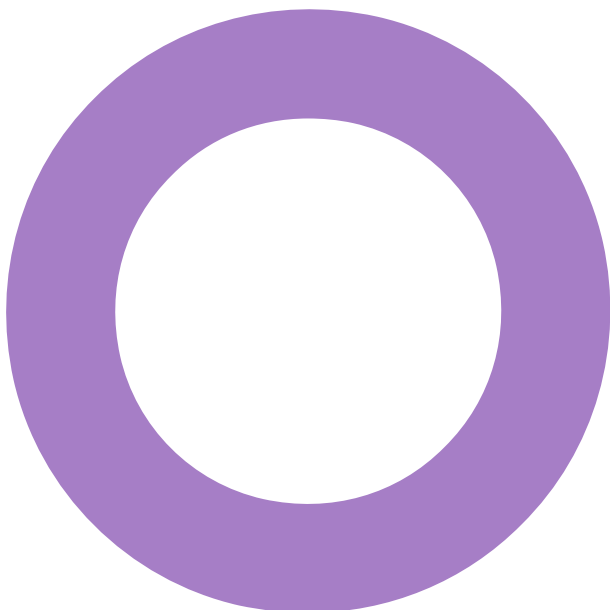


Fountain House. Reading. Moorgarth Group.

ACOUSTICS

PROPOSED RESIDENTIAL CONVERSION
BASELINE NOISE ASSESSMENT
REVISION 1 – 02 JULY 2021



Audit sheet.

Rev.	Date	Description	Prepared	Verified
0	01/07/2021	Draft Report	AM	
1	02/07/2021	Issued report	AM	DM

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Contents.

Audit sheet.	2
1. Introduction.	4
2. Site Description.	5
3. Development Proposals.	5
4. Basis of assessment.	7
4.1 National Planning Policy Framework.	7
4.2 Noise Policy Statement for England.	7
4.3 Planning Practice Guidance.	8
4.4 ProPG:2017.	9
4.5 BS 8233:2014.	9
5. Measurements.	11
6. Results.	12
6.1 Position P1.	12
6.2 Position P2.	12
6.3 Position P3.	12
7. Discussion.	13
7.1 Existing noise climate.	13
7.2 ProPG assessment.	13
7.3 BS8233 Assessment.	13
8. Conclusions.	14
Appendix 1: Proposed Floor Layouts.	15
Appendix 2: List of measurement equipment.	17
Appendix 3: Survey measurement data.	18
Appendix 4: Glossary of Terms.	19

1. Introduction.

Hoare Lea Acoustics (HLA) has been appointed by Moorgarth Group to conduct a noise assessment for the proposed residential conversion of Fountain House, Reading.

This report presents the results of a survey of the existing noise climate for the site and reviews this data with respect to applicable guidance and standards for residential development. Where required, recommendations are provided for achieving the necessary noise standards.

2. Site Description.

The site comprises existing office premises on eleven storeys located above Broad Street Mall shopping centre off Oxford Road within Reading town centre. The shopping mall and associated car park provides a podium for the existing office tower. The lower floors of the office building are currently occupied by restaurant and other commercial premises.

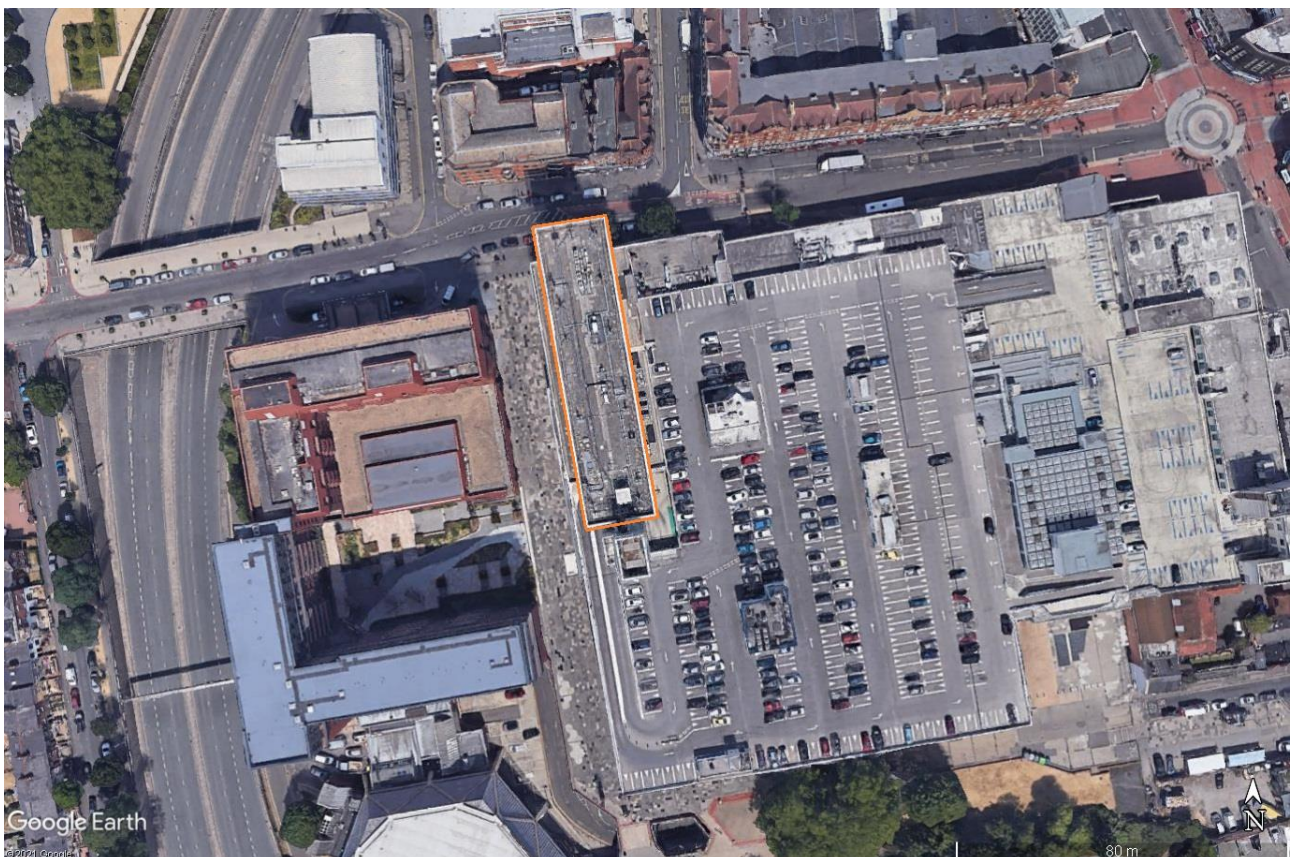
Oxford Road forms the northern site boundary and provides an east-west route through the town centre. Traffic flows on the section of road to the east of the site are restricted but include regular bus and delivery vehicle movements.

Oxford Road forms part of the central retail district and is lined with retail, offices and other commercial premises.

To the east and south, Fountain House overlooks the roof level car park above the shopping centre. There are a number of plant areas located on the car park level on this side of the building towards Oxford Road which serve the adjoining retail and commercial premises.

To the west, Fountain House overlooks Queens Walk which provides pedestrian access to The Hexagon and other civic buildings to the south. Across Queens Walk is the Pentahotel and Queens Court which provides student residential accommodation. Further to the west beyond the hotel is the A329 Caversham Road which provides a principal north-south traffic route through the town centre.

An aerial view of the site (amber) and surroundings is given below.



3. Development Proposals.

It is proposed that the upper eight floors of the existing building be refurbished and converted to provide residential accommodation. The lower floor (Level 4) will provide 4no apartments on the southern half of the floor plate and a Communal Amenity Space on the northern section of floor nearest to Oxford Road. The further seven upper floors will accommodate 11no apartments at each level.

The apartments will be arranged around the periphery of the building with a central access corridor.

The proposed typical floor layouts are shown at Appendix 1.

4. Basis of assessment.

4.1 National Planning Policy Framework.

The National Planning Policy Framework (NPPF): June 2019 sets out the Government's planning policies for England and how these are expected to be applied. The document seeks to encourage sustainable development subject to all relevant factors.

Section 7: 'Ensuring the vitality of town centres', paragraph 85 advises that there is a preference for development of town centre sites over edge of centre sites and that vitality and viability should be promoted by allowing a suitable mix of uses including housing. This section also advises planners to *'recognise that residential development often plays an important role in ensuring the vitality of centres and encourage residential development on appropriate sites'*

Section 11: 'Making effective use of land' advises that planning policy and decisions should promote effective use of land making as much use as is possible of brownfield sites.

Section 15: 'Conserving and enhancing the natural environment', paragraph 170, states the following:

'Planning policies and decisions should contribute to and enhance the natural and local environment by:

- preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability'.*

Furthermore, paragraph 180 states that:

'Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development. In doing so they should:

- 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 the quality of life;*
- identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason'*

Paragraph 182 states that:

'Planning policies and decisions should ensure that new development can be integrated effectively with existing businesses and community facilities (such as places of worship, pubs, music venues and sports clubs). Existing businesses and facilities should not have unreasonable restrictions placed on them as a result of development permitted after they were established. Where the operation of an existing business or community facility could have a significant adverse effect on new development (including changes of use) in its vicinity, the applicant (or 'agent of change') should be required to provide suitable mitigation before the development has been completed.'

Paragraph 183, additionally, states *'The focus of planning policies and decisions should be on whether proposed development is acceptable use of land rather than control of processes or emissions (where these are subject to separate pollution control regimes)'.*

NPPF also makes reference to the DEFRA Noise Policy Statement for England (NPSfE) 2010.

4.2 Noise Policy Statement for England.

The NPSfE is intended to apply to all forms of noise other than that which occurs in the workplace and includes environmental noise and neighbourhood noise in all forms.

NPSfE advises that the impact of noise should be assessed on the basis of adverse and significant adverse effect but does not provide any specific guidance on assessment methods or limit sound levels. Moreover, the document advises that it is not possible to have *'a single objective noise-based measure...that is applicable to all sources of*

noise in all situations'. It further advises that the sound level at which an adverse effect occurs is 'likely to be different for different noise sources, for different receptors and at different times'.

Paragraphs 2.20 and 2.22 of NPSE introduce the concepts summarised in the table below which can be applied when considering the significance of noise impacts, as defined by the World Health Organization.

Effect Level	Description
No Observed Effect Level (NOEL)	This is the noise level below which no effect can be detected. Below this level, there is no detectable effect on health and quality of life due to the noise.
Lowest Observed Adverse Effect Level (LOAEL)	This is the level above which adverse effects on health and quality of life can be detected.
Significant Observed Adverse Effect Level (SOAEL)	This is the level above which significant adverse effects on health and quality of life occur.

It is noted that NPSfE also advises that the general principle that increases in ambient noise should be 'minimised', needs to be considered in context for each site and, in this regard, states:

'Of course, taken in isolation and to a literal extreme, noise minimisation would mean no noise at all. In reality, although it has not always been stated, the aim has tended to be to minimise noise as far as is reasonably practical... the application of the NPSfE should enable noise to be considered alongside other relevant issues and not to be considered in isolation. In the past, the wider benefits of a particular...development or other activity may not have been given adequate weight when assessing the noise implications.'

Noise Policy Statement for England (NPSE) (Department for Environment, Food & Rural Affairs, 2010) advises that noise impacts should be assessed on the basis of adverse and significant adverse effect but does not provide any specific guidance on assessment methods or numerical noise limits.

4.3 Planning Practice Guidance.

Online Planning Practice Guidance (PPG) (Ministry of Housing, Communities & Local Government, 2019) has been published to provide greater details in relation to the relevance of noise to the planning process following the introduction of NPPF and NPSE.

This guidance states, under the heading 'How can noise impacts be determined', that the following should be considered by local authorities:

- 'whether or not a significant adverse effect is occurring or likely to occur;
- whether or not an adverse effect is occurring or likely to occur; and
- whether or not a good standard of amenity can be achieved.'

In line with NPSE, this includes identifying where noise exposure is above or below the significant observed adverse effect level and the lowest observed adverse effect level for a given situation during the operation of the Proposed Development.

Further guidance on each of the various observed effect levels set out in NPSE is provided in the table contained within the section headed 'How can it be established whether noise is likely to be a concern?' which is reproduced below.

Perception	Example of outcomes	Increasing effect level	Action
Not present	No effect	No Observed Effect	No specific measures required
No Observed Adverse Effect Level			

Perception	Example of outcomes	Increasing effect level	Action
Present and not intrusive	Noise can be heard, but does not cause any change in behaviour, attitude or other physiological response. Can slightly affect the acoustic character of the area but not such that there is a change in the quality of life.	No Observed Adverse Effect	No specific measures required
Lowest Observed Adverse Effect Level			
Present and intrusive	Noise can be heard and causes small changes in behaviour, attitude or other physiological response, e.g. turning up volume of television; speaking more loudly; where there is no alternative ventilation, having to close windows for some of the time because of the noise. Potential for some reported sleep disturbance. Affects the acoustic character of the area such that there is a small actual or perceived change in the quality of life.	Observed Adverse Effect	Mitigate and reduce to a minimum
Significant Observed Adverse Effect Level			
Present and disruptive	The noise causes a material change in behaviour, attitude, or other physiological response, e.g. avoiding certain activities during periods of intrusion; where there is no alternative ventilation, having to keep windows closed most of the time because of noise. Potential for sleep disturbance resulting in difficulty in getting to sleep, premature awakening and difficulty in getting back to sleep. Quality of life diminished due to change in acoustic character of the area.	Significant Observed Adverse Effect Level	Avoid
Present and very disruptive	Extensive and regular changes in behaviour, attitude or other physiological response and/or an inability to mitigate effect of noise leading to psychological stress, e.g. regular sleep deprivation/awakening; loss of appetite, significant, medically definable harm, e.g. auditory and non-auditory.	Unacceptable Adverse Effect	Prevent

It is important to note that no specific noise parameters or target noise levels are defined in the text.

In the absence of specific guidance for the assessment of environmental noise within NPPF, NPSfE and PPG, it is considered appropriate to base assessment on a combination of current British Standards, national guidance and local planning policy.

4.4 ProPG:2017.

ProPG Planning and Noise – ‘New residential developments’ is the most recent planning guidance with respect to the impact of transportation noise upon new residential development.

Section 2 of the document provides general guidance to achieve ‘good design’ of new dwellings and advises that site levels above approximately L_{Aeq} 70dB daytime and L_{Aeq} 60dB night time represent a ‘high noise risk’ whilst levels below approximately L_{Aeq} 55dB daytime and L_{Aeq} 45dB night time represent a ‘low noise risk’.

The guidance recommends that new residential developments be designed to achieve the internal and external criteria given in BS 8233:2014 but, additionally, advises that night time maximum sound levels in bedrooms at night should not normally exceed a level of L_{Amax} 45dB more than ten times over the course of the night.

4.5 BS 8233:2014.

BS8233:2014 ‘*Guidance on sound insulation and noise reduction for buildings*’ is the current British Standard providing guidance on acoustic requirements for buildings. The Standard advises appropriate criteria and limits for different building types including dwellings. The BS8233 internal design criteria for dwellings are as follows:

Activity	Location	Day (07:00 to 23:00)	Night (23:00 to 07:00)
Resting	Living rooms	35 dB LAeq,16hour	-
Dining	Dining Room / Area	40 dB LAeq,16hour	-
Sleeping (daytime resting)	Bedroom	35 dB LAeq,16hour	30 dB LAeq,8hour

Section G1 of BS8233 advises that the typical sound reduction that is achievable through open windows is limited to 15dB. The Standard does, however, acknowledge that additional sound reduction will result from room furnishings. Available test data indicates that, for mid-frequencies typical of road traffic noise, the overall sound reduction from outside to inside is approximately 20dB for a window open by approximately 100mm.

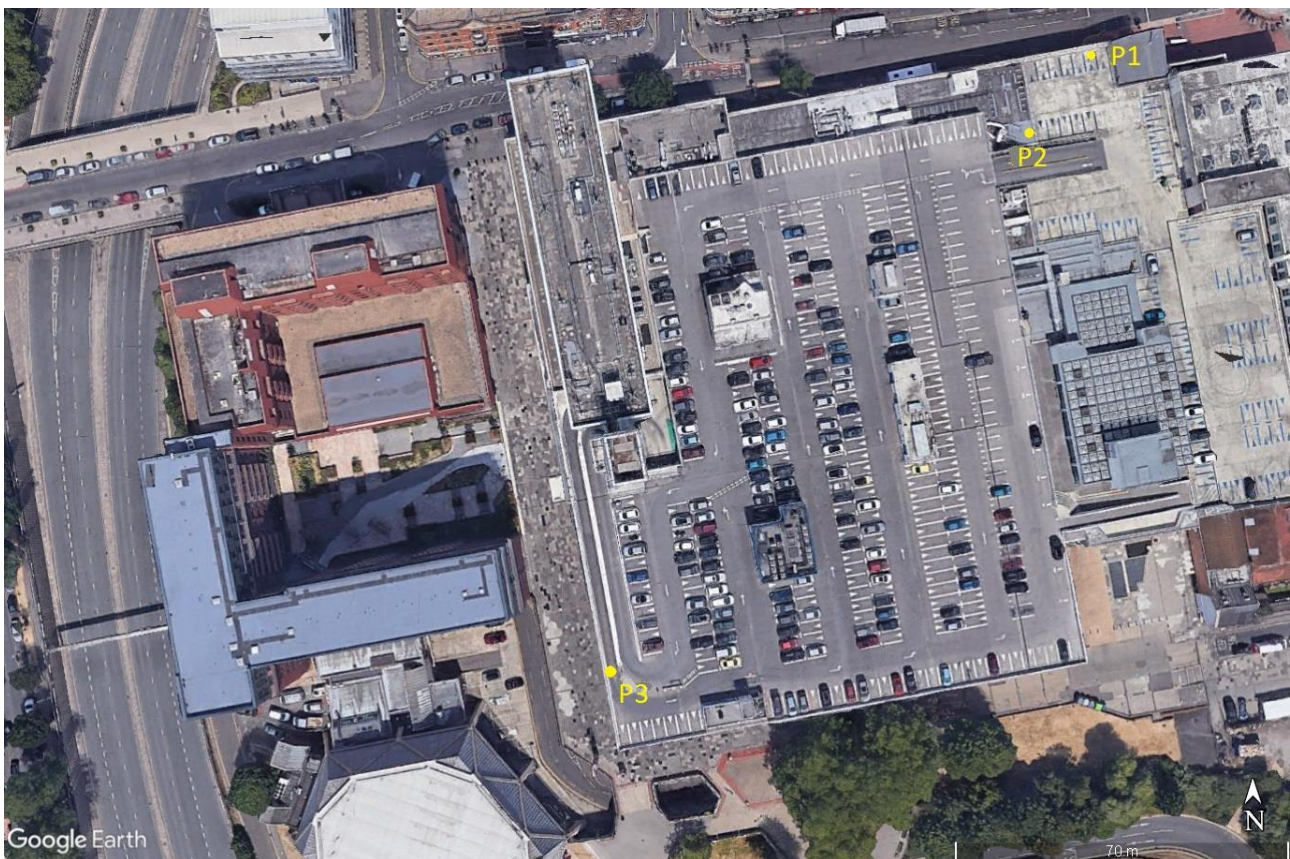
With regard to ventilation, BS 8233 section 8.4.5.4 refers to the Building Regulations recommendation that habitable rooms be provided with background ventilation and states ‘*Where openable windows cannot be relied upon for this ventilation, trickle ventilators can be used and sound attenuating types are available. However, windows may remain openable for rapid or purge ventilation, or at the occupant’s choice*’.

5. Measurements.

Continuous sound level measurements were undertaken at the development site between Thursday 1st and Friday 2nd July 2021 to determine the typical diurnal noise climate at the site. Three measurement positions used were as follows:

Position	Description
P1	24hr measurement overlooking Oxford Road
P2	Sample roof plant noise measurement
P3	Sample measurement overlooking the A329 to the west

The measurement positions are indicated on the following aerial view.



Sound levels were recorded continuously in 15-minute samples to determine the equivalent continuous sound level, $L_{Aeq,15min}$, the short duration level L_{Amax} and also the percentile $L_{A90,15min}$.

Weather conditions over the survey period were fine with dry road surfaces. The meteorological conditions were satisfactory for measurement purposes at all times during the monitoring period.

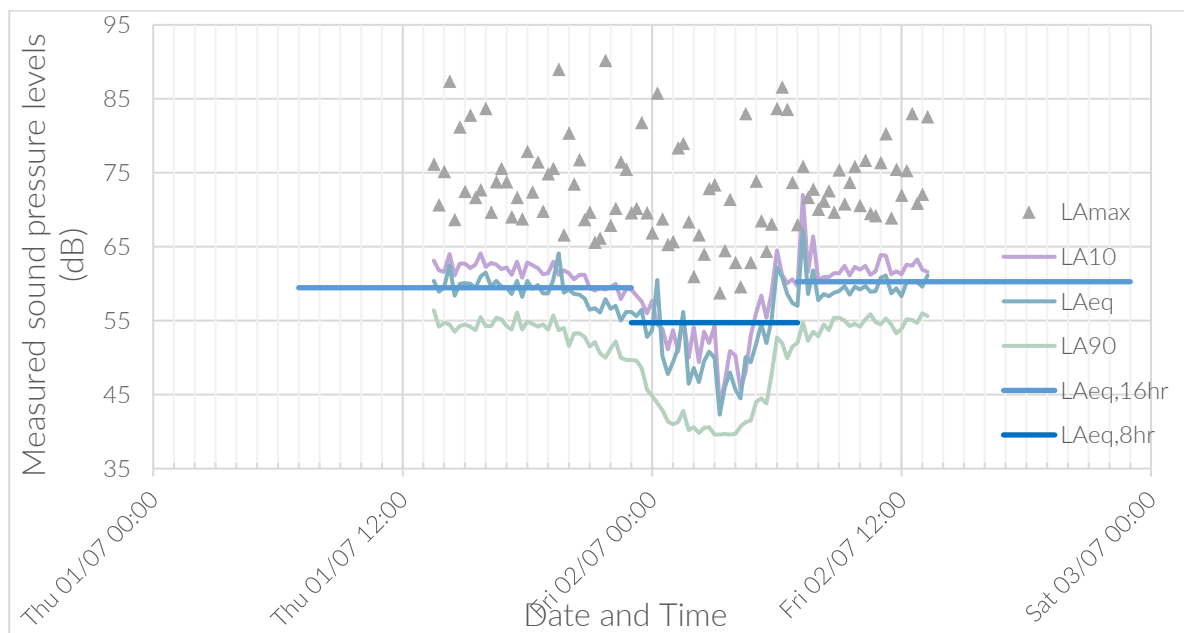
The measurements were made with calibrated precision grade sound level meters, in accordance with BS EN 60651 and BS 7445:1993. The equipment was acoustically calibrated before and after the survey with no drift being observed. A list of the equipment used can be found in Appendix 2.

6. Results.

6.1 Position P1.

The results of all site measurements are tabulated in Appendix 3. Levels are shown as hourly values.

The variation in sound levels over the survey period is shown graphically below.



The following table summarised the daytime and night time noise levels at the measurement position.

Period	L _{Aeq}	L _{Amax}	L _{A10}	L _{A90}
Thursday (11:45 – 23:00)	59.2	66 – 90	61.5	52.0
Thursday night	57.0	59 – 87	54.2	43.3
Friday (07:00 – 13:00)	59.6	69 – 83	62.5	54.0

The overall mean sound levels were L_{Aeq, 16hr} 59.4dB daytime and L_{Aeq, 8hr} 57.0dB during night time.

Most night time maximum noise levels were in the range L_{Amax} 65-75dB with only a small number of events above the upper value.

6.2 Position P2.

This position was used to determine typical noise levels for existing plant at the site. From observation, the Oxford Road side of the roof area of Broad Street Mall is subject to continuous plant noise during the day which generates similar sound levels across the roof at positions near to the plant.

The measured level at Position P2 was L_{Aeq} 57.8dB and is representative of all plant currently installed. This level is similar to the daytime levels recorded at position P1.

6.3 Position P3.

This position was used to determine typical daytime sound levels for traffic noise from the A329 to the west. The overall level for a 30minute period during the middle of the day was L_{Aeq,30min} 62.4dB which is comparable to the position 1 data for the same period.

7. Discussion.

7.1 Existing noise climate.

The results of the survey, including observations made during the site visits, indicate that the general noise climate at the site and surrounding area is dominated by traffic flows on Cavendish Road and Oxford Road but with other noise from general town centre activity.

During the site visits, it was noted that there is significant plant noise on the eastern side of the building towards the Oxford Road frontage which impacts the lower floor areas.

The survey data indicates that general daytime traffic noise levels and plant noise levels at the lower part of the building are similar with overall levels around L_{Aeq} 60dB. Both plant and traffic noise levels reduce during the late evening through night time.

Noise levels were noticeably lower on the western and southern sides of the building.

7.2 ProPG assessment.

Given that the predominant noise at the site during both daytime and night time is attributable to road traffic noise, ProPG 2017 guidance indicates that site would have a 'low noise risk' during daytime and a 'low-medium noise risk' during the night time.

The guidance recommends that new residential developments be designed to achieve the internal and external criteria given in BS 8233:2014 but, additionally, advises that night time maximum sound levels in bedrooms at night should not normally exceed a level of L_{Amax} 45dB more than ten times over the course of the night.

From Section 6. above, the building fabric would need to provide a minimum sound reduction of 30dB to achieve the ProPG requirements for night time maxima.

7.3 BS8233 Assessment.

From the survey data the building fabric to habitable rooms would need to provide a minimum sound reduction of 25dB for daytime resting and 27dB for night time sleeping. It is expected that sound reduction requirements would reduce slightly with height.

In practice, the structural components of the building envelope can be expected to provide a sound reduction in excess of 45 dB and will not provide a significant pathway for noise break-in and greatest sound break-in can be expected to occur via windows. The existing sealed double-glazed windows are to be retained.

Data given in BRE IP 12/89 and BS8233 Annex G indicates that, for road traffic noise, standard thermal double glazing provides a typical sound reduction of the order of 33dB. This order of noise reduction would enable the BS 8233 internal criteria to be achieved across the building.

BS 8233 notes that regular individual noise events can cause sleep disturbance whilst ProPG 2017 advises that, for good sleeping conditions, maximum sound levels should not exceed L_{Amax} 45dB more than ten times during the course of the night. Glazing achieving a sound reduction of 33dB would reduce the majority of night time internal maximum levels to less than L_{Amax} 45dB with less than ten events per night exceeding this value with the level of exceedance, generally, within 5dB.

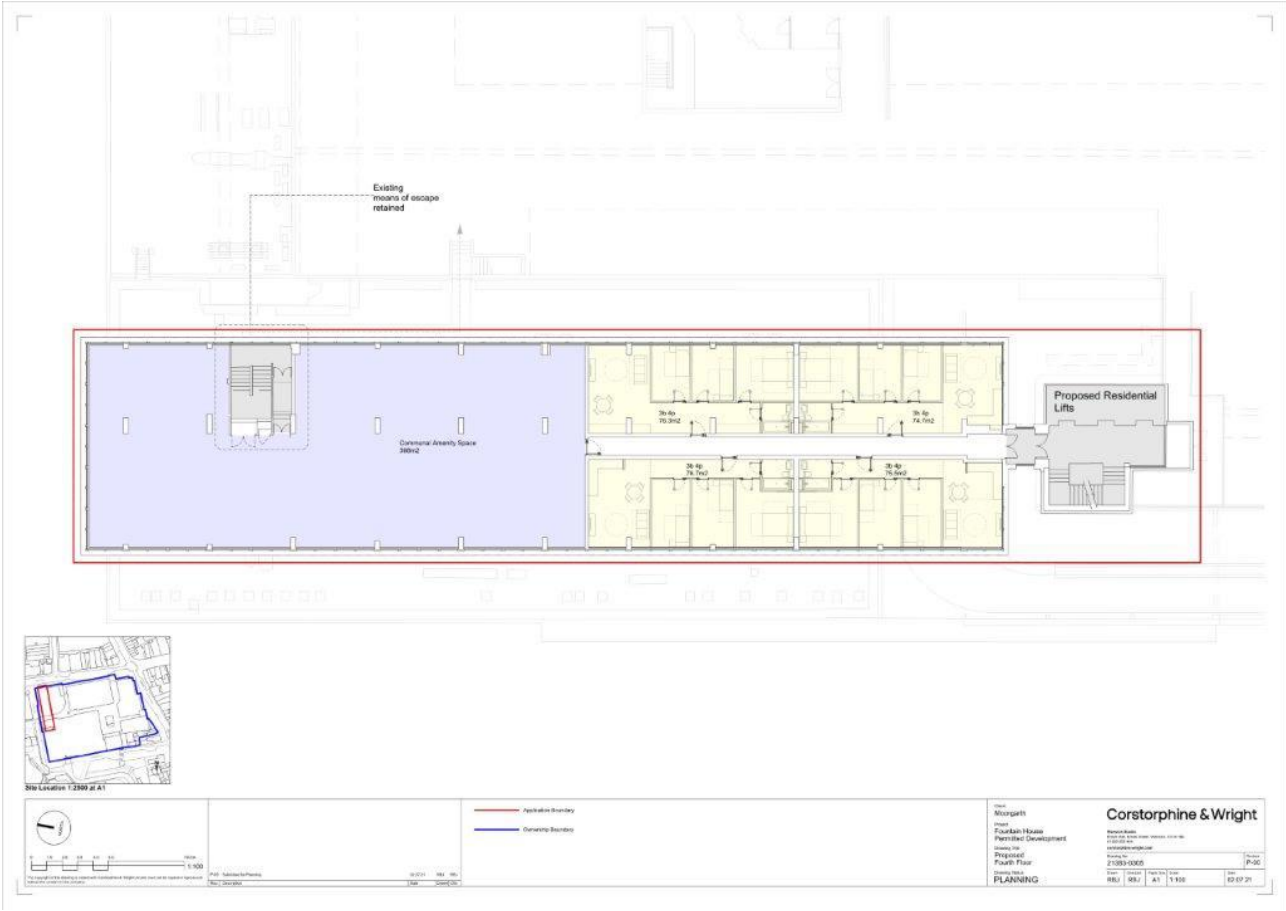
8. Conclusions.

The survey and subsequent assessment carried out for this site indicates that the noise climate at the proposed residential development is dominated by road traffic noise from Oxford Road, the A329 and other town centre roads. Additional noise is generated by roof level plant installed to the shopping centre and this noise generates comparable levels to general ambient noise at the lower floors of the building.

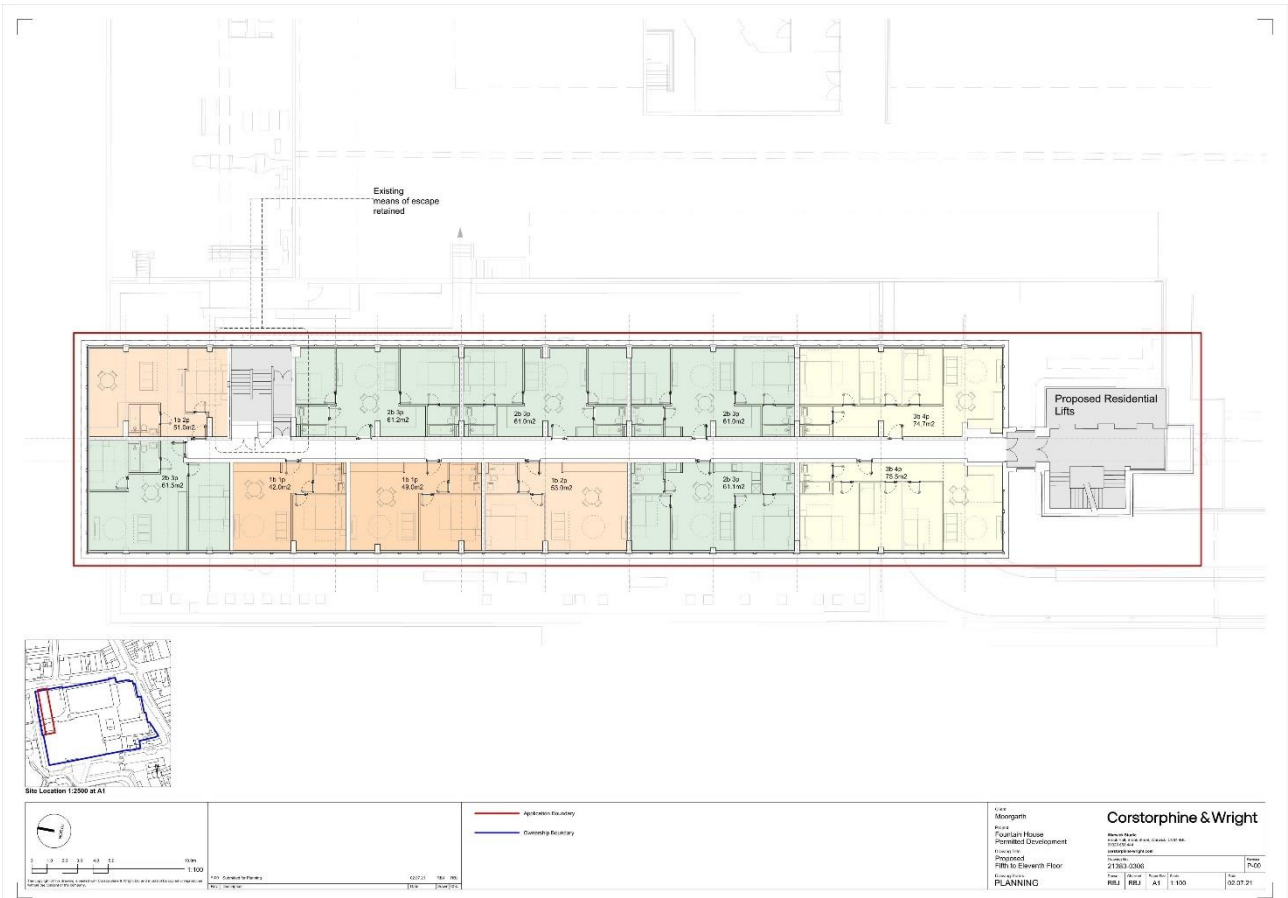
Based upon the measured noise climate at the site, the existing sealed glazing system will provide adequate sound reduction to achieve the internal requirements of ProPG 2017 and BS8233.

Appendix 1: Proposed Floor Layouts.

Level 4.



Levels 5-11.



Appendix 2: List of measurement equipment.

Noise Monitoring Information Sheet						
Name		Location P1				
Description		The noise climate was dominated by road traffic.				
Equipment		Type	Serial Number		Last Calibrated	
Sound Level Meter		NL-52	1143560		28/05/2021	
Pre-amplifier		NH-25	43577		28/05/2021	
Microphone		UC-59	7371		28/05/2021	
Calibrator		NC-74	34172705		29/06/2020	
SLM Range		20 – 100 dB(A)	Serial Number		Last Calibrated	
Data Collected						
File	Start Date	End Date	Cal Start	Cal End	Drift	Notes
1	01/07/2021	02/07/2021	94.0	93.9	-0.1	Not significant

Appendix 3: Survey measurement data.

Date	Day	From:	To:	L _{Aeq}	L _{Amax}	L _{A10}	L _{A90}
Thursday		13:00	13:59	60.4	71 - 76	62.2	53.5
		14:00	14:59	60.2	69 - 87	62.6	53.7
		15:00	15:59	60.4	72 - 84	62.8	54.3
		16:00	16:59	59.3	70 - 76	62.4	53.8
		17:00	17:59	59.6	69 - 78	62.0	54.2
		18:00	18:59	61.1	70 - 77	61.8	53.7
		19:00	19:59	58.6	67 - 89	61.9	51.6
		20:00	20:59	56.9	69 - 77	60.6	50.0
		21:00	21:59	56.3	66 - 90	59.3	49.7
		22:00	22:59	55.5	70 - 77	59.1	45.7
		23:00	23:59	55.8	67 - 82	57.4	41.4
23/10/2020	Friday	00:00	00:59	52.3	65 - 86	53.3	40.2
		01:00	01:59	49.2	61 - 79	52.6	39.8
		02:00	02:59	47.4	64 - 73	52.3	39.6
		03:00	03:59	48.0	59 - 71	47.9	39.7
		04:00	04:59	53.6	60 - 83	50.7	43.8
		05:00	05:59	60.2	64 - 84	59.3	49.9
		06:00	06:59	63.0	68 - 87	60.4	52.0
		07:00	07:59	58.4	70 - 76	65.1	52.9
		08:00	08:59	59.2	70 - 75	61.2	54.3
		09:00	09:59	59.2	72 - 76	61.9	54.2
		10:00	10:59	60.1	69 - 77	62.3	53.3
		11:00	11:59	59.9	69 - 80	62.0	53.9
		12:00	12:59	60.4	71 - 83	62.6	55.6

Appendix 4: Glossary of Terms.

Decibel (dB)

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

A-Weighting

The 'A' weighting is a correction term applied to the frequency range in order to approximate to the sensitivity of the human ear to noise. It is generally used to obtain an overall noise level from octave or third octave band frequencies. An 'A' weighted sound level is written as dB(A).

$L_{Aeq,T}$

The A-weighted equivalent continuous sound level – the sound level of a notionally steady sound having the same energy as the fluctuating sound over a specified measurement period (T). $L_{Aeq,T}$ is used to describe many types of noise and can be measured directly with an integrating sound level meter. It is the preferred descriptor for environmental noise in accordance with BS 7445:1993.

$L_{A90,T}$

The A-weighted noise level exceeded for 90% of the specified measurement period (T). This is generally taken to indicate the prevailing background noise level.

$L_{A10,T}$

The A-weighted sound level exceeded for 10% of the specified measurement period (T). This parameter is indicative of the average maximum sound level.

L_{Amax}

The highest short duration A-weighted sound level recorded during a noise event.

R_w

A single figure value of sound reduction index, derived according to procedures given in BS 5821, used for rating and comparing the sound reduction performance of partitions and based on the values of sound reduction index at different frequencies.



ADRIAN MCCORDICK
SENIOR ACOUSTICS ENGINEER

+44 121 450 4800
adrianmccordick@hoarelealea.com

HOARELEA.COM

6th Floor West
54 Hagley Road
Edgbaston
Birmingham
B16 8PE
England

