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**PROPOSED RESIDENTIAL DEVELOPMENT
AT LOWER ROAD, BEDHAMPTON
NOISE IMPACT ASSESSMENT**

Technical Report: R8907-4 Rev 5

Date: 26th July 2024

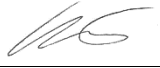
For: Bargate Homes Ltd
The New Barn,
Vicarage Farm Business Park
Winchester Road,
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SO50 7HD

24 Acoustics Document Control Sheet

Project Title: Proposed Residential Development at Lower Road, Bedhampton
Noise Impact Assessment

Report Ref: R8907-4 Rev 5

Date: 26th July 2024

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For and on behalf of 24 Acoustics Ltd				

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1.0 INTRODUCTION

- 1.1 24 Acoustics Ltd has been instructed by Bargate Homes Ltd to undertake a noise impact assessment for Phase 2 of the development site off Lower Road in Bedhampton. Outline planning consent has been granted at appeal to develop the site for residential use for up to 43 dwellings, associated landscaping, open space and allotments with access from Lower Road.
- 1.2 24 Acoustics produced an outline noise assessment (Ref: R8907-1 Rev 1) and subsequent advisory notes (Ref: R8907-2 and R8907-3) to accompany the initial application. Planning Condition 4 of the outline consent requires a detailed noise assessment. Therefore, this report has assessed the impact of noise from road traffic and rail movements at the site. The A27 dual carriageway and associated slip road are to south and west of the site with a railway line to the south.
- 1.3 24 Acoustics' outline assessment concluded that noise from surrounding sources could be adequately controlled to provide a satisfactory acoustic environment to habitable rooms. Additionally, 24 Acoustics' previous work on Phase 1 of the development concluded that vibration impact from the railway will be negligible.
- 1.4 All noise levels in this report are quoted in dB relative to 20 μ Pa. A definition of noise and vibration parameters described in this report is provided in Appendix A.

2.0 SITE DESCRIPTION AND PROPOSED DEVELOPMENT

- 2.1 The site is located to the south of Bedhampton with vehicular access via Lower Road to the north.
- 2.2 The A27 junction with Bedhampton Roundabout follows the site's western boundary. The A3(M) junction with the A27 lies further west and a train line follows the site's southern boundary. The main carriageway of the A27 lies further south at a distance of approximately 200 m. The Bargate Homes Bedhampton Phase 1 development lies to the east and comprises residential properties.
- 2.3 An aerial image showing the location of the site is shown in Figure 1. The site masterplan is shown in Figure 2.

3.0 STANDARDS AND GUIDANCE

Planning Condition 4

3.1 Planning Condition 4 (appeal ref: APP/X1735/W/22/3305704) is reproduced below:

"No development shall take place until details of the measures to be taken to acoustically insulate all habitable rooms of the development against traffic noise together with details of measures to provide ventilation to habitable rooms, have been submitted to and approved in writing by the Local Planning Authority. The approved details shall be fully implemented, and validation test results submitted to the Planning Authority prior to occupation."

3.2 Based on the above, the following criteria have been used in the assessment.

Internal Noise Levels

3.3 British Standard 8233:2014 [Reference 1] and World Health Organisation guidelines [Reference 2] are adopted for internal noise within dwellings.

3.4 BS 8233 provides desirable internal ambient noise levels for habitable rooms. Table 1 shows a summary of the levels recommended in BS 8233 for living rooms and bedrooms.

Activity	Location	Daytime 07:00 to 23:00	Night-time 23:00 to 07:00
Resting	Living Room	35 dB $L_{Aeq,16hr}$	--
Sleeping (daytime resting)	Bedroom		30 dB $L_{Aeq,8hr}$

Table 1 - Indoor Ambient Noise Levels as Recommended in BS 8233

3.5 The World Health Organisation provides guidance on desirable internal noise levels to minimise the risk of sleep disturbance. The WHO guidelines suggest internal noise levels not exceeding 30 dB L_{Aeq} or regularly exceeding 45 dB $L_{Amax,f}$ for 'a good sleep'.

Summary of Proposed Criteria

3.6 Based upon the review of standards described above, noise has been assessed in accordance with the following approach:

- BS 8233 for recommended internal noise levels inside the properties. It is considered that an upper internal daytime level of 35 dB $L_{Aeq,16hr}$ for lounges or living rooms and a night-time level for bedrooms of 30 dB $L_{Aeq,8hr}$ should apply. Similarly, a maximum night-time internal level of 45 dB $L_{Amax,f}$ should apply in bedrooms for regular events;

4.0 AMBIENT NOISE SURVEYS

Methodology

4.1 Environmental noise measurements were undertaken at the undeveloped site in order to establish existing ambient noise levels across the site. Noise measurements were undertaken between 3rd and 10th April 2024. The measurement locations are shown in Figure 1 and described below:

- Location 1: Northern boundary with housing off Lower Common Road;
- Location 2: Western boundary;
- Location 3: Southern boundary with railway.

4.2 Measurements were undertaken using the following equipment:

3 N° Rion class 1 sound level meter	Type NL52;
Brüel and Kjær acoustic calibrator	Type 4231.

4.3 All noise measurements were undertaken at approximately 2 m above local grade level in free field conditions and with direct line of sight to the railway. Environmental windshields were fitted to the microphones and instrumentation was configured to measure and store overall A-weighted statistical parameters such as L_{Aeq} , L_{Amax} and L_{A90} (all measured on fast response) in 5 minute intervals. Measurements were made in accordance with BS 7445: 1991 "Description and measurement of environmental noise Part 2 - Acquisition of data pertinent to land use" [Reference 3].

4.4 Weather conditions during the survey period were variable, with periods of rain and wind speeds exceeding 5 m/s. Measurements affected by meteorological conditions have been removed from the design levels.

Results

- 4.5 Noise sources in the area include road traffic from the A3(M) and A27 slip road to the west as well as the A27 to the south of the site. Maximum noise levels were predominantly controlled by road traffic and, to a lesser extent, train movements to the south of the site.
- 4.6 The noise survey results are shown graphically in Appendix B and summarised in Tables 2 to 4.
- 4.7 Note, 24 Acoustics determines the typical background noise level as the average minus one standard deviation and the typical maximum noise level as the tenth highest during the relevant period.

Date (April 2024)	Time Period and Noise Level dB				
	Day 07:00 - 23:00 hours		Night 23:00 - 07:00 hours		
	L _{Aeq} Average	L _{A90} Typical	L _{Aeq} Average	L _{Amax} Typical	L _{A90} Typical
Wednesday 3rd	63	57	57	67	46
Thursday 4th	63	59	58	68	47
Friday 5th	63	59	54	67	47
Saturday 6th	61	57	55	67	47
Sunday 7th	61	56	54	64	43
Monday 8th	59	55	59	77	50
Tuesday 9th	62	57	55	66	44
Wednesday 10th	59	54	-	-	-
Representative	61	57	56	66	46

Table 2 - Summary of Noise Survey Results at Location 1 (Northern Boundary)

Date (April 2024)	Time Period and Noise Level dB				
	Day 07:00 - 23:00 hours		Night 23:00 - 07:00 hours		
	L _{Aeq} Average	L _{A90} Typical	L _{Aeq} Average	L _{Amax} Typical	L _{A90} Typical
Wednesday 3rd	63	54	60	71	46
Thursday 4th	63	57	61	71	47
Friday 5th	64	57	57	72	47
Saturday 6th	62	57	56	68	47
Sunday 7th	62	54	58	74	41
Monday 8th	62	57	61	75	50
Tuesday 9th	62	54	59	75	41
Wednesday 10th	62	58	-	-	-
Representative	63	56	59	72	45

Table 3 - Summary of Noise Survey Results at Location 2 (Western Boundary)

Date (April 2024)	Time Period and Noise Level dB				
	Day 07:00 - 23:00 hours		Night 23:00 - 07:00 hours		
	L _{Aeq} Average	L _{A90} Typical	L _{Aeq} Average	L _{Amax} Typical	L _{A90} Typical
Wednesday 3rd	64	58	59	73	48
Thursday 4th	64	60	59	73	49
Friday 5th	64	60	56	74	48
Saturday 6th	63	58	56	73	48
Sunday 7th	62	57	55	66	44
Monday 8th	62	58	60	74	51
Tuesday 9th	64	59	57	72	46
Wednesday 10th	61	56	-	-	-
Representative	63	58	58	73	48

Table 4 - Summary of Noise Survey Results at Location 3 (Southern Boundary)

Noise Propagation Model

4.8 Measurement results have been used to calibrate an acoustic model of the site, using IMMI v30 noise-mapping software, to determine the noise levels at the proposed site from the road and railway. This has used the propagation methodology of CRTN [Reference 4] taking into account the effects of geometric divergence, atmospheric and ground absorption and acoustic screening. The following parameters were used in the model:

- Ambient temperature: 10 degrees centigrade;
- Relative humidity: 70%;
- Ground effects: G=0 ('hard' ground);

- Light downwind propagation conditions.

4.9 The acoustic model has considered the proposed site layout including topography of the site for receptor heights at both ground floor and first floor level (1.5 m and 4 m receptor heights).

5.0 ASSESSMENT

Internal Noise Levels

5.1 Calculations to determine glazing and ventilation specifications have been undertaken, using the measured noise levels, to determine the glazing and ventilation requirements for habitable rooms, which will ensure that noise levels inside the rooms do not exceed 35 dB $L_{Aeq, 16 \text{ hour}}$ during the day and 30 dB $L_{Aeq, 8 \text{ hour}}$ at night (and also not regularly exceed 45 dB $L_{Amax,f}$ at night) from road traffic and rail noise sources. In order to achieve these standards, it will be necessary for residents to occupy their dwellings with windows closed. It should be emphasised that windows will be openable (and not non-openable) and residents will have a choice over whether to open them or not. Where they choose to occupy with windows closed then alternative means of ventilation and measures to prevent overheating will be needed where necessary in accordance with the building regulations.

5.2 The calculations are based on the layout and house type drawings from Thrive Architects. If the site layout changes, this assessment should be updated accordingly.

5.3 The analysis given below is based on 24 Acoustics' understanding of the envelope construction to be used for this scheme, based on a traditional cavity masonry construction, which would be expected to achieve a minimum sound insulation performance of 52 dB R_w .

5.4 The acoustic requirements for glazing and ventilation are specified in the following sections.

Recommended Design

5.5 In order to comply with the requirements of BS 8233:2014, mechanical ventilation and heat recovery (with summer bypass) is strongly recommended for all dwellings (which is highly likely to be required in those units which will need consideration of overheating under Approved Document O of the Building Regulations).

- 5.6 The minimum sound insulation performances required by the glazing throughout the development are stated in Table 5.

Glazing Type	Minimum SRI (dB) per Octave Band Centre Frequency (Hz)						Overall R_w (dB)
	125	250	500	1k	2k	4k	
G1	24	20	25	35	38	35	31

Table 5 - Minimum Glazing Performance

- 5.7 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 (i.e. from balcony areas).
- 5.8 In order to assist with the selection process, the following window/glazing configurations, if installed correctly, would be capable of achieving the required sound reduction performance:
- Glazing Type G1: 4 mm glass – 12 mm (min) cavity – 4 mm glass.

Alternative Design

- 5.9 It will be possible to achieve acceptable internal noise levels via passive ventilation solutions (i.e. acoustically rated through wall or trickle vents). However, this would require the respecification of the glazing's sound insulation performance, leading to the recommendation of acoustically rated glazing to facades near the road and rail networks. It is also likely that passive vents will not be adequate for those units which will require consideration of overheating under Approved Document O of the Building Regulations.

6.0 CONCLUSIONS

- 6.1 24 Acoustics Ltd has been instructed by Bargate Homes Ltd to undertake a noise impact assessment for a proposed development site off Lower Road in Bedhampton in order to address Condition 4 of the site's planning consent.
- 6.2 Environmental noise measurements have been undertaken at the site to establish the prevailing ambient noise levels.
- 6.3 Calculations have been undertaken based upon proposed constructions to determine suitable glazing and ventilation requirements. Following these recommendations, a satisfactory internal environment in all habitable rooms will be achieved.
- 6.4 On the above basis, it is considered that an appropriate acoustic environment can be provided to the proposed residential properties.

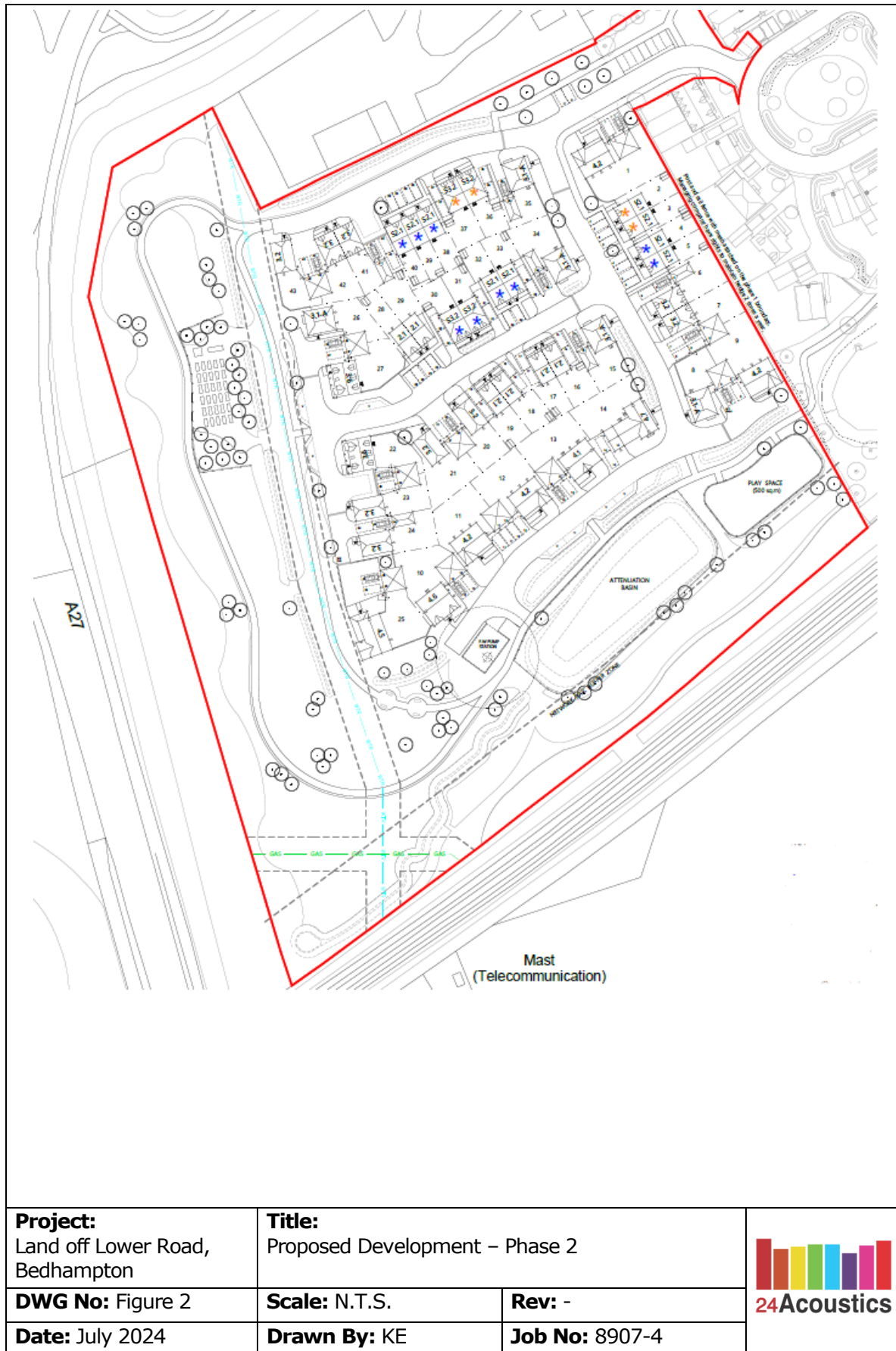
REFERENCES

1. British Standards Institution. British Standard 8233: Guidance on sound insulation and noise reduction for buildings, 2014.
2. World Health Organisation. Guidelines for Community Noise, 1999.
3. British Standards Institution. British Standard 7445: 1991 Description and measurement of environmental noise Part 2 - Acquisition of data pertinent to land use.
4. Department of Transport, Calculation of Road Traffic Noise, 1988.



-  Measurement Location 1
-  Measurement Location 2
-  Measurement Location 3

Project: Land off Lower Road, Bedhampton	Title: Site Location Plan/ Noise Survey Locations		 24Acoustics
DWG No: Figure 1	Scale: N.T.S.	Rev: -	
Date: July 2024	Drawn By: KE	Job No: 8907-4	



APPENDIX A: NOISE UNITS

Noise

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 dB(A) weighting. This is an internationally accepted standard for noise measurements.

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

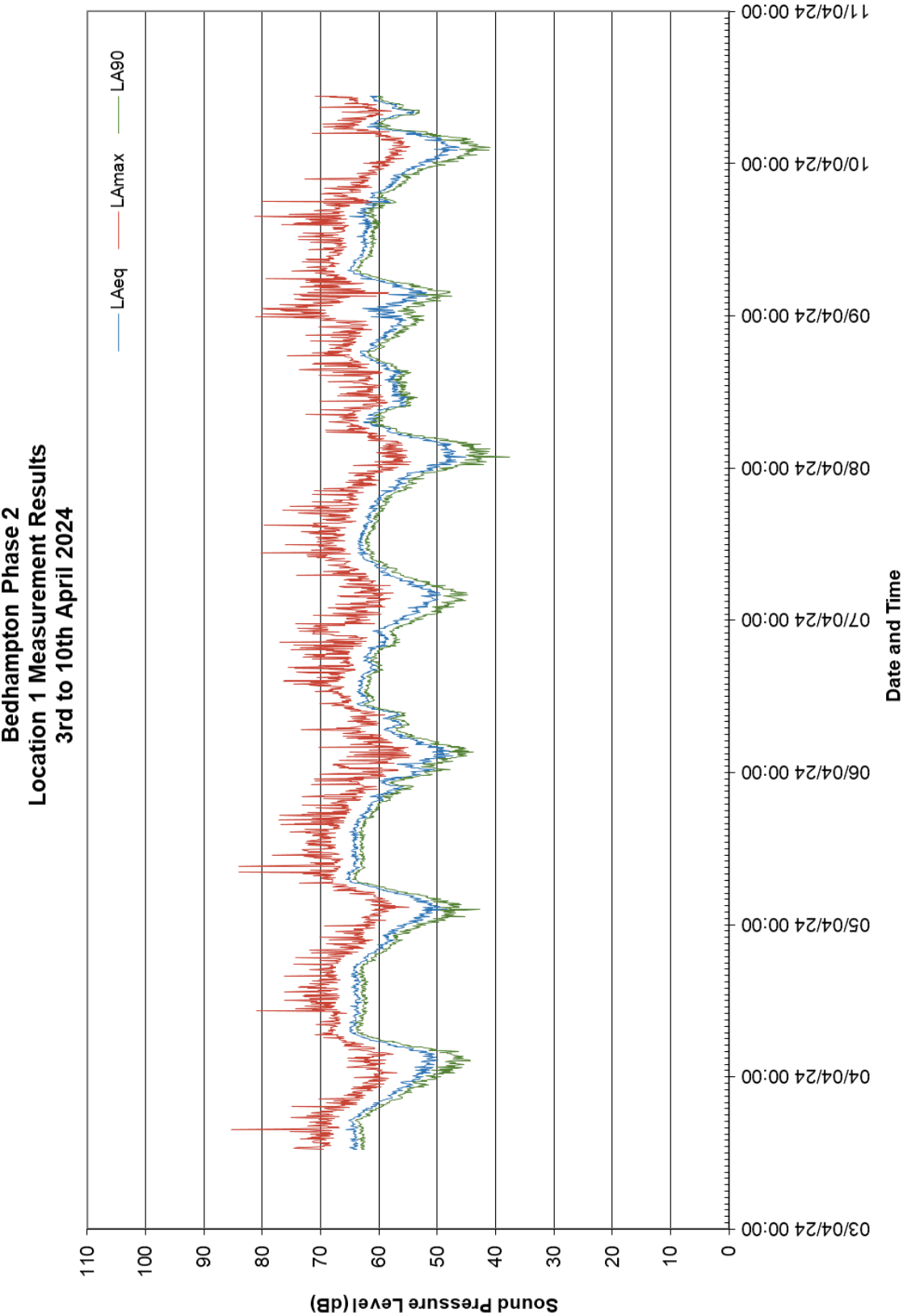
This is the maximum noise level recorded over the measurement period.

- ii) The L_{Aeq} noise level

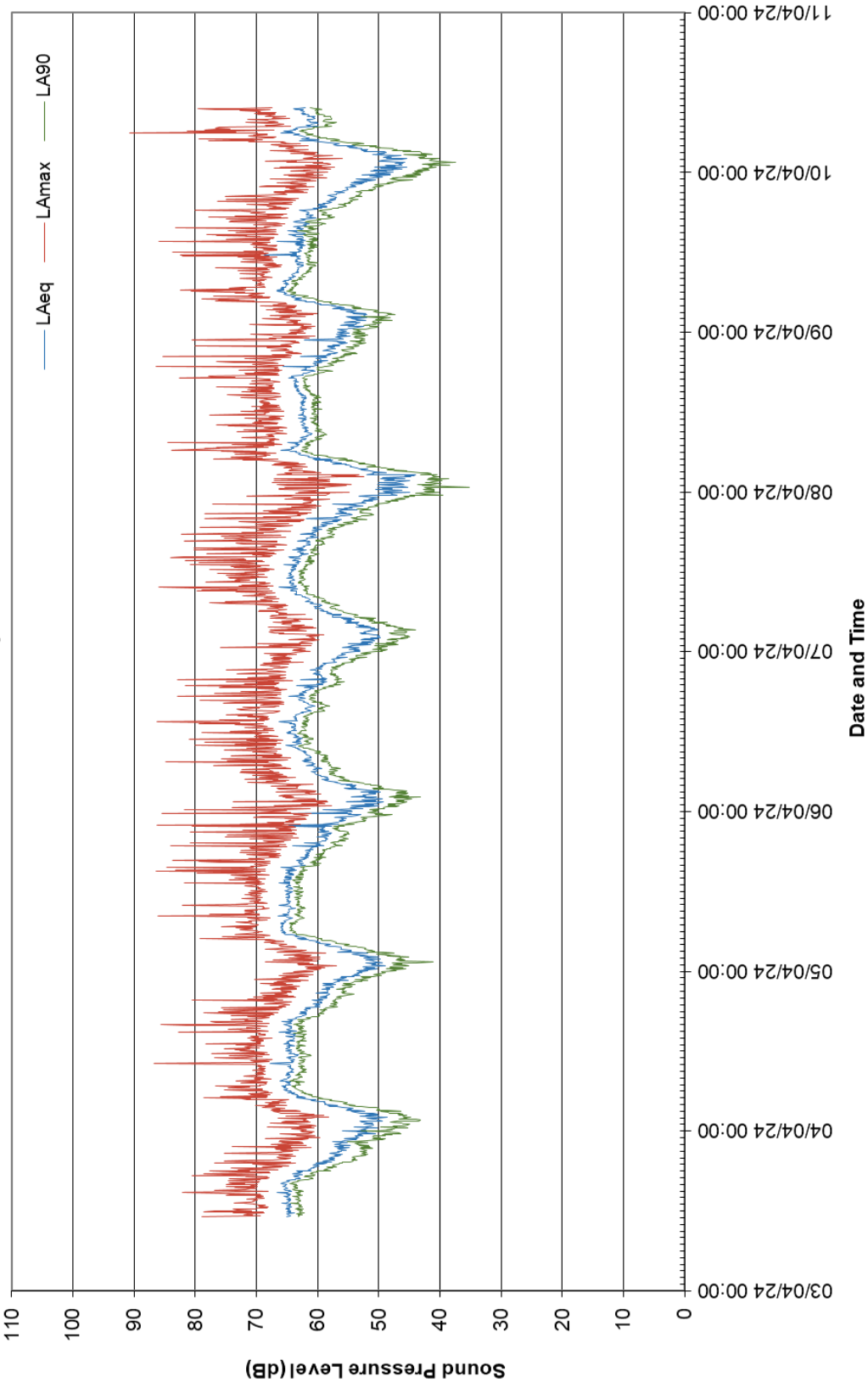
This is "equivalent continuous A-weighted sound pressure level, in decibels" and is defined in British Standard BS 7445 as the "value of the A-weighted sound pressure level of a continuous, steady sound that, within a specified time interval, T , has the same mean square sound pressure as a sound under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

APPENDIX B: AMBIENT NOISE MEASUREMENT RESULTS



Bedhampton Phase 2
Location 2 Measurement Results
3rd to 10th April 2024



Bedhampton Phase 2
Location 3 Measurement Results
3rd to 10th April 2024

