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ENVIRONMENT

Brackley Property Developments Ltd

Axis 50 near
Willington, Derby

Proposed Commercial/Industrial
Development

NOISE IMPACT ASSESSMENT

ENVIRONMENT

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Willington, Derby

Proposed
Commercial/Industrial
Development

NOISE IMPACT ASSESSMENT

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EXECUTIVE SUMMARY

BWB Consulting Limited have been appointed by Brackley Property Developments Limited to undertake a noise impact assessment for a proposed commercial/industrial development at Axis 50, near Willington, Derby.

The proposed development site currently comprises open land and is located to the northwest of Willington.

The proposed development comprises 11 units varying between 400sqft and 50,000sqft, with associated bunding, car parking and service areas.

The noise impact assessment has been undertaken to support an outline planning application for the scheme and considers the potential noise impact of the proposed development at existing noise sensitive receptors in the vicinity of the site. The noise assessment includes consideration of noise from deliveries, car parking and from proposed fixed plant noise sources.

To inform the assessment, a baseline noise survey was undertaken on the site in March 2018.

The results of the noise impact assessment indicate that operations associated with the development will have a low impact at existing noise sensitive receptors during the daytime. Mitigation measures will be required to reduce noise levels to acceptable levels during the night-time. In addition, appropriate noise limits have been determined to be achieved by fixed plant items associated with the proposed development.

The assessment of the potential noise impact from development generated traffic indicates that at the worst affected receptors, there is likely to be, at worst a permanent, minor adverse effect from this noise.

Based on the results of the assessment, and with appropriate mitigation measures in place, it is considered that noise need not be a determining factor in granting outline planning permission for the proposed scheme.

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1.0 INTRODUCTION

- 1.1 BWB Consulting Limited have been appointed by Brackley Property Developments Limited to undertake a noise impact assessment for a proposed commercial/industrial development at Axis 50 near Willington, Derby.
- 1.2 The proposed development comprises 11 units varying between 400sqft and 50,000sqft, with associated bunding, car parking and service areas.
- 1.3 This noise assessment has been undertaken to support an outline planning application for the scheme and is based on a baseline noise survey conducted in March 2018 in the vicinity of existing noise sensitive receptors.
- 1.4 The results of this survey and subsequent noise prediction work have been assessed against relevant British Standards.
- 1.5 Where appropriate, consideration has been given to noise mitigation measures to demonstrate how an appropriate level of protection could be afforded to existing noise sensitive receptors in the local area.
- 1.6 Whilst every effort has been made to ensure that this report is easy to understand, it is necessarily technical in nature. Therefore, to assist the reader, a glossary of terminology is included in **Appendix A**.

Site Setting

- 1.7 The site location is shown in **Figure 1.1**. The proposed site currently comprises open land and is located to the northwest of Willington.
- 1.8 The dominant source of noise is the passage of road traffic on Derby Southern Bypass (A50), Etwall Road (B5008), Burton Road (A38) and the remainder of the local road network. In addition, train movements on the Stoke to Derby Railway Line, located to the south, were also audible on the proposed development site.

Figure 1.1 Site Location



Proposed Development

- 1.9 The end users of the commercial/industrial units are currently unknown. The indicative masterplan shows that 11 units will be built on the site, and vehicles will access the site from Etwall Road, to the north east of the site. In addition, bunding is proposed at the eastern and southern site boundaries. The indicative masterplan is shown below in **Figure 1.2**.

Figure 1.2 – Indicative Masterplan



- 1.10 For the purpose of this assessment, it is assumed that the Site will operate continuously, over a 24-hour period. Therefore, the daytime (0700-2300) and night-time (2300-0700) periods have been included in the following assessment. However, it is considered unlikely that all proposed units will operate 24 hours a day.

Existing Sensitive Receptors

- 1.11 The nearest existing sensitive receptors (ESRs) are located adjacent to the northern-most area of the Development Site, Hill Farm to the east (approximately 70m back from Etwall Road), and to the south-south-east (a relatively new residential development, where the railway is elevated by 1.5m relative to ground floor of the dwellings). Details of each receptor considered within the assessment are detailed below in **Table 1.1** and shown in **Appendix C**.

Table 1.1: Existing Sensitive Receptors

ESR Number	Address	Grid Coordinates		Bearing from site	Distance from site
		Easting	Northing		
ESR1	Danes Lodge, Willington Lane, Willington, Derby, DE65 6HE	429157	329725	North	15m
ESR2	Hill Farm, Etwall Road, Willington, Derby DE65 6DX	429412	329417	East	70m
ESR3	James Clarke Road, Willington, Derby, DE65 6RD	429439	328907	South East	70m

- 1.12 An impact may be experienced at other receptors, but this is likely to be equal to or less than those stated above.

2.0 STANDARDS AND GUIDANCE

National Planning Policy Framework (NPPF)

- 1.1 Published in February 2019, this document sets out the Government's planning policies for England and supersedes the previous NPPF published in 2012. 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."

- 1.2 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 impacts resulting from noise from new development – and avoid noise giving rise to significant adverse impacts on health and the quality of life⁶⁰;

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)."

And

"182. Planning policies and decisions should ensure that new development can be integrated effectively with existing businesses and community facilities (such as places of worship, pubs, music venues and sports clubs). Existing businesses and facilities should not have unreasonable restrictions placed on 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 the development has been completed."

BS 8233:2014: Guidance On Sound Insulation And Noise Reduction For Buildings

- 2.1 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.
- 2.2 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** overleaf:

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 LAeq, 16 Hour	-
Dining	Dining Room/area	40 dB LAeq, 16 Hour	-
Sleeping (daytime resting)	Bedroom	35 dB LAeq, 16 Hour	30 dB LAeq, 8 Hour

- 2.3 Whilst BS 8233:2014 recognises that a guideline value may be set in terms of SEL or LA_{Fmax} 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*.
- 2.4 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 LAeq,T, with an upper guideline value of 55 dB LAeq,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.

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

- 2.5 The BS 4142 Standard describes methods for rating and assessing the following:
- Sound from industrial and manufacturing processes;

- Sound from fixed installations which comprise mechanical and electrical plant and equipment;
 - Sound from the loading and unloading of goods and materials at industrial and/or commercial premises; and
 - Sound from mobile plant and vehicles that is an intrinsic part of the overall sound emanating from premises or processes, such as that from forklift trucks, or that from train movements on or around an industrial and/or commercial site.
- 2.6 The methods use outdoor sound levels to assess the likely effects of sound on people who might be inside or outside a dwelling or premises used for residential purposes upon which sound is incident. The Standard advises the purpose of the methodology includes the assessment of sound from any plant and activities associated with existing industrial and/or commercial uses at proposed residential dwellings.
- 2.7 If appropriate, the specific sound level of the source ($L_{Aeq,T}$) is corrected, by the application of one or more corrections for acoustic features such as tonal qualities and/or distinct impulses, to give a 'rating' level ($L_{A,r,T}$). The Standard effectively compares and rates the difference between the rating level of the specific sound and the typical background sound level ($L_{A90,T}$) in the absence of the specific sound.
- 2.8 The Standard advises that the time interval ('T') of the background sound measurement should be sufficient to obtain a representative or typical value of the background sound level at the time(s) the source in question operates or is proposed to operate in the future.
- 2.9 Comparing the rating level with the background sound level, BS 4142 states:
- "Typically, the greater this difference, the greater the magnitude of impact.*
- A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context.*
- A difference of around +5 dB 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 it is that 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."*

The Design Manual for Roads and Bridges (DMRB): Volume 11: Environmental Assessment

- 2.10 Section 3 Part 7 of this document is pertinent to noise and vibration and was first published by the Department of Transport in 1993 with subsequent amendments, the latest of which is November 2011 (reference HD213/11 Revision 1). This document sets out procedures for undertaking the environmental assessment of new road schemes, including the assessment of noise impacts from road traffic. In particular, Section 3 Part 7 describes a method for assessing the severity of a noise impact, in terms of the number of people who will be bothered by any noise increases/decreases due to a new road scheme. When undertaking a DMRB assessment, the methodology

contained within the Department for Transport 1988 document *Calculation of Road Traffic Noise* (CRTN) should be used to calculate levels of road traffic noise.

- 2.11 Although the DMRB strictly applies to new road schemes, the principles of the approach contained within the document can also be applied to the assessment of noise from road traffic in general. The Proposed Development has the potential to affect road traffic noise levels along existing roads, hence there is a need for such an assessment.
- 2.12 The DMRB assessment methodology suggests that the magnitude of noise changes from a project should be classified into levels of impact. Section 3 Part 7 considers how the magnitude of change can be affected by whether a noise level change occurs in the short term (e.g. as a result of a sudden opening of a scheme), or in the long term (e.g. gradually over time, such as that associated with natural traffic growth).
- 2.13 The example classification scale for short term changes, which is the most stringent, and long term changes is presented below:

Table 2.2: Classification of Magnitude of Noise Changes in the Short Term

Noise Change, $L_{A10, 18h}$, dB	Magnitude of Change
0	No Change
0.1 to 0.9	Negligible
1.0 to 2.9	Minor / Low
3.0 to 4.9	Moderate / Medium
5.0+	Major / High

Table 2.3: Classification of Magnitude of Noise Changes in the Long Term

Noise Change, $L_{A10, 18h}$, dB	Magnitude of Change
10+	High
5 to 9.9	Medium
3 to 4.9	Low
<3	Very Low

Consultation with South Derbyshire District Council (SDDC)

- 2.14 At the outset of the project, consultation was undertaken with Mr John Mills, Senior Environmental Health Officer in the Environmental Protection Team at SDDC by e-mail (dated 7th March 2018), outlining the proposed assessment methodology. A response was received via email on 8th March from Mr. Mills.

2.15 Mr. Mills broadly agreed with the methodology but requested the following criteria in relation to the BS4142 assessment;

- The rating level is at least 10dB below the existing ambient noise level (L_{Aeq});
- The rating level (calculated in accordance with BS4142) is at least 5dB below the existing background noise level (L_{A90}); and
- Between the hours of 19:00 and 07:00, the maximum noise levels (L_{AFmax}) from the development shall not exceed the L_{A90} by more than 10dB, however where the existing background noise level is 45dB L_{A90} or less, the maximum noise level shall not exceed 55dB L_{AFmax} .

2.16 It is considered that the above criteria are over and above that required by BS4142. The following comments were sent via email, on 8th March, in response to the criteria requested by Mr. Mills.

- BS4142 states that the rating level from any proposed noise sources be assessed against the measured L_{A90} noise level. Therefore, in accordance with BS4142, it is not deemed appropriate to consider the L_{Aeq} when assessing proposed noise sources, however we can take into account the prevailing L_{Aeq} to provide some context to the assessment.
- BS4142 states that 'where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact'. A rating level that is equal to the measured background noise level (L_{A90}) is considered an appropriate assessment criterion in relation to BS4142 to ensure an adverse impact is not experienced at the nearest noise sensitive receptors.
- The L_{AFmax} level is usually considered when considering the likelihood of sleep disturbance during the night-time period (2300-0700). Therefore, it is not considered appropriate to assess the maximum noise level between the hours of 1900-2300, as these hours fall within the daytime period, where maximum levels are considered to be less critical. Furthermore, there is no guidance that we are aware of that advises on daytime L_{Amax} criteria to be considered.
- In accordance with BS4142, the rating level for any proposed noise sources includes corrections for character, including impulsivity or transient noise levels where the individual event may cause disturbance. There is no assessment procedure for assessing the maximum noise levels against the background noise levels (L_{A90}), therefore it is not considered appropriate to set a limit for the maximum noise level based on the measured background noise level. We can consider the L_{AFmax} level from any proposed noise sources if required. However, WHO guidelines (1999) state that a L_{AFmax} level of 60dB is considered the threshold for sleep disturbance.

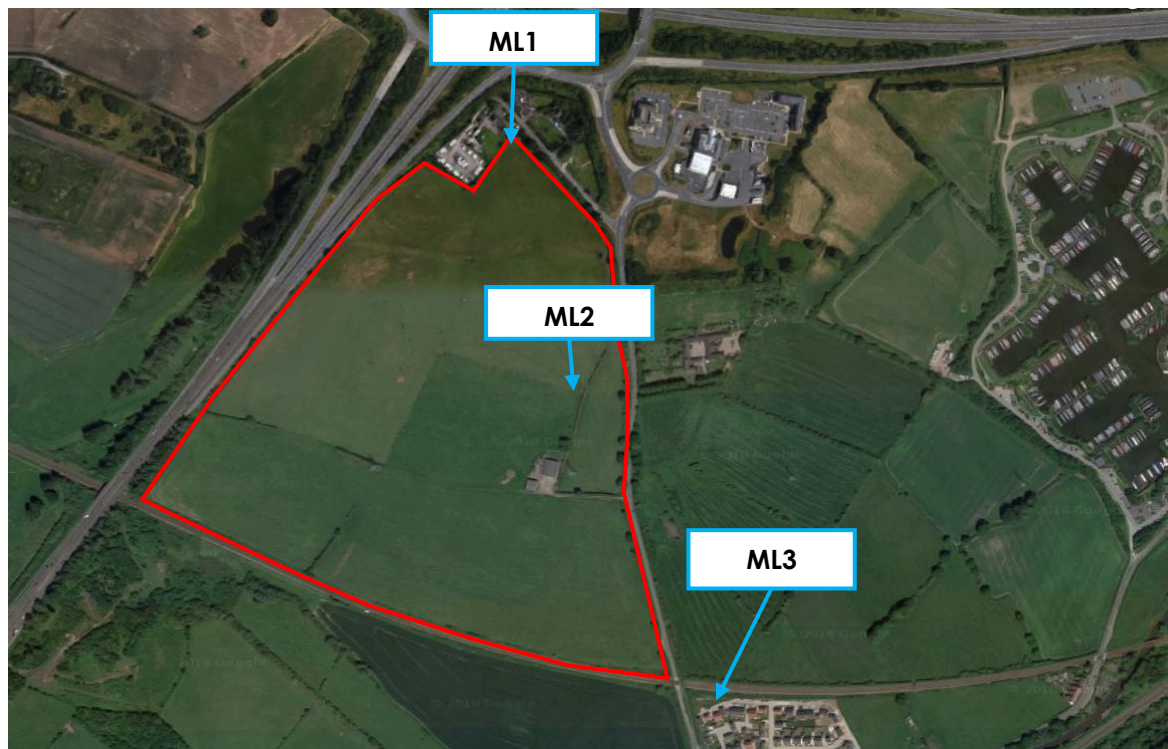
2.17 At the time of writing, no response has been received.

3.0 Noise Monitoring

Overview

- 3.1 An attended baseline survey has been undertaken to determine the prevailing noise climate across the site.
- 3.2 Noise monitoring was undertaken at three monitoring locations (MLs) as shown in **Figure 3.1**.

Figure 3.1 Noise Monitoring Positions



ML1

- 3.3 ML1 was chosen to be representative of dwellings closest to the northern most area of the site.
- 3.4 The main source of noise throughout the surveys carried out at ML1 was distant road traffic on the A38, and road traffic on the elevated slip road. As the elevated slip road and roundabout provide significant screening of road traffic noise from northern sections of the A38 and A50, distant road traffic was perceived to be from the west when at ML1. Faint and distant trains and aircraft from the south were also noted. Some faint noise from bleating sheep was occasionally audible.
- 3.5 The measured daytime and evening ambient noise levels were 62dB $L_{Aeq,1hr}$ and 60dB $L_{Aeq,1hr}$ respectively. The measured daytime and evening background noise levels were 60dB $L_{A90,1hr}$ 57dB $L_{A90,1hr}$ respectively.

- 3.6 During the night-time, ambient noise levels were in the range of 52-54dB $L_{Aeq,15min}$, and background noise levels were 50dB $L_{A90,15min}$ throughout.

ML2

- 3.7 ML2 was setback 70m from Etwall Road and was chosen to be representative of Hill Farm to the east, also set back approximately 70m from Etwall Road.
- 3.8 The main source of noise in the daytime and evening at ML2 was road traffic on Etwall Road and distant road traffic on the A38. Distant trains and train horns were periodically audible, but generally low in absolute level relative to road traffic noise.
- 3.9 The measured daytime and evening ambient noise levels were 59dB $L_{Aeq,1hr}$ and 60dB $L_{Aeq,1hr}$ respectively. The measured daytime and evening background noise level was 60dB $L_{A90,15min}$.
- 3.10 During the night-time, the main source of noise was distant road traffic on the A38, with occasional vehicles on Etwall Road. The range of measured ambient noise levels was 50-52dB $L_{Aeq,15min}$. The measured background noise level was in the range of 46-47dB $L_{A90,15min}$.

ML3

- 3.11 ML3 was chosen to be representative of the dwellings to the south-east of the site.
- 3.12 The main source of noise throughout the noise survey in the day and evening was road traffic on Etwall Road and distant road traffic on the A38. Noise from passing trains on the elevated railway was clearly audible with train horns were sounded before the passage of each train and resulting in measured peaks of noise of up to 86dB $L_{Amax,f}$.
- 3.13 The measured daytime and evening ambient noise levels were 57dB $L_{Aeq,1hr}$ and 58dB $L_{Aeq,1hr}$ respectively. The measured background noise level was 51dB $L_{A90,15min}$ in both the daytime and evening.
- 3.14 During the night-time, the main source of noise was distant road traffic on the A38, with infrequent vehicles on Etwall Road passing over the railway junction. Ambient noise levels were in the range of 45-47dB $L_{Aeq,15min}$. The measured background noise level was 41dB $L_{A90,15min}$ for all measurement samples.

Measurement Summary

- 3.15 All noise measurements were carried out under free-field conditions at a height of 1.4m above ground (i.e. at least 3.5m away from any reflecting surface other than the ground).
- 3.16 Noise monitoring was carried out in the daytime (15:58hrs to 19:00hrs) and evening (19:00hrs-22:12hrs) on Tuesday 13th March 2018, and at night from 01:15hrs until 04:0hrs on Wednesday 14th March 2018.
- 3.17 In accordance with BS4142, noise levels were measured over a 1-hour period during the daytime, and 15-minute periods during the night-time. For each location, noise levels were logged and post-processed to exclude any extraneous/spurious noise (such as sheep bleating close to the sound level meter). During the late evening and night-time, road works were being carried out to the south-west of the proposed

development site. Noise from the road works was inaudible at the MLs, and road traffic was free flowing past the entire western boundary.

Equipment

- 3.18 The survey was undertaken using the noise measurement equipment detailed in **Table 3.1**. Noise measurements were carried out using a NTi XL2-TA Class 1, precision integrating sound level meter (including pre-amplifier and microphone) calibrated within the preceding 12 months. Prior to, and following the noise measurements, acoustic field calibration of the sound level meters and microphones used for the measurements was carried out using a 1kHz tone at 114dB or 94dB, using an acoustic calibrator that itself had been calibrated within the preceding 12 months. No drift in the field-calibrated noise level was observed.

Table 3.1: Equipment summary

Equipment	Make & Model	Serial Number	Calibration due Date
Sound Level Meter	NTi XL2-TA (Class 1)	A2A-11111-E0	5/9/2019
Pre-Amplifier	NTi MA220	6908	
Microphone	NTi MC230A	A14423	
Acoustic Calibrator	Larson David CAL200 (Class 1)	14154	5/9/2018

Meteorological Conditions

- 3.19 There was no rainfall before or during the noise survey and roads were therefore dry throughout. Wind speeds were low (<3m/s, from the south) when measured using a hand-held anemometer during the site surveys. Temperatures were noted to vary between 3–8 degrees Celsius.
- 3.20 Weather conditions during the surveys are therefore considered to be suitable for environmental noise monitoring and subsequent assessment of the measured noise data.

Survey Results

- 3.1 The results of the noise survey are summarised below. Detailed, octave-band survey results are presented in **Appendix B**.

Table 3.2: Summary of noise monitoring at ML1

Start Time	Period (T, hh:mm)	Measured Sound Pressure Level		
		dB LAeq,T	dB LA90,T	dB LAfmax
13/03/2018 17:00	01:00	62	60	70 ¹
13/03/2018 21:12	01:00	60	57	68 ²
14/03/2018 01:59	00:15	54	50	61
14/03/2018 03:33	00:15	52	50	60
14/03/2018 03:49	00:15	53	50	60

¹ Road traffic on A38

Start Time	Period (T, hh:mm)	Measured Sound Pressure Level		
		dB LAeq,T	dB LA90,T	dB LAfmax
² Aircraft				

Table 3.3: Summary of noise monitoring at ML2

Start Time	Period (T, hh:mm)	Measured Sound Pressure Level		
		dB LAeq,T	dB LA90,T	dB LAfmax ¹
13/03/2018 15:58	01:00	59	56	68
13/03/2018 20:06	01:00	60	56	70 ²
14/03/2018 01:38	00:15	52	46	61
14/03/2018 03:00	00:15	50	47	61
14/03/2018 03:15	00:15	50	46	63
¹ LAmax generally dominated by Road traffic on Etwall Road				
² Distant train				

Table 3.4: Summary of noise monitoring at ML3

Start Time	Period (T, hh:mm)	Measured Sound Pressure Level		
		dB LAeq,T	dB LA90,T	dB LAfmax
13/03/2018 18:02	01:00	58	51	86 ¹
13/03/2018 19:03	01:00	57	51	83 ¹
14/03/2018 01:15	00:15	47	41	63 ²
14/03/2018 02:23	00:15	45	41	61 ²
14/03/2018 02:38	00:15	47	41	67 ²
¹ LAmax due to passing trains and horn				
² LAmax due to road traffic				

4.0 ASSESSMENT

Noise modelling

4.1 In order to predict the noise levels from the proposed development site at the ESRs, a detailed acoustic model of the site has been generated in order to calculate the noise propagation across the site. This noise model was generated applying the following methodology:

- The model was generated using the PC based CadnaA® noise modelling package;
- For industrial/commercial noise sources, the noise model was set to apply the noise prediction methodology set out in ISO 9613-2: *Acoustics – Attenuation of sound during propagation outdoors – Part 2: General method of calculation*;
- Noise from HGV movements and deliveries were included in the model using noise data from a library of historical measurement data, which has been collected during surveys undertaken at similar developments. The noise levels used within the assessment are presented in **Table 4-1**.

Table 4-1 – Noise levels used within the assessment

Noise Source	Distance	Duration	L _{Aeq}
HGV Passby	5 m	6 seconds	73 dB
Vehicle Arriving	10 m	150 seconds	68 dB
Vehicle Unloading	10m	1500 seconds	62 dB
Vehicle Departure	10 m	30 seconds	73 dB

- Noise from deliveries have been included in the model as a point source;
- Noise from HGV passbys have been derived from the noise level for HGV Passby shown in **Table 4-1**. The noise levels have been corrected for time based on the assumed number of HGV passbys associated with each unit. These have been included in the model as a line source;
- To reflect the local ground cover, ground absorption was set to $G = 0.5$ (50% acoustically reflective ground);
- The bunds, included within the proposals and shown on the masterplan, have been included within the noise model. The bund on the eastern boundary has been modelled at a height of 2.3m, and the bund on the southern boundary has been modelled at a height of 4.5m;
- An indicative development layout was incorporated into the noise model in order to account for screening that is provided by the development itself; and,
- The estimated number of deliveries for each unit used within the assessment are shown below in Table 4.2.

Table 4-2 – Number of assumed deliveries to each unit

Unit	Number of deliveries per hour
1	4
2	10
3	8
4	14
5	1
6	1
7	1
8	0
9	6
10	4
11	5

Noise from loading and unloading activities and HGV movements

- 4.2 Activities associated with the loading and unloading of vehicles on site have been assessed in accordance with BS 4142.
- 4.3 The noise level from operations at the proposed development site have been modelled at the ESRs, using the methodology described above. Noise from HGVs arriving and departing and noise associated with unloading operations have been included within the assessment.
- 4.4 The specific noise levels used within the BS4142 assessment are summarised in **Table 4-1**. It is considered that noise from the delivery process at the nearest proposed units to ESR1 and ESR2 is likely to be just perceptible at the receptors. Therefore, in accordance with BS4142, a 3dB penalty has been applied.
- 4.5 The assessment has been based on the following assumptions:
- The site will operate for the whole 24-hour period;
 - The night-time operations will be the same as the daytime operations;
 - It is assumed all visits would be for loading/unloading purposes; and,
 - The proposed bunds on the eastern and southern site boundaries have been included within the noise model.
- 4.6 Based on the above information, the predicted daytime and night-time specific noise levels have been calculated at the closest ESRs, identified in **Table 1.1** and **Appendix C** without any additional mitigation in place. The predicted noise levels have been assessed in accordance with BS 4142.

Table 4.3 – BS 4142 assessment of HGV loading/unloading – Daytime

Description	Noise Level (dB(A))			Relevant BS4142 clause	Commentary
	Daytime				
	ESR1	ESR2	ESR3		
Specific sound level	55	50	40	7.3.5	Derived based on 1 delivery during a worst-case hour
Characteristic Feature correction	+3	+3	+0	9.2	+3 dB for impulsivity just perceptible at the receptor
Rating level	58	54	40	9.2	-
Background sound level	57dB LA90	56 dB LA90	51 dB LA90	8	Representative background noise level measured at Baseline survey position
Rating - background level	+1	-3	-11	11	-
Below the criteria for low impact.					

Table 4.4 – BS 4142 assessment of HGV loading/unloading – Night-time

Description	Noise Level (dB(A))			Relevant BS4142 clause	Commentary
	Night-time				
	ESR1	ESR2	ESR3		
Specific sound level	55	50	40	7.3.5	Derived based on 1 delivery during a worst-case hour
Characteristic Feature correction	+3	+3	+0	9.2	+3 dB for impulsivity just perceptible at the receptor
Rating level	58	53	40	9.2	-
Background sound level	50dB LA90	46 dB LA90	41 dB LA90	8	Representative background noise level measured at Baseline survey position
Rating - background level	+8	+7	-1	11	-

- 4.7 The assessment has shown that noise associated with HGV movements and deliveries is at worst, around the measured background noise level during the daytime period at all ESRs.
- 4.8 During the night-time, noise associated with HGV movements and deliveries are between -1 and +8dB above the measured background noise levels, dependent on the ESR. Therefore, mitigation is required.
- 4.9 It is important to noted that it is unlikely that all units will operate for the whole 24-hour period. Therefore, it is likely that the impact will be less than those stated above.

Noise from fixed plant

- 4.10 It is anticipated that there may be fixed plant and equipment associated with the Proposed Development that may have the potential to generate noise. However, at this stage details of the proposed type, number and precise location of any such plant or the nature of its operation are not available. In the absence of detailed information, it is appropriate to specify suitable noise control limits to which any plant should conform. These limits should include any appropriate corrections for acoustic characteristics, in accordance with BS 4142.
- 4.11 It is considered that the rating level of fixed plant noise sources should not exceed the prevailing background sound level when measured at the nearest ESRs. The cumulative effect of all external plant should be specified so that the rating level is less than or equal to the lowest prevailing background noise level.
- 4.12 Noise from external plant on the development site should achieve the following noise level limits, shown in **Table 4-5**.

Table 4.5 – Noise limits from fixed plant

Receptor	Rating level limit to be achieved at the receptor (dB LAeq)		
	Daytime	Evening	Night-time
ESR1	60	57	50
ESR2	60	60	46
ESR3	51	51	41

- 4.13 The above rating level limits apply at least 3.5 metres from the façade of any residential property i.e. in free-field conditions.
- 4.14 In accordance with BS 4142, the assessment of plant noise emissions should include appropriate rating corrections for tonal, irregular or intermittent plant where applicable, before comparison with the above limits.
- 4.15 Once the detailed nature of such future uses is confirmed, noise from any fixed plant can be considered to ensure that the above limits can be met.
- 4.16 It should be noted that the derived rating level limits would be applicable to the total noise from the simultaneous operation of all external plant serving the proposed development. As such, noise emissions from individual items of plant will need to be lower than the given limit, although the exact limit for each individual item of plant will

be dependent upon its type, noise characteristics, location etc. This issue is best addressed during the detailed design stage.

Operational Noise

- 4.17 The indicative masterplan shows that each unit includes an associated carpark area, which has the potential to generate noise. However, given the distances between the carpark areas and the ESRs, and that the carpark areas are screened by the intervening buildings, it is considered unlikely that noise from the carparks will cause a significant impact at the ESRs.

Development Generated Road Traffic Noise

- 4.18 An increase in road traffic due to the proposed development has the potential to increase the noise levels at ESRs in the vicinity of the site and shown in **Table 1.2**.
- 4.19 Traffic data has been provided as 18-hour Annual Average Weekly Traffic (AAWT) by BSP Consulting for the following scenarios:
- 2018 Base Year;
 - 2020 Opening Year – Base + Committed Developments;
 - 2020 Opening Year – Base + Committed Developments + Proposed Development;
 - 2028 Future Year – Base + Committed Developments; and,
 - 2028 Future Year – Base + Committed Developments + Proposed Development.
- 4.20 The Basic Noise Level (BNL), as referenced in the Calculation of Road Traffic (CRTN), has been calculated for the roads nearest to the NSRs, to predict the change in noise level between 2020 opening year including committed developments with and without the development, and 2028 future year including committed developments with and without the development.
- 4.21 The results of the traffic assessment have been used as the basis for determining the change in road traffic noise levels that would result from development generated traffic.
- 4.22 Road traffic noise calculations have been carried out in accordance with CRTN, and have been undertaken for a notional receptor location 10m from the edge of the carriageway of each road considered, and 1.5m above ground level. A notional receptor has been used because the change in traffic noise level adjacent to any given road will be the same at all distances where noise from that route is dominant. Traffic noise calculations have been undertaken to establish the change in the weekday daytime $L_{A10,18h}$ noise level.
- 4.23 To quantify short term effects, calculations have been undertaken for the opening year 2020 both with and without the proposed development. Road traffic speeds have been applied based on the speed limits applicable to each link. The traffic data supplied has included for other committed developments for the assessment year. The results are presented in **Table 4.6**.

Table 4.6 – Opening year (2020) road traffic BNLs, daytime 18-hour, dB(A)

Road link	2020 no development, L _{A10,18h}	2020 with development, L _{A10,18h}	Increase in noise due to the Proposed Development
A50 (west of junction with A38)	82.0	82.1	+0.1
Toyota Access	65.4	65.4	0
A38 (north of junction with A50)	82.9	83.0	+0.1
A50 (east of junction with A38)	83.2	83.2	0
B5008 (between A38/A50 junction and services)	69.3	70.5	+1.2
A38 (south of junction with A50)	82.9	82.9	0
B5008 (between services access and Site access)	68.2	69.6	+1.3
B5008 (between site access and Findern Road)	69.2	69.3	+0.1
Findern Rd	64.0	64.2	+0.2
B5008 Etwall Road (between Findern Rd and A5132)	68.1	68.1	0
A5132 Twyford Rd	66.5	66.5	0
B5008 Repton Rd	68.5	68.5	0
A5132 The Castle Way	67.9	67.9	0
A38 southbound link to Castle Way	66.9	66.9	0
A38 northbound link to Carriers Way	70.1	70.1	0
A5132 Carriers Way	68.7	68.7	0
A38 north of A5132	82.9	82.9	0
A38 south of A5132	83.0	83.1	+0.1

4.24 To quantify long term effects, calculations have also been undertaken for the future year 2028 both with and without the proposed development. The results are presented in **Table 4.7** below.

Table 4.7 – Future year (2028) road traffic BNLs, daytime 18-hour, dB(A)

Road link	2028 no development, $L_{A10,18h}$	2028 with development, $L_{A10,18h}$	Increase in noise due to the Proposed Development
A50 (west of junction with A38)	82.6	82.6	0
Toyota Access	66.0	66.0	0
A38 (north of junction with A50)	83.4	83.5	+0.1
A50 (east of junction with A38)	83.7	83.7	0
B5008 (between A38/A50 junction and services)	69.8	71.0	+1.2
A38 (south of junction with A50)	83.4	83.4	0
B5008 (between services access and Site access)	68.8	70.0	+1.2
B5008 (between site access and Findern Road)	69.7	69.9	+0.2
Findern Rd	64.6	64.8	+0.2
B5008 Etwall Road (between Findern Rd and A5132)	68.6	68.7	+0.1
A5132 Twyford Rd	67.0	67.0	0
B5008 Repton Rd	69.0	69.0	0
A5132 The Castle Way	68.4	68.4	0
A38 southbound link to Castle Way	67.4	67.4	0
A38 northbound link to Carriers Way	70.7	70.7	0
A5132 Carriers Way	69.2	69.2	0

Road link	2028 no development, L _{A10,18h}	2028 with development, L _{A10,18h}	Increase in noise due to the Proposed Development
A38 north of A5132	83.4	83.4	0
A38 south of A5132	83.6	83.6	0

- 4.25 For the vast majority of road links assessed in 2020, the predicted increase is less than 1 dB, with all links experiencing an increase of less than 3 dB. In accordance with DMRB, there is predicted to be a minor adverse effect during the daytime as a result of the additional road traffic in the short term.
- 4.26 In the long term, no link will experience an increase of more than +1.2 dB, therefore the long-term effect is likely to be negligible.
- 4.27 Similarly, in order to account for the potential effects over the 8-hour night-time period (23:00 – 07:00), **Table 4.8** and **Table 4.9** show the predicted increases in night-time noise in the opening and future years, respectively. The night-time noise levels have been approximated using the BNL method which, in the absence of an established method, is considered the most appropriate way to consider the night-time effects.

Table 4.8 – Opening year (2020) road traffic BNLs, night-time 8-hour, dB(A)

Road link	2020 no development, L _{A10,18h}	2020 with development, L _{A10,18h}	Increase in noise due to the Proposed Development
A50 (west of junction with A38)	76.1	76.1	0
Toyota Access	49.3	49.3	0
A38 (north of junction with A50)	76.7	76.7	0
A50 (east of junction with A38)	77.2	77.2	0
B5008 (between A38/A50 junction and services)	55.4	61.2	+5.8
A38 (south of junction with A50)	76.6	76.7	+0.1
B5008 (between services access and Site access)	55.4	60.8	+5.4
B5008 (between site access and Findern Road)	56.4	57.6	+1.2

Road link	2020 no development, L _{A10,18h}	2020 with development, L _{A10,18h}	Increase in noise due to the Proposed Development
Findern Rd	46.4	48.3	+1.9
B5008 Etwall Road (between Findern Rd and A5132)	54.4	55.0	+0.6
A5132 Twyford Rd	53.4	53.5	+0.1
B5008 Repton Rd	56.2	56.5	+0.3
A5132 The Castle Way	55.2	55.2	0
A38 southbound link to Castle Way	51.9	52	+0.1
A38 northbound link to Carriers Way	54.9	54.9	0
A5132 Carriers Way	57.2	57.3	+0.1
A38 north of A5132	76.6	76.7	+0.1
A38 south of A5132	76.8	76.8	0

Table 4.9 – Future year (2028) road traffic BNLs, night-time 8-hour, dB(A)

Road link	2028 no development, L _{A10,18h}	2028 with development, L _{A10,18h}	Increase in noise due to the Proposed Development
A50 (west of junction with A38)	76.6	76.6	0
Toyota Access	50.4	50.4	0
A38 (north of junction with A50)	77.2	77.3	+0.1
A50 (east of junction with A38)	77.7	77.7	0
B5008 (between A38/A50 junction and services)	56.3	61.6	+5.3
A38 (south of junction with A50)	77.1	77.2	+0.1
B5008 (between services access and Site access)	56.4	61.2	+4.8

Road link	2028 no development, LA _{10,18h}	2028 with development, LA _{10,18h}	Increase in noise due to the Proposed Development
B5008 (between site access and Findern Road)	57.3	58.4	+1.1
Findern Rd	47.6	49.7	+2.1
B5008 Etwall Road (between Findern Rd and A5132)	55.3	55.8	+0.5
A5132 Twyford Rd	54.2	54.3	+0.1
B5008 Repton Rd	56.9	57.2	+0.3
A5132 The Castle Way	55.8	55.8	0
A38 southbound link to Castle Way	52.8	52.9	+0.1
A38 northbound link to Carriers Way	55.8	55.8	0
A5132 Carriers Way	57.8	57.8	0
A38 north of A5132	77.1	77.2	+0.1
A38 south of A5132	77.3	77.4	+0.1

- 4.28 In the short term, the predicted changes range from 0 dB to +5.8 dB. Therefore, the short-term effects are predicted to range from negligible to major adverse effect as a result of the additional road traffic for night-time, based on the predicted change.
- 4.29 In the long term, the predicted changes range from 0 dB to +5.3 dB. Therefore, the long-term effects are predicted to range from negligible to major adverse effect as a result of the additional road traffic for night-time, based on the predicted change.
- 4.30 There are only two links that have increases associated with a higher than minor adverse effect; the B5008 (between A38/A50 junction and services), which does not have any noise sensitive receptors along it and therefore does not warrant further consideration, and the B5008 (between services access and Site access). This is in effect a link between the two roundabouts.
- 4.31 There is only Hill Farm to the south east of the link that could be affected. Assuming Hill Farm contains dwellings, then the night-time is a valid consideration. The indicative LA_{10,8h} in 2028 is 61.6 dB. Given that the nearest building is at least 90 metres from this link, assuming line source distance attenuation only, this would reduce to 52.1 dB LA_{10,8h}. Although there is no known conversion factor to approximate the LA_{eq,8h} from an estimated LA_{10,8h}, it is conceivable that the LA_{eq} could be 1 to 2 dB lower than the LA₁₀. This would result in night-time LA_{eq,8h} of around 50 dB. There would likely also be around 3 dB attenuation from ground absorption, and the noise level is based on the

assumption of free-flowing traffic at the speed limit – vehicles will be much slower at the site access roundabout. These effects combined could result in free-field noise levels of around 45 dB at the nearest receptor during the night-time.

- 4.32 Given that the results during the night-time at ML2 are above this, and that resultant internal road traffic noise through a partially opened window would give rise to around 30 dB inside (thus meeting the desirable 30 dB guideline level for inside bedrooms from BS 8233), no further consideration is warranted.

6.0 MITIGATION

Loading and unloading operations

- 6.1 Rating levels associated with the loading and unloading operations are predicted to be above the measured background noise level at ESR1 and ESR2 during the night-time. Therefore, further consideration of mitigation measures is required for night-time use. No mitigation measures are required for daytime use.
- 6.2 As the final location and operation of each unit is unknown, mitigation measures are recommended in outline terms only, and can be confirmed at the detail design stage when further information is known.
- To mitigate noise from HGV movements and deliveries at ESR1 during the night-time, a close boarded fence, located between the source and receiver would be required. It is widely accepted that a barrier which removes line of sight between the source and receiver will attenuate the noise source by approximately 10dB. The barrier would need to remove line of sight at first floor windows.
- 6.3 To mitigate noise from HGV movements and deliveries at ESR2 during the night-time, the following mitigation measures could be implemented;
- Buildings could be orientated to ensure the delivery areas are located on the screened side of the buildings.
 - A barrier located adjacent to the access road to reduce noise levels from HGV movements through the development site.
- 6.4 Mitigation measures can be confirmed at the detailed design stage, once the final layout is known.

Noise from fixed plant

- 6.5 Noise level limits have been derived at the nearest noise sensitive receptors. Provided that these limits are achieved, a low impact is predicted. Therefore, no further consideration of mitigation measures is warranted.

Carpark

- 6.6 It is considered that noise associated with the carpark areas will not cause a significant impact at ESRs. Therefore, further consideration of mitigation measures is unwarranted.

Development generated road traffic noise

- 6.7 The assessment of the potential noise impact from Development generated traffic indicates that, when considering the change in noise levels, and the resultant future noise levels at worst affected receptors, there is likely to be, at worst a permanent, minor adverse effect from this noise. Therefore, further mitigation is not required.

7.0 CONCLUSIONS AND RECOMMENDATIONS

- 7.1 BWB Consulting has been appointed by Brackley Property Developments Limited to undertake a noise impact assessment for a proposed commercial/industrial development at Axis 50 near Willington, Derby.
- 7.2 The dominant source of noise is the passage of road traffic on Derby Southern Bypass (A50), Etwall Road (B5008), Burton Road (A38) and the remainder of the local road network. In addition, train movements on the Stoke to Derby Railway Line, located to the south, were also audible on the proposed development site.
- 7.3 The end users of the proposed warehouse units are currently unknown.
- 7.4 This assessment has been undertaken based on the results of a baseline noise survey undertaken in March 2018. The results of the survey have been assessed in accordance with current guidance.
- 7.5 The noise impact from deliveries at nearby existing noise sensitive receptors has been assessed. During the daytime period, the rating level has been predicted to be around the measured background noise level, with no mitigation measures in place. During the night-time, the rating level has been predicted to be above the measured background level at ESR1 and ESR2. Therefore, mitigation measures have been recommended.
- 7.6 Appropriate design limits for noise from fixed plant items have been set.
- 7.7 It is considered that noise levels from the carpark areas are unlikely to cause a significant impact at ESRs.
- 7.8 The assessment of the potential noise impact from development generated traffic indicates that at the worst affected receptors, there is likely to be, at worst a permanent, minor adverse effect from this noise.
- 7.9 Based on the results of the assessment, and with the appropriate mitigation in place, it is considered that noise need not be a determining factor in granted planning consent for the proposed development.

APPENDIX A

Glossary of terms

Appendix A – Glossary of Acoustic Terminology

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 LAeq, LA90 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 ⁻⁵ Pa).
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

Detailed Survey Results

Table B.1: Octave-band Noise Measurement Data at Position 1

Start 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	1k Hz	2k Hz	4k Hz	8 kHz
13/03/2018 17:00	01:00	62	60	70 ¹	65	59	52	53	61	51	41	31
13/03/2018 21:12	01:00	60	57	68 ²	64	57	52	55	59	50	34	19
14/03/2018 01:59	00:15	54	50	61	63	52	47	51	52	44	39	26
14/03/2018 03:33	00:15	52	50	60	61	53	47	48	50	40	39	27
14/03/2018 03:49	00:15	53	50	60	61	53	46	48	51	43	40	25
¹ Road traffic on A38												
² Aircraft												

Table B.2: Octave-band Noise Measurement Data at Position 2

Start 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	1k Hz	2k Hz	4k Hz	8 kHz
13/03/2018 15:58	01:00	59	56	68	64	60	57	50	58	49	38	22
13/03/2018 20:06	01:00	60	56	70 ²	63	58	51	54	58	48	33	18
14/03/2018 01:38	00:15	52	46	61	57	51	47	51	49	41	33	20
14/03/2018 03:00	00:15	50	47	61	57	51	43	46	48	37	23	13
14/03/2018 03:15	00:15	50	46	63	57	51	45	46	48	37	25	19

¹ L_{Amax} generally dominated by Road traffic on Etwall Road

² Distant train

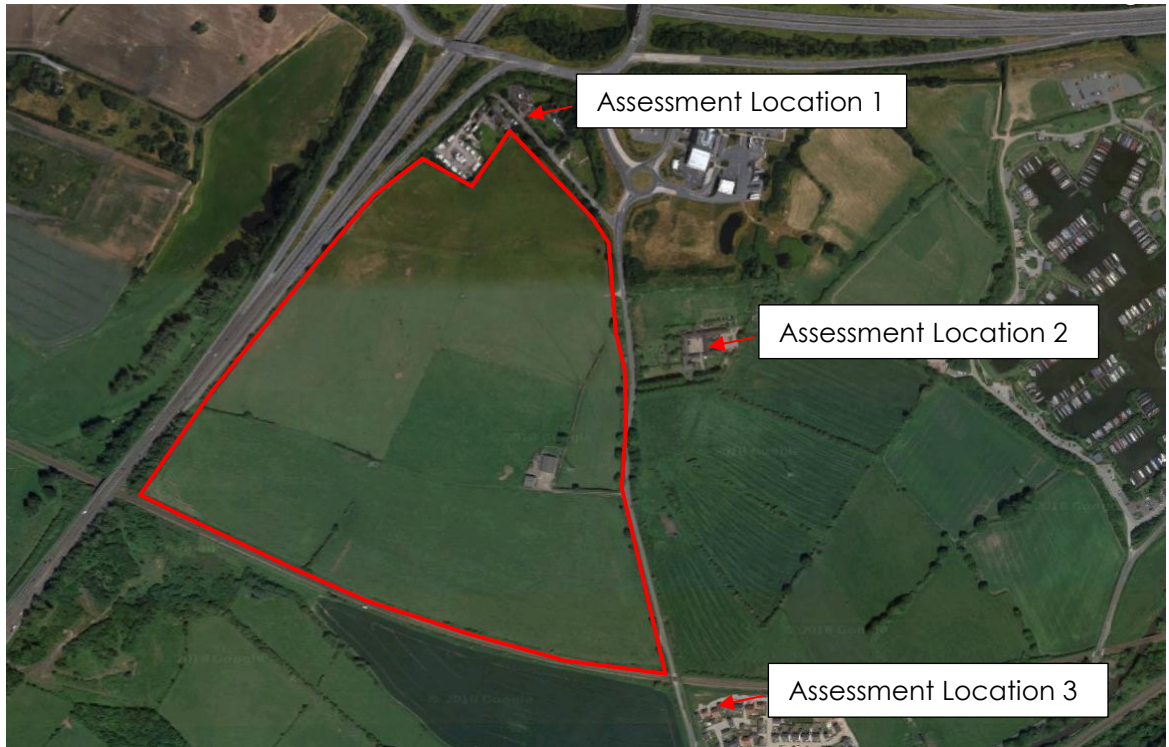
Table B.3: Octave-band Noise Measurement Data at Position 2

Start 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	1k Hz	2k Hz	4k Hz	8 kHz
13/03/2018 18:02	01:00	58	51	86 ¹	63	59	52	54	55	49	42	32
13/03/2018 19:03	01:00	57	51	83 ¹	63	56	50	53	55	48	40	29
14/03/2018 01:15	00:15	47	41	63 ²	53	46	47	46	43	29	18	14
14/03/2018 02:23	00:15	45	41	61 ²	53	44	40	43	43	31	24	19
14/03/2018 02:38	00:15	47	41	67 ²	57	47	41	44	44	39	28	20
¹ L _{Amax} due to passing trains and train horn												
² L _{Amax} due to road traffic												

APPENDIX C

Assessment Locations

Figure E.1 Assessment Locations



BWB

