



Environmental Noise Assessment & Building Design

31 Apartments

Former Curlew Public House site
Petersfield Road
Portsmouth
PO9 2HU

Client:

R. J. MORRALL LTD
16 Alder Drive
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1 Executive Summary

Condition 20 of the planning permission granted by Havant Borough Council requires details of sound attenuation measurements to be submitted for approval for this development.

This report proposes that the internal noise criteria should be taken from BS8233:2014, namely living room ambient sound levels no more than 35 dB $L_{Aeq,day}$ and for bedrooms 30 dB $L_{Aeq,night}$ & 45 dB $L_{Amax,regular}$.

A detailed site noise survey has been carried out, with one microphone positioned on the first floor balcony of the existing pub building overlooking Petersfield Road.

The survey showed that noise levels are no higher than 67 dB $L_{Aeq,day}$ and 59 dB $L_{Aeq,night}$ and night time regular event levels no more than 74 dB $L_{Amax,regular}$.

All the apartments with a view of Petersfield Road will need enhanced glazing and trickle vents. The window and door sets will need to offer a combined sound insulation performance of 45 dB R_w . The trickle vents will also be required to offer at least 42¹ dB D_{new} , to just achieve the internal design target of 35 dB $L_{Aeq,16hr}$ if the through casement vents were to be changed to high performance through wall events, offering at least 52² dB D_{new} the level of confidence could be increased.

These are high sound insulation requirements and great care will need to be taken to ensure that the suppliers are quoting not just for a glass configuration but an installed sound insulation levels, their quotes should be supported by certified tests in accordance with BS EN 12354, Building acoustics – Estimation of acoustic performance in buildings from the performance of elements BS EN 12354-3, Building acoustics – Estimation of acoustic performance of buildings from the performance of elements – Part 3: Airborne sound insulation against outdoor sound.

Poor detailing of the fixings and sealing of the window frames into the façade reveals, such as excessive use expanding foam to fill wide gaps, will undermine the overall level of sound insulation that can be achieved.

Rear facing apartments, which have no view of Petersfield Road, do not require special enhancement and the required internal levels can be expected to be achieved with modern double glazing and vents (provided they achieve 31 dB R_w & 31 dB D_{new} respectively).

Adopting these enhanced specifications for the façade elements should therefore be sufficient to discharge Condition No. 20.

2 Introduction

Planning permission has been granted by Havant Borough Council for the demolition of existing building Curlew Public House and erection of a three-storey block of thirty-one flats on Petersfield Road, Havant, PO9 2HU (planning reference APP/17/00369. The site lies on Petersfield Road, a dual

¹ Such as Aereco EHA² AM (with acoustic canopy) or similar

² Such as Aereco A-EHT or similar

carriageway with a 40 mph speed limit but with quiet residential areas to the south. A Condition relating to sound attenuation measures has been imposed in the consent. Condition No. 20 states;

“The building hereby permitted shall not be occupied unless and until details of noise insulation including window glazing details have been submitted to and approved in writing by the Local Planning Authority”

R J Morrall Ltd has appointed Acoustic Associates SW Ltd to carry out a site sound survey and prepare a mitigation scheme sufficient to control internal sound levels to those set out in BS8233.

3 Environmental Sound Levels

The aerial view below shows the site and its proximity to the dual carriage way to the north.



A site sound survey was carried out over 24 hours from Monday 12th March 2018. The Curlew pub was still open for business at this time but on the two days I was there, there were few customers and traffic noise from the Petersfield Road was dominant.

A sound level meter was set up on the first floor external balcony overlooking the main road as shown in the photograph below;



The meter was calibrated before and after the survey without any adverse variants being observed. Details of the equipment used are given in the table below;

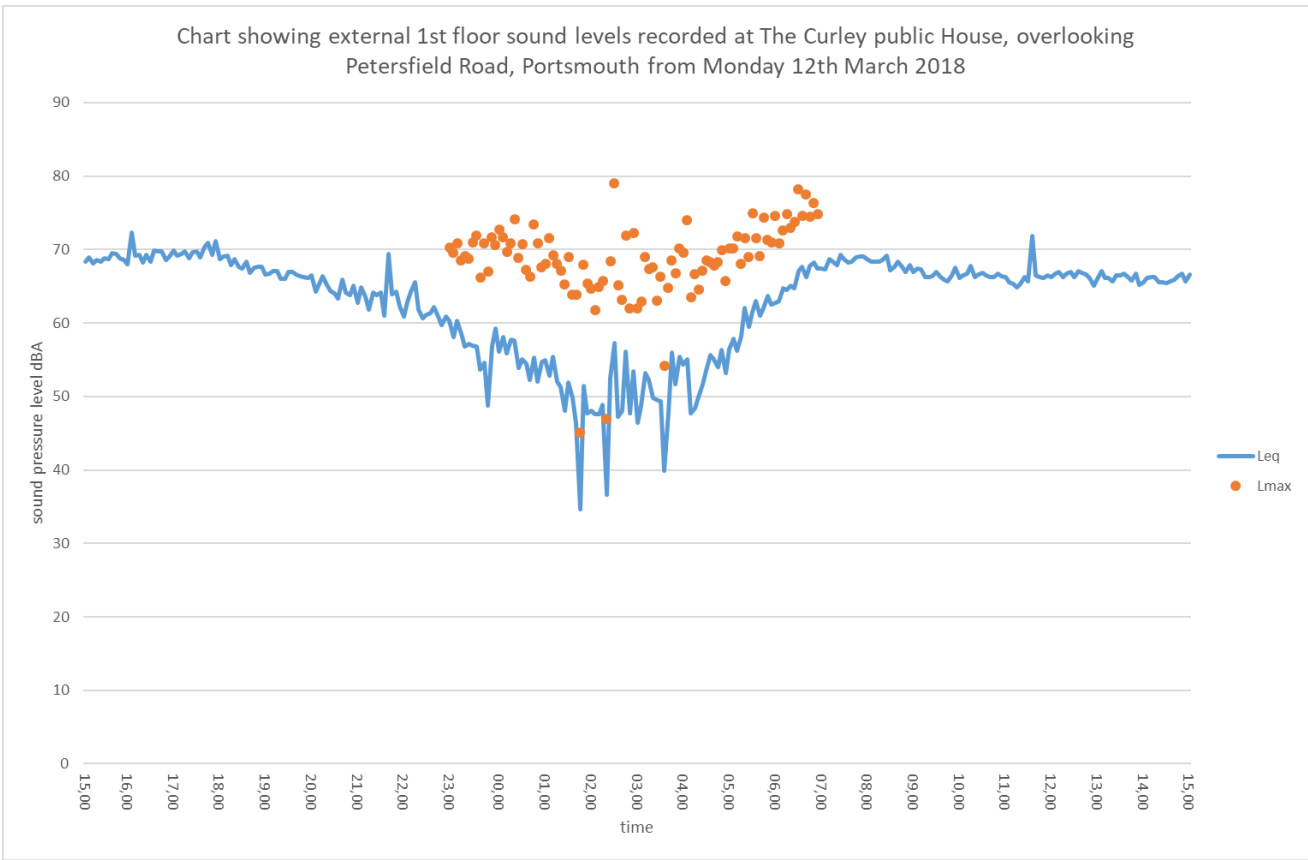
Make	Model	Serial No.	Calibration No.	Cert	Re-calibration due
Rion	NL31	00732148	TCRT16/1212		5-8-18
Rion	NC74	34794316	TRAC17/04089		5-5-18

The meter was set to record noise parameters over repetitive 5 minute periods.

The weather during the survey was showery but this gave way to finer weather with westerly winds recorded at Southampton Airport³ of generally less than 5 m/s and suitable for repeatable environmental sound measurement.

³https://www.wunderground.com/history/airport/EGHI/2018/3/13/DailyHistory.html?req_city=EGHI&req_state=HAM&req_statename=United%20Kingdom&reqdb.zip=00000&reqdb.magic=77&reqdb.wmo=03865

The chart below shows the L_{Aeq} and L_{Amax} levels recorded;



A summary of the sound levels recorded are shown in the table below;

Date	Day	Period	Sound Levels	
			$L_{Aeq,T}$	L_{Amax}
12/03/2018	Monday/Tuesday	day 7am to 11pm	67	
		night 11pm to 7am	59	74 ⁴

These levels will be used to inform the acoustic modelling that will be subsequently used to predict external sound levels around the facades of the proposed development.

4 Assessment of external sound levels

The level of sound incident on the facades of the new dwellings can be estimated using Wolfe IMMI 3-D computer noise modelling software, which implements the calculation procedures set out in ISO 9613-2:1996 (Acoustics - Attenuation of sound during propagation outdoors - Part 2: General method of calculation). As well as the amendment contained within ISO/TR 17534-3:2015 (Acoustics - Software for the calculation of sound outdoors - Part 3: Recommendations for quality assured implementation of ISO 9613-2 in software according to ISO 17534-1).

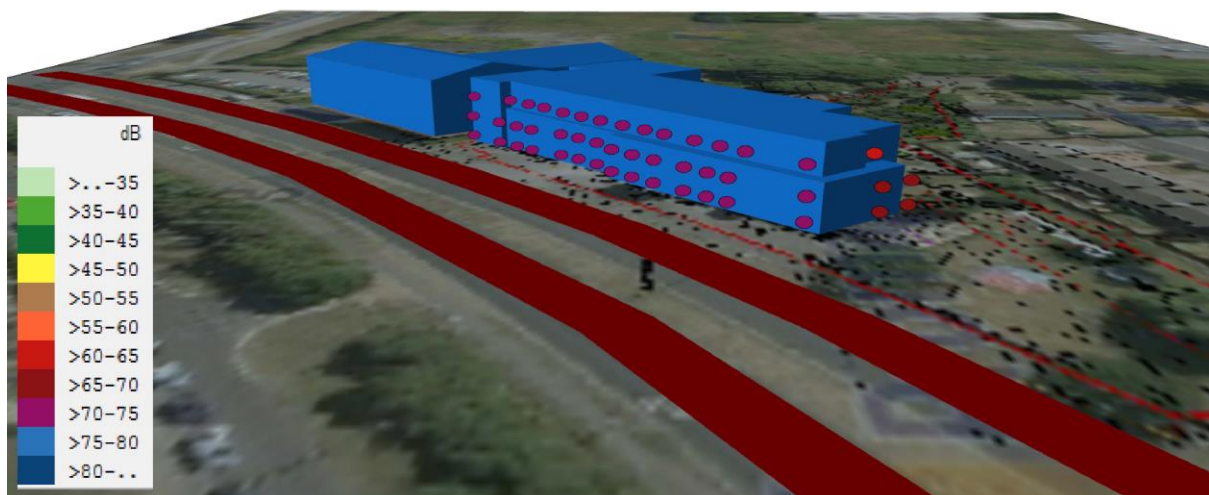
⁴ 10th highest L_{Amax} recorded during the night

The following modelling assumptions have been relied upon;

- $G = 0.0$ (hard ground outside the site)
- Air temperature 10°C ,
- Humidity 70%,
- Downwind propagation,
- Petersfield Road represented by two line sources (north & south bound) with an equal $84\text{ dB } L_{wA}/m$ which have been arrived at to achieve the monitored levels,
- The general arrangement is shown on ARC's drawing No.FB 5728/100m, 101f, 102f, 103e, (copies at the rear of this report),

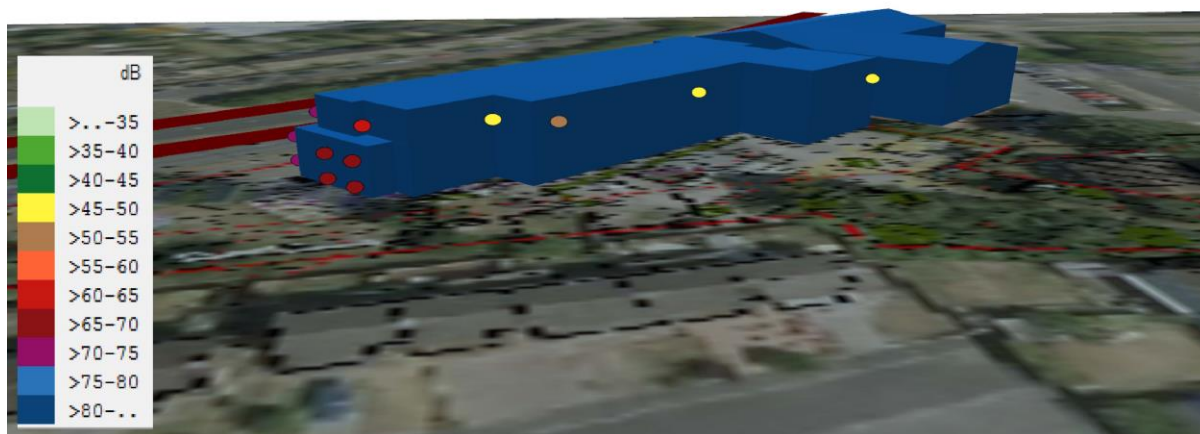
The image below shows the view of apartments from the southeast and shows sound levels across the facades looking directly onto Petersfield Road, with façade levels between 70 and $75\text{ dB } L_{Aeq,16hr}$;

IMMI 3D Model - The Curlew Havant
View looking SouthEast



The image below shows the view of the apartments from the north and shows predicted sound levels of the sheltered rear facades, with levels between 45 and 55 dB $L_{Aeq,8hr}$.

IMMI 3D Model - The Curlew Havant
 View looking North



The table over page shows the predicted external levels for each apartment along with the relevant internal noise criteria and the overall required sound insulation from the façade. The figures highlight in orange show the maximum requirements.

Location	predicted external Sound Levels			Internal criteria BS8233		
	Living	bed		Living	bed	
	67	59	74	35	30	45
	Day	Night		Sound Insulation Required		
	$L_{Aeq16hr}$	L_{Aeq8hr}	L_{Amax}	$L_{Aeq16hr}$	L_{Aeq8hr}	L_{Amax}
4 Liv	73			38		
4 Bed2		60	75		30	30
4 Bed1		59	74		29	29
5 Bed1		65	80		35	35
5 Bed2		66	81		36	36
5 Liv	74			39		
6 Liv	74			39		
6 Bed2		66	81		36	36
6 Bed1		66	81		36	36
7 Liv	73			38		
7 Bed2		65	80		35	35
7 Bed1		65	80		35	35
8 Liv	74			39		
8 Bed2		65	80		35	35
8 Bed1		65	80		35	35
9 Liv	74			39		
9 Bed		59	74		29	29
15 Bed1		59	74		29	29
15 Bed2		60	75		30	30
15 Liv	72			37		
16 Bed1		65	80		35	35
16 Bed2		65	80		35	35
16 Liv	73			38		
17 Liv	73			38		
17 Bed2		66	81		36	36
17 Bed1		65	80		35	35

18 Liv	73		38		
18 Bed2		65	80	35	35
18 Bed1		65	80	35	35
19 Liv	73		38		
19 Bed2		65	80	35	35
19 Bed1		65	80	35	35
10 Liv	73		38		
20 Bed		59	74	29	29
26 Liv	72		37		
26 Bed1		57	72	27	27
27 Bed1		64	79	34	34
27 Bed2		64	79	34	34
27 Liv	72		37		
28 Liv	72		37		
28 Bed2		64	79	34	34
28 Bed1		64	79	34	34
29 Liv	73		38		
29 Bed2		65	80	35	35
29 Bed1		65	80	35	35
30 Liv	73		38		
30 Bed2		65	80	35	35
30 Bed1		64	79	34	34
31 Liv	73		38		
31 Bed		59	74	29	29
21 Liv	46	38	53	11	
24 Liv	46	38	53	11	
25 Liv 1	52	44	59	17	
25 Liv 2	49	41	56	14	

It can be seen that the highest required façade insulation is 39 dB for living rooms and 36 for bedrooms overlooking the main road.

5 Required Sound Insulation Measures

The level of sound break-in in the apartment building can be estimated using the procedures set out in BS8233⁵ and enabled in a handy calculator provided by BRE⁶.

The constructions for the external walls will be;

Brick & Timber Frame walls

102mm Brickwork
 50mm Unventilated cavity with
 25mm Celotex FR5000 with
 9mm plywood with membrane with
 140mm timber studs with
 120mm Isover Timber frame batt between studs with
 2 layers of 12.5mm wall board finish
 Estimated sound insulation > 60 dB R_w

Timber & Timber Frame walls

External timber cladding
 25mm vertical battens with
 100mm dense concrete blockwork
 50mm Unventilated cavity with
 25mm Celotex FR5000 with

⁵ BS8233: 2014 Guidance on sound insulation and noise reduction for buildings Annex C

⁶ Building Research Establishment

9mm plywood with membrane with
 140mm timber studs with
 120mm Isover Timber frame batt between studs with
 2 layers of 12.5mm wall board finish
 Estimated sound insulation > 60 dB R_w

The image over page shows the estimated external sound break-in to the living room of Unit 4 (corner plot on the south west corner of the building with dual aspect living room windows and an over sink window, with a large corner glass section (2.1m high x 4.6m long) plus a kitchen window (1m x 1m) based on predicted external sound levels of 73 dB $L_{Aeq,16hr}$.

BRE Building Envelope Insulation

Switch to Reverberation Time Calculation

2) Select elements of facade structure, and enter corresponding internal surface area in m² OR enter number of vents.

1) Enter room dimensions or volume

☐ Use dimensions

x: 4 m
 y: 2.3 m
 z: 7.4 m
 Volume: - m³

OR

☒ Use volume

85 m³

3) Enter reverberation time of the room.

0.5 seconds

4) Select exterior sound level type

Option (A) ☒ User defined spectrum

road spectrum 73 dB L_{Aeq}

View/Edit Data

Option (B) ☐ Spectrum shape

Select spectrum shape and enter free field exterior sound level, L_{Aeq} (considering only the octave bands between 125Hz and 2kHz)

L_{Aeq} 74 dB

ISO 717 - 1 (Ctr)

View Data

Internal sound level

L_{Aeq} 34.9 dB

This shows that with 2 No. high performance acoustic casement trickle vents (with a minimum rating of 42 dB D_{new} with the vent in its open position) and the glazing/window/door assemblies offering at least 45 dB R_w 45 ($R_{a,tr}$ 39 dB) sound insulation performance will provide predicted internal sound levels of 35 dB providing a 0 dB margin of confidence in achieving the required internal criteria of 35 dB $L_{Aeq,16hr}$. To increase the level of confidence would require the through casement vents to be changed to through wall vents offering at least 50 dB D_{new} . However it should be noted that many housing associations will not use these through wall vents as they can present practical problems with residents blocking them off to prevent drafts, which leads to excessive condensation and damp issues.

The image below shows the calculation for sound break-in into bedrooms overlooking the main road where the highest predicted night time sound level is 66 $L_{Aeq,8hr}$ for Unit 5, the window size of 1m x 2.1m with 1 No. trickle vent (4000mm²) and the external wall area of 9 m²;

BRE Building Envelope Insulation

2) Select elements of facade structure, and enter corresponding internal surface area in m² OR enter number of vents.

Element	Material / Specification	Surface area OR number of vents	Area (m ²)
Wall 1	brick & timber	9	9 m ²
Wall 2	None	0	0 m ²
Window 1	10/16/8.4 Rw45	2.1	2.1 m ²
Window 2	None	0	0 m ²
Door	None		0 m ²
Roof/Ceiling	None		0 m ²
Vent 1	KIT EAR 5-35 Autriche 42 Dnew	1	1 m ²
Vent 2	None		0 m ²

3) Enter reverberation time of the room. 0.5 seconds

4) Select exterior sound level type
Option (A) ☒ User defined spectrum
road spectrum 66 dB L_{Aeq}
View/Edit Data

Option (B) ☐ Spectrum shape
Select spectrum shape and enter free field exterior sound level, L_{Aeq} (considering only the octave bands between 125Hz and 2kHz)
 L_{Aeq} 74 dB
ISO 717 - 1 (Ctr)
View Data

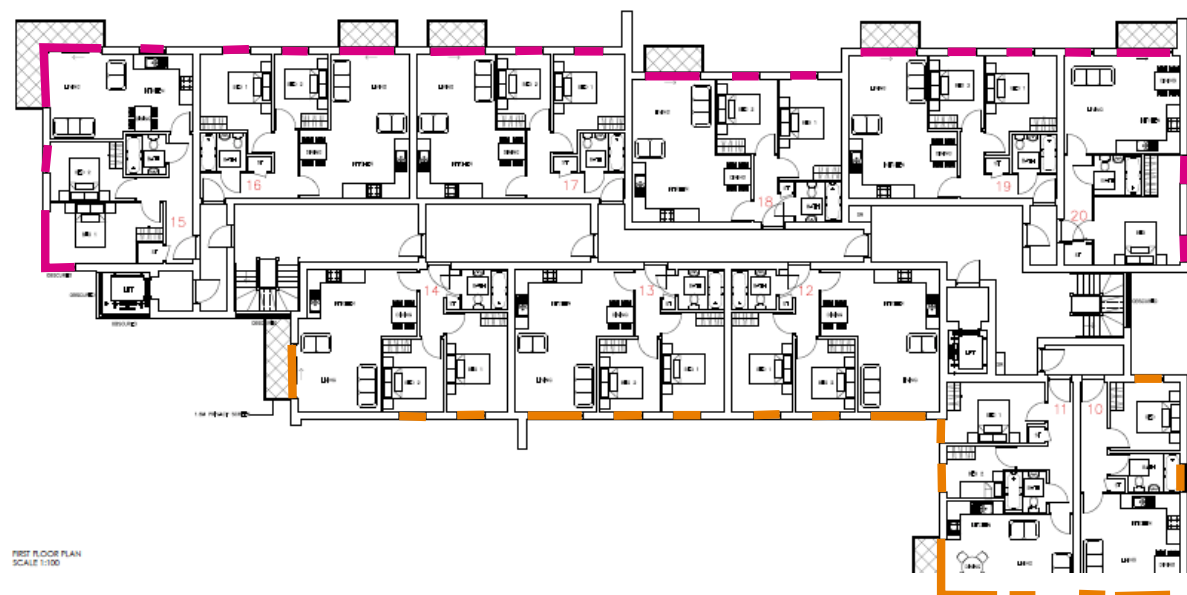
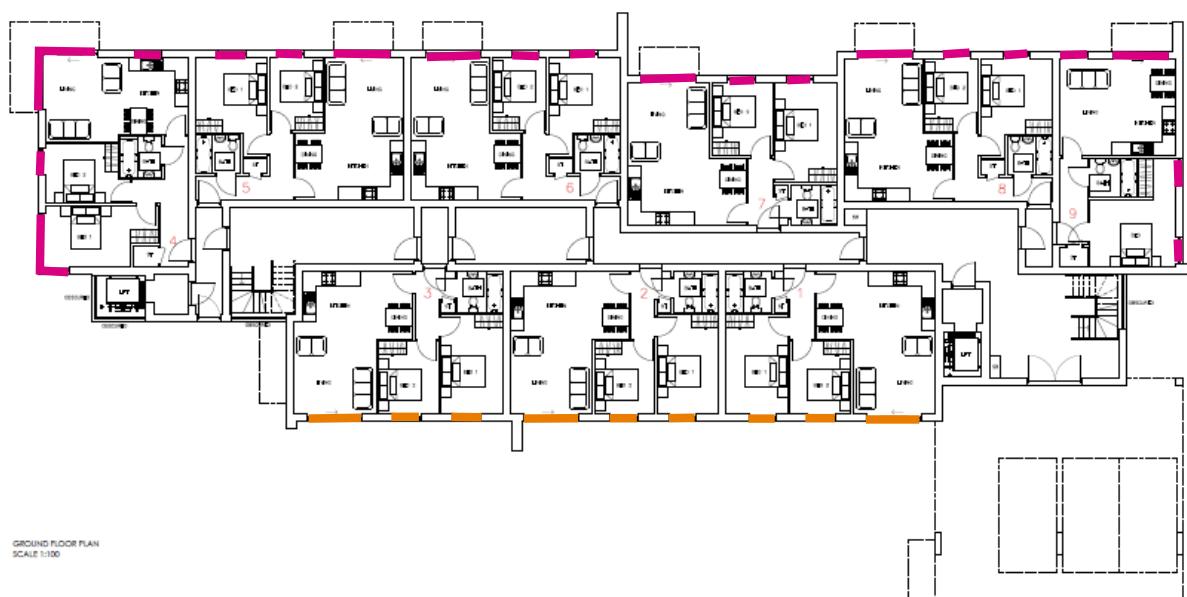
Internal sound level
 L_{Aeq} 23.7 dB

This shows that with 1 No. high performance acoustic casement trickle vents (with a minimum rating of 42 dB D_{new} with the vent in its open position) and the glazing/window assembly offering at least 45 dB R_w 45 ($R_{a,tr}$ 39 dB) sound insulation performance will provide predicted internal sound levels of 24 dB providing a 6 dB margin of confidence in achieving the required internal criteria of 30 dB $L_{Aeq,8hr}$.

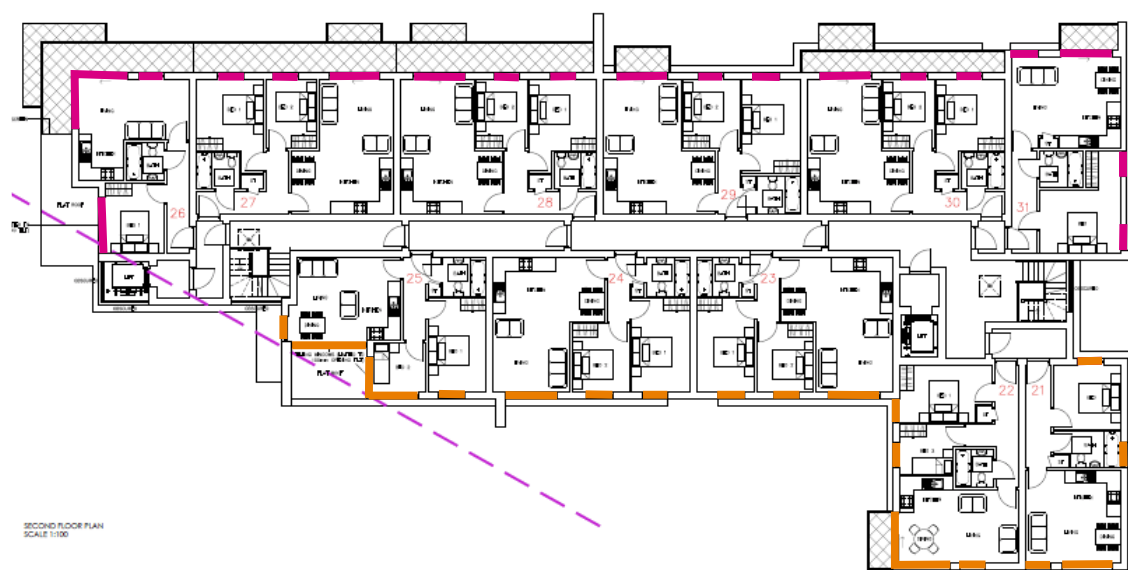
The predicted sound levels for the plots facing away from the main road should be no higher than 52 dB $L_{Aeq,16hr}$ and therefore requiring only 17 dB overall sound insulation outside to inside, to achieve internal day time ambient sound levels of 35 dB $L_{Aeq,16hr}$. This can be delivered with standard wide airspace double glazed windows and doors, offering at least 31 dB R_w ($R_{a,tr}$ 27 dB) and standard through casement trickle vents, offering 31 dB D_{new} .

With night time sound levels being 8 dB less than day time ones but the night time internal sound criteria being 5 dB lower internal levels leads to a requirement outside to inside sound insulation 3 dB lower at 14 dB, again this can be delivered with the standard specification listed above.

The plans below show floor layouts and glazing/trickle vent requirements highlighted.



- window/door systems offering at least 45 dB Rw & acoustic trickle vents 42 dB Dnew
- window/door systems offering at least 31 dB Rw & acoustic trickle vents 31 dB Dnew



- window/door systems offering at least 45 dB Rw & acoustic trickle vents 42 dB Dnew
- window/door systems offering at least 31 dB Rw & acoustic trickle vents 31 dB Dnew

[illegible][illegible]





