

Finch Consulting Report.

**Environmental Noise and Impact Assessment at
Dukesbridge House/Chambers, Reading (PD
Application).**

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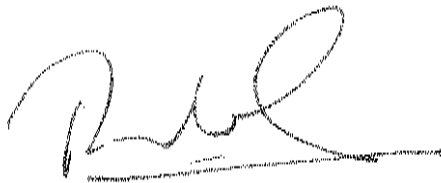
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1.0 INTRODUCTION

Contents Sub Heading

- 1.1 It is currently proposed to change the use of the office accommodation building called Dukesbridge House and Dukesbridge Chambers located along London Street/Duke Street in Reading into residential use. As part of the proposals, residential extensions to the buildings are also proposed (alongside new build standalone elements) and consent will be sought to reclad parts of the building.
- 1.2 The proposals in relation to Dukesbridge House allow for a change of use of the building from Class B1(a) (offices) and Class to C3 (dwelling houses) to comprise 77 dwellings (25 x Studio, 51 x 1 bed, 1 x 2 bed). The existing D2 (leisure and entertainment) use on site (around 262 m2) will be retained.
- 1.3 The proposals in relation to Dukesbridge Chambers allow for a change of use of the building from Class B1(a) (offices) to Class C3 (dwelling houses) to comprise 25 dwellings (10 x studio, 14 x 1 bed and 1 x 2 bed).
- 1.4 Both proposals are under prior notification under Class O, Part 3 of Schedule 2 of the Town and Country Planning (General Permitted Development) Order 2015'
- 1.5 Under the Prior Approval scheme (Class O), a noise impact assessment in relation to the office conversion is not required to support the planning application since there will be no existing commercial uses near the development that can have a significant noise impact to the proposed new residential use and the dominant source of incident noise is surrounding road traffic.
- 1.6 However, the client has requested suggestions in relation to a suitable external building fabric construction to protect the future residential occupants of the converted premises.
- 1.7 This report presents the results of an environmental noise survey and acoustic specifications for the converted office accommodation. To allow for a holistic approach, relevant planning policy is also presented in order to provide a consistent approach in the assessment between the PD scheme and the new build elements.
- 1.8 To assist with the understanding of this report a brief glossary of acoustic terms can be found in Appendix 3. A more in-depth glossary of acoustic terms can be accessed at <http://www.acoustic-glossary.co.uk>.



2.0 SITE LOCATION

- 2.1 Dukesbridge House occupies a four-storey redbrick-clad building on the banks of the River Kennet, in Reading town centre. Dukesbridge Chambers is of a similar construction and height and overlooks Duke Street.
- 2.2 Dukesbridge is prominently located on London Street adjacent to the pedestrianised retail pitch of Broad Street and the Oracle Shopping Centre. To the north, the area surrounding Jackson's Corner provides a range of retail, restaurant, bar and leisure uses. The River Kennet is located along the south boundary of Dukesbridge House.
- 2.3 The location of Dukesbridge House is shown in Figure 1 below.

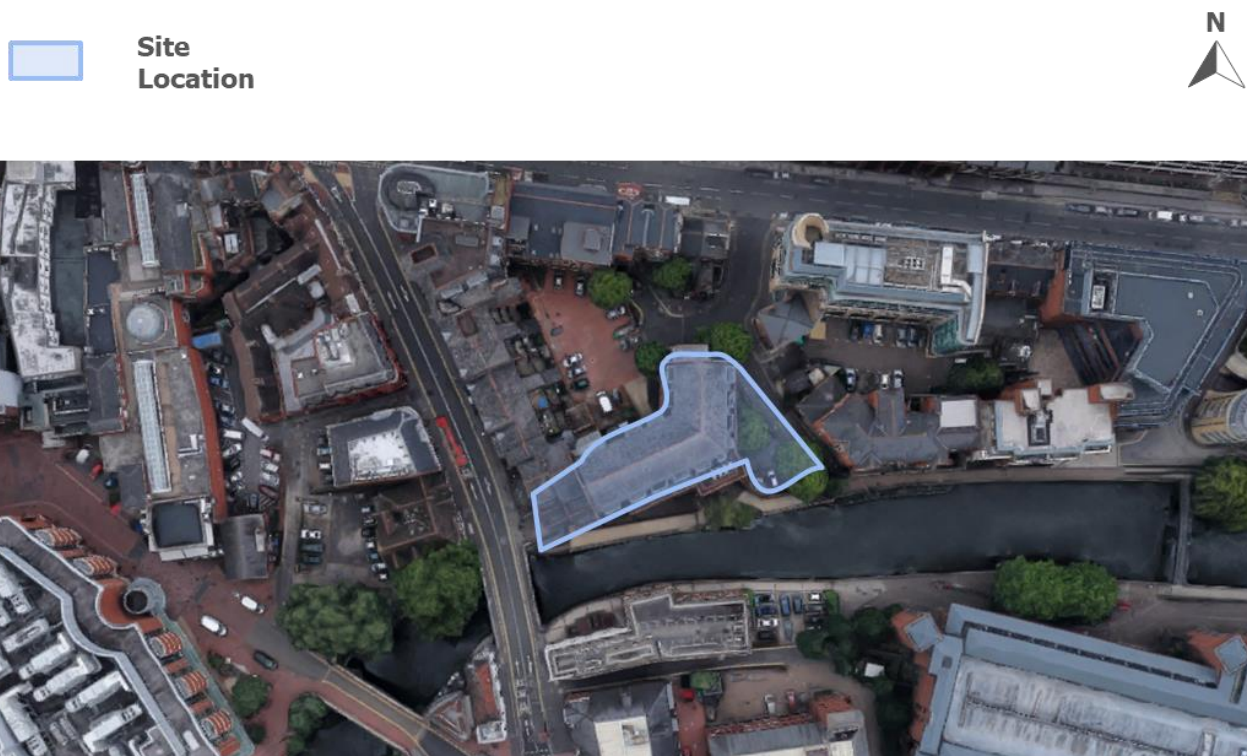


Figure 1: Dukesbridge House Location Map

- 2.4 Figure 2 below shows the proposed first floor arrangement of the Dukesbridge House development.

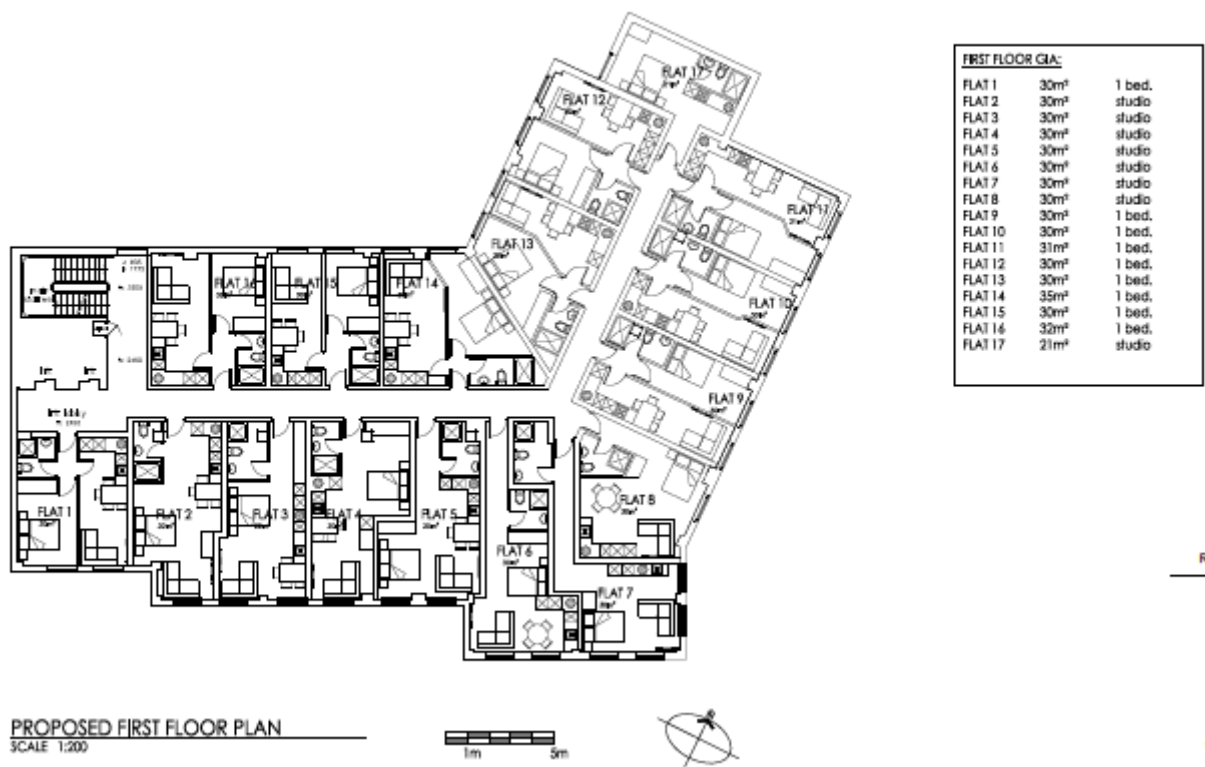


Figure 2: First Floor Layout of proposed Development at Dukesbridge House

2.5 The location of Dukesbridge Chambers is shown in Figure 3 below.

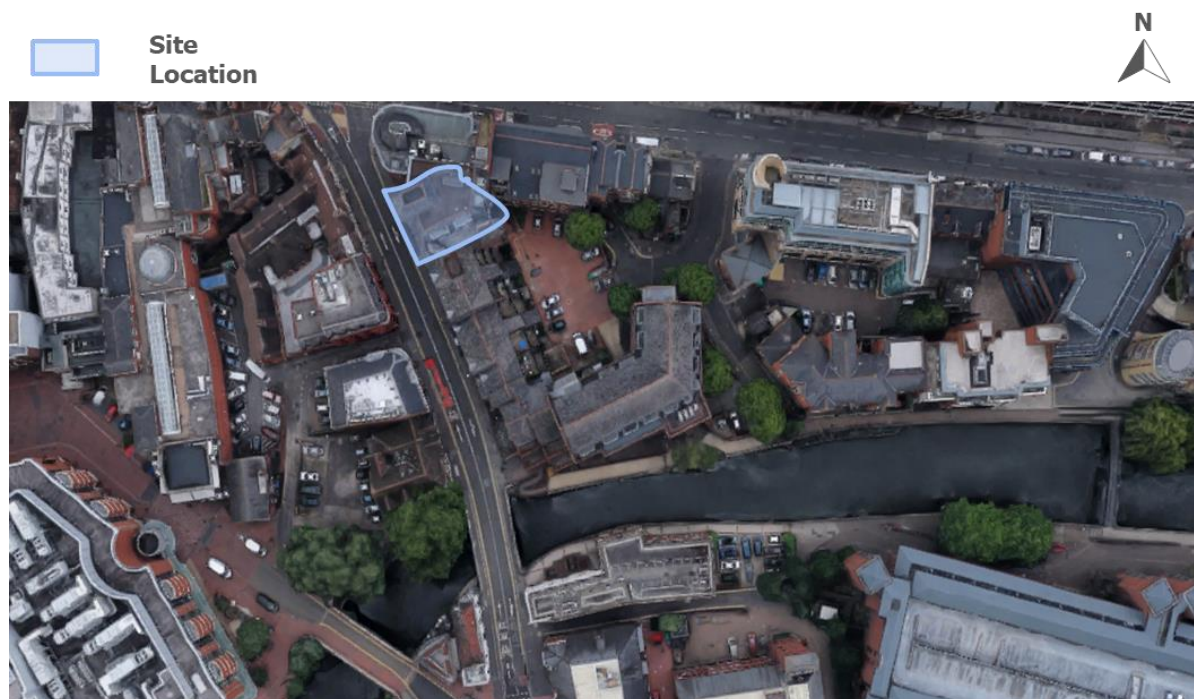


Figure 3: Dukesbridge Chambers Location Map

2.6 Figure 2 below shows the proposed second and third floor arrangement of the Dukesbridge Chambers development.

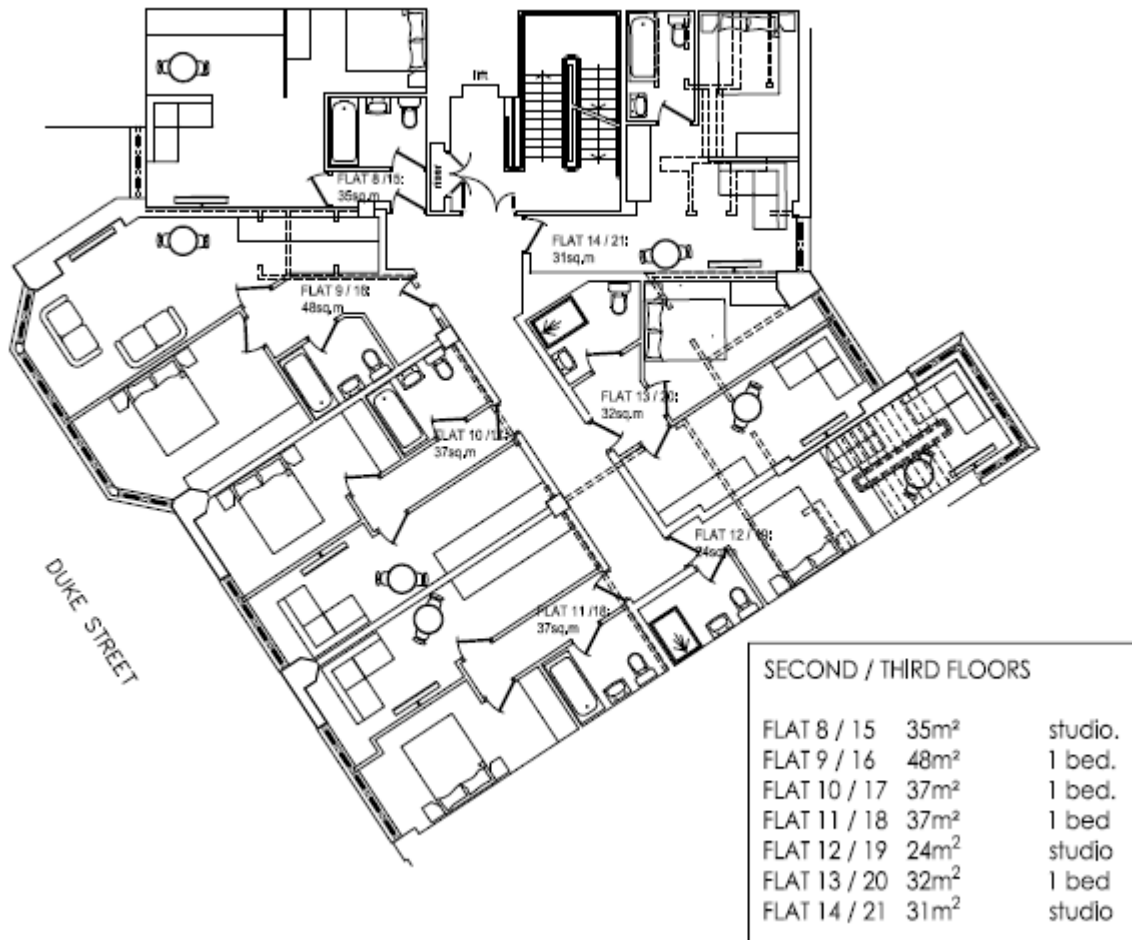


Figure 2: First Floor Layout of proposed Dukesbridge Chambers Development

3.0 PLANNING POLICIES

3.1 A great deal of change has occurred in recent years in the assessment of noise impacts and their relationship with planning decisions. In 2010 the publication of the Noise Policy Statement for England (NPSE) introduced clear aims in relation to the management of noise via government policy. It introduced new assessment terms like LOAEL (Lowest Observed Adverse Effect Level) and SOAEL (Significant Observed Adverse Effect Level) and provided the government vision for the control of noise impacts.



- 3.2 In 2012 the National Planning Policy Framework (NPPF) was published that replaced previous guidance (the PPG24) and reiterated the aims in the NPSE. It set a requirement for local authorities to update their local plans in order to show alignment with the aims of the NPPF and importantly if such an alignment is not evident, planning decisions should view the NPPF as a material consideration and therefore place more weight to an NPPF compliant assessment. In 2018, the NPPF was updated and in relation to noise the changes have been subtle. The NPSE or the NPPF do not contain technical guidance for the assessment of noise through the planning system. No British Standards or any documents are quoted therein as suitable for the assessment of noise. In March 2014, the Planning Practice Guidance was published that constituted technical guidance for the application of the NPPF. However, it too did not contain any objective levels to base an assessment of noise impacts.
- 3.3 In order to undertake an assessment relating to environmental noise, the assessor now has to propose suitable (in his or her professional opinion) values for the LOAEL and SOAEL based on guidance documents, research, standards etc. and these values may be unique to each project and may be different for different sources and even different time periods.
- 3.4 In a nutshell, if the impact is below the LOAEL, planning permission ought to be granted without any conditions. If the impact is above the SOAEL, planning permission may be refused if suitable mitigation measures are not available or when other sustainability targets are not met. When the impact is predicted to lie between the LOAEL and SOAEL, planning permission ought to be granted with a suitable planning condition to ensure that the impact is reduced as far as reasonably practicable when the development reaches the detailed design stage and the proposals develop further.
- 3.5 It ought to be highlighted that noise impact assessments undertaken to support the planning application can only offer an outline of a design for any mitigation measures and these will always be discretionary at this stage of the development.
- 3.6 Appendix 1 presents the relevant planning policies on a national level, as well as the guidance documents that will be used in order to propose suitable LOAEL and SOAEL values for the assessment of the relevant impacts. These values will be presented within the body of this report but the background to these is available in Appendix 1.
- 3.7 Even though the NPPF is a material consideration (and therefore can override decisions made via adherence to a non-compliant local plan), the level of correlation with local policies should be reviewed in noise impact assessment reports (prepared to assist planning applications) to present



a thorough overview of the applicable planning law. Relevant local policies are presented in the following sections.

Reading Borough Council

- 3.8 Reading Borough Council is working on producing a new Local Plan, which will replace the current development plans (the Core Strategy, Reading Central Area Action Plan and Sites and Detailed Policies Document), setting out how Reading will develop up to 2036. The Local Plan was submitted to the Secretary of State on Thursday 29th March 2018.

Core Strategy

- 3.9 Reading Borough Council's Core Strategy sets out the council's overall planning strategy and important principles for development in Reading. It was adopted in January 2008 and altered in January 2015. A submission version has been made for the Reading Local Plan, 2019.
- 3.10 Noise is included within Policy CR6 where it is stated that:

“Proposals for new residential development within the central area will be required to demonstrate how the issue of potential noise disturbance from neighbouring land uses and other sources, and air quality implications of residential development, have been considered and if necessary, mitigated. New residential development should not be located next to existing town centre uses where those uses would give rise to unacceptable levels of noise and disturbance to the occupiers of the new scheme, unless this can be mitigated.”.

- 3.11 Policy CR10:Tall Buildings states:

“Avoid significant negative impacts on existing residential properties and the public realm in terms of outlook, privacy, daylight, sunlight, noise, light glare and night-time lighting”.

Reading Central Area Action Plan

- 3.12 Reading Borough Council's Central Area Action Plan Core Strategy sets out the council's planning principles for the centre of Reading up until 2026. It contains general policies and details on specific sites it aims to develop and protect.



3.13 In Paragraph 7.6 it states that:

“in some cases, residential development is proposed in areas where noise levels may be an issue. It should be possible to mitigate this through the design of the scheme. In order for the internal noise levels to be reasonable and not adversely affect health, it would be necessary to provide a system of ventilation that entirely removes the necessity to open windows, even in very hot weather. Similarly, in terms of air quality, mitigation of impacts on residential development may be required, including means of ventilation that remove the need to open windows, and draw in the lowest levels of pollution possible, for instance from roof sources. This should be secured through the design of the proposal, and planning condition if necessary. Such systems will require additional energy use, which will need to be offset in order to comply with policy CS1 of the Core Strategy.”

3.14 Policy RC9 Living in the Centre states that:

“Proposals for residential development within the central area will be assessed against the following criteria...ii Proposals for new residential development within the central area will be required to demonstrate how the issue of potential noise disturbance from neighbouring land uses and other sources, and air quality implications of residential development, have been considered and if necessary, mitigated. New residential development should not be located next to existing town centre uses where those uses would give rise to unacceptable levels of noise and disturbance to the occupiers of the new scheme, unless this can be mitigated”.

Sites and Detailed Policies

3.15 Reading Borough Council’s Sites and Detailed Policies document sets out detailed policies it uses when considering planning applications and identifies sites for development and protection.

3.16 Policy DM8: RESIDENTIAL CONVERSIONS states that:

“Proposals to convert properties into self-contained flats or for multiple occupation under Core Strategy Policy CS18 will only be acceptable where:

- *The proposal respects the physical character of the area and additionally would not, either individually or cumulatively, unduly dilute or harm an existing mixed and sustainable community through the significant loss of single family housing;*



- *There are no unacceptable adverse impacts to other residential properties arising from noise and disturbance in terms of the number and layout of units proposed and the proximity to other properties;*
- *There is appropriate sound insulation between proposed and neighbouring units and layouts avoid inappropriate stacking and location of rooms between units."*

3.17 Paragraph 5.4.8 states that:

"Generally, conversions provide for a market need for small, flexibly let accommodation reflecting household formation trends in the population and the more transient nature of parts of the labour market. However, there has been a substantial increase in applications for conversions over recent years as well as evidence of large numbers of unauthorised conversions. It is clear that significant effects on the character of an area or street are being experienced in several parts of Reading where large numbers of conversions are taking place. Such streets are suffering. When calculating the floor area of a property the measurement should be based on the external dimensions as at 1st July 1948 or when built (which ever is the later) from impacts such as significant car parking problems including parking abuse; clutter and untidiness; a plethora of satellite dishes; poor building maintenance; increased activity, noise and nuisance, etc. The quality of conversions, particularly where unregulated, can also be poor, with poor standards of accommodation and health and safety fears".

NPPF Compliance

- 3.18 Reading Borough Council's Policies that refer to noise impacts do not use the same wording as Paragraph 123 of the NPPF and the level of convergence may be debatable. These policies do not provide an assessment methodology that can be used to demonstrate NPPF compliance and therefore the guidance in the NPPF and PPG should be used for such an assessment to be undertaken.
- 3.19 As neither the NPPF nor the relevant Policies provide specific objective criteria for the assessment of noise, it is important to review relevant guidance in order to propose objective levels which can be used to assess a proposal in line with the aims of the NPPF (which is a material consideration for planning application), and this guidance is presented in Appendix 1.



4.0 MEASUREMENT OF NOISE

Details of Environmental Sound Survey

- 4.1 Four sound level meters were installed on site from Monday 1 April 2019 to Tuesday 2 April 2019.
- 4.2 The sound level meters were programmed to record the A-weighted L_{eq} , L_{90} , L_{10} and L_{max} noise indices and corresponding octave band frequency¹ information (for L_{eq}) for fifteen-minute sample periods.

Measurement Positions

- 4.3 The measurements of incident sound pressure levels were undertaken at four locations. The approximate locations of the microphones are indicated in Figure 4 below. At Position 1, the microphone was located at the corner of the balcony of Flat 16 (around 1m from a wall), directly above the external corner of an open balcony at second floor level overlooking Duke Street road. In Position 2 the microphone was mounted on a pole at the south elevation and was located approximately 1m from the facade at second floor level. The microphone at Position 3 was mounted on a pole and located approximately 1m from the façade of the building at second floor level. At Position 4, the microphone was mounted on a pole and was located approximately 1m from the facade at second floor level. At the first three positions, the noise climate was subjectively dominated by local and distant road traffic. Road traffic was subjectively lower at Position 4 and in addition at that position mechanical noise was also audible.
- 4.4 The measurement positions were not in free field conditions and therefore 3 dB has been subtracted from the recorded measurements.

¹ Except at position 3 as this sound level meter did not have this technical capability





Figure 4: On Site Sound Pressure Level Measurement Positions

Equipment

4.5 Details of the equipment used during the survey are provided in Table 1 below. The sound level meters were subjected to sensitivity checks (or a 'field calibration') before and after the survey; no significant changes (± 0.2 dB) in the levels were noted.

Position	Description	Model / serial no.	Calibration date	Calibration certificate no.
1	Class 1 Sound level meter	Norsonic SLM 140/1403413	29/01/19	30778
	Condenser microphone	Norsonic 40AF/207390		
	Preamplifier	Norsonic 1209/12821	08/11/2018	430034
	Calibrator	B & K 4231/1839133		
2	Class 1 Sound level meter	Norsonic SLM 140/6112	08/11/2018	430036
	Condenser microphone	Norsonic 1127/151737		
	Preamplifier	Norsonic 1209/20299	08/11/2018	430034
	Calibrator	B & K 4231/1839133		
3	Class 1 Sound level meter	Norsonic SLM 140/5947	01/03/2018	27908
	Condenser microphone	Norsonic 1125/355507		



Position	Description	Model / serial no.	Calibration date	Calibration certificate no.
	Preamplifier	Norsonic 1209/15793		
	Calibrator	B & K 4231/1839133	08/11/2018	430034
4	Class 1 Sound level meter	Norsonic SLM 140/5948	09/03/2018	27991
	Condenser microphone	Norsonic 1225/107390		
	Preamplifier	Norsonic 1209/15806		
	Calibrator	B & K 4231/1839133	08/11/2018	430034

Table 1: On Site Instrumentation

Weather Conditions

- 4.6 Weather conditions were determined when the sound level meters were set up and when they were collected. It is considered that the meteorological conditions were appropriate for environmental noise measurements. Table 2 below presents the weather conditions recorded on site.

Date/Time	Description	Setting up of sound level meters	Collection of sound level meters
01/04/2019 – 02/04/2019	Temperature (°C)	15	7
Cloud Cover Symbol Scale in oktas (eighths) 0 Sky completely clear 1 2 3 4 Sky half cloudy 5 6 7 8 Sky completely cloudy (9) Sky obstructed from view	Precipitation:	0	Light shower
	Cloud cover (oktas - see guide)	0	8
	Presence of fog/snow/ice	Nil	Nil
	Presence of damp roads/wet ground	Nil	Slightly damp
	Wind Speed (m/s)	<2.4	<3.1
	Wind Direction	Northwest	West
	Conditions that may cause temperature inversion (i.e. calm nights with no cloud)	No	No

Table 2: Weather Conditions



Results

- 4.7 At the beginning and end of the survey, the dominant source of noise around the site was road traffic.

Exterior Noise Levels

- 4.8 The single figure free field equivalent noise levels are presented in time history graphs in Appendix 2. The relevant results of the survey have been summarised in Table 3 below.

Position	Measurement period	Range of recorded sound pressure levels (dB)			
		L_{Aeq} (15 minutes)	L_{Amax} (15 minutes)	L_{A10} (15 minutes)	L_{A90} (15 minutes)
1	Daytime (07.00 – 23.00 hours)	52-67	67-91	54-69	46-54
	Night-time (23.00 – 07.00 hours)	46-59	63-76	48-61	40-54
2	Daytime (07.00 – 23.00 hours)	50-58	62-83	52-61	45-52
	Night-time (23.00 – 07.00 hours)	44-55	57-70	47-57	39-51
3	Daytime (07.00 – 23.00 hours)	51-71	64-104	53-67	47-52
	Night-time (23.00 – 07.00 hours)	44-56	56-83	47-59	39-50
4	Daytime (07.00 – 23.00 hours)	44-71	56-104	45-67	42-52
	Night-time (23.00 – 07.00 hours)	42-53	49-79	43-55	41-46

Table 3: Summary of Survey Results (free field levels)

- 4.9 Table 4 below presents the incident free field noise levels at the measurement position in terms of daytime (16 hours) and night-time (8 hours) levels measured during the monitoring periods.

Position	Free field sound pressure levels (dB)	Free field sound pressure levels (dB)
	L_{Aeq} (16 hours)	L_{Aeq} (8 hours)
1	59	52
2	54	49
3	57	50
4	50	45

Table 4: Daytime and Night-Time Equivalent Levels (Free Field Levels)



- 4.10 Table 5 below presents the suggested incident noise levels that can be used for the assessment of environmental noise break in (the spectrum data are taken from the results of the onsite survey).

Position /Period	Incident free field sound pressure levels (dB) at Octave Band Centre Frequencies (Hz)								A-weighted level (dB)
	63	125	250	500	1000	2000	4000	8000	
1/Daytime	62	58	57	54	55	52	48	43	59
1/Night-time	56	53	50	48	49	45	39	30	52
2/Daytime	59	54	53	50	51	46	38	31	54
2/Night-time	55	49	47	45	46	41	31	21	49
3/Daytime	No octave band filters on this sound level meter								57
3/Night-time									50
4/Daytime	58	53	51	47	45	41	36	29	50
4/Night-time	53	49	46	42	41	37	32	24	45

Table 5: Free Field Equivalent Facade Incident Environmental Noise Levels at Octave Band Centre Frequencies

5.0 ASSESSMENT LEVELS

- 5.1 The applicable policy and guidance documents are presented in Appendix 1. This section shows the proposed LOAEL and SOAEL values that will be used in the assessment in relation to the proposed new residential flats.

Proposed LOAEL and SOAEL for Transportation Airborne Noise Affecting Rooms used for Residential Purposes

- 5.2 The proposed LOAEL and SOAEL values in relation to transportation airborne noise affecting rooms used for residential premises are provided in Table 6 below. It should be highlighted that the Secretary of State's approved assessment methodology for the HS2 project includes an outdoor SOAEL of 65 dB $L_{Aeq,16h}$. The HS2 project also includes an outdoor LOAEL of 50 dB $L_{Aeq,16h}$. Therefore, the difference between the LOAEL and SOAEL for transportation noise in the Secretary of State's approved HS2's environmental statement is 15 dB.

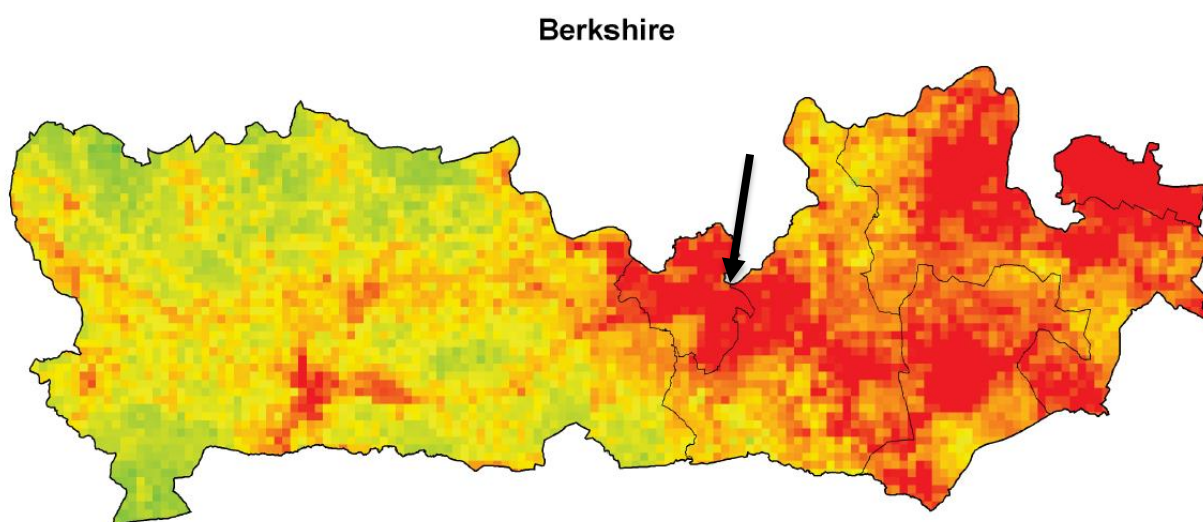


Level	Daytime (07:00 hours to 23:00 hours)	Night-Time (23:00 hours to 07:00 hours)
LOAEL Internal	35 $L_{Aeq,16h}$ (dB)	30 $L_{Aeq,8h}$ (dB)
SOAEL Internal	49 $L_{Aeq,16h}$ (dB)	44 $L_{Aeq,8h}$ (dB)
LOAEL External	50 $L_{Aeq,16h}$ (dB)	Not Applicable
SOAEL External	65 $L_{Aeq,16h}$ (dB)	Not Applicable

Table 6: Proposed LOAEL and SOAEL for Transportation Noise Affecting New Dwellings

5.3 The LOAEL and SOAEL values above are related to the relevant aims in the NPPF (Paragraph 180, a)).

5.4 In relation to the second aim (Paragraph 180, b)) in the NPPF, regarding the protection of tranquil areas, advice was sought from the Campaign to Protect Rural England. This organisation has published maps that use colours to indicate tranquillity across the country. Areas of red or reddish colour have a low level of tranquillity and areas of green colour have a high level of tranquillity. The figure below of this map for Berkshire shows that the location of the site has a low value of tranquillity and therefore it is assumed that the relevant aim of Paragraph 180 does not carry any weight in the planning decision for the proposals.



5.5 In relation to the principle of the agent of change, where a new noise sensitive development needs to be mindful of existing businesses that generate noise incident at this new development, the following is noted. The previous use of the commercial space in the development was a late night drinking establishment. However, at present this unit is vacant and any proposed uses will have to comply to future planning restrictions in relation to the noise impact at the new residential premises.

- 5.6 It was noted at the site inspection that various commercial air condensers were visible around the development plus kitchen extract fans (located adjacent to Dukesbridge house). These items of plant are mostly located to the rear of shops that face on to London street/Duke Street to the Northwest. These items of plant were slightly audible inside the proposed development only when the windows were open.
- 5.7 Larger size air conditioning units were also seen on the rooftops of office accommodation location to the South across the River Kennet. These were not audible at the site.
- 5.8 Therefore, based on the observations around the site, it is believed that there are no nearby commercial premises where the Agent of Change principle would apply.
- 5.9 Since access into Dukesbridge Chambers was not provided, similar comments can not be made for this building.

6.0 ASSESSMENT OF NOISE IMPACT

Indoor Levels

- 6.1 In order to assess the site in relation to the applicable policy aims, it is important to review the internal noise levels due to incident noise ingress inside the proposed habitable rooms.
- 6.2 The composite acoustic performance required of any portion of the building envelope will depend on its location relative to the principal noise sources around the site and the nature of the spaces behind it (noise criteria, size, room finishes, etc.).
- 6.3 Due to the layout, orientation, size, location and varying noise climate around the development it can be inferred that each façade and probably each window and ventilator (if present) on a façade should have a different sound insulation performance level in order for a specific internal ambient noise level to be reached. Logistically, this could result in increased costs for the development due to bespoke solutions, effects on programme and increase of errors during construction. National policy on noise does not insist on compliance with a specific level but rather it suggests that reasonably practicable mitigation measures should be put in place in order to approach a certain target level (assuming the non-mitigated impact is predicted to lie above this target level) when this level is below the SOAEL.
- 6.4 Therefore, it is not practical to specify a large number of different external building fabric constructions and this is also not supported by national policy on noise.



- 6.5 Incident traffic noise levels around the development differ substantially by direction. Based on the results of the noise survey and as expected the facades that overlook London Road to the West will experience worst case incident daytime noise levels in the high- 50s dB and incident night time levels in the low- 50s dB.
- 6.6 The latest set of drawings for the Dukesbridge house development are dated June 2018 and the latest drawings for Dukesbridge Chambers are dated March 2019.
- 6.7 The results of the noise survey have shown that the daytime impact is the 'worst case'. The detailed calculation methodology described in BS8233:2014 will be used in the assessment as detailed in the British Standard.
- 6.8 Tables 7 and 8 below presents the input data² used to predict the resultant daytime internal noise level in typical 'worst case' rooms facing west at the lower levels of the converted office development.

Bedroom Level 1	
Room Volume (m ³)	38
Room Type	A typical bedroom (flat 1)
Room Furnishings	Curtains, bed, timber floor finish
Area of window (m ²)	2.2
Area of wall (m ²)	7.8
Effective area of ventilator (mm ²)	System 1, hit and miss ventilator
Living Room Level 1	
Room Volume (m ³)	45
Room Type	living room/dining room (overlooking River Kennet)
Room Furnishings	Sofa, small rug, blinds, timber floor finish
Area of window (m ²)	2.2
Area of wall (m ²)	6
Effective area of ventilator (mm ²)	System 1, hit and miss ventilator

Table 7: Room Information Required for the Noise Break in Assessment

² Approximate values



Bedroom Level 2	
Room Volume (m ³)	125
Room Type	A “worst” type bedroom overlooking Duke Street (flat 9)
Room Furnishings	Curtains, bed, timber floor finish
Area of window (m ²)	14
Area of wall (m ²)	0.5
Effective area of ventilator (mm ²)	System 1, hit and miss ventilator
Living Room Level 2	
Room Volume (m ³)	140
Room Type	A “worst” type living room/dining room overlooking Duke Street (flat 9)
Room Furnishings	Sofa, small rug, blinds, timber floor finish
Area of window (m ²)	14
Area of wall (m ²)	0.5
Effective area of ventilator (mm ²)	System 1, hit and miss ventilator

Table 8: Room Information Required for the Noise Break in Assessment

Impact at Most Affected Habitable Rooms

- 6.9 The input data presented in the preceding sections were used in spreadsheet models realising the calculation methodology described in BS 8233:2014 in order to calculate the internal daytime ambient noise level. The calculation showed that L_{Aeq} levels below 35 dB, at around 30 dB (and therefore below the preferred guideline level for bedrooms/living rooms in Table 4 of BS8233:2014) are achievable by the use of hit and miss ventilators and double-glazing units that offering the minimum sound insulation performance (for thermal double-glazing units). Table 9 below presents the sound reduction indices used in the calculation procedure for these elements.



External Building Fabric Element	Construction Element	Sound Reduction Indices (dB) at Octave Band Centre Frequencies (Hz)				
		125	250	500	1000	2000
Glazing configuration, glass mm/airgap mm/glass mm	4 mm glass, 16 mm airgap, 4 mm glass	24	20	25	34	37
Background ventilation system as per System 1 in Approved Document F	Hit and miss trickle ventilator	31	24	34	32	55
Non-vision wall	Thin masonry wall	24	34	40	45	49

Table 9: Elements of External Building Fabric (Utilizing System 1)

- 6.10 The assessment has demonstrated that under the worst-case scenarios suitable internal ambient noise levels can be met using typical non acoustic trickle ventilators and thermal double glazing.
- 6.11 An acoustic specification for the glazing and ventilators of the converted office accommodation is presented in Appendix 4. It should be noted that compliance with this specification is solely at the discretion of the developer and it has been based on the guidance in BS8223:2014.

Outdoor Levels

- 6.12 The proposed converted flats will not contain any balconies. However, a total of four flats located in the lower ground floor of Dukesbridge House will have access to an outdoor garden area (with openable glass roofs). The results of the noise survey at Position 4 are deemed the most representative of the likely future noise levels at these outdoor areas. The results of the survey show that typical noise levels in these amenity areas should be compliant with the LOAEL and therefore mitigation measures are deemed superfluous.

7.0 CONCLUSIONS

- 7.1 An environmental noise survey at the proposed site was undertaken in order to review the existing incident noise levels at the proposed converted residential redevelopments of Dukesbridge House and Chambers.
- 7.2 The assessment of the suitability of the proposed residential units for their intended use was undertaken in full accordance with the aims and requirements within the National Policy Statement



for England (NPSE), the National Planning Policy Framework (NPPF) and the Planning Practice Guidance (PPG). The NPPF is a material consideration for planning applications when the local plan does not align closely with its aims.

- 7.3 The assessment has demonstrated that the noise climate outside the proposed new habitable rooms will not give rise to significant adverse effects on health and quality of life (since the SOAEL will not be exceeded). The assessment has demonstrated that based on the surrounding noise climate, the provision of typical non acoustic trickle ventilator and thermal double glazing will protect future occupants from environmental noise intrusion in line with national policy on noise.



APPENDIX 1

PLANNING POLICY AND GUIDANCE DOCUMENTS



Noise Policy Statement for England 2010 (NPSE)

The NPSE defines government policy aims for noise management as follows:

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

- *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. “*

The Explanatory Note of NPSE introduces the concept of observable effect levels.

- NOEL – No Observed Effect Level ^[1]_{SEP} This is the level below which no effect can be detected. In simple terms, below this level, there is no detectable effect on health and quality of life due to the noise.
- LOAEL – Lowest Observed Adverse Effect Level ^[1]_{SEP} This is the level above which adverse effects on health and quality of life can be detected. ^[1]_{SEP}
- SOAEL – Significant Observed Adverse Effect Level ^[1]_{SEP} This is the level above which significant adverse effects on health and quality of life occur. ^[1]_{SEP}

National Planning Policy Framework 2018 (NPPF)

Following on from the NPSE, NPPF describes how noise should be considered in relation to planning applications. Section 180 of the NPPF dated July 2018 states as follows:

“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”*

* for the definition of adverse impacts reference is made here to the Explanatory Note to the NPSE 2010 i.e. the observable effect levels.



Paragraph 182 introduces the “Agent of Change” principal as follows:

“Planning policies and decisions should ensure that new development can be integrated effectively with existing businesses and community facilities..... Existing businesses and facilities should not have unreasonable restrictions placed upon 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 development has been completed”

Planning Practice Guide (PPG)

The following table from PPG identifies the increasing noise effect levels and action guidance outlined in the NPSE and NPPF:

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

The PPG also states that noise impact may be partially offset if the residents of dwellings have access to:

- a relatively quiet façade as part of their dwelling;
- a relatively quiet amenity space for their sole use (eg a garden or balcony);
- a relatively quiet amenity space for shared use;
- a relatively quiet public park or green space nearby (eg within 5 minutes).



In section 1 of the guidance, PPG also notes that although Noise can override other planning considerations neither the Noise Policy Statement for England nor the National Planning Policy Framework (which reflects the Noise Policy Statement) expects noise to be considered in isolation, separately from the economic, social and other environmental dimensions of proposed development.

Local Authority Planning Policy

The section of the Local Development Framework 2010 dealing with noise in this context (Policy SQ6) refers to the obsolete PPG25. The local planning department have been contacted and have advised that reference to WHO and BS8233:2014 would be expected in any noise impact assessment.

The local planning department have also indicated that an assessment should include analysis of the likely noise impact when windows are open for cooling purposes.

Further Guidance and British Standards

World Health Organisation 1999 and 2018 (WHO)

WHO Environmental Noise Guidelines for the European Region (2018) partially supersede the previously published Community Noise Guidelines (1999) and compliment the intervening Night Noise Guidelines (2009)

The following noise limit recommendations for health protection are in the form of average noise levels, found external at the worst affected facade:

WHO 2018 Noise Limit Recommendations		
Noise source	L_{den} dB ¹	L_{night} dB ²
Road Traffic Noise	53	45
Railway Noise	54	44
Aircraft Noise	45	40

¹ compound day, evening and night time yearly average

² night time yearly average

The WHO noise guidelines further state:

“In many situations, average noise levels like the L_{den} or L_{night} indicators may not be the best to explain a particular noise effect. Single-event noise indicators – such as the maximum sound pressure level (L_{Amax}) and its frequency distribution – are warranted in specific situations, such as in the context of night-time railway or aircraft noise events that can clearly elicit awakenings and other physiological reactions that are mostly determined by L_{Amax} . Nevertheless, the assessment of the relationship between different types of single-event noise indicators and long-term health



outcomes at the population level remains tentative. The guidelines therefore make no recommendations for single-event noise indicators.”

The following guidelines are considered to carry over from the previous WHO 1999 publication Guidelines for Community Noise:

WHO 1999 Guidelines for Community Noise				
Environment	Critical Health Effect	$L_{Aeq,T}$ dB	L_{Amax} dB	Time base
Outdoor living area (noise from sources other than road traffic, railways, aircraft or wind turbines)	Serious annoyance, daytime and evening	55	-	16 hours 07:00-23:00
	Moderate annoyance, daytime and evening	50	-	16 hours 07:00-23:00
Dwellings indoors	Speech intelligibility and moderate annoyance, daytime and evening	35	-	16 hours 07:00-23:00
	Sleep disturbance, night time	30	45	8 hours 23:00-07:00

BS8233:2014

The guidance set out in BS8233:2014 is closely aligned with WHO and specifically provides guideline limits for noise within internal living spaces and external amenity areas.

Table 4 from BS8233:2014 gives the following internal guideline values:

BS8233:2014 internal guideline levels			
Activity	Location	07:00-23:00	23:00-07:00
Resting	Living Room	35 dB $L_{Aeq, 16hr}$	
Dining	Dining room/area	40 dB $L_{Aeq, 16hr}$	
Sleeping (daytime resting)	Bedroom	35 dB $L_{Aeq, 16hr}$	30 dB $L_{Aeq, 8hr}$

In certain circumstances a 5 dB relaxation of the limits shown in the table above is considered reasonable in BS8233:2014 note 7:

“Where development is considered necessary or desirable, despite external noise levels above WHO guidelines, the internal target levels may be relaxed by up to 5 dB and reasonable internal conditions still achieved.”

In BS8233 design limits for noise affecting external amenity areas is given as 50 dB $L_{Aeq,T}$ with an upper guideline of 55 dB $L_{Aeq,T}$. It is further noted that in areas where achieving these levels is deemed to be not realistically feasible (e.g. city centres or urban areas adjoining a strategic transportation network) developments should be designed to achieve the lowest practicable levels in these amenity areas.

In Section 7.7.3.2 of BS8233:2014, Design Criteria for External Use, it is noted that in developments such as flats and apartment blocks “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”



The Noise Insulation Regulations 1975

The Noise Insulation Regulations 1975 define the conditions under which habitable rooms are eligible for noise insulation to control internal noise levels. The conditions relate to the level of traffic noise at the façade, the increase in noise levels as a result of the highway and the contribution of the new or altered scheme to the noise level received at the façade. Noise insulation qualification criteria must abide by a few tests that include the following two:

- The facade noise threshold of 68dB $L_{A10,18h}$ is met or exceeded;
- That there must be a noise increase of at least 1dB compared to the prevailing noise level immediately before the construction of a highway or an additional carriageway were begun.

Ventilation Requirements for Habitable Rooms

Background Ventilation

Three types of ventilation are required under Part F. Whole building ventilation provides nominally continuous air exchange that may be reduced or ceased when the building is not occupied. It can be provided via background ventilators operating alone, or together with:

- passive stack ventilators;
- continuous mechanical extract; or
- continuous mechanical supply and extract with heat recovery.

Extract ventilation is applicable to rooms where most water vapour and/or pollutants are released (e.g. kitchens and bathrooms). It can be provided by intermittent fans, passive stack or continuous mechanical extract with or without mechanical supply and heat recovery.

The four systems described in Part F do not present solutions that utilise the use of opening windows for background ventilation. Opening windows do not provide a controllable means of ventilation and also pose security risks. Therefore, it is not possible to offer to the market a residential dwelling that utilises opening³ windows for background ventilation.

Purge Ventilation

Purge ventilation is required throughout the building to aid the removal of high concentrations of pollutants and water vapour. It is commonly provided simply by opening windows and doors. Even though purge ventilation is recommended via opening windows, the temporary and intermittent occurrence of this does not normally result in an unacceptable increase of internal noise levels. Part F goes on to say⁴ that "*Purge*

³ Meaning without any restrictions on opening size

⁴ Paragraph 4.15 in Approved Document F



ventilation provisions may also be used to improve thermal comfort, although this is not controlled under the Building Regulations."

Summary in Relation to Ventilation

In summary, background ventilation for new residential dwellings should be provided via one of the four systems in Approved Document F. The composite external building fabric should be designed to ensure that appropriate internal noise levels due to external incident noise are met during background ventilation. This can be secured via a planning condition if deemed necessary.

Purge ventilation for residential dwellings should be provided via open windows. The slight increase of internal noise levels should be considered acceptable.



APPENDIX 2

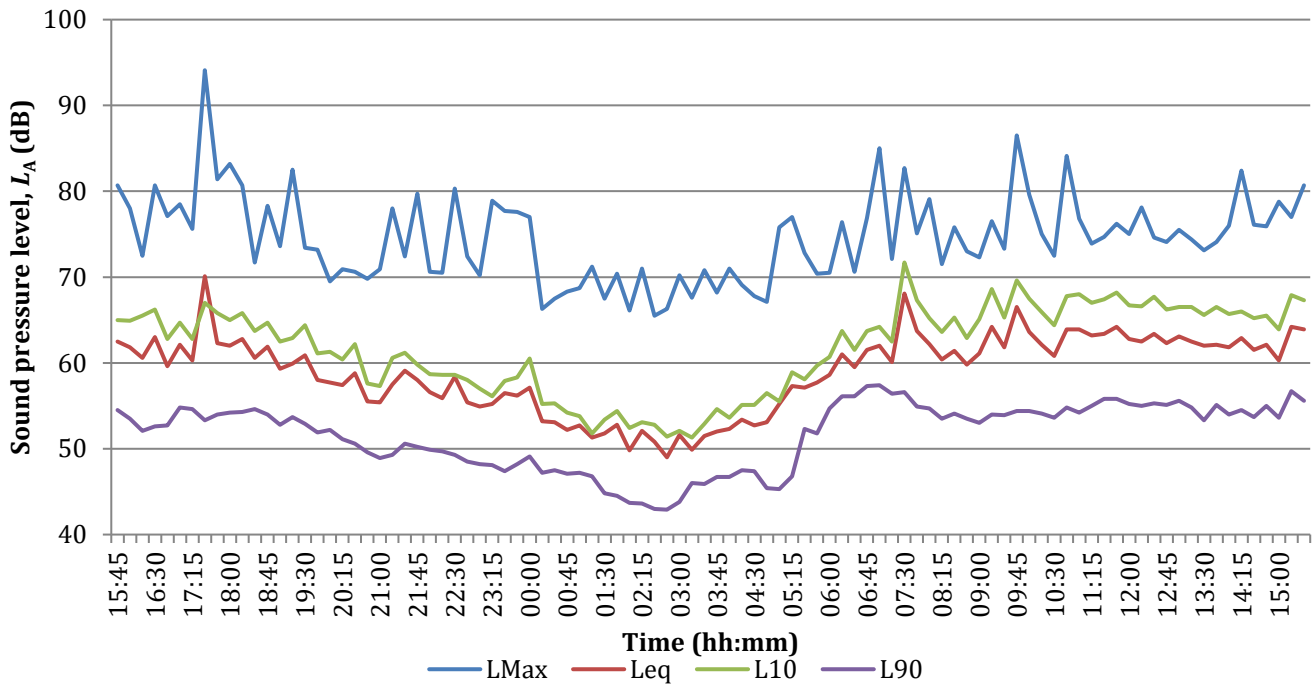
RESULTS OF NOISE SURVEY



Dukesbridge House, Reading

Environmental Noise Survey At Position 1

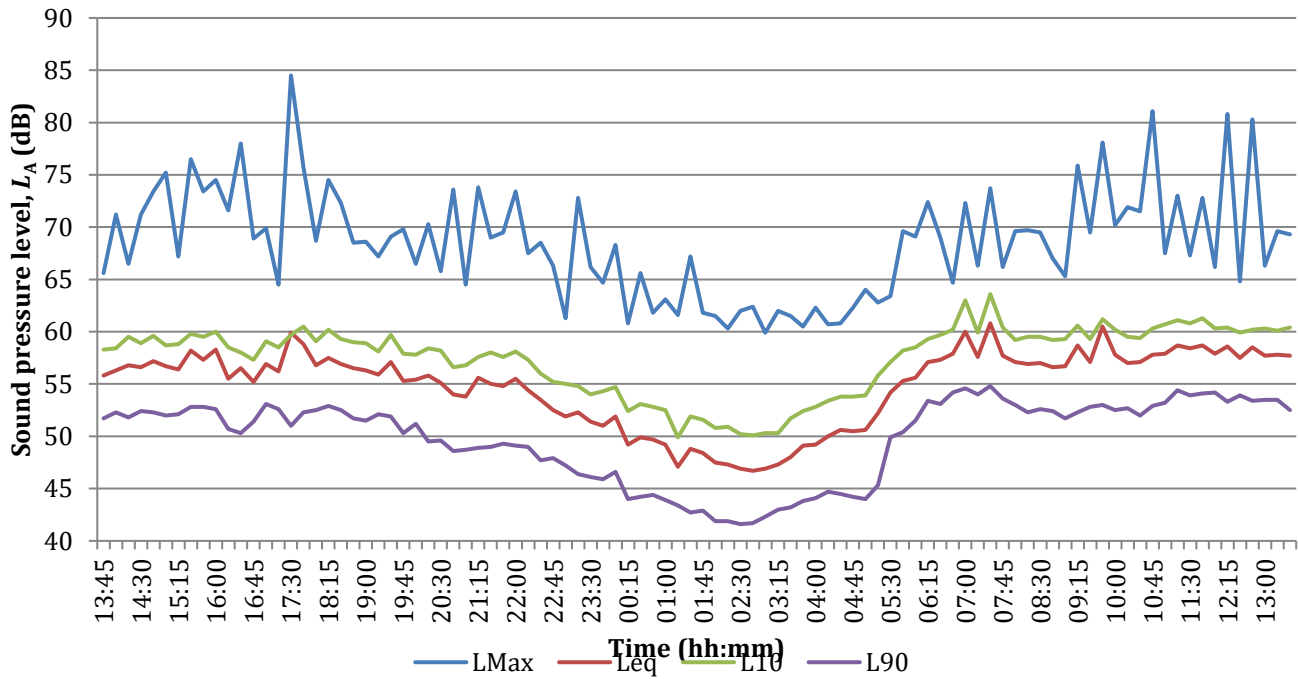
Monday 1 April to Tuesday 2 April 2019



Dukesbridge House, Reading

Environmental Noise Survey At Position 2

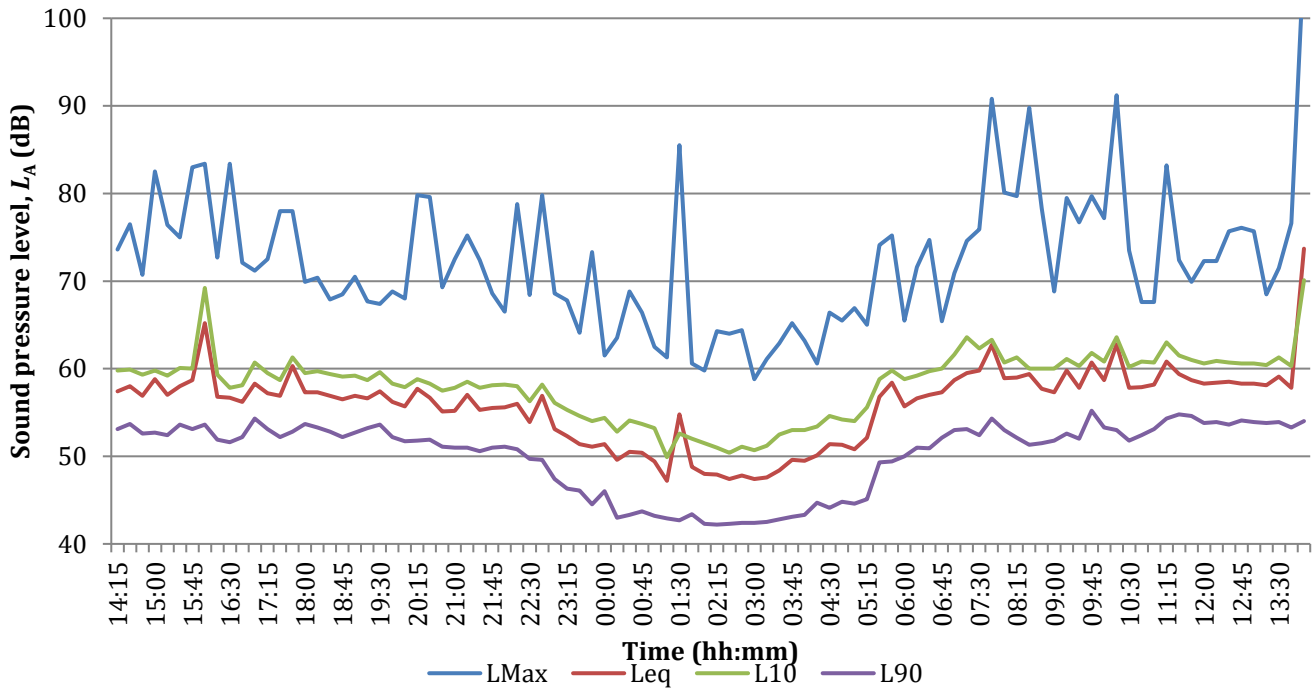
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Dukesbridge House, Reading

Environmental Noise Survey At Position 3

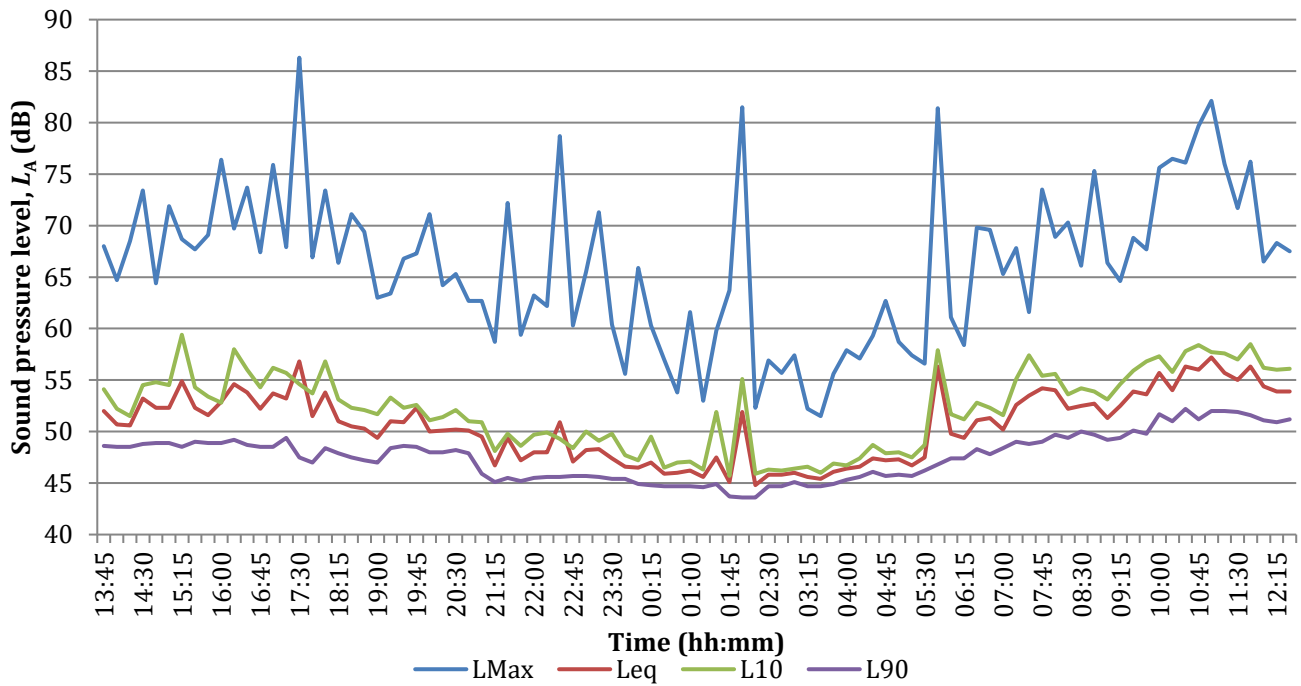
Monday 1 April to Tuesday 2 April 2019



Dukesbridge House, Reading

Environmental Noise Survey At Position 4

Monday 1 April to Tuesday 2 April 2019



APPENDIX 3

GLOSSARY



GLOSSARY OF TERMS

Decibels

It is convenient when quantities have a large range to express them in decibel units. The decibel (dB) is a relative unit, showing how much larger or smaller the quantity is relative to a reference value, which is defined as zero on the decibel scale. Decibels are intended to make a large range more readily comprehensible.

A quantity expressed in decibels is commonly called a 'level'.

Many quantities in acoustics are expressed in decibels (see below).

Frequency Weightings

Sounds that would be measured as equal by a sound measuring instrument may not sound equally loud to a human listener, depending on their character, particularly the frequency content (pitch).

Various 'frequency weightings' have been developed that can be used to modify the measured sound in order to produce a value that more closely corresponds to perceived loudness.

One such frequency weighting, the 'A' weighting, has become almost universally used in assessing the effect of prolonged exposure to noise on human health, and features in most Regulations, guidelines and Standards in this area.

A different frequency weighting, the 'C' weighting, has in a similar way become standardised for the measurement and assessment of short-duration sounds for their effect on human health. The 'C' weighting is also used in some methods for assessing the performance of hearing protection.

A sound that has been measured with the 'A' weighting applied is commonly referred to as 'A-weighted'. Similarly, one will see 'C-weighted' where the 'C' weighting has been applied.

Note that sometimes a sound pressure level that has been measured with the 'A-weighting' or 'C-weighting' applied can be found expressed in units of 'dB(A)' or 'dB(C)'. This nomenclature is no longer standard practice.



Quantities and Symbols

Parameter	Description
Ambient Noise Level	The totally encompassing sound in a given situation at a given time, usually composed of a sound from many sources both distant and near ($L_{Aeq,T}$).
Decibel (dB)	A scale for comparing the ratios of two quantities, including sound pressure and sound power. The difference in level between two sounds s_1 and s_2 is given by $20 \log_{10} (s_1/s_2)$. 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 $20 \mu\text{Pa}$. The threshold of normal hearing is in the region of 0 dB and 140 dB is the threshold of pain. A change of 1 dB is only perceptible under controlled conditions.
dB(A), L_{Ax}	Decibels measured on a sound level meter incorporating a frequency weighting (A weighting) that differentiates between sounds of different frequency (pitch) in a similar way to the human ear. Measurements in dB(A) broadly agree with people's assessment of loudness. A change of 3 dB(A) is the minimum perceptible under normal conditions, and a change of 10 dB(A) corresponds roughly to halving or doubling the loudness of a sound. The background noise in a living room may be about 30 dB(A); normal conversation about 60 dB(A) at 1 metre; heavy road traffic about 80 dB(A) at 10 metres; the level near a pneumatic drill about 100 dB(A).
Fast Time Weighting	Setting on sound level meter, denoted by a subscript F, that determines the speed at which the instrument responds to changes in the amplitude of any measured signal. The fast time weighting can lead to higher values than the slow time weighting when rapidly changing signals are measured. The average time constant for the fast response setting is 0.125 (1/8) seconds.
Free-field	Sound pressure level measured outside, far away from reflecting surfaces (except the ground), usually taken to mean at least 3.5 metres
Façade	Sound pressure level measured at a distance of 1 metre in front of a large sound reflecting object such as a building façade.
$L_{Aeq,T}$	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 recorded during a noise event with a 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.
$L_{10,T}$	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. $LA_{10,18h}$ is the A –weighted arithmetic average of the 18 hourly $L_{A10,1h}$ values from 06:00-24:00.



APPENDIX 4

ACOUSTIC SPECIFICATIONS



DUKESBRIDGE HOUSE, READING
ACOUSTIC SPECIFICATION
FOR WINDOWS TO CONVERTED RESIDENTIAL FACADES

SOUND REDUCTION PERFORMANCE

The complete window configurations shall achieve the following minimum sound reduction indices when tested in accordance with BS EN ISO 10140-2:2010.

Façade	Minimum Sound Reduction Index (dB) @ Octave Band Centre Frequency (Hz)					
	125	250	500	1k	2k	4k
All	24	20	25	34	37	24

TEST DATA

Fully detailed test reports from independent acoustic test authorities shall be supplied. All test reports shall be in English or, a full English translation.

Test data should include the 1/3 octave band results from 100Hz to 3150Hz inclusive, together with the corresponding octave band results from 125Hz to 4000Hz inclusive.

The test report shall be provided for test samples which are representative of the complete glazing configuration - including frames, joints, seals, spandrel panels and opening lights and trickle vents (as appropriate).



DUKESBRIDGE HOUSE, READING**ACOUSTIC SPECIFICATION
FOR TRICKLE VENTILATORS TO CONVERTED RESIDENTIAL FACADES**

SOUND INSULATION: Ventilators shall be tested in accordance with BS EN ISO 10140-2:2010. This will involve testing in 1/3 octaves from at least 100Hz to 2500Hz inclusive. These results, together with suitably converted octave band results from 125Hz to 2000Hz shall be provided for a ventilator unit which is representative of the proposed ventilator for the relevant façade.

The following element normalised level differences shall be achieved as a minimum:

	Dn,e Values (dB) Open Areas Corrected to 2500mm ² at Octave Band Centre Frequency (Hz)				
Façade	125	250	500	1k	2k
All	31	24	34	32	55

