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KR03775

Land South of Ranelagh Road

Havant

PO9 1NR

Noise Impact Assessment

British Standard 8233:1999

APRIL 2014

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1 EXECUTIVE SUMMARY

1.1 Instruction

KR Associates (UK) Ltd have been instructed by Foreman Homes Ltd to undertake an assessment in accordance with British Standard 8233:2014 to determine the specification of glazing units that will ensure the resultant internal noise levels are acceptable. To discharge condition 14 of planning permission APP/12/00772.

1.2 Planning Condition

Planning Condition 14 states:

> *"Notwithstanding the submitted details, the development hereby permitted shall not commence unless and until details of the glazing specification to be utilized in the proposed residential properties has been submitted to and approved in writing by the Local Planning Authority. The glazing shall thereafter be provided and maintained in accordance with the approved specification unless otherwise agreed in writing by the Local Planning Authority"*

1.3 Summary of Criterion

Activity	Location	07:00 to 23:00	23:00 to 07:00
Resting	Living Room	$L_{Aeq,\ 16\ hour}$ 35 dB	--
Dining	Dining Room	$L_{Aeq,\ 16\ hour}$ 40 dB	--
Sleeping (Daytime Resting)	Bedroom	$L_{Aeq,\ 16\ hour}$ 35 dB	$L_{Aeq,\ 8\ hour}$ 30 dB

1.4 Summary of Assessments

Location of Assessment	Resultant Internal Noise Levels	
	Day Time (07:00 – 23:00)	Night Time (23:00 to 07:00)
1. South and East Facades of the Apartment Building on the South East Corner of the development. (Most impacted property)	$L_{Aeq,16\ hours}$ 32 dB	$L_{Aeq,8\ hours}$ 19 dB

1.5 Recommendations

As no special ventilation (beyond attenuated trickle vents) is required on the most impacted property of the development and the range of day/night ambient noise across the development is relatively small, glazing across all properties can be 6.4 – 12 – 4.4, with attenuated trickle vents installed. There is no requirement to install mechanical ventilation in the development as long as the glazing and attenuated trickle vents meet the required performance standards.

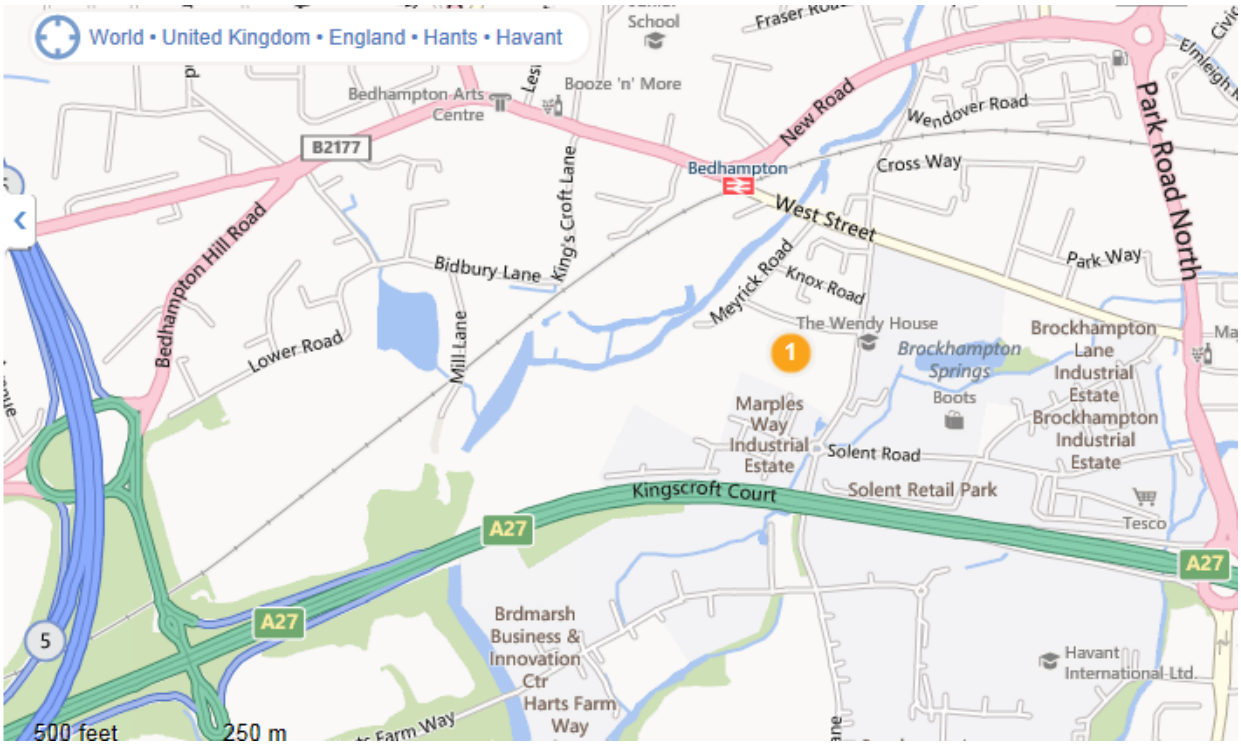
1.6 Summary

With the proposed glazing and trickle vents installed the criterion detailed within British Standard 8233:2014 can be met in terms of internal noise levels. This is sufficient to meet the requirements of condition 14 of planning permission APP/12/00772.

2 SITE LOCATION AND POSITION

2.1 Position of Site in the Wider Area Road Network

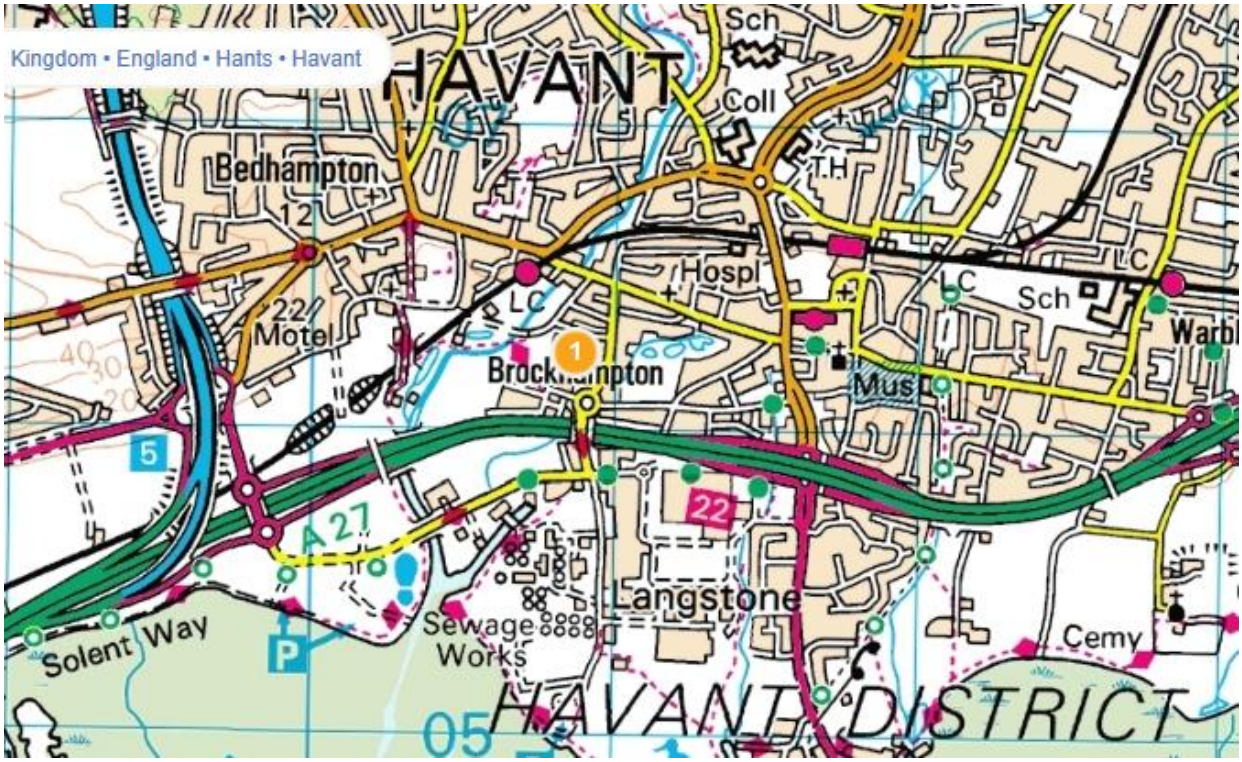
The site is located on the South side of Ranelagh Road to the West of Brockhampton Road. The Marples Way Industrial Estate is to the South of the site with the A27 South Coast Road beyond that (some 250m from the site itself). Bedhampton Railway Station is approximately 250m to the North of the site.

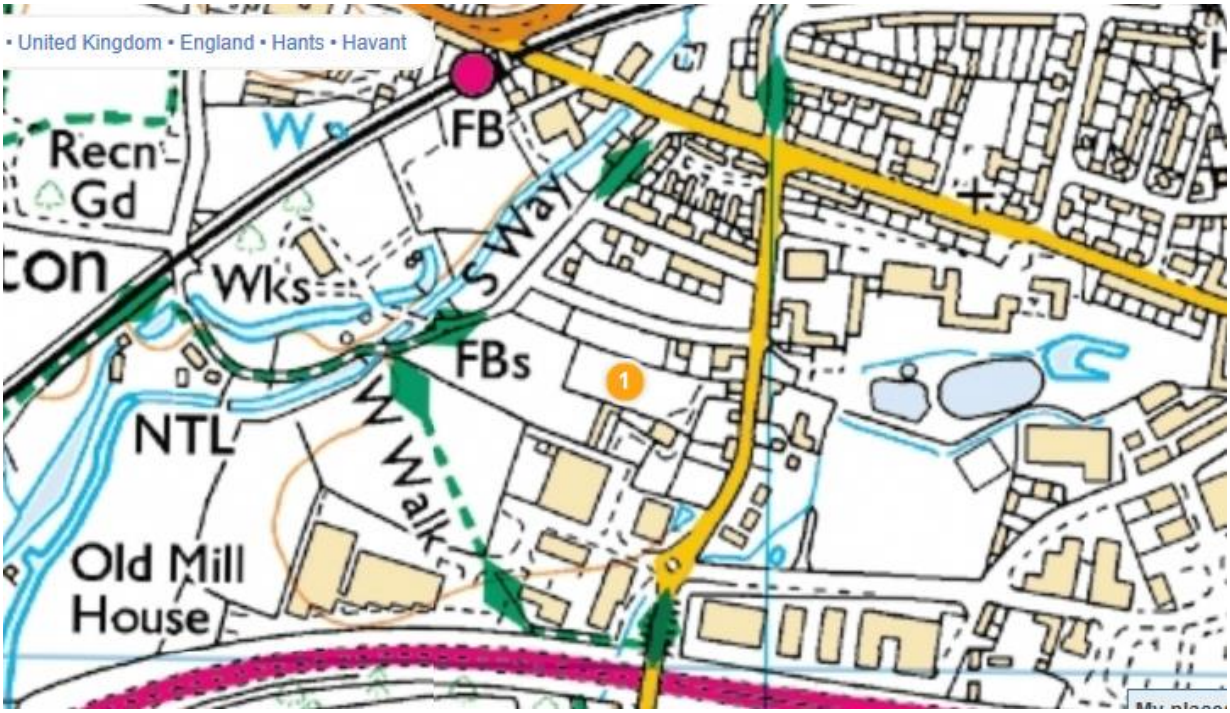


Site Location:	Latitude:	50.851485	Longitude:	-0.994079	Elevation:	6m

2.2 Position of the Site in the Wider Built-up Area

The site is located in a mainly new residential area with fields to the West and an industrial estate to the South.





2.3 Streets in the Vicinity of the Site

The site is located to the South of Ranelagh Road, to the West of Brockhampton Road and the North of Marples Way and the A27 trunk Road.

2.4 Buildings in the Vicinity of the Site

There are two storey residential houses located on the East side of the site on the North side of Ranelagh Road. There are commercial buildings located to the South of the site (Marples Way Industrial Estate). The East of the site consists of fields.

Houses on Brockhampton Road

Houses on Ranelagh Road

3 BACKGROUND NOISE LEVELS

3.1 Location of Measurements

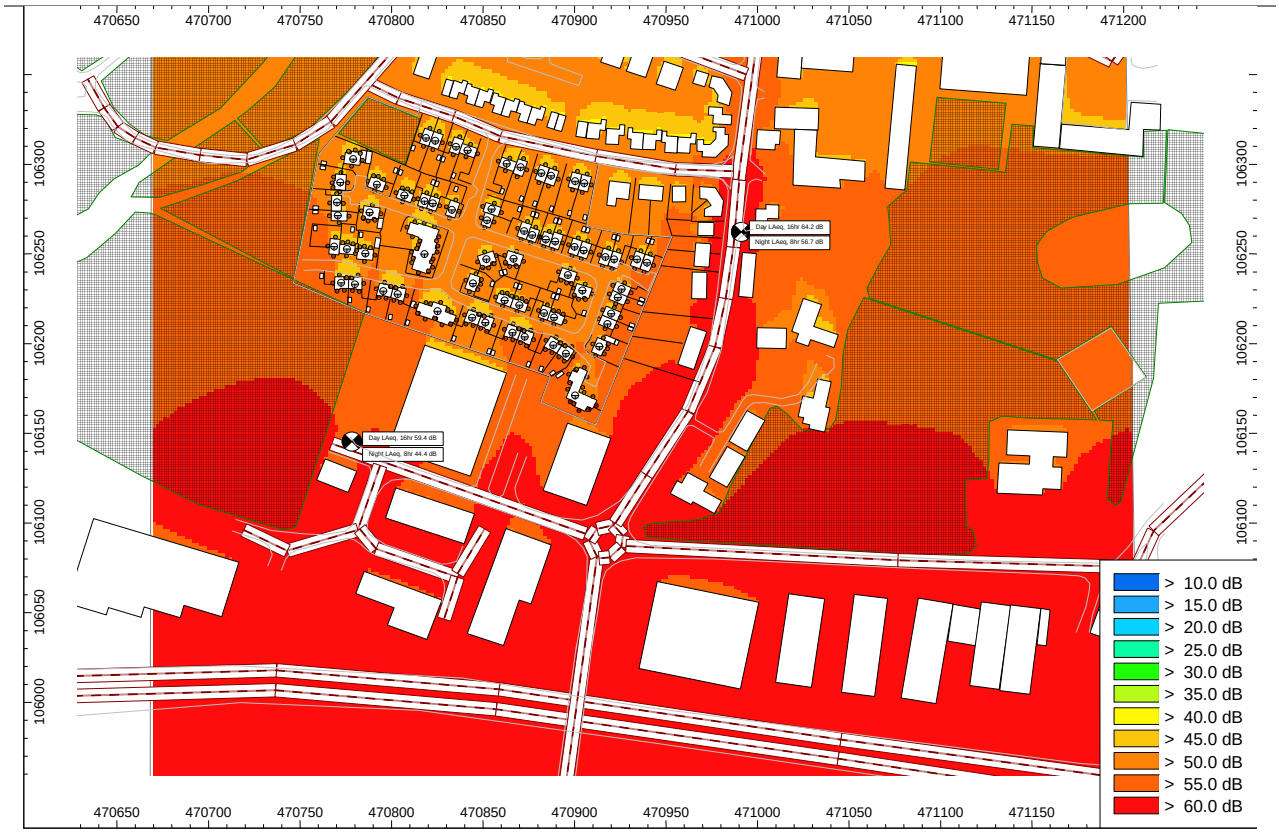
Position 1:	Latitude:	50.857040	Longitude:	-1.243824	Elevation:	35 m
Position 2:	Latitude:	50.856997	Longitude:	-1.245943	Elevation:	35 m

Background Measurements at Brockhampton Rd

Background Measurements at Marples Way

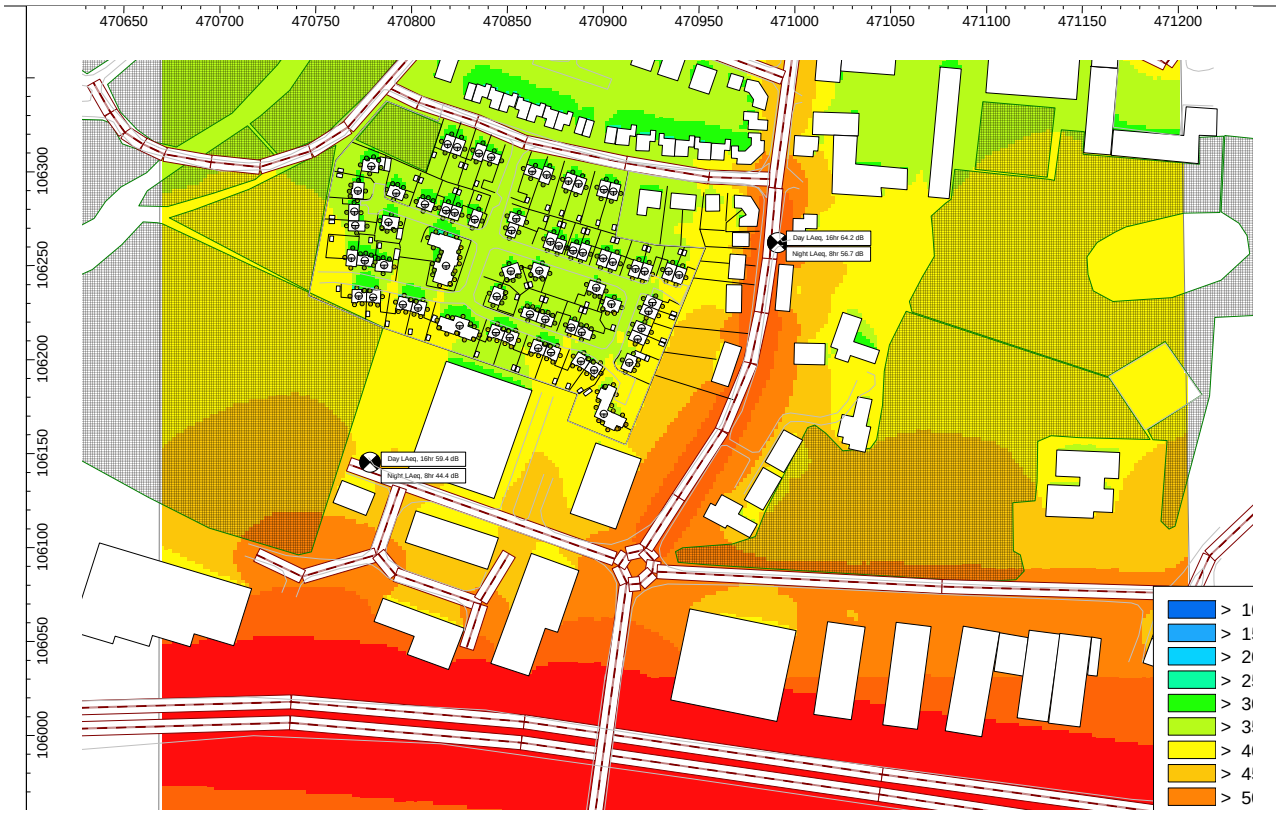
The background noise levels were assessed by positioning environmental noise monitoring stations on Brockhampton Road and on Marples Way close to the A27. The detailed results are contained within the Appendix of the report and the results of the maximum and average levels are summarised below as 3D noise maps. The noise maps have been created and calibrated to the background noise data at both positions with the standard traffic flow rate adjusted accordingly.

3.2 Day Time (07:00 – 23:00)



Position 1	Day Time Maximum	L_{Max} 81 dB	Day Time Average	$L_{Aeq,\ 8\ hour}$ 64 dB
Position 2:	Day Time Maximum	L_{Max} 75 dB	Day Time Average	$L_{Aeq,\ 8\ hour}$ 57 dB

3.3 Night Time (23:00 to 07:00)



Position 1	Night Time Maximum	L_{Max} 81 dB	Night Time Average	$L_{Aeq,\ 8\ hour}$ 59 dB
Position 2:	Night Time Maximum	L_{Max} 75dB	Night Time Average	$L_{Aeq,\ 8\ hour}$ 44 dB

4 Noise Criterion

4.1 National Planning Policy Framework ("NPPF")

4.1.1 Scope of Document

The National Planning Policy Framework ("NPPF") published in March 2012 sets out the Governments National Planning Policies for England and how these can be applied by local communities when developing their local plans or deciding planning application to best reflect the needs and priorities of the local communities. Current planning law requires Local Authorities to determine planning applications in accordance with the local development plan unless there are material considerations which require them to reach a different decision.

4.1.2 Specific Reference to Noise

Section 123 of the NPPF which falls under the title *"Conserving and enhancing the natural environment"* provides the following aims:

> *"Planning Policies and decisions should aim to:*
> *Avoid noise from giving rise to significant adverse impacts on health and quality of life as a result of new development;*
>
> *Mitigate and reduce to a minimum other adverse impacts on health and quality of life arising from noise from new development, including through the use of conditions;*
>
> *Recognise that development will often create some noise and existing businesses wanting to develop in continuance of their business should not have unreasonable restrictions put on them because of changes in nearby land uses since they were established…"*

4.2 Noise Policy Statement for England ("NPSE")

4.2.1 Scope of Document

The National Policy Statement for England ("NPSE") published in March 2010 provides guidance on the management of noise from sustainable development without placing unreasonable cost or time restraints on sustainable developments. The document has the following noise policy vision:

> *"Noise Policy Vision - Promote good health and quality of life through the effective management of noise within context of Government policy on sustainable development"*

NPSE defines that the long term vision is supported by the following three Noise Policy Aims:

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

4.3 British Standard 8233: 2014 ("BS8233")

4.3.1 Scope of Document

British Standard 8233: 2014 provides guidance on the sound insulation and the reduction of noise in and around buildings and replaced the original 1999 standard in February 2014.

> *"This British Standard provides guidance for the control of noise in and around buildings. It is applicable to the design of new buildings….."*

The standard goes onto to provide details of the approach to be taken when assessing the design in terms of planning:

"a) Assess the site, identify significant existing and potential noise sources, measure or estimate noise levels and evaluate layout options.

b) Determine design noise levels for spaces in and around the building (s).

c) Determine sound insulation of the building envelope, including the ventilation strategy.

d) Identify internal sound insulation requirements.

e) Identify and design appropriate noise control measures.

f) Establish quality control and ensure good workmanship."

4.3.2 Internal Ambient Noise Levels for dwellings

British Standard 8233: 2014 provides desirable internal ambient noise levels within different rooms and at different times for external noise sources that are considered steady within section 7.7.2.:

Activity	Location	07:00 to 23:00	23:00 to 07:00
Resting	Living Room	$L_{Aeq,\ 16\ hour}$ 35 dB	--
Dining	Dining Room	$L_{Aeq,\ 16\ hour}$ 40 dB	--
Sleeping (Daytime Resting)	Bedroom	$L_{Aeq,\ 16\ hour}$ 35 dB	$L_{Aeq,\ 8\ hour}$ 30 dB

5 Proposed Layout

5.1 Site Layout Drawing

It is proposed to develop the existing site with 6 two bedroom houses, 53 three bedroom houses, 6 one bedroom flats and 4 two bedroom flats

5.2 Ambient Noise Impact

The highest levels of ambient noise are experienced by the South elevations of the properties on the Southern edge of the development which face towards the A27. These levels are somewhat mitigated by the fence on the Southern edge of the development, the buildings of the Marples Industrial estate and the distance from the trunk road itself.

The most impacted building on the development is the apartment block in the South East corner of the development which is impacted by noise from both the A27 and Brockhampton Road.

The noise impact on the development buildings overall range from $L_{Aeq,\ 16hr}$ 53 – 61 dB day and $L_{Aeq,\ 8hr}$ 38 – 48 night. LAmax 81 dB (day) and LAmax 77 dB (night).

5.3 Window Schedule

Window Key	Description
Standard Trickle	Opening Windows – With standard trickle vents 6mm float glass outer pane 12mm sealed air gap 4mm float glass inner pane

5.4 Key Construction Elements

Window Key	Description
Walls	Standard density 100mm internal brick 70mm cavity Standard 65mm brick
Roof	Standard lightweight roof construction
Ceiling in Upper Floors	2 Layers of 15mm Fireline plasterboard

5.5 Resultant Façade Noise Levels

Assessment Position	Day Time Levels (07:00 to 23:00)		Night Time Levels (23:00 to 07:00)	
	$L_{Max\ 16\ hour}$	$L_{Aeq,\ 16\ hour}$	$L_{Max\ 8\ hour}$	$L_{Aeq,\ 8\ hour}$
1. South and East Facades of the Apartment Building on the South East Corner of the development. (Most impacted property)	81 dB	61 dB	77 dB	48 dB
Sound Pressure Levels – Reference Level 2 x 10^{-5} Nm^{-2}				

6 CALCULATIONS

6.1 Calculation Procedure

$$L_{eq,2} \approx L_{eq,ff} + 10.\log_{10}\left(\frac{A_0}{S}.10^{\frac{-D_{n,e}}{10}} + \frac{S_{wi}}{S}.10^{\frac{-R_{wi}}{10}} + \frac{S_{ew}}{S}.10^{\frac{-R_{ew}}{10}} + \frac{S_{rr}}{S}.10^{\frac{-R_{rr}}{10}} +\right) + 10.\log_{10}\left(\frac{S}{A}\right) + 3$$

$L_{eq,2}$ = Equivalent sound pressure level internally within the room (dB) – reference 2 x 10^{-5}Nm^{-2}.

$L_{eq,ff}$ = Equivalent sound pressure level externally outside the room under consideration (dB) – reference 2 x 10^{-5}Nm^{-2}.

A_0 = Reference absorption area within room of 10m^2 and independent of frequency.

S_f = Total façade area of room in question (m^2).

S_{wi} = Area of windows or glazing within the room (m^2).

S_{ew} = Area of external wall within the room (m^2).

S_{rr} = Area of the ceiling within the room (m^2).

S = Total area of elements through which sound enters the room (m^2). i.e. $S = S_f + S_{rr}$

$D_{n,e}$ = Sound insulation of the trickle vent measured to British Standard 20140 – Part 10: 1992 (Withdrawn)

R_{wi} = Sound reduction index of the window (dB)

R_{ew} = Sound reduction index of the external wall (dB)

R_{rr} = Sound reduction index of the ceiling (dB)

A = Equivalent absorption of the room under consideration (m)

6.2 Attenuated Ventilation (D_{ne})

Octave Band Frequency	63	125	250	500	1000	2000	4000
Attenuated Force Ventilation	23	28	32	39	45	45	42
Attenuated Trickle Vent	19	25	31	34	39	39	39
Normal Trickle Vent	10	13	14	16	17	17	16

6.3 Glazing (R_{wi})

Octave Band Frequency	63	125	250	500	1000	2000	4000
6mm Outer - 12mm - 4mm Inner	12	18	25	30	37	39	37

6.4 Walls (R_{ew})

Octave Band Frequency	63	125	250	500	1000	2000	4000
Brick and Concrete Block	28	34	39	46	52	58	58

6.5 Ceiling (R_{rr})

Octave Band Frequency	63	125	250	500	1000	2000	4000
2 x 15mm Fireline (Upper Floor)	32	36	43	48	50	52	50

7 Internal Noise Assessments

7.1 Position 1 – South East Apartment Block (South and East Facades)

7.1.1 Day Time Assessment (07:00 to 23:00)

British Standard 8233: 1999 Assessment

Day Time – 07:00 to 23:00 Hours

Internal Noise Level from External Noise Sources

Quietly confident

Location of Measurements	Assessment Position 1 – South Eastern Apartment Block						
Construction of Walls	External Brick, 75mm cavity and 100mm internal concrete block					Area (S_f):	12.2 m²
Construction of Ceiling	2 layers of 15mm Fireline plasterboard					Area (S_{rr}):	12.9 m²
Construction of Windows	6mm out pane, sealed 12mm airgap, 4mm inner pane					Area (S_{wi}):	1.2 m²
Construction of Trickle Vents	Attenuated Trickle Vents						
Octave Band Frequency	63	125	250	500	1000	2000	4000
A = L_{eqff} ($L_{eq,1}$ + 2 dB)	58	60	59	56	59	51	48
B = Trickle Vents (D_{ne})	19	25	31	34	39	39	39
	0.00479	0.00120	0.00030	0.00015	0.00005	0.00005	0.00005
C = Window (R_{wi})	12	18	25	30	37	39	37
	0.00288	0.00072	0.00014	0.00005	0.00001	0.00001	0.00001
D = Walls (R_{ew})	28	34	39	46	52	58	58
	0.00074	0.00018	0.00006	0.00001	0.00000	0.00000	0.00000
E = Ceiling (R_{rr})	32	36	43	48	50	52	50
	0.00031	0.00012	0.00002	0.00001	0.00000	0.00000	0.00000
F = 10.Log_{10} (B + C + D + E)	-20.6	-26.5	-32.8	-36.6	-41.9	-42.4	-42.0
Absorption (A)	4	6	7	9	9	8	6
G = 10.Log_{10} (S/A)	8.2	6.4	5.7	4.7	4.7	5.2	6.4
Resultant Level	48.6	42.9	35.0	27.0	24.8	16.8	15.4
A-Weighting	-26	-16	-9	-3	0	1	1
A-Weighted	23	27	26	24	25	18	16
Resultant Internal Noise Level	$L_{Aeq,16\ hours}$ 32 dB						
British Standard 8233:2014	Sleeping (Daytime Resting) $L_{Aeq,16\ hours}$ 35 dB – Levels Meet the Requirements						

7.1.2 Night Time Assessment (07:00 to 23:00)

British Standard 8233: 1999 Assessment

Night Time – 23:00 to 07:00 Hours

Internal Noise Level from External Noise Sources

Quietly confident

Location of Measurements	Assessment Position 1 – South Eastern Apartment Block						
Construction of Walls	External Brick, 75mm cavity and 100mm internal concrete block					Area (S_f):	12.2 m^2
Construction of Ceiling	2 layers of 15mm Fireline plasterboard					Area (S_{rr}):	12.9 m^2
Construction of Windows	6mm out pane, sealed 12mm airgap, 4mm inner pane					Area (S_{wi}):	1.2 m^2
Construction of Trickle Vents	Attenuated Trickle Vents						
Octave Band Frequency	63	125	250	500	1000	2000	4000
A = L_{eqff} ($L_{eq,1}$ + 2 dB)	57	55	55	41	32	27	25
B = Attenuated Ventilation (D_{ne})	19	25	31	34	39	39	39
	0.00479	0.00120	0.00030	0.00015	0.00005	0.00005	0.00005
C = Window (R_{wi})	12	18	25	30	37	39	37
	0.00288	0.00072	0.00014	0.00005	0.00001	0.00001	0.00001
D = Walls (R_{ew})	28	34	39	46	52	58	58
	0.00074	0.00018	0.00006	0.00001	0.00000	0.00000	0.00000
E = Ceiling (R_{rr})	32	36	43	48	50	52	50
	0.00031	0.00012	0.00002	0.00001	0.00000	0.00000	0.00000
F = 10.Log_{10} (B + C + D + E)	-20.6	-26.5	-32.8	-36.6	-41.9	-42.4	-42.0
Absorption (A)	4	6	7	9	9	8	6
G = 10.Log_{10} (S/A)	8.2	6.4	5.7	4.7	4.7	5.2	6.4
Resultant Level	47.6	37.9	31.0	12.0	-2.2	-7.2	-7.6
A-Weighting	-26	-16	-9	-3	0	1	1
A-Weighted	22	22	22	9	-2	-6	-7
Resultant Internal Noise Level	$L_{Aeq,8\ hours}$ 19 dB						
British Standard 8233:2014	Sleeping (Daytime Resting) $L_{Aeq,16\ hours}$ 30 dB – Levels Meet the Requirements						

8 CONCLUSIONS

8.1 Summary of Criterion

Activity	Location	07:00 to 23:00	23:00 to 07:00
Resting	Living Room	$L_{Aeq,\ 16\ hour}$ 35 dB	--
Dining	Dining Room	$L_{Aeq,\ 16\ hour}$ 40 dB	--
Sleeping (Daytime Resting)	Bedroom	$L_{Aeq,\ 16\ hour}$ 35 dB	$L_{Aeq,\ 8\ hour}$ 30 dB
External Amenity Space	Gardens	$L_{Aeq,\ T}$ 55 dB	--

8.2 Summary of Assessments

Location of Assessment	Resultant Internal Noise Levels	
	Day Time (07:00 – 23:00)	Night Time (23:00 to 07:00)
Position 1 - South East Apartment Block (South and East Facades)	$L_{Aeq,16\ hours}$ 32 dB	$L_{Aeq,8\ hours}$ 19 dB

8.3 Recommendations

As no special ventilation (beyond attenuated trickle vents) is required on the most impacted property of the development and the range of day/night ambient noise across the development is relatively small, glazing across all properties can be 6.4 – 12 – 4.4, with attenuated trickle vents installed. There is no requirement to install mechanical ventilation in the development as long as the glazing and attenuated trickle vents meet the required performance standards.

8.4 Summary

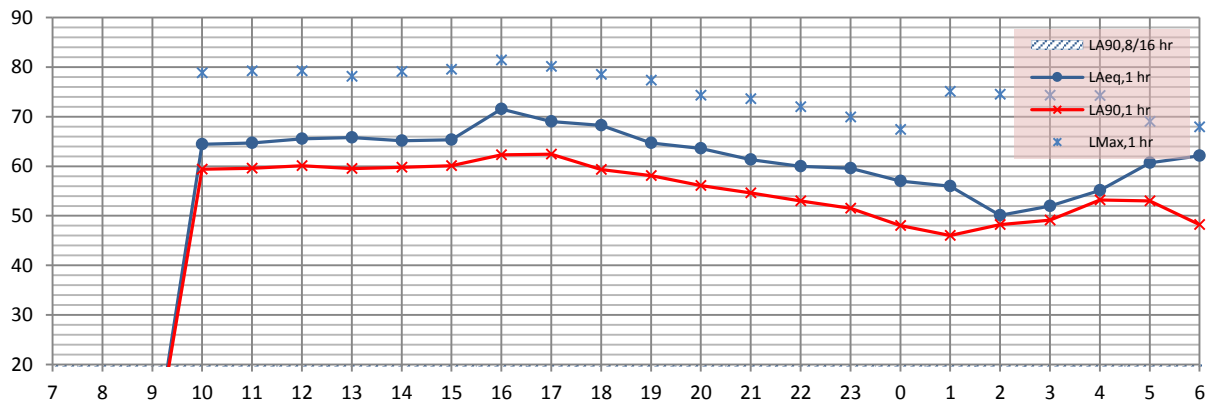
With the proposed glazing and trickle vents installed the criterion detailed within British Standard 8233:2014 can be met in terms of internal noise levels. This is sufficient to meet the requirements of condition 14 of planning permission APP/12/00772.

9 Appendix A – Background Noise Levels

9.1 Position 1

9.1.1 10:00 Friday 4th April 2014 to 07:00 Saturday 5th 2014

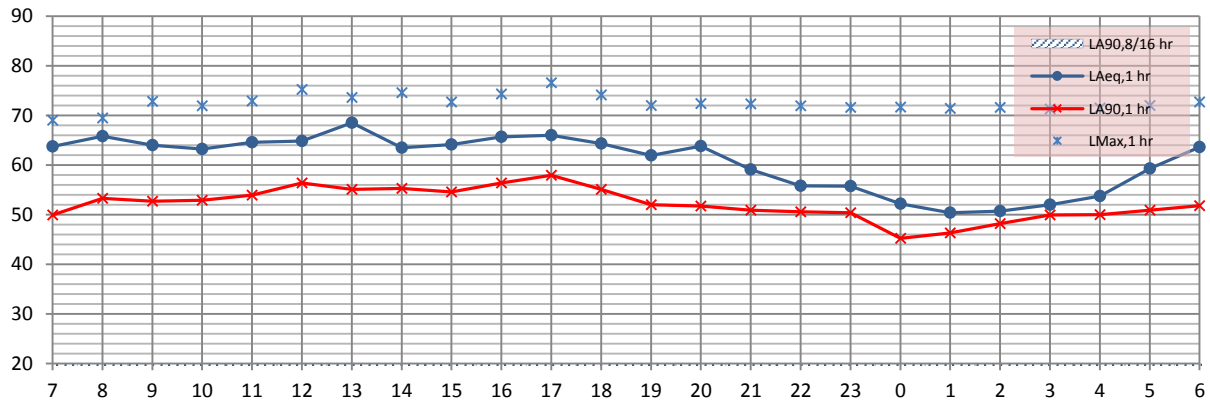
Time Period	L_{Max}	Minimum 5 minute			1 Hour			Day and Night		
		$L_{Aeq,5\ min}$	$L_{A10,\ 5\ min}$	$L_{A90,\ 5\ min}$	$L_{Aeq,\ 1\ hour}$	$L_{A10,\ 1\ hour}$	$L_{A90,\ 1\ hour}$	$L_{Aeq,\ t}$	$L_{A10,\ t}$	$L_{A90,\ 16hours}$
07:00 – 08:00	--	--	--	--	--	--	--	--	--	--
08:00 – 09:00	--	--	--	--	--	--	--			
09:00 – 10:00	--	--	--	--	--	--	--			
10:00 – 11:00	78.8	62.4	64.0	58.6	64.4	67.1	59.4			
11:00 – 12:00	79.2	63.6	65.9	58.9	64.7	67.1	59.6			
12:00 – 13:00	79.2	64.2	66.9	59.2	65.5	68.0	60.1			
13:00 – 14:00	78.1	63.1	65.4	58.8	65.8	68.1	59.5			
14:00 – 15:00	79.1	64.1	66.7	59.4	65.1	67.7	59.8			
15:00 – 16:00	79.5	63.3	65.7	59.0	65.3	67.8	60.1			
16:00 – 17:00	81.4	66.7	69.0	61.3	71.5	70.5	62.3			
17:00 – 18:00	80.1	66.2	68.5	61.4	69.0	71.8	62.4			
18:00 – 19:00	78.5	65.5	68.2	58.0	68.2	71.3	59.3			
19:00 – 20:00	77.3	62.5	63.1	57.4	64.7	67.2	58.1			
20:00 – 21:00	74.3	60.6	59.2	54.0	63.6	65.4	56.1			
21:00 – 22:00	73.6	57.0	56.7	52.6	61.3	60.2	54.6			
22:00 – 23:00	72.0	56.3	55.9	51.2	60.0	58.2	53.0			
23:00 – 00:00	69.9	54.7	53.6	49.7	59.6	57.8	51.5	58.1	56.5	46.5
00:00 – 01:00	67.4	50.0	50.2	47.2	57.0	56.0	48.0			
01:00 – 02:00	75.1	50.5	54.6	53.6	56.0	55.4	46.0			
02:00 – 03:00	74.5	50.0	53.8	52.9	50.1	54.3	48.2			
03:00 – 04:00	74.3	50.0	53.4	52.8	52.0	54.3	49.1			
04:00 – 05:00	74.2	50.0	54.0	52.7	55.1	55.1	53.2			
05:00 – 06:00	69.0	56.3	55.7	49.4	60.7	58.1	53.0			
06:00 – 07:00	67.9	56.5	57.7	47.4	62.1	62.4	48.2			



Sound Pressure Levels, dB. Reference level of 2 x 10^{-5} Nm^{-2}

9.1.2 07:00 Saturday 5th April 2014 to 07:00 Sunday 6th April 2014

Time Period	L_{Max}	Minimum 5 minute			1 Hour			Day and Night		
		$L_{Aeq,5\ min}$	$L_{A10,\ 5\ min}$	$L_{A90,\ 5\ min}$	$L_{Aeq,\ 1\ hour}$	$L_{A10,\ 1\ hour}$	$L_{A90,\ 1\ hour}$	$L_{Aeq,\ t}$	$L_{A10,\ t}$	$L_{A90,\ 16hours}$
07:00 – 08:00	69.0	61.7	63.7	48.6	63.7	66.9	49.9	64.4	66.8	51.5
08:00 – 09:00	69.5	62.9	65.4	50.0	65.8	68.5	53.3			
09:00 – 10:00	72.8	61.5	64.8	52.1	64.0	67.0	52.7			
10:00 – 11:00	71.9	60.6	63.6	51.5	63.2	66.4	52.9			
11:00 – 12:00	72.9	61.5	64.7	52.5	64.6	67.1	53.9			
12:00 – 13:00	75.2	64.0	66.5	55.6	64.8	67.3	56.4			
13:00 – 14:00	73.6	62.7	65.0	53.4	68.5	66.6	55.1			
14:00 – 15:00	74.6	62.5	64.6	54.4	63.5	66.1	55.3			
15:00 – 16:00	72.7	61.7	64.8	52.5	64.1	66.7	54.6			
16:00 – 17:00	74.3	64.2	66.8	55.4	65.7	68.0	56.4			
17:00 – 18:00	76.6	64.9	67.9	56.6	66.0	69.2	57.9			
18:00 – 19:00	74.1	62.5	63.4	53.5	64.3	67.1	55.1			
19:00 – 20:00	72.0	57.3	56.9	51.4	61.9	64.6	52.0			
20:00 – 21:00	72.4	56.6	57.1	51.2	63.8	63.8	51.7			
21:00 – 22:00	72.3	50.1	51.9	50.8	59.1	58.5	50.9			
22:00 – 23:00	71.9	50.0	51.3	50.4	55.8	52.9	50.6			
23:00 – 00:00	71.6	50.0	51.0	50.2	55.7	51.6	50.4	57.3	54.0	47.1
00:00 – 01:00	71.7	50.0	50.8	50.2	52.2	51.2	45.2			
01:00 – 02:00	71.4	50.0	50.3	49.8	50.4	50.8	46.3			
02:00 – 03:00	71.6	50.0	50.4	49.9	50.7	50.6	48.2			
03:00 – 04:00	71.3	50.0	50.3	49.7	52.0	50.5	49.9			
04:00 – 05:00	71.5	50.0	50.5	49.9	53.7	51.6	50.0			
05:00 – 06:00	72.0	53.9	53.4	50.5	59.3	57.8	50.9			
06:00 – 07:00	72.7	59.4	59.0	51.5	63.6	63.6	51.8			

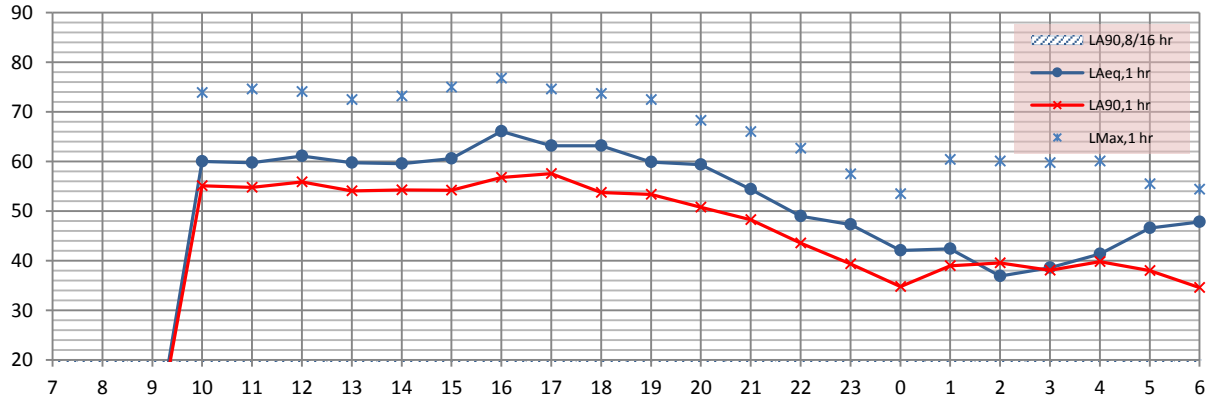


Sound Pressure Levels, dB. Reference level of 2 x 10^{-5} Nm^{-2}

9.2 Position 2

9.2.1 14:00 Friday 4th April 2014 to 07:00 Saturday 5th 2014

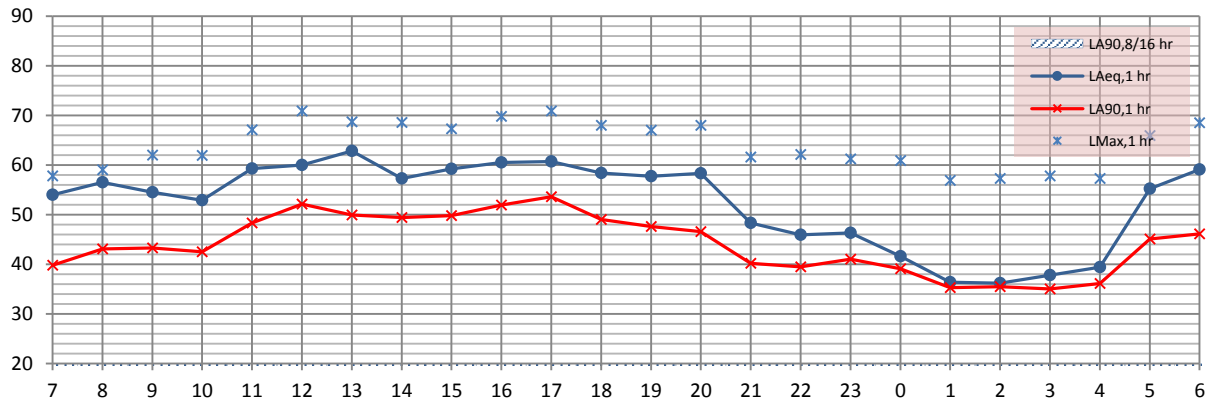
Time Period	L_{Max}	Minimum 5 minute			1 Hour			Day and Night		
		$L_{Aeq,5\ min}$	$L_{A10,\ 5\ min}$	$L_{A90,\ 5\ min}$	$L_{Aeq,\ 1\ hour}$	$L_{A10,\ 1\ hour}$	$L_{A90,\ 1\ hour}$	$L_{Aeq,\ t}$	$L_{A10,\ t}$	$L_{A90,\ 16hours}$
07:00 – 08:00	--	--	--	--	--	--	--	--	--	--
08:00 – 09:00	--	--	--	--	--	--	--			
09:00 – 10:00	--	--	--	--	--	--	--			
10:00 – 11:00	73.9	58.0	58.4	53.3	60.0	60.9	55.1			
11:00 – 12:00	74.6	59.3	61.0	54.5	59.8	61.2	54.8			
12:00 – 13:00	74.1	59.9	62.0	54.7	61.1	62.5	55.9			
13:00 – 14:00	72.5	57.8	60.9	53.5	59.8	62.7	54.1			
14:00 – 15:00	73.2	58.0	61.3	55.2	59.6	61.5	54.3			
15:00 – 16:00	75.0	58.1	61.3	54.4	60.6	62.2	54.2			
16:00 – 17:00	76.8	61.7	63.0	56.3	66.1	65.2	56.8			
17:00 – 18:00	74.6	61.8	62.4	55.6	63.2	65.7	57.6			
18:00 – 19:00	73.7	59.9	63.5	52.6	63.2	65.8	53.8			
19:00 – 20:00	72.5	56.5	58.9	51.7	59.9	62.1	53.4			
20:00 – 21:00	68.3	56.2	53.4	48.1	59.4	59.6	50.8			
21:00 – 22:00	66.0	49.7	49.5	46.0	54.4	53.1	48.3			
22:00 – 23:00	62.7	46.8	45.4	40.6	49.0	47.7	43.6			
23:00 – 00:00	57.5	41.7	42.4	37.3	47.3	44.7	39.4	34.9	45.4	34.4
00:00 – 01:00	53.5	36.5	36.4	32.0	42.1	40.8	34.8			
01:00 – 02:00	60.4	36.0	41.1	38.8	42.4	41.6	39.0			
02:00 – 03:00	60.1	35.1	39.6	39.0	36.9	40.6	39.6			
03:00 – 04:00	59.8	36.2	40.1	39.1	38.6	41.0	38.1			
04:00 – 05:00	60.1	34.9	40.3	38.1	41.4	41.2	39.8			
05:00 – 06:00	55.5	41.6	41.4	35.4	46.6	43.7	38.0			
06:00 – 07:00	54.4	43.0	44.0	33.4	47.8	47.2	34.6			



Sound Pressure Levels, dB. Reference level of 2 x 10^{-5} Nm^{-2}

9.2.2 07:00 Saturday 5th April 2014 to 07:00 Sunday 6th April 2014

Time Period	L_{Max}	Minimum 5 minute			1 Hour			Day and Night		
		$L_{Aeq,5\ min}$	$L_{A10,\ 5\ min}$	$L_{A90,\ 5\ min}$	$L_{Aeq,\ 1\ hour}$	$L_{A10,\ 1\ hour}$	$L_{A90,\ 1\ hour}$	$L_{Aeq,\ t}$	$L_{A10,\ t}$	$L_{A90,\ 16hours}$
07:00 – 08:00	57.8	50.8	53.8	39.3	54.0	57.6	39.8	53.4	53.9	42.1
08:00 – 09:00	59.0	52.2	54.7	40.0	56.5	58.8	43.1			
09:00 – 10:00	62.0	51.1	53.8	41.7	54.5	55.8	43.3			
10:00 – 11:00	61.9	50.7	54.0	40.6	52.9	56.3	42.5			
11:00 – 12:00	67.1	56.9	59.1	47.1	59.3	61.1	48.3			
12:00 – 13:00	70.9	58.9	62.4	50.9	60.0	61.7	52.1			
13:00 – 14:00	68.7	58.4	60.6	49.1	62.8	62.0	49.9			
14:00 – 15:00	68.6	56.9	59.3	50.1	57.3	61.7	49.4			
15:00 – 16:00	67.3	56.2	60.0	46.8	59.2	62.4	49.8			
16:00 – 17:00	69.8	58.8	62.1	49.8	60.5	62.6	51.9			
17:00 – 18:00	70.9	60.0	63.4	52.4	60.7	64.4	53.6			
18:00 – 19:00	68.0	56.9	57.2	49.0	58.4	61.0	49.0			
19:00 – 20:00	67.0	52.3	52.6	47.0	57.7	60.0	47.6			
20:00 – 21:00	68.0	50.8	52.5	45.2	58.3	59.5	46.6			
21:00 – 22:00	61.6	39.4	41.5	40.9	48.3	47.4	40.2			
22:00 – 23:00	62.1	40.2	41.8	39.5	45.9	42.1	39.5			
23:00 – 00:00	61.2	40.6	41.5	40.2	46.3	41.0	41.0	33.1	43.2	32.4
00:00 – 01:00	60.9	39.5	40.2	40.8	41.6	41.5	39.1			
01:00 – 02:00	56.9	34.9	35.4	34.7	36.4	35.8	35.3			
02:00 – 03:00	57.3	35.1	35.7	35.8	36.2	37.4	35.5			
03:00 – 04:00	57.8	36.5	35.2	34.6	37.8	35.6	35.0			
04:00 – 05:00	57.3	35.2	36.1	35.1	39.4	36.7	36.1			
05:00 – 06:00	65.9	49.1	47.5	44.5	55.2	52.6	45.1			
06:00 – 07:00	68.5	55.2	54.2	45.6	59.1	58.7	46.1			



Sound Pressure Levels, dB. Reference level of 2 x 10^{-5} Nm^{-2}

End of Report