

# **AB acoustics**

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**Environmental Noise Assessment**

**Maesgwyn Road**

**Wrexham**

**LL11 2AP**

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**Shaw**

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**November 2016**

## Introduction

AB Acoustics were commissioned by Blueprint Architectural Services to undertake an environmental noise assessment for the conversion of former Offices on Maesgwyn Road Wrexham into three residential apartments with associated parking.

This assessment was undertaken in order to satisfy Condition 4 of the Planning Number WRO P/2016/0298 which is detailed below :

4. Within one month of commencement of development a detailed scheme of noise attenuation and or noise insulation measures shall be submitted to and approved in writing by the Local Planning Authority. The measures as are approved shall be fully implemented prior to the first occupation / use of the development.
5. The vehicular parking area as shown on approved drawing No

A plan of the proposed site is shown below – together with the measurement position used to determine the existing background noise level in the vicinity – only one measurement location was used as this was deemed to be representative of the existing noise level at the proposed site.



Approximate Measurement Location.

Proposed Site

The report presents the results of the survey to establish the existing noise levels at the site.

As can be seen from the above the site is located in a mixed commercial / residential area.

Immediately adjacent to the three apartments will be a B2 Workshop facility - Reference WRO P/2016/0299 and adjacent to this is the Wrexham Carpets Depot and showroom ( again a B2 Workshop classification ) - on the other side of Maesgwyn Road are old established residential properties.

### **Noise Assessment Criteria**

The likelihood of complaints about noise from industrial / commercial premises can be assessed where the standard is appropriate using BS 4142 – 2014.

The above Standard includes in it noise from vehicles that would potentially use the above proposed site.

Within the standard, another Standard, BS8233 is introduced for general guidance on acceptable noise levels within buildings.

Guidance in BS 8233 (Sound Insulation and Noise Reduction in Buildings) provides design criteria for noise inside dwellings. These are:

Bedrooms: LAeq,T = 30 dBA  
Living Areas: LAeq,T = 35 dBA

However it is usual for Blackburn LPA to apply a blanket 30 dBA level to all room,s at all times of the day.

Also relevant are the World Health Organisation (WHO) Guidelines for Community Noise – these identify that sleep may be disturbed by short term noise events and the level associated with this is 45 dB L<sub>Amax</sub> inside the bedroom – this relates to 60 dB L<sub>Amax</sub> external to the bedroom.

In brief an 'Outdoor Living Area' should be subject to a noise level less than 55 dBA in order to prevent serious annoyance during the daytime and evening - a level less than 50 dBA is desirable to prevent moderate annoyance : reference World Health Organisation.

## The Qualitative Guidance NPPG

This new guidance issued in March 2014 is qualitative therefore it does not contain any quantitative guidance on acceptable noise levels.

Paragraph 10 states ' *Care should be taken, however, to avoid these ( British Standards) being implemented as fixed thresholds as specific circumstances may justify some variation being allowed* ' .

Therefore it is clear that current guidance assumes that quantitative standards can be used provided that there is flexibility in their application.

In paragraph 5 various noise categories and thresholds are set out; up to and including "Noticeable and Intrusive" it seems likely that the intention would be to recognise that whilst the noise levels are not desirable, planning consent should be granted provided that the noise can be mitigated and the intrusion reduced to a minimum. "Noticeable and Intrusive" noise occurs when:

*"Noise can be heard and causes small changes in behaviour and/or attitude, e.g. turning up volume of television; speaking more loudly; where there is no alternative ventilation, having to close windows for some of the time because of the noise. Potential for some reported sleep disturbance. Affects the acoustic character of the area such that there is a perceived change in the quality of life."*

Above the 'Significant Observed Adverse Effect Level ' - SOAEL – threshold, noise becomes 'Noticeable and Disruptive ' because

*"The noise causes a material change in behaviour and/or attitude, e.g. avoiding certain activities during periods of intrusion; where there is no alternative ventilation, having to keep windows closed most of the time because of the noise. Potential for sleep disturbance resulting in difficulty in getting to sleep, premature awakening and difficulty in getting back to sleep. Quality of life diminished due to change in acoustic character of the area."*

Noise which is "Noticeable and disruptive" should be avoided; however, it is the next level of disturbance "Noticeable and very disruptive" that should be prevented.

It can be seen that the NPPG noise guidance envisages that if properties are provided with alternative ventilation and acoustic glazing, designed to ensure "acceptable" internal noise levels, then internal noise levels would not exceed the "Significant Observed Adverse Effect Level" and that planning consent could be granted. The guidance states "If the exposure is above this level the planning process should be used to avoid this effect occurring, by use of appropriate mitigation such as by altering the design and layout."

### Equipment Used and Measurement Method

The noise levels were measured using a :

Bruel & Kjaer Type 2260 Sound Level Meter (Type 1 instrument)

Calibration was undertaken using a :  
Bruel & Kjaer type 4231 calibrator

The measurements were carried out at the location shown at a height of 1500mm above the ground and away from reflecting surfaces.

The measurements were undertaken at the times stated in the results.

The location of the measurements are indicated on the plan above.

### Results

Tuesday 01 November 2016 – Weather : Dry – Temperature = 10 - 12 degrees C – wind = 1.1 m/sec  
cloud cover = 100 - 70% - No temperature inversion.

| Time          | LA eq | LA 90 | LA max             |
|---------------|-------|-------|--------------------|
| 06.15 - 06.45 | 49.8  | 43.2  | 57.9               |
|               |       |       |                    |
| 09.50 - 10.50 | 53.8  | 42.5  | 63.1               |
| 15.15 - 16.15 | 50.6  | 40.2  | 65.4               |
| 18.45 - 19.45 | 53.7  | 46.1  | 76.7<br>(Car horn) |
|               |       |       |                    |
| 23.00 - 23.15 | 51.4  | 41.8  | 60.7               |

Wednesday 02 November 2016 – Weather : Dry – Temperature = 10 - 12 degrees C – wind = 1.1 m/sec  
cloud cover = 10% - 50% - No temperature inversion.

| Time          | LAeq | LA90 | LAmix |
|---------------|------|------|-------|
| 13.00 - 14.00 | 54.7 | 43.8 | 62.9  |
| 14.00 - 15.00 | 51.3 | 42.5 | 61.4  |

From the above it can be seen that the existing noise level at the proposed site is low – the site is quiet as it is effectively screened from traffic noise on the surrounding road system by the commercial properties between the site and Mold Road

From the above the Log average noise level between the hours 07.00 and 23.00 is **53 (52.9) dBA** - whilst there is a B” workshop facility immediately adjacent to the residential apartments we consider that the character and level of the external noise will not change as access to the B2 facility will be

intermittent and as access will be using vehicles the noise character will be the same as the present character of vehicle movement along Maesgwyn Road.

Also from the above the Log Average level between the hours 23.00 and 07.00 hrs is **51 (50.6) dBA** dBA with an LA max of **63 dBA**.

These are the levels used to determine the glazing / ventilation requirements for the apartments.

Therefore between 07.00 to 23.00 hrs the attenuation needs to be  $52 - 35 = 17 \text{ dBA}$  - between 23.00 to 07.00 hrs  $51 - 30 = 21 \text{ dBA}$  with an attenuation to the LA max of  $63 - 45 = 18 \text{ dBA}$ .

Therefore as the main noise source is the traffic flow along Maesgwyn Road then then as traffic noise contains most of its energy in the lower frequency bands then the  $R_w + C_{tr}$  indicator is used rather than the  $R_w$ .

All the windows in the apartments can be glazed with 4 / 6 to 20mm / 4mm IGU's which have a quoted  $R_w + C_{tr}$  of 25 dB - these units will attenuate the LA max to the required level ( see data sheet at the end of the report).

The type of ventilation fitted will depend also upon the number of air changes per hour that are required by Building Regulations – this is beyond the scope of this report – however suppliers of suitable acoustically treated ventilation systems can be found on the following web sites;

[www.passivent.com](http://www.passivent.com)

These supply vents that fit into the window header and can be acoustically treated or:

[www.vents.com](http://www.vents.com)

supply core vents that are wall mounted.

Both these types of vent will be suitable acoustically provided that they meet the minimum attenuation requirements for the attenuation.

Or any ventilation unit having a quoted  $D_{n,ew}$  in excess of **22 dB**

It is important that the windows are correctly fitted into the wall – gaps and holes around the frames must be kept to a minimum and those that occur must be fully sealed with a high density sealer – *on no account must light weight expanding foams be used.*

In general the construction of the building must be undertaken with great care as even small gaps will reduce the attenuation provided by the structure and even if a complete wall, which may have an attenuation of 50 dBA has a hole in it equivalent to 1/1000 of the wall area the effective attenuation of the wall is limited to a maximum of 30 dBA.

The actual area of the window in the wall affects the internal noise level: the greater the window area the higher the internal noise level. In general a normal double skinned brick wall will have an attenuation of 45/50 dBA .

The attenuation of the external wall can be reduced by in excess of 5 dBA if the area of the windows is of the order of 25%. The type of glazing then becomes important.

When the windows are open the only important consideration is the area of the opening: if it is 10% of the total area the noise attenuation will be of the order of 12 dBA regardless of the construction of the remaining 90% of the wall.

With regard to the roof, which is a Kingspan panel with the First Floor rooms double boarded an attenuation of 45 dB has been calculated.

The National Planning Guidance 2014 states that noise exposure defined by the response of people to the noise – briefly it states that – if the above case – *windows closed*

| Perception                   | Examples of Outcome                                                                                                                                                                   | Increasing Effect Level    | Action                               |
|------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------|--------------------------------------|
| <b>Not Noticeable</b>        | <b>No effect</b>                                                                                                                                                                      | <b>No observed Effect</b>  | <b>No Specific Measures required</b> |
| Noticeable and not Intrusive | Noise can be heard – does not cause any change in behaviour or attitude                                                                                                               | No Observed Adverse Impact | No Specific Measures required        |
| Noticeable and Intrusive     | Noise can be heard and causes small changes in behaviour and / or attitude – affects the acoustic character of the area such that there is a perceived change in the quality of life. | Observed Adverse Impact    | Mitigate and reduce to a minimum.    |

The Perception at the residential property being highlighted.

The residential properties are screened from any rail noise by the development itself and as no train movements were audible then no assessment of this source was undertaken.

BS 4142 : 2016 Assessment

During the measurement periods at the site we were not aware of any industrial / commercial noise at the proposed development.

There were occasional deliveries to Wrexham Carpets by light vans - the noise from these was regarded as insignificant and is exactly of the same character as the existing environmental noise and has therefore been ignored.

There was no audible contribution from the Tyre Depot on Mold Road.

The actual noise generated by the B2 Workshop facility will also be on the same character as the existing environment is that there will - after the initial start up period - be occasional deliveries / collections from site.

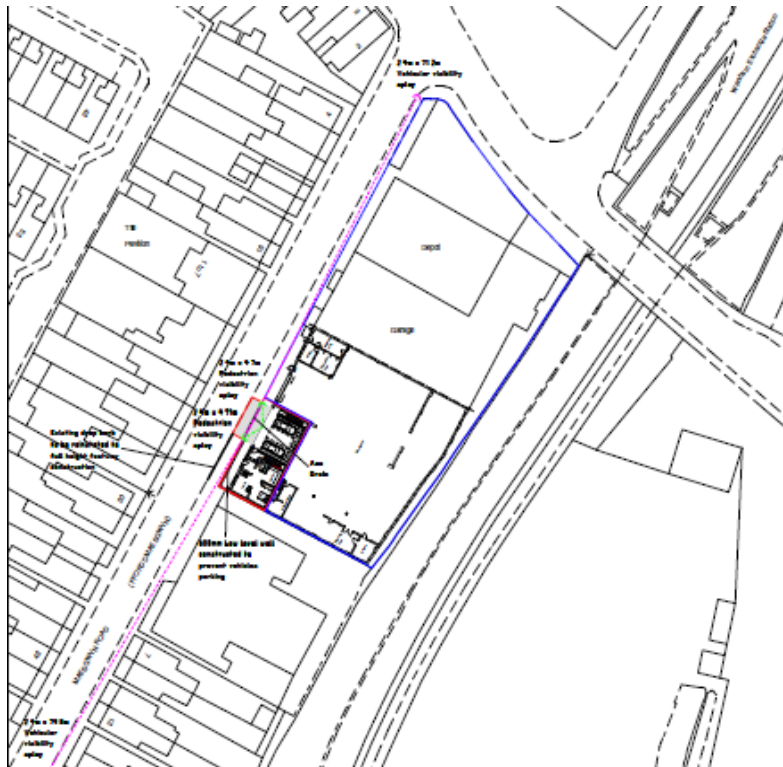
The contribution of the internal noise within the facility on the residential accommodation is dealt with in an additional report.

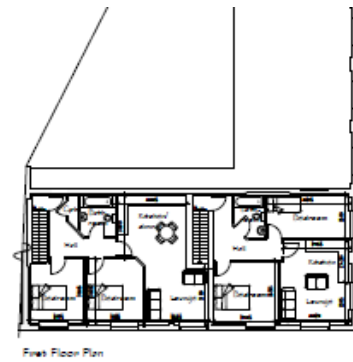
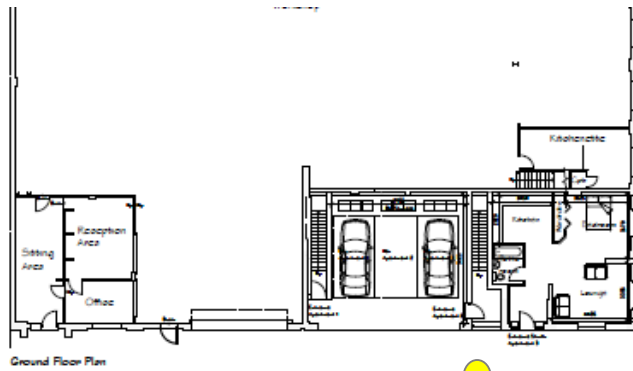
#### **External Private Amenity Areas**

There are no external private amenity areas at the proposed site.

AMIOA

Dated : November 2016





Approximate measurement location.



## Pilkington Optiphon™

|  | dB sound reduction index by octave band – Hz |     |     |      |      |      | $R_w(C;C_T)$ | $R_w$ | $R_w+C$ | $R_w+C_T$ |
|--|----------------------------------------------|-----|-----|------|------|------|--------------|-------|---------|-----------|
|  | 125                                          | 250 | 500 | 1000 | 2000 | 4000 |              |       |         |           |

### Configuration single glazing

|                              |    |    |    |    |    |    |           |    |    |    |
|------------------------------|----|----|----|----|----|----|-----------|----|----|----|
| 6.8 mm Pilkington Optiphon™  | 21 | 26 | 31 | 35 | 37 | 38 | 35(-1;-3) | 35 | 34 | 32 |
| 8.8 mm Pilkington Optiphon™  | 24 | 28 | 34 | 38 | 37 | 43 | 37(-1;-4) | 37 | 36 | 33 |
| 10.8 mm Pilkington Optiphon™ | 28 | 31 | 36 | 38 | 39 | 47 | 38(-1;-2) | 38 | 37 | 36 |
| 12.8 mm Pilkington Optiphon™ | 30 | 32 | 37 | 39 | 41 | 51 | 39(-0;-2) | 39 | 39 | 37 |
| 16.8 mm Pilkington Optiphon™ | 29 | 34 | 37 | 39 | 46 | 55 | 40(-0;-2) | 40 | 40 | 38 |

### Configuration Insulating Glass Unit (IGU), thickness in mm

|                                                                    |    |    |    |    |    |    |           |    |    |    |
|--------------------------------------------------------------------|----|----|----|----|----|----|-----------|----|----|----|
| 6 / 6 to 20 mm / 6.8 Pilkington Optiphon™                          | 23 | 24 | 34 | 42 | 43 | 52 | 38(-2;-5) | 38 | 36 | 33 |
| 6 / 6 to 20 mm / 8.8 Pilkington Optiphon™                          | 24 | 26 | 40 | 48 | 46 | 54 | 41(-3;-7) | 41 | 38 | 34 |
| 6 / 6 to 20 mm / 10.8 Pilkington Optiphon™                         | 23 | 28 | 41 | 47 | 45 | 55 | 42(-3;-7) | 42 | 39 | 35 |
| 6 / 6 to 20 mm / 12.8 Pilkington Optiphon™                         | 20 | 29 | 43 | 47 | 46 | 49 | 42(-3;-8) | 42 | 39 | 34 |
| 8.8 Pilkington Optiphon™ / 6 to 20 mm / 12.8 Pilkington Optiphon™  | 26 | 36 | 46 | 50 | 52 | 63 | 47(-2;-7) | 47 | 45 | 40 |
| 16.8 Pilkington Optiphon™ / 6 to 20 mm / 16.8 Pilkington Optiphon™ | 29 | 40 | 45 | 47 | 54 | 68 | 48(-2;-6) | 48 | 46 | 42 |

The above IGUs with Pilkington K Glass™ on one pane and a 16 mm 90 % Argon-filled cavity achieve a U value of 1.5 W/m² K

Further information on solar and thermal performance is available on the Pilkington website using the Spectrum program: [www.pilkington.com/spectrum](http://www.pilkington.com/spectrum)

Impact classification EN12600 Class 1(B)1 for all above Pilkington Optiphon™ products

$R_w(C;C_T)$  are in accordance with EN717-1

### Non Pilkington Optiphon™ glass products. Figures from BS EN 12354

|  | dB sound reduction index by octave band – Hz |     |     |      |      |      | $R_w(C;C_T)$ | $R_w$ | $R_w+C$ | $R_w+C_T$ |
|--|----------------------------------------------|-----|-----|------|------|------|--------------|-------|---------|-----------|
|  | 125                                          | 250 | 500 | 1000 | 2000 | 4000 |              |       |         |           |

### Configuration single glazing

|                   |    |    |    |    |    |    |           |    |    |    |
|-------------------|----|----|----|----|----|----|-----------|----|----|----|
| 4 mm Float Glass  | 17 | 20 | 26 | 32 | 33 | 26 | 29(-2;-3) | 29 | 27 | 26 |
| 6 mm Float Glass  | 18 | 23 | 30 | 35 | 27 | 32 | 31(-2;-3) | 31 | 29 | 28 |
| 8 mm Float Glass  | 20 | 24 | 29 | 34 | 29 | 37 | 32(-2;-3) | 32 | 30 | 29 |
| 10 mm Float Glass | 23 | 26 | 32 | 31 | 32 | 39 | 33(-2;-3) | 33 | 31 | 30 |
| 12 mm Float Glass | 27 | 29 | 31 | 32 | 38 | 47 | 34(-0;-2) | 34 | 34 | 32 |

### Configuration Insulating Glass Unit (IGU), Float glass, thickness in mm

|                     |    |    |    |    |    |    |           |    |    |    |
|---------------------|----|----|----|----|----|----|-----------|----|----|----|
| 4 / 6 to 20 mm / 4  | 21 | 17 | 25 | 35 | 37 | 31 | 29(-1;-4) | 29 | 28 | 25 |
| 6 / 6 to 20 mm / 6  | 20 | 18 | 28 | 38 | 34 | 38 | 31(-1;-4) | 31 | 30 | 27 |
| 6 / 6 to 20 mm / 4  | 21 | 20 | 26 | 38 | 37 | 39 | 32(-2;-4) | 32 | 30 | 28 |
| 10 / 6 to 20 mm / 4 | 24 | 21 | 32 | 37 | 42 | 43 | 35(-2;-5) | 35 | 33 | 30 |
| 10 / 6 to 20 mm / 6 | 24 | 24 | 32 | 37 | 37 | 44 | 35(-1;-3) | 35 | 34 | 32 |

Note that these are conservative figures and cover all products by European glass manufacturers.

$R_w$  = Weighted sound reduction. This scale allows for the response of the human ear and could be used for determining a suitable product to reduce noise such as voices.

C = An adjustment to the  $R_w$  scale that could be used for selecting a product to reduce noise from music, radio, tv, high speed traffic and other medium to high frequencies.

$C_T$  = An adjustment to the  $R_w$  scale that could be used for selecting a product to reduce noise from urban road traffic, disco music and other noises with a large component of low frequencies.

Note that a 3 dB difference is barely discernable, 5 dB is clearly discernable and 10 dB is a doubling or halving of the noise.