



**20 Cross Street
Reading**

Noise Assessment Report

27 July 2021

For
Realm Holdings RDBS
Ruperts Elm
Ruperts Lane
Henley on Thames
RG9 2JE

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SUMMARY

It is proposed to convert the upper floors of the commercial office property at 20 Cross Street in Reading to create residential apartments.

The site is near to commercial noise sources, therefore **auricl** has been instructed to undertake an assessment of noise levels affecting the site, for comparison with Reading Borough Council's requirements and the Town and Country Planning (General Permitted Development) (England) Order 2015 (as amended) (GPDO) and Southampton City Council's requirements.

For façades facing Cross Street, it was found that the measured internal noise levels achieve the Reading Borough Council standards without the need for further noise mitigation measures.

For façades facing the rear/west of the site, the sound reduction performance of the external façade is to be upgraded through the use of secondary glazing. Ventilation is to be provided via mechanical means, to provide an alternative to opening windows.

A sound insulation test and assessment of commercial noise transmission via the internal separating floor has also been undertaken, which demonstrated that an adverse noise impact is unlikely.

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1.0 Introduction

It is proposed to convert the upper floors of the commercial office property at 20 Cross Street in Reading to create residential apartments.

The site is near to commercial noise sources, therefore **auricl** has been instructed to undertake an assessment of noise levels affecting the site, for comparison with the Town and Country Planning (General Permitted Development) (England) Order 2015 (as amended) (GPDO) and Southampton City Council's requirements.

The following report presents the methodology and results of a noise survey and test carried out at the site and a subsequent noise assessment against Reading Borough Council's standards.

An explanation of the terminology used in this report is presented in Appendix A.

2.0 Description of Site and Proposals

The site is located at 20 Cross Street in central Reading and is occupied by a four-storey commercial office building.

The site is bounded by Cross Street to the east (pedestrianised) and commercial properties to the north, south and west.

Figure 2.1 shows the approximate existing site extent in **red** in relation to the surrounding area.

Figure 2.1 Existing Site Extent and Surroundings



It is proposed to convert the first, second and third floors of the building to create residential apartments. The ground floor of the building will remain as a commercial unit.

3.0 Noise Assessment Standards

3.1 General Permitted Development Order

Schedule 2, Part 3, Class O, paragraph O2 (1) of the GPDO states the following:

“Development.....is permitted subject to the condition that before beginning the development, the developer must apply to the local planning authority for a determination as to whether the prior approval of the authority will be required to.....impacts of noise from commercial premises on the intended occupiers of the development.....”

The National Planning Policy Framework (NPPF) sets out the Government’s core policies and principles with respect to land use planning in England. In respect to noise, the Framework states at paragraph 180 that planning policies and decisions should aim to:

- Mitigate and reduce to a minimum potential adverse impacts resulting from noise from new development - and avoid noise giving rise to significant adverse impacts on health and quality of life; and
- Identify and protect areas of tranquillity which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason.

The Noise Policy Vision is to ‘promote good health and a good quality of life through the effective management of noise within the context of government policy on sustainable development’.

Through effective management and control of environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development, there are the following aims:

- Avoid significant adverse impacts on health and quality of life;
- Mitigate and minimise adverse impacts on health and quality of life; and
- Where possible, contribute to the improvement of health and quality of life.

3.2 Reading Borough Council Noise Standards

Reading Borough Council has advised the following in relation to the site:

“The noise assessment will be assessed against the recommendations for internal noise levels within dwellings and external noise levels within gardens / balconies in accordance with BS 8233:2014 and WHO guidelines for Community Noise. The report should identify any mitigation measures that are necessary to ensure that the recommended standard is met.

The noise assessment data should also include noise events (LAMax) and the design should aim to prevent noise levels from noise events exceeding 45dB within bedrooms at night, as this is linked with sleep disturbance.

Internal noise criteria (taken from BS 8233:2014)

Room	Design criteria	Upper limit
Bedrooms (23:00 to 07:00)	<30dB LAeq,8hour	
Living rooms (07:00 – 23:00)	<35dB LAeq,16hour	
Gardens & Balconies	<50dB LAeq,T	<55dB LAeq,T

The noise assessment will need to identify the external noise levels impacting on the proposed site.

Noise mitigation is likely to focus on the weak point in the structure; glazing. Given that the acoustic integrity would be compromised should the windows be opened, ventilation details must also be provided, where mitigation relies on closed windows. Ventilation measures should be selected which do not allow unacceptable noise ingress and should provide sufficient ventilation to avoid the need to open windows in hot weather, however non-openable windows are not considered an acceptable solution due to the impact on living standards."

3.3 BS 8233: 2014 and WHO Guidelines

British Standard 8233: 2014 "Guidance on sound insulation and noise reduction for buildings", which is the current industry standard document for assessing external noise levels affecting residential dwellings, presents 'desirable' internal noise levels as shown in Table 3.1.

Table 3.1 BS 8233 Recommended Internal Noise Levels

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

In addition, the World Health Organisation (WHO) document "Guidelines for Community Noise" (1999) advises the following:

"For a good sleep, it is believed that indoor sound pressure levels should not exceed approximately 45dB L_{Amax} more than 10-15 times per night (Vallet & Vernet 1991)."

3.4 Internal Sound Insulation

Approved Document E of the Building Regulations states limits for the passage of sound through buildings.

The impact sound insulation performance does not need to be considered where residential properties are situated above a commercial development.

Approved Document E specifies a minimum airborne sound insulation performance of 45 dB $D_{nT,w} + C_{tr}$ for separating floors between new build residential properties.

Additionally, in relation to internal noise break-out, we have considered the desirable internal noise levels within residential dwellings specified in British Standard 8233: 2014, shown in Table 3.1.

4.0 Noise Survey

4.1 Methodology

An unmanned environmental noise survey was undertaken at one internal position at the site over a 4-day period between Friday 16 July 2021 and Tuesday 20 July 2021. This period was selected to assess typical daytime and night-time noise levels over weekday and weekend periods, due to external commercial noise sources.

In addition, an unmanned environmental noise survey was undertaken at one external position at the site over a 2-day period between Tuesday 20 July 2021 and Thursday 22 July 2021. This period was selected to assess noise levels due to building services plant at the rear/west of the property.

The approximate measurement positions are shown in purple on Figure 4.1 and described in Table 4.1.

Figure 4.1 Noise Measurement Positions

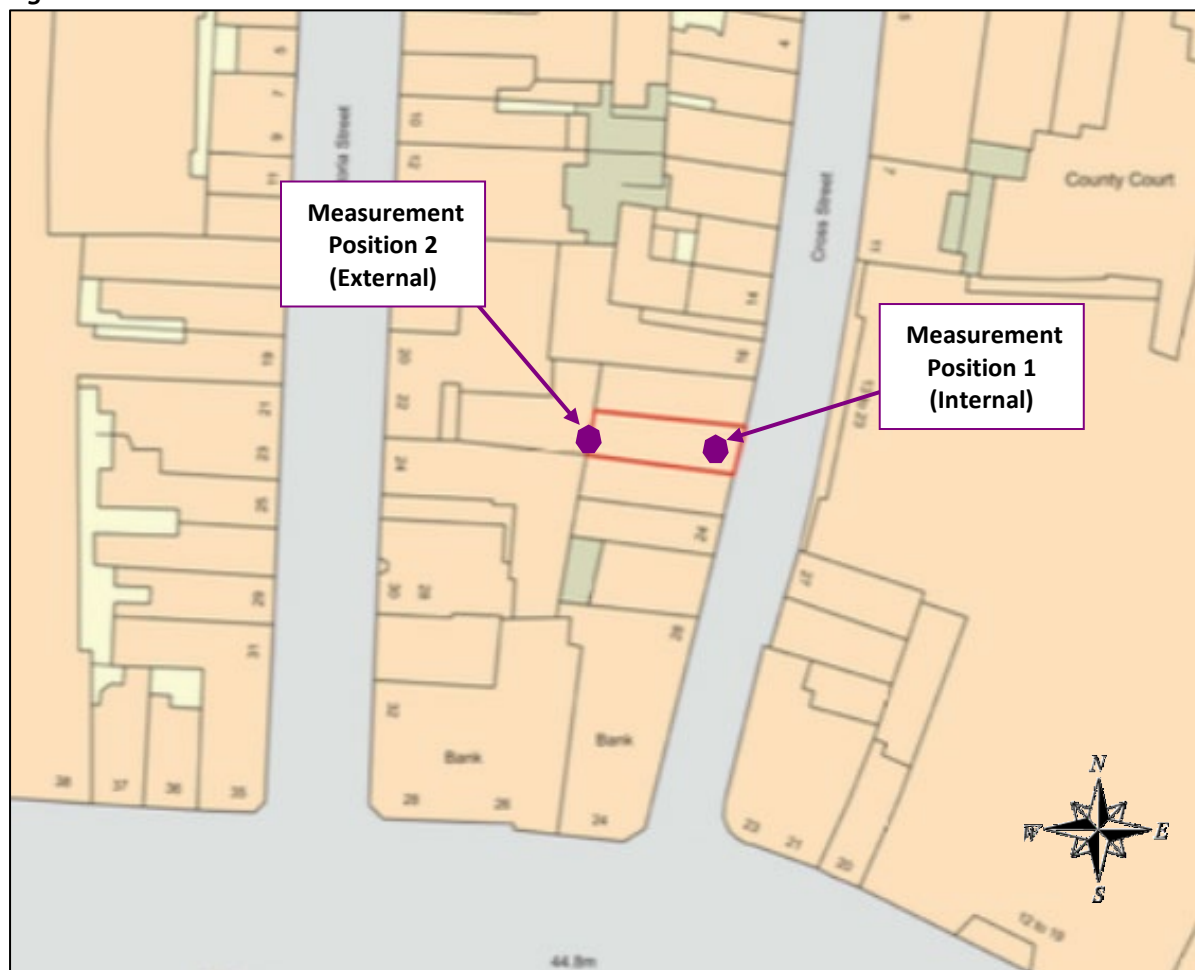


Table 4.1 Description of Noise Measurement Positions

Measurement Position	Description
1 (Internal)	Measurement microphone mounted on a tripod in the centre of the open plan office area located at first floor level on the eastern side of the building
2 (External)	Measurement microphone attached to security bars fitted to a window at second floor level in the western façade

Measurement position 1 was selected to measure noise affecting the site due to commercial activities emanating from Cross Street on the eastern side of the site.

Measurement position 2 was selected to measure noise levels affecting the site due to the building services plant located at the rear/west of the site (serving adjacent commercial properties).

The equipment used for the noise survey is summarised in Table 4.2.

Table 4.2 Description of Equipment used for Noise Survey

Measurement Position	Item	Make & Model	Serial Number
1 and 2	Type 1 automated logging sound level meter	01dB FUSION	12078
	Type 1 ½" external microphone	GRAS 40CD	331906
	Calibrator	01dB CAL31	86020

L_{Amax} , L_{Aeq} and L_{A90} sound pressure levels were measured throughout the noise survey over contiguous 125-millisecond intervals.

The noise monitoring equipment was calibrated before and after the survey. No significant change was found. Laboratory equipment calibration certificates can be provided upon request.

Due to the nature of the noise survey, i.e. unmanned, we are unable to comment on the weather conditions throughout the entire noise survey period, however at the beginning and end of the survey period, there was noted to be no rainfall, a clear sky and only light wind. These conditions are understood to be representative of the majority of the survey period and are considered appropriate for undertaking environmental noise measurements.

4.2 Noise Survey Results & Observations

Appendix B presents time history graphs showing the L_{Amax} , L_{Aeq} and L_{A90} sound pressure levels measured at the measurement positions throughout the noise survey (shown as 15-minute intervals).

In accordance with BS 8233: 2014, the measured noise levels at position 2 have been corrected by -2 dB to approximate free-field conditions, since the measurement position was within 2m of the existing building façade.

During our daytime site visits, the dominant noise source affecting measurement position 1 was noted to be commercial noise and pedestrian activity along Cross Street. The dominant noise source affecting measurement position 2 was noted to be building services plant located at the rear/west of the property, serving adjacent commercial properties.

5.0 External Commercial Noise Assessment

Table 5.1 presented a comparison of the measured internal noise levels with the requirements of Reading Borough Council, BS 8233: 2014 and the WHO Guidelines.

Table 5.1 Measured Internal Noise Levels

Parameter	Daytime L_{Aeq} (16 hour) dB	Night-time L_{Aeq} (8 hour) dB	Night-time L_{Amax} dB (10 th highest)
Measured	32	27	36-42
Limit	35	30	45

The L_{Amax} limit was exceeded on 3-5 occasions per night during the survey period, which is less than the 10-15 occasions deemed acceptable by the WHO Guidelines.

The measured internal noise levels are therefore considered to achieve the Reading Borough Council standards, without the need for further noise mitigation measures.

With windows open, it is predicted that the noise limits will be exceeded, therefore an alternative means of ventilation (e.g. mechanical) may be necessary for rooms facing Cross Street.

6.0 External Building Services Plant Noise Assessment

One bedroom of each of the proposed flats is to be located in the rear/west façade of the building.

Noise levels affecting the rear of the site are noted to be dominated, to varying extents, by building services plant items (condenser units) serving adjacent commercial properties. From the noise survey results and audio recordings, some items of plant are noted to operate during both daytime and night-time periods.

The plant noise was noted to be constant (i.e. not intermittent) and generally without any tonal elements. BS 8233: 2014 states that the recommended internal noise level criteria presented therein apply to “steady sources, such as those due to road traffic, mechanical services or continuously running plant”. As such, it is appropriate to consider the plant noise at the rear of the site in relation to the BS 8233: 2014 internal noise criteria.

Table 6.1 presents the measured external noise levels at the rear/west of the site.

Table 6.1 Measured Internal Noise Levels

Daytime L_{Aeq} (16 hour) dB	Night-time L_{Aeq} (8 hour) dB	Night-time L_{Amax} dB (10 th highest)
50	44	62

Taking into account the above, our calculations indicate that desirable internal noise levels, as specified in Sections 3.3 and 3.4 above, would be achievable in the proposed bedrooms through the use of suitable external façade constructions.

The following is proposed to the bedrooms at the rear/west of the site:

- The sound insulation performance of the external façade is to be upgraded to provide a sound insulation performance of at least R_w 41 dB, through the use of internal secondary glazing, additional to the existing glazing.
- Ventilation is proposed via mechanical means, to provide an alternative to opening windows.

The specialist proprietary internal secondary glazing (e.g. Selectaglaze or acoustic equivalent), will involve an additional single-glazed pane in a separate frame fitted into the existing glazing reveals, spaced at least 100mm from the existing external glazing.

An MVHR unit is proposed in each apartment to provide background ventilation (removing the need for trickle ventilators fitted into the façade) and boost ventilation (providing an alternative to opening windows).

Noise emissions associated with the MVHR units will be considered and attenuated where necessary, so as to comply with Approved Document F (2010) and the Association of Noise Consultants/Institute of Acoustics 2020 guide which considers the acoustic impact of open windows.

With windows closed, the proposed measures should allow the proposed apartments to be comfortably less than the limits specified in BS 8233: 2014 and the WHO night-time L_{Amax} standard.

The recommendations above are intended to demonstrate viability for planning guidance only. Further analysis shall be undertaken during the project design stage to determine detailed octave-band glazing and ventilator acoustic specifications.

7.0 Internal Sound Insulation

Auricl undertook an acoustic test on Tuesday 20 July 2021 to determine the existing sound insulation performance of the existing floor construction separating the ground floor commercial unit and the first-floor flat.

The test yielded an airborne sound insulation performance of **47 dB $D_{nT,w} + C_{tr}$** . By comparison with the Approved Document E 2003 standard in Section 3.5, it can be seen that the existing floor construction exceeds the performance required for walls and floors between new-build residential properties.

Based on the measured sound insulation performance, we have undertaken calculations to predict noise transmission from the ground floor commercial unit to the proposed first-floor flat, based on worst-case noise levels previously measured by **auricl** within similar commercial units.

Our calculations are shown in Table 7.1.

Table 7.1 Internal Commercial Noise Transmission Calculations

Element	Octave Band Centre Frequency (Hz)							$L_{Aeq,T}$
	63	125	250	500	1k	2k	4k	
Measured Internal Noise Level in a Typical Commercial Unit (dB)	68	72	72	67	65	60	59	70
Sound Reduction of Separating Floor Construction (dB)	-29	-32	-44	-51	-59	-64	-69	
Predicted Noise Break-Out Level (dB)	30	40	28	16	6	<0	<0	25

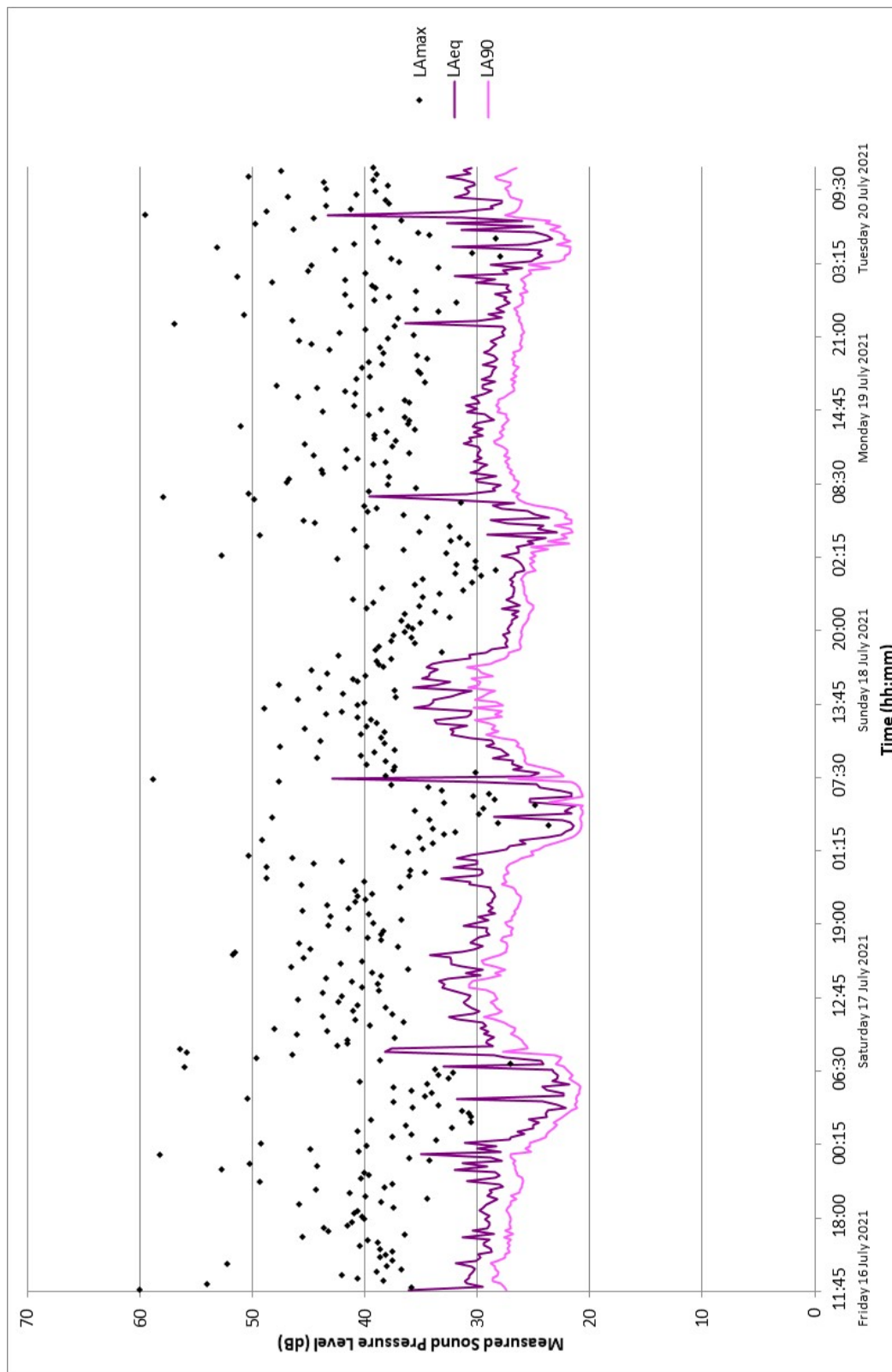
It can be seen that the predicted level of noise transmission to the proposed residential dwellings is comfortably less than the BS 8233: 2014 desirable internal noise limits in residential dwellings.

Appendix A – Acoustic Terminology

Parameter	Description
Decibel (dB)	A logarithmic scale representing the sound pressure or power level relative to the threshold of hearing (20×10^{-6} Pascals).
Sound Pressure Level (L_p)	The sound pressure level is the sound pressure fluctuation caused by vibrating objects relative to the threshold of hearing.
A-weighting (L_A or dBA)	The sound level in dB with a filter applied to increase certain frequencies and decrease others to correspond with the average human response to sound.
L_{Amax}	The A-weighted maximum noise level measured during the measurement period.
$L_{Aeq,T}$	The A-weighted equivalent continuous noise level over the time period T (typically T = 16 hours for daytime periods, T = 8 hours for night-time periods). This is the sound level that is equivalent to the average energy of noise recorded over a given period.
L_{A90} (15 min)	The noise level exceeded for 90% of the time (also referred to as the background noise level), measured over a 15-minute period
R_w	The weighted (w) sound reduction index (R), a single figure rating of the laboratory airborne sound insulation performance of a construction, usually measured across the frequency range 100-3150Hz. The higher the value, the greater the sound insulation, and the more onerous the requirement.
$D_{n,e,w}$	The weighted (w) element (e) normalised (n) level difference (D), a single figure indicator of the ability of a small building element (such as a trickle ventilator) to reduce sound. The higher the value, the greater the sound reduction, and vice versa.

Appendix B – Time History Graphs

Position 1



Position 2

