

# Noise Survey

## BS 8233:2014 Analysis

Miles Platting Area 3.1

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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.

# Introduction

FES Acoustics were instructed by Lovell Homes to carry out noise surveys at the site of a proposed development at Miles Platting Area 3.1.

The site is located with Oldham Road (A62) to the North West, Butler Street to the South and Gunson Street to the East of the site within an urban area. During the time of the survey there was intermittent construction work being undertaken to the highest floors of a neighbouring high rise building to the East of the site.

## 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

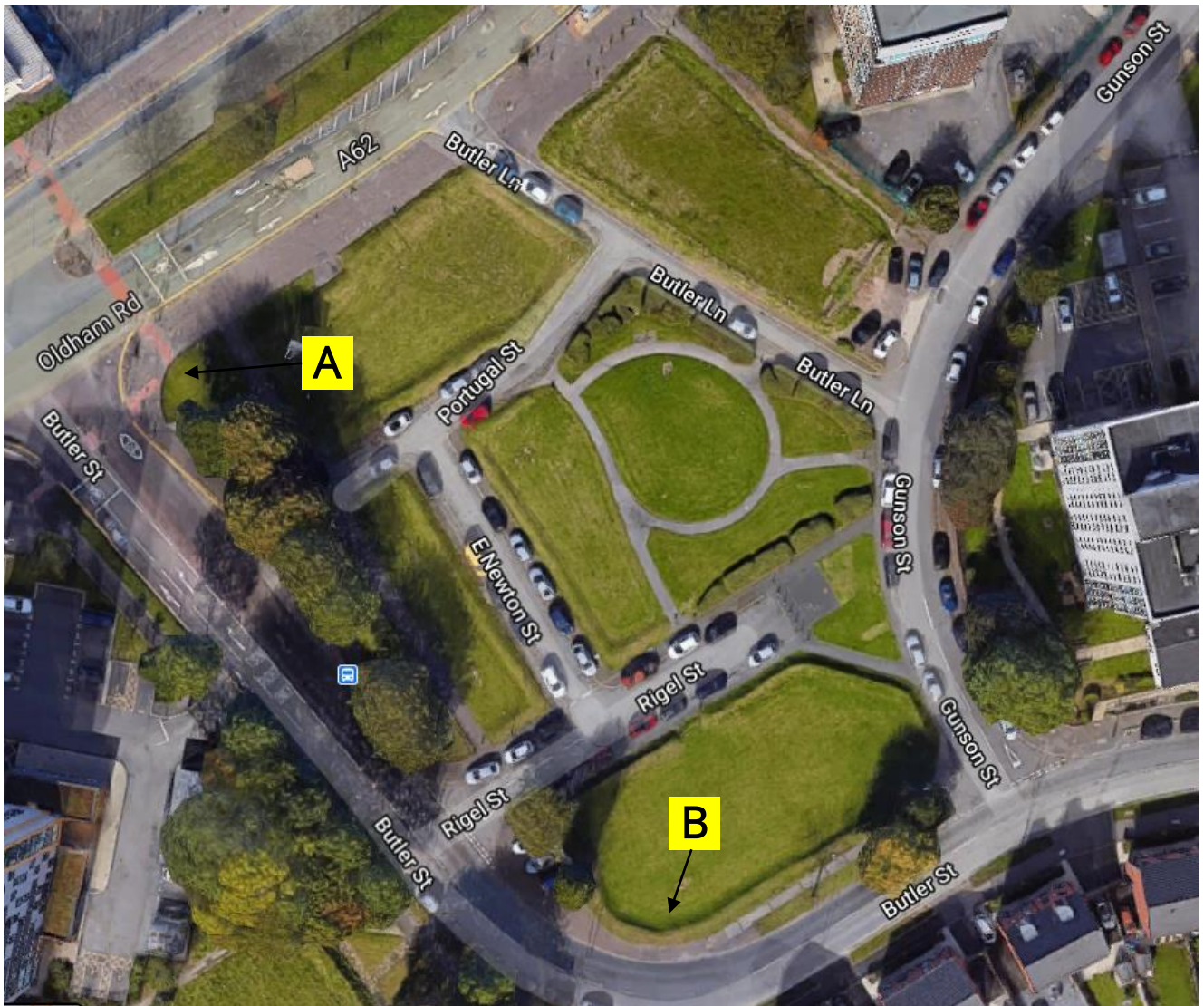
Two measurement positions were chosen as shown in Figure 1 below.

A 24-hour noise measurement was taken at position A near the Northern boundary. This position is in close proximity to traffic noise from Oldham Road (A62) including idle vehicles at the nearby junction.

A 24-hour noise measurement was taken at position B near the South Western boundary. This position is in close proximity to traffic noise from Butler Street.

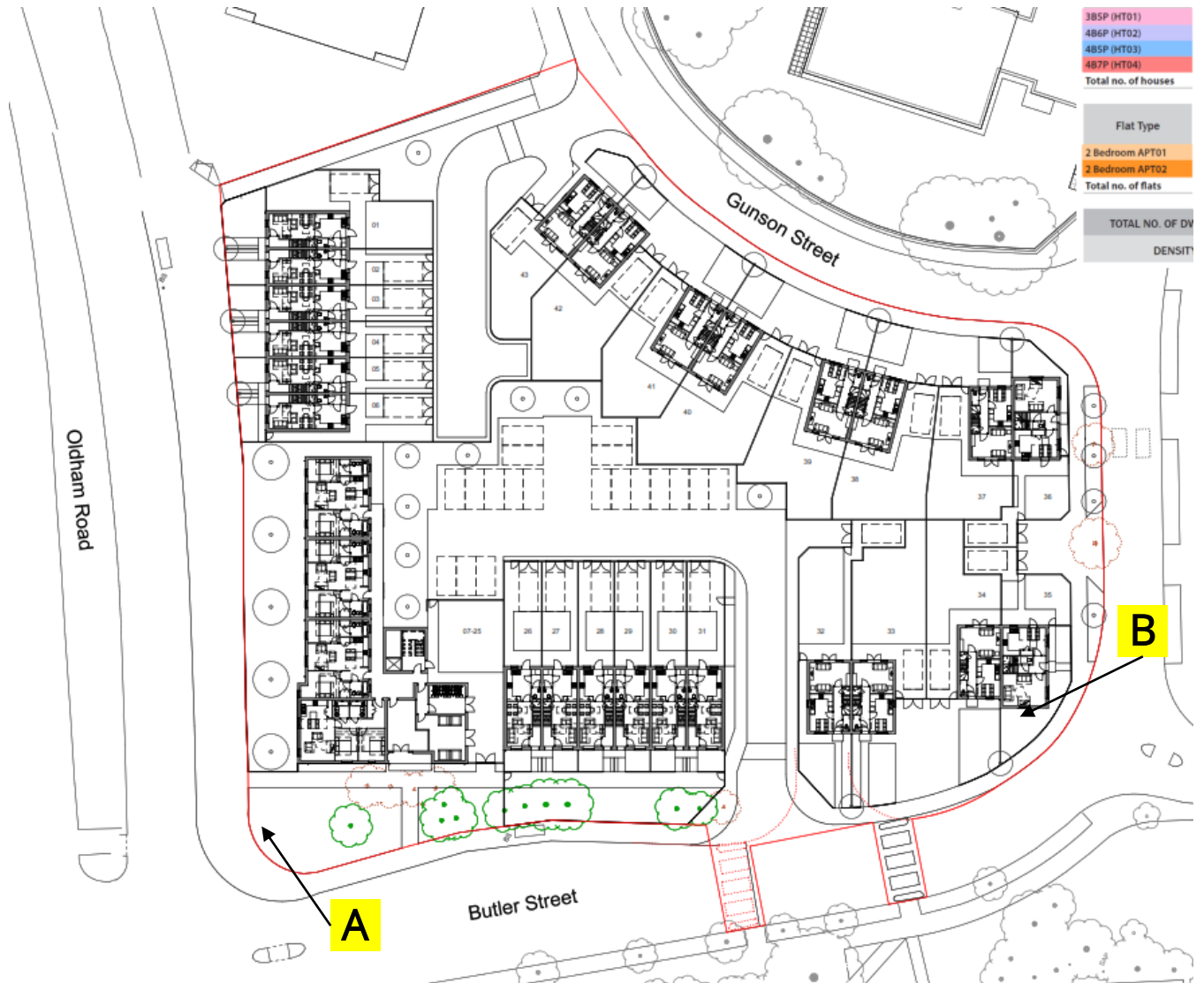
The data from these positions can be expected to be the maximum levels of noise to which any of the proposed dwellings will be subjected.

*Image 1 – SLM Locations*



# Method

Image 2 – SLM Locations



# 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 <sub>Aeq</sub> (dB) |
|-------------------------------|-----------------------|
| Daytime, 10:32 – 23:00 hrs    | 61.5                  |
| Night-time, 23.00 – 07.00 hrs | 55.0                  |
| Daytime, 07:00 – 10:32 hrs    | 64.9                  |

Table 4 – L<sub>Aeq</sub> Day and Night Averages\_ Position A

| Period                        | L <sub>Aeq</sub> (dB) |
|-------------------------------|-----------------------|
| Daytime, 07.00 – 23.00 hrs    | 63                    |
| Night-time, 23.00 – 07.00 hrs | 55                    |

Table 3 above outlines the LAeq levels of the three periods over the 24-hour recording period. These figures could then be averaged to determine the L<sub>Aeq,8hr</sub> and L<sub>Aeq,16hr</sub>. The daytime L<sub>Aeq</sub> is currently 29dB above target, with the night-time LAeq 25dB above target, which inform the minimum requirements of attenuation.

Calculated through Insul, a single skin 100mm brickwork finish would provide 44dB R<sub>w</sub>, and a traditional cavity masonry construction provides even more than this meaning that the real area of focus should be glazing. Opened windows provide a reduction of approximately 15dB when open, and a standard 6-12-6 double glazed unit offers attenuation of 35dB R<sub>w</sub>. As such, an opened window would reduce the daytime L<sub>Aeq</sub> to 48dB if open for the entire daytime duration. The night-time L<sub>Aeq</sub> would be expected to be around 40dB. Both figures would not meet the requirements of BS 8233:2014.

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.

With regard to the sound reduction performance of the acoustic ventilator (trickle vent) commonly referred to as Dn,e,w, it is not possible to give a direct conversion between Dn,e,w and Rw because they vary from one product to another, and one composite wall performance to another. The Dn,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 Dn,e,w requirement it is always necessary to specify a value higher than the required Rw attenuation value. As a rough guide, the Rw can commonly be 5dB to 10dB lower than the Dn,e,w, and as such a Dn,e,w figure that is 7dB higher than Rw should not lessen the sound reduction performance of the window. In this case, affected plots will require windows to the facing façade that are a minimum of 35dB Rw+Ctr and 42dB Dn,e,w.

## 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 an average 6-12-6 double glazed window (35dB Rw). A theoretical limit of 80dB can be applied to determine if the limits are likely to be achieved on site, which was not exceeded during recording.

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             |
|-------------------------------------------------------------------------------------------|----------------------------------------|-------------------------|
| 03/11/2020 23:00:00.000 - 03/11/2020 23:04:59.999                                         | 78.8 dB                                | 03/11/2020 22:57:04.000 |
| 03/11/2020 23:05:00.000 - 03/11/2020 23:09:59.999                                         | 69.8 dB                                | 03/11/2020 23:02:04.000 |
| 03/11/2020 23:10:00.000 - 03/11/2020 23:14:59.999                                         | 76.0 dB                                | 03/11/2020 23:12:04.000 |
| 03/11/2020 23:15:00.000 - 03/11/2020 23:19:59.999                                         | 76.0 dB                                | 03/11/2020 23:12:04.000 |
| 03/11/2020 23:20:00.000 - 03/11/2020 23:24:59.999                                         | 66.8 dB                                | 03/11/2020 23:17:04.000 |
| 03/11/2020 23:25:00.000 - 03/11/2020 23:29:59.999                                         | 65.7 dB                                | 03/11/2020 23:22:04.000 |
| 03/11/2020 23:30:00.000 - 03/11/2020 23:34:59.999                                         | 72.2 dB                                | 03/11/2020 23:32:04.000 |
| 03/11/2020 23:35:00.000 - 03/11/2020 23:39:59.999                                         | 72.2 dB                                | 03/11/2020 23:32:04.000 |
| 03/11/2020 23:40:00.000 - 03/11/2020 23:44:59.999                                         | 68.5 dB                                | 03/11/2020 23:42:04.000 |
| 03/11/2020 23:45:00.000 - 03/11/2020 23:49:59.999                                         | 68.5 dB                                | 03/11/2020 23:42:04.000 |
| 03/11/2020 23:50:00.000 - 03/11/2020 23:54:59.999                                         | 71.1 dB                                | 03/11/2020 23:52:04.000 |
| 03/11/2020 23:55:00.000 - 03/11/2020 23:59:59.999                                         | 71.1 dB                                | 03/11/2020 23:52:04.000 |
| 04/11/2020 00:00:00.000 - 04/11/2020 00:04:59.999                                         | 68.1 dB                                | 03/11/2020 23:57:04.000 |
| 04/11/2020 00:05:00.000 - 04/11/2020 00:09:59.999                                         | 70.2 dB                                | 04/11/2020 00:07:04.000 |
| 04/11/2020 00:10:00.000 - 04/11/2020 00:14:59.999                                         | 70.2 dB                                | 04/11/2020 00:07:04.000 |
| 04/11/2020 00:15:00.000 - 04/11/2020 00:19:59.999                                         | 69.1 dB                                | 04/11/2020 00:12:04.000 |
| 04/11/2020 00:20:00.000 - 04/11/2020 00:24:59.999                                         | 62.9 dB                                | 04/11/2020 00:17:04.000 |
| 04/11/2020 00:25:00.000 - 04/11/2020 00:29:59.999                                         | 59.3 dB                                | 04/11/2020 00:22:04.000 |
| 04/11/2020 00:30:00.000 - 04/11/2020 00:34:59.999                                         | 68.6 dB                                | 04/11/2020 00:32:04.000 |
| 04/11/2020 00:35:00.000 - 04/11/2020 00:39:59.999                                         | 72.7 dB                                | 04/11/2020 00:37:04.000 |
| 04/11/2020 00:40:00.000 - 04/11/2020 00:44:59.999                                         | 72.7 dB                                | 04/11/2020 00:37:04.000 |
| 04/11/2020 00:45:00.000 - 04/11/2020 00:49:59.999                                         | 68.5 dB                                | 04/11/2020 00:47:04.000 |
| 04/11/2020 00:50:00.000 - 04/11/2020 00:54:59.999                                         | 68.5 dB                                | 04/11/2020 00:47:04.000 |
| 04/11/2020 00:55:00.000 - 04/11/2020 00:59:59.999                                         | 74.2 dB                                | 04/11/2020 00:57:04.000 |
| 04/11/2020 01:00:00.000 - 04/11/2020 01:04:59.999                                         | 74.2 dB                                | 04/11/2020 00:57:04.000 |
| 04/11/2020 01:05:00.000 - 04/11/2020 01:09:59.999                                         | 69.5 dB                                | 04/11/2020 01:07:04.000 |
| 04/11/2020 01:10:00.000 - 04/11/2020 01:14:59.999                                         | 69.5 dB                                | 04/11/2020 01:07:04.000 |
| 04/11/2020 01:15:00.000 - 04/11/2020 01:19:59.999                                         | 71.0 dB                                | 04/11/2020 01:17:04.000 |
| 04/11/2020 01:20:00.000 - 04/11/2020 01:24:59.999                                         | 71.0 dB                                | 04/11/2020 01:17:04.000 |
| 04/11/2020 01:25:00.000 - 04/11/2020 01:29:59.999                                         | 69.9 dB                                | 04/11/2020 01:27:04.000 |
| 04/11/2020 01:30:00.000 - 04/11/2020 01:34:59.999                                         | 69.9 dB                                | 04/11/2020 01:27:04.000 |
| 04/11/2020 01:35:00.000 - 04/11/2020 01:39:59.999                                         | 68.9 dB                                | 04/11/2020 01:32:04.000 |
| 04/11/2020 01:40:00.000 - 04/11/2020 01:44:59.999                                         | 60.3 dB                                | 04/11/2020 01:42:04.000 |
| 04/11/2020 01:45:00.000 - 04/11/2020 01:49:59.999                                         | 70.8 dB                                | 04/11/2020 01:47:04.000 |
| 04/11/2020 01:50:00.000 - 04/11/2020 01:54:59.999                                         | 70.8 dB                                | 04/11/2020 01:47:04.000 |
| 04/11/2020 01:55:00.000 - 04/11/2020 01:59:59.999                                         | 69.4 dB                                | 04/11/2020 01:52:04.000 |
| 04/11/2020 02:00:00.000 - 04/11/2020 02:04:59.999                                         | 74.8 dB                                | 04/11/2020 02:02:04.000 |
| 04/11/2020 02:05:00.000 - 04/11/2020 02:09:59.999                                         | 74.8 dB                                | 04/11/2020 02:02:04.000 |
| 04/11/2020 02:10:00.000 - 04/11/2020 02:14:59.999                                         | 73.8 dB                                | 04/11/2020 02:07:04.000 |
| 04/11/2020 02:15:00.000 - 04/11/2020 02:19:59.999                                         | 66.9 dB                                | 04/11/2020 02:17:04.000 |
| 04/11/2020 02:20:00.000 - 04/11/2020 02:24:59.999                                         | 66.9 dB                                | 04/11/2020 02:17:04.000 |
| 04/11/2020 02:25:00.000 - 04/11/2020 02:29:59.999                                         | 69.0 dB                                | 04/11/2020 02:27:04.000 |
| 04/11/2020 02:30:00.000 - 04/11/2020 02:34:59.999                                         | 70.8 dB                                | 04/11/2020 02:32:04.000 |
| 04/11/2020 02:35:00.000 - 04/11/2020 02:39:59.999                                         | 70.8 dB                                | 04/11/2020 02:32:04.000 |
| 04/11/2020 02:40:00.000 - 04/11/2020 02:44:59.999                                         | 70.4 dB                                | 04/11/2020 02:37:04.000 |
| 04/11/2020 02:45:00.000 - 04/11/2020 02:49:59.999                                         | 69.7 dB                                | 04/11/2020 02:42:04.000 |
| 04/11/2020 02:50:00.000 - 04/11/2020 02:54:59.999                                         | 70.1 dB                                | 04/11/2020 02:52:04.000 |
| 04/11/2020 02:55:00.000 - 04/11/2020 02:59:59.999                                         | 70.1 dB                                | 04/11/2020 02:52:04.000 |
| 04/11/2020 03:00:00.000 - 04/11/2020 03:04:59.999                                         | 72.3 dB                                | 04/11/2020 03:02:04.000 |
| 04/11/2020 03:05:00.000 - 04/11/2020 03:09:59.999                                         | 72.3 dB                                | 04/11/2020 03:02:04.000 |
| 04/11/2020 03:10:00.000 - 04/11/2020 03:14:59.999                                         | 68.9 dB                                | 04/11/2020 03:12:04.000 |
| 04/11/2020 03:15:00.000 - 04/11/2020 03:19:59.999                                         | 69.5 dB                                | 04/11/2020 03:17:04.000 |
| 04/11/2020 03:20:00.000 - 04/11/2020 03:24:59.999                                         | 70.7 dB                                | 04/11/2020 03:22:04.000 |
| 04/11/2020 03:25:00.000 - 04/11/2020 03:29:59.999                                         | 70.7 dB                                | 04/11/2020 03:22:04.000 |
| 04/11/2020 03:30:00.000 - 04/11/2020 03:34:59.999                                         | 69.7 dB                                | 04/11/2020 03:32:04.000 |

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

Table 6 – L<sub>AF,MAX</sub> Values

|                                                   |         |                         |
|---------------------------------------------------|---------|-------------------------|
| 04/11/2020 03:35:00.000 - 04/11/2020 03:39:59.999 | 69.7 dB | 04/11/2020 03:32:04.000 |
| 04/11/2020 03:40:00.000 - 04/11/2020 03:44:59.999 | 72.1 dB | 04/11/2020 03:42:04.000 |
| 04/11/2020 03:45:00.000 - 04/11/2020 03:49:59.999 | 72.1 dB | 04/11/2020 03:42:04.000 |
| 04/11/2020 03:50:00.000 - 04/11/2020 03:54:59.999 | 71.7 dB | 04/11/2020 03:52:04.000 |
| 04/11/2020 03:55:00.000 - 04/11/2020 03:59:59.999 | 71.7 dB | 04/11/2020 03:52:04.000 |
| 04/11/2020 04:00:00.000 - 04/11/2020 04:04:59.999 | 70.0 dB | 04/11/2020 04:02:04.000 |
| 04/11/2020 04:05:00.000 - 04/11/2020 04:09:59.999 | 70.0 dB | 04/11/2020 04:02:04.000 |
| 04/11/2020 04:10:00.000 - 04/11/2020 04:14:59.999 | 73.3 dB | 04/11/2020 04:12:04.000 |
| 04/11/2020 04:15:00.000 - 04/11/2020 04:19:59.999 | 73.3 dB | 04/11/2020 04:12:04.000 |
| 04/11/2020 04:20:00.000 - 04/11/2020 04:24:59.999 | 71.3 dB | 04/11/2020 04:17:04.000 |
| 04/11/2020 04:25:00.000 - 04/11/2020 04:29:59.999 | 70.6 dB | 04/11/2020 04:27:04.000 |
| 04/11/2020 04:30:00.000 - 04/11/2020 04:34:59.999 | 71.7 dB | 04/11/2020 04:32:04.000 |
| 04/11/2020 04:35:00.000 - 04/11/2020 04:39:59.999 | 71.7 dB | 04/11/2020 04:32:04.000 |
| 04/11/2020 04:40:00.000 - 04/11/2020 04:44:59.999 | 78.6 dB | 04/11/2020 04:42:04.000 |
| 04/11/2020 04:45:00.000 - 04/11/2020 04:49:59.999 | 78.6 dB | 04/11/2020 04:42:04.000 |
| 04/11/2020 04:50:00.000 - 04/11/2020 04:54:59.999 | 71.1 dB | 04/11/2020 04:47:04.000 |
| 04/11/2020 04:55:00.000 - 04/11/2020 04:59:59.999 | 71.2 dB | 04/11/2020 04:57:04.000 |
| 04/11/2020 05:00:00.000 - 04/11/2020 05:04:59.999 | 71.2 dB | 04/11/2020 04:57:04.000 |
| 04/11/2020 05:05:00.000 - 04/11/2020 05:09:59.999 | 69.8 dB | 04/11/2020 05:07:04.000 |
| 04/11/2020 05:10:00.000 - 04/11/2020 05:14:59.999 | 70.7 dB | 04/11/2020 05:12:04.000 |
| 04/11/2020 05:15:00.000 - 04/11/2020 05:19:59.999 | 71.6 dB | 04/11/2020 05:17:04.000 |
| 04/11/2020 05:20:00.000 - 04/11/2020 05:24:59.999 | 71.6 dB | 04/11/2020 05:17:04.000 |
| 04/11/2020 05:25:00.000 - 04/11/2020 05:29:59.999 | 71.1 dB | 04/11/2020 05:27:04.000 |
| 04/11/2020 05:30:00.000 - 04/11/2020 05:34:59.999 | 71.4 dB | 04/11/2020 05:32:04.000 |
| 04/11/2020 05:35:00.000 - 04/11/2020 05:39:59.999 | 71.4 dB | 04/11/2020 05:32:04.000 |
| 04/11/2020 05:40:00.000 - 04/11/2020 05:44:59.999 | 70.0 dB | 04/11/2020 05:42:04.000 |
| 04/11/2020 05:45:00.000 - 04/11/2020 05:49:59.999 | 70.0 dB | 04/11/2020 05:42:04.000 |
| 04/11/2020 05:50:00.000 - 04/11/2020 05:54:59.999 | 70.0 dB | 04/11/2020 05:52:04.000 |
| 04/11/2020 05:55:00.000 - 04/11/2020 05:59:59.999 | 70.0 dB | 04/11/2020 05:52:04.000 |
| 04/11/2020 06:00:00.000 - 04/11/2020 06:04:59.999 | 69.7 dB | 04/11/2020 05:57:04.000 |
| 04/11/2020 06:05:00.000 - 04/11/2020 06:09:59.999 | 70.0 dB | 04/11/2020 06:07:04.000 |
| 04/11/2020 06:10:00.000 - 04/11/2020 06:14:59.999 | 71.4 dB | 04/11/2020 06:12:04.000 |
| 04/11/2020 06:15:00.000 - 04/11/2020 06:19:59.999 | 73.1 dB | 04/11/2020 06:17:04.000 |
| 04/11/2020 06:20:00.000 - 04/11/2020 06:24:59.999 | 73.1 dB | 04/11/2020 06:17:04.000 |
| 04/11/2020 06:25:00.000 - 04/11/2020 06:29:59.999 | 70.9 dB | 04/11/2020 06:27:04.000 |
| 04/11/2020 06:30:00.000 - 04/11/2020 06:34:59.999 | 70.9 dB | 04/11/2020 06:27:04.000 |
| 04/11/2020 06:35:00.000 - 04/11/2020 06:39:59.999 | 74.4 dB | 04/11/2020 06:37:04.000 |
| 04/11/2020 06:40:00.000 - 04/11/2020 06:44:59.999 | 74.4 dB | 04/11/2020 06:37:04.000 |
| 04/11/2020 06:45:00.000 - 04/11/2020 06:49:59.999 | 70.3 dB | 04/11/2020 06:42:04.000 |
| 04/11/2020 06:50:00.000 - 04/11/2020 06:54:59.999 | 66.3 dB | 04/11/2020 06:52:04.000 |
| 04/11/2020 06:55:00.000 - 04/11/2020 06:59:59.999 | 69.3 dB | 04/11/2020 06:57:04.000 |

## Results – Position B

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 7 to 10.

Table 7 - Measured noise level – Position B

| Period                       | L <sub>Aeq</sub> (dB) |
|------------------------------|-----------------------|
| Daytime, 12:22 – 23:00 hrs   | 67.5                  |
| Night-time, 23.00 – 07.00hrs | 62.5                  |
| Daytime, 07:00 – 11:22hrs    | 67.8                  |

Table 8 – L<sub>Aeq</sub> Day and Night Averages\_ Position B

| Period                       | L <sub>Aeq</sub> (dB) |
|------------------------------|-----------------------|
| Daytime, 07.00 – 23.00hrs    | 68                    |
| Night-time, 23.00 – 07.00hrs | 63                    |

Table 7 above outlines the L<sub>Aeq</sub> levels of the three periods over the 24-hour recording period. These figures could then be averaged to determine the LAeq,8hr and LAeq,16hr. The daytime L<sub>Aeq</sub> is currently 33dB above target, with the night-time L<sub>Aeq</sub> 33dB above target, which inform the minimum requirements of attenuation.

Calculated through Insul, a single skin 100mm brickwork finish would provide 44dB R<sub>w</sub>, and a traditional cavity masonry construction provides even more than this meaning that the real area of focus should be glazing. Openable windows provide a reduction of approximately 15dB when open, and a standard 6-12-6 double glazed unit offers attenuation of 35dB R<sub>w</sub>. As such, an opened window would reduce the daytime L<sub>Aeq</sub> to 53dB if open for the entire daytime duration. The night-time L<sub>Aeq</sub> would be expected to be around 48dB. Both figures would not meet required internal noise levels under BS 8233:2014.

Given the size of the development and the fact that Oldham Road (A62) and Butler Street surround the development on three sides, 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 to all plots on site.

In order to meet desired amenity area noise level requirements, it is recommended that an acoustic barrier is provided. An indicative diagram is provided and discussed on page 14. This barrier would also provide additional attenuation internally to plots nearest the train line, further ensuring compliance within internal BS 8233:2014 requirements.

## 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 an average 6-12-6 double glazed window (35dB Rw). A theoretical limit of 80dB can be applied to determine if the limits are likely to be achieved on site, which was exceeded eight times during recording.

Table 9 – 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             |
|-------------------------------------------------------------------------------------------|----------------------------------------|-------------------------|
| 03/11/2020 23:00:00.000 - 03/11/2020 23:04:59.999                                         | 79.3 dB                                | 03/11/2020 22:57:57.000 |
| 03/11/2020 23:05:00.000 - 03/11/2020 23:09:59.999                                         | 76.6 dB                                | 03/11/2020 23:07:57.000 |
| 03/11/2020 23:10:00.000 - 03/11/2020 23:14:59.999                                         | 76.6 dB                                | 03/11/2020 23:07:57.000 |
| 03/11/2020 23:15:00.000 - 03/11/2020 23:19:59.999                                         | 73.6 dB                                | 03/11/2020 23:17:57.000 |
| 03/11/2020 23:20:00.000 - 03/11/2020 23:24:59.999                                         | 76.0 dB                                | 03/11/2020 23:22:57.000 |
| 03/11/2020 23:25:00.000 - 03/11/2020 23:29:59.999                                         | 76.0 dB                                | 03/11/2020 23:22:57.000 |
| 03/11/2020 23:30:00.000 - 03/11/2020 23:34:59.999                                         | 74.6 dB                                | 03/11/2020 23:32:57.000 |
| 03/11/2020 23:35:00.000 - 03/11/2020 23:39:59.999                                         | 74.6 dB                                | 03/11/2020 23:32:57.000 |
| 03/11/2020 23:40:00.000 - 03/11/2020 23:44:59.999                                         | 75.5 dB                                | 03/11/2020 23:42:57.000 |
| 03/11/2020 23:45:00.000 - 03/11/2020 23:49:59.999                                         | 75.5 dB                                | 03/11/2020 23:42:57.000 |
| 03/11/2020 23:50:00.000 - 03/11/2020 23:54:59.999                                         | 74.3 dB                                | 03/11/2020 23:52:57.000 |
| 03/11/2020 23:55:00.000 - 03/11/2020 23:59:59.999                                         | 78.9 dB                                | 03/11/2020 23:57:57.000 |
| 04/11/2020 00:00:00.000 - 04/11/2020 00:04:59.999                                         | 81.8 dB                                | 04/11/2020 00:02:57.000 |
| 04/11/2020 00:05:00.000 - 04/11/2020 00:09:59.999                                         | 81.8 dB                                | 04/11/2020 00:02:57.000 |
| 04/11/2020 00:10:00.000 - 04/11/2020 00:14:59.999                                         | 88.1 dB                                | 04/11/2020 00:12:57.000 |
| 04/11/2020 00:15:00.000 - 04/11/2020 00:19:59.999                                         | 93.9 dB                                | 04/11/2020 00:17:57.000 |
| 04/11/2020 00:20:00.000 - 04/11/2020 00:24:59.999                                         | 93.9 dB                                | 04/11/2020 00:17:57.000 |
| 04/11/2020 00:25:00.000 - 04/11/2020 00:29:59.999                                         | 90.4 dB                                | 04/11/2020 00:22:57.000 |
| 04/11/2020 00:30:00.000 - 04/11/2020 00:34:59.999                                         | 78.8 dB                                | 04/11/2020 00:27:57.000 |
| 04/11/2020 00:35:00.000 - 04/11/2020 00:39:59.999                                         | 75.3 dB                                | 04/11/2020 00:32:57.000 |
| 04/11/2020 00:40:00.000 - 04/11/2020 00:44:59.999                                         | 75.5 dB                                | 04/11/2020 00:42:57.000 |
| 04/11/2020 00:45:00.000 - 04/11/2020 00:49:59.999                                         | 75.5 dB                                | 04/11/2020 00:42:57.000 |
| 04/11/2020 00:50:00.000 - 04/11/2020 00:54:59.999                                         | 87.3 dB                                | 04/11/2020 00:52:57.000 |
| 04/11/2020 00:55:00.000 - 04/11/2020 00:59:59.999                                         | 87.3 dB                                | 04/11/2020 00:52:57.000 |
| 04/11/2020 01:00:00.000 - 04/11/2020 01:04:59.999                                         | 76.0 dB                                | 04/11/2020 00:57:57.000 |
| 04/11/2020 01:05:00.000 - 04/11/2020 01:09:59.999                                         | 74.0 dB                                | 04/11/2020 01:02:57.000 |
| 04/11/2020 01:10:00.000 - 04/11/2020 01:14:59.999                                         | 75.6 dB                                | 04/11/2020 01:12:57.000 |
| 04/11/2020 01:15:00.000 - 04/11/2020 01:19:59.999                                         | 75.6 dB                                | 04/11/2020 01:12:57.000 |
| 04/11/2020 01:20:00.000 - 04/11/2020 01:24:59.999                                         | 71.7 dB                                | 04/11/2020 01:22:57.000 |
| 04/11/2020 01:25:00.000 - 04/11/2020 01:29:59.999                                         | 78.9 dB                                | 04/11/2020 01:27:57.000 |
| 04/11/2020 01:30:00.000 - 04/11/2020 01:34:59.999                                         | 85.0 dB                                | 04/11/2020 01:32:57.000 |
| 04/11/2020 01:35:00.000 - 04/11/2020 01:39:59.999                                         | 85.0 dB                                | 04/11/2020 01:32:57.000 |
| 04/11/2020 01:40:00.000 - 04/11/2020 01:44:59.999                                         | 77.0 dB                                | 04/11/2020 01:42:57.000 |
| 04/11/2020 01:45:00.000 - 04/11/2020 01:49:59.999                                         | 77.0 dB                                | 04/11/2020 01:42:57.000 |
| 04/11/2020 01:50:00.000 - 04/11/2020 01:54:59.999                                         | 72.2 dB                                | 04/11/2020 01:52:57.000 |
| 04/11/2020 01:55:00.000 - 04/11/2020 01:59:59.999                                         | 79.9 dB                                | 04/11/2020 01:57:57.000 |
| 04/11/2020 02:00:00.000 - 04/11/2020 02:04:59.999                                         | 79.9 dB                                | 04/11/2020 01:57:57.000 |
| 04/11/2020 02:05:00.000 - 04/11/2020 02:09:59.999                                         | 74.7 dB                                | 04/11/2020 02:07:57.000 |
| 04/11/2020 02:10:00.000 - 04/11/2020 02:14:59.999                                         | 74.7 dB                                | 04/11/2020 02:07:57.000 |
| 04/11/2020 02:15:00.000 - 04/11/2020 02:19:59.999                                         | 73.1 dB                                | 04/11/2020 02:12:57.000 |
| 04/11/2020 02:20:00.000 - 04/11/2020 02:24:59.999                                         | 75.4 dB                                | 04/11/2020 02:22:57.000 |
| 04/11/2020 02:25:00.000 - 04/11/2020 02:29:59.999                                         | 99.2 dB                                | 04/11/2020 02:27:57.000 |
| 04/11/2020 02:30:00.000 - 04/11/2020 02:34:59.999                                         | 99.2 dB                                | 04/11/2020 02:27:57.000 |
| 04/11/2020 02:35:00.000 - 04/11/2020 02:39:59.999                                         | 72.0 dB                                | 04/11/2020 02:32:57.000 |
| 04/11/2020 02:40:00.000 - 04/11/2020 02:44:59.999                                         | 70.8 dB                                | 04/11/2020 02:42:57.000 |
| 04/11/2020 02:45:00.000 - 04/11/2020 02:49:59.999                                         | 74.5 dB                                | 04/11/2020 02:47:57.000 |
| 04/11/2020 02:50:00.000 - 04/11/2020 02:54:59.999                                         | 74.5 dB                                | 04/11/2020 02:47:57.000 |
| 04/11/2020 02:55:00.000 - 04/11/2020 02:59:59.999                                         | 72.6 dB                                | 04/11/2020 02:57:57.000 |
| 04/11/2020 03:00:00.000 - 04/11/2020 03:04:59.999                                         | 72.6 dB                                | 04/11/2020 02:57:57.000 |
| 04/11/2020 03:05:00.000 - 04/11/2020 03:09:59.999                                         | 76.0 dB                                | 04/11/2020 03:07:57.000 |
| 04/11/2020 03:10:00.000 - 04/11/2020 03:14:59.999                                         | 76.0 dB                                | 04/11/2020 03:07:57.000 |
| 04/11/2020 03:15:00.000 - 04/11/2020 03:19:59.999                                         | 72.4 dB                                | 04/11/2020 03:17:57.000 |
| 04/11/2020 03:20:00.000 - 04/11/2020 03:24:59.999                                         | 73.6 dB                                | 04/11/2020 03:22:57.000 |
| 04/11/2020 03:25:00.000 - 04/11/2020 03:29:59.999                                         | 73.6 dB                                | 04/11/2020 03:22:57.000 |
| 04/11/2020 03:30:00.000 - 04/11/2020 03:34:59.999                                         | 72.8 dB                                | 04/11/2020 03:32:57.000 |

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

Table 10 – L<sub>AF,MAX</sub> Values

|                                                   |         |                         |
|---------------------------------------------------|---------|-------------------------|
| 04/11/2020 03:35:00.000 - 04/11/2020 03:39:59.999 | 79.6 dB | 04/11/2020 03:37:57.000 |
| 04/11/2020 03:40:00.000 - 04/11/2020 03:44:59.999 | 79.6 dB | 04/11/2020 03:37:57.000 |
| 04/11/2020 03:45:00.000 - 04/11/2020 03:49:59.999 | 70.3 dB | 04/11/2020 03:42:57.000 |
| 04/11/2020 03:50:00.000 - 04/11/2020 03:54:59.999 | 69.7 dB | 04/11/2020 03:47:57.000 |
| 04/11/2020 03:55:00.000 - 04/11/2020 03:59:59.999 | 68.8 dB | 04/11/2020 03:52:57.000 |
| 04/11/2020 04:00:00.000 - 04/11/2020 04:04:59.999 | 70.2 dB | 04/11/2020 04:02:57.000 |
| 04/11/2020 04:05:00.000 - 04/11/2020 04:09:59.999 | 74.0 dB | 04/11/2020 04:07:57.000 |
| 04/11/2020 04:10:00.000 - 04/11/2020 04:14:59.999 | 74.0 dB | 04/11/2020 04:07:57.000 |
| 04/11/2020 04:15:00.000 - 04/11/2020 04:19:59.999 | 67.8 dB | 04/11/2020 04:12:57.000 |
| 04/11/2020 04:20:00.000 - 04/11/2020 04:24:59.999 | 72.7 dB | 04/11/2020 04:22:57.000 |
| 04/11/2020 04:25:00.000 - 04/11/2020 04:29:59.999 | 72.7 dB | 04/11/2020 04:22:57.000 |
| 04/11/2020 04:30:00.000 - 04/11/2020 04:34:59.999 | 72.1 dB | 04/11/2020 04:32:57.000 |
| 04/11/2020 04:35:00.000 - 04/11/2020 04:39:59.999 | 72.1 dB | 04/11/2020 04:32:57.000 |
| 04/11/2020 04:40:00.000 - 04/11/2020 04:44:59.999 | 68.9 dB | 04/11/2020 04:42:57.000 |
| 04/11/2020 04:45:00.000 - 04/11/2020 04:49:59.999 | 75.5 dB | 04/11/2020 04:47:57.000 |
| 04/11/2020 04:50:00.000 - 04/11/2020 04:54:59.999 | 75.5 dB | 04/11/2020 04:47:57.000 |
| 04/11/2020 04:55:00.000 - 04/11/2020 04:59:59.999 | 75.0 dB | 04/11/2020 04:52:57.000 |
| 04/11/2020 05:00:00.000 - 04/11/2020 05:04:59.999 | 74.5 dB | 04/11/2020 04:57:57.000 |
| 04/11/2020 05:05:00.000 - 04/11/2020 05:09:59.999 | 71.4 dB | 04/11/2020 05:02:57.000 |
| 04/11/2020 05:10:00.000 - 04/11/2020 05:14:59.999 | 75.2 dB | 04/11/2020 05:12:57.000 |
| 04/11/2020 05:15:00.000 - 04/11/2020 05:19:59.999 | 75.2 dB | 04/11/2020 05:12:57.000 |
| 04/11/2020 05:20:00.000 - 04/11/2020 05:24:59.999 | 74.0 dB | 04/11/2020 05:22:57.000 |
| 04/11/2020 05:25:00.000 - 04/11/2020 05:29:59.999 | 74.0 dB | 04/11/2020 05:22:57.000 |
| 04/11/2020 05:30:00.000 - 04/11/2020 05:34:59.999 | 74.9 dB | 04/11/2020 05:32:57.000 |
| 04/11/2020 05:35:00.000 - 04/11/2020 05:39:59.999 | 74.9 dB | 04/11/2020 05:32:57.000 |
| 04/11/2020 05:40:00.000 - 04/11/2020 05:44:59.999 | 81.5 dB | 04/11/2020 05:42:57.000 |
| 04/11/2020 05:45:00.000 - 04/11/2020 05:49:59.999 | 81.5 dB | 04/11/2020 05:42:57.000 |
| 04/11/2020 05:50:00.000 - 04/11/2020 05:54:59.999 | 75.4 dB | 04/11/2020 05:52:57.000 |
| 04/11/2020 05:55:00.000 - 04/11/2020 05:59:59.999 | 75.4 dB | 04/11/2020 05:52:57.000 |
| 04/11/2020 06:00:00.000 - 04/11/2020 06:04:59.999 | 74.4 dB | 04/11/2020 05:57:57.000 |
| 04/11/2020 06:05:00.000 - 04/11/2020 06:09:59.999 | 72.8 dB | 04/11/2020 06:07:57.000 |
| 04/11/2020 06:10:00.000 - 04/11/2020 06:14:59.999 | 77.3 dB | 04/11/2020 06:12:57.000 |
| 04/11/2020 06:15:00.000 - 04/11/2020 06:19:59.999 | 77.3 dB | 04/11/2020 06:12:57.000 |
| 04/11/2020 06:20:00.000 - 04/11/2020 06:24:59.999 | 74.9 dB | 04/11/2020 06:22:57.000 |
| 04/11/2020 06:25:00.000 - 04/11/2020 06:29:59.999 | 74.9 dB | 04/11/2020 06:22:57.000 |
| 04/11/2020 06:30:00.000 - 04/11/2020 06:34:59.999 | 74.5 dB | 04/11/2020 06:27:57.000 |
| 04/11/2020 06:35:00.000 - 04/11/2020 06:39:59.999 | 77.0 dB | 04/11/2020 06:37:57.000 |
| 04/11/2020 06:40:00.000 - 04/11/2020 06:44:59.999 | 77.0 dB | 04/11/2020 06:37:57.000 |
| 04/11/2020 06:45:00.000 - 04/11/2020 06:49:59.999 | 76.7 dB | 04/11/2020 06:47:57.000 |
| 04/11/2020 06:50:00.000 - 04/11/2020 06:54:59.999 | 76.7 dB | 04/11/2020 06:47:57.000 |
| 04/11/2020 06:55:00.000 - 04/11/2020 06:59:59.999 | 76.5 dB | 04/11/2020 06:52:57.000 |

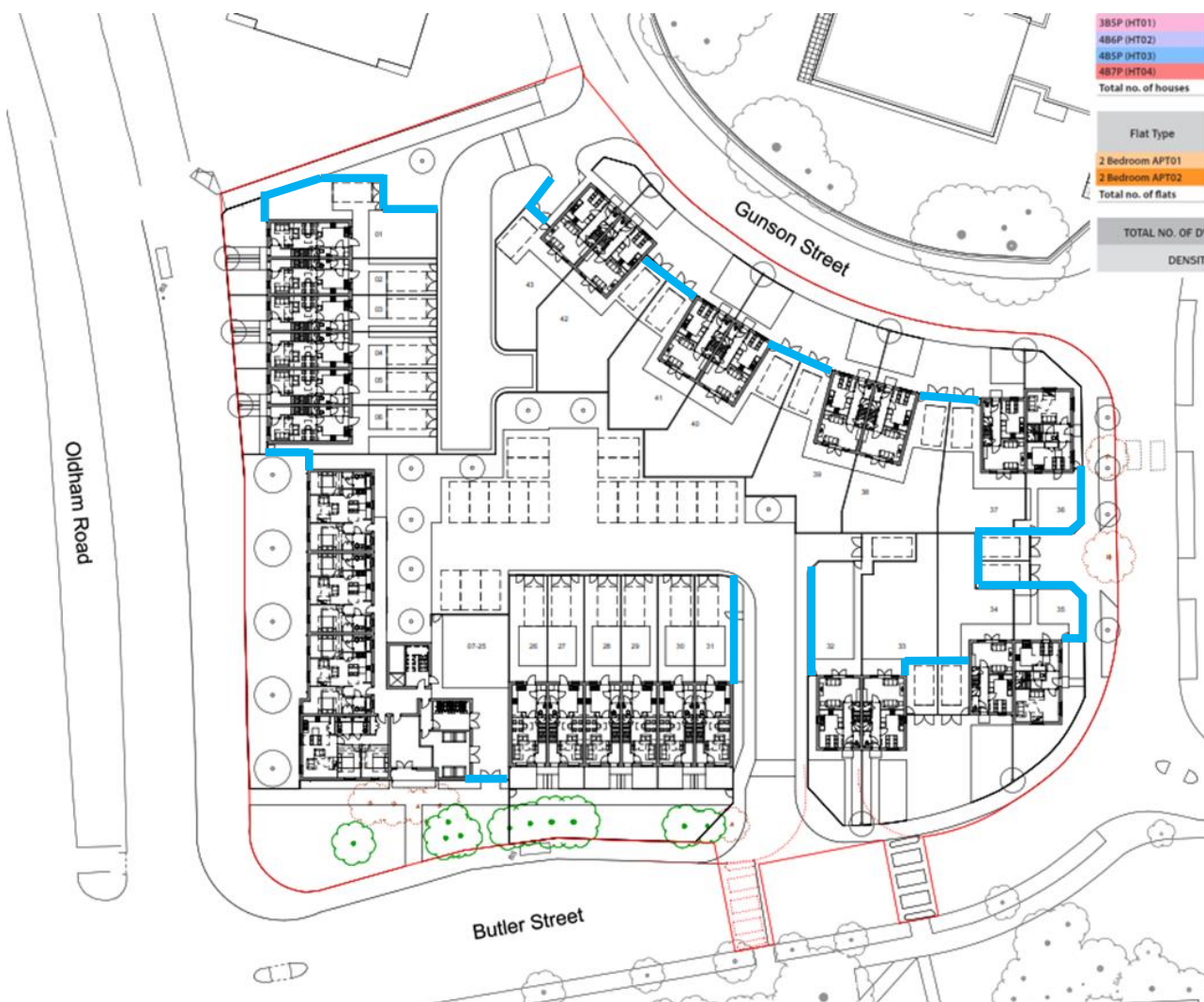
# Barrier Requirements

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



# Conclusions and Recommendations

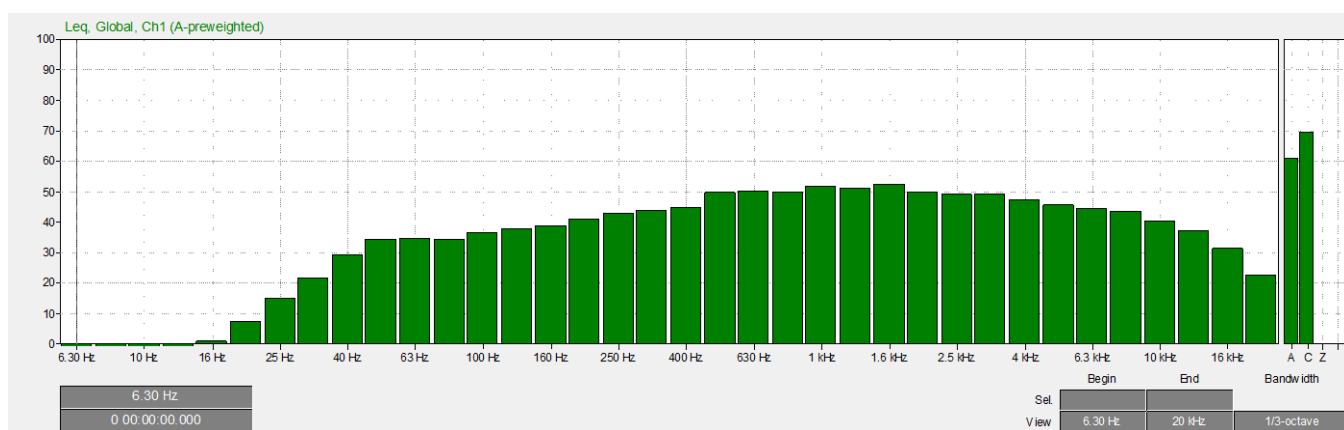
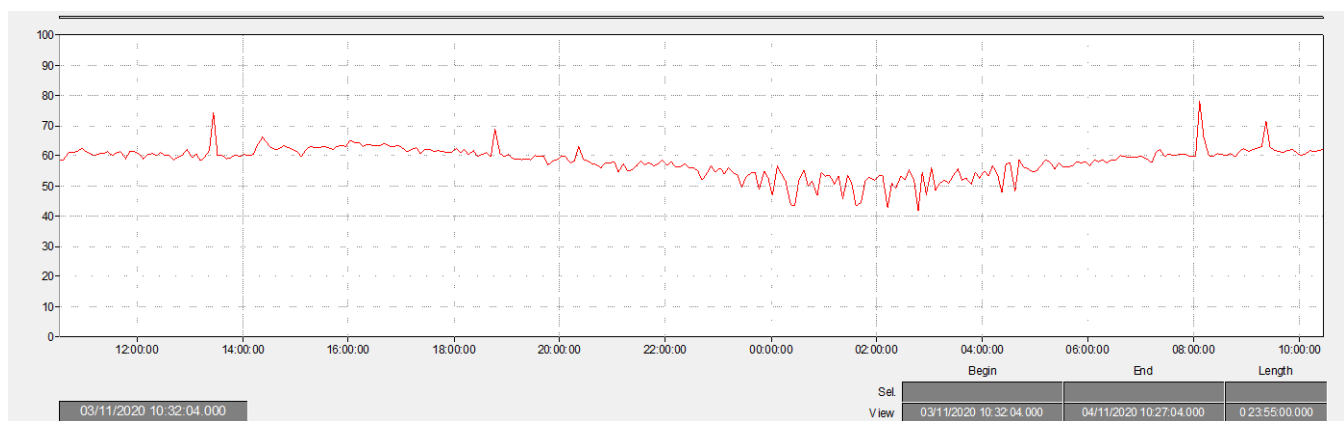
As discussed, it is recommended that all plots on site will require windows with a specification allowing windows to remain closed at the discretion of the occupant. Glazing attenuation should provide a minimum of 35dB  $R_w+C_{tr}$  and 42dB  $D_{n,e,w}$  if trickle vents are determined to be feasible.

The site will require an acoustic barrier layout similar to proposed within this report to provide desired amenity level noise for residents, 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.

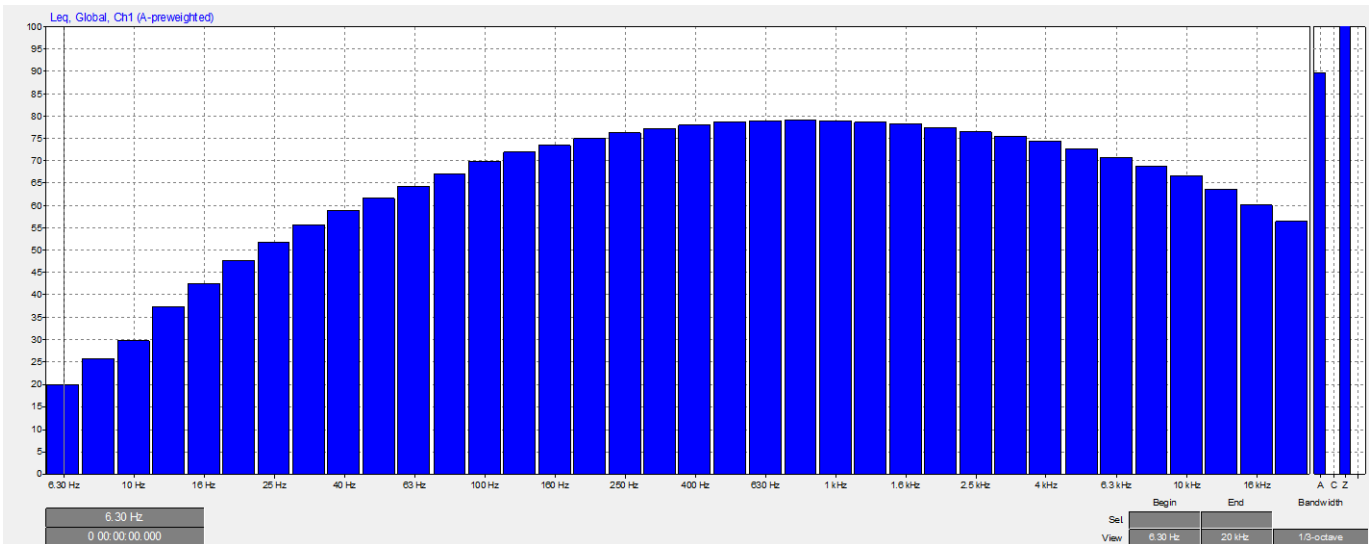
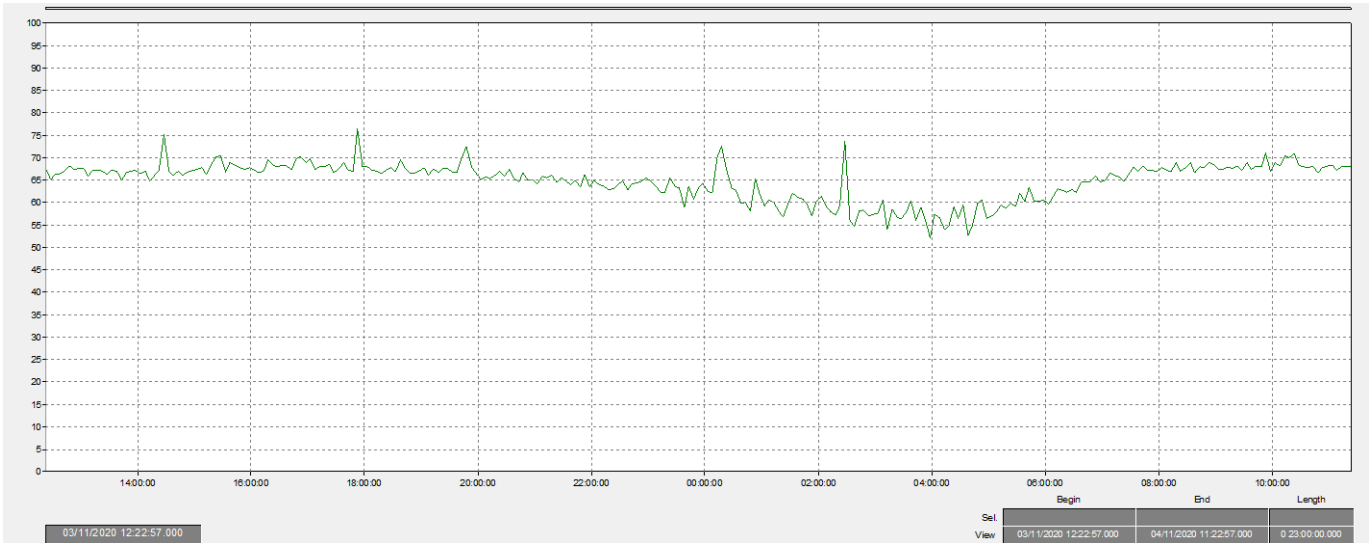
# Appendix A

## MEASUREMENT DATA – POSITION A



# Appendix A

## MEASUREMENT DATA – POSITION B



# 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.