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Environmental Noise Assessment

Prepared: 25th August 2020

Report No	21122-1
Client	Keepmoat Homes
Site	Eakring Road Bilsthorpe Newark

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1. Quality Management

Report Number	21122 - 1
Issue	1
Prepared	25th August 2020
Prepared By	Rohan Ramadorai BEng, MSc, MIOA
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2. Limitations

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2.1.3. The methodology adopted and the sources of information used by Noise in providing its services are outlined in this report. The work described in this report was undertaken between the 17th August 2020 and 25th August 2020 and is based on the conditions encountered and the information available up to the said date. The scope of this report and the services are accordingly factually limited by these circumstances.

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2.1.7.

3. Executive Summary

3.1.1. An environmental noise assessment has been carried out for a proposed residential development at Eakring Road, Bilsthorpe, Newark ("Proposed Development").

3.2. Measurement, Assessment and Evaluation

3.2.1. The survey was carried out to BS7445-1:2003,[1] BS7445-2:1991[2] and BS4142:2014[3] which are covered under our UKAS Accreditation.

3.2.2. The interpretation of the data and the specification of suitable mitigation or treatment are outside the scope of our UKAS accreditation but is covered in our 17025 Quality Management System and reporting procedure.

3.3. Scope

3.3.1. This report covers all aspects of the noise survey, including:

- the identification of acoustic design criteria;
- the identification of specific sound sources;
- an objective sound pressure level survey of the existing site;
- calculation of the ambient, residual and specific sound levels;
- calculation of appropriate acoustic feature corrections and determination of the rating level ;
- assessment of the specific sound sources based on guidance contained in BS4142:2014; and
- the design of any mitigation to meet the required internal noise criteria

3.4. Results Summary

3.4.1. A numerical BS4142 assessment shows that there is an indication that the specific sound will have a low impact on proposed new residential receivers and, generally, the lower the rating level is relative to the background sound level, the less likely it is that the specific sound source will have an adverse impact.

3.4.2. Specific noise levels were not subjectively audible at the proposed development. Therefore, assessments have been based on near-field measurements of the sound source. These near field levels have then been distance corrected to predict noise levels at the proposed receiver.

3.4.3. In this instance, near field measurements indicated a feature correction for two event types. While these feature corrections are unlikely to be present at the proposed development (evidenced by the subjective assessment), we have included these corrections into the overall specific noise levels which have then been corrected for distance. Although this is not in strict accordance with the BS4142 standard which requires an assessment of the character of the sound at the site boundary, we deem this to be a worst case assessment.

3.4.4. In this context the new residential receivers are being introduced close to existing residential receivers. This is likely to result in reduced impact when compared to the situation where new sources are being introduced close to existing residential receivers.

[1] BS7445-1:2003 "Description and measurement of environmental noise – Part 1: Description of quantities and procedures"
[2] BS7445-2:1991 "Description and measurement of environmental noise – Part 2: Guide to the acquisition of data pertinent to land use"
[3] BS4142:2014 "Methods for rating and assessing industrial and commercial sound"

3.5. Mitigation

3.5.1. No additional mitigation is deemed necessary to mitigate and minimise the sound from the industrial/commercial sources.

3.5.2. The facade sound insulation required to meet the guideline values from BS8233:2014 are summarised in Table 1 in line with the original recommendations of the ProPG assessment[4]. The glazing performance has been specified in terms of the road traffic corrected weighted sound reduction index, $R_w + C_{tr}$, and the ventilator performance has been specified in terms of the road traffic corrected element normalised level difference $D_{ne,w} + C_{tr}$.

Living rooms (Daytime)	Bedrooms (Night-time)
Specification 1 – Properties Fronting onto Eakring Road	
24dB $R_w + C_{tr}$ /30dB $D_{ne,w} + C_{tr}$	23dB $R_w + C_{tr}$ /29dB $D_{ne,w} + C_{tr}$
Specification 2 – All other Facades	
20dB $R_w + C_{tr}$ /26dB $D_{ne,w} + C_{tr}$	19dB $R_w + C_{tr}$ /25dB $D_{ne,w} + C_{tr}$

Table 1 – Required facade sound insulation (Glazing/Ventilator)

[4] Noise.co.uk report 20482-1 - R1 - Eakring Road, Bilsthorpe - BS8233 and ProPG - Keepmoat Homes - RR - 200527

4. Contents

5. Background

5.1. Noise Policy Statement for England

5.1.1. The Noise Policy Statement for England (NPSE), published in March 2010, states the long-term vision of Government noise policy is to *"promote good health and a good quality of life through the effective management of noise within the context of Government policy on sustainable development".*

5.1.2. This long-term vision is supported by the following aims; through the effective management and control of environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development:

- Avoid significant adverse impacts on health and quality of life;
- Mitigate and minimise adverse impacts on health and quality of life;
- Where possible, contribute to the improvement of health and quality of life.

5.1.3. The intention is that the NPSE should apply to all types of noise apart from noise in the workplace (occupational noise).

5.2. National Planning Policy Framework

5.2.1. The National Planning Policy Framework (NPPF) was published on 19th June 2019 and sets out the Government's planning policies for England and how these are expected to be applied. The framework states that 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".*

5.2.2. The NPPF requires that new developments be appropriate to their locations such that the effects of pollution on health have been taken into account. Planning policies and decisions should aim to:

1. avoid noise giving rise to significant adverse impacts on health and the quality of life;
2. mitigate and reduce to a minimum potential adverse impacts resulting from noise from new development; and,
3. identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value.

5.2.3. Existing businesses near to proposed development 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.

5.3. National Planning Practice Guidance

5.3.1. The National Planning Practice Guidance (PPG) is a web-based resource, launched by the Department for Communities and Local Government (DCLG) which was updated on the 22nd July 2019 to reflect the changes made to the NPPF and make it more accessible.[5]

[5] http://planningguidance.communities.gov.uk/

5.3.2. It advises on how planning can manage potential noise impacts in new development. The guidance is regularly reviewed and updated and noise is listed as a specific category. A summary of the effects of noise exposure (in terms of health and quality of life) associated with both noise generating developments and noise sensitive developments is presented within the PPG and reproduced in Table 2.

Perception	Examples of outcomes	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 Observed Adverse Effect (NOAEL)	No specific measures required
Lowest Observed Adverse Effect Level (LOAEL)			
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; where there is no alternative ventilation, having to close windows for some of the time because of the noise. Potential for some reported sleep disturbance. Affects the acoustic character of the area such that there is a perceived change in the quality of life.	Observed Adverse Effect	Mitigate and reduce to a minimum
Significant Observed Adverse Effect Level (SOAEL)			
Noticeable and disruptive	The noise causes a material change in behaviour and/or attitude, e.g. avoiding certain activities during periods of intrusion; where there is no alternative ventilation, having to keep windows closed most of the time because of the noise. Potential for sleep disturbance resulting in difficulty in getting to sleep, premature awakening and difficulty in getting back to sleep. Quality of life diminished due to change in acoustic character of the area.	Significant Observed Adverse Effect	Avoid
Noticeable and very intrusive	Extensive and regular changes in behaviour and/or an inability to mitigate effect of noise leading to psychological stress or physiological effects, e.g. regular sleep deprivation/awakening; loss of appetite, significant, medically definable harm, e.g. auditory and non-auditory	Unacceptable Adverse Effect	Prevent

Table 2 – Noise exposure hierarchy

5.3.3. There are a number of factors that determine whether a noise could be a concern to a receptor. These include: the absolute level of the noise and when it occurs, whether it is existing or new to the area, temporal characteristics, spectral content and the acoustic absorption in the area.

5.3.4. It is emphasised in the PPG that the planning process should be used to mitigate and minimise the impact of noise. This could include: engineering the noise sources to be quiet, minimising the impact of noise through layout, using conditions/obligations to restrict activities, mitigating the impact in places where noise is likely to be experienced (e.g. using facade sound insulation).

6. Introduction

6.1.1. An environmental noise assessment has been carried out for a proposed residential development at Eakring Road, Bilsthorpe, Newark.

6.2. Proposed Development

6.2.1. An image showing the proposed location and layout of the Proposed Development is given in Figure 1.

Figure 1 - Plan showing the layout of the Proposed Development

6.3. Noise Climate

6.3.1. During the original assessment, measurements were undertaken around the proposed development site and the noise climate was noted to be dominated by traffic on Eakring Road along the western boundary and some distant operational noise associated with the business park to the north of the site. No specific sources associated with the business park were noted.

6.3.2. The current assessment of specific noise sourced from the Via Depot located to the north of the site, has been undertaken at the behest of the Local Authority. Since no noise from the depot was subjectively audible at the proposed site, measurements of the depot operation have been undertaken at the southern boundary of the depot. All measured levels will therefore be subject to a distance correction to represent levels at the proposed development site.

6.4. Specific Sound Sources

6.4.1. During the survey visit, no specific sources were audible at the proposed development site. Therefore, attended measurements were undertaken on the depot's premises at the southern boundary. The following Figure 2 sets out an image of the depot layout, including the measurement location:

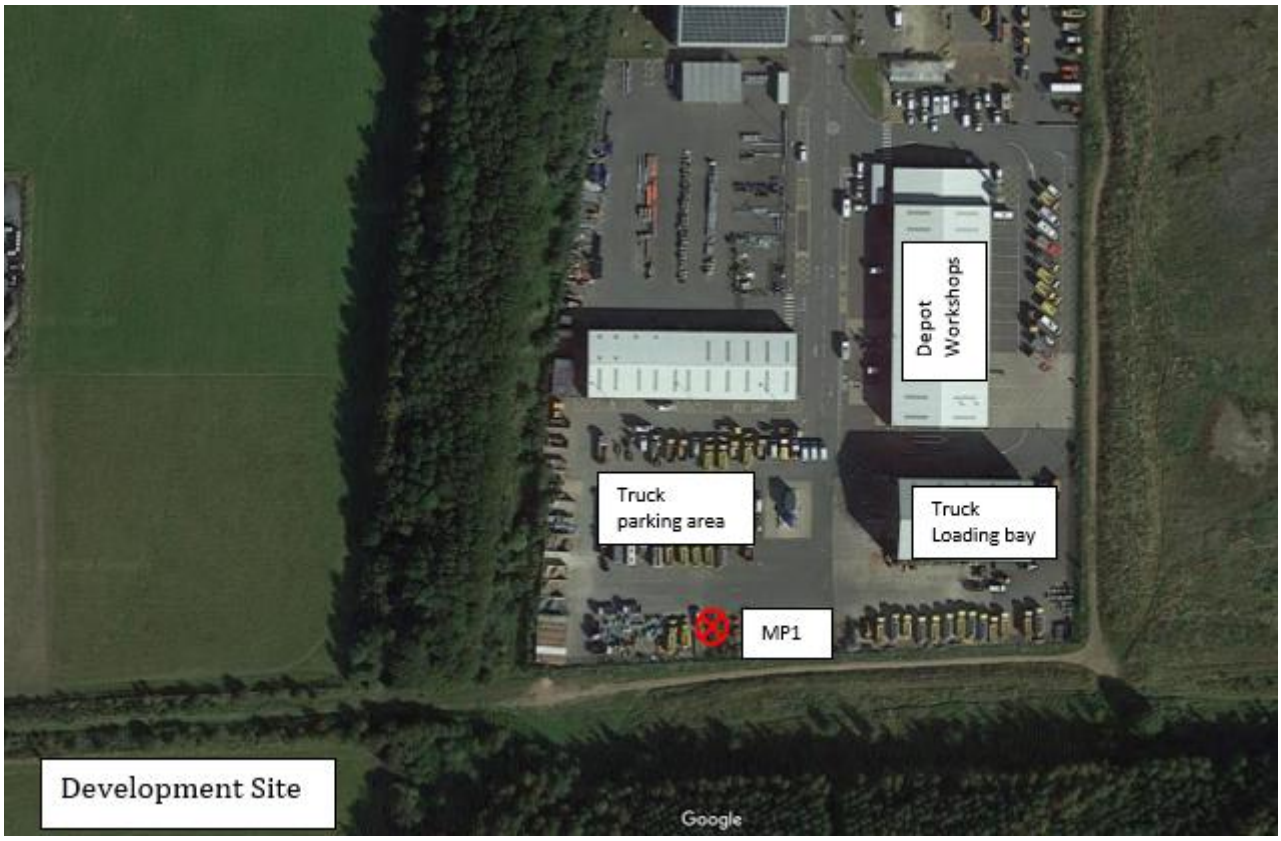


Figure 2 – satellite plan illustrating depot layout and measurement position

6.4.2. There were no visible fixed plant items on the depot premises. On enquiry, the depot personnel confirmed this to be the case. The depot workshop is understood to be used for MOT examinations and light repairs. The workshops were active during the survey however, no audible noise events were noted during the survey.

6.4.3. Some loading and unloading noise events were apparent during the measurements and these have been taken into account for analysis, as have the vehicular movements across the parking area during the time of the survey.

6.4.4. The truck parking area was not particularly busy during the time of the survey. A total of 5 movements were noted over an hourly period. Depot personnel confirmed that the area was most busy at the start of the day (7am) and at the end of the day (3pm). Outside these hours, levels of noise from the parking area are supposedly minimal.

6.4.5. However, on inspection of long term unattended data captured over the previous survey[6], there is no discernible change in the ambient hourly noise levels across these hours. Therefore, all assessments have been based on the measurements that were undertaken and no additional corrections have been deemed necessary.

[6] Noise.co.uk report 20482-1 - R1 - Eakring Road, Bilsthorpe - BS8233 and ProPG - Keepmoat Homes - RR - 200527

7. Assessment Criteria

7.1. BS4142:2014

7.1.1. BS4142 provides methods for rating and assessing ***specific sound sources*** of an industrial and/or commercial nature, which includes: industrial and manufacturing processes, fixed services plant, sound generated by the loading/unloading of goods and sound from mobile plant/vehicles associated with industrial/commercial premises (e.g. fork-lift trucks). The ***assessment location*** is outside a residential receptor.

7.1.2. The standard is specifically precluded from being used to assess the likely impact inside a building or from the assessment of various sound sources for which other (more relevant) guidance exists, including: music/entertainment noise, noise from people and construction noise.

7.1.3. The foundation of the assessment is to establish the following quantities, either by measurement or prediction:

- ***Ambient sound***: The overall sound at the assessment location
- ***Residual sound***: The ambient sound without the specific sound source operating
- ***Specific sound:*** The ambient sound with the specific sound source operating, corrected for residual sound
- ***Background sound***: Residual sound present for 90% of the time

7.1.4. How these quantities relate to the sound that would be measured during a survey has been illustrated in Figure 3.

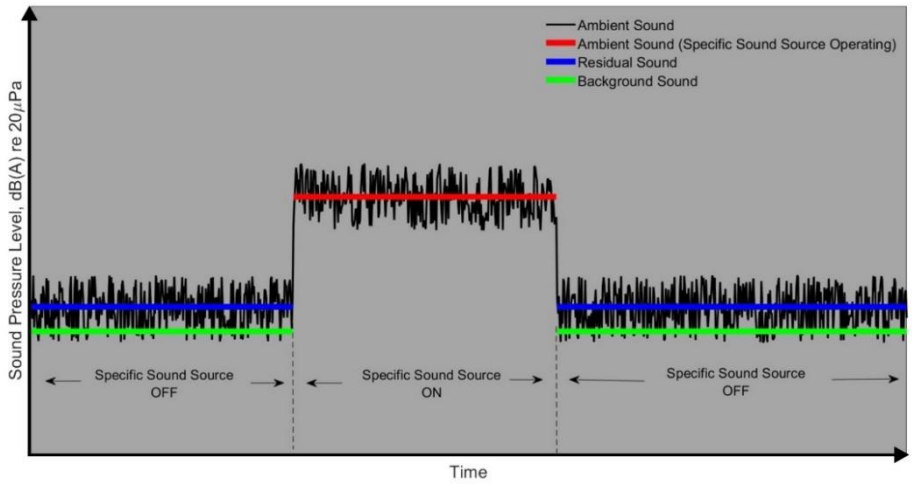


Figure 3 – Diagrammatic illustration of the definitions of ambient, residual, specific and background sound

7.1.5. Once the specific sound level has been determined, this must be corrected for the presence of acoustic features that are audible at the assessment location to determine the ***rating level***:

Rating Level = Specific Sound Level + Character Corrections

7.1.6. Normally it is possible to carry out a subjective assessment of characteristics, based on the following correction guidelines:

- Tonality: +2dB for a 'just perceptible' tone, +4dB for 'clearly perceptible', and rising to +6dB for 'highly perceptible' tones.
- Impulsivity (rapidity of change and overall chance in level): +3 dB for 'just perceptible' impulsivity, +6dB for 'clearly perceptible', rising to +9 dB for 'highly perceptible' impulsivity.
- Intermittency: if the on/off-time of the specific sound is readily distinctive at the noise- sensitive receivers, +3dB.

7.1.7. It should be noted that. where one feature is clearly perceived as dominant, it may be appropriate to apply a single correction. Where multiple features are likely to affect perception and response, each should be added arithmetically.

7.1.8. An estimate of the magnitude of the impact is evaluated by subtracting the measured background sound level at the assessment location from the rating level

Assessment Level = Rating Level – Background Sound Level

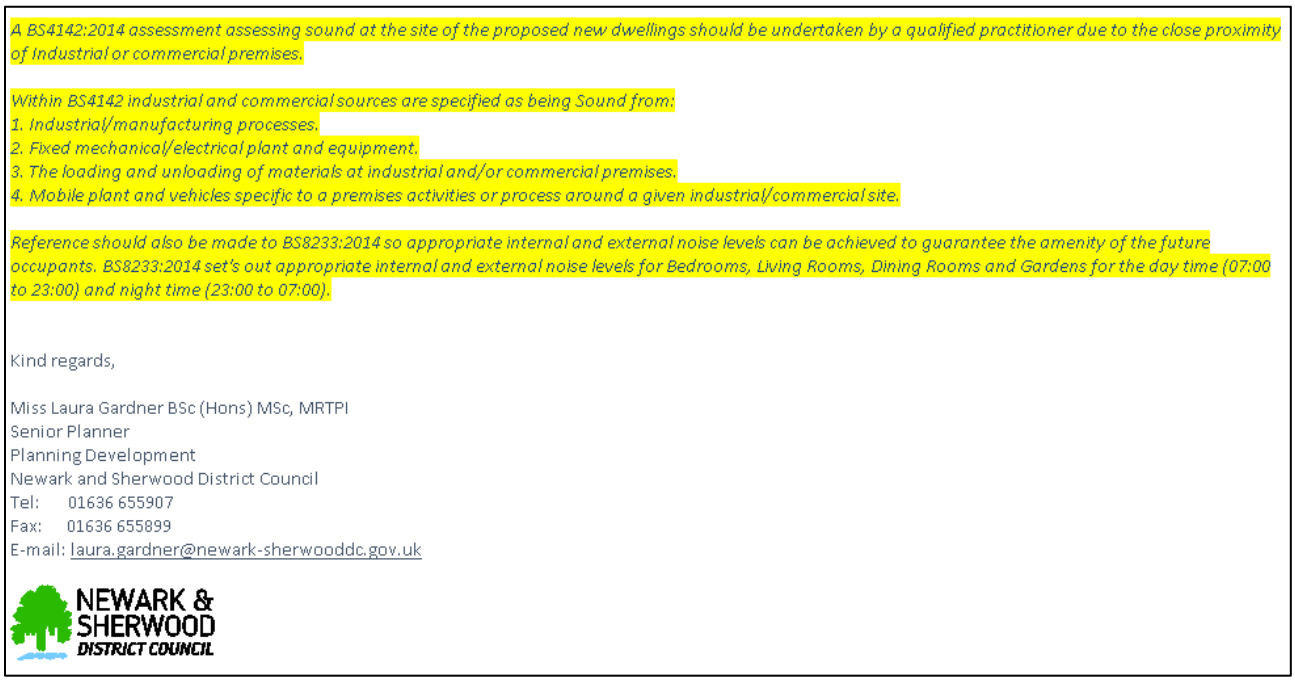
7.1.9. Typically, the greater the difference between the background and rating level, the greater the magnitude of impact, although BS 4142 emphasises that this is highly context-specific. As an initial estimate, BS4142 states that:

- A difference (between the background and rating level) of around +10 dB or more is likely to be indicative of significant adverse impact, depending on context
- A difference (between the background and rating level) of around +5 dB or more is likely to be indicative of adverse impact, depending on context
- Where the rating level does not exceed the background level, this is an indication that the specific sound will have a low impact, depending on context

7.1.10. Where the initial estimate of the impact needs to be modified due to the context, other factor should be considered, including: absolute sound levels, the character and level of the residual sound and the sensitivity of the receiver, which includes the effect of building façade sound insulation.

7.2. Local Planning Authority Criteria

7.2.1. The local planning authority has provided specific noise-related planning requirements for the Proposed Development. The noise-related requirements have been reproduced in Figure 4.



A BS4142:2014 assessment assessing sound at the site of the proposed new dwellings should be undertaken by a qualified practitioner due to the close proximity of industrial or commercial premises.

Within BS4142 industrial and commercial sources are specified as being Sound from:
1. Industrial/manufacturing processes.
2. Fixed mechanical/electrical plant and equipment.
3. The loading and unloading of materials at industrial and/or commercial premises.
4. Mobile plant and vehicles specific to a premises activities or process around a given industrial/commercial site.

Reference should also be made to BS8233:2014 so appropriate internal and external noise levels can be achieved to guarantee the amenity of the future occupants. BS8233:2014 set's out appropriate internal and external noise levels for Bedrooms, Living Rooms, Dining Rooms and Gardens for the day time (07:00 to 23:00) and night time (23:00 to 07:00).

Kind regards,

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NEWARK & SHERWOOD DISTRICT COUNCIL

Figure 4 – Noise related planning requirements provided by the local planning authority

8. Survey

8.1. Measurement Locations

8.1.1. Fixed position monitoring took place at 1 attended position to account for the likely specific noise sources. In addition, results from measurement position P1 from the previous noise survey[7] have been used to ascertain the prevailing background in the area. The monitoring equipment was located 1.5m from the ground and at least 3m from the next nearest reflecting surface. The monitoring positions are shown in Figure 5.

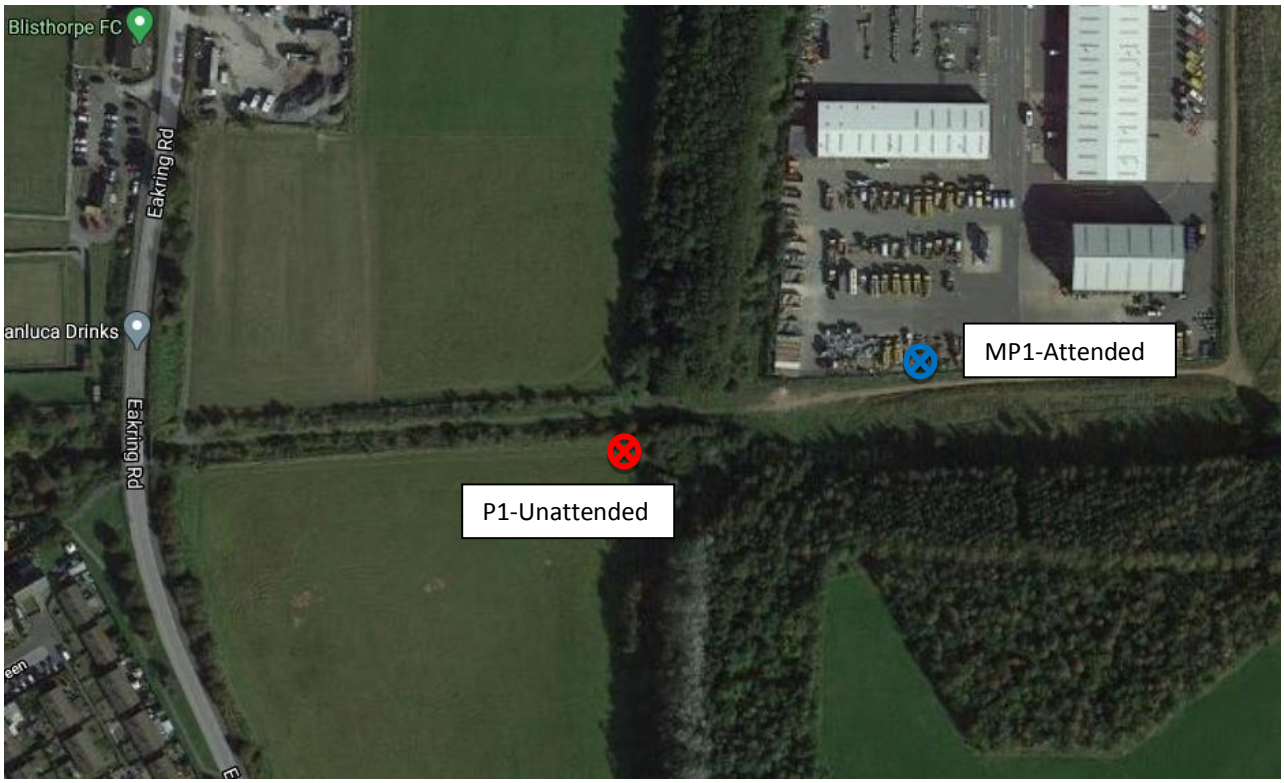

*Figure 5 - Noise monitoring locations on site. **Red** receiver positions indicate unattended monitoring and **Blue** positions indicate attended monitoring*

8.1.2. The measurement instrumentation used during the survey is detailed in the appendix. The acoustic equipment was calibrated to comply with Section 4.2 of BS7445-1:2003[8] before and after the surveys. The calibration details are also detailed in the appendix.

8.2. Meteorology

8.2.1. During the attended survey the weather information was noted. This is summarised in Table 3.

	17th August 2020
Roads(Wet/Dry)	Dry
Wind Speed (ms^{-1})/Direction	4/S

Table 3 - Meteorological data noted during the attended survey

[7] Noise.co.uk report 20482-1 - R1 - Eakring Road, Bilsthorpe - BS8233 and ProPG - Keepmoat Homes - RR - 200527
[8] BS7445-1:2003 "Description and measurement of environmental noise – Part 1: Guide to quantities and procedures"

8.4. Results Summary

Average Sound Pressure Levels

8.4.1. The fixed unattended position external measurement results are summarised in Table 4. These results are based on the data collected during the original survey.

Measurement location	Daytime dB, $L_{Aeq,16hr}$	Night-time dB, $L_{Aeq,8hr}$
P1	55.4	48.8

Table 4 - Summary of the external sound pressure levels measured

Background Sound Levels

8.4.2. Figure 6 shows the results of the data analysis in terms of the frequency of occurrence of each data value during the daytime and the night-time. These levels are based on the long term unattended measurements undertaken at position P1, at the development site boundary.

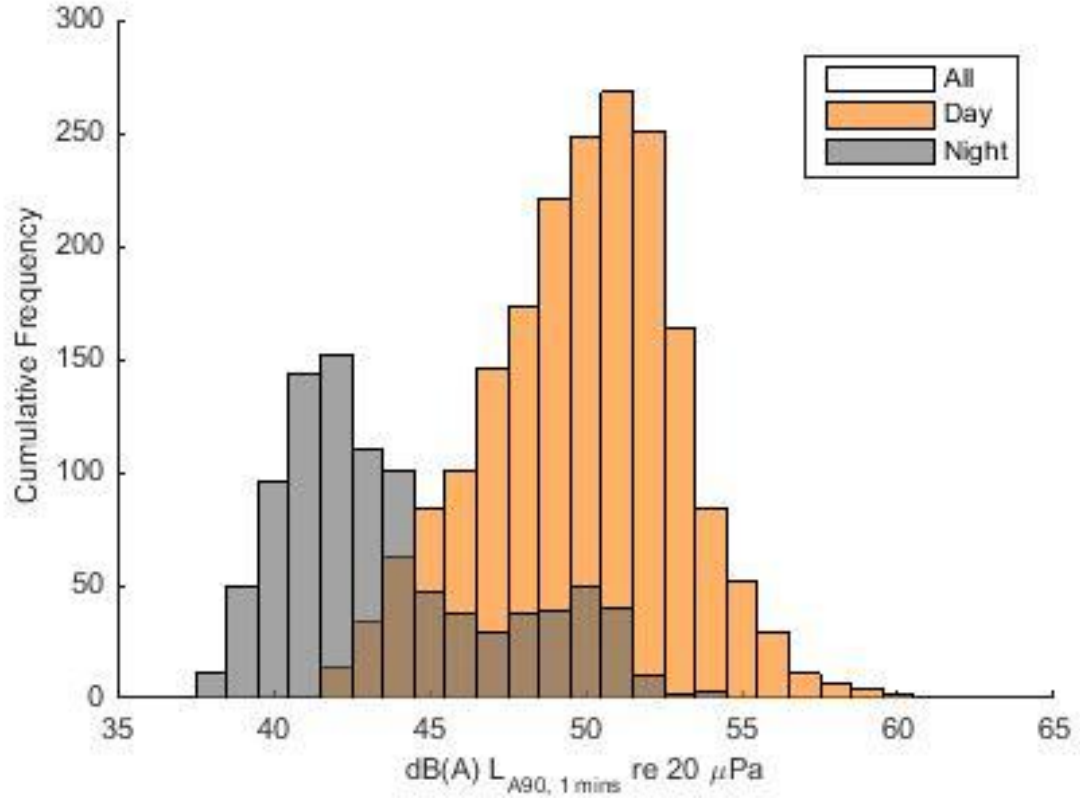

Figure 6 – Distribution of background sound levels during the daytime (07:00-23:00) and night time (23:00 – 07:00)

8.4.3. As can be seen in Figure 6 the background sound levels ranged between 42dB $L_{A90,5min}$ and 60dB $L_{A90,5min}$ during the daytime period.

8.4.4. The typical background sound level has been taken to be 51dB $L_{A90,5min}$ during the daytime. No night time assessments have been undertaken since it was confirmed by depot personnel that the depot does not operate overnight.

Specific Sound Levels

8.4.5. Short term L_{Aeq} measurements (25ms) were made during the attended surveys for the duration of the reference time interval. The specific events associated with surrounding commercial/industrial businesses were noted, including:

- time of event;
- duration of event;
- description of event; and,
- time-series for subsequent acoustic feature analysis.

8.4.6. The specific sound levels for the individual events and the overall monitoring period have been summarised in Table 5. The specific sound levels have been corrected for the presence of residual sound by considering the periods where there was no activity. The $L_{pAF,100ms}$ time-series was also derived from the residual sound data to determine the background sound level, L_{A90}.

Description	Ambient Sound Level, L_a dB(A)	Residual Sound Level, L_r dB(A)	Specific Sound Level, L_s dB(A)
Truck Pass by	52.7	43.5	52.1
Brake Squeal	74.8		74.8
Motor Noise	49.6		48.4
Loading/Unloading	67.4		67.4

Table 5 – Summary of the specific sound level measurements

9. BS4142 Assessment

9.1. Rating level

9.1.1. The commercial sound sources were operating at the time of the attended survey. The sources have been assessed based on the character of the sound at the near field of the sound owing to a lack of audible specific sound at the proposed site boundary. The adjustments to the specific sound levels for acoustic features have been discussed in the following sections.

Tonality

9.1.2. The reference method from BS4142 has been used to determine the audibility of tones at the boundary with the Proposed Development. The autospectra that were used had a bin width of 2Hz, implement a Hanning window and had been A-weighted. The measurements used to create the autospectra were made at the location of the nearest residential receiver.

9.1.3. The noise pauses were identified in the spectra using an automated computer routine. The tones have been identified and evaluated, taking into account the appropriate half or quarter power bandwidths. Where two or more tones appear in the same critical band, their energies have been combined. The masking noise was evaluated using a regression line spanning ±0.75 of the critical frequency band, only noise lines within ±0.5 of the critical frequency band were included in the masking noise. Corrections for the effective analysis bandwidth have been taken into account. The threshold of hearing has been taken into account and tones identified below 50Hz have automatically been excluded.

9.1.4. The tone audibility acoustic feature corrections for each event measured during the survey have been assessed. However, only the brake squeal was tonal. The result is summarised in Table 6.

Source description	Tone Audibility, L_{ta}	Adjustment, K_t(dB)
Run 1		
Brake Squeal	30.5dB	+6
Adopted Correction		**+6**

Table 6 – Tonality acoustic feature correction applied to specific sound levels

9.1.5. Figure 7 sets out the autospectrum to illustrate the tonality of the event:

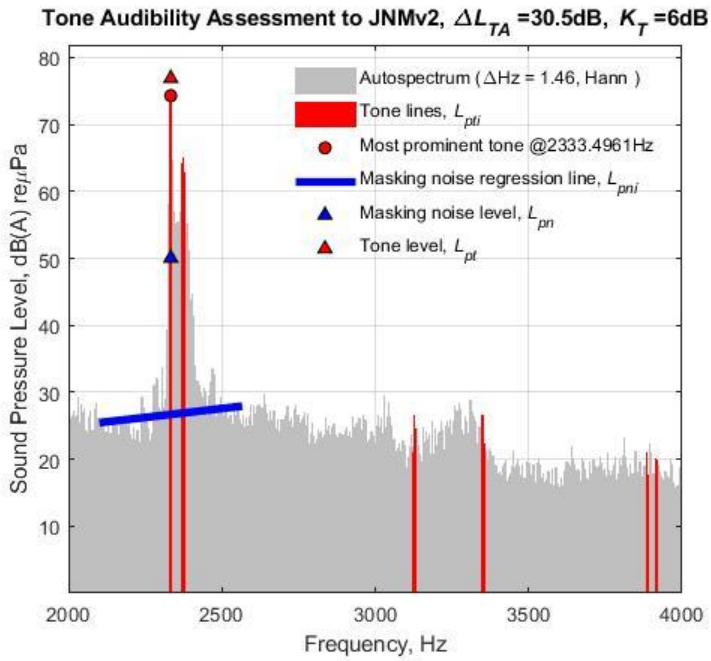

Figure 7 – Autospectrum for brake squeal event illustrating tonality results

Intermittency

9.1.6. In a given hourly period, each specific activity is likely to be either one off (e.g. drive by) or impulsive (e.g. loading/unloading). Given this and the absence of any other fixed plant, there are no intermittent specific sound sources. As a result, no corrections for intermittency will apply.

Impulsivity

9.1.7. The reference method from BS4142:2014 has been used to evaluate the impulsivity objectively. The short-term L_{Aeq} measurements during each event have been converted to an L_{pAF} time-series in 25ms intervals using a low-pass filter.

9.1.8. The sudden 'onset' of a sound is defined as an impulse and occurs when the rate of increase in sound exceeds 10dB/s. The start and end of the onset was determined using a combination of computer automation and expert listening. The worst case onset rate and level difference were determined and used to predict the subjective prominence of the impulse and calculate the acoustic feature adjustment, K_I, to be added to the L_{Aeq} to adjust for the acoustic feature.

9.1.9. The adjustments for impulsivity have been summarised in Table 7.

Source description	Prominence, *P* (dB)	Adjustment, K_I (dB)
Run 1		
Loading/unloading	9	+7
Adopted Correction		**+7**

Table 7 – Impulsivity acoustic feature correction applied to specific sound levels

9.1.10. The assessment has been graphically presented in Figure 8 below:

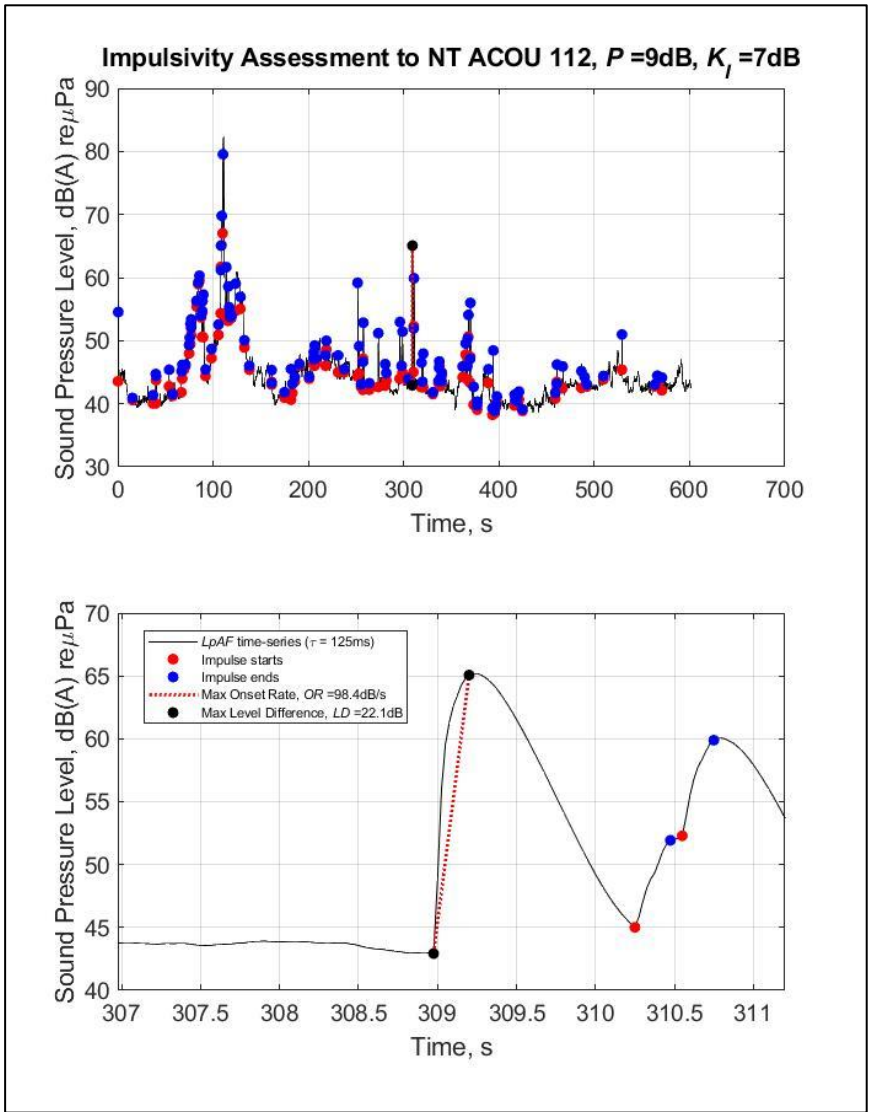

Figure 8 – impulsivity assessment for worst case unloading/loading activity

9.2. Assessment

9.2.1. Based on the individual corrections for each of the events, the following Table 8 sets outs the overall specific sound levels for the depot operations:

Description	Measured Specific sound levels (dB)	Tonality Correction (dB)	Impulsivity Correction (dB)	Resultant Specific Sound Level (dB)
Truck Pass by	52.1			52.1
Brake Squeal	74.8	+6		80.8
Motor Noise	48.4			48.4
Loading/Unloading	67.4		+7	74.4
Total				**81.7**

Table 8 – Summary of the specific sound level measurements

9.2.2. Specific noise levels were not subjectively audible at the proposed development. Therefore, assessments have been based on near-field measurements of the sound source. These near field levels have then been distance corrected to predict noise levels at the proposed receiver.

9.2.3. In this instance, near field measurements indicated a feature correction for two event types. While these feature corrections are unlikely to be present at the proposed development (evidenced by the subjective assessment), we have included these corrections into the overall specific noise levels which have then been corrected for distance. Although this is not in strict accordance with the BS4142 standard, we deem this to be a worst case assessment.

9.2.4. The site boundary for the application site is approximately 70m to the measurement position as determined by satellite imagery. Taking this into account, the BS4142 assessment for the overall levels from the depot is detailed in Table 9.

	Level, dB
	Depot Operation Daytime (07:00-23:00)
Background sound level, dB $L_{A90,15min}$	51
Specific sound level, dB(A) (including feature corrections)	82
Distance Correction (Spherical propagation) – 70m	–36
Rating level Specific sound level + corrections	46
Assessment Level Rating level – Background sound level	–5
"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"	

Table 9 - The assessment procedure from BS4142

9.3. Context

9.3.1. In this situation, the new residential receivers are being introduced close to the specific sound sources. The impact of the industrial/commercial sound is likely to be significantly reduced compared to the situation where new sound sources are being introduced close to existing residential receivers.

9.4. Proposed Retail – Plant Noise Limits

9.4.1. In addition to the impact of existing sources on the proposed development, it is understood that some new retail units are proposed as part of the development. In order to ensure plant noise from these units do not cause an adverse impact, plant noise limits have been set as sound power levels at the retail unit termination. It is noted that night time limits have been based on the typical night time background of 42dB $L_{A90,5min}$ taken from Figure 6.

9.4.2. As part of the assessment, it is assumed that the units are likely to be marginally tonal, attracting a 2dB penalty for tonality, however, no additional penalties for impulsivity or intermittency has been assumed since fixed plant such as condensers or fans, are not impulsive and can be assumed to operate continuously during the reference time period.

9.4.3. Table 10 presents the calculation for the sound power limits.

	Level, dB	
	Daytime (07:00-23:00)	**Night-time (23:00-07:00)**
Background sound level, dB $L_{A90,15min}$	51	42
Acoustic feature corrections		
Tonality	+2	+2
Impulsivity	0	0
Intermittency	0	0
Other	0	0
Environmental Corrections		
Distance (5m – Point Source)	–14	–14
Radiation (hemispherical propagation)	–8	–8
Screening (Line of Sight)	–5	–5
Level of Adverse impact	0	0
Resultant Sound Power Level	76	67
"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"		

Table 10 - The assessment procedure from BS4142

9.4.4. Based on the above, the specific sound source limiting power level is set at **76 dBA** during the day time and **67 dBA** at night time for the operation of the ventilation unit making it likely to be indicative of adverse impact.

10. Mitigation

10.1.1. No additional mitigation is deemed necessary to mitigate and minimise the sound from the industrial/commercial sources. Therefore, the facade sound insulation required to meet the guideline values from BS8233:2014 are summarised in Table 11 in line with the original recommendations of the ProPG assessment[9].

10.1.2. The single figure glazing and ventilator performance requirements in order to achieve the internal design criteria are summarised in Table 11. The glazing performance has been specified in terms of the road traffic corrected weighted sound reduction index, $R_w + C_{tr}$, and the ventilator performance has been specified in terms of the road traffic corrected element normalised level difference $D_{ne,w} + C_{tr}$.

Living rooms (Daytime)	Bedrooms (Night-time)
Specification 1 – Properties Fronting onto Eakring Road	
24dB $R_w + C_{tr}$ /30dB $D_{ne,w} + C_{tr}$	23dB $R_w + C_{tr}$ /29dB $D_{ne,w} + C_{tr}$
Specification 2 – All other Facades	
20dB $R_w + C_{tr}$ /26dB $D_{ne,w} + C_{tr}$	19dB $R_w + C_{tr}$ /25dB $D_{ne,w} + C_{tr}$

Table 11 – Required facade sound insulation (Glazing/Ventilator)

10.2. Glazing and Ventilator Specifications

10.2.1. The glazing and ventilator performance has been specified based on the performance data provided by Saint-Gobain and Greenwood Airvac. These are suggested configurations and any other glazing and vent combination can be used provided it achieves the minimum performance levels given in Table 11. The recommended glazing specification is given in Table 12.

Living rooms (Daytime)	Bedrooms (Night-time)
Specification 1	
4/12/4	4/12/4
Specification 2	
4/12/4	4/12/4

Table 12 - Our recommended glazing configurations

10.2.2. Should penetrations be required for ventilation purposes our recommended ventilator configurations, calculated to work in conjunction with the above glazing specifications, are summarised in Table 13. The specification provides an equivalent area of at least 5000mm^2. It should be checked by a suitably qualified person that this ventilator specification meets the requirements of Approved Document F.[10]

[9] Noise.co.uk report 20482-1 - R1 - Eakring Road, Bilsthorpe - BS8233 and ProPG - Keepmoat Homes - RR - 200527
[10] Approved Document F: Means of Ventilation (2010 Edition)

Living rooms (Daytime)	Bedrooms (Night-time)
Specification 1	
Greenwood Airvac 5000EA	Greenwood Airvac 5000EA
Specification 2	
Greenwood Airvac 5000EA	Greenwood Airvac 5000EA

Table 13 - Our recommended ventilator configurations.

10.2.3. Given the assumptions in this method the information in this section should be treated as general guidance only. The acoustic performance of third party products cannot be guaranteed by noise.co.uk.

11. Conclusions

11.1.1. An environmental noise assessment has been carried out at the site of a proposed residential development at Eakring Road, Bilsthorpe, Newark to determine typical ambient sound levels. In addition, specific sound measurements have been undertaken at the behest of the local authority to quantify noise from a vehicle depot located to the north of the proposed site.

11.1.2. A numerical BS4142 assessment shows that there is an indication that the specific sound will have a low impact on proposed new residential receivers and, generally, the lower the rating level is relative to the background sound level, the less likely it is that the specific sound source will have an adverse impact.

11.1.3. Specific noise levels were not subjectively audible at the proposed development. Therefore, assessments have been based on near-field measurements of the sound source. These near field levels have then been distance corrected to predict noise levels at the proposed receiver.

11.1.4. In this instance, near field measurements indicated a feature correction for two event types. While these feature corrections are unlikely to be present at the proposed development (evidenced by the subjective assessment), we have included these corrections into the overall near field specific noise levels which have then been corrected for distance. Although this is not in strict accordance with the BS4142 standard which requires an assessment of the character of the sound at the site boundary, we deem this to be a worst case assessment.

11.1.5. In this context the new residential receivers are being introduced close to existing residential receivers. This is likely to result in reduced impact when compared to the situation where new sources are being introduced close to existing residential receivers

11.1.6. Table 11 in section 10 gives the required facade sound reduction by any glazing and ventilator combination to be compliant with the guideline values in line with the recommendations of the original assessment[11].

11.1.7. We strongly recommend that this report be passed to the local planning authority for approval prior to any works being carried out.

[11] Noise.co.uk report 20482-1 - R1 - Eakring Road, Bilsthorpe - BS8233 and ProPG - Keepmoat Homes - RR - 200527

12. Appendix

APPENDIX A: Summary Information

Required ISO Test Report Information (cross referenced where required)			
		Measurements carried out to:	Analysed to:
A	Standards	BS 7445-1: 2003 BS 7445-2: 1991 BS4142:2014	BS 8233:2014 BS4142:2014
B	Organisation performed the measurements	noise.co.uk Ltd, The Haybarn, Newnham Grounds, Kings Newnham Lane, Bretford, Coventry, CV23 0JU.	
C	Name of Client	Keepmoat Homes	
D	Full site address	Eakring Road Bilsthorpe Newark	
E	Date of surveys	Survey Date: 17th August - 25th August 2020	
F	Description & identification of Proposed Development	It is proposed to develop the site for residential use.	
G	Brief Description of details of Procedure & equipment	See Section 5 of this report.	

APPENDIX B: Technical Appendix

12.1.1. Measurements were made using the following equipment:

Monitoring Position	Sound Level Meter (Serial Number)	Calibrator (Serial Number)
P1 (Unattended)	Norsonic 140 (1405560)	Norsonic 1251 (33824)
MP1 (Attended)	Norsonic 140 (1404965)	Norsonic 1251 (31817)

12.1.2. The equipment has traceable calibration. The sound level meter was calibrated immediately prior to and immediately after the measurements were carried out.

Sound Level Meter	Before	After
Norsonic 140 (1405560)	114.0 dB	114.0 dB
Norsonic 140 (1404965)	114.0 dB	114.0 dB

12.1.3. There was no adverse deviation.

APPENDIX C: Average hourly levels

Date	Time	$L_{Aeq,1\text{-}hour}$
		Position P1 (unattended)
10:40:00	11:40:00	55.5
11:40:00	12:40:00	56.7
12:40:00	13:40:00	58.4
13:40:00	14:40:00	55
14:39:59	15:39:59	55.2
15:40:00	16:40:00	55.7
16:40:00	17:40:00	56.7
17:40:00	18:40:00	54.3
18:40:00	19:40:00	50.3
19:40:00	20:40:00	50.3
20:40:00	21:40:00	51.3
21:40:00	22:40:00	52.7
22:40:00	23:40:00	52.6
23:40:00	24:40:00	44
00:40:00	01:40:00	45.6
01:39:59	02:40:00	44
02:40:00	03:40:00	43.5
03:39:59	04:40:00	45.1
04:40:00	05:40:00	46.4
05:40:00	06:40:00	51
06:40:00	07:40:00	55
07:40:00	08:40:00	57.2
08:39:59	09:40:00	52.2
09:40:00	10:40:00	54.9

APPENDIX D: Raw Data

Attended Position (MP1)