SPIRE ENVIRONMENTAL

NOISE, VIBRATION AND AIR QUALITY CONSULTANTS

Conversion of workshop/store to 3 apartments

Rear of Market Place, Slaithwaite, Huddersfield

Application Number 2013/62/92051/W

Noise Assessment

Date: 2nd February 2015

Report Number: R14.1059-4-AG

Spire Environmental Consultants Limited
Raines House
Denby Dale Road
Wakefield
WF1 1HR

Telephone 01246 766909

E-mail: info@spireenvironmental.co.uk

Web: www.spireenvironmental.co.uk

Contents

Figure

Appendix

1.0 Introduction

1.1 Following the submission of a noise assessment to Kirklees Council for a proposed change of use of former workshop/store to 3 apartments at the rear of Market Place, Slaithwaite, Huddersfield, this a revised report which includes an updated BS 4142:2014 assessment and incorporates an assessment using Noise Rating (NR) curves.

2.0 Site Description

2.1 Introduction

2.1.1 The former workshop/store building is located to the rear of Market Place, Slaithwaite, Huddersfield.

2.1.2 To the North of the building is the rear wall which is built into the banking. To the East and South of the building are existing retail shops with apartments above. To the South West of the building is the existing cobbled access road, leading onto Church Street and the Shoulder of Mutton public house.

2.2 Proposed Development

2.2.1 The existing building will be retained and converted into 3 apartments. Glazed/boarded entrances will be incorporated into the existing large door openings of the original workshop. Timber framed windows will be installed providing ventilation.

3.0 Noise Criteria

3.1 Introduction

3.1.1 The ambient environmental noise at any location will vary according to the activities in progress around that location. In the vicinity of a busy motorway, for example, the noise level will remain fairly constant due to the relatively steady noise input from road traffic, whereas the noise level close to a source of high noise over short periods, such as an airport, will vary over a much wider range. It is therefore necessary to consider how to quantify the existing noise levels in an area in order to accurately assess the acceptability of the introduction of a new noise source.

3.1.2 The background noise level, defined as the L_{A90} parameter, represents the noise level exceeded for 90% of a measurement period. It generally represents the lower noise levels between noise events and tends to ignore the effects of short term higher noise level events.

3.1.3 The L_{A10} represents the noise level exceeded for 10% of the measurement period and is commonly used to describe and quantify noise from road traffic.

3.1.4 The equivalent continuous sound pressure level, or L_{Aeq} parameter, is a measure of the average sound energy over a given measurement period or time period. It will include noise from all contributing sources. Unless the noise level at the receiving point is perfectly steady for the duration of the measurement period, the L_{Aeq} will always be higher than the L_{A90}.

3.2 BS 4142:2014 Methods for rating and assessing industrial and commercial sound

3.2.1 The guidance set out within BS 4142 is related to the likelihood of complaints from local residents in response to noise resulting from either the introduction of a new industrial or commercial facility or the operation/alteration of an existing one.

3.2.2 The likelihood of compliant is assessed by direct comparison of the rating level of the source (the specific noise level of the source, adjusted for individual characteristics of the noise, if necessary), to the existing background noise level measured in its absence.

3.2.3 The following subjective assessment for the application of a rating penalty is given below:

Tonality

For sound ranging from not tonal to prominently tonal the Joint Nordic Method gives a correction of between 0 dB and +6 dB for tonality. Subjectively, this can be converted to a penalty of 2 dB for a tone which is just perceptible at the noise receptor, 4 dB where it is clearly perceptible and 6 dB where it is highly perceptible.

Impulsivity

A correction of up to +9dB can be applied for sound that is highly impulsive, considering both the rapidity of the change in sound level and the overall change in sound level. Subjectively, this can be converted to a penalty of 3 dB for impulsivity which is just perceptible at the noise receptor, 6 dB where it is clearly perceptible and 9 dB where it is highly perceptible.

Intermittency

When the specific sound has identifiable on/off conditions, the specific sound level ought to be representative of the time period of length equal to the reference time interval which contains the greatest amount of on time. This can necessitate measuring the specific sound over a number of shorter sampling periods that are in combination less than the reference time interval in total, and then calculating the specific sound level for the reference time interval allowing for time when the specific sound is not present. If the intermittency is readily distinctive against the residual acoustic environment, a penalty of 3 dB can be applied.

3.2.4 The comparison can be undertaken by the use of either direct measurement on site of both background and specific noise levels, or where this is not possible due to practical reasons; the expected rating level can be calculated and then compared with the measured background noise level.

3.2.5 In order to obtain the significance of the sound of an industrial or commercial nature, the measured background level should be subtracted from the rating level and then the following should be considered.

a) Typically, the greater this difference, the greater the magnitude of the impact

b) A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context.

c) A difference of around +5dB is likely to be an indication of an adverse impact, depending on the context.

3.3 Noise Rating Curves

3.3.1 The noise rating or NR curves were developed by the International Organisation for Standardisation (ISO) to determine the acceptable indoor environment for hearing preservation, speech communication and annoyance. Some examples of NR values and their applications are shown in Table 1 below:

Noise rating curve	Application
NR 20	Sound broadcast and recording studio
NR 25	Concert halls, churches
NR 30	Private dwellings, hospitals, theatres, cinemas, conference rooms
NR 35	Libraries, museums, court rooms, schools, hospitals, operating theatres and wards, flats, hotels, executive offices
NR 40	Halls, corridors, cloakrooms, restaurants, night clubs, offices, shops
NR 45	Department stores, supermarkets, canteens, general offices
NR 50	Typing pools, offices with business machines
NR 60	Light engineering works
NR 70	Foundries, heavy engineering works

Table 1 **Noise rating curves and their applications**

3.3.2 In order to achieve the specified NR levels in the table above, the octave band values must be below the specified NR values in the table below:

NR Level	Frequency								
	31.5 Hz	63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz
NR 20	69	51	39	31	24	20	17	14	13
NR 25	72	55	44	35	29	25	22	20	18
NR 30	76	59	48	40	34	30	27	20	18
NR 35	79	63	52	45	39	35	32	30	28
NR 40	83	67	57	49	44	40	37	35	33
NR 45	86	71	61	54	48	45	42	40	38
NR 50	89	75	65	59	53	50	47	45	43
NR 60	96	83	74	68	63	60	57	55	54
NR 70	103	91	83	77	73	70	68	66	64

Table 2 **Noise rating curve centre band frequencies**

3.4 Background Ventilation

3.4.1 An appropriate level of background ventilation will be determined by calculating the equivalent area of ventilation required in accordance with Approved Document F.

Total floor area (m^2)	Total equivalent ventilator area (mm^2)				
	Number of bedrooms				
	1	2	3	4	5
<50	35000	40000	50000	60000	65000
51 – 60	35000	40000	50000	60000	65000
61 – 70	45000	45000	50000	60000	65000
71 – 80	50000	50000	50000	60000	65000
81 – 90	55000	60000	60000	60000	65000
91 – 100	65000	65000	65000	65000	65000
>100	Add 700 mm^2 for every additional 10 m^2 floor area				

Table 3 **Total equivalent ventilator areas**

4.0 Noise Assessment

4.1 Measured Noise Levels

4.1.1 The current noise levels were measured during the daytime period (0700 – 2300 hours) at the front façade of the workshop/store building on Friday 25th July 2014. The survey position is shown in Figure 1.

4.1.2 The noise measurements were undertaken using a Cirrus 1710 Type 1 sound level meter (serial number G061905). The sound level meter was calibrated with a Cirrus CR 515 calibrator (serial number 64316) at the start and end of the survey period. There was no variation in the calibration level.

4.1.3 During the survey period, the wind speed was between 1 and 3m/s, from the South West with a cloud cover between 0 and 30%. The maximum temperature was 25°C.

4.1.4 The results obtained during the survey period are summarised in Table 2 below and presented in full in Appendix A1. Given the intermittent nature of the operation of the take-away extraction unit, the noise data has been presented in 15 minute periods. The façade levels have been corrected by subtracting 3 dB from each measured parameter.

Table 4 Existing measured daytime noise levels (over 16 hour period)

Survey Date	Façade corrected noise levels			
	dB $L_{Aeq,16h}$	dB $L_{A10,16h}$	dB $L_{A90,16h}$	dB $L_{Amax,f}$
Friday 25th July 2014	51	52	45	*77

* Maximum obtained during the survey period

4.2 Noise Sources

4.2.1 The workshop/store is located to the rear of an existing two storey building. This building contains a laundrette, Chinese take away and convenience store on the ground floor with residential accommodation on the first floor.

4.2.2 During the survey period the noise climate was dominated by noise from an extraction unit located to the rear of the Chinese take away building which is opposite the workshop/store building. However, the extraction unit is only used intermittently whilst food preparation is taking place. The Chinese take away is only open during the evening period between 1700 and 2300 hours.

4.2.3 The noise climate was influenced by local vehicle movements around the Market Place, trees rustling and noise emanating from customers of the Shoulder of Mutton public house which is located at the end of the cobbled access road to the South West of the workshop/store. The noise survey was conducted on a Friday evening and as such there were a number of people outside the pub during the survey period.

4.2.4 Additional faintly audible noise sources during the survey period included the operation of washing machines and dryers at the laundrette only when the rear door of the premises was open intermittently during the survey period, and mobile plant movements during the construction of a new supermarket on Brittania Road to the South of the workshop/store building.

4.3 Octave Band Noise Levels

4.3.1 Octave band noise levels were measured outside the workshop/stores building during the operation of the extraction fan on Monday 26th January 2015. The survey position is shown in Figure 1.

4.3.2 The noise measurements were undertaken using a Cirrus 171B Type 1 sound level meter (serial number G061742). The sound level meter was calibrated with a Cirrus CR 515 calibrator (serial number 64316) at the start and end of the survey period. There was no variation in the calibration level.

4.3.3 During the survey period, there were near calm conditions and a maximum temperature of 5°C.

5.0 BS 4142 Assessment

5.1 Introduction

5.1.1 A noise assessment of the take-away extraction unit in accordance with BS 4142:2014 has been conducted. The extraction unit is only operational whilst the cooking of meals is taking place. The take-away is only open between 1700 and 2300 hours, therefore the assessment has considered this period only.

5.1.2 The likelihood of compliant is assessed by direct comparison of the rating level of the noise source (the specific noise level of the source, adjusted for individual characteristics), to the existing background noise level measured in its absence.

5.1.3 A BS 4142 assessment has been conducted for each hour of the operational period (1700 – 2300 hours) at the location of the proposed conversion. In order to ensure the assessment is robust, this assessment has been conducted on the lowest representative 15 minute background noise levels obtained for each hourly period.

5.2 Specific Noise Level

5.2.1 The specific noise level of the extraction unit was calculated during the operational period. The lowest ambient noise level obtained during the survey period was 45.3 $L_{Aeq,15m}$ which was measured between 2245 and 2300 when the fan was not operating. Prior to this period between 2230 and 2245, the fan was operating and the measured ambient noise level was 50.6 $L_{Aeq,15m.}$

5.2.2 The specific noise level of the fan has therefore been calculated by the logarithmic subtraction of the measured ambient noise level with the fan operating from the measured ambient noise level without the fan operating (51 – 45). The specific noise level of the fan is therefore 50 $L_{Aeq,15m.}$

5.3 Character Correction/Rating Penalty

5.3.1 Given the intermittent nature of its operation, the take-away extraction unit may be readily distinguishable above the existing background noise level. Therefore in order to present a worst-case scenario, the + 3dB character correction for intermittency has been added to the specific noise level of the extraction unit.

5.4 Rating Level

5.4.1 The rating level is the specific noise level with the addition of the character correction/rating penalty. A +3 dB character correction has been applied for intermittency, therefore the rating level of the extraction unit is (50 + 3) = 53 dB(A).

5.5 Excess of rating level over background level

5.5.1 In order to determine the outcome of the BS 4142:2014 assessment, the rating level has been subtracted from the measured background level during the operation period of the extraction unit (1700 – 2300).

5.5.2 During the operational period of the extraction unit, the BS 4142:2014 has shown the operation of the extraction unit will have an adverse or significant adverse impact.

Table 5 BS 4142:2014 assessment of extraction unit

Time Period (hours)	Specific noise level $L_{Aeq,15m}$	Character correction/rating penalty	Rating Level $L_{Aeq,1h}$	Background noise level $L_{A90,15m}$	Excess of rating level over background level
1700 – 1800	50	+ 3	53	44	+ 9
1800 – 1900	50	+ 3	53	46	+ 7
1900 – 2000	50	+ 3	53	44	+ 9
2000 – 2100	50	+ 3	53	44	+ 9
2100 – 2200	50	+ 3	53	42	+ 11
2200 – 2300	50	+ 3	53	43	+ 10

6.0 Acoustic Ventilation

6.1 Introduction

6.1.1 In order to provide an acceptable internal noise level, the existing windows will need to be closed, therefore background ventilation will be required. The Equivalent Area (EA) of a ventilator is based on the total floor area of a dwelling and the number of bedrooms. For each of the proposed apartments, the total floor area for each apartment is detailed below:

Table 6 **Apartment 1 floor area**

Floor Level Apartment 1	Room	Floor area (m^2)
Ground Floor	Living	13.0
Ground Floor	Kitchen/dining	11.4
First Floor	Bedroom	13.0
First Floor	Bathroom/landing	11.4
Total floor area (m^2)		**48.8**

Table 7 **Apartment 2 floor area**

Floor Level Apartment 2	Room	Floor area (m^2)
Ground Floor	Kitchen/living/hall/bath	28.3
First Floor	Bedroom 1	14.4
First Floor	Bedroom 2	9.3
Total floor area (m^2)		**52.0**

Table 8 **Apartment 3 floor area**

Floor Level Apartment 3	Room	Floor area (m^2)
Ground Floor	Kitchen/living	23.8
First Floor	Bedroom/bathroom	23.8
Total floor area (m^2)		**47.6**

6.2 Ventilation Calculations

6.2.1 The correct number of background ventilators in each apartment can be calculated according to the specifications detailed in Approved Document F.

6.2.2 In apartment 1, the total floor area is less than 50 m^2, and there is one bedroom, with the addition of 10000 mm^2, the total equivalent area for apartment 1 is 45,000 mm^2.

6.2.3 In apartment 2, the total floor area is between 51 and 60 m^2, and there are two bedrooms, with the addition of 10000 mm^2, the total equivalent area for apartment 1 is 50,000 (mm^2)

6.2.4 In apartment 3, the total floor area is below 50 m^2, with one bedroom, with the addition of 10000 mm^2, the total equivalent area for apartment 3 is 45,000 mm^2.

6.2.5 According to Approved Document F (Ventilation) 2010 the minimum ventilation requirements are for at least 5,000 mm^2 equivalent area for a habitable room (kitchen, lounge bedroom) and at least 2,500 mm^2 equivalent area for a non-habitable room (bathroom, corridor, stairwell, service rooms).

7.0 Internal Noise Levels

7.1 Introduction

7.1.1 In order to provide a suitable internal noise level inside the apartments during the operation of the extraction unit, the glazing and acoustic ventilation units have been assessed against Noise Rating (NR) curves (below).

7.2 Glazing Acoustic Specification

7.2.1 The octave band measured noise levels obtained during the operation of the extraction fan are shown in Table 9 (below).

Table 9 Extraction fan measured noise levels

	Frequency								
	31.5 Hz	63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz
Fan Operating	63	60	57	51	47	45	40	30	22
NR 25 Criteria	72	55	44	35	29	25	22	20	18
Difference	- 9	+ 5	+ 13	+ 16	+ 18	+ 20	+ 18	+ 10	+ 4

7.2.2 The calculated NR during the operation of the extraction unit is 47. In order to comply with Kirklees Noise Design Advice, the NR values in bedrooms (2300 – 0700) should be 25 and NR 30 in all habitable rooms.

Table 10 Glazing attenuation values

Glazing type	Frequency				
	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz
4mm single glazing	20	22	28	32	33
6mm single glazing	20	24	31	35	27
10mm single glazing	26	27	34	35	36
4/12/4 double glazing	24	20	25	34	37
6/12/6 double glazing	20	19	29	38	34

7.2.3 Table 9 above shows the measured noise external noise level during the operation of the extraction fan along with the octave band values required in order to achieve an internal noise level in accordance with NR 25. The relevant attenuation required in order to achieve these values are also shown.

7.2.4 The attenuation provided by different types of glazing is shown in Table 10 (above). The attenuation provided by standard 4mm glazing will meet the NR 25 criteria.

7.3 Ventilation Acoustic Specification

7.3.1 In order to meet NR 25 with the windows closed, suitable acoustic ventilation will need to be provided. A number of different types are shown in Table 11 (below).

Table 11 **Ventilation attenuation values**

Ventilation type	Frequency				
	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz
Through wall attenuated air vent (indicative minimum)	18	19	22	28	32
Trickle vent with indirect air path	30	31	31	32	28
Hit and miss trickle	34	27	37	35	34
Acoustic trickle vent	30	33	38	37	36

7.3.2 With reference to Table 11 (above), the attenuation provided by through wall attenuated air vents (indicative minimum) will provide sufficient attenuation to meet the NR 25 criteria.

8.0 Conclusions

8.1 A BS 4142:2014 assessment has been conducted during the operation of an air extraction unit operating in the courtyard, opposite the proposed conversion of a workshop/store into 3 apartments.

8.2 The BS 4142:2014 assessment has indicated the predicted noise level during its normal operating period (1700 – 2300), will have an adverse or significant adverse impact, as the predicted noise levels are between 7 and 11 dB(A) above the measured background level. These predicted levels are also above the criteria in Kirklees Noise Design advice of 5 dB below the existing background noise level.

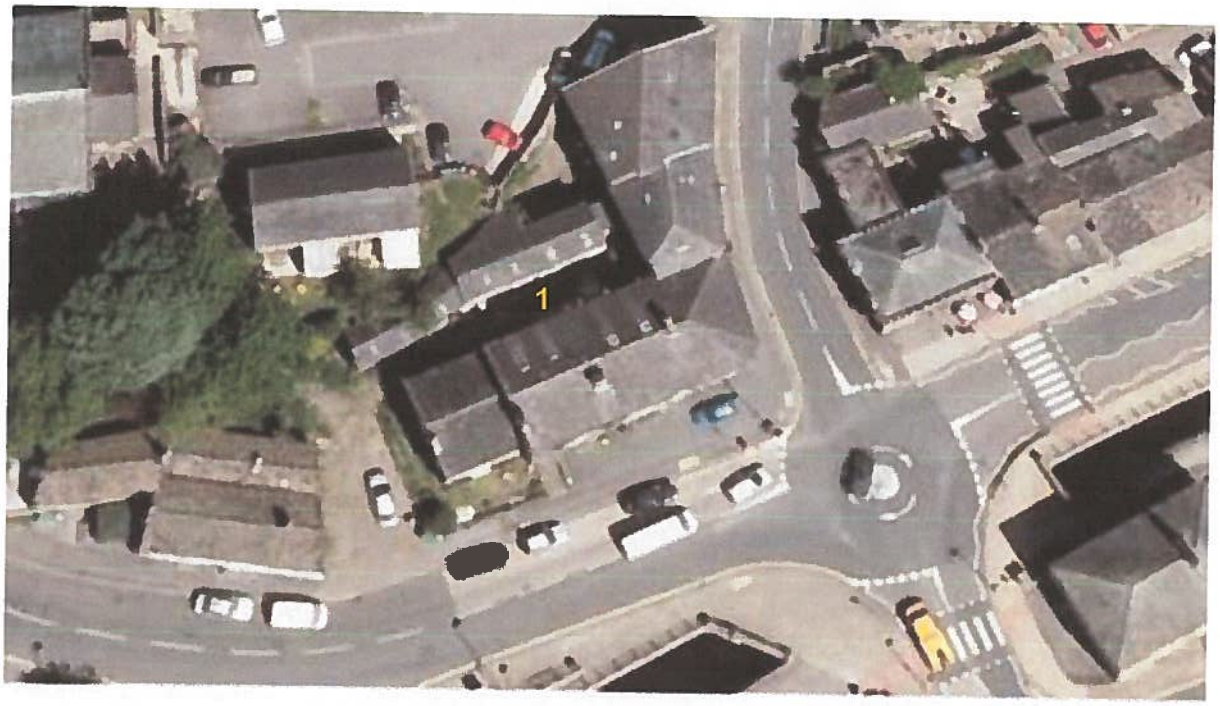
8.3 In order to achieve acceptable internal noise levels inside the apartments during the operation of the extraction fan, the internal noise levels will need to meet NR 25. This can be achieved through the use of standard 4mm single glazing and the provision of a through wall attenuated air vent in habitable rooms.

8.4 The ventilation provided will need to provide at least 5,000 mm^2 for each habitable room and 2,500 mm^2 for non-habitable rooms. The total equivalent area of ventilation required for each one bedroom apartment is 45,000 mm^2 and 50,000 mm^2 for the two bedroom apartment.

9.0 References

1. BS 4142:2014 Methods for rating and assessing industrial and commercial sound.
2. Approved Document E Resistance to the Passage of Sound Regulations 2010.
3. Approved Document F Means of Ventilation. 2010.
4. Noise Design Advice. Kirklees Council. May 2007.

Figure 1 – Noise Monitoring Location



Key

1. Workshop/store front façade

Appendix A – Noise Survey Results

Appendix A1

Friday 25th July 2014

Monitoring Period	Statistical Parameters (dB)			
	L_{Aeq}	L_{A10}	L_{A90}	L_{Amaxf}
0700 – 0715	44.9	48.0	38.0	63.0
0715 – 0730	44.8	47.9	39.3	56.9
0730 – 0745	45.5	48.5	39.9	56.7
0745 – 0800	47.6	50.2	43.0	58.0
Over 1 hour period	**46**	**49**	**40**	***63**
0800 – 0815	49.3	51.2	44.4	63.1
0815 – 0830	48.0	50.5	42.9	57.9
0830 – 0845	50.0	52.2	45.3	61.1
0845 – 0900	51.0	52.9	46.5	63.7
Over 1 hour period	**50**	**52**	**45**	***64**
0900 – 0915	49.5	51.5	44.8	62.1
0915 – 0930	48.8	51.0	44.3	64.3
0930 – 0945	47.4	49.7	42.7	61.0
0945 – 1000	48.1	50.5	44.1	56.6
Over 1 hour period	**49**	**51**	**44**	***64**
1000 – 1015	49.9	51.3	45.1	68.1
1015 – 1030	48.4	50.5	42.9	65.8
1030 – 1045	47.5	49.6	43.5	59.2
1045 – 1100	47.1	50.1	42.4	59.7
Over 1 hour period	**48**	**50**	**44**	***68**
1100 – 1115	49.3	52.6	42.9	58.9
1115 – 1130	46.8	49.6	41.1	59.6
1130 – 1145	46.3	48.6	41.8	59.4
1145 – 1200	50.5	54.1	45.4	64.9
Over 1 hour period	**49**	**51**	**43**	***65**

*Maximum obtained during survey period

Appendix A2 (Continued)

Monitoring Period	Statistical Parameters (dB)			
	L_{Aeq}	L_{A10}	L_{A90}	L_{Amaxf}
1200 – 1215	48.9	52.8	41.9	62.5
1215 – 1230	48.0	53.0	41.6	57.6
1230 – 1245	47.0	48.4	40.5	64.7
1245 – 1300	45.2	46.6	40.3	64.7
Over 1 hour period	**48**	**50**	**41**	***65**
1300 – 1315	51.3	53.4	45.8	59.4
1315 – 1330	51.3	52.5	50.0	59.0
1330 – 1345	51.4	52.1	50.1	60.4
1345 – 1400	51.7	52.5	50.7	59.6
Over 1 hour period	**51**	**53**	**49**	***60**
1400 – 1415	51.9	53.1	50.7	57.3
1415 – 1430	49.6	51.3	46.1	60.9
1430 – 1445	49.4	51.8	45.7	57.1
1445 – 1500	51.9	52.7	49.8	62.4
Over 1 hour period	**51**	**52**	**48**	***62**
1500 – 1515	50.4	53.1	43.6	62.0
1515 – 1530	50.6	51.7	44.8	62.0
1530 – 1545	48.4	51.0	43.7	60.6
1545 – 1600	51.3	53.1	45.4	61.6
Over 1 hour period	**50**	**52**	**44**	***62**
1600 – 1615	51.1	52.6	45.4	59.0
1615 – 1630	51.3	52.3	45.2	59.7
1630 – 1645	48.8	49.9	43.8	69.1
1645 – 1700	52.9	51.7	44.8	76.9
Over 1 hour period	**51**	**52**	**45**	***77**

*Maximum obtained during survey period

Appendix A1 (Continued)

Monitoring Period	Statistical Parameters (dB)			
	L_{Aeq}	L_{A10}	L_{A90}	L_{Amaxf}
1700 – 1715	51.0	52.3	47.1	60.6
1715 – 1730	51.3	52.9	46.3	62.4
1730 – 1745	51.5	53.2	45.0	62.8
1745 – 1800	53.1	56.6	44.2	61.6
Over 1 hour period	**52**	**54**	**46**	***63**
1800 – 1815	51.5	52.5	47.4	69.0
1815 – 1830	53.4	56.3	49.7	59.0
1830 – 1845	55.7	55.4	49.0	72.5
1845 – 1900	57.7	62.5	46.3	70.5
Over 1 hour period	**55**	**57**	**48**	***73**
1900 – 1915	53.8	57.9	49.7	65.1
1915 – 1930	55.9	60.1	49.4	69.4
1930 – 1945	51.7	54.7	44.3	61.9
1945 – 2000	50.0	51.3	45.5	57.0
Over 1 hour period	**53**	**56**	**47**	***69**
2000 – 2015	50.6	51.6	49.3	64.2
2015 – 2030	52.0	52.1	49.6	67.4
2030 – 2045	50.3	51.9	44.1	65.0
2045 – 2100	49.4	50.7	44.0	56.8
Over 1 hour period	**51**	**52**	**47**	***67**
2100 – 2115	50.7	51.3	49.6	58.6
2115 – 2130	51.3	52.1	49.1	67.9
2130 – 2145	47.5	51.1	42.2	56.6
2145 – 2200	46.2	48.4	42.5	59.3
Over 1 hour period	**49**	**51**	**46**	***68**

*Maximum obtained during survey period

Appendix A1 (Continued)

Monitoring Period	Statistical Parameters (dB)			
	L_{Aeq}	L_{A10}	L_{A90}	L_{Amaxf}
2200 – 2215	48.8	52.0	43.3	57.6
2215 – 2230	49.7	51.8	43.2	57.2
2230 – 2245	50.6	51.4	43.7	58.1
2245 – 2300	45.3	51.0	35.4	62.0
Over 1 hour period	**49**	**52**	**41**	***62**
Over 16 hour period	**51**	**52**	**45**	***77**

*Maximum obtained during survey period