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NOISE IMPACT ASSESSMENT REPORT

REAR OF 105 EVESHAM ROAD, REDDITCH B97 4JX

Client: Mr Shahid Farooqui

Report Ref: P4351-R1-V1

Issue Date: 8th September 2020

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MR SHAHID FAROOQUI

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REAR OF 105 EVESHAM ROAD, REDDITCH B97 4JX

REPORT VERSION CONTROL:

Document Reference	Date	Report Prepared by	Report Checked / Authorised by
P4351-R1-V1	08/09/2020	J. E. Noriega-Linares, PhD AMIOA, MCIEH	N. J. Malone, MIOA

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APPENDICES

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1 INTRODUCTION

1.1.1 By instruction from Shahid Farooqui ('the client'), NoiseAir was commissioned to undertake a noise impact assessment (NIA) with respect to a planning application for conversion of a commercial premises located at the rear of 105 Evesham Road, Redditch B97 4JX, to one residential unit, herein referred to as the 'development site'.

1.1.2 This noise report has been prepared in support of a planning application with respect to Change of use, renovation, and restoration from commercial premises to residential property at the development site. The report assesses the results of a noise survey carried out in accordance with current guidance and includes recommendations and mitigation as appropriate.

1.2 Site Description

1.2.1 At the time of writing the development site is a vacant / unoccupied two storey brick building located to the at the edge of a mixed residential and commercial use area.

1.2.2 Immediately adjacent to the development is an existing / operational upholstery business. The development site and adjacent upholstery business site are separated by a brick wall.

1.2.3 Access to the development site is via an alleyway between two existing buildings.

1.2.4 At the back of the development site there is an existing car park with approx. 150 parking spaces.

1.2.5 **Figure 1** shows an aerial photograph of the development site with respect to the local area and its context.

Figure 1: Site aerial photograph.

1.3 Development Proposals

1.3.1 At the time of writing, the development proposals are to gain planning for change of use, renovation, and restoration to previous use as a residential property.

1.3.2 The proposals for the residential development detail a single residential dwelling with living room and kitchen to the ground floor with associated garden area and two bedrooms to the first floor.

1.3.3 The proposed site layout plans are detailed in The Other Space drawings, obtained from Bromsgrove District Council Planning Portal:

- Existing Site and as proposed, Drawing Number 001;
- Ground, Roof and First Floor Plan, as proposed, Drawing Number 002;
- Elevations, as proposed, Drawing Number 003;
- Elevations, as existing, Drawing Number 004; and,
- Ground, roof and first floor plan, as existing, Drawing Number 005.

The aforementioned drawings can be found in Appendix C.

2 ASSESSMENT METHODOLOGY AND SCOPE OF WORKS

2.1 Planning Guidance and Noise

2.1.1 This acoustic report has been prepared as supporting documentation for a proposed planning application and therefore it is considered that reference should be made to the appropriate planning guidance documentation, specifically:

- National Planning Policy Framework (NPPF), 2019;
- Noise Policy Statement for England (NPSE), 2010;
- Planning Practice Guidance – Noise, 2019;
- World Health Organisation Guidelines for Community Noise 1999 (WHO, 1999);
- British Standard 8233: 2014 Guidance on sound insulation and noise reduction for buildings (BS8233, 2014); and,
- Pro:PG Planning & Noise: Professional Practice Guidance on Planning and Noise (2017).

2.1.2 A summary of the relevant planning documentation and its relevance with respect to noise is provided below.

National Planning Policy Framework [NPPF 2019]

2.1.3 The NPPF was published in March 2012 with the most recent version updated in February 2019. The NPPF sets out the Governments planning policies for England and how these are expected to be applied across a number of areas.

2.1.4 With respect to noise specifically, Section 15, Paragraph 170 of the NPPF 2019 states:

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

- *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;'*

2.1.5 The NPPF 2019 continues to state in Paragraph 180:

'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:

- *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;*
- *identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason; and;*

Noise Policy Statement for England [NPSE 2010]

2.1.6 The Noise Policy Statement for England (NPSE), published in March 2010, states the long-term vision of Government noise policy is to "*promote good health and a good quality of life through the effective management of noise within the context of Government policy on sustainable development*".

2.1.7 This long-term vision is supported by the following aims; through the effective management and control of environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development:

- Avoid significant adverse impacts on health and quality of life;
- Mitigate and minimise adverse impacts on health and quality of life;
- Where possible, contribute to the improvement of health and quality of life.

2.1.8 The NPSE also introduces the below categories with respect to 'adverse impacts'.

'NOEL – No Observed Effect Level

- *This is the level below which no effect can be detected. In simple terms, below this level, there is no detectable effect on health and quality of life due to the noise.*

LOAEL – Lowest Observed Adverse Effect Level

- *This is the level above which adverse effects on health and quality of life can be detected.*

SOAEL – Significant Observed Adverse Effect Level

- *This is the level above which significant adverse effects on health and quality of life occur'.*

2.1.9 The first aim of the NPSE states that significant adverse effects on health and quality of life should be avoided. The second aim refers to the situation where the impact lies somewhere

between LOAEL and SOAEL, and it requires that all reasonable steps are taken to mitigate and minimise the adverse effects of noise. However, the requirement to mitigate and minimise the adverse effects of noise does not mean that such adverse effects cannot occur.

Planning Practice Guidance - Noise [PPG 2019]

2.1.10 The National Planning Practice Guidance (PPG) is a web-based resource, launched by the Department for Communities and Local Government (DCLG) in March 2014 to support the NPPF[1].

2.1.11 The PPG advises on how planning can manage potential noise impacts in new development. The guidance is regularly reviewed and updated, and noise is listed as a specific category, the noise category was most recently updated on 22nd July 2019.

2.1.12 The PPG provides further detail about how the effect levels can be recognised. Above the NOEL noise becomes noticeable, however it has no adverse effect as it does not cause any change in behaviour or attitude. Once noise crosses the LOAEL threshold it begins to have an adverse effect and consideration needs to be given to mitigating and minimising those effects, taking account of the economic and social benefits being derived from the activity causing the noise.

2.1.13 Increasing noise exposure further might cause the SOAEL threshold to be crossed. If the exposure is above this level the planning process should be used to avoid the effect occurring by use of appropriate mitigation such as by altering the design and layout. Such decisions must be made taking account of the economic and social benefit of the activity causing the noise, but it is undesirable for such exposure to be caused.

2.1.14 At the highest extreme the situation should be prevented from occurring regardless of the benefits which might arise.

2.1.15 **Table 1** summarises the noise exposure hierarchy outlined within the PPG.

[1] https://www.gov.uk/guidance/noise--2

Table 1: National Planning Practice Guidance noise exposure hierarchy			
Perception	**Examples of Outcomes**	**Increasing Effect Level**	**Action**
Not noticeable	No effect	No Observed Effect	No specific measures required
Noticeable and not intrusive	Noise can be heard, but does not cause any change in behaviour or attitude. Can slightly affect the acoustic character of the area but not such that there is a perceived change in the quality of life.	No Observed Adverse Effect	No specific measures required
Lowest Observed Effect Level			
Noticeable and intrusive	Noise can be heard and causes small changes in behaviour and/or attitude, e.g. turning up volume of television; speaking more loudly; where there is no alternative ventilation, having to close windows for some of the time because of the noise. Potential for non-awakening sleep disturbance. Affects the acoustic character of the area such that there is a perceived change in the quality of life.	Observed Adverse Effect	Mitigate and reduce to a minimum
Significant Observed Effect Level			
Noticeable and disruptive	The noise causes a material change in behaviour and/or attitude, e.g. avoiding certain activities during periods of intrusion; where there is no alternative ventilation, having to keep windows closed most of the time because of the noise. Potential for sleep disturbance resulting in difficulty in getting to sleep, premature awakening and difficulty in getting back to sleep. Quality of life diminished due to change in acoustic character of the area.	Significant Observed Adverse Effect	Avoid
Noticeable and very disruptive	Extensive and regular changes in behaviour and/or an inability to mitigate effect of noise leading to psychological stress or physiological effects, e.g. regular sleep deprivation/awakening; loss of appetite, significant, medically definable harm, e.g. auditory and non-auditory.	Unacceptable Adverse Effect	Prevent

2.2 Consultation and Scope of Works

2.2.1 A planning application has been submitted for the development site (ref: 20/00724/FUL) by Bromsgrove District Council and, at the time of writing, pending consideration. Condition five is pertinent to noise and is reproduced below:

> *Before the development hereby approved is commenced, a scheme for protecting the proposed dwelling from noise from the adjacent railway line shall be submitted to and approved in writing by the Local Planning Authority. The approved scheme of noise protection shall thereafter be implemented before the development is first occupied and shall be the subject of a validation report which shall be submitted to and approved in writing by the Local Planning Authority prior to the development being first occupied. The validation report shall ensure that all noise issues on the site have been adequately addressed prior to the development being first occupied. The approved measures shall thereafter be maintained for the life of the development.*

2.2.2 NoiseAir contacted Bromsgrove and Redditch Council prior to undertaking the acoustic assessment. A response was received from the Worcestershire Regulatory Services (WRC) on stating that WRC does not routinely engage directly with applicants and only comment on submitted information. The WRC response then directed NoiseAir to previous comments made by WRC with respect to a previous application (ref: 19/00121/FUL) by the same applicant at the same site. The comments provided with respect to application 19/00121/FUL are reproduced below.

> *Thank you for consulting WRS, we have reviewed documents associated with the above application and have the following comments to make in relation to noise/nuisance:*
>
> *Comments from the previous submission 19/00121/FUL indicate that the adjacent land use is a commercial upholstery business which makes use of compressors, air tools and hand tools to refurbish furniture. As such there is the potential for noise impacts upon future residents of the property.*
>
> *WRS would advise that a noise assessment be submitted for review to demonstrate that future residents will not be adversely impacted by noise from the neighbouring*

commercial activity. WRS note that acoustic insulation has been proposed but this is insufficient to demonstrate that internal noise levels as per BS8233 can be achieved.

I would draw the applicant's attention to clause 182 of the National Planning Policy Framework

Planning policies and decisions should ensure that new development can be integrated effectively with existing businesses and community facilities (such as places of worship, pubs, music venues and sports clubs). Existing businesses and facilities should not have unreasonable restrictions placed on them as a result of development permitted after they were established. Where the operation of an existing business or community facility could have a significant adverse effect on new development (including changes of use) in its vicinity, the applicant (or 'agent of change') should be required to provide suitable mitigation before the development has been completed.

2.2.3 Based on the information provided and the subsequent site visits it is considered that an NIA should be undertaken to assess the potential for adverse impact from primarily local traffic and commercial noise sources.

2.2.4 The scope of the assessment includes consideration of noise at sensitive areas of the proposed development, i.e. proposed residential areas / bedrooms, specifically in terms of the potential impact of local noise sources.

2.3 Assessment Criteria

2.3.1 In order to achieve noise levels which are considered to be in alignment with the planning approaches and policies discussed in Section 2.1 it is considered that all efforts are made to ensure that future occupants are unlikely to be exposed to noise levels which might breach the LOEL criteria.

2.3.2 It should be noted however that planning guidance does not preclude development where the LOEL is likely to be breached in certain circumstances as long as reasonable efforts are made to mitigate and reduce such an effect.

2.3.3 It is therefore considered that the noise assessment and subsequent criteria should be undertaken in accordance with Pro-PG Planning and Noise a summary of which is provided below.

Pro-PG – Planning & Noise [Pro-PG 2018]

2.3.4 Pro-PG Planning and Noise provides professional practice guidance in relation to new residential development exposed to noise from transport sources. It provides practitioners with a recommended approach to the management of noise within the planning system in England.

2.3.5 The guidance reflects the Government's overarching National Planning Policy Framework, the Noise Policy Statement for England, and Planning Practice Guidance (including PPG-Noise) and draws on other authoritative sources of guidance. It provides advice for Local Planning Authorities and developers, and their professional advisers, on achieving good acoustic design in and around new residential developments.

2.3.6 Pro-PG adopts a two-stage approach to assessment:

- **Stage 1** – an initial noise risk assessment of the proposed development site; and,
- **Stage 2** – a systematic consideration of four key elements.

2.3.7 The four key elements to be undertaken in parallel during Stage 2 of the recommended approach are:

- **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.

2.3.8 Internal noise level guidelines are set out in Figure 2 of Pro-PG which have been reproduced in **Table 2**.

Table 2: Summary of internal noise guidelines.

Activity	Location	0700 – 2300 hours	2300 – 0700 hours
Resting	Living Room	35 dB $L_{Aeq,16hour}$	-
Dining	Dining room / area	40 dB $L_{Aeq,16hour}$	-
Sleeping (daytime resting)	Bedroom	35 dB $L_{Aeq,16hour}$	30 dB $L_{Aeq,8hour}$ 45 dB L_{AMax}

2.3.9 There are multiple notes outlined within Pro-PG with respect to **Table 2** which should be considered in full however the main points for consideration are outlined below:

- The table provides recommended internal $L_{Aeq,T}$ target levels for overall noise in the design of a building. These are the sum total of structure-borne noise and airborne noise sources.

- The internal $L_{Aeq,T}$ target levels shown in the table are based on the existing guidelines issued by the World Health Organisation (WHO) and assume normal diurnal fluctuation in external noise.
- The internal $L_{Aeq,T}$ target levels are based on annual average data and do not have to be achieved in all circumstances. For example, it is normal to exclude occasional events, such as fireworks night or New Year's Eve.
- Regular individual noise events (for example, scheduled aircraft or passing trains) can cause sleep disturbance. In most circumstances in noise-sensitive rooms at night (e.g. bedrooms) good acoustic design can be used so that individual noise events do not normally exceed 45dB $L_{Amax,F}$ more than 10 times a night. However, where it is not reasonably practicable to achieve this guideline then the judgement of acceptability will depend not only on the maximum noise levels but also on factors such as the source, number, distribution, predictability and regularity of noise events.
- Designing the site layout and the dwellings so that the internal target levels can be achieved with open windows in as many properties as possible demonstrates good acoustic design. Where it is not possible to meet internal target levels with windows open, internal noise levels can be assessed with windows closed, however any façade openings used to provide whole dwelling ventilation (e.g. trickle ventilators) should be assessed in the "open" position and, in this scenario, the internal L_{Aeq} target levels should not normally be exceeded.
- Where development is considered necessary or desirable, despite external noise levels above WHO guidelines, the internal L_{Aeq} target levels may be relaxed by up to 5 dB and reasonable internal conditions still achieved.

2.3.10 The guidelines presented in **Table 2** reflect and extend current practice contained in BS8233:2014.

2.3.11 In terms of external amenity noise assessment, Pro-PG again draws upon guidelines set presented by the WHO and also presented in BS8233:2014.

2.3.12 BS8233:2014 states that "the acoustic environment of external amenity areas that are an intrinsic part of the overall design should always be assessed and noise levels should ideally not be above the range 50 – 55 dB $L_{Aeq,16hr}$". The standard continues… "These guideline values may not be achievable in all circumstances where development might be desirable. In such a situation, development should be designed to achieve the lowest practicable noise levels in these external amenity spaces but should not be prohibited."

2.4 Noise Survey

2.4.1 As part of this assessment, NoiseAir has carried out a primarily unattended noise survey to assess the existing sound levels at the development site.

2.4.2 At the time of the survey, the condition of the existing building at the site did not allow a safe access for the installation of the sound level meter, a surrogate location was selected in a neighbour building at 103 Evesham Road. This location permitted the collection of data from the main source of noise that affects the site, i.e. Evesham Road.

2.4.3 The primary noise sources assessed are:

- Road traffic noise from Evesham Road;
- Car park on the East side of the development site; and,
- Adjoining commercial upholstery business.

2.4.4 The above noise sources have been assessed in relation to the below identified receptors:

- Future occupants of the proposed residential building.

3 ACOUSTIC SURVEY

3.1 Acoustic Survey Details

3.1.1 NoiseAir carried out fixed position noise monitoring between 18th August 2020 to 20th August 2020 at the development site.

3.1.2 Noise monitoring was undertaken at one monitoring location (ML). The noise monitoring location (ML) is shown in **Figure 2** and **Table 3** below.

Figure 2: Site layout plan and noise monitoring location.

Table 3: Summary of Noise Monitoring Locations

Monitor Location Number	Location Description	Time Period Monitored		Attended or Unattended Monitoring
		Start	End	
ML1	First floor of 103 Evesham Road, East of Development Site.	1500 18/08/20	1245 20/08/20	Unattended

3.1.3 The monitor location was positioned to be representative of the noise levels at the approximate location of the development site and so data from this location will be adopted for the calibration of the 3D sound model.

3.1.4 The microphone at ML1 was mounted on a boom out of a window with the microphone at 1 m from the façade. ML1 is considered representative of the dominant source of noise in the area, i.e. Evesham Road, and used to calibrate the 3D sound model.

3.1.5 The acoustic equipment was calibrated to comply with Section 4.2 of BS7445-1:2003[2] before and after the noise monitoring periods.

3.1.6 Details of the SLM and associated field calibration can be found in **Table 4** below;

Table 4: Summary of SLM's used for survey and associated field calibration

SLM (Serial Number)	Preamp (Serial Number	Microphone (Serial Number)	Calibrator (Serial Number)	Start Calibration	End Calibration	Drift
NOR140 (1406176)	NOR1206 (20336)	GRAS 40AF (212902)	B&K4231 (2431761)	-26 dB	-25.8 dB	0.2 dB

3.1.7 The weather conditions were noted to be as outlined in **Table 5** during the site visits at the start and end of the monitoring period.

Table 5: Summary of weather conditions noted at the start and end of the monitoring duration.

	18th August 2020	20th August 2020
Roads (Wet / Dry)	Dry	Dry
Temperature (˚C)	21	22
Wind speed (ms^{-1})	Occasional gusts up to 4.5 ms^{-1}	Occasional gusts up to 4.8 ms^{-1}
Cloud Cover (Approx. %)	100	40
Humidity (%)	66	52

3.1.8 The weather conditions remained approximately consistent over the duration of the noise survey with typical temperature fluctuations over night and daytime hours.

[2] BS7445-2003 "Description and measurement of environmental noise – Part 1: Guide to quantities and procedures.

3.1.9 A-weighted[3] L_{eq}[4] and L_{AMax}[5] noise levels were measured to comply with the requirements of Pro-PG, WHO and BS8233. A-weighted L_{90}[6] were also measured to provide additional information. The measured noise levels are set out in full in Appendix B.

3.1.10 Attending the development site at the start and end of the survey monitoring period provided opportunity for observations and detailed notes to be made of the significant noise sources which contribute to each of the measured levels.

ML1 – Front Façade 103 Evesham Road

Road Traffic Noise from Evesham Road: Ambient noise from vehicles passing in front of the site. Vehicles typically were noted to be predominantly cars, vans and light goods vehicles (LGV's).

Car movements: Car movements associated with the adjacent upholstery business were noted as a secondary source of noise at the development site.

3.2 Measured Sound Levels

3.2.1 The results for the monitoring location during the daytime and night-time periods are presented in **Table 6**.

Table 6: Average Measured Daytime and Night-time Noise Levels

Monitoring Location	Time	Measured Noise Level		
		dB $L_{Aeq,16hour}$ / dB $L_{Aeq,8hour}$	dB $L_{Aeq,1hour}$ / dB $L_{Aeq,15mins}$	dB $L_{A90,1hour}$ / dB $L_{A90,15mins}$
ML1	0700-2300	63 – 65.3*	59.1 – 67.1	41.8 – 58.4
	2300-0700	55.6 – 56.2	41.6 – 66.4	24.5 – 48.6

* 16 hour time period (note that some measurements were not made over the entire period, however an appropriate proportion of this period was included such that a typical / conservative noise climate was derived).

[3] An electronic filter in a sound level meter which mimics the human ear's response to sounds at different frequencies under defined conditions.
[4] Equivalent continuous noise level; the steady sound pressure which contains an equivalent quantity of sound energy as the time-varying sound pressure levels.
[5] The instantaneous maximum noise level recorded for a measurement period.
[6] The noise level which is exceeded for 90% of the measurement period.

3.2.2 The maximum noise level exceeded more than 10 times recorded during a single night-time period, is summarised in **Table 7**.

Table 7: Summary of the Maximum Night-time Noise Levels Exceeded More than 10 times in one Night-Time Period (Figures in dB L_{Amax}).

Monitoring Location	Measured Maximum Noise Level Exceeded More than 10 times in one night-time period (dB)
ML1	75

3.2.3 Data is shown in **Figure 3** detailing a level vs. time graph of the recorded L_{Amax}, L_{Aeq} and L_{A90} sound level over 15-minute time periods for ML1.

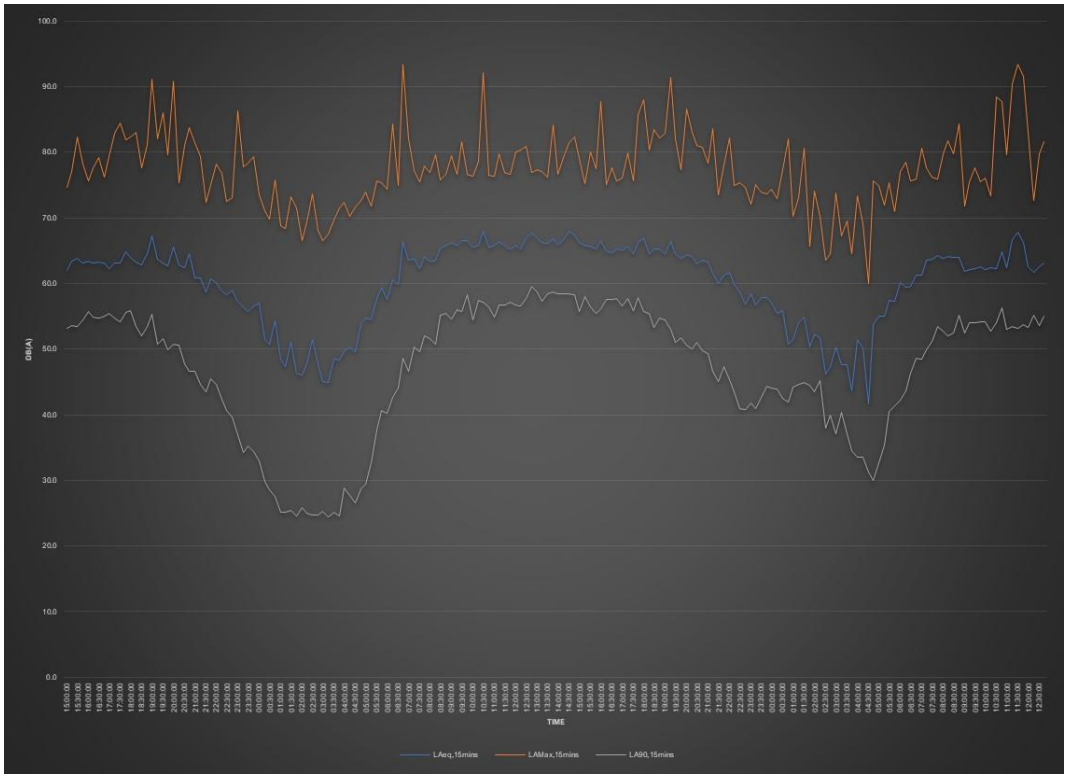

Figure 3: Level vs. time graph showing L_{Amax}, L_{Aeq} and L_{A90} sound levels – ML1.

3.3 Background Sound Levels

3.3.1 **Figure 4** details the results of the data analyses on the background sound levels in terms of the frequency of occurrence of each value at ML during daytime hours.

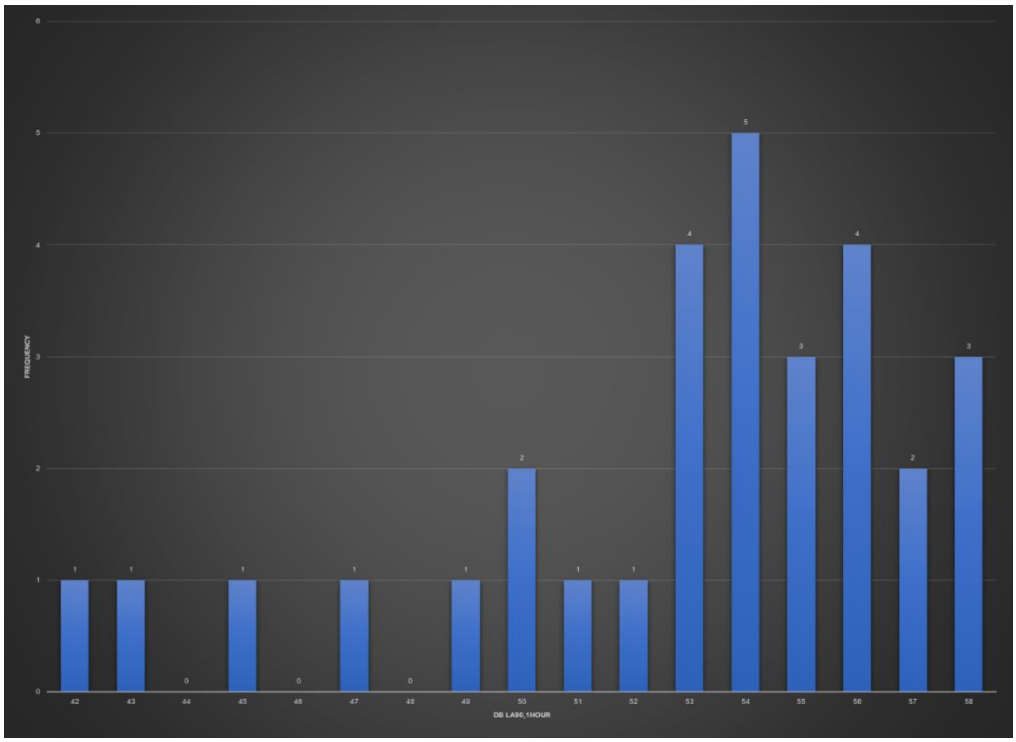

Figure 4: Data analysis of the daytime background ($L_{A90,1hour}$) sound level results – ML

3.3.2 **Figure 5** details the results of the data analyses on the background sound levels in terms of the frequency of occurrence of each value at ML during night-time hours.

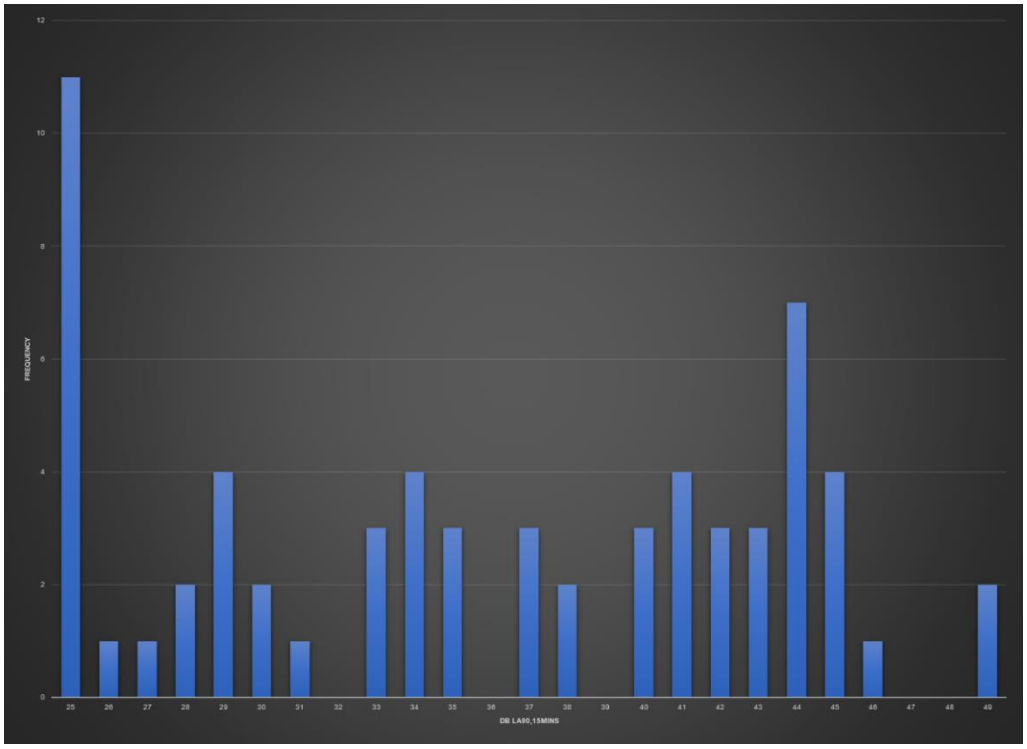

Figure 5: Data analysis of the night-time background ($L_{A90,15min}$) sound level results – ML

3.3.3 **Figure 4** shows the daytime background sound level ranged between 42 - 58 dB L_{A90} at the ML. 53 dB L_{A90} has been taken as the typical background sound level during the daytime.

3.3.4 **Figure 5** shows the night-time background sound level ranged between 25 - 49 dB L_{A90} at ML. 29 dB L_{A90} has been taken as the typical background sound level during the night-time.

3.3.5 Based on the results obtained, a robust assessment can be made of the noise levels at the site and of the mitigation necessary to achieve the required noise levels at the development

4 SITE NOISE RISK ASSESSMENT

4.1.1 In accordance with Pro-PG 2017, a Site Noise Risk Assessment (SNRA) has been carried out. The SNRA assesses the initial risk of noise to have an adverse impact on a proposed development based on the overall measured levels with no mitigation in place.

4.1.2 The results of noise measurements carried out during the daytime and night-time periods are presented in **Table 8**, and have been compared to the information provided on Figure 1 of Pro-PG 2017.

Table 8: Stage 1 Risk Assessment of Noise Levels

Monitoring Location	Residential Property Location	Daytime Noise Level (Figures in dB L_{Aeq})	Risk of Adverse Effect	Night-time Noise Level (Figures in dB L_{Aeq})	Risk of Adverse Effect
ML1	Rear of 105 Evesham Road.	65	Medium	56	Medium

4.1.3 **Table 8** indicates that during the daytime and night-time periods, proposed receptors of the development are at a '**Medium'** risk of adverse effect at the development site

4.1.4 ProPG states that:

> *'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.'*

4.1.5 The Site Noise Risk Assessment shows that local noise mitigation and good acoustic design will be required to ensure that the potential risk of the noise impact is minimised and guideline internal and external noise levels are achieved.

4.1.6 In accordance with Pro-PG 2017, a Stage 2 full noise assessment, which includes an acoustic design statement, is required to ensure future residents are protected and good acoustic design has been implemented.

5 NOISE IMPACT ASSESSMENT

5.1.1 The results of the Pro-PG Stage 1: Initial Site Noise Risk Assessment shows that receptors at the proposed development are likely to be at **'Medium'** risk of experiencing an adverse noise impact, with no mitigation in place. Therefore, an assessment against the criteria in WHO, BS8233 has been undertaken with reference to the general sound levels at the site.

5.1.2 This section forms the Stage 2 Acoustic Design Statement of Pro-PG:2017.

5.2 3D Sound Model

5.2.1 A 3D sound model has been constructed in SoundPLAN™ to calculate the predicted sound pressure levels at selected potential receiver facades. The model uses the calculation method from ISO 9613-2:1996[7] to account for the distance between the source and receiver and any screening or reflections provided by the surrounding buildings. The model is based on and calibrated against data collected during the survey presented in Section 3.2 of this report.

5.2.2 The 3D noise model specifically includes the following noise sources:

- **Traffic noise from Evesham Road** – calibrated to site measurements.
- **Car park behind development site** – calibrated using SoundPlan calculations with different cars per hour per bay movements, ranging from 1 to 3, depending on the car park bays.

5.2.3 A noise contour plot illustrating the propagation of sound from source to receptor during the day ($L_{Aeq,16hour}$), night time ($L_{Aeq,8hour}$) and night time L_{Amax} condition is given in **Figure 6, Figure 7** and **Figure 8** respectively.

[7] ISO9613-2:1996 "Acoustics – Attenuation of sound during propagation outdoors – Part 2: General method of calculation"

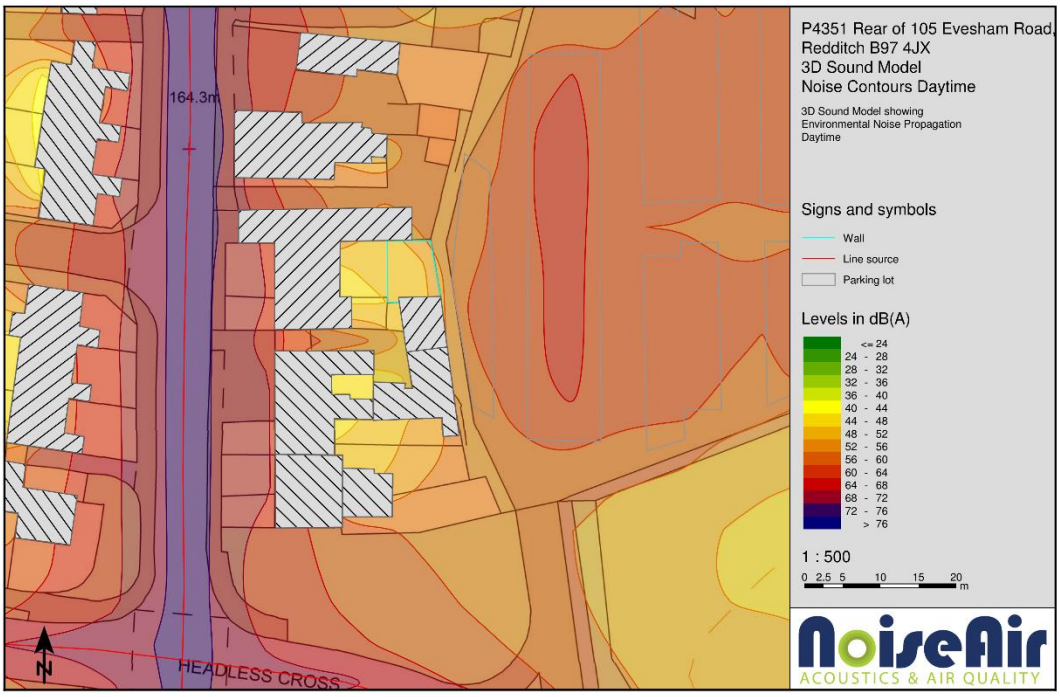

Figure 6*: Noise contour plot illustration of the predicted propagation of sound to the proposed development during the daytime –* $L_{Aeq,16hour}$.

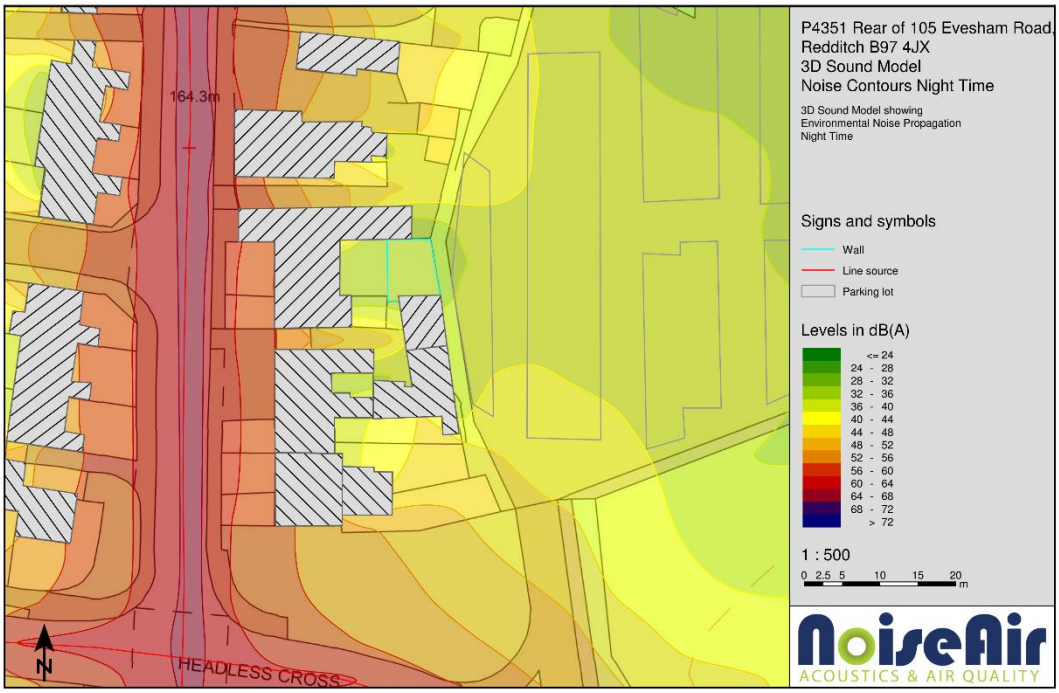

Figure 7*: Noise contour plot illustration of the predicted propagation of sound to the proposed development during the night-time –* $L_{Aeq,8hour}$.

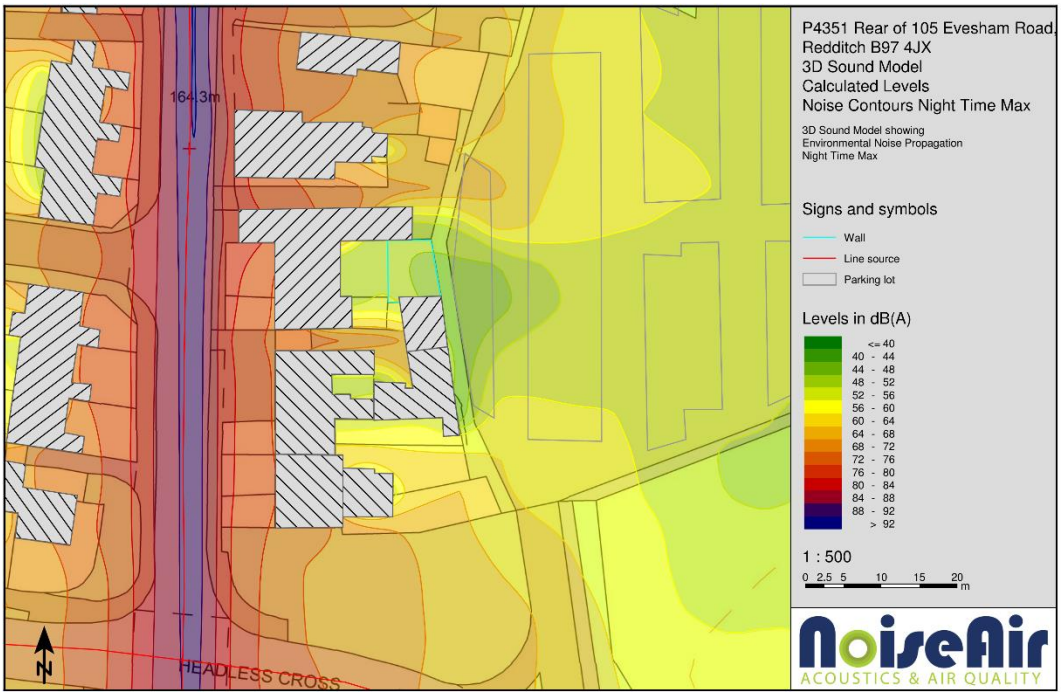

Figure 8 ***Noise contour plot illustration of the predicted propagation of sound to the proposed development during the night-time – L_{Amax}.***

5.2.4 Predicted façade readings have also been calculated. **Figure 9**, presented below, details the predicted façade noise levels at the development site.

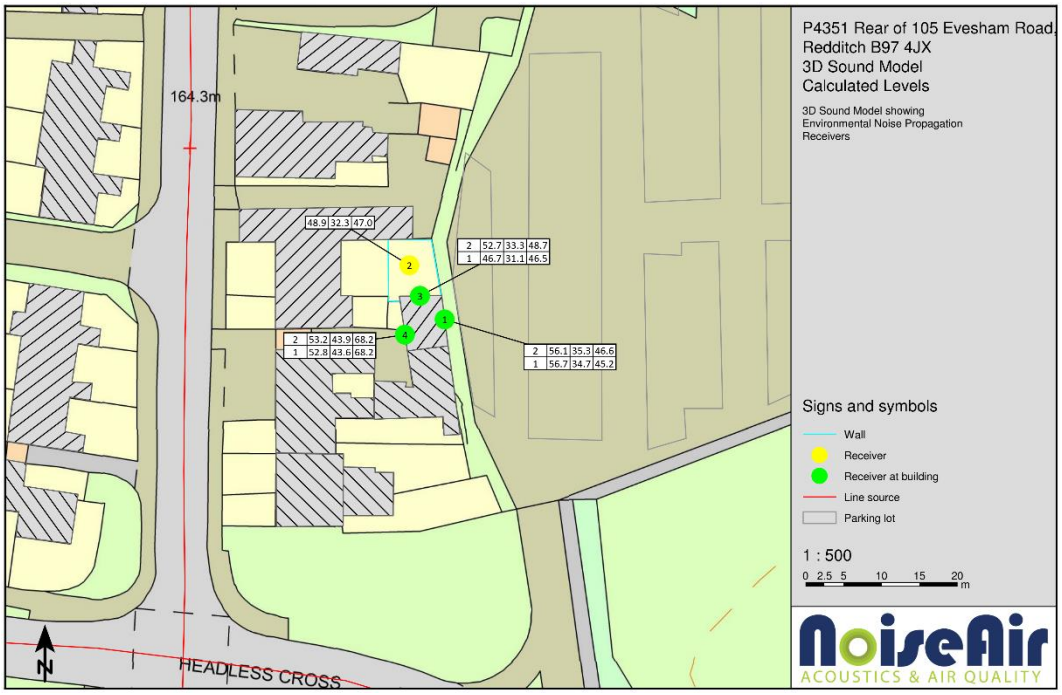

Figure 9*: Illustration of the 3D sound model façade noise levels.*

5.2.5 **Table 9** below details the predicted noise levels at each façade receptor location.

Table 9: Predicted noise levels at each façade receptor location (Figures in dB(A))					
No.	Receiver Name	Floor	Predicted Levels (dB(A))		
			Day	Night	Night Max
1	East Façade	GF	56.7	34.7	45.2
		1 FL	56.1	35.3	46.6
2	Garden	-	48.9	32.3	47
3	North Façade	GF	46.7	31.1	46.5
		1 FL	52.7	33.3	48.7
4	West Façade	GF	52.8	43.6	68.2
		1 FL	53.2	43.9	68.2

5.3 WHO Assessment of Daytime Noise Levels in Outdoor Living Areas

5.3.1 The proposals at the time of writing indicate that amenity space in form of a patio is going to be to the north of the proposed building.

5.3.2 The daytime LAeq,16hour noise level within amenity space at the development site is calculated to be 49 dB(A), and, therefore, it is below the WHO 50 dB guideline level for people being moderately annoyed.

5.4 WHO and BS8233 Assessment of Daytime Noise Levels in Living Rooms and Bedrooms

5.4.1 The predicted noise levels at the façades of the proposed building structures as detailed in **Figure 9** and **Table 9** for the day time period, together with the level of attenuation required to achieve 35 dB L_{Aeq} in the living room and bedroom areas in accordance with BS8233 (2014) and WHO (1999) are presented in **Table 10** below.

Table 10: Level of Attenuation Required to Achieve the Internal Daytime Noise Guideline Levels (Figures in dB(A))		
Façade	Worst Case Noise Level at the Façade of the Property	Worst Case Level of Attenuation Needed to Achieve 35 dB L_{Aeq} in Living Room and Bedroom Areas
West Façade	53	18
East Façade	57	22
North Façade	47	12

5.5 Assessment of Night-time Noise Levels in Bedrooms

5.5.1 The noise levels calculated from the 3D sound model at the façades of the proposed building structures as detailed in **Figure 9** and **Table 9** for the night-time period, together with the level of attenuation required to achieve 30 dB L_{Aeq} and 45 dB $L_{Amax,}$ in the bedrooms, are summarised in **Table 11**.

Table 11: Level of Attenuation Required to Achieve the Internal Night-time Noise Guideline Levels (Figures in dB(A))

Façade	Worst Case Noise Level at the Façade of the Property (dB L_{Aeq})	Maximum Noise Level at the Façade of the Property (dB $L_{Amax,f}$)	Worst Case Level of Attenuation Needed to Achieve the Noise Guideline Levels in Bedrooms (dB)
West Façade	44	68	23
East Façade	35	47	27
North Façade	33	49	17

5.6 Assessment of Internal Daytime Noise Transmission

5.6.1 The proposed residential dwelling will share a separating wall with the adjacent upholstery business located immediately next door at 107 Evesham Road.

5.6.2 The Local Authority has reasoned that potential noise emissions received within the proposed building should be assessed for the likely noise breakout from the neighbour business.

5.6.3 It is assumed that the business will operate during typical daytime working hours only (i.e. from 08:30 to 17:00). Given the typical acceptable daytime internal ambient noise levels recommended by BS8233:2014 of 35 dB(A) LAeq,16hour for 'anonymous' noise, it is reasoned that any potential noise break in from the adjacent upholstery business is likely to have 'character' and 'distinguishable' characteristics and therefore it is considered that to avoid the potential for adverse impact noise break in from the adjacent upholstery business should be reduced to 30 dB(A).

5.6.4 At the time of writing, detailed construction details of the existing partition between both buildings is unknown. For the purpose of this assessment, the existing separating wall is assumed as two layers of 70 mm brick construction i.e. 140 mm total thickness.

5.6.5 The above system description was input within sound insulation software Insul (Marshall Day Acoustics, 2014), providing a predicted sound reduction value of 46 dB Rw.

5.6.6 The dominant internal noise source in the adjacent building, taken into consideration the nature of the business, is considered potential noise from compressors, air tools and hand tools to refurbish furniture. To conduct a conservative assessment, the internal noise level of 85 dB (A) has been adopted assuming a reverberant sound field.

5.6.7 To account for "real world" construction factors, a 5 dB margin has been taken into account with respect to the calculations.

5.6.8 Based on the internal source level of 85 dB (A) for compressors, air tools and hand tools, the level of sound attenuation required to achieve daytime noise guideline values within adjoining habitable rooms is summarised within **Table 12**.

Table 12: Level of Attenuation Required to Achieve the Internal Daytime Noise Guideline Levels (Figures in dB(A))

Noise Source (compressors, air tools and hand tools to refurbish furniture), dB	Level of Attenuation Needed to Achieve 25 dB L_{Aeq} in Living Room and Bedroom Areas
85	60

5.6.9 Given the aforementioned, NoiseAir recommend the following enhancements to the existing minimum 140 mm brick separating wall:

- Double timber stud, with a 100 mm airgap and stud spacing 600 mm;
- Infill of fibreglass with a minimum density of 10 kg/m^3 and a thickness of 60 mm; and,
- Two 15 layers of 12.5 mm Gyproc SoundBloc.

5.6.10 Independent joists should be installed using an isolating mounting system to minimise structural flanking transmission.

5.6.11 A full breakdown of the recommend system description and subsequent sound insulation predictions can be viewed within **Appendix F.**

5.6.12 **Table 13** summarises the level of reduction and excess over criteria based on the predicted sound reduction of the enhanced wall structure.

Table 13: Level of Attenuation Provided by the Enhanced Partition Structure

Noise Source (compressors, air tools and hand tools to refurbish furniture), dB	Level of Attenuation Needed to Achieve 25 dB L_{Aeq} in Living Room and Bedroom Areas, dB Rw	Level of Attenuation Provided by The Proposed Dividing Structure, dB Rw
85	60	78

6 SOUND INSULATION SCHEME

6.1 Building Envelope Requirements – Windows Closed

6.1.1 Proposals for the development site at the time of writing outline a proposed new two storey building with residential use, specifically a two-bedroom apartment with an external amenity area. The proposed layout is presented in Appendix C.

6.1.2 Bedrooms face facades at the north, east and west of the property. Therefore, internal noise levels are required to not exceed 35 dB L_{Aeq} during the daytime hours in all rooms and 30 dB L_{Aeq} and 45 dB L_{Amax} during the night-time hours in bedrooms.

6.1.3 The living room and dining room share the same space in the ground floor, therefore, the internal noise levels to be achieve will be the most restrictive, in this case, the internal noise levels in living rooms, as they require not to exceed 35 dB L_{Aeq} during the daytime hours.

6.1.4 When assessing sound levels in habitable areas of the proposed development, the sound attenuation provided by the overall building facade should be considered. To mitigate sound levels, the composition of the building facade can be designed to provide the level of attenuation required. Glazing is generally the building element which attenuates noise the least, so the proportion of glazing in a building facade is an important consideration when assessing overall sound attenuation. Additionally, any façade penetrations should also be considered such as for ventilation i.e. trickle ventilation.

6.1.5 Based on the design details forwarded, worst case façade attenuation calculations have been undertaken in accordance with BS EN ISO 12354-3:2000. Full details of the calculations undertaken are presented in Appendix D.

6.1.6 Calculations show that to achieve a reasonable internal acoustic environment in habitable rooms as specified within BS8233, the building envelope constructions should be selected to meet the sound reduction index (SRI) values presented in **Table 14** and **Table 15**.

Table 14: Summary of Building Envelope Performance Requirements to Bedrooms at All Facades – Daytime and Night-time		
Walls	50 dB R_w+C_{tr}	Example - Brick / Block cavity wall with insulation and internal plasterboard lining
Roof	47 dB R_w	Example - Pitched tile roof / 12.5mm plasterboard ceiling with 100 mm insulation.
Glazing	34 dB R_w+C_{tr}	Example - Pilkington Optiphon 6 mm - 16 mm Argon - 6.8 mm or similar
Trickle Vent	35 dB $D_{ne,w}$+C_{tr}	Example: Titon - TA5221 (V25) + TA5005 (SF 418) 2500EA or similar
NOTE: where an active ventilation system is adopted (i.e. MVHR) and passive ventilation is not required (i.e. no trickle vents) the glazing specification should be retained at 34 dB R_w+C_{tr}.		

Table 15: Summary of Building Envelope Performance Requirements to Living Rooms at All Facades – Daytime and Night-time		
Walls	50 dB R_w+C_{tr}	Example - Brick / Block cavity wall with insulation and internal plasterboard lining
Glazing	34 dB R_w+C_{tr}	Example - Glazing: Pilkington Optiphon 6 mm - 16 mm Argon - 6.8 mm or similar.
Trickle Vent	35 dB $D_{ne,w}$+C_{tr}	Example: Titon - TA5221 (V25) + TA5005 (SF 418) 2500EA or similar
NOTE: where an active ventilation system is adopted (i.e. MVHR) and passive ventilation is not required (i.e. no trickle vents) the glazing specification should be retained at 34 dB R_w+C_{tr}.		

6.2 Building Envelope Performance – Windows Open

6.2.1 The sound performance requirements for bedrooms, living and dining rooms at the development during the daytime and night-time in rooms with windows closed are summarised in Section 6.1.

6.2.2 However, with windows open, the attenuation provided by the façade will be approximately 10-15 dB(A). This would potentially allow the recommended internal noise limit to be exceeded in most rooms at the development during certain parts of a typical day / night.

6.2.3 On occasions, this may be acceptable to a resident, but when quiet conditions are required, the resident should be able to close the windows whilst maintaining adequate ventilation. Some form of acoustic ventilation would therefore need to be installed within the building; ventilation is to be designed by others.

6.3 Acoustic Ventilation Requirements

6.3.1 It is recommended that the acoustic ventilation proposed at the site should, as a minimum, comply with Building Regulations 2000 Approved Document F1 Means of Ventilation and British Standard BS5925 1991: "Code of Practice for Ventilation Principles and Designing for Natural Ventilation". Acoustic ventilation is only recommended for noise sensitive rooms, which are bedrooms and living/dining rooms.

6.3.2 Where a passive ventilation system is incorporated into the design, ventilators should be acoustically treated for habitable rooms to all facades.

6.3.3 The implementation of the recommended glazing together with appropriate acoustic ventilation would ensure that the required internal daytime and night-time noise limits are achieved.

6.3.4 It should be further noted that the glazing and ventilation configurations within this report are for guidance only. Similar products to those used in NoiseAir calculations may achieve a similar level of sound reduction however this should be verified by the manufacturer.

6.3.5 As explained in Section 6.2 it is likely that noise levels in noise sensitive rooms within some of the proposed dwelling will likely rely on the windows being in the closed position and therefore appropriate ventilation design should be completed. It is likely that either a passive or active ventilation system can be adopted at the development site, basic acoustic requirements for any passive ventilation which may be installed are outlined in Section 6.1 however it should be noted that ventilation requirements for future occupants of the proposed development are outside the scope of this report.

6.3.6 Where an active ventilation system is to be adopted at the development site by the client, such as an MVHR system, and there are to be no trickle ventilators installed at the development site, the acoustic requirement of the glazing at the development site may be reduced. Any mechanical ventilation adopted for the noise sensitive rooms should have a noise output which complies with NR25 L_{eq} noise rating curve.

7 CONCLUSIONS

7.1.1 NoiseAir has carried out a noise impact assessment with respect to the proposed residential development to be located at the rear of 105 Evesham Road, Redditch B97 4JX.

7.1.2 Proposals detail the construction of a new two storey building, specifically, a two-bedroom dwelling.

7.1.3 The development site is located within an urban area of Redditch, with the west side of the site in close proximity to Evesham road. The proposed development site is situated within a mixed residential and commercial area with residential properties of similar characteristics of the proposed building in the local surroundings.

7.1.4 The primary noise sources assessed as part of the NIA are:

- Road traffic noise from Evesham Road;
- Car park movements from car park on the East side of the development site; and,
- Adjoining commercial upholstery business.

7.1.5 The results of the noise survey and initial site noise risk assessment show that areas of the development have a '**Medium**' risk of adverse effect in accordance with Pro-PG without mitigation.

7.1.6 Building performance requirements with windows closed are based around two design categories as presented in **Table 14** and **Table 15** of this report.

7.1.7 With windows open the recommended internal noise limit is likely to be exceeded in most habitable rooms at the development site.

7.1.8 Internal noise transfer across the separating wall between the development site and the adjoining upholstery business has been assessed within Section 5.6 and recommendations for wall enhancements provided.

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APPENDIX A - REPORT LIMITATIONS

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This Report is presented to Mr Shahid Farooqui and may not be used or relied on by any other person or by the client in relation to any other matters not covered specifically by the scope of this report.

Notwithstanding anything to the contrary contained in the report, NoiseAir Limited is obliged to exercise reasonable skill, care and diligence in the performance of the services required by Mr Shahid Farooqui and NoiseAir shall not be liable except to the extent that it has failed to exercise reasonable skill, care and diligence, and this report shall be read and construed accordingly.

This report has been prepared by NoiseAir Limited. No individual is personally liable in connection with the preparation of this report. By receiving this report and acting on it, the client or any other person accepts that no individual is personally liable whether in contract, tort, for breach of statutory duty or otherwise.

The conclusions and recommendations contained in this report are based upon information provided by others and upon the assumption that all relevant information has been provided by those parties from who it has been requested and that such information is accurate. Information obtained by NoiseAir Limited has not been independently verified by NoiseAir Limited unless otherwise stated in the report and should be treated accordingly.

Where assessments of works or costs identified in this report are made, such assessments are based upon the information available at the time and where appropriate are subject to further investigations or information which may become available.

Where / if estimates and projects are made within this report, are made based on reasonable assumptions as of the date of this report, such statements however by their very nature involve risks and uncertainties that could cause actual results to differ materially from the results predicted. NoiseAir Limited specifically does not guarantee or warrant any estimates or projects contained in this report.

DISCLAIMER- This report was prepared by NoiseAir Limited. The material in it contains NoiseAir Limited best judgment in light of the information available at the time of preparation of this report. Any use which a third party makes of this report, or any reliance on, or decisions based on it are the responsibility of such third parties. NoiseAir Limited accept no responsibility for damages, if any, suffered by any third party as a result of decisions made or actions taken based on this report.

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APPENDIX B – METER READINGS

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ML1

Start Date	Start Time	Duration	L_{Aeq}	L_{AFMax}	L_{A90}
dd/mm/yyyy	hh:mm:ss	hh:mm:ss	dB	dB	dB
18/08/2020	15:00:00	00:15:00	62.0	74.7	53.2
18/08/2020	15:15:00	00:15:00	63.4	77.1	53.6
18/08/2020	15:30:00	00:15:00	63.9	82.3	53.4
18/08/2020	15:45:00	00:15:00	63.1	78.2	54.4
18/08/2020	16:00:00	00:15:00	63.4	75.6	55.8
18/08/2020	16:15:00	00:15:00	63.2	77.7	54.9
18/08/2020	16:30:00	00:15:00	63.3	79.2	54.8
18/08/2020	16:45:00	00:15:00	63.2	76.2	55.0
18/08/2020	17:00:00	00:15:00	62.3	79.4	55.4
18/08/2020	17:15:00	00:15:00	63.2	82.9	54.7
18/08/2020	17:30:00	00:15:00	63.2	84.5	54.1
18/08/2020	17:45:00	00:15:00	64.8	81.9	55.6
18/08/2020	18:00:00	00:15:00	64.0	82.4	55.9
18/08/2020	18:15:00	00:15:00	63.3	83.0	53.5
18/08/2020	18:30:00	00:15:00	62.9	77.6	52.0
18/08/2020	18:45:00	00:15:00	64.6	81.2	53.4
18/08/2020	19:00:00	00:15:00	67.3	91.2	55.3
18/08/2020	19:15:00	00:15:00	63.7	82.1	50.7
18/08/2020	19:30:00	00:15:00	63.1	86.0	51.6
18/08/2020	19:45:00	00:15:00	62.7	79.6	49.9
18/08/2020	20:00:00	00:15:00	65.6	90.9	50.7
18/08/2020	20:15:00	00:15:00	62.8	75.4	50.6
18/08/2020	20:30:00	00:15:00	62.4	81.0	47.8
18/08/2020	20:45:00	00:15:00	64.5	83.8	46.7
18/08/2020	21:00:00	00:15:00	60.8	81.5	46.6
18/08/2020	21:15:00	00:15:00	60.8	79.4	44.6
18/08/2020	21:30:00	00:15:00	58.7	72.4	43.5
18/08/2020	21:45:00	00:15:00	60.7	75.1	45.5
18/08/2020	22:00:00	00:15:00	60.1	78.2	44.6
18/08/2020	22:15:00	00:15:00	58.9	76.8	42.4
18/08/2020	22:30:00	00:15:00	58.3	72.5	40.6
18/08/2020	22:45:00	00:15:00	59.0	73.1	39.7
18/08/2020	23:00:00	00:15:00	57.3	86.3	37.0
18/08/2020	23:15:00	00:15:00	56.5	77.8	34.2
18/08/2020	23:30:00	00:15:00	55.8	78.3	35.2
18/08/2020	23:45:00	00:15:00	56.6	79.4	34.4
19/08/2020	00:00:00	00:15:00	57.0	73.5	33.0
19/08/2020	00:15:00	00:15:00	51.4	71.1	29.9
19/08/2020	00:30:00	00:15:00	50.8	69.8	28.6
19/08/2020	00:45:00	00:15:00	54.3	75.8	27.6
19/08/2020	01:00:00	00:15:00	48.5	68.8	25.1
19/08/2020	01:15:00	00:15:00	47.3	68.4	25.1
19/08/2020	01:30:00	00:15:00	51.0	73.2	25.4
19/08/2020	01:45:00	00:15:00	46.3	71.5	24.6
19/08/2020	02:00:00	00:15:00	46.0	66.5	25.9
19/08/2020	02:15:00	00:15:00	47.7	69.4	25.0
19/08/2020	02:30:00	00:15:00	51.4	73.6	24.7
19/08/2020	02:45:00	00:15:00	47.8	68.1	24.7
19/08/2020	03:00:00	00:15:00	45.0	66.6	25.3

Start Date	Start Time	Duration	L_{Aeq}	L_{AFMax}	L_{A90}
dd/mm/yyyy	hh:mm:ss	hh:mm:ss	dB	dB	dB
19/08/2020	03:15:00	00:15:00	44.9	67.5	24.5
19/08/2020	03:30:00	00:15:00	48.6	69.7	25.2
19/08/2020	03:45:00	00:15:00	48.3	71.5	24.6
19/08/2020	04:00:00	00:15:00	49.8	72.4	28.8
19/08/2020	04:15:00	00:15:00	50.3	70.2	27.7
19/08/2020	04:30:00	00:15:00	49.6	71.6	26.6
19/08/2020	04:45:00	00:15:00	53.9	72.6	28.7
19/08/2020	05:00:00	00:15:00	54.7	73.9	29.4
19/08/2020	05:15:00	00:15:00	54.6	71.8	32.7
19/08/2020	05:30:00	00:15:00	57.7	75.6	37.7
19/08/2020	05:45:00	00:15:00	59.5	75.3	40.6
19/08/2020	06:00:00	00:15:00	57.6	74.4	40.2
19/08/2020	06:15:00	00:15:00	60.6	84.3	42.7
19/08/2020	06:30:00	00:15:00	59.9	74.9	44.0
19/08/2020	06:45:00	00:15:00	66.4	93.4	48.6
19/08/2020	07:00:00	00:15:00	63.6	82.1	46.7
19/08/2020	07:15:00	00:15:00	63.8	77.2	50.3
19/08/2020	07:30:00	00:15:00	62.3	75.5	49.6
19/08/2020	07:45:00	00:15:00	64.1	77.9	52.0
19/08/2020	08:00:00	00:15:00	63.4	77.0	51.6
19/08/2020	08:15:00	00:15:00	63.5	79.7	50.7
19/08/2020	08:30:00	00:15:00	65.4	75.8	55.1
19/08/2020	08:45:00	00:15:00	65.8	76.7	55.5
19/08/2020	09:00:00	00:15:00	66.3	79.5	54.6
19/08/2020	09:15:00	00:15:00	65.9	76.6	56.0
19/08/2020	09:30:00	00:15:00	66.5	81.6	55.7
19/08/2020	09:45:00	00:15:00	66.6	76.7	58.3
19/08/2020	10:00:00	00:15:00	65.6	76.4	54.5
19/08/2020	10:15:00	00:15:00	65.8	78.7	57.4
19/08/2020	10:30:00	00:15:00	67.9	92.2	57.2
19/08/2020	10:45:00	00:15:00	65.6	76.5	56.4
19/08/2020	11:00:00	00:15:00	65.8	76.4	54.9
19/08/2020	11:15:00	00:15:00	66.4	79.8	56.8
19/08/2020	11:30:00	00:15:00	65.9	77.0	56.7
19/08/2020	11:45:00	00:15:00	65.3	76.6	57.1
19/08/2020	12:00:00	00:15:00	65.8	80.1	56.8
19/08/2020	12:15:00	00:15:00	65.2	80.3	56.6
19/08/2020	12:30:00	00:15:00	67.0	80.9	57.7
19/08/2020	12:45:00	00:15:00	67.7	76.9	59.6
19/08/2020	13:00:00	00:15:00	67.0	77.4	58.7
19/08/2020	13:15:00	00:15:00	66.3	77.1	57.3
19/08/2020	13:30:00	00:15:00	66.1	76.2	58.5
19/08/2020	13:45:00	00:15:00	66.8	84.2	58.7
19/08/2020	14:00:00	00:15:00	66.0	76.7	58.4
19/08/2020	14:15:00	00:15:00	66.7	79.2	58.5
19/08/2020	14:30:00	00:15:00	67.9	81.5	58.5
19/08/2020	14:45:00	00:15:00	67.4	82.3	58.3
19/08/2020	15:00:00	00:15:00	66.2	79.0	55.8
19/08/2020	15:15:00	00:15:00	65.8	75.2	58.0
19/08/2020	15:30:00	00:15:00	65.7	80.1	56.5

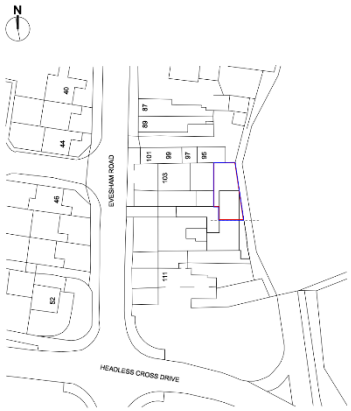
Start Date	Start Time	Duration	L_{Aeq}	L_{AFMax}	L_{A90}
dd/mm/yyyy	hh:mm:ss	hh:mm:ss	dB	dB	dB
19/08/2020	15:45:00	00:15:00	65.2	77.5	55.4
19/08/2020	16:00:00	00:15:00	66.5	87.7	56.1
19/08/2020	16:15:00	00:15:00	65.0	75.1	57.6
19/08/2020	16:30:00	00:15:00	64.7	77.7	57.6
19/08/2020	16:45:00	00:15:00	65.2	75.7	57.7
19/08/2020	17:00:00	00:15:00	65.1	76.1	56.6
19/08/2020	17:15:00	00:15:00	65.7	79.9	57.7
19/08/2020	17:30:00	00:15:00	64.5	75.7	55.9
19/08/2020	17:45:00	00:15:00	66.2	85.8	57.8
19/08/2020	18:00:00	00:15:00	67.0	88.0	55.7
19/08/2020	18:15:00	00:15:00	64.6	80.3	55.4
19/08/2020	18:30:00	00:15:00	65.3	83.5	53.3
19/08/2020	18:45:00	00:15:00	65.2	82.2	54.7
19/08/2020	19:00:00	00:15:00	64.6	82.9	54.5
19/08/2020	19:15:00	00:15:00	66.4	91.5	53.0
19/08/2020	19:30:00	00:15:00	64.5	82.1	51.0
19/08/2020	19:45:00	00:15:00	63.8	77.4	51.8
19/08/2020	20:00:00	00:15:00	64.4	86.6	50.6
19/08/2020	20:15:00	00:15:00	64.1	83.0	50.0
19/08/2020	20:30:00	00:15:00	63.0	81.1	51.1
19/08/2020	20:45:00	00:15:00	63.5	80.8	49.7
19/08/2020	21:00:00	00:15:00	63.3	78.3	49.3
19/08/2020	21:15:00	00:15:00	61.5	83.6	46.7
19/08/2020	21:30:00	00:15:00	60.0	73.5	45.1
19/08/2020	21:45:00	00:15:00	61.3	78.1	47.3
19/08/2020	22:00:00	00:15:00	61.7	82.2	45.4
19/08/2020	22:15:00	00:15:00	59.9	74.9	43.5
19/08/2020	22:30:00	00:15:00	58.7	75.4	40.9
19/08/2020	22:45:00	00:15:00	56.9	74.6	40.8
19/08/2020	23:00:00	00:15:00	58.5	72.1	41.8
19/08/2020	23:15:00	00:15:00	56.7	75.1	41.0
19/08/2020	23:30:00	00:15:00	57.8	74.0	42.6
19/08/2020	23:45:00	00:15:00	57.9	73.6	44.4
20/08/2020	00:00:00	00:15:00	57.1	74.3	44.0
20/08/2020	00:15:00	00:15:00	55.5	73.0	43.9
20/08/2020	00:30:00	00:15:00	55.9	77.3	42.5
20/08/2020	00:45:00	00:15:00	50.8	82.1	41.9
20/08/2020	01:00:00	00:15:00	51.4	70.2	44.2
20/08/2020	01:15:00	00:15:00	54.0	73.1	44.7
20/08/2020	01:30:00	00:15:00	54.9	80.6	44.9
20/08/2020	01:45:00	00:15:00	50.3	65.7	44.5
20/08/2020	02:00:00	00:15:00	52.3	74.1	43.5
20/08/2020	02:15:00	00:15:00	51.8	70.2	45.2
20/08/2020	02:30:00	00:15:00	46.2	63.5	38.0
20/08/2020	02:45:00	00:15:00	47.3	64.6	39.9
20/08/2020	03:00:00	00:15:00	50.4	73.8	37.1
20/08/2020	03:15:00	00:15:00	47.6	67.3	40.4
20/08/2020	03:30:00	00:15:00	47.6	69.6	37.1
20/08/2020	03:45:00	00:15:00	43.6	64.6	34.6
20/08/2020	04:00:00	00:15:00	51.4	73.4	33.6

Start Date	Start Time	Duration	L_{Aeq}	L_{AFMax}	L_{A90}
dd/mm/yyyy	hh:mm:ss	hh:mm:ss	dB	dB	dB
20/08/2020	04:15:00	00:15:00	50.2	69.1	33.6
20/08/2020	04:30:00	00:15:00	41.6	60.0	31.2
20/08/2020	04:45:00	00:15:00	53.7	75.7	30.0
20/08/2020	05:00:00	00:15:00	55.0	74.9	32.7
20/08/2020	05:15:00	00:15:00	55.0	71.9	35.4
20/08/2020	05:30:00	00:15:00	57.5	75.3	40.5
20/08/2020	05:45:00	00:15:00	57.3	71.0	41.3
20/08/2020	06:00:00	00:15:00	60.1	77.1	42.2
20/08/2020	06:15:00	00:15:00	59.5	78.5	43.7
20/08/2020	06:30:00	00:15:00	59.6	75.6	46.3
20/08/2020	06:45:00	00:15:00	61.3	75.9	48.6
20/08/2020	07:00:00	00:15:00	61.3	80.7	48.5
20/08/2020	07:15:00	00:15:00	63.6	77.7	49.9
20/08/2020	07:30:00	00:15:00	63.7	76.2	51.2
20/08/2020	07:45:00	00:15:00	64.2	75.9	53.5
20/08/2020	08:00:00	00:15:00	63.8	79.8	52.8
20/08/2020	08:15:00	00:15:00	64.1	81.7	52.1
20/08/2020	08:30:00	00:15:00	64.0	79.8	52.4
20/08/2020	08:45:00	00:15:00	64.0	84.3	55.1
20/08/2020	09:00:00	00:15:00	61.8	71.8	52.5
20/08/2020	09:15:00	00:15:00	62.1	75.5	54.0
20/08/2020	09:30:00	00:15:00	62.3	77.6	54.0
20/08/2020	09:45:00	00:15:00	62.6	75.5	54.1
20/08/2020	10:00:00	00:15:00	62.1	76.1	54.2
20/08/2020	10:15:00	00:15:00	62.4	73.4	52.8
20/08/2020	10:30:00	00:15:00	62.3	88.4	54.0
20/08/2020	10:45:00	00:15:00	64.8	87.8	56.3
20/08/2020	11:00:00	00:15:00	62.4	79.6	53.1
20/08/2020	11:15:00	00:15:00	66.7	90.5	53.4
20/08/2020	11:30:00	00:15:00	67.8	93.4	53.2
20/08/2020	11:45:00	00:15:00	66.2	91.6	53.7
20/08/2020	12:00:00	00:15:00	62.5	83.0	53.3
20/08/2020	12:15:00	00:15:00	61.7	72.7	55.1
20/08/2020	12:30:00	00:15:00	62.5	79.8	53.6
20/08/2020	12:45:00	00:15:00	63.1	81.6	55.0

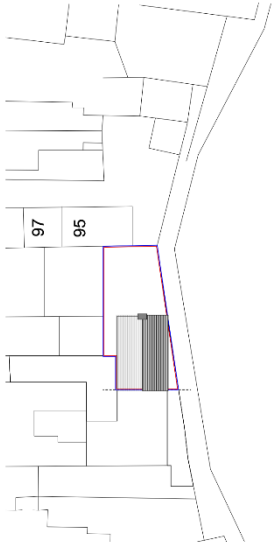
APPENDIX C – PROPOSAL DRAWINGS

REAR OF 105 EVESHAM ROAD

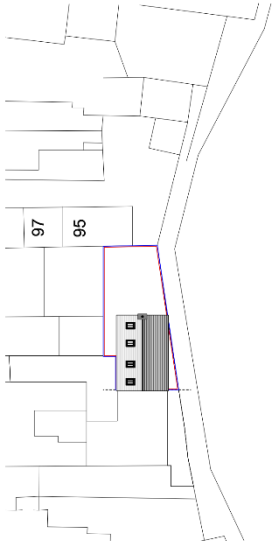
As Existing & As Proposed



LOCATION PLAN
SCALE 1:500 @ A1



BLOCK PLAN AS EXISTING
SCALE 1:200 @ A1



BLOCK PLAN AS PROPOSED
SCALE 1:200 @ A1

Scale 1:200 @ A1

PLANNING drawings are not for construction

Drawing no: 001
Page Size: A1

REAR OF 105 EVESHAM ROAD

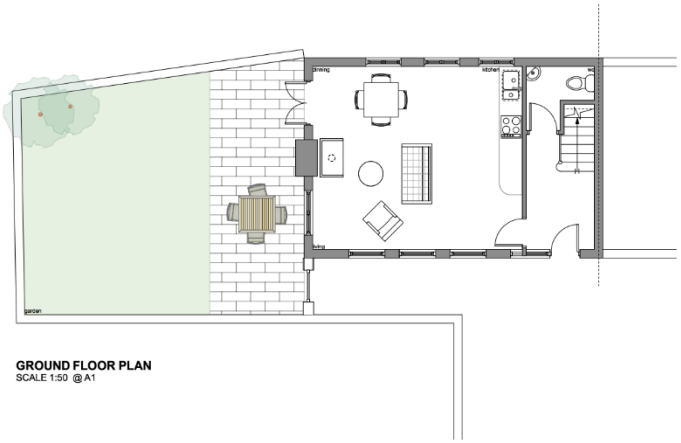
As Proposed

DRAWINGS NOTE:

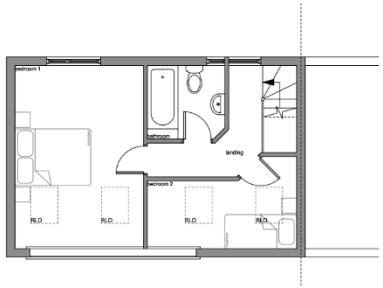
1. Re-roofed using slate or similar to match existing.
2. Restore existing brickwork.
3. New windows to match existing in style.
4. Rooflights to be conservation style or similar.
5. Fill in first floor windows on West elevation.

GENERAL NOTES:

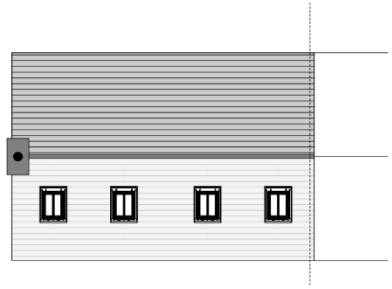
1. Artist's impressions and site axo's are for representation purpose only.
2. Neighbours property is not surveyed and it is only shown as part of site context.



GROUND FLOOR PLAN
SCALE 1:50 @ A1



FIRST FLOOR PLAN
SCALE 1:50 @ A1



ROOF PLAN
SCALE 1:50 @ A1

Scale 1:50 @ A1

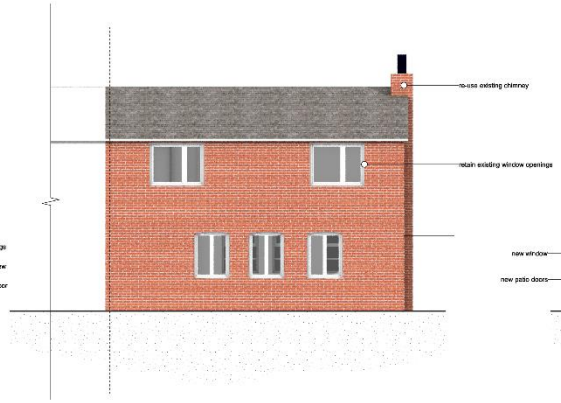
PLANNING drawings are not for construction

Drawing no: 002
Page Size: A1

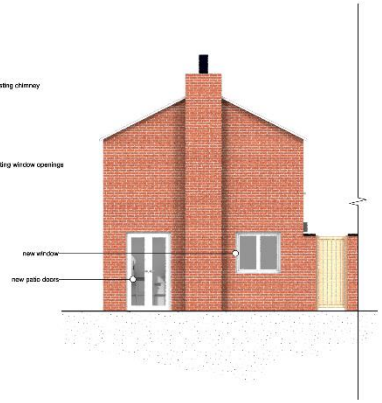
REAR OF 105 EVESHAM ROAD

As Proposed

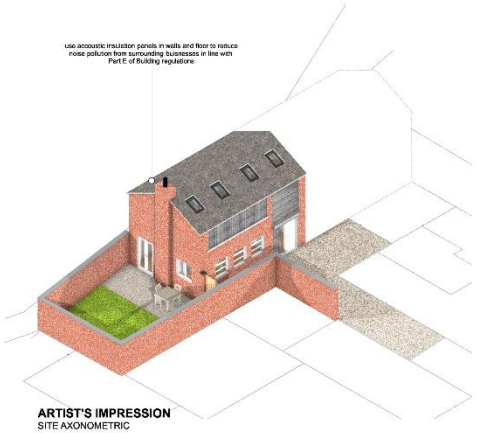
FRONT ELEVATION
SCALE 1:50 @ A1



BACK ELEVATION
SCALE 1:50 @ A1



SIDE ELEVATION
SCALE 1:50 @ A1



ARTIST'S IMPRESSION
SITE AXONOMETRIC

ARTIST'S IMPRESSION
SITE AXONOMETRIC

DRAWINGS NOTE:

1. Re-roofed using slate to match existing.
2. Restore existing brickwork.
3. New windows to match existing in style.
4. Rooflights to be conservation style or similar.
5. Fill in first floor windows on West elevation.
6. use accoustic insulation panels in walls and floors to reduce noise pollution from surrounding buisnesses in line with Part E of Building regulations.

GENERAL NOTES:

1. Artist's impressions and site axo's are for representation purpose only.
2. Neighbours property is not surveyed and it is only shown as part of site context.

PLANNING drawings are not for construction

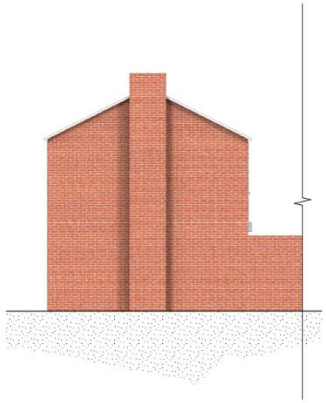
Drawing no: 003
Page Size: A1

REAR OF 105 EVESHAM ROAD

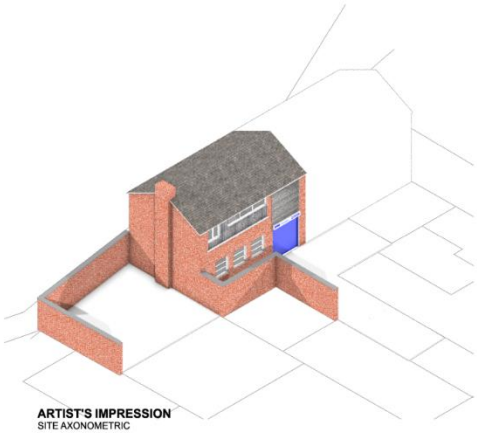
As Existing

FRONT ELEVATION
SCALE 1:50 @A1

BACK ELEVATION
SCALE 1:50 @A1



SIDE ELEVATION
SCALE 1:50 @A1



ARTIST'S IMPRESSION
SITE AXONOMETRIC

ARTIST'S IMPRESSION
SITE AXONOMETRIC

GENERAL NOTES:

1. Artist's impressions and site axo's are for representation purpose only.
2. Neighbours property is not surveyed and it is only shown as part of site context.

PLANNING drawings are not for construction

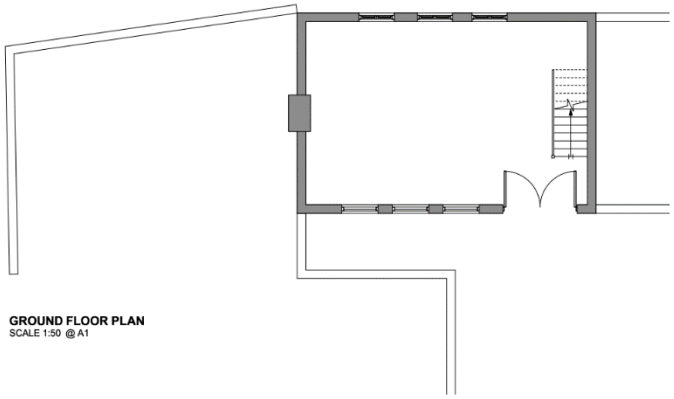
Drawing no: 004
Page Size: A1

REAR OF 105 EVESHAM ROAD

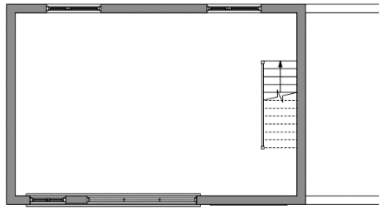
As Existing

GENERAL NOTES:

1. Artist's impressions and site axo's are for representation purpose only.
2. Neighbours property is not surveyed and it is only shown as part of site context.



GROUND FLOOR PLAN
SCALE 1:50 @ A1



FIRST FLOOR PLAN
SCALE 1:50 @ A1

ROOF PLAN
SCALE 1:50 @ A1

Scale 1:50 @ A1

PLANNING drawings are not for construction

Drawing no: 005
Page Size: A1

APPENDIX D – BS12354-3:2000 CALCULATIONS

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Rear of 105 Evesham Road - Proposed Building

BA Outside1.baf - Interior level calculations

Living Room / GF / Proposed Building

Room type:	Living room	Room geometry:	5.54 m x 4.83 m = 26.76 m²
L2,nT valid:	35.0 dB	L2,nT existent / improved:	17.2 / 17.2 dB

Typical Example: 100 mm brick exterior wall, 100 mm cavity with 60 mm 10 kg / m3 fiberglass insulation, 100 mm lightweight concrete block / breeze block and two layers of plasterboard.

Example - Glazing: Pilkington Optiphon 6 mm - 16 mm Argon - 6.8 mm or similar.

West Facade

Facade geometry:	5.54 m x 2.50 m = 13.85 m²
L2,nTi existent / improved:	10.5 / 10.5 dB
Assessment level Day:	53.0 dB(A)
Correction for facade structure by EN 12354-3	0.0 dB
Correction by user:	0.0 dB
Exterior level:	53.0 dB

ser. No.	Component existent	Count	Area [m²]	R'w [dB]	Dn,e [dB]		Component improved	Count	Area [m²]	R'w [dB]	Dn,e [dB]	Fan
1	Wall	1	10.97	50	-	=	Wall	1	10.97	50	-	-
2	Window	3	0.96	34	-	=	Window	3	0.96	34	-	-

East Facade

Facade geometry:	5.54 m x 2.50 m = 13.85 m²
L2,nTi existent / improved:	14.7 / 14.7 dB
Assessment level Day:	57.0 dB(A)
Correction for facade structure by EN 12354-3	0.0 dB
Correction by user:	0.0 dB
Exterior level:	57.0 dB

ser. No.	Component existent	Count	Area [m²]	R'w [dB]	Dn,e [dB]		Component improved	Count	Area [m²]	R'w [dB]	Dn,e [dB]	Fan
1	Wall	1	10.81	50	-	=	Wall	1	10.81	50	-	-
2	Window	3	1.01	34	-	=	Window	3	1.01	34	-	-

North Facade

Facade geometry:	4.83 m x 2.50 m = 12.07 m²
L2,nTi existent / improved:	10.8 / 10.8 dB
Assessment level Day:	46.0 dB(A)
Correction for facade structure by EN 12354-3	0.0 dB
Correction by user:	0.0 dB
Exterior level:	46.0 dB

ser. No.	Component existent	Count	Area [m²]	R'w [dB]	Dn,e [dB]		Component improved	Count	Area [m²]	R'w [dB]	Dn,e [dB]	Fan
1	Wall	1	6.72	50	-	=	Wall	1	6.72	50	-	-
2	Ventilator	1	0.01	-	35	=	Ventilator	1	0.01	-	35	-
3	Window	3	1.01	34	-	=	Window	3	1.01	34	-	-
4	Patio Door	1	2.30	30	-	=	Patio Door	1	2.30	30	-	-

Rear of 105 Evesham Road - Proposed Building

BA Outside1.baf - Interior level calculations

Bedroom 1 Night Time / 1.FL / Proposed Building

Room type:	Bedrooms Night Time	Room geometry:	3.40 m x 4.84 m = 16.46 m²
L2,nT valid:	30.0 dB	L2,nT existent / improved:	2.2 / 2.2 dB

Example - Brick / Block cavity wall with insulation and internal plasterboard lining

Example - Pitched tile roof / 12.5mm plasterboard ceiling with 100 mm insulation.

Example - Glazing: Pilkington Optiphon 6 mm - 16 mm Argon - 6.8 mm or similar.

Example: Titon - TA5221 (V25) + TA5005 (SF 418) 2500EA or similar

Ceiling

Facade geometry:	3.40 m x 4.84 m = 16.46 m²
L2,nTi existent / improved:	-2.2 / -2.2 dB
Assessment level Day:	44.0 dB(A)
Correction for facade structure by EN 12354-3	0.0 dB
Correction by user:	0.0 dB
Exterior level:	44.0 dB

ser. No.	Component existent	Count	Area [m²]	R'w [dB]	Dn,e [dB]		Component improved	Count	Area [m²]	R'w [dB]	Dn,e [dB]	Fan
1	Wall	1	16.46	47	-	=	Wall	1	16.46	47	-	-

West Facade

Facade geometry:	3.40 m x 2.50 m = 8.50 m²
L2,nTi existent / improved:	-8.1 / -8.1 dB
Assessment level Day:	44.0 dB(A)
Correction for facade structure by EN 12354-3	0.0 dB
Correction by user:	0.0 dB
Exterior level:	44.0 dB

ser. No.	Component existent	Count	Area [m²]	R'w [dB]	Dn,e [dB]		Component improved	Count	Area [m²]	R'w [dB]	Dn,e [dB]	Fan
1	Wall	1	8.50	50	-	=	Wall	1	8.50	50	-	-

North Facade

Facade geometry:	4.84 m x 2.50 m = 12.10 m²
L2,nTi existent / improved:	-17.5 / -17.5 dB
Assessment level Day:	33.0 dB(A)
Correction for facade structure by EN 12354-3	0.0 dB
Correction by user:	0.0 dB
Exterior level:	33.0 dB

ser. No.	Component existent	Count	Area [m²]	R'w [dB]	Dn,e [dB]		Component improved	Count	Area [m²]	R'w [dB]	Dn,e [dB]	Fan
1	Wall	1	12.10	50	-	=	Wall	1	12.10	50	-	-

East Facade

Facade geometry:	3.39 m x 2.50 m = 8.47 m²
L2,nTi existent / improved:	-0.5 / -0.5 dB
Assessment level Day:	35.0 dB(A)
Correction for facade structure by EN 12354-3	0.0 dB
Correction by user:	0.0 dB
Exterior level:	35.0 dB

ser. No.	Component existent	Count	Area [m²]	R'w [dB]	Dn,e [dB]		Component improved	Count	Area [m²]	R'w [dB]	Dn,e [dB]	Fan
1	Wall	1	6.89	50	-	=	Wall	1	6.89	50	-	-
2	Window	1	1.57	34	-	=	Window	1	1.57	34	-	-
3	Ventilator	1	0.01	-	35	=	Ventilator	1	0.01	-	35	-

Rear of 105 Evesham Road - Proposed Building

BA Outside1.baf - Interior level calculations

Bedroom 2 Night Time / 1.FL / Proposed Building

Room type:	Bedrooms Night Time	Room geometry:	3.97 m x 1.80 m = 7.15 m²
L2,nT valid:	30.0 dB	L2,nT existent / improved:	0.1 / 0.1 dB

Ceiling

Facade geometry:	3.97 m x 1.80 m = 7.15 m²
L2,nTi existent / improved:	-2.2 / -2.2 dB

Assessment level Day:	44.0 dB(A)
Correction for facade structure by EN 12354-3	0.0 dB
Correction by user:	0.0 dB
Exterior level:	44.0 dB

ser. No.	Component existent	Count	Area [m²]	R'w [dB]	Dn,e [dB]		Component improved	Count	Area [m²]	R'w [dB]	Dn,e [dB]	Fan
1	Wall	1	7.15	47	-	=	Wall	1	7.15	47	-	-

West Facade

Facade geometry:	3.94 m x 2.50 m = 9.85 m²
L2,nTi existent / improved:	-3.8 / -3.8 dB

Assessment level Day:	44.0 dB(A)
Correction for facade structure by EN 12354-3	0.0 dB
Correction by user:	0.0 dB
Exterior level:	44.0 dB

ser. No.	Component existent	Count	Area [m²]	R'w [dB]	Dn,e [dB]		Component improved	Count	Area [m²]	R'w [dB]	Dn,e [dB]	Fan
1	Wall	1	9.85	50	-	=	Wall	1	9.85	50	-	-

Rear of 105 Evesham Road - Proposed Building

BA Outside1.baf - Interior level calculations

Bedroom 1 Night Time Max / 1.FL / Proposed Building

Room type:	Bedroom Night time Max	Room geometry:	3.40 m x 4.84 m = 16.46 m²
L2,nT valid:	45.0 dB	L2,nT existent / improved:	23.1 / 23.1 dB

Example - Brick / Block cavity wall with insulation and internal plasterboard lining

Example - Pitched tile roof / 12.5mm plasterboard ceiling with 100 mm insulation.

Example - Glazing: Pilkington Optiphon 6 mm - 16 mm Argon - 6.8 mm or similar.

Example: Titon - TA5221 (V25) + TA5005 (SF 418) 2500EA or similar

Ceiling

Facade geometry:	3.40 m x 4.84 m = 16.46 m²
L2,nTi existent / improved:	21.8 / 21.8 dB
Assessment level Day:	68.0 dB(A)
Correction for facade structure by EN 12354-3	0.0 dB
Correction by user:	0.0 dB
Exterior level:	68.0 dB

ser. No.	Component existent	Count	Area [m²]	R'w [dB]	Dn,e [dB]		Component improved	Count	Area [m²]	R'w [dB]	Dn,e [dB]	Fan
1	Wall	1	16.46	47	-	=	Wall	1	16.46	47	-	-

West Facade

Facade geometry:	3.40 m x 2.50 m = 8.50 m²
L2,nTi existent / improved:	15.9 / 15.9 dB
Assessment level Day:	68.0 dB(A)
Correction for facade structure by EN 12354-3	0.0 dB
Correction by user:	0.0 dB
Exterior level:	68.0 dB

ser. No.	Component existent	Count	Area [m²]	R'w [dB]	Dn,e [dB]		Component improved	Count	Area [m²]	R'w [dB]	Dn,e [dB]	Fan
1	Wall	1	8.50	50	-	=	Wall	1	8.50	50	-	-

North Facade

Facade geometry:	4.84 m x 2.50 m = 12.10 m²
L2,nTi existent / improved:	-1.5 / -1.5 dB
Assessment level Day:	49.0 dB(A)
Correction for facade structure by EN 12354-3	0.0 dB
Correction by user:	0.0 dB
Exterior level:	49.0 dB

ser. No.	Component existent	Count	Area [m²]	R'w [dB]	Dn,e [dB]		Component improved	Count	Area [m²]	R'w [dB]	Dn,e [dB]	Fan
1	Wall	1	12.10	50	-	=	Wall	1	12.10	50	-	-

East Facade

Facade geometry:	3.39 m x 2.50 m = 8.47 m²
L2,nTi existent / improved:	11.5 / 11.5 dB
Assessment level Day:	47.0 dB(A)
Correction for facade structure by EN 12354-3	0.0 dB
Correction by user:	0.0 dB
Exterior level:	47.0 dB

ser. No.	Component existent	Count	Area [m²]	R'w [dB]	Dn,e [dB]		Component improved	Count	Area [m²]	R'w [dB]	Dn,e [dB]	Fan
1	Wall	1	6.89	50	-	=	Wall	1	6.89	50	-	-
2	Window	1	1.57	34	-	=	Window	1	1.57	34	-	-
3	Ventilator	1	0.01	-	35	=	Ventilator	1	0.01	-	35	-

Rear of 105 Evesham Road - Proposed Building

BA Outside1.baf - Interior level calculations

Bedroom 2 Night Time Max / 1.FL / Proposed Building

Room type:	Bedroom Night time Max	Room geometry:	3.97 m x 1.80 m = 7.15 m²
L2,nT valid:	45.0 dB	L2,nT existent / improved:	24.1 / 24.1 dB

Ceiling

Facade geometry:	3.97 m x 1.80 m = 7.15 m²
L2,nTi existent / improved:	21.8 / 21.8 dB

Assessment level Day:	68.0 dB(A)
Correction for facade structure by EN 12354-3	0.0 dB
Correction by user:	0.0 dB
Exterior level:	68.0 dB

ser. No.	Component existent	Count	Area [m²]	R'w [dB]	Dn,e [dB]		Component improved	Count	Area [m²]	R'w [dB]	Dn,e [dB]	Fan
1	Wall	1	7.15	47	-	=	Wall	1	7.15	47	-	-

West Facade

Facade geometry:	3.94 m x 2.50 m = 9.85 m²
L2,nTi existent / improved:	20.2 / 20.2 dB

Assessment level Day:	68.0 dB(A)
Correction for facade structure by EN 12354-3	0.0 dB
Correction by user:	0.0 dB
Exterior level:	68.0 dB

ser. No.	Component existent	Count	Area [m²]	R'w [dB]	Dn,e [dB]		Component improved	Count	Area [m²]	R'w [dB]	Dn,e [dB]	Fan
1	Wall	1	9.85	50	-	=	Wall	1	9.85	50	-	-

Rear of 105 Evesham Road - Proposed Building

BA Outside1.baf - Interior level calculations

Bedroom 1 Daytime / 1.FL / Proposed Building

Room type:	Bedrooms Daytime	Room geometry:	3.40 m x 4.84 m = 16.46 m²
L2,nT valid:	35.0 dB	L2,nT existent / improved:	20.8 / 20.8 dB

Example - Brick / Block cavity wall with insulation and internal plasterboard lining

Example - Pitched tile roof / 12.5mm plasterboard ceiling with 100 mm insulation.

Example - Glazing: Pilkington Optiphon 6 mm - 16 mm Argon - 6.8 mm or similar.

Example: Titon - TA5221 (V25) + TA5005 (SF 418) 2500EA or similar

Ceiling

Facade geometry:	3.40 m x 4.84 m = 16.46 m²
L2,nTi existent / improved:	6.8 / 6.8 dB
Assessment level Day:	53.0 dB(A)
Correction for facade structure by EN 12354-3	0.0 dB
Correction by user:	0.0 dB
Exterior level:	53.0 dB

ser. No.	Component existent	Count	Area [m²]	R'w [dB]	Dn,e [dB]		Component improved	Count	Area [m²]	R'w [dB]	Dn,e [dB]	Fan
1	Wall	1	16.46	47	-	=	Wall	1	16.46	47	-	-

West Facade

Facade geometry:	3.40 m x 2.50 m = 8.50 m²
L2,nTi existent / improved:	0.9 / 0.9 dB
Assessment level Day:	53.0 dB(A)
Correction for facade structure by EN 12354-3	0.0 dB
Correction by user:	0.0 dB
Exterior level:	53.0 dB

ser. No.	Component existent	Count	Area [m²]	R'w [dB]	Dn,e [dB]		Component improved	Count	Area [m²]	R'w [dB]	Dn,e [dB]	Fan
1	Wall	1	8.50	50	-	=	Wall	1	8.50	50	-	-

North Facade

Facade geometry:	4.84 m x 2.50 m = 12.10 m²
L2,nTi existent / improved:	2.5 / 2.5 dB
Assessment level Day:	53.0 dB(A)
Correction for facade structure by EN 12354-3	0.0 dB
Correction by user:	0.0 dB
Exterior level:	53.0 dB

ser. No.	Component existent	Count	Area [m²]	R'w [dB]	Dn,e [dB]		Component improved	Count	Area [m²]	R'w [dB]	Dn,e [dB]	Fan
1	Wall	1	12.10	50	-	=	Wall	1	12.10	50	-	-

East Facade

Facade geometry:	3.39 m x 2.50 m = 8.47 m²
L2,nTi existent / improved:	20.5 / 20.5 dB
Assessment level Day:	56.0 dB(A)
Correction for facade structure by EN 12354-3	0.0 dB
Correction by user:	0.0 dB
Exterior level:	56.0 dB

ser. No.	Component existent	Count	Area [m²]	R'w [dB]	Dn,e [dB]		Component improved	Count	Area [m²]	R'w [dB]	Dn,e [dB]	Fan
1	Wall	1	6.89	50	-	=	Wall	1	6.89	50	-	-
2	Window	1	1.57	34	-	=	Window	1	1.57	34	-	-
3	Ventilator	1	0.01	-	35	=	Ventilator	1	0.01	-	35	-

Rear of 105 Evesham Road - Proposed Building

BA Outside1.baf - Interior level calculations

Bedroom 2 Daytime / 1.FL / Proposed Building

Room type:	Bedrooms Daytime	Room geometry:	3.97 m x 1.80 m = 7.15 m²
L2,nT valid:	35.0 dB	L2,nT existent / improved:	9.1 / 9.1 dB

Ceiling

Facade geometry:	3.97 m x 1.80 m = 7.15 m²
L2,nTi existent / improved:	6.8 / 6.8 dB

Assessment level Day:	53.0 dB(A)
Correction for facade structure by EN 12354-3	0.0 dB
Correction by user:	0.0 dB
Exterior level:	53.0 dB

ser. No.	Component existent	Count	Area [m²]	R'w [dB]	Dn,e [dB]		Component improved	Count	Area [m²]	R'w [dB]	Dn,e [dB]	Fan
1	Wall	1	7.15	47	-	=	Wall	1	7.15	47	-	-

West Facade

Facade geometry:	3.94 m x 2.50 m = 9.85 m²
L2,nTi existent / improved:	5.2 / 5.2 dB

Assessment level Day:	53.0 dB(A)
Correction for facade structure by EN 12354-3	0.0 dB
Correction by user:	0.0 dB
Exterior level:	53.0 dB

ser. No.	Component existent	Count	Area [m²]	R'w [dB]	Dn,e [dB]		Component improved	Count	Area [m²]	R'w [dB]	Dn,e [dB]	Fan
1	Wall	1	9.85	50	-	=	Wall	1	9.85	50	-	-

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APPENDIX F – PARTITION MODEL

Sound Insulation Prediction (v8.0.4)

NoiseAir - Key No. 0381

Margin of error is generally within Rw +/- 3 dB

Job Name:

Job No.: Page No.: Notes:

Date: 8 Sep 20 Initials:mmalone

File Name: Proposed.ixl

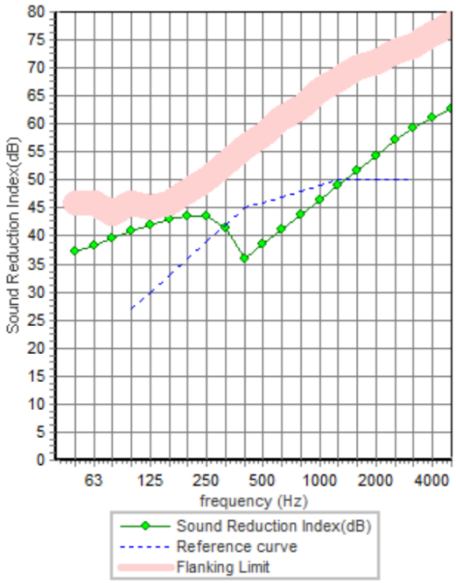
Rw	46 dB	
C	-1 dB	
C_{tr}	-3 dB	
D_{nTw}	48 dB	[V:50m3] [A:11m2]

System description

Panel 1: 1 x 70.0 mm Brick (ρ:1600 kg/m3,E:8.9GPa,η:0.01) + 1 x 70.0 mm Brick (ρ:1600 kg/m3,E:8.9GPa,η:0.01)

frequency (Hz)	R(dB)	R(dB)
50	37	
63	38	38
80	40	
100	41	
125	42	42
160	43	
200	44	
250	44	43
315	41	
400	36	
500	39	38
630	41	
800	44	
1000	46	46
1250	49	
1600	52	
2000	54	54
2500	57	
3150	59	
4000	61	61
5000	63	

Panel Size 2.7x4 m; Mass 224.0 kg/m2



Sound Insulation Prediction (v8.0.4)

NoiseAir - Key No. 0381

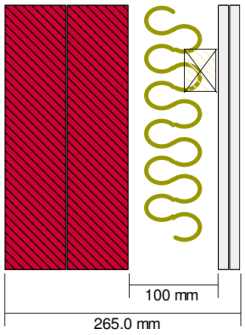
Margin of error is generally within Rw +/- 3 dB

Job Name:

Job No.: Page No.: Notes:

Date: 8 Sep 20 Initials:mmalone

File Name: Proposed.ixl



Rw	78 dB	
C	-2 dB	
C_{tr}	-8 dB	
D_{nTw}	80 dB	[V:50m3] [A:11m2]

System description

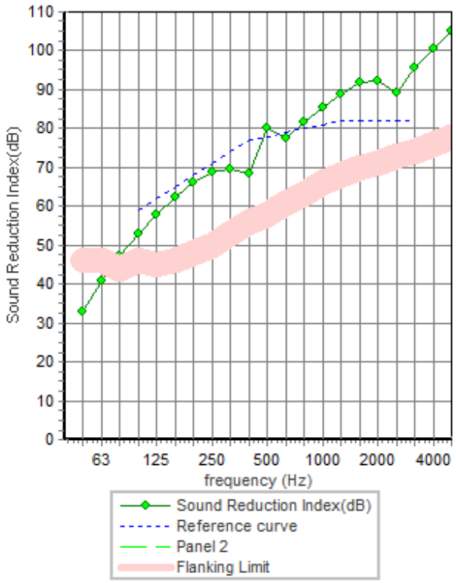
Panel 1: 1 x 70.0 mm Brick (ρ:1600 kg/m3,E:8.9GPa,η:0.01) + 1 x 70.0 mm Brick (ρ:1600 kg/m3,E:8.9GPa,η:0.01)

Cavity: Double timber stud: Stud spacing 600 mm , Infill Fibreglass (10kg/m3) Thickness 60 mm (ρ:10 kg/m3, Rf:4000 Pa.s/m2)
Panel 2+ 2 x 12.5 mm Gyproc SoundBloc 12.5mm (ρ:848 kg/m3,E:3.8GPa,η:0.01)

Mass-air-mass resonant frequency =37 Hz

frequency (Hz)	R(dB)	R(dB)
50	33	
63	41	37
80	47	
100	53	
125	58	56
160	62	
200	66	
250	69	68
315	69	
400	69	
500	80	73
630	78	
800	82	
1000	85	84
1250	89	
1600	92	
2000	92	91
2500	89	
3150	96	
4000	100	99
5000	105	

Panel Size 2.7x4 m; Mass 245.8 kg/m2



APPENDIX E - GLOSSARY

A-weighted sound pressure, p_A	Value of overall sound pressure, measured in pascals (Pa), after the electrical signal derived from a microphone has been passed through an A-weighting network. *NOTE: The A-weighting network modifies the electrical response of a sound level meter with frequency in approximately the same way as the sensitivity of the human hearing system.*
A-weighted sound pressure level, L_{pA}	Quantity of A-weighted sound pressure in decibels (dBA).
Acoustic environment	Sound from all sound sources as modified by the environment [BS ISO 12913-1:2013].
Ambient sound	Totally encompassing sound in a given situation at a given time, usually composed of sound from many sources near and far. *NOTE: The ambient sound comprises the residual sound and the specific sound when present.*
Ambient sound level, $L_a = L_{Aeq,T}$ (BS4142:2014)	Equivalent continuous A-weighted sound pressure level of the totally encompassing sound in a given situation at a given time, usually from many sources near and far, at the assessment location over a given time interval, T *NOTE: The ambient sound level is a measure of the residual sound and the specific sound when present.*
Background sound	Underlying level of sound over a period, *T*, which might in part be an indication of relative quietness at a given location.
Background sound level, $L_{A90,T}$ (BS4142:2014)	A-weighted sound pressure level that is exceeded by the residual sound at the assessment location for 90% of a given time interval, T, measured using time weighting F and quoted to the nearest whole number of decibels.
Break-in	Noise transmission into a structure from outside.
Break-out	Noise transmission from inside a structure to the outside.
Cross-talk	Noise transmission between one room and another room or space via a duct or other path.
C_{tr}	Correction term applied against the sound insulation single-number values (R_w, D_w, and $D_{nT,w}$) to provide a weighting against low frequency performance. *NOTE: The reference values used within the C_{tr} calculation are based on urban traffic noise.*
Equivalent continuous A-weighted sound pressure level, $L_{Aeq,T}$	Value of the A-weighted sound pressure level in decibels (dB) of a continuous, steady sound that, within a specified time interval, T, has the same mean-squared sound pressure as the sound under consideration that varies with time.
Equivalent continuous A-weighted sound pressure level, $L_{Aeq,T}$ (BS4142:2014)	Value of the A-weighted sound pressure level in decibels of continuous steady sound that, within a specified time interval, $T = t_2 – t_1$, has the same mean-squared sound pressure as a sound that varies with time.
Equivalent sound absorption area of a room, A	Hypothetical area of a totally absorbing surface without diffraction effects, expressed in square metres (m2), which, if it were the only absorbing element in the room, would give the same reverberation time as the room under consideration
Facade level	Sound pressure level 1 m in front of the façade. *NOTE: Facade level measurements of L_{pA} are typically 1 dB to 2 dB higher than corresponding free-field measurements because of the reflection from the facade.*
Free-field level	Sound pressure level away from reflecting surfaces. *NOTE: Measurements made 1.2 m to 1.5 m above the ground and at least 3.5 m away from other reflecting surfaces are usually regarded as free-field. To minimize the effect of reflections the measuring position has to be at least 3.5 m to the side of the reflecting surface (i.e. not 3.5 m from the reflecting surface in the direction of the source). Estimates of noise from aircraft overhead usually include a correction of 2 dB to allow for reflections from the ground.*

Impact sound pressure level, L_i	Average sound pressure level in a specific frequency band in a room below a floor when it is excited by a standard tapping machine or equivalent.
Indoor ambient noise	Noise in a given situation at a given time, usually composed of noise from many sources, inside and outside the building, but excluding noise from activities of the occupants. *NOTE: The location(s) within the room at which the ambient indoor noise is to be measured or calculated ought to be considered.*
Measurement time interval, T_m (BS4142:2014)	Total time over which measurements are taken. *NOTE: This may consist of the sum of a number of non-contiguous, short-term measurement time intervals.*
Noise criteria	Numerical indices used to define design goals in a given space.
Noise rating, NR	Graphical method for rating a noise by comparing the noise spectrum with a family of noise rating curves.
Normalised impact sound pressure level, L_n	Impact sound pressure level normalized for a standard absorption area in the receiving room. *NOTE: Normalised impact sound pressure level is usually used to characterize the insulation of a floor in a laboratory against impact sound in a stated frequency band.*
Octave band	Band of frequencies in which the upper limit of the band is twice the frequency of the lower limit.
Percentile level, $L_{AN,T}$	A-weighted sound pressure level obtained using time-weighting "F", which is exceeded for *N*% of a specified time interval.
Reference time interval, T_r (BS4142:2014)	Specified interval over which the specific sound level is determined. *NOTE: This is 1 h during the day from 07:00 h to 23:00 h and a shorter period of 15 min at night from 23:00 h to 07:00 h.*
Residual sound (BS4142:2014)	Ambient sound remaining at the assessment location when the specific sound source is suppressed to such a degree that it does not contribute to the ambient sound.
Residual sound level, $L_r = L_{Aeq,T}$ (BS4142:2014)	Equivalent continuous A-weighted sound pressure level of the residual sound at the assessment location over a given time interval, T.
Rating level, $L_{Ar,Tr}$	Equivalent continuous A-weighted sound pressure level of the noise, plus any adjustment for the characteristic features of the noise. *NOTE: This is used in BS 7445 and BS 4142 for rating industrial noise, where the noise is the specific noise from the source under investigation.*
Reverberation time, *T*	Time that would be required for the sound pressure level to decrease by 60 dB after the sound source has stopped.
Sound exposure level, *L*AE	Level of a sound, of 1 s duration, that has the same sound energy as the actual noise event considered.
Sound level difference, *D*	Difference between the sound pressure level in the source room and the sound pressure level in the receiving room.
Sound pressure, *p*	Root-mean-square value of the variation in air pressure, measured in pascals (Pa) above and below atmospheric pressure, caused by the sound.
Sound pressure level, L_p	Quantity of sound pressure, in decibels (dB).
Sound reduction index, *R*	Laboratory measure of the sound insulating properties of a material or building element in a stated frequency band.

Specific sound level, $L_s = L_{Aeq,Tr}$ (BS4142:2014)	Equivalent continuous A-weighted sound pressure level produced by the specific sound source at the assessment location over a given reference time interval, T_r.
Specific sound source (BS4142:2014)	Sound source being assessed.
Standardised impact sound pressure level, L'_{nT}	Impact sound pressure level normalized to a reverberation time in the receiving room of 0.5 s.
Standardised level difference, D_{nT}	Difference in sound level between a pair of rooms, in a stated frequency band, normalized to a reference reverberation time of 0.5 s for dwellings.
Groundborne noise	Audible noise caused by the vibration of elements of a structure, for which the vibration propagation path from the source is partially or wholly through the ground. *NOTE Common sources of ground-borne noise include railways and heavy construction work on adjacent construction sites.*
Structure-borne noise	Audible noise caused by the vibration of elements of a structure, the source of which is within a building or structure with common elements. *NOTE Common sources of structure-borne noise include building services plant, manufacturing machinery and construction or demolition of the structure.*
Third octave band	Band of frequencies in which the upper limit of the band is 2% times the frequency of the lower limit.
Weighted level difference, D_w	Single-number quantity that characterizes airborne sound insulation between rooms, but which is not adjusted to reference conditions. *NOTE Weighted level difference is used to characterize the insulation between rooms in a building as they are. Values cannot normally be compared with measurements made under other conditions (see BS EN ISO 717-1).*
Weighted normalised impact sound pressure level, $L'_{n,w}$	Single-number quantity used to characterize the impact sound insulation of floors over a range of frequencies.
Weighted sound reduction index, R_w	Single-number quantity which characterizes the airborne sound insulating properties of a material or
Weighted standardised impact sound pressure level $L'_{nT,w}$	Single-number quantity used to characterize the impact sound insulation of floors over a range of frequencies.
Weighted standardised level difference, $D_{nT,w}$	Single-number quantity that characterizes the airborne sound insulation between rooms.

Symbols

D_{w}	Weighted level difference (dB)
D_{nT}	Standardized level difference (dB)
$D_{nT,w}$	Weighted standardized level difference (dB)
L_{Amax}	Maximum noise level (dB)
$L_{Ar,Tr}$	Rating level (dB)
L_{n}	Normalised impact sound pressure level (dB)
L'_{nT}	Standardised impact sound pressure level (dB)
$L'_{nT,w}$	Weighted standardised impact sound pressure level (dB)
$L'_{n,w}$	Weighted normalised impact sound pressure level (dB)
L_{p}	Sound pressure level (dB)
L_{pA}	A-weighted sound pressure level (dB)
$L_{AN,T}$	Percentile level (dB)
L_{AE}	Sound exposure level (dB)
$L_{Aeq,T}$	Equivalent continuous A-weighted sound pressure level (dB)
p	Sound pressure (Pa)
p_{A}	A-weighted sound pressure (dB)
$p_{A(t)}$	Instantaneous A-weighted sound pressure (Pa)

R	Sound reduction index (dB)
R_w	Weighted sound reduction index (dB)
T	Time interval (also used for reverberation time) (s)
t_0	Reference time interval (s)

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