

Noise Assessment

on behalf of

ALDROCK PROPERTIES LTD

for the site at

CHAPEL STREET, PRESCOT, KNOWSLEY

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Summary

A noise assessment has been undertaken to predict the potential impact of a proposed development consisting of 5 flats in a 3-story residential building at Chapel Street, Prescott, Knowsley. This is to support a planning application for the development.

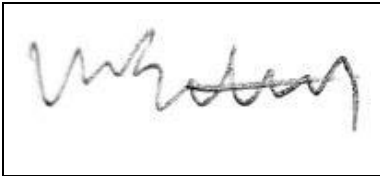
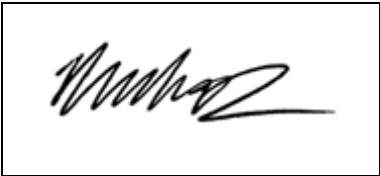
Measurements were made at locations representative of the proposed residential dwellings at the proposed site to identify the existing ambient and background sound levels. This data was subsequently used to predict the potential impact of existing environmental noise sources upon the proposed residential development when in use.

A noise model has been assembled for the proposed development site, the results from which are provided in this report.

Recommended glazing and ventilation specifications have been provided to enable the recommended internal noise limits to be achieved within the properties. With the implementation of these recommendations, it is considered that a suitable and commensurate level of protection against noise can be provided to the occupants of the proposed accommodation.

It is recommended that the final mitigation strategy is reviewed as the design is developed to ensure suitable internal noise levels can be achieved.

Record of changes

Prepared By: William Bateman		Reviewed By: Michael Rickard	
Signed:		Signed:	
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Version	Date	Change	Initials
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1 Introduction

- 1.1 Miller Goodall Ltd has on behalf of Aldrock Properties Ltd, undertaken an environmental noise assessment regarding the impact of noise on a residential development in Prescott.

2 Site Description

- 2.1 The site is located at Chapel Street, Prescott, Knowsley. The site location is shown outlined in red in Appendix 1.
- 2.2 The site is in an urban area with numerous nearby commercial developments including several restaurants. Chapel Street is located directly off Prescott High Street. The most significant noise sources were identified to be music/entertainment noise associated with the Yada restaurant to the south of the site on Eccleston Street, plant equipment associated with Mr Ho's Chinese Restaurant located to the north of the site, and traffic from the high street.

3 Proposed Development

- 3.1 The proposal is to construct 5 residential apartments in a new 3-storey building attached to the Spice Chilli Prescott Indian restaurant. The apartments have provision for outside amenity in the form of ground floor fenced garden areas with balconies on the higher floors.

4 Policy Context

4.1 Noise Policy Statement for England

- 4.1.1 The Noise Policy Statement for England (NPSE¹), published in March 2010, sets out the long-term vision of Government noise policy. The Noise Policy aims, as presented in this document, are:

"Through the effective management and control of environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development:

- avoid significant adverse effects on health and quality of life;
- mitigate and minimise adverse effects on health and quality of life; and

¹Noise Policy Statement for England, Defra, March 2010

- where possible, contribute to the improvement of health and quality of life.”

4.1.2 The NPSE makes reference to the concepts of NOEL (No Observed Effect Level) and LOAEL (Lowest Observed Adverse Effect Level) as used in toxicology but applied to noise impacts. It also introduces the concept of SOAEL (Significant Observed Adverse Effect Level) which is described as the level above which significant adverse effects on health and the quality of life occur.

4.1.3 The first aim of the NPSE is to avoid significant adverse effects, taking into account the guiding principles of sustainable development (as referenced in Section 1.8 of the Statement). The second aim seeks to provide guidance on the situation that exists when the potential noise impact falls between the LOAEL and the SOAEL, in which case:

“...all reasonable steps should be taken to mitigate and minimise adverse effects on health and quality of life while also taking into account the guiding principles of sustainable development”.

4.1.4 Importantly, the NPSE goes on to state:

“This does not mean that such adverse effects cannot occur”.

4.1.5 The Statement does not provide a noise-based measure to define SOAEL, acknowledging that the SOAEL is likely to vary depending on the noise source, the receptor and the time in question. NPSE advises that:

“Not having specific SOAEL values in the NPSE provides the necessary policy flexibility until further evidence and suitable guidance is available”

4.1.6 It is therefore likely that other guidance will need to be referenced when applying objective standards for the assessment of noise, particularly in reference to the SOAEL, whilst also taking into account the specific circumstances of a proposed development.

4.2 National Planning Policy Framework

4.2.1 The National Planning Policy Framework (NPPF²) initially published in March 2012, was updated in July 2021. One of the documents that the NPPF replaces is Planning Policy Guidance Note 24 (PPG 24) “Planning and Noise”³.

² National Planning Policy Framework, Ministry of Housing, Communities and Local Government, July 2021

³ Planning Policy Guidance 24: Planning and Noise, DCLG, September 1994

4.2.2 The revised NPPF advises that the planning system has three overarching objectives, which are interdependent and need to be pursued in mutually supportive ways (so that opportunities can be taken to secure net gains across each of the different objectives). One of these is an environmental objective which is described in par. 8 (c):

“to protect and enhance our natural, built and historic environment; including making effective use of land, improving biodiversity, using natural resources prudently, minimising waste and pollution, and mitigating and adapting to climate change, including moving to a low carbon economy.”

4.2.3 At par. 174 we are advised that:

“Planning policies and decisions should contribute to and enhance the natural and local environment by:

e) preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability. Development should, wherever possible, help to improve local environmental conditions such as air and water quality, taking into account relevant information such as river basin management plans.”

4.2.4 Par. 185 goes on to state:

“Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development. In doing so they 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.”

- 4.2.5 Par. 187 seeks to ensure that any development does not prejudice the legally permitted operations and activities of other, existing non-residential uses, stating:

“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.”

4.3 Planning Practice Guidance – Noise

- 4.3.1 As of March 2014, a Planning Practice Guidance⁴ for noise was issued which provides additional guidance and elaboration on the NPPF, the guidance was updated in July 2019. It advises that when plan-making and decision-taking, the Local Planning Authority should consider the acoustic environment in relation to:

- Whether or not a significant adverse effect is occurring or likely to occur;
- Whether or not an adverse effect is occurring or likely to occur; and
- Whether or not a good standard of amenity can be achieved.

- 4.3.2 In line with the Explanatory Note of the NPSE, the PPG goes on to reference the LOAEL and SOAEL in relation to noise impact. It also provides examples of outcomes that could be expected for a given perception level of noise, plus actions that may be required to bring about a desired outcome. However, in line with the NPSE, no objective noise levels are provided for LOAEL or SOAEL although the PPG acknowledges that:

“...the subjective nature of noise means that there is not a simple relationship between noise levels and the impact on those affected. This will depend on how various factors combine in any particular situation”.

- 4.3.3 Examples of these factors include:

⁴ Planning Practice Guidance – Noise, <https://www.gov.uk/guidance/noise--2> 22nd July 2019.

- The source and absolute noise level of the source along with the time of day that it occurs;
- Where the noise is non-continuous, the number of noise events and pattern of occurrence;
- The frequency content and acoustic characteristics of the noise;
- The effect of noise on wildlife;
- The acoustic environment of external amenity areas provided as an intrinsic part of the overall design;
- The impact of noise from certain commercial developments such as night clubs and pubs where activities are often at their peak during the evening and night.

4.3.4 The PPG also provides general advice on the typical options available for mitigating noise. It goes on to suggest that Local Plans may include noise standards applicable to proposed developments within the Local Authority's administrative boundary, although it states that:

"Care should be taken, however, to avoid these being implemented as fixed thresholds as specific circumstances may justify some variation being allowed".

4.3.5 The PPG was amended in December 2014 to clarify guidance on the potential effect of noise from existing businesses on proposed new residential accommodation. Even if existing noise levels are intermittent (for example, from a live music venue), noise will need to be carefully considered and appropriate mitigation measures employed to control noise at the proposed accommodation.

4.4 Local Planning Policy

4.4.1 Policy ENV2 of the Knowsley Replacement Unitary Development Plan states that "Development that will either cause an unacceptable increase in noise or vibration levels or itself be subject to unacceptable noise or vibration from an existing source will not be permitted". and "Where developments are permitted, conditions may be attached to the planning permission to ensure effective noise insulation or other required mitigation measures are carried out".

5 Local Authority Consultation

5.1 Helen Bradshaw from KC was consulted regarding the methodology for this assessment. It was decided that attended measurements would be conducted at two monitoring positions from 22:00 to 01:00. Additionally, brief attended measurements near the loudest noise sources would be carried out to help calibrate a CadnaA model of the site, which would be used to inform the assessment.

6 Acoustic Standards and Guidance

6.1 **ProPG: Planning & Noise – Professional Practice Guidance on Planning & Noise – New Residential Development – May 2017**

6.1.1 ProPG: Planning and Noise is new guidance with the aim of delivering sustainable development and promoting good health and well-being through the effective management of noise which may impact on new residential developments. The guidance aims to complement the national planning policy and encourages the use of good acoustic design at the earliest phase of the planning process. It builds upon the recommendations of various other guidance documents including NPPF, NPSE and PPG-Noise, BS 8233 and WHO.

6.1.2 The guidance is applicable to new residential developments which would be exposed predominantly to noise from existing transport sources. The ProPG advocates a risk-based approach to noise using a two-stage process:

- Stage 1 – an initial noise risk assessment of the proposed development site; and
- Stage 2 – a systematic consideration of four key elements: –
 - Element 1 – demonstrating a ‘Good Acoustic Design Process’;
 - Element 2 – observing internal ‘Noise Level Guidelines’;
 - Element 3 – undertaking an ‘External Amenity Area Noise Assessment’; and
 - Element 4 – consideration of ‘Other Relevant Issues’.

6.1.3 The ProPG approach is underpinned by the preparation and delivery of an ‘Acoustic Design Statement’ (ADS), whereby the higher the risk for noise at the site, the more detailed the ADS. The ADS should address the following issues:

- Present the initial site noise risk assessment, including the pre-development acoustic conditions prior to development;
- Describe the external noise levels that occur across the site both before and after any necessary mitigation measures have been incorporated. The external noise assessment with mitigation measures in place should use an informed judgement of typical worst-case conditions;

- Demonstrate how good acoustic design is integrated into the overall design and how the proposed acoustic design responds to specific circumstances of the site;
- Confirm how the internal noise level guidelines will be achieved, including full details of the design measures and building envelope specifications;
- A detailed assessment of the potential impact on occupants should be undertaken where individual noise events are expected to exceed 45 dB $L_{AF,max}$ more than 10 times a night inside bedrooms;
- Priority should be given to enable the use of openable windows where practical across the development. Where this is not practical to achieve the internal noise level guidelines with windows open, then full details of the proposed ventilation and thermal comfort arrangements must be provided;
- Present the findings of the external amenity area noise assessment;
- Present the findings of the assessment of other relevant issues;
- Confirm for a low risk site how adverse impacts of noise will be mitigated and minimised;
- Confirm for a medium or high noise risk site how adverse impacts of noise will be mitigated and minimised and clearly demonstrate that a significant adverse noise impact has been avoided.

6.1.4 ProPG target noise levels are based on existing guidance from BS 8233 and WHO (see below). Table 1 below outlines the guidance noise levels for different room types during day and night times.

Table 1: ProPG guideline indoor ambient noise levels for dwellings

Activity	Location	07:00 to 23:00	23:00 to 07:00
Resting	Living Room	35 dB $L_{Aeq,16hr}$	–
Dining	Dining room/area	40 dB $L_{Aeq,16hr}$	–
Sleeping (daytime resting)	Bedroom	35 dB $L_{Aeq,16hr}$	30 dB $L_{Aeq,8hr}$ 45 dB $L_{Amax,F}$

- 6.1.5 The footnotes to this table suggest that internal noise level limits can be relaxed by up to 5 dB where development is considered necessary or desirable, and still represent “reasonable” internal conditions. They also suggest that in such cases, external levels which exceed WHO guidance target levels (see WHO section below) may still be acceptable provided that reasonable internal noise levels are achieved. Although, where the acoustic environment of external amenity areas is intrinsic to the overall design, “noise levels should ideally not be above the range 50 – 55 dB $L_{Aeq,16hr}$ ”. The wording of ProPG (and BS 8233:2014) is clear that exceedance of guideline noise levels in external areas should not prohibit the development of desirable developments in any event.

6.2 **BS 8233:2014 Guidance on Sound Insulation and Noise Reduction for Buildings**

- 6.2.1 This standard carries the full weight of an adopted British Standard, provides recommended guideline acoustic design criteria for new dwellings and is supported by guidance contained within WHO GCN⁵. The guideline noise design criteria of BS 8233 apply to external noise “*without a specific character*” (previously and sometimes termed or referred to as “*anonymous noise*”) such as that associated with road and rail traffic.

Internal Amenity

- 6.2.2 The Standard states that for external noise without a specific character, such as road traffic, it is desirable that the internal ambient noise level does not exceed the guideline values shown in Table 2 below.
- 6.2.3 The note to paragraph 7.7.1 states that where noise has a specific character (i.e. it contains features such as a distinguishable, discrete and continuous tone, is irregular enough to attract attention, or has strong low-frequency content) “*lower noise limits might be appropriate*”.

⁵ World Health Organisation Guidelines for Community Noise, 1999

Table 2: BS 8233: 2014 guideline indoor ambient noise levels for dwellings

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

6.2.4 Note 7 to Table 4 of BS 8233 states:

“Where development is considered necessary or desirable, despite external noise levels above WHO guidelines, the internal target levels may be relaxed by up to 5 dB and reasonable internal conditions still achieved.”

6.2.5 Guidance on reasonable acoustic design criteria for individual noise events are also provided, and the Standard advises that:

“regular individual noise events...can cause sleep disturbance. A guideline value may be set in terms of SEL^6 or $L_{Amax,F}$ depending on the character and number of events per night. Sporadic noise events could require separate values”.

6.2.6 For Internal spaces, the Standard states that;

“..to avoid sleep disturbance, sound pressure levels at the outside facades of living spaces should not exceed 45 dB L_{Aeq} (taken as a façade level, and equating to a free-field external level of 42 dB L_{Aeq}) and 60 dB L_{AFmax} so that people may sleep with bedroom windows open.”

External Amenity

6.2.7 BS 8233:2014 adopts guideline external noise values provided in WHO for external amenity areas such as gardens, patios and private outdoor amenity spaces. BS 8233:2014 adopts guideline external noise level limits provided in WHO for external amenity areas such as gardens and patios. The standard states that it is “desirable” that the external noise does not exceed 50 dB $L_{Aeq,16hr}$ with

⁶ Sound exposure level or L_{AE}

an upper guideline value of 55 dB $L_{Aeq,16hr}$ whilst recognising in paragraph 7.7.3.2 that development in higher noise areas, such as urban areas or those close to the transport network, may require a compromise between elevated noise levels (i.e., above 55 dB $L_{Aeq,16hr}$) and other factors that determine if development in such areas is warranted. In such circumstances, the development should be designed to achieve the lowest practicable noise levels in external amenity areas, but should not be prohibited.

6.2.8 The standard also states:

“Other locations, such as balconies, roof gardens and terraces, are also important in residential buildings where normal external amenity space might be limited or not available, i.e. in flats, apartment blocks, etc. In these locations, specification of noise limits is not necessarily appropriate. Small balconies may be included for uses such as drying washing or growing pot plants, and noise limits should not be necessary for these uses. However, the general guidance on noise in amenity space is still appropriate for larger balconies, roof gardens and terraces, which might be intended to be used for relaxation. In high-noise areas, consideration should be given to protecting these areas by screening or building design to achieve the lowest practicable levels. Achieving levels of 55 dB $L_{Aeq,T}$ or less might not be possible at the outer edge of these areas, but should be achievable in some areas of the space.”

6.3 World Health Organisation (WHO) Guidelines for Community Noise 1999

- 6.3.1 The WHO Guidelines 1999 recommends that to avoid sleep disturbance, indoor night-time guideline noise values of 30 dB L_{Aeq} for continuous noise and 45 dB L_{AFmax} for individual noise events should be applicable. It is to be noted that the WHO Night Noise Guidelines for Europe 2009⁷ makes reference to research that indicates sleep disturbance from noise events at indoor levels as low as 42 dB L_{AFmax} . The number of individual noise events should also be taken into account and the WHO guidelines suggest that indoor noise levels from such events should not exceed approximately 45 dB L_{AFmax} more than 10 – 15 times per night.

⁷ WHO Night Noise Guidelines for Europe 2009

6.3.2 The WHO document recommends that steady, continuous noise levels should not exceed 55 dB L_{Aeq} on balconies, terraces and outdoor living areas. It goes on to state that to protect the majority of individuals from moderate annoyance, external noise levels should not exceed 50 dB L_{Aeq} .

6.4 **BS 4142:2014+A1:2019 'Methods for rating and assessing industrial and commercial sound'**

6.4.1 BS 4142:2014+A1:2019⁸ provides guidance on the assessment of the likelihood of complaints relating to noise from industrial sources. It replaced the 1997 edition of the Standard in October 2014 and was amended in June 2019. The amended version corrected a number of printing errors and further clarified that the standard is used to assess external noise levels, and not internal noise levels (although this can form part of the discussion regarding context). The key aspects of the Standard are summarised below.

6.4.2 The standard presents a method of assessing potential noise impact by comparing the noise level due to industrial sources (the Rating Level) with that of the existing background noise level at the nearest noise sensitive receiver in the absence of the source (the Background Sound Level).

6.4.3 The Specific Noise Level – the noise level produced by the source in question at the assessment location – is determined and a correction applied for certain undesirable acoustic features such as tonality, impulsivity or intermittency. The corrected Specific Noise Level is referred to as the Rating Level.

6.4.4 In order to assess the noise impact, the Background Sound Level is arithmetically subtracted from the Rating Level. The standard states the following:

- *Typically, the greater this difference, the greater the magnitude of the impact,*
- *A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context,*
- *A difference of around +5 dB is likely to be an indication of an adverse impact, depending on the context,*
- *The lower the Rating Level is relative to the measured Background Sound Level, the less likely it is that the specific sound source will have an adverse impact or a significant*

⁸ BS 4142:2014+A1:2019 Methods for rating and assessing industrial and commercial sound

adverse impact. Where the Rating Level does not exceed the Background Sound Level, this is an indication of the specific sound source having a low impact, depending on the context.

- 6.4.5 In addition to the margin by which the Rating Level of the specific sound source exceeds the Background Sound Level, the 2014+A1:2019 edition places emphasis upon an appreciation of the context, as follows:

An effective assessment cannot be conducted without an understanding of the reason(s) for the assessment and the context in which the sound occurs/will occur. When making assessments and arriving at decisions, therefore, it is essential to place the sound in context.

- 6.4.6 The 2014 edition of BS 4142 also introduced a requirement to consider and report the uncertainty in the data and associated calculations and to take reasonably practicable steps to reduce the level of uncertainty.

7 Noise Survey

7.1 Measurements of Existing Noise Sources

- 7.1.1 Noise measurements were undertaken at a location consistent with the proposed development in accordance with BS 7445-1: 2003⁹ by William Bateman of Miller Goodall Ltd. The calibration of the sound level meter was checked before and after measurements with negligible deviation (<0.1 dB). Details of the equipment used are shown in Table 3, below.

⁹ BS 7445-1: 2003 Description and measurement of environmental noise – Part 1: Guide to quantities and procedures

Table 3: Noise monitoring equipment

Equipment Description	Type Number	Manufacturer	Serial No.	Date Calibrated	Calibration Certification Number
Class 1 ^{10,11} Integrating Real-Time 1/3 Octave Sound Analyser	NTi XL2-TA	NTi Audio	A2A-11111-E0	13/09/2021	05451/1
Microphone	NTi MC230A	NTi Audio	A14423	13/09/2021	05451/1
Class 1 Calibrator ¹²	CAL 200	Larson Davies	14154	10/10/2022	05964/1
Class 1 ^{13,14} Integrating Real-Time 1/3 Octave Sound Analyser	NTi XL2-TA	NTi Audio	A2A-15860-E0	27/02/2023	05145/1
Microphone	NTi MC230A	NTi Audio	A16445	28/02/2023	05145/1

7.1.2 Specific, background and ambient noise monitoring was undertaken at the times specified in Table 4, below. Weather conditions were determined both at the start and on completion of the survey. It is considered that meteorological conditions were appropriate for environmental noise measurements. Measurement locations are shown in Appendix 1.

¹⁰ IEC 61672-1 (2002) Electroacoustics – Sound level meters Part 1: Specifications

¹¹ IEC 61260 (1995) Electroacoustics – Octave-band and fractional-octave-band filters

¹² IEC 60942 (2003) Electroacoustics – Sound calibrators

¹³ IEC 61672-1 (2002) Electroacoustics – Sound level meters Part 1: Specifications

¹⁴ IEC 61260 (1995) Electroacoustics – Octave-band and fractional-octave-band filters

Table 4: Dates, times and weather conditions during noise measurements

Measurement Locations	Date/Time	Weather conditions		
		Description	At the Start of Survey	On Completion
MP1 & MP2	22:06 01/09/2023 to 01:19 02/09/2023	Temperature:	17 °C	15 °C
		Precipitation:	Dry	Dry
		Cloud cover (oktas – see opposite):	1	2
		Any fog/snow/ice?	No	No
		Any damp roads/wet ground?	No	No
		Wind speed:	3 m/s	3 m/s
		Wind direction:	SE	NW
		Any conditions that may cause temp. inversion (e.g. calm nights with no cloud):	No	No

Cloud Cover	
Symbol	Scale in oktas (eighths)
	0 Sky completely clear
	1
	2
	3
	4 Sky half cloudy
	5
	6
	7
	8 Sky completely cloudy
	(9) Sky obstructed from view

7.1.3 Measurements were taken at times considered to be representative of the periods during which the proposed residential accommodation would be most sensitive to the surrounding noise sources. Measurements were made under free-field conditions at a height of 1.5 m above the ground.

7.1.4 Before the noise survey, potential plant noise sources were identified in Figure 1 shown below. Upon undertaking an attended noise survey, many of the noise sources were found to be inaudible and/or non-operational during the measurement period. Details of these noise sources are discussed in Table 5 below.

Figure 1: Plant identified before survey

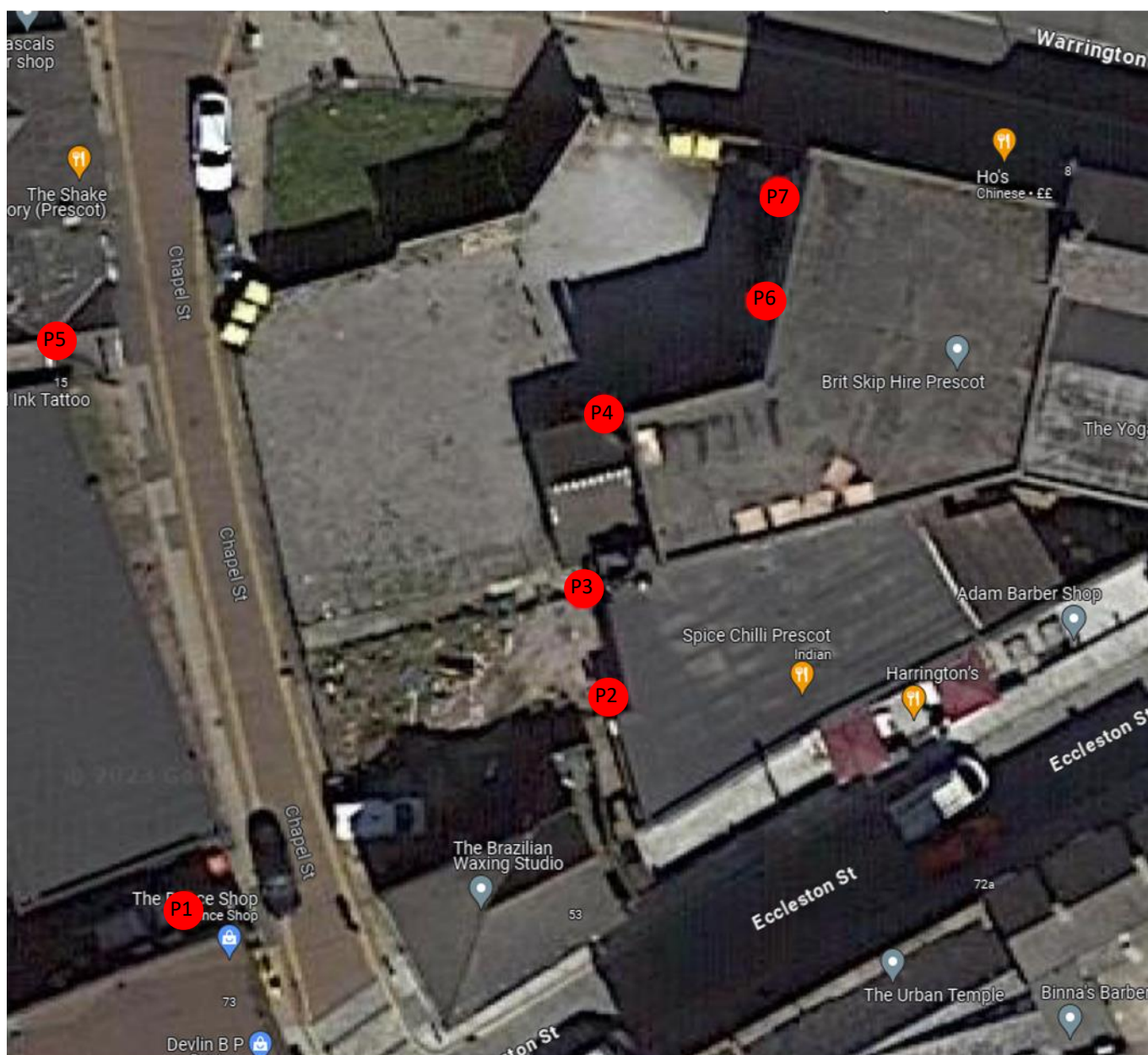
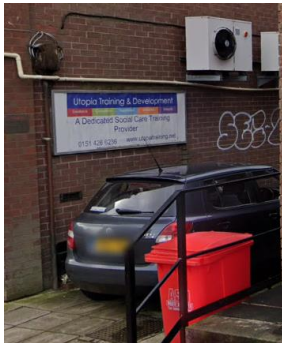
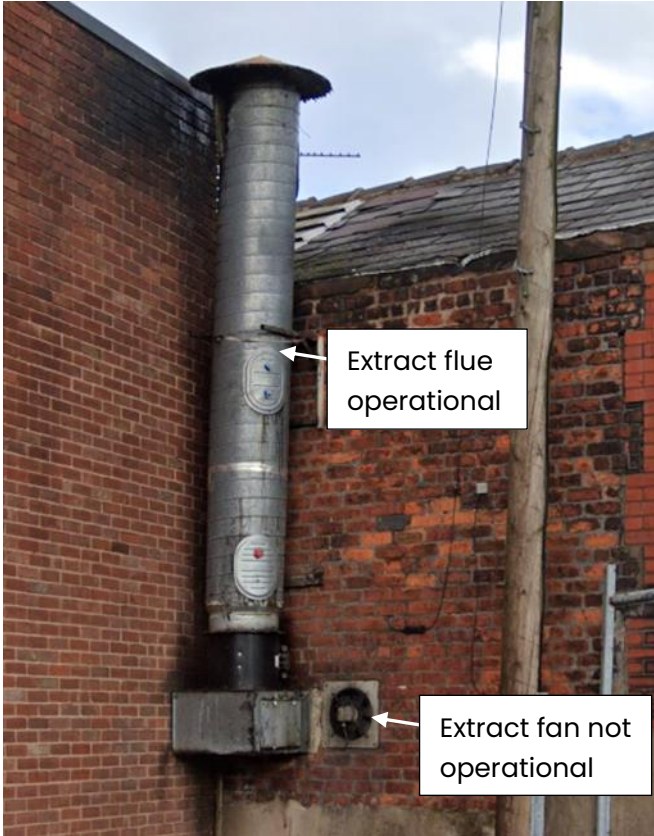


Table 5: Identified noise sources prior to survey

Noise Source	Image	Commentary
P1		Unable to confirm if operating, however no audible noise observed during survey.
P2		Not operating during survey.
P3		Not operating during survey. Possible relocation due to air quality concerns.

Noise Source	Image	Commentary
P4		Loudest plant during survey. Dominant noise source at MP2, operational until 00:00. (see Table 6)
P5		Flue audible during survey. Operational until 00:30 (see Table 6) (Wall mounted extract fan not operational)

Noise Source	Image	Commentary
P6 & P7		Unable to confirm if operating, however no audible noise observed during survey.

7.1.5 The measurement locations are detailed below and indicated in Appendix 1.

- MP1 – in the south-west corner of the site.
- MP2 – in the north-east corner of the site.
- P4 – 1 m horizontally from Ho's Restaurant plant (extract flue).
- P5 – 0.7 m from UNO takeaway plant (extract flue).

7.1.6 The noise sources within the vicinity of the measurement locations are summarised in Table 6, below:

Table 6: Description of noise sources affecting the site

Measurement Location	Noise Sources
MP1	Plant from Ho’s Restaurant (off at 00:00), Yada restaurant/bar (off at 23:46), traffic, people talking, plant from UNO takeaway (off at 00:30)
MP2	Plant from Ho’s Restaurant (off at 00:00), Yada restaurant/bar (off at 23:46), traffic, people talking, plant from UNO’s Pizza (off at 00:30)
P4	Dominated by Ho’s Restaurant plant
P5	Dominated by UNO takeaway plant

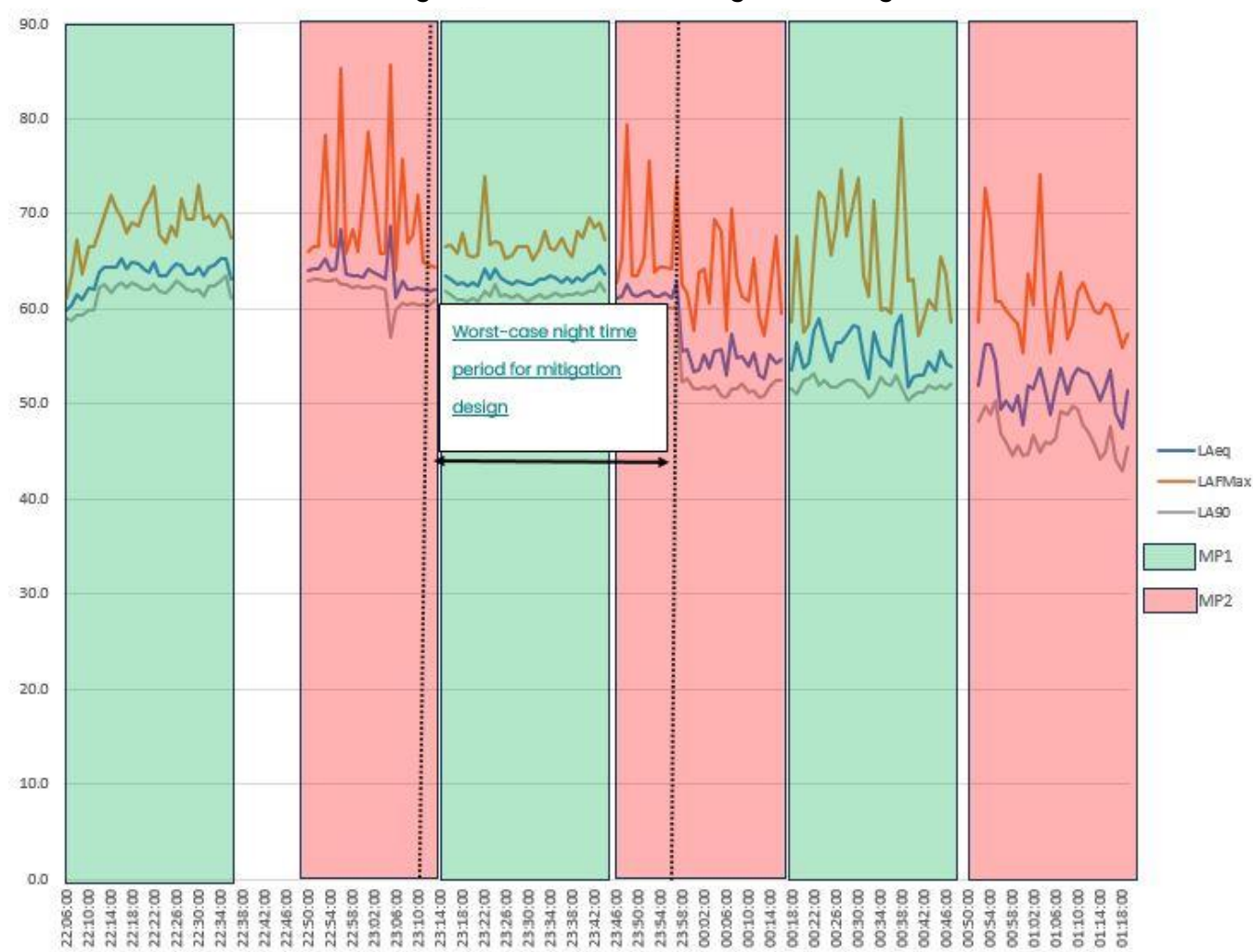
7.1.7 With the Yada restaurant’s loud music being a significant noise source at MP1 and MP2, it is important to consider and control the risk of low frequency noise disturbance from entertainment sources. We propose that the $L_{eq,T}$ levels in the 63Hz and 125Hz octave bands should not exceed 47 dB and 41 dB respectively, based on NANR 45 guidance and similar criteria used by other local authorities in England such as Manchester City Council and Lancaster Council. This is assessed in the noise ingress calculations in Table 10.

7.2 Monitoring Results

7.2.1 A summary of the broadband measurement data is provided in Table 7 below. All data are sound pressure levels in dB re 20 µPa.

Table 7: Summary of Noise Measurements

Measurement Location	Start Time	Elapsed Time (hr:min:sec)	$L_{Aeq,T}$ (dB)	L_{AFmax} (dB)	$L_{A90,T}$ (dB)
MP1	22:06	0:28:42	64.0	73.0	61
MP1	23:15	0:28:40	63.2	73.9	61
MP1	00:17	0:29:15	55.9	80.1	52
MP2	22:50	0:23:30	64.1	85.6	61
MP2	23:46	0:30:00	58.7	79.3	52
MP2	00:49	0:27:18	52.3	74.2	52
P4	22:52	0:02:00	69	71	68
P5	00:10	0:02:00	65	67	64

Figure 2: Noise levels during monitoring

- 7.2.2 Figure 2 shows a small drop off in noise at 23:46 (when Yada restaurant stopped playing music) and a distinct drop in noise at 23:57 (when Ho's restaurant plant stopped operating), indicating that the noise levels at the site are dominated by these two sources. On this basis the assessment will focus on the critical night time period of 23:00 – 23:46 hours when both sources were operating, and mitigation will be specified to ensure suitable internal noise levels during this period.
- 7.2.3 The measurement periods at MP1 and MP2 consisted of sequential 30 minute measurements of 1-minute samples which therefore allowed the variation in noise level over time to be assessed. This data was subsequently used to determine a 'typical' L_{AFmax} noise level and octave band spectrum based on the 95th percentile of individual 1-minute measurements. This data was subsequently utilised within the noise model.

8 Impact of Existing Noise Sources on the Development

8.1 Initial BS 4142 Assessment of Ho's restaurant plant noise

- 8.1.1 It can be seen from Figure 2 that the noise from Ho's restaurant flue is approximately 10 dB above the background sound level observed after it stopped operating. A +3 dB correction may also be applied to the specific noise level due to slight tonality of the plant. A rating level of 13 dB above the background indicates a potentially significant adverse impact at the proposed site due to the plant. Given the context for this site where new residential development is being introduced where there is existing plant noise affecting the site, and the plant noise was observed as steady and continuous, suitable and appropriate mitigation should be provided in the form of glazing and ventilation specifications to ensure that guidance noise levels from BS 8233 and ProPG can be achieved internally.

8.2 Computer Modelling

- 8.2.1 Predictions of existing noise levels on the site have been undertaken using the CadnaA noise modelling package. Specific model parameters were applied as follows:
- Propagation of noise using algorithms within ISO 9613: 1993 *Acoustics – Attenuation of sound during propagation outdoors*. Roads were modelled as line sources at a height of 0.5 m above ground level and calibrated using spectral data measured during the survey.

- Default ground absorption $G = 0.1$ (equivalent to grassed areas and consistent with the dominant ground cover at the site).
- Ground attenuation: spectral all sources
- No adverse meteorological effects
- Two orders of reflection
- Topographical data was obtained using DEFRA LIDAR for the site and surrounding assessment area.

8.3 Validation of the Noise Model

- 8.3.1 Noise level receptor points were incorporated into the CadnaA model at the noise survey measurement locations to calibrate the model using the measured octave band L_{eq} and L_{Fmax} noise levels. The modelled results agreed with the measured results to within around ± 1 dB L_{Aeq} and around ± 1 dB L_{AFmax} .

8.4 Noise Model Predictions

- 8.4.1 Three scenarios were modelled using the indicative master plan provided: daytime L_{Aeq} noise levels affecting the site, night-time L_{Aeq} noise levels and night-time L_{AFmax} noise levels. Screen shots from each model are provided in Appendices 2a-c.
- 8.4.2 The model indicates that the external noise levels at the closest properties to the High Street are above the level of 55 dB L_{Aeq} during the day recommended by WHO for external amenity areas.
- 8.4.3 The results of the noise monitoring have been assessed against the ProPG noise risk levels to determine the potential effect of noise on the proposed site without mitigation measures. The risk level has been determined based on the predicted daytime and night-time noise levels at the worst affected façades for the proposed development.

Table 8: ProPG Noise Risk Level Assessment

Noise Risk Assessment	Potential Effect Without Noise Mitigation	Pre-Planning Application Advice
Indicative Daytime Noise Levels $L_{Aeq,16hr}$ Indicative Night-time Noise Levels $L_{Aeq,8hr}$ High 64 dB 70 dB 60 dB Medium 65 dB 55 dB 60 dB 50 dB Low 55 dB 45 dB 50 dB 40 dB Negligible	Increasing risk of adverse effect	High noise levels indicate that there is an increased risk that development may be refused on noise grounds. This risk may be reduced by following a good acoustic design process that is demonstrated in a detailed ADS. Applicants are strongly advised to seek expert advice. As noise levels increase, the site is likely to be less suitable from a noise perspective and any subsequent application may be refused unless a good acoustic design process is followed and is demonstrated in an ADS which confirms how the adverse impacts of noise will be mitigated and minimised, and which clearly demonstrate that a significant adverse noise impact will be avoided in the finished development. At low noise levels, the site is likely to be acceptable from a noise perspective provided that a good acoustic design process is followed and is demonstrated in an ADS which confirms how the adverse impacts of noise will be mitigated and minimised in the finished development.
	No Adverse effect	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.
Typical Night-time L_{Amax} (dB)	> 60 dB?	L_{Amax} Level Comment
80	Yes	An indication that that there may be more than 10 noise events at night-time with $L_{Amax} > 60$ dB means the site should not be regarded as negligible risk.

Table Notes:

- a. Indicative noise levels should be assessed without inclusion of the acoustic effect of any scheme specific noise mitigation measures.
- b. Indicative noise levels are the combined free-field noise level from all sources of transport noise and may also include industrial/commercial noise where this is present but is not dominant.

8.4.4 As can be seen in Table 8 above, the noise levels measured at the site indicate high noise levels and therefore good acoustic design will be necessary to mitigate the risk.

8.5 Predicted Internal Noise Levels Assessed to ProPG Guidance Levels

8.5.1 Based on ProPG guidance levels, it is proposed that noise from the development is controlled to 30 dB L_{Aeq} in bedrooms at night and 35 dB L_{Aeq} in habitable rooms during the day, and that noise from individual events such as vehicle pass-bys does not regularly exceed an indoor level of 45 dB L_{AFmax} .

8.5.2 The generally accepted rule of thumb is that a window left open for ventilation provides 10 – 15 dB attenuation from external noise sources with the WHO Guidelines for Community Noise suggesting 15 dB. The DEFRA report NANR116: Open/Closed Window Research¹⁵ suggests the figure to be between 12 and 18 dB for road and rail traffic. ProPG indicates that where external noise levels are more than 15 dB higher than the internal noise targets, openable windows should not be relied upon as the sole means of ventilation and some form of acoustically attenuated ventilation may be required. This equates to an external noise level of 45 dB L_{Aeq} / 60 dB L_{Amax} during the night or 50 dB L_{Aeq} during the day.

8.5.3 External noise levels recorded at the site are above the threshold levels below which internal noise levels remain achievable with the use of open windows for ventilation, and therefore mitigation measures to reduce the noise impact have been applied as described in the following section of this report.

¹⁵ NANR116: 'Open/closed window research' Sound Insulation through ventilated open windows, Defra April 2007

8.6 Mitigation for Achieving Good Acoustic Design

8.6.1 In order to assess the potential glazing and ventilation requirements for dwellings, noise ingress calculations were undertaken based on the methodology in BS EN 12354-3¹⁶ using dimensions in the proposed plans provided by the client.

8.6.2 Noise ingress calculations are summarised in Table 9, below:

Table 9: Predicted internal noise levels

Description	External Noise Levels		Predicted Internal Noise Levels		BS 8233 Criteria		Exceedance of Criteria		Mitigation Type
	dB	dB	dB	dB	dB	dB	dB	dB	
	$L_{Aeq,T}$	L_{AFmax}	$L_{Aeq,T}$	L_{AFmax}	$L_{Aeq,T}$	L_{AFmax}	$L_{Aeq,T}$	L_{AFmax}	
Ground Floor Living Room 01 (daytime)	63		33		35		-2		2
Ground Floor Living Room 02 (daytime)	63		31		35		-4		1
First Floor Living Room 03 (daytime)	67		35		35		0		2
First Floor Living Room 04 (daytime)	64		32		35		-3		1
Second Floor Living Room 05 (daytime)*	64		31		35		-4		1
Ground Floor Bedroom 01 (nighttime)	61	80	27	46	30	45	-3	+1	1 (or mv)**
Ground Floor Bedroom 02 (nighttime)	62	78	30	45	30	45	0	0	1
First Floor Bedroom 03 (nighttime)	63	80	30	46	30	45	0	+1	1 (or mv)**

¹⁶ BS EN 12354-3:2000 Building acoustics. Estimation of acoustic performance in buildings from the performance of elements - Airborne sound insulation against outdoor sound

Description	External Noise Levels		Predicted Internal Noise Levels		BS 8233 Criteria		Exceedance of Criteria		Mitigation Type
	dB $L_{Aeq,T}$	dB L_{AFmax}	dB $L_{Aeq,T}$	dB L_{AFmax}	dB $L_{Aeq,T}$	dB L_{AFmax}	dB $L_{Aeq,T}$	dB L_{AFmax}	
First Floor Bedroom 04 (nighttime)	64	78	31	45	30	45	+1	0	1 (or mv)**
Second Floor Bedroom 05 west (nighttime)*	63	78	31	45	30	45	+1	0	1 (or mv)**
Second Floor Bedroom 05 east (nighttime)	58	66	30	40	30	45	0	-5	1

* Second floor habitable rooms with west facing facades require enhanced acoustic ceilings comprising tiled roofs with min. 200mm mineral wool insulation in the loft, with 2 x 15mm high density plasterboard ceilings (min 12.6kg/m² per board) fixed using resilient rails or acoustic hangers.

** nominal exceedance predicted. In order to reduce noise levels in these rooms to within guideline limits, mechanical ventilation would be necessary for the associated apartment. Ducts should be fitted with acoustic silencers inserted in line with the façade to mitigate atmospheric noise break-in risk.

- **Type 1** – High specification specialist acoustic glazing with minimum weighted sound reduction index of 46 dB $R_w + C_{tr}$ (e.g. Pilkington Optiphone: 10.8 mm laminated glass / 24 mm argon filled airgap / 16.8 mm acoustic laminated glass); high specification acoustic ventilators with significant low frequency performance and a minimum element normalised sound level difference of 40 dB $D_{ne,W} + C_{tr}$ (e.g. Invisivent Evo AK Ultra)
- **Type 2** – High specification specialist acoustic glazing with minimum weighted sound reduction index of 40 dB $R_w + C_{tr}$ (e.g. Pilkington Optiphone: 10 mm glass / 20 mm argon filled airgap / 8.8 mm acoustic laminated glass); high specification acoustic ventilators with a minimum element normalised sound level difference of 44 dB $D_{ne,W} + C_{tr}$ (e.g. Invisivent Evo AK Ultra)

8.6.3 It can be seen from Table 9 that with the recommended mitigation in place, guidance broadband internal noise limits would generally be achieved. However some minor exceedances are predicted in some rooms. In order to reduce noise levels to below guidance levels in these rooms the associated dwelling would require mechanical ventilation to be specified with appropriately silenced atmospheric ducting (see notes in table above).

8.6.4 To reduce the impact of entertainment noise, in this case music from the Yada restaurant, L_{eq} noise levels at 63 Hz and 125Hz in habitable rooms of the proposed development are considered and presented in the Table 10 below for rooms on the west facing elevation.

Table 10: Noise levels at 63 Hz and 125Hz in west elevation rooms with recommended mitigation in place

Room	63Hz Criterion (dB)	63 Hz Predicted Level (dB)	125Hz Criterion (dB)	125 Hz Predicted Level (dB)
Living 02	≤ 47	43	≤ 41	41
Living 04	≤ 47	44	≤ 41	42*
Living 05	≤ 47	47	≤ 41	41
Bedroom 01	≤ 47	37	≤ 41	36
Bedroom 02	≤ 47	40	≤ 41	40
Bedroom 03	≤ 47	42	≤ 41	41
Bedroom 04	≤ 47	42	≤ 41	42*
Bedroom 05 west	≤ 47	45	≤ 41	42*

* nominal exceedance predicted. In order to reduce noise levels in these rooms to within recommended criteria, secondary glazing with min. 200mm dimension from outer glazing would be recommended behind the already specified glazing. It should be noted that the criteria here have not been specified by Preston Council, and it may be considered that a small 1 dB exceedance over the adopted criteria is acceptable.

8.6.5 Mitigation Summary

- 8.6.6 The site has significant noise sources, primarily from entertainment and external restaurant plant, and the proposed development will require significant acoustic mitigation. It is recommended that the final mitigation strategy is reviewed as the design is developed to ensure suitable internal noise levels can be achieved. Due to the low frequency component of noise, octave band specifications of potential glazing and trickle ventilators should be reviewed at the appropriate stage to ensure adequate performance.

8.7 External Noise Levels

- 8.7.1 The predicted daytime noise levels across the open site are currently over 55 dB L_{Aeq} and as such would not achieve the WHO daytime noise criteria in external amenity spaces. However BS8233:2014 states in section 7.7.3.2 Design criteria for external noise; "For traditional external areas that are used for amenity space, such as gardens and patios, 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. However, it is also recognized that these guideline values are not achievable in all circumstances where development might be desirable. In higher noise areas, such as city centres 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."

8.8 Acoustic Design Statement

Typical Issues for high risk sites	Statement
Relevant noise sources identified	This assessment has considered noise from road traffic, music (entertainment), people noise and noise from machinery surrounding the site.
Multiple source contributions carefully quantified	All noise sources at the site have been independently calibrated based on worst-case measurements.
Greater coverage across the site (all buildings, all relevant heights)	Noise grids have been predicted to cover the entirety of the site.

Typical Issues for high risk sites	Statement
Alternative site layouts considered	The proposed site has a small area and as such the layout cannot be changed in a manner that greatly improves the acoustic environment for residents without reducing total provisions
Adequate non-sensitive use for screening	East side of site is screened from Ho's Chinese restaurant by the site itself.
Opportunities to mitigate the noise source within the site	Unable to mitigate noises at source.
Opportunities to mitigate the noise source outside owned land; Physical mitigation; Operational management	Opportunity not available.
Maximise separation	Not applicable, proposal is a single building in a small area
Existing topographical advantages; Change site level	Not applicable, effectively a flat site between source and receptor.
Noise barriers – screening opportunities	Not feasible for this site.
Design external amenity spaces (e.g. balconies) to reduce noise entering sensitive rooms	No balconies on Chapel St façade.
Consideration of alternative acoustic options	Considered, but not relevant within financial and design constraints.
Window location & size on affected facades	Internal noise criteria achieved by utilising acoustic glazing rather than reducing glazing size
Innovative facade and window designs e.g. plenum windows	Noise levels too high for innovative façade designs to achieve noise limits with open windows.
Façade insulation design	Standard cavity masonry construction, is not the weak point of the façade.

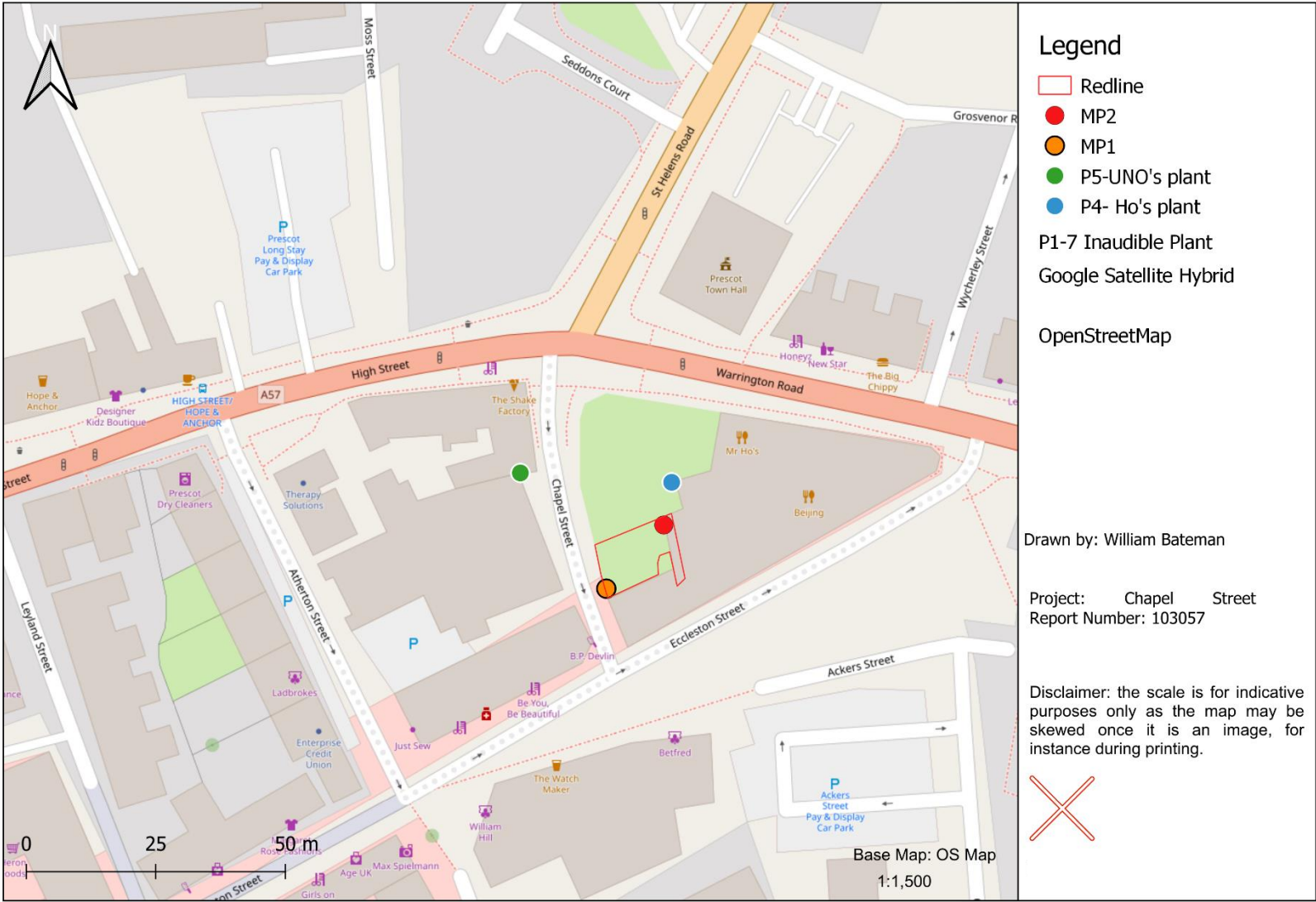
9 Conclusions

- 9.1 A noise assessment has been undertaken at the site of a proposed development of land to support a planning application. Measurements have been taken to determine the ambient noise levels affecting the dwellings at the site. The measured data has been used to predict the impact of existing noise sources on future users of the proposed dwellings. Recommended glazing and ventilation specifications have been provided to enable the recommended internal noise limits to be achieved within the properties.
- 9.2 With the implementation of these recommendations, it is considered that a suitable and commensurate level of protection against noise can be provided to the occupants of the proposed accommodation.
- 9.3 It is recommended that the final mitigation strategy is reviewed as the design is developed to ensure suitable internal noise levels can be achieved.

APPENDICES

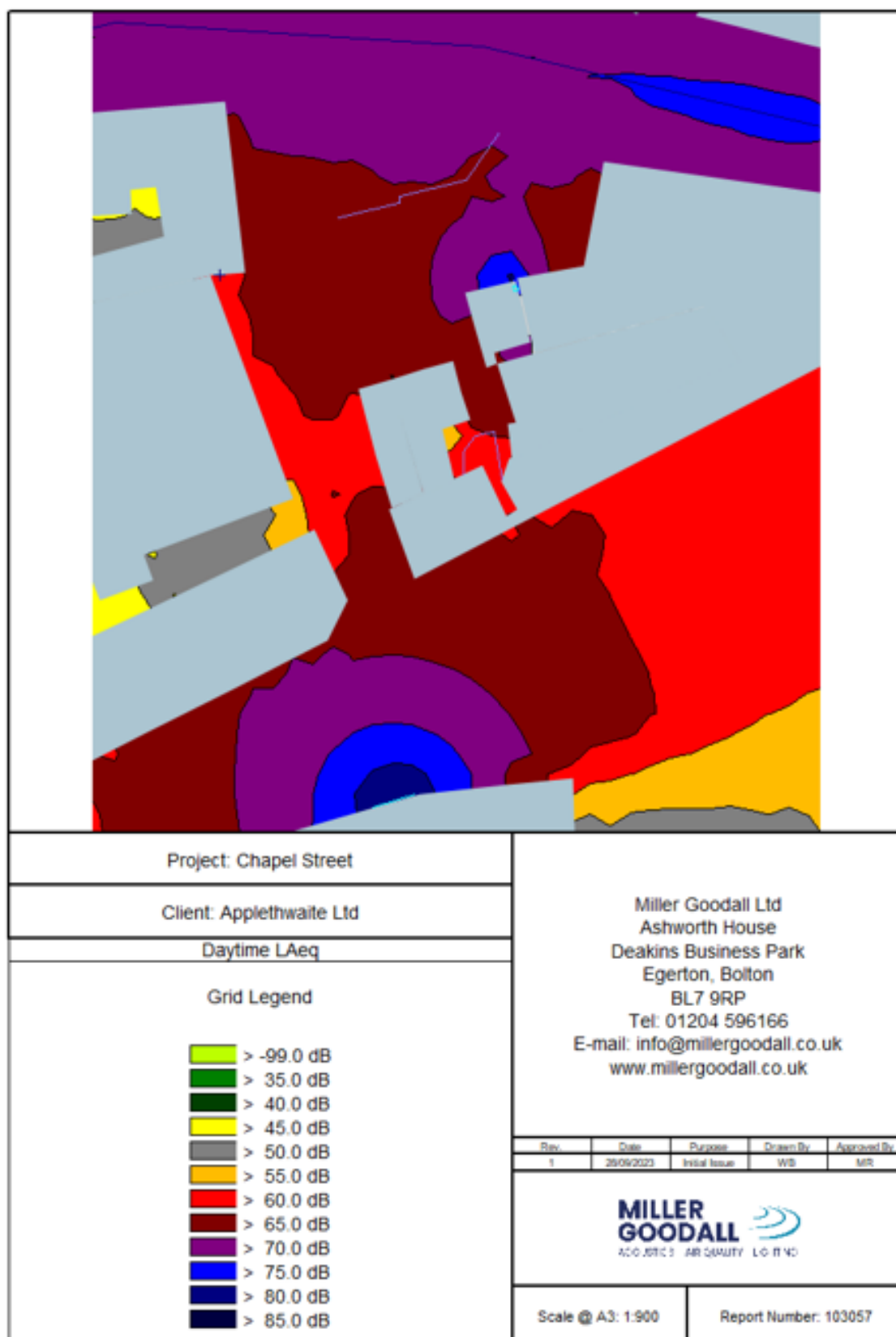
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Appendix 1: Site Location and monitoring locations

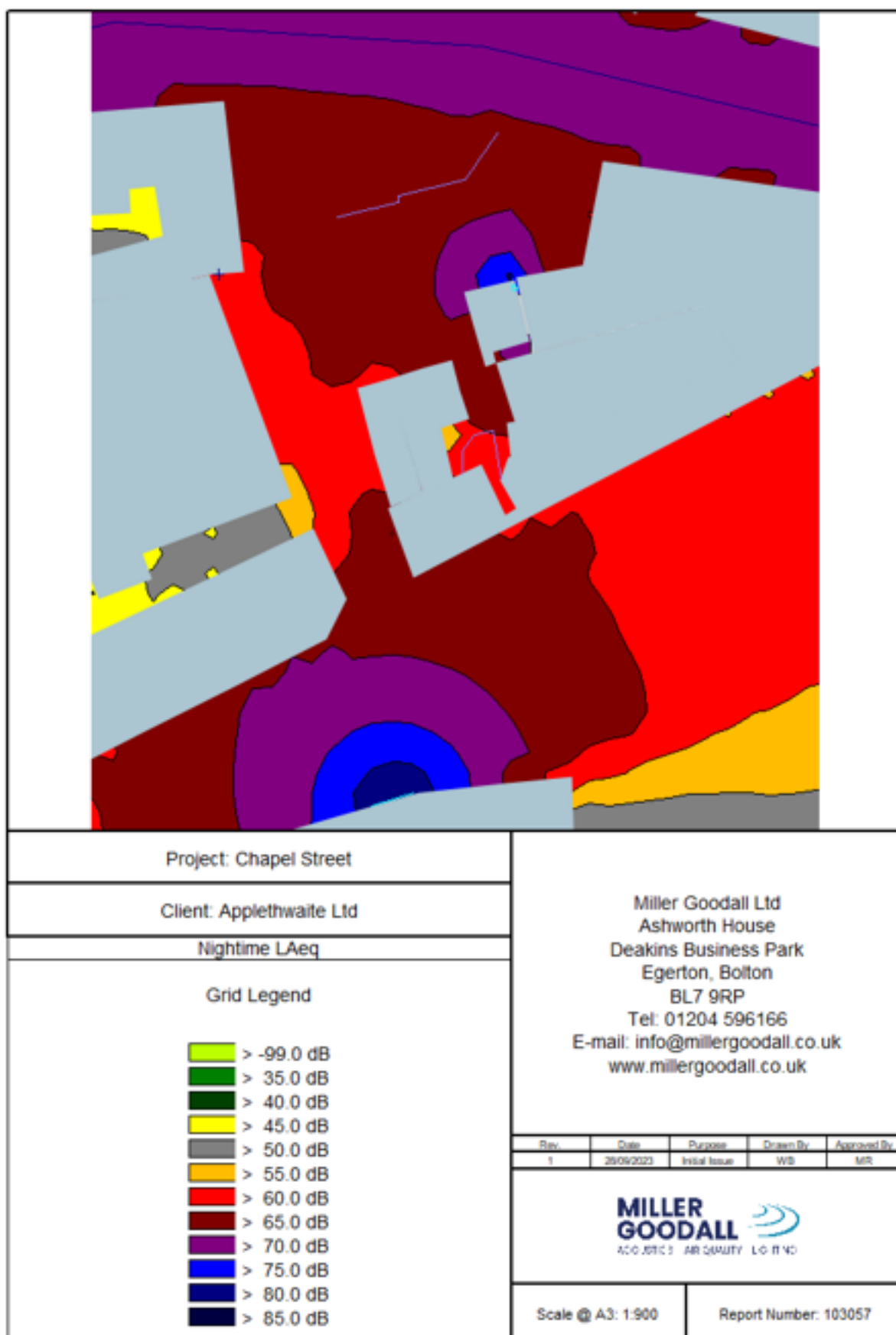


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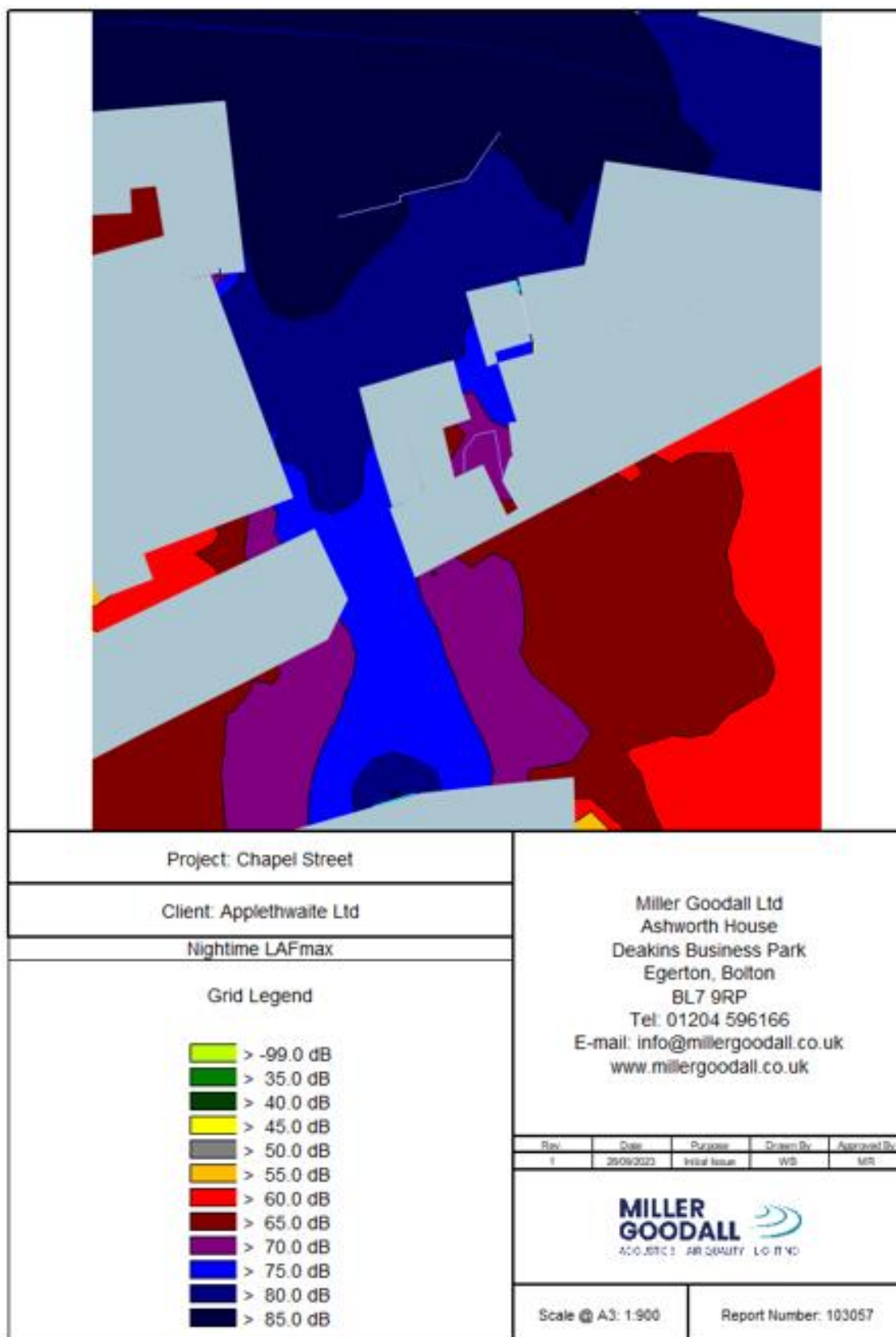
Appendix 2a: Daytime L_{Aeq} noise levels



Appendix 2b: Nighttime L_{Aeq} noise levels



Appendix 2c: Nighttime L_{AFMax} noise levels



Glossary of Terms

Decibel (dB) The unit used to quantify sound pressure levels; it is derived from the logarithm of the ratio between the value of a quantity and a reference value. It is used to describe the level of many different quantities. For sound pressure level the reference quantity is 20 μPa , the threshold of normal hearing is in the region of 0 dB, and 140 dB is the threshold of pain. A change of 1 dB is usually only perceptible under controlled conditions.

dB L_A Decibels measured on a sound level meter incorporating a frequency weighting (A weighting) which differentiates between sounds of different frequency (pitch) in a similar way to the human ear. Measurements in dB L_A broadly agree with an individual's assessment of loudness. A change of 3 dB L_A is the minimum perceptible under normal conditions, and a change of 10 dB L_A corresponds roughly to halving or doubling the loudness of a sound. The background noise level in a living room may be about 30 dB L_A ; normal conversation about 60 dB L_A at 1 meter; heavy road traffic about 80 dB L_A at 10 meters; the level near a pneumatic drill about 100 dB L_A .

$L_{A90,T}$ The A weighted noise level exceeded for 90% of the specified measurement period (T). In BS 4142: 2014+A1:2019 it is used to define background noise level.

$L_{Aeq,T}$ The equivalent continuous sound level. The sound level of a notionally steady sound having the same energy as a fluctuating sound over a specified measurement period (T). $L_{Aeq,T}$ is used to describe many types of noise and can be measured directly with an integrating sound level meter.

L_{Amax} The highest A weighted noise level recorded during the time period. It is usually used to describe the highest noise level that occurred during the event.

R_w Single number rating used to describe the sound insulation of building elements and is defined in BS EN ISO 10140-2: 2010 (formerly BSEN ISO 140-3:1995). It is derived by measurement under laboratory conditions and does not take into account the effects of flanking transmissions.

$D_{ne,w}$ The weighted element-normalized level difference is a single figure rating used to describe the sound insulation of small elements within a larger construction and is defined in BS EN ISO 10140-2:2010 (BSEN ISO 140-10:1991). It is most often used to rate the sound insulation performance of ventilator units e.g. trickle vents.

C_{tr} A single-number spectrum adaptation term used to characterise the sound insulation rating with respect to urban traffic. It is defined in ISO 717-1:20-13.

