



**Environmental Noise Assessment For A  
Proposed Residential Development Off High  
Street, Donington**

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## **1 OBJECTIVES**

- 1.1 To carry out a \*noise assessment of a proposed residential development off High Street, Donington following guidance in Planning & Noise: Professional Practice Guidance on Planning & Noise: New Residential Development (ProPG – Reference 1).
- 1.2 To recommend solutions to any problems identified by the assessment.

## **2 CONCLUSIONS**

- 2.1 The dominant noise across the site will be from road traffic on High Street and other local roads.
- 2.2 At times industrial noise will be dominant or significant:
  - The operations of fixed plant at George Barnsdale may cause a <sup>1</sup>*“significant adverse impact”* at the residential locations.
  - There is also the potential for disturbance from fixed plant at Jacks Fish Bar and Budgens supermarket, yard activities at the fire station and deliveries at Budgens.
- 2.3 Design recommendations are made in section 3 to mitigate the impact of these sources.
- 2.4 The ProPG initial site noise risk assessment for the site is between “Low” and “Medium” for both the daytime and night-time.
- 2.5 The overall impact on future residents is assessed as being no worse than “Observed Adverse Effect” using terminology from the National Planning Policy Guidance (Reference 5).

## **3 RECOMMENDATIONS**

### **3.1 Acoustic fence**

An acoustic fence of at least 2.4m in height should be constructed on the footprint marked as a red line in Drawing 3.1 shown below. Further details on the specification are given in Appendix 6.

All outdoor amenity area serving the proposed dwellings should be surrounded by 1.8m or higher acoustic fencing, as shown in Drawing 3.1. Further details on the specification are given in Appendix 6.

**\* See Appendix 1 for a Glossary of Terms**

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<sup>1</sup> using terminology from British Standard BS 4142:2014+A1:2019  
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## 3.2 Glazing, Ventilation, Overheating

### 3.2.1 Bedrooms (Façade A Marked blue in Drawing 3.1)

For the <sup>2</sup>bedrooms facing the High Street double glazing with compression seals of specification <sup>3</sup>R<sub>w</sub> 38(-5) dB or better should be installed with trickle or wall vents of specification D<sub>n,ew</sub> (C<sub>tr</sub>) 40(-2) or better.

Ventilation System 3 is recommended for ventilation. System 1 or 2 may be feasible but could result in poor indoor air quality.

Opening windows on these facades is not recommended to control overheating and the design team should select an alternative strategy, such as ventilative cooling, if overheating is deemed to be a risk.

### 3.2.2 Living rooms and bedrooms exposed to industrial noise (Façade B - Marked green in Drawing 3.1)

Double glazing with compression seals of specification <sup>4</sup>R<sub>w</sub> (C<sub>tr</sub>) 31(-6) dB or better should be installed with trickle or wall vents of specification D<sub>n,ew</sub> (C<sub>tr</sub>) <sup>5</sup>34 (-1) or better. For the bedrooms and living rooms on these façades ambient noise levels are generally low however they may be exposed to industrial noise sources at George Barnsdale from the east and Budgens ventilation plant from the west. It is therefore necessary that residents should be able to achieve satisfactory ventilation if they decide to close their windows to protect against industrial noise sources.

Any ventilation system can be used provided the design team assume closed windows. It is therefore not recommended to control overheating via open windows and the design team should select an alternative strategy, such as ventilative cooling, if overheating is deemed to be a risk.

### 3.2.3 Other facades (Façade C in Drawing 3.1 – Marked yellow in Drawing 3.1)

Double glazing with compression seals of specification <sup>6</sup>R<sub>w</sub> (C<sub>tr</sub>) 31(-6) dB or better is recommended. Noise levels will be acceptable with partially open windows. Overheating can be controlled by opening windows without causing excessive noise levels.

### 3.2.4 All facades

Any mechanical ventilation system chosen should comply with the requirements of Document F (Reference 2) for noise. Acoustic Associates can offer further advice at detailed design stage if required.

<sup>2</sup> There are no living room windows on these facades

<sup>3</sup> This can be achieved by glazing of spec 6/16/6.8 mm

<sup>4</sup> This can be achieved by glazing of spec 4/16/4 mm

<sup>5</sup> Most standard trickle vents

<sup>6</sup> This can be achieved by glazing of spec 4/16/4 mm



**Drawing 3.1 – Summary Of Noise Mitigation Measures**

#### 4 **BACKGROUND**

Magnum Fabrications Ltd propose the residential redevelopment of a site off High Street, Donington. Under the proposal Magnum Fabrications existing production buildings and offices will be demolished. The residential development will consist of two new blocks of terraced properties (seven dwellings) on the High Street and four new detached houses accessed via a new cul-de-sac on the site. Drawing 4.1 shows the existing site bounded in red and Drawing 4.2 shows a plan of the proposed site.

Acoustic Associates (Peterborough) have been contracted to undertake the noise assessment for the site.



**Drawing 4.1 – Site Location**



Drawing 4.2 – Proposed Site Layout

## **5 POLICY, GUIDANCE AND STANDARDS**

### **5.1 National Planning Policy Framework (NPPF – Reference 3)**

#### **5.1.1** The NPPF states that planning policies and decisions should prevent

<sup>7</sup> “...new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of .... noise pollution”

#### **5.1.2** It states further:-

<sup>8</sup>“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 <sup>9</sup>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;.....

### **5.2 Noise Policy Statement for England (NPSE – Reference 4) and National Planning Policy Guidance (NPPG – Reference 5)**

The NPSE has stated that the impact of noise be classified according to an “effect level” (shown in column 3 below). The NPPG has clarified what this effect level below means in terms of its perception by people at receptors and what action should be taken (columns 1 and 4 in Table 1 below).

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<sup>7</sup> Para 174 – item e)

<sup>8</sup> Para 185

<sup>9</sup> It refers to the Noise Policy Statement for England in order to explain what it means by “adverse impact” (see section 5.2).

| Perception                                | Examples 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 Observed Adverse Effect          | 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; 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 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                     |                                  |
| 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 disruptive            | 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                          |

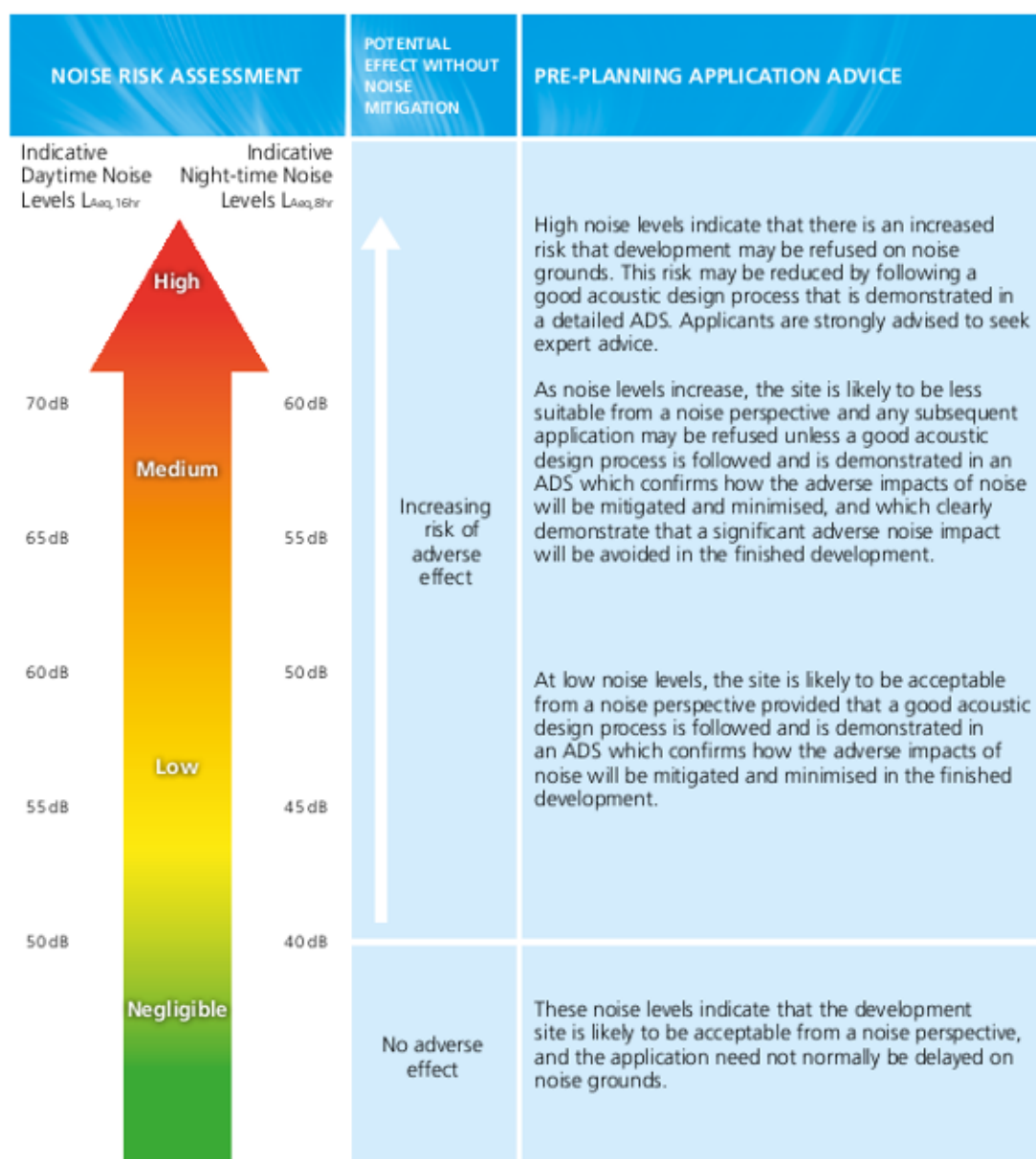
**Table 1 – NPPG noise exposure hierarchy****5.3 ProPG: Planning and Noise (Reference 1)**

This document was produced by noise professionals to offer them guidance on noise management within the planning system in England. It recommends a 2-stage approach to managing for noise:

**5.3.1 ProPG: Stage 1 – Initial Site Noise Risk Assessment**

5.3.1.1 The aim of this stage is to provide an indication of the likely risk of adverse effects due to noise from developing a site. Using measurement and/or prediction, indicative future noise levels on a site are estimated.

5.3.1.2 The following excerpt shows the potential effect associated with likely site noise levels for daytime and night-time.

**Figure 1 Notes:**

- Indicative noise levels should be assessed without inclusion of the acoustic effect of any scheme specific noise mitigation measures.
- Indicative noise levels are the combined free-field noise level from all sources of transport noise and may also include industrial/commercial noise where this is present but is "not dominant".
- $L_{Aeq,16hr}$  is for daytime 0700 – 2300,  $L_{Aeq,8hr}$  is for night-time 2300 – 0700.
- An indication that there may be more than 10 noise events at night (2300 – 0700) with  $L_{Amax,F} > 60$  dB means the site should not be regarded as negligible risk.

Figure 1. Stage 1– Initial Site Noise Risk Assessment

5.3.1.3 It must be noted that the initial assessment of noise risk is not the basis for the eventual recommendation of approval. Its aim is to give an early assessment of site suitability for residential development and the extent of the acoustic issues to be faced. The higher the risk the more important it is that good acoustic design is followed for the development.

### 5.3.2 ProPG: Stage 2 – Full Assessment

There are 4 stages to a full assessment, and these are briefly described below.

#### 5.3.2.1 Element 1 - Good Acoustic Design Process

Provide an integrated solution whereby development avoids “unreasonable” and prevents “unacceptable” acoustic conditions. In particular the following should be considered: -

- Check the feasibility of relocating or reducing noise levels from relevant sources.
- Consider options for planning the site or building layout.
- Consider the orientation of proposed building(s).
- Select construction types and methods for meeting building performance requirements.
- Examine the effects of noise control measures on ventilation, fire regulation, health and safety, cost, CDM (construction, design and management) etc.
- Assess the viability of alternative solutions.
- Assess external amenity area noise.

#### 5.3.2.2 Element 2 – Internal noise level Guidelines

Seek to achieve recommended noise levels inside noise sensitive rooms in new residential development. The following excerpt from the document shows the recommended internal noise levels that should ideally be achieved.

| Activity | Location           | Noise criteria         |                                             |
|----------|--------------------|------------------------|---------------------------------------------|
|          |                    | 07:00 to 23:00         | 23:00 to 07:00                              |
| Resting  | Living room        | 35 dB $L_{Aeq,16hour}$ | -                                           |
| Dining   | Dining room / area | 40 dB $L_{Aeq,16hour}$ | -                                           |
| Sleeping | Bedroom            | 35 dB $L_{Aeq,16hour}$ | 30 dB $L_{Aeq,8hour}$<br>45 dB $L_{Amax,F}$ |

**Table 2 – ProPG Internal Noise Level Guidelines**

**Note 1:** Figure 2 - Note 4 in ProPG states that in most circumstances the maximum noise level  $L_{Amax,F}$  should not exceed 10 times per night.

**Note 2:** Section 2.3.3 of ProPG states the following with respect to the reduction of noise due to the building envelope *“the acoustic performance of the building envelope will be reduced in the event windows are opened for ventilation or cooling purposes, typically reducing the insulation to no more than 10 to 15 dB(A)”*.

**Note 7:** *Where development is considered necessary or desirable, despite external noise levels above WHO guidelines, the internal  $L_{Aeq}$  target levels may be relaxed by up to 5 dB and reasonable internal conditions still achieved. The more often internal  $L_{Aeq}$  levels start to exceed the internal  $L_{Aeq}$  target levels by more than 5 dB, the more that most people are likely to regard them as “unreasonable”. Where such exceedances are predicted, applicants should be required to show how the relevant number of rooms affected has*

*been kept to a minimum. Once internal  $L_{Aeq}$  levels exceed the target levels by more than 10 dB, they are highly likely to be regarded as “unacceptable” by most people, particularly if such levels occur more than occasionally. Every effort should be made to avoid relevant rooms experiencing “unacceptable” noise levels at all and where such levels are likely to occur frequently, the development should be prevented in its proposed form*

#### 5.3.2.3 Element 3 – External Amenity Area Noise Assessment

The acoustic environment of external amenity areas that are an intrinsic part of the overall design assessment should always be assessed and noise levels should ideally not be above the range 50-55 dB  $L_{Aeq,16hours}$ . However the following follow-up advice should be noted

*“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.”*

#### 5.3.2.4 Element 4 – Assessment of Other Relevant Issues

At this stage the following should be addressed:

- compliance with relevant national and local policy
- magnitude and extent of compliance with ProPG
- likely occupants of the development
- acoustic design v unintended adverse consequences
- acoustic design v wider planning objectives

### 5.4 Acoustics Ventilation and Overheating: Residential Design Guide (AVOG -Reference 6)

Acoustics design considerations for dwellings may impact on the ventilation and thermal comfort of the inhabitants e.g., closing windows to prevent noise ingress may mean that alternative means are needed to provide fresh air to inhabitants and to prevent overheating. The AVOG design guide details good practice to achieve satisfactory thermal and acoustic comfort for residents. It currently addresses noise from transport sources.

In summary an assessment for a dwelling will consist of the following:

- Based on the estimates of noise levels at the façades, advise on glazing specifications to achieve suitable internal noise levels;

- Advise the design team on the options for a ventilation strategy team (System 1,2,3 or 4 from Document F of the Building Regulations);
- Assess the effects of the ventilation strategy chosen and advise accordingly to prevent noise ingress. This advice could be on measures allowing natural (windows vents or open windows ) or other methods such as mechanical ventilation;
- Assess the risk of overheating based on input from thermal modelling in a 2 stage assessment. Stage 1 determines whether open windows will suffice to mitigate against overheating. If so, there is no further assessment required for overheating as open windows will suffice;
- If a Stage 2 assessment is required, then, with input from the design team, advise on measures to achieve acceptable noise levels while preventing overheating. These could be measures to allow natural input (e.g., plenum windows) or physical measures such as cooling fans. If the latter, then noise emissions must be limited to avoid disturbance.

## **5.5 British Standard BS 4142:2014+A1:2019**

5.5.1 BS 4142 (Reference 7) is a standard which describes a method for assessing whether the 'specific noise' from an industrial source is likely to give rise to complaints from residents of the adjacent dwellings. The 'specific noise' levels are determined outside dwellings. The specific noise level is determined for reference time periods of 1-hour for the daytime (7am to 11pm) and 15 minutes for the night-time. Tonal or impulsive characteristics of a noise are likely to increase the scope for complaints and this is taken into account by adding a value to the specific noise source level to obtain the 'rating level'. The value may be between 0 and 15 dB depending on objective and subjective measures detailed in the standard. The following table detail the values added for the subjective method.

| Characteristics of noise                                                                                                            | Noise at receptor                                                            | Value to add to specific noise level for rating level |
|-------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------|-------------------------------------------------------|
| Noise has tonal characteristics                                                                                                     | Just perceptible                                                             | +2 dB                                                 |
|                                                                                                                                     | Clearly perceptible                                                          | +4 dB                                                 |
|                                                                                                                                     | Highly perceptible                                                           | +6 dB                                                 |
| Noise has impulsive characteristics                                                                                                 | Just perceptible                                                             | +3 dB                                                 |
|                                                                                                                                     | Clearly perceptible                                                          | +6 dB                                                 |
|                                                                                                                                     | Highly perceptible                                                           | +9 dB                                                 |
| Other - characteristics that are neither tonal nor impulsive but are readily distinctive against the residual acoustic environment, | -                                                                            | + 3 dB                                                |
| Intermittency                                                                                                                       | If intermittency is readily distinctive in the residual acoustic environment | +3 dB                                                 |

**Table 3 – BS 4142 – Corrections to noise to calculate rating level – subjective method**

5.5.2 BS 4142 requires that the rating level of a noise is compared with the existing background noise ( $L_{A90,T}$ ). Guidance given in the standard states the following regarding the difference between the rating Level and the background noise.

- A difference of 0 dB is indicative of a “*minor impact*”;
- A difference of +5 dB is indicative of an “*adverse impact*”;
- A difference of +10 dB is indicative of a “*significant adverse impact*” .

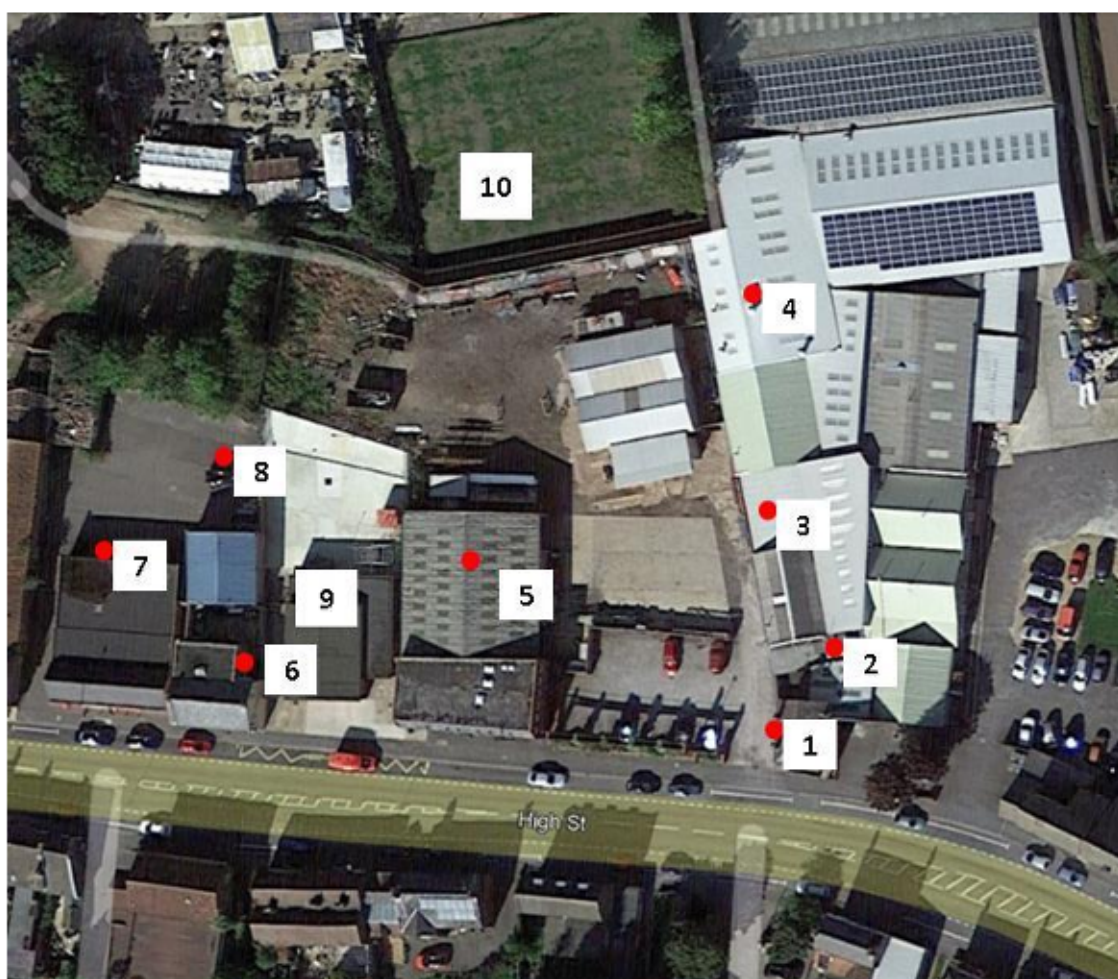
## **6 NOISE ASSESSMENT**

### **6.1 Noise Sources Affecting The Site**

Based on inspection of and measurements taken on site, the following noise sources may potentially impact the proposed site.

- Noise from road traffic on High Street;
- Noise from George Barnsdale (items 1-4 in Diagram 6.1). This consists of fixed plant noise from roof sources and breakout through the building envelope. The western façade facing the site is complete and without gaps and all of the windows were double-glazed when the site was visited.
- Budgen's fixed plant (item 7) and yard activities (8). There are 9 inverters on the north-wall, and it is assumed that they may operate at their maximum in summer;
- An extractor chimney plant at Jacks Fish Bar (item 6).
- Magnum Fabrications (item 5) This will be demolished so is not an issue.

In addition, there is a fire station to the west of the site (item 9) which may create noise at some time. There is a bowling green to the north (item 10) and this is not considered to be an issue.



● = Noise Source Locations

- 1 — 2 x Inverters at George Barnsdale
- 2 — "Rumbling noise" source breaking out from inside George Barnsdale
- 3 — Extraction / machine running breaking out from George Barnsdale
- 4 — Roof Extraction at George Barnsdale
- 5 — Existing Magnum Fabrication Shop (to be demolished during redevelopment)
- 6 — Jacks Fish Bar chimney extractor
- 7 — 9 x Inverters at Budgens
- 8 — Delivery cages in Budgens shop yard
- 9 — Fire Station
- 10 — Bowling Green

**Drawing 6.1 – Noise Sources Around The Site**

## 6.2 Noise Measurements

Long-term noise monitoring equipment was set up at Locations A and B on the site (see Drawing 6.2). Location A was positioned next to the existing Magnum Fabrications building at a height of approximately 3 metres above ground level and approximately 18 metres from the High Street. Location B was positioned at a height of approximately 1.5m above ground level and adjacent to the Fire Station rear yard corner fence. Noise was continuously monitored throughout the period from 11:00 hours on Wednesday 6<sup>th</sup> October to 10:15 hours on

Wednesday 13<sup>th</sup> October 2021. Short-term noise monitoring equipment was also setup at Locations C – F at various times during attended daytime monitoring periods at heights of 1.5m above ground level. Appendix 2 gives details of the noise instrumentation used. The long-term noise monitoring results at Locations A & B are documented in Appendices 3 & 4. The short-term noise monitoring results are documented in Appendix 5.



**Drawing 6.2 – Noise Monitoring Locations**

### 6.3 Summary Of Long-Term Monitoring

6.3.1 The following table summarises the results of the long-term monitoring carried out on site.

| Start Period                     | End of Period     | Location A Noise level dB(A)       |                                    |                                    |                                     | Location B Noise level dB(A)       |                                    |                                    |
|----------------------------------|-------------------|------------------------------------|------------------------------------|------------------------------------|-------------------------------------|------------------------------------|------------------------------------|------------------------------------|
|                                  |                   | Minimum background noise $L_{A90}$ | Maximum background noise $L_{A90}$ | Energy Average "Ambient" $L_{Aeq}$ | *Overheating design case $L_{Amax}$ | Minimum background noise $L_{A90}$ | Maximum background noise $L_{A90}$ | Energy Average "Ambient" $L_{Aeq}$ |
| Wednesday - 11:00                | Wednesday - 23:00 | 34.3                               | 52.3                               | 58.2                               | -                                   | 34.2                               | 52.1                               | 52.7                               |
| Wednesday - 23:00                | Thursday - 07:00  | 28.1                               | 45.7                               | 51.6                               | 71                                  | 28.3                               | 43.2                               | 41.4                               |
| Thursday - 07:00                 | Thursday - 23:00  | 33.6                               | 60.5                               | 61.4                               | -                                   | 36.3                               | 58.7                               | 57.8                               |
| Thursday - 23:00                 | Friday - 07:00    | 30.1                               | 45.4                               | 52.8                               | 73                                  | 30.8                               | 43.1                               | 42.1                               |
| Friday - 07:00                   | Friday - 23:00    | 28.6                               | 61.2                               | 60.7                               | -                                   | 35.6                               | 53.1                               | 52.3                               |
| Friday - 23:00                   | Saturday - 07:00  | 24.6                               | 38.5                               | 49.8                               | 70                                  | 26.8                               | 43.5                               | 40.6                               |
| Saturday - 07:00                 | Saturday - 23:00  | 27.9                               | 47.3                               | 57.4                               | -                                   | 32.3                               | 45.6                               | 50.7                               |
| Saturday - 23:00                 | Sunday - 07:00    | 27.0                               | 34.0                               | 49.3                               | 70                                  | 32.0                               | 38.5                               | 40.1                               |
| Sunday - 07:00                   | Sunday - 23:00    | 29.8                               | 46.0                               | 56.6                               | -                                   | 32.6                               | 44.7                               | 47.0                               |
| Sunday - 23:00                   | Monday - 07:00    | 29.2                               | 49.9                               | 51.2                               | 72                                  | 31.3                               | 47.6                               | 43.4                               |
| Monday - 07:00                   | Monday - 23:00    | 33.4                               | 53.6                               | 57.7                               | -                                   | 33.5                               | 53.1                               | 51.7                               |
| Monday - 23:00                   | Tuesday - 07:00   | 30.1                               | 44.3                               | 51.3                               | 71                                  | 33.0                               | 46.2                               | 43.8                               |
| Tuesday - 07:00                  | Tuesday - 23:00   | 36.7                               | 61.2                               | 59.2                               | -                                   | 38.2                               | 54.0                               | 54.6                               |
| Tuesday - 23:00                  | Wednesday - 07:00 | 27.6                               | 44.6                               | 51.7                               | 72                                  | 29.8                               | 44.6                               | 44.3                               |
| Wednesday - 07:00                | Wednesday - 10:14 | 47.7                               | 56.8                               | 60.5                               | -                                   | 44.8                               | 51.7                               | 54.8                               |
| Daytime summary (07:00-23:00)    |                   | 27.9                               | 61.2                               | 59.3                               | -                                   | 32.3                               | 58.7                               | 53.7                               |
| Night-time summary (23:00-07:00) |                   | 24.6                               | 49.9                               | 51.2                               | 72                                  | 26.8                               | 47.6                               | 42.5                               |

\* The 10<sup>th</sup> highest  $L_{Amax,1minute}$  recorded at night-time

**Table 4 – Summary of unattended noise monitoring on site at Locations A and B**

6.3.2 In addition to the above, the background noise levels were analysed to determine the "modal" background noise level at the site

- At Location A the modal background noise was  $L_{A90}$  **51 dB(A)** in the daytime and  $L_{A90}$  **30 dB(A)** at night-time;
- At Location B the modal background noise was  $L_{A90}$  **49 dB(A)** in the daytime and  $L_{A90}$  **36 dB(A)** at night-time;

These levels were used in the assesment of industrial noise

## 6.4 ProPG Initial Site Risk Assessment

Given the measurement results, the site is classified as between “Low” and “Medium” for those adjacent to the road and “Low” for most of the site during both the daytime and night-time periods.

This means that *“the site is likely to be acceptable from a noise perspective provided that a good acoustic design process is followed and is demonstrated in an acoustic design statement (ADS) which confirms how the adverse impacts of noise will be mitigated and minimised, and which clearly demonstrate that a significant adverse noise impact will be avoided in the finished development.”*

## 6.5 Industrial Noise Assessment (BS 4142)

### 6.5.1 George Barnsdale

The following table documents an assessment of industrial noise at the eastern side of the development.

| Item                                | Daytime                                                                                                                                                                                                                                                                          | Night-time | Comments                                                                                                                                                                                                                                                                                                                  |
|-------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Specific sound level dB(A)          | 55                                                                                                                                                                                                                                                                               | 55         | The measurements taken and documented in Appendix 5 at location D, E and F indicate that sound levels of $L_{Aeq,1hour}$ 55 dB(A) daytime (or $L_{Aeq,15minutes}$ 55 dB(A) night-time) may occur at the eastern side of the proposed development due to fixed plant, vehicle movements and breakout from inside buildings |
| Penalty                             | +10                                                                                                                                                                                                                                                                              |            | Assumed to have clearly perceptible tonal and impulsive characteristics                                                                                                                                                                                                                                                   |
| Rating Sound level $L_{A,Tr}$ dB(A) | 65                                                                                                                                                                                                                                                                               | 65         | Specific sound level + penalty                                                                                                                                                                                                                                                                                            |
| Assumed background sound            | 49                                                                                                                                                                                                                                                                               | 36         | See section 6.3.2                                                                                                                                                                                                                                                                                                         |
| Excess over background dB           | +16                                                                                                                                                                                                                                                                              | +29        | Rating Level – Background sound level                                                                                                                                                                                                                                                                                     |
| BS 4142 Assessment                  | “Significant adverse impact”                                                                                                                                                                                                                                                     |            |                                                                                                                                                                                                                                                                                                                           |
| Context                             | Continuous noise in mixed use residential/industrial area. It is a worst case assessment, and the site currently operates for a small portion of the night-time (06:30-07:00). The evidence of 3 visits to the site is that noise levels are generally lower for most of the day |            |                                                                                                                                                                                                                                                                                                                           |

**Table 5 – BS 4142 Assessment at nearest residential location to George Barnsdale**

As can be seen there is a potential for disturbance to residence from industrial noise so mitigation is recommended.

#### 6.5.2 Other noise sources

The western site is adjacent to Budgens, Jacks Fish Bar and the Fire Station. The noise impact of sources has not been quantified however it is reasonable to assume the following .

- The fixed plant at Budgens includes 9 inverter units on a north facing wall and it is assumed that some of them will operate at night-time, particularly in the summer months; Typically, these will have a sound power of around  $L_w$  75 dB(A). This will mean that noise levels at the proposed new properties due to emissions from inverters could be more than  $L_{Aeq}$  40 dB(A) if more than one inverter was running simultaneously.
- The chimney stack for Jacks Fish Bar includes an attenuator and there are already residents closer to it than those proposed for this development (south of High Street);
- There may be early morning deliveries at the rear of Budgens which cause disturbance;
- The noise from the Fire Station is likely to be rare but may also occur at night-time.

Mitigation measures should be taken to minimise the risk of disturbance.

## 7 **MITIGATION**

### 7.1 **Outdoor Amenity Areas**

1.8m high acoustic fencing meeting the minimum specification detailed in Appendix 6 has been proposed for the boundaries of all outdoor amenity areas across the proposed site. A 2.4m high acoustic barrier along the entire eastern boundary of the site has also been proposed by the client and should be installed.

### 7.2 **Internal noise**

#### 7.2.1 Introduction

Noise levels inside particular rooms were calculated in line with formulas shown in British Standard BS 8233:2014 section 6.7.2 (Reference 8) and design recommendations were made based on those results.

#### 7.2.2 Houses facing High Street

The terraced houses facing the road will be exposed to noise levels from road traffic on their southern, eastern and western façades. By comparing the results of short-term monitoring at Location C (the location of the new façades) with the results of the same period at Location A it

is assumed that the noise levels next to the High Street are 5 dB higher. The following levels are assumed for this façade.

- A daytime noise level of  $L_{Aeq,16hours}$  **64 dB(A)**;
- A night-time noise level of  $L_{Aeq,8hours}$  **56 dB(A)**;
- The 10<sup>th</sup> highest maximum noise level (the ventilation design case) is  $L_{Amax,8hours}$  **77 dB(A)** and this value is generally exceeded by no more than 5 dB.

The recommendations given in section 3 of this report are based on these noise levels and the architect's layout drawings.

### 7.2.3 Other

For other parts of the site, levels due to road traffic are significantly lower with levels likely to be under  $L_{Aeq}$  50 dB(A) in the daytime and under  $L_{Aeq}$  45 dB(A) at night-time. However, it is assumed that rooms which face the industrial noise sources may at times be exposed to noise of a character which could potentially cause disturbance.

The recommendations given in section 3 of this report are based on these assumptions.

## 8 **ACOUSTIC DESIGN**

### 8.1 **Stage 2 - Element 1 Good Acoustic Design**

It is acknowledged that the layout is not optimized for acoustics however the shape of the plot and the fact that either road traffic or industrial noise sources are present on the southern, eastern and western site boundaries means that it is difficult to do so.

However the building envelope will be constructed to resist the ingress of noise.

### 8.2 **Stage 2 - Element 2 Noise levels inside dwellings**

Noise levels inside dwellings will be acceptable according to ProPG provided the mitigation measures taken in section 3 are carried out.

### 8.3 **Stage 2 - Element 3 - Noise levels in amenity areas**

Noise levels over a 16 hour daytime period will comply with the guidelines given in ProPG (less than  $L_{Aeq,16h}$  55 dB(A)) provided acoustic fencing is constructed around all outdoor amenity areas. The proposed 2.4m high acoustic barrier along the eastern boundary is also likely to provide some additional protection from noise emissions breaking out from the building envelope of the George Barnsdale site.

## **9 DISCUSSIONS**

### **9.1 Uncertainties**

The monitoring period was sufficiently long to estimate the ambient noise in the area.

There is uncertainty in the industrial emissions from George Barnsdale however the mitigation measures taken assume that the highest noise levels measured on this survey may occur on any part of this site.

There are therefore no uncertainties which could affect the conclusions or recommendations of this assessment.

### **9.2 Fence performance**

It is acknowledged that the proposed acoustic fencing will have a limited effect in reducing noise from the ventilation plant on the roof at George Barnsdale. However, the effect may still be significant. When the top of a fence is just in line of sight between a noise source and receiver a reduction of about 5 dB can be expected.

## **REFERENCES**

1. ProPG working group. *ProPG: Planning & Noise: Professional Practice Guidance on Planning & Noise: New Residential Development*;, 2017.
2. *Document F Ventilation Regulations*; thenbs, 2010.
3. Ministry of Housing, Communities and Local Government. *National Policy Planning Framework* ;, 2021.
4. *Noise Policy Statement for England*; DEFRA, 2010.
5. DEFRA. *National Policy Planning Guidance (revised 2019)*.
6. ANC + IOA. *Acoustics Ventilation and Overheating Guide V1.1*;, 2020.
7. *British Standard BS 4142:2014+A1:2019, Methods of rating and assessing industrial and commercial sound*; BSI, 2014, amended 2019.
8. *British Standard BS 8233, Guidance on sound insulation and noise reduction for buildings*; BSI, 2014.

## **Appendix 1 – Glossary of terms**

|                                             |                                                                                                                                                                                                                                                                                                                                      |
|---------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Sound Pressure</b>                       | The variation of ambient pressure that is detected by the ear as sound.                                                                                                                                                                                                                                                              |
| <b>Noise</b>                                | Unwanted sound                                                                                                                                                                                                                                                                                                                       |
| <b>decibel (dB)</b>                         | Ten times the logarithm of the square of the ratio of the Sound Pressure to a reference pressure (20 micro-Pascal's).                                                                                                                                                                                                                |
| <b>Sound Pressure Level (L<sub>p</sub>)</b> | The decibel version of the Sound Pressure.                                                                                                                                                                                                                                                                                           |
| <b>A-Weighting</b>                          | A frequency weighting which simulates the response of the ear. An A-Weighted Sound Pressure Level is denoted by L <sub>pA</sub> and has units of dB(A)                                                                                                                                                                               |
| <b>L<sub>Aeq,T</sub></b>                    | The value of the A-weighted sound pressure level, in decibels [dB(A)], of a continuous steady sound that within a specified time interval (T), for example 16 hours, has the same mean-square sound pressure as a sound that varies with time. Therefore, the average over a 16 hour period would be denoted as L <sub>Aeq,16h</sub> |
| <b>L<sub>Amax,T</sub></b>                   | The maximum A-Weighted sound pressure level that was encountered during the measurement period.                                                                                                                                                                                                                                      |
| <b>L<sub>A90,T</sub></b>                    | The A-Weighted sound pressure level that is exceeded for 90% of the time (T). This is usually used a measure of background noise.                                                                                                                                                                                                    |
| <b>Free Field</b>                           | Where noise can propagate freely without any reflections from buildings etc.                                                                                                                                                                                                                                                         |
| <b>Octave Band</b>                          | A band of frequencies the upper limit of which is twice the lower limit. They are known by their centre frequency, e.g., 63, 125, 250, 500, 1000, 2000                                                                                                                                                                               |
| <b>NPSE Criteria</b>                        |                                                                                                                                                                                                                                                                                                                                      |
| <b>NOEL</b>                                 | No Observed Effect Level                                                                                                                                                                                                                                                                                                             |
| <b>LOAEL</b>                                | Lowest Observed Adverse Effect Level                                                                                                                                                                                                                                                                                                 |
| <b>SOAEL</b>                                | Significant Observed Adverse Effect Level                                                                                                                                                                                                                                                                                            |

## BS 4142 Terms

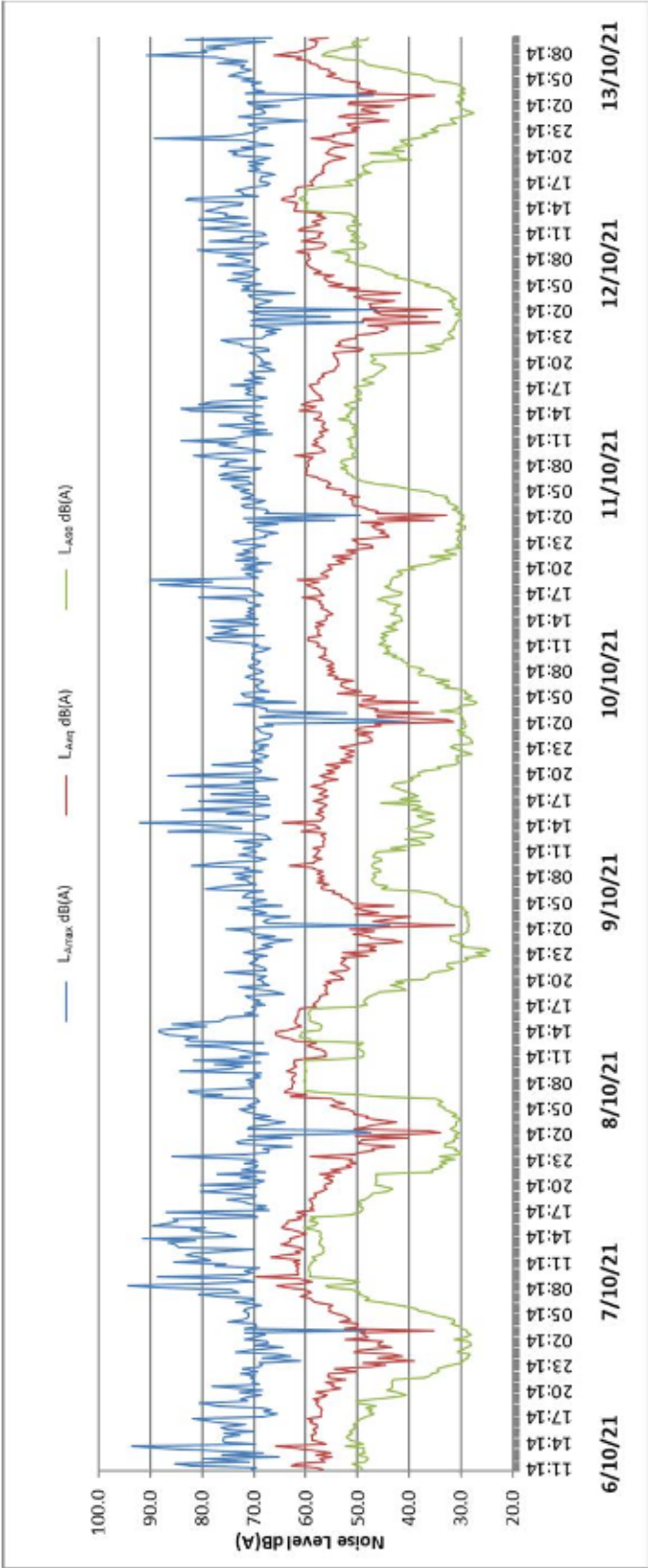
|                                                                      |                                                                                                                                                                                |
|----------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b><math>T_r</math></b>                                              | The reference time interval over which an equivalent continuous A-weighted sound pressure is determined.<br>Day time = 1 hour<br>Night-time = 15 minutes                       |
| <b><math>T_m</math></b>                                              | The measurement time interval over which measurements are taken.                                                                                                               |
| <b>Ambient Sound</b>                                                 | Total sound in a given situation at a given time.                                                                                                                              |
| <b>Residual Sound</b>                                                | The ambient sound remaining at a given position in a given situation when the specific noise is suppressed to a degree such that it does not contribute to the ambient noise.  |
| <b>Specific Sound Level<br/>Rating Level <math>L_{Ar,T_r}</math></b> | The dB $L_{Aeq,T_r}$ of the noise sources being assessed at a site.<br>The specific sound level plus any correction for the character of the noise, known as the Rating Level. |
| <b>Assessment Level</b>                                              | Difference between Rating Level ( $L_{Ar,T}$ ) and Background Sound ( $L_{A90,T}$ )                                                                                            |
| <b>Sound Power Level (<math>L_{WA}</math>)</b>                       | The noise level from the source in terms of sound power, in dB(A).                                                                                                             |

**Appendix 2 – Noise instrumentation**

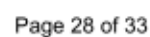
| Type      | Manufacturer | Description            | Serial Number | Last Calibration Date | Calibration Certificate No. |
|-----------|--------------|------------------------|---------------|-----------------------|-----------------------------|
| Svan 945A | Svantek      | Sound level meter      | 9485          | 13/05/2021            | 1112023                     |
| GA 607    | Castle       | Sound level calibrator | 032942        | 13/05/2021            | 1112022                     |
| 4231      | Brüel & Kjær | Sound level calibrator | 2035091       | 23/03/2021            | 1110523                     |
| Svan 949  | Svantek      | Sound level meter      | 8101          | 11/03/2021            | 1110162                     |
| 4230      | Brüel & Kjær | Sound level calibrator | 781674        | 11/03/2021            | 1110163                     |
| Svan 971  | Svantek      | Sound level meter      | 28229         | 15/03/2021            | 1110164                     |
| 820       | Larson Davis | Sound level meter      | 1013          | 23/07/2020            | 1101381                     |

The calibration of the instrumentation was checked at the start and end of the tests and there was no significant drift.

**Appendix 3 – Results of noise monitoring at Location A on site**



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**Appendix 5 – Results of attended noise monitoring on site****A5.1 Results of attended noise monitoring carried out at Location B**

| <b>Date</b>                        | <b>Time (Hours)</b> | <b>Ambient Noise Level<br/>(<math>L_{Aeq,15min}</math>)<br/>dB(A)</b> | <b>Background Noise Level<br/>(<math>L_{A90,15min}</math>)<br/>dB(A)</b> | <b>Maximum Noise Level<br/>(<math>L_{Amax,15min}</math>)<br/>dB(A)</b> | <b>Comments</b>                                                                                                                                                                                                                                                                                                                                                                                                            |
|------------------------------------|---------------------|-----------------------------------------------------------------------|--------------------------------------------------------------------------|------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 6 <sup>th</sup><br>October<br>2021 | 11:30 – 11:45       | 65.4                                                                  | 52.1                                                                     | 94.5                                                                   | Construction noise dominant from neighbouring building site consisting of a mini dumper, mini-excavator and cement mixer in use. Distant traffic audible. Occasional fabrication work audible from inside Magnum Fabrications workshop. HGV enters rear yard and turns around adjacent to monitoring position at 11:43 hours. Fork-lift used to load HGV with large steels at 11:46 hours. HGV drives away at 11:55 hours. |
|                                    | 11:45 – 12:00       | 58.3                                                                  | 51.6                                                                     | 79.8                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                            |
|                                    | 12:00 – 12:15       | 55.1                                                                  | 51.9                                                                     | 65.8                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                            |
|                                    | 12:15 – 12:30       | 53.2                                                                  | 50.1                                                                     | 72.2                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                            |
|                                    | 12:30 – 12:45       | 51.7                                                                  | 49.4                                                                     | 63.2                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                            |
|                                    | 12:45 – 13:00       | 55.0                                                                  | 50.5                                                                     | 74.2                                                                   |                                                                                                                                                                                                                                                                                                                                                                                                                            |

**A5.2 Results of attended noise monitoring carried out at Location C**

| Date                                 | Time (Hours)  | Ambient Noise Level<br>( $L_{Aeq,15min}$ )<br>dB(A) | Background Noise Level<br>( $L_{A90,15min}$ )<br>dB(A) | Maximum Noise Level<br>( $L_{Amax,15min}$ )<br>dB(A) | Comments                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|--------------------------------------|---------------|-----------------------------------------------------|--------------------------------------------------------|------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 6 <sup>th</sup><br>October<br>2021   | 12:00 – 12:15 | 59.8                                                | 48.2                                                   | 77.0                                                 | Traffic dominant on High Street. Occasional fabrication work audible from inside Magnum Fabrications workshop. Occasional low frequency rumbling noise audible from George Barnsdale building, occurs approximately once every 3 minutes, lasting between 4-5 seconds per time. Car exits car park at 12:34 hours. Military aircraft audible at 12:52 hours. Fabrication work dominant at times at 13:20 hours. HGV enters site at 13:40 hours. Fork-lift loading HGV with steels at 13:46 hours. HGV exits site at 13:59 hours. Military aircraft audible at 14:01 hours. Car exits site at 14:09 hours. Fabrication work dominant at times at 14:13 hours. |
|                                      | 12:15 – 12:30 | 60.4                                                | 47.5                                                   | 77.8                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|                                      | 12:30 – 12:45 | 59.4                                                | 47.4                                                   | 72.2                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|                                      | 12:45 – 13:00 | 61.9                                                | 50.5                                                   | 80.8                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|                                      | 13:00 – 13:15 | 59.2                                                | 48.0                                                   | 75.0                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|                                      | 13:15 – 13:30 | 61.4                                                | 48.6                                                   | 82.5                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|                                      | 13:30 – 13:45 | 67.6                                                | 47.7                                                   | 97.8                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|                                      | 13:45 – 14:00 | 62.2                                                | 51.2                                                   | 82.0                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|                                      | 14:00 – 14:15 | 59.3                                                | 48.3                                                   | 74.9                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|                                      | 14:15 – 14:30 | 60.8                                                | 48.0                                                   | 77.2                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|                                      | 14:30 – 14:45 | 62.7                                                | 50.3                                                   | 81.0                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|                                      | 14:45 – 15:00 | 62.4                                                | 50.8                                                   | 82.1                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
| 13 <sup>th</sup><br>October<br>2021  | 11:00 – 11:15 | 62.5                                                | 54.6                                                   | 77.9                                                 | Traffic dominant. Machine / extraction noise from inside George Barnsdale building audible and dominant during lulls in traffic. Intermittent fabrication work audible on occasions. Rumbling noise audible from George Barnsdale building every 3 minutes lasting 4-5 seconds per time. Aircraft audible at 11:06 hours. Distant car horn honks twice at 11:14 hours.                                                                                                                                                                                                                                                                                       |
| 30 <sup>th</sup><br>November<br>2021 | 08:30 – 08:45 | 67.1 (61.6)                                         | 56.1                                                   | 87.7                                                 | Dominant passing traffic on High Street. Values in red are the levels logged simultaneously at Location A.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|                                      | 08:45 – 09:00 | 66.7 (61.8)                                         | 55.4                                                   | 79.8                                                 |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |

**A5.3 - Results of attended noise monitoring carried out at Location D**

| <b>Date</b>                         | <b>Time (Hours)</b> | <b>Ambient Noise Level (<math>L_{Aeq,T}</math>) dB(A)</b> | <b>Background Noise Level (<math>L_{A90,T}</math>) dB(A)</b> | <b>Maximum Noise Level (<math>L_{Amax,T}</math>) dB(A)</b> | <b>Comments</b>                                                                                                                                                                                                                                                                                   |
|-------------------------------------|---------------------|-----------------------------------------------------------|--------------------------------------------------------------|------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 6 <sup>th</sup><br>October<br>2021  | 13:11 (4 secs)      | 51.1                                                      | 49.0                                                         | 52.4                                                       | Rumbling noise dominant from George Barnsdale building, minimal distant traffic.                                                                                                                                                                                                                  |
|                                     | 13:14 (6 secs)      | 48.7                                                      | 46.5                                                         | 51.2                                                       | Measurement taken without rumbling noise from George Barnsdale building, minimal distant traffic.                                                                                                                                                                                                 |
|                                     | 13:14 (4 secs)      | 51.2                                                      | 47.2                                                         | 52.5                                                       | Rumbling noise dominant from George Barnsdale building, minimal distant traffic.                                                                                                                                                                                                                  |
|                                     | 13:20 (15 secs)     | 47.6                                                      | 46.3                                                         | 50.4                                                       | Measurement taken without rumbling noise from George Barnsdale building, minimal distant traffic.                                                                                                                                                                                                 |
|                                     | 13:35 (15 secs)     | 51.8                                                      | 49.6                                                         | 54.6                                                       | Rumbling noise dominant from George Barnsdale building, minimal distant traffic.                                                                                                                                                                                                                  |
|                                     | 14:30 – 14:45       | 61.7                                                      | 50.3                                                         | 80.3                                                       | Traffic dominant. Fabrication works audible on occasions. Rumbling noise audible at 14:34, 14:37, 14:40, 14:43, 14:46, 14:49, 14:52, 14:55, 14:58 hours. Aircraft audible between 14:36 – 14:37 hours. Car enters car park at 14:50 hours. Fabrication works audible between 14:53 – 15:00 hours. |
|                                     | 14:45 – 15:00       | 61.2                                                      | 51.1                                                         | 79.0                                                       |                                                                                                                                                                                                                                                                                                   |
| 13 <sup>th</sup><br>October<br>2021 | 10:47 (50 secs)     | 57.8                                                      | 56.8                                                         | 59.5                                                       | Machine / extraction noise dominant from inside George Barnsdale building, includes rumbling noise on occasions, with minimal distant traffic.                                                                                                                                                    |
|                                     | 10:57 (5 mins)      | 60.8                                                      | 57.3                                                         | 70.5                                                       | As above, includes traffic and intermittent fabrication works audible.                                                                                                                                                                                                                            |

**A5.4 - Results of attended noise monitoring carried out at Location E**

| Date                                | Time (Hours)    | Ambient Noise Level ( $L_{Aeq,T}$ ) dB(A) | Background Noise Level ( $L_{A90,T}$ ) dB(A) | Maximum Noise Level ( $L_{Amax,T}$ ) dB(A) | Comments                                                                                                                                   |
|-------------------------------------|-----------------|-------------------------------------------|----------------------------------------------|--------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------|
| 6 <sup>th</sup><br>October<br>2021  | 15:08 (20 secs) | 55.8                                      | 54.4                                         | 59.2                                       | Music / talking on radio audible from inside George Barnsdale building, minimal distant traffic.                                           |
|                                     | 15:12 (78 secs) | 56.9                                      | 54.5                                         | 65.8                                       | As above, includes some light banging and sawing from inside building, roof extraction also very faintly audible. Minimal distant traffic. |
| 13 <sup>th</sup><br>October<br>2021 | 10:15 – 10:20   | 56.4                                      | 52.2                                         | 72.9                                       | Music / talking on radio audible from inside George Barnsdale building, includes intermittent sawing, banging and distant traffic.         |
|                                     | 10:17 (76 secs) | 58.1                                      | 54.0                                         | 68.1                                       | Music / talking on radio audible from inside George Barnsdale building, includes intermittent sawing, banging. Minimal distant traffic.    |
|                                     | 10:41 (50 secs) | 61.3                                      | 58.5                                         | 75.1                                       | Machine / extraction noise dominant from inside George Barnsdale building, includes banging on occasions. Minimal distant traffic.         |

**A5.5 - Results of attended noise monitoring carried out at Location F**

| Date                                | Time (Hours)    | Ambient Noise Level ( $L_{Aeq,T}$ ) dB(A) | Background Noise Level ( $L_{A90,T}$ ) dB(A) | Maximum Noise Level ( $L_{Amax,T}$ ) dB(A) | Comments                                                                                                                                |
|-------------------------------------|-----------------|-------------------------------------------|----------------------------------------------|--------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------|
| 6 <sup>th</sup><br>October<br>2021  | 15:22 (5 secs)  | 50.1                                      | 49.3                                         | 51.1                                       | Roof extraction dominant, minimal distant traffic.                                                                                      |
|                                     | 15:25 (31 secs) | 51.9                                      | 50.5                                         | 57.7                                       | As above, longer sample, includes some distant traffic.                                                                                 |
| 13 <sup>th</sup><br>October<br>2021 | 09:56 (44 secs) | 47.7                                      | 46.7                                         | 49.1                                       | Roof extraction dominant, includes some rustling of tree leaves, minimal distant traffic.                                               |
|                                     | 10:00 - 10:07   | 49.4                                      | 47.3                                         | 56.0                                       | Roof extraction, distant traffic and rustling of tree leaves audible. Includes some construction noise from neighbouring building site. |

### **Appendix 6 – Fence details**

The fences / acoustic barriers around the outdoor amenity areas (see section 3) and along the eastern site boundary should be constructed on the footprint shown in Diagram 3.1.

They should comprise of an impervious material, e.g., close-boarded timber and have a mass per unit area of at least 10 kg/m<sup>2</sup>. If timber is selected, then the mass per unit area must apply for the lifetime of the barrier.

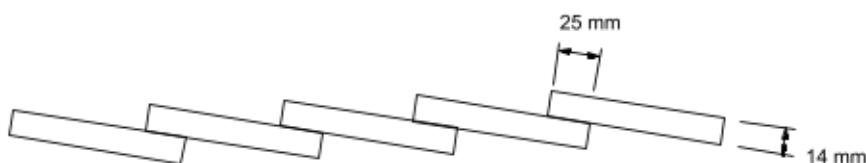
Any material can be used to construct the acoustic barriers, with a minimum surface density of 10 kg/m<sup>2</sup>. This will give noise attenuation up to 20 dB.

It is advised that the minimum thickness of a wooden fence is at least 14mm and is overlapped as shown below.

### **Suitable Wooden Fence Configurations:**



### **Plan Views**



**Note 1:** All gaps should be sealed, including the area between the ground and bottom of the barrier.

**Note 2:** If constructed of wood then the surface density should be achieved after drying out of the timber.