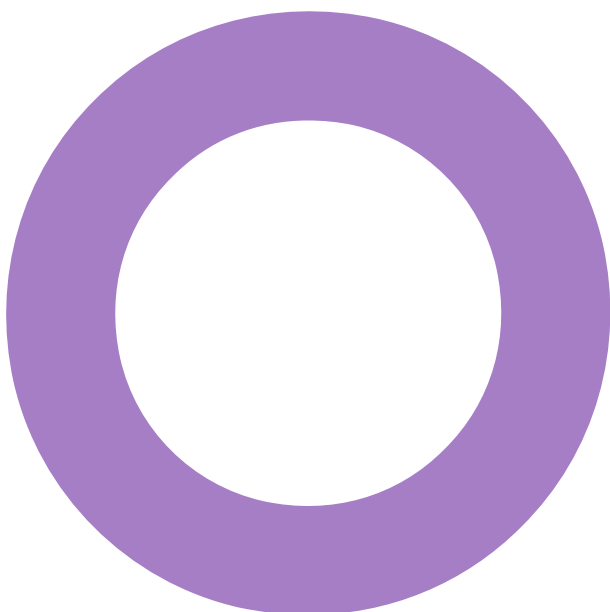


**Reading International
Business Park.
Reading.
SPIE UK.**

ACOUSTICS
ENVIRONMENTAL NOISE REPORT

REVISION 02 – 21 NOVEMBER 2019



Audit sheet.

Rev.	Date	Description of change / purpose of issue	Prepared	Reviewed	Authorised
01	17/10/2019	First draft for review	RN/AG/MF	MMC	MMC
02	21/11/2019	Update of local policy	MF	MMC	MMC

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Executive summary

Hoare Lea LLP has been appointed by SPIE UK to undertake an environmental noise assessment of a proposed commercial development at the Reading International Business Park.

In order to assess the impact of commercial noise and road traffic noise from the Proposed Development, a number of nearby noise sensitive receptors have been selected.

Acoustic surveys of baseline noise levels at neighbouring noise sensitive locations have been undertaken. The measured survey data has been used to assess the impact of for commercial operation based on B8 use, as a worst case.

For residential receptors, a statistical analysis of the measured background sound levels has been undertaken in accordance with BS 4142. The results of noise prediction calculations and noise rating level at receptors has been compared to measured background noise levels.

Noise rating levels from commercial activity noise are comfortably below background noise at residential receptors, such that there is a clear indication that the specific sound source would have a low impact on nearby residential properties.

Based on a separate assessment for non-residential receptors, commercial activity noise is not anticipated to have a negative impact at these properties.

Traffic flow data has been provided and used to predict noise levels due to additional road traffic as a result of the Proposed Development.

Increased road traffic noise levels present a maximum difference of 0.2 dB above the factored baseline without the Proposed Development. The magnitude of short-term road traffic noise impact would be 'Negligible' based on the outcome of the assessment.

1. Introduction

Hoare Lea LLP has been appointed by SPIE UK to undertake an environmental noise assessment of a proposed commercial development at the Reading International Business Park. The site location is shown in Figure 1 and is currently unused. Sources of noise in the area include the M4 motorway and M4 Junction 11 Basingstoke road traffic noise, located south of the business park site.

The proposed development is for B2 / B8 flexible use. For the assessment of noise, a worst-case use has been assumed which is all B8. Hereafter referred to as the 'Proposed Development'.

A glossary of acoustic terminology and abbreviations used is provided in Appendix A.



Figure 1: Location of the Proposed Development. Contains Google Map Data © Google 2019

2. Planning Policy and Published Guidance

2.1 Noise Policy Statement for England

The *Noise Policy Statement for England* (NPSE) (Department for Communities and Local Government, 2018) advises that noise impacts should be assessed on the basis of adverse and significant adverse effect but does not provide any specific guidance on assessment methods or noise limits.

The NPSE introduces the concepts summarised in Table 1 that can be applied when considering the significance of noise impacts, which are applied by the World Health Organization.

The document advises that it is not possible to have *“a single objective noise based measure.... that is applicable to all sources of noise in all situations”*. It further advises that the sound level at which an adverse effect occurs is likely to be different for different noise sources, for different receptors at different times.

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

Table 1: NPSE observed effect levels.

2.2 National Planning Policy Framework

The *National Planning Policy Framework* (NPPF) (Department for Communities and Local Government, 2019) sets out the Government's planning policies and how these are expected to be applied. In relation to noise and vibration, NPPF Section 15 paragraph 170 states:

“The planning system should contribute to and enhance the natural and local environment by:

...

- *preventing both new and existing development from contributing to or being put at unacceptable risk from, or being adversely affected by unacceptable levels of soil, air, water or noise pollution or land instability...”*

Whilst paragraph 180 states:

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

- a) mitigate and reduce to a minimum potential adverse impacts resulting from noise from new development – and avoid noise giving rise to significant adverse impacts on health and the quality of life;*
- b) identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason; and*
- c) limit the impact of light pollution from artificial light on local amenity, intrinsically dark landscapes and nature conservation.”*

2.3 Planning Practice Guidance

Online *Planning Practice Guidance* (PPG) (Ministry of Housing, Communities & Local Government, 2014) has been published to provide greater details in relation to the relevance of noise to the planning process following the introduction of the NPPF and NPSE.

This guidance states, under the heading *'How to Determine the Noise Impact'*, that:

"Local planning authorities' plan-making and decision taking should take account of the acoustic environment and in doing so consider:

- whether or not a significant adverse effect is occurring or likely to occur;*
- whether or not an adverse effect is occurring or likely to occur; and*
- whether or not a good standard of amenity can be achieved."*

In line with NPSE, this includes identifying where noise exposure is above or below the significant observed adverse effect level and the lowest observed adverse effect level for a given situation during the operation of the Proposed Development.

Further guidance on each of the various observed effect levels set out in the NPSE is provided in the table detailed in the section headed *'How to Recognise when Noise could be a concern?'* which is reproduced below in Table 2. It is important to note that no specific noise parameters are defined in the text or target noise levels provided. Under the heading *'What factors influence whether noise could be a Concern?'*, the subjective nature of noise is discussed. It is stated that there is no simple relationship between noise levels and the impact on those affected. This depends on how various factors combine in particular situations.

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

Table 2: PPG observed effects.

2.4 Local Planning Policy

Reading Borough Council Local Plan Document, adopted November 2019, sets out the Local Authority policies with regard to pollution, including noise pollution.

Policy EN16: POLLUTION AND WATER RESOURCES deals with noise issues in general and states the following:

"Development will only be permitted where it would not be damaging to the environment and sensitive receptors through land, noise or light pollution; where it would result in no deterioration in, or ideally enhance, ground and surface water quality; and where adequate water resources, sewerage and wastewater treatment infrastructure will be in place to support the proposed development prior to occupation.

Proposals for development that are sensitive to the effects of noise or light pollution will only be permitted in areas where they will not be subject to high levels of such pollution, unless adequate mitigation measures are provided to minimise the impact of such pollution.

Development will only be permitted on land affected by contamination where it is demonstrated that the contamination and land gas can be satisfactorily managed or remediated so that it is suitable for the proposed end use and will not impact on the groundwater environment, human health, buildings and the wider environment, during demolition and construction phases as well as during the future use of the site."

Policy EN17 NOISE GENERATING EQUIPMENT deals particularly with noise-generating equipment and sets out the following criterion:

"Where noise generating equipment is proposed, the noise source specific level (plant noise level) should be at least 10dBA below the existing background level as measured at the nearest noise sensitive receptor."

At the time of writing, consultation with the Local Authority was pending review and will be confirmed once comments are received.

2.5 British Standard 4142:2019 Methods for rating and assessing industrial and commercial sound

Current Government advice to Local Planning Authorities in both England and Wales makes reference to British Standard 4142:2014+A1:2019 (BS 4142) (British Standards Institution, 2014) as being the appropriate guidance for assessing commercial operations and fixed building services plant noise. The British Standard provides an objective method for rating the significance of impact from industrial and commercial operations impacting on residential properties. It describes a means of determining sound levels from fixed plant installations and determining the background sound levels that prevail on a site.

The assessment of the impacts is based on the subtraction of the pre-existing background sound level ($L_{A90,T}$) from the rating level ($L_{A,r,T}$) and depending on the context.

The standard does not give a definitive method for determining the background sound level but instead, as a commentary, it states that "the objective is not simply to ascertain a lowest measured background sound level but rather to quantify what is typical during particular time periods".

Clause 8. 1.4, which discusses the monitoring duration, states "there is no "single" background sound level as this is a fluctuating parameter. However, the background sound level used for the assessment should be representative of the period being assessed." As a note to this clause the following commentary is given on obtaining a representative background sound level:

"To obtain a representative background sound level a series of either sequential or disaggregated measurements ought to be carried out for the period(s) of interest, possibly on more than one occasion. A representative level ought to account for the range of background sound levels and ought not automatically to be assumed to be either the minimum or modal value."

The rating level is defined objectively as the specific source noise level in question (either measured or predicted) with graduated corrections for tonality (up to +6 dB(A)), impulsivity (up to +9 dB(A)), intermittency (+3 dB(A)) and other sound characteristics (+3 dB(A)) which may be determined either subjectively or objectively, if necessary.

The background sound level is subtracted from the rating level. The following is considered to evaluate the magnitude of impact on residential properties:

- A difference of around +10 dB is likely to be an indication of a significant adverse impact, depending on context – Taken in this assessment to be the threshold of SOAEL;
- A difference of around +5 dB is likely to be an indication of an adverse impact, depending on context – Taken in this assessment to be the threshold of LOAEL; and
- A difference of +0 dB or less is an indication of the specific sound source having a low impact, depending on the context.

This method is only applicable for external noise levels.

3. Assessment methodology.

3.1 Noise measurement procedure

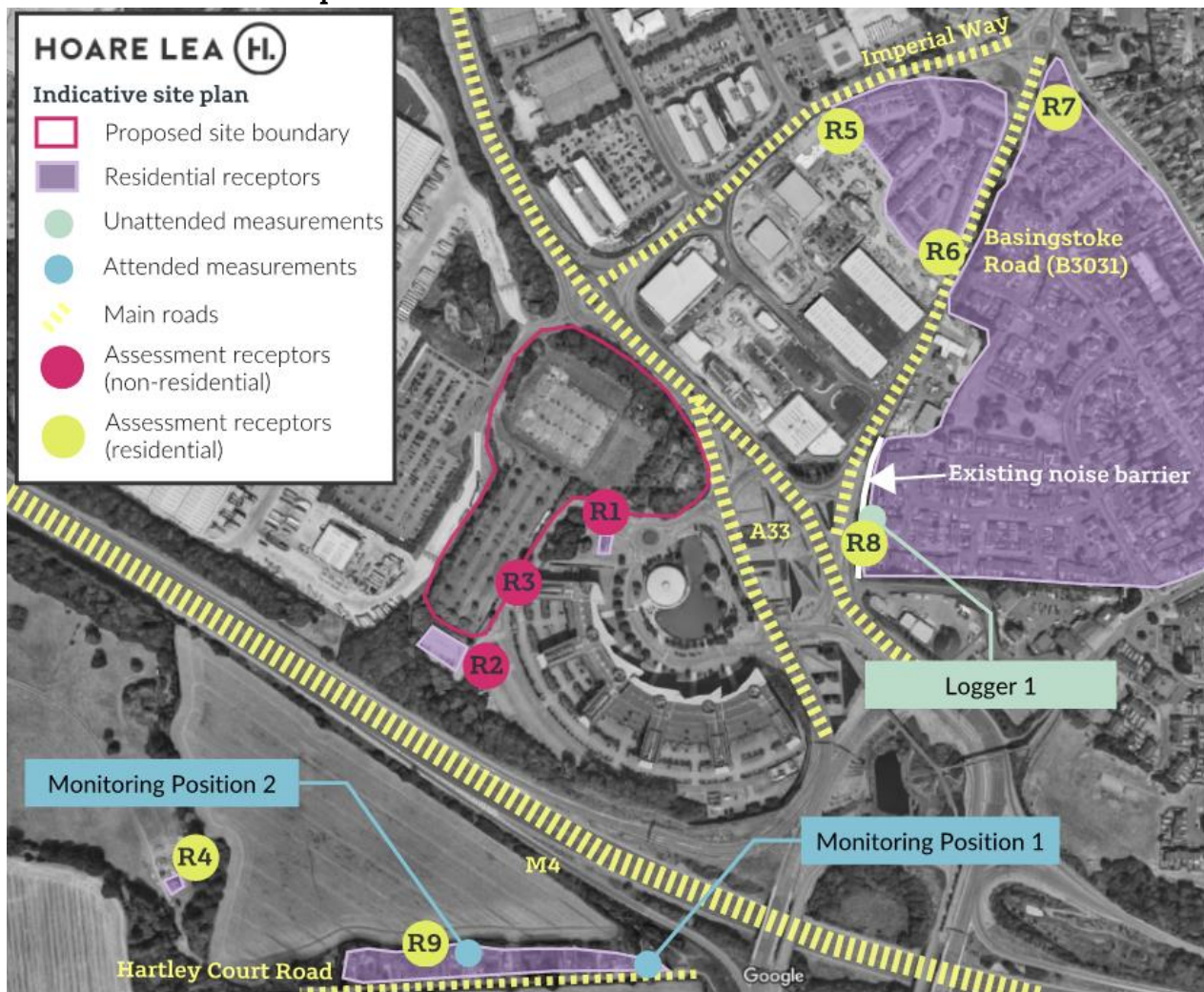


Figure 2: Survey Locations. Contains Google Map Data © Google 2019

The site layout is shown in Figure 2 above. One unattended logger (green marker) was placed on the rear patio of 50 Kingsley Close and two attended measurements were undertaken (blue markers) at the rear garden of 36 Hartley Court Road and at the Cul-de-sac at the end of Hartley Court Road. These three measurement locations were chosen to, represent the closest residential noise receptors.

Noise levels were continuously monitored at the 'Logger 1' location (shown in Figure 2) between Friday 30th November 2018 and Tuesday 4th December 2018. This was to capture the typical ambient noise environment over a four-day period, allowing calculation of the $L_{Aeq, 16 \text{ hour day}}$ and $L_{Aeq, 8 \text{ hour night}}$ ambient noise levels. The measurements recorded by the unattended noise logger consisted of continuous 15-minute duration samples of A-weighted fast-time weighted metrics throughout the survey period.

Two attended sound level meter positions (Monitoring Positions 1 and 2) were chosen to supplement the logger measurements, to simultaneously assess the ambient noise levels at other residential receptors over shorter 15-minute measurement durations. These single measurements were synchronised with the continuous 15-minute calculation intervals at position Logger 1. All measurements were taken in free-field conditions at a height of 1.3 metres above the local ground height.

Weather conditions were monitored remotely during the four-day survey period and were deemed to be suitable for undertaking noise measurements. Noise levels thought to be the result of atypical events, i.e. engineer presence/adjustment noise, have been removed from the assessment calculations.

Field calibrations were undertaken at the beginning and end of the measurement period for all three SLM monitors with no significant drift in level. The calibration and survey equipment details are listed in Appendix B.

3.2 Noise sensitive receptors

In order to assess the impact of commercial noise and road traffic noise from the Proposed Development, a number of nearby noise sensitive receptors have been selected.

The effect of commercial activities and site traffic on these selected receptors will be assessed.

The selected receptors are identified as shown in Table 3 below and shown in Figure 2 above.

Receptor ID	Receptor name	Description
R1	Little Lea Farmhouse	Commercial storage usage
R2	Busy Bees	Children's day nursey
R3	Reading International Business Park Offices (RIBP)	Commercial office premises
R4	Residence off Hartley Ct. Rd.	Residential dwelling
R5	Tidman Rd. Resi - Imperial Way	Residential dwelling
R6	Tidman Rd. Resi - B3031	Residential dwelling
R7	Resi by St. Paul's Church roundabout	Residential dwelling
R8	Rear of Kingsley Close	Residential dwelling
R9	Rear of Hartley Court Road	Residential dwelling

Table 3: Selected noise sensitive receptor locations for noise assessment

It should be noted that the office/commercial receptors are less noise sensitive than the residential locations and as such are provided for reference purposes only.

3.3 Assessment of commercial noise

The Proposed Development has the potential to generate commercial noise and is not considered to be noise-sensitive. Therefore, the noise assessment considers the impact of noise generated by the development upon existing sensitive receptors in the area.

The noise assessment follows the guidance set out in BS 4142. Measured background noise data from Logger 1 (Figure 2) has been separated into day time (07.00 to 23.00) and night-time (23.00 to 07.00) periods and collated to help determine typical background noise level during these periods. A single value for background noise is considered typical if:

- It occurs for more than 50% of the time; or
- At least 75% of levels measured are spread over a close range of 4 dB or less, a value in that range should be considered; or
- In the case of a classic bell-curve statistical distribution a value on the rise of the curve should be considered to reflect a worst-case; or
- It represents the point at which the cumulative percentage of the total starts to increase more rapidly.

The above are considerations that are taken into account when determining a single value for the typical background noise; however, each site is different, and it is not always possible to follow set formulae as the context of the noise climate of the area is also important.

Commercial noise levels have been calculated using a noise model created in DataKustik Cadna-A (2019) proprietary noise modelling software. This software implements the environmental noise propagation prediction methodology set out in ISO 9613-2 for predicting the propagation of sound.

A schedule of delivery vehicle visits to site have been provided by transport consultant Stantec for the proposed use and are summarised in Table D2 in Appendix D. Traffic data for the Proposed Development is calculated based on area and approved trip rates. For the purpose of this assessment, vehicle trip rates have been rounded to the nearest whole number.

Based on the above traffic information and typical service yard activity for development of this type and scale the following service yard activity has been assumed for each delivery vehicle visit. It is assumed that for each HGV arrival during day-time periods, there is a maximum of 30 minutes engine noise and delivery activity. It is assumed that all commercial noise relating to delivery activity for each of the four proposed units will take place at the proposed docking ports. Overall, there is a forecast increase in the number of delivery vehicles for the Proposed Development when compared to existing traffic on roads. A maximum of 31 HGV movements is predicted during the daytime within a single hour, and a maximum of 10 HGV movements is predicted within a single hour during the night.

The assessment uses a CadnaA noise model to determine the reduction in sound as it propagates from commercial sources to receivers using the principles of ISO 9613-2. The model incorporates distance attenuation from noise source to receptors assuming hemi-spherical spreading from a source and screening from intervening structures.

It should be noted that the noise model takes into account the effect of the existing noise barrier to residential locations as shown in Figure 2 above.

BS 4142 advises that if the noise contains a prominent feature which would attract attention a further correction should be applied to the specific noise level to give the Rating Level. Corrections should be applied for tonality, impulsivity, intermittency and any other characteristic not covered by these. It is considered likely that the noise will be impulsive (bangs and clangs) and intermittent (identifiable on/off periods) and there is the potential that vehicle alarms could be perceptible at the nearest receptor locations. As a precautionary measure the assessment assumes a correction of +8 dB for acoustic features (+3 dB for tonality, +3dB for impulsivity and +2 dB for intermittency) therefore, the total Rating Level includes +8 dB for acoustic feature corrections. This is considered to be a conservative application of noise feature penalties.

3.4 Assessment of road traffic noise.

Road traffic noise levels have been calculated using DataKustik Cadna-A (2019) proprietary noise modelling software. This software implements the methodology within Calculation of Road Traffic Noise (CRTN), which utilises a number of input parameters provided by Stantec (e.g. road traffic flow, composition, speed, gradient road, road surface, distance of receptor from road, etc.) to enable predictions of noise levels due to road traffic to be produced.

The noise models have been produced with the following assumptions:

- The ground conditions around the site are predominantly hard with interspersed soft areas surrounding roads and buildings, therefore the ground has been modelled as semisoft;
- Up to two orders of reflections were modelled

The assessment also uses the methodology from The Design Manual for Roads and Bridges (DMRB) to assess the impacts of the Proposed Development that result in changes in traffic flows on existing road links. Table 3.1 of the DMRB provides guidance on the magnitude of short-term road traffic noise impacts. This is set out in Table 4 below.

Noise Change, dB LA10, 18 hour	Magnitude of Impact
0	No change
0.1 – 0.9	Negligible
1.0 – 2.9	Minor
3.0 – 4.9	Moderate
5.0 +	Major

Table 4: Classification of magnitude of short-term road traffic noise impacts

4. Assessment.

4.1 Noise survey results

The measured noise level time histories for the unattended survey locations are included in Appendix C. A summary of the unattended measurements at Logger 1 is provided in Table 5 below.

Date	Ambient sound pressure levels measured (dB) at position Logger 1	
	Day Time (07:00 - 23:00) $L_{Aeq, 16hr}$	Night Time (23:00 - 07:00) $L_{Aeq, 8hr}$
30/11/2018	55	50
01/12/2018	56	50
02/12/2018	56	51
03/12/2018	56	49
04/12/2018	52	-

Table 5: Summary of results from measured noise survey at Logger 1 position

A summary of the 15-minute attended measurements is provided in Table 6 below.

Survey location	Start time	Ambient sound pressure level, $L_{Aeq,15mins}$ (dB)	Background sound pressure level, $L_{A90,15 min}$ (dB)	Concurrent $L_{A90,15min}$ measurement at Logger 1 (dB)
Monitoring Position 1	30/11/2018 15:00	60	58	55
	30/11/2018 15:15	60	58	54
Monitoring Position 2	30/11/2018 16:00	56	55	54
	30/11/2018 16:15	56	55	53

Table 6: Summary of results from attended noise survey positions

4.2 Background sound levels

In line with the guidance given in BS 4142, to “quantify what is typical during particular time periods”, a statistical analysis of the measured background sound levels has been undertaken. Appendix C contains graphs of the statistical distribution of the measured background sound levels for the daytime and night-time at the monitoring positions shown in Figure 2 (as Logger 1).

The daytime period for Logger 1 has a reasonable spread of background sound levels between 49 dB $L_{A90,15 min}$ and 56 dB $L_{A90,15 min}$ with no obvious typical level. The statistical analysis chart in Appendix C illustrates the statistical distribution of the daytime only background sound levels along with the cumulative percentage of the total number of events. A value of 51 dB $L_{A90,15 min}$ has been selected to represent the typical background sound level for this period as representative of approximately 2/3rd of the time. For the night-time period, a value of 43 dB $L_{A90,15 min}$ has been selected to be representative of the background sound level during this period. The primary reasons for this are that the majority of measured levels fall into this category and that it falls toward the lower end of the range of measured levels.

As shown in Table 6 above, the background noise measurements at the attended measurement positions are comparable to noise levels at Logger 1 position. It is therefore proposed to use the Logger 1 measurements as representative background noise levels for assessments at positions R4 and R9.

4.3 Commercial noise assessment results

Appendix D contains tables of predicted hourly delivery visits for the site. Deliveries and loading/unloading for the site will be carried out within the loading bays of the proposed units. As set out in Section 3.3 above, the assessment is based on a maximum of 31 HGV movements is predicted during the daytime within a single hour (19:00-20:00) and a maximum of 10 HGV movements is predicted within a single hour (06:00-07:00) during the night.

Based on the above information, the results of noise prediction calculations and noise rating level at receptors is as shown in Table 7 below, where the difference relative to background noise is stated. The BS4142 assessment method is only suitable for assessing residential receptors and hence non-residential receptors (R1-R3) are not included.

Assessment period	Receptor ID	Receptor location	Representative background location	Background noise level	Rating level at receptor	Difference
Daytime (07:00-23:00)	R4	Residence off Hartley Ct. Rd.	Logger 1	51 dB	35.9	-15.1
	R5	Tidman Rd. Resi - Imperial Way			26.9	-24.1
	R6	Tidman Rd. Resi - B3031			19.9	-31.1
	R7	Resi by St. Paul's Church roundabout			19.0	-32.0
	R8	Rear of Kingsley Close			31.0	-20.0
	R9	Rear of Hartley Court Road			31.8	-19.2
Night time (23:00-07:00)	R4	Residence off Hartley Ct. Rd.	Logger 1	43 dB	24.8	-18.2
	R5	Tidman Rd. Resi - Imperial Way			14.0	-29.0
	R6	Tidman Rd. Resi - B3031			14.9	-28.1
	R7	Resi by St. Paul's Church roundabout			19.5	-23.5
	R8	Rear of Kingsley Close			33.4	-9.6
	R9	Rear of Hartley Court Road			23.4	-19.6

Table 7: Results of noise predictions and comparison to background noise for commercial noise at residential receptors

As shown in Table 7 above, commercial noise during the day results in Rating Levels of between 15 dB and 32 dB below background levels and Rating Levels between 10 dB and 29 dB below background during the night for nearby residential receptors. These levels are comfortably below background noise, such that there is a good indication that the specific sound source would have a low impact on nearby residential properties. Although commercial noise levels from HGVs would not normally be considered as noise generating equipment, the above levels would comply with the Reading Borough Council Policy EN17 for such sources.

Further to the above residential assessment, the noise levels at non-residential receptors have been assessed during daytime hours (when they will be in operation).

During the worst-case hour of operation, commercial noise levels from the Proposed Development are predicted to be 47 dB(A) at Little Lea Farmhouse (R1). Since this is a non-sensitive receptor, this noise level is not anticipated to have a negative impact at this property.

During the worst-case hour of operation, commercial noise levels from the Proposed Development are predicted to be 33 dB(A) at Busy Bees nursery (R2). This is expected to be below the existing ambient noise profile at this receptor. In terms of noise break-in, even with a partially open window, the internal noise levels from commercial activity would be reduced to an insignificant level within the building.

During the worst-case hour of operation, commercial noise levels from the Proposed Development are predicted to be 49 dB(A) at Reading International Business Park (R3). In terms of noise break-in, this commercial office premises is likely to have a sealed façade with non-openable windows. A nominal façade construction would be anticipated to reduce external noise from commercial activity to an insignificant level within the building.

Based on the above assessments for non-residential receptors, commercial activity noise is not anticipated to have a negative impact at these properties.

4.4 Road traffic noise assessment results

Appendix D contains the traffic flows for the Proposed Development including the factored baseline with and without the development.

Based on the above information, the results of noise prediction calculations at all receptors is as shown in Table 8 below, where the difference relative to baseline predictions without the development are stated.

Receptor ID	Receptor location	Absolute noise level (L _{A10,18h} dB)		Difference (dB)
		2019 Factored Baseline	2019 Factored Baseline with (B8) Development	
R1	Little Lea Farmhouse	56.5	56.5	0.0
R2	Busy Bees	42.7	42.8	0.1
R3	Reading International Business Park Offices (RIBP)	51.5	51.6	0.1
R4	Residence off Hartley Ct. Rd.	43.6	43.7	0.1
R5	Tidman Rd. Resi - Imperial Way	70.7	70.7	0.0
R6	Tidman Rd. Resi - B3031	70.9	70.9	0.0
R7	Resi by St. Paul's Church roundabout	65.2	65.2	0.0
R8	Rear of Kingsley Close	55.1	55.1	0.0
R9	Rear of Hartley Court Road	40.3	40.5	0.2

Table 8: Results of noise predictions and comparison to baseline for road traffic noise

As shown in Table 8 above, road traffic noise levels present a maximum difference of 0.2 dB above the factored baseline without the Proposed Development. Referring to the Design Manual for Roads and Bridges (DMRB) magnitude of short-term road traffic noise impact would be 'Negligible' as set out in Table 4 above.

5. Summary and conclusions.

Hoare Lea LLP has been appointed by SPIE UK to undertake an acoustic assessment of the proposed commercial development at the Reading International Business Park.

Acoustic surveys of baseline noise levels at neighbouring noise sensitive locations have been undertaken. The measured survey data has been used to assess the impact of for commercial operation based on B8 use, as a worst case.

Traffic flow predictions have been used to calculate the impact from both commercial noise and increased traffic flow due to the development at nearby noise sensitive receptors.

Noise rating levels from commercial activity noise are comfortably below background noise at residential receptors, such that there is a clear indication that the specific sound source would have a low impact on nearby residential properties.

Based on a separate assessment for non-residential receptors, commercial activity noise is not anticipated to have a negative impact at these properties.

Increased road traffic noise levels present a maximum difference of 0.2 dB above the factored baseline without the Proposed Development. The magnitude of short-term road traffic noise impact would be 'Negligible' based on the outcome of the assessment.

Appendix A: Terminology and Abbreviations

TERMINOLOGY	DESCRIPTION
<i>A-weighting</i>	a filter that down-weights low frequency and high frequency sound to better represent the frequency response of the human ear when assessing the likely effects of noise on humans
<i>acoustic character</i>	one or more distinctive features of a sound (e.g. tones, whines, whistles, impulses) that set it apart from the background noise against which it is being judged, possibly leading to a greater subjective effect than the level of the sound alone might suggest
<i>acoustic screening</i>	the presence of a solid barrier (natural landform or manmade) between a source of sound and a receiver that interrupts the direct line of sight between the two, thus reducing the sound level at the receiver compared to that in the absence of the barrier
<i>ambient noise</i>	all-encompassing noise associated with a given environment, usually a composite of sounds from many sources both far and near, often with no particular sound being dominant
<i>annoyance</i>	a feeling of displeasure in this case evoked by noise
<i>atmospheric absorption</i>	the diminishing of the energy of the sound wave as it propagates through air from the source to the receiver
<i>attenuation</i>	the reduction in level of a sound between the source and a receiver due to any combination of effects including: distance, atmospheric absorption, acoustic screening, the presence of a building façade, etc.
<i>audible sound</i>	a sound that can be heard above all other ambient sounds
<i>audio frequency</i>	any frequency of a sound wave that lies within the frequency limits of audibility of a healthy human ear, generally accepted as being from 20 Hz to 20,000 Hz
<i>background noise</i>	the noise level rarely fallen below in any given location over any given time period, often classed according to day-time, evening or night-time periods (for the majority of the population of the UK the lower limiting noise level is usually controlled by noise emanating from distant road, rail or air traffic)
<i>dB</i>	abbreviation for 'decibel'
<i>dB(A)</i>	abbreviation for the decibel level of a sound that has been A-weighted
<i>decibel</i>	the unit normally employed to measure the magnitude of sound
<i>directivity</i>	the property of a sound source that causes more sound to be radiated in one direction than another
<i>equivalent continuous sound pressure level</i>	the steady sound level which has the same energy as a time varying sound signal when averaged over the same time interval, T, denoted by $L_{Aeq,T}$
<i>frequency</i>	the number of acoustic pressure fluctuations per second occurring about the atmospheric mean pressure (also known as the 'pitch' of a sound)
<i>frequency analysis</i>	the analysis of a sound into its frequency components
<i>geometric spreading</i>	the spreading of sound as it propagates from source to receiver. Noise from a point source spreads in a spherical pattern and noise from a line source spreads in a cylindrical pattern.

TERMINOLOGY	DESCRIPTION
<i>ground effects</i>	the modification of sound at a receiver location due to the interaction of the sound wave with the ground along its propagation path from source to receiver
<i>impulsive sound</i>	a sound having all its energy concentrated in a very short time period
<i>instantaneous sound pressure</i>	at a given point in space and at a given instant in time, the difference between the instantaneous pressure and the mean atmospheric pressure
$L_{A90,T}$	The abbreviation of the level of noise exceeded for 90% of the measurement period, T. Used to quantify the background noise level
L_{Aeq}	the abbreviation of the A-weighted equivalent continuous sound pressure level
<i>level</i>	the general term used to describe a sound once it has been converted into decibels
<i>loudness</i>	the attribute of human auditory response in which sound may be ordered on a subjective scale that typically extends from barely audible to painfully loud
<i>noise</i>	physically: a regular and ordered oscillation of air molecules that travels away from the source of vibration and creates fluctuating positive and negative acoustic pressure above and below atmospheric pressure. Subjectively: sound that evokes a feeling of displeasure in the environment in which it is heard, and is therefore unwelcomed by the receiver
<i>noise climate</i>	a description given to the sources of noise audible at a receiver location
<i>noise emission</i>	the noise emitted by a source of sound
<i>noise immission</i>	the noise to which a receiver is exposed
<i>noise nuisance</i>	an unlawful interference with a person's use or enjoyment of land, or of some <i>right</i> over, or in connection with it
<i>octave band frequency analysis</i>	a frequency analysis using a filter that is an octave wide (the upper limit of the filter's frequency band is exactly twice that of its lower frequency limit)
<i>percentile exceeded sound level</i>	the noise level exceeded for n% of the time over a given time period, T, denoted by $L_{An,T}$
<i>rating level</i>	specific sound level plus any adjustment for the characteristic features of the sound
<i>receiver</i>	a person or property exposed to the noise being considered
<i>residual noise</i>	the ambient noise that remains in the absence of the specific noise whose effects are being assessed
<i>sound</i>	physically: a regular and ordered oscillation of air molecules that travels away from the source of vibration and creates fluctuating positive and negative acoustic pressure above and below atmospheric pressure subjectively: the sensation of hearing excited by the acoustic oscillations described above (see also 'noise')
<i>sound level meter</i>	an instrument for measuring sound pressure level

TERMINOLOGY	DESCRIPTION
<i>sound pressure amplitude</i>	the root mean square of the amplitude of the acoustic pressure fluctuations in a sound wave around the atmospheric mean pressure, usually measured in Pascals (Pa)
<i>sound pressure level</i>	a measure of the sound pressure at a point, in decibels
<i>sound power level</i>	the total sound power radiated by a source, in decibels
<i>specific sound level</i>	equivalent continuous A-weighted sound pressure level produced by the specific sound source at the assessment location over a given reference time interval
<i>specific sound source</i>	sound source being assessed
<i>spectrum</i>	a description of the amplitude of a sound as a function of frequency

Appendix B: Noise Survey Details

Project name: Reading International Business Park

Project number: 10/10924 **Engineer:** Rylan Norcross

Survey Date: 30/11/2018

General Comments: Clear sunny day

Equipment	Type	Serial Number	Last Calibrated
Sound Level Meter	Rion NL-52	00632044	10/10/2017
Pre-amplifier	Rion UC-59	05211	10/10/2017
Microphone	Rion NH-25	32072	10/10/2017

Table B1: Sound level meter 1 - unattended survey

Equipment	Type	Serial Number	Last Calibrated
Sound Level Meter	Rion NL-52	00832244	11/10/2017
Pre-amplifier	Rion UC-59	05471	11/10/2017
Microphone	Rion NH-25	32272	11/10/2017

Table B2: Sound level meter 2 - attended survey

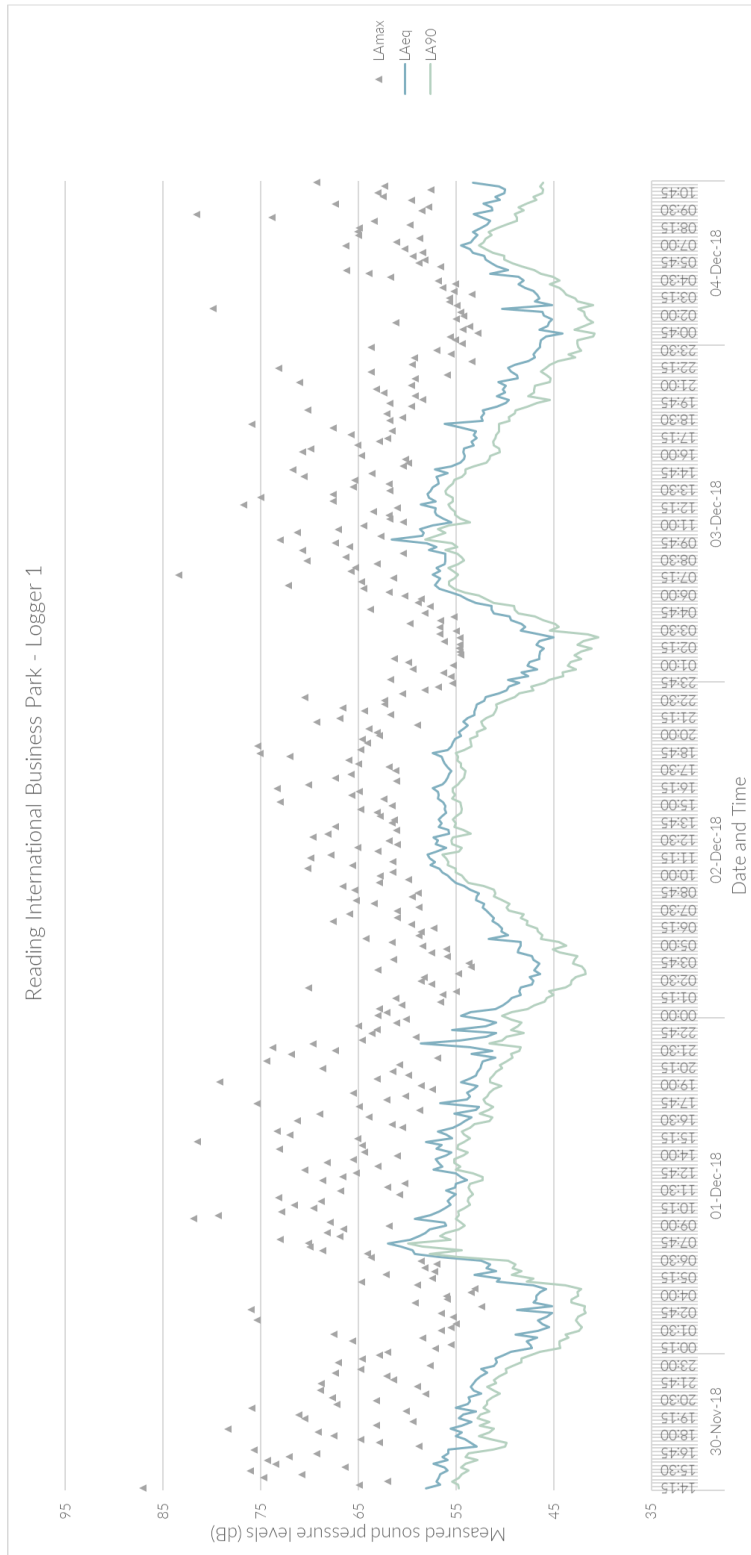
A field calibration was carried out at the start and end of the measurements, using:

Equipment	Type	Serial Number	Last Calibrated
Calibrator	B&K 4231	3000377	30/11/2017

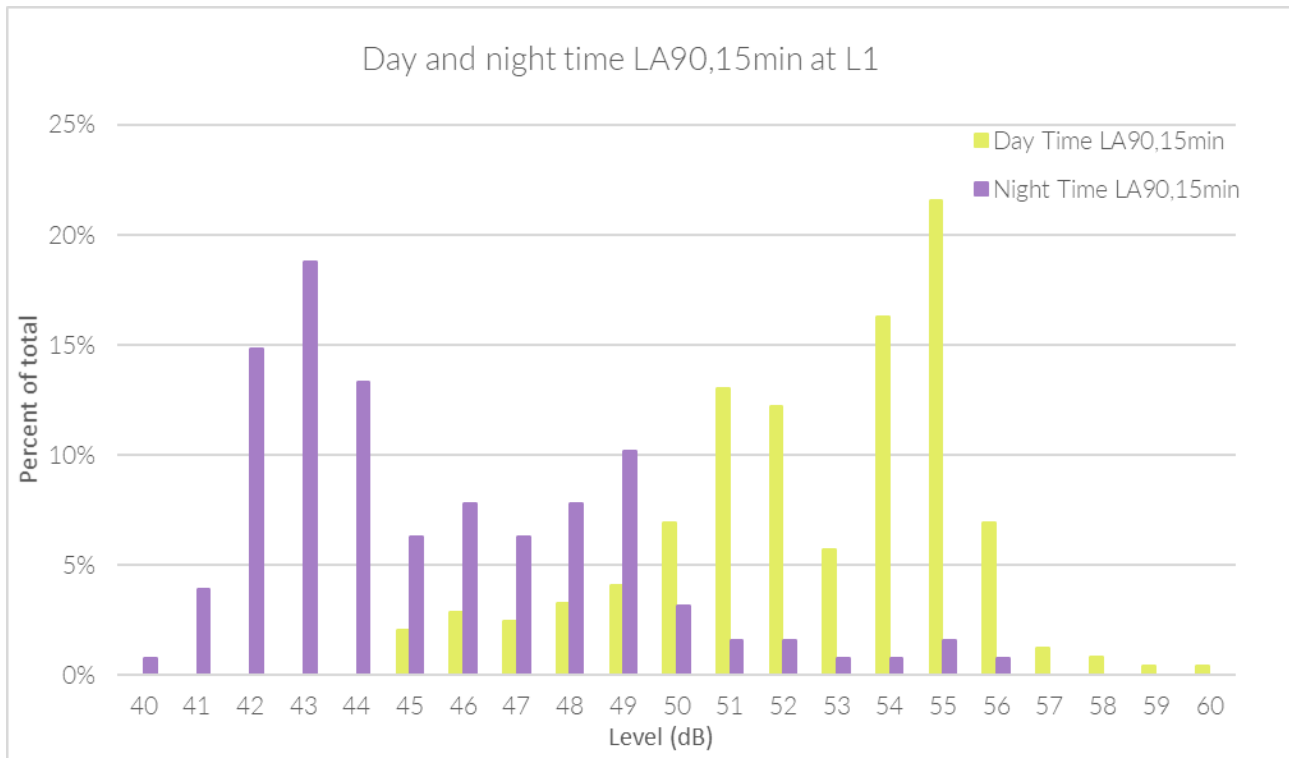
Table B3: Calibrator

Appendix C: Noise Survey Results

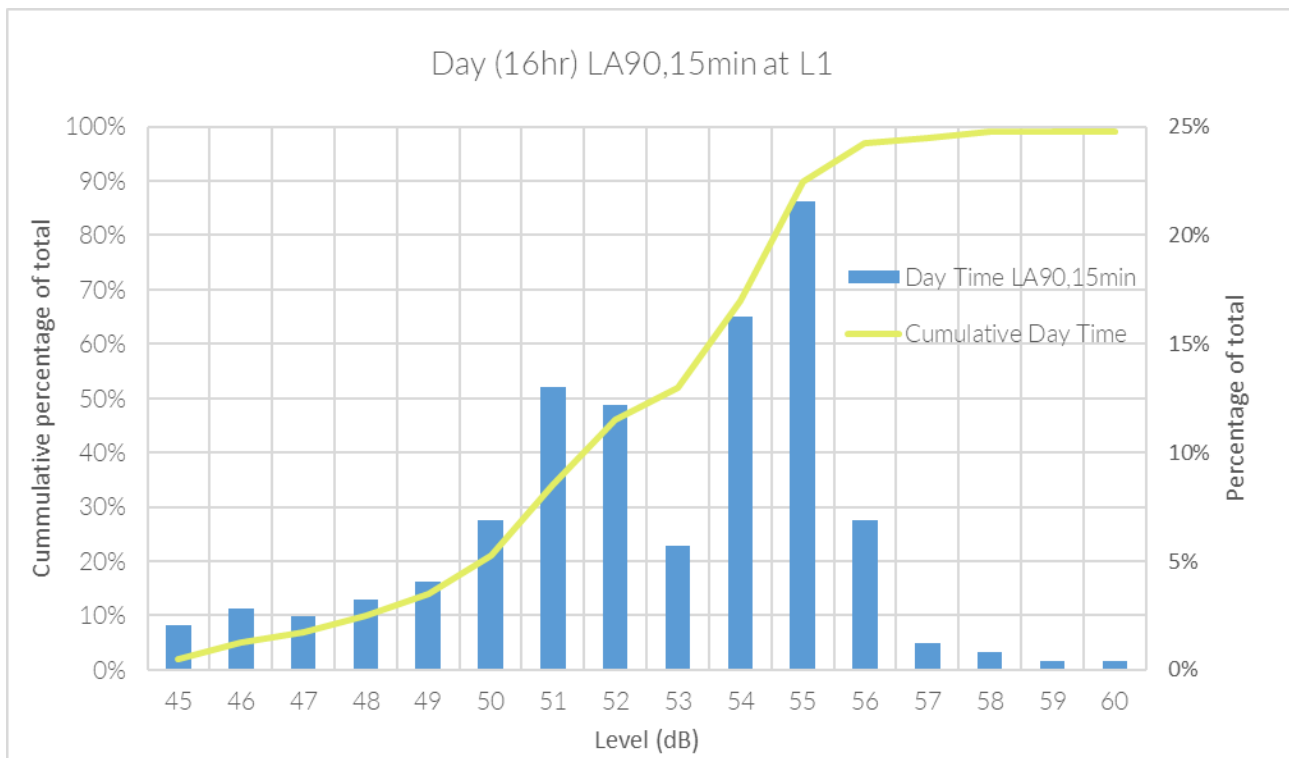
Logger 1 – Measured data time history.



Logger 1 – daytime and night-time statistical distribution of the background sound levels.



Logger 1 – daytime detailed statistical distribution of the background sound levels.



Appendix D: Traffic Data for Proposed Development

Traffic data provided by Stantec included 18 hour daily vehicle movements for B2 and B8 use for the Proposed Development. For the purpose of this assessment, only B8 vehicle movements were considered in the models as a worst-case. Traffic data is calculated based on area and approved trip rates. For the purpose of this assessment, vehicle trip rates have been rounded to the nearest whole number.

B2 Use – Daily Vehicle Trips (18h)									
Time	Car/Van			HGV			Total		
	Inbound	Outbound	Two-Way	Inbound	Outbound	Two-Way	Inbound	Outbound	Two-Way
06:00 – 07:00	0	0	0	0	0	0	0	0	0
07:00 – 08:00	25	3	28	1	1	2	26	5	31
08:00 – 09:00	33	9	42	3	1	3	36	9	45
09:00 – 10:00	19	8	27	2	3	5	21	11	33
10:00 – 11:00	13	9	22	3	2	5	16	11	27
11:00 – 12:00	16	11	27	3	3	5	18	14	33
12:00 – 13:00	16	24	40	4	4	8	20	28	48
13:00 – 14:00	20	19	38	3	3	6	22	22	44
14:00 – 15:00	20	19	38	2	2	3	21	20	42
15:00 – 16:00	15	22	37	6	5	11	20	27	48
16:00 – 17:00	10	29	39	2	3	5	12	32	44
17:00 – 18:00	6	29	35	0	1	1	6	30	35
18:00 – 19:00	2	11	12	0	0	0	2	11	12
19:00 – 20:00	0	0	0	0	0	0	0	0	0
20:00 – 21:00	0	0	0	0	0	0	0	0	0
21:00 – 22:00	0	0	0	0	0	0	0	0	0

B2 Use – Daily Vehicle Trips (18h)									
22:00 – 23:00	0	0	0	0	0	0	0	0	0
23:00 – 24:00	0	0	0	0	0	0	0	0	0
Total	194	192	386	26	28	55	220	220	441

Table D1: Predicted hourly vehicular visits to proposed site for B2 use.

B8 Use – Daily Vehicle Trips (18h)									
Time	Car/Van			HGV			Total		
	Inbound	Outbound	Two-Way	Inbound	Outbound	Two-Way	Inbound	Outbound	Two-Way
06:00 – 07:00	28	4	32	10	0	10	38	4	42
07:00 – 08:00	14	4	18	4	3	8	18	7	26
08:00 – 09:00	18	4	22	5	2	7	23	6	29
09:00 – 10:00	15	5	21	5	4	9	20	9	30
10:00 – 11:00	5	4	10	6	5	12	12	10	21
11:00 – 12:00	4	5	9	6	4	10	10	9	19
12:00 – 13:00	11	8	20	3	3	7	14	12	26
13:00 – 14:00	24	12	36	6	4	11	30	17	47
14:00 – 15:00	10	17	27	3	3	6	13	20	33
15:00 – 16:00	3	11	14	5	3	8	8	14	22
16:00 – 17:00	3	14	17	4	3	8	7	17	25
17:00 – 18:00	4	19	23	3	3	7	7	22	30
18:00 – 19:00	5	9	15	2	2	4	7	12	19
19:00 – 20:00	28	0	28	0	31	31	28	31	58

B8 Use – Daily Vehicle Trips (18h)									
20:00 – 21:00	12	4	16	0	15	15	12	19	31
21:00 – 22:00	0	0	0	0	0	0	0	0	0
22:00 – 23:00	0	0	0	0	0	0	0	0	0
23:00 – 24:00	0	0	0	0	0	0	0	0	0
Total	184	122	329	63	88	151	247	210	481

Table D2: Predicted hourly vehicular visits to proposed site for B8 use.



Figure D1: Traffic flow connection links used in this assessment

Location	Reference	2019 Factored Baseline (estimated) flows		2019 Factored Baseline flows with Development (B8)	
		All Vehicles	HGVs	All Vehicles	HGVs
1	A33 north of Imperial Way roundabout	46,510	1,595	46,644	1,638
2	A33 between RIBP north and Imperial Way roundabout	46,455	2,212	46,672	2,282
3a	A33 between RIBP south and north accesses (southbound)	20,311	1,784	20,409	1,822
3b	A33 between RIBP south and north accesses (northbound)	24,883	2,235	25,003	2,267
4	Imperial Way	12,877	390	12,944	390
5	B3031 Old Basingstoke Road	9,447	372	9,460	372

Figure D2: Traffic flows for the Proposed Development



MAX FOSTER

SENIOR ACOUSTICS ENGINEER

+44 1454 806 894
maxfoster@hoarelea.com

HOARELEA.COM

155 Aztec West
Almondsbury
Bristol
BS32 4UB
England

