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RESIDENTIAL
DEVELOPMENTS LTD

AFFORDABLE HOUSING
UNITS, THE POPLARS,
LITTLEHAMPTON

ACOUSTICS REPORT

NOVEMBER 2008



southdowns
environmental consultants ltd

Hargreaves Residential Developments Ltd

Affordable Housing Units, The Poplars, Littlehampton

Acoustics Report

November 2008

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Date: 25th November 2008

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1. INTRODUCTION

Southdowns Environmental Consultants Limited was commissioned by Hargreaves Residential Developments Ltd in October 2008 to undertake a revised assessment of A259 road traffic noise levels at the site of proposed residential development at The Poplars Site, Worthing Road in Littlehampton.

Southdowns has previously assessed the noise from the A259 on development proposals for The Poplars site and the results of this assessment were presented in an Acoustics Report in June 2006 [1]. Following revised proposals for part of the site, previous noise assessments have been updated and the results of this latest assessment are presented in this report.

The requirement for this noise assessment is to comply with a planning approval condition attached to the development site by Arun District Council. This condition requires that a scheme be designed which protects the residential development from noise from the A259.

The noise levels and assessment criteria used for the assessment of road traffic noise affecting the affordable housing residential dwellings are described in Section 2. A description of the existing site and proposed development is provided in Sections 3 and 4 of this report respectively. Details of previous noise surveys undertaken at The Poplars Site and subsequent noise modelling are provided in sections 5 and 6 of this report respectively. Assessment of predicted internal and external noise levels and mitigation options are presented in Section 7 and findings from the study are summarised in Section 8 of this report.



2. NOISE LEVELS AND ASSESSMENT CRITERIA

2.1 Noise Levels

Noise is measured on a logarithmic scale in decibels (dB) because of the ears' sensitivity to a wide range of pressure changes. The sound pressure level of a signal is denoted by the symbol L_p and defined by the equation $L_p = 10 \log_{10} (p/p_0)^2$ where p is the root mean square pressure of the signal and p_0 is the reference sound pressure (2×10^{-5} Pa).

The human auditory system is capable of detecting sounds over a frequency range of 20 to 20k Hz. Because the ear is most sensitive to sounds with frequencies between 1 and 5 kHz, an A-weighting network is used to reflect the differential sensitivity of human hearing to sounds of different frequency. The A-weighted sound pressure level, L_{pA} , is measured on a scale effectively defined by the dB(A) logarithmic interval.

The dB(A) level is commonly used for the measurement and assessment of environmental noise due to the relationship between the subjective impression of the auditory strength of a sound, otherwise known as loudness, and the A-weighted sound pressure level of that sound. A change of 3 dB in event noise levels is generally considered to be the minimum perceptible change under normal conditions whilst a 10 dB increase or decrease in the sound pressure level of a steady sound corresponds to a perceived doubling or halving of loudness. An indication of the range of sound pressure levels commonly found in the environment is given below:

<u>Location</u>	<u>L_{pA} dB</u>
Normal threshold of hearing	-10 to 20
Music halls and theatres	20 to 30
Living rooms and offices	30 to 50
Inside motor vehicles	50 to 70
Industrial premises	70 to 100
Burglar alarms at 1m	100 to 110
Jet aircraft on take-off at 100m	110 to 130
Threshold of pain	130 to 140

Community response to unwanted sound in the environment is dependent on several parameters including the type of noise source. The continuous equivalent sound pressure level, $L_{Aeq,T}$, is described as the notional steady sound which, at a given position over a defined period of time T , has the same A-weighted acoustic energy as the actual fluctuating sound. This average level provides a measure of the ambient noise from all sources and is widely used in this country to quantify railway and aircraft noise.

The background noise level, $L_{A90,T}$, is defined as the A-weighted sound pressure level of the ambient noise exceeded for 90% of a given time interval, T . This provides a measure of the lower levels of a fluctuating noise and is normally defined separately for day and night-time periods. Other percentile levels such as the levels exceeded for 5 and 50% of the time period T are also sometimes used for the description of noise levels which vary with time whilst the maximum sound pressure level in any given interval is denoted by the symbol $L_{Amax,F/S}$ obtained using either the Fast (F) or SLOW (S) time weighting.

The $L_{A10,18hr}$ noise index has traditionally been used for quantifying the particular characteristics of traffic noise from new roads in the UK and a reasonable correlation has been shown to exist between community dissatisfaction to road traffic noise and this index. It is defined as the arithmetic mean of noise levels exceeded for 10% of the time in each of the 18 one-hour periods



between 6 a.m. and midnight and effectively takes into account the fluctuating acoustic characteristics of a stream of road traffic.

2.2 Noise Standards and Criteria

2.2.1 British Standard 8233

The following absolute values for good and reasonable indoor noise levels are specified in British Standard BS 8233: 1999: Sound insulation and noise reduction for buildings – Code of practice [2].

Room	Good	Reasonable
Living Room	30 dB $L_{Aeq,T}$	40 dB $L_{Aeq,T}$
Bedroom	30 dB $L_{Aeq,T}$	35 dB $L_{Aeq,T}$ & 45 dB $L_{Amax,F}$

TABLE 2.1: BRITISH STANDARD 8233 INDOOR CRITERION NOISE LEVELS

The standard further suggests that for gardens and balconies it is desirable that the steady noise level does not exceed 50 dB $L_{Aeq,T}$ and 55 dB $L_{Aeq,T}$ should be regarded as the upper limit.

2.2.2 World Health Organization

The following precautionary noise limits for community noise in specific environments are presented in the World Health Organization (WHO) document [3].

Specific Environment	Critical Health Effect(s)	dB $L_{Aeq,T}$	Time Base hours	dB $L_{Amax,F}$
Outdoor living area	Serious annoyance, daytime and evening	55	16	-
	Moderate annoyance, daytime and evening	50	16	-
Dwelling indoors	Speech intelligibility and moderate annoyance, daytime and evening	35	16	-
Inside bedrooms	Sleep disturbance, night-time	30	8	45

TABLE 2.2: WHO GUIDELINE NOISE VALUES

2.2.3 Planning Policy Guidance PPG 24

Typical road traffic noise reductions for a dwelling façade with windows set in a brick/block wall are presented in Planning Policy Guidance Note: 24 [4] and range from 28 dB(A) for single glazing through to 33 and 34 dB(A) for thermal double glazing and secondary glazing respectively. For partially open windows, the insulation provided is stated to be in the region of 10 to 15 dB(A) and an average value of 13 dB(A) is often used to estimate internal noise levels when outdoor façade noise levels are known.

2.3 Local Planning Authority Noise Conditions

Arun District Council has specified the following noise planning condition for the site:

"Development shall not begin until a scheme for protecting the proposed residential development from noise from the A259 has been submitted to and approved in writing by the local planning authority; all works which form part of this scheme shall be completed before any part of the development is occupied."



3. SITE DESCRIPTION

The location of the site is shown on Figure A1 of Appendix A.

The site is situated on the outskirts of Littlehampton in West Sussex. To the north of the site lies the A259 Rustington Bypass, which carries traffic around the outskirts of Littlehampton, and to the south lies Worthing Road. Adjoining the site to the west is land currently under construction with residential housing being built, and beyond is a commercial development that includes a Travel Lodge Motel and Little Chef. To the east there is open grassland and a children's playground area and beyond are other residential dwellings.



4. PROPOSED DEVELOPMENT

The layout of the proposed affordable housing on the development site is outlined in red on Figure A2 of Appendix A.

The affordable housing development consists of 36 properties in seven building blocks. The houses are terraced two-storey properties with one, two or three bedrooms.

The internal layout of each building type varies and therefore due consideration has been given to the positions of the living rooms and bedrooms for each house or flat, when assessing internal noise levels.

Vehicular access to the site is via Worthing road at the south of the site.

Proposals to mitigate noise from the A259 road traffic at the site are presented on Figure A3 of Appendix A. The noise mitigation proposals include:

- a 4.25 m earth noise bund running along the north-western site boundary, with a 2.25 m high acoustics fence installed on top;
- a 2.4 m high acoustics fence running from the top of the north-eastern site boundary to where the site boundary bends to run in a more southerly direction; and
- a 2.5 m high acoustic fence installed along a section of the south-western site boundary.



5. NOISE MEASUREMENTS

Assessment of the noise impact on the proposed affordable housing units has been based on noise survey data obtained in January 2006. A summary of this noise survey and the survey results is presented in the following subsection. The noise data have been used to calibrate a noise model of the development. Details of the noise modelling are presented in Section 6 of this report.

Southdowns has undertaken noise surveys at the site in December 2002, May 2005 and January 2006.

The noise assessment of the previous development proposals presented in the June 06 report was based on the noise survey results obtained in January 2006. These results have also been used to assess the noise impact of A259 road traffic on the proposed affordable housing development area at the site.

Further details of the noise surveys undertaken in December 2002 and May 2005 are presented in the June 2006 Acoustics report.

5.1 Noise Survey - January 2006

A noise survey was carried out at the site in January 2006. Details of this noise survey and the survey results are presented below.

5.1.1 Continuous Noise Monitoring

Long-term (LT) continuous noise monitoring was undertaken at a location close to the north-west site boundary to ensure the road traffic noise was dominating the noise environment. This location is shown as LT2 on Figure A1 of Appendix A to this report.

Noise monitoring at LT2 was undertaken with the microphone positioned 1.5 m above ground in free-field conditions.

All continuous noise levels were measured using a Rion NL-31 Type 1 precision integrating sound level meter fitted with a UC-53A microphone and weatherproof windshield. The sound level meter was powered by dry cell batteries and stored inside a weatherproof security box.

$L_{Amax,F}$, $L_{A10,T}$, $L_{Aeq,T}$, $L_{A50,T}$, and $L_{A90,T}$ noise levels were measured over consecutive 60-minute intervals. Noise levels monitored were obtained between 11:00 hrs Thursday 12th January and 10:00 hrs Thursday 19th January 2006 respectively. The equipment was calibrated before and after the survey using a Rion NC-74 Class 1 Acoustic Calibrator to generate a calibration level of 94 dB at 1 kHz.

5.4 Noise Survey Results

The results of the continuously monitored noise data obtained over the duration of the survey period are presented graphically on Figure A4 of Appendix A and tabulated in Table B1 of Appendix B. These noise levels are summarised in Table 5.3 overleaf.



Day of Measurement	Measured Noise Levels, dB re. 2×10^{-5} Pa.					
	Daytime			Night time		
	$L_{Amax,F}$	$L_{Aeq,16hr}$	$L_{A90,16hr}$	$L_{Amax,F}$	$L_{Aeq,8hr}$	$L_{A90,8hr}$
Thursday	82 (80-88)	70 (66-72)	58 (46-65)	79 (75-82)	61 (57-66)	39 (35-51)
Friday	83 (80-89)	70 (65-71)	59 (47-64)	79 (77-83)	61 (56-64)	39 (37-46)
Saturday	82 (79-88)	70 (65-72)	58 (43-65)	79 (77-81)	60 (55-65)	36 (33-44)
Sunday	83 (78-89)	68 (63-71)	54 (42-63)	79 (77-84)	61 (53-67)	40 (36-55)
Monday	83 (79-89)	71 (66-73)	60 (46-67)	79 (77-85)	62 (56-68)	42 (37-52)
Tuesday	82 (79-88)	71 (67-73)	60 (47-66)	79 (77-82)	63 (55-68)	40 (36-52)
Wednesday	84 (80-91)	71 (67-74)	60 (49-67)	80 (77-83)	62 (55-68)	39 (35-53)
Thursday	82 (78-88)	72 (70-73)	62 (57-66)	-	-	-
Mean Values	83 (82-84)	70 (68-72)	59 (54-62)	79 (79-80)	61 (60-63)	39 (36-42)

TABLE 5.1: SUMMARY OF CONTINUOUS NOISE MONITORING SURVEY RESULTS THURSDAY 12 TO THURSDAY 19 JANUARY 2006 (range of hourly and daily noise levels shown in parentheses)

The results of the unattended monitoring show that the day and night-time ambient noise levels measured at LT2 ranged between 68 and 72 dB $L_{Aeq,1hr}$ and 60 and 63 $L_{Aeq,1hr}$ respectively, with mean levels of 70 dB $L_{Aeq,16hrs}$ and 61 $L_{Aeq,8hrs}$.

These mean day and night-time noise levels have been used as the basis for this noise assessment.



6. ACOUSTIC MODELLING

To assess the road traffic noise from the A259 a computer software model has been developed of the site. This modelling exercise has been undertaken using the noise calculation software module RoadNoise, which is part of the software suite NoiseMap 2000. This software enables the prediction of road noise in accordance with the Calculation of Road Traffic Noise [5].

An initial noise model was developed of the existing site, and this was then calibrated using the noise data obtained at LT2. The calibration exercise was undertaken by adjusting the model traffic flow parameters on the A259 until the predicted levels are within an acceptable tolerance of the measured survey levels. Once calibrated the road traffic parameters were fixed and the proposed site layout was then modelled.

Calculated day and night time noise levels derived from the long-term survey data to calibrate the acoustic model are presented below in Table 6.1.

Monitoring Location	Survey Noise Levels		Calibrated Model Levels		Level Differences	
	L _{Aeq,16hr}	L _{Aeq,8hr}	L _{Aeq,16hr}	L _{Aeq,8hr}	L _{Aeq,16hr}	L _{Aeq,8hr}
LT2	70	61	70	61	0	0

TABLE 6.1: MODEL CALIBRATION LEVELS

6.1 Model Assumptions

In developing a noise model of the site, the following assumptions have been made:

- A259 road traffic is the dominant source of noise across the site;
- the slope of the A259 has been modelled into segments of variable height, whilst the surrounding topography of the site has been assumed to be flat;
- the site and surrounding area has been modelled as soft ground;
- receptors representative of garden noise levels have been modelled at a free-field height of 1.5 m above ground; and
- all other receptors have been modelled at the edge of the façade of individual properties taking into consideration ground and first floor heights where appropriate;
- façade attenuations of 13 and 33 dB(A) have been assumed for facades with windows partially open and with closed thermal double glazing units.

6.2 Receptor Locations

Representative calculation receptor locations have been chosen to obtain coverage of the likely noise environment at properties across the site of the proposed development. In total, 45 receptor locations have been identified and these are presented in Figure A5 of Appendix A.



7. ASSESSMENT AND NOISE MITIGATION

7.1 Internal Noise Levels

Internal noise levels have been considered for both living rooms and bedrooms. Internal noise levels have firstly been considered with previously agreed site boundary acoustic screening and double glazed windows partially open to allow for natural ventilation. Where internal levels exceed relevant criteria, then mitigation options include closure of windows and provision of alternative forms of background ventilation such as acoustic trickle vents. A subsequent noise assessment has then been undertaken to ensure that a reasonable internal noise environment is achieved with windows closed.

Where necessary, mitigation measures have been proposed to reduce internal noise levels to around 40 dB $L_{Aeq,16hr}$ for living rooms and around 35 dB $L_{Aeq,8hr}$ for bedrooms. These noise levels are considered to provide a 'reasonable' internal noise environment as defined in BS 8233.

The following subsections provide an assessment of the internal noise levels calculated inside living rooms and bedrooms at properties across the site.

7.1.1 Living Rooms

The results of the predicted daytime noise levels inside living rooms with windows partially open are presented in Table B2 of Appendix B and indicate that a 'reasonable' internal noise environment should be achieved inside the living rooms of the following properties:

- R8 - No. 220 to 222 ;
- R11 - No. 238 to 240 ;
- R22 - No. 232 to 234 ;
- R23 - No. 230 to 231 ;
- R24 - No. 227 to 229;
- R25 - No. 225 to 226; and
- R28 - No. 213 to 215.

Properties where a 'reasonable' noise environment inside a living room is not achieved with windows partially open to allow for natural ventilation are listed in Table 7.1 below.

Rep ID	Property Nos.	Façade Orientation
R5	No. 224	SW
R6	No. 223 & 224	NW
R7	No. 223	NE
R14	No. 216 & 217	W
R15	No. 218 & 219	W
R19	No. 211 & 212	NE
R20	No. 208 to 210	NE
R21	No. 205 to 207	NE

Table 7.1: Living Room Noise Levels > 40 dB $L_{Aeq,16hr}$, Facades with Partially Open Windows



It is recommended therefore that in order to achieve a good internal noise environment the living rooms of Properties listed in Table 7.1 above should have closed double glazed thermal windows with an alternative form of acoustically treated background ventilation in the relevant facades.

The results of the predicted daytime noise levels inside living rooms with windows fully closed are presented in Table B3 of Appendix A.

Based on the PPG 24 stated value of 33 dB(A) attenuation for façades with closed double glazed windows a 'good' internal daytime noise environment should be achieved inside living rooms of all properties located within the affordable housing development area.

7.1.2 Bedrooms

Internal bedroom noise levels specified in BS 8233 for a 'good' and 'reasonable' noise environment are 30 dB $L_{Aeq, 8hr}$ and 35 dB $L_{Aeq, 8hr}$ respectively.

The predicted night-time noise levels inside bedrooms at properties across the site with windows partially open are presented in Table B4 of Appendix B.

The results in Table B4 show that the following bedrooms should achieve a 'reasonable' internal noise environment with a partially open window:

- R8 - No. 220 to 222;
- R10 - No. 235 to 237;
- R11 - No. 238 to 240;
- R14 - No. 216 to 217;
- R15 - No. 218 to 219;
- R16 - No. 211 to 212;
- R17 - No. 208 to 210;
- R18 - No. 205 to 207;
- R22 - No. 232 to 234;
- R23 - No. 230 to 231;
- R24 - No. 227 to 229;
- R25 - No. 225 to 226;
- R26 - No. 235 to 237;
- R27 - No. 238 to 240;
- R28 - No. 213 to 215.

Properties where a 'reasonable' noise environment is not likely to be achieved inside bedrooms with windows partially open during the night-time are listed in Table 7.2 below. This table also presents the façade on which a bedroom(s) does not achieve the 'reasonable' internal noise criterion.



Rep ID	Property Nos.	Façade	Façade Orientation
R1	Nos. 232 & 234	Front	NW
R2	Nos. 230 & 231	Front	NW
R3	Nos. 227 to 229	Front	NW
R4	Nos. 225 & 226	Front	NW
R5	No. 224	Side	SW
R6	Nos. 223 & 224	Front	NW
R7	No. 223	Side	NE
R9	Nos. 220 to 222	Front	NE
R12	No. 213	Front	NW
R13	Nos. 214 & 215	Front	NW
R19	Nos. 211 & 212	Rear	NE
R20	Nos. 208 to 210	Rear	NE
R21	Nos. 205 & 207	Rear	NE
R29	House Nos. 216 & 219	Rear	E

Table 7.2: Bedrooms with Internal Noise Environment > 35 dB $L_{Aeq,8hr}$

It is recommended therefore that in order to achieve a good internal noise environment the bedrooms of Properties listed in Table 7.2 above should have closed double glazed thermal windows with an alternative form of acoustically treated ventilation in the relevant façades.

The results of the predicted night-time noise levels inside bedrooms with windows fully closed are presented in Table B5 of Appendix B.

Based on the PPG 24 stated value of 33 dB(A) attenuation for façades with closed double glazed windows a 'good' internal night-time noise environment should be achieved inside bedrooms of all properties located within the affordable housing development area.

7.3 External Noise Levels

Criteria specified in BS 8233 and WHO guidelines indicate that external garden noise levels of 50 dB $L_{Aeq,T}$ are desirable with an upper limit of 55 dB $L_{Aeq,T}$.

Calculated external free-field noise levels in garden areas are presented in Table 7.3 overleaf.



Rep No.	Property No.	Free-field Garden Levels, dB $L_{Aeq,16hr}$
R30	No. 224 - Garden	56
R31	No. 223 - Garden	55
R32	No. 220 to 222 - Gardens	52
R33	No. 218 to 219 - Gardens	53
R34	No. 216 to 217 - Gardens	53
R35	No. 235 to 237 - Gardens	51
R36	No. 238 to 240 - Gardens	51
R37	No. 213 - Garden	48
R38	No. 214 to 215 - Gardens	48
R39	No. 211 to 212 - Gardens	58
R40	No. 208 to 210 - Gardens	57
R41	No. 205 to 207 - Gardens	56
R42	No. 232 to 234 - Gardens	49
R43	No. 230 to 231 - Gardens	50
R44	No. 227 to 229 - Gardens	50
R45	No. 225 to 226 - Gardens	51

TABLE 7.3: GARDEN NOISE LEVELS

These results indicated that the upper noise limit of 55 dB $L_{Aeq,T}$ for garden areas is achieved at all representative calculation receptor locations, with the exception of property no. 224 near to the acoustic bund towards the middle of the north-east site boundary and nos. 205 to 212 in the north-east corner of the site, where external noise levels are predicted to be 1 to 3 dB(A) higher than this limit.



8. CONCLUSIONS

Noise levels have been calculated for the internal and external noise levels due to A259 road traffic at The Poplars Site, Worthing Road in Littlehampton.

The assessment presented in this report indicates that 'reasonable' internal noise environments can be achieved inside living rooms and bedrooms with the inclusion of the acoustic earth bund and acoustic fence configuration along the north-west boundary, acoustic fencing around the perimeter of the site and closed double glazed windows. The results presented in this report indicate that certain habitable rooms may require alternative acoustically treated ventilation, where reasonable noise levels are not achieved with windows partially open.

Upper limits for garden noise level criteria should be achieved outside properties across the site, with the exception of property no. 224. which is located near the earth bund and towards the middle of the north-east site boundary and nos. 205 to 212 located along the north-east corner of the site, where external noise levels are predicted to be 1 to 3 dB(A) higher than the 55 dB $L_{Aeq,16hr}$ guideline value.



9. REFERENCES

1. HRI Site, Littlehampton. Acoustics Report. June 2006.
2. British Standards Institution. Sound Insulation and Noise Reduction for Buildings – Code of Practice. BS 8233: 1999.
3. World Health Organization. Guidelines for Community Noise. 2000.
4. Department of the Environment. Planning Policy Guidance: Planning and Noise. PPG24. September 1994.
5. Department of Transport, Welsh Office. Calculation of Road Traffic Noise. 1988.

APPENDIX A: TABLES

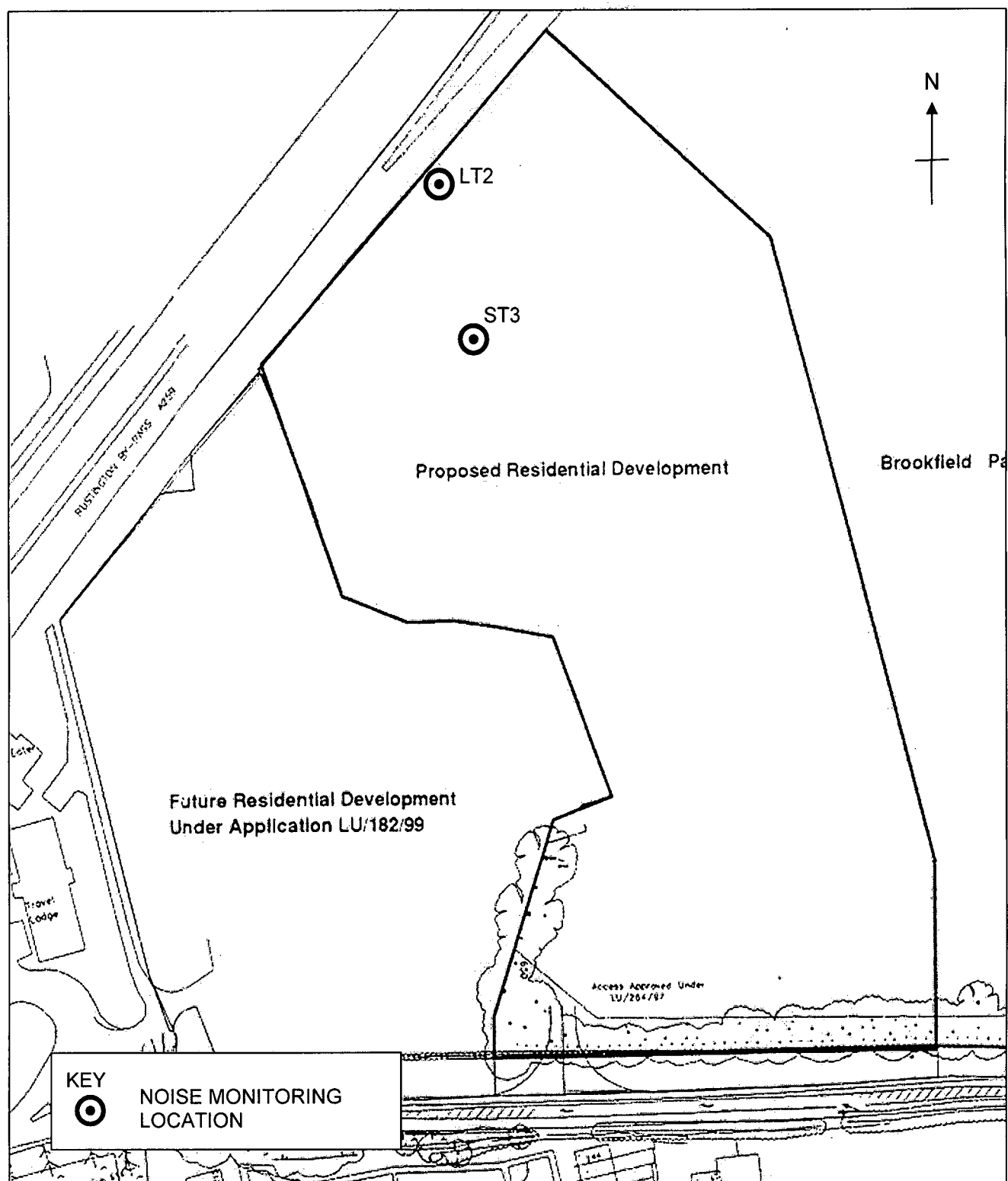
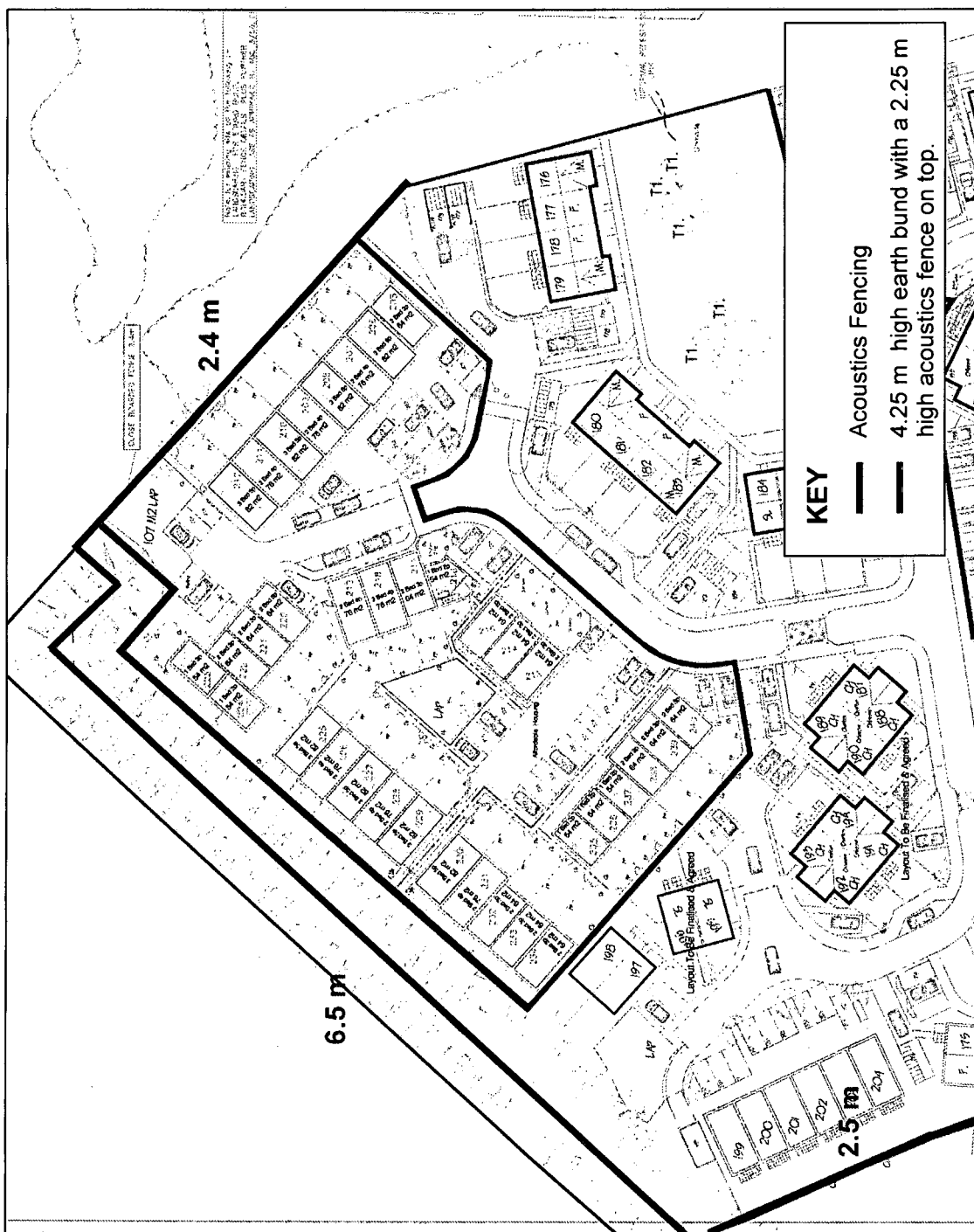


FIGURE A1: NOISE MONITORING LOCATION PLAN





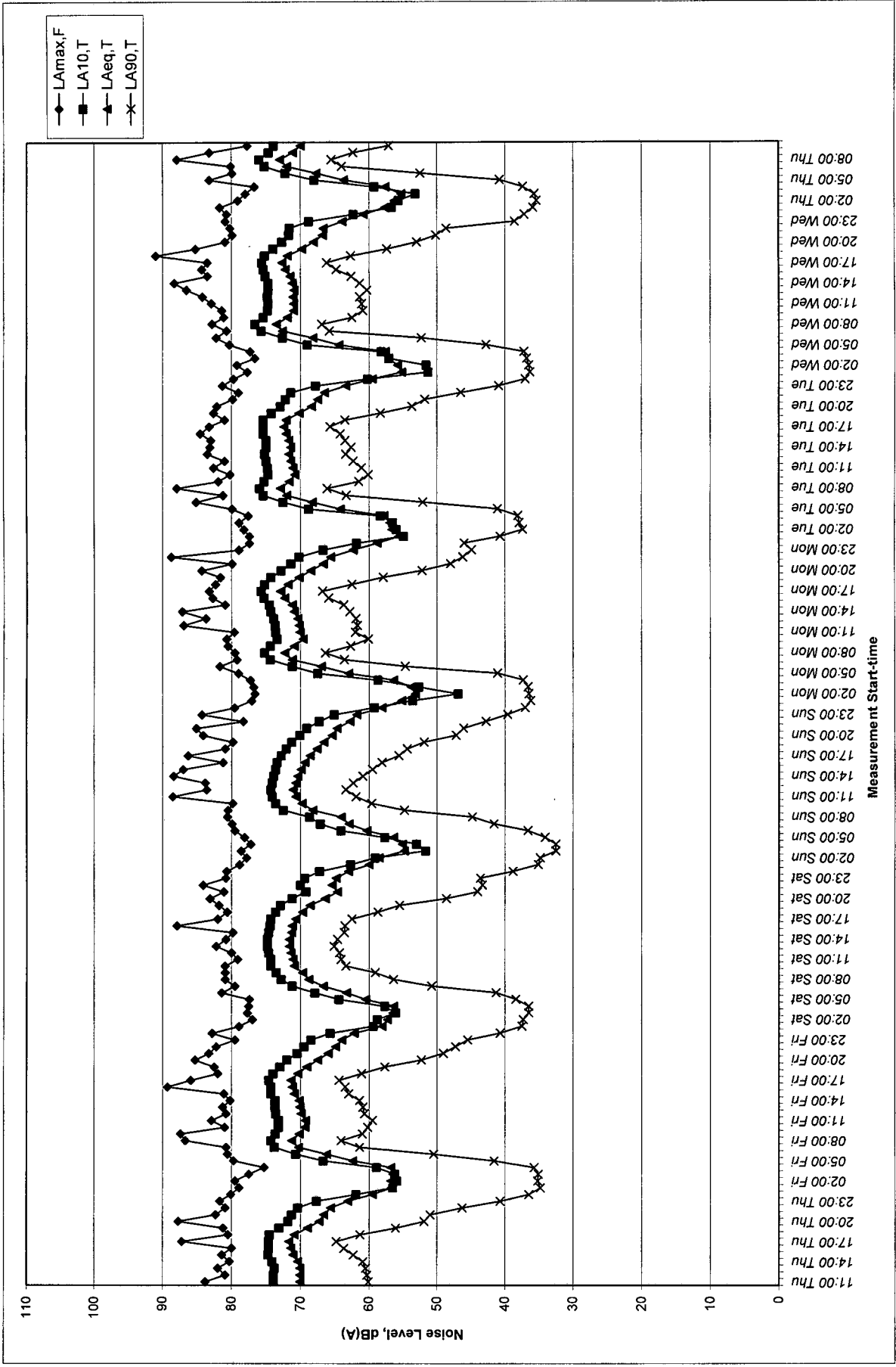


FIGURE A4: CONTINUOUS NOISE MONITORING SURVEY RESULTS – JANUARY 2006

APPENDIX B: TABLES

Date of Measurement	Start Time	Measured Noise Levels, dB re. 2×10^{-5} Pa.					
		$L_{Amax,F}$	$L_{A10,1\text{ hr}}$	$L_{Aeq,1\text{ hr}}$	$L_{A50,1\text{ hr}}$	$L_{A90,1\text{ hr}}$	$L_{A95,1\text{ hr}}$
Thursday 12-Jan-06	11:00	83.8	73.9	70.1	68.2	60.1	57.3
	12:00	80.9	73.9	70.1	68.2	60.3	58.2
	13:00	82.0	73.8	70.1	68.1	60.5	58.5
	14:00	80.3	74.1	70.4	68.8	60.9	58.6
	15:00	81.4	74.7	71.1	69.6	62.3	59.6
	16:00	80.0	74.6	71.4	70.5	63.7	61.4
	17:00	87.2	74.6	71.7	70.9	64.8	62.8
	18:00	80.5	74.5	70.9	69.3	61.3	58.8
	19:00	81.2	73.1	69.0	66.3	56.1	53.9
	20:00	87.7	71.8	67.3	62.6	51.9	49.6
	21:00	82.3	71.3	66.6	61.3	51.0	48.1
	22:00	80.9	70.4	65.6	59.9	46.3	44.0
	<i>Arith. Average</i>	82.4	73.4	69.5	67.0	58.3	55.9
	<i>Log. Average</i>	83.2	73.6	69.9	68.1	60.5	58.2
	<i>Min. Value</i>	80.0	70.4	65.6	59.9	46.3	44.0
	<i>Max. Value</i>	87.7	74.7	71.7	70.9	64.8	62.8
	23:00	81.7	67.7	63.1	52.1	40.7	39.4
Friday 13-Jan-06	00:00	80.1	61.9	59.5	42.3	36.5	35.8
	01:00	78.9	56.5	56.7	37.8	34.8	34.4
	02:00	79.5	55.9	56.8	37.6	35.2	34.8
	03:00	77.5	56.2	56.5	38.5	35.1	34.6
	04:00	75.3	58.9	56.8	40.6	35.7	35.1
	05:00	79.7	66.7	62.4	53.4	41.6	39.2
	06:00	80.6	70.7	66.2	61.7	50.5	47.7
	<i>Arith. Average</i>	79.2	61.8	59.8	45.5	38.8	37.6
	<i>Log. Average</i>	79.5	65.1	61.3	53.8	42.9	40.6
	<i>Min. Value</i>	75.3	55.9	56.5	37.6	34.8	34.4
	<i>Max. Value</i>	81.7	70.7	66.2	61.7	50.5	47.7
	07:00	80.8	73.8	70.3	68.8	61.4	58.8
	08:00	86.7	74.3	71.3	70.4	64.1	62.2
	09:00	87.4	73.7	70.2	68.5	61.0	58.9
	10:00	81.0	73.2	69.4	67.6	60.2	57.7
	11:00	82.9	73.2	69.3	67.2	59.5	57.6
	12:00	80.8	73.6	69.9	68.3	60.7	58.7
	13:00	81.3	73.7	70.1	68.5	60.9	58.9
	14:00	80.2	73.7	70.2	68.7	61.4	59.5
	15:00	81.1	74.3	70.9	69.7	63.0	61.0
	16:00	89.3	74.3	71.2	69.9	63.5	61.2
	17:00	85.9	74.6	71.4	70.5	64.4	62.5
	18:00	82.0	74.0	70.4	68.8	61.1	59.1
	19:00	82.5	73.0	69.1	66.5	57.7	54.7
	20:00	85.3	72.0	67.5	63.1	52.3	49.1

TABLE: B1: LONG-TERM NOISE MONITORING SURVEY RESULTS, THURSDAY 12 JANUARY TO THURSDAY 19 JANUARY 2006

Date of Measurement	Start Time	Measured Noise Levels, dB re. 2×10^{-5} Pa.					
		$L_{Amax,F}$	$L_{A10,1\text{ hr}}$	$L_{Aeq,1\text{ hr}}$	$L_{A50,1\text{ hr}}$	$L_{A90,1\text{ hr}}$	$L_{A95,1\text{ hr}}$
Saturday 14-Jan-06	21:00	83.3	70.5	66.0	61.6	49.1	47.1
	22:00	82.2	69.5	64.9	59.1	47.3	45.6
	<i>Arith. Average</i>	83.3	73.2	69.5	67.3	59.2	57.0
	<i>Log. Average</i>	84.2	73.4	69.8	68.2	61.0	58.9
	<i>Min. Value</i>	80.2	69.5	64.9	59.1	47.3	45.6
	<i>Max. Value</i>	89.3	74.6	71.4	70.5	64.4	62.5
	23:00	79.5	68.5	64.0	56.5	45.5	43.9
	00:00	82.8	65.7	62.2	48.9	40.7	39.8
	01:00	78.9	59.4	58.1	41.4	37.5	37.0
	02:00	77.0	58.8	57.3	39.9	37.3	36.9
	03:00	77.7	56.1	56.5	38.7	36.5	36.1
	04:00	77.5	57.7	56.4	39.2	36.5	36.2
	05:00	77.4	64.4	60.5	47.7	38.4	37.6
	06:00	81.4	67.9	63.3	55.2	41.3	40.0
	<i>Arith. Average</i>	79.0	62.3	59.8	45.9	39.2	38.4
	<i>Log. Average</i>	79.5	64.5	60.7	50.8	40.4	39.3
	<i>Min. Value</i>	77.0	56.1	56.4	38.7	36.5	36.1
	<i>Max. Value</i>	82.8	68.5	64.0	56.5	45.5	43.9
	07:00	79.5	71.2	66.7	62.0	50.8	47.7
	08:00	80.9	72.8	68.8	66.0	56.4	53.3
	09:00	80.9	73.5	69.7	67.8	59.1	56.3
	10:00	80.9	74.3	70.9	69.6	63.4	61.6
	11:00	79.1	74.3	71.1	70.0	64.1	62.4
	12:00	80.0	74.6	71.4	70.5	64.3	62.4
	13:00	82.2	74.8	71.6	70.6	65.1	63.4
	14:00	80.8	74.8	71.6	70.5	64.6	62.5
	15:00	79.8	74.6	71.3	70.2	63.6	61.3
	16:00	87.9	74.4	71.2	69.9	63.5	61.4
	17:00	82.0	74.3	70.7	69.2	62.5	60.3
	18:00	80.6	73.6	69.7	67.4	58.7	55.3
	19:00	81.8	72.9	68.6	65.6	55.5	51.7
	20:00	83.1	71.2	66.4	60.7	48.6	45.0
	21:00	81.1	69.2	64.6	57.7	44.0	42.3
	22:00	84.1	70.0	65.4	58.9	43.3	41.6
	<i>Arith. Average</i>	81.5	73.2	69.4	66.7	58.0	55.5
	<i>Log. Average</i>	82.2	73.5	69.9	68.2	61.5	59.4
	<i>Min. Value</i>	79.1	69.2	64.6	57.7	43.3	41.6
	<i>Max. Value</i>	87.9	74.8	71.6	70.6	65.1	63.4
Sunday 15-Jan-06	23:00	80.8	69.4	64.8	58.1	43.6	41.9
	00:00	80.7	67.2	63.0	52.4	38.8	37.3
	01:00	78.8	62.7	60.0	42.3	35.1	34.5
	02:00	77.8	59.1	58.5	39.5	34.8	34.2
	03:00	78.6	51.7	54.8	35.0	32.5	32.0

TABLE: B1: LONG-TERM NOISE MONITORING SURVEY RESULTS, THURSDAY 12 JANUARY TO THURSDAY 19 JANUARY 2006

Date of Measurement	Start Time	Measured Noise Levels, dB re. 2×10^{-5} Pa.					
		$L_{Amax,F}$	$L_{A10,1\text{ hr}}$	$L_{Aeq,1\text{ hr}}$	$L_{A50,1\text{ hr}}$	$L_{A90,1\text{ hr}}$	$L_{A95,1\text{ hr}}$
Monday 16-Jan-06	04:00	77.2	53.0	55.1	35.3	32.5	32.0
	05:00	78.1	57.7	56.4	37.5	34.1	33.5
	06:00	79.5	64.1	60.3	47.8	36.6	35.4
	Arith. Average	78.9	60.6	59.1	43.5	36.0	35.1
	Log. Average	79.1	64.0	60.4	50.6	37.7	36.4
	Min. Value	77.2	51.7	54.8	35.0	32.5	32.0
	Max. Value	80.8	69.4	64.8	58.1	43.6	41.9
	07:00	79.9	67.1	62.9	52.9	41.6	39.9
	08:00	80.6	68.7	64.1	57.1	44.8	43.1
	09:00	80.5	72.5	68.2	65.2	54.8	51.8
	10:00	79.8	73.6	69.8	67.9	59.6	57.2
	11:00	88.5	74.1	70.7	69.2	61.9	59.4
	12:00	83.6	74.3	71.1	70.0	63.4	61.3
	13:00	83.8	74.1	70.7	69.3	62.3	60.1
	14:00	88.4	73.9	70.4	68.9	60.9	58.6
	15:00	87.0	73.6	69.9	67.8	59.5	57.5
	16:00	81.2	73.4	69.4	66.9	58.1	55.7
	17:00	86.3	72.8	68.6	65.4	55.6	53.3
	18:00	80.9	72.1	67.6	63.9	54.4	52.1
	19:00	79.8	71.3	66.6	61.9	51.9	48.8
	20:00	84.1	70.1	65.4	58.9	47.2	45.5
	21:00	85.1	69.1	64.7	57.2	46.1	44.7
	22:00	78.3	67.3	62.8	54.1	42.8	41.6
	Arith. Average	83.0	71.8	67.7	63.5	54.1	51.9
	Log. Average	84.2	72.3	68.5	66.1	58.1	55.8
	Min. Value	78.3	67.1	62.8	52.9	41.6	39.9
	Max. Value	88.5	74.3	71.1	70.0	63.4	61.3
	23:00	84.3	65.1	61.8	48.9	39.6	38.8
	00:00	79.6	59.2	58.1	39.7	37.0	36.6
	01:00	77.1	53.6	55.2	37.9	36.2	35.9
	02:00	76.6	46.9	53.2	38.0	36.5	36.2
	03:00	76.8	52.7	53.8	38.2	36.6	36.3
	04:00	77.3	58.7	56.4	41.4	37.3	36.8
	05:00	79.0	67.5	63.0	55.7	41.1	39.4
	06:00	81.7	71.2	67.0	64.0	54.7	50.7
	Arith. Average	79.1	59.4	58.6	45.5	39.9	38.8
	Log. Average	79.9	64.8	61.1	55.7	46.3	42.9
	Min. Value	76.6	46.9	53.2	37.9	36.2	35.9
	Max. Value	84.3	71.2	67.0	64.0	54.7	50.7
	07:00	79.2	74.4	71.2	70.3	63.6	61.2
	08:00	79.5	75.2	72.3	71.6	66.4	64.5
	09:00	80.5	74.4	70.9	69.4	62.7	60.4
	10:00	80.7	73.4	69.6	67.7	60.1	57.3

TABLE: B1: LONG-TERM NOISE MONITORING SURVEY RESULTS, THURSDAY 12 JANUARY TO THURSDAY 19 JANUARY 2006

Date of Measurement	Start Time	Measured Noise Levels, dB re. 2×10^{-5} Pa.					
		$L_{Amax,F}$	$L_{A10,1\text{ hr}}$	$L_{Aeq,1\text{ hr}}$	$L_{A50,1\text{ hr}}$	$L_{A90,1\text{ hr}}$	$L_{A95,1\text{ hr}}$
Tuesday 17-Jan-06	11:00	79.6	73.6	70.1	68.6	62.0	59.2
	12:00	86.9	73.7	70.2	68.6	61.7	59.3
	13:00	83.7	73.9	70.4	69.1	61.9	59.4
	14:00	87.1	74.3	70.9	69.5	62.8	60.7
	15:00	80.9	74.5	71.2	69.9	63.7	61.5
	16:00	82.7	75.3	72.3	71.5	65.9	64.0
	17:00	83.2	75.7	72.9	72.2	66.8	64.8
	18:00	82.3	75.2	71.8	70.5	62.5	60.2
	19:00	81.6	74.3	70.2	67.7	57.9	53.9
	20:00	84.3	72.8	68.5	64.5	52.2	48.0
	21:00	79.9	71.4	66.7	61.7	48.0	46.0
	22:00	88.7	70.2	65.6	59.6	46.2	45.0
	Arith.						
	Average	82.6	73.9	70.3	68.3	60.3	57.8
	Log. Average	83.6	74.1	70.7	69.2	62.7	60.5
	Min. Value	79.2	70.2	65.6	59.6	46.2	45.0
	Max. Value	88.7	75.7	72.9	72.2	66.8	64.8
	23:00	78.9	66.7	62.3	53.1	44.9	44.1
	00:00	77.4	61.8	58.8	50.0	46.0	45.3
	01:00	77.4	54.9	55.6	44.9	40.7	40.2
	02:00	78.2	56.0	56.6	39.6	37.4	37.0
	03:00	78.9	56.5	56.9	40.1	37.9	37.5
	04:00	77.6	58.3	57.8	40.3	38.1	37.7
	05:00	79.9	68.8	64.2	55.6	41.1	39.6
	06:00	85.1	72.5	68.3	64.8	52.1	49.1
	Arith.						
	Average	79.2	61.9	60.1	48.6	42.3	41.3
	Log. Average	80.1	66.2	62.4	56.7	45.4	43.4
	Min. Value	77.4	54.9	55.6	39.6	37.4	37.0
	Max. Value	85.1	72.5	68.3	64.8	52.1	49.1
	07:00	81.2	75.4	72.0	70.9	63.3	60.8
	08:00	87.9	75.9	72.9	72.2	66.1	64.5
	09:00	81.9	75.3	71.6	70.1	61.5	58.4
	10:00	80.2	74.7	70.8	69.0	60.1	57.5
	11:00	82.6	74.8	71.1	69.3	61.1	58.7
	12:00	81.0	75.0	71.4	69.7	62.3	60.3
	13:00	83.5	75.2	71.7	70.3	63.4	61.5
	14:00	83.1	75.0	71.4	69.8	62.6	60.1
	15:00	83.0	75.0	71.7	70.5	63.5	61.6
	16:00	84.5	75.4	72.1	71.0	64.2	62.1
	17:00	83.2	75.4	72.4	71.6	65.7	63.2
	18:00	81.0	75.4	72.1	71.0	63.5	61.2
	19:00	82.6	74.2	70.2	67.7	58.3	56.3

TABLE: B1: LONG-TERM NOISE MONITORING SURVEY RESULTS, THURSDAY 12 JANUARY TO THURSDAY 19 JANUARY 2006

Date of Measurement	Start Time	Measured Noise Levels, dB re. 2×10^{-5} Pa.					
		$L_{Amax,F}$	$L_{A10,1\text{ hr}}$	$L_{Aeq,1\text{ hr}}$	$L_{A50,1\text{ hr}}$	$L_{A90,1\text{ hr}}$	$L_{A95,1\text{ hr}}$
Wednesday 18-Jan-06	20:00	82.1	72.9	68.4	64.3	53.7	50.1
	21:00	79.8	72.2	67.5	62.4	51.8	48.7
	22:00	79.0	71.4	66.5	59.5	46.5	44.0
	Arith.						
	Average	82.3	74.6	70.9	68.7	60.5	58.1
	Log. Average	82.8	74.7	71.2	69.6	62.4	60.2
	Min. Value	79.0	71.4	66.5	59.5	46.5	44.0
	Max. Value	87.9	75.9	72.9	72.2	66.1	64.5
	23:00	81.3	67.8	63.4	52.2	40.9	40.1
	00:00	79.7	60.2	59.5	40.4	37.0	36.5
	01:00	77.7	51.3	55.2	37.9	36.3	36.0
	02:00	79.2	51.6	55.8	38.0	36.5	36.2
	03:00	76.6	57.1	57.1	39.4	36.8	36.4
	04:00	77.3	58.2	57.6	39.6	37.2	36.8
	05:00	80.3	69.0	64.4	55.9	42.8	41.0
	06:00	82.2	72.6	68.2	64.5	52.3	48.7
	Arith.						
	Average	79.3	61.0	60.2	46.0	40.0	39.0
	Log. Average	79.7	66.4	62.5	56.3	44.5	41.7
	Min. Value	76.6	51.3	55.2	37.9	36.3	36.0
	Max. Value	82.2	72.6	68.2	64.5	52.3	48.7
	07:00	80.7	75.7	72.6	71.8	65.8	63.9
	08:00	82.8	76.6	73.5	72.7	66.9	64.8
	09:00	81.1	75.4	71.9	70.6	62.5	60.3
	10:00	81.4	74.8	71.0	69.4	60.9	58.2
	11:00	82.9	74.7	71.0	69.4	61.1	59.0
	12:00	84.2	74.8	71.1	69.5	61.4	58.9
	13:00	86.5	74.7	70.9	69.1	60.3	58.0
	14:00	88.3	74.7	71.2	69.6	61.4	59.3
	15:00	83.5	75.1	71.5	70.1	62.6	60.8
	16:00	84.3	75.4	72.2	71.3	64.8	62.8
	17:00	83.5	75.6	72.7	71.9	66.2	64.1
	18:00	91.0	75.2	71.9	70.7	62.7	60.4
	19:00	85.2	74.0	69.8	67.1	57.4	54.8
	20:00	80.9	72.7	68.1	63.1	53.0	50.2
	21:00	79.9	71.7	66.8	60.8	50.2	46.1
	22:00	80.2	71.6	66.7	60.5	48.7	44.0
	Arith.						
	Average	83.5	74.5	70.8	68.6	60.4	57.9
	Log. Average	84.8	74.7	71.2	69.7	62.5	60.4
	Min. Value	79.9	71.6	66.7	60.5	48.7	44.0
	Max. Value	91.0	76.6	73.5	72.7	66.9	64.8
Thursday 19-Jan-06	23:00	80.9	68.8	63.9	53.4	38.6	37.6
	00:00	80.7	62.3	60.8	41.7	37.2	36.7
	01:00	81.7	56.7	57.7	38.0	35.9	35.6
	02:00	79.1	55.7	56.3	37.3	35.4	35.1

TABLE: B1: LONG-TERM NOISE MONITORING SURVEY RESULTS, THURSDAY 12 JANUARY TO THURSDAY 19 JANUARY 2006

Date of Measurement	Start Time	Measured Noise Levels, dB re. 2×10^{-5} Pa.					
		$L_{Amax,F}$	$L_{A10,1\text{ hr}}$	$L_{Aeq,1\text{ hr}}$	$L_{A50,1\text{ hr}}$	$L_{A90,1\text{ hr}}$	$L_{A95,1\text{ hr}}$
	03:00	78.0	53.2	55.3	37.5	35.7	35.3
	04:00	76.7	59.2	57.6	40.7	37.4	36.9
	05:00	83.2	68.0	63.7	54.2	40.8	39.2
	06:00	79.9	72.2	67.7	63.9	52.5	49.4
	<i>Arith. Average</i>	80.0	62.0	60.4	45.8	39.2	38.2
	<i>Log. Average</i>	80.4	66.3	62.4	55.7	44.4	41.8
	<i>Min. Value</i>	76.7	53.2	55.3	37.3	35.4	35.1
	<i>Max. Value</i>	83.2	72.2	67.7	63.9	52.5	49.4
	07:00	80.1	75.2	72.0	71.1	64.0	61.7
	08:00	87.9	76.0	73.0	72.1	65.5	63.2
	09:00	83.2	74.6	71.1	69.8	62.3	59.7
	10:00	77.7	73.9	70.0	68.3	57.1	53.9
	<i>Arith. Average</i>	82.2	74.9	71.5	70.3	62.2	59.6
	<i>Log. Average</i>	83.9	75.0	71.7	70.6	63.2	60.7
	<i>Min. Value</i>	77.7	73.9	70.0	68.3	57.1	53.9
	<i>Max. Value</i>	87.9	76.0	73.0	72.1	65.5	63.2

TABLE: B1: LONG-TERM NOISE MONITORING SURVEY RESULTS, THURSDAY 12 JANUARY TO THURSDAY 19 JANUARY 2006

Rep ID	Property	Façade Orientation	Room	External Road Traffic Noise Level $L_{Aeq,16hr}$	Predicted Internal Noise Level with Windows Partially Open		'Good' Internal Noise Environment (≤ 30 dB(A))	'Reasonable' Internal Noise Environment (31 to ≤ 40 dB(A))	> 40 dB(A)
						dB $L_{Aeq,16hrs}$			
R1	No. 232 to 234 - Front Facade	NW	Kitchen	58		45			✓
R2	No. 230 to 231 - Front Facade	NW	Kitchen / Dining	58		45			✓
R3	No. 227 to 229 - Front Facade	NW	Kitchen / Dining	58		45			✓
R4	No. 225 to 226 - Front Facade	NW	Kitchen / Dining	58		45			✓
R5	No. 224 - Side Facade	SW	Living Room	55		42			✓
R6	No. 223 / 224 - Front Facade	NW	Living Room	58		45			✓
R7	No. 223 - Side Facade	NE	Living Room	55		42			✓
R8	No. 220 to 222 - Rear Facade	SW	Lounge / Dining	53		40		✓	
R9	No. 220 to 222 - Front Facade	NE	Kitchen	57		44			✓
R10	No. 235 to 237 - Rear Facade	SW	Kitchen / Living Room	52		39		✓	
R11	No. 238 to 240 - Rear Facade	SW	Lounge / Dining	52		39		✓	
R12	No. 213 - Front Facade	NW	Kitchen	55		42			✓
R13	No. 214 to 215 - Front Facade	NW	Kitchen	55		42			✓
R14	No. 216 to 217 - Rear Facade	W	Lounge / Dining	54		41			✓
R15	No. 218 to 219 - Rear Facade	W	Lounge / Dining	54		41			✓
R16	No. 211 to 212 - Front Facade	SW	Dining / Kitchen	52		39		✓	
R17	No. 208 to 210 - Front Facade	SW	Dining / Kitchen	52		39		✓	
R18	No. 205 to 207 - Front Facade	SW	Dining / Kitchen	52		39		✓	

TABLE B2: DAYTIME PREDICTED NOISE LEVELS WITH WINDOWS PARTIALLY OPEN

Note: The assessment of internal noise levels only considers habitable rooms (i.e living room and bedrooms). For information noise levels for dining rooms/kitchens are also presented in the table and are shaded grey.

Rep ID	Property	Façade	Room	External Road Traffic Noise Level L _{Aeq, 16hr}	Predicted Internal Noise Level with Windows Partially Open	'Good' Internal Noise Environment (≤ 30 dB(A))	'Reasonable' Internal Noise Environment (31 to ≤ 40 dB(A))	> 40 dB(A)
					dB L _{Aeq, 16hr}			
R19	No. 211 to 212 - Rear Facade	NE	Lounge / Dining	60	47			✓
R20	No. 208 to 210 - Rear Facade	NE	Lounge / Dining	60	47			✓
R21	No. 205 to 207 - Rear Facade	NE	Lounge / Dining	59	46			✓
R22	No. 232 to 234 - Rear Facade	SE	Lounge / Dining	50	37		✓	
R23	No. 230 to 231 - Rear Facade	SE	Lounge / Dining	50	37		✓	
R24	No. 227 to 229 - Rear Facade	SE	Lounge / Dining	50	37		✓	
R25	No. 225 to 226 - Rear Facade	SE	Lounge / Dining	51	38		✓	
R26	House No. 235 to 237 - Front Facade	SE	Kitchen	52	39		✓	
R27	House No. 238 to 240 - Front Facade	SE	Kitchen	53	40		✓	
R28	House No. 213 to 215 - Rear Facade	SE	Lounge	50	37		✓	
R29	House No. 216 to 219 - Rear Facade	SE	Kitchen / Living Room	55	42			✓

TABLE B2(CTD): DAYTIME PREDICTED NOISE LEVELS WITH WINDOWS PARTIALLY OPEN

Note: The assessment of internal noise levels only considers habitable rooms (i.e living room and bedrooms). For information noise levels for dining rooms/kitchens are also presented in the table and are shaded grey.

Rep ID	Property	Façade	Room	External Road Traffic Noise Level $L_{Aeq, 16hr}$	Predicted Internal Noise Level with Windows Closed		'Good' Internal Noise Environment (≤ 30 dB(A))	'Reasonable' Internal Noise Environment (31 to ≤ 40 dB(A))	> 40 dB(A)
					dB $L_{Aeq, 16hr}$				
R1	No. 232 to 234 - Front Facade	NW	Kitchen	58	25		✓		
R2	No. 230 to 231 - Front Facade	NW	Kitchen- / Dining	58	25		✓		
R3	No. 227 to 229 - Front Facade	NW	Kitchen / Dining	58	25		✓		
R4	No. 225 to 226 - Front Facade	NW	Kitchen / Dining	58	25		✓		
R5	No. 224 - Side Facade	SW	Living Room	55	22		✓		
R6	No. 223 / 224 - Front Facade	NW	Living Room	58	25		✓		
R7	No. 223 - Side Facade	NE	Living Room	55	22		✓		
R8	No. 220 to 222 - Rear Facade	SW	Lounge / Dining	53	20		✓		
R9	No. 220 to 222 - Front Facade	NE	Kitchen	57	24		✓		
R10	No. 235 to 237 - Rear Facade	SW	Kitchen / Living Room	52	19		✓		
R11	No. 238 to 240 - Rear Facade	SW	Lounge / Dining	52	19		✓		
R12	No. 213 - Front Facade	NW	Kitchen	55	22		✓		
R13	No. 214 to 215 - Front Facade	NW	Kitchen	55	22		✓		
R14	No. 216 to 217 - Rear Facade	W	Lounge / Dining	54	21		✓		
R15	No. 218 to 219 - Rear Facade	W	Lounge / Dining	54	21		✓		
R16	No. 211 to 212 - Front Facade	SW	Dining / Kitchen	52	19		✓		
R17	No. 208 to 210 - Front Facade	SW	Dining / Kitchen	52	19		✓		
R18	No. 205 to 207 - Front Facade	SW	Dining / Kitchen	52	19		✓		

TABLE B3: DAYTIME PREDICTED NOISE LEVELS WITH WINDOWS CLOSED

Note: The assessment of internal noise levels only considers habitable rooms (i.e living room and bedrooms). For information noise levels for dining rooms/kitchens are also presented in the table and are shaded grey.

Rep ID	Property	Façade	Room	External Road Traffic Noise Level L _{Aeq,16hr}	Predicted Internal Noise Level with Windows Closed	'Good' Internal Noise Environment (≤ 30 dB(A))	'Reasonable' Internal Noise Environment (31 to ≤ 40 dB(A))	> 40 dB(A)
					dB L _{Aeq,16hr}			
R19	No. 211 to 212 - Rear Facade	NE	Lounge / Dining	60	27	✓		
R20	No. 208 to 210 - Rear Facade	NE	Lounge / Dining	60	27	✓		
R21	No. 205 to 207 - Rear Facade	NE	Lounge / Dining	59	26	✓		
R22	No. 232 to 234 - Rear Facade	SE	Lounge / Dining	50	17	✓		
R23	No. 230 to 231 - Rear Facade	SE	Lounge / Dining	50	17	✓		
R24	No. 227 to 229 - Rear Facade	SE	Lounge / Dining	50	17	✓		
R25	No. 225 to 226 - Rear Facade	SE	Lounge / Dining	51	18	✓		
R26	House No. 235 to 237 - Front Facade	NE	Kitchen	52	19	✓		
R27	House No. 238 to 240 - Front Facade	NE	Kitchen	53	20	✓		
R28	House No. 213 to 215 - Rear Facade	SE	Lounge	50	17	✓		
R29	House No. 216 to 219 - Rear Facade	E	Kitchen / Living Room	55	22	✓		

TABLE B3(CTD): DAYTIME PREDICTED NOISE LEVELS WITH WINDOWS CLOSED

Note: The assessment of internal noise levels only considers habitable rooms (i.e living room and bedrooms). For information noise levels for dining rooms/kitchens are also presented in the table and are shaded grey.

Rep ID	Property	Façade	External Road Traffic Noise Level L _{Aeq} , 16hr	Predicted Internal Noise Level with Windows Partially Open		'Good' Internal Noise Environment (≤ 30 dB(A))	'Reasonable' Internal Noise Environment (31 to ≤ 35 dB(A))	> 35 dB(A)
					dB L _{Aeq} ,8hr			
R1	No. 232 to 234 - Front Facade	NW	54	41				✓
R2	No. 230 to 231 - Front Facade	NW	53	40				✓
R3	No. 227 to 229 - Front Facade	NW	53	40				✓
R4	No. 225 to 226 - Front Facade	NW	52	39				✓
R5	No. 224 - Side Facade	SW	49	36				✓
R6	No. 223 / 224 - Front Facade	NW	52	39				✓
R7	No. 223 - Side Facade	NE	50	37			✓	✓
R8	No. 220 to 222 - Rear Facade	SW	47	34				
R9	No. 220 to 222 - Front Facade	NE	52	39				✓
R10	No. 235 to 237 - Rear Facade	SW	46	33			✓	
R11	No. 238 to 240 - Rear Facade	SW	45	32			✓	
R12	No. 213 - Front Facade	NW	49	36				✓
R13	No. 214 to 215 - Front Facade	NW	49	36				✓
R14	No. 216 to 217 - Rear Facade	W	48	35			✓	
R15	No. 218 to 219 - Rear Facade	W	48	35			✓	
R16	No. 211 to 212 - Front Facade	SW	46	33			✓	
R17	No. 208 to 210 - Front Facade	SW	45	32			✓	
R18	No. 205 to 207 - Front Facade	SW	45	32			✓	

TABLE B4: NIGHT-TIME PREDICTED NOISE LEVELS WITH WINDOWS PARTIALLY OPEN

Rep ID	Property	Façade	External Road Traffic Noise Level $L_{Aeq, 16hr}$	Predicted Internal Noise Level with Windows Partially Open		'Good' Internal Noise Environment (≤ 30 dB(A))	'Reasonable' Internal Noise Environment (31 to ≤ 35 dB(A))	> 35 dB(A)
				dB $L_{Aeq, 8hr}$				
R19	No. 211 to 212 - Rear Facade	NE	56	43				✓
R20	No. 208 to 210 - Rear Facade	NE	56	43				✓
R21	No. 205 to 207 - Rear Facade	NE	54	41				✓
R22	No. 232 to 234 - Rear Facade	SE	44	31			✓	
R23	No. 230 to 231 - Rear Facade	SE	44	31			✓	
R24	No. 227 to 229 - Rear Facade	SE	44	31			✓	
R25	No. 225 to 226 - Rear Facade	SE	45	32			✓	
R26	House No. 235 to 237 - Front Facade	NE	46	33			✓	
R27	House No. 238 to 240 - Front Facade	NE	46	33			✓	
R28	House No. 213 to 215 - Rear Facade	SE	44	31			✓	
R29	House No. 216 to 219 - Rear Facade	E	49	36				✓

TABLE B4(CTD): NIGHT-TIME PREDICTED NOISE LEVELS WITH WINDOWS PARTIALLY OPEN

Rep ID	Property	Façade	External Road Traffic Noise Level L _{Aeq} , 16hr	Predicted Internal Noise Level with Windows Closed	'Good' Internal Noise Environment (≤ 30 dB(A))	'Reasonable' Internal Noise Environment (31 to ≤ 35 dB(A))	> 35 dB(A)
				dB L _{Aeq} ,8hr			
R1	No. 232 to 234 - Front Façade	NW	54	21	✓		
R2	No. 230 to 231 - Front Façade	NW	53	20	✓		
R3	No. 227 to 229 - Front Façade	NW	53	20	✓		
R4	No. 225 to 226 - Front Façade	NW	52	19	✓		
R5	No. 224 - Side Façade	SW	49	16	✓		
R6	No. 223 / 224 - Front Façade	NW	52	19	✓		
R7	No. 223 - Side Façade	NE	50	17	✓		
R8	No. 220 to 222 - Rear Façade	SW	47	14	✓		
R9	No. 220 to 222 - Front Façade	NE	52	19	✓		
R10	No. 235 to 237 - Rear Façade	SW	46	13	✓		
R11	No. 238 to 240 - Rear Façade	SW	45	12	✓		
R12	No. 213 - Front Façade	NW	49	16	✓		
R13	No. 214 to 215 - Front Façade	NW	49	16	✓		
R14	No. 216 to 217 - Rear Façade	W	48	15	✓		
R15	No. 218 to 219 - Rear Façade	W	48	15	✓		
R16	No. 211 to 212 - Front Façade	SW	46	13	✓		
R17	No. 208 to 210 - Front Façade	SW	45	12	✓		
R18	No. 205 to 207 - Front Façade	SW	45	12	✓		

TABLE B5: NIGHT-TIME PREDICTED NOISE LEVELS WITH WINDOWS CLOSED

Rep ID	Property	Façade	External Road Traffic Noise Level L _{Aeq, 16hr}	Predicted Internal Noise Level with Windows Closed	'Good' Internal Noise Environment (≤ 30 dB(A))	'Reasonable' Internal Noise Environment (31 to ≤ 35 dB(A))	> 35 dB(A)
				dB L _{Aeq, 8hr}			
R19	No. 211 to 212 - Rear Facade	NE	56	23	✓		
R20	No. 208 to 210 - Rear Facade	NE	56	23	✓		
R21	No. 205 to 207 - Rear Facade	NE	54	21	✓		
R22	No. 232 to 234 - Rear Facade	SE	44	11	✓		
R23	No. 230 to 231 - Rear Facade	SE	44	11	✓		
R24	No. 227 to 229 - Rear Facade	SE	44	11	✓		
R25	No. 225 to 226 - Rear Facade	SE	45	12	✓		
R26	House No. 235 to 237 - Front Facade	NE	46	13	✓		
R27	House No. 238 to 240 - Front Facade	NE	46	13	✓		
R28	House No. 213 to 215 - Rear Facade	SE	44	11	✓		
R29	House No. 216 to 219 - Rear Facade	E	49	16	✓		

TABLE B5(CTD): NIGHT-TIME PREDICTED NOISE LEVELS WITH WINDOWS CLOSED