A CAF GROUP COMPANY

ENVIRONMENT

Persimmon Homes Ltd T/A Persimmon

Brascote Lane,

Newbold Verdon RM

Noise Impact Assessment

244726

ENVIRONMENT

Persimmon Homes Ltd T/A Persimmon

Brascote Lane,

Newbold Verdon RM

Noise Impact Assessment

Birmingham
Livery Place, 35 Livery Street, Colmore Business District
Birmingham, B3 2PB
T: 0121 233 3322

Leeds
Whitehall Waterfront, 2 Riverside Way
Leeds, LS1 4EH
T: 0113 233 8000

London
11 Borough High Street
London, SE1 9SE
T: 0207 407 3879

Manchester
11 Portland Street
Manchester, M1 3HU
T: 0161 233 4260

Nottingham
5th Floor, Waterfront House, Station Street
Nottingham, NG2 3DQ
T: 0115 924 1100

November 2024

DOCUMENT ISSUE RECORD

Document Number:	**BLNV-BWB-ZZ-ZZ-RP-YA-0002_NIA_S2_P01**
BWB Reference:	**244726-001**

Revision	Date of Issue	Status	Author:	Checked:	Approved:
1	01/11/2024	Issue	Lucy Elmer BA (Hons), Msc, MIOA	Sam Ellwood BSc (Hons) MIOA	Mike Barrett BSc (Hons), MIOA

Notice

EXECUTIVE SUMMARY

BWB Consulting Ltd was appointed by Persimmon Homes Ltd T/A Persimmon to undertake an environmental noise assessment for a proposed residential development at Brascote Lane, Newbold Verdon.

This assessment has been undertaken based on the results of a baseline noise survey undertaken in November 2021 at the Site, subsequent noise measurements of the kitchen extract system at The Windmill Inn in December 2023 and source noise data for live music events. The assessment has been undertaken in accordance with current standards and guidance.

The noise assessment shows that with appropriate consideration to noise mitigation measures, a commensurate level of protection can be afforded to future noise sensitive receptors on the Site.

All internal criteria across the Site, are likely to be achieved with standard double glazing such with a configuration of 6mm pane / 12mm airgap / 8mm pane, which would need to provide a minimum $R_w + C_{tr}$ of 30 dB. Acoustically treated trickle ventilators, such as the Greenwood 2500EA, which achieve a minimum performance of $D_{n,e,w} + C_{tr}$ 36 dB are likely to be required.

Based on the results of the assessment, it has been demonstrated that the Site is suitable for residential development, and the amenity of future receptors can be protected.

CONTENTS

FIGURES

APPENDICES

1. INTRODUCTION

Appointment & Background

1.1 BWB Consulting Ltd was appointed by Persimmon Homes Ltd T/A Persimmon (the Client) to undertake a noise assessment to support the Reserved Matters planning application for a proposed residential development of 239 dwellings on land at Brascote Lane (the Site).

1.2 BWB has previously undertaken a noise impact assessment (BLN-BWB-ZZ-ZZ-RP-YA-0002_NIA_S2_P04 dated December 2023) to support the outline planning application for the proposed development.

1.3 A Reserved Matters Application has been submitted and the following comments have been received from the Environmental Health Officer;

> *"With regard to noise can the applicant provide details of the mitigation measures to be adopted. The Noise Impact Assessment submitted during the planning phase of 22/02277/OUT was updated during the submissions for a subsequent application (23/01037/OUT). In the updated version (December 2023) recommendations were made regarding mitigation for both road noise and noise from the adjacent Windmill Inn. That report recommended that "Based on the results of the assessment, it has been demonstrated that the Site is suitable for residential development, however, it is recommended that further assessment is undertaken at the appropriate stage, once the development design has been finalised".*

1.4 This assessment considers noise from road traffic affecting the Site, along with noise from the kitchen extract system and live music events at The Windmill Inn.

1.5 This assessment has been undertaken based on the results of the baseline noise survey undertaken in November 2021 at the Site, measurements undertaken at the Windmill Inn in December 2023, and source noise data for live music events. The assessment has been undertaken in accordance with current standards and guidance.

1.6 Where appropriate, consideration has been given to noise mitigation measures to demonstrate how an appropriate level of protection could be afforded to proposed Noise Sensitive Receptors (NSRs) within the Site.

1.7 This report is necessarily technical in nature, so to assist the reader, a glossary of acoustic terminology can be found in **Appendix A**.

Site Setting

1.8 The Site currently comprises open farmland. To the north and north west, the Site is bordered by open land and existing allotments, with existing residential dwellings beyond. To the east, the Site is bordered by an existing residential dwelling and associated land. To the south and the west, the Site is bordered by Brascote Lane. There is an existing public house, The Windmill Inn, located to the south west. Further west,

beyond Brascote Lane is an existing quarry that is no longer in operation and small waste water treatment works. The location of the Site is shown in **Figure 1.1**.

Figure 1.1: Site Location

Proposed Development

1.9 The proposed development will comprise 239 residential dwellings, associated infrastructure. The Site layout is shown below in **Figure 1.2.**

Figure 1.2: Site layout

Source: The Greenfield Design Partnership (Drawing Number TGDP/BLNV/CPL-1)

2. STANDARDS AND GUIDANCE

National Planning policy Framework (NPPF)

2.1 Most recently updated in December 2023, this document sets out the Government's planning policies for England. It makes the following reference to noise in the section entitled Conserving and enhancing the natural environment:

"180. Planning policies and decisions should contribute to and enhance the natural and local environment by:

[…]

e) preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability. Development should, wherever possible, help to improve local environmental conditions such as air and water quality, taking into account relevant information such as river basin management plans."

2.2 It also makes the following references to noise in the Section entitled *Ground conditions and pollution*:

"191. 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[60];

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.

[65] See Explanatory Note to the Noise Policy Statement for England (Department for Environment, Food & Rural Affairs, 2010)."

BS 8233:2014: Guidance on Sound Insulation and Noise Reduction for Buildings

2.3 This standard provides guidance for the control of noise in and around buildings. The guidance provided within the document is applicable to the design of new buildings, or refurbished buildings undergoing a change of use, but does not provide guidance on assessing the effects of changes in the external noise levels to occupants of an existing building.

2.4 The guidance provided includes appropriate internal and external noise level criteria which are applicable to dwellings for steady external noise sources. It is stated that it is

desirable that the internal ambient noise level does not exceed the following criteria set out **Table 2.1**.

Table 2.1: Summary of Internal Ambient Noise Levels to be achieved in Habitable Rooms when Assessed in Accordance with BS 8233

Activity	Location	Period	
		07:00 to 23:00 Hours, i.e. Daytime	23:00 to 07:00 Hours, i.e. Night-time
Resting	Living Room	35 dB $L_{Aeq, 16\ Hour}$	-
Dining	Dining Room/area	40 dB $L_{Aeq, 16\ Hour}$	-
Sleeping (daytime resting)	Bedroom	35 dB $L_{Aeq, 16\ Hour}$	30 dB $L_{Aeq, 8\ Hour}$

2.5 Whilst BS 8233:2014 recognises that a guideline value may be set in terms of SEL or L_{AFmax} for the assessment of regular individual noise events that can cause sleep disturbance during the night-time, a specific criterion is not stipulated. Accordingly, reference has been made in this assessment to the World Health Organisation (WHO) 1999: *Guidelines for Community Noise* below.

2.6 With respect to external amenity space such as gardens and patios it is stated that it is desirable that the noise level does not exceed 50 dB $L_{Aeq,T}$, with an upper guideline value of 55 dB $L_{Aeq,T}$ which would be acceptable in noisier environments. It is then confirmed that higher external noise criteria may be appropriate under certain circumstances such as within city centres urban areas, and locations adjoining the strategic transportation network, where it may be necessary to compromise between elevated noise levels and other factors such as convenience of living, and efficient use of land resource.

World Health Organisation (WHO) 1999: Guidelines for Community Noise

2.7 The World Health Organisation (WHO) guidance: 1999: Guidelines for Community noise includes guidance for individual maximum noise events during the night-time. This document draws upon guidance from Vallet and Vernay, which states:

> "For good sleep, it is believed that indoor sound pressure levels should not exceed approximately 45 dB L_{AFmax} more than 10-15 times per night".

The Department for Environment Food and Rural Affairs (DEFRA) Noise from Pubs and Clubs (Phase II) Final Report, 2006

2.8 The Licensing Act 2003 brought licensed premises within the Scope of the Noise Act 1996. The Noise Act 1996 uses a noise protocol for calculating the accepted level and a procedure for the seizure and forfeiture of noise making equipment. It is an offence to cause noise at night above the permitted level once a warning has been issued. The initial noise protocol was developed for domestic noise at night; however noise from licensed premises may be of a different nature and therefore a different noise protocol may be more appropriate.

2.9 Defra instructed research to consider the assessment methods and criteria for assessment of entertainment noise from licensed premises. The objective of the study

was to identify which of the methodologies and criteria tested were best suited for assessment of entertainment noise from pubs and clubs late at night. The results of the study in their homes indicated that for the majority of the public the onset of audibility of the entertainment noise did not equate to a threshold for enforcement of acceptability for intrusive entertainment noise late at night. The majority of Environmental Health Practitioners also reported that for more regular occurrences (i.e. once a week) the onset of audibility of the entertainment noise did not equate to a threshold for enforcement action for intrusive entertainment noise.

2.10 The results of the study indicated the best noise metrics and assessment method options which include an assessment of the absolute L_{Aeq} noise level over a 5-minute period. The document states:

> *"In the context of this study's objective to determine criteria that represent a clearly unacceptable situation, the noise levels at which test subjects felt the noise was "just unacceptable" for an event within a habitable room with windows closed was at 34 dB $L_{Aeq,5\ minute}$."*

3. BASELINE NOISE CLIMATE

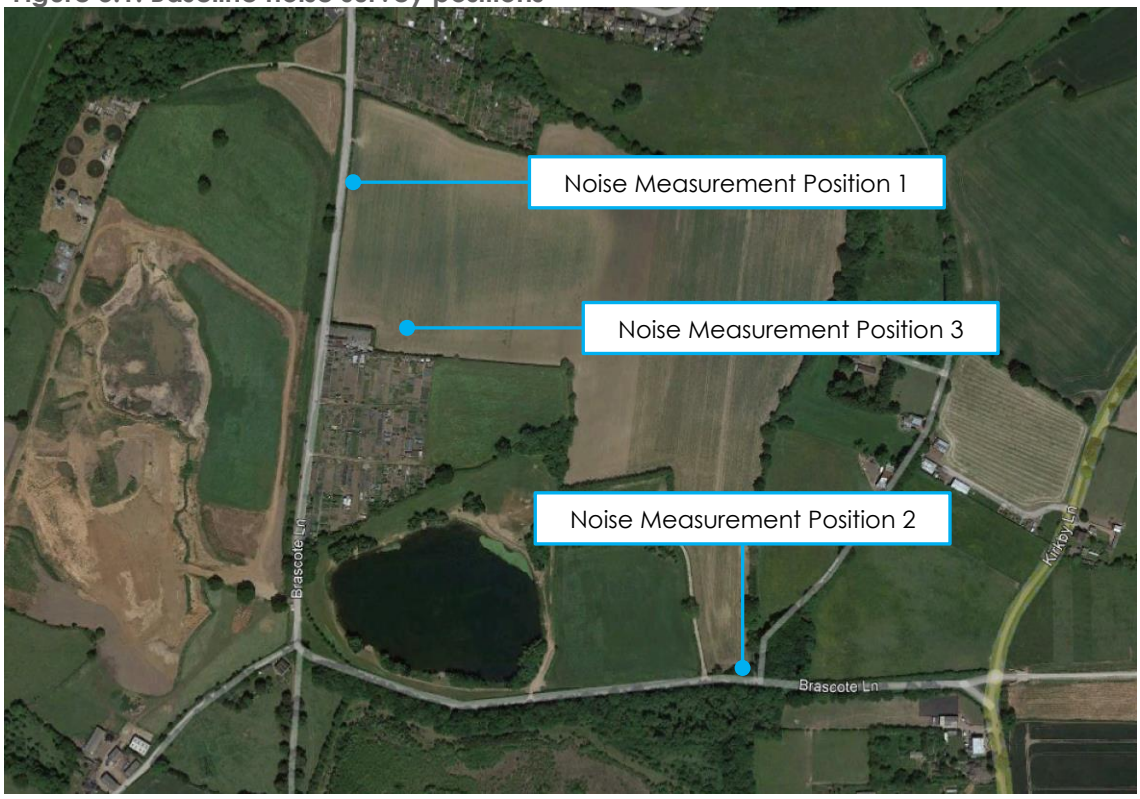
Summary

3.1 Noise surveys have been undertaken to determine the prevailing noise climate across the Site. The primary sources of noise which have been measured during the surveys are road traffic on Brascote Lane to the west and south, and kitchen extract noise emissions from The Windmill Inn to the southwest.

3.2 Baseline noise measurements have been undertaken at the positions identified in **Figure 3.1.** Details of the measurements undertaken at each position are provided below and overleaf.

3.3 During the baseline noise survey in November 2021, observations were made of the nearby quarry and Waste Water Treatment Works (WWTW). It was noted that the WWTW was either not operational or not audible at the Proposed Development Site. As previously discussed, it is understood that the quarry is not operational. Therefore these sources have not been included within the following assessment.

Figure 3.1: Baseline noise survey positions



Survey Methodology

Noise Measurement Position 1 (NMP1)

3.4 Unattended noise measurements were undertaken at NMP1 over a 24-hour period commencing at 19:00 on Tuesday 2nd November 2021.

3.5 Measurement equipment at NMP1 was established on the western boundary, in free-field conditions at a height of 1.5 m above local ground level and at circa. 6 m from the nearside kerb edge of Brascote Lane. During periods of attendance on the site (i.e. between 18:00 until 19:15 on 02/11/21, and from 16:00 until 19:00 on 03/11/2021) the noise climate at NMP1 was noted to be dominated by road traffic on Brascote Lane, located to the west.

Noise Measurement Position 2 (NMP2)

3.6 Unattended noise measurements were undertaken at NMP2 over a 24-hour period commencing at 19:00 on Tuesday 2nd November 2021.

3.7 Measurement equipment at NMP2 was established on the southern boundary, in free-field conditions at a height of 1.5 m above local ground level and at circa. 5 m from the nearside kerb edge of Brascote Lane. During periods of attendance on the site (i.e. between 18:00 until 19:15 on 02/11/21, and from 16:00 until 19:00 on 03/11/2021) the noise climate at NMP2 was noted to be dominated by road traffic on Brascote Lane, located to the south.

Noise Measurement Position 3 (NMP3)

3.8 Attended noise measurements were undertaken at NMP3 from 20:05 until 20:10 on Wednesday 14th December 2023.

3.9 The location is considered representative of proposed dwellings most likely to be exposed to kitchen extract noise emissions, located approximately 40 m from the site boundary. The microphone was at a height of 1.2 m above the ground level in free-field conditions. The measurement location had direct line of site of the kitchen extract fan, which was located approximately 68 m away. The kitchen extract was just audible at this measurement location with car passbys noted as the dominant noise sources. Patron noise from The Windmill Inn was not audible at this location during attendance. The kitchen extract noise was consistent in level and continuous.

Measurement Equipment

3.10 The baseline noise surveys were undertaken using the Class 1 specification noise measurement equipment detailed in **Table 3.1**. Equipment was calibrated using a portable calibrator immediately before and after the measurements with no significant drift in calibration observed. The sound level meters, pre-amplifiers and microphones were calibrated to traceable standards at an accredited laboratory within the 24 months prior to the measurements. The portable calibrators were calibrated within the 12 months preceding the dates of the surveys.

Table 3.1: Noise measurement equipment

Position	Equipment	Make & Model	Serial Number
NMP1	Sound Level Meter	NTi XL2	A2A-15860-E0
	Microphone	B&K 4189	2008903
	Preamp	NTi MA220	7148

Position	Equipment	Make & Model	Serial Number
NPM2	Sound Level Meter	NTi XL2	A2A-11111-E0
	Microphone	B&K 4189	2005673
	Preamp	NTi MA220	6735
NMP1, NMP2	Calibrator	01dB-Stell Cal 21	34675335
NPM3	Sound Level Meter	Svantek SVAN 971	72616
	Microphone	ACO 7052E	69463
	Preamp	Svantek SV18	72283
	Calibrator	Svantek SV33A	73412

Meteorological Conditions

3.11 The weather throughout both surveys remained conducive to environmental noise measurement, it being dry with wind speeds <5ms^{-1} on both occasions.

Measurement Results

3.12 A summary of daytime, and night-time noise levels at NMP1 and NMP2 is presented below in **Tables 3.2** to **3.5**. Details of the short term attended source measurements at NMP3 are presented in **Tables 3.6.**

Table 3.2: Summary of measured sound pressure levels at NMP1

Period	Start Time	Duration	dB $L_{Aeq,T}$	dB $L_{A90,T}$[2]	dB L_{AFmax}
Daytime[1]	02/11/2021 19:00	16-hours	58	39	-
Night-Time	02/11/2021 23:00	8-hours	50	33	77[3]

[1] includes periods between 19:00 – 23:00 on 02/11/2021 and from 07:00 – 19:00 on 03/11/2021
[2] arithmetic average background noise level ($L_{A90,15mins}$) during measurement period
[3] 10th Percentile L_{AFmax} noise levels during measurement period

Table 3.3: Summary of octave band day & night-time sound pressure levels at NMP1

Period	Octave Band Sound Pressure Levels (L_{eq} dB)								dB(A)
	63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz	
Daytime	59	57	53	52	57	50	38	40	58
Night-Time	52	49	45	44	48	42	31	25	50

Table 3.4: Summary of measured sound pressure levels at NMP2

Period	Start Time	Duration	dB $L_{Aeq,T}$	dB $L_{A90,T}$[2]	dB L_{AFmax}
Daytime[1]	02/11/2021 19:00	16-hours	58	39	-
Night-Time	02/11/2021 23:00	8-hours	50	31	78[3]

[1] includes periods between 19:00 – 23:00 on 02/11/2021 and from 07:00 – 19:00 on 03/11/2021
[2] arithmetic average background noise level ($L_{A90,15mins}$) during measurement period
[3] 10th Percentile L_{AFmax} noise levels during measurement period

Table 3.5: Summary of octave band day & night-time sound pressure levels at NMP2

Period	Octave Band Sound Pressure Levels (L_{eq} dB)								dB(A)
	63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz	
Daytime	59	57	56	54	56	49	40	35	58
Night-Time	51	49	46	45	47	41	33	29	50

Table 3.6: Summary of Measured Sound Pressure Levels at NMP3

Time	Duration (mm:ss)	dB $L_{Aeq,T}$	dB $L_{A90,T}$
20:10	05:00	43	40

3.13 It should be noted that no outdoor music events were programmed to take place at The Windmill Inn around the time of the surveys. Therefore, in order to assess noise from live music events in the outdoor space at The Windmill Inn, source noise data have been used from the BWB data library for music at an outdoor wedding venue. The measured data were obtained at an outdoor wedding venue with a capacity of 150-200 people, which is deemed to exceed the likely capacity of the pub's outdoor space. As such, the sound reinforcement system and measured noise levels are likely to exceed those for a live event at the pub.

3.14 **Table 3.7** presents the octave band sound pressure level ($L_{Aeq,5min}$)for amplified music from the outdoor wedding venue, measured on the dancefloor.

Table 3.7: Summary of octave band sound pressure levels from an outdoor wedding venue

Octave Band Sound Pressure Levels ($L_{eq,5min}$ dB)								dB(A)
63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz	
95	87	87	87	88	85	86	80	93

4. ASSESSMENT

4.1 The results of the baseline noise survey undertaken in November 2021 and the kitchen extract source measurements undertaken in December 2023 have been used as a basis for the noise assessment of the Site's suitability for residential development. Additional source noise data which are considered representative of outdoor live music events at The Windmill Inn have also been used. The assessment considers noise from road traffic on Brascote Lane both to the west and south of the Proposed Development and noise from The Windmill Inn to the south west.

Noise Model

4.2 A detailed noise model has been generated in order to calculate the daytime and night-time noise propagation across the Site from road traffic on Brascote Lane and for noise from live music events in the outdoor area at The Windmill Inn. The following prediction methodologies were adopted for the modelling exercise:

- The noise model was set up to apply the noise prediction methodology set out in the 1988 Department of Transport and the Welsh Office document Calculation of Road Traffic Noise for road traffic noise sources;
- For industrial/commercial noise sources, the noise model was set to apply the noise prediction methodology set out in ISO 9613-2:1996 Acoustics – *Attenuation of sound during propagation outdoors – Part 2: General method of calculation*[1];
- The noise data collected from the Site was used to calibrate the road traffic noise sources on Brascote Lane;
- Mapping of the Site and the surrounding area was calibrated into the noise model based on known Ordinance Survey grid reference points;
- Indicative ground topography was approximated using Lidar Data available from the DEFRA Website;
- Off-site buildings which would provide screening to the Site have been incorporated as reflective façades;
- To reflect the local ground cover, ground absorption was set to G = 0.5 (50% acoustically absorptive ground);
- The model was set to include second order reflected noise from solid structures;
- Noise levels in outdoor amenity spaces have been predicted with the grid height set at 1.5m;
- Incident noise levels at windows of habitable rooms have been predicted at 4m; and
- Noise from the live music event has been modelled as a point source at 1.5m in height centrally within the outdoor area at The Windmill Inn.

4.3 NMP1 and NMP2 have been included into the model and the resultant road traffic noise has been adjusted until the model is equal to the noise levels for the daytime and night-time periods.

[1] International Organization for Standardization (1996), IS0 9613-2:1996, Acoustics – Attenuation of sound during propagation outdoors – Part 2: General method of calculation

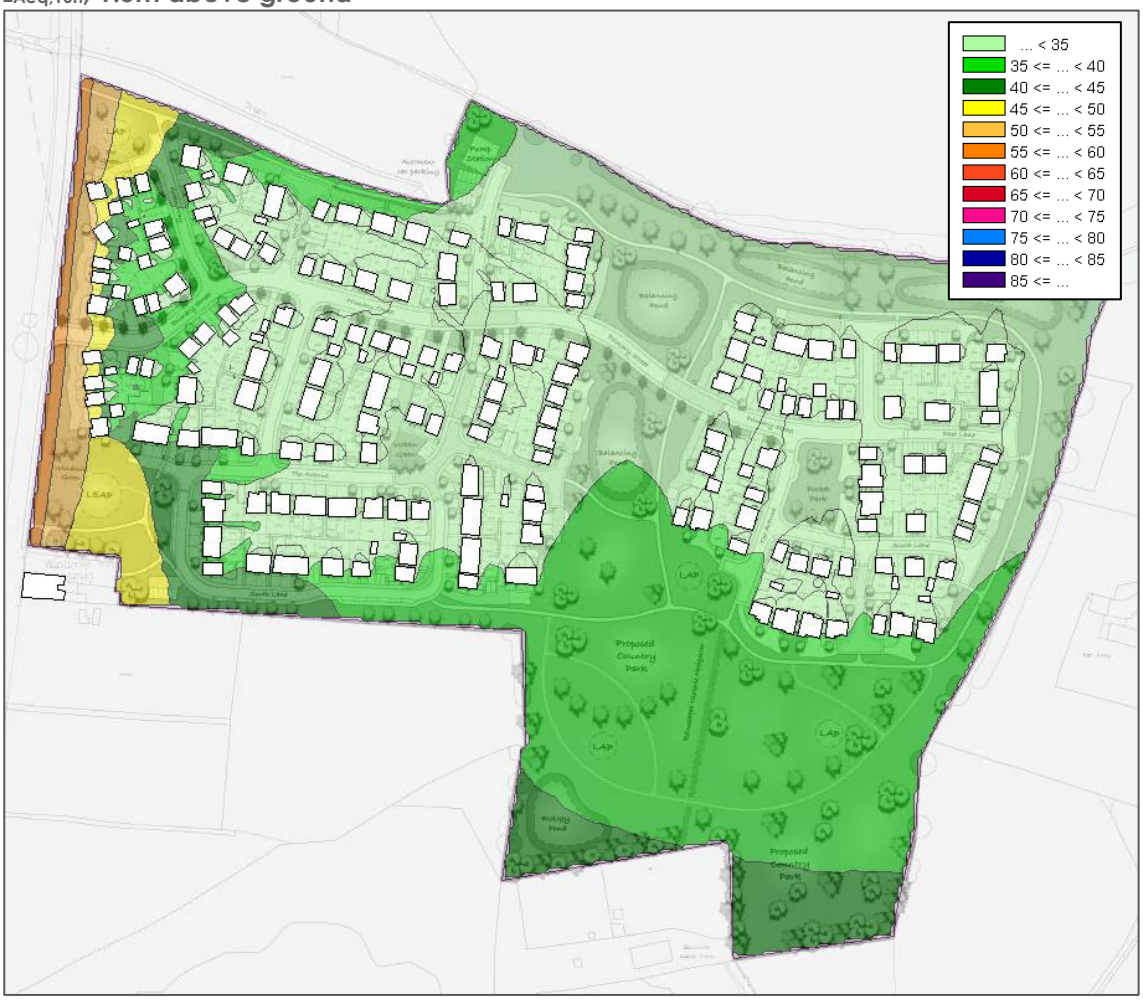
4.4 The site layout, shown in **Figure 1.2**, has been incorporated into the model, and the free-field level at the nearest façades have been calculated. Noise contours have been calculated showing the external free-field noise level in external areas, across the Site. The predicted noise levels have been used to inform the assessment.

Road Traffic Noise

External Daytime Noise Levels

4.5 The noise contour plot, shown in **Figure 4.1** indicates that outdoor living areas across the Site are predicted to be below the upper guideline value of 55dB $L_{Aeq,16h}$. Therefore, consideration has not been given to mitigation measures.

Figure 4.1: Predicted Road Traffic Noise during the Daytime without Mitigation, dB $L_{Aeq,16h}$, 1.5m above ground



Internal Noise Levels

4.6 The results of the noise modelling indicate that the nearest proposed façade to Brascote Lane would be exposed to free-field levels of 55dB $L_{Aeq,16hr}$ and 48dB $L_{Aeq,8hr}$ for daytime and night-time at first floor level. The night-time L_{AFmax} level of 77dB has been corrected

for distance assuming a simple point source correction from the edge of the carriageway, which results in a noise level of 66dB $L_{AF,max}$ at the nearest façade.

4.7 Assuming a 15dB loss through a partially opened window, this would result in internal levels of 40dB $L_{Aeq,16h}$ and 33dB $L_{Aeq,8h}$ for daytime and night-time, respectively. A partially opened window would also result in an internal level of 51dB L_{AFmax} during the night-time. Therefore, the criteria of 35dB for the daytime and 30dB / 45dB L_{Afmax} for the night-time, are likely to be exceeded, assuming partially opened windows for the nearest proposed dwellings to Brascote Lane. Consideration has been given to mitigation in **Section 5**.

Kitchen Extract Noise

4.8 For the assessment of noise emissions from the kitchen extract system at The Windmill Inn, which is understood to operate until 20:30, noise measurement data at NMP3 have been used. It was noted that at the time of the measurements that the kitchen extract was only just perceptible in between car passbys on Brascote Lane. On this basis the measured L_{A90} at NMP3 is considered representative of the specific noise level of kitchen extract emissions perceptible at NMP3 (i.e. the location of the nearest proposed dwelling).

4.9 As the kitchen extract noise was not perceived as exhibiting any notable acoustic features, no corrections have been applied to the measured L_{A90} noise level of 40 dB.

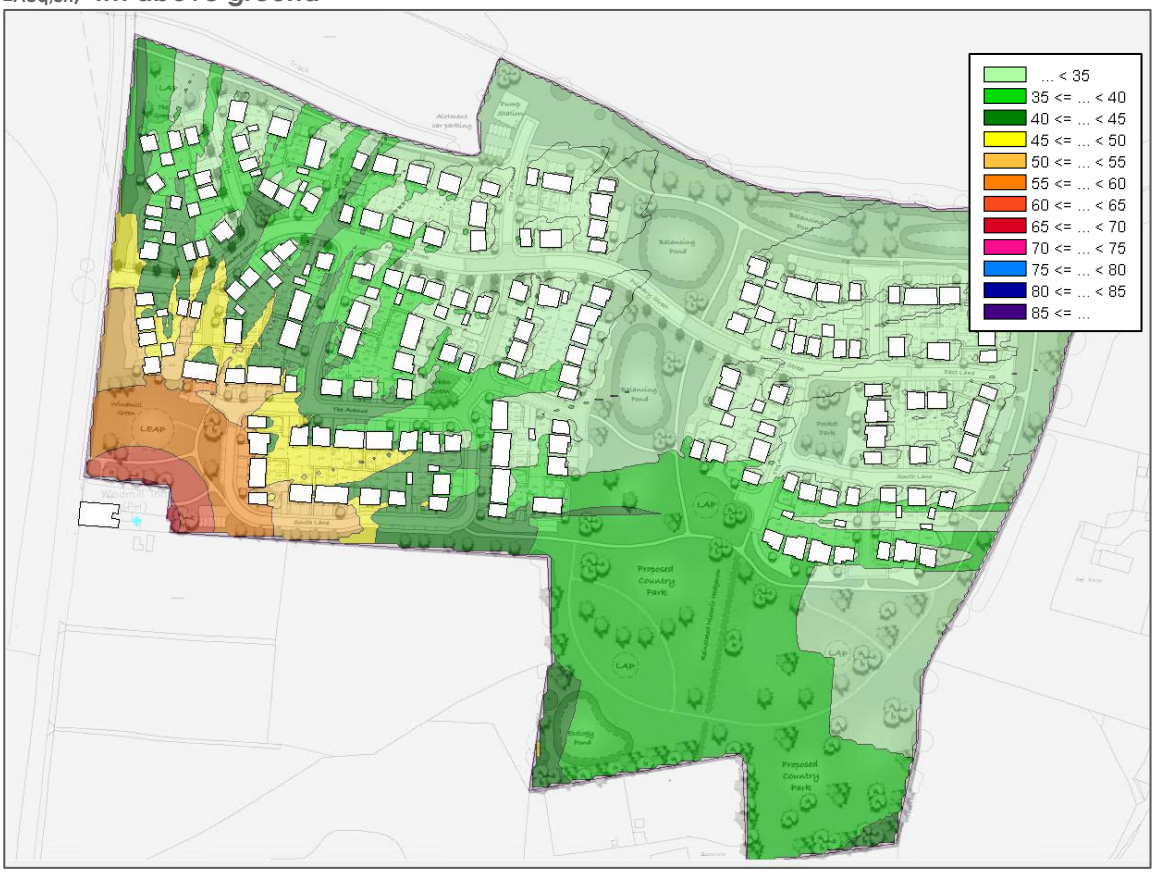
4.10 Based on a rating level of 40 dB, externally at a location representative of the nearest proposed dwelling, it is considered unlikely that a significant adverse impact will result, when compared with the upper guideline threshold of 55dB $L_{Aeq,16h,}$ for outdoor living areas. Furthermore, assuming a 15dB loss through a partially opened window, this would result in an internal level of 25dB $L_{Aeq,16h,}$ which is significantly below the internal ambient noise level criterion of 35 dB. Therefore, consideration has not been given to mitigation measures to reduce noise levels.

Live Music Event Noise

4.11 It is noted that live music events outdoor at The Windmill Inn, have previously taken place and concluded before 23:00. However, the premises licence allows for such activities up to 03:00. Therefore this assessment assumes that events take place during the night-time period, which is considered the worst-case scenario.

4.12 **Figure 4.2** presents the predicted noise levels ($L_{Aeq,5min}$) during an outdoor music event in the night-time period.

Figure 4.2: Predicted Outdoor Event Noise during the Night-time without Mitigation, dB $L_{Aeq,8h}$, 4m above ground



Internal Noise Levels

4.13 The results of the noise modelling indicate that the nearest proposed façade to the event would be exposed to free-field levels of 57dB $L_{Aeq,5min}$ for the night-time at first floor level. Assuming a 15dB loss through a partially opened window, this would result in internal levels of 42dB $L_{Aeq,5min}$ for night-time.

4.14 Based on the predicted internal noise level at the worst affected proposed façade consideration is given to mitigation measures in **Section 5**, based on windows being closed during a night-time event.

5. MITIGATION

5.1 **Section 4** has determined that consideration should be given to mitigation measures for internal habitable areas of the Site to provide a commensurate level of protection against event noise, and road traffic noise to a lesser degree, for future occupants.

Internal Living Areas

5.2 It is widely considered that first amelioration measure available to an occupant will be to close windows. Therefore, in order to assess the noise mitigation required to ensure an adequate level of protection against noise, it is appropriate to explore the protection that could be afforded by the sound insulation performance of the external building fabric, and in particular the glazing elements.

5.3 Detailed noise break-in calculations have been undertaken in accordance with the rigorous method from section G.2 from BS 8233 based on the frequency spectra measured on-site and the following dimension:

- Room dimensions of 3m (width) x 2.5m (depth) x 2.5m (height);
- Double glazed window dimensions of 1.0m (width) x 2.5m (height);
- External building fabric elements shall achieve a sound reduction performance of at least Rw + Ctr 48; and,
- A reverberation time of 0.5 seconds.

5.4 The break-in calculations have been undertaken for the 1st floor, to provide a worst-case scenario.

5.5 To achieve the internal noise criterion of 34 dB $L_{Aeq,5min}$, adopted from the *Noise from Pubs and Clubs (Phase II)* guidance, based on the façade closest to the music event at The Windmill Inn experiencing 57dB $L_{Aeq,5mih}$ free-field at the facade, a reduction of 23dB(A) would be required for habitable rooms. Based on the predicted noise levels from Brascote Lane, such an acoustic performance would also be sufficient to mitigate road traffic noise. It should be noted that the guidance makes reference only to $L_{Aeq,5min}$ equivalent continuous noise levels and does not make reference to maximum noise events. This is perhaps based on the likelihood that the equivalent continuous noise levels for amplified music will be reasonably consistent with a maximum noise level over a 5 minute period. As such, the mitigation specification is considered to be driven by the predicted $L_{Aeq,5min}$ level.

5.6 All criteria are likely to be achieved with standard double glazing such with a configuration of 6mm pane / 12mm airgap / 8mm pane, which would need to provide a minimum $R_w + C_{tr}$ of 30 dB. Acoustically treated trickle ventilators, such as the Greenwood 2500 EA which achieve a minimum performance of $D_{n,e,w} + C_{tr}$ 36 dB would be required for worst affected properties located nearest to The Windmill Inn and Brascote Lane.

5.7 The dwellings requiring mitigation are shown below in **Figure 5.1**. The mitigation would be required to all floors. For all unmarked dwellings, standard double glazing and openable windows would be appropriate.

Figure 5.1: Properties Requiring Uprated Glazing and Ventilation

5.8 **Table 5.1** shows the resultant internal noise levels in the worst affected rooms.

Table 5.1: Predicted External and Internal Noise Levels, dB

Mitigation	Predicted External Noise Level, free-field (dB)			Resultant Internal Noise Level		
	$L_{Aeq,16h}$	$L_{Aeq,8h}$	L_{AFmax}	$L_{Aeq,16h}$	$L_{Aeq,8h}$	L_{AFmax}
6mm pane / 12mm airgap / 8mm pane and Greenwood 2500 EA	57	57	66	28	28	38

5.9 The above presents solutions to satisfy the proposed internal ambient noise limits within habitable room during normal ventilation conditions to meet Part F minimum ventilation.

5.10 It should be noted that the minimum sound insulation performance requirement for trickle ventilators outlined above assume that one ventilator is required in each room to meet the whole dwelling ventilation rates from ADF of the Building Regulations. Should additional ventilators be required, the minimum sound insulation performance of each ventilator is required to increase as per the values in **Table 5.2**.

5.11 The specification of the required number of ventilators to achieve compliance with ADF requirements is beyond the scope of this report and should be confirmed by the project Mechanical and Electrical Engineers.

Table 5.2: Correction to Ventilator Performance Depending on Number of Ventilators

Number of Ventilators Required per Room	Additional Performance Required per Ventilator (dB)
1	0
2	+3
3	+5
4	+6

6. CONCLUSION AND RECOMMENDATIONS

6.1 BWB Consulting Ltd was appointed by Persimmon Homes Ltd T/A Persimmon to undertake an environmental noise assessment for a proposed residential development at Brascote Lane, Newbold Verdon.

6.2 This assessment has been undertaken based on the results of a baseline noise survey undertaken in November 2021 at the Site, subsequent noise measurements of the kitchen extract system at The Windmill Inn in December 2023 and source noise data for live music events. The assessment has been undertaken in accordance with current standards and guidance.

6.3 The noise assessment shows that with appropriate consideration to noise mitigation measures, a commensurate level of protection can be afforded to future noise sensitive receptors on the Site.

6.4 All internal criteria across the Site, are likely to be achieved with standard double glazing such with a configuration of 6mm pane / 12mm airgap / 8mm pane, which would need to provide a minimum $R_w + C_{tr}$ of 30 dB. Acoustically treated trickle ventilators, such as the Greenwood 2500EA, which achieve a minimum performance of $D_{n,e,w} + C_{tr}$ 36 dB are likely to be required.

6.5 Based on the results of the assessment, it has been demonstrated that the Site is suitable for residential development, and the amenity of future receptors can be protected.

APPENDICES

APPENDIX A: Glossary of Terms

Noise

Noise is defined as unwanted sound. Human ears are able to respond to sound in the frequency range 20 Hz (deep bass) to 20,000 Hz (high treble) and over the audible range of 0 dB (the threshold of perception) to 140 dB (the threshold of pain). The ear does not respond equally to different frequencies of the same magnitude but is more responsive to mid-frequencies than to lower or higher frequencies. To quantify noise in a manner that approximates the response of the human ear, a weighting mechanism is used. This reduces the importance of lower and higher frequencies, in a similar manner to the human ear.

Furthermore, the perception of noise may be determined by a number of other factors, which may not necessarily be acoustic. In general, the impact of noise depends upon its level, the margin by which it exceeds the background level, its character and its variation over a given period of time. In some cases, the time of day and other acoustic features such as tonality or impulsiveness may be important, as may the disposition of the affected individual. Any assessment of noise should give due consideration to all of these factors when assessing the significance of a noise source.

The most widely used weighting mechanism that best corresponds to the response of the human ear is the 'A'-weighting scale. This is widely used for environmental noise measurement, and the levels are denoted as dB(A) or L_{Aeq}, L_{A90} etc., according to the parameter being measured.

The decibel scale is logarithmic rather than linear, and hence a 3 dB increase in sound level represents a doubling of the sound energy present. Judgement of sound is subjective, but as a general guide a 10 dB(A) increase can be taken to represent a doubling of loudness, whilst an increase in the order of 3 dB(A) is generally regarded as the minimum difference needed to perceive a change under normal listening conditions.

Acoustic Terminology

Term	Description
dB (decibel)	The scale on which sound pressure level is expressed. Sound pressure level is defined as 20 times the logarithm of the ratio between the root-mean-square pressure of the sound field and a reference pressure (2x10-5Pa).
dB(A)	A-weighted decibel. This is a measure of the overall level of sound across the audible spectrum with a frequency weighting (i.e. 'A' - weighting) to compensate for the varying sensitivity of the human ear to sound at different frequencies.
$L_{Aeq,T}$	L_{Aeq} is defined as the notional steady sound level which, over a stated period of time (T), would contain the same amount of acoustical energy as the A - weighted fluctuating sound measured over that period.
L_{Amax}	L_{Amax} is the maximum A - weighted sound pressure level recorded over the period stated. L_{Amax} is sometimes used in assessing environmental noise where occasional loud noises occur, which may have little effect on the overall L_{eq} noise level but will still affect the noise environment. Unless described otherwise, it is measured using the 'fast' sound level meter response.
L_{10} and L_{90}	If a non-steady noise is to be described it is necessary to know both its level and the degree of fluctuation. The L_n indices are used for this purpose, and the term refers to the level exceeded for n% of the time. Hence L_{10} is the level exceeded for 10% of the time, and the L_{90} is the level exceeded for 90% of the time.
Free-field Level	A sound field determined at a point away from reflective surfaces other than the ground with no significant contributions due to sound from other reflective surfaces. Generally as measured outside and away from buildings.
Façade Level	A sound field determined at a distance of 1m in front of a large sound reflecting object such as a building façade.

APPENDIX B: Full Survey Results

Table B1: Full Measurement Results from NMP1

Start Date and Time	Period (T)	dB $L_{Aeq,T}$	dB $L_{A90,T}$	dB L_{AFmax}	Sound Pressure Levels (dB $L_{eq,T}$) per Octave Band (Hz)							
					63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz
02/11/2021 19:00	15-mins	62	36	87	59	62	58	59	59	53	45	30
02/11/2021 19:15	15-mins	62	37	83	57	54	55	57	60	53	41	29
02/11/2021 19:30	15-mins	55	35	77	56	54	53	48	53	46	32	23
02/11/2021 19:45	15-mins	55	34	80	52	57	52	49	54	46	33	25
02/11/2021 20:00	15-mins	57	34	80	52	50	50	49	55	49	35	25
02/11/2021 20:15	15-mins	58	36	83	61	63	55	51	56	49	37	31
02/11/2021 20:30	15-mins	50	35	72	48	46	43	43	48	42	29	20
02/11/2021 20:45	15-mins	56	35	78	53	49	48	49	55	47	34	26
02/11/2021 21:00	15-mins	56	36	77	52	49	49	48	55	48	34	24
02/11/2021 21:15	15-mins	52	34	78	51	50	46	44	50	45	32	22
02/11/2021 21:30	15-mins	52	33	74	50	45	45	44	51	43	30	22
02/11/2021 21:45	15-mins	55	35	74	52	47	47	47	53	46	31	21
02/11/2021 22:00	15-mins	53	36	79	51	48	48	46	51	45	30	21
02/11/2021 22:15	15-mins	53	35	77	53	51	49	48	51	44	32	24
02/11/2021 22:30	15-mins	50	33	73	50	47	47	44	49	40	25	18
02/11/2021 22:45	15-mins	51	34	78	48	45	45	45	50	42	27	19
02/11/2021 23:00	15-mins	48	33	72	53	51	50	44	46	36	22	17
02/11/2021 23:15	15-mins	42	34	56	52	47	46	42	35	22	15	16
02/11/2021 23:30	15-mins	39	30	54	51	46	44	37	31	22	15	16
02/11/2021 23:45	15-mins	48	32	75	47	44	40	40	47	39	25	18

Start Date and Time	Period (T)	dB $L_{Aeq,T}$	dB $L_{A90,T}$	dB L_{AFmax}	Sound Pressure Levels (dB $L_{eq,T}$) per Octave Band (Hz)							
					63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz
03/11/2021 00:00	15-mins	33	31	40	42	42	30	29	30	21	15	16
03/11/2021 00:15	15-mins	44	32	72	44	42	36	37	41	37	27	21
03/11/2021 00:30	15-mins	32	30	40	42	41	28	29	28	21	15	16
03/11/2021 00:45	15-mins	31	30	37	42	41	28	28	27	22	15	16
03/11/2021 01:00	15-mins	36	28	48	49	44	41	34	25	19	14	16
03/11/2021 01:15	15-mins	31	29	41	43	41	28	28	27	20	15	16
03/11/2021 01:30	15-mins	35	30	52	44	42	40	33	28	19	14	16
03/11/2021 01:45	15-mins	32	29	44	42	41	30	28	28	21	16	16
03/11/2021 02:00	15-mins	40	30	53	51	47	45	40	28	20	15	16
03/11/2021 02:15	15-mins	40	30	56	53	47	46	38	27	20	14	16
03/11/2021 02:30	15-mins	30	29	36	43	41	29	27	26	18	14	16
03/11/2021 02:45	15-mins	44	30	69	51	45	43	39	42	34	22	17
03/11/2021 03:00	15-mins	33	30	41	48	44	37	29	24	16	15	16
03/11/2021 03:15	15-mins	49	32	76	50	46	43	41	47	41	27	19
03/11/2021 03:30	15-mins	35	31	43	46	45	39	31	27	18	14	16
03/11/2021 03:45	15-mins	35	32	43	46	46	39	30	27	18	14	16
03/11/2021 04:00	15-mins	49	30	76	48	46	41	40	47	40	26	20
03/11/2021 04:15	15-mins	35	31	45	47	47	38	30	27	18	14	16
03/11/2021 04:30	15-mins	38	33	46	52	50	42	33	30	18	14	16
03/11/2021 04:45	15-mins	47	33	73	50	48	42	39	45	40	29	19

Start Date and Time	Period (T)	dB $L_{Aeq,T}$	dB $L_{A90,T}$	dB L_{AFmax}	Sound Pressure Levels (dB $L_{eq,T}$) per Octave Band (Hz)							
					63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz
03/11/2021 05:00	15-mins	51	35	77	53	50	47	45	49	43	30	22
03/11/2021 05:15	15-mins	52	36	76	56	50	46	44	50	44	32	22
03/11/2021 05:30	15-mins	50	38	74	53	53	48	43	48	41	28	19
03/11/2021 05:45	15-mins	55	39	78	54	50	48	48	53	46	32	22
03/11/2021 06:00	15-mins	55	37	77	54	49	47	47	54	47	34	24
03/11/2021 06:15	15-mins	57	39	79	56	50	49	49	55	49	36	26
03/11/2021 06:30	15-mins	60	41	87	58	58	55	55	58	53	41	37
03/11/2021 06:45	15-mins	57	41	76	59	53	51	50	56	49	38	31
03/11/2021 07:00	15-mins	56	41	79	56	50	48	49	54	48	36	41
03/11/2021 07:15	15-mins	58	43	78	58	51	51	50	56	50	38	29
03/11/2021 07:30	15-mins	60	45	80	62	56	53	54	59	52	41	32
03/11/2021 07:45	15-mins	61	46	79	60	54	53	54	59	52	40	31
03/11/2021 08:00	15-mins	61	45	83	64	62	58	54	59	52	41	32
03/11/2021 08:15	15-mins	60	44	88	59	53	52	52	58	51	39	56
03/11/2021 08:30	15-mins	60	43	79	61	55	53	53	59	52	39	31
03/11/2021 08:45	15-mins	61	44	77	63	56	55	54	59	53	42	34
03/11/2021 09:00	15-mins	59	42	76	58	53	52	51	57	51	39	31
03/11/2021 09:15	15-mins	60	41	80	61	57	55	53	58	52	43	33
03/11/2021 09:30	15-mins	58	40	79	60	51	51	52	56	49	38	34
03/11/2021 09:45	15-mins	58	41	76	60	55	52	52	56	50	38	36

Start Date and Time	Period (T)	dB $L_{Aeq,T}$	dB $L_{A90,T}$	dB L_{AFmax}	Sound Pressure Levels (dB $L_{eq,T}$) per Octave Band (Hz)							
					63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz
03/11/2021 10:00	15-mins	57	39	75	58	52	50	50	56	49	37	29
03/11/2021 10:15	15-mins	57	39	78	57	52	51	50	56	49	37	32
03/11/2021 10:30	15-mins	59	39	75	59	52	53	52	57	50	39	32
03/11/2021 10:45	15-mins	57	39	73	56	52	51	50	56	49	37	32
03/11/2021 11:00	15-mins	58	39	75	57	51	51	51	57	50	38	33
03/11/2021 11:15	15-mins	60	40	76	57	52	53	52	58	51	39	30
03/11/2021 11:30	15-mins	59	41	77	57	52	53	52	58	51	38	30
03/11/2021 11:45	15-mins	57	39	77	57	51	51	51	56	49	38	31
03/11/2021 12:00	15-mins	57	39	75	56	51	51	50	56	49	37	28
03/11/2021 12:15	15-mins	57	38	75	55	50	50	50	56	48	36	29
03/11/2021 12:30	15-mins	57	39	76	58	52	51	50	55	48	36	28
03/11/2021 12:45	15-mins	57	38	77	56	50	51	50	56	48	36	30
03/11/2021 13:00	15-mins	59	38	76	57	54	55	52	58	50	39	33
03/11/2021 13:15	15-mins	57	38	77	55	51	50	50	55	48	36	31
03/11/2021 13:30	15-mins	58	39	74	57	51	51	51	56	49	36	30
03/11/2021 13:45	15-mins	58	40	77	58	52	52	51	57	49	37	30
03/11/2021 14:00	15-mins	58	40	76	58	52	51	51	56	49	37	32
03/11/2021 14:15	15-mins	57	39	75	56	51	50	50	55	49	37	31
03/11/2021 14:30	15-mins	58	39	77	59	51	51	51	57	48	37	30
03/11/2021 14:45	15-mins	58	39	77	58	56	53	52	57	49	37	29

Start Date and Time	Period (T)	dB $L_{Aeq,T}$	dB $L_{A90,T}$	dB L_{AFmax}	Sound Pressure Levels (dB $L_{eq,T}$) per Octave Band (Hz)							
					63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz
03/11/2021 15:00	15-mins	59	39	76	62	58	55	53	57	50	39	32
03/11/2021 15:15	15-mins	59	39	80	58	56	55	54	58	50	38	33
03/11/2021 15:30	15-mins	60	41	76	60	55	54	54	58	51	39	30
03/11/2021 15:45	15-mins	61	40	85	61	67	60	55	59	52	40	32
03/11/2021 16:00	15-mins	59	40	77	62	55	54	54	57	51	39	32
03/11/2021 16:15	15-mins	60	40	77	63	58	57	57	57	50	37	27
03/11/2021 16:30	15-mins	60	41	78	64	66	56	54	58	51	40	33
03/11/2021 16:45	15-mins	61	40	80	58	52	54	53	58	51	38	53
03/11/2021 17:00	15-mins	60	40	78	59	52	53	53	59	52	39	29
03/11/2021 17:15	15-mins	59	40	77	62	54	54	53	58	51	37	28
03/11/2021 17:30	15-mins	60	40	81	63	59	58	55	58	51	39	30
03/11/2021 17:45	15-mins	60	40	82	66	63	60	54	58	51	38	30
03/11/2021 18:00	15-mins	59	39	76	60	54	53	53	57	50	38	30
03/11/2021 18:15	15-mins	58	38	80	63	62	58	52	55	47	35	28
03/11/2021 18:30	15-mins	54	38	73	57	48	48	47	52	45	32	25
03/11/2021 18:45	15-mins	56	38	79	54	50	49	49	55	48	35	29

Table B2: Results from NMP2

Start Date and Time	Period (T)	dB $L_{Aeq,T}$	dB $L_{A90,T}$	dB L_{AFmax}	Sound Pressure Levels (dB $L_{eq,T}$) per Octave Band (Hz)							
					63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz
02/11/2021 19:00	15-mins	60	35	83	59	61	58	56	57	50	39	30
02/11/2021 19:15	15-mins	60	34	80	57	57	56	55	58	51	41	35
02/11/2021 19:30	15-mins	56	33	79	55	55	54	51	54	46	36	29
02/11/2021 19:45	15-mins	58	32	86	60	62	61	54	53	45	35	28
02/11/2021 20:00	15-mins	57	32	81	53	53	52	51	55	48	42	32
02/11/2021 20:15	15-mins	58	34	79	65	58	54	52	55	49	39	34
02/11/2021 20:30	15-mins	52	31	76	49	47	47	45	50	44	33	24
02/11/2021 20:45	15-mins	56	31	79	52	51	51	52	54	47	37	31
02/11/2021 21:00	15-mins	56	32	77	54	51	51	51	54	49	38	29
02/11/2021 21:15	15-mins	49	33	75	52	53	46	43	46	42	32	24
02/11/2021 21:30	15-mins	52	32	76	53	49	48	47	50	44	34	26
02/11/2021 21:45	15-mins	55	33	75	53	49	50	49	53	46	35	26
02/11/2021 22:00	15-mins	48	32	74	49	48	47	44	46	39	27	19
02/11/2021 22:15	15-mins	54	33	77	54	52	51	50	52	46	35	27
02/11/2021 22:30	15-mins	48	31	74	49	48	47	44	46	36	26	20
02/11/2021 22:45	15-mins	52	32	79	51	49	48	49	50	43	32	25
02/11/2021 23:00	15-mins	48	31	73	50	52	50	45	45	36	26	19
02/11/2021 23:15	15-mins	42	31	57	49	49	46	42	32	17	14	16
02/11/2021 23:30	15-mins	40	29	56	49	48	45	38	28	17	14	16
02/11/2021 23:45	15-mins	48	29	77	47	45	43	42	46	40	29	23

Start Date and Time	Period (T)	dB $L_{Aeq,T}$	dB $L_{A90,T}$	dB L_{AFmax}	Sound Pressure Levels (dB $L_{eq,T}$) per Octave Band (Hz)							
					63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz
03/11/2021 00:00	15-mins	31	27	45	44	43	28	26	26	16	14	16
03/11/2021 00:15	15-mins	43	29	70	44	40	36	37	39	37	30	24
03/11/2021 00:30	15-mins	31	29	42	42	40	26	28	27	18	16	16
03/11/2021 00:45	15-mins	30	28	39	43	41	26	27	25	18	17	17
03/11/2021 01:00	15-mins	36	28	51	47	45	42	35	25	16	16	17
03/11/2021 01:15	15-mins	31	28	44	42	40	25	29	27	17	15	16
03/11/2021 01:30	15-mins	36	29	55	45	42	42	33	28	17	15	16
03/11/2021 01:45	15-mins	30	28	39	43	38	28	28	26	16	15	16
03/11/2021 02:00	15-mins	41	30	56	49	48	45	42	28	17	16	17
03/11/2021 02:15	15-mins	40	30	53	50	49	46	39	27	18	18	18
03/11/2021 02:30	15-mins	30	28	37	43	39	26	27	26	17	16	17
03/11/2021 02:45	15-mins	48	29	74	49	47	46	42	46	38	28	21
03/11/2021 03:00	15-mins	30	28	42	46	41	31	27	25	17	17	17
03/11/2021 03:15	15-mins	47	30	74	48	45	44	42	45	37	27	20
03/11/2021 03:30	15-mins	32	30	41	46	42	29	29	28	18	16	17
03/11/2021 03:45	15-mins	31	30	39	46	42	30	28	26	17	16	17
03/11/2021 04:00	15-mins	33	29	52	46	41	29	28	30	21	19	17
03/11/2021 04:15	15-mins	47	29	75	49	43	41	41	45	39	28	24
03/11/2021 04:30	15-mins	34	30	47	53	44	32	30	28	20	19	17
03/11/2021 04:45	15-mins	46	31	74	49	44	40	40	43	38	28	21
03/11/2021 05:00	15-mins	51	32	77	52	49	48	47	48	42	32	24

Start Date and Time	Period (T)	dB $L_{Aeq,T}$	dB $L_{A90,T}$	dB L_{AFmax}	Sound Pressure Levels (dB $L_{eq,T}$) per Octave Band (Hz)							
					63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz
03/11/2021 05:15	15-mins	51	33	74	54	48	45	45	49	43	33	24
03/11/2021 05:30	15-mins	52	36	77	54	54	50	47	50	43	32	24
03/11/2021 05:45	15-mins	53	37	79	52	50	49	48	51	45	33	25
03/11/2021 06:00	15-mins	55	36	79	54	51	50	49	53	46	36	27
03/11/2021 06:15	15-mins	56	39	78	56	52	52	51	54	48	37	29
03/11/2021 06:30	15-mins	59	41	85	58	57	55	55	56	50	46	42
03/11/2021 06:45	15-mins	57	41	78	59	54	52	51	54	49	39	36
03/11/2021 07:00	15-mins	56	42	78	58	53	52	52	54	48	40	33
03/11/2021 07:15	15-mins	57	43	78	57	53	52	51	55	49	39	32
03/11/2021 07:30	15-mins	59	43	78	60	55	54	54	57	51	41	34
03/11/2021 07:45	15-mins	61	43	80	61	57	57	56	59	52	42	35
03/11/2021 08:00	15-mins	61	42	83	60	60	57	57	58	52	43	40
03/11/2021 08:15	15-mins	59	42	77	60	55	55	54	57	50	40	41
03/11/2021 08:30	15-mins	60	42	79	61	57	57	55	58	52	43	38
03/11/2021 08:45	15-mins	60	43	79	60	56	56	55	58	52	43	37
03/11/2021 09:00	15-mins	59	42	78	60	57	55	54	57	52	42	36
03/11/2021 09:15	15-mins	60	42	79	62	58	56	55	58	52	43	35
03/11/2021 09:30	15-mins	57	40	77	59	53	52	53	55	49	40	33
03/11/2021 09:45	15-mins	58	40	77	58	56	54	53	56	50	41	35
03/11/2021 10:00	15-mins	57	40	75	58	54	53	52	55	49	40	36
03/11/2021 10:15	15-mins	59	39	79	59	56	56	54	56	50	41	36

Start Date and Time	Period (T)	dB $L_{Aeq,T}$	dB $L_{A90,T}$	dB L_{AFmax}	Sound Pressure Levels (dB $L_{eq,T}$) per Octave Band (Hz)							
					63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz
03/11/2021 10:30	15-mins	59	40	75	61	56	55	54	56	50	42	36
03/11/2021 10:45	15-mins	56	40	73	58	53	53	51	54	47	39	34
03/11/2021 11:00	15-mins	58	40	77	60	55	55	53	56	49	40	36
03/11/2021 11:15	15-mins	60	39	77	59	56	56	55	57	51	41	35
03/11/2021 11:30	15-mins	60	42	79	59	56	56	55	58	51	41	36
03/11/2021 11:45	15-mins	59	42	80	59	56	55	54	56	50	42	38
03/11/2021 12:00	15-mins	57	41	76	58	55	54	53	55	47	40	36
03/11/2021 12:15	15-mins	55	42	75	58	53	51	50	53	47	39	36
03/11/2021 12:30	15-mins	57	42	75	59	56	55	53	55	48	40	36
03/11/2021 12:45	15-mins	57	40	77	58	54	54	52	55	48	41	38
03/11/2021 13:00	15-mins	59	41	78	60	57	55	54	57	49	42	39
03/11/2021 13:15	15-mins	56	40	78	58	54	53	51	54	47	39	35
03/11/2021 13:30	15-mins	58	43	75	60	56	55	54	56	49	42	40
03/11/2021 13:45	15-mins	59	42	78	60	55	55	54	57	49	41	38
03/11/2021 14:00	15-mins	58	41	76	60	55	54	53	55	48	41	38
03/11/2021 14:15	15-mins	58	41	78	59	56	55	54	56	49	40	36
03/11/2021 14:30	15-mins	58	41	78	60	55	55	54	56	49	40	37
03/11/2021 14:45	15-mins	59	40	78	60	56	56	55	57	50	40	35
03/11/2021 15:00	15-mins	59	40	78	59	58	55	54	57	49	40	34
03/11/2021 15:15	15-mins	59	39	77	62	56	56	54	57	49	39	33
03/11/2021 15:30	15-mins	60	41	77	60	57	57	56	58	51	42	36

Start Date and Time	Period (T)	dB $L_{Aeq,T}$	dB $L_{A90,T}$	dB L_{AFmax}	Sound Pressure Levels (dB $L_{eq,T}$) per Octave Band (Hz)							
					63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	8 kHz
03/11/2021 15:45	15-mins	63	41	89	63	69	66	59	59	52	43	37
03/11/2021 16:00	15-mins	59	41	82	59	56	56	55	57	50	41	36
03/11/2021 16:15	15-mins	59	40	76	64	59	58	56	57	49	38	37
03/11/2021 16:30	15-mins	60	41	79	62	62	59	55	57	51	41	35
03/11/2021 16:45	15-mins	60	39	77	60	57	57	56	59	50	41	37
03/11/2021 17:00	15-mins	60	40	76	61	57	57	56	58	50	40	33
03/11/2021 17:15	15-mins	59	41	76	59	55	55	54	57	50	39	33
03/11/2021 17:30	15-mins	60	39	80	62	59	57	56	57	50	40	33
03/11/2021 17:45	15-mins	60	42	81	61	62	57	56	58	51	42	38
03/11/2021 18:00	15-mins	59	42	77	60	56	55	54	57	50	41	38
03/11/2021 18:15	15-mins	58	40	82	62	60	56	54	56	48	39	34
03/11/2021 18:30	15-mins	56	40	77	57	53	53	51	54	46	38	34
03/11/2021 18:45	15-mins	55	41	77	57	53	52	51	53	47	39	37


BWB
A CAF GROUP COMPANY