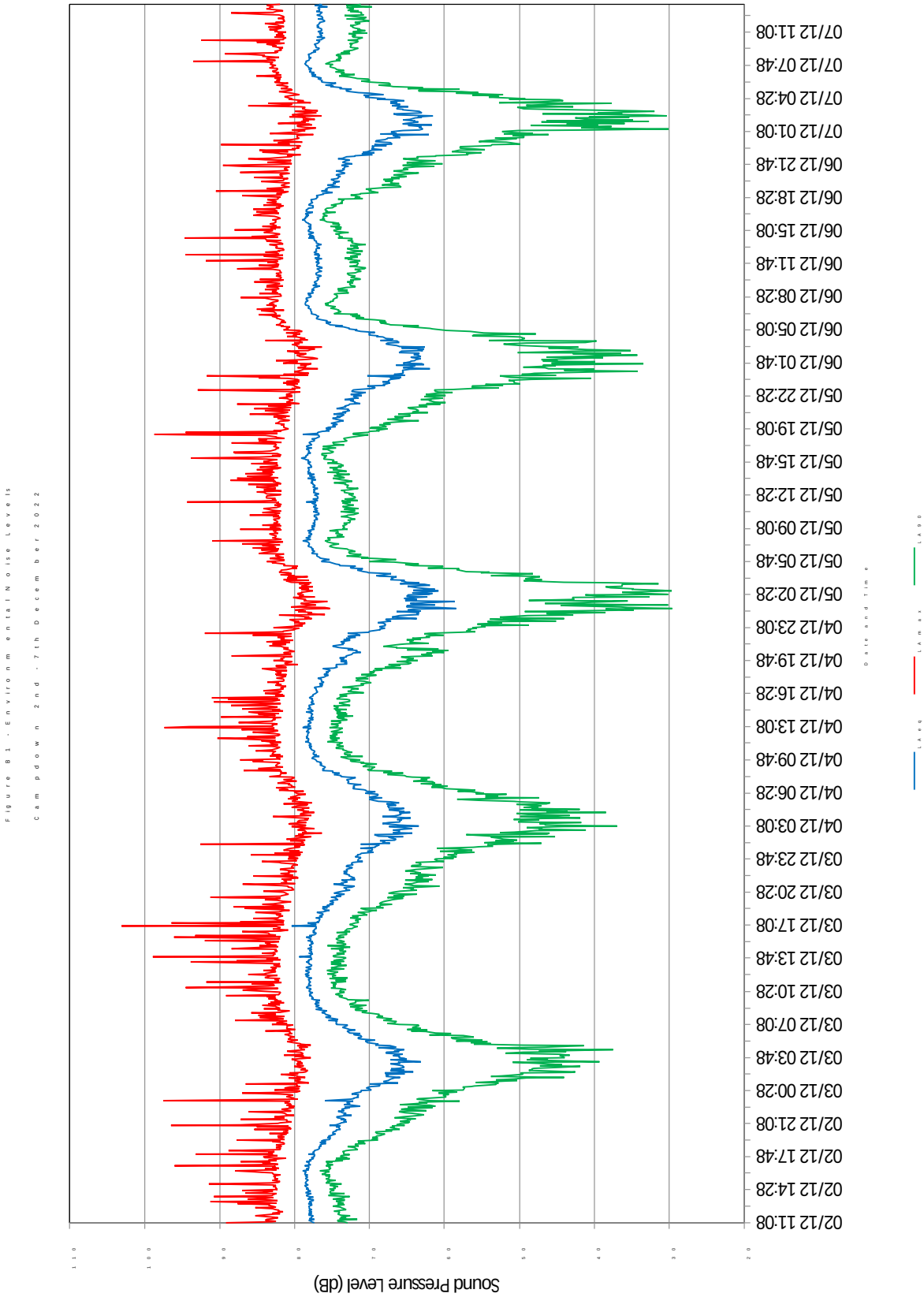
This is "equivalent continuous A-weighted sound pressure level, in decibels" and is defined in British Standard BS 7445 as the "value of the A-weighted sound pressure level of a continuous, steady sound that, within a specified time internal, T, has the same mean square sound pressure as a sound under consideration whose level varies with time".

It is a unit commonly used to describe construction noise and noise from industrial premises and is the most suitable unit for the description of other forms of environmental noise. In more straightforward terms, it is a measure of energy within the varying noise.

iii) The L_{A10} noise level

This is the noise level that is exceeded for 10% of the measurement period and gives an indication of the noisier levels. It is a unit that has been used over many years for the measurement and assessment of road traffic noise.

iv) The L_{A90} noise level

This is the noise level that is exceeded for 90% of the measurement period and gives an indication of the noise level during the quieter periods. It is often referred to as the background noise level and is used in the assessment of disturbance from industrial noise.

APPENDIX B – NOISE MEASUREMENT RESULTS