

MILL LANE, BOLSOVER

Noise Impact Assessment

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CONTENTS

| | | |
|------------|--|-----------|
| 1.0 | INTRODUCTION | 3 |
| 2.0 | SITE DESCRIPTION | 5 |
| 2.1 | Existing Site | 5 |
| 2.2 | Proposed Site | 5 |
| 3.0 | SCOPE AND GUIDANCE | 6 |
| 3.1 | Assessment One..... | 6 |
| 3.1.1 | British Standard 4142:2014+A1:2019 | 6 |
| 3.2 | Assessment Two | 7 |
| 3.2.1 | BS8233:2014..... | 7 |
| 3.3 | Mitigation Strategy | 8 |
| 3.3.1 | Agent of Change Principle..... | 8 |
| 3.3.2 | Professional Practice Guidance: Planning and Noise | 8 |
| 4.0 | BASELINE NOISE SURVEY | 10 |
| 4.1 | Monitoring Equipment..... | 10 |
| 4.2 | Monitoring Locations | 10 |
| 4.3 | Weather | 11 |
| 4.4 | Baseline Noise Level Results | 12 |
| 5.0 | ASSESSMENT ONE | 13 |
| 5.1 | Noise Model..... | 13 |
| 5.1.1 | Noise Model Assumptions | 13 |
| 5.1.2 | Noise Sources..... | 13 |
| 5.2 | Predicted Specific Sound Level | 15 |
| 5.3 | BS4142:2014+A1:2019 Assessment..... | 17 |
| 5.3.1 | Sound Penalties | 17 |
| 5.3.2 | Results..... | 18 |
| 6.0 | ASSESSMENT TWO | 19 |
| 6.1 | BS823:2014 Noise Levels in External Amenity Space..... | 19 |
| 6.2 | BS8223:2014 Daytime Internal Noise Levels..... | 20 |
| 6.3 | BS8233: 2014 Night-Time Internal Noise Levels | 21 |
| 7.0 | MITIGATION STRATEGY | 23 |

| | |
|--|-----------|
| 8.0 CONCLUSION..... | 24 |
| 8.1 Assessments Completed | 24 |
| 8.2 Results Summary..... | 24 |
| 8.2.1 BS4142:2014+A1:2019 Assessment | 24 |
| 8.2.2 BS8233:2014 assessment..... | 25 |
| 8.2.3 Mitigation..... | 25 |

DOCUMENT REFERENCES

TABLES

| | |
|---|----|
| Table 3-1 Residential Development Suitable Internal Noise Levels, dB..... | 7 |
| Table 3-2 ProPG initial site noise risk assessment guidelines | 8 |
| Table 4-1 Survey Equipment | 10 |
| Table 4-2 Location 1 - Summary of Measured Noise Levels, free-field, dB | 12 |
| Table 5-1 Noise Sources Associated HGV Movements at the Site - dB..... | 14 |
| Table 5-2 Predicted Sound Levels of the Warehouse – Free-Field dB(A)..... | 15 |
| Table 5-3 BS4142+A1:2019 Assessment, dB | 18 |
| Table 6-1 BS8233:2014 External Amenity Assessment, dB..... | 19 |
| Table 6-2 BS8233:2014 Daytime Internal Assessment, dB | 20 |
| Table 6-3 BS8233:2014 Night-time Internal Assessment, dB..... | 22 |

FIGURES

| | |
|--|----|
| Figure 4-1 Site and Monitoring Locations | 11 |
| Figure 5-1 Daytime $L_{Aeq,T}$ Specific Sound Level – dB(A) | 16 |
| Figure 5-2 Night-Time Specific Sound Level – dB(A) | 17 |
| Figure 6-1 External Ambient Noise Level $L_{Aeq,T}$ – dB | 20 |
| Figure 6-2 Daytime Internal Ambient Noise Level $L_{Aeq,T}$ – dB | 21 |
| Figure 6-3 Night-Time Internal Ambient Noise Level $L_{Aeq,T}$ – dB..... | 22 |

APPENDICES

| |
|--------------------------------------|
| Appendix 01: Glossary of Terminology |
| Appendix 02: Drawings |

1.0 Introduction

Dragonfly Development Ltd has appointed SLR Consulting Ltd. (SLR) to undertake a noise impact assessment relating to a proposed residential development on land off Mill Lane in Bolsover, Derbyshire.

The assessment is required in support of the planning application to address comments made by the Local Authority relating to the proposed development.

The comments were as follows:

“...at Mill Lane the existing warehouse and distribution use (for vehicle parts/accessories business) has no time restrictions on its operations and so deliveries could take place at any time now or in the future. I think a noise consultant needs to look at this and make recommendations on a precautionary basis since this could affect the internal and external layout of the new dwellings on the western boundary. Hence an acoustic report will be needed with the planning application.

Please note that the NPPF requires at para 183:-

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”.

It is considered that the following assessments are required:

- Assessment One: An assessment of existing commercial/industrial noise incident upon the Site. This assessment will be completed with reference to:
 - BS4142:2014+A1:2019 Methods for rating and assessing industrial and commercial sound.
- Assessment Two: An assessment of environmental noise arising from noise sources in the vicinity of the Site incident upon the proposed residential Receptors. This assessment will be completed with reference to:
 - BS8233:2014 *Guidance on sound insulation and noise reduction for buildings*.

The mitigation strategy for each assessment will be discussed with reference to:

- The Agent of Change Principle.
- ProPG: Professional Practice Guidance: Planning and Noise (ProPG).

This Report is structured as follows:

- A description of the Site.
- A description of applicable guidance.
- The results of a baseline background sound survey.
- Assessment One (as detailed above).
- Assessment Two (as detailed above).
- Mitigation Strategy.

- Conclusion.

Whilst reasonable effort has been made to ensure that this report is easy to understand, it is technical in nature; to assist the reader, a glossary of terminology is included in Appendix 01.

2.0 Site Description

2.1 Existing Site

The site is a currently disused land with several derelict warehouses, located just to the north of the town centre of Bolsover, Derbyshire.

The site is situated on Mill Lane, close to the junction with Oxcroft Lane. It is bounded by Mill Lane and residential properties to the north, residential properties and Oxcroft Lane to the east, a playing field to the south, and commercial premises to the west.

There is a new residential development immediately development to the north, with ongoing construction of further new properties beyond.

2.2 Proposed Site

It is proposed to develop the Site for residential purposes. A plan showing the proposed layout can be seen in Appendix 02.

3.0 Scope and Guidance

3.1 Assessment One

Assessment One will be completed with reference to:

- BS4142:2014+A1:2019.
- The Agent of Change Principle.
- The ProPG.

Relevant sections of these documents are presented below.

3.1.1 British Standard 4142:2014+A1:2019

British Standard 4142:2014+A1:2019 *Methods for rating and assessing industrial and commercial sound* is intended to be used to assess the potential adverse impact of sound, of an industrial and/or commercial nature, at nearby noise-sensitive receptor locations within the context of the existing sound environment.

Where the specific sound contains tonality, impulsivity and/or other sound characteristics, penalties should be applied depending on the perceptibility. For tonality a correction of either 0, 2, 4 or 6dB should be added and for impulsivity a correction of either 0, 3, 6 or 9dB should be added. If the sound contains specific sound features which are neither tonal nor impulsive, a penalty of 3dB should be added.

In addition, if the sound contains identifiable operational and non-operational periods, that are readily distinguishable against the existing sound environment, a further penalty of 3dB may be applied.

The assessment of impact contained in BS4142:2014+A1:2019 is undertaken by comparing the sound rating level, i.e. the specific sound level of the source plus any penalties, to the measured representative background sound level immediately outside the noise-sensitive receptor location. Consideration is then given to the context of the existing sound environment at the noise-sensitive receptor location to assess the potential impact.

Once an initial estimate of the impact is determined, by subtracting the measured background sound level from the rating sound level, BS4142:2014+A1:2019 states that the following should be considered:

- typically, the greater the difference, the greater the magnitude of the impact;
- a difference of around +10dB or more is likely to be an indication of a significant adverse impact, depending on the context;
- a difference of around +5dB is likely to be an indication of an adverse impact, depending on the context; and
- 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. It is an indication that the specific sound source has a low impact, depending on the context.

BS4142:2014+A1:2019 notes that:

“Adverse impacts include, but are not limited to, annoyance and sleep disturbance. Not all adverse impacts will lead to complaints and not every complaint is proof of an adverse impact.”

BS4142:2014+A1:2019 outlines guidance for the consideration of the context of the potential impact including consideration of the existing residual sound levels, location and/or absolute sound levels.

To account for the acoustic character of proposed sound sources, BS4142:2014+A1:2019 provides the following with respect to the application of penalties to account for “the subjective prominence of the character of the specific sound at the noise-sensitive locations and the extent to which such acoustically distinguishing characteristics will attract attention”.

- **Tonality** – “For sound ranging from not tonal to predominantly tonal the Joint Nordic Method gives a correction of between 0dB and +6dB for tonality. Subjectively, this can be converted to a penalty of 2dB for a tone which is just perceptible at the noise receptor, 4dB where it is clearly perceptible and 6dB where it is highly perceptible;
- **Impulsivity** – A correction of up to +9dB can be applied for sound that is highly impulsive, considering both the rapidity of the change in sound level and the overall change in sound level. Subjectively, this can be converted to a penalty of 3dB for impulsivity which is just perceptible at the noise receptor, 6dB where it is clearly perceptible, and 9dB where it is highly perceptible;
- **Intermittency** – When the specific sound has identifiable on/off conditions, the specific sound level ought to be representative of the time period of length equal to the reference time interval which contains the greatest total amount of on time. If the intermittency is readily distinctive against the residual acoustic environment, a penalty of 3dB can be applied; and
- **Other Sound Characteristics** – Where the specific sound features characteristics that are neither tonal nor impulsive, though otherwise are readily distinctive against the residual acoustic environment, a penalty of 3dB can be applied.”

Finally, BS4142:2014+A1:2019 outlines guidance for the consideration of the context of the potential impact including consideration of the existing residual sound levels, location and/or absolute sound levels.

3.2 Assessment Two

Assessment Two, an assessment of environmental noise arising from noise sources in the vicinity of the Site incident upon the proposed residential Receptors, will be completed with reference to:

- BS8233:2014.

Relevant sections of these documents are presented below.

3.2.1 BS8233:2014

The assessment of environmental noise arising from noise sources in the vicinity of the Site incident upon the proposed residential Receptors will be completed with reference to BS8233:2014.

The standard suggests suitable internal noise levels within different types of buildings, including residential dwellings, as shown in Table 3-1.

Table 3-1
Residential Development Suitable Internal Noise Levels, dB

| Activity | Location | 07:00 to 23:00 L _{Aeq,16hr} | 23:00 to 07:00 L _{Aeq,8hr} |
|----------------------------|------------------|---|--|
| Resting | Living room | 35 | - |
| Dining | Dining room/area | 40 | - |
| Sleeping (daytime resting) | Bedroom | 35 | 30 |

BS8233:2014 states that the recommended limits can be relaxed by up to 5dB “where development is considered necessary or desirable” (Paragraph 7.7.2).

Whilst it may be considered desirable to achieve the BS8233:2014 recommended internal noise levels with windows open, it is stated that where the limit cannot be met with an open window “there needs to be appropriate alternative ventilation that does not compromise the façade insulation or the resulting noise level” (Paragraph 7.7.2).

It is, therefore, not essential that the recommended internal noise levels are achievable with open windows if suitable alternative means of ventilation can be provided.

With regards to external noise, Section 7.7.3.2 of BS8233:2014 states that:

“For traditional external areas that are used for amenity space, such as gardens and patios, it is desirable that the external noise level does not exceed 50 dB $L_{Aeq,T}$, with an upper guideline value of 55 dB $L_{Aeq,T}$ which would be acceptable in noisier environments. However, it is also recognized that these guideline values are not achievable in all circumstances where development might be desirable. In higher noise areas, such as city centres or urban areas adjoining the strategic transport network, a compromise between elevated noise levels and other factors, such as the convenience of living in these locations or making efficient use of land resources to ensure development needs can be met, might be warranted. In such a situation, development should be designed to achieve the lowest practicable levels in these external amenity spaces but should not be prohibited”.

3.3 Mitigation Strategy

3.3.1 Agent of Change Principle

In accordance with the ‘Agent of Change’ Principle (defined in the National Planning Policy Framework), the new development should not result in ‘unreasonable restrictions’ being placed on existing businesses and any proposed new development should include ‘suitable mitigation’. Example mitigation measures are discussed in the ProPG and replicated in this Report at Section 3.1.2.

3.3.2 Professional Practice Guidance: Planning and Noise

The ProPG guidance, for new residential development that are exposed predominantly to airborne noise from transport sources, was prepared by a working group consisting of representatives of the Association of Noise Consultants (ANC), the Institute of Acoustics (IOA) and the Chartered Institute of Environmental Health (CIEH) and was published in June 2017. It was produced “to provide practitioners with guidance on the management of noise within the planning system in England”, though it does not constitute an official government code of practice and neither replaces nor provides an authoritative interpretation of the law or government policy.

ProPG bases much of its guidance on the numerical targets within BS 8233:2014 and the interpretation of NPPF and NPSE guidelines, providing new and extended recommendations where these standards are considered to fall short.

Design Approach (“Good Acoustic Design Process”)

ProPG strongly encourages an approach that can be considered as “good acoustic design”. In short, “good acoustic design” means that the acoustic design should:

- be considered early in the development control process;
- take an integrated approach to achieve ‘optimal’ acoustic conditions both internally and externally, which does not just focus on compliance with noise exposure standards, but aims to avoid compromises for other sustainable design objectives that may adversely affect living conditions and quality of life;

- avoid “unreasonable” and prevent “unacceptable” acoustic conditions, without overdesigning or ‘gold plating’ the new development; and
- consider the viability of alternative solutions rather than solely rely on the building envelope to provide sufficient sound insulation, which may adversely affect living conditions.

Noise Management Measures

ProPG recommends that alternative noise mitigation solutions should be considered before arriving at the use of fixed un-openable windows, as occupants would favour the ability to open the windows even if the resultant internal acoustic conditions are unsatisfactory. Supplementary Document 2 of ProPG therefore advises that the following hierarchy of noise management measures (in descending order of preference) should be followed:

- Maximising the spatial separation of noise source(s) and receptor(s).
- Investigating the necessity and feasibility of reducing existing noise levels and relocating existing sources.
- Using existing topography and existing structures (that are likely to last the expected life of the noise-sensitive scheme) to screen the Proposed Development site from significant sources of noise.
- Incorporating noise barriers as part of the scheme to screen the Proposed Development site from significant sources of noise.
- Using the layout of the scheme to reduce noise propagation across the site.
- Using the orientation of buildings to reduce the noise exposure of noise sensitive rooms.
- Using the building envelope to mitigate noise to acceptable levels.

All of these measures, if considered for implementation, should examine the effects of noise control measures on ventilation, fire regulation, health and safety, cost and CDM (construction, design and management). Any reliance on the use of the building envelope alone to mitigate noise levels should be justified. In many cases there is *“justification that the internal target noise levels can only be practically achieved with windows closed, which may be the case in urban areas and at sites adjacent to transportation noise sources”*.

4.0 Baseline Noise Survey

To determine the baseline noise environment at the site, a noise survey was undertaken between Friday 5th and Monday 8th March 2021.

4.1 Monitoring Equipment

The equipment used during the noise survey is detailed in Table 4-1. All measurement instrumentation was calibrated before and after the measurements were recorded. No significant drift was observed following the calibration. The calibration chain is traceable via the United Kingdom Accreditation Service to National Standards held at the National Physical Laboratory.

Table 4-1
Survey Equipment

| Location | Equipment | Serial Number |
|------------|---------------------------------------|---------------|
| Location 1 | Norsonic 140 Type 1 Sound Level Meter | 1403012 |
| | Norsonic 1251 Acoustic Calibrator | 31872 |

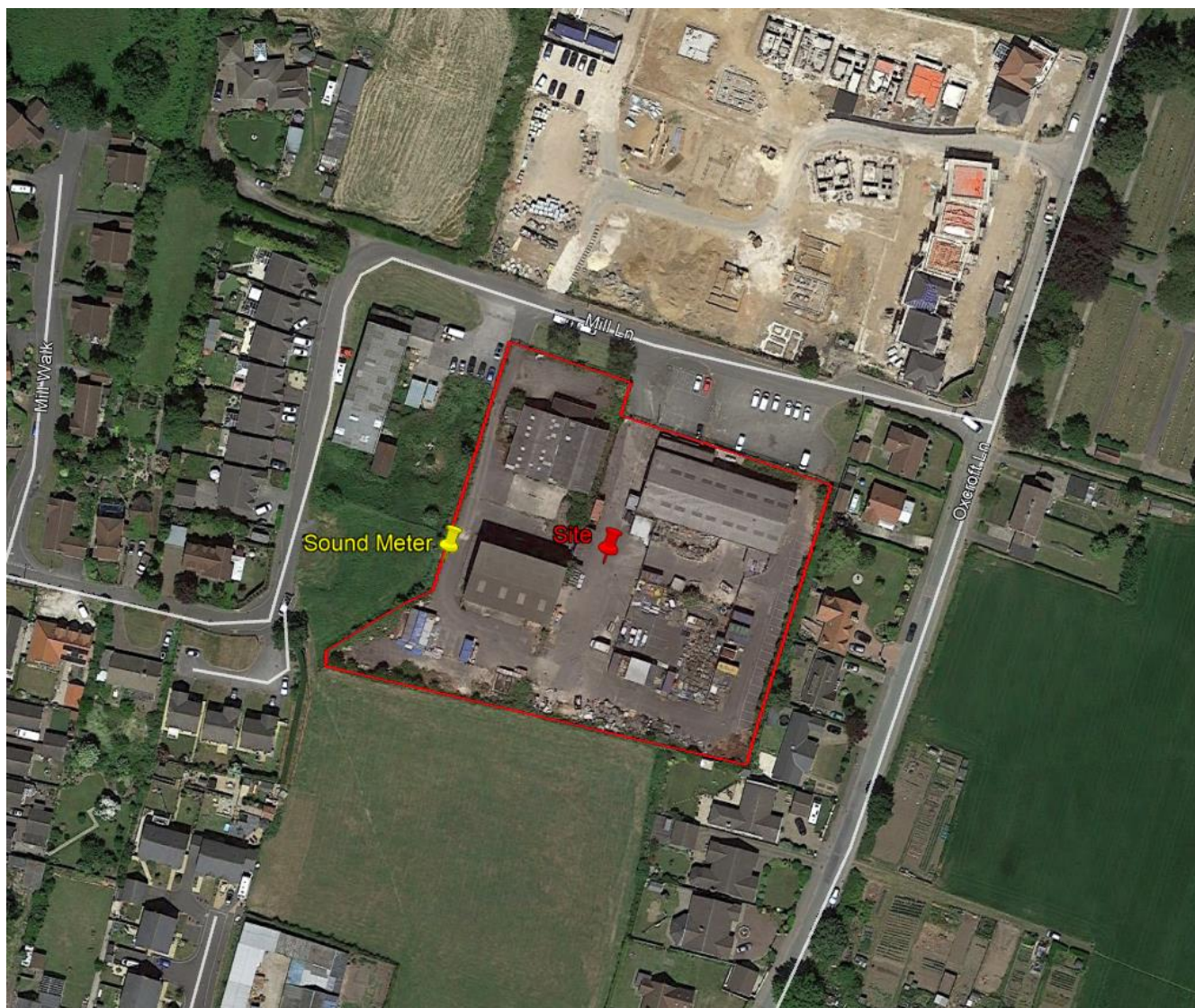
4.2 Monitoring Locations

Baseline noise levels were measured at the following locations during the survey:

- Location 1: At the western boundary of the site, approximately 35m from the nearby commercial premises

The survey locations can be seen in Figure 4-1.

Figure 4-1
Site and Monitoring Locations



At each monitoring location, the microphone was placed 1.5m above the ground in free-field conditions, i.e. at least 3.5m from the nearest vertical reflecting surface, with the following noise level indices being recorded:

- $L_{Aeq,T}$.
- L_{A90} .
- L_{A10} .
- L_{AFmax} .

4.3 Weather

During the survey the weather was suitable for monitoring noise levels with dry conditions and wind speeds less than 5m/s.

4.4 Baseline Noise Level Results

A summary of the baseline survey results is shown in Table 4-2. The full survey results are available upon request.

Table 4-2
Location 1 - Summary of Measured Noise Levels, free-field, dB

| Date | Period | L _{Aeq,T} | Median L _{A90} | Median L _{A10} | L _{Amax} |
|--------------------------------|----------------------------|--------------------|-------------------------|-------------------------|-------------------|
| Friday 5 th March | Daytime (13:00 – 23:00) | 50.7 | 29.3 | 42.9 | 89.8 |
| | Night-Time (23:00 – 07:00) | 49.0 | 25.1 | 29.8 | 89.9 |
| Saturday 6 th March | Daytime (07:00 – 23:00) | 50.2 | 32.1 | 47.2 | 86.7 |
| | Night-Time (23:00 – 07:00) | 44.5 | 33.3 | 38.3 | 81.9 |
| Sunday 7 th March | Daytime (07:00 – 12:30) | 51.1 | 37.3 | 47.4 | 91.6 |
| | Night-Time (23:00 – 07:00) | 48.5 | 38.1 | 42.2 | 85.2 |

For the purpose of Assessment 1 the following noise levels will be referred to:

- Daytime L_{A90,T}: 32.1dB
- Night-Time L_{A90,T}: 25.1dB

5.0 Assessment One

During the Survey set up and collection it was noted that there was no noise generating activity at the Warehouse. However as noted by the EHO:

“...at Mill Lane the existing warehouse and distribution use (for vehicle parts/accessories business) has no time restrictions on its operations and so deliveries could take place at any time now or in the future. I think a noise consultant needs to look at this and make recommendations on a precautionary basis since this could affect the internal and external layout of the new dwellings on the western boundary. Hence an acoustic report will be needed with the planning application”.

Therefore, to ensure that residential development at the Site does not lead to un-reasonable restrictions being placed upon the Warehouse, SLR has developed a noise model of potential Warehouse noise sources that may impact upon the proposed residential development. The noise model is detailed below.

5.1 Noise Model

5.1.1 Noise Model Assumptions

The sound predictions in this assessment have been undertaken using a proprietary software-based noise model, CadnaA, which implements the full range of UK calculation methods. The calculation algorithms set out in ISO 9613-2:1996 Acoustics – *Attenuation of sound during propagation outdoors – Part 2* General method of calculation have been used and the model assumes:

- A ground absorption factor of 0.5.
- A reflection factor of 2.
- A 1.8m acoustic fence at the boundary of the Site with the Warehouse (as indicated on Figures 6-1 and 6-2).
- A daytime receiver height of 1.5m and a night-time receiver height of 4.0m.

5.1.2 Noise Sources

The assessment of Warehouse noise sources will include the following sources of noise:

- HGV movements.
- HGV reversing alarms.

The noise sources listed in Table 5-1 have been included in the noise model.

Table 5-1
Noise Sources Associated HGV Movements at the Site - dB

| Name | Frequency Hz | | | | | | | | | A | Source Type | Height (m) | Movements / On Time |
|---------------------------|--------------|------|------|------|------|------|------|------|------|------|-------------|------------|-------------------------------|
| | 31.5 | 63 | 125 | 250 | 500 | 1000 | 2000 | 4000 | 8000 | | | | |
| HGV at 15mph ¹ | 91.9 | 95.4 | 91.8 | 89.5 | 88.1 | 88.4 | 86.9 | 81.3 | 70.0 | 93.0 | Line | 1 | 1 over the BS4142 Ref. period |
| Reversing HGV alarm | 89.8 | 95.5 | 90.8 | 88.0 | 84.1 | 84.9 | 82.2 | 79.6 | 74.3 | 89.6 | Point | 1.5 | 1 minute per HGV |

¹ This was the measured noise level at 15mph. Within the noise model HGVs have been modelled as a moving point source along the internal HGV route at a speed of 5mph (site speed limit).

5.2 Predicted Specific Sound Level

The predicted sound levels of the HGV and car movements at each location are shown in Table 5-2.

Daytime sound levels have been predicted to 1.5m above ground level, the approximate height of a ground floor window. Night-Time sound levels have been predicted to 4.0m above ground level, the approximate height of a first-floor window.

Table 5-2
Predicted Sound Levels of the Warehouse – Free-Field dB(A)

| Location | Period | Specific Sound Level $L_{Aeq,T}$ |
|------------|------------|----------------------------------|
| Location 1 | Daytime | 33.3 |
| | Night-Time | 34.6 |
| Location 2 | Daytime | 31.9 |
| | Night-Time | 33.3 |
| Location 3 | Daytime | 33.4 |
| | Night-Time | 37.9 |
| Location 4 | Daytime | 23.6 |
| | Night-Time | 28.1 |

A graphical image of the calculated specific sound level during the daytime can be seen in Figure 5-1, whilst a graphical image of the calculated specific sound level during the night-time can be seen in Figure 5-2.

Figure 5-1
Daytime $L_{Aeq,T}$ Specific Sound Level – dB(A)

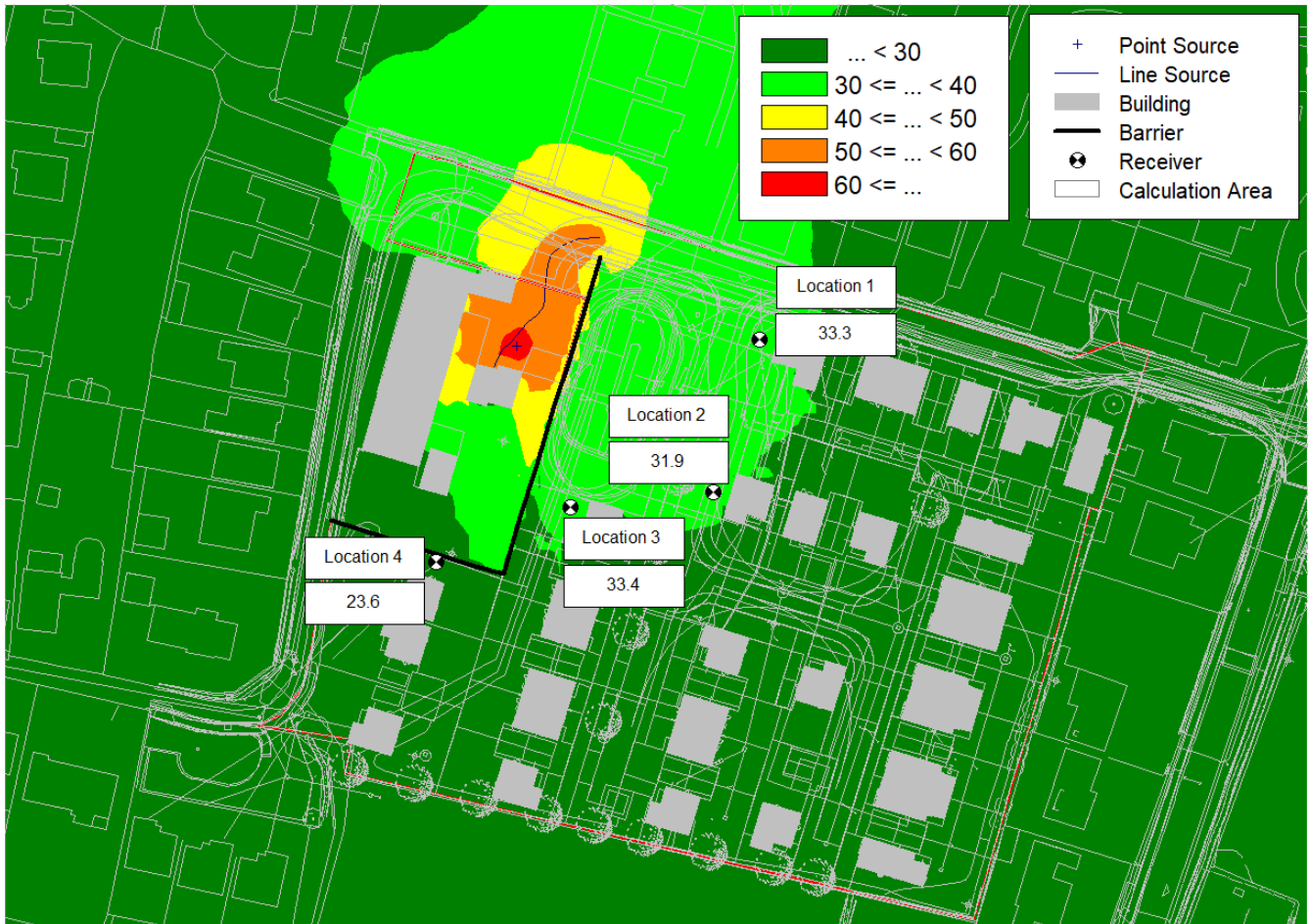
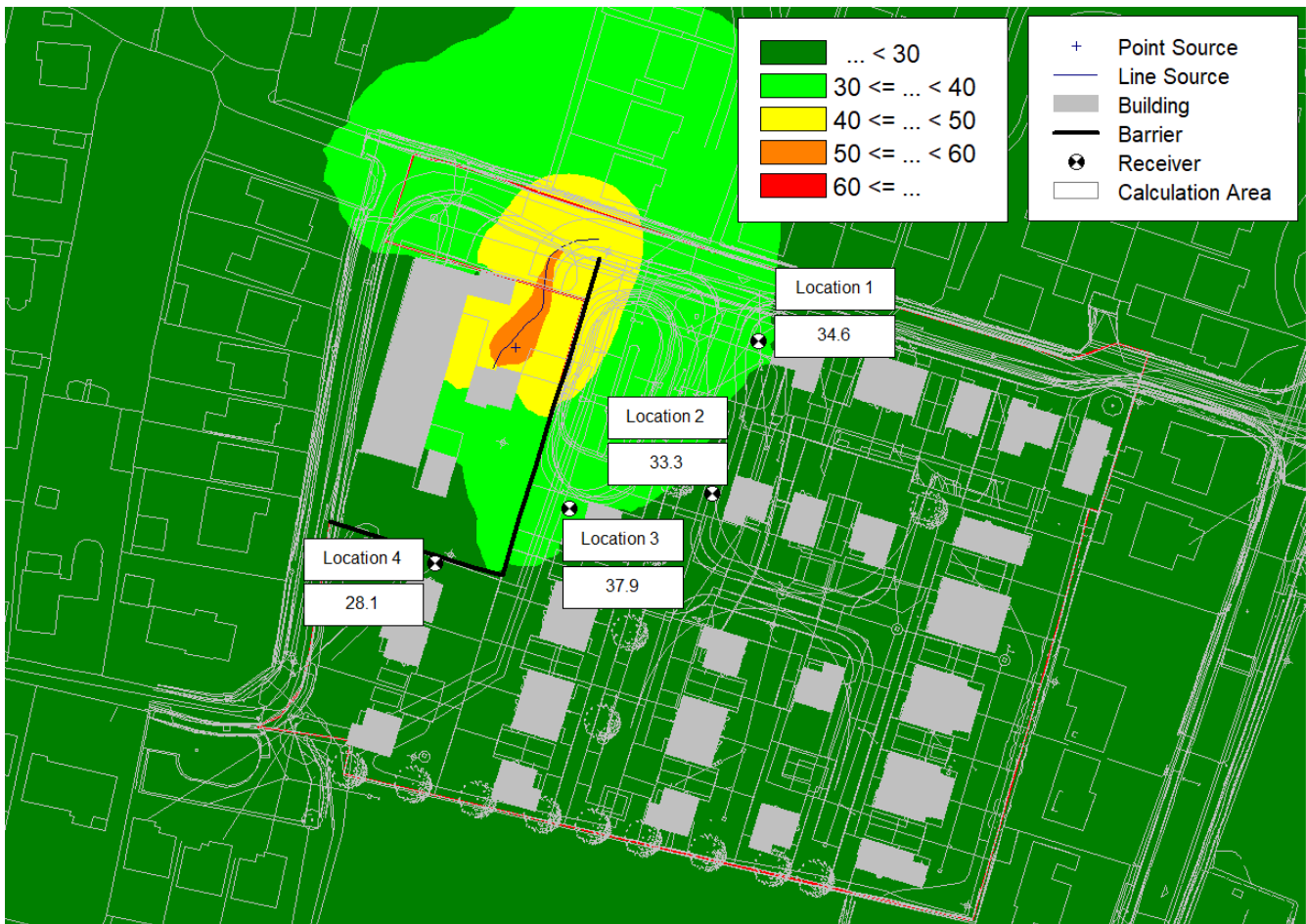


Figure 5-2
Night-Time Specific Sound Level – dB(A)



5.3 BS4142:2014+A1:2019 Assessment

5.3.1 Sound Penalties

The character of each noise source, and the sound correction that will be applied in the BS4142:2014+A1:2019 assessment is detailed below:

- **Tonality:** SLR has not undertaken the BS4142:2014+A1:2019 *objective method for assessing the audibility of tones in sound: one third octave method*. However, it is not expected that any noise from the HGVs would be tonal. No tonal penalty is considered necessary.
- **Impulsivity:** It is not anticipated that the HGVs would generate impulsive noise.
- **Other sound characteristics:** The HGVs are not considered to have any other sound characteristics that may be readily distinctive against the residual acoustic environment. No penalty is required for other characteristics.
- **Intermittency;** Over the BS4142:2014+A1:2019 reference period of 1-hour in the day and 15-minute at night, it is anticipated that noise from HGVs would be intermittent. A 3dB penalty will therefore be required.

Based on the data presented above, a 3dB penalty is applicable to the predicted specific sound level at the closest receptors to derive the corresponding rating levels.

5.3.2 Results

The penalties described in the Section above have been added to the predicted sound levels shown in Table 5-2 to derive the rating levels at each of the nearest noise-sensitive receptors.

The rating levels have then been compared to the derived background sound levels, measured by SLR and assessed accordingly.

The results of the BS4142:2014+A1:2019 assessment are shown in Table 5-3. It must be noted that the rating levels and the representative background sound levels have been rounded to the nearest decibel.

Table 5-3
BS4142+A1:2019 Assessment, dB

| Location | Period | Median L _{A90} | Rating Level L _{A,r,T} | Dif. Between L _{A90} and Rating Level |
|------------|------------|-------------------------|---------------------------------|--|
| Location 1 | Daytime | 32 | 36 | +4 |
| | Night-Time | 25 | 38 | +13 |
| Location 2 | Daytime | 32 | 35 | +3 |
| | Night-Time | 25 | 36 | +11 |
| Location 3 | Daytime | 32 | 36 | +4 |
| | Night-Time | 25 | 41 | +16 |
| Location 4 | Daytime | 32 | 27 | -5 |
| | Night-Time | 25 | 31 | +6 |

It can be seen from Table 5-3 that during the daytime the rating level of HGV movements associated with the Warehouse would be between 5dB(A) below and 4dB above the background sound level at the new residential receptors assessed.

The BS4142:2014+A1:2019 assessment provides a positive indication of a low impact at the receptor locations during the daytime.

At night the rating level of HGV movements associated with the Warehouse are predicted to be between 6dB(A) and 16dB above the background sound level at the new residential receptors assessed.

However, the predicted rating levels are for one 15-minute period during which time there is one HGV movement and one reversing alarm. Whilst this scenario may occur, at present it is understood that HGV movements at the Site are infrequent, and whilst there is nothing to restrict HGV movements at the Site, regular HGV movements at night are unlikely.

6.0 Assessment Two

6.1 BS8233:2014 Noise Levels in External Amenity Space

Table 6-1 below shows:

- The daytime highest measured ambient noise level over 16 hours (see Table 4-2).
- The highest predicted specific sound level (see Table 5-2).
- The resultant cumulative ambient sound level in external amenity spaces for the development.
- A comparison against the external amenity limit of 55dB(A) presented in BS8233:2014.
- It must be noted that the sound levels have been rounded to the nearest decibel.

Table 6-1
BS8233:2014 External Amenity Assessment, dB

| Highest Daytime Residual Sound Level, dB $L_{Aeq,16hr}$ | Highest Specific Sound Level of Warehouse, dB $L_{Aeq,1hr}$ | Ambient Sound Level, dB(A) | BS8233:2014 External Amenity Sound Limit | Difference |
|---|---|----------------------------|--|------------|
| 51 | 33 | 51 | 55 | -4 |

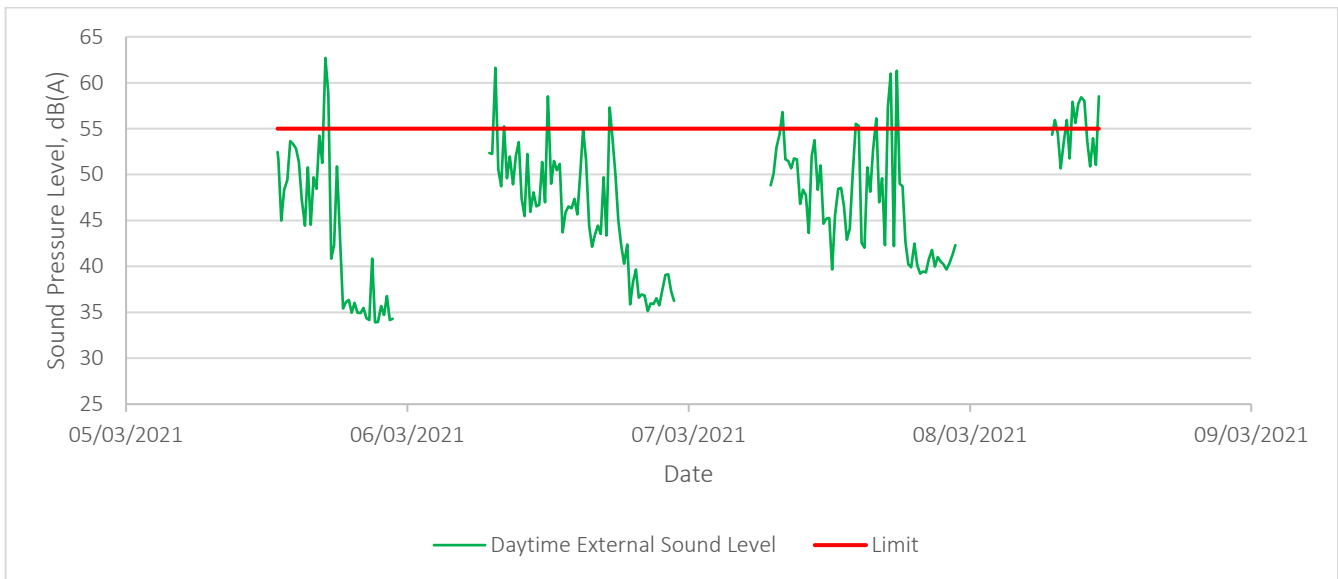
Table 6-1 shows that the ambient sound level in the most affected external amenity areas of the site will meet the BS8233:2014 limit of 55dB(A).

Whilst it is not a requirement for the 55dB(A) limit to be met for time periods averaged over less than 16-hours, Figure 6-1 graphs the daytime survey data including the highest daytime specific sound level in Table 5-2².

The BS8233:2014 upper limit of 55dB(A) for a noise level in an external amenity space is also provided.

² To account for Warehouse noise not measured on Site.

Figure 6-1
External Ambient Noise Level $L_{Aeq,T}$ – dB



It can be seen from Figure 6-1 that at the boundary of the Site with the Warehouse the ambient noise level is below the BS8233:2014 upper limit of 55dB(A) except for infrequent, short periods of time, likely resulting from high maximum noise levels in the measured noise data at these times.

6.2 BS8233:2014 Daytime Internal Noise Levels

Table 6-2 below shows:

- The daytime highest measured ambient noise level over 16 hours (see Table 4-2).
- The highest predicted specific sound level (see Table 5-2).
- The resultant internal ambient sound level (assuming a partially open window reduces external noise levels by 15dB(A)).
- A comparison against the daytime internal limit of 35dB(A) presented in BS8233:2014.
- It must be noted that the sound levels have been rounded to the nearest decibel.

Table 6-2
BS8233:2014 Daytime Internal Assessment, dB

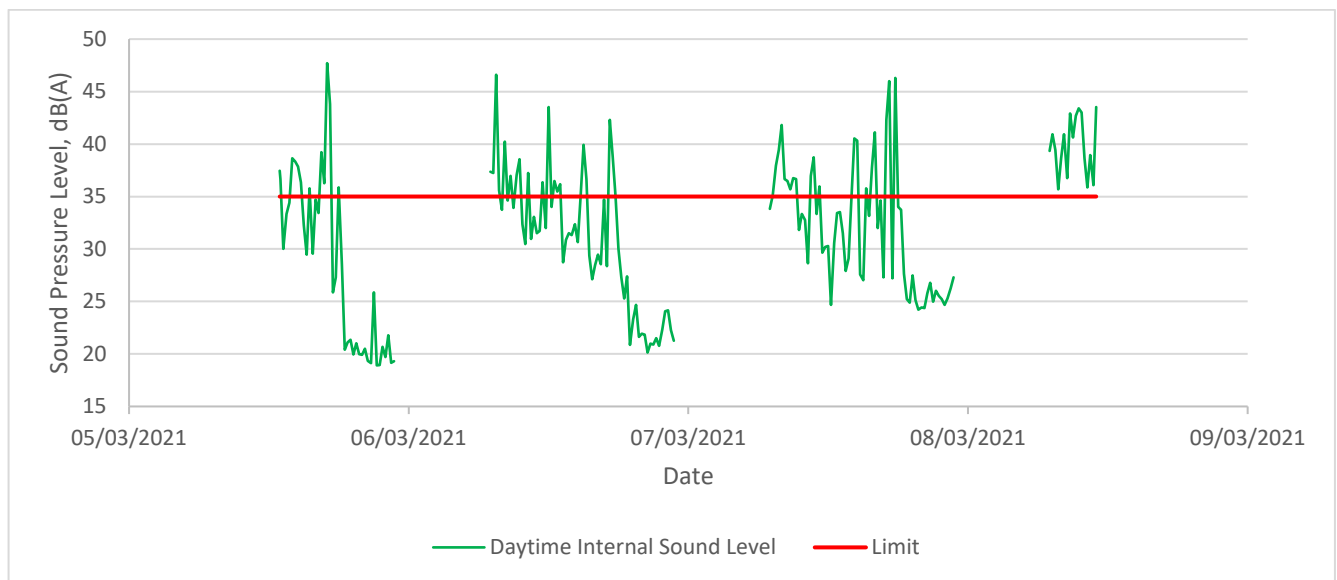
| Highest Daytime Residual Sound Level, dB $L_{Aeq,16hr}$ | Highest Specific Sound Level of Warehouse, dB $L_{Aeq,1hr}$ | Internal Ambient Sound Level, dB(A) | BS8233:2014 Daytime Internal Sound Limit | Difference |
|---|---|-------------------------------------|--|------------|
| 51 | 33 | 36 | 35 | +1 |

Table 6-2 shows that the internal ambient sound level of 35dB(A) is marginally exceeded. However an exceedance of 1dB(A) is not considered significant.

Whilst it is not a requirement for the 35dB(A) limit to be met for time periods averaged over less than 16-hours, Figure 6-2 graphs the internal daytime survey data including the highest daytime specific sound level in Table 5-2⁴.

The BS8233:2014 limit of 35dB(A) for a noise level in a habitable room is also presented.

Figure 6-2
Daytime Internal Ambient Noise Level $L_{Aeq,T}$ – dB



It can be seen from Figure 6-1 that at the boundary of the Site with the Warehouse the internal ambient noise level is typically below the BS8233:2014 habitable room limit of 35dB(A) during the evening period.

At other times, when the limit is exceeded, it is considered reasonable to assume that windows can be closed with alternative means of background ventilation provided, to mitigate against noise ingress. If a standard window set with a minimum 20 dB R_w is specified, then the BS8233:2014 internal noise limits will be met in all scenarios.

6.3 BS8233: 2014 Night-Time Internal Noise Levels

Table 6-3 below shows:

- The night-time highest measured ambient noise level over 8 hours (see Table 4-2).
- The highest predicted night-time specific sound level (see Table 5-2).
- The resultant internal ambient sound level (assuming a partially open window reduces external noise levels by 15dB(A)).
- A comparison against the night-time internal limit of 30dB(A) presented in BS8233:2014.

It must be noted that the sound levels have been rounded to the nearest decibel.

⁴ To account for Warehouse noise not measured on Site.

Table 6-3
BS8233:2014 Night-time Internal Assessment, dB

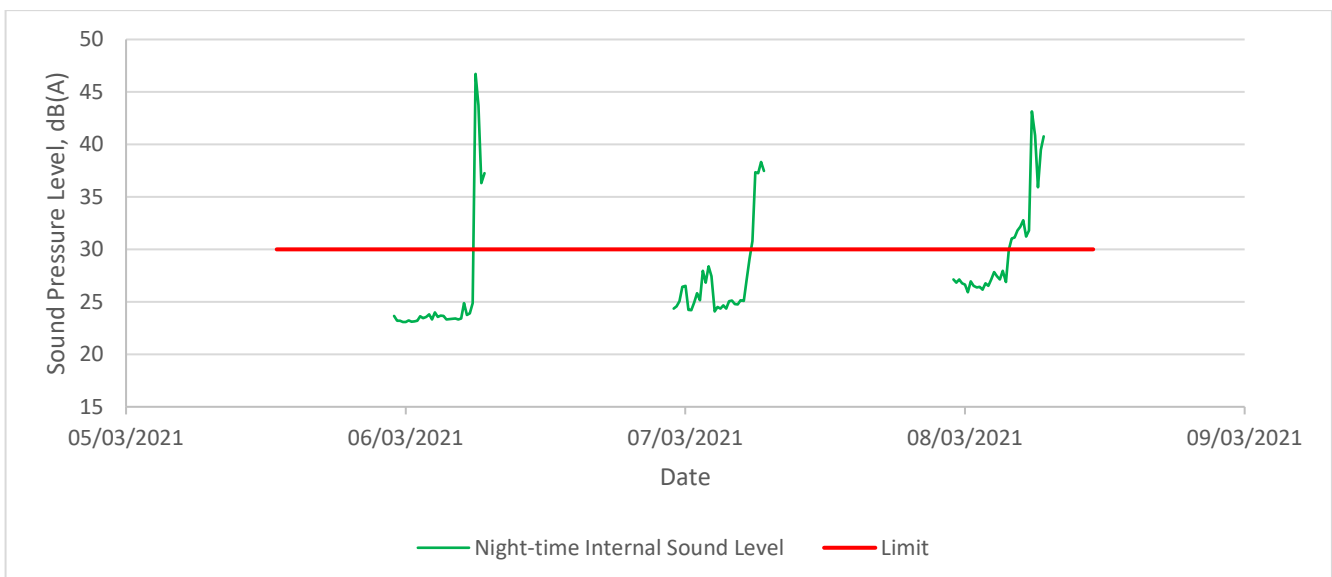
| Highest Night-Time Residual Sound Level, dB $L_{Aeq,8hr}$ | Highest Specific Sound Level of Warehouse, dB $L_{Aeq,15min}$ | Internal Ambient Sound Level, dB(A) | BS8233:2014 Night-Time Internal Sound Limit | Difference |
|---|---|-------------------------------------|---|------------|
| 49 | 38 | 34 | 30 | +4 |

Table 6-3 shows that the internal ambient sound level of 30dB(A) is exceeded.

Whilst it is not a requirement for the 30dB(A) limit to be met for time periods averaged over less than 8-hours, Figure 6-3 graphs the internal night-time survey data including the highest night-time specific sound level in Table 5-2⁶.

The BS8233:2014 limit of 30dB(A) for a noise level in a habitable room is also presented.

Figure 6-3
Night-Time Internal Ambient Noise Level $L_{Aeq,T}$ – dB



It can be seen from Figure 6-3 that the internal night-time ambient noise level does not exceed the BS8233:2014 limit for night-time internal noise except where the sound level rises sharply at the end of each night-time period, presumably as a consequence of local road traffic.

When the limit is exceeded, it is considered reasonable to assume that windows can be closed with alternative means of background ventilation provided, to mitigate against noise ingress. If a standard window set with a minimum 20 dB R_w is specified, then the BS8233:2014 internal noise limits will be met in all scenarios.

⁶ To account for Warehouse noise not measured on Site.

7.0 Mitigation Strategy

In accordance with the ProPG and the Agent of Change Principle the following mitigation measures have been included in the Site design:

- The spatial separation between the Warehouse and the Residential Receptors has been maximised.
- A 1.8m high acoustic fence has been included on the western Site boundary to screen the Proposed Development site from significant sources of noise.
- Using the layout of the scheme to reduce noise propagation across the site.
- Using the building envelope to mitigate noise to acceptable levels (see Section 6).

With the above measures in place it is considered that the proposed residential development would not lead to unreasonable restrictions being placed on operations at the Warehouse.

8.0 Conclusion

Dragonfly Development Ltd has appointed SLR to undertake a noise impact assessment relating to a proposed residential development on land off Mill Lane in Bolsover, Derbyshire.

The assessment was required in support of the planning application to address comments made by the Local Authority relating to the proposed development.

The comments were as follows:

“...at Mill Lane the existing warehouse and distribution use (for vehicle parts/accessories business) has no time restrictions on its operations and so deliveries could take place at any time now or in the future. I think a noise consultant needs to look at this and make recommendations on a precautionary basis since this could affect the internal and external layout of the new dwellings on the western boundary. Hence an acoustic report will be needed with the planning application.

Please note that the NPPF requires at para 183:-

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”.

8.1 Assessments Completed

In this Report the following assessments have been completed:

- Assessment One: An assessment of existing commercial/industrial noise incident upon the Site. This assessment will be completed with reference to:
 - BS4142:2014+A1:2019 Methods for rating and assessing industrial and commercial sound.
 - The Agent of Change Principle.
 - ProPG: Professional Practice Guidance: Planning and Noise (ProPG).
- Assessment Two: An assessment of environmental noise arising from noise sources in the vicinity of the Site incident upon the proposed residential Receptors. This assessment will be completed with reference to:
 - BS8233:2014 *Guidance on sound insulation and noise reduction for buildings.*

8.2 Results Summary

8.2.1 BS4142:2014+A1:2019 Assessment

The BS4142:2014+A1:2019 assessment provides a positive indication of a low impact at the receptor locations during the daytime.

At night the rating level of HGV movements associated with the Warehouse are predicted to be between 6dB(A) and 16dB above the background sound level at the new residential receptors assessed.

However, the predicted rating levels are for one 15-minute period during which time there is one HGV movement and one reversing alarm. Whilst this scenario may occur, at present it is understood that HGV movements at the Site are infrequent, and whilst there is nothing to restrict HGV movements at the Site, regular HGV movements at night are unlikely.

8.2.2 BS8233:2014 assessment

The assessment has shown that the 16-hour ambient sound level in the most affected external amenity areas of the site will meet the BS8233:2014 limit of 55dB(A). Over the whole survey period, at the boundary of the Site with the Warehouse the ambient noise level is below the BS8233:2014 upper limit of 55dB(A) except for infrequent, short periods of time, likely resulting from high maximum noise levels in the measured noise data at these times.

With regards to internal noise levels, at the boundary of the Site with the Warehouse the internal ambient noise level is typically below the BS8233:2014 habitable room limit of 35dB(A) during the evening period.

At other times, when the limit is exceeded, it is considered reasonable to assume that windows can be closed with alternative means of background ventilation provided, to mitigate against noise ingress. If a standard window set with a minimum 20 dB R_w is specified, then the BS8233:2014 internal noise limits will be met in all scenarios.

8.2.3 Mitigation

In accordance with the ProPG and the Agent of Change Principle the following mitigation measures have been included in the Site design:

- The spatial separation between the Warehouse and the Residential Receptors has been maximised.
- A 1.8m high acoustic fence has been included on the western Site boundary to screen the Proposed Development site from significant sources of noise.
- Using the layout of the scheme to reduce noise propagation across the site.
- Using the building envelope to mitigate noise to acceptable levels (see Section 6).

With the above measures in place it is considered that the proposed residential development would not lead to unreasonable restrictions being placed on operations at the Warehouse.

APPENDIX 01

Glossary of Terminology

Appendix 01 – Glossary of Terminology

In order to assist the understanding of acoustic terminology and the relative change in noise, the following background information is provided.

The human ear can detect a very wide range of pressure fluctuations, which are perceived as sound. In order to express these fluctuations in a manageable way, a logarithmic scale called the decibel, or dB scale is used. The decibel scale typically ranges from 0dB (the threshold of hearing) to over 120dB. An indication of the range of sound levels commonly found in the environment is given in the following table.

Table 01-1
Sound Levels Commonly Found in the Environment

| Sound Level | Location |
|-----------------|----------------------------|
| 0dB(A) | Threshold of hearing |
| 20 to 30dB(A) | Quiet bedroom at night |
| 30 to 40dB(A) | Living room during the day |
| 40 to 50dB(A) | Typical office |
| 50 to 60dB(A) | Inside a car |
| 60 to 70dB(A) | Typical high street |
| 70 to 90dB(A) | Inside factory |
| 100 to 110dB(A) | Burglar alarm at 1m away |
| 110 to 130dB(A) | Jet aircraft on take off |
| 140dB(A) | Threshold of Pain |

Acoustic Terminology

| | |
|---------------------|--|
| dB (decibel) | The scale on which sound pressure level is expressed. It is defined as 20 times the logarithm of the ratio between the root-mean-square pressure of the sound field and a reference pressure ($2 \times 10^{-5} \text{Pa}$). |
| 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} | L_{Aeq} is defined as the notional steady sound level which, over a stated period of time, would contain the same amount of acoustical energy as the A - weighted fluctuating sound measured over that period. |
| L_{10} & 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 as such can be regarded as the 'average maximum level'. Similarly, L_{90} is the 'average minimum level' and is often used to describe the background noise. It is common practice to use the L_{10} index to describe traffic noise. |
| 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_{Aeq} noise level but will still affect the noise environment. Unless described otherwise, it is measured using the 'fast' sound level meter response. |

APPENDIX 02

Drawing



GENERAL NOTES

Not for construction. Please check dimensions on site. All topographical information by others. Exact site boundaries and lease agreements TBC by clients solicitor with reference to title deeds.

Demolition works subject to S.Eng appraisal. Refer to recommendations in asbestos register and refer to current asbestos reports. Specialist asbestos removal contractor to be used prior to demolition works.

All layouts as illustrated are subject to designs and surveys by others.

LEGEND

Refer to house type plans for info

| | |
|--------------|-------------------|
| [Blue] | Type 1 - 2B4P |
| [Light Blue] | Type 2 - 2B4P |
| [Green] | Type 3/3A - 3B5P |
| [Yellow] | Type 4 - 4B7P |
| [Orange] | Type 5/5A - 2B3P |
| [Brown] | Type 6 - 3B6P etc |

MILL LANE - UNIT SCHEDULE

| |
|-------------------------|
| 03 nos. 2bed Type 1 |
| 03 nos. 2bed Type 2 |
| 05 nos. 3bed Type 3 |
| 02 nos. 3bed Type 3A |
| 03 nos. 4bed Type 4 |
| 03 nos. 2bed Type 5 |
| 06 nos. 2bed Type 5A |
| 10 nos. 3bed Type 6 |
| TOTAL UNITS - 32 |
| TOTAL BEDS - 87 |

Legal Info

1. All units are subject to standard leasehold conditions. The standard lease is available on the project website.
2. All units are subject to standard leasehold conditions. The standard lease is available on the project website.
3. The standard lease is available on the project website.
4. The standard lease is available on the project website.

WORK IN PROGRESS

| | |
|--|---------------|
| 20/001 | |
| Fountain Gardens Mill Lane Bolsover | |
| 20/001 | |
| Proposed Site Layout Plan | |
| DATE | BY |
| 13/03/21 | JSB CGJ AD |
| 2747(08)G01 | D Preliminary |

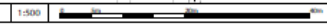
RaynerDavies Architects

Nottingham | Kent

2 St. Peter's Lane
 Nottingham
 NG1 2JG

01154473828
 www.rdaya.co.uk

00 MILL LANE - Proposed Plan



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