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ENVIRONMENT

RICHBOROUGH ESTATES LIMITED

SANDWICH ROAD, SHOLDEN, KENT

Noise Assessment

BMW2914

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March 2021

DOCUMENT ISSUE RECORD

Document Number:	SRS-BWB-ZZ-ZZ-RP-LA-0001_NIA_S0_P03
BWB Reference:	BMW2914-003

Revision	Date of Issue	Status	Author:	Checked:	Approved:
P01	12/02/2021	Issue	Michaela Moffatt BSc (Hons), MSc, AMIOA	Lucy Elmer BA (Hons) MSc, MIOA	Dawit Abraham MSc, MIOA
P02	22/02/2021	Issue	Michaela Moffatt BSc (Hons), MSc, AMIOA	Lucy Elmer BA (Hons) MSc, MIOA	Dawit Abraham MSc, MIOA
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Notice

EXECUTIVE SUMMARY

BWB Consulting Limited was appointed by Richborough Estates Limited to undertake a noise impact assessment for a proposed residential development at land off Sandwich Road in Sholden, Kent.

This assessment has been undertaken based on the results of a baseline noise survey on the Site. The results of the survey have been assessed in accordance with current standards and guidance, following consultation with Dover District Council.

The noise assessment shows that daytime noise levels across the Site are within the external criteria range set out in BS8233 and WHO guidance, therefore it is not considered that mitigation measures are required for garden areas.

Regarding internal habitable rooms, the assessment shows that during the daytime and night-time, noise levels associated with the A258 have the potential to cause a disturbance in habitable rooms when a partially opened window is relied upon for ventilation. However, with the provision of appropriate glazing and ventilation products, a suitable internal noise environment can be achieved across the site during the daytime and night-time periods.

Based on the results of the assessment, it has been demonstrated that the Site is suitable for residential development. It is therefore considered that noise need not be a determining factor in the granting of outline planning permission for the proposed development.

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APPENDICES

1. INTRODUCTION

Appointment & Background

1.1 BWB Consulting Limited was appointed by Richborough Estates Limited to undertake a noise impact assessment for a proposed residential development at land off Sandwich Road in Sholden, Kent to be referred to hereafter as '*the Site*'.

1.2 This assessment has been undertaken based on the results of a baseline noise survey on the Site. The results of the survey have been assessed in accordance with current standards and guidance, following consultation with Dover District Council (DDC).

1.3 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

1.4 The Site is located off Sandwich Road / London Road (A258) and is located within the administrative area of DDC. **Figure 1.1** details the location of the proposed development. The Site currently comprises open fields.

1.5 To the north of the Site lies open fields and the A258 with existing residential dwellings beyond. To the east of the Site lies Sholden Church of England Primary School and existing residential dwellings, with the A258 beyond. Existing residential dwellings are located to the south of the Site, with Mongeham Road and Hornbeam Primary School beyond. To the west lies open fields.

Figure 1.1 - Site Location

Proposed Development

1.6 Outline application for the erection of up to 117 dwellings with associated parking and means of access (all matters reserved except for access). The proposed illustrative layout is detailed in **Figure 1.2**.

Figure 1.2: Illustrative Layout

2. STANDARDS AND GUIDANCE

National Planning Policy Framework (NPPF)

2.1 Published in February 2019, this document sets out the Government's planning policies for England and supersedes the previous NPPF published in 2012, and revised in July 2018. It makes the following reference to noise in the section entitled *Conserving and enhancing the natural environment*:

"*170. 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*:

"*180. 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 impact 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.

[60] 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 in **Table 2.1** below:

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 L_{AFmax} criterion is largely concordant with the World Health Organisation (WHO) guidance: 1999: *Guidelines for community noise*. 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"

Consultation with Dover District Council

2.8 At the outset of the wider project, consultation was undertaken with the Environmental Health Department at DDC by email dated November 2020, outlining the proposed survey and assessment methodologies as summarised below:

"Please note we are proposing the assessment methodology below with the benefit of having attended site to collect baseline monitoring data in October 2020. During attendance, any noise associated with the garage was not audible from the site,

therefore we propose to consider road traffic noise and school noise as part of the assessment:

- *Use baseline noise surveys to determine the existing noise levels from road traffic on Sandwich Road, and Sholden C of E Primary School;*
- *Assess noise from road traffic at proposed sensitive receptors in accordance with BS8233:2014;*
- *Assess noise from the school at proposed sensitive receptors in accordance with BS8233:2014 and IEMA:2014;*
- *Where appropriate, noise mitigation measures will be considered to reduce noise to within acceptable levels at proposed noise sensitive receptors; and,*
- *Provide a noise report summarising our findings."*

2.9 The following commentary was received by Brian Gibson, Senior Environmental Protection Officer at DDC, in November 2020 in agreement with proposals:

"Thanks for your email. My colleague Liam has advised that your proposals for a noise assessment for this development are acceptable. The repair garage in Mongeham Road is considered to be low impact with minimal noise. At present I believe the Sholden school has closed due to Covid-19 infections and I do not know when it will re-open, please ensure that noise impact of the school is considered when the school is open, however it is a very small primary school with few pupils. Agreed, road noise would be the highest priority."

2.10 Following consultation, the application boundary was revised resulting in Sholden C of E Primary School and the repair garage on Mongeham Road being located 200m and 500m from the closest Site boundary, respectively. Therefore, it is considered that both these potential noise sources would not be significant enough to warrant further assessment.

3. BASELINE NOISE MONITORING

Summary

3.1 A baseline noise survey has been undertaken to determine the noise environment on the proposed development site. The survey included measurements of the noise levels generated by the A258 adjacent to the north-eastern site boundary.

Measurement Location

3.2 The measurement location adopted during the survey is identified in **Figure 3.1**. Details of the monitoring undertaken at the measurement location are provided in the following paragraphs.

Figure 3.1 - Site Red Line Boundary and Noise Measurement Location 1

Measurement Location 1 (ML1)

3.3 ML1 was selected to determine the noise levels generated by the passage of road traffic along the A258.

3.4 Monitoring at ML1 was undertaken between 14:15 on 22nd October and 13:30 on 23rd October 2020. The microphone was at a height of 1.5 m above local ground and was in free-field conditions. The distance from ML1 to the nearside kerb edge of the A258 was approximately 12 m.

3.5 The noise climate at ML1 was dominated by the passage of traffic on the A258.

Measurement Equipment

3.6 The baseline noise survey was undertaken using the Class 1 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 within the 24 months prior to the measurements. The portable calibrator was calibrated within the 12 months preceding the date of the survey.

Table 3.1: Noise measurement equipment

Measurement Location	Item	Make and Model	Serial Number	Calibration due Date
1	Sound Level Meter	SVAN 971	60745	01/08/2021
	Microphone	ACO 7052E	64535	
	Preamp	SV18	66815	
	Calibrator	01 dB CAL21	34675335	27/11/2020

Weather Conditions

3.7 Weather conditions were conducive to environmental noise monitoring, it being dry with low wind speeds.

Measurement Results

3.8 A summary of measured sound pressure levels is presented in **Tables 3.2 to 3.3**. Full results are provided in **Appendix B.**

Table 3.2: Summary of measured sound pressure levels at ML1

Start Date and Time	Period	dB $L_{Aeq,T}$	dB L_{AFmax}
22/10/2020 14:15	Daytime (07:00 – 23:00)[1]	63	-
22/10/2020 23:00	Night-time (23:00 – 07:00)	54	74[2]

[1] Includes periods between 14:15 and 23:00 on the 22nd October and between 07:00 and 13:30 on the 23rd October 2020.

[2] 90th percentile of measured $L_{AFmax,15min}$ values during the night-time.

Table 3.3: Summary of measured octave band sound pressure levels at ML1

Period	Octave Band Sound Pressure Levels (L_{eq} dB)								dB(A)
	63 Hz	125 Hz	250 Hz	500 Hz	1kHz	2kHz	4kHz	8kHz	
Daytime	67	62	59	57	59	57	51	44	63
Night-time	57	53	49	47	51	48	40	33	54

4. ASSESSMENT

Overview

4.1 The results of the baseline noise survey have been used as a basis for the noise assessment of the Site's suitability for residential development. The assessment considers noise from road traffic noise on proposed receptors.

Road Traffic Noise

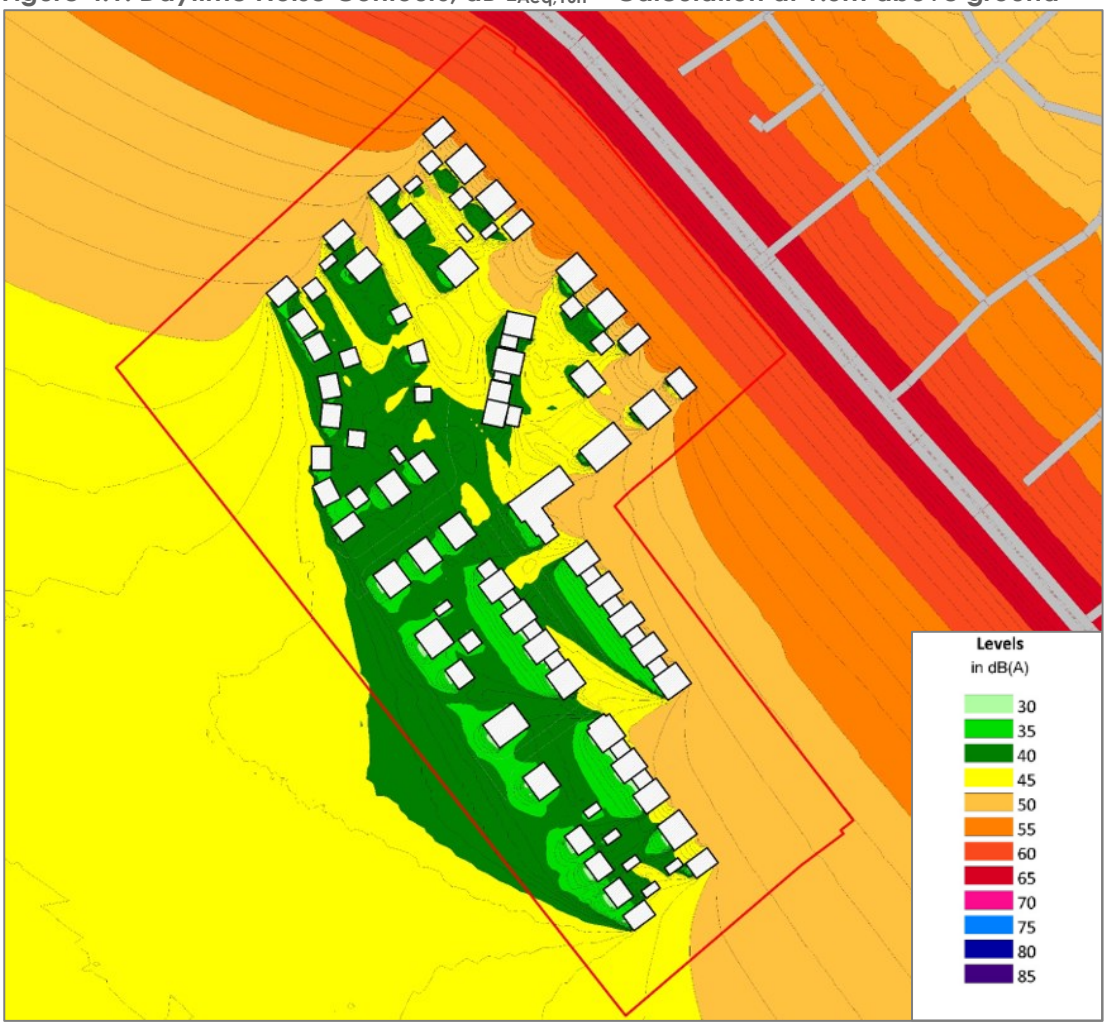
4.2 To assess the potential noise impact from the A258 on the Proposed Development Site, a noise model has been developed using CadnaA© noise modelling software, to calculate the noise propagation across the site from road traffic on the A258. The following prediction methodologies were adopted for the 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;
- 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 at 2m;
- Off-site buildings which would provide screening to the Site have been incorporated as reflective façades;
- To reflect the ground cover with the development in place, 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; and,
- Road traffic noise from the A258 was included in the model as a road source using noise measurement data for ML1, as shown in **Table 3.2**.

External Noise Levels in Gardens

4.3 Noise contour maps have been generated showing the resultant daytime and night-time noise levels, and are shown in **Figures C.1** and **C.2** of **Appendix C**. The daytime noise contours are also reproduced in **Figure 4.1** below.

Figure 4.1: Daytime Noise Contours, dB $L_{Aeq,16h}$ – Calculation at 1.5m above ground



4.4 The noise model indicates that noise levels in outdoor living areas range from below 40dB and up to 54dB which is below the recommended upper guideline value of 55dB $L_{Aeq,T}$ in accordance with BS8233 and WHO guidance. Noise levels are anticipated to be further reduced should standard garden fences be introduced. As such, mitigation for external amenity areas is not required.

Internal Noise Habitable Rooms

4.5 In order to accurately determine the noise level within habitable rooms, the external noise level has been calculated immediately outside the façade. Accordingly, the noise model has been used in order to calculate such noise levels from road traffic noise. The measured L_{AFmax} has been predicted using a measured maximum level of 74dB at ML1, corrected to the nearest proposed bedroom assuming point source attenuation.

4.6 The worst-case first floor façade to the A258 would be exposed to free-field levels of 60dB $L_{Aeq,16hr}$ and 50dB $L_{Aeq,8hr}$ / 62dB L_{AFmax} for daytime and night-time, respectively.

4.7 Assuming a 15dB loss through a partially opened window, this would result in internal levels of 45dB $L_{Aeq,16h}$ and 35dB $L_{Aeq,8h}$ / 47dB L_{AFmax} for daytime and night-time. Therefore, the criteria of 35dB $L_{Aeq,16h}$ and 30dB $L_{Aeq,8h}$ / 45dB L_{AFmax} for the daytime and night-time

respectively are likely to be exceeded, assuming partially opened windows. Consideration has been given to mitigation in **Section 5**.

5. MITIGATION

Internal habitable rooms

5.1 It has been determined in **Section 4** that, during the daytime, the established criteria set for habitable will be exceeded by up to 10 dB with windows partially opened, and that this is driven by the daytime $L_{Aeq,16h}$ criterion.

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 in the first instance 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 daytime frequency spectrum shape from **Table 3.3** corrected to give an overall A-weighted level of 60 dB, representative of the $L_{Aeq,16h}$, based on standard room dimensions of 4m depth, 3m width, 2.5m height, glazed area of 2.5m^2 and a reverberation time of approximately 0.5 seconds.

5.4 To achieve the internal noise criteria adopted for this assessment, a reduction of up to 25 dB(A) would be required at the most exposed bedrooms for daytime resting.

5.5 All criteria should be achieved with standard double glazing such as a configuration 4mm pane / 12mm airgap / 4mm pane, which would need to provide a minimum $R_w + C_{tr}$ of 25 dB. Standard trickle ventilators, which achieve a minimum performance of $D_{n,e,w} + C_{tr}$ of 31 dB, should be sufficient.

5.6 It is recommended that the above specifications are used for habitable rooms on the closest line of dwellings for any façades with an aspect onto the A258.

5.7 For rooms with no angle of view onto the A258, it is likely that partially opened windows may be sufficient to mitigate road traffic noise to acceptable levels.

5.8 Final specifications on a plot-by-plot basis should be finalised at the appropriate stage in the design process, once final site layout, internal layouts and glazed openings are known.

6. SUMMARY AND CONCLUSIONS

6.1 BWB Consulting Limited was appointed by Richborough Estates Limited to undertake a noise impact assessment for a proposed residential development at land off Sandwich Road in Sholden, Kent.

6.2 This assessment has been undertaken based on the results of a baseline noise survey on the Site. The results of the survey have been assessed in accordance with current standards and guidance, following consultation with DDC.

6.3 The noise assessment shows that daytime noise levels across the Site are within the external criteria range set out in BS8233 and WHO guidance, therefore it is not considered that mitigation measures are required for garden areas.

6.4 Regarding internal habitable rooms, the assessment shows that during the daytime and night-time, noise levels associated with the A258 have the potential to cause a disturbance in habitable rooms when a partially opened window is relied upon for ventilation. However, with the provision of appropriate glazing and ventilation products, a suitable internal noise environment can be achieved across the site during the daytime and night-time periods.

6.5 Based on the results of the assessment, it has been demonstrated that the Site is suitable for residential development. It is therefore considered that noise need not be a determining factor in the granting of outline planning permission for the proposed development.

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.
R_w	R_w is the weighted sound reduction index in dB and represents airborne sound insulating properties over a range of frequencies of a material based on laboratory measurements.
$D_{n,e,w}$	$D_{n,e,w}$ is the weighted normalized element level difference in dB and represents the sound reduction performance over a range of frequencies provided by a small single element e.g. air transfer devices.
C_{tr}	C_{tr} is a correction term applied against weighted sound insulation values (R_w, $D_{n,e,w}$ etc.) which describes low frequency performance.
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: Baseline Survey Data

Table A1: Results from ML1

Start Date and Time	Period (T)	dB $L_{Aeq,T}$	dB L_{AFmax}	dB $L_{A10,T}$	dB $L_{A90,T}$	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
22/10/2020 14:15	15-minutes	61	70	65	51	66	60	57	56	58	54	46	38
22/10/2020 14:30	15-minutes	63	82	65	52	67	66	62	57	59	55	47	39
22/10/2020 14:45	15-minutes	62	72	66	53	67	61	60	57	59	55	51	41
22/10/2020 15:00	15-minutes	63	73	66	53	68	61	59	58	59	55	51	40
22/10/2020 15:15	15-minutes	63	78	66	55	66	65	59	58	59	56	53	42
22/10/2020 15:30	15-minutes	63	76	66	57	68	63	60	58	60	56	53	42
22/10/2020 15:45	15-minutes	63	74	66	55	69	62	58	57	60	56	48	42
22/10/2020 16:00	15-minutes	63	73	66	53	70	63	59	57	60	56	48	41
22/10/2020 16:15	15-minutes	63	82	66	52	68	66	62	58	59	56	48	39
22/10/2020 16:30	15-minutes	63	70	66	54	67	60	58	57	60	56	47	39
22/10/2020 16:45	15-minutes	63	73	66	55	68	61	59	57	60	57	48	40
22/10/2020 17:00	15-minutes	63	73	66	54	69	63	59	57	60	56	47	39
22/10/2020 17:15	15-minutes	63	73	66	54	68	62	60	56	59	56	48	38
22/10/2020 17:30	15-minutes	63	72	66	53	67	61	58	56	60	56	48	38
22/10/2020 17:45	15-minutes	63	85	66	53	71	67	64	57	59	56	48	38
22/10/2020 18:00	15-minutes	64	85	65	51	68	60	57	56	59	58	56	50
22/10/2020 18:15	15-minutes	61	73	65	48	66	61	56	54	58	55	46	37
22/10/2020 18:30	15-minutes	60	72	64	48	66	58	55	54	57	54	46	36
22/10/2020 18:45	15-minutes	66	93	66	50	65	58	56	55	62	63	51	41
22/10/2020 19:00	15-minutes	61	70	65	51	64	58	56	54	58	55	46	36
22/10/2020 19:15	15-minutes	61	79	64	48	65	60	55	53	57	55	49	42

Start Date and Time	Period (T)	dB $L_{Aeq,T}$	dB L_{AFmax}	dB $L_{A10,T}$	dB $L_{A90,T}$	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
22/10/2020 19:30	15-minutes	59	69	64	48	62	55	53	52	56	53	44	34
22/10/2020 19:45	15-minutes	66	96	63	46	68	67	66	60	61	60	54	48
22/10/2020 20:00	15-minutes	59	72	63	47	62	56	53	52	56	53	44	34
22/10/2020 20:15	15-minutes	58	71	63	43	60	54	52	50	55	52	43	32
22/10/2020 20:30	15-minutes	58	69	63	44	64	57	53	51	56	52	44	33
22/10/2020 20:45	15-minutes	60	76	65	49	64	62	56	53	57	54	45	38
22/10/2020 21:00	15-minutes	61	84	63	46	61	65	59	57	56	53	47	39
22/10/2020 21:15	15-minutes	58	76	62	41	61	61	57	51	54	51	43	35
22/10/2020 21:30	15-minutes	59	71	63	46	61	57	53	50	56	53	44	34
22/10/2020 21:45	15-minutes	58	78	63	43	60	55	52	51	55	53	45	38
22/10/2020 22:00	15-minutes	57	72	62	40	59	53	50	48	54	52	42	31
22/10/2020 22:15	15-minutes	57	73	62	39	59	56	50	48	54	51	43	32
22/10/2020 22:30	15-minutes	56	70	61	37	59	52	49	47	53	50	41	30
22/10/2020 22:45	15-minutes	57	74	61	37	57	58	49	48	54	51	42	31
22/10/2020 23:00	15-minutes	54	71	58	38	58	50	48	47	52	48	39	28
22/10/2020 23:15	15-minutes	52	72	53	27	53	50	47	44	49	45	36	25
22/10/2020 23:30	15-minutes	53	71	54	27	55	49	47	45	50	46	37	27
22/10/2020 23:45	15-minutes	53	71	55	26	57	53	51	46	50	46	38	28
23/10/2020 00:00	15-minutes	52	73	53	24	55	55	49	47	49	45	37	31
23/10/2020 00:15	15-minutes	52	72	53	25	49	48	44	42	49	47	38	28
23/10/2020 00:30	15-minutes	53	69	54	26	54	48	45	45	50	47	38	28
23/10/2020 00:45	15-minutes	45	69	40	17	44	41	40	39	42	39	31	22

Start Date and Time	Period (T)	dB $L_{Aeq,T}$	dB L_{AFmax}	dB $L_{A10,T}$	dB $L_{A90,T}$	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
23/10/2020 01:00	15-minutes	49	72	43	16	52	47	42	40	47	42	34	24
23/10/2020 01:15	15-minutes	51	69	51	22	51	46	46	42	48	44	38	27
23/10/2020 01:30	15-minutes	45	66	43	22	44	40	38	35	42	39	30	19
23/10/2020 01:45	15-minutes	47	68	44	20	45	40	41	38	44	41	33	22
23/10/2020 02:00	15-minutes	41	64	37	17	42	38	38	35	38	34	26	17
23/10/2020 02:15	15-minutes	48	70	45	17	52	43	41	40	45	42	34	24
23/10/2020 02:30	15-minutes	19	35	20	16	37	31	18	16	13	10	13	13
23/10/2020 02:45	15-minutes	47	69	43	16	45	39	37	38	44	42	32	23
23/10/2020 03:00	15-minutes	48	73	41	16	57	49	45	44	45	41	34	26
23/10/2020 03:15	15-minutes	46	68	43	15	49	40	42	37	42	40	32	20
23/10/2020 03:30	15-minutes	46	68	42	17	47	41	38	37	43	40	31	21
23/10/2020 03:45	15-minutes	51	69	51	17	54	53	46	43	48	45	37	27
23/10/2020 04:00	15-minutes	49	73	40	17	49	42	38	40	45	45	36	24
23/10/2020 04:15	15-minutes	47	69	44	19	46	43	40	38	44	42	33	21
23/10/2020 04:30	15-minutes	53	74	51	22	52	48	46	44	49	48	39	29
23/10/2020 04:45	15-minutes	53	71	52	23	56	50	47	46	49	47	38	28
23/10/2020 05:00	15-minutes	53	72	54	27	56	49	46	46	50	48	39	29
23/10/2020 05:15	15-minutes	56	71	60	35	56	49	48	48	53	51	42	32
23/10/2020 05:30	15-minutes	58	74	62	35	60	53	51	51	54	52	44	35
23/10/2020 05:45	15-minutes	57	72	61	35	58	52	51	50	54	51	44	34
23/10/2020 06:00	15-minutes	58	71	63	36	59	55	50	50	54	52	44	35
23/10/2020 06:15	15-minutes	59	72	64	41	60	55	52	51	55	53	45	36

Start Date and Time	Period (T)	dB $L_{Aeq,T}$	dB L_{AFmax}	dB $L_{A10,T}$	dB $L_{A90,T}$	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
23/10/2020 06:30	15-minutes	61	81	65	46	64	64	60	55	57	55	48	43
23/10/2020 06:45	15-minutes	62	74	67	47	65	58	56	54	58	56	48	42
23/10/2020 07:00	15-minutes	63	75	67	52	64	57	57	55	60	57	49	42
23/10/2020 07:15	15-minutes	64	71	68	55	67	60	58	56	61	58	50	45
23/10/2020 07:30	15-minutes	65	86	68	55	69	68	65	60	61	59	51	44
23/10/2020 07:45	15-minutes	65	79	67	57	69	62	61	58	61	59	51	44
23/10/2020 08:00	15-minutes	64	70	67	55	68	60	58	58	61	58	51	44
23/10/2020 08:15	15-minutes	65	81	68	56	69	64	60	59	61	58	52	43
23/10/2020 08:30	15-minutes	65	74	68	56	69	63	60	58	61	59	52	46
23/10/2020 08:45	15-minutes	64	73	67	54	69	61	58	57	60	58	51	43
23/10/2020 09:00	15-minutes	63	73	66	53	67	62	58	57	59	57	50	43
23/10/2020 09:15	15-minutes	63	77	66	52	67	61	59	57	60	57	49	41
23/10/2020 09:30	15-minutes	67	93	66	54	67	59	57	56	60	60	62	56
23/10/2020 09:45	15-minutes	63	73	67	52	68	63	60	57	59	56	54	43
23/10/2020 10:00	15-minutes	67	98	66	54	69	62	59	57	62	63	57	45
23/10/2020 10:15	15-minutes	63	76	66	54	69	63	62	58	59	56	52	43
23/10/2020 10:30	15-minutes	61	73	65	51	68	60	58	56	58	55	47	38
23/10/2020 10:45	15-minutes	67	92	66	52	67	61	59	57	60	60	61	55
23/10/2020 11:00	15-minutes	62	75	66	54	68	61	59	57	59	56	48	40
23/10/2020 11:15	15-minutes	62	73	65	52	67	63	60	57	59	55	47	39
23/10/2020 11:30	15-minutes	62	74	66	51	68	62	60	57	59	55	48	42
23/10/2020 11:45	15-minutes	63	80	65	51	67	67	65	58	59	55	47	40

Start Date and Time	Period (T)	dB $L_{Aeq,T}$	dB L_{AFmax}	dB $L_{A10,T}$	dB $L_{A90,T}$	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
23/10/2020 12:00	15-minutes	63	82	65	53	71	65	64	59	59	55	47	40
23/10/2020 12:15	15-minutes	62	73	65	51	67	60	58	56	59	55	47	38
23/10/2020 12:30	15-minutes	62	72	65	54	68	62	58	57	59	55	47	39
23/10/2020 12:45	15-minutes	61	74	64	52	66	63	58	56	58	54	47	39
23/10/2020 13:00	15-minutes	65	86	65	51	70	65	63	63	61	56	48	39
23/10/2020 13:15	15-minutes	62	77	65	54	67	60	58	57	59	55	47	40

APPENDIX C: Noise Contours

Figure C.1: Daytime Noise Contours, dB $L_{Aeq,16h}$ – Calculation at 1.5m above ground

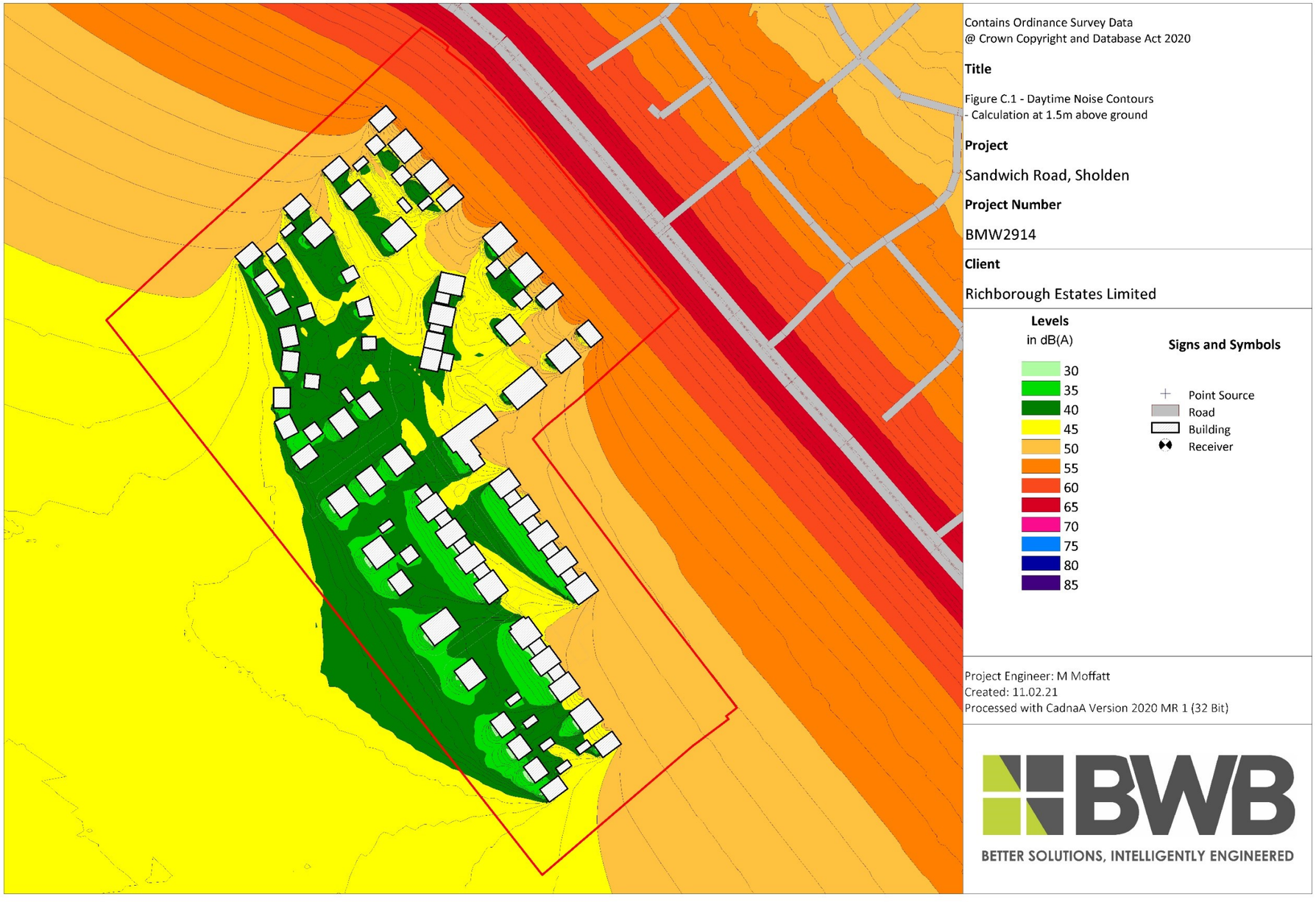


Figure C.2: Night-time Noise Contours, dB $L_{Aeq,8h}$ – Calculation at 4m above Ground

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