

# **Acoustic South East**

## Noise Impact Assessment



|                          |                                     |
|--------------------------|-------------------------------------|
| <b>Client:</b>           | <b>Moretons Investments Limited</b> |
| <b>Site Address:</b>     | <b>32 Montague Street Worthing</b>  |
| <b>Reported By:</b>      | <b>George Orton BEng(Hons) MIOA</b> |
| <b>Date Written:</b>     | <b>19/08/2025</b>                   |
| <b>Issue 1</b>           |                                     |
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Report by: George Orton BEng (Hons) MIOA

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## 1 Summary and Conclusion

Acoustic Southeast have been appointed to undertake an acoustic assessment in support of a planning application. The development description can be seen below:

Prior approval application to convert office space to one residential dwelling.

The purpose of this assessment is to assess noise levels affecting the proposed noise sensitive receptors (NSRs). The following has been assessed:

- Noise from existing environmental sources close to proposed development
- Noise from existing commercial and entertainment premises close to proposed development

Noise levels have been measured close to where the proposed re-development will take place.

The noise levels for the day and the night time period have been assessed in terms of and following the guidelines of the documents listed below:

- World Health Organisation (WHO) - Guidelines for Community Noise 1999
- BS8233 (Sound insulation and noise reduction for buildings) 2014
- BS4142 (2014) Method for rating industrial noise affecting mixed residential and industrial areas
- ProPG: Planning & Noise (Professional Practice Guidance on Planning & Noise) 2017

Noise mitigation measures have been recommended and if they are implemented correctly the internal noise levels will achieve the guideline values detailed in ProPG, WHO and BS8233. To achieve the standard internal noise criteria secondary glazing may be required for windows overlooking Montague Street/Place.

Achieving these criteria will result in a good acoustic environment inside the proposed dwelling. As such it is considered that the change of use would not be refused on noise grounds.

## 2 Context & Noise Criteria

### 2.1 Context

The upper floors of the building will be converted from commercial use to a single dwelling. The ground floor will be retained as a commercial area (likely to be a retail unit or small café/restaurant). The noise sources affecting the proposed dwellings will be as detailed below:

- Street noise from Montague St/Place (Front/Side facade)
- Existing Commercial Plant (end of building)
- Retained ground floor commercial unit

### 2.2 Local Planning Guidance

Based upon the “*Planning Noise Advice Document - Sussex (November 2023)*” document, it is recommended in this case that appropriate criteria are provided by:

- BS4142 (2014+A1:2019) Method for rating industrial noise affecting mixed residential and industrial areas
- BS8233 (Sound insulation and noise reduction for buildings) 2014
- World Health Organisation (WHO) - Guidelines for Community Noise 1999

Reference is also made to the 2017 ProPG “Planning & Noise Document” although this project may be outside the scope of the guidance (conversion dwellings and road noise is not the dominant source of noise)

### 2.3 BS8233 Noise Criteria

Table 5 of BS8233 provides the following guideline values:

| Activity                   | Location         | Time period of day    |                      |
|----------------------------|------------------|-----------------------|----------------------|
|                            |                  | 07:00-23:00           | 23:00-07:00          |
| Resting                    | Living Rooms     | 35dB $L_{Aeq,16hour}$ | -                    |
| Dining                     | Dining Room/Area | 40dB $L_{Aeq,16hour}$ | -                    |
| Sleeping (daytime resting) | Bedroom          | 35dB $L_{Aeq,16hour}$ | 30dB $L_{Aeq,8hour}$ |

**Table 1: BS8233 Criteria**

### 2.4 WHO Internal Noise Criteria

The target internal levels are based on guidelines laid out by the World Health Organisation (WHO) and are as follows:

#### Room Type Target Maximum Internal Level - $L_{Aeq}$ dB (A)

Living rooms 35 (Daytime only)

Bedrooms 30 (Night)

#### Room Type Maximum Internal Level – $L_{Amax}$ dB(A)

Bedrooms 45 (not more than 10-15 times per Night)

The ProPG: *Planning & Noise – New Residential Development* (2017) document has slightly more onerous criteria where  $L_{Amax}$  events should not exceed 45dBA more than ten times during the night

## 2.5 WHO External Noise Criteria

With regard to outdoor amenity areas WHO states the following:

*To protect the majority of people from being seriously annoyed during the daytime, the outdoor sound level from steady, continuous noise should not exceed 55dB(A) on balconies, terraces and in outdoor living areas.*

*To protect the majority of people from being moderately annoyed during the daytime, the outdoor sound level from steady, continuous noise should not exceed 50dB(A) on balconies, terraces and in outdoor living areas.*

## 2.6 Building Regulations Criteria

Approved Document E of the Building Regulations (2003 Edition) specifies minimum performance values of Weighted Standardised Level Difference ( $D_{nT,w} + C_{tr}$ ) for airborne noise transmission through party floors and walls and Weighted Standardised Sound Pressure Level ( $L'_{nT,w}$ ) for impact sound transmission through a floor.

It should be noted that with airborne sound insulation it is the level difference that is being measured between rooms and the higher the result the better the insulation. With impact sound insulation it is the actual sound pressure level in the receiving room that is measured, and therefore the lower results, the better the insulation.

A summary of the acoustic requirements, for the conversion property, are as follows:

| Requirements of:        | Element | Airborne Sound Insulation ( $D_{nT,w} + C_{tr}$ ) | Impact Sound Insulation ( $L'_{nT,w}$ ) |
|-------------------------|---------|---------------------------------------------------|-----------------------------------------|
| Commercial/Dwelling*    | Floor   | $\geq 48\text{dB}$                                | N/A                                     |
| Bregs Dwelling/Dwelling | Floor   | $\geq 43\text{dB}$                                | $\leq 64\text{dB}$                      |
| Bregs Dwelling/Dwelling | Wall    | $\geq 43\text{dB}$                                | N/A                                     |

**Table 2: Building Regulations Noise Criteria**

\* For many other projects the Local Authorities in Sussex require that the basic ADE target is exceeded when there is a commercial unit directly adjacent to a dwelling. In this case the Building Regulations+5dB target should be sufficient (ground floor units are most likely going to be retail units and will not open late as arcade is locked up at the end of the day)

## 2.7 BS4142: 2014: Method for rating and assessing industrial and commercial sound

This document provides a means of assessing the impact of industrial or commercial sound upon nearby noise-sensitive receptors, including residential properties.

It does this by comparing the Rating Level of the noise from the industrial or commercial source with the pre-existent  $L_{90}$  background noise level affecting the same noise-sensitive premises. The Standard provides guidance that:

- Typically, the greater the difference, the greater the magnitude of the impact.
- A difference of around +10dB or more is likely to be an indication of a significant adverse impact, depending on the context.
- A difference of around +5dB is likely to be an indication of an adverse impact, depending on the context.
- The lower the rating level is relative to the measured background sound level, the less likely it is that the specific sound source will have an adverse impact or a significant adverse impact. Where the rating level does not exceed the background noise level, this is an indication of the specific sound source having a low impact, depending on the context.

## 2.8 Overheating and Acoustics

For new build properties the new Approved Document O of the Building Regulations details ways of reducing the risk of overheating. It should be noted that this conversion project would be outside of the ADO Scope.

For past projects the Local Authority have expressed concern over the risk of overheating and the problems that may occur if cooling is required via an open window that is subject to undesirable external sound levels. As such an “overheating condition” acoustic assessment has also been completed for the different proposed dwellings. To help with the assessment criteria for the overheating condition (at times when cooling is required) have been adopted based on the criteria in Approved Document O

### 2.8.1 ADO Criteria

The noise criteria details from the document have been copied below:

## Noise

- 3.2 In locations where external noise may be an issue (for example, where the local planning authority considered external noise to be an issue at the planning stage), the overheating mitigation strategy should take account of the likelihood that windows will be closed during sleeping hours (11pm to 7am).
- 3.3 Windows are likely to be closed during sleeping hours if noise within bedrooms exceeds the following limits.
  - a. 40dB  $L_{Aeq,T}$  averaged over 8 hours (between 11pm and 7am).
  - b. 55dB  $L_{AFmax}$  more than 10 times a night (between 11pm and 7am).

The ANC and IOA have also created the “*Guide to Demonstrating Compliance with the Noise Requirements of Approved Document O July 2022*” document

The document demonstrates that the noise level inside a room, with a window wide open, will be approximately 10dB lower than the outside free-field noise level (another document states that a partially open window will result in indoor noise levels 13dB lower than the external level).

### 3 Unattended Noise Survey Baseline Conditions and Results

Two separate sound surveys have been completed prior to the conversion being completed:

- Survey Position 1 (Front façade) - 13/08/24 to the 20/08/24.
- Survey Position 2 (Rear façade) - 13/08/24 to the 20/08/24.

The survey was completed for an application on the next-door property. However they were on the boundary with this property so are deemed representative, The survey positions can be seen in the figure within the appendix

#### 3.1 Details

- Survey carried out by: George Orton BEng (Hons) MIOA
- Equipment used: Castle Mirus & Svantek971 - Type1 Sound Level Meters
- Weather conditions: Sheltered location Wind speed average less than 5ms<sup>-1</sup>

Meters were calibrated before and after commencing the noise measurements (@94dB no drift). The façade level survey results for both positions have been reduced by 3dB to express the results as free-field levels. All levels in this report, unless stated otherwise, will be free-field levels.

#### 3.2 Survey Results - L<sub>Aeq</sub> & L<sub>Amax</sub>

The day and night time sound levels have been shown in the table below:

##### 3.2.1 Position 1 – Front

| Date    | Date   | Freefield Level - dBA        |                               |                                                     |
|---------|--------|------------------------------|-------------------------------|-----------------------------------------------------|
|         |        | L <sub>Aeq,07:00-23:00</sub> | L <sub>Aeq, 23:00-07:00</sub> | 10 <sup>th</sup> Highest<br>L <sub>Amax-night</sub> |
| Tue     | 13-Aug |                              | 49                            | 75                                                  |
| Wed     | 14-Aug | 55                           | 51                            | 72                                                  |
| Thu     | 15-Aug | 56                           | 48                            | 71                                                  |
| Fri     | 16-Aug | 55                           | 47                            | 71                                                  |
| Sat     | 17-Aug | 55                           | 51                            | 74                                                  |
| Sun     | 18-Aug | 52                           | 48                            | 73                                                  |
| Mon     | 19-Aug | 56                           | 45                            | 69                                                  |
| Average |        | 55                           | 48                            | 72                                                  |

Table 3: Survey 1 Results

##### 3.2.2 Position 2 – Rear

| Date    | Date   | Freefield Level - dBA        |                               |                                                     |
|---------|--------|------------------------------|-------------------------------|-----------------------------------------------------|
|         |        | L <sub>Aeq,07:00-23:00</sub> | L <sub>Aeq, 23:00-07:00</sub> | 10 <sup>th</sup> Highest<br>L <sub>Amax-night</sub> |
| Tue     | 13-Aug |                              | 43                            | 66                                                  |
| Wed     | 14-Aug | 49                           | 41                            | 64                                                  |
| Thu     | 15-Aug | 51                           | 44                            | 67                                                  |
| Fri     | 16-Aug | 50                           | 42                            | 66                                                  |
| Sat     | 17-Aug | 49                           | 42                            | 66                                                  |
| Sun     | 18-Aug | 47                           | 41                            | 66                                                  |
| Mon     | 19-Aug | 49                           | 40                            | 65                                                  |
| Average |        | 49                           | 42                            | 66                                                  |

Table 4: Survey 2 Results

### 3.3 Survey Results - $L_{A90}$ – Background Sound Levels

The  $L_{A90,15min}$  statistical modal (most commonly occurring) graphs can be seen below. A summary of the representative background sound levels would be:

- Front
  - Daytime = 44dBA
  - Night time = 38dBA
- Rear
  - Daytime = 48dBA
  - Night time = 39dBA

#### 3.3.1 Position 1 – Front

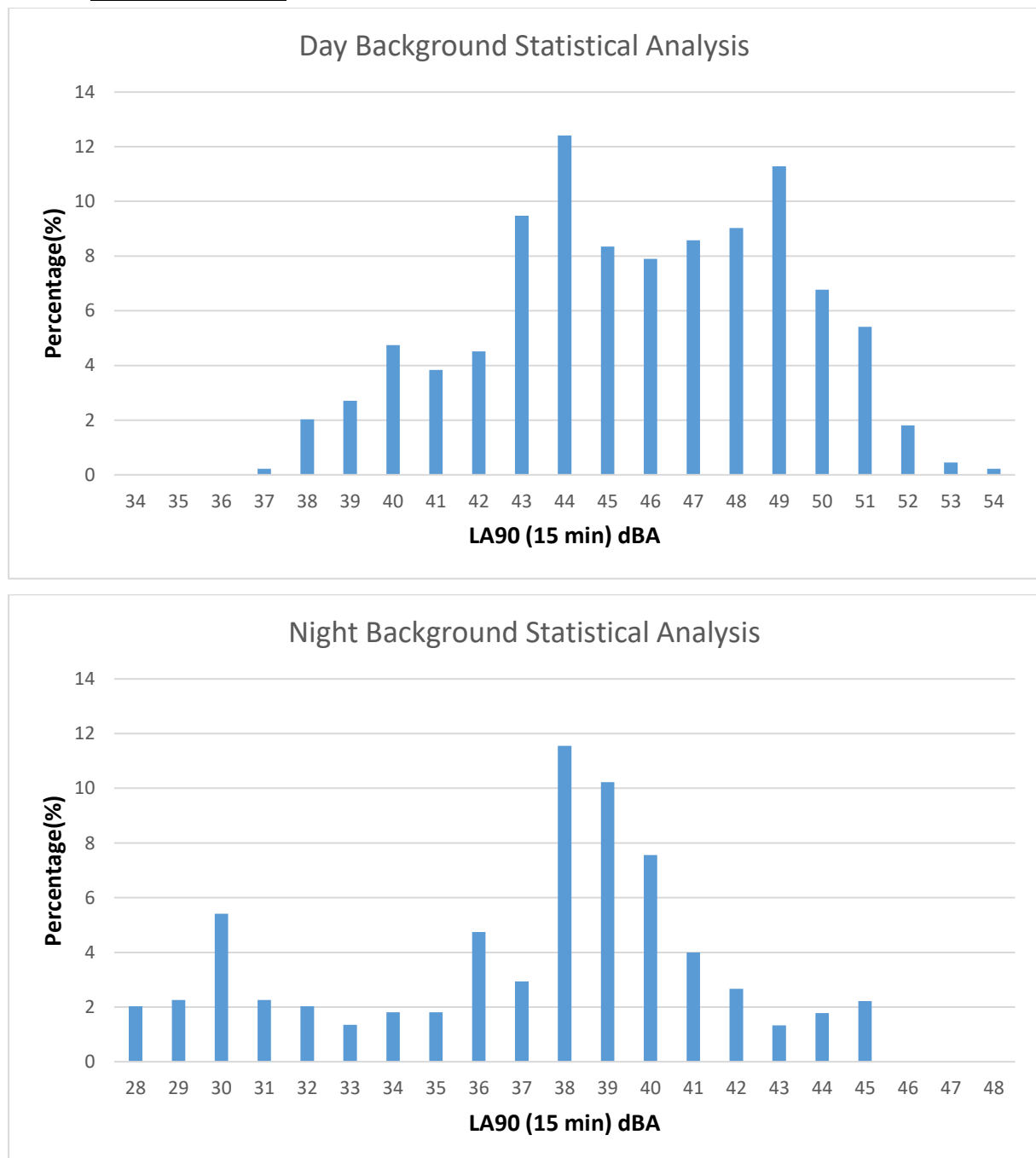


Figure 1: Position 1 Background Sound

3.3.2 Position 2 – Rear

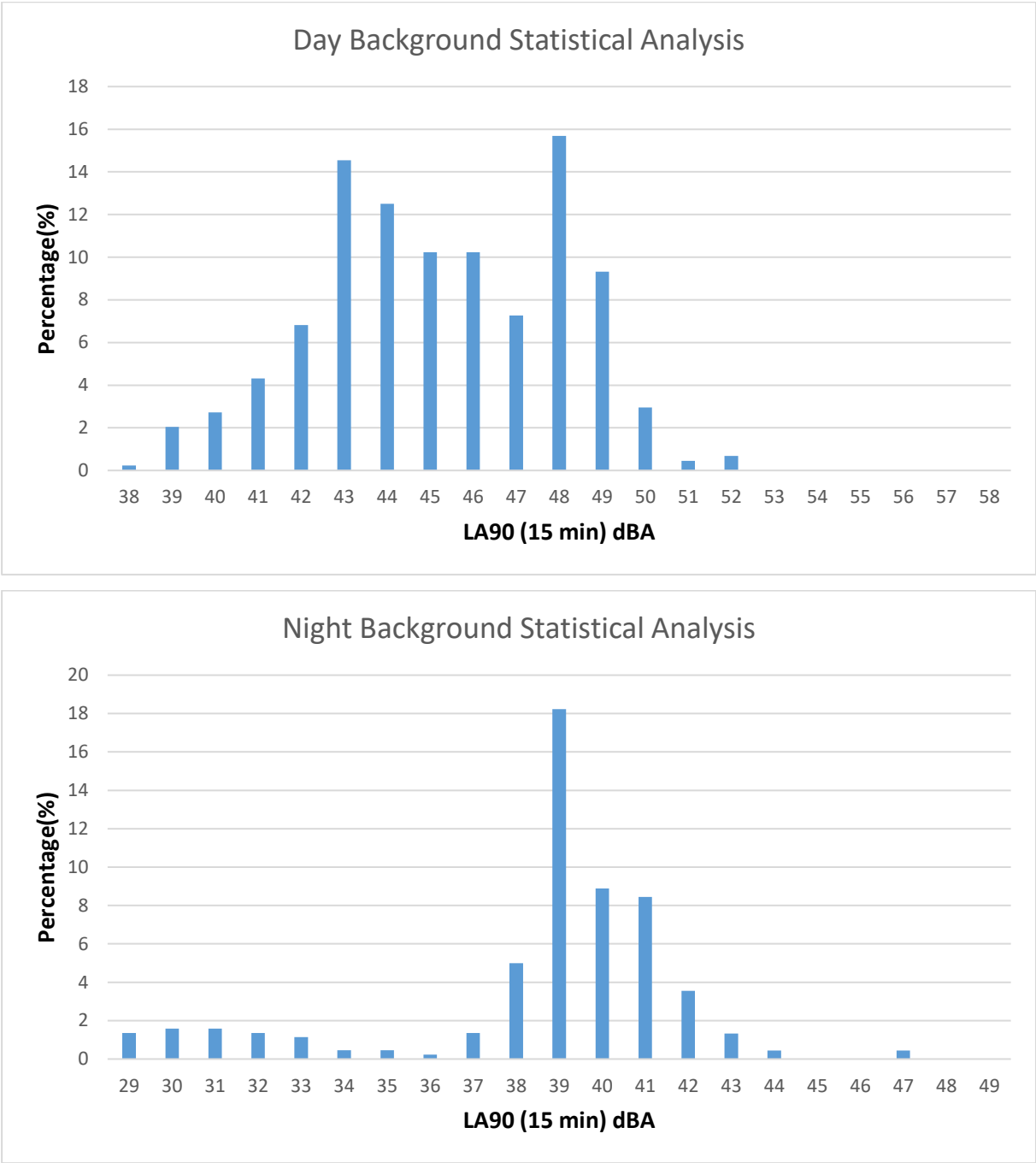


Figure 2: Position 2 Background Sound

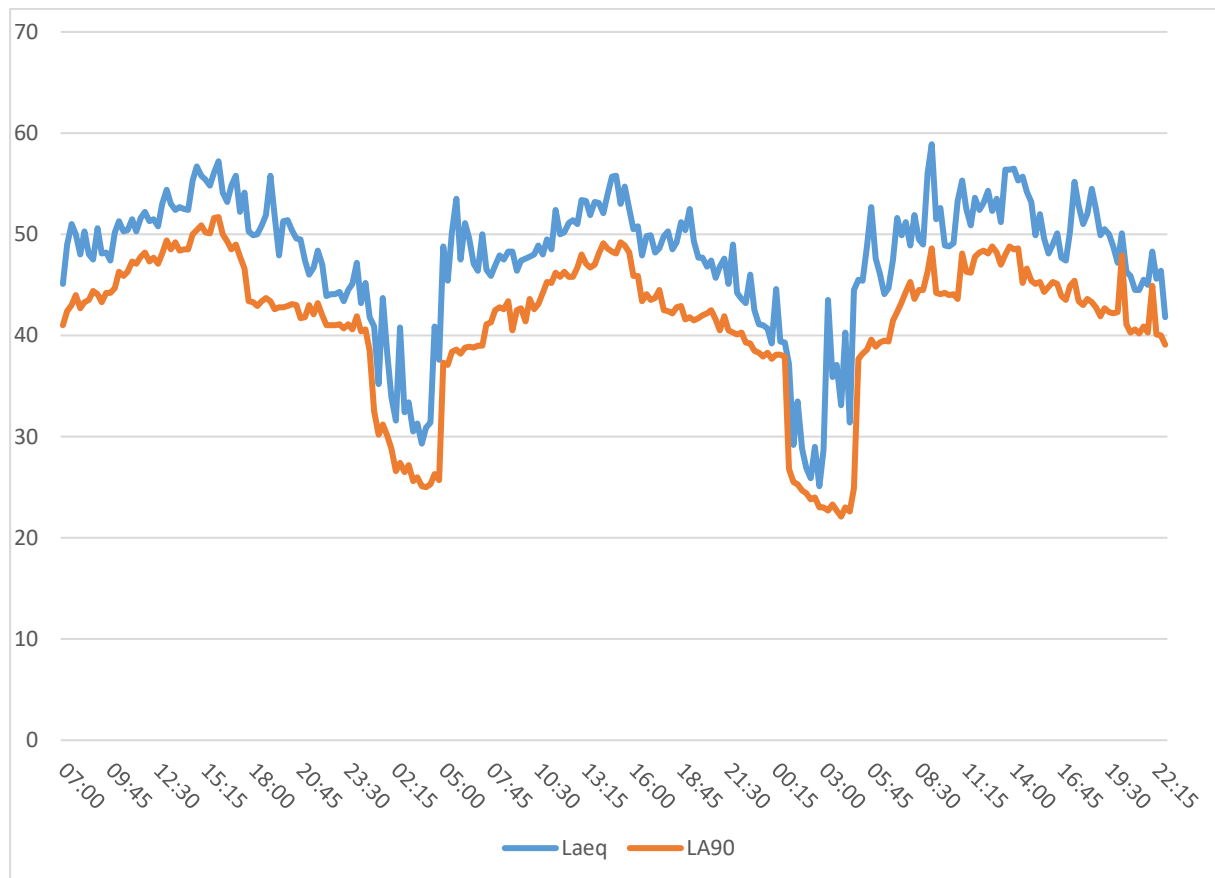
## 4 Assessments

### 4.1 BS4142

#### 4.1.1 Specific Sound at Survey Point

Whilst setting up the sound survey the sounds created by plant machinery were clearly audible. The plant is located rear façade of the neighbouring building (currently used as opticians)

The survey data for the weekend days have been shown below:



**Figure 3: Sun/Mon Graph**

The 15minute  $L_{Aeq}$  measurements demonstrate what would be classed as a diurnal pattern.

The background sound level does show a clear drop at shop closing time (17:00 Sat and 16:00 Sun). This may be more related to the shopping area becoming quiet as opposed to the plant switching off. If plant noise was more dominant during the day the L90 curve would likely be flatter throughout the day.

The daytime modal LA90 value (48dBA) may be acceptable to use as the specific sound level for the Heatpump plant that operates at a fairly steady level. Looking at the rear position results it is unlikely that the plant operates at night time

#### 4.1.2 Distance and Barrier Corrections

To err on the side of caution only a simple distance correction has been applied based on the distances shown below.

The barrier attenuation, provided by the side of the building has been ignored.



**Figure 4: Plant Location**

Assuming a 20Log reduction the distance correction will be minus 7dB (sound level at bedroom window is 7dB lower than sound level at the survey point).

Therefore the specific sound level used in the assessment will be 41dBA

#### 4.1.3 Background Sound Level

The survey data at the front (away from the plant at the rear) was used to find the most commonly occurring background sound level:

- Daytime  $L_{A90,15min} = 44\text{dBA}$

It is possible that the  $L_{A90,15min}$  levels at the front are marginally higher than at the rear. However the weekend graph above indicates the background sound level after closing time is around 43dBA. As earlier in the day the level would be higher the 44dBA modal value will be used for the assessment.

#### 4.1.4 Rating Level

The sounds created by the AC plant were not considered to be highly tonal. A 3dB correction will be applied to err on the side of caution.

#### 4.1.5 Assessment

The rating level of 44dB (41+3) is equal to the representative background sound level.

The Standard provides guidance that this should not create an adverse impact, depending on the context.

The context points, that may reduce the possibility of adverse impacts, are as follows:

- Plant only operates during the day
- The occupants will move in to the dwellings with the plant operational (as opposed to new plant next to existing dwellings)
- Specific sound levels are fairly modest

### 4.2 **WHO/BS8233 Noise Assessments**

To further assess the likely noise impact, upon nearby NSRs, guidelines and standards, other than BS4142, can also be used

#### 4.2.1 Criteria

Based on BS8233/WHO the maximum internal/external noise level for each area is as follows:

- Bedrooms  $\leq 35/30\text{dBA}$  Day/Night (Inside)
- Bedrooms  $\leq 10$  events, per night, over  $L_{Amax}$  45dB (Inside)
- Lounges  $\leq 35\text{dBA}$  Day (Inside)
- Outdoor Areas  $\leq 50\text{dBA}$  (N/A as there are no external amenity areas)

#### 4.2.2 Distance Corrections

For the front façade sound survey the microphone was outside the second floor. For the 1<sup>st</sup> floor (closer to the street level) a 4dB increase in sound levels will be applied (worst case points source correction for 4.5m to 7.5m distances)

For the rear sound survey no corrections will be applied as the survey microphone was at the top of the first floor window.

#### 4.2.3 Required Sound Reduction

In order for the BS8233 and WHO criteria to be achieved the building envelope will have to achieve the following levels of sound insulation (SRI). For the LA<sub>max</sub> SRI the sound reduction is based on achieving an average of no more than 10 events over 45dBA per night (ProPG criteria). The required sound reduction levels are detailed in the table below:

| Floor | Room          | Ext level<br>dBA<br>Day/Night/max | Required Sound Reduction |             |                          |
|-------|---------------|-----------------------------------|--------------------------|-------------|--------------------------|
|       |               |                                   | 07:00-23:00              | 23:00-07:00 | L <sub>Amax</sub> -night |
| 1     | Lounge        | 59                                | 24                       |             |                          |
| 1     | Bedroom       | 59/52/76                          | 24                       | 22          | 31                       |
| 2     | Kitchen/Diner | 55                                | 20                       |             |                          |

**Table 5: Required Sound Reduction**

## 5 Mitigation Measures – Normal Condition

As this report has been completed at the planning stage only generic mitigation measures have been recommended. During the detailed design phase specific measures will be incorporated into the design so the criteria can be achieved. To help with specifying the mitigation measures the following table has been copied from the AVOG guide. The table estimates the sound façade reduction values for different glazing and ventilation scenarios:

**Table B-2 Potential level differences associated with different ventilation Systems from ADF**

| Ventilation System from ADF | Cont. equiv. (L <sub>Aeq</sub> ) or events (L <sub>AFmax</sub> ) | Level Difference, external free field level – internal reverberant level, dB |                                              |
|-----------------------------|------------------------------------------------------------------|------------------------------------------------------------------------------|----------------------------------------------|
|                             |                                                                  | Typical windows and vent                                                     | Higher acoustic performance windows and vent |
| 1, 2                        | L <sub>Aeq</sub>                                                 | 21                                                                           | 31                                           |
|                             | L <sub>AFmax</sub>                                               | 22                                                                           | 35                                           |
| 3 (with trickle vent)       | L <sub>Aeq</sub>                                                 | 23                                                                           | 33                                           |
|                             | L <sub>AFmax</sub>                                               | 24                                                                           | 38                                           |
| 4 (no trickle vent)         | L <sub>Aeq</sub>                                                 | 27                                                                           | 38                                           |
|                             | L <sub>AFmax</sub>                                               | 31                                                                           | 45                                           |

**Figure 5: AVOG Table B2**

## 5.1 Glazing

For the bedrooms and lounges facing onto Montague Street/Place, in order to achieve the levels in table 5 above, secondary glazing will have to be installed (As it is understood that the existing single glazed sash units are to be retained).

## 5.2 Whole Dwelling ADF Ventilation

There is sometimes be confusion over ventilation for cooling or purge purposes and “whole dwelling ventilation” as defined in Approved Document F (the latter is often referred to as background ventilation

Whole dwelling ventilation relates to supplying a minimum level of outdoor air for occupants’ health). It is understood there are no examples in the Approved Document where whole dwelling ventilation can be completed using an open window (irrespective of external noise climate). This is shown in the extract below:

**NOTE:** A window with a night latch position is not adequate for background ventilation, due to the following.

- The risk of draughts.
- Security issues.
- The difficulty of measuring the equivalent area.

**Figure 6: ADF Extract**

A ventilation strategy will have to be developed at the detailed design stage that achieves the ADF ventilation rates. Irrespective of the noise climate the whole house ventilation system will not rely on open windows to provide the correct ventilation levels (in order to comply with the Approved Document criteria). Based on the AVOG table a strategy with acoustic trickle vents would be possible in terms of acoustics as would a ducted system.

## 6 Mitigation Measures – Overheating Condition

At this stage a full overheating assessment has not been completed.

To achieve the adopted overheating criteria (ADO which concerns bedrooms at night time) the sound reduction required will be 10dB lower than as detailed in the table in the previous section. The required sound reduction therefore would be as detailed below

| Floor | Facade | Room     | Required Sound Reduction<br>Overheating Condition |                          |
|-------|--------|----------|---------------------------------------------------|--------------------------|
|       |        |          | 23:00-07:00                                       | L <sub>Amax</sub> -night |
| 1     | Front  | Bedrooms | 12                                                | 21                       |

**Table 6: Required Sound Reduction - Overheating**

The above shows that the overheating strategy could possibly include the following points (if required as both facades are fairly sheltered/shaded by other nearby buildings):

- criteria achieved with windows closed or secondary glazing acting as plenum
- Low G secondary glazing (to reduce thermal gains)
- Mechanical cooling from extract fans or MVHR system

*It should be noted that even in high noise areas the strategy could still implement open windows for certain periods of time. For example, one strategy, for a bedroom, may include open windows during the day (when unoccupied) and closed windows at night (to prevent sleep disturbance)*

## 7 Sound Insulation of Internal Partitions

This report is required to be submitted prior to the commencement of the development. As such the detailed design has not been completed.

The sound insulation of the floor will be upgraded to achieve at least  $D_{nT,w} + C_{tr} \geq 48\text{dB}$  (assuming the ground floor is a retail unit as opposed to a café/bar etc.)

To reduce sound transfer from the ground floor retail areas, to the 1<sup>st</sup> floor areas of the new dwelling above, new suspended ceilings are to be installed. Services and lighting are to be surface mounted below the fire/acoustic ceiling. Two example specifications have been detailed below:

- Independent Timber Ceiling
  - Over boarded existing floorboards (or new 22mm Chipboard/Ply)
  - Existing timber joists
  - Existing Ceiling (made good if damaged) or 15mm Fireline to underside of joists
  - 100mm acoustic mineral wool or Rockwool
  - Independent timber joists (mid span resilient hangers if required)
  - 2x12.5mm Soundbloc
- Metal Furring (MF) Ceiling
  - Over boarded existing floorboards (or new 22mm Chipboard/Ply)
  - Existing timber joists
  - Existing Ceiling (made good if damaged) or 15mm Fireline to underside of joists
  - 100mm acoustic mineral wool or Rockwool
  - MF Ceiling on resilient hangers
  - 2x12.5mm Soundbloc

## 8 Appendix



Figure 7: LT Survey Locations