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ENVIRONMENTAL NOISE ASSESSMENT

PROPOSED CHANGE OF USE RESIDENTIAL DEVELOPMENT, REGENT HOUSE, REGENT STREET, WREXHAM, LL11 1PR

REPORT REFERENCE NO. J006296-9694-LK-02

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	Name	Position
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This report has been prepared based upon a scope of works and associated resources agreed between the client and Philip Dunbavin Acoustics Ltd (PDA). This report has been prepared with all reasonable skill, care and diligence and has been based upon the interpretation of data collected. This has been accepted in good faith as being accurate and valid at the time of the collection. This report has been based solely on the specific design assumptions and criteria stated herein.

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1.0 SUMMARY

PDA Ltd was commissioned by Osborne House Limited to carry out an environmental noise and building envelope assessment report for the proposed residential development at Regent House, Regent Street, Wrexham, LL11 1PR. The proposed development consists of the change of use of an office building into circa 36 residential studios over the upper three floors while retaining the commercial uses at ground floor level.

A noise survey has been conducted at the proposed development site and has been used to assess the existing acoustic climate and determine the building envelope specification.

The assessment for the development has been undertaken in accordance with Technical Advice Note (TAN) 11 – Noise. Overall the results of the noise survey and noise models indicate that the proposed development falls in NEC category B. In PDA's experience planning permission can usually be granted on the basis that suitable mitigation is applied to the proposed development.

Based upon the measured and predicted noise levels, calculations have been undertaken for the Bedrooms and Living Spaces to evaluate the internal noise levels. Recommendations are given for glazing, ventilation and building façade elements to meet the internal noise level requirements of Planning Condition 6 and good practice guidance given in BS8233:2014 Guidance on Sound Insulation and Noise Reduction for Buildings. Calculations suggest that the noise level criteria of BS8233:2014 can be achieved within the proposed accommodation.

In addition, an assessment of internal noise transfer via from the ground floor commercial units has been carried out which indicates that internal noise levels within the proposed residential accommodation above are unlikely to be adversely affected by the expected noise levels generated by the ground floor commercial use.

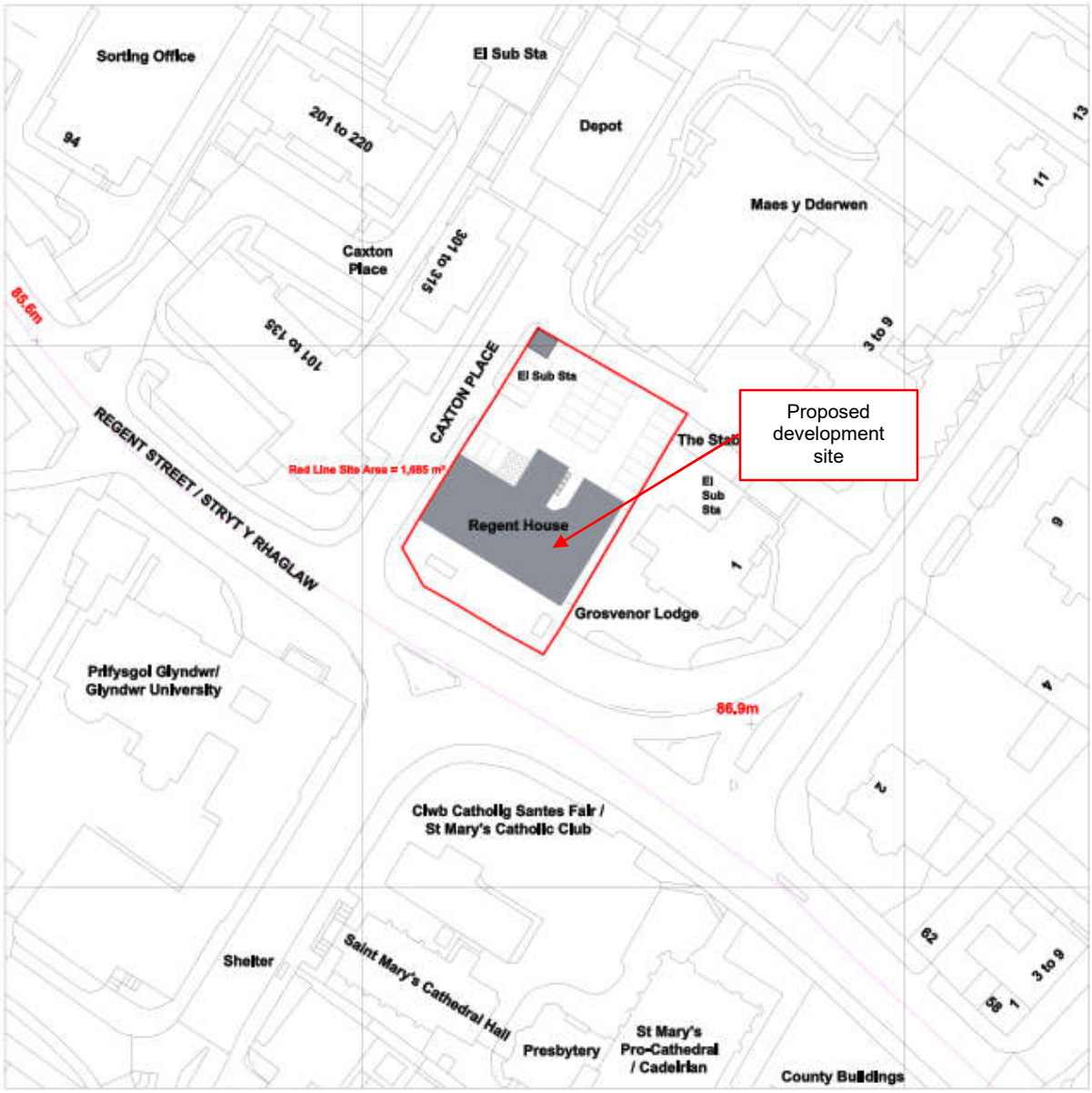
2.0 SITE DESCRIPTION

The proposed residential development is located at Regent House, Regent Street, Wrexham, LL11 1PR. The proposed development consists of the change of use of an office building into circa 36 residential studios over the upper three floors while retaining the commercial uses at ground floor level.

The proposed residential development is located on Regent Street close to Wrexham city centre. The front facade of the building faces onto Regent Street. The area is mainly made up of a mixture of commercial units and residential properties. The existing ground floor commercial uses are fast food restaurant / takeaway premises.

A site plan showing the location of the site and surrounding local area is shown in Figure 1 below.

Figure 1. Site overview showing proposed development site (in red) and surrounding area



3.0 NOISE ASSESSMENT CRITERIA

3.1 Planning Policy Wales

Planning Policy Wales (PPW) Edition 12, published on 7 February 2024, addresses noise within the broader framework of sustainable development, placemaking, and environmental protection. The policy emphasises the importance of managing noise to support healthy and sustainable communities, promote well-being, and create positive acoustic environments (soundscapes).

PPW does not prescribe numerical noise limits specifically for industrial noise in most cases. The policy mandates that impacts should be minimised, but leaves detailed criteria and assessment methods to supporting guidance (for example through Technical Advice Notes or local authority policy) rather than being embedded in PPW itself.

3.2 Technical Advice Note (TAN 11) – Assessment of Noise

Technical Advice Note (Wales) 11 – Noise, determines whether noise should be a major factor when granting planning permission for development of residential developments.

With regard to noise-sensitive developments as is proposed here TAN11 states the following:

'Local planning authorities should consider whether proposals for new noise-sensitive development would be incompatible with existing activities, taking into account the likely level of noise exposure at the time of the application and any increase that may reasonably be expected in the foreseeable future. Such development should not normally be permitted in areas which are, or are expected to become, subject to unacceptably high levels of noise and should not normally be permitted where high levels of noise will continue throughout the night.'

The method used to assess whether noise dominates a development site is through the use of Noise Exposure Categories (NECs). TAN11 suggests, '*when assessing a proposal for residential development near a source of noise, local planning authorities should determine into which of the four noise exposure categories (NECs) the proposed site falls, taking account of both day and night-time noise levels. Local planning authorities should then have regard to the advice in the appropriate NEC, as below:*'

Table 1. Noise exposure categories for residential developments

NEC	Description of NEC Level
A	Noise need not be considered as a determining factor in granting planning permission, although the noise level at the high end of the category should not be regarded as a desirable level.
B	Noise should be taken into account when determining planning applications and, where appropriate, conditions imposed to ensure an adequate level of protection against noise.
C	Planning permission should not normally be granted. Where it is considered that permission should be given, for example because there are no alternative quieter sites available, conditions should be imposed to ensure a commensurate level of protection against noise.
D	Planning permission should normally be refused.

The NEC level is selected by its noise level and source category, as shown in the table below.

Table 2. Noise Exposure Category Levels

Noise Source		A	B	C	D
Road traffic:	0700-2300	<55	55-63	63-72	>72
	2300-0700	<45	45-57	57-66	>66
Rail traffic:	0700-2300	<55	55-66	66-74	>74
	2300-0700	<45	45-59	59-66	>66
Air traffic:	0700-2300	<57	57-66	66-72	>72
	2300-0700	<48	48-57	57-66	>66
Mixed sources:	0700-2300	<55	55-63	63-72	>72
	2300-0700	<45	45-57	57-66	>66

Furthermore, TAN11 suggests sites where individual noise events regularly exceed 82 dB L_{Amax} (slow time weighting) several times in any hour during the night time, the site should be treated as being in NEC C, regardless of the $L_{Aeq,8H}$ (except where the $L_{Aeq,8H}$ already puts the site in NEC D)

3.3 BS8233:2014 Guidance on Sound Insulation and Noise Reduction for Buildings

Dwelling houses, flats and rooms in residential use

British Standard 8233:2014, *Guidance on Sound Insulation and noise reduction for buildings*, gives guidance on internal noise levels within dwellings, flats and rooms in residential use when unoccupied. The following criteria are for Living and Dining Rooms for daytime use and Bedrooms for night time.

Table 3. BS8233 recommended indoor ambient noise levels

Activity	Location	07:00 to 23:00	23:00 to 07:00
Resting	Living room	35 dB $L_{Aeq,16hour}$	–
Dining	Dining room/area	40 dB $L_{Aeq,16hour}$	–
Sleeping (daytime resting)	Bedrooms	35 dB $L_{Aeq,16hour}$	30 dB $L_{Aeq,8hour}$

It should however be stressed that the above criterion relates to steady noise, in this case from road traffic etc., excluding unusual noise events departing from the typical noise character of the area.

In addition BS 8233 suggests, '*regular individual noise events (for example, scheduled aircraft or passing trains) can cause sleep disturbance. A guideline value may be set in terms of SEL or $L_{Amax,F}$, depending on the character and number of events per night. Sporadic noise events could require separate values'.*

3.4 WHO Guidelines for Community Noise

In 1999, the WHO (World Health Organisation) published Guidelines for Community Noise, stating the following internal noise levels are applicable within dwellings.

Table 4. WHO Guidelines for Community Noise criteria

Specific Environment	Critical Health Effect(s)	L_{Aeq} dB	Time Base (hours)*
Dwelling, indoors	Speech intelligibility & moderate annoyance, daytime & evening	35	16
Inside bedrooms	Sleep disturbance, night time	30	8

* Typically taken to be daytime/evening - 07:00 – 23:00 hours and night time 23:00 – 07:00 hours.

In addition to the above continuous equivalent noise levels, WHO guidelines indicates that exceedances of 45 dB L_{Amax} for single sound events should be limited to no more than 10 – 15 times per night, when measured with a 'fast' time weighting.

4.0 NOISE SURVEY DETAILS AND RESULTS

Monitoring surveys have been undertaken to establish the level of noise currently experienced upon the proposed development site including for noise from the surrounding roads and other local noise sources.

4.1 Survey Times and Dates

Measurements were conducted between 11:55 hours on Tuesday 23rd June 2026 and 12:55 hours on Wednesday 24th June 2026 encompassing full day and night time measurements. It should also be noted that measurements from the surveys have been grouped into "day" and "night" categories in accordance with the following times:-

Daytime: Between 0700 and 2300 hours
Night-time: Between 2300 and 0700 hours

5 minute sample durations were taken for the positions over the daytime and night time measurement periods. The measurements were made and partially attended by Liam Kavaney of PDA Ltd.

4.2 Equipment Used

Throughout the survey, measurements were undertaken with a NTi XL2 sound level meter and a Rion NA-28 sound level meter. The meters are precision grade Class 1 sound level meters (as per BS EN 61672-1: 2002) for which current calibration certificates are held. The meters were set to A-Weighted and fast response. The meters were calibrated directly before any measurement took place and immediately afterwards and no significant drift was observed.

4.3 Weather

Weather conditions were conducive to undertake noise measurements which can be described as dry with minimal wind speeds for the majority of the survey period.

4.4 Measurement Locations

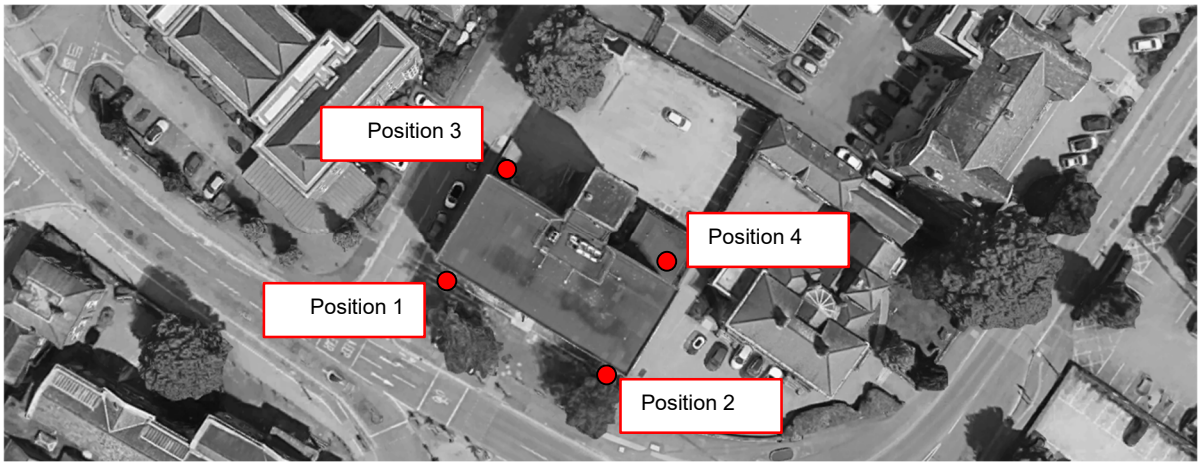
Measurements were undertaken at 4 no. fixed positions to describe the noise level at the proposed development site and were as follows:

- Position 1 – Microphone located on a pole from out of a façade window of the existing building at second floor level facing onto Regent Street.
- Position 2 – Microphone located on a pole from out of a façade window of the existing building at second floor level facing onto Regent Street.
- Position 3 – Microphone located on a pole from out of a façade window of the existing building at second floor level facing onto the rear car park.
- Position 4 – Microphone located on a pole from out of a façade window of the existing building at second floor level facing onto the rear car park

In addition sample noise measurements were made around a number of locations around the site and within the existing building to characterise any variation in existing noise levels across the proposed development site. The sample measurements have also been used to inform the calibration of the noise model below.

All measurements were undertaken with a fast time-weighting and broadband statistics were measured throughout along with octave band spectra. The measurement positions are detailed in Figure 2 below.

Figure 2. Fixed Measurement Locations



4.5 Description of Ambient Noise Climate

Positions 1 & 2

During the survey the main source of noise was road traffic on Regent Street, Bradley Road and Grosvenor Road. A steady flow of traffic was observed whilst on site. Emergency vehicle sirens were also observed intermittently throughout the survey period. Roadworks were in operation on Regent Street which contributed to the noise climate.

Position 3

Plant noise from the ground floor restaurant was the main noise source at this location. When the plant was not in operation the main noise sources was intermittent traffic on local roads.

Position 4

During the survey the main source of noise was road traffic on surrounding local roads.

4.6 Measured Results

The noise measurements from the survey conducted by PDA are summarised in the tables below. Average levels are the logarithmic average of all the measured noise levels. A graphical representation of the measured results can be seen in Appendix C included at the end of this report.

It should be noted that the measured noise levels below are measured at the façade of the existing building. -3dB should be taken from the values below to give the equivalent free-field noise level, to account for the reflection from the existing building.

Table 5. Summary of environmental noise measurements – Position 1

Date	Time Period (hh:mm)	Duration (hh:mm)	$L_{Aeq,T}$ (dB)	Typical Night-time $L_{Amax,5mins}$ (dB) [1]
23rd – 24th June 2026	Day 11:15 – 23:00 Day 07:00 – 12:55	11:45 05:55	65	-
	Night 23:00 – 07:00	08:00	58	73

Table 6. Summary of environmental noise measurements – Position 2

Date	Time Period (hh:mm)	Duration (hh:mm)	$L_{Aeq,T}$ (dB)	Typical Night-time $L_{Amax,5mins}$ (dB) [1]
23rd – 24th June 2026	Day 12:15 – 23:00 Day 07:00 – 12:40	10:45 05:40	66	-
	Night 23:00 – 07:00	08:00	58	73

Table 7. Summary of environmental noise measurements – Position 3

Date	Time Period (hh:mm)	Duration (hh:mm)	$L_{Aeq,T}$ (dB)	Typical Night-time $L_{Amax,5mins}$ (dB) [1]
23rd – 24th June 2026	Day 12:40 – 23:00 Day 07:00 – 12:40	10:20 05:40	61	-
	Night 23:00 – 07:00	08:00	57	72

Table 8. Summary of environmental noise measurements – Position 4

Date	Time Period (hh:mm)	Duration (hh:mm)	$L_{Aeq,T}$ (dB)	Typical Night-time $L_{Amax,5mins}$ (dB) [1]
23rd – 24th June 2026	Day 14:10 – 23:00 Day 07:00 – 11:25	08:50 04:25	54	-
	Night 23:00 – 07:00	08:00	50	67

Notes:

The WHO Guidelines for Community Noise state that sleep disturbance may occur where the specified 45dB L_{Amax} is exceeded internally 10 to 15 times over the 8-hour night-time period. The L_{Amax} recorded for these positions is the L_{Amax} exceeded no more than 10 times over the full night-time-period or equivalent.

4.7 Noise Modelling

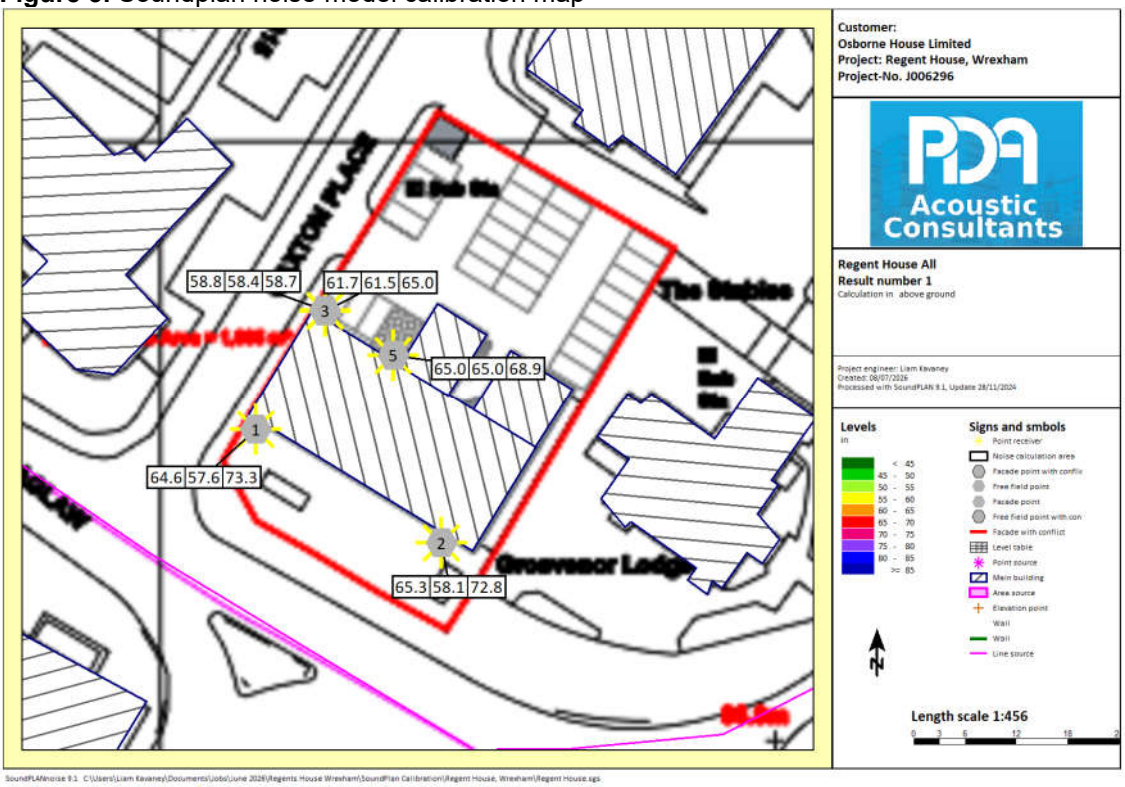
Using the measured noise level data, a 3-dimensional computer noise model has been constructed using Soundplan noise modelling software to give an indication of the noise level impact upon the proposed development from road traffic noise and plant noise at the rear. The software uses the method of ISO 9613 '*Acoustics – attenuation of sound during propagation outdoors – general method of calculation' and* takes into account geometric spreading, ground effects, air absorption, barrier attenuation and reflections from the surroundings to calculate the noise levels incident upon the proposed development.

The model has been calibrated to the noise levels measured on-site. From this the proposed layout of the new building has been added. It should be noted that within the model, the noise source for the roads are modelled as continuous line sources, the noise source for the extract louvre is modelled as an area source and the extract ducting modelled as a continuous line source.

A ground absorption coefficient of 0 has been used to take into account the predominately hard surfaces of roads, hard standing, buildings, etc. The noise model in Figure 3 shows good correlation with the measured survey data.

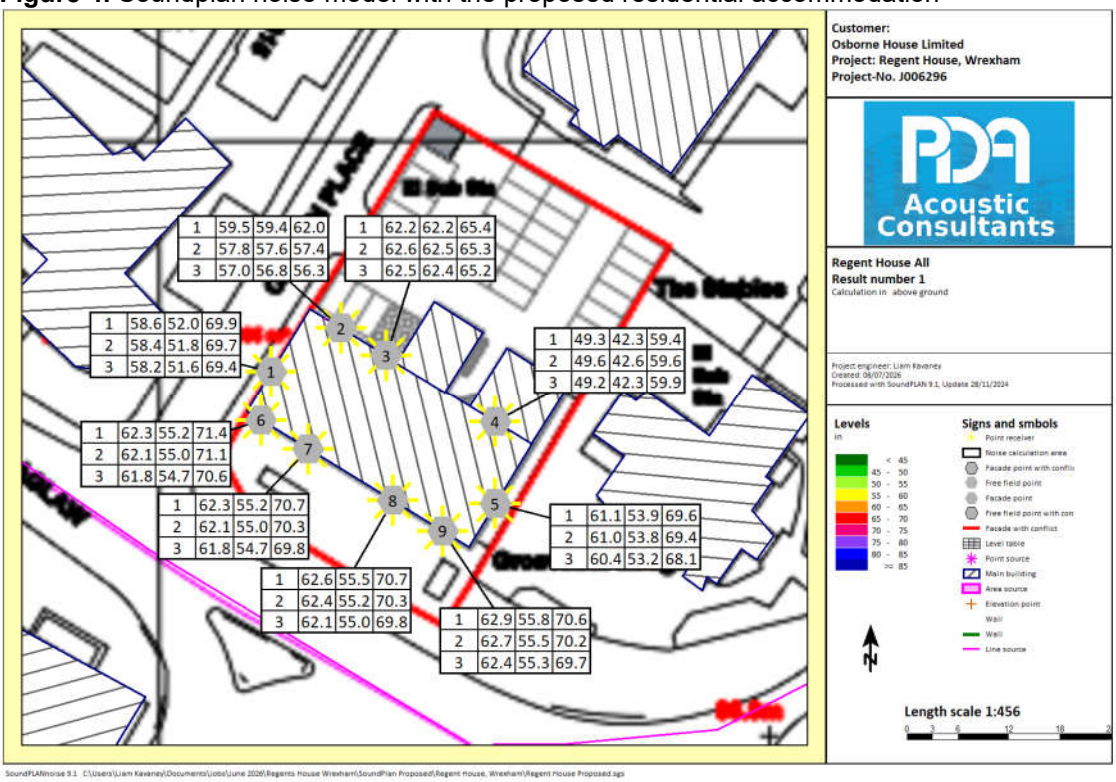
From this the noise levels incident upon the proposed conversion development building are calculated at 3m above ground level for the first floor residential accommodation with an additional 3m added for each successive floor level. The Soundplan model predicts the following noise levels at the façade of the proposed development.

Figure 3. Soundplan noise model calibration map



NB. Noise Levels for each position are given as [Day L_{Aeq}][Night L_{Aeq}][Night L_{Amax}]

Figure 4. Soundplan noise model with the proposed residential accommodation



NB. Noise Levels for each position are given as [Floor Level][Day L_{Aeq}][Night L_{Aeq}][Night L_{Amax}]

4.8 TAN 11 NEC Categories & Assessment

The TAN 11 categories relevant to proposed site are reproduced below for reference.

Table 9. Noise Exposure Category Levels (Plot 3, Riverside Wharf)

Noise Source		A	B	C	D
Road traffic:	0700-2300	<55	55-63	63-72	>72
	2300-0700	<45	45-57	57-66	>66
Mixed sources:	0700-2300	<55	55-63	63-72	>72
	2300-0700	<45	45-57	57-66	>66

The measured and predicted noise levels detailed in Sections 4.6 & 4.7 indicate that noise levels across the site predominantly fall into NEC Category B. Additionally based on the results of the noise survey L_{Amax} noise levels are not predicted to exceed 82 dBA on a regular basis in any given 1-hour period throughout the night.

Further to the above it is PDA's experience that developments with the measured/modelled noise levels above are suitable for residential development provided that adequate acoustic attenuation is provided to habitable areas. Therefore in accordance with TAN 11 the proposed development is considered to achieve NEC Category B.

Suitable internal noise level criterion for the proposed residential dwelling is taken from the good practice guidance as detailed in Section 3 above (BS8233:2014 and WHO Guidelines for Community Noise). Considering the acoustic weak points of a building façade, typically the glazing and the ventilation elements, calculations have been undertaken to determine building fabric specifications to ensure that internal noise levels as detailed in Tables 3 & 4 can be achieved.

5.0 NOISE LEVEL PREDICTIONS

Based upon the measured and predicted noise levels in Section 4, calculations have been undertaken to determine internal noise levels for the proposed living accommodation. The proposed and existing internal GA Layouts and Elevations used within our calculations are as per the Initiatives Design Ltd Proposed Arrangements, ref. 806.7 \ OBH \ 100 \ 14 and 7 dated July 2026.

5.1 Room Dimensions & Volumes

Internal noise levels to the proposed development have been calculated based on the following room dimensions. Room volumes have been calculated based on the floor areas of the proposed room layout drawings and assuming a typical room height of 2.4m. Window sizes have been estimated based on the proposed plan layouts and existing glazing on site. PDA Ltd should be informed if volumes or glazing areas differ significantly from the areas accounted for in Table 10 below.

Table 10. Room Dimensions

Room	External Wall Area m^2 (excluding glazing)	Window/Glazing Area m^2	Room Volume m^3
Studios, 02, 12, 14, 24, 26, 36	15	9.4	61
Studios, 04, 06, 08, 10, 16, 18, 20, 22, 28, 30, 32, 34	2	5.1	61
Studios, 01, 11, 13, 23, 25, 35	13	6.8	43
Studios, 03, 09, 15, 21, 27, 33	2	5.1	43
Studios, 05, 07, 17, 19, 29, 31	2	4.4	43

5.2 Glazing and Ventilation Attenuation Requirements

The dominant paths for noise transfer to the interior of buildings are generally the glazing and ventilation elements of the façade constructions. Based on this premise, to achieve the required internal noise levels from Section 3 would require the following glazing and ventilation specifications.

The calculation of noise break-in to the residential rooms has been undertaken in accordance with the calculation methods of BS EN 12354-3:2000 *Building Acoustics – Estimation of acoustic performance of buildings from the performance of elements. Part 3: Airborne sound insulation against outdoor sound*, in octave bands. The internal noise levels have been determined, taking into account the sound insulation and area of each element, the room volume and reverberation time, and finally A-weighting the resulting spectrum to determine the internal noise levels. Reverberation time is 0.5 seconds as per the BS EN 12354-3 reference time for dwellings.

We understand that attenuated mechanical ventilation will be proposed for the studios and calculations have therefore been conducted without the inclusion of passive ventilation inlets.

Figure 5. Glazing requirements for proposed accommodation for all floors



Table 11. Glazing and Ventilator Schedule on Worst Case Habitable Rooms

Colour	Façade	Room	Minimum Glazing Rating R_w dB	Minimum combined Ventilator Rating $D_{n,e,w}$ dB	Internal Noise Level Target	Calculated Internal Noise Level
					$L_{Aeq,T}$ dB Day/Night	$L_{Aeq,T}$ dB Day/Night
Green	Front / Side	Studio 02	33	Mech.	35/30	33/26
Green	Front	Studio 04	33	Mech.	35/30	32/24
Green	Front / Side	Studio 12	33	Mech.	35/30	33/25
Green	Rear	Studio 11	33	Mech.	35/30	25/19
Amber	Rear	Studio 01	Sec.	Mech.	35/30	25/25
Amber	Rear	Studio 05	Sec.	Mech.	35/30	23/23

With the glazing specifications proposed in Table 11 above, calculations suggest that the internal Day time and Night time BS8233:2014/WHO noise level requirements can be achieved.

In addition due to the nature of the noise sources affecting the rear of the development a more stringent internal noise criteria is considered appropriate as the BS8233 and WHO recommended internal and external noise criteria set out in Section 3 above are primarily intended for anonymous noise sources such as transportation noise. Where noise sources with a distinct character such as fixed plant noise affect a site an additional 'penalty' may be appropriate. In this case it is recommended that the indoor ambient noise level criteria above be reduced by 5dB in areas affected by fixed plant noise to reflect the additional potential disturbance caused by the particular character of the sound.

Therefore, with the glazing specifications proposed adjacent to or above fixed plant locations calculations indicate that the Internal noise levels will be at least 5 dBA below the recommended criteria.

In addition to the above, calculations have been undertaken to determine L_{Amax} noise levels within the bedrooms at night time. Using the full night time L_{Amax} noise levels measured and predicted, with the glazing and ventilation specifications above, the calculated L_{Amax} values are predicted to be in line with the WHO guidance for acceptable exceedances.

5.2.1 Glazing Specification and Installation Notes

Notes on any new Glazing Installation

For the glazing specifications all sound insulation values quoted must be achieved by the overall combination of frame and glazing, and not just by the glazing alone. The frame should not reduce the performance of the system overall.

Glazing framing systems must be fully sealed with any small gaps (<10mm nominal) around the perimeter to be stuffed with dense mineral wool to full frame depth and sealed both sides with acoustic non-setting mastic, with additional weathering protection to be applied additionally externally to this. No gaps should be left unsealed.

Notes on Retaining Existing Glazing

From on-site inspections the existing windows comprise 4mm glazing, 16mm cavity, 4mm glazing (4/16/4mm) within aluminium frames. The acoustic performance of this glazing configuration is expected to be comparable to that adopted within the assessment calculations. It is therefore considered capable of achieving the required internal noise level criteria and can therefore be retained where applicable.

Where it is proposed to install secondary glazing a secondary pane in a separate frame would be installed, behind the existing glazing, in order to increase the sound insulation of the window to meet the specifications above. Pilkington acoustic test data would suggest that a secondary pane consisting of a minimum 6mm glass installed a minimum of 100mm behind 4mm glazing would have an acoustic rating of 46 dB R_w. This performance has been adopted within the assessment calculations. The proposed arrangement of 6 mm secondary glazing installed a minimum of 100 mm behind the existing 4/16/4 mm double-glazed units is expected to provide a comparable level of acoustic performance. Specialist secondary glazing manufacturers are available, and include Selectaglaze.

Minimum performance requirements for the combination of glazing and framing recommended in the above tables are as follows:

Table 12. Required Minimum Sound insulation of Combined Glazing and Framing

Typical Product	Minimum Sound Reduction Index R (dB) at Octave Band Centre Frequency (Hz)							R_w dB
	63	125	250	500	1k	2k	4k	
Double glazing e.g. 4/16/4 MB-70	25	21	19	32	40	40	37	33
Secondary glazing e.g. 4/100/6mm	23	26	34	44	56	53	52	46

Figures stated in the table above are based on manufacturer quoted data. Acoustic ratings should be checked with the manufacturer and supported by laboratory test reports where necessary.

5.2.2 Ventilator Requirements - Mechanical Ventilation

It is understood that ventilation is proposed through use of a mechanical ventilation system, therefore passive ventilators will not be used within the building façade. It should be borne in mind that with any fan-assisted ventilation systems it should be ensured that the fan itself does not exceed the noise criteria as specified in Tables 3 and 4.

Ventilation strategy needs to be checked with Local Authority and other standards and regulations for compliance. It should be noted that inclusion of ventilators alone does not ensure compliance with Building Regulations or other regulatory requirements for ventilation. The ventilation strategy should be checked by others.

In addition, please note that in accordance with the guidance contained within BS8233:2014 “Guidance on sound insulation and noise reduction for buildings”, windows may remain openable for rapid or purge ventilation, or at the occupant’s choice.

5.3 External Walls

We are not aware of the construction details of the existing external wall but based on the period of the building we have assumed that this is likely a solid and/or cavity brick construction. From laboratory test data for similar constructions, it is assumed that the above build-up would provide a laboratory sound insulation in excess of 54 dB R_w which is considered acceptable and far exceeds that of the glazing and ventilation elements.

It will need to be ensured the following minimum sound insulation values are achieved. The sound insulation properties for the assumed external wall construction has been predicted using Insul®, see Table 13 below:

Table 13. External Façade Elements Acoustic Properties

Façade Element	Octave Band (Hz) Sound Insulation, R (dB)							R_w
	63	125	250	500	1000	2000	4000	
Existing External Wall	35	41	45	48	56	58	60	54

Please note that the external façade should have no unsealed penetrations.

5.4 Roof

Within the calculations, the roof to the has been assumed to be lightweight construction with insulation below, the ceiling comprising of 2 no. layers of 12.5mm Soundbloc plasterboard (min. total mass per unit area 20kg/m^2).

Insul sound prediction software would suggest the above structure has a laboratory sound insulation of at least 48 dB R_w, which is considered to be acceptable.

It will need to be ensured the following minimum sound insulation values are achieved. The sound insulation properties for the roof construction has been predicted using Insul®, see Table 14 below:

Table 14. Roof Acoustic Properties

Façade Element	Octave Band (Hz) Sound Insulation, R (dB)							R_w
	63	125	250	500	1000	2000	4000	
Roof	29	41	47	52	55	51	55	48

5.5 Noise Transfer from Ground Floor Commercial Units to First Floor

We have assessed the potential noise transfer from the existing ground floor commercial units to the proposed residential accommodation above by undertaking verification sound insulation tests of the existing floor structure.

The separating floor is understood to be a concrete slab, with external walls made up of masonry.

5.5.1 Initial Sound Insulation Verification

Sample sound insulation tests were undertaken between the existing ground ground lobby and first floor (airborne) to assess the level of sound insulation offered by the existing floor build up. An additional test was also undertaken between the first floor and second floor. The sample tests were undertaken on the 24th June 2026 by Liam Kavaney of PDA Ltd with the results in the table below.

Table 15. Test results – Floors (Airborne Sound Insulation)

Test Ref.	Source Room	Receiver Room	Required ADE Performance Criteria, $D_{nT,w} + C_{tr}$ dB	Measured Result $D_{nT,w}$ dB	Measured Result $D_{nT,w} + C_{tr}$ dB
1	Ground Floor Lobby	First Floor Office	43	67	60
2	Second Floor Office	First Floor Office	43	61	53

The test results of the existing separating floors demonstrate compliance with the minimum requirements of Building Regulations Approved Document E.

The minimum required sound insulation performance of separating elements in residential buildings is governed by the Building Regulations Approved Document E, which sets out minimum sound reduction performance criteria that should be achieved between the spaces. The ADE airborne sound insulation requirement needs to be achieved between any residential unit and another part of the same building. The tests above demonstrate that the separating floor between the existing ground ground floor space and first floor would meet the minimum requirements of the Building Regulations ADE for dwellings formed by material change of use.

However Clause 0.8 of Approved Document E would suggest that, '*the performance standards set out in Tables 1a and 1b (of the document) are appropriate for walls, floors and stairs that separate spaces used for normal domestic purposes. A higher standard of sound insulation may be required between spaces used for normal domestic purposes and communal or non-domestic purposes. In these situations the appropriate level of sound insulation will depend on the noise generated in the communal or non-domestic space. Specialist advice may be needed to establish if a higher standard of sound insulation is required and, if so, to determine the appropriate level.*'

It is understood that the existing uses of two of the three occupied ground floor commercial spaces are fast food restaurant / takeaway premises. The sample test results suggest that the tested construction is capable of achieving the minimum requirements of Building Regulations ADE requirement for dwellings formed by material change of use, and is likely to be sufficient for reasonable noise levels (e.g. up to 75 dBA) without causing intrusion to the proposed residential units above.

It is important that all separating elements between the ground floor and first-floor accommodation comply with the minimum ADE sound insulation standards.

If the proposed ground floor use changes to one that generates higher noise levels than that of a typical restaurant such as a music bar then upgrades to the building structure may be necessary. These could include enhanced ceilings, additional wall linings to walls, and the use of noise limiters for amplified music systems. A detailed acoustic assessment should be carried out either at the detailed design stage or during the fit-out phase if the uses change.

5.6 Quality Control

Please note that achieving performance standards requires strict adherence to best practice construction methodology on site. A checklist of acoustic requirements for quality control is attached at the rear of this report.

6.0 CONCLUSIONS

PDA Ltd was commissioned by Osborne House Limited to carry out an environmental noise and building envelope assessment report for the proposed residential development at Regent House, Regent Street, Wrexham, LL11 1PR. The proposed development consists of the change of use of an office building into circa 36 residential studios over the upper three floors while retaining the commercial uses at ground floor level.

A noise survey has been conducted at the proposed development site and has been used to assess the existing acoustic climate and determine the building envelope specification.

The assessment for the development has been undertaken in accordance with Technical Advice Note (TAN) 11 – Noise. Overall the results of the noise survey and noise models indicate that the proposed development falls in NEC category B. In PDA's experience planning permission can usually be granted on the basis that suitable mitigation is applied to the proposed development.

Based upon the measured and predicted noise levels, calculations have been undertaken for the Bedrooms and Living Spaces to evaluate the internal noise levels. Recommendations are given for glazing, ventilation and building façade elements to meet the internal noise level requirements of Planning Condition 6 and good practice guidance given in BS8233:2014 Guidance on Sound Insulation and Noise Reduction for Buildings. Calculations suggest that the noise level criteria of BS8233:2014 can be achieved within the proposed accommodation.

In addition, an assessment of internal noise transfer via from the ground floor commercial units has been carried out which indicates that internal noise levels within the proposed residential accommodation above are unlikely to be adversely affected by the expected noise levels generated by the ground floor commercial use.

APPENDIX A – NOTES FOR QUALITY CONTROL

1. Blockwork

All blockwork is to be mortared to an almost fair faced standard both horizontally and vertically. Only perfect blocks may be used with no pitting or cracks. The blockwork must seal effectively to the underside of the soffit.

Where blockwork walls form a cavity wall, care should be taken to avoid rubble and snots from bridging the cavity. This is especially important where one or more of the leaves is floating.

2. Plasterboard

All plasterboard joints are to be butted tight. The rule of thumb is that the joint should be tight enough over its entire length to prevent a normal business card from being inserted. Multiple layers should be fitted with staggered joints.

Base details and deflection heads are to be as per the British Gypsum White Book unless otherwise stated, and copious amounts of mastic to be used when fitting to the walls, floor and ceiling respectively.

3. Mineral Fibre

Mineral fibre slabs are to be butted tightly together and to boundary structures, to form a homogeneous layer.

4. Windows

All window frames are to be a good tight fit into the building structure with any gaps to be filled both internally and externally with a non-setting mastic in addition to the usual weather proofing seal to the exterior. Any gaps between the frame and building that are greater than 5 mm are to packed with a dense mineral fibre prior to mastic sealing.

5. Electrical Sockets

Electrical sockets must not be fitted back to back and removed areas of blockwork and plasterboard should be kept to an absolute minimum.

6. Water Pipes

All water pipes (and any other pipework) are to be resiliently mounted to avoid “water hammer”. This is particularly important for plasterboard walls.

7. Penetrations

Penetrations are to be dealt with as described in this report. Details for specific services penetrations may be supplied upon request.

8. Approved Samples and Inspections

Samples of each individual acoustic element should be provided for inspection at the beginning of its installation. Once approved, the Clerk of Works must ensure that the same level of quality continues throughout construction.

APPENDIX B – DEFINITION OF ACOUSTIC TERMS

The decibel

This is the basic unit of noise, denoted dB.

A Weighting

This is a weighting process which simulates the human ear's different sensitivity at different frequencies. A weighting can be shown two typical ways, 50 dB(A) L_{eq} or 50 dB L_{Aeq}. Both mean the same thing. (See below for a definition of L_{eq}). The dB(A) level can be regarded as the overall level perceived by human beings.

L_{eq} and $L_{eq(s)}$

This is the equivalent continuous noise level which contains the same acoustic energy as the actual time-varying sound. In other words it is a kind of average noise level. It is denoted dB L_{eq} or, for A-weighted figures dB(A) L_{eq} or dB L_{Aeq}. It can also be expressed in terms of frequency analysis (see later). $L_{eq(s)}$ is the sample L_{eq} level.

L_n

This is the level exceeded for n% of the time. It is denoted dB L_n or, for A-weighted figures dB(A) L_n or dB L_{An}. It can be expressed in terms of frequency analysis (see later). L_{90} is the level exceeded for 90% of the time and is a measure of the lowest level typically reached. L_{10} is the level exceeded for 10% of the time and is the highest level typically reached. L_{50} is the level exceeded for 50% of the time and, mathematically, it is the median.

L_{max}

This is the maximum level reached during a measurement period. The "time constant", or the ability of the equipment to respond to impulses is usually expressed along with it, e.g. "Fast", "Slow", etc. It is denoted dB L_{max} or, for A-weighted figures dB(A) L_{max}, dB L_{Amax}, etc. It can also be expressed in terms of frequency analysis.

Frequency Analysis

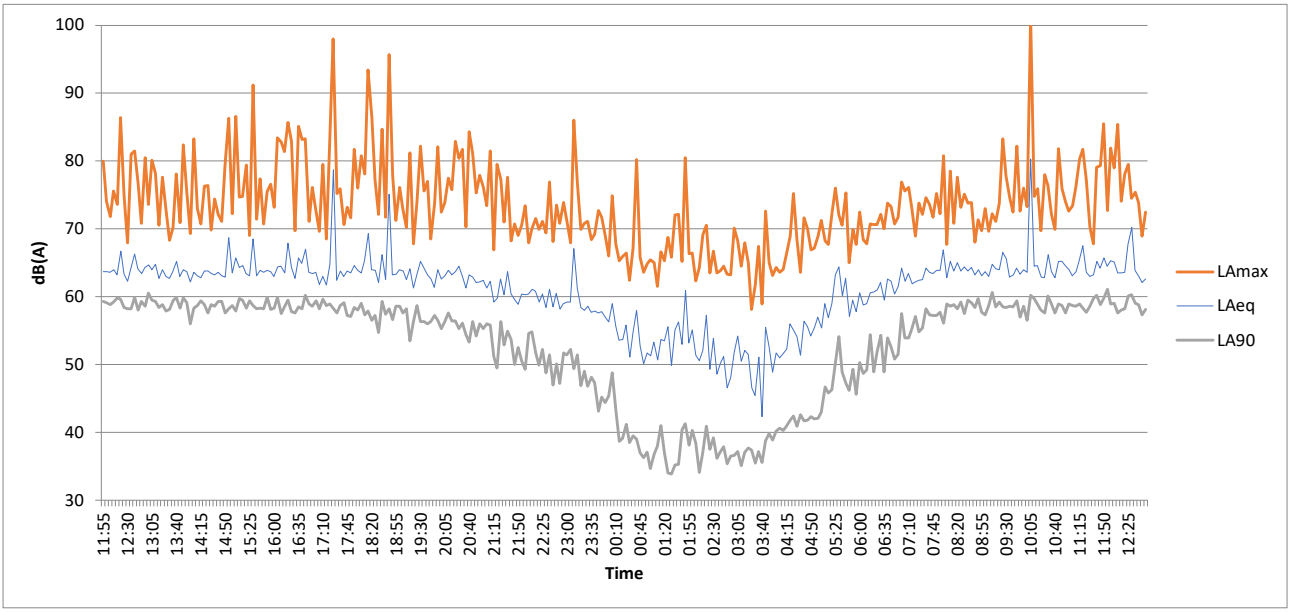
Whereas dB(A) gives a very useful overall figure, it has its limitations in that it cannot be used to model or predict the effect of noise control and mitigation as this nearly always has radically different performance at different frequencies.

Frequency analysis expresses an overall noise level at each frequency or band of frequencies in the audible range. Octave band analysis divides the audible range into 10 bands from 31.5 Hz to 16 kHz and the noise level in each band can be expressed in any form e.g. L_{eq}, L_{90}, L_{max} etc. One third octave band analysis uses 30 bands.

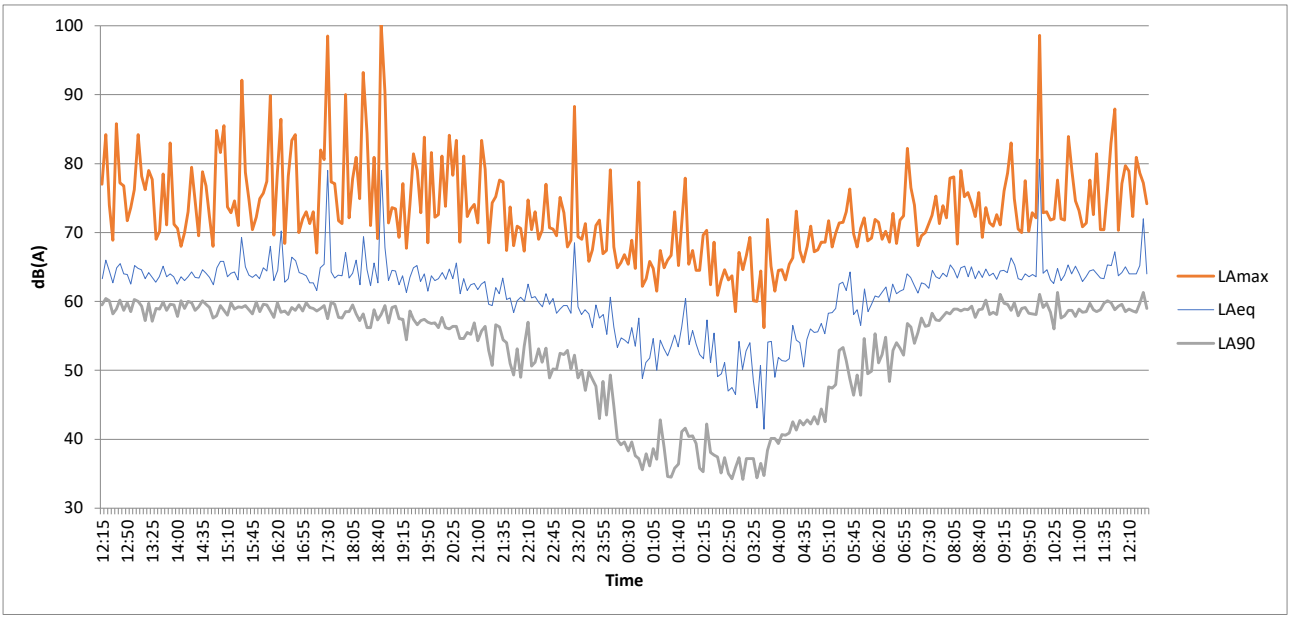
Narrow band analysis takes the process to resolutions of less than 1 Hz. This is useful for identifying the existence of tones (whines, hums, etc.) and in pin-pointing the sources.

APPENDIX C – NOISE SURVEY RESULTS

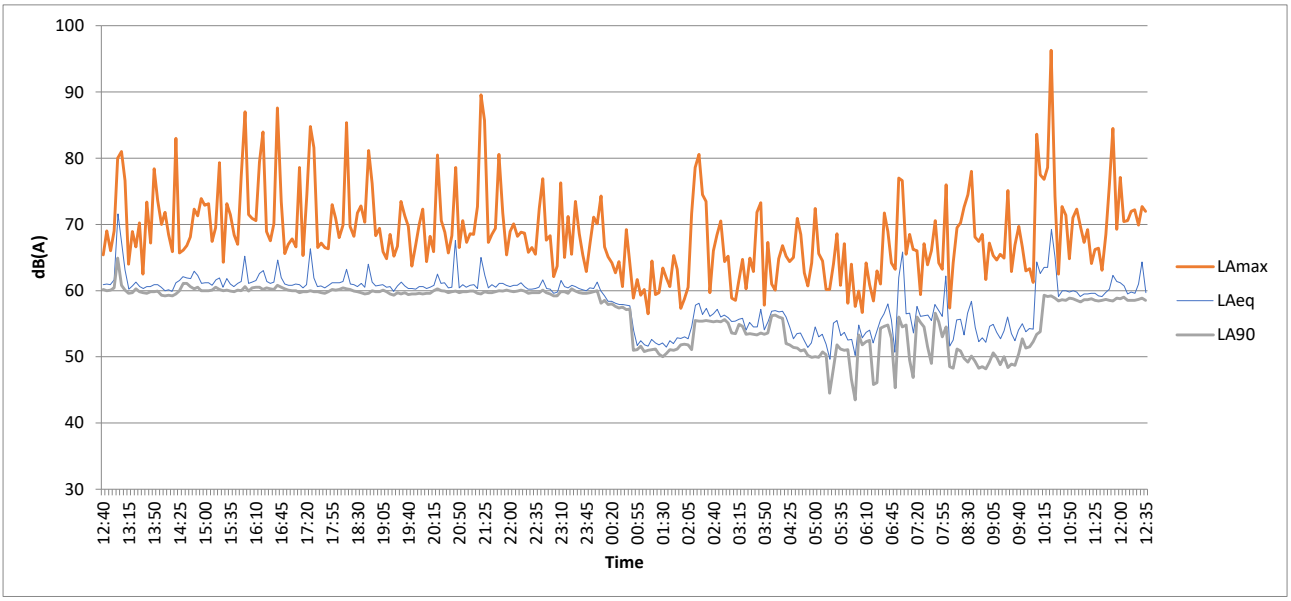
Time History of Noise measurements – Position 1



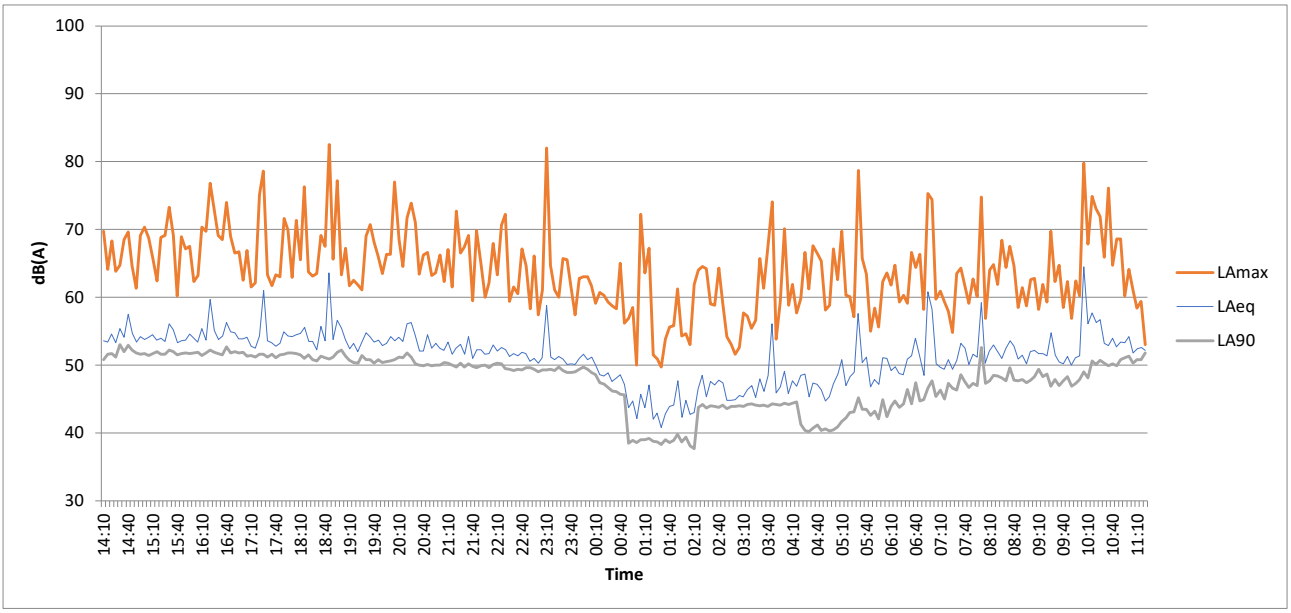
Time History of Noise measurements – Position 2



Time History of Noise measurements – Position 3



Time History of Noise measurements – Position 4



Summary of sample environmental noise measurements for use within Soundplan model

Location	Duration (hh:mm)	$L_{Aeq,T}$ (dB)	$L_{Amax,T}$ (dB)
First Floor Level Window adjacent Ducting	00:01	65	68
First Floor Level Window below Position 3	00:01	60	65