MILLER GOODALL
ACOUSTICS AND AIR QUALITY

NOISE ASSESSMENT

on behalf of

HARLEX (RLP TIMPERLEY) LLP

for the site at

THORLEY LANE, ALTRINCHAM

REPORT DATE: 19TH MAY 2021

REPORT NUMBER: 102504

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Summary

A noise and vibration assessment has been undertaken to predict the potential impact on a proposed development consisting of approximately 116no dwellings with all matters reserved except for access, at Thorley Lane, Altrincham. This was requested by the Local Authority to support an outline planning application for the development.

Measurements were made at the proposed site to identify the pre-development baseline noise levels. This data was subsequently used to predict the potential impact of noise from existing noise sources close to the proposed development when in use.

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

A ProPG assessment of noise shows that the site is suitable for residential development assuming care is taken in the final design of the site and appropriate mitigation is applied to individual plots where appropriate.

Record of changes

Prepared By	Matt Wilson MIOA	Reviewed By	Jo Miller MIOA
[redacted]		[redacted]	
Date	19th May 2021	Date	19th May 2021

Version	Date	Change	Initials
1	3rd March 2021	Initial issue	MJW
2	6th April 2021	Client Revisions	MJW
3	19th May 2021	Client Revisions	MJW

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Contents

1 Introduction

1.1 Miller Goodall Ltd has, on behalf of Harlex (RLP Timperley) LLP Ltd, undertaken a noise assessment in respect of the impact of noise on a proposed outline planning application for a residential development consisting of approximately 116no dwellings with all matters reserved except for access, at land off Thorley Lane, Timperley, Altrincham.

1.2 The report provides an assessment of existing road and commercial noise sources that will have an impact on the amenity of the proposed residential units.

2 Site Description

2.1 The site is located in Timperley to the east of Altrincham and has recently been used as a commercial space for a garden centre and aquatic retail and associated carparking and outdoor space.

2.2 The site is bounded by existing residential to the west and north east, agricultural land to the south and commercial land to the west. The A5144 Thorley Lane forms the western boundary of the site and Wood Lane borders a portion of the site to the north. The site location and redline plan is shown in Appendix 1.

3 Proposed Development

3.1 The proposal is to develop a site of approximately 2.9 hectares for residential use involving the erection of approximately 116no dwellings with all matters reserved except for access. Road access to the development site is located off Thorley Lane and Wood Lane. The mix of dwellings has not been fixed and layout is reserved for consideration at a later date. The development framework plan for the development is shown in Appendix 1

4 Policy Context

4.1 Noise Policy Statement for England

4.1.1 The Noise Policy Statement for England (NPSE[1]), 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
- where possible, contribute to the improvement of health and quality of life."

[1] Noise Policy Statement for England, Defra, March 2010

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 (NPPF[2]) initially published in March 2012, was updated in June 2019. One of the documents that the NPPF replaces is Planning Policy Guidance Note 24 (PPG 24) "Planning and Noise"[3].

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 contribute to protecting and enhancing our natural, built and historic environment; including making effective use of land, helping to improve biodiversity, using natural resources prudently, minimising waste and pollution, and mitigating and adapting to climate change, including moving to a low carbon economy."*

[2] National Planning Policy Framework, Ministry of Housing, Communities and Local Government, June 2019

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

4.2.3 At par. 170 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. 180 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.

4.3 Planning Practice Guidance – Noise

4.3.1 As of March 2014, a Planning Practice Guidance[4] 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:

- 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;

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

- 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.

5 Local Authority Consultation

5.1 Trafford Council's Planning department have been consulted[5] regarding the scope of the monitoring and assessment methodology. No response has been received to date, however the methodology of the survey and assessment is typical of a noise assessment for an outline planning application and will follow the guidance in ProPG.

[5] Email 11/2/21 environmental.health@trafford.gov.uk

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 provides recommended guideline values for internal noise levels within dwellings which are similar in scope to guideline values contained within the World Health Organisation (WHO) document, Guidelines for Community Noise (1999)[6]. These guideline noise levels are shown in Table 2, below.

[6] 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 $L_{Aeq,8hr}$

6.2.2 BS 8233:2014 advises that:

> *"regular individual noise events…can cause sleep disturbance. A guideline value may be set in terms of SEL[7] or $L_{Amax,F}$ depending on the character and number of events per night. Sporadic noise events could require separate values".*

6.2.3 BS 8233:2014 adopts guideline external noise values 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 $L_{Aeq,T}$ with an upper guideline value of 55 dB $L_{Aeq,T}$ whilst recognising 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 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.

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 2009[8] 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.

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}.

[7] Sound exposure level or L_{AE}

[8] WHO Night Noise Guidelines for Europe 2009

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: 2003[9] by Matt Wilson 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.

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	NOR 140	Norsonic	1406017	22/10/2019	U33164
Microphone	NOR 1225	Norsonic	358159	22/10/2019	33163
Class 1 Calibrator[12]	Type 4231	Brüel & Kjær	2478249	20/07/2020	04743/1

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.

7.1.3 MP01 is an unattended monitoring location adjacent to Thorley Lane, at the south part of the site. MP02 is an attended monitoring location adjacent to Wood Lane at the north of the site. MP03 is immediately to the south of an operational Veterinary Surgery off Wood Lane.

7.1.4 Weather conditions during the attended survey at MP02 and MP04 on 26th February, was still, clear and approximately 7-10C.

7.1.5 The noise survey was undertaken during a national lockdown as part of the Covid-19 pandemic. The data measured is considered to be representative of typical L_{Amax} events at night, which is the likely worst case noise source over the site. The mitigation methodology will not be affected, in that plot design and orientation will be a key component of the good acoustic design process and, if required, further monitoring can be done at reserved matters stage to confirm façade noise levels.

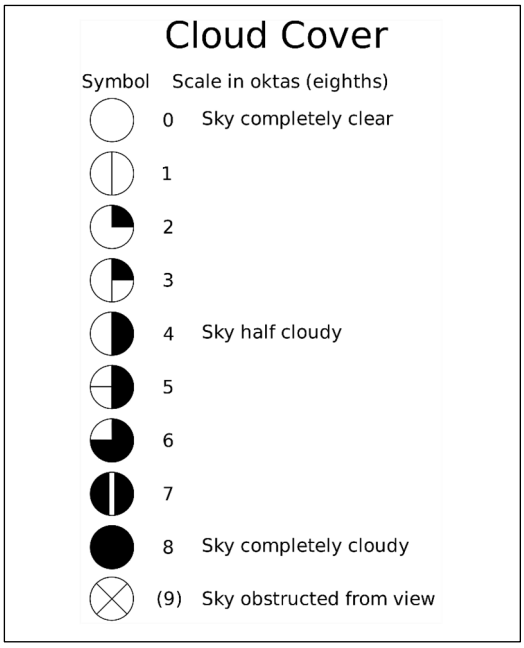
[9] BS 7445-1: 2003 Description and measurement of environmental noise - Part 1: Guide to quantities and procedures

[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

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

Measurement Locations	Date/Time	Weather conditions		
		Description	At Start of Survey	On Completion
P1	01/03/21, 10:00 to 02/03/21, 07:00	Temperature:	5C	1C
		Precipitation:	0	0
		Cloud cover (oktas – see opposite):	0	1
		Any fog/snow/ice?	0	Slight frost
		Any damp roads/wet ground?	0	0
		Wind speed:	<2m/s	<2m/s0
		Wind direction:	Variable	
		Any conditions that may cause temp. inversion (e.g. calm nights with no cloud):	No	Yes

7.1.6 Measurements were made under free-field conditions at a height of 2.5 m above the ground.

7.1.7 The noise sources within the vicinity of the measurement locations are summarised in Table 5, below:

Table 5: Description of noise sources affecting the site

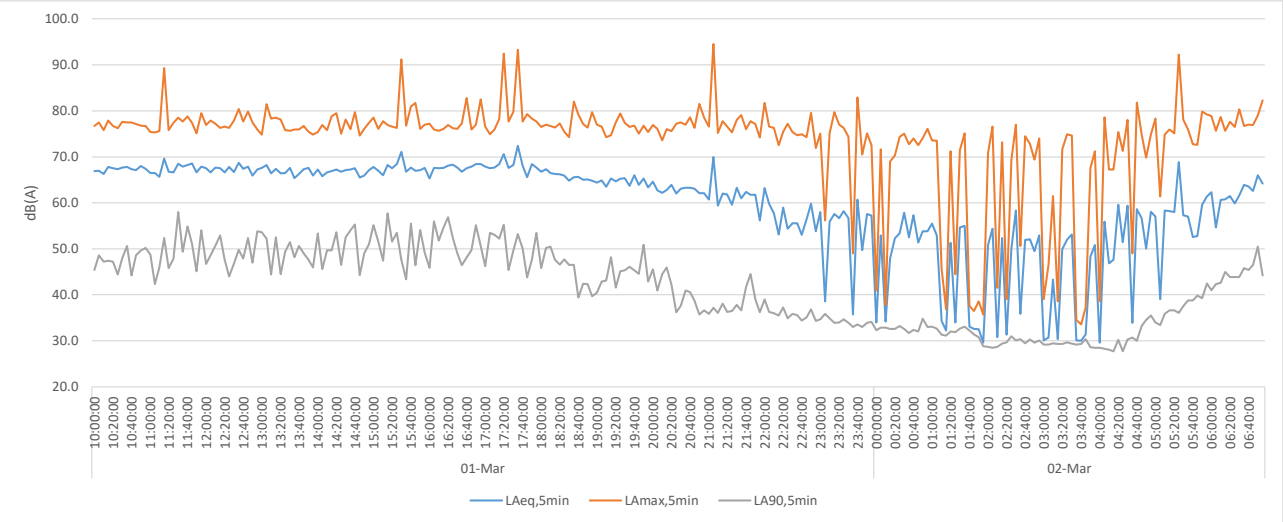
Measurement Locations	Noise Sources
MP01	Dominated by traffic, day and night. Birds, aircraft and building activities were also audible. A stream was noted nearby but no sound of water was audible.
MP02	Traffic noise occasionally from Wood Lane, with a background noise source of traffic from Thorley Lane. Birds and dog barking were also audible.
MP03	Off-site noise levels were dominated by traffic from the nearby road network and occasional dogs associated with the Vets. An onsite water feature dominated the background noise level

7.1.8 The 2019 Summertime noise contours produced by Manchester Airport were consulted[13]. The site is outside the 51dB $L_{Aeq,16h}$ contour for daytime noise and outside the 45 dB $L_{Aeq,8h}$ contour for night time noise.

7.2 Monitoring Results

7.2.1 A summary of the broadband measurement data is provided in Chart 1 below. All data are sound pressure levels in dB re 20 µPa.

Chart 1: Broadband noise data MP01



7.2.2 Each measurement period consisted of sequential 5 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 11th highest of individual 15 second measurements. This data was subsequently utilised within the noise model.

7.2.3 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 façade(s) for the proposed development.

7.2.4 Noise monitoring data has been used to calibrate a computer noise model of the site. During visits to the site and site walkovers it was determined that the road traffic on Thorley Lane was the most dominant as such day and night time noise from each of these sources have been modelled.

7.2.5 Octave band frequency data was obtained during surveying and this was utilised within noise ingress calculations to determine suitable mitigation in terms of glazing and ventilation requirements. This source data is provided in Table 6, below.

[13] https://www.manchesterairport.co.uk/community/environmental-management/

Table 6: Octave band free-field external noise level spectra at MP01 and MP02

Measurement Descriptor	Sound Pressure Level, dB in Octave Band Centre Frequency, Hz								dB(A)
	63	125	250	500	1k	2k	4k	8k	
MP01 Daytime noise level	60	58	59	59	65	58	48	41	67
MP01 Night time noise level	52	54	52	51	55	50	42	37	57
MP01 Maximum noise level	70	69	69	71	77	70	61	54	79
MP02 Daytime noise level	64	55	50	47	51	48	44	39	55
MP02 Maximum noise level	88	76	75	73	67	69	66	66	76

7.2.6 The night time maximum noise level spectrum was taken as an average of the top 10 L_{AFmax} events, adjusted to give a level equal to the 11th highest L_{AFmax} event. All max noise events were associated with vehicles passing the monitoring position.

7.2.7 No night time monitoring was undertaken off Wood Lane. It is likely that the L_{AFMAX} noise events would be 15dB above an 8 hour L_{Aeq} for the night time, and therefore a typical max event from the daytime road traffic has been used.

7.2.8 Data from MP03 has been discounted due to the influence of the onsite water feature that will not be present following development.

8 Impact of Existing Noise Sources on the Development

8.1 Computer Modelling

8.1.1 Predictions of existing noise levels on the site have also 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 = 0.9 (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 DEFRA LIDAR data.

8.2 Validation of the Noise Model

8.2.1 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.

8.3 Noise Model Predictions

8.3.1 Three scenarios were investigated 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. Modelling outputs are provided in Appendix 2.

8.3.2 The noise modelling demonstrates the drop-off in noise levels with increasing distance from Thorley Lane, the most significant noise source affecting the site. Whilst the areas immediately adjacent to the road source are likely to be above 55 dB $L_{Aeq,16h}$, the vast majority of the site will allow for external levels below 55 dB $L_{Aeq,16h}$.

8.3.3 Use of building massing and appropriate plot boundary fencing will be utilised to reduce noise levels in those worst affected areas of the site, mainly within 40m of Thorley Lane. This will also have a beneficial effect on the rest of the site, as the buildings closest to the road will act as a barrier, so reducing the noise levels experienced over the western portion of the site.

8.3.4 Table 7 shows a ProPG risk assessment for the site based upon the variable levels predicted over the undeveloped site.

8.3.5 As can be seen in Table 7 below, the noise levels predicted over some eastern parts of the site indicate moderate noise levels and therefore the site is less suitable from a noise perspective and may be refused planning unless a good acoustic design process is followed and demonstrated in an ADS which describes how the adverse impacts of noise will be mitigated and minimised, and which clearly demonstrates that a significant adverse noise impact will be avoided in the finished development.

Table 7: ProPG Noise Risk Level Assessment

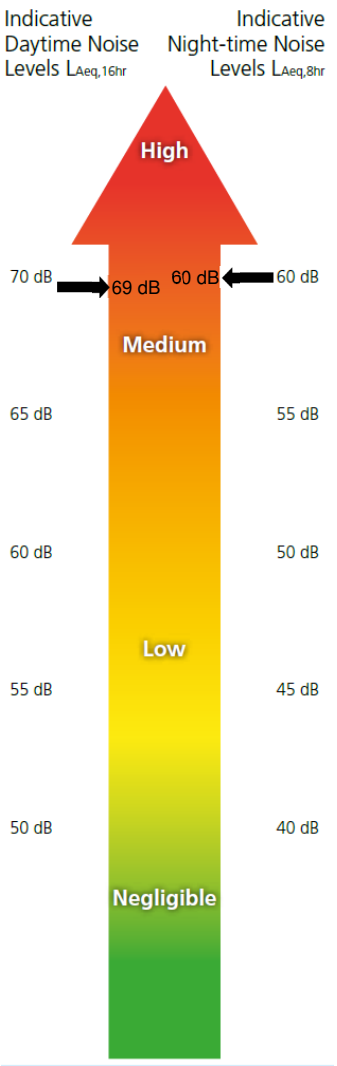
Noise Risk Assessment	Potential Effect Without Noise Mitigation	Pre-Planning Application Advice
	Increasing risk of adverse effect	High noise levels indicate that there is an increased risk that development may be refused on noise grounds. This risk may be reduced by following a good acoustic design 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 Predicted Internal Noise Levels Assessed to ProPG Guidance Levels

8.4.1 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}.

8.4.2 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 Research[14] 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.

8.4.3 External noise levels predicted along the eastern part of 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.

8.4.4 For the purpose of this outline application, indicative house locations from the draft Masterplan in Appendix 1 have been included in the noise model.

8.5 Traffic noise generated by the development

8.5.1 The development traffic will access the site through the existing site entrances off Thorley Lane and Wood Lane. The anticipated increases in traffic flow due to the built-out development are in the region of 1% to 3%. This is well below the threshold of significant effect to existing receptors due to road traffic noise ($L_{A10,18h}$). An increase of approximately 25% is required for 1dB increase in traffic noise and a 100% increase is required for a 3dB increase in traffic noise which is generally the threshold of significant effect.

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 12354-3[15]. The following assumptions were made regarding the internal rooms:

- Assessed within first floor bedrooms 3.0m x 3.0m x 2.6m with an internal volume of 23.4 m^3
- 'Normal' internal surface finishes e.g. carpeted with curtains etc.
- Glazed area of 1.5 m^2 per room.

8.6.2 The areas of the proposed site where internal noise may exceed the standards are bedrooms on elevations closest to, and facing, Thorley Lane.

8.6.3 Noise ingress calculations are provided in Appendix 3 with a summary of the results in Table 8, below:

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

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

Table 8: Predicted internal noise levels – Thorley Lane

Description	External Noise Levels		Predicted Internal Noise Levels		BS 8233 Criteria		Exceedance of Criteria		Proposed Glazing and Ventilation
	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}	
Daytime Ground Floor	69	-	34	-	35	-	-1	-	Option 1
Night-time First Floor	60	82	26	45	30	45	-4	0	Option 1

- **Option 1** - Glazing with minimum weighted sound reduction index of 33 dB $R_W + C_{tr}$ (e.g. 10/12/6); ventilators with a minimum element normalised sound level difference of 38 dB $D_{ne,W} + C_{tr}$.
- **Option 2** - Glazing with minimum weighted sound reduction index of 33 dB $R_W + C_{tr}$ (e.g. 10/12/6); ventilators with a minimum element normalised sound level difference of 44 dB $D_{ne,W} + C_{tr}$.

8.6.4 It can be seen from Table 8 that rooms on the noisiest elevations are predicted to satisfy the internal noise level requirements with glazing with a sound reduction index of 33 dB $R_w + C_{tr}$; this could be achieved using double glazing with a 10/12/6 configuration. Background ventilation could be provided by trickle ventilators with a minimum element normalised sound level difference of at least 44 dB $D_{ne,w} + C_{tr}$.

8.6.5 For dwellings with habitable rooms facing away from road sources or where shielding from other buildings is provided, a lower specification of glazing or ventilation may be feasible. Final proposals for glazing and ventilation options would need to be reviewed as the final master plan of the site is developed at the reserved matters stage.

8.6.6 Trickle ventilation has been used as a typical ventilation strategy where windows are required to be closed to meet indoor noise criteria. Another option is a Positive Input Ventilation system (PIV). This removes the requirement for trickle ventilation units.

8.7 External Noise Levels

8.7.1 The predicted daytime noise levels across the open site currently range between 70 and 50 dB. Where dwellings are proposed inside the 60 – 70dB noise contours, careful consideration will be given to the plot layout and boundary fencing, such that the predicted noise level in the garden does not exceed 55dB $L_{Aeq,16h}$. This will be necessary for the plots closest to Thorley Lane. The draft masterplan presented has south facing gardens at the southern boundary of the site. It is likely that these gardens will not achieve the required standard in the current configuration and additional orientation of the site or mitigation will be required at this location.

8.7.2 A local Veterinary surgery borders the site to the north. At the time of the survey, no activity was noted on the façade of the surgery facing the development site. It is recommended that the orientation of plots facing the vets be designed to shield outdoor space from the vets as it is likely that barking dogs will be a feature of the area during opening times.

9 Acoustic Design Statement

Typical Issues for low / medium risk sites	Statement
Relevant noise sources identified	This assessment has considered noise from road traffic.
Greater coverage across the site (all buildings, all relevant heights)	Noise grids have been predicted to cover the entirety of the undeveloped site.
Opportunities to mitigate the noise source within the site	Detailed design phase will utilise building massing to provide noise mitigation along with the use of noise barriers
Maximise separation	Not possible due to the site layout, maximising separation would greatly reduce developable area.
Existing topographical advantages; Change site level	Not applicable, effectively a flat site between source and receptor.
Noise barriers – screening opportunities	No detailed design yet, plot boundary fencing will be required in some areas
Site layout – protecting residential units	Detailed design phase will utilise building massing to provide noise mitigation along with the use of noise barriers
Site layout – protecting external amenity space	Achieved utilising self-screening by new houses. All gardens located on the quieter rear elevation.
Access to quiet open space on or off-site	Achieved by provision of shielded rear gardens.
Building layout to self-screen sensitive rooms	At detailed design phase
Orientation of noise sensitive rooms away from the source of noise exposure i.e. quiet facades	At detailed design phase
Building treatment to screen openings	At detailed design phase
Window location & size on affected facades	Internal noise criteria achieved by utilising acoustic glazing rather than reducing glazing size
Façade insulation design	Standard brick/block façade construction, is not the weak point of the façade.
Complete Acoustic Design Process throughout	Yes

10 Consideration of Other Discipline Requirements

10.1 It is recommended that you confirm the suitability of all recommended noise mitigation measures with your architects, structural engineers, building contractors, fire consultants and material manufacturers prior to procurement and field application so that when the recommended noise control measures are implemented on site they will satisfy the requirements of all disciplines, therefore, should not cause any health and safety issues.

11 Conclusions

11.1 A noise assessment has been undertaken at the site of a proposed development of land at Thorley Lane, Timperley, to support an outline planning application. Measurements have been taken to determine the ambient noise levels affecting the proposed dwellings at the site and a noise model has been developed for the site. A recommended glazing and ventilation specification has been provided for an indicative plot to enable the recommended internal noise limits to be achieved within the properties.

11.2 Final proposals for glazing and ventilation options would need to be reviewed as the final master plan of the site is developed at the reserved matters stage.

11.3 With the implementation of these recommendations, it is considered that a suitable and commensurate level of protection against noise and vibration will be provided to the occupants of the proposed dwellings and the site is suitable for development.

APPENDICES

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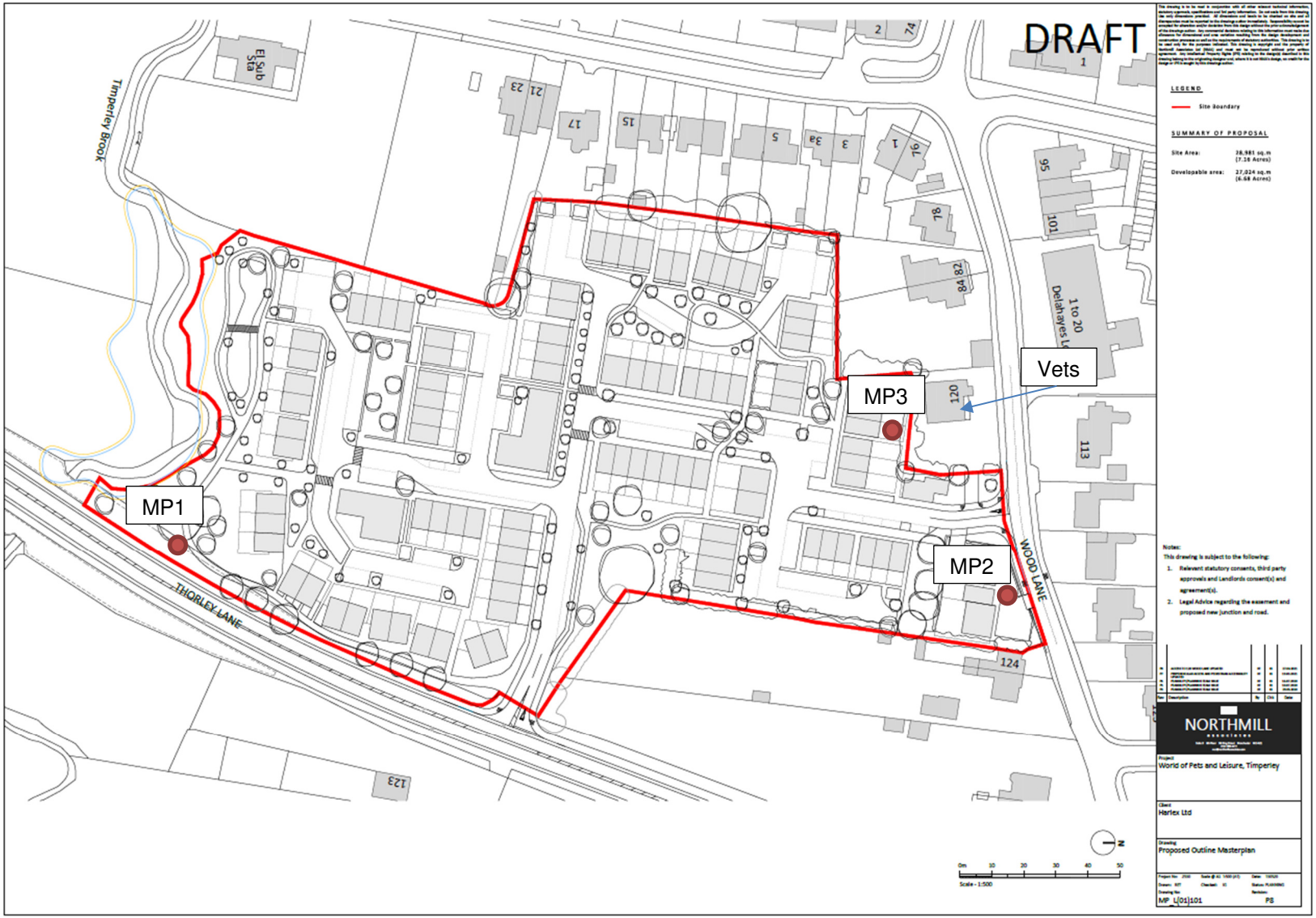
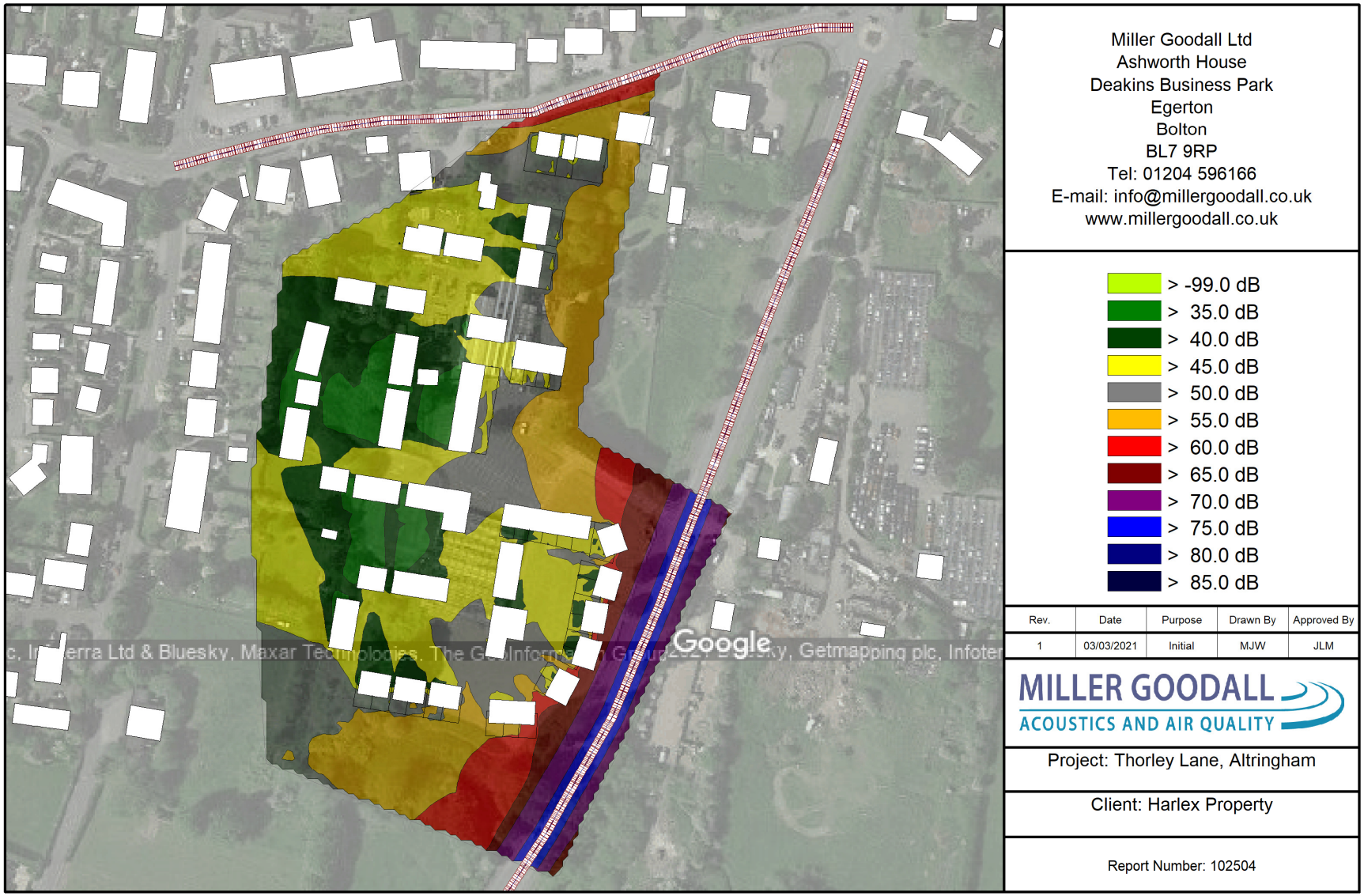
Appendix 1: Draft Framework Plan & Monitoring Locations



Appendix 2a: Noise Model Output – Daytime $L_{Aeq,16h}$ at 1.5m



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Rev.	Date	Purpose	Drawn By	Approved By
1	03/03/2021	Initial	MJW	JLM

MILLER GOODALL
ACOUSTICS AND AIR QUALITY

Project: Thorley Lane, Altringham

Client: Harlex Property

Report Number: 102504

Appendix 2b: Noise Model Output – Night time $L_{Aeq,8h}$ at 4.0m

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	> -99.0 dB
	> 35.0 dB
	> 40.0 dB
	> 45.0 dB
	> 50.0 dB
	> 55.0 dB
	> 60.0 dB
	> 65.0 dB
	> 70.0 dB
	> 75.0 dB
	> 80.0 dB
	> 85.0 dB

Rev.	Date	Purpose	Drawn By	Approved By
1	03/03/2021	Initial	MJW	JLM

MILLER GOODALL
ACOUSTICS AND AIR QUALITY

Project: Thorley Lane, Altringham

Client: Harlex Property

Report Number: 102504

Appendix 3 – Example Noise Ingress Calculation

Day

Miller Goodall Environmental Services: Noise Ingress Calculation

MILLER GOODALL
ACOUSTICS AND AIR QUALITY

Project:	Thorley Lane	**Calcs By:**	MJW
Description:	Day Time, Bedroom, 4.0m	**Date:**	02/03/2021

Calculation is based on methodology within BS 8233:2014 & BSEN ISO 12354-3. The following equation is utilised:

$L_{internal} = L_{external} - \Sigma R + 10 \log S/A - DL_{fs} + 3$

where A = 0.16V/T

and DL_{fs} is a correction to account for the influence of façade shape (e.g. where balconies or terraces are present)

This can be broken down further to:

$L_{eq,2} = L_{eq,ff}+10\text{xlog}\ ((A_0/Sx10^{(-D_{n,e}/10)})+(S_{wi}/Sx10^{(-R_{wi}/10)})+(S_{ew}/Sx10^{(-R_{ew}/10)})+(S_{rr}/Sx10^{(-R_{rr}/10)}))+10\text{xlog}\ (S/A)-DL_{fs}+3$

The above terms are described below:

Description	Term	Value	Room assessed:
Total facade area (m2)	S_f	7.8	
Window area (m2)	S_{wi}	1.5	
External wall area (Sf - Swi)	S_{ew}	6.3	Height: 2.6
Area of ceiling (m2)	S_{rr}	0	
Total area of elements (Sf + Srr)	S	7.8	Width: 3 **Width is horizontal length of façade in question**
Volume of receiving room (m3)	V	23.4	
Reference absorption area (m2)	A_0	10	Length: 3
Number of ventilators in facade:		1	
Façade shape correction	DL_{fs}	0	See Annex C of BS EN 12354-3

Input	Octave band centre frequency, Hz								dBA	R_w	C_{tr}	$R_w + C_{tr}$	Description
	63	125	250	500	1k	2k	4k	8k					
External Leq, freefield (dB Leq,ff)	69	63	62	61	68	61	50	42	69	-	-	-	Freefield daytime level
External Lmax, freefield (dB Lmax,ff)									#####	-	-	-	loudest Lmax Freefield daytime level
Dne of each ventilator	27	31	33	42	43	39	44	44	-	41	-3	38	Renson AK38 acoustic trickle vent
Total Dne of all ventilators	27	31	33	42	43	39	44	44	-	41	-3	38	
SRI of window (Rwi)	20	26	27	34	40	38	46	46	-	37	-4	33	10/12/6
SRI of external wall (Rew)	35	37	42	52	60	63	68	68	-	54	-6	48	Double leaf 112 mm brickwork, 50 mm cavity, rigid wall ties
SRI of roof and ceiling (Rrr)	21	27	37	43	48	52	52	52	-	46	-7	39	Tiled/slate roof, 25 mm plasterboard ceiling, 100 mm mineral wool
Rev time of receiving room (T) - secs	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5					Habitable room ref Part E
All ventilators [eqn. B]	0.003	0.001	0	0	0	0	0	5E-05					A0/S x 10^(-Dne/10)
Glazing [eqn. C]	0.002	5E-04	0	0	0	0	0	5E-06					Swi/S x 10^(-Rwi/10)
External wall [eqn. D]	3E-04	2E-04	0	0	0	0	0	1E-07					Sew/S x 10^(-Rew/10)
Ceiling [eqn. E]	0	0	0	0	0	0	0	0					Srr/S x 10^(-Rrr/10)
All ventilators [10 x log "B"]	-25.7	-29.7	-31.6	-40.6	-42.1	-37.6	-43.1	-42.9					
Glazing [10 x log "C"]	-27.2	-33.2	-34.2	-41.2	-47.2	-45.2	-53.2	-53.2					
External wall [10 x log "D"]	-35.9	-37.9	-42.9	-52.9	-60.9	-63.9	-68.9	-68.9					
Ceiling [10 x log "E"]	#####	#####	####	####	####	####	####	######					
All elements combined [eqn. F]	-23.1	-27.7	-29.5	-37.7	-40.9	-36.9	-42.7	-42.5					Log sum of equations B,C,D,E
Equiv. absorption area of rec. room (m^2)	7	7	7	7	7	7	7	7					
10 x log(S/A) [eqn. G]	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2					
Façade shape correction, DL_{fs}	0	0	0	0	0	0	0	0					

Linear Spectra	63	125	250	500	1k	2k	4k	8k	dBA		Target	Exc.	
Internal Leq,2	49	38	35	27	30	27	10	3	34		35	-1	Equations (A+F+G) - DLfs +3 dB
Internal Lmax,2													Equations (A+F+G) - DLfs +3 dB

Night

Miller Goodall Environmental Services: Noise Ingress Calculation

MILLER GOODALL ACOUSTICS AND AIR QUALITY

Project:	Thorley Lane	**Calcs By:**	MJW
Description:	Night Time, Bedroom, 4.0m	**Date:**	02/03/2021

Calculation is based on methodology within BS 8233:2014 & BSEN ISO 12354-3. The following equation is utilised:

$L_{internal} = L_{external} - \Sigma R + 10 \log S/A - DL_{fs} + 3$

where A = 0.16V/T

and DL_{fs} is a correction to account for the influence of façade shape (e.g. where balconies or terraces are present)

This can be broken down further to:

$L_{eq,2} = L_{eq,ff} + 10\text{xlog}\ ((A_0/Sx10^{(-D_{n,e}/10)}) + (S_{wi}/Sx10^{(-R_{wi}/10)}) + (S_{ew}/Sx10^{(-R_{ew}/10)}) + (S_{rr}/Sx10^{(-R_{rr}/10)})) + 10\text{xlog}\ (S/A) - DL_{fs} + 3$

The above terms are described below:

Description	Term	Value
Total facade area (m2)	S_f	7.8
Window area (m2)	S_{wi}	1.5
External wall area (Sf - Swi)	S_{ew}	6.3
Area of ceiling (m2)	S_{rr}	9
Total area of elements (Sf + Srr)	S	16.8
Volume of receiving room (m3)	V	23.4
Reference absorption area (m2)	A_0	10
Number of ventilators in facade:		1
Façade shape correction	DL_{fs}	0

Room assessed:

Height: 2.6

Width: 3 **Width is horizontal length of façade in question**

Length: 3

See Annex C of BS EN 12354-3

Input	Octave band centre frequency, Hz								dBA	R_w	C_{tr}	$R_w + C_{tr}$	Description
	63	125	250	500	1k	2k	4k	8k					
External Leq, freefield (dB Leq,ff)	61	58	55	53	58	52	43	39	60	-	-	-	Freefield night-time level
External Lmax, freefield (dB Lmax,ff)	75.9	72.7	74.5	74.8	80.2	73.8	64.5	58.4	82	-	-	-	loudest Lmax Freefield night-time level
Dne of each ventilator	29	33	40	45	56	67	75	69	-	50	-6	44	Caice acoustic trickle vent
Total Dne of all ventilators	29	33	40	45	56	67	75	69	-	50	-6	44	
SRI of window (Rwi)	20	26	27	34	40	38	46	46	-	37	-4	33	10/12/6
SRI of external wall (Rew)	35	37	42	52	60	63	68	68	-	54	-6	48	Double leaf 112 mm brickwork, 50 mm cavity, rigid wall ties
SRI of roof and ceiling (Rrr)	21	27	37	43	48	52	52	52	-	46	-7	39	Tiled/slate roof, 25 mm plasterboard ceiling, 100 mm mineral wool
Rev time of receiving room (T) - secs	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	Habitable room ref Part E				
All ventilators [eqn. B]	7E-04	0.0003	0	0	0	0	0	0	A0/S x 10^(-Dne/10)				
Glazing [eqn. C]	9E-04	0.00022	0	0	0	0	0	0	Swi/S x 10^(-Rwi/10)				
External wall [eqn. D]	1E-04	7.5E-05	0	0	0	0	0	0	Sew/S x 10^(-Rew/10)				
Ceiling [eqn. E]	0.004	0.00107	0	0	0	0	0	0	Srr/S x 10^(-Rrr/10)				
All ventilators [10 x log "B"]	-31.3	-35.3	-42.3	-47.3	-58.3	-69.3	-77.3	-71.3					
Glazing [10 x log "C"]	-30.5	-36.5	-37.5	-44.5	-50.5	-48.5	-56.5	-56.5					
External wall [10 x log "D"]	-39.3	-41.3	-46.3	-56.3	-64.3	-67.3	-72.3	-72.3					
Ceiling [10 x log "E"]	-23.7	-29.7	-39.7	-45.7	-50.7	-54.7	-54.7	-54.7					
All elements combined [eqn. F]	-22.2	-27.8	-34.3	-40.8	-47.1	-47.5	-52.4	-52.4	Log sum of equations B,C,D,E				
Equiv. absorption area of rec. room (m^2)	7	7	7	7	7	7	7	7					
10 x log(S/A) [eqn. G]	3.5	3.5	3.5	3.5	3.5	3.5	3.5	3.5					
Façade shape correction, DL_{fs}	0	0	0	0	0	0	0	0					

Linear Spectra	63	125	250	500	1k	2k	4k	8k	dBA	Target	Exc.	
Internal Leq,2	45	37	27	19	17	11	-3	-7	**26**	30	**-4**	Equations (A+F+G) - DLfs +3 dB
Internal Lmax,2	60	51	47	41	40	33	19	13	**45**	45	**0**	Equations (A+F+G) - DLfs +3 dB

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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.

$L_{A10(18\ hour)}$ Often referred to as the UK road traffic noise index, this is the arithmetic average of the values of L_{A10} hourly for each of the 18 one hour periods between 06:00 and 00:00.

L_{night} The A-weighted long-term average sound level as defined in ISO 1996-2: 1987, determined over all the night-time periods (23:00 – 07:00) of a year. Referenced in the Environmental Noise Directive 2002/49/EC. It is also referred to as $L_{Aeq,8h}$.

$D_{ne,w}$ 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.

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