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Noise Impact Assessment

Elsa Road, Levenshulme, Manchester

Seddon Construction Limited

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'Experience and expertise working in union'

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Noise Impact Assessment

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For:	Seddon Construction Limited
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1 Introduction

1.1 Project Introduction

1.1.1 Enzygo Limited has been commissioned by Seddon Construction Limited to undertake a noise impact assessment for a proposed residential development on land to the south of Elsa Road, Levenshulme, Manchester.

1.1.2 The assessment presented in this report draws on the results of a baseline noise survey and noise modelling and considers potential impacts in accordance with relevant British Standards and guidance.

1.1.3 Details of the assessment methodology employed, together with the results of the surveys, predictions, assessment, and conclusions are presented in this report.

1.2 Site Location

1.2.1 The proposed residential development site is located on land to the south of Elsa Road, Levenshulme, Manchester.

1.2.2 The site is located within an existing residential area, with the proposed development area currently unoccupied space. To the north are residential properties, with Elsa Rd and Barlow Road beyond. To the east are allotments (Levenshulme Allotments) with residential properties and Houldsworth Golf Club beyond. To the south are further allotment spaces and Highfield Country Park. To the west are residential properties.

1.2.3 The site and monitoring locations are shown in Figure 1-1 overleaf.

1.3 Proposed Scheme

1.3.1 The proposed development comprises of approximately 50no. dwellings. The proposed development layout is shown in Figure 1-2.

Figure 1-1: Site Location & Layout Plan



Figure 1-2: Proposed Development Layout



2 Standards and Guidance

2.1.1 The assessment of potential noise impact at the development site has been informed by relevant British Standards and guidance documents relating to noise. A summary of the relevant standards and guidance documents referenced in this assessment is presented below.

2.1.2 This report does not provide detailed assessment of any requirements under the building regulations, i.e., Approved Document E or Approved Document O. It does provide outline commentary on the likely suitability of a reliance on openable windows for compliance with the Overheating requirements outlined in Approved Document O for information purposes only. However, detailed thermal modelling would still need to be undertaken at detailed design stage.

2.2 Professional Practice Guidance on Planning and Noise

2.2.1 The Professional Practice Guidance (ProPG) on Planning and Noise (May 2017) provides guidance on transport noise affecting new residential developments. The guidance was prepared by a working group formed from members of the Institute of Acoustics (IoA), the Association of Noise Consultants (ANC) and the Chartered Institute of Environmental Health (CIEH). It has no formal planning status but nevertheless represents industry good practice. It is specifically for assessing noise impact due to transportation sources on residential development, though can include industrial noise sources if they are not dominant.

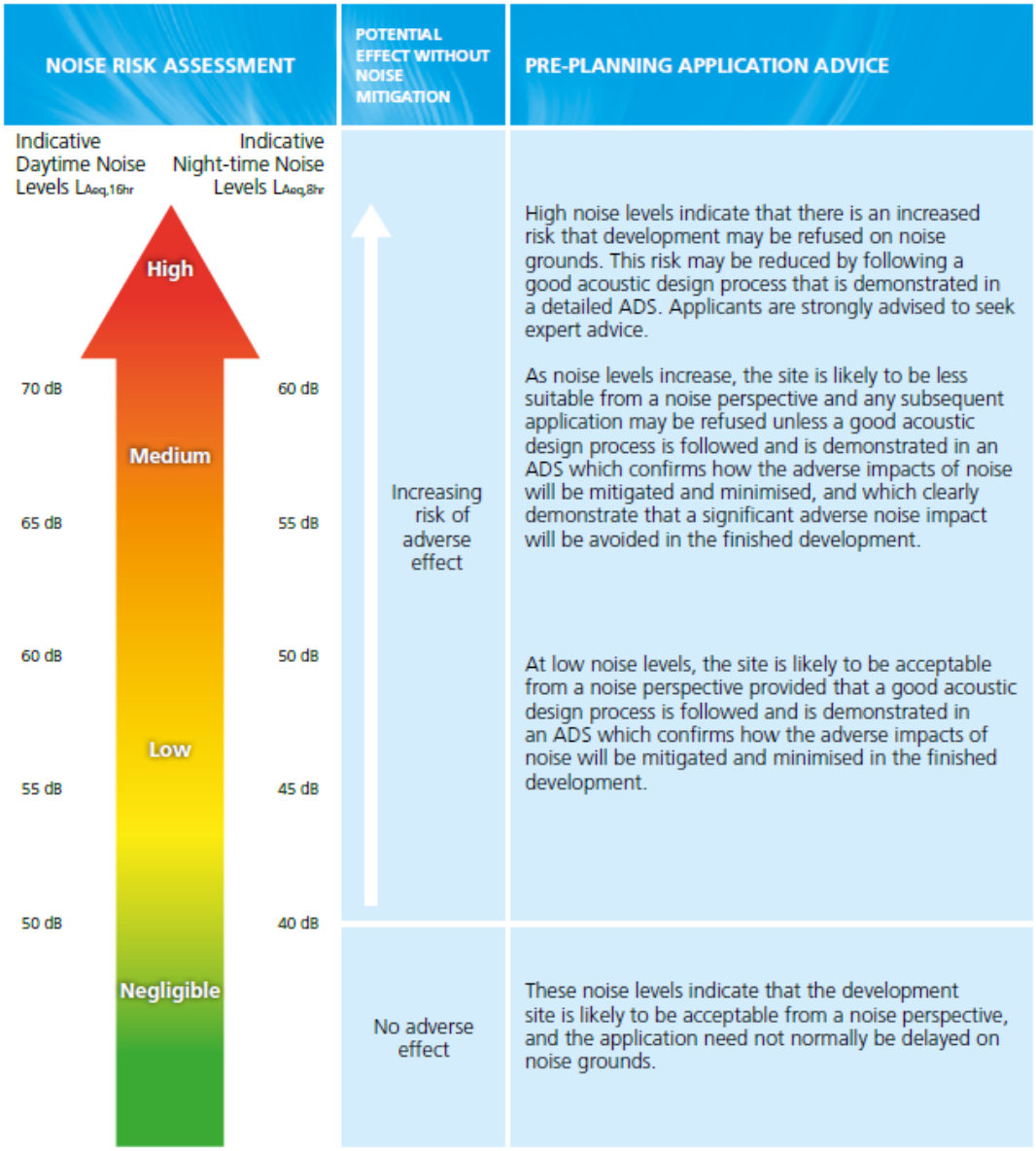
2.2.2 The guidance outlines a two staged approach to an assessment:

- Stage 1 – a noise risk assessment of the proposed site; and,
- Stage 2 – a more detailed consideration of the suitability of the development, including the adoption of good acoustic design principles, consideration of internal noise levels, noise levels in external amenity areas, and other issues.

2.2.3 The Stage 1 noise risk assessment, based on noise from transport sources is presented as an infographic in Figure 1 of the guidance document and is presented overleaf (Figure 2-1).

2.2.4 The Stage 1 assessment considers external noise levels incident in the development only and provides a qualitative assessment of likely impacts and potential design considerations.

Figure 2-1: ProPG Stage 1 Risk Assessment



2.2.5 The Stage 1 assessment demonstrates that rising $L_{Aeq,T}$ noise levels relate to an increased risk of noise impacts.

2.2.6 Notes to the figure include a caveat that more than 10 noise events exceeding 60 dB L_{AFmax} during the night would put the site above the negligible risk category.

2.2.7 The ProPG states the following in Paragraph 2.22, in relation to openable windows:

'Using fixed unopenable glazing for sound insulation purposes is generally unsatisfactory and should be avoided; occupants generally prefer the ability to have control over the internal environment using openable windows, even if the acoustic conditions would be considered unsatisfactory when open.'

2.2.8 The guidance further states:

'Any reliance upon building envelope insulation with closed windows should be justified in supporting documents.'

2.3 British Standard 8233:2014 Guidance on sound insulation and noise reduction for buildings

2.3.1 National guidance on noise limits for dwellings is set out in BS8233:2014. This sets limits in terms of two noise parameters: the ambient level L_{Aeq} and the maximum level L_{AFmax}. The L_{AFmax} is the highest noise level in each period and is determined by individual events such as a vehicle pass-bys. An L_{AFmax} limit is usually only applied at night when sleep disturbance is more likely to be an issue. The L_{Aeq} is defined as the steady-state noise level which has the same energy as the actual time-varying noise over the same period. It is effectively the energy average noise level.

2.3.2 Appropriate internal noise levels are recommended in BS8233:2014, shown in Table 2-1 below. These accord well with the values recommended in the World Health Organisation (WHO) Guidance "Guidelines for Community Noise", 1999.

Table 2-1: BS8233 Indoor Ambient Noise Levels for Dwellings

Activity	Location	07:00 to 23:00 Hours	23:00 to 07:00 Hours
Resting	Living room	35dB $L_{Aeq,16hr}$	-
Dining	Dining room/area	40dB $L_{Aeq,16hr}$	-
Sleeping (daytime resting)	Bedroom	35dB $L_{Aeq,16hr}$	30dB $L_{Aeq,8hr}$

2.3.3 The guidance values are generally taken as applying to noise sources without specific character, previously termed 'anonymous noise' in earlier versions of the standard.

2.3.4 Whilst it is considered desirable to achieve these internal noise levels with the windows open, it is not stipulated within the Standard which states:

"If relying on closed windows to meet the guide values, there needs to be appropriate alternative ventilation that does not compromise the façade insulation or the resulting noise level."

2.3.5 BS8233 also sets out a design-criteria for external noise in external amenity spaces such as gardens and patios stating:

"it is desirable that the external noise level does not exceed 50 dB $L_{Aeq,T}$, with an upper guideline value of 55 dB $L_{Aeq,T}$ which would be acceptable in noisier environments."

2.4 ISO9613 Acoustics – Attenuation of sound during propagation outdoors – Part 2: Engineering method for the prediction of sound pressure levels outdoors.

2.4.1 The noise levels generated by the operation of the proposed development have been predicted using the calculation methodology set out in ISO9613-2. The methodology considers the distance between the sources and the receptors and applies the amount of attenuation due to atmospheric absorption and other site-specific characteristics.

2.4.2 The methodology assumes downwind propagation, i.e., a wind direction that assists the propagation of noise from the source to all receptors.

3 Baseline Survey Information

3.1 Introduction

3.1.1 The main source of noise impacting upon the proposed development site is road traffic on Barlow Road. Due to security concerns at site, baseline noise monitoring was undertaken in accordance with the shortened measurement procedure outlined in the Department of Transport guidance document Calculation of Road Traffic Noise (CRTN), 1988, i.e., for 3-hours during the daytime avoiding rush hour periods and for a representative night-time period. Measurements were made at a safe location close to northern site boundary with a direct line of sight to Barlow Road.

3.1.2 The survey was undertaken on Thursday 20th November 2025 at the locations shown in Figure 1-1.

3.1 Weather Conditions

3.1.1 Weather conditions during set up of the monitoring equipment were noted and are detailed in Table 3-1.

Table 3-1: Weather Conditions

Location	Period	Wind Speed & Direction	Rain	Ground Conditions	Cloud Cover	Temperature
ML01	Night-time	0.8 m/s N	None	Dry	25%	-2 °C
	Daytime	1.2 m/s N	None	Dry	15%	3 °C

3.2 Measuring Equipment

3.2.1 The noise monitoring equipment used during the surveys is shown in Table 3-1 and was set to record the $L_{Aeq,T}$, L_{A90}, L_{A10} and L_{Afmax} parameters.

3.2.2 The following set-up parameters were used on the sound level meter during all the noise measurements undertaken:

Time Weighting: Fast

Frequency Weighting: "A"

3.2.3 The sound level meters were field calibrated, using the acoustic calibrator, prior to commencement and upon completion of the overall survey. No drifts in calibration were noted.

Table 3-2: Noise Monitoring Equipment

Location	Equip. Make & Model	Class	Calibration Level, dB	Serial No.	Calibration Date Prior to Survey
ML01	RION NL-53 Sound Level Meter	1	94.0	351949	06/05/2025
	RION NC-75 Calibrator	1	-	34456696	06/05/2025

3.2.4 The external calibration documentation for the equipment used is available upon request.

3.3 Survey Details and Results

3.3.1 The results of the baseline surveys are summarised in Table 3-3 below and can be found in full in Appendix A.

Table 3-3: Summary of Baseline Survey Results

Location	Period	Duration hh:mm:ss	Average $L_{Aeq,T}$, dB	L_{Afmax}, dB	L_{A90}, dB	L_{A10}, dB
ML01 Elsa Road	Day	03:00:00	49.1	73.6	43.5	51.6
	Night	02:00:00	41.1	63.2	36.8	42.7

3.4 Subjective Observations

3.4.1 During installation of the monitoring equipment the prevailing noise climate was dominated by road traffic noise from Barlow Road. No other significant noise sources were observed. Birdsong was audible. During the night, occasional distance rail noise was also audible, however very quiet and not considered significant within the noise climate.

4 Noise Modelling

4.1 Introduction

4.1.1 The noise levels measured adjacent to the northern site boundary with a direct line of sight to Barlow Road have been used to inform a noise modelling assessment, demonstrate noise propagation across the site and provide an indication of likely façade noise levels at the worst affected proposed properties.

4.1.2 A noise model has been constructed using the proprietary noise modelling software package CadnaA utilising Google Earth geo-referenced 1:1 scaled aerial photography, openstreetmap.org mapping data and the latest iteration of the site layout plan.

4.2 Foundations of the Noise Model

4.2.1 In the first instance, the measured survey data was used to inform the base model of the site, reflecting the existing noise climate across the site during the daytime and night-time periods. The following factors were included in the model.

Table 4-1: CadnaA Noise Model Parameters

CadnaA Noise Model Parameters	
Calculation Methodology	ISO 9613-2 (2024) Calculation of Road Traffic Noise (CRTN)
Noise Model Configuration	Ground Absorption set to G = 0.5 Order of Reflection = 2
Meteorological Conditions	Temperature 10°C Relative Humidity 70% Wind and temperature gradient assisted sound propagation has been assumed to all receptors.

5 ProPG Noise Assessment

5.1 Introduction

5.1.1 The assessment of noise across the site includes several elements. Initially, a site risk assessment has been undertaken in accordance with the guidance of the ProPG to establish the risk of noise impacts on the development.

5.2 Stage 1: Noise Risk Assessment

5.2.1 In the first instance, noise levels have been predicted from Barlow Road across a flattened site assuming all proposed buildings and structures are not in place. The contour plots are shown in Figure B-1 (daytime: 07:00 to 23:00 hours) and Figure B-2 (night-time: 23:00 to 07:00 hours) in Appendix B.

5.2.2 The contour plots are presented in the approximate colour bandings adopted in the ProPG infographic and indicate:

- During the daytime period the proposed developed area of the site falls within the negligible (green) risk banding
- During the night-time period the proposed developed area of the site falls within the negligible (green) risk banding.

Green

'These noise levels indicate that the development site is likely to be acceptable from a noise perspective, and the application need not normally be delayed on noise grounds."

5.2.3 Overall, it is considered unlikely that the general noise climate in the vicinity would result in any significant restrictions on amenity, etc., though some mitigation measures may be required, subject to a detailed assessment.

6 Detailed Noise Assessment

6.1.1 Developing the noise model further, the site layout plans provided by the applicant have been included and noise levels predicted to the various outdoor amenity spaces and façade locations across the development site. Garden fences have not been incorporated in the model. Low fences and hedgerows have been ignored.

6.1.2 The detailed noise assessment follows a staggered approach dealing first with outdoor amenity space and then, with any required mitigation measures in place to achieve outdoor amenity space guidance levels, with façade and noise 'break in' to internal spaces.

6.2 Outdoor Amenity Space – Daytime, Gardens

6.2.1 Figure B-3 shows predicted noise propagation across the site. The contour plot shows that noise levels in external amenity areas are below the desirable guideline value of 50dB $L_{Aeq,16hr}$ from BS8233 in all gardens.

6.2.2 As such, outdoor amenity space noise levels are considered suitable without the need for further mitigation.

6.3 Façade Noise Levels

6.3.1 BS8233 suggests that a 15dB reduction from outside to inside can be expected where windows are open for ventilation. As such, to achieve compliance with the desirable guideline values from BS8233 with windows open, the external noise level ought not to exceed 50dB $L_{Aeq,16hr}$ during the day, or 45dB $L_{Aeq,8hr}$ at night. In addition, L_{AFmax} noise levels ought not to exceed 60dB L_{AFmax} more than 10 times per night.

6.3.2 Where suitable internal noise levels cannot be achieved with windows open, consideration has been given to noise levels which could be achieved with windows closed and ventilation provided by other means, as per guidance from BS8233.

6.3.3 Internal noise levels with windows closed and ventilators open can be estimated from external free-field noise levels in accordance with the simple calculation method from BS8233 by subtracting the sound insulation performance (R_W) of the glazing from the external free-field noise levels incident on the building, assuming suitable sound attenuating trickle ventilators are used.

6.3.4 The contour plots shown in Appendix B present the predicted free-field noise levels incident on the building façade following the application of the mitigation measures required to meet outdoor amenity guideline noise levels.

6.3.5 Figure B-4 shows that predicted daytime façade noise levels at all plots would be below 50dB $L_{Aeq,16hr}$, and ventilation via openable windows would be acceptable in all plots.

6.3.6 Figure B-5 shows that predicted night-time façade noise levels at all plots would be below 45dB $L_{Aeq,8hr}$, and ventilation via openable windows would be acceptable in all plots.

6.3.7 Based on the highest maximum noise level measured, Figure B-6 shows that predicted maximum night-time façade noise levels at all but two plots would be below 60dB L_{AFmax}, and ventilation via openable windows would be acceptable in all but two plots (Plot 1 and Plot 50). For properties where this level is exceeded, to achieve internal guidance noise levels, the ventilation requitements must be satisfied when the windows are closed (windows may be openable for occupant comfort), and an appropriate glazing performance must be specified.

6.3.8 The façade noise levels, internal noise targets and mitigation requirements (with example glazing), where mitigation is required, are detailed in Table 6-1.

6.3.9 The glazing performance specifications are based on EN 12354 double glazed unit reductions for traffic generated noise levels.

6.3.10 It is assumed that whole dwelling ventilation rates (as defined in Approved Document F of the Building Regulations) could be achieved using a continuous mechanical extract ventilation (MEV) system, with passive frame mounted trickle ventilators installed in the building façade (i.e., System 3 from Approved Document F). To ensure that trickle ventilators in the building façade do not undermine the sound insulation performance of the wider façade, it is recommended that all ventilators are selected to achieve a minimum sound insulation performance of 34dB $D_{n,e,w}$ when in the open position. This is achievable by most proprietary non-acoustic trickle ventilators (Greenwood EAV vent or similar).

Table 6-1: Mitigation Requirements to meet Internal Noise Criteria Levels

Plot Ref:	Daytime Assessment, dB			Night-time Assessment, dB			Maximum Levels Assessment, dB			Summary		Applicable Facades
	Predicted External	Target Internal	Mitigation Required, R_w+C_{tr}	Predicted External	Target Internal	Mitigation Required, R_w+C_{tr}	Predicted External	Target Internal	Mitigation Required, R_w+C_{tr}	Mitigation Required, R_w+C_{tr}	Example Glazing Requirement	
1	48	35	13	41	30	11	62	45	17	**17**	4mm/6-16mm/4mm	N, E
50	49	35	14	41	30	11	63	45	18	**18**	4mm/6-16mm/4mm	N, W

7 Ventilation and Overheating

7.1.1 The Building Regulations: Approved Document O highlights the importance of considering the potential for overheating and its implications on noise impacts.

7.1.2 The toolkit described in the Good Homes Alliance indicate that overheating is likely to be a relatively infrequent occurrence and, as a result, residents are more likely to be tolerant of slightly higher noise levels when overheating does occur.

7.1.3 It is noted that these risk categories relate solely to the risk of overheating and do not relate to the levels of noise reported in the previous section.

7.1.4 Approved Document O establishes that a relaxation of the normal internal acoustic criteria is allowed for periods when overheating is a concern, i.e., peak summer months. During these periods, the approved document identifies that windows are likely to be closed during sleeping hours if internal noise levels exceed the following:

40dB $L_{Aeq,8hr}$ between 23:00 and 07:00 hours; and

55dB L_{AFmax} more than 10 times per night.

7.1.5 A detailed overheating assessment, which should be undertaken by others at the detailed design stage, should assume that windows are closed at night at properties where the external night-time noise level exceeds 55dB $L_{Aeq,8hr}$ or 70dB L_{AFmax}.

8 Conclusion

8.1.1 Enzygo Limited has been commissioned by Seddon Construction Limited to undertake a noise impact assessment for a proposed residential development on land to the south of Elsa Road, Levenshulme, Manchester.

8.1.2 The assessment has been undertaken to assess the potential impacts of the existing noise levels incident on the site for the proposed residential use. The assessments have been undertaken in accordance with the relevant standards and guidance and have been informed by a baseline noise and vibration monitoring survey.

8.2 Noise Assessment

8.2.1 The noise monitoring survey data indicates that levels across the site would generally fall within the 'negligible' according to the ProPG during the daytime and night-time periods.

8.2.2 Noise levels in external amenity spaces are below the desirable guideline value of 50dB $L_{Aeq,16hr}$ from BS8233 in all gardens. Therefore, outdoor amenity space noise levels are considered suitable without the need for further mitigation.

8.2.3 The assessment also demonstrates that, based on daytime, night-time and maximum night-time noise levels, appropriate internal noise levels can be achieved with open windows at all but two plots (Plot 1 and Plot 50) within the proposed development. However, plots 1 and 50 would require ventilation to be provided by other means, i.e., trickle vents, to achieve guidance levels (windows may be openable but the ventilation requitements must be satisfied when the windows are closed).

8.2.4 Mitigation requirements (with example glazing), where mitigation is required, are detailed in Table 6-1.

8.2.5 Overall, the assessments presented in this report have demonstrated that, with appropriate consideration of mitigation, external amenity space and internal noise criteria can be achieved.

Glossary of Terminology

Noise is defined as unwanted sound. The range of audible sound is known to be from 0dB (threshold of hearing) to 140dB (threshold of pain). Examples of typical noise levels relating to 'everyday' occurrences are given in Table G-1 below.

Table G-1: Typical Noise Levels

Source	Sound Pressure Level in dB(A)	Subjective Level
Gun shot	160	Perforation of eardrum
Military Jet take-off	140	Threshold of pain
Jet Aircraft at 100m	120	Very Loud
Rock Concert, front seats	110	Threshold of Sensation
Pneumatic Drill at 5m	100	Very Loud
Heavy goods vehicle from pavement	90	
Traffic at kerb edge	70 – 85	Loud
Vacuum Cleaner, Hair Dryer	70	
Normal conversation at 1m	60	Moderate
Typical Office	50 – 60	
Residential area at night	40	Quiet
Rural area at night, still air	30	
Leaves Rustling	20	
Rubbing together of fingertips	10	
	0	Threshold of hearing

The frequency response of the human ear to noise is usually taken to be around 18Hz (number of oscillations per second) to 18,000Hz. However, the human ear does not respond equally to different frequencies at the same level; it is more sensitive in the mid-frequency range than lower and higher frequencies and, because of this when undertaking the measurement of noise, the low and high frequency components of any given sound are reduced in importance by applying a filtering (weighting) circuit to the noise measuring instrument. The weighting which is widely accepted to correlate best with the subjective nature of human response to noise and is most widely used to quantify this is the A-weighted filter set. This is an internationally accepted standard for noise measurement.

For variable noise sources within an area an increase of 3dB(A) would be the minimum perceptible to the human ear under normal conditions. It is generally accepted that an increase/decrease of 10dB(A) corresponds to a doubling or halving in perceived loudness. The 'loudness' of a noise is a purely subjective parameter, dependant not only upon the sound pressure of the event but also on the dynamics of the listener's ear, the time of the day and the general mood of the person.

With regards to environmental noise levels (in the open air), these are rarely steady but rise and fall according to the activities being undertaken within the surrounding area at any given time. Attempting to produce a figure that relates this variable nature of noise to human subjective response, various statistical noise metrics have been developed. These and other useful terminology and descriptors are presented in Table G-2 below.

Table G-2: Terminology

Term	Definition
Sound	Pressure fluctuations in a fluid medium within the audible range of amplitudes and frequencies which stimulate the organs of hearing.
Noise	Unwanted sound emitted from a source and received by the sensitive receptor.
Decibel (dB)	Unit most often used to describe the sound pressure level. A logarithmic number, it correlates closely to the way in which humans perceive sound. Its wide range of values helps quantify sound pressures from a large variety of magnitudes.
A-Weighting (dB(A))	Human perception of sound is frequency dependant. A-weighting applies a range of corrections at each frequency to provide a 'human-averaged'. Can be frequency band or broadband values.
Frequency (Hz)	The number of cycles per second, for sound this is closely related (and often mistaken for) pitch.
Frequency Spectrum	A more detailed analysis of the frequency components that comprise a sound source.
$L_{A10,T}$	The 10th statistical percentile of a measurement period, i.e., the level that is exceeded for 10% of the measurement duration. Closely correlates with traffic sources, A-weighted.
$L_{A90,T}$	The 90th statistical percentile of a measurement period, i.e., the level that is exceeded for 90% of the measurement duration. Used to describe background sound levels, as this value is affected less by short, transient sound sources, A-weighted.
L_{Amax}	The root mean square (RMS) maximum sound pressure level within a measurement period, A-weighted.
Ambient Sound	The total sound climate of all noise sources incident at one location, both in the near- and far-field (*The ambient sound comprises the residual sound and the specific sound when present)*.
Ambient Sound Level $L_a = L_{Aeq,T}$	Equivalent continuous A-weighted sound pressure level of the totally encompassing sound in a given situation at a given time, usually from many sources near and far, at the assessment location over a given time interval, T.
Background Sound Level $L_{A90,T}$	A-weighted sound pressure level that is exceeded by the residual sound at the assessment location for 90% of a given time interval, T, measured using time weighting F and quoted to the nearest whole number of decibels.
Equivalent Continuous A-weighted Sound Pressure Level $L_{Aeq,T}$	Value of the A-weighted sound pressure level in decibels of continuous steady sound that, within a specified time interval, $T = t_2 - t_1$, has the same mean-squared sound pressure as a sound that varies with time, and is given by the following equation:

Term	Definition
	$$L_{Aeq,T} = 10lg_{10}\left\{\left(\frac{1}{T}\right)\int_{t1}^{t2}\left[p_A\frac{(t)^2}{{p_0}^2}\right]dt\right\}$$ Where p_0 is the reference sound pressure (20µPA); and $P_A(t)$ is the instantaneous A-weighted sound pressure level at time t.
Measurement Time Interval T_m	Total time over which measurements are taken (*This may consist of the sum of several non-contiguous, short-term measurement time intervals)*
Rating level $L_{Ar,Tr}$	Specific sound level plus any adjustment for the characteristic features of the sound, over time, T.
Reference Time Interval, T_r	Specified interval over which the specific sound level is determined (This is 1hr during the day from 07:00 to 23:00 hours and a shorter period of 15-min at night from 23:00 to 07:00 hours).
Residual Sound	Ambient sound remaining at the assessment location when the specific sound source is suppressed to such a degree that it does not contribute to the ambient sound.
Residual sound level $L_r = L_{Aeq,T}$	Equivalent continuous A-weighted sound pressure level of the residual sound in a given situation at the assessment location over a given time interval, T.
Sound Pressure Level	The level of fluctuation in air pressure, caused by airborne sound sources. Measured in Pascals (Pa).
Sound Power Level	The rate at which sound is radiated by a source. This parameter is useful as it describes sound energy before environmental or decay factors. Quantified in dB and notated usually as L_w or SWL.
Specific sound level $L_s = L_{Aeq,Tr}$	Equivalent continuous A-weighted sound pressure level produced by the specific sound source at the assessment location over a given time interval, T.
Specific Sound Source	Sound source being assessed.

Statement of Uncertainty

This report is based upon a range of measurements, a system of calculations and noise predictions. As such, this report attempts to quantify fluctuations in air pressure and is subject to the effects of meteorology, physical and perceived anomalies, tolerances within the measuring and monitoring equipment and accuracy margins within the noise modelling software. In the interests of repeatability, this report must be considered as being affected by common factors involved in the measurement and calculation of noise propagation.

All measurement values, outcomes and assumptions are subject to a margin of uncertainty. This has been quantified and assessed as follows:

- Rounding errors – systemic tolerance of ±1dB;
- Meteorology – allowance of ±1.9dB; and
- CadnaA noise propagation modelling software – operational accuracy of ±2.1dB

The most influential uncertainty factors for the assessment of noise are deemed to be equipment tolerances, meteorology and software accuracy. A root-sum-square statistical average has been used to provide an overall margin of uncertainty of ±3dB.

APPENDICES

Appendix A Baseline Survey Data

Table A-1: Baseline Measurements – ML01 Daytime

Date & Time	L_{Aeq} (dB)	L_{AFmax} (dB)	L_{A90} (dB)	L_{A10} (dB)
20/11/2025 10:30	48.7	63.1	42.9	51.9
20/11/2025 10:45	47.1	58.9	42.8	50.1
20/11/2025 11:00	48.0	63.8	43.5	50.7
20/11/2025 11:15	51.1	67.8	42.4	52.2
20/11/2025 11:30	48.3	64.7	43.1	51.0
20/11/2025 11:45	49.6	73.6	43.2	51.8
20/11/2025 12:00	48.7	66.2	44.6	51.1
20/11/2025 12:15	49.6	64.6	44.5	52.6
20/11/2025 12:30	48.7	67.4	43.8	51.3
20/11/2025 12:45	49.9	66.3	44.2	52.6
20/11/2025 13:00	48.2	63.8	42.6	51.3
20/11/2025 13:15	50.3	68.7	44.4	52.6
Summary	**49.1**	**73.6**	**43.5**	**51.6**

Table A-2: Baseline Measurements – ML01 Night-time

Date & Time	L_{Aeq} (dB)	L_{AFmax} (dB)	L_{A90} (dB)	L_{A10} (dB)
20/11/2025 00:00	42.7	63.2	38.6	45.0
20/11/2025 00:15	42.2	60.4	37.7	44.3
20/11/2025 00:30	42.1	61.1	36.9	45.1
20/11/2025 00:45	40.6	55.3	36.7	43.0
20/11/2025 01:00	39.8	56.1	36.4	40.1
20/11/2025 01:15	38.8	55.1	36.2	40.2
20/11/2025 01:30	41.0	55.9	36.0	43.8
20/11/2025 01:45	40.3	62.8	35.8	40.2
Summary	**41.1**	**63.2**	**36.8**	**42.7**

Appendix B Noise Contour Plots

Figure B-1: ProPG Assessment Daytime

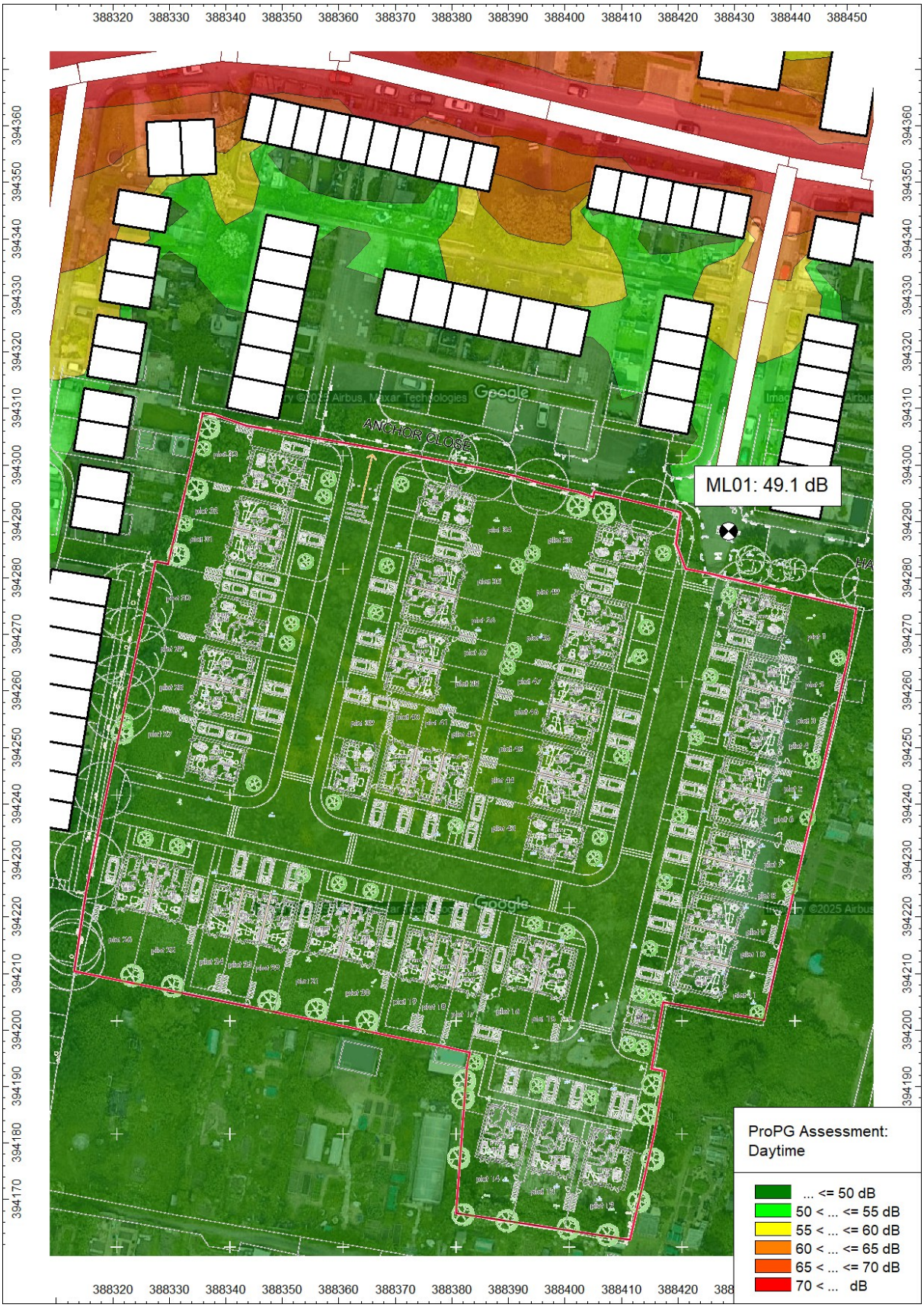


Figure B-2: ProPG Assessment Night-time



Figure B-3: BS8233 Outdoor Amenity Space, Daytime



Figure B-4: Day-time Façade Noise Levels

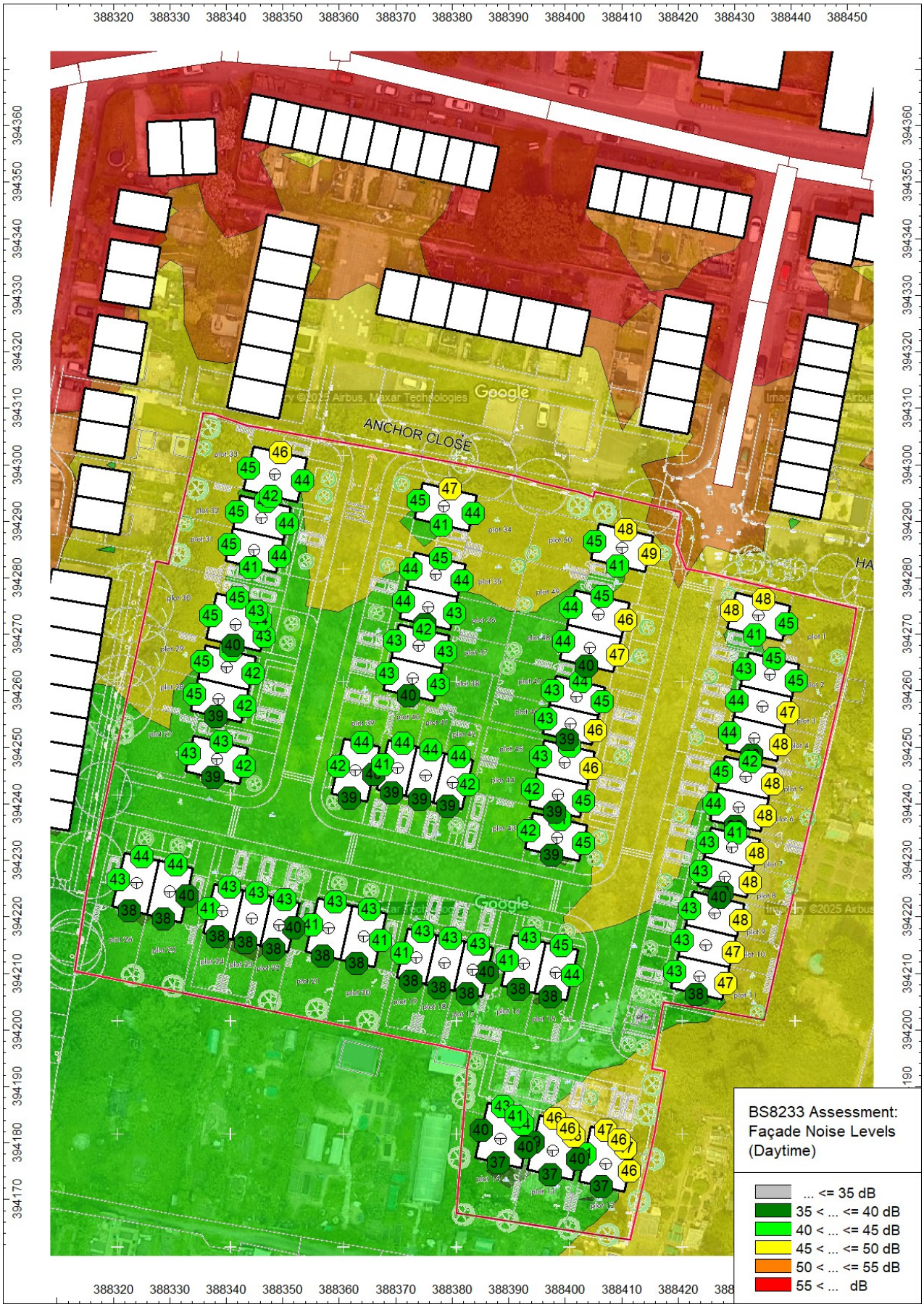
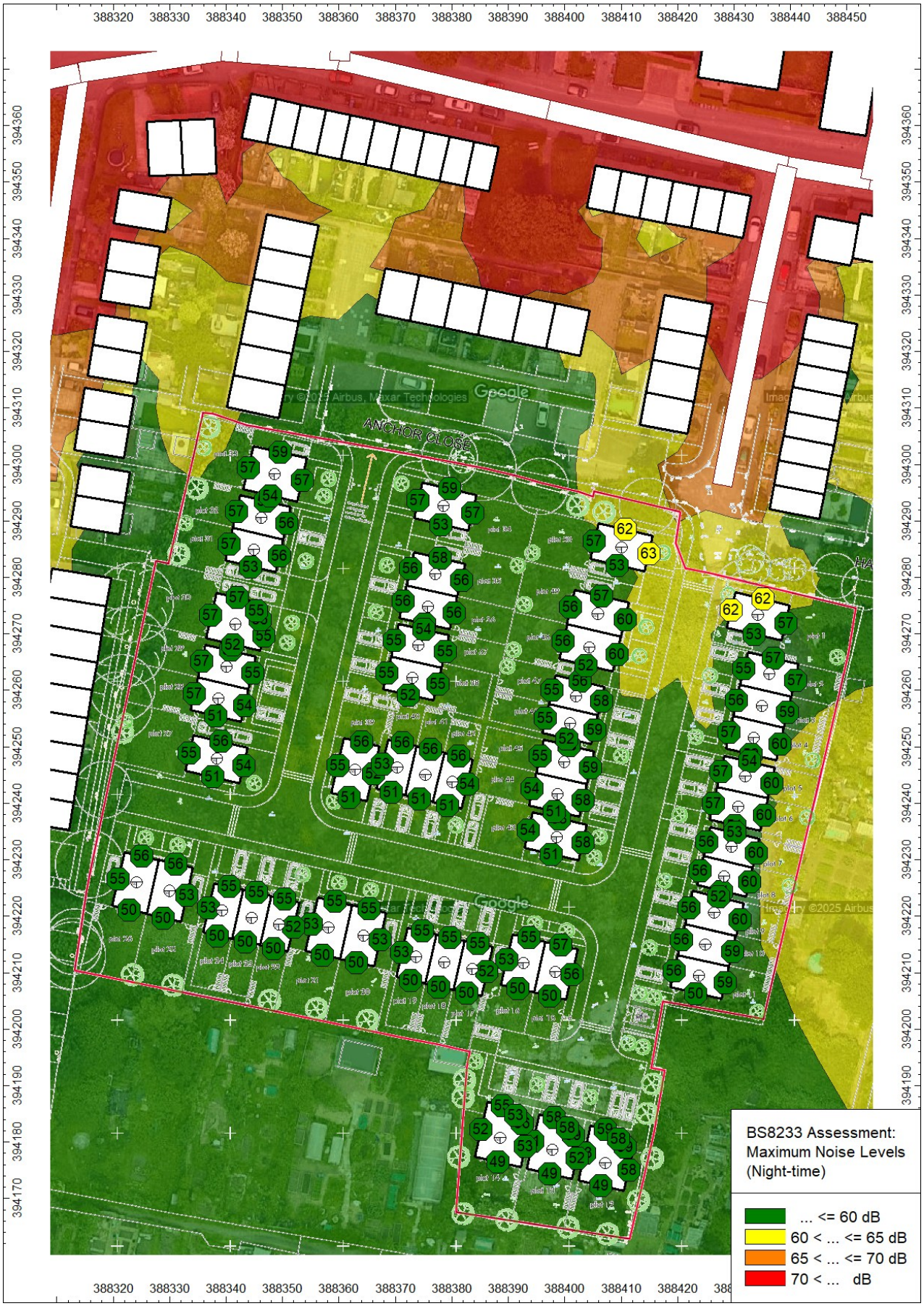


Figure B-5: Night-time Façade Noise Levels



Figure B-6: Night-time Maximums



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