6 Coopers Villas

Parsonage Road, Takeley, Bishop's Stortford.

Noise Impact Assessment Report 1554.NIA.00

For

Mr B Delaney
6 Coopers Villas
Parsonage Road
Takeley
Bishop's Stortford
Essex CM22 6PT

12 December 2023

By

dBA Acoustics

Acoustic Consultancy

Railway Cottage 49 Arnold Road

Woking Surrey GU21 5JX

david@dbaacoustics.co.uk

www.dbaacoustics.co.uk

01483 771282

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Table 1. Author and Qualifications

Report	Signed	Name and Position	Relevant Qualification
Undertaken and Prepared By		David Fernleigh Principal	MIOA
Checked By		David Fernleigh Principal	MIOA

1.0 INTRODUCTION

1.1 Planning approval is sought for a single new build dwelling on an end-of terrace plot at 6 Coopers Villas. The site is in the vicinity though not directly adjacent to the M11 and Stanstead Airport.

1.2 dBA Acoustics have been commissioned to undertake an assessment of the prevailing environmental noise at site with regards to the likely noise impact upon the proposed residential use and assess the suitability.

1.3 This report concerns the assessment and/or control of atmospheric noise affecting the development site for the purposes of planning. Detailed mechanical, structural, H,S&E and conservation considerations are beyond the expertise of this practice and should be dealt with accordingly.

2.0 SUMMARY

2.1 A 6day environmental noise survey has been undertaken and the likely noise impact assessed upon residential use. The noise impact assessment indicates that, unmitigated, the development site is exposed to environmental (transportation) noise of a sufficient magnitude to cause a low to medium risk of adverse impact.

2.2 Calculations have been undertaken in accordance with BS8233:2014 to determine the likely internal noise levels assuming that windows are closed. The results indicate that internal levels commensurate with WHO 1999 and BS8233:2014 internal design limits should be achievable using commonly available methods and materials.

2.3 The acoustic specifications required for the worst-case bedrooms and living room have been provided.

2.4 At times when windows are opened to provided ventilative cooling, internal noise levels up to 10dB above the Approved Document O guideline levels are predicted. Based on ADO advice it is expected that windows are likely to be closed at night due to excessive noise.

2.5 Therefore, to maintain both thermal and acoustic comfort during overheating conditions alternative means of cooling and/or ventilation will be provided. It is understood that an MVHR system is currently proposed.

2.6 Noise levels in the external amenity area to the rear is expected to be around the upper guideline level of 55dB. Existing screening from road traffic noise using Parsonage Road is expected to be enhanced once the building is constructed. Other than this the potential for additional mitigation is considered to be practicable (boundary screening is already present). As such, no further mitigation is proposed in this respect. It is still the case that relatively quieter amenity areas should be available located on the quiet (rear garden) side of the development. Given the location close to strategic transportation networks this is considered acceptable and conforms with the guidance given in BS8233:2014 Section 7.7.3.2.

2.7 It is therefore recommended that from the perspective of noise impact, planning permission should be conditionally granted to ensure that:

- acoustically suitable windows are provided, as specified within this report.
- all bedrooms are provided with alternative means of cooling such that windows can optionally be kept closed during summertime overheating and thermal comfort maintained.

3.0 SITE

3.1 The development site lies to the east of Stanstead Airport. Immediate adjacencies are rural farmland, woods and residential dwellings. The M11 motorway and Stanstead Airport are to the west and the A120 to the south. The site location has been indicated on excerpts from the 2018 and 2019 Summer Day and Night-time noise contours published by the Civil Aviation Authority. As can be seen the site is outside both the 54dB daytime contour, and the 48dB night-time contour:

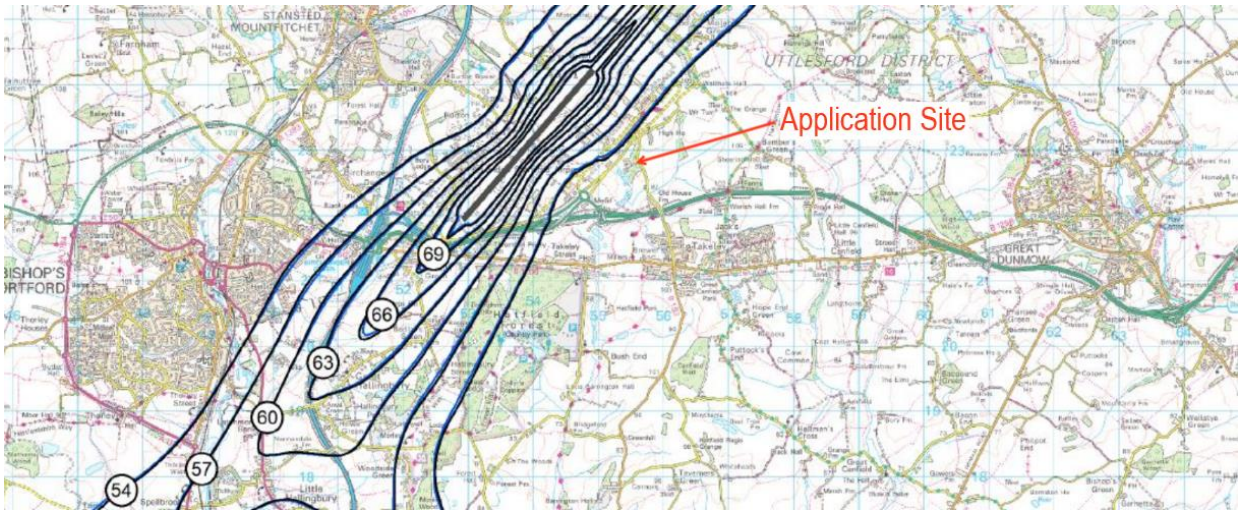

Figure 1. Site Location – Map and Summer Daytime Contour © Civil Aviation Authority (ref: Appendix D)

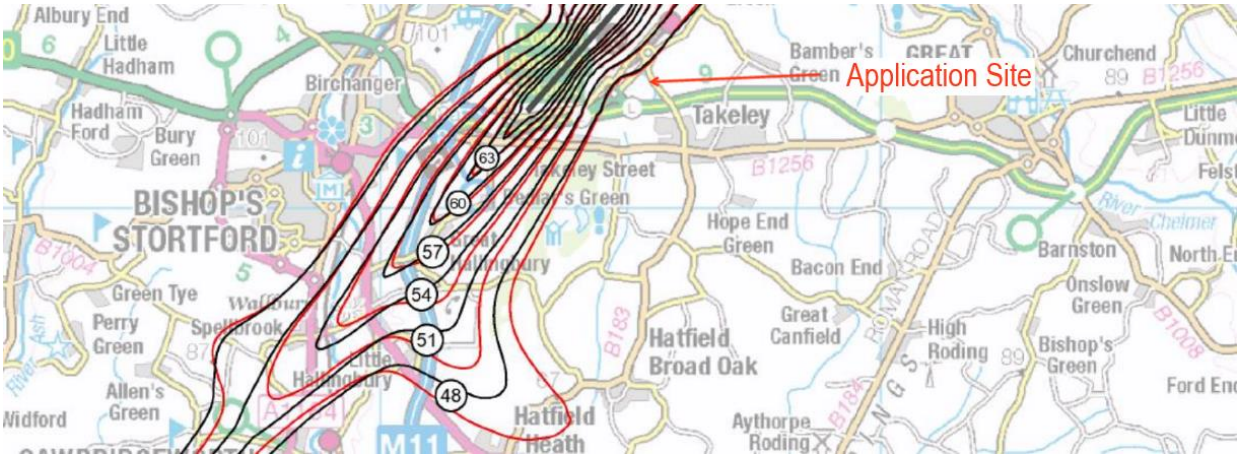

Figure 2. Site Location – Map and Summer Night Contour © Civil Aviation Authority (ref: Appendix D)

3.2 The site is on the west side of Parsonage Road, as indicated below:

Figure 3. Site Location Detail

3.3 Automated environmental noise monitoring was undertaken at positions 1 and 2. The noise monitoring positions were at 1m from the front and rear facades at 1st floor level of 6 Coopers Villas, approximately as shown on the image below:

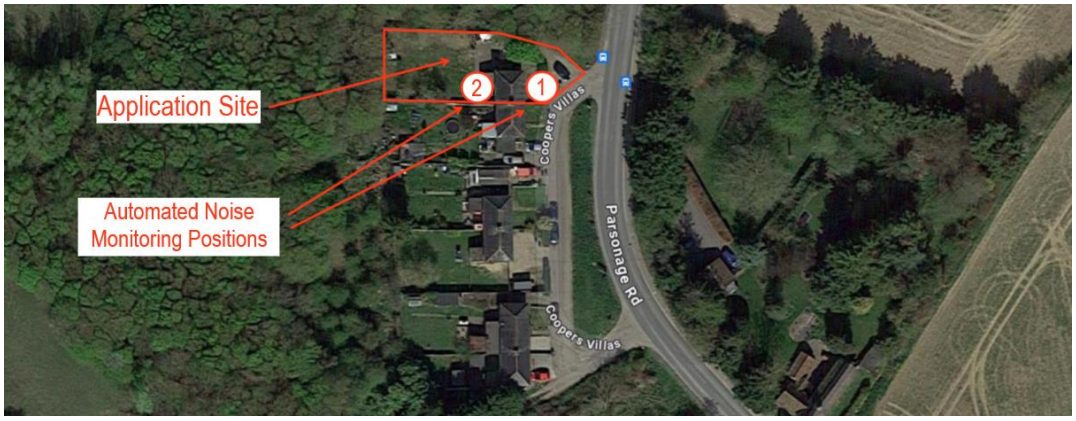

Figure 4. Noise Monitoring Positions – Imagery © Google 2023

3.4 The proposed location is shown on Libre Solutions Proposed Site Plan LS-PL-0045-201-P1 below:

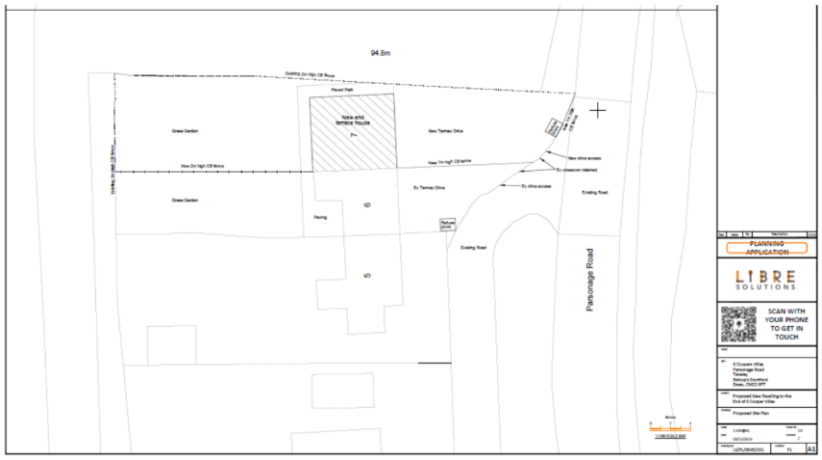

Figure 5. Proposed Location and Footprint – Libre Solutions Proposed Site Plan

3.5 The automated monitoring positions 1 and 2 were selected to obtain measurements that would be representative of those likely to be incident at the worst affected facades and indicative of noise levels within the amenity areas.

4.0 GUIDANCE

4.1 There are no statutory numerical noise limit requirements with regards to residential development. However, there are planning policy, British Standard and guidance documents applicable in this context. A detailed analysis of these documents is contained within the appendix with a summary given at the end of this section.

4.2 ProPG Planning and Noise 2017 draws on a wide range of policy, standards and guidance and offers a useful template for the assessment of noise impacts.

Guidance Summary

4.3 The policy and guidance quoted above and in the discussion contained within the appendix aim to avoid significant adverse noise impacts (SOAEL) where planning permission may be refused unless adequate mitigation is provided; and mitigate and reduce to a minimum observed noise impacts (LOAEL), where planning permission would normally be granted without conditions, by the selection of appropriate development sites and the implementation of good acoustic design.

4.4 To translate this into the context of residential development, in the first instance and where possible a development should aim to achieve the external noise limits given in WHO and BS8233:2014, but in any event achieve the internal noise limits given in BS8233:2014, along with a consideration of night-time noise events.

4.5 Government policy does allow for development where achieving these limits is not practicably feasible and BS8233:2014 gives an indication of reasonable relaxations that may be adopted.

4.6 The NPPF now includes the "Agent of Change" principle the onus is upon the developer to take reasonable steps to ensure that where appropriate, pre-existing commercial noise is adequately controlled. BS4142:2014 is generally considered to provide an appropriate framework for this.

4.7 From the above, the internal noise limits considered applicable for this development are as follows:

Table 2 BS8233:2014 Internal Guideline Levels

Activity	Location	07:00-23:00	23:00-07:00
Resting	Living Room	35 dB $L_{Aeq\ 16hr}$	-
Dining	Dining room/area	40 dB $L_{Aeq\ 16hr}$	-
Sleeping (daytime resting)	Bedroom	35 dB $L_{Aeq\ 16hr}$	30 dB $L_{Aeq\ 8hr}$

"NOTE 4 Regular individual noise events… can cause sleep disturbance. A guideline value may be set in terms of SEL or L_{AFmax}, depending on the character and number of events per night"

"NOTE 5 If relying on closed windows to meet the guide values, there needs to be an appropriate alternative ventilation that does not compromise the facade insulation or the resulting noise level." (From BS8233)

4.8 With respect to the night-time L_{AFmax} noise levels, the WHO Guidelines for Community Noise states:

'For a good sleep, it is believed that indoor sound pressure levels should not exceed approximately 45 dB L_{Amax} more than 10–15 times per night'

4.9 In BS8233 the design limit for noise affecting external amenity areas is given as 50 dB $L_{Aeq,T}$ with an upper guideline of 55 dB $L_{Aeq,T}$. It is further noted that in areas where achieving these levels is deemed to be not realistically feasible developments should be designed to achieve the lowest practicable levels in amenity areas.

5.0 METHODOLOGY

5.1 An automated environmental noise survey was undertaken from 07:00hrs on 20 November 2023 for approximately 6days. The L_{Aeq}, $L_{Amax,}$ L_{A10} and L_{A90} noise levels were measured continuously and logged every 15 minutes. Individual L_{Afmax} noise events were measured continuously and logged every 2 minutes. The following equipment was deployed:

Table 3. Noise Monitoring Equipment Position 1

Position 1	SLM	Preamplifier	Microphone	Calibrator
Manufacturer	Norsonic AS	Norsonic AS	Norsonic AS	Norsonic AS
Type	140	1209	1225	1255
Serial No.	1405947	15793	355507	125525261
Latest Calibration	08/07/2022			24/11/2023
Certificate No.	41442			U446049

Table 4. Noise Monitoring Equipment Position 2

Position 2	SLM	Preamplifier	Microphone	Calibrator
Manufacturer	Norsonic AS	Norsonic AS	Gras	Norsonic AS
Type	140	1209	40AF	1255
Serial No.	1403413	12821	207390	125525261
Latest Calibration	14/03/2023			21/12/2021
Certificate No.	43668			U39794

5.2 The calibration of the sound level meters used comply with IEC 61672-1:2003 class 1.

5.3 For the measurements proprietary windshields and extensions cable were deployed. The microphones were fixed to poles in the conditions given in the following table:

Table 5. Noise Monitoring Locations

Position	Period	Location	Mounting	Environment	Comments
1	6days	East, Front, Parsonage Road	Pole, 1st Floor Window	1m out from facade	Partially Screened from Airport
2	6days	West, Rear, Airport			Screened from Parsonage Rd

5.4 The monitoring positions were as indicated Figure 3. in section 3.3 above.

5.5 The entire signal path was checked for calibration at the beginning and end of the survey. No significant fluctuation (greater than 0.1dB) was detected in any noise monitor.

5.6 The following table details the weather conditions for the survey period:

Table 6. Weather Conditions

Condition	Start	End
Wind Speed ms^{-1}	<0.9	0.5
Wind Direction (from)	west	northwest
Precipitation or Fog	nil	nil
Wet Ground	damp	nil
Frozen Ground or Snow	nil	nil
Temperature ° C	10	5
Cloud Cover %	100	80

5.7 It is understood that the weather during the unattended part of the survey was mixed but with no high winds or significant rainfall. Wind direction was generally from the west which is understood the be the prevailing direction.

5.8 The monitoring positions and field calibration noted above were deemed suitable for obtaining measurements representative of the prevailing environmental noise levels.

5.9 The dominant environmental noise sources at the beginning and end of the survey were noted to be road traffic using Parsonage Road, and aircraft taking off/landing, when present.

6.0 RESULTS

6.1 The uncorrected 15minute interval time history graphs are contained within the appendix. The table below shows the summary of the measured daytime and night-time noise levels:

Table 7. Survey Results

Position	Day	dB L_{den}	dB L_{Aeq}		dB $L_{Amax, night}$ - highest	dB L_{A10}	dB L_{A90}	
		24hr	Day 16hr	Night 8hr	23:00-07:00	18hr	Day 16hr	Night 8hr
1	Mon	-	64.5	57.3	83.1	67.2	43.9	38.8
	Tues	65.5	63.4	56.7	84.0	66.7	46.0	37.8
	Wed	65.2	65.3	57.1	83.7	66.3	46.6	38.4
	Thurs	66.2	63.6	57.8	92.1	67.2	46.6	38.0
	Fri	64.8	61.8	57.0	86.7	65.5	44.6	36.8
	Sat	64.4	61.2	58.6	79.0	65.2	42.6	38.5
	Sun	67.6	65.8	56.1	78.2	68.6	47.8	39.5
2	Mon	-	56.8	54.7	91.6	59.3	45.5	39.1
	Tues	62.2	58.4	56.6	80.1	59.6	50.5	43.6
	Wed	63.6	57.7	54.4	80.3	59.8	49.3	42.2
	Thurs	61.7	60.4	55.2	78.9	60.6	48.6	41.1
	Fri	62.7	58.2	55.1	81.0	60.1	46.0	41.8
	Sat	63.2	56.3	57.7	66.0	-	-	-

6.2 The above results include the effects of façade reflections at both positions. Accordingly, the measured levels have been corrected (-3dB for façade reflections) the table below presents the expected façade incident results:

Table 8. Survey Results Corrected for Façade Reflections

Position	Day	dB L_{den}	dB L_{Aeq}		dB $L_{Amax, night}$ 10th highest	dB L_{A10}	dB L_{A90}	
		24hr	Day 16hr	Night 8hr	23:00-07:00	18hr	Day 16hr	Night 8hr
1	Mon	-	615	54.3	74	64.2	40.9	35.8
	Tues	62.5	60.4	53.7	74	63.7	43.0	34.8
	Wed	62.2	62.3	54.1	75	63.3	43.6	35.4
	Thurs	63.2	60.6	54.8	75	64.2	43.6	35.0
	Fri	61.8	58.8	54.0	75	62.5	41.6	33.8
	Sat	61.4	58.2	55.6	75	62.2	39.6	35.5
	Sun	65.6	62.8	53.1	-	65.6	44.8	36.5
2	Mon	-	54.8	51.7	73	56.3	42.5	36.1
	Tues	59.2	55.4	53.6	75	56.6	47.5	40.6
	Wed	60.6	53.7	51.4	73	56.8	46.3	39.2
	Thurs	58.7	57.4	52.2	74	57.6	45.6	38.1
	Fri	59.7	55.2	52.1	75	57.1	43.0	38.8
	Sat	60.2	53.3	-	-	-	-	-

6.3 The uncorrected 2min resolution L_{Amax} night-time noise event time history graphs are contained within the appendix.

6.4 The most recent noise contours published by the Civil Aviation Authority prior to the effects of the Covid pandemic are shown within Appendix D. The site lies outside the Leq contours for 54 dBA daytime and 48 dBA night-time.

6.5 From the above results tables the typical (weekly mean) day and night-time noise levels at the most noise exposed parts of the development site (Position 1, Front) are considered to be as follows:

- $L_{Aeq,16hour}$ 61dB
- $L_{Aeq,8hour}$ 54dB
- $L_{Amax\ (10th\ worst)}$ 75dB.

6.6 A summary of the worst-case façade incident noise levels derived from the measurements for the site during typical conditions is shown in the following table:

Table 9. Input Data – Worst-Case Façade Incident Noise Levels

Façade Incident Sound Levels (dB) at Octave Band Centre Frequency (Hz) at Front (Position 1)									
Representative Level	63	125	250	500	1k	2k	4k	8k	dBA
Daytime 16hour	64.8	61.3	62.2	59.2	56.9	48.8	37.8	33.1	61.0
Night-time 8 hour	57.7	55.5	54.1	52.5	49.8	43.0	32.7	25.2	54.1
Night-time LAmax events	78.1	81.1	75.7	74.5	68.9	60.3	49.2	46.7	75.0

7.0 ASSESSMENT

7.1 Analysis of the results indicates that the site would not achieve the WHO 2018 guideline levels for exposure to road or air traffic noise for both a 24-hour period (L_{den}) nor at night (L_{night}).

7.2 Comparing to the ProPG noise risk assessment chart (Figure 1, see appendix) it can be seen that the site surveyed is broadly low to medium risk for average daytime and night-time noise levels.

7.3 The 10th worst L_{Amax} noise event at both positions was greater than 60dB indicating that noise events should be considered in the design.

7.4 The results indicate that in the daytime road traffic noise dominates the sound environment and to a greater extent at the front (east) of the building.

7.5 The L_{Amax} night-time noise events appear to be a mixture of road traffic and aircraft movements with the highest noise events being of similar magnitude at both positions, front and rear.

7.6 Reference to the Civil Aviation Noise 2019 Summer daytime contours indicates that guideline noise levels within external amenity are not likely to be exceeded due to aircraft noise. For reference the noise contours are provided in Appendix D.

7.7 Regarding road traffic noise it is estimated that future areas that are least exposed (i.e. located in the acoustic shadow of the new building) could achieve a level approximately equivalent to the upper guideline level.

7.8 The assessment indicates that consideration of mitigation is required in order to ensure adequate living conditions are achieved.

8.0 ACOUSTIC DESIGN

Internal Noise Levels in Habitable Rooms (with windows closed)

8.1 High-level analysis indicates that in order for acceptable internal acoustic conditions to be achieved windows will need to be closed. There is little or no alternative mitigation available and the guidance in BS8233:2014 allows for this provided alternative means of ventilation/cooling is provided.

8.2 The approximate worst-case room and window dimensions of noise-exposed areas of a living room and bedroom are tabulated below. These have been taken from the Site Location Proposed Plans and Elevation drawings provided by Libra Solutions:

- LS-PL-0045-100_P1
- LS-PL-0045-200-P1

Table 10. Input Data - Room Dimensions

Living room	Bedroom
Unglazed noise exposed wall area: 6.6m^2	Unglazed noise exposed wall area: 6.9m^2
Noise exposed glazing area: 1.8m^2	Noise exposed glazing area: 1.5m^2
Noise exposed roof area: 0m^2	Noise exposed ceiling area: 9m^2
Approx Volume: 40m^3	Approx Volume: 22m^3

8.3 It is assumed the habitable rooms will have carpet, curtains and soft furnishings appropriate to their use.

8.4 As a MVHR system is proposed it is assumed that there will be no passive trickle ventilation present in the window frames.

8.5 It is understood that the external walls are to comprise medium density cavity masonry (100mm blockwork, 100mm cavity containing 90mm insulation, 100mm blockwork) with a sand and cement render externally, and a dry lined internal face.

8.6 An insulated loft space will be provided. In order that the relatively lightweight tiled roof/ceiling construction provides adequate sound insulation it is recommended that the bedroom ceilings are constructed from 2 x12.5mm plasterboard fixed to the joists via resilient bars.

8.7 Calculations to predict internal noise levels have been undertaken in accordance with the more rigorous calculation method given in BS8233:2014 (G2). The sound reduction indices assumed/required for the walls and roof as described above are shown in the following table:

Table 11. Input Data - Sound Reduction Indices for External Walls and Roof

Sound Reduction Index (dB) at Octave Band Centre Frequency (Hz)								
Construction	63	125	250	500	1k	2k	4k	8k
External Walls	28	34	34	40	55	55	55	55
Roof / Ceiling	17	30	40	50	55	55	55	55

8.8 Adopting uprated bedroom ceilings and windows achieving the specification shown in the Section 9.0 results in calculated internal levels that are compared to the guideline levels in the table below:

Table 12. Predicted Internal Levels with Windows Closed

Internal level	Daytime Living $L_{Aeq,16hr}$	Daytime Bedroom $L_{Aeq,16hr}$	Night-time $L_{Aeq,8hr}$	Night-time L_{Amax}	Comment
BS8233 Guideline	35	35	30	45	BS8233 Guideline
Predicted Internal Levels (mitigated)	31	31	25	45	Commensurate with Guidelines
Colour Key:		More than 5dB above guideline – not commensurate with BS8233			
		No more than 5dB above guideline – BS8233 reasonable relaxation			
		No higher than guideline – fully commensurate with BS8233			

8.9 As can be seen in the above table with the external building fabric elements and constructions, as described above; and suitably specified windows, as detailed in Section 9.0, the internal noise levels are predicted to be fully commensurate with the guideline levels.

8.10 From the above it is concluded that acceptable internal living conditions should be achievable at this site with modern methods and materials, assuming windows are closed.

Internal Noise Levels in Habitable Rooms (with windows open)

8.11 With regard to overheating the current Approved Document O states the following:

> *"3.2 In locations where external noise may be an issue (for example, where the local planning authority considered external noise to be an issue at the planning stage), the overheating mitigation strategy should take account of the likelihood that windows will be closed during sleeping hours (11pm to 7am).*
>
> *3.3 Windows are likely to be closed during sleeping hours if noise within bedrooms exceeds the following limits.*
>
> *a. 40dB LAeq,T, averaged over 8 hours (between 11pm and 7am).*
>
> *b. 55dB LAFmax, more than 10 times a night (between 11pm and 7am)."*

8.12 The ADO limits quoted above suggest that in an overheating situation night-time internal noise levels up to 10dB higher than the BS8233:2014 guideline levels may be tolerable but where internal levels are higher than this it should be expected that windows would be closed due to noise. The following table compares the BS8233 guideline levels with the Approved Document O limits and the predicted internal noise levels with windows open (assuming a reduction of -10dB for noise passing through a partially open window):

Table 13. Predicted Internal Noise Levels with Windows Open

	Daytime $L_{Aeq,16hr}$	Night-time $L_{Aeq,8hr}$	Night-time L_{Amax}	Comment
BS8233 Guideline limit	35	30	45	BS8233 Guideline limit
Approved Document O limit	n/a	40	55	Approved Document O limit
Predicted internal level	51	44	65	Windows likely to be closed at night

8.13 The above table shows that when windows are open internal noise levels are predicted to be up to 10dB above the night-time ADO levels given above. According to ADO it therefore follows that windows are likely to be kept closed at night-time because of the prevailing noise.

8.14 To maintain both acoustic and thermal comfort during overheating conditions alternative means of cooling/ventilation should be provided, at the least in all bedrooms, such that windows can optionally be kept closed. It is understood that an MVHR system is proposed.

8.15 MVHR system equipment has a noise output. It will be necessary that the equipment is suitably designed/specified such that the acceptable internal noise levels are maintained. The current MVHR proposals are at an early stage so this aspect should be addressed when the detailed design is progressed.

External Amenity

8.16 It is estimated that noise levels within external amenity is likely to be at or around the upper guideline level of 55dB.

8.17 There is already a new boundary fence installed and the mass of the proposed building should increase the degree of acoustic screening provided to the rear garden from road traffic using Parsonage Road (the loudest side). Additional mitigation is not thought practicable and none is proposed at this time.

8.18 A relatively quiet amenity space will be available to the rear side of the development, the proposals are considered to conform to Section 7.7.3.2 of BS8233:2014 which states:

"For traditional external areas that are used for amenity space, such as gardens and patios, it is desirable that the external noise level does not exceed 50 dB LAeq,T, with an upper guideline value of 55 dB LAeq,T which would be acceptable in noisier environments. However, it is also recognized that these guideline values are not achievable in all circumstances where development might be desirable. In higher noise areas, such as city centres or urban areas adjoining the strategic transport network, a compromise between elevated noise levels and other factors, such as the convenience of living in these locations or making efficient use of land resources to ensure development needs can be met, might be warranted. In such a situation, development should be designed to achieve the lowest practicable levels in these external amenity spaces, but should not be prohibited."

9.0 ACOUSTIC SPECIFICATION

9.1 **Window Specification**

The windows (and external doors) to habitable rooms should be tested in accordance with BS EN ISO 10140-2:2021 (or BS EN ISO 10140-2:2010) "Acoustics. Laboratory measurement of sound insulation of building elements. Measurement of airborne sound insulation." Testing should be in 1/3 octaves from 50Hz to 5000Hz inclusive, together with suitably converted octave band results from 63Hz to 4000Hz shall be provided for a unit which is representative for the relevant façade/room/application. The complete glazing system (including frames/cladding) should achieve the following minimum sound reduction indices:

.

Table 14. Sound Reduction Indices

Sound Reduction Index (dB) at Octave Band Centre Frequency (Hz)									
Location	Example	63	125	250	500	1k	2k	4k	8k
Bedrooms	6/16/6.8	20	26	30	41	44	46	53	53
Living Rooms	6/16/4	17	19	18	24	36	35	37	38

9.2 **Bedroom Ceilings**

A tiled roof and insulated loft space shall be provided. The bedroom ceilings shall comprise 2 x12.5mm plasterboard fixed to the joists via resilient bars.

10.0 CONCLUSION

10.1 A 6day environmental noise survey has been undertaken and the likely noise impact assessed upon residential use. The noise impact assessment indicates that, unmitigated, the development site is exposed to environmental (transportation) noise of a sufficient magnitude to cause a low to medium risk of adverse impact (ref:ProPG).

10.2 Calculations have been undertaken in accordance with BS8233:2014 to determine the likely internal noise levels assuming that windows are closed. The results indicate that internal levels commensurate with WHO 1999 and BS8233:2014 internal design limits should be achievable using commonly available methods and materials.

10.3 The acoustic specifications required for the worst-case bedroom and living room windows have been provided.

10.4 At times when windows are opened to provided ventilative cooling, internal noise levels up to 10dB above the Approved Document O guideline levels are predicted. Based on ADO advice it is expected that windows are likely to be closed at night due to excessive noise.

10.5 Therefore, to maintain both thermal and acoustic comfort during overheating conditions alternative means of cooling and/or ventilation will be provided. It is understood that an MVHR system is currently proposed.

10.6 Noise levels in the external amenity area to the rear is expected to be around the upper guideline level of 55dB. Existing screening from road traffic noise using Parsonage Road is expected to be enhanced once the building is constructed. Other than this the potential for additional mitigation is considered to be impracticable (as boundary screening is already present). As such, no further mitigation is proposed in this respect. It is still the case that relatively quieter amenity areas should be available located on the quiet (rear garden) side of the development. Given the location close to strategic transportation networks this is considered acceptable and conforms with the guidance given in BS8233:2014 Section 7.7.3.2.

10.7 It is therefore recommended that from the perspective of noise impact, planning permission should be conditionally granted to ensure that:

- acoustically suitable windows are provided, as specified within this report
- all bedrooms are provided with alternative means of cooling such that windows can optionally be kept closed during summertime overheating and thermal comfort maintained

Report end - dBA Acoustics

APPENDIX A – GUIDANCE DOCUMENTS DISCUSSION

Introduction

A.1.1 There are no statutory numerical noise limit requirements with regards to residential development. However, there follows a summary of a number of relevant planning policy, British Standard and guidance documents applicable in this context.

Planning Policy Documents

Noise Policy Statement for England 2010 (NPSE)

A.1.2 The NPSE defines government policy aims for noise management as follows:

"Through the effective management and control of environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development:

- avoid significant adverse impacts 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. "

A.1.3 The Explanatory Note of NPSE introduces the concept of observable effect levels.

- NOEL – No Observed Effect Level This is the level below which no effect can be detected. In simple terms, below this level, there is no detectable effect on health and quality of life due to the noise.
- LOAEL – Lowest Observed Adverse Effect Level This is the level above which adverse effects on health and quality of life can be detected.
- SOAEL – Significant Observed Adverse Effect Level This is the level above which significant adverse effects on health and quality of life occur.

National Planning Policy Framework 2018 (NPPF)

A.2.1 Following on from the NPSE, NPPF describes how noise should be considered in relation to planning applications. Section 180 of the NPPF dated July 2018 states as follows:

"Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development. In doing so they should:

a) mitigate and reduce to a minimum potential adverse impacts resulting from noise from new development – and avoid noise giving rise to significant adverse impacts on health and the quality of life*;

b) identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason"

* for the definition of adverse impacts reference is made here to the Explanatory Note to the NPSE 2010 i.e. the observable effect levels.

A.2.2 Paragraph 182 introduces the "Agent of Change" principle as follows:

"Planning policies and decisions should ensure that new development can be integrated effectively with existing businesses and community facilities….. Existing businesses and facilities should not have unreasonable restrictions placed upon them as a result of development permitted after they were established. Where the operation of an existing business or community facility could have a significant adverse effect on new development (including changes of use) in its vicinity, the applicant (or 'Agent of Change') should be required to provide suitable mitigation before development has been completed.

Planning Practice Guide (PPG)

A.3.1 The following table from PPG identifies the increasing noise effect levels and action guidance outlined in the NPSE and NPPF:

Table 15. PPG Noise Effect Levels

Perception	Examples of Outcomes	Increasing Effect Level	Action
Noticeable and not intrusive	Noise can be heard, but does not cause any change in behaviour or attitude. Can slightly affect the acoustic character of the area but not such that there is a perceived change in the quality of life.	No Observed Adverse Effect **(NOAEL)**	No specific measures required
Noticable and Intrusive	Noise can be heard and causes small changes in behaviour and/or attitude, e.g. turning up volume of television; speaking more loudly; where there is no alternative ventilation, having to close windows for some of the time because of the noise. Potential for some reported sleep disturbance. Affects the acoustic character of the area such that there is a perceived change in the quality of life.	Observed Adverse Effect **(LOAEL)**	Mitigate and reduce to the minimum
Noticable and Disruptive	The noise causes a material change in behaviour and/or attitude, e.g. avoiding certain activities during periods of intrusion; where there is no alternative ventilation, having to keep windows closed most of the time because of the noise. Potential for sleep disturbance resulting in difficulty in getting to sleep, premature awakening and difficulty in getting back to sleep. Quality of life diminished due to change in acoustic character of the area.	Significant Observed Adverse Effect **(SOAEL)**	Avoid
Noticeable and very disruptive	Extensive and regular changes in behaviour and/or an inability to mitigate effect of noise leading to psychological stress or physiological effects, e.g. regular sleep deprivation/awakening; loss of appetite, significant, medically definable harm, e.g. auditory and non- auditory	Unacceptable Adverse Effect **(UOAEL)**	Prevent

A.3.2 The PPG also states that noise impact may be partially off set if the residents of dwellings have access to:

- a relatively quiet façade as part of their dwelling;
- a relatively quiet amenity space for their sole use (eg a garden or balcony);
- a relatively quiet amenity space for shared use;
- a relatively quiet public park or green space nearby (eg within 5 minutes).

A.3.3 In section 1 of the guidance, PPG also notes that although Noise can override other planning considerations neither the Noise Policy Statement for England nor the National Planning Policy Framework (which reflects the Noise Policy Statement) expects noise to be considered in isolation, separately from the economic, social and other environmental dimensions of proposed development.

Further Guidance and British Standards

World Health Organisation 1999 and 2018

A.4.1 WHO Environmental Noise Guidelines for the European Region (2018) partially supersede the previously published Community Noise Guidelines (1999) and compliment the intervening Night Noise Guidelines (2009)

A.4.2 The following noise limit recommendations for health protection are in the form of average noise levels, found external at the worst affected facade:

Table 16. WHO 2018 Noise Limits Recommendations

Noise source	L_{den} dB[1]	L_{night} dB[2]
Road Traffic Noise	53	45
Railway Noise	54	44
Aircraft Noise	45	40

[1] compound day, evening and night time yearly average

[2] night time yearly average

A.4.3 The WHO noise guidelines further state:

"In many situations, average noise levels like the L_{den} or L_{night} indicators may not be the best to explain a particular noise effect. Single-event noise indicators – such as the maximum sound pressure level (L_{Amax}) and its frequency distribution – are warranted in specific situations, such as in the context of night-time railway or aircraft noise events that can clearly elicit awakenings and other physiological reactions that are mostly determined by L_{Amax}. Nevertheless, the assessment of the relationship between different types of single-event noise indicators and long-term health outcomes at the population level remains tentative. The guidelines therefore make no recommendations for single-event noise indicators."

A.4.4 The following guidelines are considered to carry over from the previous WHO1999 publication Guidelines for Community Noise:

Table 17. WHO 1999 Guidelines for Community Noise

Environment	Critical Health Effect	$L_{Aeq,T}$ dB	L_{Afmax}dB	Time base
Outdoor living area (noise from sources other than road traffic, railways, aircraft or wind turbines)	Serious annoyance, daytime and evening	55	-	16 hours 07:00-23:00
	Moderate annoyance, daytime and evening	50	-	16 hours 07:00-23:00
Dwellings indoors	Speech intelligibility and moderate annoyance, daytime and evening	35	-	16 hours 07:00-23:00
	Sleep disturbance, night time	30	45	8 hours 23:00-07:00

BS8233:2014 Guidelines on Sound Insulation and Noise

A.5.1 The guidance relating to residential development as set out in BS8233:2014 is closely aligned with WHO and specifically provides guideline limits for noise within internal living spaces and external residential amenity areas.

A.5.2 Table 4 from BS8233:2014 gives the following internal guideline values:

Table 18. BS8233:2014 Internal Guideline Levels

Activity	Location	07:00-23:00	23:00-07:00
Resting	Living Room	35 dB $L_{Aeq\ 16hr}$	
Dining	Dining room/area	40 dB $L_{Aeq\ 16hr}$	
Sleeping (daytime resting)	Bedroom	35 dB $L_{Aeq\ 16hr}$	30 dB $L_{Aeq\ 8hr}$

A.5.3 In certain circumstances a 5dB relaxation of the limits shown in the table above is considered reasonable in BS8233:2014 note 7:

"Where development is considered necessary or desirable, despite external noise levels above WHO guidelines, the internal target levels may be relaxed by up to 5 dB and reasonable internal conditions still achieved."

A.5.4 In BS8233 design limits for noise affecting external amenity areas is given as 50 dB $L_{Aeq,T}$ with an upper guideline of 55 dB $L_{Aeq,T}$. It is further noted that in areas where achieving these levels is deemed to be not realistically feasible (e.g. city centres or urban areas adjoining a strategic transportation network) developments should be designed to achieve the lowest practicable levels in these amenity areas.

A.5.5 In Section 7.7.3.2 of BS8233:2014, Design Criteria for External Use, it is noted that in developments such as flats and apartment blocks "*Specification of noise limits is not necessarily appropriate. Small balconies may be included for uses such as drying washing or growing pot plants, and noise limits should not be necessary for these uses*"

ProPG Planning and Noise 2017

A.6.1 ProPG 2017 sets out a two-stage approach. Firstly, a noise survey is undertaken to identify the prevailing noise levels and provide an initial risk assessment of the likely noise impact excluding design mitigation. Where necessary this is followed by a full assessment and Acoustic Design Statement to include the likely internal and external noise levels including any design mitigation.

A.6.2 Figure 4 below, (Figure 1 excerpt from ProPG) sets out the site noise risk assessment:

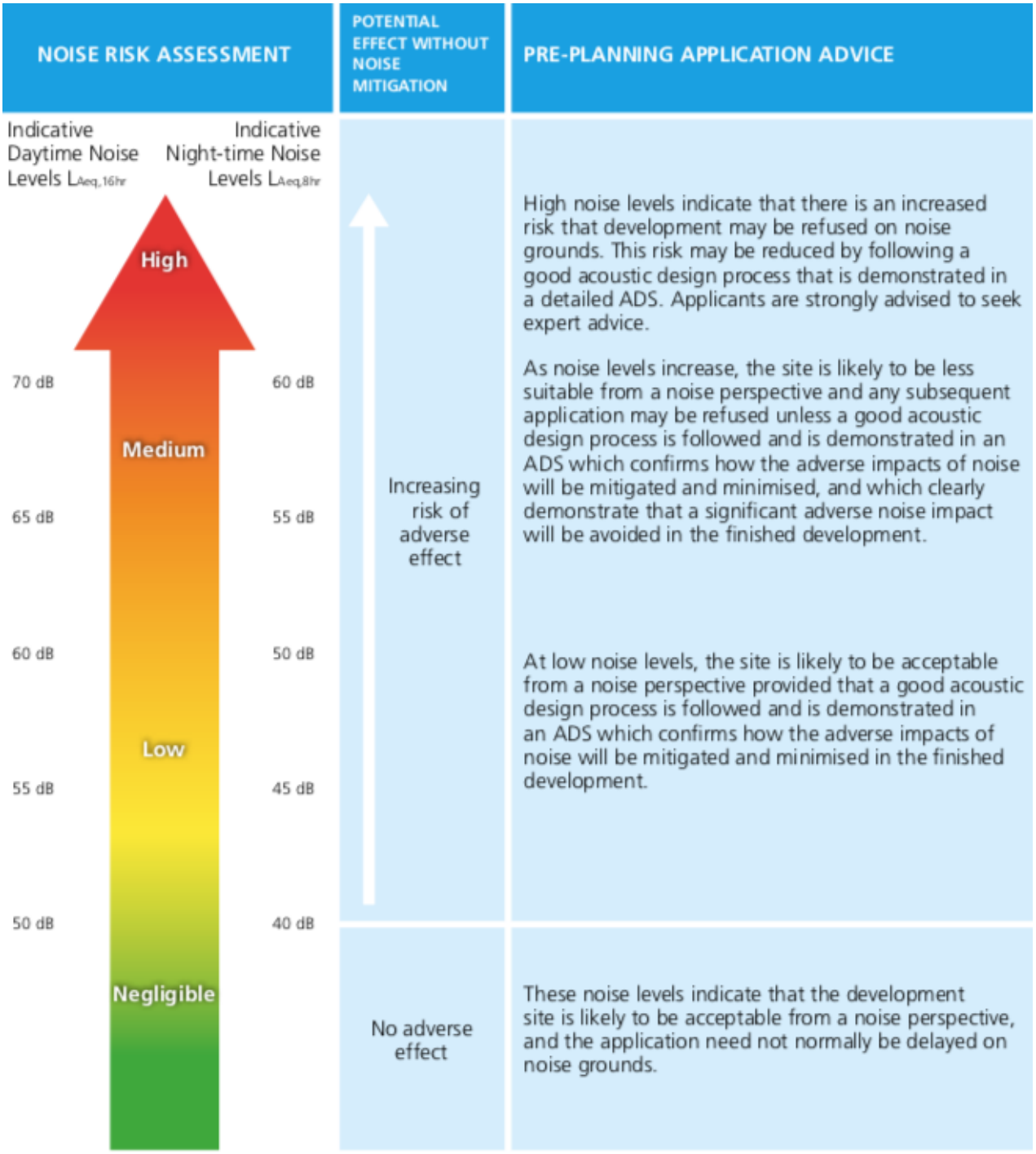

Figure 6. Figure 1 from ProPG - Noise Risk Assessment

The Noise Insulation Regulations 1975

A.7.1 Although not applicable in this instance the Noise Insulation Regulations are a useful guide indicating where noise levels at the façade would be considered significantly excessive. The Noise Insulation Regulations define the conditions under which habitable rooms are eligible for noise insulation to control internal noise levels. The conditions relate to the level of traffic noise at the façade, the increase in noise levels as a result of the highway and the contribution of the new or altered scheme to the noise level received at the façade. Noise insulation qualification criteria must abide by a few tests that include the following two:

- The facade noise threshold of 68dB $L_{A10,18h}$ is met or exceeded;
- That there must be a noise increase of at least 1dB compared to the prevailing noise level immediately before the construction of a highway or an additional carriageway were begun.

BS EN ISO 4142:2014 Methods for Rating and Assessing Industrial and Commercial Sound

A.8.1 In the assessment of commercial sound, BS4142: 2014 Methods for Rating and Assessing Industrial and Commercial Sound is a key guidance document. The standard sets out a methodology that considers the likely impact of a commercial or industrial noise source when measured and/or predicted against the acoustic environment. Corrections are given for times, duration and the presence of acoustic feature characteristics that could make the sound intrusive.

A.8.2 The magnitude of the corrections that can be applied to the noise in question are dependent upon its severity/prominence. A penalty of between 0dB to +3dB may be applied for sound that is intermittent; 0dB to +6dB for sound that is tonal and 0dB to +9dB for sound that is impulsive. The maximum levels are applied where the acoustic feature is highly perceptible. The corrections are additive with the maximum correction being +15dB in any given case.

A.8.3 The standard states that generally, the greater the margin by which the specific sound emerges above the background sound level, the greater the magnitude of impact.

Guidance is given on the assessment of impact as follows:

- A difference of around +10dB or more is likely to be an indication of a significant adverse impact, depending on the context.
- A difference of around +5dB or more is likely to be an indication of an adverse impact, depending on the context.
- The lower the rating level is relative to the measured background sound level, the less likely the specific sound source will have an adverse impact or a significant adverse impact.
- Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending on the context.

A.8.4 In summary, for planning purposes it should normally be demonstrated that adverse noise impacts have been avoided and /or mitigated and reduced to a minimum. Ideally low noise impact would be achieved although this is not always possible.

Approved Document O

A.9.1 With regard to overheating the current Approved Document O states the following:

> *"3.2 In locations where external noise may be an issue (for example, where the local planning authority considered external noise to be an issue at the planning stage), the overheating mitigation strategy should take account of the likelihood that windows will be closed during sleeping hours (11pm to 7am).*
> *3.3 Windows are likely to be closed during sleeping hours if noise within bedrooms exceeds the following limits.*
> *a. 40dB LAeq,T, averaged over 8 hours (between 11pm and 7am).*
> *b. 55dB LAFmax, more than 10 times a night (between 11pm and 7am)."*

Guidance Summary

A.10.1 The policy and guidance documents quoted above aim to avoid significant adverse noise impacts (SOAEL),and mitigate and reduce to a minimum observed noise impacts (LOAEL) with the selection of appropriated development sites and the implementation of good acoustic design.

A.10.2 To translate this into the context of residential development, in the first instance and where possible a development should aim to achieve the external noise limits given in WHO and BS8233:2014, and in any event achieve the internal noise limits given in BS8233:2014, along with a consideration of night-time noise events.

A.10.3 Government policy does allow for development where achieving these limits is not practicably feasible and BS8233:2014 gives an indication of reasonable relaxations that may be adopted.

A.10.4 Since the update of the NPPF to include the "Agent of Change" principal the onus is upon the developer to take reasonable steps to ensure that where appropriate, pre-existing commercial noise is adequately controlled. BS4142:2014 is generally considered to provide an appropriate framework for this.

APPENDIX B – TIME HISTORY GRAPHS

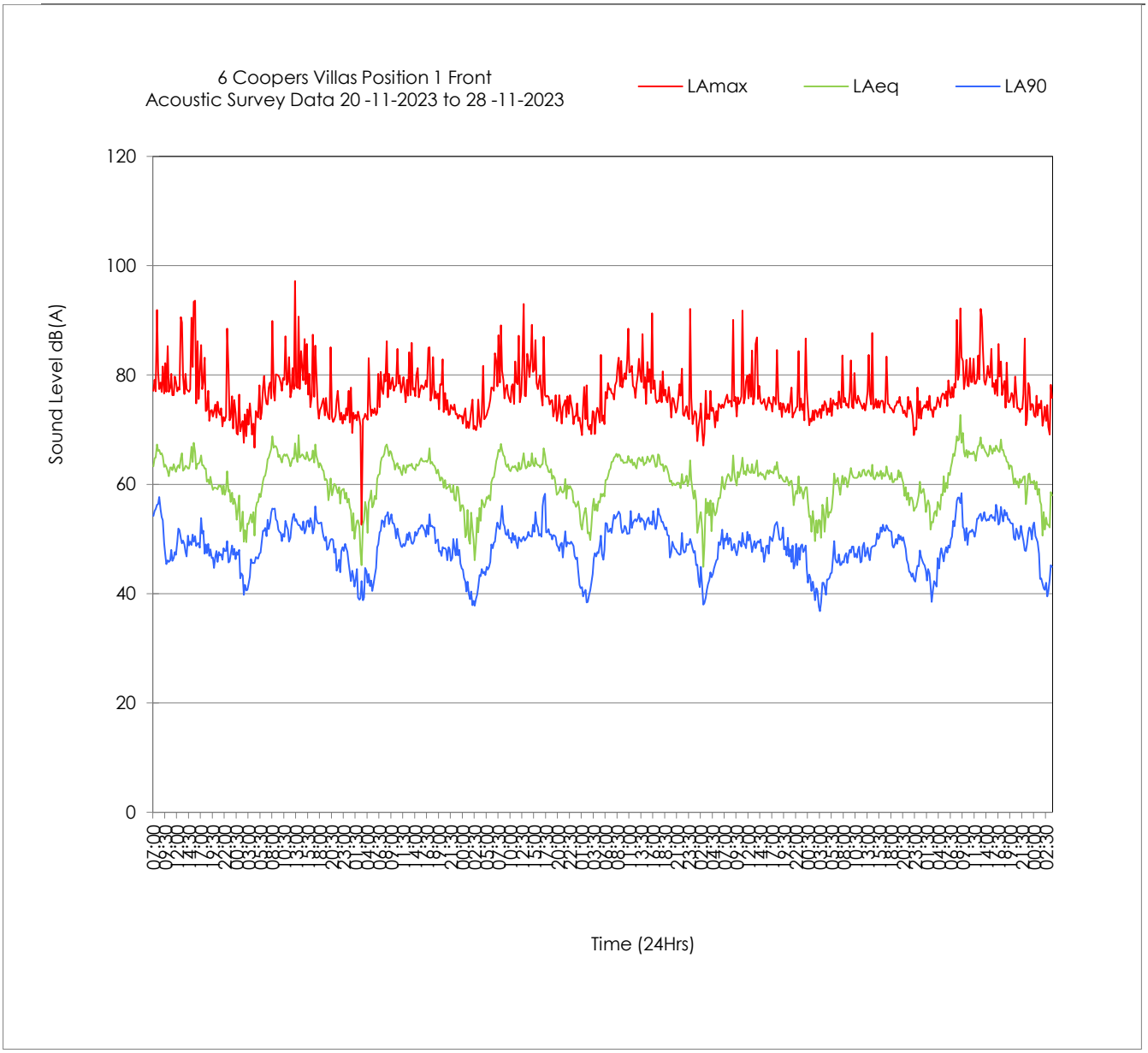

Figure 7. Time History Graph – Position 1

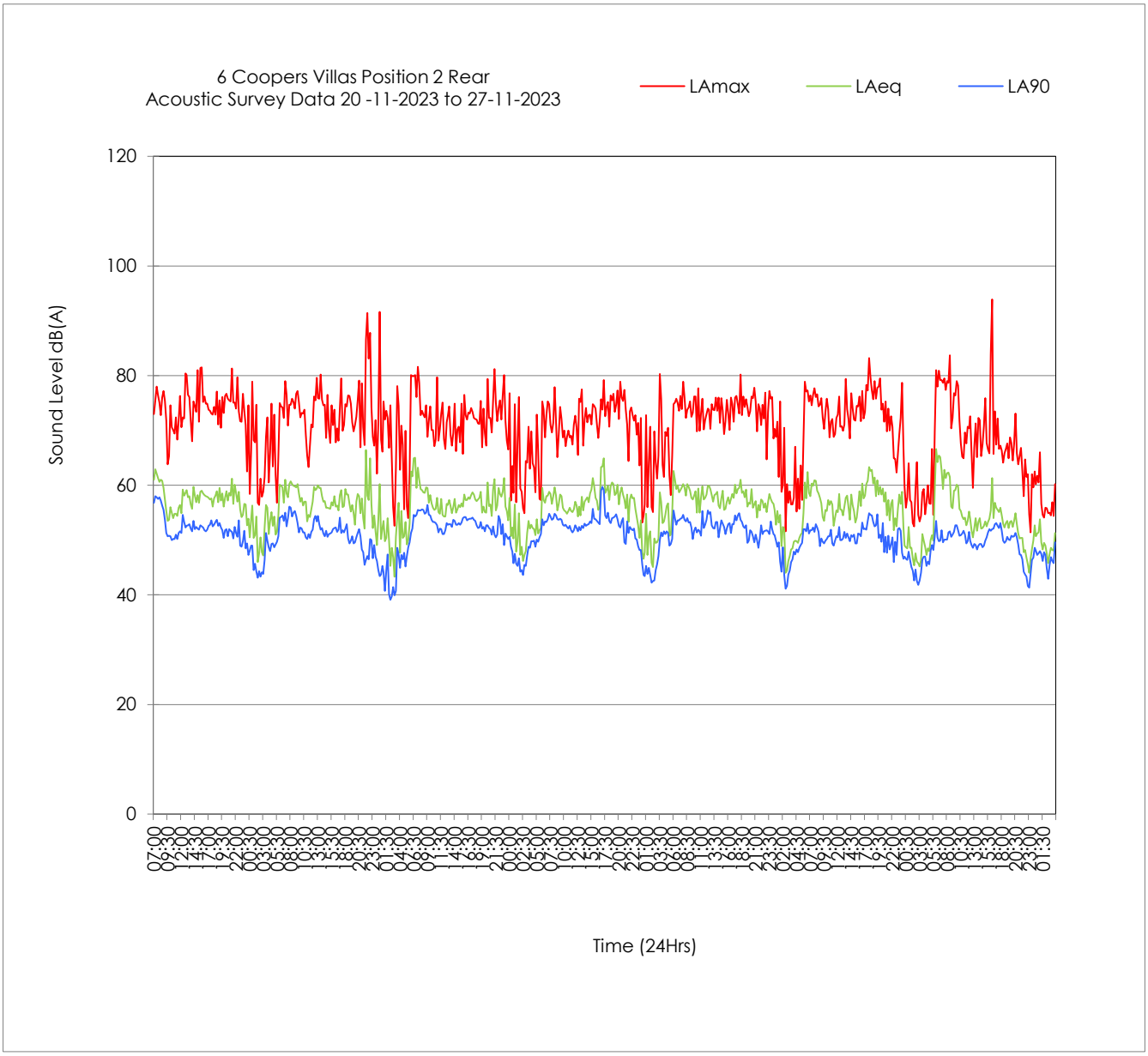

Figure 8. Time History Graph - Position 2

APPENDIX C - DETAILED NIGHT-TIME NOISE EVENT TIME HISTORY GRAPHS

Figure 9. Night-time Noise Event Time History 1st night, Positions 1 and 2 respectively

Figure 10. Night-time Noise Event Time History 2nd night, Positions 1 and 2 respectively

Figure 11. Night-time Noise Event Time History 3rd night, Positions 1 and 2 respectively

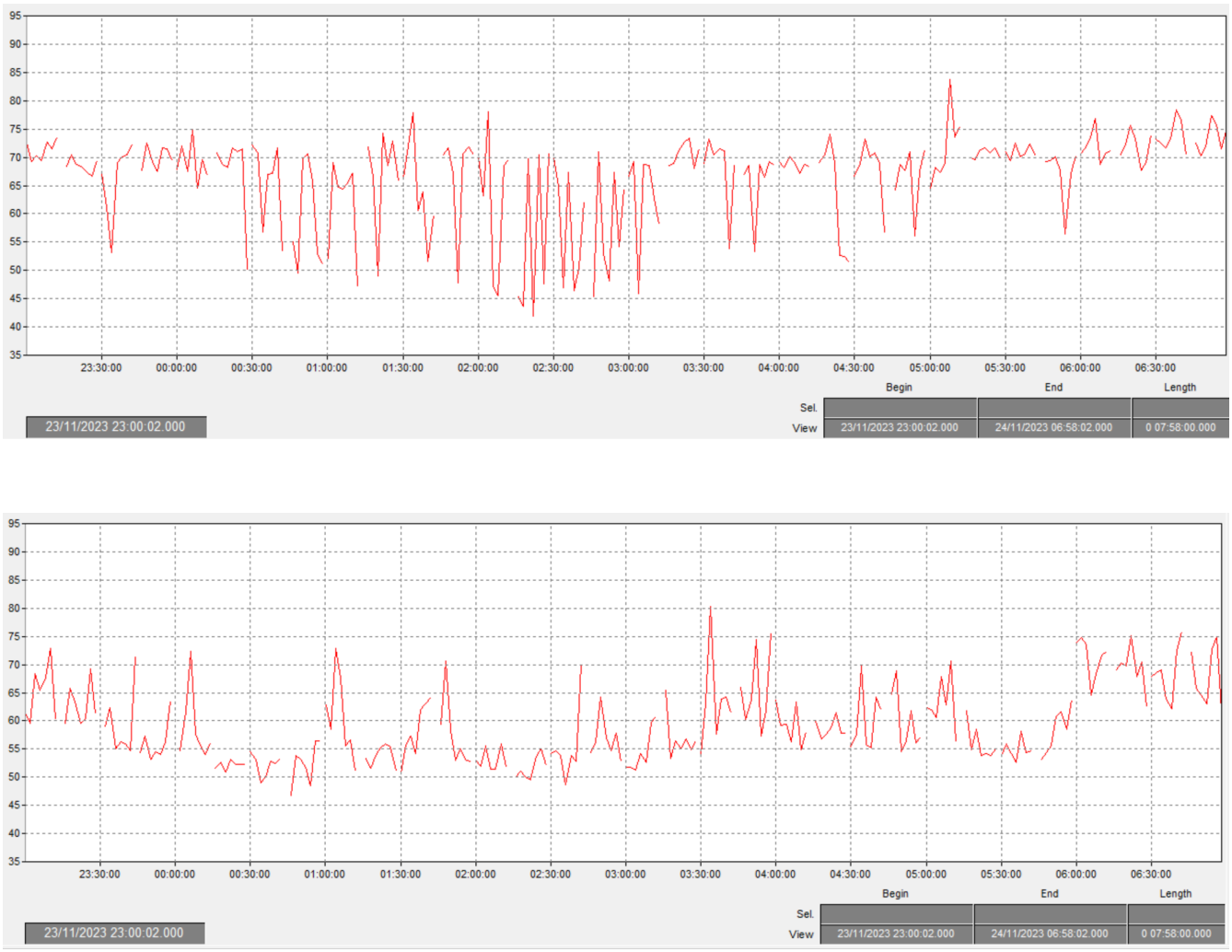

Figure 12. Night-time Noise Event Time History 4th night, Positions 1 and 2 respectively

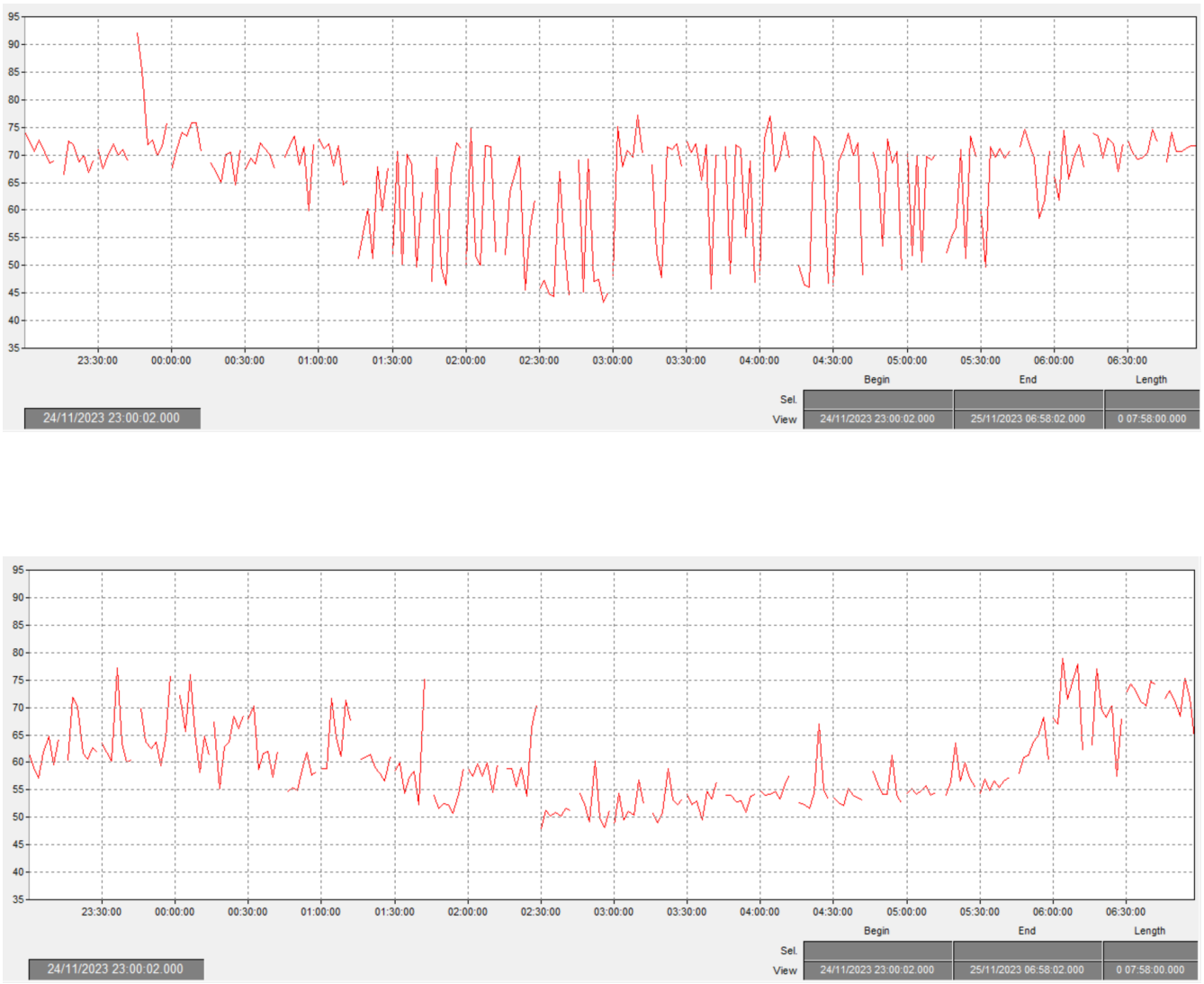

Figure 13. Night-time Noise Event Time History 5th night, Positions 1 and 2 respectively

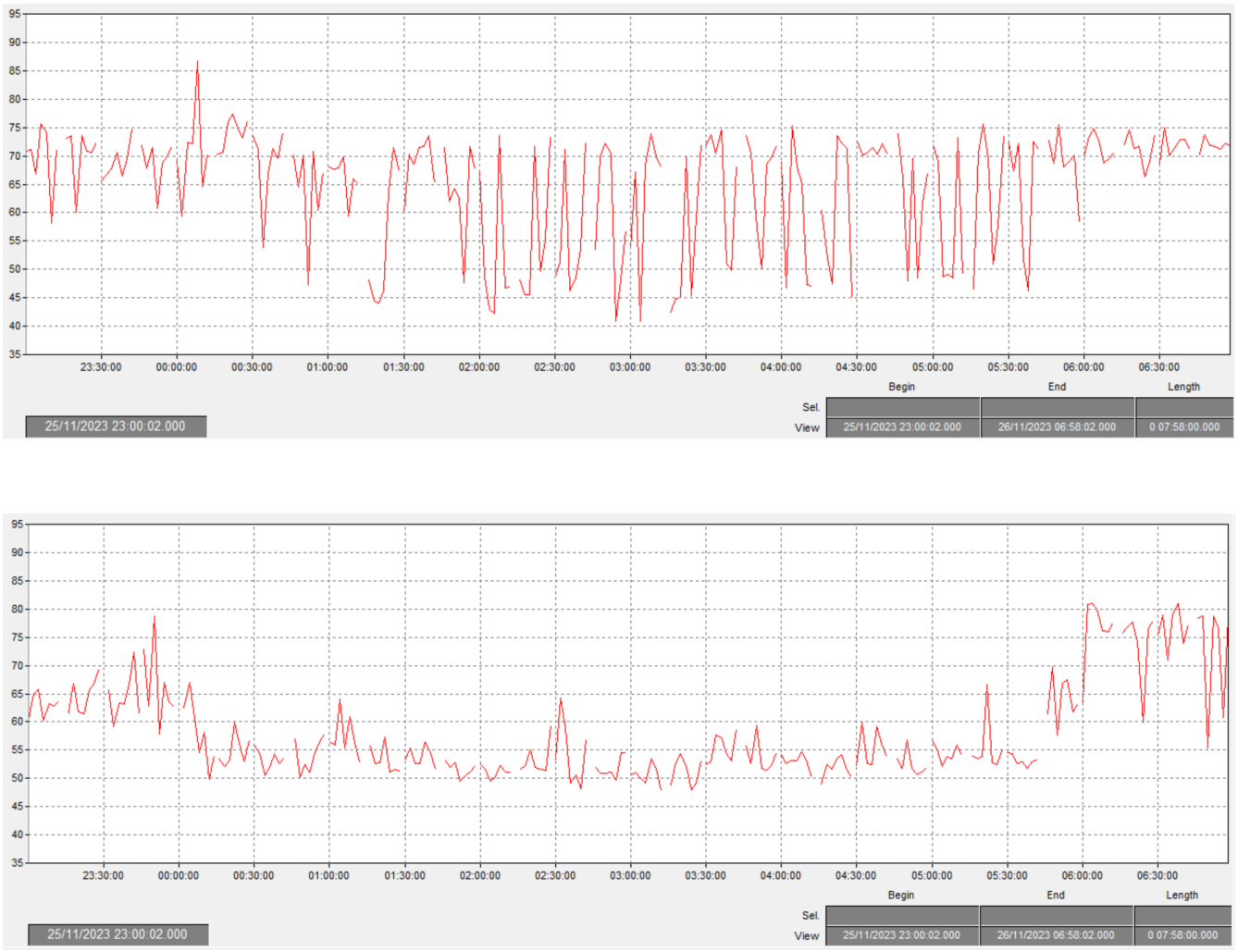

Figure 14. Night-time Noise Event Time History 6th night, Positions 1 and 2 respectively

APPENDIX D – CIVIL AVIATION AUTHORITY NOISE CONTOURS

Figure B12 Stansted 2019 summer day actual modal split (75% SW / 25% NE) Leq contours

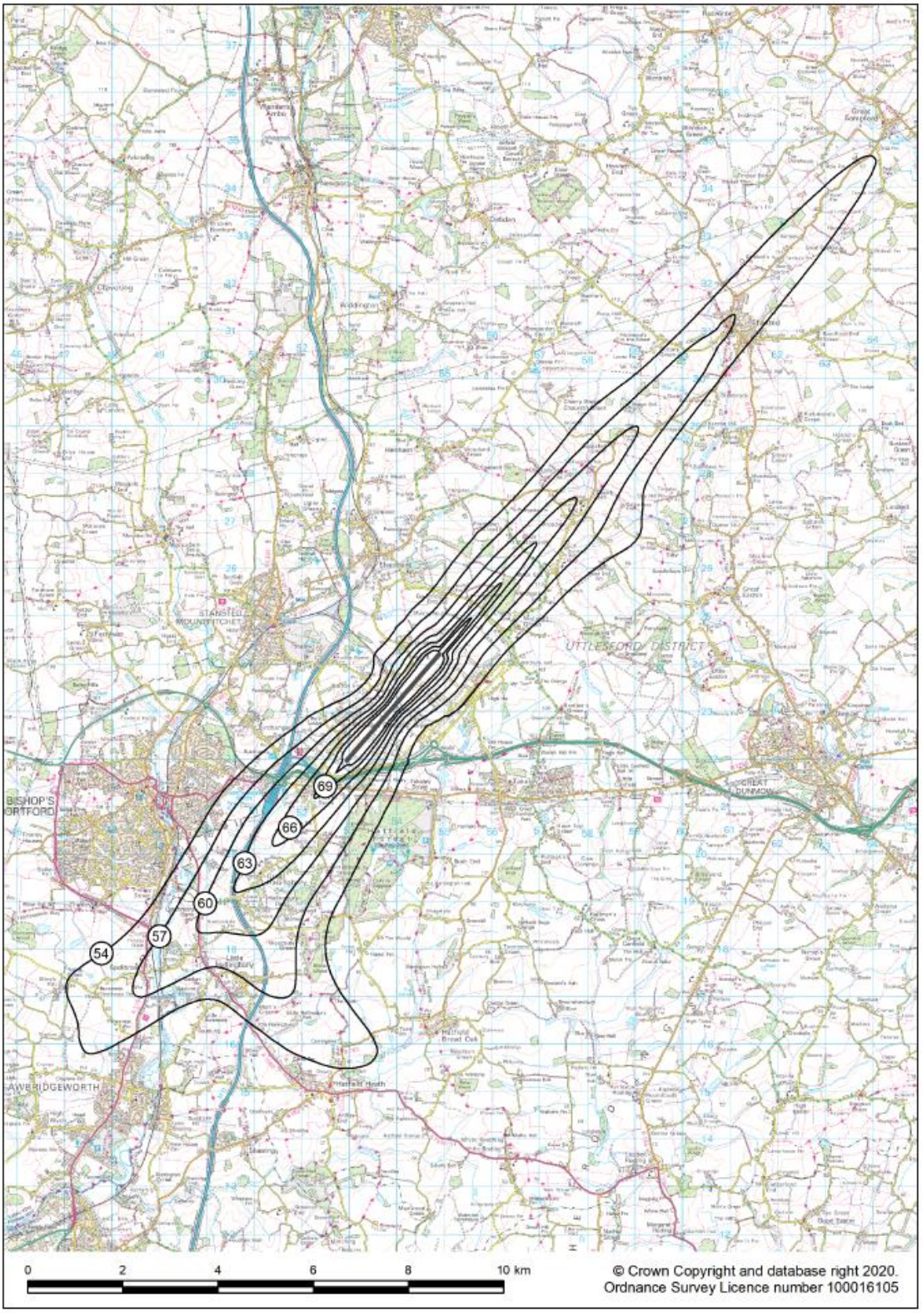

Figure 15. Stanstead Airport 2019 Summer Day Noise Contours

Figure B13 Stansted 2019 summer night actual modal split (75% SW / 25% NE) Leq

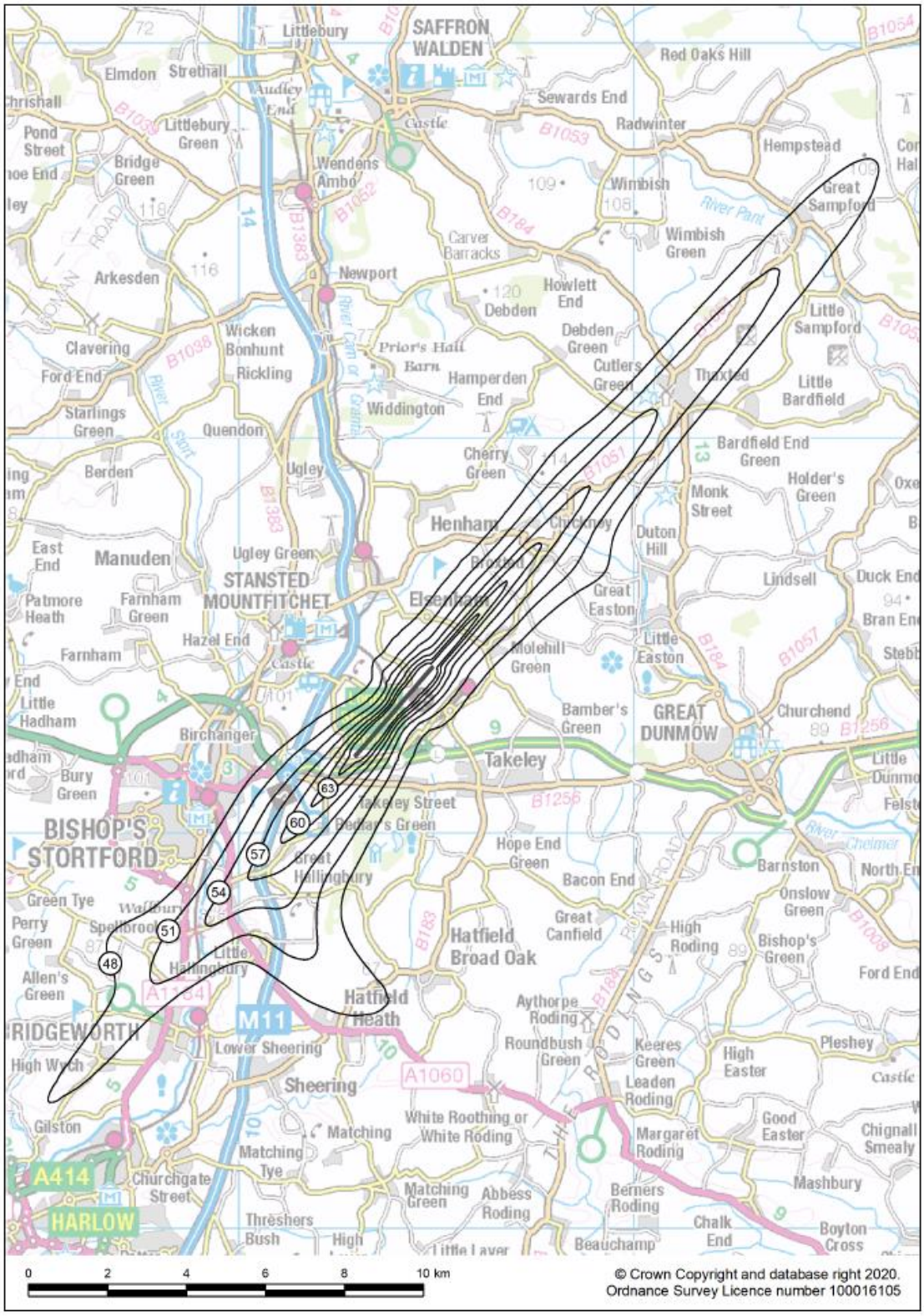

Figure 16. Stanstead Airport 2019 Summer Night Noise Contours

APPENDIX E - DEFINITION OF TERMS

$L_{Aeq,T}$: Defined in WHO as exposure to noise for the duration of a given time interval T (a 24-hour period, a night, a day, an evening) is expressed as an equivalent sound pressure level (measured in dB(A)) over the interval in question.

L_{Amax} : Defined in WHO as the maximum outdoor sound pressure level associated with an individual noise event.

L_{Afmax} : Defined in WHO as the maximum outdoor sound pressure level associated with an individual noise event, measured with fast time constant option.

L_{A90} : The background sound level as defined in BS4142: 2014 as the A-weighted sound pressure level that is exceeded by the residual sound at the assessment location for 90% of a given time interval, *T*, measured using time weighting F and quoted to the nearest whole number of decibels.

L_{A10} : The A-weighted sound pressure level that is exceeded by the residual sound at the assessment location for 10% of a given time interval, *T*, measured using time weighting F and quoted to the nearest whole number of decibels.

L_{day} : is the A-weighted long-term average sound level as defined in ISO 1996-1: 2016, determined over all the day periods of a year.

$L_{evening}$: is the A-weighted long-term average sound level as defined in ISO 1996-1: 2016, determined over all the evening periods of a year.

L_{night} : is the A-weighted long-term average sound level as defined in ISO 1996-1: 2016, determined over all the night periods of a year.

L_{den} : is an average sound pressure level over all days, evenings and nights in a year (EEA, 2010), a compound indicator of the above mentioned L_{day}, $L_{evening}$, and L_{night}.

Measurement time interval, T: The total time over which each individual measurements is taken.