



**ACOUSTIC**  
CONSULTANTS LTD

# Noise Impact Assessment

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**For MAINTY Group LTD**  
**83 Commercial Street, Newport, NP201LR**

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**Reference: 15443/ER**

**Client:****MAINTY Group Consulting LTD****Document Control**

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|                 |                              |              |                |                     |                     |
|                 |                              |              |                |                     |                     |
|                 |                              |              |                |                     |                     |

The report has been prepared in good faith, with all reasonable skill and care, based on information provided or available at the time of its preparation and within the scope of work agreement with the Client. We disclaim any responsibility to the Client and others in respect of any matters outside the scope of the above. The report is provided for the sole use of the named Client and is confidential to them and their professional advisors. No responsibility is accepted to other parties.

The report limits itself to addressing solely on the noise, acoustic, and vibration aspects as included in this report. We provide advice only in relation to noise, vibration and acoustics. It is recommended that appropriate expert advice is sought on all the ramifications (e.g. CDM, structural, condensation, fire, legal, etc.) associated with any proposals in this report or as advised and concerning the appointment. It should be noted that noise predictions are based on the current information as we understand it and, on the performances noted in this report. Any modification to these parameters can alter the predicted level. All predictions are in any event subject to a degree of tolerance of normally plus or minus three decibels. If this tolerance is not acceptable, then it would be necessary to consider further measures.

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# 1. Introduction

MAINTY Group Ltd appointed Acoustic Consultants Limited to undertake an environmental noise assessment for the residential development located at 83 Commercial Street, Newport, NP201LR.

This assessment considers the impact of noise from the surrounding area. A noise survey was conducted to establish environmental noise levels at the site.

Internal noise levels have been predicted and assessed based on the measured survey data and site plans. Where guideline noise levels are predicted to be exceeded internally, required noise mitigation measures have been set out in this report.

This report is created to support a planning application to provide 6no residential properties at the address in question. The noise assessment has been undertaken in accordance with the requirements, British Standard 8233:2014 (BS8233) and WHO (1999).

## 2. The Site & Proposals

The site is located on Commercial Street within Newport city centre. Newport Street is a vehicle and pedestrian-friendly, commercial street with retail units spanning the ground floor level of the entire street.

It is proposed to develop 6 residential flats over 2 existing stories and a new-build 3<sup>rd</sup> floor. Flats will consist of bedrooms and daytime living rooms.

It is proposed to retain the existing, ground-floor retail unit with enclosed commercial waste zone. Assessment of noise ingress from the retail unit into the first-floor residential flat is beyond the scope of this report.

The site location and proposed plans are provided in the figures below.



Figure 1: Proposed site location

Figure 2: Proposed ground and first floor plan



Figure 3: Proposed second and third floor plan



### 3. Planning Application

Planning permission is being sought through planning application 25/0153/FUL.

This noise assessment is being carried out in advance of permission being granted therefore it is assumed, if planning should be granted, the relevant details need not be controlled under a standard condition.

E.g.: "No development should take place until a Noise Impact Assessment has been carried out and submitted to the Local Planning Authority for approval. Any sound mitigation measures recommended within the approved Noise Impact Assessment shall be fully implemented and a verification report submitted to the Local Planning Authority prior to beneficial use. Reason: To protect future occupiers of the residential units from unreasonable noise disturbance."

## 4. Assessment Criteria

This assessment is written in line with BS8233:2014 'Guidance on sound insulation and noise reduction for buildings', which provides advice on noise as it affects buildings of all types, giving consideration to various common sources of noise. This is considered relevant when assessing noise from external noise sources as it effects the proposed residential properties.

The standard outlines design guidance in general terms and provides criteria for the indoor ambient noise levels (IANLs) for different types of room. These are stated in terms of the 'equivalent continuous sound pressure level' over the reference time period, the  $L_{Aeq, T}$ . The IANLs specified by British Standard 8233 that are relevant to this development are as follows.

Table 1: British Standard 8233:2014 Internal Noise Criteria

| Activity                   | Location         | Daytime<br>(07:00 to 23:00)     | Night-time<br>(23:00 to 07:00) |
|----------------------------|------------------|---------------------------------|--------------------------------|
| Resting                    | Living Room      | 35 dB $L_{Aeq,16 \text{ hour}}$ | -                              |
| Dining                     | Dining Room/area | 40 dB $L_{Aeq,16 \text{ hour}}$ | -                              |
| Sleeping (daytime resting) | Bedroom          | 35 dB $L_{Aeq,16 \text{ hour}}$ | 30 dB $L_{Aeq,8 \text{ hour}}$ |

The British Standard does not provide any internal noise criteria for maximum noise levels.

Section 3.4 of the WHO Guidelines state "For a good sleep, it is believed that indoor sound pressure levels should not exceed approximately 45 dB  $L_{Amax}$  more than 10-15 times per night (Vallet & Verbey 1991)". We would consider this criteria applicable.

## 5. Baseline Noise Monitoring

A partially-attended baseline noise survey was completed at the site on Monday 5<sup>th</sup> – Friday 9<sup>th</sup> of January 2026.

### 5.1. Monitoring Equipment

Sound Pressure Levels were measured using a Class 1 sound level meter with a half-inch condenser microphone, using the 'fast' setting. The equipment is checked regularly using a Quality System meeting the requirements of British Standard EN ISO/IEC 17025:2017 "General requirements for the competence of testing and calibration laboratories"; in accordance with British Standard EN 10012:2003 "Measurement management systems. Requirements for measurement processes and measuring equipment"; and traceable to the National Standards.

This equipment was checked and calibrated as noted below and the certificates are available for inspection.

Table 2: Equipment and Calibration Status

| Equipment Description / Manufacturer / Type | Serial Number | Date of Calibration | Calibration Certification Number |
|---------------------------------------------|---------------|---------------------|----------------------------------|
| SLM, NTI, XL2                               | A2A-13561-E0  | 18/11/2025          | 39498                            |
| Pre-Amp, NTI, MA220                         | 7606          | 18/11/2025          | 39498                            |
| Microphone, NTI, MC230A                     | A17955        | 18/11/2025          | 39497                            |
| Calibrator, Larson Davis, CAL200            | 15064         | 10/12/2025          | 42729                            |
| SLM, Cirrus Research, CR:171C               | G080650       | 23/07/2025          | 177498                           |
| Microphone, Cirrus Research, MK224          | 210551D       | 23/07/2025          | 177495                           |
| Calibrator, Cirrus Research, CR:515         | 84377         | 23/07/2025          | 177496                           |

The measurement system was checked before and after use with the noted calibrator and no significant drift was detected.

### 5.2. Weather Conditions

The weather conditions present at the site over the survey period are detailed below.

Table 3: Weather Conditions During Survey

| Date       | Wind Speed (m/s) | Prevailing Wind Direction | Average Air Temperature (°C) | Rainfall (time/hrs) | Cloud Cover (%) |
|------------|------------------|---------------------------|------------------------------|---------------------|-----------------|
| 05/01/2026 | ≤5               | W                         | 6 – 9                        | 4                   | 50              |
| 06/01/2026 | ≤3               | E                         | 6 – 10                       | 3                   | 100             |
| 07/01/2026 | ≤4               | E                         | 6 – 9                        | 0                   | 0               |
| 08/01/2026 | ≤5               | E                         | 7 – 10                       | 2                   | 25              |
| 09/01/2026 | ≤6               | W                         | 8 – 11                       | 21                  | 100             |
| 10/01/2026 | ≤6               | S                         | 7 – 11                       | 12                  | 100             |

Weather conditions from 05/01/2026 – 10/01/2026 are not expected to have had an adverse effect on the collected data.

### 5.3. Noise Monitoring Procedure

The partially attended noise survey was undertaken at the proposed site in two monitoring locations, ML 1 & ML 2 as detailed below.

The microphone at ML 1 was situated in a façade position out a first-floor window on the southern façade overlooking Commercial Street. Noise levels at this monitoring position were determined by street-level pedestrian traffic and vehicles.

The microphone at ML 2 was situated in a façade position at height on the eastern façade. Noise levels at this monitoring position were primarily determined by car movement activity. Noise from fixed plant was present, however, it was determined on site that noise from plant is negligible when in context with the residual noise climate.

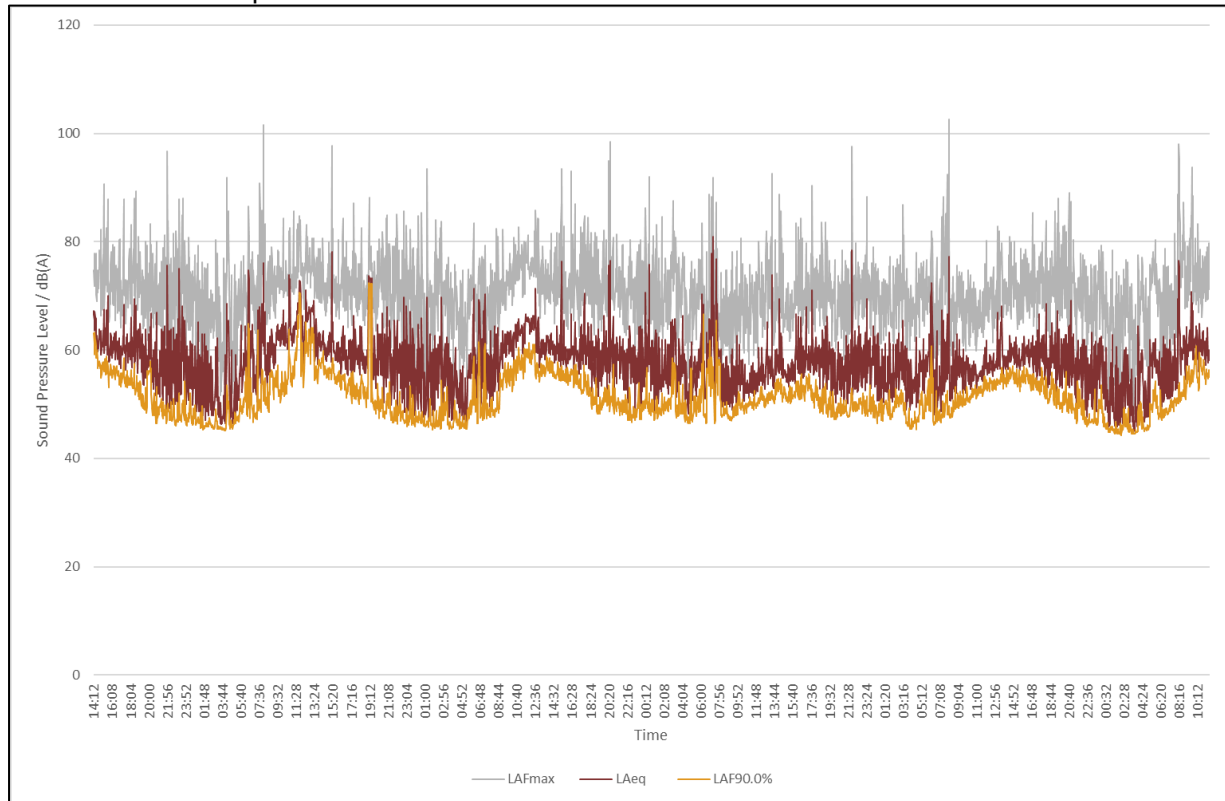
Distant road traffic noise from the surrounding road network was also present at both monitoring positions.

## 5.4. Measured Noise Levels

### 5.4.1. Monitoring Location 1

A chart of the variation in equivalent and maximum noise levels over time, at the monitoring location, is provided below.

Chart 1: Measured equivalent and maximum noise levels at ML 1



The equivalent noise levels and design night-time maximum noise levels determined from the measurement data at the monitoring location, excluding periods of poor weather, are provided in the table below.

Table 4: Measured equivalent and maximum noise levels at the monitoring location (façade levels)

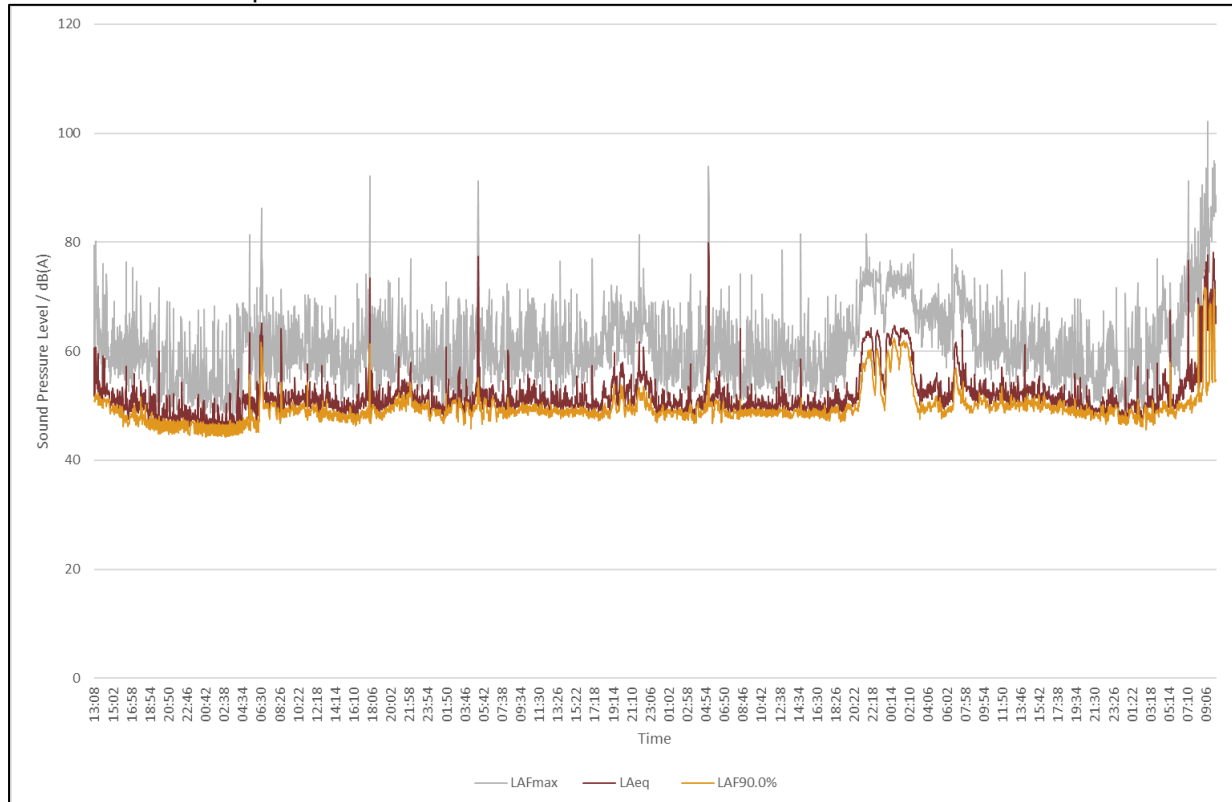
| Period          | Sound Pressure Level (dB) per Octave Band (Hz) |     |     |     |    |    |    |    | dB(A) |
|-----------------|------------------------------------------------|-----|-----|-----|----|----|----|----|-------|
|                 | 63                                             | 125 | 250 | 500 | 1K | 2K | 4K | 8K |       |
| $L_{eq}(16hrs)$ | 63                                             | 63  | 61  | 60  | 59 | 56 | 48 | 41 | 63    |
| $L_{eq}(8hrs)$  | 61                                             | 61  | 58  | 56  | 56 | 51 | 47 | 44 | 60    |
| $L_{maxF}^*$    | 74                                             | 72  | 71  | 81  | 82 | 72 | 64 | 53 | 84    |

\*10<sup>th</sup> highest maximum noise event

### 5.4.2. Monitoring Location 2

A chart of the variation in equivalent and maximum noise levels over time, at the monitoring location, is provided below.

Chart 2: Measured equivalent and maximum noise levels at ML 2



The equivalent noise levels and design night-time maximum noise levels determined from the measurement data at the monitoring location, excluding periods of poor weather, are provided in the table below.

Table 5: Measured equivalent and maximum noise levels at the monitoring location (façade levels)

| Period          | Sound Pressure Level (dB) per Octave Band (Hz) |     |     |     |    |    |    |    | dB(A) |
|-----------------|------------------------------------------------|-----|-----|-----|----|----|----|----|-------|
|                 | 63                                             | 125 | 250 | 500 | 1K | 2K | 4K | 8K |       |
| $L_{eq}(16hrs)$ | 58                                             | 55  | 53  | 50  | 47 | 43 | 36 | 26 | 52    |
| $L_{eq}(8hrs)$  | 55                                             | 54  | 52  | 56  | 48 | 44 | 38 | 27 | 55    |
| $L_{maxF^*}$    | 70                                             | 69  | 65  | 64  | 70 | 63 | 56 | 38 | 72    |

\*10<sup>th</sup> highest maximum noise event

## 6. Noise Control Measures

Noise level ingress from external noise sources, such as pedestrian traffic will need to be controlled through façade construction and appropriate ventilation techniques in order to meet BS8233:2014 IANL criteria.

### 6.1. Design Noise Levels

The table below details the free-field design noise levels that represent the noise levels impacting on the façades of the proposals.

Table 6: Design equivalent and maximum noise levels at building façades (free-field levels)

| Façade  | Period     | Sound Pressure Level ( $L_{zeq}$ dB) per Octave Band (Hz) |     |     |     |    |    |    |    | dB(A) |
|---------|------------|-----------------------------------------------------------|-----|-----|-----|----|----|----|----|-------|
|         |            | 63                                                        | 125 | 250 | 500 | 1K | 2K | 4K | 8K |       |
| Western | Daytime    | 60                                                        | 60  | 58  | 57  | 56 | 53 | 45 | 38 | 60    |
|         | Night-time | 58                                                        | 58  | 55  | 53  | 53 | 48 | 44 | 41 | 57    |
|         | Maximum    | 71                                                        | 69  | 68  | 78  | 79 | 69 | 61 | 50 | 81    |
| Eastern | Daytime    | 55                                                        | 52  | 50  | 47  | 44 | 40 | 33 | 23 | 49    |
|         | Night-time | 52                                                        | 51  | 49  | 53  | 45 | 41 | 35 | 24 | 52    |
|         | Maximum    | 67                                                        | 66  | 62  | 61  | 67 | 60 | 53 | 35 | 69    |

### 6.2. Building Façade Construction

#### 6.2.1. Calculation Method

Calculations for the internal ambient noise levels have been undertaken using the calculation method provided in Annex G Section G.2 of British Standard 8233:2014.

The calculations have been undertaken using the building façade construction specified below and the octave band free-field design equivalent noise levels and maximum noise levels taken from the design noise spectra noted above.

We advise that building elements, having the sound insulation performances noted below, be incorporated into the design of the façades including the windows, doors and ventilation system.

Alternative constructions to those noted below could be used, however they would need to be assessed to ensure they control external noise to within the BS 8233:2014 recommended internal ambient noise level criteria.

The calculations are based on the dimensions within architectural drawings provided in section 2 , as well as the following assumptions:

- Vents: 2 to daytime rooms and 1 to bedrooms; all vents are open
- Reverberation ( $T_{mf}$ ) of 0.5 seconds
- Room height of 2.4 meters
- The proposed external wall for the first and second floors are as detailed in section 6.2.2 below.

### 6.2.2. External Wall Construction

The proposed external wall construction will be at least 1x100mm facing brick, 175mm PIR insulation and a 215mm concrete block, fairfaced with a surface mass of 355 kg/m<sup>2</sup>. The above construction is expected to achieve the following sound reduction indices:

Table 7: Expected minimum sound insulation performance of external walls

| Construction   | Sound Reduction Index (dB) per Octave Band (Hz) |     |     |     |    |    |    |    | R <sub>w</sub> |
|----------------|-------------------------------------------------|-----|-----|-----|----|----|----|----|----------------|
|                | 63                                              | 125 | 250 | 500 | 1k | 2k | 4k | 8k |                |
| Concrete Block | 40                                              | 40  | 42  | 45  | 56 | 66 | 73 | 73 | 52             |

Please advise if there are any discrepancies in the determination of the above construction.

The proposed construction of external walls for the new-build third floor is 1x100mm facing brick, 175mm PIR insulation and a 215mm concrete block, fairfaced with a surface mass of 355 kg/m<sup>2</sup>. The third-floor external walls should be of similar construction and/or meet the sound insulation performance noted above. The supplier should confirm the above sound reduction indices are achievable with the proposals.

### 6.2.3. Roof

The proposed construction of the third-floor is insulated raftered traditional. we have assumed the following are inclusive – timber joist roof, slate tile with PIR board thermal insulation 12mm plasterboard ceiling.

Table 8: Minimum sound insulation performance of third-floor roof

| Construction            | Sound Reduction Index (dB) per Octave Band (Hz) |     |     |     |    |    |    |    | R <sub>w</sub> |
|-------------------------|-------------------------------------------------|-----|-----|-----|----|----|----|----|----------------|
|                         | 63                                              | 125 | 250 | 500 | 1k | 2k | 4k | 8k |                |
| Flat, timber joist roof | 17                                              | 22  | 37  | 42  | 50 | 57 | 57 | 57 | 44             |

An alternative construction may be used however it must, at a minimum, achieve the sound insulation performance above.

### 6.2.4. Window Construction

The windows on all elevations could be openable. However, they need to be sealed airtight to control external noise when the windows are closed within the areas noted above. There should be no un-attenuated vents or openings in the building façade.

The performance for each window is provided below. Other constructions may also achieve this level of sound attenuation. The supplier should provide test data confirming that the octave band sound reduction indices stated below for each window type are achievable.

Table 9: Required minimum sound reduction indices of windows

| Facade                  | Room Type           | Minimum Sound Reduction Index (dB)<br>per Octave Band |     |     |     |    |    |    |    | R <sub>w</sub> | Typical Construction |
|-------------------------|---------------------|-------------------------------------------------------|-----|-----|-----|----|----|----|----|----------------|----------------------|
|                         |                     | 63                                                    | 125 | 250 | 500 | 1k | 2k | 4k | 8k |                |                      |
| West<br>(Commercial St) | Bedrooms            | 16                                                    | 21  | 20  | 31  | 39 | 37 | 47 | 46 | 33             | 6/12/6.4             |
|                         | Living Rooms        |                                                       |     |     |     |    |    |    |    |                |                      |
| East<br>(Rear)          | All Habitable Rooms | 15                                                    | 20  | 19  | 29  | 38 | 36 | 45 | 46 | n32            | 6/12/6               |

The glazing supplier should confirm the above performance is achievable when tested to the current British Standards.

## 6.3. Ventilation Provisions

### 6.3.1. Background Ventilation

To ventilate habitable rooms on all façades, window-fitted trickle vents or attenuated wall vents are required to meet the internal BS8233 noise criteria. The table below sets the minim sound reduction indices required.

Table 10: Required minimum element normalised level difference of ventilation (in the open position)

| Façade | Room Type           | Floor          | Minimum Sound Reduction Index (dB)<br>per Octave Band |     |     |     |    |    |    |    | D <sub>n,e,w</sub> | Construction (open)                             |
|--------|---------------------|----------------|-------------------------------------------------------|-----|-----|-----|----|----|----|----|--------------------|-------------------------------------------------|
|        |                     |                | 63                                                    | 125 | 250 | 500 | 1k | 2k | 4k | 8k |                    |                                                 |
| West   | Bedrooms            | First & Second | 30                                                    | 37  | 37  | 36  | 47 | 49 | 55 | 61 | 44                 | Acoustic Trickle- SF X V75 / SFSA C75           |
|        |                     | Third          | 45                                                    | 47  | 46  | 50  | 55 | 65 | 68 | 60 | 54                 | Wall Vent – Greenwood MA3051                    |
|        | Living Rooms        |                |                                                       |     |     |     |    |    |    |    |                    |                                                 |
| East   | All Habitable Rooms | All Floors     | 30                                                    | 35  | 35  | 36  | 34 | 29 | 33 | 34 | 32                 | Standard Trickle – XS13 4400 EA+XC13 412 Canopy |

Alternatively, should a mechanical ventilation system be installed, the sound level difference to 'habitable rooms' through the system required to meet BS8233:2014 and WHO 1999 guidelines would be, at a minimum, 46 dB(A) for habitable rooms on the northern façade and 34dB(A) for habitable rooms on the northern façade. This is the difference between the outside façade level and the level inside a furnished room at one-and-a-half metres from the vent.

### 6.3.2. Overheating Ventilation

We understand as this is a change of use. Approved Document O does not apply. The building control officer should confirm this is correct.

## 6.4. Effect of Mitigation Measures

With the mitigation measures installed to habitable rooms of the dwellings in the rooms noted above, the predicted internal noise levels are below British Standard 8233:2014 and WHO (1999) criteria.

The predictions are shown in more detail in 'Appendix 1 – BS8233 Calculations' for second & third bedrooms on both the Eastern and Western façades.

## 7. Summary and Conclusion

MAINTY Group Ltd appointed Acoustic Consultants Limited to undertake an environmental noise assessment for the Proposed residential development located at 83 Commercial Street, Newport.

The report is based upon noise levels measured at the site. This report considers the impact of noise associated with pedestrian traffic and car park activity.

The report identifies relevant noise guidance, establishes environmental noise levels and provides mitigation measures to the proposed dwellings to proactively address planning requirements.

The assessment has been undertaken in accordance with WHO 1999 and British Standard 8233:2014 (BS8233).

Noise mitigation measures are required to meet the relevant noise guidance in British Standard 8233:2014 and WHO (1999) in all habitable rooms across the proposed development. Noise mitigation advice is provided in this report in the form of glazing constructions and ventilation provisions.

The proposals and recommended mitigation measures set in this report achieve the successfully address the planning condition in order "To protect future occupiers of the residential units from unreasonable noise disturbance."

## 8. Appendix 1 – BS8233 Calculations

Figure 4: Third floor bedroom on Eastern façade BS8233 calculation

| Free Field Level at Façade                                                                        |              |              |              |              |              |             |              |              |      |
|---------------------------------------------------------------------------------------------------|--------------|--------------|--------------|--------------|--------------|-------------|--------------|--------------|------|
| Octave Band                                                                                       | 63           | 125          | 250          | 500          | 1000         | 2000        | 4000         | 8000         | dBA  |
| Day $L_{eq,1hour}$                                                                                | 55           | 52           | 50           | 47           | 44           | 40          | 33           | 23           | 49   |
| Night $L_{eq,8hour}$                                                                              | 52           | 51           | 49           | 53           | 45           | 41          | 35           | 24           | 52   |
| Night-time $L_{max(fast)}$                                                                        | 67           | 66           | 62           | 61           | 67           | 60          | 53           | 35           | 69   |
| Building Façade Construction                                                                      |              |              |              |              |              |             |              |              |      |
| External Element                                                                                  |              | 63           | 125          | 250          | 500          | 1000        | 2000         | 4000         | 8000 |
| Standard Trickle - XS13 4400 EA+XCL3 412 Canopy - 32 Dnew                                         | $D_{se}$     | 30           | 35           | 35           | 36           | 34          | 29           | 33           | 34   |
|                                                                                                   | Number of    | 1            |              |              |              |             |              |              |      |
|                                                                                                   |              | 0            | 0            | 0            | 0            | 0           | 0            | 0            | 0    |
| 215mm concrete block, fairfaced, 355kgm <sup>2</sup> , 1470kgm <sup>3</sup> - 52 Rw               | Area         | 40           | 40           | 42           | 45           | 56          | 66           | 73           | 73   |
|                                                                                                   |              | 4            | 0            | 0            | 0            | 0           | 0            | 0            | 0    |
| Double Glazed: 6/12/6 - 32 Rw                                                                     | Area         | 15           | 20           | 19           | 29           | 38          | 36           | 45           | 46   |
|                                                                                                   |              | 2            | 0            | 0            | 0            | 0           | 0            | 0            | 0    |
| at, timber-joint roof, asphalt on boarding, 12mm plasterboard ceiling, thermal insulation - 44 Rw | Area         | 17           | 22           | 37           | 42           | 50          | 57           | 57           | 57   |
|                                                                                                   |              | 13           | 0            | 0            | 0            | 0           | 0            | 0            | 0    |
| Calculations to BS EN 12354                                                                       |              |              |              |              |              |             |              |              |      |
|                                                                                                   | 63           | 125          | 250          | 500          | 1000         | 2000        | 4000         | 8000         |      |
| Sum                                                                                               | 0.01705      | 0.005408386  | 0.001625219  | 0.000311533  | 0.000231414  | 0.000684302 | 0.000266075  | 0.000211625  |      |
| 10log sum                                                                                         | -17.68217368 | -22.66932299 | -27.89088187 | -35.06495612 | -36.35610643 | -31.6475195 | -35.74995542 | -36.74432751 |      |
| 10log S/A                                                                                         | 2.937992708  | 2.937992708  | 2.937992708  | 2.937992708  | 2.937992708  | 2.937992708 | 2.937992708  | 2.937992708  |      |
| correction factor +3                                                                              | 3            | 3            | 3            | 3            | 3            | 3           | 3            | 3            |      |
| Octave Band                                                                                       | 63           | 125          | 250          | 500          | 1000         | 2000        | 4000         | 8000         | dBA  |
| Day $L_{eq,1hour}$                                                                                | 43           | 35           | 28           | 18           | 14           | 14          | 3            | -8           | 25   |
| Night $L_{eq,8hour}$                                                                              | 40           | 34           | 27           | 24           | 15           | 15          | 5            | -7           | 26   |
| Night-time $L_{max(fast)}$                                                                        | 55           | 49           | 40           | 32           | 37           | 34          | 23           | 4            | 41   |

Figure 5: Third floor bedroom on Western façade BS8233 calculation

| Free Field Level at Façade                                                                        |             |              |              |              |              |              |              |             |      |
|---------------------------------------------------------------------------------------------------|-------------|--------------|--------------|--------------|--------------|--------------|--------------|-------------|------|
| Octave Band                                                                                       | 63          | 125          | 250          | 500          | 1000         | 2000         | 4000         | 8000        | dBA  |
| Day $L_{eq,1hour}$                                                                                | 60          | 60           | 58           | 57           | 56           | 53           | 45           | 38          | 60   |
| Night $L_{eq,8hour}$                                                                              | 58          | 58           | 55           | 53           | 53           | 48           | 44           | 41          | 57   |
| Night-time $L_{max(fast)}$                                                                        | 71          | 69           | 68           | 78           | 79           | 69           | 61           | 50          | 81   |
| Building Façade Construction                                                                      |             |              |              |              |              |              |              |             |      |
| External Element                                                                                  |             | 63           | 125          | 250          | 500          | 1000         | 2000         | 4000        | 8000 |
| Wall Vent - Greenwood MA3051 - 54 Dnew                                                            | $D_{se}$    | 45           | 47           | 46           | 50           | 55           | 65           | 68          | 60   |
|                                                                                                   | Number of   | 1            |              |              |              |              |              |             |      |
|                                                                                                   |             | 0            | 0            | 0            | 0            | 0            | 0            | 0           | 0    |
| 215mm concrete block, fairfaced, 355kgm <sup>2</sup> , 1470kgm <sup>3</sup> - 52 Rw               | Area        | 40           | 40           | 42           | 45           | 56           | 66           | 73          | 73   |
|                                                                                                   |             | 5            | 0            | 0            | 0            | 0            | 0            | 0           | 0    |
| Double Glazed: 6/12/6.4 - 33 Rw                                                                   | Area        | 16           | 21           | 20           | 31           | 39           | 37           | 47          | 46   |
|                                                                                                   |             | 2            | 0            | 0            | 0            | 0            | 0            | 0           | 0    |
| at, timber-joint roof, asphalt on boarding, 12mm plasterboard ceiling, thermal insulation - 44 Rw | Area        | 17           | 22           | 37           | 42           | 50           | 57           | 57          | 57   |
|                                                                                                   |             | 15           | 0            | 0            | 0            | 0            | 0            | 0           | 0    |
| Calculations to BS EN 12354                                                                       |             |              |              |              |              |              |              |             |      |
|                                                                                                   | 63          | 125          | 250          | 500          | 1000         | 2000         | 4000         | 8000        |      |
| Sum                                                                                               | 0.01584     | 0.00502964   | 0.001050313  | 0.000125265  | 2.00092E-05  | 1.92787E-05  | 3.21237E-06  | 4.04559E-06 |      |
| 10log sum                                                                                         | -18.0025984 | -22.98463058 | -29.78681345 | -39.02170697 | -46.98770991 | -47.14922817 | -54.93174767 | -53.9301773 |      |
| 10log S/A                                                                                         | 2.821298673 | 2.821298673  | 2.821298673  | 2.821298673  | 2.821298673  | 2.821298673  | 2.821298673  | 2.821298673 |      |
| correction factor +3                                                                              | 3           | 3            | 3            | 3            | 3            | 3            | 3            | 3           |      |
| Octave Band                                                                                       | 63          | 125          | 250          | 500          | 1000         | 2000         | 4000         | 8000        | dBA  |
| Day $L_{eq,1hour}$                                                                                | 48          | 43           | 34           | 24           | 15           | 12           | -4           | -10         | 31   |
| Night $L_{eq,8hour}$                                                                              | 46          | 41           | 31           | 20           | 12           | 7            | -5           | -7          | 28   |
| Night-time $L_{max(fast)}$                                                                        | 59          | 52           | 44           | 45           | 38           | 28           | 12           | 2           | 45   |

Figure 6: Second floor bedroom on Western facade BS8233 calculation

| Free Field Level at Facade                                                          |              |              |              |              |              |              |              |              |     |
|-------------------------------------------------------------------------------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|-----|
| Octave Band                                                                         | 63           | 125          | 250          | 500          | 1000         | 2000         | 4000         | 8000         | dBA |
| Day $L_{eq,15hr}$                                                                   | 55           | 52           | 50           | 47           | 44           | 40           | 33           | 23           | 49  |
| Night $L_{eq,8hr}$                                                                  | 52           | 51           | 49           | 53           | 45           | 41           | 35           | 24           | 52  |
| Night-time $L_{max(fast)}$                                                          | 67           | 66           | 62           | 61           | 67           | 60           | 53           | 35           | 69  |
| Building Façade Construction                                                        |              |              |              |              |              |              |              |              |     |
| External Element                                                                    | 63           | 125          | 250          | 500          | 1000         | 2000         | 4000         | 8000         |     |
| Standard Trickle - XS13 4400 EA+XC13 412 Canopy - 32 Dnew                           | $D_{se}$     | 30           | 35           | 35           | 36           | 34           | 29           | 33           | 34  |
|                                                                                     | Number of    | 1            |              |              |              |              |              |              |     |
|                                                                                     |              | 0            | 0            | 0            | 0            | 0            | 0            | 0            | 0   |
| 215mm concrete block, fairfaced, 355kgm <sup>2</sup> , 1470kgm <sup>3</sup> - 52 Rw |              | 40           | 40           | 42           | 45           | 56           | 66           | 73           | 73  |
|                                                                                     | Area         | 6            |              |              |              |              |              |              |     |
|                                                                                     |              | 0            | 0            | 0            | 0            | 0            | 0            | 0            | 0   |
| Double Glazed: 6/12/6 - 32 Rw                                                       |              | 15           | 20           | 19           | 29           | 38           | 36           | 45           | 46  |
|                                                                                     | Area         | 2            |              |              |              |              |              |              |     |
|                                                                                     |              | 0            | 0            | 0            | 0            | 0            | 0            | 0            | 0   |
| Calculations to BS EN 12354                                                         |              |              |              |              |              |              |              |              |     |
|                                                                                     | 63           | 125          | 250          | 500          | 1000         | 2000         | 4000         | 8000         |     |
| Sum                                                                                 | 0.00912      | 0.002934849  | 0.003546379  | 0.00064477   | 0.000532515  | 0.00161644   | 0.000626596  | 0.00049773   |     |
| 10log sum                                                                           | -20.40101863 | -25.32414225 | -24.50214854 | -31.90595245 | -32.73668018 | -27.91440423 | -32.03012723 | -33.03005949 |     |
| 10log S/A                                                                           | -1.6790781   | -1.6790781   | -1.6790781   | -1.6790781   | -1.6790781   | -1.6790781   | -1.6790781   | -1.6790781   |     |
| correction factor +3                                                                | 3            | 3            | 3            | 3            | 3            | 3            | 3            | 3            |     |
| Octave Band                                                                         | 63           | 125          | 250          | 500          | 1000         | 2000         | 4000         | 8000         | dBA |
| Day $L_{eq,15hr}$                                                                   | 36           | 28           | 27           | 16           | 13           | 13           | 2            | -9           | 22  |
| Night $L_{eq,8hr}$                                                                  | 33           | 27           | 26           | 22           | 14           | 14           | 4            | -8           | 23  |
| Night-time $L_{max(fast)}$                                                          | 48           | 42           | 39           | 30           | 36           | 33           | 22           | 3            | 39  |

Figure 7: Second floor bedroom on Eastern facade BS8233 calculation

| Free Field Level at Facade                                                          |              |               |             |              |              |              |              |              |     |
|-------------------------------------------------------------------------------------|--------------|---------------|-------------|--------------|--------------|--------------|--------------|--------------|-----|
| Octave Band                                                                         | 63           | 125           | 250         | 500          | 1000         | 2000         | 4000         | 8000         | dBA |
| Day $L_{eq,15hr}$                                                                   | 60           | 60            | 58          | 57           | 56           | 53           | 45           | 38           | 60  |
| Night $L_{eq,8hr}$                                                                  | 58           | 58            | 55          | 53           | 53           | 48           | 44           | 41           | 57  |
| Night-time $L_{max(fast)}$                                                          | 71           | 69            | 68          | 78           | 79           | 69           | 61           | 50           | 81  |
| Building Façade Construction                                                        |              |               |             |              |              |              |              |              |     |
| External Element                                                                    | 63           | 125           | 250         | 500          | 1000         | 2000         | 4000         | 8000         |     |
| SF X V75 / SFSA C75 (open) - 44 Dnew                                                | $D_{se}$     | 30            | 37          | 37           | 36           | 47           | 49           | 55           | 61  |
|                                                                                     | Number of    | 1             |             |              |              |              |              |              |     |
|                                                                                     |              | 0             | 0           | 0            | 0            | 0            | 0            | 0            | 0   |
| 215mm concrete block, fairfaced, 355kgm <sup>2</sup> , 1470kgm <sup>3</sup> - 52 Rw |              | 40            | 40          | 42           | 45           | 56           | 66           | 73           | 73  |
|                                                                                     | Area         | 8             |             |              |              |              |              |              |     |
|                                                                                     |              | 0             | 0           | 0            | 0            | 0            | 0            | 0            | 0   |
| Double Glazed: 6/12/6.4 - 33 Rw                                                     |              | 16            | 21          | 20           | 31           | 39           | 37           | 47           | 46  |
|                                                                                     | Area         | 2             |             |              |              |              |              |              |     |
|                                                                                     |              | 0             | 0           | 0            | 0            | 0            | 0            | 0            | 0   |
| Patio 51 Rw                                                                         | R            | 17            | 25          | 41           | 51           | 58           | 65           | 66           | 66  |
|                                                                                     | Area         | 10            |             |              |              |              |              |              |     |
|                                                                                     |              | 0             | 0           | 0            | 0            | 0            | 0            | 0            | 0   |
| Calculations to BS EN 12354                                                         |              |               |             |              |              |              |              |              |     |
|                                                                                     | 63           | 125           | 250         | 500          | 1000         | 2000         | 4000         | 8000         |     |
| Sum                                                                                 | 0.01309      | 0.002527367   | 0.001170254 | 0.00021973   | 2.47061E-05  | 2.6353E-05   | 3.66897E-06  | 3.04315E-06  |     |
| 10log sum                                                                           | -18.82955398 | -25.973331687 | -29.3172001 | -36.58111524 | -46.07195521 | -45.79169214 | -54.35455335 | -55.16676853 |     |
| 10log S/A                                                                           | 0.421930478  | 0.421930478   | 0.421930478 | 0.421930478  | 0.421930478  | 0.421930478  | 0.421930478  | 0.421930478  |     |
| correction factor +3                                                                | 3            | 3             | 3           | 3            | 3            | 3            | 3            | 3            |     |
| Octave Band                                                                         | 63           | 125           | 250         | 500          | 1000         | 2000         | 4000         | 8000         | dBA |
| Day $L_{eq,15hr}$                                                                   | 45           | 37            | 32          | 24           | 13           | 11           | -6           | -14          | 28  |
| Night $L_{eq,8hr}$                                                                  | 43           | 35            | 29          | 20           | 10           | 6            | -7           | -11          | 25  |
| Night-time $L_{max(fast)}$                                                          | 56           | 46            | 42          | 45           | 36           | 27           | 10           | -2           | 44  |

## 9. Appendix 2 – Glossary of Acoustic Terminology

A-weighted sound pressure  $p_A$  – value of overall sound pressure, measured in pascals (Pa), after the electrical signal derived from a microphone has been passed through an A-weighting network.

A-weighted sound pressure level,  $L_{pA}$  – quantity of A-weighted sound pressure given by the following formula in decibels (dBA)

$$L_{pA} = 10 \log_{10} (p_A/p_0)^2$$

where:

$p_A$  is the A-weighted sound pressure in pascals (Pa);  
 $p_0$  is the reference sound pressure (20  $\mu$ Pa)

Background sound level,  $L_{A90,T}$  – A-weighted sound pressure level that is exceeded by the residual sound assessment location for 90% of a given time interval, T, measured using weighting F and quoted to the nearest whole number of decibels

Break-in - noise transmission into a structure from outside.

Decibel (dB) – The decibel is the unit used to quantify sound pressure levels. The human ear has an approximately logarithmic response to acoustic pressure over a very large dynamic range (typically 20 micro-Pascals to 100 Pascals). Therefore, a logarithmic scale is used to describe sound pressure levels and also sound intensity and power levels. The logarithms are taken to base 10. Hence an increase of 10 dB in sound pressure level is equivalent to an increase by a factor of 10 in the sound pressure level (measured in Pascals). Subjectively, this increase would correspond to a doubling of the perceived loudness of sound.

Equivalent continuous A-weighted sound pressure level,  $L_{Aeq,T}$  – value of the A-weighted sound pressure level in decibels of continuous steady sound that, within a specified time interval,  $T = t_2 - t_1$ , has the same mean-squared sound pressure as a sound that varies with time, and is given by the following equation:

$$L_{Aeq,T} = 10 \log_{10} \left\{ (1/T) \int_{t_1}^{t_2} [p_A(t)^2/p_0^2] dt \right\} \quad (1)$$

where:

$p_0$  is the reference sound pressure (20  $\mu$ Pa); and

$p_A(t)$  is the instantaneous A-weighted sound pressure (Pa) at time t

*NOTE The equivalent continuous A-weighted sound pressure level is quoted to the nearest whole number of decibels.*

Facade level – sound pressure level 1 m in front of the façade. Facade level measurements of  $L_{pA}$  are typically 1 dB to 3 dB higher than corresponding free-field measurements because of the reflection from the facade.

**Free-field level** – sound pressure level away from reflecting surfaces. Measurements made 1.2 m to 1.5 m above the ground and at least 3.5 m away from other reflecting surfaces are usually regarded as free-field. To minimize the effect of reflections the measuring position has to be at least 3.5 m to the side of the reflecting surface (i.e. not 3.5 m from the reflecting surface in the direction of the source).

**Octave and Third Octave Bands** – The human ear is sensitive to sound over a range of frequencies between approximately 20 Hz to 20 kHz and is generally more sensitive to medium and high frequencies than to low frequencies within the range. There are many methods of describing the frequency content of a noise. The most common methods split the frequency range into defined bands, in which the mid-frequency is used as the band descriptor and in the case of octave bands is double that of the band lower. For example, two adjacent octave bands are 250 Hz and 500 Hz. Third octave bands provide a fine resolution by dividing each octave band into three bands. For example, third octave bands would be 160 Hz, 250 Hz, 315 Hz for the same 250 Hz octave band.

**Sound pressure level** – Sound pressure level is stated on many of the charts. It is the amplitude of the acoustic pressure fluctuations in a sound wave, fundamentally measured in Pascals (Pa), typically from 20 micro-Pascals to 100 Pascals, but commonly simplified onto the decibel scale.

**Sound reduction index, R** – laboratory measure of the sound insulating properties of a material or building element in a stated frequency band.

**Specific sound level,  $L_s = L_{Aeq,Tr}$**  – equivalent continuous A-weighted sound pressure level produced by the specific sound source at the assessment location over a given reference time interval,  $T_r$ .

**Structure-borne noise** – audible noise caused by the vibration of elements of a structure, the source of which is within a building or structure with common elements.

**Rating level,  $L_{Ar,Tr}$**  – Specific sound level plus any adjustment for the characteristic features of the sound.

**Reverberation Time, T** – The reverberation time is defined as the time taken for a noise level in an enclosed space to decay by 60 dB from a steady level once the noise source has stopped. It is measured in seconds. Often a 60 dB decay cannot be measured so the reverberation time is measured over a lesser range and corrected back to the time for a 60 dB drop assuming a constant decay rate. Common parameters are T20 (time taken for a 20 dB decay multiplied by three) and T30 (time taken for a 30 dB decay multiplied by two).

**Vibration Dose Value, VDV** – measure of the total vibration experienced over a specified period of time.

Estimated Vibration Dose Value, eVDV – estimation of the total vibration experienced over a specified period of time. This is usually based on the number of events and shortened measurement data.

Weighted sound reduction index,  $R_w$  – Single-number quantity which characterizes the airborne sound insulating properties of a material or building element over a range of frequencies. The weighted sound reduction index is used to characterize the insulation of a material or product that has been measured in a laboratory (see BS EN ISO 717-1).



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