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FORMER POLICE STATION, WINDMILL STREET, GRAVESEND
NOISE IMPACT ASSESSMENT

Technical Report: R9433-1 Rev 1

Date: 14th April 2022

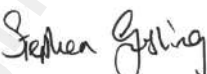
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Noise Impact Assessment

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SUMMARY

Planning Issues Ltd has retained 24 Acoustics Ltd to carry out a noise impact assessment at the Former Police Station in Windmill Street, Gravesend. It is proposed to redevelop the site for sheltered housing.

The site is potentially affected by noise from road traffic using the neighbouring road network.

Noise levels in external amenity areas will be marginally greater than the guidance levels advocated in BS 8233. The provision of an acoustic barrier fence at the site boundaries would remedy this, however, this is understood not to be feasible on conservation grounds. Internal noise levels will be acceptable throughout (through the provision of alternative means of background ventilation and some acoustically rated glazing throughout).

On the above basis, it is considered that an appropriate acoustic environment can be provided to the proposed residential properties, both externally and internally, and there is considered no reason, on noise grounds, why planning consent should be refused.

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1.0 INTRODUCTION

- 1.1 Planning Issues Ltd has retained 24 Acoustics Ltd to carry out a noise impact assessment at the Former Police Station in Windmill Street, Gravesend. It is proposed to redevelop the site for sheltered housing.
- 1.2 The site is potentially affected by noise from road traffic using the neighbouring road network.
- 1.3 This report provides the results of the assessment. An explanation of the noise 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 AND PROPOSED DEVELOPMENT

- 2.1 The site is located off Windmill Street in Gravesend in a mixed residential and commercial area. Windmill Street is located to the east, Woodville Place to the north, Wrotham Road to the west and Zion place to the south. Figure 1 provides an aerial image of the site and surroundings.
- 2.2 Planning consent is sought to construct sheltered housing flats on the site in a single block together with 25 parking spaces and associated shared external amenity spaces. The proposed development scheme is shown in Figure 2.

3.0 STANDARDS AND GUIDANCE

National Planning Policy Framework and Noise Policy Statement for England

- 3.1 Paragraph 180 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;
- 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.

- 3.8 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.

- 3.9 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

- 3.10 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).
- 3.11 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.*”
- 3.12 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’.
- 3.13 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.

Summary

- 3.15 The impact of noise upon the proposed development has been assessed using the following recommended maximum internal noise levels, due to road/ trail traffic:
- 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 SURVEY METHODOLOGY AND RESULTS

Methodology

4.1 Noise measurements were undertaken on the site between 4th and 10th May 2022 and attended noise measurements made on 4th February 2022 using the following equipment:

- Rion (Class 1) precision sound level meter x 2 Type NL52;
- Rion (Class 1) precision sound level meter x 1 Type NL32;
- Brüel and Kjær acoustic calibrator Type 4231.

4.2 The noise measurement locations used (shown in Figure 1 and described below) were chosen to establish how noise from the neighbouring road uses affects the proposed site. The unattended long-term measurement location is described below:

- Location 1 – Northern site boundary with Woodville Place.

4.3 In order to assess typical ambient noise levels, the sound level meter was configured to continuously monitor in five minute sample periods. The meters were set up to measure and store overall A-weighted statistical parameters including the L_{Amax} and L_{Aeq} parameters (measured on fast response). Noise 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 9].

4.4 The instrumentation was powered by external batteries and stored in a weatherproof case. Throughout the course of the survey, an outdoor microphone windshield was used. The microphone height was 1.5m above local grade. The weather was generally dry with wind speeds less than 5 m/s, however, where weather conditions were unsuitable for noise measurement, data has been removed prior to analysis.

4.5 Additional attended noise measurements were undertaken at the following locations (shown in Figure 1):

- Location 2 – Western boundary with Wrotham Road;
- Location 3 – Eastern boundary with Windmill Street.

- 4.6 Calibration of all noise monitoring instrumentation was checked before and on completion of the measurements and no drift was found. The calibration of 24 Acoustics' instrumentation is traceable to National Standards.

Results

- 4.7 The results of the survey are shown graphically in Appendix B and are summarised in Tables 2, 3 & 4 below.

Day and Date	Period and Noise Level, dB		
	Daytime	Night Time	
	L _{Aeq} 16 hr	L _{Aeq} 8 hr	L _{Amax} , f
Friday 4/2/2022	68*	61	83
Saturday 5/2/2022	67	60	80
Sunday 6/2/2022	66	62	83
Monday 7/2/2022	68	62	83
Tuesday 8/2/2022	68	62	83
Wednesday 9/2/2022	68	63	84
Thursday 10/2/2022	68*		
Representative	68	62	83

Table 2: Noise Survey Results, Location 1

* partial measurement

- 4.8 The results of the attended surveys are shown in Appendix B.

5.0 NOISE IMPACT ASSESSMENT

- 5.1 An acoustic model of the site has been developed to determine the noise levels across the site from the neighbouring road traffic. The model has been produced using IMMI 2017 noise mapping software and has used the propagation methodology of ISO 9613 [Reference 9] which takes into account the effects of geometric divergence, acoustic screening and ground and atmospheric absorption. The model has used 100% hard ground ($G=1$), ambient temperature of 10 degrees C and a relative humidity of 70%. Downwind propagation has been assumed to represent a worst case assessment.
- 5.2 Figures 3 to 6 show the predicted L_{Aeq} noise contours across the proposed development site for the day and night-time periods at a height of 1.5 and 4 m above local grade (ground and first floor levels).

- 5.3 The analysis indicates that the noise level in the amenity space in the south-western corner of the site (neighbouring Zion Place and Wortham Road) will vary between 52- 63 dB $L_{Aeq,16 hr}$. On this basis some areas will fall outside of the aspirational 55 dB $L_{Aeq,16 hr}$ daytime noise level target advocated in BS 8233. Acoustic screening is understood to not be feasible due to the conservation status of the area, however, in any event, it should be noted that Paragraph 7.7.3.2 of BS 8233:2014 states the following:

However, it is also recognised that these guideline values are not achievable in all circumstances where development might be desirable. In higher noise areas, such as city centres or urban areas adjoining the strategic transport network, 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.

- 5.4 On this basis it is considered that the noise environment in these amenity areas will fall within the spirit of the requirements of BS 8233.
- 5.5 Noise levels are such that it will be necessary for residents throughout the development to occupy their properties with windows closed in order to ensure internal noise levels that are compliant with the guidelines of BS 8233. Windows may be openable for purge ventilation, however, background ventilation (as required by Part F of the Building Regulations [Reference 11]) will need to comprise acoustically rated passive wall vents or acoustically rated trickle vents. In addition, it will be necessary to specify some rooms in some elevations with enhanced acoustically rated glazing systems (such as acoustic laminate systems).
- 5.6 The full acoustic design for fenestration, glazing and ventilation system should be undertaken as a detailed design matter on a plot by plot basis once planning consent has been granted (as late design changes such as alterations to room volumes and/ or glazed area dimensions can affect the calculations).

6.0 CONCLUSIONS

- 6.1 Planning Issues Ltd has retained 24 Acoustics Ltd to carry out a noise impact assessment at the Former Police Station in Windmill Street, Gravesend. It is proposed to redevelop the site for sheltered housing.

- 6.2 The site is potentially affected by noise from road traffic using the neighbouring road network.
- 6.3 Noise levels in external amenity areas will be marginally greater than the guidance levels advocated in BS 8233. The provision of an acoustic barrier fence at the site boundaries would remedy this, however, this is understood not to be feasible on conservation grounds. Internal noise levels will be acceptable throughout (through the provision of alternative means of background ventilation and some acoustically rated glazing throughout).
- 6.4 On the above basis, it is considered that an appropriate acoustic environment can be provided to the proposed residential properties, both externally and internally, and there is considered no reason, on noise grounds, why planning consent should be refused.

REFERENCES

1. Department for Communities and Local Government. National Planning Policy Framework, 2018.
2. DEFRA. Noise Policy Statement for England, 2010.
3. Department of Communities and Local Government. Planning Practice Guidance, July 2019.
4. Association of Noise Consultants, Institute of Acoustics, Chartered Institute of Environmental Health. Professional Practice Guidance on Planning and Noise, May 2017.
5. British Standards Institution. British Standard 8233:2014 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 4142:2014+A1:2019. Method for rating and assessing industrial and commercial sound, 2019.
8. British Standards Institution. British Standard 6472: Guide to evaluation of human exposure to vibration in buildings, Part 1: Vibration source other than blasting, 2008.
9. British Standards Institution. British Standard 7445: 1991 'Description and measurement of environmental noise Part 2 - Acquisition of data pertinent to land use'
10. International Standards Organisation. ISO 9613. Acoustics - Propagation of Environmental Noise, 1997.
11. Office of the Deputy Prime Minister. The Building Regulations Approved Document F: Ventilation.



Project: Former Police Station, Gravesend	Title: Site Location and Noise Survey Locations		
DWG No: Figure 1	Scale: N.T.S.	Rev: -	
Date: April 2022	Drawn By: RP	Job No: 9433	



Project:
Former Police Station,
Gravesend

Title:
Proposed development scheme

DWG No: Figure 2

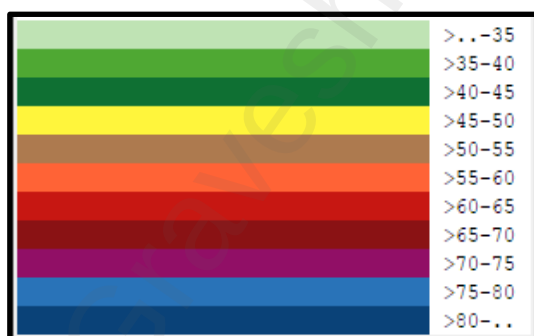
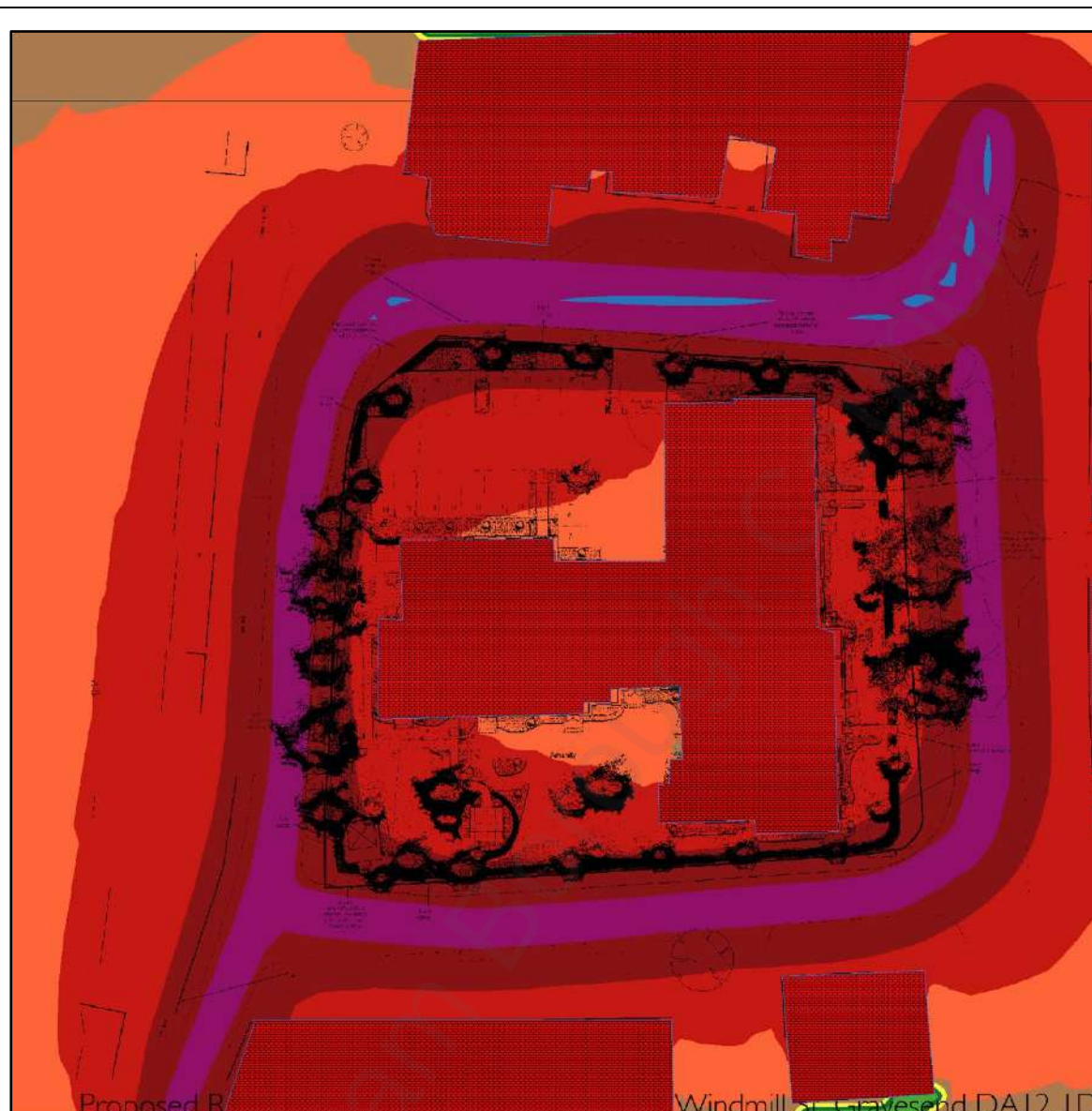
Scale: N.T.S.

Rev: -

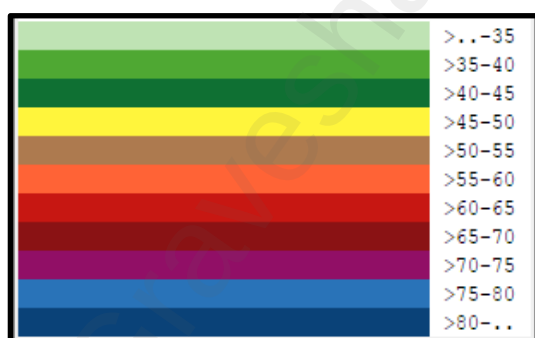
Date: April 2022

Drawn By: RP

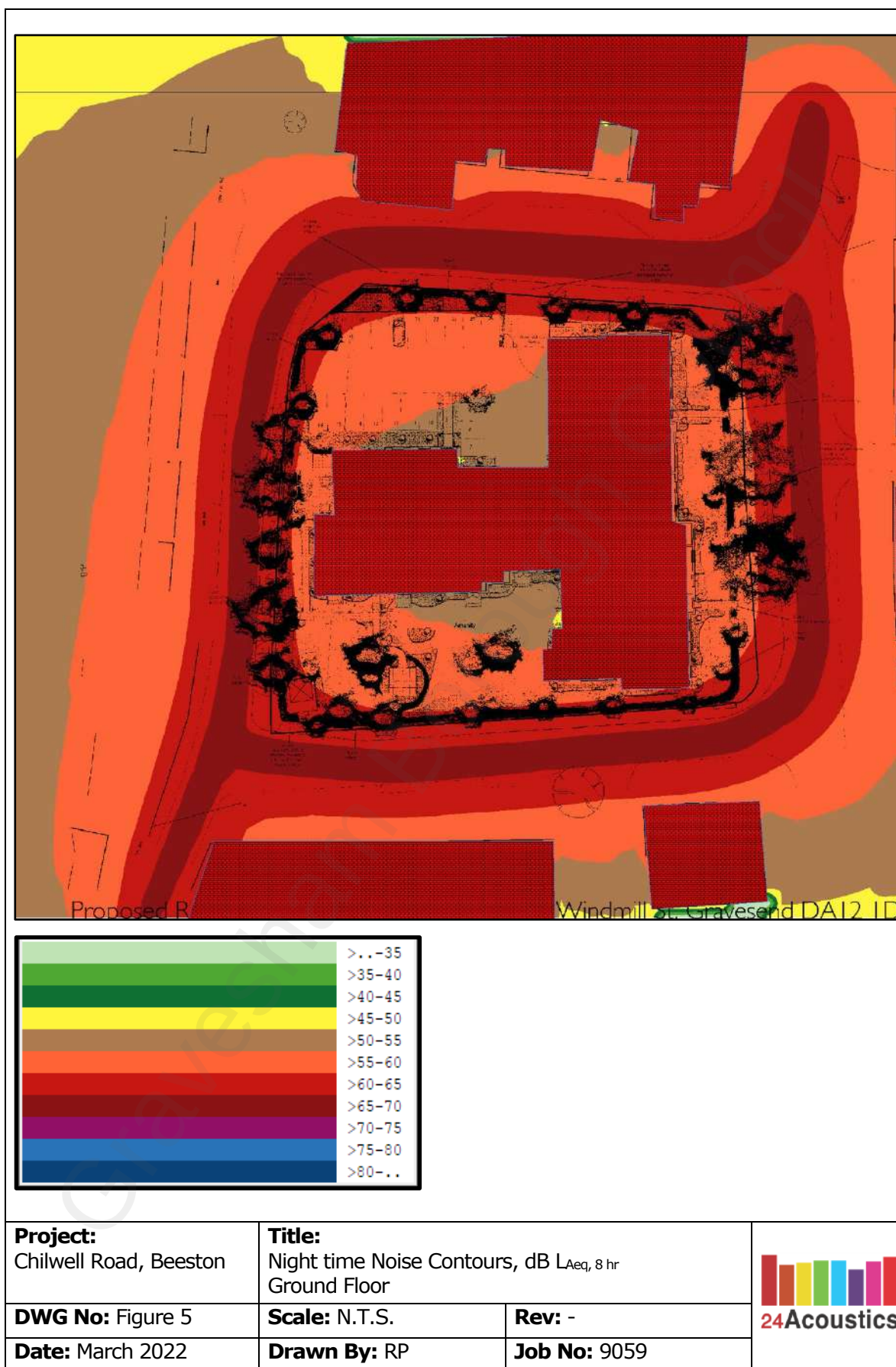
Job No: 9433



Project: Former Police Station, Gravesend	Title: Daytime Noise Contours, dB L_{Aeq} , 16 hr Ground First Floor		
DWG No: Figure 3	Scale: N.T.S.	Rev: -	
Date: March 2022	Drawn By: RP	Job No: 9433	



Project: Former Police Station, Gravesend	Title: Daytime Noise Contours, dB L_{Aeq} , 16 hr First Floor		
DWG No: Figure 4	Scale: N.T.S.	Rev: -	
Date: March 2022	Drawn By: RP	Job No: 9433	





APPENDIX A: NOISE 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 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.

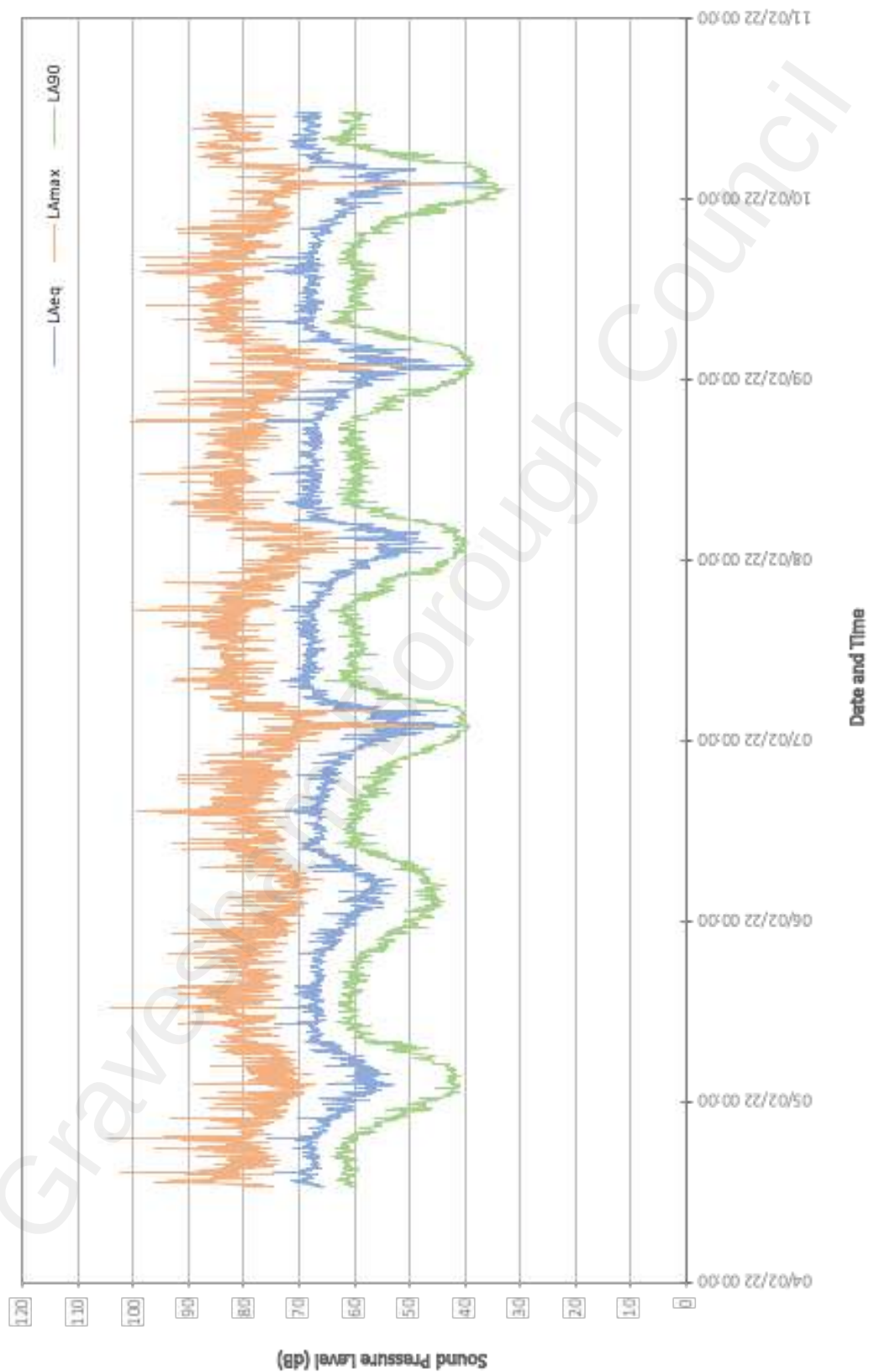
- ii) The L_{Aeq} noise level

This is "equivalent continuous A-weighted sound pressure level, in decibels" and is defined in British Standard BS 7445 [1] 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 Survey Results

Figure B1: Location 1, Former Police Station, Gravesend Noise Survey, 4th - 10th February 2022



Date & Time	Noise Level, dB	
	L _{Aeq,15 min}	L _{Amax,f}
04/02/2022 12:00	62	96
04/02/2022 12:15	57	80
04/02/2022 12:30	63	83
04/02/2022 12:45	66	82
04/02/2022 13:00	66	78
04/02/2022 13:15	65	76
04/02/2022 13:30	66	76
04/02/2022 13:45	66	77
04/02/2022 14:00	65	74
04/02/2022 14:15	65	75
04/02/2022 14:30	69	102
04/02/2022 14:45	66	75
04/02/2022 15:00	65	74
04/02/2022 15:15	65	74
04/02/2022 15:30	65	75
04/02/2022 15:45	66	81
04/02/2022 16:00	66	77

Table B1: Attended Noise Survey Results, Location 2, 4 February 2022

Date & Time	Noise Level, dB	
	L _{Aeq, 15 min}	L _{Amax,f}
04/02/2022 12:00	63	97
04/02/2022 12:15	62	88
04/02/2022 12:30	65	80
04/02/2022 12:45	63	74
04/02/2022 13:00	64	76
04/02/2022 13:15	64	79
04/02/2022 13:30	65	81
04/02/2022 13:45	64	85
04/02/2022 14:00	65	79
04/02/2022 14:15	64	79
04/02/2022 14:30	67	90
04/02/2022 14:45	64	77
04/02/2022 15:00	64	80
04/02/2022 15:15	64	81
04/02/2022 15:30	64	79
04/02/2022 15:45	64	79
04/02/2022 16:00	64	82

Table B2: Attended Noise Survey Results, Location 3, 4 February 2022