

# Noise Survey

## BS 8233:2014 Analysis

Miles Platting Area 7.5B

**Reference Number:** A001269

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Issue 2

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Author and contact details: Jack Park

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Document produced by:



Jack Park AMIOA

Document reviewed by:



Bryan Wood MRICS, MCIOB, MIOA

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# Company Profile

Established in 2007 as a family business, we set out to create a sustainable, resilient business, establishing a happy and positive working environment for both clients and colleagues. It was important for us to offer adaptable and growing solutions for the areas of the construction industry that would benefit from them the most.

Creating an environment that was a pleasure to work in for both colleagues and clients was, and remains, incredibly important to us. Building our future on the foundations of honest relationships, flexibility and efficiency means that we value every client's success as though it were our own.

We have grown to become a trusted construction compliance partner. We continue to grow, to offer packages of sustainability, environmental and acoustic services, with the long-term aim of making our clients' lives easier, so they can focus on the jobs that they enjoy.

Today, the business works with a wide spectrum of clients from household name plc firms, one-off builds and everything in between. Our client list includes many of the nation's major house builders and contractors, as well as universities and public sector organisations. The team also lends their know-how to many architectural practices, M&E consultants and planners.

## Disclaimer

Future Energy Surveys Ltd T/A The FES Group and its staff shall not be held liable for any damage or loss sustained as a result of using of the information provided in this report. The report is based on drawings and information provided by the client and/or project design team at the time of issue. The information and the drawings provided to us determine the results within the report. If anything changes during the course of the ongoing design or construction, the reduction and calculations will be incorrect. The FES Group will not be held responsible for the implications of such change.

As such this report should be viewed as providing a reasonable assessment of the predicted performance of the development based on current knowledge.

# Introduction

FES Acoustics were instructed by Lovell Homes to carry out a noise survey at the site of a proposed development at Miles Platting Area 7.5B for the purposes of assessment under BS 8233:2014 criteria.

The site is located with Bradford Road to the South and Saxon Street to the East, with existing housing to the North and West of the proposed development.

## Requirements

BS 8233:2014 gives guideline limits for noise both within buildings and in external garden and other amenity areas. These are as follows:

*Table 1 - BS 8233:2014 guidelines for internal noise levels*

| Daytime Maximum $L_{Aeq}$ (07.00 to 23.00) | Night Time Maximum $L_{Aeq}$ (23.00 to 07.00) |
|--------------------------------------------|-----------------------------------------------|
| Living Rooms                               | Bedrooms                                      |
| 35 dB(A)                                   | 30 dB(A)                                      |

*Table 2- BS 8233:2014 and WHO guidelines for noise levels in external amenity areas*

| Desirable Amenity Space Maximum Noise Level | Upper Guideline Value for Amenity Space Noise Level (for noisier environments) |
|---------------------------------------------|--------------------------------------------------------------------------------|
| 50 dB(A)                                    | 55 dB(A)                                                                       |

The internal noise levels will be determined by the external noise level and the degree of attenuation offered by the external envelope of the building. External levels will be determined by the noise level of the source, the distance to the amenity spaces and any barriers (e.g. fences, walls) in the pathway of the sound.

# Method

Two measurement position was chosen as shown in Figure 1 below.

A 24-hour noise measurement was taken at position A near the Southern boundary. This position is in close proximity to traffic noise from Bradford Road and is inclusive of the junction with Saxon Street to the East of the development.

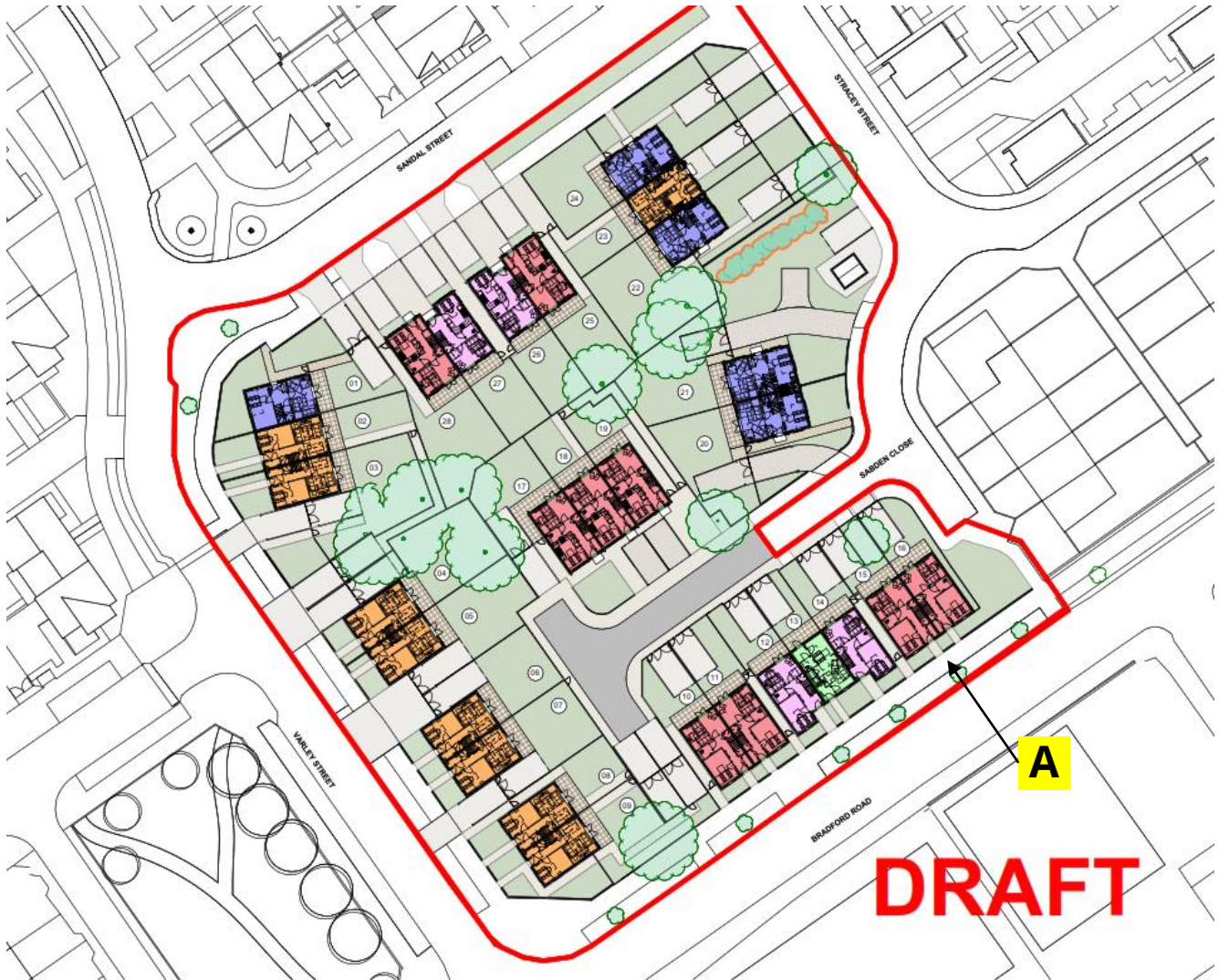
The data from this position can be utilised to calculate to be the maximum levels of noise to which any of the proposed dwellings will be subjected.

*Image 1 – SLM Location*



# Method

Image 2 – SLM Location



# Results – Position A

Graphical representations of the recorded data are presented in Appendix 2. Analysis of the data is given below.

The actual measured noise level is shown below in Tables 3 to 6.

Table 3 - Measured noise level – Position A

| Period                        | $L_{Aeq}$ (dB) | $L_{Aeq}$ (dB) |
|-------------------------------|----------------|----------------|
| Daytime, 10:22 – 23:00 hrs    | 71.0           | 67.0           |
| Night-time, 23.00 – 07.00 hrs | 64.2           | 56.4           |
| Daytime, 07:00 – 10:22 hrs    | 71.7           | 70.2           |

Table 4 –  $L_{Aeq}$  Day and Night Averages\_ Position A

| Period                        | $L_{Aeq}$ (dB) | $L_{Aeq}$ (dB) |
|-------------------------------|----------------|----------------|
| Daytime, 07.00 – 23.00 hrs    | 71             | 68             |
| Night-time, 23.00 – 07.00 hrs | 64             | 56             |

Table 3 above outlines the  $L_{Aeq}$  levels of the three periods over the 24-hour recording period. These figures could then be averaged and corrected for distance as per Table 5 below.

Table 5 –  $L_{Aeq}$  Day and Night Averages at NSR's

| Period        | Daytime $L_{Aeq}$ (dB)<br>07.00-23.00 hrs | Night-time $L_{Aeq}$ (dB)<br>23.00-07.00 hrs |
|---------------|-------------------------------------------|----------------------------------------------|
| Bradford Road | 66                                        | 59                                           |
| Varley Street | 64                                        | 57                                           |
| Sandal Street | 63                                        | 56                                           |

Openable windows provide a reduction of approximately 15dB when open, and a standard 6-12-6 double glazed unit offers attenuation of 28dB  $R_{w+Ctr}$ . As such, an opened window would reduce the daytime  $L_{Aeq}$  to 48-51dB  $L_{Aeq,16hr}$  if open for the entire daytime duration. The night-time  $L_{Aeq}$  would be expected to be around 41-44dB. Both figures would not meet the requirements of BS 8233:2014. As the maximum daytime reduction requirement is 31dB, to achieve 35dB  $L_{Aeq,16hr}$  an enhanced glazing specification will be required.

As such, it is recommended that a window specification is provided that allows windows to remain closed at the discretion of the occupant in order to sufficiently attenuate ambient noise to provide internal noise levels. These are slightly higher than the requirements to achieve  $L_{Aeq}$  internal noise levels, as these requirements have been superseded by the requirements to reduce overnight  $L_{AF,MAX}$  values as discussed on the following page.

- 33dB  $R_{w+Ctr}$ , 40dB  $D_{n,e,w}$  Bradford Road
- 31dB  $R_{w+Ctr}$ , 38dB  $D_{n,e,w}$  Varley Street
- 30dB  $R_{w+Ctr}$ , 37dB  $D_{n,e,w}$  Sandal Street

With regard to the sound reduction performance of the acoustic ventilator (trickle or wall vent) commonly referred to as  $D_{n,e,w}$ , it is not possible to give a direct conversion between  $D_{n,e,w}$  and  $R_w$  because they vary from one product to another, and one composite wall performance to another. The  $D_{n,e,w}$  is the weighted average composite loss of a typical wall with the vent installed – the sound reduction (R) of the vent alone is likely to be less individually. Therefore, to select a  $D_{n,e,w}$  requirement it is always necessary to specify a value higher than the required  $R_w$  attenuation value. As a rough guide, the  $R_w$  can commonly be 5dB to 10dB lower than the  $D_{n,e,w}$ , and as such a  $D_{n,e,w}$  figure that is 7dB higher than  $R_w$  should not lessen the sound reduction performance of the window.

## LAF,MAX

The data below outlines the LAF,MAX results recorded during the survey at position A, which is a limit of 45dB LAF,MAX internally that should be exceeded no more than 10 times during the night-time period (23:00-07:00). By applying the attenuation of the window attenuation requirement of the most sensitive road noise source (Bradford Road), and correcting for distance from Position A, a theoretical limit can be applied to determine if the limits are likely to be achieved on site.

Table 5 – LAF,MAX Values

| Calculation interval (absolute time)<br>27/08/2020 10:00:30.000 - 28/08/2020 09:55:30.000 | Max:<br>LAFmax<br>Profile, Ch1<br>[dB] | Time of Max             |
|-------------------------------------------------------------------------------------------|----------------------------------------|-------------------------|
| 25/05/2022 23:00:00.000 - 25/05/2022 23:04:59.999                                         | 85.0 dB                                | 25/05/2022 23:02:00.000 |
| 25/05/2022 23:05:00.000 - 25/05/2022 23:09:59.999                                         | 85.0 dB                                | 25/05/2022 23:02:00.000 |
| 25/05/2022 23:10:00.000 - 25/05/2022 23:14:59.999                                         | 79.9 dB                                | 25/05/2022 23:07:00.000 |
| 25/05/2022 23:15:00.000 - 25/05/2022 23:19:59.999                                         | 80.7 dB                                | 25/05/2022 23:17:00.000 |
| 25/05/2022 23:20:00.000 - 25/05/2022 23:24:59.999                                         | 80.7 dB                                | 25/05/2022 23:17:00.000 |
| 25/05/2022 23:25:00.000 - 25/05/2022 23:29:59.999                                         | 79.9 dB                                | 25/05/2022 23:27:00.000 |
| 25/05/2022 23:30:00.000 - 25/05/2022 23:34:59.999                                         | 79.9 dB                                | 25/05/2022 23:27:00.000 |
| 25/05/2022 23:35:00.000 - 25/05/2022 23:39:59.999                                         | 79.5 dB                                | 25/05/2022 23:32:00.000 |
| 25/05/2022 23:40:00.000 - 25/05/2022 23:44:59.999                                         | 78.5 dB                                | 25/05/2022 23:37:00.000 |
| 25/05/2022 23:45:00.000 - 25/05/2022 23:49:59.999                                         | 79.3 dB                                | 25/05/2022 23:47:00.000 |
| 25/05/2022 23:50:00.000 - 25/05/2022 23:54:59.999                                         | 83.2 dB                                | 25/05/2022 23:52:00.000 |
| 25/05/2022 23:55:00.000 - 25/05/2022 23:59:59.999                                         | 83.2 dB                                | 25/05/2022 23:52:00.000 |
| 26/05/2022 00:00:00.000 - 26/05/2022 00:04:59.999                                         | 85.1 dB                                | 26/05/2022 00:02:00.000 |
| 26/05/2022 00:05:00.000 - 26/05/2022 00:09:59.999                                         | 85.1 dB                                | 26/05/2022 00:02:00.000 |
| 26/05/2022 00:10:00.000 - 26/05/2022 00:14:59.999                                         | 79.0 dB                                | 26/05/2022 00:07:00.000 |
| 26/05/2022 00:15:00.000 - 26/05/2022 00:19:59.999                                         | 76.6 dB                                | 26/05/2022 00:12:00.000 |
| 26/05/2022 00:20:00.000 - 26/05/2022 00:24:59.999                                         | 75.2 dB                                | 26/05/2022 00:22:00.000 |
| 26/05/2022 00:25:00.000 - 26/05/2022 00:29:59.999                                         | 78.6 dB                                | 26/05/2022 00:27:00.000 |
| 26/05/2022 00:30:00.000 - 26/05/2022 00:34:59.999                                         | 78.6 dB                                | 26/05/2022 00:27:00.000 |
| 26/05/2022 00:35:00.000 - 26/05/2022 00:39:59.999                                         | 74.0 dB                                | 26/05/2022 00:32:00.000 |
| 26/05/2022 00:40:00.000 - 26/05/2022 00:44:59.999                                         | 77.0 dB                                | 26/05/2022 00:42:00.000 |
| 26/05/2022 00:45:00.000 - 26/05/2022 00:49:59.999                                         | 77.0 dB                                | 26/05/2022 00:42:00.000 |
| 26/05/2022 00:50:00.000 - 26/05/2022 00:54:59.999                                         | 77.1 dB                                | 26/05/2022 00:52:00.000 |
| 26/05/2022 00:55:00.000 - 26/05/2022 00:59:59.999                                         | 77.1 dB                                | 26/05/2022 00:52:00.000 |
| 26/05/2022 01:00:00.000 - 26/05/2022 01:04:59.999                                         | 76.7 dB                                | 26/05/2022 00:57:00.000 |
| 26/05/2022 01:05:00.000 - 26/05/2022 01:09:59.999                                         | 78.2 dB                                | 26/05/2022 01:07:00.000 |
| 26/05/2022 01:10:00.000 - 26/05/2022 01:14:59.999                                         | 80.9 dB                                | 26/05/2022 01:12:00.000 |
| 26/05/2022 01:15:00.000 - 26/05/2022 01:19:59.999                                         | 80.9 dB                                | 26/05/2022 01:12:00.000 |
| 26/05/2022 01:20:00.000 - 26/05/2022 01:24:59.999                                         | 79.9 dB                                | 26/05/2022 01:22:00.000 |
| 26/05/2022 01:25:00.000 - 26/05/2022 01:29:59.999                                         | 79.9 dB                                | 26/05/2022 01:22:00.000 |
| 26/05/2022 01:30:00.000 - 26/05/2022 01:34:59.999                                         | 74.7 dB                                | 26/05/2022 01:32:00.000 |
| 26/05/2022 01:35:00.000 - 26/05/2022 01:39:59.999                                         | 76.4 dB                                | 26/05/2022 01:37:00.000 |
| 26/05/2022 01:40:00.000 - 26/05/2022 01:44:59.999                                         | 76.4 dB                                | 26/05/2022 01:37:00.000 |
| 26/05/2022 01:45:00.000 - 26/05/2022 01:49:59.999                                         | 81.1 dB                                | 26/05/2022 01:47:00.000 |
| 26/05/2022 01:50:00.000 - 26/05/2022 01:54:59.999                                         | 81.1 dB                                | 26/05/2022 01:47:00.000 |
| 26/05/2022 01:55:00.000 - 26/05/2022 01:59:59.999                                         | 74.2 dB                                | 26/05/2022 01:57:00.000 |
| 26/05/2022 02:00:00.000 - 26/05/2022 02:04:59.999                                         | 82.2 dB                                | 26/05/2022 02:02:00.000 |
| 26/05/2022 02:05:00.000 - 26/05/2022 02:09:59.999                                         | 82.2 dB                                | 26/05/2022 02:02:00.000 |
| 26/05/2022 02:10:00.000 - 26/05/2022 02:14:59.999                                         | 79.7 dB                                | 26/05/2022 02:12:00.000 |
| 26/05/2022 02:15:00.000 - 26/05/2022 02:19:59.999                                         | 79.7 dB                                | 26/05/2022 02:12:00.000 |
| 26/05/2022 02:20:00.000 - 26/05/2022 02:24:59.999                                         | 82.0 dB                                | 26/05/2022 02:22:00.000 |
| 26/05/2022 02:25:00.000 - 26/05/2022 02:29:59.999                                         | 82.2 dB                                | 26/05/2022 02:27:00.000 |
| 26/05/2022 02:30:00.000 - 26/05/2022 02:34:59.999                                         | 82.2 dB                                | 26/05/2022 02:27:00.000 |
| 26/05/2022 02:35:00.000 - 26/05/2022 02:39:59.999                                         | 80.2 dB                                | 26/05/2022 02:32:00.000 |
| 26/05/2022 02:40:00.000 - 26/05/2022 02:44:59.999                                         | 78.8 dB                                | 26/05/2022 02:37:00.000 |
| 26/05/2022 02:45:00.000 - 26/05/2022 02:49:59.999                                         | 80.0 dB                                | 26/05/2022 02:47:00.000 |
| 26/05/2022 02:50:00.000 - 26/05/2022 02:54:59.999                                         | 80.0 dB                                | 26/05/2022 02:47:00.000 |
| 26/05/2022 02:55:00.000 - 26/05/2022 02:59:59.999                                         | 76.2 dB                                | 26/05/2022 02:52:00.000 |

# L<sub>AF,MAX</sub> Cont.

Table 6 – L<sub>AF,MAX</sub> Values

|                                                   |         |                         |
|---------------------------------------------------|---------|-------------------------|
| 26/05/2022 03:00:00.000 - 26/05/2022 03:04:59.999 | 79.2 dB | 26/05/2022 03:02:00.000 |
| 26/05/2022 03:05:00.000 - 26/05/2022 03:09:59.999 | 79.2 dB | 26/05/2022 03:02:00.000 |
| 26/05/2022 03:10:00.000 - 26/05/2022 03:14:59.999 | 74.1 dB | 26/05/2022 03:12:00.000 |
| 26/05/2022 03:15:00.000 - 26/05/2022 03:19:59.999 | 75.7 dB | 26/05/2022 03:17:00.000 |
| 26/05/2022 03:20:00.000 - 26/05/2022 03:24:59.999 | 75.7 dB | 26/05/2022 03:17:00.000 |
| 26/05/2022 03:25:00.000 - 26/05/2022 03:29:59.999 | 77.5 dB | 26/05/2022 03:27:00.000 |
| 26/05/2022 03:30:00.000 - 26/05/2022 03:34:59.999 | 79.9 dB | 26/05/2022 03:32:00.000 |
| 26/05/2022 03:35:00.000 - 26/05/2022 03:39:59.999 | 79.9 dB | 26/05/2022 03:32:00.000 |
| 26/05/2022 03:40:00.000 - 26/05/2022 03:44:59.999 | 79.7 dB | 26/05/2022 03:42:00.000 |
| 26/05/2022 03:45:00.000 - 26/05/2022 03:49:59.999 | 79.7 dB | 26/05/2022 03:42:00.000 |
| 26/05/2022 03:50:00.000 - 26/05/2022 03:54:59.999 | 78.7 dB | 26/05/2022 03:52:00.000 |
| 26/05/2022 03:55:00.000 - 26/05/2022 03:59:59.999 | 78.7 dB | 26/05/2022 03:52:00.000 |
| 26/05/2022 04:00:00.000 - 26/05/2022 04:04:59.999 | 82.1 dB | 26/05/2022 04:02:00.000 |
| 26/05/2022 04:05:00.000 - 26/05/2022 04:09:59.999 | 82.1 dB | 26/05/2022 04:02:00.000 |
| 26/05/2022 04:10:00.000 - 26/05/2022 04:14:59.999 | 80.7 dB | 26/05/2022 04:07:00.000 |
| 26/05/2022 04:15:00.000 - 26/05/2022 04:19:59.999 | 76.9 dB | 26/05/2022 04:12:00.000 |
| 26/05/2022 04:20:00.000 - 26/05/2022 04:24:59.999 | 81.0 dB | 26/05/2022 04:22:00.000 |
| 26/05/2022 04:25:00.000 - 26/05/2022 04:29:59.999 | 81.0 dB | 26/05/2022 04:22:00.000 |
| 26/05/2022 04:30:00.000 - 26/05/2022 04:34:59.999 | 75.8 dB | 26/05/2022 04:27:00.000 |
| 26/05/2022 04:35:00.000 - 26/05/2022 04:39:59.999 | 80.9 dB | 26/05/2022 04:37:00.000 |
| 26/05/2022 04:40:00.000 - 26/05/2022 04:44:59.999 | 80.9 dB | 26/05/2022 04:37:00.000 |
| 26/05/2022 04:45:00.000 - 26/05/2022 04:49:59.999 | 83.4 dB | 26/05/2022 04:47:00.000 |
| 26/05/2022 04:50:00.000 - 26/05/2022 04:54:59.999 | 83.4 dB | 26/05/2022 04:47:00.000 |
| 26/05/2022 04:55:00.000 - 26/05/2022 04:59:59.999 | 81.6 dB | 26/05/2022 04:57:00.000 |
| 26/05/2022 05:00:00.000 - 26/05/2022 05:04:59.999 | 81.6 dB | 26/05/2022 04:57:00.000 |
| 26/05/2022 05:05:00.000 - 26/05/2022 05:09:59.999 | 79.3 dB | 26/05/2022 05:07:00.000 |
| 26/05/2022 05:10:00.000 - 26/05/2022 05:14:59.999 | 79.3 dB | 26/05/2022 05:07:00.000 |
| 26/05/2022 05:15:00.000 - 26/05/2022 05:19:59.999 | 77.9 dB | 26/05/2022 05:12:00.000 |
| 26/05/2022 05:20:00.000 - 26/05/2022 05:24:59.999 | 80.3 dB | 26/05/2022 05:22:00.000 |
| 26/05/2022 05:25:00.000 - 26/05/2022 05:29:59.999 | 80.3 dB | 26/05/2022 05:22:00.000 |
| 26/05/2022 05:30:00.000 - 26/05/2022 05:34:59.999 | 80.8 dB | 26/05/2022 05:32:00.000 |
| 26/05/2022 05:35:00.000 - 26/05/2022 05:39:59.999 | 83.4 dB | 26/05/2022 05:37:00.000 |
| 26/05/2022 05:40:00.000 - 26/05/2022 05:44:59.999 | 83.4 dB | 26/05/2022 05:37:00.000 |
| 26/05/2022 05:45:00.000 - 26/05/2022 05:49:59.999 | 82.6 dB | 26/05/2022 05:42:00.000 |
| 26/05/2022 05:50:00.000 - 26/05/2022 05:54:59.999 | 83.2 dB | 26/05/2022 05:52:00.000 |
| 26/05/2022 05:55:00.000 - 26/05/2022 05:59:59.999 | 83.2 dB | 26/05/2022 05:52:00.000 |
| 26/05/2022 06:00:00.000 - 26/05/2022 06:04:59.999 | 82.6 dB | 26/05/2022 06:02:00.000 |
| 26/05/2022 06:05:00.000 - 26/05/2022 06:09:59.999 | 82.6 dB | 26/05/2022 06:02:00.000 |
| 26/05/2022 06:10:00.000 - 26/05/2022 06:14:59.999 | 84.5 dB | 26/05/2022 06:12:00.000 |
| 26/05/2022 06:15:00.000 - 26/05/2022 06:19:59.999 | 84.5 dB | 26/05/2022 06:12:00.000 |
| 26/05/2022 06:20:00.000 - 26/05/2022 06:24:59.999 | 84.7 dB | 26/05/2022 06:22:00.000 |
| 26/05/2022 06:25:00.000 - 26/05/2022 06:29:59.999 | 87.0 dB | 26/05/2022 06:27:00.000 |
| 26/05/2022 06:30:00.000 - 26/05/2022 06:34:59.999 | 87.0 dB | 26/05/2022 06:27:00.000 |
| 26/05/2022 06:35:00.000 - 26/05/2022 06:39:59.999 | 82.1 dB | 26/05/2022 06:37:00.000 |
| 26/05/2022 06:40:00.000 - 26/05/2022 06:44:59.999 | 82.1 dB | 26/05/2022 06:37:00.000 |
| 26/05/2022 06:45:00.000 - 26/05/2022 06:49:59.999 | 82.7 dB | 26/05/2022 06:47:00.000 |
| 26/05/2022 06:50:00.000 - 26/05/2022 06:54:59.999 | 84.1 dB | 26/05/2022 06:52:00.000 |
| 26/05/2022 06:55:00.000 - 26/05/2022 06:59:59.999 | 84.1 dB | 26/05/2022 06:52:00.000 |

With a calculated L<sub>aeq</sub> at the nearest sensitive receptors of Bradford Road of 66dB, the minimum attenuation requirement would be 31dB R<sub>W+Ctr</sub>. Tested against the L<sub>AF,MAX</sub> data, overnight L<sub>AF,MAX</sub> limits of 45dB would be exceeded 16 times.

As such, the analysis was undertaken with an improved glazing attenuation of 33dB R<sub>W+Ctr</sub>. This exceeded the requirements 5 times, which is within the recommendations of the WHO guidelines. Applying this 2dB increase requirements to the other road sources accounting for distance, the following glazing requirements were concluded as per page 8:

- 33dB R<sub>W+Ctr</sub>, 40dB D<sub>n,e,w</sub> Bradford Road
- 31dB R<sub>W+Ctr</sub>, 38dB D<sub>n,e,w</sub> Varley Street
- 30dB R<sub>W+Ctr</sub>, 37dB D<sub>n,e,w</sub> Sandal Street

# Barrier Requirements

Due to recorded noise levels being above the desirable amenity guidelines throughout the site, it is recommended that acoustic fencing should be installed to the open perimeter of the site not attenuated through the buildings themselves to effectively attenuate from the traffic noise sources. Where acoustic continuous barriers are not feasible due to openings, standard fencing should be present and remain as continuous and free from gaps and holes as possible to provide the lowest amenity noise possible.

All barriers should be continuous, free from gaps and holes and provide a minimum density of 15kg/m<sup>2</sup>.

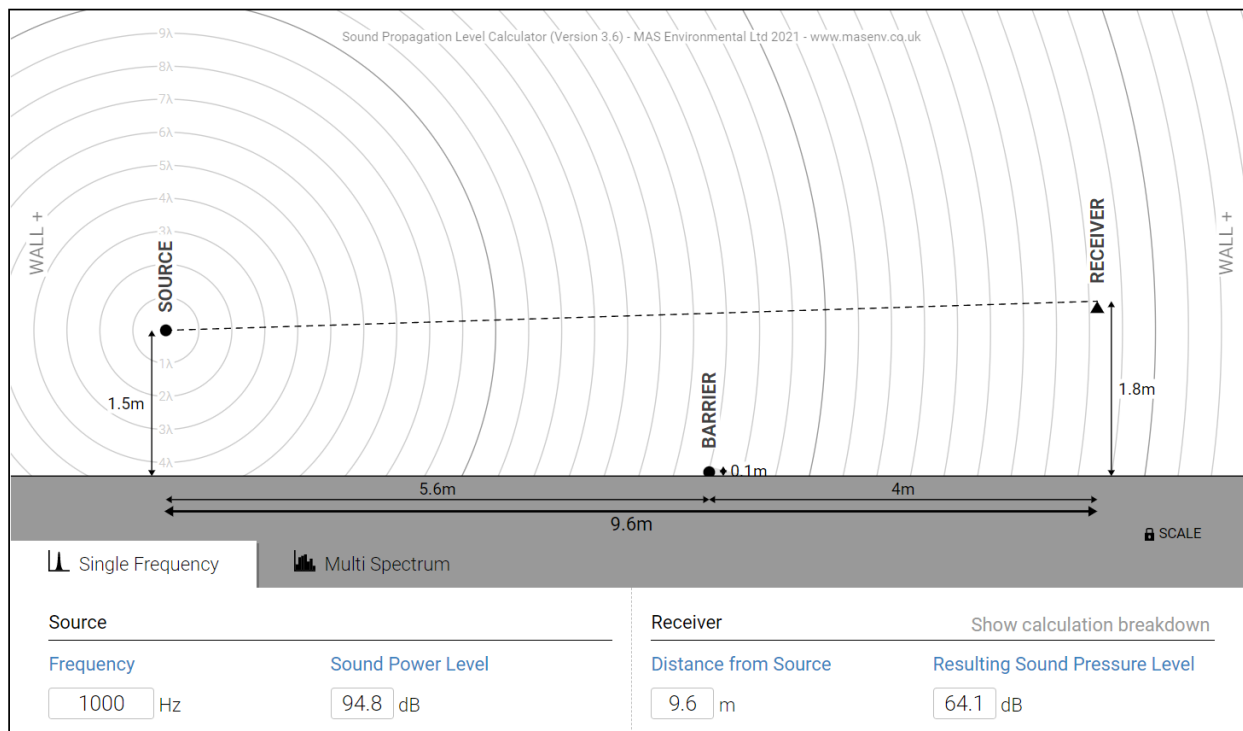
A recommended barrier layout is proposed in blue in Image 3.

Image 3



# Barrier Requirements

Image 4 – Plot 10 amenity area – no barrier



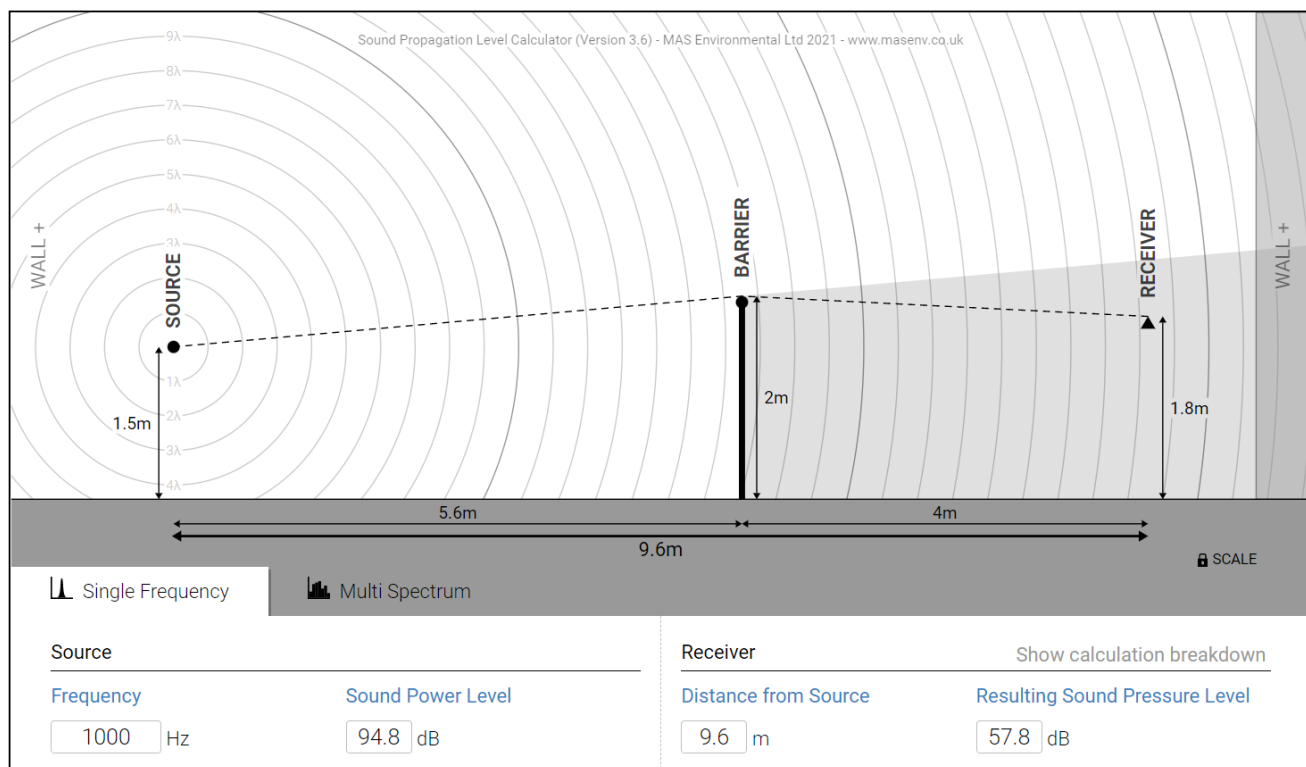
Following analysis of required attenuation levels to provide suitable  $L_{Aeq}$  levels at the nearest sensitive receptors, it was determined that this would be glazing in the region of 30-33dB  $R_{w+Ctr}$ , accompanied by an appropriate ventilation strategy and provision of acoustic barriers to mitigate amenity area noise as much as is feasible given the urban location of the surrounding noise environment. An acoustic barrier which is 2m in height, continuous and free from gaps and holes with a density of 15kg/m<sup>2</sup> would provide a reduction of 6dB to amenity areas if the barrier can be provided in close proximity to the noise source on the perimeter of the site. The reduction has been demonstrated above, with the daytime  $L_{Aeq,16hr}$  figure of 64dB with no barrier in Image 4 being reduced to 58dB within the indicative diagram in Image 5 on the following page.

This calculation is based on worst case performance on site via assessment of one of the closest properties to the Bradford Road noise source – Plot 10. Many properties on site will experience far more attenuation through distance, buildings and barrier attenuation that is reflected in this instance. The plot boundary is approximately 5.6m from the roadside, and has been assessed with the use of a 2m acoustic barrier with the receiving occupant being 1.8m tall and situated in the middle of the amenity space at a frequency of 1000 Hz representing typical traffic noise. The calculation above is undertaken using the assumptions and calculation. Although the predicted noise level is higher than the WHO guidelines Upper Guideline Value for Amenity Space Noise Level (for noisier environments) of 55dB, BS 8233:2014 outlines the following guidance:

*'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 LAeq,T, with an upper guideline value of 55 dB LAeq,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.'*

# Barrier Requirements

Image 5 – Plot 10 amenity area – 2m acoustic barrier



As discussed on the previous page, an acoustic barrier which is 2m in height, continuous and free from gaps and holes with a density of 15kg/m<sup>2</sup> would provide a reduction of 6dB to amenity areas if the barrier can be provided in close proximity to the noise sources on the perimeter of the site as per Image 3. The reduction has been demonstrated above, with the daytime  $L_{Aeq,16hr}$  figure of 64dB with no barrier in Image 2 being reduced to 58dB  $L_{Aeq,16hr}$ .

Barrier calculations have been undertaken using the methodology and assumptions as per ISO9613-2:1996, with the assumptions being as follows:

- No transmission of sound around the barrier - therefore, the combined transmission of sound around the sides of the barrier must be at least 10dB below the level of sound transmission above the barrier.
- No transmission of sound through the barrier - therefore, the total transmission of sound through the barrier must be at least 10dB below the level of sound transmission above the barrier.
- There are no reflections from the barrier. In reality when dealing with short distances and many reflective surfaces the "canyon effect" may occur with repeating reflections.
- There are no affecting weather conditions, such as wind or temperature inversion, as these will affect the propagation path of a noise source and diffraction around the barrier.
- The noise source behaves as a point source and is far-field, where inherent directivity is minimal.
- Walls used in the model are considered to be perfectly reflecting and at 1 metre distance (facade level).
- Conditions are free-field and there is no reverberant field.

# Conclusions and Recommendations

As discussed, it is recommended that all plots on site will require windows with a specification allowing windows to remain closed at the discretion of the occupant. Glazing attenuation should provide the following:

- 33dB Rw+Ctr, 40dB Dn,e,w - Bradford Road
- 31dB Rw+Ctr, 38dB Dn,e,w - Varley Street
- 30dB Rw+Ctr, 37dB Dn,e,w - Sandal Street

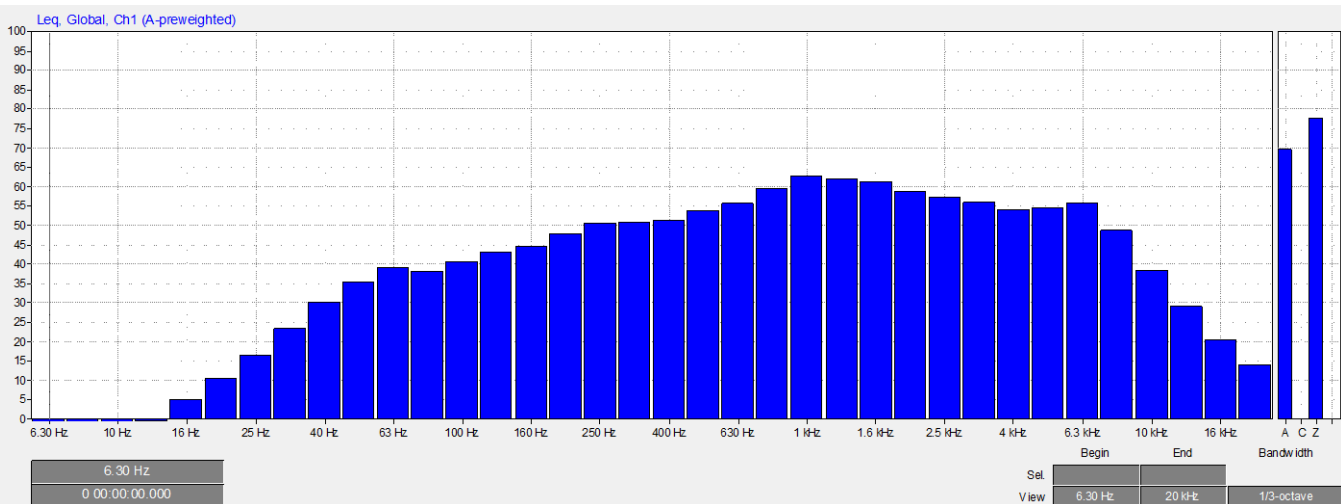
The glazing strategy should be inclusive of sufficient ventilation measures to allow occupants to have their windows remained closed at their own discretion, with any such ventilation such as trickle or wall vents meeting the  $D_{n,e,w}$  figures as stipulated above. Any proposed ventilation measures should be reviewed and confirmed by a suitably qualified person.

The site will require an acoustic barrier layout similar to proposed within this report to mitigate amenity level noise for residents as much as is feasible for an urban location such as Miles Platting Area 7.5B, although this is an indicative layout. This can take the form of an acoustically designed fence of the with a minimum height of 2m. This should form a continuous barrier between each dwelling, with additional side fencing to properties located at junctions.

Any fence should have a minimum density of 15kg/m<sup>2</sup> and be completely free of any gaps or holes. A site plan showing the preferred positioning of an acoustic fence is shown within Image 3.

# Appendix A

## MEASUREMENT DATA – POSITION A



# Appendix B

## INSTRUMENT AND WEATHER DATA

| Item                           | Serial Number | Date of Calibration | Calibration Cert. No. |
|--------------------------------|---------------|---------------------|-----------------------|
| Sound Level Meter Norsonic 140 | 1406857       | 29/03/2019          | U31402                |
| Field Calibrator Norsonic 1251 | 34960         | 29/03/2019          | U31400                |

At the time of the measurements at Position A and B there was 1 – 2 m/s wind, the temperature was 11°C, and the relative humidity was 78%. There was intermittent rain during recording.

The SLM was field calibrated at the beginning and the end of the measurements with no significant drift recorded.