MILLER GOODALL
ACOUSTICS AND AIR QUALITY

NOISE ASSESSMENT

on behalf of

RIBBLE VALLEY PROPERTY DEVELOPMENT LTD

for the site at

LODEMATIC, PRIMROSE ROAD, CLITHEROE

REPORT DATE: 18TH OCTOBER 2019

REPORT NUMBER: 102183

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Summary

A noise assessment was undertaken to predict the potential impact of a proposed development consisting of conversion of a former industrial building for residential use at Lodematic, Primrose Road, Clitheroe. This was requested by the Local Authority to support a planning application for the development.

Measurements were made at the location of the proposed residential apartments overlooking the surrounding mill complex on the site to identify the pre-development ambient noise levels.

The measurement data was subsequently used to predict the potential noise levels within the proposed apartments. Noise mitigation measures have subsequently been recommended to control noise to appropriate levels.

With the implementation of the recommended mitigation measures, it is predicted that noise from activities associated with the adjacent Primrose Mill industrial estate may be controlled to acceptable levels and as such we do not see any reason why planning permission need be refused on the basis of noise.

Record of changes

Prepared By	Matt Wilson MIOA	Reviewed By	Jo Miller MIOA
Signed		Signed	
Date	18th October 2019	Date	18th October 2019

Version	Date	Change	Initials
1	18th October 2019	Draft issue	MJW

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Contents

1 Introduction

1.1 Miller Goodall Ltd has, on behalf of Ribble Valley Property Development Ltd, undertaken a noise assessment in respect of the impact of noise from existing noise sources on a proposed residential development on the Lodematic (Components) Ltd site at Primrose Works, Primrose Road, Clitheroe ("the site"). This was requested by Ribble Valley Borough Council (RVBC) to support a planning application.

2 Site Description

2.1 The proposed development site comprises a four storey former mill building and smaller ancillary workshop buildings owned and operated by Lodematic (Components) Ltd and used for the manufacturing of hydraulic components.

2.2 The site is located north-west and adjacent to Primrose Mill Business Park, a series of former mill buildings located off Primrose Road which are currently used predominantly for various light industrial uses and retail. The closest unit to the Lodematic building is Decron Ltd (a scaffolding contractor) with access to this unit via roller shutter doors located directly opposite the building to the south.

2.3 The site is located approximately 1 km south west from the centre of Clitheroe and access to the site is provided via a junction with Primrose Road and Woone Lane. The main mill building overlooks a communal car park used by the adjacent Primrose Studios office building and tenants of Primrose Mill. There is also access to a single detached private residence (Primrose House) to the south-west of the site.

2.4 At the time of the noise survey, the Lodematic works is no longer operational and the internal structure has been stripped back ahead of proposed redevelopment works.

3 Proposed Development

3.1 Proposals for the redevelopment of the Lodematic site include the development of 24 dwellings over two blocks identified as A and B. Block A will comprise three apartments on the lower ground floor with 14 further 3 floor townhouses on the ground to second floors. Block B will comprise seven three story townhouses.

3.2 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:

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

"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."

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 February 2019. 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 2018

[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 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."

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. 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] Planning Practice Guidance – Noise, http://planningguidance.planningportal.gov.uk/blog/guidance/noise/, 06 March 2014

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;
- 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 Pre-application advice was provided by RVBC in a document produced by Rachel Horton, a Pre-Planning Advice Officer, in July 2014 (document ref. RV/2014/ENQ/00064).

5.2 The following advice was issued relating to noise:

Given the potential close proximity of the dwellings to existing business premises at Primrose Mill, consideration will need to be made as to whether the site is suitable for residential development given potential noise disturbance, and therefore a noise assessment should be submitted with any subsequent application. I am also mindful of the potential conflict with existing businesses in the area and para. 123 of the NPPF which states that "existing businesses wanting to develop in continuance of their business should not have unreasonable restrictions put on them because of changes in nearby land uses since they were established".

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)[5]. These guideline noise levels are shown in Table 2, below.

[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 $L_{Aeq,8hr}$

6.2.2 BS 8233:2014 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".*

6.2.3 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[7] 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}.

[6] Sound exposure level or L_{AE}

[7] WHO Night Noise Guidelines for Europe 2009

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

6.4.1 BS 4142:2014+A1:2019[8] 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 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.

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

7 Noise Survey

7.1 Measurements of Existing Noise Sources

7.1.1 Noise measurements were undertaken 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	29/05/19	04255/2
Microphone	NOR 1225	Norsonic	151206	29/05/19	04255/2
Class 1 Calibrator[12]	Type 4231	Brüel & Kjær	2478249	29/05/19	04255/1
Outdoor microphone housing	NOR 1217	Norsonic	12175146	N/a	N/a

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.

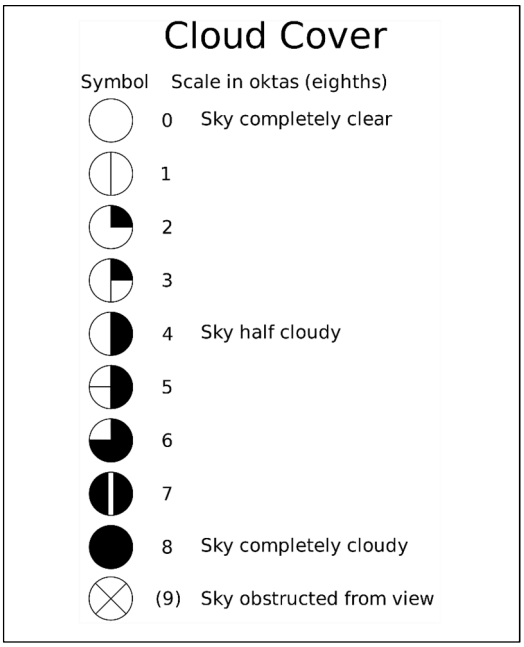
[9] BS 7445-1: 2003 Description and measurement of environmental noise - Part 1: Guide to quantities and procedures

[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 noise measurements

Measurement Locations	Date/Time	Weather conditions		
		Description	At Start of Survey	On Completion
P1	21/05/15, 14:45 to 22/05/15, 16:10	Temperature:	14 ºC	13 ºC
		Precipitation:	Dry	Dry
		Cloud cover (oktas – see opposite):	3	0
		Any fog/snow/ice?	No	No
		Any damp roads/wet ground?	No	Slight
		Wind speed:	1 - 2 m/s	1 - 2 m/s
		Wind direction:	Variable, generally westerly	
		Any conditions that may cause temp. inversion (e.g. calm nights with no cloud):	No	No

7.1.3 Measurements were taken at times considered to be representative of the periods during which the proposed residential accommodation would be subject to the highest levels of ambient noise. Measurements were made at a distance of 1.0 m from the façade of the existing building at Lower Ground floor height (approximately 4.0m above the ground) directly opposite from the existing scaffolding contractor.

7.1.4 The baseline ambient noise level within the vicinity of the measurement location is a weir to the immediate north east of the development site, this is clear from the consistent background noise level at all times of the day and night as seen in Chart 1.

7.1.5 General vehicle activity in the courtyard to the east of the development site was noted during daytime hours. At night, occasional short term activity is noted from the scaffolding warehouse. Such events can occur at any time during the night and will typically have a duration of 30 minutes.

7.1.6 Observation of the areas surrounding the site show that the façade facing onto the courtyard will be considered as the worst case.

7.2 Monitoring Results

7.2.1 A summary of the broadband measurement data is provided in Chart 1 below with full data in Appendix 2. All data are sound pressure levels in dB re 20 µPa. Table 5 gives average daytime, night time and maximum noise levels in A weighted Octave bands.

Chart 1: Broadband Noise Level Data

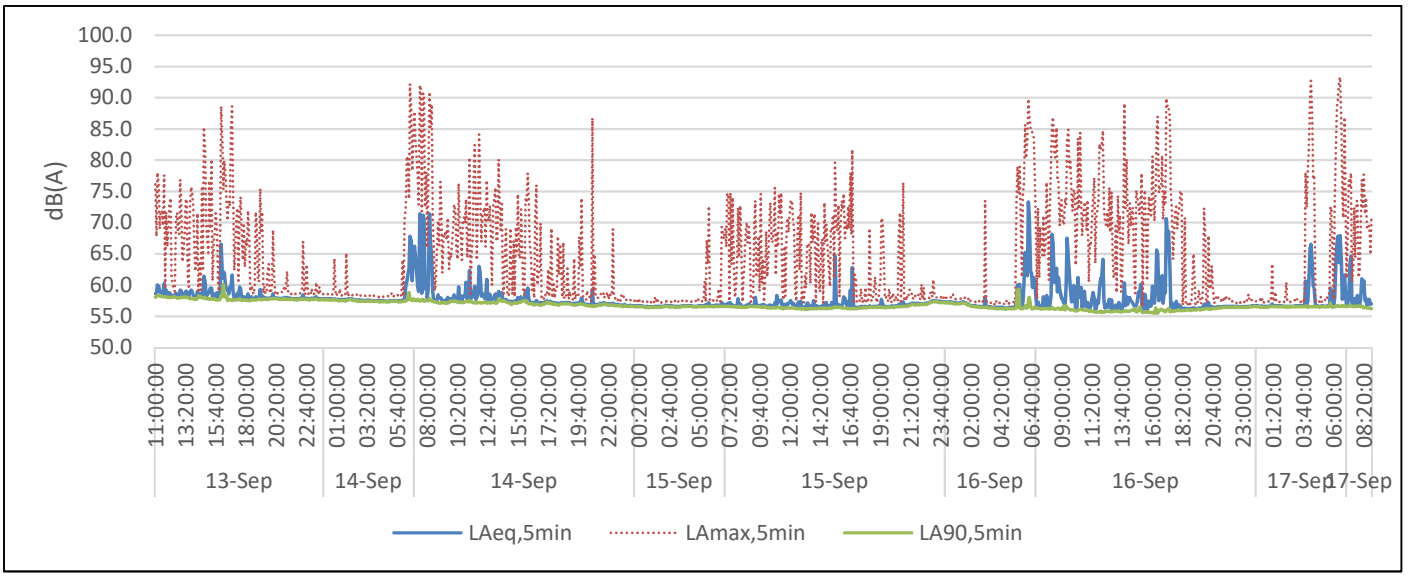


Table 5: Octave band free-field external noise level spectra

Measurement Descriptor	Sound Pressure Level, dBA in Octave Band Centre Frequency, Hz								dB(A)
	63	125	250	500	1k	2k	4k	8k	
Daytime $L_{Aeq,16h}$	28	33	41	47	50	52	47	39	56
Night-time $L_{Aeq,8h}$	24	31	40	46	50	52	47	39	56
Night-time L_{AFmax}	21	35	46	54	64	79	72	64	80

7.2.2 The 10 second noise levels have not been presented in this report but are kept on file for future reference.

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.

Table 6: ProPG Noise Risk Level Assessment

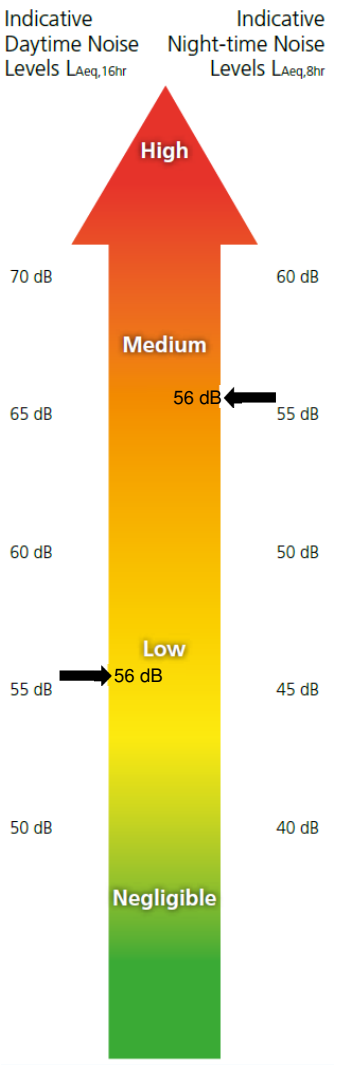
Noise Risk Assessment	Potential Effect Without Noise Mitigation	Pre-Planning Application Advice
	Increasing risk of adverse effect	High noise levels indicate that there is an increased risk that development may be refused on noise grounds. This risk may be reduced by following a good acoustic design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

7.2.4 As can be seen in Table 6 above, the noise levels measured at 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.

8 Impact of Existing Noise Sources on the Development

8.1 Predicted Internal Noise Levels Assessed to ProPG Guidance Levels

8.1.1 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}.

8.1.2 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[13] 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.

8.1.3 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.

8.2 Mitigation for Achieving Good Acoustic Design

8.2.1 The internal layout of the building has been designed so that less sensitive rooms are closest to the identified noise source. Living room / Kitchen / Diners have a daytime criteria of 35 dB(A) and no L_{Amax} criteria. The only sensitive bedroom facing the identified noise source is on the 1st floor.

8.2.2 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[14]. The room dimensions have been taken from the proposed elevations and floor plans provided by Sunderland Peacock Architects in drawings with reference:

- 5857- 07B – Proposed Lower Ground Floor
- 5857- 08B – Proposed Ground Floor
- 5857- 09B – Proposed First Floor

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

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

- 5857- 10B – Proposed Second Floor
- 5857- 11B – Elevations

8.2.3 Noise ingress calculation is provided in Appendix 3 for the worst affected room with a summary of the results in Table 7, below for the Living room on the Lower Ground Floor and the Bedroom on the First Floor:

Table 7: Predicted internal noise levels

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}	
Lower Ground Floor Living Room Daytime	56	N/A	28	N/A	35	N/A	-7	N/A	Option 1
1st Floor Bedroom Night time	56	80	24	44	30	45	-6	-1	Option 2

- **Option 1** - Glazing with minimum weighted sound reduction index of 27 dB $R_W + C_{tr}$ (e.g. 4/12/4); ventilators with a minimum element normalised sound level difference of 33 dB $D_{ne,W}$.
- **Option 2** - Glazing with minimum weighted sound reduction index of 27 dB $R_W + C_{tr}$ (e.g. 4/12/4); ventilators with a minimum element normalised sound level difference of 38 dB $D_{ne,W}$.

8.2.4 The glazing specification requirements for all floors are identical.

8.2.5 The floors with living rooms facing onto the noise source are required to have a similar type of ventilation product.

8.2.6 The bedroom on Floor 1, facing into the noise source will require an upgraded ventilation product.

8.2.7 All bedrooms on the façade facing into the courtyard should utilise Option 2 ventilation, other habitable rooms facing onto the courtyard and towards the weir should use Option 1 ventilation. All rooms can use the same glazing.

8.2.8 It can be seen from Table 7 that the most sensitive rooms are predicted to satisfy the internal noise level requirements with glazing with a sound reduction index of 27 dB $R_w + C_{tr}$; this could be achieved using double glazing with a 4/12/4 configuration. Background ventilation could be provided by trickle ventilators with a minimum element normalised sound level difference of at least 38 dB $D_{ne,w} + C_{tr.}$

8.2.9 For dwellings with habitable rooms facing away from the courtyard containing the noise source or where shielding from other buildings is provided, a lower standard glazing with no requirement for alternative ventilation would be appropriate.

8.2.10 Specification for the glazing and ventilation types are given in Table 8.

Table 8: Minimum sound reduction indices of glazing

Glazing Option	Sound Reduction Index, dB R_w in Octave Band Centre Frequency, Hz								R_w	C_{tr}	$R_w + C_{tr}$
	63	125	250	500	1k	2k	4k	8k			
Glazing	18	24	20	25	35	38	35	35	31	-4	27
Option 1	34	38	35	34	31	34	37	42	34	-1	33
Option 2	27	31	33	42	43	39	44	44	41	-3	38

8.2.11 Whilst the provision of acoustic trickle ventilators will allow background ventilation to be achieved in conjunction with the required indoor noise levels, it may be necessary to consider alternative ventilation solutions in order to achieve compliance both with Part F of the Building Regulations (ventilation) and with the required indoor noise levels. These alternative solutions could be in the form of continuous mechanical extract (MEV) or continuous mechanical supply and extract with heat recovery (MVHR) systems. The M&E consultant will be able to advise on the suitability of mechanical ventilation systems.

8.2.12 Should such a system be considered, it is important that they be selected for low noise operation and it is recommended that a noise level of no more than 28 dB L_A as a result of the operation of the ventilation system should be targeted within habitable rooms. Furthermore, any openings to south or east facing facades that may be required for supply and/or extract ducting would need to be acoustically attenuated to prevent noise break-in (the same acoustic specification as specified for trickle vents would be appropriate).

8.3 Consideration of Other Discipline Requirements

8.3.1 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.

9 Conclusions

9.1 A noise assessment was undertaken to predict the potential impact of a proposed development consisting of conversion of a former industrial building for residential use at Lodematic, Primrose Road, Clitheroe. This was requested by the Local Authority to support a planning application for the development.

9.2 Measurements were made at the location of the proposed residential apartments overlooking the surrounding mill complex on the site to identify the pre-development ambient noise levels

9.3 The ambient noise climate includes occasional noise from a scaffolding depot in an adjacent building which results in significant L_{Amax} events at night.

9.4 Calculations have been undertaken to determine the specification of glazing and ventilation products required to meet the specified indoor criteria.

9.5 As the criteria will not be met for habitable rooms facing onto the courtyard or weir i.e. the south and east elevations, closed windows with alternative ventilation will be required on these façades .

9.6 All bedrooms on the façade facing into the courtyard should utilise ventilation with a minimum element normalised sound level difference of 33 dB $D_{ne,W}$., other habitable rooms facing onto the courtyard and towards the weir should use ventilation with a minimum element normalised sound level difference of 38 dB $D_{ne,W}$. ventilation. All rooms can use the same glazing with minimum weighted sound reduction index of 27 dB $R_W + C_{tr}$.

APPENDICES

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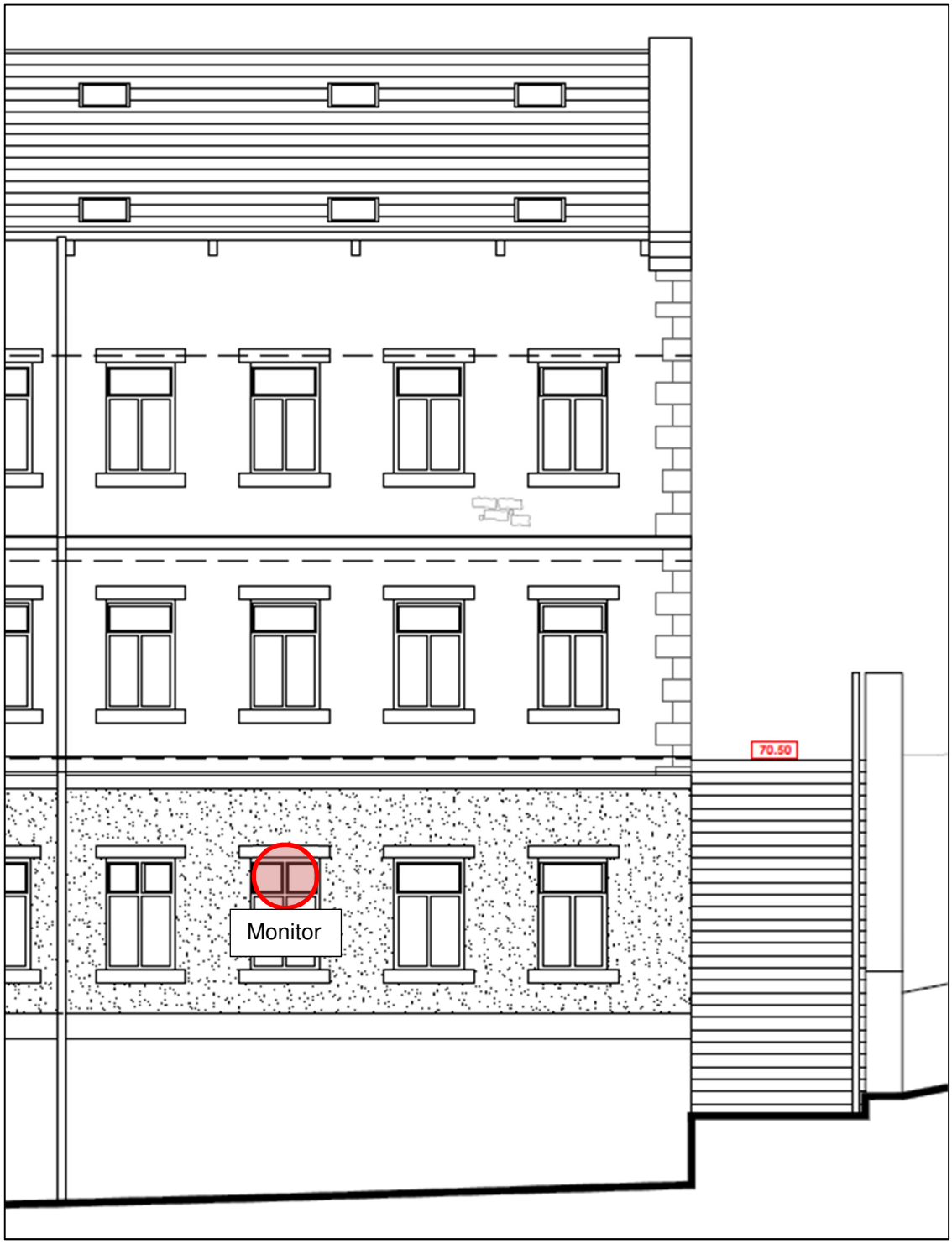
Appendix 1: Measurement Position and Plans

Plan showing a portion of the south elevation and monitoring position.



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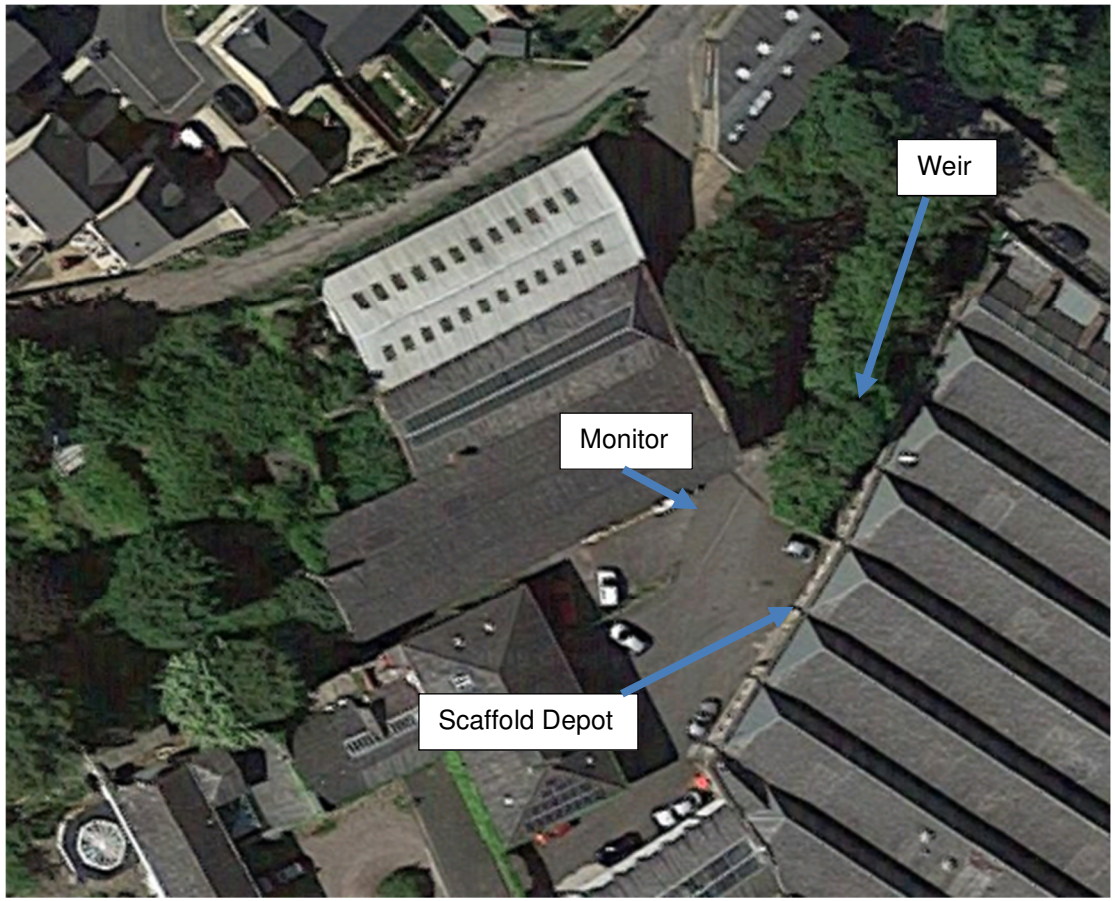
Plan showing Ground Floor and monitoring position 1.0 m from façade.

Plan showing wider site and noise sources.



Appendix 2: Measurement Data

Unattended Monitoring - 1 hour resolution

Date	Start Time	Elapsed Time (min:sec)	L_{Aeq} (dB)	L_{AFmax} (dB)	L_{AF1} (dB)	L_{AF10} (dB)	L_{AF90} (dB)	L_{AF99} (dB)
13/09/2019	11:00:00	01:00:00	59.0	78.0	64.0	59.5	58.1	58.0
13/09/2019	12:00:00	01:00:00	58.4	76.9	61.9	58.5	58.0	57.9
13/09/2019	13:00:00	01:00:00	58.7	75.7	64.6	58.7	57.9	57.8
13/09/2019	14:00:00	01:00:00	58.9	85.3	63.1	58.9	57.8	57.8
13/09/2019	15:00:00	01:00:00	58.6	80.1	64.2	59.1	57.7	57.6
13/09/2019	16:00:00	01:00:00	61.4	88.6	69.0	62.0	57.7	57.6
13/09/2019	17:00:00	01:00:00	58.4	75.7	64.5	58.5	57.6	57.6
13/09/2019	18:00:00	01:00:00	58.0	71.9	60.3	58.2	57.6	57.5
13/09/2019	19:00:00	01:00:00	58.1	75.4	58.8	58.1	57.7	57.6
13/09/2019	20:00:00	01:00:00	57.9	68.8	59.2	58.1	57.7	57.7
13/09/2019	21:00:00	01:00:00	57.9	62.2	58.5	58.1	57.7	57.6
13/09/2019	22:00:00	01:00:00	57.9	67.0	59.1	58.1	57.7	57.6
13/09/2019	23:00:00	01:00:00	57.9	60.4	58.7	58.0	57.7	57.6
14/09/2019	00:00:00	01:00:00	57.8	64.2	58.1	58.0	57.6	57.6
14/09/2019	01:00:00	01:00:00	57.7	65.1	58.0	57.8	57.5	57.4
14/09/2019	02:00:00	01:00:00	57.7	58.6	58.1	57.9	57.5	57.4
14/09/2019	03:00:00	01:00:00	57.5	58.3	57.8	57.7	57.4	57.4
14/09/2019	04:00:00	01:00:00	57.5	58.2	57.8	57.7	57.3	57.3
14/09/2019	05:00:00	01:00:00	57.5	58.7	57.8	57.7	57.3	57.3
14/09/2019	06:00:00	01:00:00	62.9	92.2	73.0	63.3	57.4	57.4
14/09/2019	07:00:00	01:00:00	66.9	92.0	81.4	65.4	57.5	57.4
14/09/2019	08:00:00	01:00:00	63.5	90.9	76.0	60.9	57.3	57.2
14/09/2019	09:00:00	01:00:00	57.6	76.5	61.0	57.8	57.2	57.1
14/09/2019	10:00:00	01:00:00	58.1	76.2	63.6	58.8	57.3	57.2
14/09/2019	11:00:00	01:00:00	59.0	82.4	66.2	60.4	57.3	57.2
14/09/2019	12:00:00	01:00:00	59.5	84.1	68.7	59.6	57.2	57.1
14/09/2019	13:00:00	01:00:00	58.1	80.1	63.8	58.2	57.3	57.2
14/09/2019	14:00:00	01:00:00	57.4	69.3	58.4	57.7	57.1	57.0
14/09/2019	15:00:00	01:00:00	58.0	77.9	63.2	58.4	57.2	57.1
14/09/2019	16:00:00	01:00:00	57.2	76.0	58.5	57.4	56.9	56.8
14/09/2019	17:00:00	01:00:00	57.2	69.1	57.9	57.5	57.0	56.9
14/09/2019	18:00:00	01:00:00	57.1	67.8	57.6	57.4	56.9	56.9
14/09/2019	19:00:00	01:00:00	57.2	73.9	58.5	57.3	56.9	56.8
14/09/2019	20:00:00	01:00:00	57.2	86.7	57.5	57.2	56.7	56.6
14/09/2019	21:00:00	01:00:00	57.0	58.9	57.5	57.2	56.8	56.8
14/09/2019	22:00:00	01:00:00	56.9	69.0	57.4	57.1	56.8	56.7
14/09/2019	23:00:00	01:00:00	56.8	58.5	57.2	57.0	56.6	56.6
15/09/2019	00:00:00	01:00:00	56.6	57.8	57.0	56.8	56.5	56.4
15/09/2019	01:00:00	01:00:00	56.5	58.0	57.0	56.8	56.4	56.4
15/09/2019	02:00:00	01:00:00	56.7	57.4	57.0	56.8	56.5	56.4
15/09/2019	03:00:00	01:00:00	56.6	57.6	57.0	56.8	56.5	56.4

15/09/2019	04:00:00	01:00:00	56.7	57.7	57.0	56.8	56.5	56.4
15/09/2019	05:00:00	01:00:00	56.8	72.6	58.0	56.9	56.5	56.5
15/09/2019	06:00:00	01:00:00	56.8	69.3	57.2	57.0	56.6	56.5
15/09/2019	07:00:00	01:00:00	56.8	74.7	58.1	56.9	56.5	56.5
15/09/2019	08:00:00	01:00:00	56.9	72.7	60.3	56.8	56.4	56.4
15/09/2019	09:00:00	01:00:00	56.9	74.6	60.5	57.0	56.5	56.4
15/09/2019	10:00:00	01:00:00	56.7	75.6	58.4	56.8	56.3	56.3
15/09/2019	11:00:00	01:00:00	57.1	74.8	62.9	57.3	56.3	56.2
15/09/2019	12:00:00	01:00:00	56.9	74.8	63.1	56.8	56.2	56.2
15/09/2019	13:00:00	01:00:00	56.7	71.6	61.1	56.8	56.2	56.1
15/09/2019	14:00:00	01:00:00	56.7	73.2	60.4	56.7	56.2	56.2
15/09/2019	15:00:00	01:00:00	58.3	79.6	68.4	57.0	56.3	56.3
15/09/2019	16:00:00	01:00:00	58.2	81.7	64.4	57.1	56.2	56.2
15/09/2019	17:00:00	01:00:00	56.5	61.7	57.2	56.7	56.3	56.2
15/09/2019	18:00:00	01:00:00	56.6	69.1	57.4	56.8	56.4	56.4
15/09/2019	19:00:00	01:00:00	56.7	70.7	58.6	56.8	56.4	56.3
15/09/2019	20:00:00	01:00:00	56.8	76.4	57.8	56.9	56.5	56.4
15/09/2019	21:00:00	01:00:00	57.0	59.3	57.5	57.2	56.8	56.7
15/09/2019	22:00:00	01:00:00	57.1	60.1	57.6	57.4	56.9	56.8
15/09/2019	23:00:00	01:00:00	57.4	60.9	57.8	57.6	57.2	57.2
16/09/2019	00:00:00	01:00:00	57.2	58.6	57.6	57.4	57.1	57.0
16/09/2019	01:00:00	01:00:00	57.1	58.0	57.5	57.4	56.9	56.8
16/09/2019	02:00:00	01:00:00	56.6	57.5	57.0	56.8	56.5	56.4
16/09/2019	03:00:00	01:00:00	56.6	73.5	57.0	56.6	56.3	56.2
16/09/2019	04:00:00	01:00:00	56.4	57.5	56.6	56.6	56.2	56.2
16/09/2019	05:00:00	01:00:00	57.7	79.0	62.6	59.5	56.2	56.2
16/09/2019	06:00:00	01:00:00	66.0	89.8	79.7	65.7	56.3	56.2
16/09/2019	07:00:00	01:00:00	57.1	76.4	63.2	57.3	56.2	56.2
16/09/2019	08:00:00	01:00:00	62.4	86.9	74.6	62.9	56.2	56.1
16/09/2019	09:00:00	01:00:00	61.2	84.9	73.1	61.9	56.1	56.0
16/09/2019	10:00:00	01:00:00	58.1	84.4	66.4	59.3	55.9	55.9
16/09/2019	11:00:00	01:00:00	57.4	82.6	65.0	57.9	55.7	55.7
16/09/2019	12:00:00	01:00:00	59.0	84.7	68.8	58.0	55.7	55.6
16/09/2019	13:00:00	01:00:00	57.0	89.1	63.1	56.8	55.8	55.7
16/09/2019	14:00:00	01:00:00	57.5	80.2	65.5	57.7	55.8	55.8
16/09/2019	15:00:00	01:00:00	57.5	77.9	66.1	58.2	55.7	55.6
16/09/2019	16:00:00	01:00:00	60.9	87.0	71.5	62.4	55.6	55.5
16/09/2019	17:00:00	01:00:00	64.0	89.9	78.4	61.8	55.8	55.8
16/09/2019	18:00:00	01:00:00	56.3	75.1	57.9	56.4	56.0	55.9
16/09/2019	19:00:00	01:00:00	56.2	65.0	57.1	56.4	56.0	56.0
16/09/2019	20:00:00	01:00:00	56.6	72.3	59.7	56.6	56.2	56.1
16/09/2019	21:00:00	01:00:00	56.5	58.3	57.1	56.8	56.4	56.3
16/09/2019	22:00:00	01:00:00	56.6	57.5	56.9	56.8	56.4	56.4
16/09/2019	23:00:00	01:00:00	56.6	58.5	57.0	56.8	56.4	56.4
17/09/2019	00:00:00	01:00:00	56.6	57.8	57.0	56.8	56.5	56.4
17/09/2019	01:00:00	01:00:00	56.7	63.4	57.1	56.9	56.5	56.5
17/09/2019	02:00:00	01:00:00	56.6	60.4	57.0	56.8	56.5	56.4
17/09/2019	03:00:00	01:00:00	57.2	78.0	61.2	56.9	56.5	56.4

17/09/2019	04:00:00	01:00:00	61.3	92.7	69.4	60.4	56.5	56.4
17/09/2019	05:00:00	01:00:00	57.2	72.5	61.0	59.1	56.5	56.4
17/09/2019	06:00:00	01:00:00	63.7	93.3	74.6	63.1	56.6	56.5
17/09/2019	07:00:00	01:00:00	59.4	77.9	69.4	59.9	56.6	56.6
17/09/2019	08:00:00	01:00:00	58.3	77.7	65.8	59.4	56.3	56.3

Appendix 3: Noise ingress calculation

Plan showing a portion of the south elevation and monitoring position.

Miller Goodall Environmental Services: Noise Ingress Calculation

MILLER GOODALL ACOUSTICS AND AIR QUALITY

Project:	102483 - Lodematic	**Calcs By:**	MJW
Description:	F1 _ Bed	**Date:**	18/10/2019

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:

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

The above terms are described below:

Description	Term	Value	Room assessed:
Total facade area (m2)	S_f	11.004	
Window area (m2)	S_{wi}	2.88	
External wall area (Sf - Swi)	S_{ew}	8.124	Height: 2.8
Area of ceiling (m2)	S_{rr}	0	
Total area of elements (Sf + Srr)	S	11.004	Width: 3.93 — Width is horizontal length of façade in question
Volume of receiving room (m3)	V	35.763	
Reference absorption area (m2)	A_0	10	Length: 3.25
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)	50	47	49	49	50	50	46	40	56	-	-	-	Freefield daytime level
External Lmax, freefield (dB Lmax,ff)	48	51	55	58	64	77	71	65	80	-	-	-	loudest Lmax Freefield daytime level
Dne of each ventilator	27	31	33	42	43	39	44	44	-	1	-3	38	Renson AK38 acoustic trickle vent
Total Dne of all ventilators	27	31	33	42	43	39	44	44	-	#NAME?	#NAME?	#NAME?	
SRI of window (Rwi)	18	24	20	25	35	38	35	35	-	31	-4	27	4/12/4
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)	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	-	#N/A	#N/A	#N/A	#N/A
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]	0.002	8E-04	0	0	0	0	0	4E-05	A0/S x 10^(-Dne/10)				
Glazing [eqn. C]	0.004	0.001	0	0	0	0	0	8E-05	Swi/S x 10^(-Rwi/10)				
External wall [eqn. D]	2E-04	1E-04	0	0	0	0	0	1E-07	Sew/S x 10^(-Rew/10)				
Ceiling [eqn. E]	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	#N/A	Srr/S x 10^(-Rrr/10)				
All ventilators [10 x log "B"]	-27.2	-31.2	-33.1	-42.1	-43.6	-39.1	-44.6	-44.4					
Glazing [10 x log "C"]	-23.8	-29.8	-25.8	-30.8	-40.8	-43.8	-40.8	-40.8					
External wall [10 x log "D"]	-36.3	-38.3	-43.3	-53.3	-61.3	-64.3	-69.3	-69.3					
Ceiling [10 x log "E"]	#####	#####	#####	#####	#####	#####	#####	######					
All elements combined [eqn. F]	-22.0	-27.1	-25.0	-30.5	-39.0	-37.8	-39.3	-39.2	Log sum of equations B,C,D,E				
Equiv. absorption area of rec. room (m^2)	11	11	11	11	11	11	11	11					
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					

A-weighted spectra

	63	125	250	500	1k	2k	4k	8k	dBA	Target	Exc.	
Internal LAeq,2	5	7	18	19	14	16	11	3	24	30	-7	Equations (A+F+G) - DLfs +3 dB
Internal LAmax,2	2	11	24	27	28	43	35	28	44	45	-1	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.

R_w *S*ingle 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.

$D_{nT,w}$ The weighted standardized level difference is a single figure rating used to describe the sound insulation of a construction separating two rooms, for example a wall or floor, and is defined in BS EN ISO 16283-1:2014 (formerly BSEN ISO 140-4:1998). It is derived by measurement of an in-situ construction and therefore takes into account the effects of flanking transmissions, workmanship etc.

$D_{ne,w}$ 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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