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**PROPOSED RESIDENTIAL DEVELOPMENT
MILTON ROAD, GRAVESEND**

NOISE IMPACT ASSESSMENT

Technical Report: R9701-1 Rev 0

Date: 31st August 2022

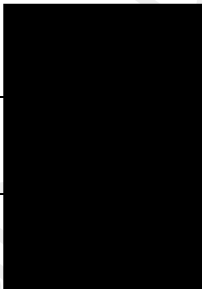
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1.0 INTRODUCTION

- 1.1 24 Acoustics Ltd has been appointed by McCarthy Stone, to provide a noise impact assessment at a site on Milton Road, Gravesend in connection with a proposed new development for residential use. Planning permission is sought for a new build development, to provide a four-storey residential apartment block comprising 62 dwellings for retirement living.
- 1.2 The site is mainly affected by noise from road traffic on Milton Road to the north. Accordingly, this noise impact assessment has included:
- Environmental noise monitoring;
 - Consideration of the noise arising from nearby sources affecting the site;
 - Assessment of internal noise levels within the dwellings;
 - Assessment of external noise levels within garden areas.
- 1.3 This report presents the results of the assessment, following site visits and ambient noise surveys undertaken between 18th and 24th August 2022.
- 1.4 An explanation of acoustical terms used in this report is provided in Appendix A. All sound pressure levels in this report are given in dB re: 20 μ Pa.

2.0 SITE DESCRIPTION

- 2.1 The site is located in a mixed-use area of Gravesend and is currently a derelict lawn bowls green and clubhouse. A Honda car dealership is located directly to the north of the site on the opposite side of Milton Road. Residential dwellings lie to the north west over Milton Road and to the east are residential properties on Church Walk. Gravesend Rugby Football Club and associated land and pitches are located to the south and west of the site.
- 2.2 Pitches to the south of the site include cricket, hockey and rugby. The centre of the nearest pitch (cricket) is approximately 110 m from the southern boundary of the site, with rugby and hockey pitches at approximately 250m.

- 2.3 It is proposed to construct a new four-story apartment block comprising 62 dwellings with associated communal areas. Vehicular access will be off Ellerslie to the west. External areas will include car parking and communal gardens.
- 2.4 The nearest noise sensitive receptors to the site are to the east on Church Walk, to the north on Milton Road and to the west on Ellerslie.
- 2.5 The primary source of environmental noise at the site is road traffic from Milton Road to the north.
- 2.6 The existing site and noise survey locations are shown in Figure 1. The proposed site layout is shown in Figure 2.

3.0 CRITERIA

National Planning Policy Framework and Noise Policy Statement for England

- 3.1 The National Planning Policy Framework (NPPF) [Reference 1] states (paragraph 185 in relation to noise that planning policies and decisions should aim to:
- 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;
 - 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 Paragraph 187 states "Planning policies and decisions should ensure that new development can be integrated effectively with existing businesses and community facilities (such as places of worship, pubs, music venues and sports clubs). Existing businesses and facilities should not have unreasonable restrictions placed on them as a result of development permitted after they were established. Where the operation of an existing business or community facility could have a significant adverse effect on new development (including changes of use) in its vicinity, the applicant (or 'agent of change') should be required to provide suitable mitigation before the development has been completed."
- 3.3 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.

3.4 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."

3.5 The National Planning Practice Guidance (NPPG) [Reference 3] is written to support the NPPF with more specific planning guidance. The NPPG 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. The NPPG states that noise can over-ride other planning concerns but should not be considered in isolation from the other economic, social and environmental dimensions of the proposed development.

3.6 The NPPG 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.

3.7 The NPPG also expands on the 'agent of change' principle and provides guidance on how the risk of conflict between new development and existing businesses can be addressed, including where mitigation is required.

- 3.8 The NPPF, NPSE and NPPG 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 and guidance from British Standard 8233: 2014 and the World Health Organisation.

Professional Practice Guidance on Planning & Noise (ProPG)

- 3.9 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;
- Outline 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.

- 3.10 The guidance describes a recommended approach for new residential development, which includes four key elements of the assessment process, identified below:

- (i) Good acoustic design process;
- (ii) Internal noise level guidelines;
- (iii) External amenity area noise assessment;
- (iv) Assessment of other relevant issues.

- 3.11 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. It is provided for guidance only and has no formal place within planning legislation.

BS 8233: 2014 and World Health Organisation Criteria

3.12 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 $L_{Aeq,16 \text{ hour}}$ in living rooms and bedrooms during the day, 40 dB $L_{Aeq, 16 \text{ hour}}$ in dining rooms during the day and 30 dB $L_{Aeq, 8 \text{ hour}}$ in bedrooms at night.

3.13 The standard states that the above limits apply to steady external noise sources without specific character, and also states the following:

"Noise has a specific character if it contains features such as a distinguishable, discrete and continuous tone, is irregular enough to attract attention, or has strong low-frequency content, in which case lower noise limits might be appropriate."

3.14 BS 8233 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."*

3.15 BS 8233:2014 suggests an upper guideline value of 55 dB $L_{Aeq,16 \text{ hour}}$ for noise levels in external amenity spaces such as gardens. This is considered an aspirational limit and the standard also states that development should not be prohibited on the basis of noise levels within external amenity areas.

3.16 The World Health Organisation (WHO) [Reference 6] provides guidance on desirable internal noise levels to minimise the risk of sleep disturbance. The WHO 2000 guidelines suggest internal noise levels not exceeding 30 dB $L_{Aeq,8hr}$ or regularly exceeding 45 dB $L_{Amax,f}$ for 'a good night's sleep'.

BS 4142

3.17 BS 4142:2014 [Reference 7] provides a method for rating the effects of industrial and commercial sound on residential areas. The standard advocates a comparison between the typical measured L_{A90} background noise level and L_{Aeq} noise level from the source being considered. For rating purposes if the noise source is tonal, intermittent or otherwise distinctive in character, a rating correction of up to 15 dBA is applied.

- 3.18 The standard states that a difference between the rating level and the background level of around +10 dBA is an indication of a significant adverse impact, depending on the context and a difference of around +5 dBA is likely to be an indication of an adverse impact again depending on the context. Where the rating level does not exceed the background noise level, this is an indication of the specific sound source having a low impact (depending upon the context).

Summary of Noise Criteria

- 3.19 The impact of noise upon the site has been assessed using the following methodology:
- BS 8233: 2014 and the WHO Guidelines for recommended internal noise levels, inside the properties. An upper internal daytime level of 35 dB $L_{Aeq, 16 \text{ hour}}$ for bedrooms, living rooms and communal lounges should apply; and a night-time level for bedrooms of 30 dB $L_{Aeq, 8 \text{ hour}}$ should apply. Similarly, a maximum night-time internal level of 45 dB $L_{Amax, fast}$ should apply in bedrooms for regular events.
 - Where feasible, noise levels in gardens should be no greater than 55 dB $L_{Aeq, 16 \text{ hour}}$ during the day.
 - Noise from plant associated with the scheme should not exceed a 5 dB below the existing background noise level at the nearest noise sensitive receptor when assessed under BS 4142: 2014.

4.0 ENVIRONMENTAL NOISE MEASUREMENTS AND RESULTS

Measurement Instrumentation and Procedure

- 4.1 Environmental noise measurements were undertaken between 18th and 24th August 2022 in order to determine prevailing noise levels at the site. Measurements were undertaken using the following equipment:

- | | |
|--|------------|
| • 2 x Rion precision sound level meter | Type NL-52 |
| • Brüel & Kjær acoustic calibrator | Type 4231 |

4.2 Long-term measurements were undertaken close to the northern and southern boundaries of the site at a height of approximately 2 m above local grade level. The survey locations are shown in Figure 1 and described below:

- Location 1: Northern boundary of the site along Milton Road;
- Location 2: Southern boundary of the site near the sports pitches.

4.3 The instrumentation's calibration was verified before and after the surveys in accordance with the manufacturer's instructions. No significant drift in calibration was recorded. Microphones were fitted with environmental weather shields during the measurement periods. 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 8].

4.4 Weather conditions during the survey were mainly fine and dry with wind speeds generally below 5 m/s.

Results

4.5 The measured noise levels at Locations 1 & 2 are summarised in Tables 1 & 2 and shown graphically in Appendix B.

Date	Daytime (07:00 - 23:00) dB LAeq, 16 hour	Night Time (23:00 – 07:00)	
		dB LAeq, 8 hour	dB LAmax, f (typical)
Thursday 18/8/2022	61	55	72
Friday 19/8/2022	63	55	72
Saturday 20/8/2022	61	54	70
Sunday 21/8/2022	60	55	72
Monday 22/8/2022	61	55	72
Tuesday 23/8/2022	61	54	68
Representative	61	55	72

Table 1: Ambient Noise Levels at Location 1 (Northern Boundary)

Date	Daytime (07:00 - 23:00) dB LAeq, 16 hour	Night Time (23:00 – 07:00)	
		dB LAeq, 8 hour	dB LAmax, f (typical)
Thursday 18/8/2022	55	46	60
Friday 19/8/2022	53	46	61
Saturday 20/8/2022	53	47	61
Sunday 21/8/2022	51	47	61
Monday 22/8/2022	51	46	59
Tuesday 23/8/2022	51	47	61
Wednesday 24/8/2022	52	-	-
Representative	53	46	61

Table 2: Ambient Noise Levels at Location 2 (Southern Boundary)

- 4.6 24 Acoustics considers the typical maximum to be the 10th highest LAmax, f noise level during the relevant night-time period (in line with WHO guidance).
- 4.7 The dominant noise source at both locations was road noise from Milton Road. No significant noise events associated with the nearby sports pitches were measured at Location 2.
- 4.8 From the results of the noise survey, the typical background noise levels measured at each location are shown in Table 3.

Date	Daytime (07:00 - 23:00) dB LA90 1 hour	Night Time (23:00 – 07:00) dB LA90, 15 mins
Location 1 (Northern Boundary)	48	35
Location 2 (Southern Boundary)	43	32

Table 3: Measured Background Noise Levels – Locations 1 and 2

5.0 ASSESSMENT AND RECOMMENDED MITIGATION MEASURES

Internal Noise Levels and Noise Mitigation to Residential Dwellings

- 5.1 The following calculations are based on the room dimensions and window areas as shown on the planning drawings provided by McCarthy Stone in August 2022. If there are any future changes to the room layouts, room volumes or elevations, these calculations should be revised accordingly.
- 5.2 For calculation purposes, it has been assumed that the external wall (non-glazed) constructions would achieve a minimum sound insulation performance of 52 dB R_w , which is readily achievable with a brick and block masonry construction or similar.
- 5.3 Background ventilation is to be provided to all habitable rooms within the apartment block by means of mechanical ventilation (MVHR).
- 5.4 Ventilation systems should allow for adequate ventilation to meet background ventilation requirements as per Part F of the Building Regulations [Reference 9].
- 5.5 The indicative glazing specifications for each glazing type are described in Table 4.

Glazing Type	Minimum Octave (Hz) Band Sound Reduction Index, dB					
	125	250	500	1k	2k	4k
GL1	24	20	25	35	38	35

Table 4: Glazing Sound Insulation Specifications

- 5.6 In making a comparison with the values in Table 3, it is important that the glazing figures used are the result of tests in accordance with ISO 10140, Part 2: 2010. The quoted minimum sound reduction specifications must be achieved 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 doors to habitable rooms.
- 5.7 For guidance, the following glazing configurations would be capable of achieving the required sound reduction performance if installed properly (i.e. with appropriate frames and seals, etc.):

Glazing Type GL1 (Minimum 31 dB R_w):

- 4 mm glass / 12 mm cavity (minimum) / 4 mm glass (or equivalent)

- 5.8 All recommendations made apply to the acoustics performance of the window systems and compliance with other requirements (e.g. security/thermal) should be checked by others.
- 5.9 The mechanical ventilation systems shall be designed to not exceed internal noise levels of NR 30 in living rooms and NR 25 in bedrooms.
- 5.10 It is considered that with the proposed mitigation measures as detailed above, suitable internal noise levels can be achieved for the proposed dwellings.

Noise Levels in External Amenity Areas

- 5.11 Communal gardens are proposed to the south of the apartment building
- 5.12 Based on the measured noise levels at the southern boundary of the site and the screening provided by the new building (from Milton Road), noise levels within the communal gardens would be less than 55 dB L_{Aeq, 16 hour} and therefore acceptable.

Noise From Sports Pitches

- 5.13 The closest pitch to the proposed site is a cricket pitch approximately 110 m to the south. The nearby hockey and rugby pitches are approximately 250 m away, further to the south. Based on the relatively low noise levels measured at the southern boundary, and given the large distances from the proposed development, the risk of noise impact from the sports pitches is considered low.

Plant Noise Limits

- 5.14 New plant associated with the scheme is likely to include kitchen ventilation systems and an external substation within an enclosure.
- 5.15 Table 5 sets out the maximum external plant noise levels for the daytime and night-time operation periods, applicable to the cumulative noise from all new building services plant associated with the scheme. These values are to be achieved outside the most affected noise sensitive properties.

Location	Maximum Plant Noise Rating Level	
	Daytime (07:00 – 23:00 hours) dB L _{Aeq} , 1 hour	Night-time (23:00 to 07:00) dB L _{Aeq} , 15 mins
Milton Road	43	30
Church Walk & Ellerslie	38	27

Table 5: Recommended Maximum External Plant Noise Levels

- 5.16 Noise from building services plant shall be assessed in accordance with BS 4142: 2014. The proposed plant will be attenuated where required to meet the plant noise limits set out in Table 5, to be specified during detailed design stage.

6.0 CONCLUSIONS

- 6.0 McCarthy Stone has instructed 24 Acoustics Ltd to undertake a noise impact assessment in relation to a new development at Milton Road, Gravesend. This report has addressed the impact of noise from nearby roads and sports pitches on the proposed dwellings.
- 6.1 Environmental noise surveys have been undertaken at the site, to determine the level of noise from the existing sources, during daytime and night-time periods.
- 6.2 Calculations have been completed to determine mitigation measures such that acceptable internal noise levels would be achieved within the properties in accordance with defined criteria (BS 8233:2014 and WHO). Suitable external noise levels can also be achieved within the garden areas of the proposed development.
- 6.3 It is therefore concluded that, with the recommended measures, an acceptable internal and external noise environment can be achieved within the development.
- 6.4 External plant noise limits have been established for cumulative noise levels from all plant associated with the scheme, applicable at the nearest sensitive properties.

REFERENCES

1. Department for Communities and Local Government. The National Planning Policy Framework (NPPF), 2021.
2. DEFRA. Noise Policy Statement for England, 2010.
3. Department of Communities and Local Government. Planning Practice Guidance, 2019.
4. ProPG Professional Practice Guidance on Planning and Noise (ProPG), ANC, IOA, CIEH, May 2017.
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 4142. Method for Rating Industrial and Commercial Sound, 2014+A1:2019.
8. British Standards Institution. BS 7445: 'Description and measurement of environmental noise Part 2 - Acquisition of data pertinent to land use' 1991.
9. Building Regulations. Approved Document F -Ventilation, 2021.





APPENDIX A: NOISE UNITS

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

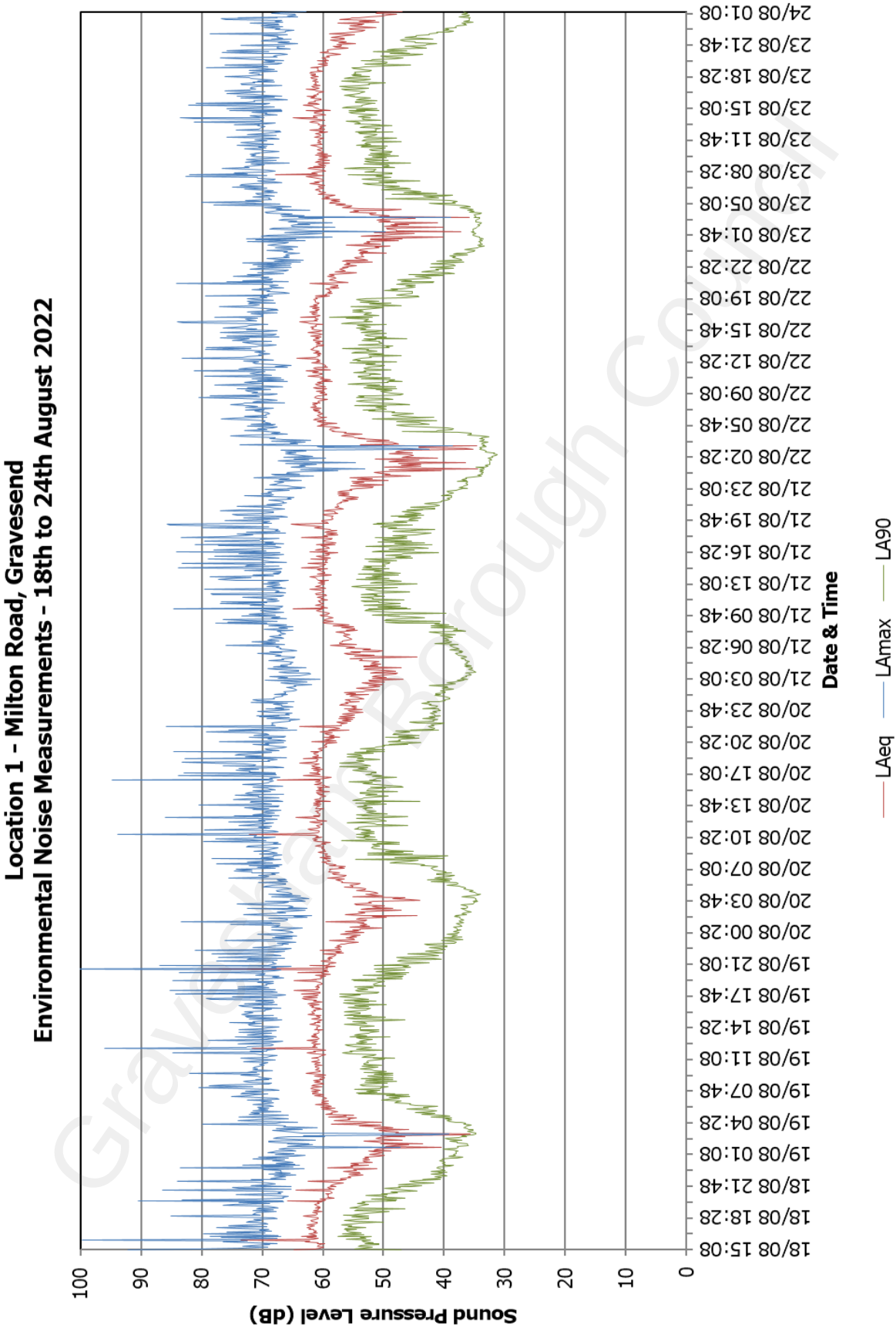
This is the maximum noise level recorded over the measurement period.

- 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: NOISE MEASUREMENT RESULTS



Location 2 - Milton Road, Gravesend
Environmental Noise Measurements - 18th to 24th August 2022

