



Architectural & Environmental Acousticians
Noise & Vibration Engineers

Noise Impact Assessment

97a-117 Caversham Road, Reading, RG1 8AN

Noise Impact Assessment

Project: 97A-117 CAVERSHAM ROAD, READING, RG1 8AN

Report reference: RP01-22227-R1

Client: BELLWAY HOMES LIMITED (THAMES VALLEY)
PACIFIC HOUSE
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REVISION	ISSUE DATE	REPORT BY	CHECKED BY	NOTES
0	15 August 2022	Sarah Green, MSc AMIMechE, Acoustics Consultant	Fabio Lassandro, MSc BEng MIOA, Associate	Initial issue
1	22 August 2022	Sarah Green, MSc AMIMechE, Acoustics Consultant	Fabio Lassandro, MSc BEng MIOA, Associate	Minor amendments

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1. EXECUTIVE SUMMARY

- 1.1 Cass Allen has been instructed by Bellway Homes Limited (Thames Valley) to assess the noise impact of a proposed new development at 97a-117 Caversham Road, Reading, RG1 8AN in Reading.
- 1.2 The assessment was carried out in accordance with relevant local and national planning guidance.
- 1.3 A noise survey was carried out at the site by Cass Allen. Noise levels at the site are dictated by road traffic noise emissions from Caversham Road.
- 1.4 A 3D noise model of the development was constructed based on the results of a site noise survey. The noise model was used to calculate road traffic noise levels at all facades of the proposed development.
- 1.5 Noise affecting the proposed development has been assessed in accordance with the ProPG guidance. The design of the proposed development is considered to be acceptable subject to the adoption of acoustically upgraded glazing and ventilation. This may be secured by the imposition of a noise related planning condition by the Local Planning Authority.
- 1.6 In summary of the above it is our view that the site is suitable for the development in terms of noise.

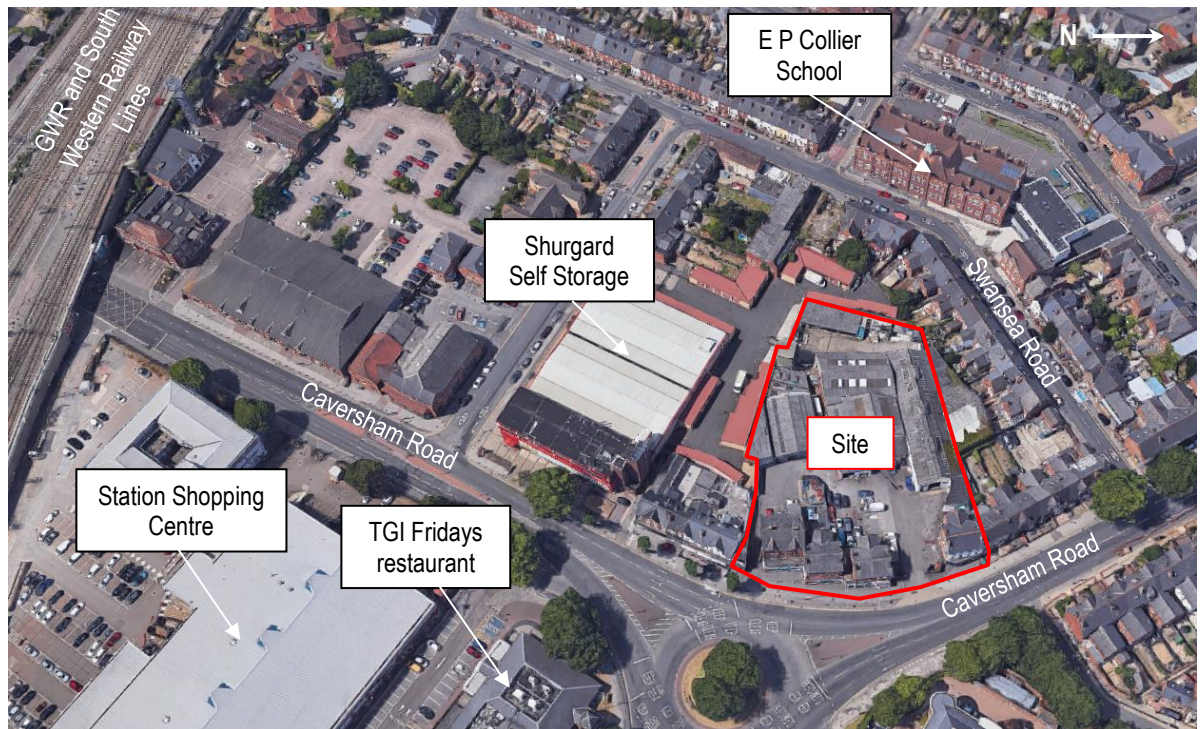
2. INTRODUCTION

- 2.1 The assessment has been carried out in accordance with relevant local and national planning guidance.
- 2.2 The aims of the assessment were:
- To establish the suitability of existing noise levels at the site for the proposed development;
 - Where required, identify appropriate measures to optimise the acoustic design of the development and achieve acceptable noise levels in habitable areas and external amenities;
- 2.3 This report contains technical terminology; a glossary of terms can be found at www.cassallen.co.uk/glossary.

3. PROJECT DESCRIPTION

- 3.1 The site currently contains industrial and commercial properties. The site is located in a mixed-use area, bounded to the East by Caversham Road, to the north and west by residential properties, and to the south by commercial properties (including Cozze restaurant and Shurgard Self Storage). Across Caversham Road, to the south-east of the site is Station Shopping Centre and TGI Friday's restaurant. There are railway lines (GWR and South Western Railway lines) located 220m south of the site. To the west of the site, across Swansea Road, is E P Collier School Primary School.
- 3.2 The site location is shown in Figure 1 below.

Figure 1 Site Location and Surrounding Area



- 3.3 The proposal is to develop the site into residential properties, including houses with gardens and four-storey apartment blocks. A current drawing of the proposed development layout is shown in Appendix 1.

4. PLANNING POLICY

National Policy

- 4.1 Outline guidance for the assessment of noise affecting new developments is given in the National Planning Policy Framework (NPPF). Relevant sections in this case are highlighted below:

174. 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 ...noise pollution.

185. 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.

Local Policy

- 4.2 Reading Borough's Local Plan (November 2019) provides outline guidance on the assessment of noise and vibration affecting new development in the borough. Relevant sections in this case are highlighted below:

CC8: SAFEGUARDING AMENITY

Development will not cause a detrimental impact on the living environment of existing residential properties or unacceptable living conditions for new residential properties, in terms of:

...• Noise and disturbance;

EN16: POLLUTION AND WATER RESOURCES

Development will only be permitted where it would not be damaging to the environment and sensitive receptors through land, noise or light pollution; where it would result in no deterioration in, or ideally enhance, ground and surface water quality; and where adequate water resources, sewerage and wastewater treatment infrastructure will be in place to support the proposed development prior to occupation.

Proposals for development that are sensitive to the effects of noise or light pollution will only be permitted in areas where they will not be subject to high levels of such pollution, unless adequate mitigation measures are provided to minimise the impact of such pollution.

EN17: NOISE GENERATING EQUIPMENT

Where noise generating equipment is proposed, the noise source specific level (plant noise level) should be at least 10dBA below the existing background level as measured at the nearest noise sensitive receptor.

CR6: LIVING IN CENTRAL READING

Proposals for residential development within the central area will be assessed against the following criteria:

ii) Proposals for new residential development within the central area will be required to demonstrate how the issue of potential noise disturbance from neighbouring land uses and other sources, and air quality implications of residential development, have been considered and if necessary, mitigated. New residential development should not be located next to existing town centre uses where those uses would give rise to unacceptable levels of noise and disturbance to the occupiers of the new scheme, unless this can be mitigated

- 4.3 To address the requirements of the national and local policies, noise affecting the habitable areas of the proposed development has been assessed in this report.

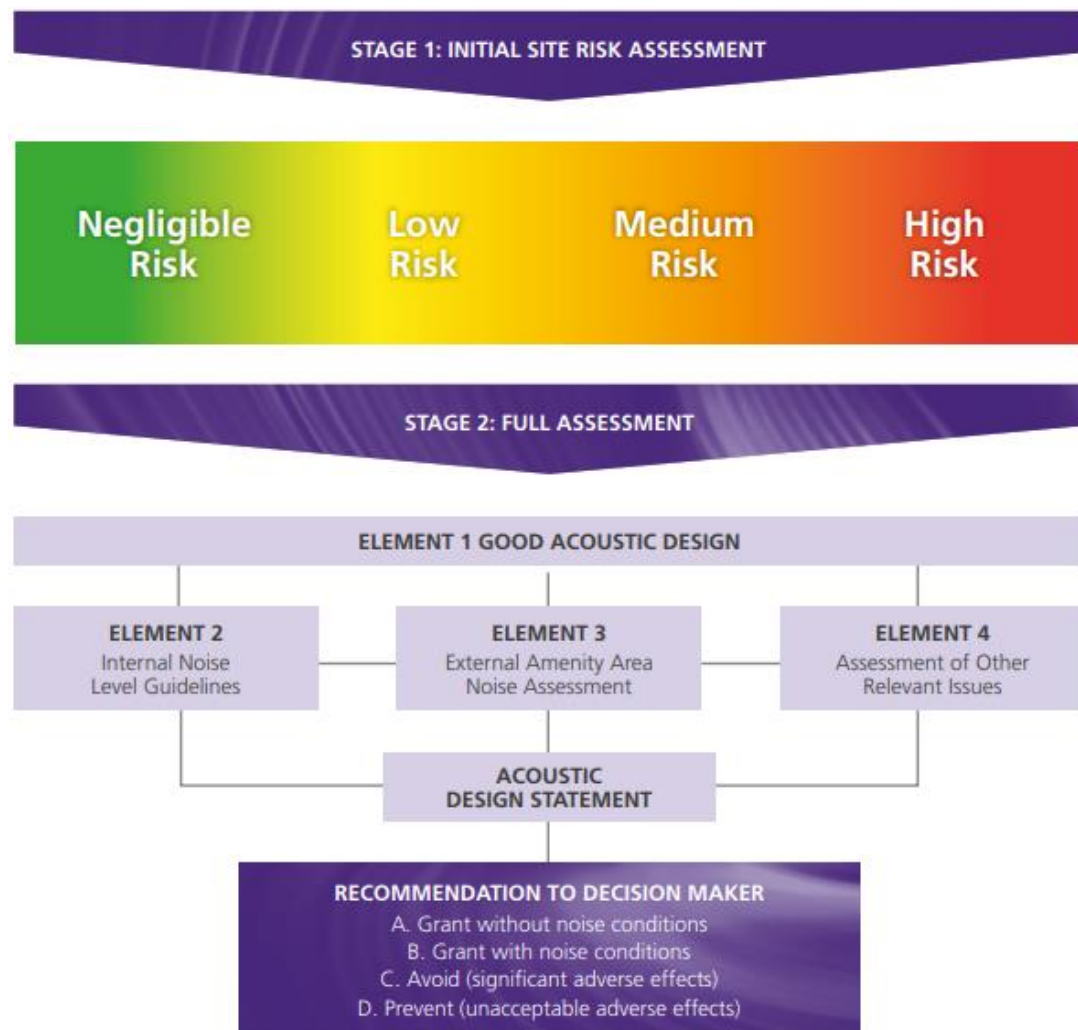
5. NOISE AFFECTING THE DEVELOPMENT

5.1 Specific guidance on the assessment of noise affecting new residential development is given in ProPG: Planning and Noise for New Residential Development, May 2017 (ProPG). The process within the ProPG guidance for the appraisal of noise levels affecting new residential development is considered to be current 'best practice' and has, therefore, been followed for the assessment. The assessment process can be summarised as follows:

- Stage 1 – measure noise levels at the site and carry out an initial noise risk assessment of the proposed development site based on the measured levels.
- Stage 2 – where a higher noise risk is identified, carry out a detailed assessment including the following four considerations:
 - Element 1 – the overall acoustic design and layout of the site
 - Element 2 – internal noise levels in habitable areas
 - Element 3 – noise levels in external amenity areas
 - Element 4 – consideration of other relevant issues
- Based on the results of the Stage assessment, provide a recommendation to the decision maker on whether planning permission can and should be granted.

5.2 The process is shown visually in Figure 2 below

Figure 2 ProPG Assessment Process



- 5.3 It should be noted that the guidance in ProPG relates primarily to noise from transportation sources, i.e. road traffic, aircraft, rail etc. Any significant noise from other sources (e.g. industrial, commercial or entertainment sources) is outside the scope of the ProPG guidance and, therefore, requires separate consideration. There are no significant other noise sources, however the minor commercial noise source, mechanical roof plant serving Cozze restaurant, has been discussed below.

Stage 1 – Noise survey and initial assessment

- 5.4 A noise survey was carried out at the site between 5th and 11th July 2022 to assess existing noise levels in the area. The full methodology and results of the noise survey are provided in Appendix 2.
- 5.5 Average noise levels across the site were generally dictated by road traffic on Caversham Road. Average noise levels within 5m of the Cozze rear ground floor facade, were also affected by noise

from continuous mechanical plant serving Cozze restaurant during the daytime. However, the mechanical plant noise was inaudible at the location of the nearest proposed development facade, and therefore will not be assessed any further.

- 5.6 Maximum noise levels at the north and east of the site were largely dictated by fast vehicle passes on the Caversham Road.
- 5.7 Background noise levels (LA90) across the site were dictated by constant road traffic noise from the surrounding roads.
- 5.8 The Cozze restaurant is open during the 16-hour daytime hours. During the survey, the Cozze roof terrace was in use on multiple evenings, however, the noise observed from the general restaurant activity did not affect the average or maximum noise levels at the location of the proposed development facade.
- 5.9 Based on the results of the site noise survey, a 3D computer noise model was developed to predict and assess the noise levels that will exist across the entire development.
- 5.10 The 3D noise model was developed using Cadna/A v2022 environmental noise modelling software. Cadna/A incorporates the calculation methodology outlined in the Department of Transport Welsh Office - *Calculation of Road Traffic Noise* (CRTN) for the assessment of road traffic noise propagation, and CRN for rail noise.
- 5.11 During the noise survey, no noise was observed from the railway lines, Shurgard Self Storage, TGI Fridays or Station Shopping Centre at the location of the development site. The noise from the railway lines have been input into the model using the isolated survey measurements of the train noise at a closer distance to the railway lines.
- 5.12 The layout of the development and surrounding area was input into the model. To calculate the spread of noise levels around the site, day-time average noise levels were input for the surrounding roads (e.g. Caversham Road and Swansea Road) and calibrated to the results of the on-site noise measurements.
- 5.13 The methodology and results of the noise modelling are provided in Appendix 3. It can be seen from the modelling results that road traffic noise levels will be highest on facades of the development facing Caversham Road and lowest on facades at the West of the site.
- 5.14 Areas of the development at the eastern edges of the site will be subject to the highest noise levels. The noise modelling results show that noise levels at these positions are as follows:
- Average noise levels during the daytime - 70 dB LAeq,0700-2300hrs;
 - Average noise levels during the night-time - 62 dB LAeq,2300-0700hrs;
 - Typical maximum noise levels during the night-time - 81 dB LMax.
- 5.15 The measured noise levels can be compared with Figure 3 below to assess the 'noise risk' of the site. Where the noise risk is high, significant acoustic design measures may be required to achieve acceptable noise levels in the development. Where the noise risk is low, acceptable noise levels may be achievable with no specific acoustic design measures.

Figure 3 Noise Risk Assessment (Adaption of Figure 1 from ProPG)



5.16 It can be seen from a comparison of the measured noise levels in paragraph 5.14 above with Figure 3 that the site is 'High' risk in relation to daytime noise levels and night-time noise levels. Therefore, ProPG requires that a more detailed 'Stage 2' assessment is carried out.

Stage 2 – Element 1 – Overall acoustic design of the site

5.17 The acoustic design of the development has been reviewed in relation to the predicted noise levels at the site. In our view the proposed design is good from an acoustics perspective for the following reasons:

1. The sensitive external amenity areas (i.e. gardens of the houses) are located at the western side of the site where the noise levels are lowest.
2. The apartment blocks (Blocks A and B) lining Caversham Road are 4-storeys and therefore provide screening from the road traffic noise to the rest of the site.
3. The internal layouts have been carefully designed to locate the bedroom facades facing onto Caversham Road in recessed alcoves, which help to screen the road traffic noise.
4. The window sizes for the bedrooms are narrower than for other living spaces, as the windows are a weaker acoustic element in the facade and therefore smaller windows reduce the external noise ingress.

5.18 We understand that treating the facades with noise mitigation is the preferred mitigation method in this case as it allows more efficient use of the land available. This approach is in line with current planning guidance, where the efficient use of land and the need for housing is a priority. The layout of the development is also good in our view as the public open space (to the southwest of the development) is well-screened by the apartment blocks and therefore all residents have access to a quieter central amenity area. The detailed design of the facades and the noise levels in external amenities are discussed further below.

5.19 For the reasons given above it is our view that the overall proposed layout of the development is appropriate for the site with regards to noise and vibration.

Stage 2 – Element 2 - Internal noise levels

5.20 Appropriate design criteria for acceptable noise levels in acoustically sensitive areas of new developments are given in BS8233:2014 '*Guidance on sound insulation and noise reduction for buildings*'.

5.21 Relevant BS8233 design criteria are summarised in Table 1 below.

Table 1 BS8233:2014 Internal Noise Criteria

Activity	Location	07:00 to 23:00	23:00 to 07:00
Resting	Living room	35 dB LAeq,16hour	-
Dining	Dining room/area	40 dB LAeq,16hour	-
Sleeping (daytime resting)	Bedroom	35 dB LAeq,16hour	30 dB LAeq,8hour

- 5.22 It is also considered appropriate in this case to assess the potential impact of noise emissions from individual vehicle passes on the bedrooms of the development during the night-time. This is in line with guidance given in BS8233:2014 and ProPG, which both point out that regular individual noise events during the night have the potential to cause sleep disturbance.
- 5.23 Appropriate design criteria for acceptable maximum noise levels in habitable rooms of new residential developments are given in the ProPG guidance, which states that *“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 45 dB LAmax,F more than 10 times a night.”*
- 5.24 Therefore, the following acoustic design criteria have been adopted for the development:
- Average noise levels in living rooms and dining rooms during the day should not exceed 35 dB LAeq,0700-2300hrs and 40 dB LAeq,0700-2300hrs respectively;
 - Average noise levels in bedrooms should not exceed 35 dB LAeq,0700-2300hrs during the day and 30 dB LAeq,2300-0700hrs during the night;
 - Maximum noise levels should not regularly exceed 45 dB LAmax in bedrooms during the night.
- 5.25 Full construction details for the development have not been finalised as the project is at an early design stage. It has therefore been assumed that the external walls of the development will be constructed using a standard masonry construction (e.g. 102mm brick, 100mm insulated cavity, 100mm concrete block) or a light-weight construction designed to achieve a similar level of sound insulation (this is technically achievable subject to detailed design). Consequently, internal noise levels would be dictated by external noise ingress via glazing and ventilators.
- 5.26 It is understood that the ventilation scheme for the terrace houses and Block C will be passively ventilated via trickle ventilators in the external facades with openable windows for the provision of purge ventilation, with continuous extract from wet rooms (as per System 3 from Building Regulations Part F).
- 5.27 It is understood that ventilation scheme for the apartment Blocks A and B is Mechanical Ventilation with Heat Recovery (MVHR) i.e. System 4 from Building Regulations Part F. Therefore, there will be no background ventilators in the external façades (e.g. trickle ventilators etc).

- 5.28 The MVHR system will be selected to ensure that noise from air supply and extract ductwork does not exceed acceptable levels within habitable rooms. Appropriate specifications for noise levels from the MVHR system (operating at typical maximum duty) would be as follows:
- Bedrooms and living rooms – 30 dB LAeq,T at 1.5m from any ventilation aperture; and,
 - Other habitable areas – 35 dB LAeq,T at 1.5m from any ventilation aperture.
- 5.29 Calculations were carried out using facade modelling software in accordance with the methodology given in BS8233:2014 to calculate the sound insulation performance required of the glazing and ventilation to achieve the nominated internal noise criteria in the habitable rooms of the development.
- 5.30 The calculations were carried out based on dimensions taken from project drawings and 1 in-frame trickle ventilators in bedrooms and in living rooms for houses and Block C apartments.
- 5.31 The results of the calculations are shown in Appendix 4 and are summarised in Table 2 below.

Table 2 Acoustic Requirements for Habitable Rooms

Habitable Rooms	Glazing Performance Requirements (inc. Frames)	Ventilator Performance Requirements (in Open Position)
Bedrooms and Living Rooms on Caversham Road facade – Block A and B	36 dB Rw + Ctr	MVHR
Bedrooms and Living rooms on side facade – Block A and B	31 dB Rw + Ctr	MVHR
Bedrooms and Living Rooms on rear side – Block A and B	27 dB Rw + Ctr	MVHR
All other Bedrooms and Living Rooms	27 dB Rw + Ctr	32 dB Dne,w + Ctr

Note The requirements given should be confirmed when further design details are available.

- 5.32 Based on the results of the calculations summarised in Table 2 and the predicted noise levels at the development facades (considering both the day and night-time average and maximum noise levels), an outline specification has been developed showing the approximate sound insulation performance requirements for all facades of the development. The facade specification is shown in Appendix 5.
- 5.33 It can be seen from the above that acceptable internal noise levels will be achievable in the development subject to the specification of suitable glazing and ventilation systems at the detailed design stage (which could be secured with a suitable planning condition). It is our view therefore that the proposed development is, in principle, acceptable with regards to the noise levels that will exist within the habitable rooms.
- 5.34 The development will be subject to the recently published Part O of the Building Regulations (Approved Document O), which comes into effect on 15 June 2022 and states that:

In locations where external noise may be an issue (for example, where the local planning authority considered external noise to be an issue at the planning stage), the overheating mitigation strategy should take account of the likelihood that windows will be closed during sleeping hours (11pm to 7am).

Windows are likely to be closed during sleeping hours if noise within bedrooms exceeds the following limits.

a. 40dB LAeq,T, averaged over 8 hours (between 11pm and 7am).

b. 55dB LAFmax, more than 10 times a night (between 11pm and 7am).

- 5.35 The results of the noise model predictions indicate that the noise levels on Caversham Road facades and side facades of Block A and B will exceed the noise limits provided in Approved Document O when the windows are opened (based on a 10-15 dB reduction through a “partially open window” as per BS8233/ProPG guidance). Therefore, the overheating assessment should consider that these windows are likely to be closed during the night.

Stage 2 – Element 3 – Noise levels in external amenity areas

- 5.36 BS8233 states that it is desirable that noise levels in external amenity areas of residential developments do not exceed 50 dB LAeq and that 55 dB LAeq,T should be regarded as an upper guideline value. However, BS8233 recognises that these guideline values will not always be achievable in city centres or urban areas adjoining main roads or other transport sources. In these cases, BS8233 states that the development should be designed to achieve the lowest practicable noise levels in the amenity spaces.
- 5.37 The noise modelling results indicate that noise levels in the gardens of the terraced houses, and the open public space are predicted to generally achieve the BS8233 recommended levels.
- 5.38 The noise modelling results indicated that the noise levels on balconies on the facades of Blocks A and B, and some of C, are predicted to exceed the BS8233 recommended levels. However, whilst this is not ideal, in our view, exceeding the BS8233 recommended levels does not normally mean that the balconies would be unacceptable to future residents. The reasons for this are as follows:
- Most developments in urban areas will be subject to noise levels above the BS8233 recommended levels for balconies¹;
 - It is common for noise levels on balconies facing main roads to exceed the BS8233 recommended noise levels in Reading and elsewhere;
 - It is reasonable to assume that residents would prefer the option to have a noisier balcony as opposed to having no balcony at all;

¹ Table 2 from BS8233 notes that daytime noise levels will typically exceed 50-55 dB LAeq,16hr in areas close to busy main roads. It was also found in the UK National Noise Incidence Study 2000/2001 that 90% of UK homes were exposed to daytime noise levels >50dB LAeq,16hr and 54% of UK homes were exposed to noise >55dB LAeq,16hr. It is reasonable to assume that a high percentage of these were in urban areas.

- In this case all residents will have the use of the ground floor level communal amenity area west of Block C, where the predicted noise levels are lower than the BS8233 'desirable' levels;
- The balconies are recessed into the apartment blocks so which gives partial screening from the road traffic noise on Caversham Road;
- There is no evidence we are aware of that high noise levels on balconies present a risk to resident's health and well-being; and,
- Planners often consider it to be beneficial to the street-scape to have balconies facing roads as they help marry the development to the surrounding area.

5.39 The current design of the development is therefore considered to be acceptable in relation to noise levels in external amenity areas.

Stage 2 – Element 4 – Other relevant issues

5.40 In our view the design and acoustic approach outlined above is in line with both local and national noise policy. It is common for residential properties to be situated near to main roads and this is an acceptable scenario provided that the properties are acoustically upgraded where necessary to achieve acceptable noise levels in habitable areas.

Recommendation to decision maker

5.41 It is our view that planning permission should be granted in relation to noise affecting habitable areas of the development.

6. CONCLUSIONS

- 6.1 The noise affecting the proposed development has been assessed in accordance with relevant local and national planning guidance.
- 6.2 The design of the proposed development is considered to be acceptable subject to the adoption of acoustically upgraded glazing and ventilation, which may be secured by the Local Planning Authority via a noise related planning condition.
- 6.3 It is our view that the site is suitable for the development in terms of noise levels and that planning permission should be granted subject to the imposition of suitable planning conditions.

Appendix 1 Development Layout



Notes:

- Do not scale from this drawing; work to figured dimensions only.
- All information is to be checked on site for accuracy and fit.
- Report any discrepancies and omissions to RMA Architects.

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• Where RMA services on a project do not include for site inspections and works surveys, RMA do not warrant that 'as built' issue drawings are a complete and accurate record of what has been constructed

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P3	02.09.22	Draft Planning Submission	NK	CT
P2	24.08.22	Issued for Comments	VC	CT
P1	05.08.22	Second Issue	VC	AS
P0	28.07.22	WIP - Issued For Comments	KD	AS
Rev	Date	Description	By	Chkd

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Key Plan



Project

Carters Site, Reading

RMA Project Reference 2207

Client

Bellway Thames Valley

Scale	Date	By	Checked
1 : 200 @ A1	07/27/22	KD	AS

Drawing Title

SITE PLAN

00

GROUND FLOOR LEVEL

Purpose of Issue INFORMATION	Status Code
Drawing No CR-RMA-ZZ-00-DR-A-0100	Revision P3



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Project

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Scale	Date	By	Checked
1 : 200 @ A1	07/27/22	KD	AS

Drawing Title

SITE PLAN

01

FIRST FLOOR LEVEL

Purpose of Issue	Status Code
INFORMATION	
Drawing No	Revision
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Drawing Title

SITE PLAN

02

SECOND FLOOR LEVEL

Purpose of Issue	Status Code
INFORMATION	
Drawing No	Revision
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P3	02.09.22	Draft Planning Submission	NK	CT
P2	24.08.22	Issued for Comments	VC	CT
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P0	28.07.22	WIP_Issued For Comments	KD	AS
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Scale	Date	By	Checked
1 : 200 @ A1	07/27/22	KD	AS

Drawing Title

SITE PLAN

03

THIRD FLOOR LEVEL

Purpose of Issue	Status Code
INFORMATION	
Drawing No	Revision
CR-RMA-ZZ-03-DR-A-0103	P3

Appendix 2 Survey Results

Survey Summary:

The survey comprised short-term operator attended noise measurements and longer-term unattended noise monitoring at the site. Noise levels at the site were generally dictated by road traffic on surrounding roads.

Survey Period:

05/07/2022 to 11/07/2022

Survey Objectives:

- To identify noise sources that contribute to ambient noise levels at the site;
- To measure noise levels around the site over a typical day and night-time period.

Equipment Used:

Type	Manufacturer	Model	Serial Number
Sound level meter ¹	Brüel & Kjær	2250	3029152
Calibrator	01dB	CAL31	83380
Sound level meter ¹	NTi Audio	XL2	A2A-15506-E0
Calibrator	NTi Audio	600 000 388	15011
Sound level meter ¹ (noise logger)	Rion	NL-32	01213688
Sound level meter ¹ (noise logger)	Rion	NL-32	00903342
Calibrator	Rion	NC-74	34551703

Note 1: All sound level meters were calibrated before and after measurement periods and no significant drift in calibration was found to have occurred. The results of the measurements are therefore considered to be representative.

Weather Conditions:

The observed weather conditions were acceptable for acoustic measurement throughout the attended survey periods (low-medium wind speeds and no rain). Weather records for the area confirmed that weather conditions were also generally acceptable for acoustic measurement during the unattended monitoring.

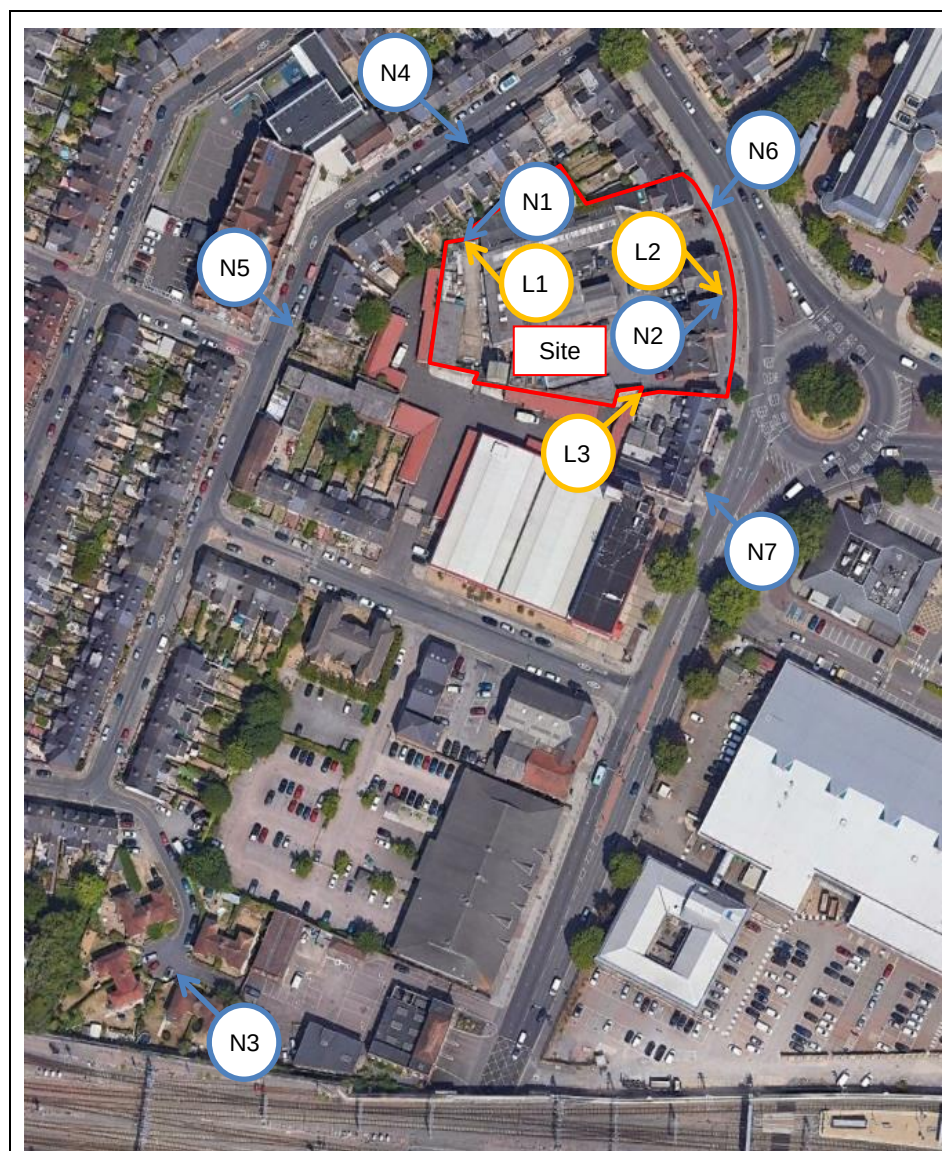
Measurement Positions:

Position (refer plan below)	Description
N1	Verification of L1 measurement
N2	Verification of L2 measurement
N3	Attended noise monitoring position. 3m above ground. Free-field. Line of sight to rail barrier.
N4	Attended noise monitoring position. 1.5m above ground. Free-field. Direct line of sight to Swansea Road
N5	

Measurement Positions:

Position (refer plan below)	Description
N6	Attended noise monitoring position. 1.5m above ground. Free-field. Direct line of sight to Caversham Road
N7	
L1	Unattended noise logging position. 3m above ground level. Free-field. Direct line of sight to rear facades of properties on Swansea Road
L2	Unattended noise logging position. 4.5m above ground level. Free-field. Direct line of sight to Caversham Road
L3	Unattended noise logging position. 4.5m above ground level. Free-field. Direct line of sight to nearby plant

Site Plan showing Measurement Positions:



Attended Noise Monitoring Results:

Date	Position	Time	Meas. Length	LAeq, dB	LAmx, dB	LA90, dB	Observations
05/07/2022	N1	12:50	5 mins	49	67	39	Noise dictated by road traffic on surrounding roads.
		12:55		42	52	39	
	N2	13:30		67	82	62	Noise dictated by road traffic on Caversham Road.
		13:35		79	104	62	
	N3	14:03	29 secs	52	58		Measurement of train pass.
		14:06	17 secs	51	54		
		14:08	11 secs	51	56		
		13:12	10 secs	50	55		
	N4	14:55	5 mins	60	76	49	Noise levels dictated by road traffic on Caversham Road. Maximum noise levels dictated by road traffic on Swansea Road.
		15:00		57	74	46	
		15:51		60	67		Measurement of traffic pass on Swansea Road.
		15:55		65	72		
		15:56		65	72		
		15:56		60	65		
		15:59		59	64		
		16:01		60	62		
		16:02		62	67		
		16:04		59	64		
	N5	15:10		58	72	50	Noise levels dictated by road traffic on Caversham Road. Maximum noise levels dictated by vehicle passes on Swansea Road. Pedestrian noise from nearby school, and aircraft noise were audible during measurement but did not dictate noise levels.
		15:15		60	81	50	Noise levels dictated by road traffic on Swansea Road and maximum noise levels dictated by pedestrians outside nearby school.
	N6	15:25		73	84	67	Noise levels dictated by road traffic on Caversham Road.
		15:30		74	86	67	
	N7	15:37		74	89	67	
		15:42		72	82	67	
11/07/2022	N6	12:53	21 secs	71	76		Measurement of traffic pass on Caversham Road.
		12:54	3 secs	72	74		
		12:55	10 secs	71	73		

Attended Noise Monitoring Results:

Date	Position	Time	Meas. Length	LAeq, dB	LAmix, dB	LA90, dB	Observations
		12:55	3 secs	70	71		
		12:56	6 secs	71	74		
		12:56	6 secs	76	79		
		12:58	4 secs	71	72		
	N3	13:16	15 secs	54	56		Measurement of train pass.
		13:21	18 secs	51	54		
		13:23	5 secs	53	59		
		13:32	24 secs	51	53		
		13:43	15 secs	53	57		

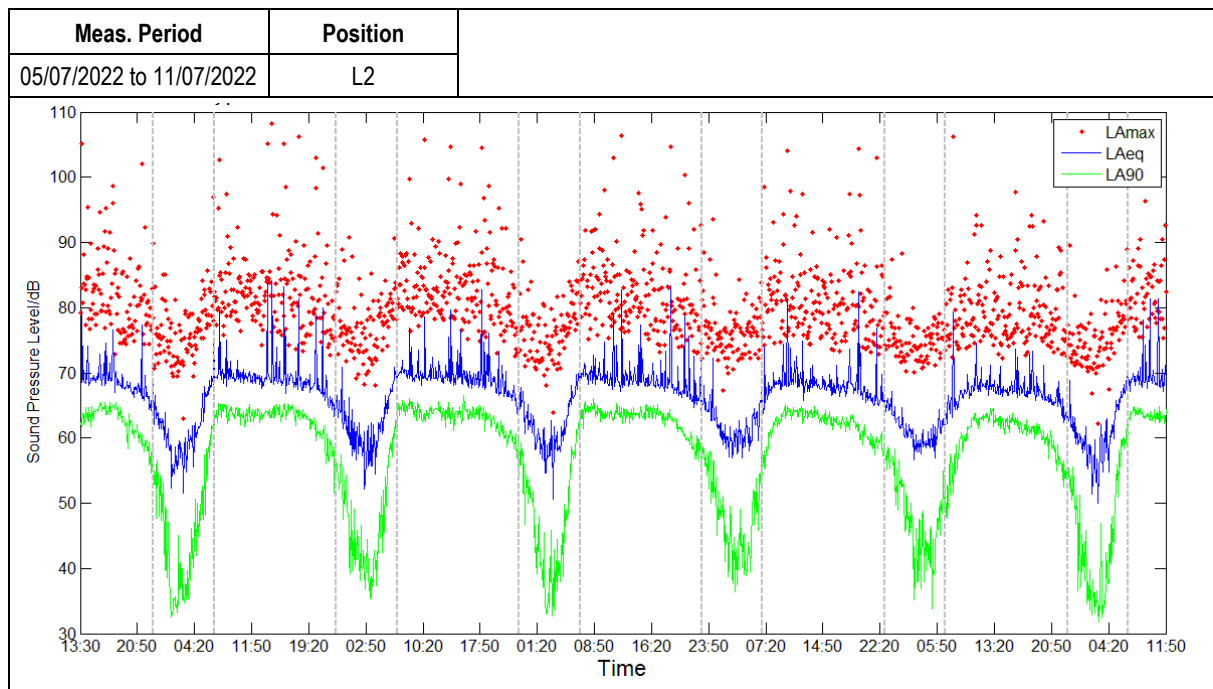
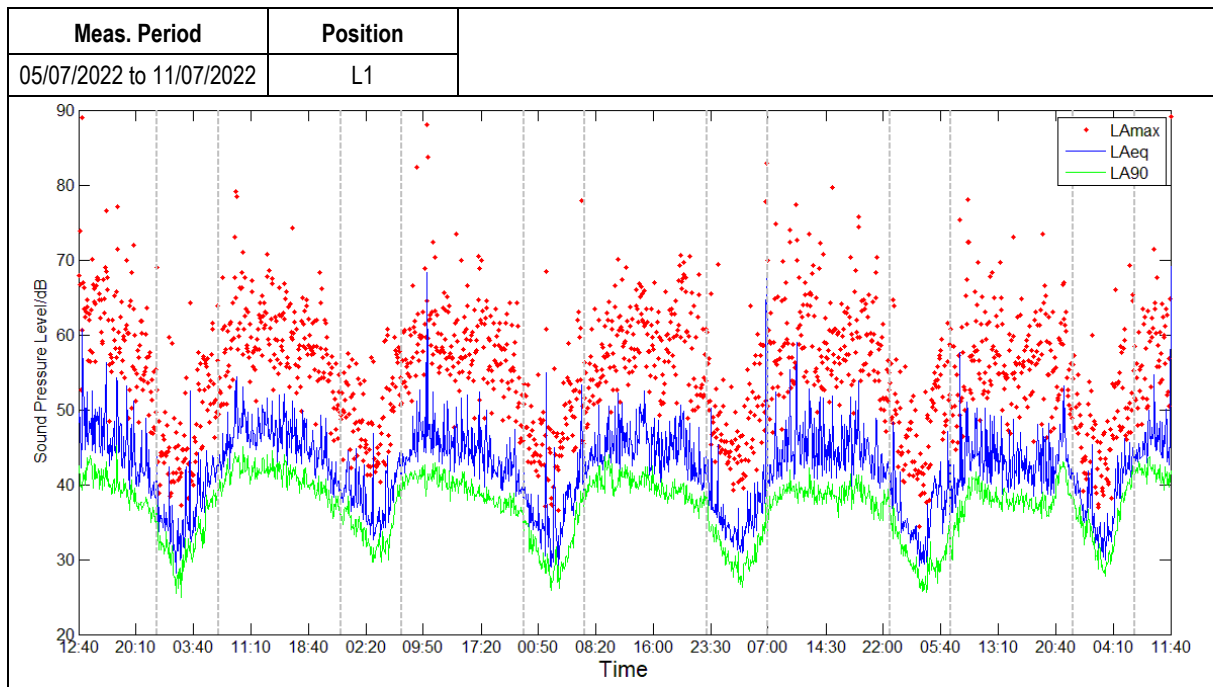
Unattended Noise Monitoring Results:

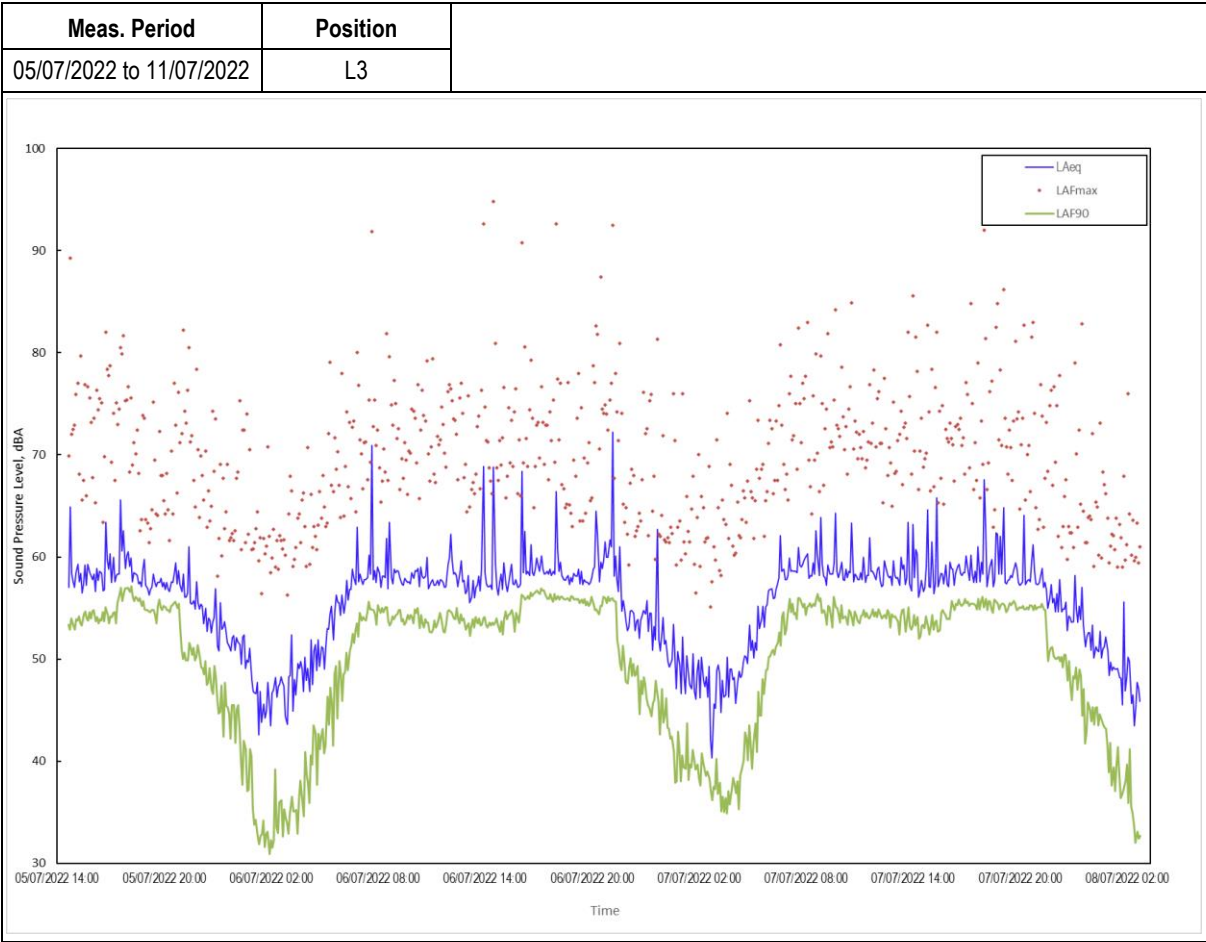
Meas. Period	Position	Daytime (0700-2300hrs)		Night-time (2300-0700hrs)		
		LAeq,16hr, dB	LA90,1hr dB ¹	LAeq,8hr, dB	LA90,5mins, dB ¹	LAmix, dB ²
05/07/2022 to 11/07/2022	L1	47	39	42	32	57
	L2	70	64	63	40	81
05/07/2022 to 08/07/2022	L3	59	54	53	45	73

Note 1: Typical lowest measured during the period shown.

Note 2: Highest typical maximum noise level during the night-time (not exceeded more than 10-15 times per night).

Unattended Noise Monitoring Results:





Appendix 3 Modelling Results

Modelling Software:

CADNA/A Version 2022

Modelled Scenarios:

Day and night-time average noise levels across the site

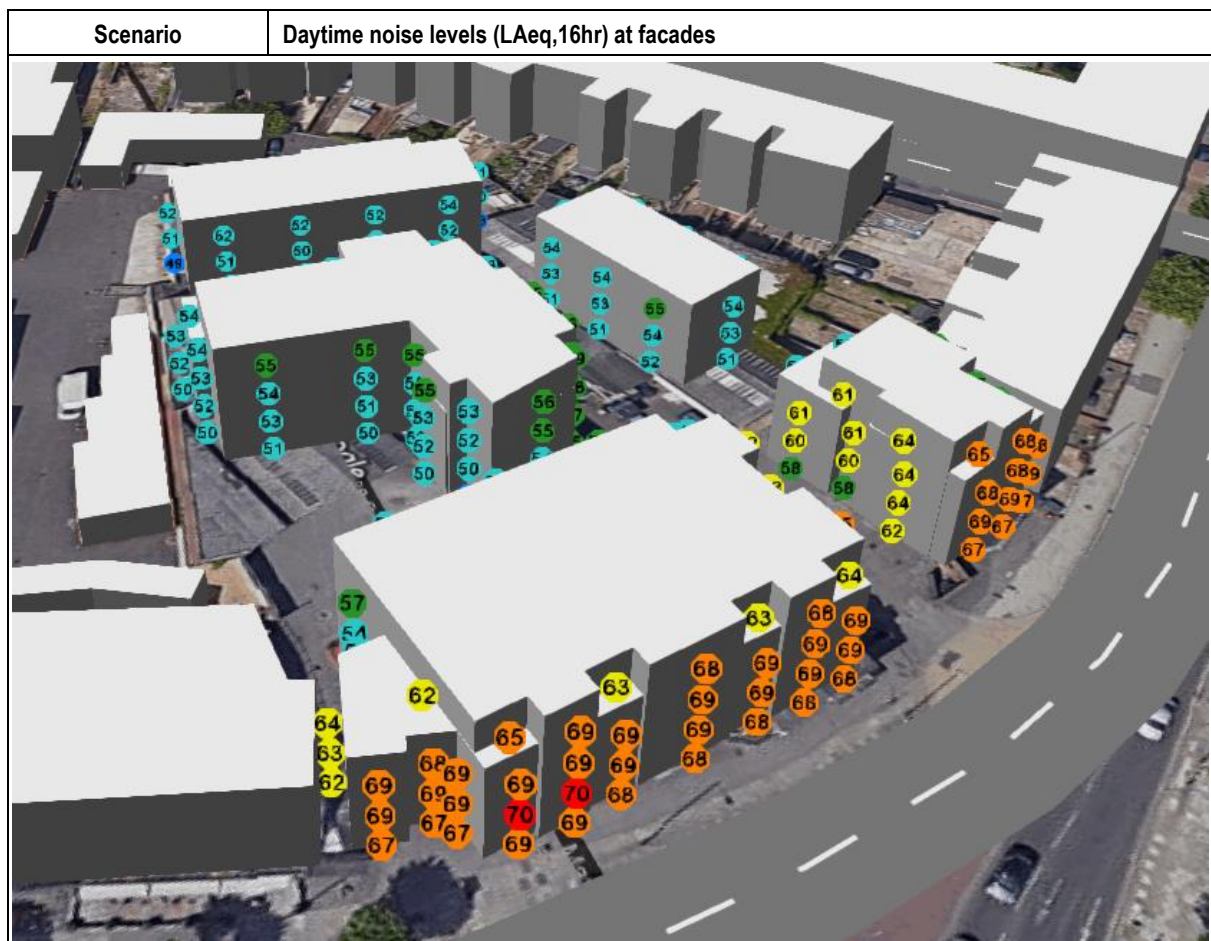
Data inputs:

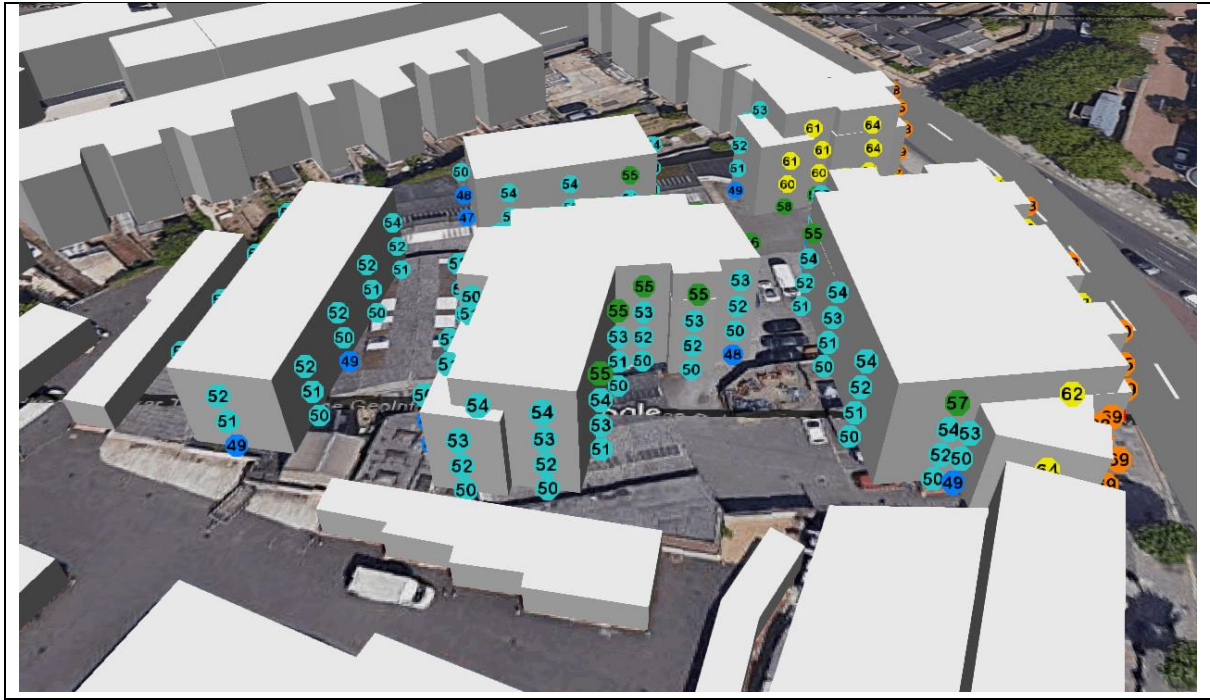
- Noise survey results
- Development layout

Calculation Algorithms Used:

- Calculation of Road Traffic Noise 1988 – Department of Transport
- ISO 9613-1:1993 Acoustics-Attenuation of sound during propagation outdoors – Part 1: Calculation of the absorption of sound by the atmosphere
- ISO 9613-2:1996 Acoustics-Attenuation of sound during propagation outdoors – Part 2: General method of calculation

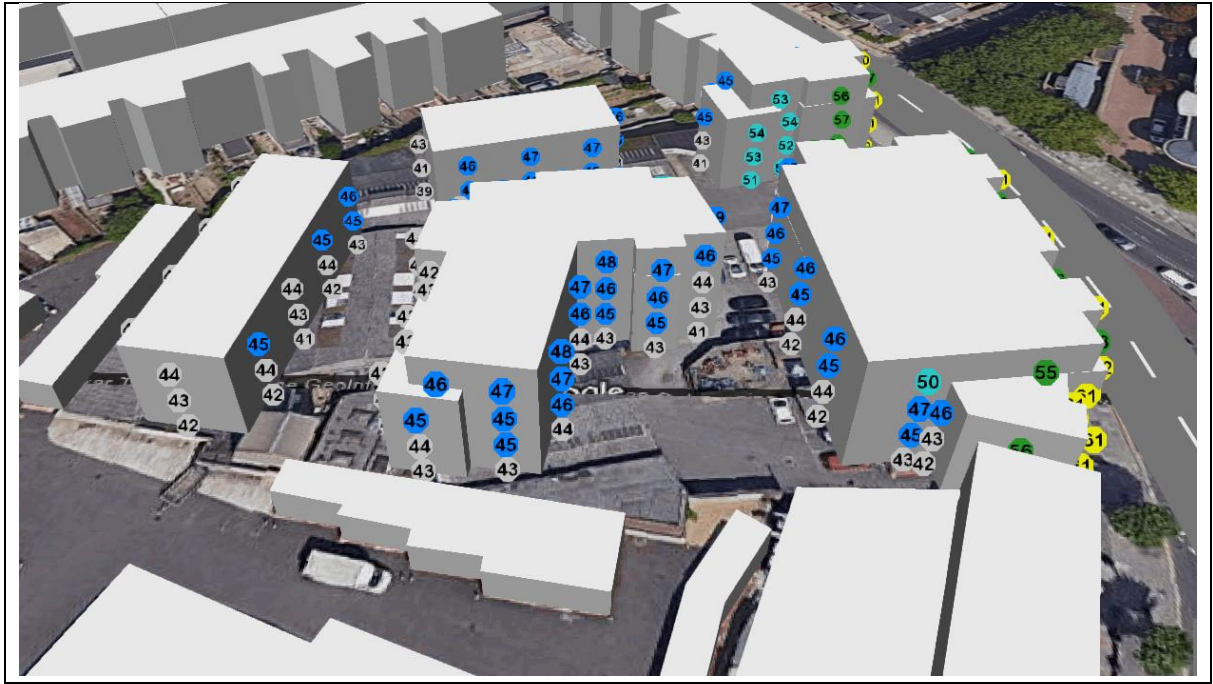
Modelling Printout:





Modelling Printout:





Appendix 4 Acoustic Facade Calculations

PROJECT: **Carters, Reading**
 ROOM: **Block A and B Bedroom**
 VARIANT: **LAeq 8 hour**
 NOTES: **FC01**

Room Dimensions [m] **3.0** X **4.0** X **2.4**
 Room Volume = **28.8** m³
 Partition Area = **8.4** m²
 Ventilation ref area = **10.0** m²
 Free Field SPL K = **3** dB

SELECT Free Field or Façade SPL for model input >>> **Free Field**

EXTERNAL SPECTRUM (A weighted)

dBA	63	125	250	500	1000	2000	4000	
Direct input - Free Field SPL (A weighted octave bands) dB ---->	-							No data
Road traffic spectrum (according to BS 8233:1999 section 6)	62.0							
	43.8	47.9	51.4	54.8	58.0	55.2	50.0	Reference spectrum

REVERBERATION TIME

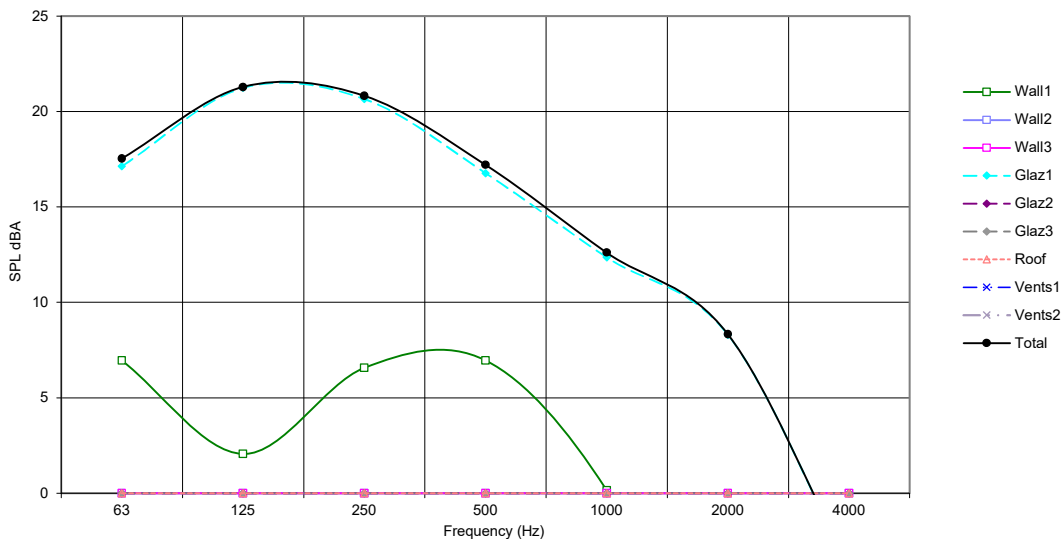
DIRECT INPUT ---->								No data
EQUAL RT for all bands ---->	0.5	0.5	0.5	0.5	0.5	0.5	0.5	Default - RT set to 0.5s

Façade Element	Area [m ²]	SRI dB to BS EN ISO 140-3:1995							Rw	C	Ctr
Wall 1 Typical - 102mm brick/50mm cavity/100mm block	3.8	36	45	44	47	57	67	77	4%	54	-4
ATTENUATION											
Wall 2 WALLS		0	0	0	0	0	0	0	0%		
ATTENUATION											
Wall 3 WALLS		0	0	0	0	0	0	0	0%		
ATTENUATION											
Glazing 1 36 dB Rw + Ctr - High Acoustic Performance Double Glazing	4.5	27	27	31	38	46	47	54	94%	36 (inc Ctr)	-
ATTENUATION											
Glazing 2 GLAZING		0	0	0	0	0	0	0	0%		
ATTENUATION											
Glazing 3 GLAZING		0	0	0	0	0	0	0	0%		
ATTENUATION											
Roof ROOF / FLOOR		0	0	0	0	0	0	0	0%		
ATTENUATION											
Resultant composite Façade SRI		29	29	33	40	48	49	56			
Resultant SPL inside room excluding ventilators dB		25.9	18	21	21	17	13	8	-4	100%	

Ventilator Type	Num	D _{n,w} dB to BS EN 20140-10:1992							Dnew	C	Ctr
Ventilation VENTS	0	0	0	0	0	0	0	0	0%		
ATTENUATION											
Ventilation VENTS	0	0	0	0	0	0	0	0	0%		
ATTENUATION											
Resultant SPL inside room through ventilators dB		-99.0	-96	-96	-96	-96	-96	-96	0%		

Total SPL inside room **25.9 18 21 21 17 13 8 -4**

Element contribution to total internal noise level



PROJECT: **Carters, Reading**
 ROOM: **Block A and B Bedroom**
 VARIANT: **LAeq 16 hour**
 NOTES: **FC01**

Room Dimensions [m] **3.0** X **4.0** X **2.4**
 Room Volume = **28.8** m³
 Partition Area = **8.4** m²
 Ventilation ref area = **10.0** m²
 Free Field SPL K = **3** dB

SELECT Free Field or Façade SPL for model input >>> **Free Field**

EXTERNAL SPECTRUM (A weighted)

Direct input - Free Field SPL (A weighted octave bands) dB -----	-							No data
Road traffic spectrum (according to BS 8233:1999 section 6)	70.0							
	51.8	55.9	59.4	62.8	66.0	63.2	58.0	Reference spectrum

REVERBERATION TIME

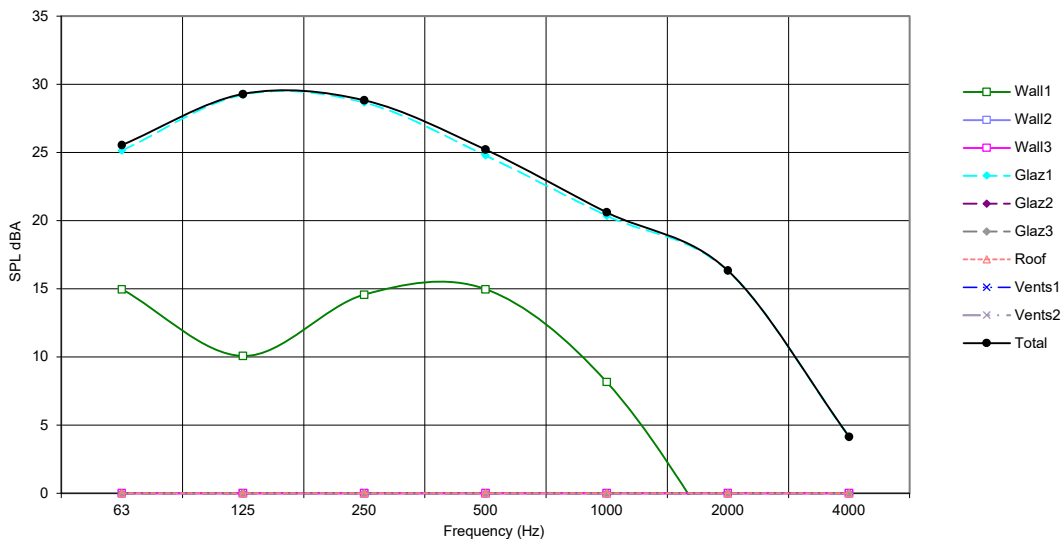
DIRECT INPUT ---->								No data
EQUAL RT for all bands ---->	0.5	0.5	0.5	0.5	0.5	0.5	0.5	Default - RT set to 0.5s

Façade Element	Area [m ²]	SRI dB to BS EN ISO 140-3:1995							Rw	C	Ctr
Wall 1 Typical - 102mm brick/50mm cavity /100mm block	3.8	36	45	44	47	57	67	77	4%	54	-4
ATTENUATION											
Wall 2 WALLS		0	0	0	0	0	0	0	0%		
ATTENUATION											
Wall 3 WALLS		0	0	0	0	0	0	0	0%		
ATTENUATION											
Glazing 1 36 dB Rw + Ctr - High Acoustic Performance Double Glazing	4.5	27	27	31	38	46	47	54	95%	36 (inc Ctr)	-
ATTENUATION											
Glazing 2 GLAZING		0	0	0	0	0	0	0	0%		
ATTENUATION											
Glazing 3 GLAZING		0	0	0	0	0	0	0	0%		
ATTENUATION											
Roof ROOF / FLOOR		0	0	0	0	0	0	0	0%		
ATTENUATION											
Resultant composite Façade SRI		29	29	33	40	48	49	56			
Resultant SPL inside room excluding ventilators dB	33.9	26	29	29	25	21	16	4	100%		

Ventilator Type	Num	D _{n,e} dB to BS EN 20140-10:1992							Dnew	C	Ctr
Ventilation VENTS	0	0	0	0	0	0	0	0	0%		
ATTENUATION											
Ventilation VENTS		0	0	0	0	0	0	0	0%		
ATTENUATION											
Resultant SPL inside room through ventilators dB	-99.0	-96	-96	-96	-96	-96	-96	-96	0%		

Total SPL inside room **33.9 26 29 29 25 21 16 4**

Element contribution to total internal noise level



PROJECT:

ROOM:

VARIANT:

NOTES:

Room Dimensions [m] X X

Room Volume = m³

Partition Area = m²

Ventilation ref area = m²

Free Field SPL K = dB

SELECT Free Field or Façade SPL for model input >>>

EXTERNAL SPECTRUM (A weighted)

dBA	63	125	250	500	1000	2000	4000
Direct input - Free Field SPL (A weighted octave bands) dB ---->	81.0	58.5	63.1	68.4	74.6	77.1	74.1
Road traffic spectrum (according to BS 8233:1999 section 6)							
	58.5	63.1	68.4	74.6	77.1	74.1	70.0

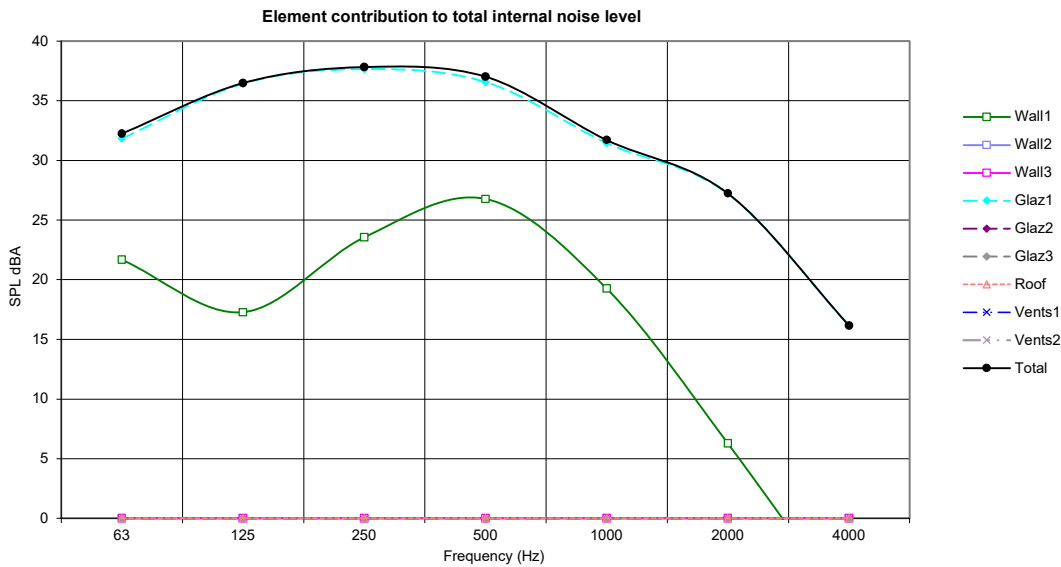
REVERBERATION TIME

DIRECT INPUT ---->								No data
EQUAL RT for all bands ---->								
	0.5	0.5	0.5	0.5	0.5	0.5	0.5	Default - RT set to 0.5s

Façade Element	Area [m ²]	SRI dB to BS EN ISO 140-3:1995							Rw	C	Ctr
Wall 1 Typical - 102mm brick/50mm cavity/100mm block	3.8	36	45	44	47	57	67	77	5%	54	-4
ATTENUATION											
Wall 2 WALLS		0	0	0	0	0	0	0	0%		
ATTENUATION											
Wall 3 WALLS		0	0	0	0	0	0	0	0%		
ATTENUATION											
Glazing 1 36 dB Rw + Ctr - High Acoustic Performance Double Glazing	4.5	27	27	31	38	46	47	54	95%	36 (inc Ctr)	-
ATTENUATION											
Glazing 2 GLAZING		0	0	0	0	0	0	0	0%		
ATTENUATION											
Glazing 3 GLAZING		0	0	0	0	0	0	0	0%		
ATTENUATION											
Roof ROOF / FLOOR		0	0	0	0	0	0	0	0%		
ATTENUATION											
Resultant composite Façade SRI		29	29	33	40	48	49	56			
Resultant SPL inside room excluding ventilators dB	42.8	32	36	38	37	32	27	16	100%		

Ventilator Type	Num	D _{n,e} dB to BS EN 20140-10:1992							Dnew	C	Ctr
Ventilation VENTS		0	0	0	0	0	0	0	0%		
ATTENUATION											
Ventilation VENTS		0	0	0	0	0	0	0	0%		
ATTENUATION											
Resultant SPL inside room through ventilators dB	-99.0	-96	-96	-96	-96	-96	-96	-96	0%		

Total SPL inside room



PROJECT: **Carters, Reading**
 ROOM: **Block A and B Living room**
 VARIANT: **LAeq 16 hour**
 NOTES: **FC01**

Room Dimensions [m] **5.1** X **5.1** X **2.4**
 Room Volume = **62.4** m³
 Partition Area = **9.5** m²
 Ventilation ref area = **10.0** m²
 Free Field SPL K = **3** dB

SELECT Free Field or Façade SPL for model input >>> **Free Field**

EXTERNAL SPECTRUM (A weighted)

dBA	63	125	250	500	1000	2000	4000	
Direct input - Free Field SPL (A weighted octave bands) dB ---->	-							No data
Road traffic spectrum (according to BS 8233:1999 section 6)	70.0							
	51.8	55.9	59.4	62.8	66.0	63.2	58.0	Reference spectrum

REVERBERATION TIME

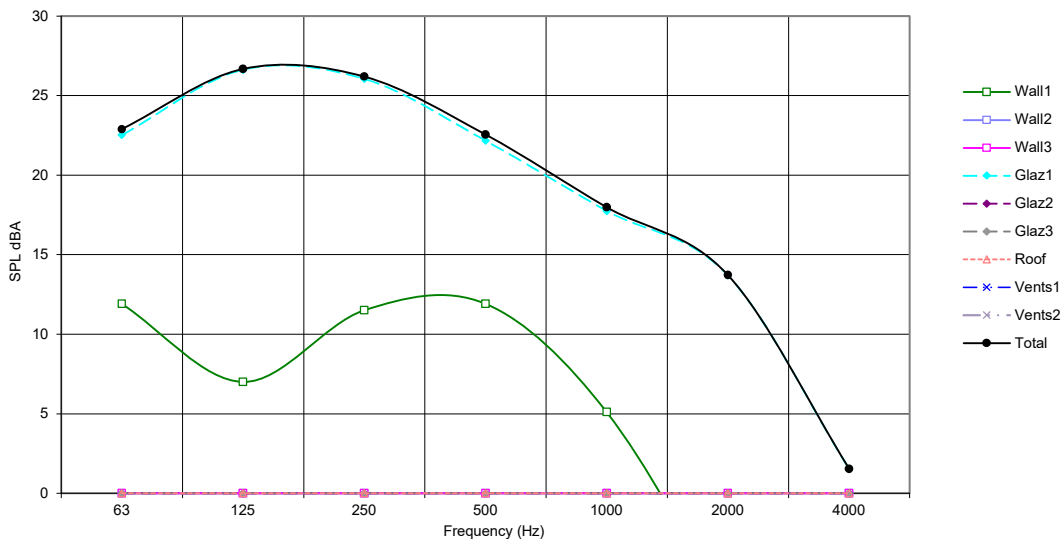
DIRECT INPUT ---->								No data
EQUAL RT for all bands ---->	0.5	0.5	0.5	0.5	0.5	0.5	0.5	Default - RT set to 0.5s

Façade Element	Area [m ²]	SRI dB to BS EN ISO 140-3:1995							Rw	C	Ctr
Wall 1 Typical - 102mm brick/50mm cavity/100mm block	4.1	36	45	44	47	57	67	77	4%	54	-4
ATTENUATION											
Wall 2 WALLS		0	0	0	0	0	0	0	0%		
ATTENUATION											
Wall 3 WALLS		0	0	0	0	0	0	0	0%		
ATTENUATION											
Glazing 1 36 dB Rw + Ctr - High Acoustic Performance Double Glazing	5.4	27	27	31	38	46	47	54	96%	36 (inc Ctr)	-
ATTENUATION											
Glazing 2 GLAZING		0	0	0	0	0	0	0	0%		
ATTENUATION											
Glazing 3 GLAZING		0	0	0	0	0	0	0	0%		
ATTENUATION											
Roof ROOF / FLOOR		0	0	0	0	0	0	0	0%		
ATTENUATION											
Resultant composite Façade SRI		29	29	33	40	48	49	56			
Resultant SPL inside room excluding ventilators dB	31.3	23	27	26	23	18	14	2	100%		

Ventilator Type	Num	D _{n,e} dB to BS EN 20140-10:1992							Dnew	C	Ctr
Ventilation VENTS		0	0	0	0	0	0	0	0%		
ATTENUATION											
Ventilation VENTS		0	0	0	0	0	0	0	0%		
ATTENUATION											
Resultant SPL inside room through ventilators dB	-99.0	-96	-96	-96	-96	-96	-96	-96	0%		

Total SPL inside room **31.3 23 27 26 23 18 14 2**

Element contribution to total internal noise level



PROJECT: Carters, Reading
 ROOM: Block A and B Bedroom
 VARIANT: LAeq 8 hour
 NOTES: FC02

Room Dimensions [m] 3.0 X 4.0 X 2.4
 Room Volume = 28.8 m³
 Partition Area = 7.9 m²
 Ventilation ref area = 10.0 m²
 Free Field SPL K = 3 dB

SELECT Free Field or Façade SPL for model input >>> Free Field

EXTERNAL SPECTRUM (A weighted)

Direct input - Free Field SPL (A weighted octave bands) dB -----> No data
 Road traffic spectrum (according to BS 8233:1999 section 6) 58.0

39.8 43.9 47.4 50.8 54.0 51.2 46.0 Reference spectrum

REVERBERATION TIME

DIRECT INPUT -----> No data

EQUAL RT for all bands -----> 0.5 0.5 0.5 0.5 0.5 0.5 0.5 Default - RT set to 0.5s

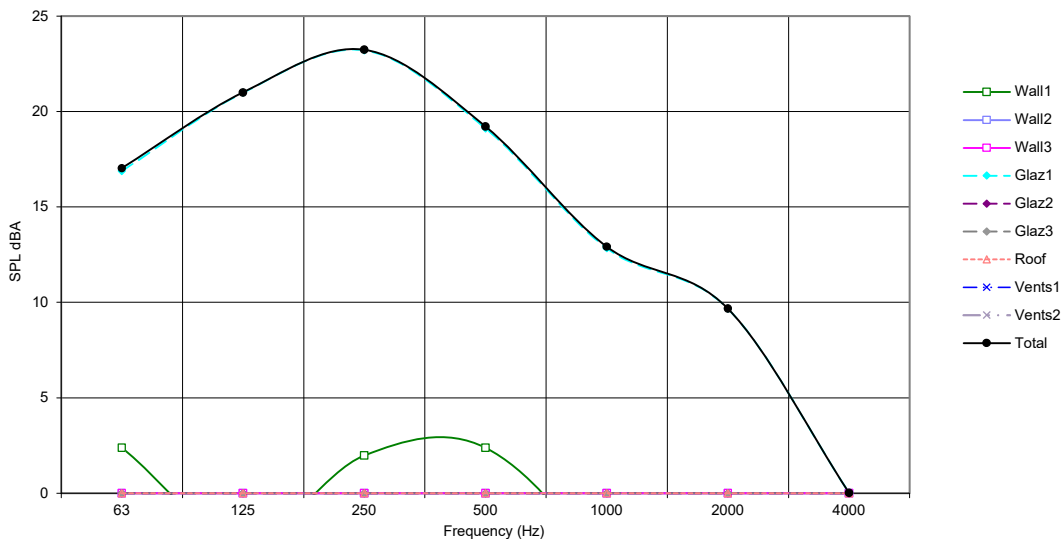
NOTES:

Façade Element	Area [m ²]	SRI dB to BS EN ISO 140-3:1995							Rw	C	Ctr
Wall 1 Typical - 102mm brick/50mm cavity /100mm block	3.3	36	45	44	47	57	67	77	0%	54	-4
ATTENUATION											
Wall 2 WALLS	0	0	0	0	0	0	0	0	0%		
ATTENUATION											
Wall 3 WALLS	0	0	0	0	0	0	0	0	0%		
ATTENUATION											
Glazing 1 31 dB Rw + Ctr - Acoustically Upgraded Double Glazing	4.5	23	23	24	32	41	41	46	99%	31 (inc Ctr)	-
ATTENUATION											
Glazing 2 GLAZING	0	0	0	0	0	0	0	0	0%		
ATTENUATION											
Glazing 3 GLAZING	0	0	0	0	0	0	0	0	0%		
ATTENUATION											
Roof ROOF / FLOOR	0	0	0	0	0	0	0	0	0%		
ATTENUATION											
Resultant composite Façade SRI		25	25	26	34	43	44	48			
Resultant SPL inside room excluding ventilators dB		27.0	17	21	23	19	13	10	0	100%	

Ventilator Type	Num	D _{n,w} dB to BS EN 20140-10:1992							Dnew	C	Ctr
Ventilation VENTS	0	0	0	0	0	0	0	0	0%		
ATTENUATION											
Ventilation VENTS	0	0	0	0	0	0	0	0	0%		
ATTENUATION											
Resultant SPL inside room through ventilators dB		-99.0	-96	-96	-96	-96	-96	-96	0%		

Total SPL inside room 27.0 17 21 23 19 13 10 0

Element contribution to total internal noise level



PROJECT: **Carters, Reading**
 ROOM: **Block A and B Bedroom**
 VARIANT: **LAeq 16 hour**
 NOTES: **FC02**

Room Dimensions [m] **3.0** X **4.0** X **2.4**
 Room Volume = **28.8** m³
 Partition Area = **7.9** m²
 Ventilation ref area = **10.0** m²
 Free Field SPL K = **3** dB

SELECT Free Field or Façade SPL for model input >>> **Free Field**

EXTERNAL SPECTRUM (A weighted)

Direct input - Free Field SPL (A weighted octave bands) dB -----	-							No data
Road traffic spectrum (according to BS 8233:1999 section 6)	65.0							
	46.8	50.9	54.4	57.8	61.0	58.2	53.0	Reference spectrum

REVERBERATION TIME

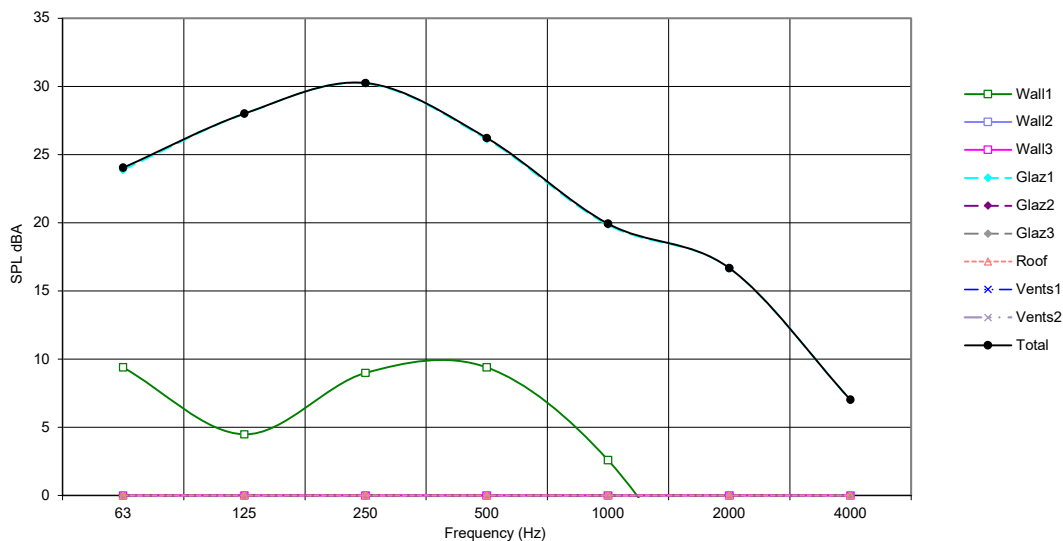
DIRECT INPUT ---->								No data
EQUAL RT for all bands ---->	0.5	0.5	0.5	0.5	0.5	0.5	0.5	Default - RT set to 0.5s

Façade Element	Area [m ²]	SRI dB to BS EN ISO 140-3:1995							Rw	C	Ctr
Wall 1 Typical - 102mm brick/50mm cavity /100mm block	3.3	36	45	44	47	57	67	77	1%	54	-4
ATTENUATION											
Wall 2 WALLS		0	0	0	0	0	0	0	0%		
ATTENUATION											
Wall 3 WALLS		0	0	0	0	0	0	0	0%		
ATTENUATION											
Glazing 1 31 dB Rw + Ctr - Acoustically Upgraded Double Glazing	4.5	23	23	24	32	41	41	46	99%	31 (inc Ctr)	-
ATTENUATION											
Glazing 2 GLAZING		0	0	0	0	0	0	0	0%		
ATTENUATION											
Glazing 3 GLAZING		0	0	0	0	0	0	0	0%		
ATTENUATION											
Roof ROOF / FLOOR		0	0	0	0	0	0	0	0%		
ATTENUATION											
Resultant composite Façade SRI		25	25	26	34	43	44	48			
Resultant SPL inside room excluding ventilators dB	34.0	24	28	30	26	20	17	7	100%		

Ventilator Type	Num	D _{n,w} dB to BS EN 20140-10:1992							Dnew	C	Ctr
Ventilation VENTS	0	0	0	0	0	0	0	0	0%		
ATTENUATION											
Ventilation VENTS	0	0	0	0	0	0	0	0	0%		
ATTENUATION											
Resultant SPL inside room through ventilators dB	-99.0	-96	-96	-96	-96	-96	-96	-96	0%		

Total SPL inside room **34.0 24 28 30 26 20 17 7**

Element contribution to total internal noise level



PROJECT:

Carters, Reading

ROOM:

Block A and B Bedroom

VARIANT:

LAmx night

NOTES:

FC02

Room Dimensions [m]

W

3.0

X

L

4.0

X

H

2.4

Room Volume =

28.8

m3

Partition Area =

8.4

m2

Ventilation ref area =

10.0

m2

Free Field SPL K =

3

dB

SELECT Free Field or Façade SPL for model input >>>

EXTERNAL SPECTRUM (A weighted)

Direct input - Free Field SPL (A weighted octave bands) dB ---->

dBA

63

125

250

500

1000

2000

4000

71.0

48.5

53.1

58.4

64.6

67.1

64.1

60.0

Road traffic spectrum (according to BS 8233:1999 section 6)

48.5

53.1

58.4

64.6

67.1

64.1

60.0

Direct input

REVERBERATION TIME

DIRECT INPUT ---->

No data

EQUAL RT for all bands ---->

0.5

0.5

0.5

0.5

0.5

0.5

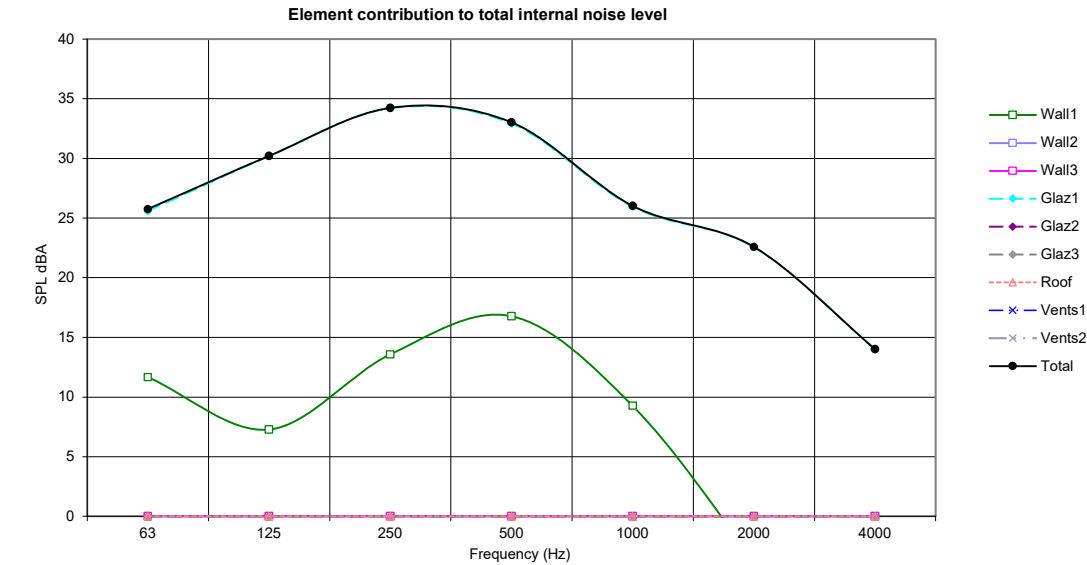
0.5

Default - RT set to 0.5s

NOTES:

Façade Element	Area [m2]	SRI dB to BS EN ISO 140-3:1995								Rw	C	Ctr
Wall 1 Typical - 102mm brick/50mm cavity /100mm block	3.8	36	45	44	47	57	67	77	1%	54	0	-4
ATTENUATION												
Wall 2 WALLS	0	0	0	0	0	0	0	0	0%			
ATTENUATION												
Wall 3 WALLS	0	0	0	0	0	0	0	0	0%			
ATTENUATION												
Glazing 1 31 dB Rw + Ctr - Acoustically Upgraded Double Glazing	4.5	23	23	24	32	41	41	46	98%	31 (inc Ctr)	-	-
ATTENUATION												
Glazing 2 GLAZING	0	0	0	0	0	0	0	0	0%			
ATTENUATION												
Glazing 3 GLAZING	0	0	0	0	0	0	0	0	0%			
ATTENUATION												
Roof ROOF / FLOOR	0	0	0	0	0	0	0	0	0%			
ATTENUATION												
Resultant composite Façade SRI		25	25	27	34	44	44	49				
Resultant SPL inside room excluding ventilators dB		38.3	26	30	34	33	26	23	14	100%		

Ventilator Type	Num	D _{n,e} dB to BS EN 20140-10:1992								Dnew	C	Ctr
Ventilation VENTS	0	0	0	0	0	0	0	0	0%			
ATTENUATION												
Ventilation VENTS	0	0	0	0	0	0	0	0	0%			
ATTENUATION												
Resultant SPL inside room through ventilators dB		-99.0	-96	-96	-96	-96	-96	-96	-96	0%		
Total SPL inside room		38.3	26	30	34	33	26	23	14			



PROJECT: **Carters, Reading**
 ROOM: **Block A and B Living room**
 VARIANT: **LAeq 16 hour**
 NOTES: **FC02**

Room Dimensions [m] **5.1** X **5.1** X **2.4**
 Room Volume = **62.4** m³
 Partition Area = **12.5** m²
 Ventilation ref area = **10.0** m²
 Free Field SPL K = **3** dB

SELECT Free Field or Façade SPL for model input >>> **Free Field**

EXTERNAL SPECTRUM (A weighted)

Direct input - Free Field SPL (A weighted octave bands) dB -----	-							No data
Road traffic spectrum (according to BS 8233:1999 section 6)	65.0							
	46.8	50.9	54.4	57.8	61.0	58.2	53.0	Reference spectrum

REVERBERATION TIME

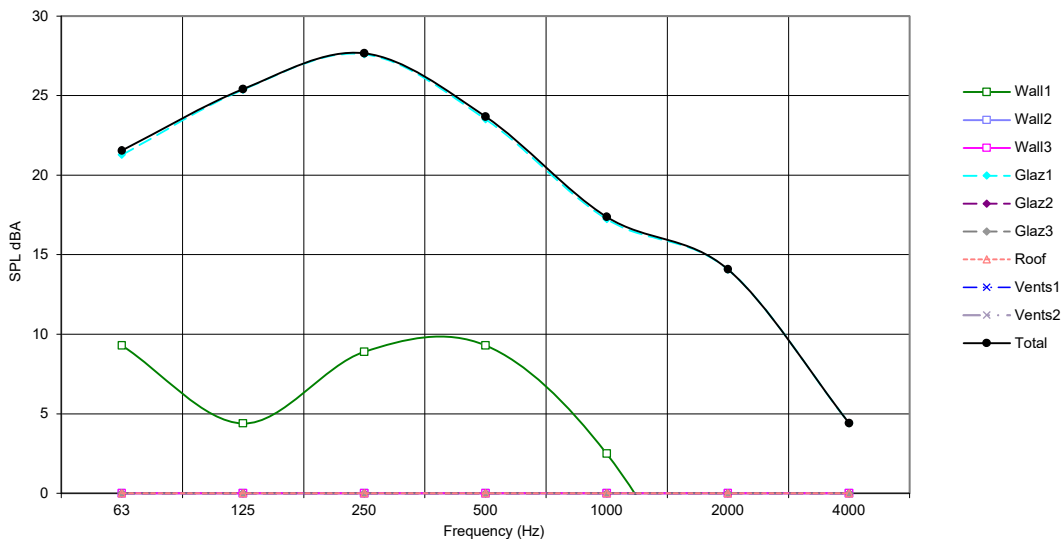
DIRECT INPUT ---->								No data
EQUAL RT for all bands ---->	0.5	0.5	0.5	0.5	0.5	0.5	0.5	Default - RT set to 0.5s

Façade Element	Area [m ²]	SRI dB to BS EN ISO 140-3:1995							Rw	C	Ctr
Wall 1 Typical - 102mm brick/50mm cavity /100mm block	7.1	36	45	44	47	57	67	77	2%	54	-4
ATTENUATION											
Wall 2 WALLS		0	0	0	0	0	0	0	0%		
ATTENUATION											
Wall 3 WALLS		0	0	0	0	0	0	0	0%		
ATTENUATION											
Glazing 1 31 dB Rw + Ctr - Acoustically Upgraded Double Glazing	5.4	23	23	24	32	41	41	46	97%	31 (inc Ctr)	-
ATTENUATION											
Glazing 2 GLAZING		0	0	0	0	0	0	0	0%		
ATTENUATION											
Glazing 3 GLAZING		0	0	0	0	0	0	0	0%		
ATTENUATION											
Roof ROOF / FLOOR		0	0	0	0	0	0	0	0%		
ATTENUATION											
Resultant composite Façade SRI		26	26	28	35	45	45	50			
Resultant SPL inside room excluding ventilators dB		31.4	22	25	28	24	17	14	4	100%	

Ventilator Type	Num	D _{n,e} dB to BS EN 20140-10:1992							Dnew	C	Ctr
Ventilation VENTS		0	0	0	0	0	0	0	0%		
ATTENUATION											
Ventilation VENTS		0	0	0	0	0	0	0	0%		
ATTENUATION											
Resultant SPL inside room through ventilators dB		-99.0	-96	-96	-96	-96	-96	-96	0%		

Total SPL inside room **31.4 22 25 28 24 17 14 4**

Element contribution to total internal noise level



PROJECT: Carters, Reading
 ROOM: Block A and B Bedroom
 VARIANT: LAeq 8 hour
 NOTES: FC03

Room Dimensions [m] $\begin{matrix} W \\ 3.0 \end{matrix} \times \begin{matrix} L \\ 4.0 \end{matrix} \times \begin{matrix} H \\ 2.4 \end{matrix}$

Room Volume = 28.8 m³
 Partition Area = 7.2 m²
 Ventilation ref area = 10.0 m²
 Free Field SPL K = 3 dB

SELECT Free Field or Façade SPL for model input >>> ☐

EXTERNAL SPECTRUM (A weighted)

Direct input - Free Field SPL (A weighted octave bands) dB -----> ☐ No data

Road traffic spectrum (according to BS 8233:1999 section 6) ☒ 49.0

30.8 34.9 38.4 41.8 45.0 42.2 37.0 Reference spectrum

REVERBERATION TIME

DIRECT INPUT -----> ☐ No data

EQUAL RT for all bands -----> ☒ 0.5 0.5 0.5 0.5 0.5 0.5 0.5 Default - RT set to 0.5s

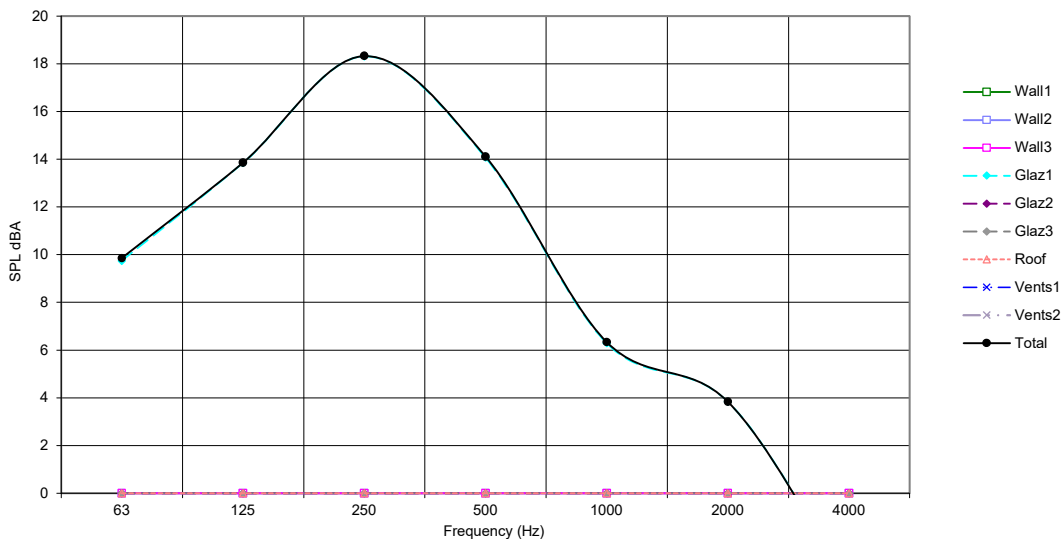
NOTES:

Façade Element	Area [m ²]	SRI dB to BS EN ISO 140-3:1995							Rw	C	Ctr
Wall 1 Typical - 102mm brick/50mm cavity /100mm block	3.7	36	45	44	47	57	67	77	1%	54	-4
ATTENUATION											
Wall 2 WALLS	0	0	0	0	0	0	0	0	0%		
ATTENUATION											
Wall 3 WALLS	0	0	0	0	0	0	0	0	0%		
ATTENUATION											
Glazing 1 27 dB Rw + Ctr - Standard Thermal Double Glazing	3.5	20	20	19	27	38	37	40	95%	27 (inc Ctr)	-
ATTENUATION											
Glazing 2 GLAZING	0	0	0	0	0	0	0	0	0%		
ATTENUATION											
Glazing 3 GLAZING	0	0	0	0	0	0	0	0	0%		
ATTENUATION											
Roof ROOF / FLOOR	0	0	0	0	0	0	0	0	0%		
ATTENUATION											
Resultant composite Façade SRI		23	23	22	30	41	40	43			
Resultant SPL inside room excluding ventilators dB		21.3	10	14	18	14	6	4	-4	100%	

Ventilator Type	Num	D _{n,e} dB to BS EN 20140-10:1992							Dnew	C	Ctr
Ventilation VENTS	0	0	0	0	0	0	0	0	0%		
ATTENUATION											
Ventilation VENTS	0	0	0	0	0	0	0	0	0%		
ATTENUATION											
Resultant SPL inside room through ventilators dB		-99.0	-96	-96	-96	-96	-96	-96	0%		

Total SPL inside room 21.3 10 14 18 14 6 4 -4

Element contribution to total internal noise level



PROJECT: **Carters, Reading**
 ROOM: **Block A and B Bedroom**
 VARIANT: **LAeq 16 hour**
 NOTES: **FC03**

Room Dimensions [m] **3.0** X **4.0** X **2.4**
 Room Volume = **28.8** m³
 Partition Area = **7.2** m²
 Ventilation ref area = **10.0** m²
 Free Field SPL K = **3** dB

SELECT Free Field or Façade SPL for model input >>> **Free Field**

EXTERNAL SPECTRUM (A weighted)

Direct input - Free Field SPL (A weighted octave bands) dB ----->	-							No data
Road traffic spectrum (according to BS 8233:1999 section 6)	55.0							
	36.8	40.9	44.4	47.8	51.0	48.2	43.0	Reference spectrum

REVERBERATION TIME

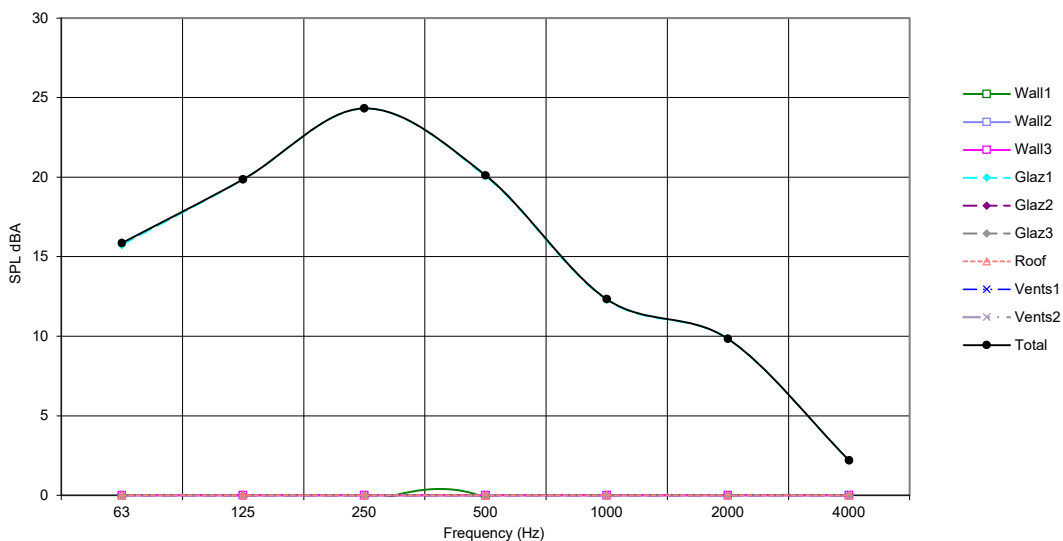
DIRECT INPUT ---->								No data
EQUAL RT for all bands ---->	0.5	0.5	0.5	0.5	0.5	0.5	0.5	Default - RT set to 0.5s

Façade Element	Area [m ²]	SRI dB to BS EN ISO 140-3:1995								Rw	C	Ctr
Wall 1 Typical - 102mm brick/50mm cavity /100mm block	3.7	36	45	44	47	57	67	77	0%	54	0	-4
ATTENUATION												
Wall 2 WALLS	0	0	0	0	0	0	0	0	0%			
ATTENUATION												
Wall 3 WALLS	0	0	0	0	0	0	0	0	0%			
ATTENUATION												
Glazing 1 27 dB Rw + Ctr - Standard Thermal Double Glazing	3.5	20	20	19	27	38	37	40	99%	27 (inc Ctr)	-	-
ATTENUATION												
Glazing 2 GLAZING	0	0	0	0	0	0	0	0	0%			
ATTENUATION												
Glazing 3 GLAZING	0	0	0	0	0	0	0	0	0%			
ATTENUATION												
Roof ROOF / FLOOR	0	0	0	0	0	0	0	0	0%			
ATTENUATION												
Resultant composite Façade SRI		23	23	22	30	41	40	43				
Resultant SPL inside room excluding ventilators dB	27.3	16	20	24	20	12	10	2	100%			

Ventilator Type	Num	D _{n,e} dB to BS EN 20140-10:1992								Dnew	C	Ctr
Ventilation VENTS	0	0	0	0	0	0	0	0	0%			
ATTENUATION												
Ventilation VENTS	0	0	0	0	0	0	0	0	0%			
ATTENUATION												
Resultant SPL inside room through ventilators dB	-99.0	-96	-96	-96	-96	-96	-96	-96	0%			

Total SPL inside room **27.3 16 20 24 20 12 10 2**

Element contribution to total internal noise level



NOTES:

PROJECT:

Carters, Reading

ROOM:

Block A and B Bedroom

VARIANT:

LAmaz night

NOTES:

FC03

Room Dimensions [m]

3.0

 X

4.0

 X

2.4

Room Volume =

28.8

 m3

Partition Area =

7.2

 m2

Ventilation ref area =

10.0

 m2

Free Field SPL K =

3

 dB

SELECT Free Field or Façade SPL for model input >>>

EXTERNAL SPECTRUM (A weighted)

dBA	63	125	250	500	1000	2000	4000
Direct input - Free Field SPL (A weighted octave bands) dB ---->	59.0	36.5	41.1	46.4	52.6	55.1	52.1
Road traffic spectrum (according to BS 8233:1999 section 6)							

36.5 41.1 46.4 52.6 55.1 52.1 48.0 Direct input

REVERBERATION TIME

DIRECT INPUT ---->

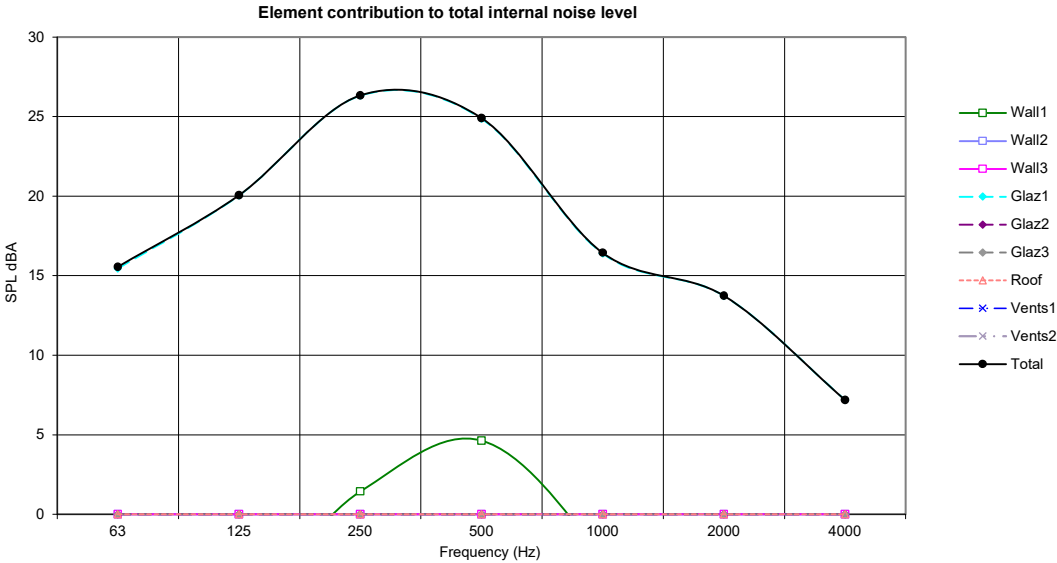
EQUAL RT for all bands ---->

No data

Default - RT set to 0.5s

Façade Element	Area [m2]	SRI dB to BS EN ISO 140-3:1995							Rw	C	Ctr
Wall 1 Typical - 102mm brick/50mm cavity/100mm block	3.7	36	45	44	47	57	67	77	0%	54	-4
ATTENUATION											
Wall 2 WALLS		0	0	0	0	0	0	0	0%		
ATTENUATION											
Wall 3 WALLS		0	0	0	0	0	0	0	0%		
ATTENUATION											
Glazing 1 27 dB Rw + Ctr - Standard Thermal Double Glazing	3.5	20	20	19	27	38	37	40	99%	27 (inc Ctr)	-
ATTENUATION											
Glazing 2 GLAZING		0	0	0	0	0	0	0	0%		
ATTENUATION											
Glazing 3 GLAZING		0	0	0	0	0	0	0	0%		
ATTENUATION											
Roof ROOF / FLOOR		0	0	0	0	0	0	0	0%		
ATTENUATION											
Resultant composite Façade SRI		23	23	22	30	41	40	43			
Resultant SPL inside room excluding ventilators dB		29.8	16	20	26	25	16	14	7	100%	

Ventilator Type	Num	D _{n,w} dB to BS EN 10140-10:1992							Dnew	C	Ctr
Ventilation VENTS		0	0	0	0	0	0	0	0%		
ATTENUATION											
Ventilation VENTS		0	0	0	0	0	0	0	0%		
ATTENUATION											
Resultant SPL inside room through ventilators dB		-99.0	-96	-96	-96	-96	-96	-96	0%		
Total SPL inside room		29.8	16	20	26	25	16	14	7		



PROJECT: **Carters, Reading**
 ROOM: **Block A and B Living room**
 VARIANT: **LAeq 16 hour**
 NOTES: **FC03**

Room Dimensions [m] **5.1** X **5.1** X **2.4**
 Room Volume = **62.4** m³
 Partition Area = **9.5** m²
 Ventilation ref area = **10.0** m²
 Free Field SPL K = **3** dB

SELECT Free Field or Façade SPL for model input >>> **Free Field**

EXTERNAL SPECTRUM (A weighted)

Direct input - Free Field SPL (A weighted octave bands) dB -----> **No data**
 Road traffic spectrum (according to BS 8233:1999 section 6) **55.0**

36.8 40.9 44.4 47.8 51.0 48.2 43.0 Reference spectrum

REVERBERATION TIME

DIRECT INPUT -----> **No data**

EQUAL RT for all bands -----> **0.5 0.5 0.5 0.5 0.5 0.5 0.5** Default - RT set to 0.5s

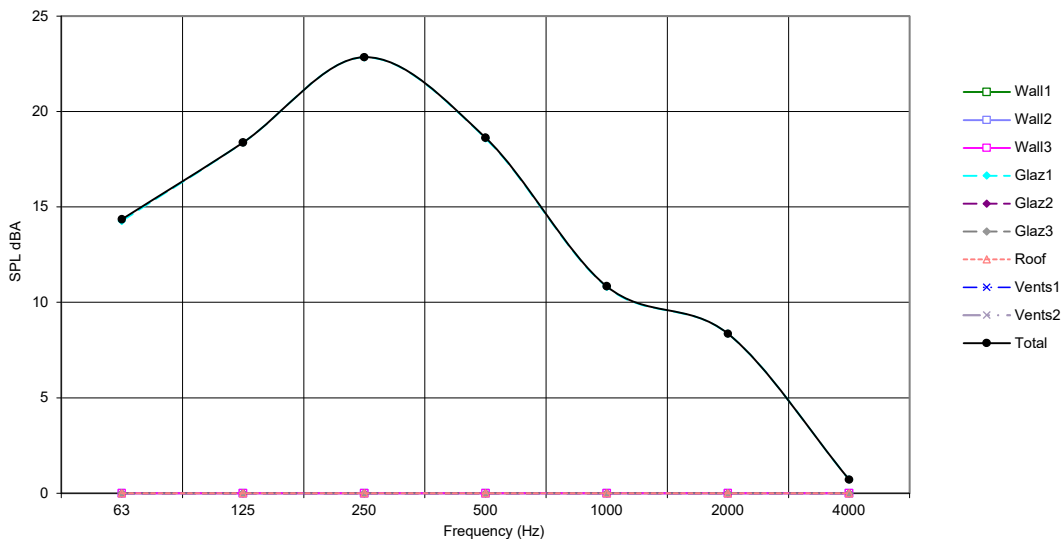
NOTES:

Façade Element	Area [m ²]	SRI dB to BS EN ISO 140-3:1995							Rw	C	Ctr
Wall 1 Typical - 102mm brick/50mm cavity /100mm block	4.1	36	45	44	47	57	67	77	0%	54	-4
ATTENUATION											
Wall 2 WALLS	0	0	0	0	0	0	0	0	0%		
ATTENUATION											
Wall 3 WALLS	0	0	0	0	0	0	0	0	0%		
ATTENUATION											
Glazing 1 27 dB Rw + Ctr - Standard Thermal Double Glazing	5.4	20	20	19	27	38	37	40	98%	27 (inc Ctr)	-
ATTENUATION											
Glazing 2 GLAZING	0	0	0	0	0	0	0	0	0%		
ATTENUATION											
Glazing 3 GLAZING	0	0	0	0	0	0	0	0	0%		
ATTENUATION											
Roof ROOF / FLOOR	0	0	0	0	0	0	0	0	0%		
ATTENUATION											
Resultant composite Façade SRI		22	22	21	29	40	40	42			
Resultant SPL inside room excluding ventilators dB		25.8	14	18	23	19	11	8	1	100%	

Ventilator Type	Num	D _{n,w} dB to BS EN 20140-10:1992							Dnew	C	Ctr
Ventilation VENTS	0	0	0	0	0	0	0	0	0%		
ATTENUATION											
Ventilation VENTS	0	0	0	0	0	0	0	0	0%		
ATTENUATION											
Resultant SPL inside room through ventilators dB		-99.0	-96	-96	-96	-96	-96	-96	0%		

Total SPL inside room **25.8 14 18 23 19 11 8 1**

Element contribution to total internal noise level



PROJECT:

ROOM:

VARIANT:

NOTES:

Room Dimensions [m] X X

Room Volume = m³

Partition Area = m²

Ventilation ref area = m²

Free Field SPL K = dB

SELECT Free Field or Façade SPL for model input >>>

EXTERNAL SPECTRUM (A weighted)

Direct input - Free Field SPL (A weighted octave bands) dB ---->	-							No data
Road traffic spectrum (according to BS 8233:1999 section 6)	49.0							

30.8	34.9	38.4	41.8	45.0	42.2	37.0
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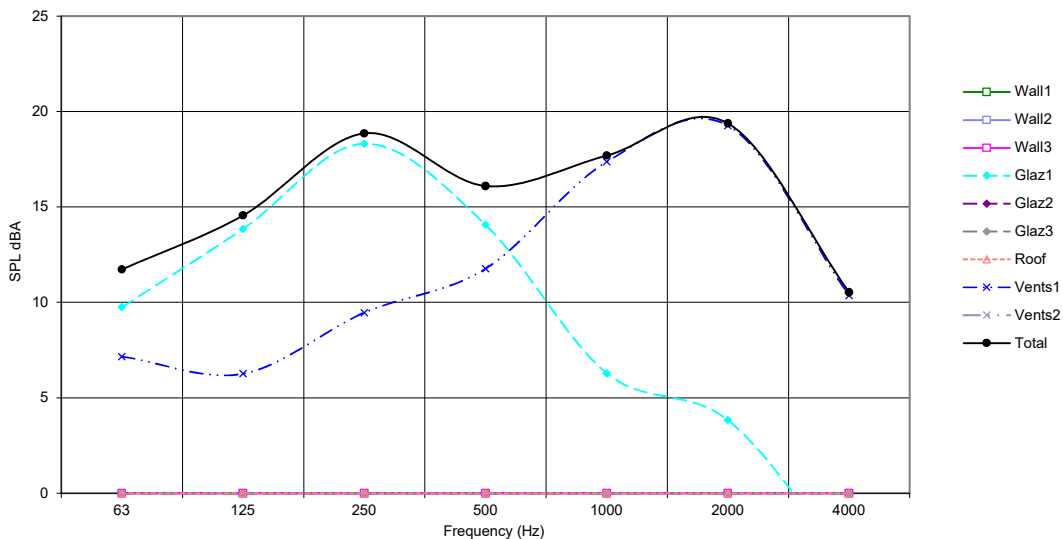
 Reference spectrum
REVERBERATION TIME

DIRECT INPUT ---->								No data
EQUAL RT for all bands ---->								
	0.5	0.5	0.5	0.5	0.5	0.5	0.5	Default - RT set to 0.5s

Façade Element	Area [m ²]	SRI dB to BS EN ISO 140-3:1995							Rw	C	Ctr
Wall 1 Typical - 102mm brick/50mm cavity/100mm block	3.7	36	45	44	47	57	67	77	0%	54	-4
ATTENUATION											
Wall 2 WALLS		0	0	0	0	0	0	0	0%		
ATTENUATION											
Wall 3 WALLS		0	0	0	0	0	0	0	0%		
ATTENUATION											
Glazing 1 27 dB Rw + Ctr - Standard Thermal Double Glazing	3.5	20	20	19	27	38	37	40	41%	27 (inc Ctr)	-
ATTENUATION											
Glazing 2 GLAZING		0	0	0	0	0	0	0	0%		
ATTENUATION											
Glazing 3 GLAZING		0	0	0	0	0	0	0	0%		
ATTENUATION											
Roof ROOF / FLOOR		0	0	0	0	0	0	0	0%		
ATTENUATION											
Resultant composite Façade SRI		23	23	22	30	41	40	43			
Resultant SPL inside room excluding ventilators dB	21.3	10	14	18	14	6	4	-4	42%		

Ventilator Type	Num	D _{n,w} dB to BS EN 20140-10:1992							Dnew	C	Ctr
Ventilation Hit and miss trickle (4000mm ²) e.g. Titon Trimvent XS13	2	30	35	35	36	34	29	33	57%	32	-1
ATTENUATION											
Ventilation VENTS		0	0	0	0	0	0	0	0%		
ATTENUATION											
Resultant SPL inside room through ventilators dB	22.6	7	6	9	12	17	19	10	58%		

25.0	12	15	19	16	18	19	11
------	----	----	----	----	----	----	----

 Total SPL inside room
Element contribution to total internal noise level

PROJECT: Carters, Reading
 ROOM: All other blocks - bedroom
 VARIANT: LAeq 16 hour
 NOTES: FC04

Room Dimensions [m] 3.0 X 4.0 X 2.4
 Room Volume = 28.8 m³
 Partition Area = 7.2 m²
 Ventilation ref area = 10.0 m²
 Free Field SPL K = 3 dB

SELECT Free Field or Façade SPL for model input >>> Free Field

EXTERNAL SPECTRUM (A weighted)

Direct input - Free Field SPL (A weighted octave bands) dB -----> No data
 Road traffic spectrum (according to BS 8233:1999 section 6) 56.0

37.8 41.9 45.4 48.8 52.0 49.2 44.0 Reference spectrum

REVERBERATION TIME

DIRECT INPUT -----> No data

EQUAL RT for all bands -----> 0.5 0.5 0.5 0.5 0.5 0.5 0.5 Default - RT set to 0.5s

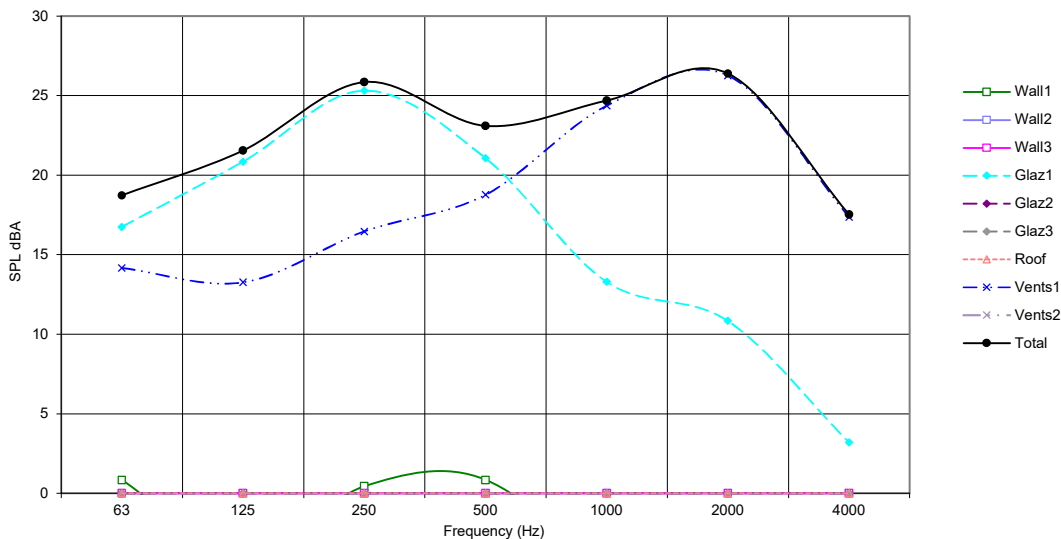
NOTES:

Façade Element	Area [m ²]	SRI dB to BS EN ISO 140-3:1995							Rw	C	Ctr
Wall 1 Typical - 102mm brick/50mm cavity/100mm block	3.7	36	45	44	47	57	67	77	0%	54	-4
ATTENUATION											
Wall 2 WALLS	0	0	0	0	0	0	0	0	0%		
ATTENUATION											
Wall 3 WALLS	0	0	0	0	0	0	0	0	0%		
ATTENUATION											
Glazing 1 27 dB Rw + Ctr - Standard Thermal Double Glazing	3.5	20	20	19	27	38	37	40	42%	27 (inc Ctr)	-
ATTENUATION											
Glazing 2 GLAZING	0	0	0	0	0	0	0	0	0%		
ATTENUATION											
Glazing 3 GLAZING	0	0	0	0	0	0	0	0	0%		
ATTENUATION											
Roof ROOF / FLOOR	0	0	0	0	0	0	0	0	0%		
ATTENUATION											
Resultant composite Façade SRI		23	23	22	30	41	40	43			
Resultant SPL inside room excluding ventilators dB		28.3	17	21	25	21	13	11	3	42%	

Ventilator Type	Num	D _{n,w} dB to BS EN 20140-10:1992							Dnew	C	Ctr
Ventilation Hit and miss trickle (4000mm ²) e.g. Titan Trimvent XS13	2	30	35	35	36	34	29	33	58%	32	-1
ATTENUATION											
Ventilation VENTS	0	0	0	0	0	0	0	0	0%		
ATTENUATION											
Resultant SPL inside room through ventilators dB		29.6	14	13	16	19	24	26	17	58%	

Total SPL inside room 32.0 19 22 26 23 25 26 18

Element contribution to total internal noise level



PROJECT: **Carters, Reading**
 ROOM: **All other blocks Living room**
 VARIANT: **LAeq 16 hour**
 NOTES: **FC04**

Room Dimensions [m] **5.1** X **5.1** X **2.4**
 Room Volume = **62.4** m³
 Partition Area = **9.5** m²
 Ventilation ref area = **10.0** m²
 Free Field SPL K = **3** dB

SELECT Free Field or Façade SPL for model input >>> **Free Field**

EXTERNAL SPECTRUM (A weighted)

Direct input - Free Field SPL (A weighted octave bands) dB -----	-							No data
Road traffic spectrum (according to BS 8233:1999 section 6)	56.0							
	37.8	41.9	45.4	48.8	52.0	49.2	44.0	Reference spectrum

REVERBERATION TIME

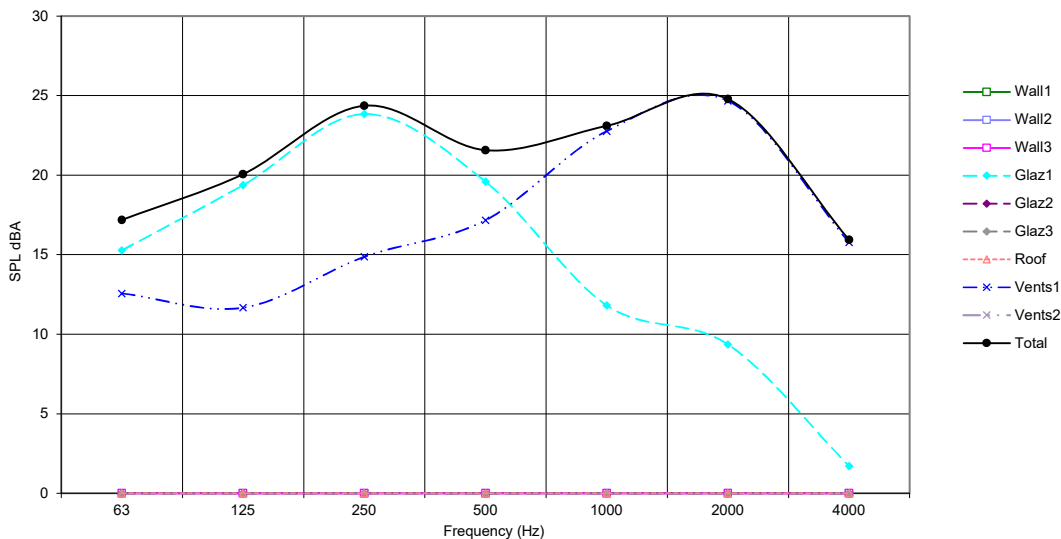
DIRECT INPUT ---->								No data
EQUAL RT for all bands ---->	0.5	0.5	0.5	0.5	0.5	0.5	0.5	Default - RT set to 0.5s

Façade Element	Area [m ²]	SRI dB to BS EN ISO 140-3:1995							Rw	C	Ctr
Wall 1 Typical - 102mm brick/50mm cavity /100mm block	4.1	36	45	44	47	57	67	77	0%	54	-4
ATTENUATION											
Wall 2 WALLS		0	0	0	0	0	0	0	0%		
ATTENUATION											
Wall 3 WALLS		0	0	0	0	0	0	0	0%		
ATTENUATION											
Glazing 1 27 dB Rw + Ctr - Standard Thermal Double Glazing	5.4	20	20	19	27	38	37	40	43%	27 (inc Ctr)	-
ATTENUATION											
Glazing 2 GLAZING		0	0	0	0	0	0	0	0%		
ATTENUATION											
Glazing 3 GLAZING		0	0	0	0	0	0	0	0%		
ATTENUATION											
Roof ROOF / FLOOR		0	0	0	0	0	0	0	0%		
ATTENUATION											
Resultant composite Façade SRI		22	22	21	29	40	40	42			
Resultant SPL inside room excluding ventilators dB	26.8	15	19	24	20	12	9	2	43%		

Ventilator Type	Num	D _{n,w} dB to BS EN 20140-10:1992							Dnew	C	Ctr
Ventilation Hit and miss trickle (4000mm ²) e.g. Titon Trimvent XS13	3	30	35	35	36	34	29	33	57%	32	-1
ATTENUATION											
Ventilation VENTS		0	0	0	0	0	0	0	0%		
ATTENUATION											
Resultant SPL inside room through ventilators dB	28.0	13	12	15	17	23	25	16	57%		

Total SPL inside room **30.5 17 20 24 22 23 25 16**

Element contribution to total internal noise level



NOTES:

PROJECT:

ROOM:

VARIANT:

NOTES:

Room Dimensions [m] X X

Room Volume = m³

Partition Area = m²

Ventilation ref area = m²

Free Field SPL K = dB

SELECT Free Field or Façade SPL for model input >>>

EXTERNAL SPECTRUM (A weighted)

dBA	63	125	250	500	1000	2000	4000
Direct input - Free Field SPL (A weighted octave bands) dB ---->	61.0	38.5	43.1	48.4	54.6	57.1	54.1
Road traffic spectrum (according to BS 8233:1999 section 6)							
	38.5	43.1	48.4	54.6	57.1	54.1	50.0

REVERBERATION TIME

DIRECT INPUT ---->								No data
EQUAL RT for all bands ---->								
	0.5	0.5	0.5	0.5	0.5	0.5	0.5	Default - RT set to 0.5s

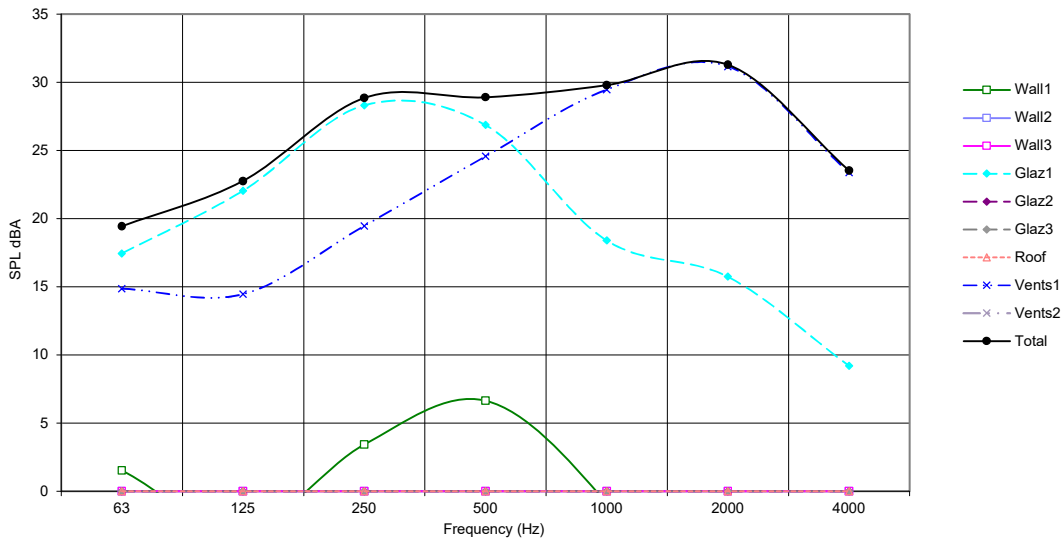
NOTES:

Façade Element	Area [m ²]	SRI dB to BS EN ISO 140-3:1995							Rw	C	Ctr
Wall 1 Typical - 102mm brick/50mm cavity/100mm block	3.7	36	45	44	47	57	67	77	0%	54	-4
ATTENUATION											
Wall 2 WALLS		0	0	0	0	0	0	0	0%		
ATTENUATION											
Wall 3 WALLS		0	0	0	0	0	0	0	0%		
ATTENUATION											
Glazing 1 27 dB Rw + Ctr - Standard Thermal Double Glazing	3.5	20	20	19	27	38	37	40	34%	27 (inc Ctr)	-
ATTENUATION											
Glazing 2 GLAZING		0	0	0	0	0	0	0	0%		
ATTENUATION											
Glazing 3 GLAZING		0	0	0	0	0	0	0	0%		
ATTENUATION											
Roof ROOF / FLOOR		0	0	0	0	0	0	0	0%		
ATTENUATION											
Resultant composite Façade SRI		23	23	22	30	41	40	43			
Resultant SPL inside room excluding ventilators dB	31.8	18	22	28	27	18	16	9	35%		

Ventilator Type	Num	D _{n,w} dB to BS EN 20140-10:1992							Dnew	C	Ctr
Ventilation Hit and miss trickle (4000mm ²) e.g. Titan Trimvent XS13	2	30	35	35	36	34	29	33	65%	32	-1
ATTENUATION											
Ventilation VENTS		0	0	0	0	0	0	0	0%		
ATTENUATION											
Resultant SPL inside room through ventilators dB	34.5	15	14	19	25	29	31	23	65%		

Total SPL inside room **36.4 19 23 29 29 30 31 24**

Element contribution to total internal noise level



Appendix 5 Acoustic Facade Specification

Reference	Colour	Glazing Specification	Ventilator Specification
FC01		36 dB Rw+Ctr	MVHR
FC02		31 dB Rw+Ctr	MVHR
FC03		27 dB Rw+Ctr	MVHR
FC04		27 dB Rw+Ctr	32 dB Dne,w + Ctr

NOTES:

Values must include the Ctr correction. Manufacturers or suppliers should provide laboratory test data demonstrating that the proposed systems are capable of achieving the values given. Windows should be tested as complete systems (rather than just the glazing in isolation) and trickle ventilators should be in the open position.

All floors:





Architectural & Environmental Acousticians Noise & Vibration Engineers

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