



114 - 116 Alexandra Road, Newport

Noise Impact Assessment for Residential Use

24th February 2026

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Authored By	John Bosley BSc (Hons)		
Checked By	Neil Morgan MSc MIOA and Natalie Wild BA (Hons) MIOA PISEP		
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1. INTRODUCTION

1.1. Overview

inacoustic has been commissioned to assess the impact of noise associated with the proposed change of use from commercial to residential (the 'Proposed Development') at first floor level at 114 - 116 Alexandra Road, Newport, NP20 2JG (the 'Site').

The following technical noise assessment has been produced to support a planning application to Newport City Council and determine the façade insulation requirements of the Proposed Development, in order to ensure appropriate levels of internal acoustic amenity. The assessment is based upon environmental noise measurements undertaken at the Site.

1.2. Scope and Objectives

The scope of the noise assessment can be summarised as follows:

- A noise monitoring survey was undertaken at discrete locations around the Site;
- An assessment of potential noise impacts with respect to the prevailing acoustic conditions on the Proposed Development; and
- Recommendation of mitigation measures, where necessary, to comply with the requirements of Technical Advice Note (Wales) 11: Noise (TAN 11)¹ and British Standard 8233:2014 '*Guidance on sound insulation and noise reduction for buildings*' (BS 8233:2014)².

This report is necessarily technical in nature; therefore a glossary of terms is included in Appendix A to assist the reader.

Full-time history graphs of the noise survey are presented in Appendix B.

¹ Planning Guidance (Wales), Technical Advice Note (TAN) 11: Noise, October 1997.

² BSI, British Standard 8233:2014 *Guidance on sound insulation and noise reduction for buildings*, 2014.

2. PLANNING POLICY FRAMEWORK

The development proposals for the Site are guided by the following policy directives and guidance:

2.1. National Policy

2.1.1. Technical Advice Note (Wales) 11 – Noise

TAN 11 has been referenced in determining the suitability of the Site for residential development. TAN 11 sets out the Welsh Assembly Government's policies on noise-related planning issues. It sets out the overarching policy context for the management of noise within the planning system, in terms of how both noise-generating developments and noise-sensitive developments should be considered.

TAN 11 gives guidance to local authorities in Wales on the use of their planning powers to minimise the adverse impact of noise. Specifically, TAN 11:

- outlines the considerations to be taken into account when determining planning applications for both noise-sensitive developments and for those activities which will generate noise;
- sets out noise exposure categories for residential development, encourages their use and recommends appropriate levels for exposure to different sources of noise; and
- advises on the use of planning conditions to minimise the impact of noise.

The four noise exposure category bands set out in TAN 11 (or NECs) are designed to assist local planning authorities in evaluating applications for residential development in noisy areas. Table 1 summarises the noise levels that correspond to each NEC band for mixed noise sources, which are the most relevant to this development.

TABLE 1: NOISE LEVELS CORRESPONDING TO NECs FOR NEW DWELLINGS – $L_{Aeq,T}$ dB

Time Period	Noise Exposure Category (NEC) – Road Traffic			
	A	B	C	D
07:00-23:00	<55	55 – 63	63 – 72	>72
23:00-07:00	<45	45 – 57	57 – 66	>66
N.B. Additionally, during night-time (2300 – 0700), sites where individual noise events exceed 82 dB L_{Amax} (slow time weighting) more than twice in any hour during this period 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).				

The relevant planning advice to the local authority with respect to each NEC is presented below.

TABLE 2: PLANNING ADVICE CORRESPONDING TO NECs FOR NEW DWELLINGS

NEC	Advice to Local Planning Authority
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.

In addition to the above, TAN 11 also states that during the night, (23:00 to 07:00 hours):

“Sites where individual noise events regularly exceed 82dB L_{Amax} (S time weighting) several times in any hour should be treated as being in NEC C, regardless of the $L_{Aeq,8hr}$ (except where the $L_{Aeq,8hr}$ already puts the site into NEC D).”

The advice within TAN 11 is useful as a planning tool; however, it is quite blunt, so reference is primarily made within this report to British Standards, which offer a greater degree of objective analysis.

2.2. British Standards

2.2.1. BS 8233:2014 ‘Guidance on sound insulation and noise reduction for buildings’

BS 8233:2014 draws on the results of research and experience to provide information on achieving internal acoustic environments appropriate to their functions. The guideline values provided are in terms of an average (L_{Aeq}) level.

The standard advises that, for steady external noise sources, it is desirable for internal ambient noise levels to not exceed the guidance values, as detailed below in Table 3.

TABLE 3: BS8233:2014 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	40 dB $L_{Aeq,16hour}$	-
Sleeping (daytime resting)	Bedroom	35 dB $L_{Aeq,16hour}$	30 dB $L_{Aeq,8hour}$

BS 8233:2014 goes on to suggest that where development is considered necessary or desirable, the internal target levels may be relaxed by up to 5 dB and reasonable internal conditions will still be achieved.

With regard to maximum noise levels, the standard identifies that regular individual noise events (such as passing trains or scheduled aircraft etc) can cause sleep disturbance. The standard does not provide a guideline design target, but simply goes on to suggest that a guideline value may be set in terms of SEL or $L_{Amax,F}$, depending upon the character and number of events per night. It goes on to suggest that more sporadic noise events could require separate values.

In respect of external noise levels, the guidance in BS 8233:2014 suggests that *“it is desirable that the external noise level does not exceed 50dB $L_{Aeq,T}$, with an upper guideline value of 55dB $L_{Aeq,T}$ which would be acceptable in noisier environments”*.

BS 8233:2014 provides a much more detailed narrative on noise levels in external amenity areas and acknowledges that it may not always be necessary or feasible to ensure that noise levels remain within these guideline values.

In respect of gardens and patios, BS 8233:2014 states;

“...it is also recognized that these guideline values are not achievable in all circumstances where development might be desirable.”

BS 8233:2014 goes on to state, for areas adjoining the strategic transport network:

“...a compromise between elevated noise levels and other factors, such as the convenience of living in these locations or making efficient use of land resources to ensure development needs can be met, might be warranted. In such a situation, development should be designed to achieve the lowest practicable levels in these external amenity spaces, but should not be prohibited”.

In respect of balconies, roof gardens and terraces, BS 8233:2014 states; *“Other locations, such as balconies, roof gardens and terraces, are also important in residential buildings where normal external amenity space might be limited or not available, i.e. in flats, apartment blocks, etc. In these locations, specification of noise limits is not necessarily appropriate. Small balconies may be included for uses such as drying washing or growing pot plants, and noise limits should not be necessary for these uses; however, the general guidance on noise in amenity space is still appropriate for larger balconies, roof gardens and terraces, which might be intended to be used for relaxation. In high-noise areas, consideration should be given to protecting these areas by screening or building design to achieve the lowest practicable levels. Achieving levels of 55 dB $L_{Aeq,T}$ or less might not be possible at the outer edge of these areas, but should be achievable in some areas of the space”*.

It is clear from the narrative of BS 8233:2014, that Proposed Development within noisy environments should be designed to ensure that the recommended internal design standards are achieved, and that noise levels in external amenity areas are designed to effectively control and reduce noise levels, although it acknowledges that in certain circumstance meeting the external design recommendations may not be feasible, or necessary, especially where the provision of such spaces is desirable for other technical, planning or policy reasons.

3. SITE DESCRIPTION

3.1. Site and Surrounding Area

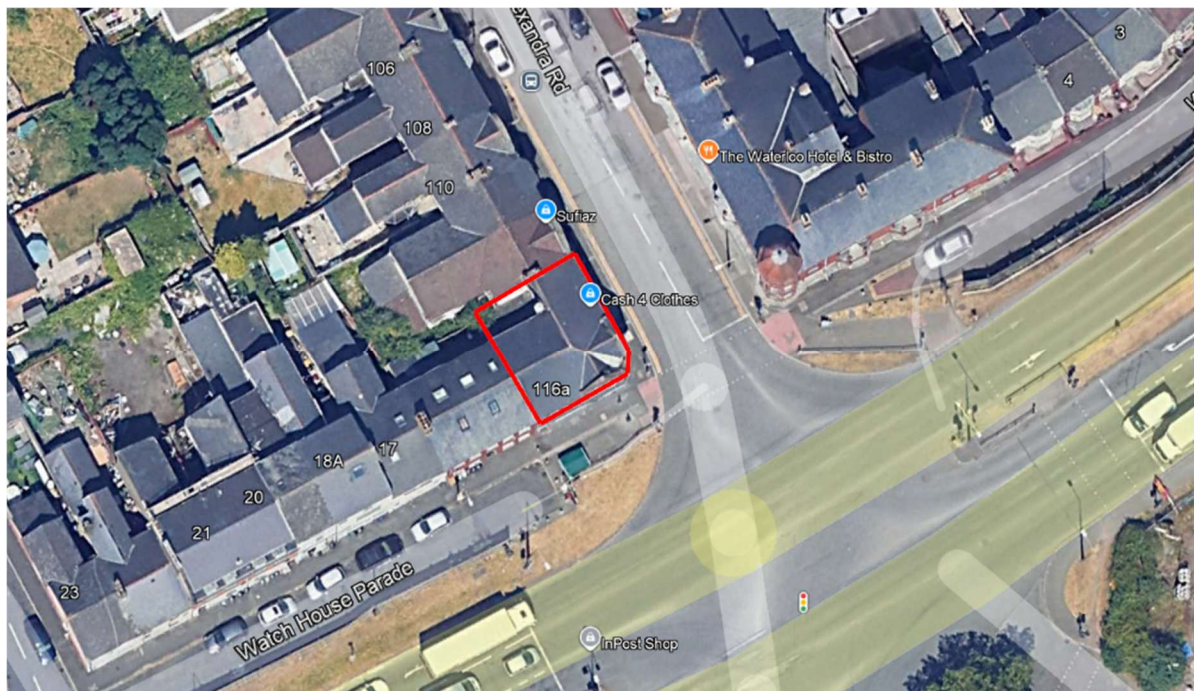
The Site is located at the junction of two main roads; the A48 to the south and Alexandra Road to the east. It is surrounded by a mix of residential properties and commercial/hospitality use. This includes a disused cafeteria situated at ground floor level of the Site, and The Waterloo Hotel & Bistro located to the east on Alexandra Road.

Commercial and industrial units are located to the south beyond the A48.

The sound environment at the Site is dominated by road traffic noise arising from vehicles using the A48 and Alexandra Road.

The Site and surrounding area can be seen in Figure 1.

FIGURE 1: SITE AND SURROUNDING AREA



3.2. Proposed Development Overview

The Proposed Development comprises a change of use and internal reconfiguration of the existing building to provide a mixed-use scheme over two stories as shown in Figure 2.

At ground floor level, the layout is arranged as a commercial café space, including customer seating, a counter/serving area, associated storage, WC facilities and ancillary back-of-house areas. At first floor level, the proposals provide two self-contained residential flats (Flat 1 and Flat 2).

Each flat includes a kitchen/living area, bedroom and bathroom, accessed via the existing internal circulation. Overall, the scheme introduces a clear separation of uses, with commercial activity included on the ground floor and residential accommodation located above at first floor.

FIGURE 2: PROPOSED DEVELOPMENT LAYOUT – GROUND AND 1ST FLOOR AND ELEVATIONS



4. MEASUREMENT METHODOLOGY

4.1. General

The prevailing noise conditions in the area have been determined by an environmental noise survey conducted during both daytime and night-time periods between Thursday 19th and Friday 20th February 2026.

4.2. Measurement Details

All noise measurements were undertaken by a consultant certified as competent in environmental noise monitoring, and, in accordance with the principles of British Standard 7445:2003 '*Description and measurement of environmental noise*'³.

All noise measurement equipment used during the survey conformed to Class 1 specification of British Standard 61672:2013 '*Electroacoustics. Sound level meters. Part 1 Specifications*'⁴. A full inventory of this equipment is shown in Table 4.

TABLE 4: INVENTORY OF NOISE MEASUREMENT EQUIPMENT

Position	Make, Model & Description	Serial Number	Calibration Certificate Number	Calibration Expiry Date
MP1	Rion NL-52 Sound Level Meter	00175499	1174057	10/01/2027
	Rion NH-25 Preamplifier	22091		
	Rion UC-59 Microphone	21910		
MP2	Rion NL-31 Sound Level Meter	00110040	1176252	12/02/2027
	Rion NH-21 Preamplifier	00142		
	Rion UC-53A Microphone	306449		
Both	Cirrus CR:515 Acoustic Calibrator	82501	1141302	07/04/2026

The noise measurement equipment used during the survey was field calibrated at the start and end of the measurement period. A calibration laboratory has calibrated the field calibrator used within the twelve months preceding the measurements. A drift of less than 0.2 dB in the field calibration was found to have occurred on all sound level meters.

The weather conditions during the survey were conducive to environmental noise measurement; it being dry, with little or no discernible wind (<5ms⁻¹). Rainfall was noted on the morning of Friday 20th February however there was no discernable influence the measured noise levels. The microphones were fitted with a protective windshield for the measurements.

The measurement positions are described in Table 5, with an aerial photograph indicating their respective locations shown in Figure 3. Installation photographs for each position are shown in Appendix C.

³ British Standards Institute, British Standard 7445: 2003: *Description and measurement of environmental noise*, 2003.

⁴ British Standards Institute, British Standard 61672: 2013: *Electroacoustics. Sound level meters. Part 1 Specifications*, 2013.

TABLE 5: MEASUREMENT POSITION DESCRIPTIONS

Measurement Position	Description
MP1	A largely unattended daytime and night-time measurement at the southern façade of the Site, overlooking Watch House Parade and the A48 beyond. The measurement was undertaken under facade-field conditions at first floor level. The sound environment was entirely influenced by road traffic on the A48.
MP2	A largely unattended daytime and night-time measurement of sound at the eastern façade of the Site, overlooking Alexandra Road. The measurement was undertaken under facade-field conditions at first floor level. The sound environment was entirely influenced by road traffic on the A48. Alexandra Road consisted of slow-moving traffic stopping at the junction merging onto the A48.

FIGURE 3: NOISE MEASUREMENT POSITIONS



4.3. Summary Results

The parameters reported are the average Equivalent Continuous Sound Level, $L_{Aeq,T}$, the statistical index (typical) Background Sound Level, $L_{A90,T}$, as well as the and the typical Maximum Sound Pressure Level, L_{AFmax} . An explanation of the sound units presented is given in Appendix A.

The summarised results of the noise measurement exercise are presented in Table 6 and Table 7 with full, measured time histories presented in Appendix B. Values have been rounded to the nearest whole decibel.

TABLE 6: SUMMARY OF NOISE MEASUREMENT RESULTS

Measurement Position	Period	Noise Level, dB		
		$L_{Aeq,T}$	L_{A90}	L_{AFmax}
MP1	Day (07:00-23:00)	71 (68)	59 (56)	91 (88)
	Night (23:00-07:00)	67 (64)	50 (47)	84 (81)
MP2	Day (07:00-23:00)	71 (68)	59 (56)	92 (89)
	Night (23:00-07:00)	66 (63)	49 (46)	84 (81)

(bracketed) figures denotes corrected for façade reflection

TABLE 7: SPECTRAL MEASUREMENT RESULTS

Period	dB(A)	Octave Band (Hz) Noise Level (dB)							
		63	125	250	500	1000	2000	4000	8000
MP1									
Leq,T									
Day	71	76	71	69	67	68	63	56	48
Night	67	72	67	63	63	64	59	52	46
LFmax									
Night	84	77	73	74	73	80	79	72	58

5. NOISE ASSESSMENT

5.1. Introduction

A façade noise break-in assessment has been carried out to determine the internal noise levels within habitable dwellings, in accordance with BS 8233:2014, taking into consideration all sources influencing the Site.

The on-site observations and data presented in Table 6 and Table 7, identify that the noise environment at the Site is moderately influenced by transport sources, with an overall categorisation of NEC C, considering the TAN11 guidance.

For sites falling within NEC C, TAN11 states:

'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.'

5.2. Internal Noise Level Guidelines

This assessment follows BS 8233:2014 guidance, which provides a method for calculating internal noise levels based on external free-field levels. To determine the necessary glazing and ventilation performance for mitigating external noise intrusion, the following metrics have been evaluated at the building façade:

- Daytime: $L_{Aeq,16\text{-hour}}$ (07:00–23:00)
- Night-time: $L_{Aeq,8\text{-hour}}$ (23:00–07:00)
- Typical L_{AFMax} levels

BS 8233:2014 (Appendix G) outlines how internal noise levels can be calculated assuming either a partially open or closed window. A partially open window is assumed to provide 15 dB of sound insulation.

Since glazing and ventilation are typically the weakest acoustic elements in a building façade, their performance is the primary focus when assessing sound insulation.

Windows do not attenuate noise uniformly across all frequencies; thus, the frequency content of external noise affects overall sound reduction performance. Glazing manufacturers test products using road traffic noise frequency spectrums, and results are expressed using the $R_w + C_{tr}$ (R_{tra}) performance index, which provides a useful indication of in-situ noise reduction where road traffic noise dominates.

Building Regulations (Approved Document F) require habitable rooms to have whole-dwelling ventilation. Where target internal noise levels can only be met with closed windows, an alternative ventilation system is required for compliance.

For this Proposed Development, the default glazing choice is thermal double glazing, while the default ventilation system consists of window-mounted trickle vents (referred to as background ventilators in ADF) and openable windows for purge ventilation.

Please note that this scope does not include an acoustic assessment during overheating conditions. If, required, then an additional acoustic assessment in accordance with The ANC/IOA 'Guide to Demonstrating Compliance with the Noise Requirements of Approved Document O' is undertaken.

5.2.1. Façade Performance Specifications

As already stated; in order to provide a robust assessment and a high quality living environment for future residents, providing internal noise levels of <35 dB $L_{Aeq,16\text{-hour}}$ by day and <30 dB $L_{Aeq,8\text{-hour}}$ by night, as well as <45 dB typical L_{AFMax} by night, as defined in BS 8233:2014 has been adopted as the design target for the Proposed Development.

To determine the glazing and ventilation requirements in order to provide an adequate level of protection against external noise intrusion, $L_{Aeq,16\text{hour}}$ daytime, $L_{Aeq,8\text{hour}}$ and typical L_{AFMax} night-time noise levels have been determined at the building façade.

Accordingly, the required sound level difference from outside to inside for the most noise-exposed building facades of the development, to provide appropriate internal noise levels during both daytime and night-time periods, as described, are identified in Table 8.

TABLE 8: REQUIRED SOUND LEVEL DIFFERENCE OUTSIDE TO INSIDE, dB

Index	Free-field Noise Level at Facade, dB		Target Internal Noise Level - dB		Required Sound Level Difference, dB
	Day	Night	Day	Night	
Façade Overlooking A48 - MP1					
L _{Aeq,T}	68	64	35	30	33
L _{AFMax}	-	81	-	45	36
Façade Overlooking Alexandra Road - MP2					
L _{Aeq,T}	68	63	35	30	33
L _{AFMax}	-	81	-	45	36

It should be noted that the sound reductions detailed in Table 8 apply to habitable rooms such as living rooms, dining rooms and bedrooms only. For non-habitable rooms such as kitchens, bathrooms, stairways, halls, landings, lower performance standards would be permissible.

Based upon the latest layout proposals, up to 50% of a room façade being glazed and a room volume of 42m³, calculations have been carried out to determine the required acoustic performances for the external façade elements, in order to provide appropriate internal noise levels in rooms during both the daytime and night-time periods. It has also been assumed that bedrooms are to be acoustically 'soft', with carpets, curtains and other soft furnishings, and living rooms to have a hard floor finish and to be less acoustically absorptive.

The outline performance requirements are presented in Table 9.

TABLE 9: ACOUSTIC PERFORMANCE RECOMMENDATIONS OF FAÇADE ELEMENTS

Example Glazing	Octave Band (Hz) Sound Level (dB)							
	63	125	250	500	1000	2000	4000	R _w (dB)
	Sound Reduction Performance, R dB							
All Façades								
10/12/4 Double Glazing	21	25	22	33	40	43	44	36
Example Ventilation	Octave Band (Hz) Sound Level (dB)							
	63	125	250	500	1000	2000	4000	D _{ne,w} (dB)
	Element Normalised Level Difference (D,n,e) dB							
All Façades								
Sonair F + G2 100F Trickle Vent	34	40	45	54	54	62	62	56
Example Walls	Octave Band (Hz) Sound Level (dB)							
	63	125	250	500	1000	2000	4000	R _w (dB)
	Sound Reduction Performance, R dB							
All Façades								
Brick/Block Cavity Wall	36	41	45	45	54	58	58	52

The above façade components are conducive with those typically required for thermal insulation and represent no uplift in design beyond that required to achieve the required thermal standards.

Other units may be suitable and it is the responsibility of the glazing manufacturer to recommend and provide appropriate systems. The above analysis is provided to demonstrate that a design solution is feasible at the site for the purposes of a planning application and not necessarily for the purposes of detailed design or glazing procurement.

The detailed design of the proposed properties may affect both the required sound reduction performance and the appropriate selection of glazing units. The aspects of the detailed design that are important are the room dimensions, room finishes, window dimensions and the sound reduction performance of non-glazing elements.

5.3. Discussion

It should be noted that the above represents an assessment considering a ventilation strategy sufficient to comply with the requirements of the Building Regulations Approved Document F. In the event of windows being widely open for periods of comfort cooling ventilation provision, the internal noise level criteria will be exceeded.

Consequently, the need for any additional cooling requirements to prevent overheating should be advised via an overheating assessment, in accordance with Approved Document O of the UK Building Regulations.

It is noted that the assessment with windows partially open is based on a sound reduction of 15 dB, based upon the Napier report titled NANR116⁵: *'Open/closed window research' – Sound Insulation Through Ventilated Domestic Windows* which has been authored for DEFRA, which demonstrates that for road traffic noise a partially openable window will achieve between 12-18 dBA. Therefore, 15dB of attenuation is the average level difference and is considered to be robust. In addition, the *WHO Environmental Noise Guidelines 2018* states that *'the difference between indoor and outdoor levels are usually estimated at around 10 dB for open, 15 dB for tilted or half-open and about 25 dB for closed windows'*.

Windows may be openable for purge ventilation purposes at the user's discretion, as this is applicable only to occasional occurrences, such as to remove smoke from burnt food, and not subject to acoustic assessment.

5.4. Separating Structures

An on-site inspection identified that the separating floor beneath the proposed residential uses and the cafeteria below comprised of a circa 15mm floorboard, fitted to a standard 8-inch timber joist, with a lath and plaster ceiling to the cafeteria, which was fitted with a suspended ceiling, with fibre glass insulation in the void.

Due to the incomplete nature of the floor, an in-situ performance test could not be undertaken, so the current acoustic performance could not be determined.

It is recommended that a minimum separating floor performance of $D_{nT,w} + C_{tr}$ 55 dB is achieved between the cafeteria space and the residential uses above, and that the precise construction details will be developed at the detailed design stage. It is recognised that compliance with the Building Regulations (Approved Document E) establishes minimum standards for sound insulation, but these requirements do not, in themselves, control the level of acoustic protection necessary to safeguard residential amenity in planning terms where noise-sensitive and commercial uses are vertically separated.

Accordingly, it is considered appropriate that the Proposed Development is designed to achieve a separating floor performance that is demonstrably sufficient to protect the amenity of future residents from noise arising from the commercial uses below. The achievement of suitable sound insulation performance between uses is therefore identified as a necessary acoustic design requirement, capable of being secured through planning condition and demonstrated at the appropriate stage.

⁵ NANR116: 'Open/Closed Window Research' Sound Insulation Through Ventilated Domestic Windows, The Building Performance Centre, Napier University for Department for Environment, Food and Rural Affairs, April 2007

6. CONCLUSION

inacoustic has been commissioned to assess the impact of noise associated with the proposed change of use from commercial to residential at first floor level at 114 - 116 Alexandra Road, Newport, NP20 2JG.

The following technical noise assessment has been produced to support a planning application to Newport City Council and determine the façade insulation requirements of the Proposed Development, in order to ensure appropriate levels of internal acoustic amenity. The assessment is based upon environmental noise measurements undertaken at the Site.

The suitability of the site for residential development has been assessed, based on the current development plans and the measured noise levels. Where the measured levels indicate that noise may be a determining factor in the granting of planning permission, mitigation measures have been proposed to ensure satisfactory acoustic conditions are met.

The on-site observations and data identify that the noise environment at the site is moderately influenced by transport sources, with an overall categorisation of NEC C, considering the TAN 11 guidance.

For sites falling within NEC C, TAN 11 states:

'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.'

Specific consideration has been given to the internal noise criteria for the proposed residential properties, as quoted within BS 8233:2014, with façade mitigation measures proposed to achieve the criteria stipulated therein.

It is considered appropriate that the Proposed Development is designed to achieve a separating floor performance that is demonstrably sufficient to protect the amenity of future residents from noise arising from the commercial uses below. The achievement of suitable sound insulation performance between uses is therefore identified as a necessary acoustic design requirement, capable of being secured through planning condition and demonstrated at the appropriate stage.

The assessment has identified that noise is a significant consideration for the Site, however subject to the outcome of an appropriate overheating assessment, the adoption of a considered design approach can ensure that the Site can be redeveloped efficiently, providing appropriate levels of acoustic amenity for future residents, thus satisfying national planning policy and the relevant British Standards.

7. APPENDICES

7.1. Appendix A – Definition of Terms

Sound Pressure	Sound, or sound pressure, is a fluctuation in air pressure over the static ambient pressure.
Sound Pressure Level (Sound Level)	The sound level is the sound pressure relative to a standard reference pressure of 20µPa (20x10 ⁻⁶ Pascals) on a decibel scale.
Decibel (dB)	A scale for comparing the ratios of two quantities, including sound pressure and sound power. The difference in level between two sounds s1 and s2 is given by $20 \log_{10} (s1 / s2)$. The decibel can also be used to measure absolute quantities by specifying a reference value that fixes one point on the scale. For sound pressure, the reference value is 20µPa.
A-weighting, dB(A)	The unit of sound level, weighted according to the A-scale, which takes into account the increased sensitivity of the human ear at some frequencies.
Noise Level Indices	Noise levels usually fluctuate over time, so it is often necessary to consider an average or statistical noise level. This can be done in several ways, so a number of different noise indices have been defined, according to how the averaging or statistics are carried out.
$L_{eq,T}$	A noise level index called the equivalent continuous noise level over the time period T. This is the level of a notional steady sound that would contain the same amount of sound energy as the actual, possibly fluctuating, sound that was recorded.
$L_{max,T}$	A noise level index defined as the maximum noise level during the period T. L_{max} is sometimes used for the assessment of occasional loud noises, which may have little effect on the overall L_{eq} noise level but will still affect the noise environment. Unless described otherwise, it is measured using the 'fast' sound level meter response.
$L_{90,T}$	A noise level index. The sound level exceeded for 90% of the time over the period T. L_{90} can be considered to be the "average minimum" sound level and is often used to describe the background sound.
$L_{10,T}$	A noise level index. The noise level exceeded for 10% of the time over the period T. L_{10} can be considered to be the "average maximum" noise level. Generally used to describe road traffic noise.
Free-Field	Far from the presence of sound reflecting objects (except the ground), usually taken to mean at least 3.5m
Facade	At a distance of 1m in front of a large sound reflecting object such as a building façade.
Fast Time Weighting	An averaging time used in sound level meters. Defined in BS 5969.

In order to assist the understanding of acoustic terminology and the relative change in noise, the following background information is provided.

The human ear can detect a very wide range of pressure fluctuations, which are perceived as sound. In order to express these fluctuations in a manageable way, a logarithmic scale called the decibel, or dB scale is used. The decibel scale typically ranges from 0 dB (the threshold of hearing) to over 120 dB. An indication of the range of sound levels commonly found in the environment is given in the following table.

TABLE 10: TYPICAL SOUND LEVELS FOUND IN THE ENVIRONMENT

Sound Level	Location
0dB(A)	Threshold of hearing
20 to 30dB(A)	Quiet bedroom at night
30 to 40dB(A)	Living room during the day
40 to 50dB(A)	Typical office
50 to 60dB(A)	Inside a car
60 to 70dB(A)	Typical high street
70 to 90dB(A)	Inside factory
100 to 110dB(A)	Burglar alarm at 1m away
110 to 130dB(A)	Jet aircraft on take off
140dB(A)	Threshold of Pain

The ear is less sensitive to some frequencies than to others. The A-weighting scale is used to approximate the frequency response of the ear. Levels weighted using this scale are commonly identified by the notation dB(A).

In accordance with logarithmic addition, combining two sources with equal noise levels would result in an increase of 3 dB(A) in the noise level from a single source.

A change of 3 dB(A) is generally regarded as the smallest change in broadband continuous noise which the human ear can detect (although in certain controlled circumstances a change of 1 dB(A) is just perceptible). Therefore, a 2 dB(A) increase would not be normally be perceptible. A 10 dB(A) increase in noise represents a subjective doubling of loudness.

A noise impact on a community is deemed to occur when a new noise is introduced that is out of character with the area, or when a significant increase above the pre-existing ambient noise level occurs.

For levels of noise that vary with time, it is necessary to employ a statistical index that allows for this variation. These statistical indices are expressed as the sound level that is exceeded for a percentage of the time period of interest. In the UK, traffic noise is measured as the L_{A10} , the noise level exceeded for 10% of the measurement period. The L_{A90} is the level exceeded for 90% of the time and has been adopted to represent the background sound level in the absence of discrete events. An alternative way of assessing the time varying noise levels is to use the equivalent continuous sound level, L_{Aeq} .

This is a notional steady level that would, over a given period of time, deliver the same sound energy as the actual fluctuating sound.

To put these quantities into context, where a receiver is predominantly affected by continuous flows of road traffic, a doubling or halving of the flows would result in a just perceptible change of 3 dB, while an increase of more than 25%, or a decrease of more than 20%, in traffic flows represent changes of 1 dB in traffic noise levels (assuming no alteration in the mix of traffic or flow speeds).

Note that the time constant and the period of the noise measurement should be specified. For example, BS 4142:2014+A1:2019 specifies background sound measurement periods of 1 hour during the day and 15 minutes during the night-time. The sound levels are commonly symbolised as $L_{A90,1\text{hour}}$ dB and $L_{A90,15\text{mins}}$ dB. The sound measurement should be recorded using a 'FAST' time response equivalent to 0.125 ms.

7.2. Appendix B – Measurement Results

FIGURE 4: MEASURED TIME HISTORY – MP1

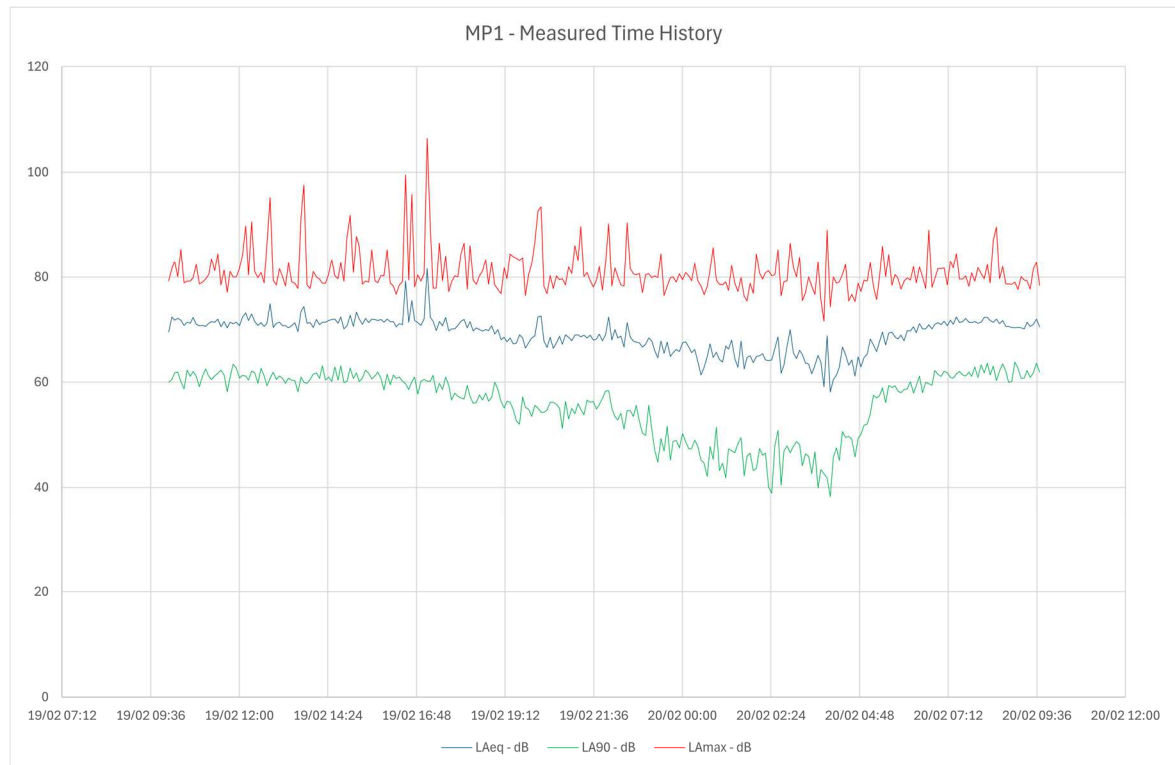
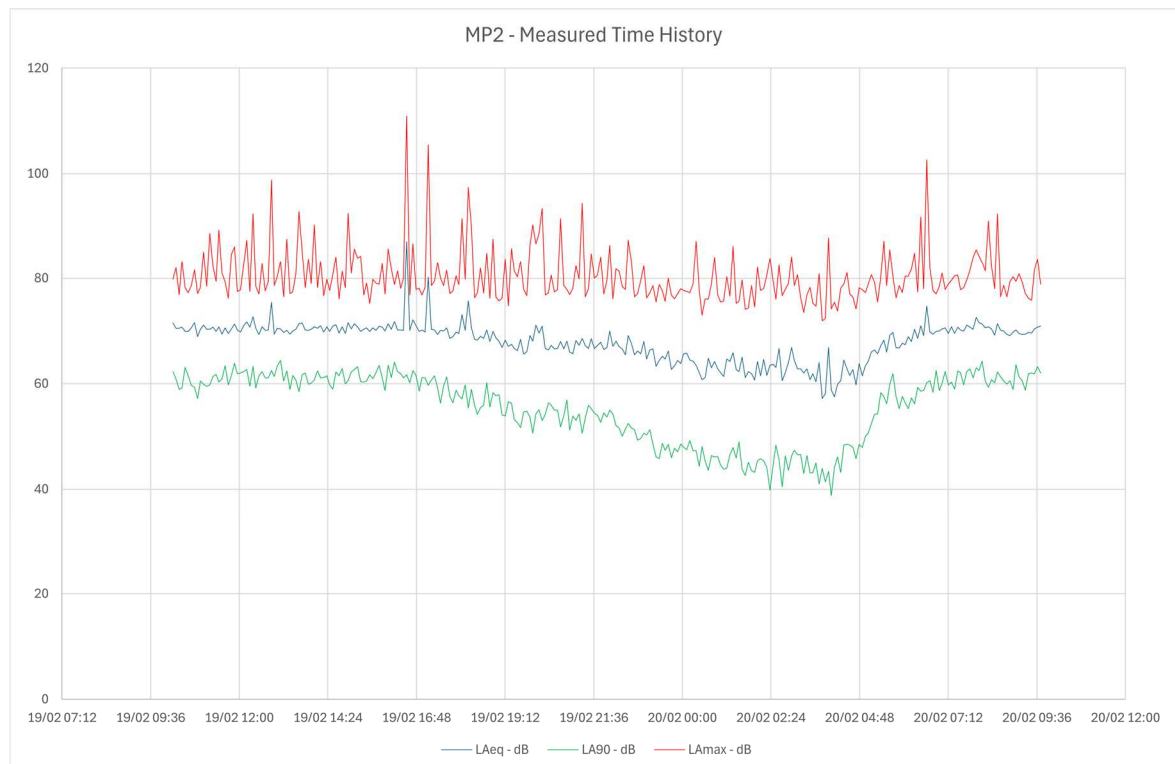


FIGURE 5: MEASURED TIME HISTORY – MP2



inacoustic | **cymru**

C5 Business Centre, North Road, Bridgend Industrial Estate, Bridgend, Cymru, CF31 3TP

029 2009 8830 cymru@inacoustic.co.uk

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