

Finch Consulting Report.

**Environmental Noise and Impact Assessment at 43
and 43a London Street, Reading.**

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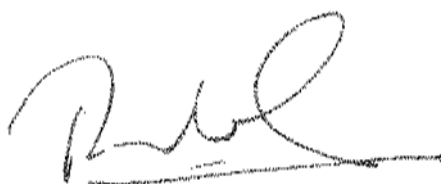
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1.0 INTRODUCTION

- 1.1 It is currently proposed to convert and extend 43 London Street in Reading to provide 3 residential units including an additional storey and a setback floor, and to redevelop 43A London Street in Reading to provide 6 residential units, together with communal cycle and bin stores, in a 3-4 storey building. It is also proposed to construct a new building at the rear of the site to provide 12 residential units in a 3-5 storey building and a landscaped square with accessible parking bays. The new development will comprise a total of 21 residential units (4 x studio, 5 x 1 bed, 9 x 2 bed & 3 x 3 bed).
- 1.2 Finch Consulting has been appointed to review the incident noise impacts to the development site in relation to national and local planning policy.
- 1.3 This report presents the results of an environmental noise survey and noise impact assessment into the proposed residential accommodation.
- 1.4 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 No 43 London Street is a double storey building that is terraced between two storey premises. No 43A at the rear is of a similar height but only adjoins a neighbouring property to the south. An open car park is located to the rear of the development site.
- 2.2 The location of 43 and 43A London Street in Reading including the area of the existing car park comprising the proposed site is shown in Figure 1 below.





Figure 1: 43 and 43a London Street Location Map

2.3 Figure 2 below shows the proposed first floor arrangement of the development.

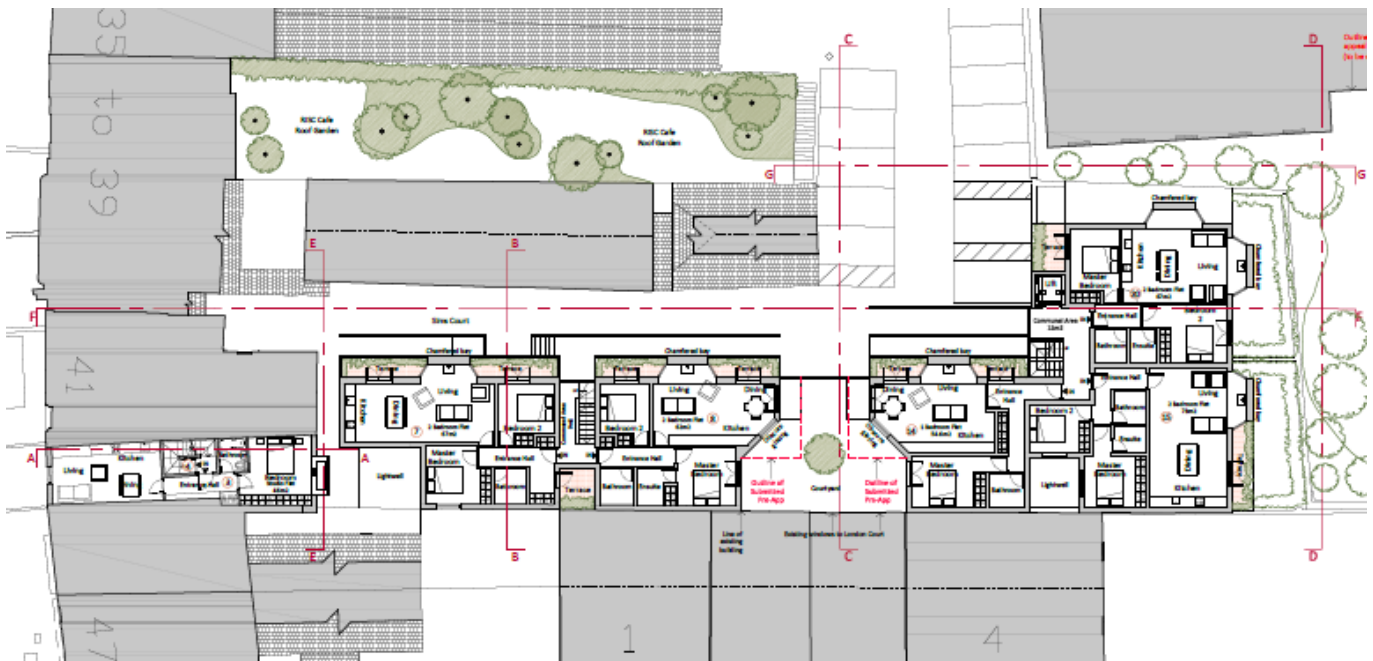


Figure 2 below shows the proposed first floor arrangement of the development.



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 2018/2019, 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.

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 revised 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 180 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.

Pre App NPPF Compliance

- 3.20 Reading Council has provided a response in relation to noise for this site in its pre application advice letter (without prejudice) dated 8 May 2019. The Environmental Health department of the Council made the following points:

“A Noise Assessment will be required to support this application for new residential uses proposed in this dense urban area. Any 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 will need to clearly identify any mitigation measures that are necessary to ensure that the recommended standard is met. Where appropriate, the 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. Noise levels above 45dB are linked with sleep disturbance.

The noise assessment will need to identify the external noise levels impacting on the proposed site. One particular source of noise (in addition to more measurable sources like traffic), is RISC, a popular café/bar next door to the site which frequently runs community events and is an active entity in Reading’s cultural and environmental scene. It is recognised that there is a distinct need to ensure that future occupiers are able to suitably co-exist with this venue, and this future proposal for residential development must not require/imply the imposition of overly restrictive restrictions on this venue.

Your attention is drawn to the ‘Agent of change’ principle which has been referred to as a means of protecting such venues from closure. Local authorities have traditionally been required to act upon complaints from residents in new developments over noise levels from established music venues in the vicinity. This has been cited as a major factor in venues closing in large numbers in recent years along with the ‘office to residential’ prior approval process.

The ‘Agent of change’ principle is triggered automatically when a new planning application is made. It holds that the person or business responsible for the change must also be responsible for managing the impact of the change. This would mean that a developer of a new residential building near an existing music venue would be required to include appropriate noise attenuation



measures to manage the noise currently generated from that venue. This is different from current position which holds that whoever is reported as making a nuisance is always responsible for that nuisance. This position is held irrespective of how long the 'nuisance' has existed, historic instances of the same noise being a nuisance, or whether someone has moved into the vicinity of the noise in full knowledge of it. 15

In addition to the responsibility of making prospective occupiers aware of the current relationship to this nearby venue, any such noise mitigation is required to manage the impacts arising from this venue on the occupiers. Such mitigation is likely to focus on the weak point in the structure; glazing, in those windows closest and that elevation nearest the venue. Given that the acoustic integrity would be compromised should the windows be opened, ventilation details must also be provided where such 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.

To minimise the disturbance by noise of future residential occupiers of the flats and its effect on neighbouring residents within the building, the residential accommodation must be designed and constructed or converted so as to achieve the insulation requirements set out in Building Regulations Approved Document E.”

- 3.21 The Council has correctly identified the new requirement in the NPPF in relation to the Agent of Change principle. However, the Council failed to provide advice in relation to the other aims of the NPPF in relation to noise. The council has not provided any relevant supportive evidence in relation to the 45 dB L_{Amax} night-time criterion. In addition, it is unknown whether a risk of overheating assessment report has been produced for this site in order to examine the possibility of occupants requiring to open windows for comfort cooling. It is noted that this advice by the Council is given on a 'without prejudice' basis.

4.0 MEASUREMENT OF NOISE

Details of Environmental Sound Survey

- 4.1 Three sound level meters were installed on site from Wednesday 22 May to Thursday 23 May 2019.



- 4.2 The sound level meters were programmed to record the A-weighted Leq, L90, L10 and Lmax noise indices and corresponding octave band frequency¹ information (for Leq) for fifteen-minute sample periods.

Measurement Positions

- 4.3 The measurements of incident sound pressure levels were undertaken at three locations. The approximate locations of the microphones are indicated in Figure 4 below. At Position 1, the microphone was placed on a pole and extended outside a first-floor window overlooking London Street to the west. The microphone at Position 2 was placed against railings of the upper ground floor windows to the rear of the building at No 43. It was located around 5-10 metres from overlooking plant, comprising two outdoor condenser units and ventilation ductwork. The microphone at position 3 was placed on a pole that was extended out of a first-floor window to the rear of No 43A and was overlooking the open rear car park.
- 4.4 The measurement positions were not in free field conditions and therefore future assessments of indoor noise levels should include a 3 dB reduction of the recorded noise levels.

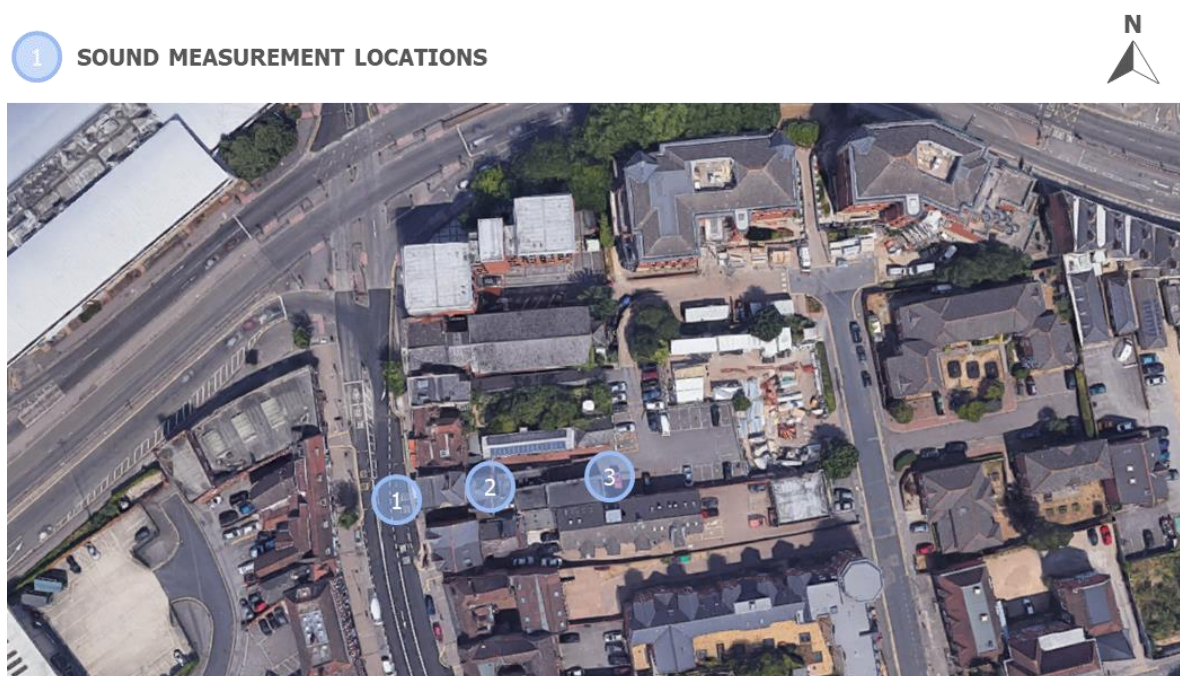


Figure 3: On Site Sound Pressure Level Measurement Positions

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

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 140/5947	01/03/2018	27908
	Condenser microphone	Norsonic 1125/355507		
	Preamplifier	Norsonic 1209/15793		
	Calibrator	B & K 4231/1839133	08/11/2018	430034
2	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
3	Class 1 Sound level meter	Norsonic SLM 140/1403413	29/01/19	30778
	Condenser microphone	Norsonic 40AF/207390		
	Preamplifier	Norsonic 1209/12821		
	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
22/05/2019 – 23/05/2019	Temperature (°C)	22	23
	Precipitation:	0	0
	Cloud cover (oktas - see guide)	3	2
	Presence of fog/snow/ice	Nil	Nil
	Presence of damp roads/wet ground	Nil	Slightly damp
	Wind Speed (m/s)	<2.6	<1.5
	Wind Direction	West	West



Cloud Cover		Conditions that may cause temperature inversion (i.e. calm nights with no cloud)	No	No
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			

Table 2: Weather Conditions

Results

- 4.7 At the beginning and end of the survey, there was construction noise present from a site to the east which included piling. Noise readings at Positions 2 and 3 would have been more influenced by this noise compared to Position 1. The microphone at Position 2 was overlooking outdoor building services to the south however these were inaudible at the position (and perhaps these were non operational).

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)	65-74	72-102	69-74	55-64
	Night-time (23.00 – 07.00 hours)	57-67	72-87	59-71	50-56
2	Daytime (07.00 – 23.00 hours)	47-69	56-86	49-73	43-58
	Night-time (23.00 – 07.00 hours)	41-61	50-89	44-52	38-48
3	Daytime (07.00 – 23.00 hours)	51-78	64-102	53-83	45-67
	Night-time (23.00 – 07.00 hours)	44-59	55-78	47-61	39-58

Table 3: Summary of Survey Results



- 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	Sound pressure levels (dB)	Sound pressure levels (dB)
	L_{Aeq} (16 hours)	L_{Aeq} (8 hours)
1	69	62
2	60	49
3	69	52

Table 4: Daytime and Night-Time Equivalent 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 survey²).

Position /Period	Incident sound pressure levels (dB) at Octave Band Centre Frequencies (Hz)								A-weighted level (dB)
	63	125	250	500	1000	2000	4000	8000	
1/Daytime	76	68	67	65	65	62	59	54	69
1/Night-time	69	61	60	58	58	55	52	47	62
2/Daytime	64	59	58	56	58	49	41	30	60
2/Night-time	54	50	49	44	42	40	41	33	49
3/Daytime	73	66	63	64	67	59	54	47	69
3/Night-time	60	61	51	46	45	44	36	27	52

Table 5: 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

² Apart from position 1. In this position five measurement were made in octave bands using the meter used later at position 3 and the results of the single figure survey adjusted based on the average octave band spectrum of these five readings.



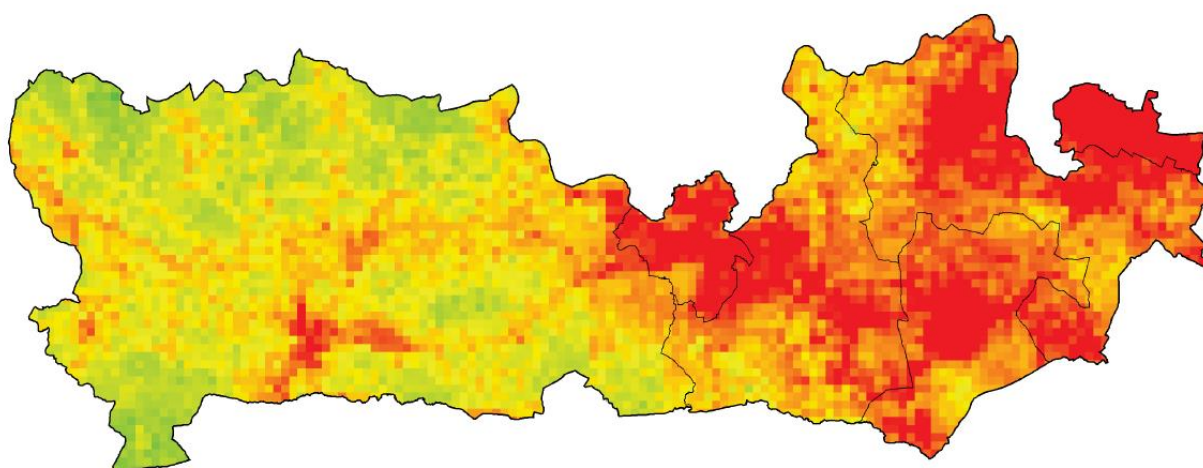
$L_{Aeq,16h}$. Therefore, the difference between the LOAEL and SOAEL for transportation noise in the Secretary of State's approved environmental statement for HS2 is 15 dB.

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.

Berkshire



- 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. Various businesses are located around the proposed development. As noted, building services plant on neighbouring premises were visible to the south of the development near measurement position 2. The Council in its response has highlighted the presence of the *RISC* café bar to the north of the development. RISC stands for Reading International Solidarity centre. According to its website it is a Development Education Centre that works with schools and community groups to raise the profile of global issues and promote action for sustainability, human rights and social justice. Its website also states that the café “*frequently hosts live music and events*”. A picture on its website shows a performer with an acoustic guitar and a microphone. The events page on its website does not currently³ list any live music events.

- 5.6 The proposed development will overlook the roof top of the RISC café/bar. This rooftop has been turned into a garden and therefore it is fair to assume that noisy roof top plant is not present.

The bar/café adjoins a hotel/pub to the north called Relax Innz, Great Expectations. The Council has not mentioned in its letter any noise complaints from patrons of this hotel towards activities in the RISC café/bar.

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.

³ Website accessed on 6 March 2019.



- 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 the facade that overlooks London Street to the West will experience worst case incident noise levels. However, the results of the noise survey showed similar noise levels (at least on a single figure average) during the daytime when the night-time figures are 10 dB different. This similarity in noise levels may be due to the presence of construction noise from a nearby site. In the absence of construction noise, incident daytime noise levels at the rear of the site should be similar to the ones at position 2. Therefore, based on the results of the survey and the above analysis, worst case incident noise levels would be in the high 60s dB during the daytime (position 1), and at the rear of the site in the 60s dB over the daytime and around 50 dB during the night-time.
- 6.6 The current proposals do not include any bedrooms that overlook London Street to the West. Therefore, in relation to habitable rooms alongside the western elevation of the site, it is the daytime levels that are of concern. Even though bedrooms are situated to the rear of the site, the large difference between daytime and night-time recorded levels means that again it is the daytime levels that are of importance or rather represent the worst-case noise impact.
- 6.7 The detailed calculation methodology described in BS8233:2014 will be used in the assessment as detailed in the British Standard.
- 6.8 Table 7 below presents the input data⁴ used to predict the resultant daytime internal noise level in a typical 'worst case' living room facing west at the upper ground floor level of the refurbished and extended building at No 43 and a bedroom facing the plant to the South of the development.

⁴ Approximate values



Living Room Upper Ground Floor	
Room Volume (m ³)	65
Room Type	Living room
Room Furnishings	Sofa, small rug, blinds, timber floor finish
Area of window (m ²)	2.2
Area of wall (m ²)	6.5
Effective area of ventilator (mm ²)	8000
Bedroom Upper ground floor	
Room Volume (m ³)	40
Room Type	Bedroom
Room Furnishings	Curtains, bed, timber floor finish
Area of window (m ²)	3.2
Area of wall (m ²)	5.8
Effective area of ventilator (mm ²)	8000

Table 7: 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 31 dB for the living room and around 25 dB for the bedroom (and therefore below the preferred guideline level for bedrooms/living rooms in Table 4 of BS8233:2014), are achievable by the use acoustic trickle ventilators and uprated glazing configurations. Table 8 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	10 mm glass, 16 mm airgap, 6 mm glass	26	27	34	40	38
Background ventilation system as per System 1 in Approved Document F	Acoustic trickle ventilator	27	30	35	34	46
Non-vision wall	Thick masonry wall	41	45	45	54	58

Table 8: 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 conventional products albeit ones that provide higher sound insulation than the minimum admissible to satisfy the Building Regulations.
- 6.11 It is understood that the proposed LOAEL and SOAEL are related to environmental sound and this may exclude noise from building services. It is noted that the predicted impact inside the worst case bedroom is around 10 dB lower than the proposed LOAEL. Guidance in BS4142 (see relevant entry in Appendix 1) may be used to adjust the proposed LOAEL to take into consideration the effects of plant noise. The magnitude of the impact from nearby plant is unknown, since this was not operational during the survey. The intermittent use of the plant may also be taken into consideration in the proposed assessment criterion. An alternative to an acoustically enhanced external building fabric (which may only be required for a small number of habitable rooms) may be to install noise control measures to the nearby plant (at the expense of the developer in order to take into consideration the Agent of Change principle in the NPPF). However, at this stage, as a possible worst-case scenario, the nearby plant noise impact (in conjunction with the environmental noise impact) may lie between the LOAEL and the SOAEL and therefore conditional planning approval is in order.
- 6.12 It should be noted that the facades of habitable rooms that experience lower incident noise levels (dominated by environmental, or plant noise or a combination of the two) may comply with the proposed LOAEL using elements that offer the minimum sound reduction performance that offers compliance with the Building Regulations. However, this is a review that ought to be undertaken at the detailed design stage following the planning stage.
- 6.13 The Council's response includes a mention of a night-time 45 dB L_{Amax} limit. This is a historic criterion, that was included in the WHO Community Noise Guidelines of 1999, but not included in



the most recent (2018) WHO Guidelines (see Appendix 1). According to the 2018 Guidelines, the assessment of the relationship between single-event noise indicators and long-term health outcomes remains tentative. The 2018 guidelines therefore make no recommendations for single-event noise indicators. There is no current guidance to use in order to quantitatively assess the impact of road/plant noise in relation to L_{Amax} noise levels during the daytime in accordance with national policy on noise. There are no bedrooms overlooking London Street (Position 1) and the highest recorded level at Positions 2 and 3 was 89 dB L_{Amax} . However, this was a single event which does not represent the typical night-time L_{Amax} noise impact. Most recorded night-time L_{Amax} levels are around 50-75 dB and the currently proposed external building fabric will, on the basis of the calculations described at paragraph 6.9, comfortably reduce these incident noise levels to 45 dB and lower within habitable rooms. Therefore, incident L_{Amax} noise levels in bedrooms during the night-time are not deemed to pose a constraint to the site based on the results of the noise survey.

Outdoor Levels

- 6.14 Some of the proposed apartments will have access to outdoor areas. The highest recorded noise levels were recorded to the west of the site overlooking London Street. The proposed residential premises at the converted No 43 building overlooking London Street will contain a small terrace overlooking London Street to the west at Second Floor level. Incident road traffic noise levels at this terrace may exceed the proposed SOAEL. However, when considering the advice given in Section 7.7.3.2 of BS8233:2014, Design Criteria for External Use, where 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"*, this terrace may be considered acceptable in relation to planning.
- 6.15 All other private outdoor areas around the development do not overlook London Street and incident noise levels therein will not exceed the proposed SOAEL. Incident noise levels will most probably hover around the proposed LOAEL and may typically be a few dB higher than this. A further reduction in outdoor noise levels at private amenity spaces is not deemed appropriate and therefore the current proposals should be deemed acceptable.

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 residential development of 43 and 43A London Street in Reading.



- 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 based on the surrounding noise climate, the provision of conventional external building fabric elements (albeit with a higher sound reduction performance compared to the minimum required to satisfy the Building Regulations) will satisfy the aims of national policy on noise and there is no evidence to show that the site cannot comply with the provisions of the local plan.
- 7.4 The assessment has demonstrated that the noise climate at private amenity areas at the vast majority of the site will not give rise to significant adverse effects on health and quality of life (since the SOAEL will not be exceeded). The slight exceedance of the proposed SOAEL at amenity areas overlooking London Street may be justified based on the reasoning in BS8233:2014.



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 ^[L]_[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 ^[L]_[SEP] This is the level above which adverse effects on health and quality of life can be detected. ^[L]_[SEP]
- SOAEL – Significant Observed Adverse Effect Level ^[L]_[SEP] This is the level above which significant adverse effects on health and quality of life occur. ^[L]_[SEP]

National Planning Policy Framework 2019 (NPPF)

Following on from the NPSE, NPPF describes how noise should be considered in relation to planning applications. Section 180 of the NPPF dated February 2019 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
Noticeable 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
Noticeable 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 (UOAEL)	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 complement 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.

BS4142:2014

British Standard (BS) 4142: 2014 describes a method for rating and assessing sound of an industrial or commercial nature, which includes:

- Sound from industrial and manufacturing processes;
- Sound from fixed installations which comprise mechanical and electrical plant and equipment;
- Sound from the loading and unloading of goods and materials at industrial and/or commercial premises; and
- Sound from mobile plant and vehicles that is an intrinsic part of the overall sound emanating from premises or processes, such as that from forklift trucks, or that from train or ship movements on or around an industrial and/or commercial site.

The industrial or commercial sound is assessed outside a dwelling or premises used for residential purposes, upon which sound is incident.

The procedure contained in BS4142 is to quantify the “specific sound level”, which is the measured or predicted level of sound from the source in question over a one-hour period for the daytime and a 15-minute period for the night-time. Daytime is defined in the standard as 07:00 to 23:00 hours, and night-time as 23:00 to 07:00 hours.

The specific sound level is converted to a rating level by adding penalties on a sliding scale to account for either potentially tonal or impulsive elements. The standard sets out objective methods for determining the presence of tones or impulsive elements, but notes that it is acceptable to subjectively determine these effects.

The penalty for tonal elements is between 0 dB and 6 dB, and the standard notes: “Subjectively, this can be converted to a penalty of 2 dB for a tone which is just perceptible at the noise receptor, 4 dB where it is clearly perceptible, and 6 dB where it is highly perceptible.”



The penalty for impulsive elements is between 0 dB and 9 dB, and the standard notes: “Subjectively, this can be converted to a penalty of 3 dB for impulsivity which is just perceptible at the noise receptor, 6 dB where it is clearly perceptible, and 9 dB where it is highly perceptible.”

The background sound level should be established in terms of the L_{A90} noise index. The standard states that the background sound level should be measured over a period of sufficient length to obtain a representative value. This should not normally be less than 15-minute intervals. The standard states that: *“A representative level ought to account for the range of background sound levels and ought not automatically to be assumed to be either the minimum or modal value.”*

The assessment outcome results from a comparison of the rating level with the background sound level. The standard states:

- Typically, the greater this difference, the greater the magnitude of the impact.
- A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context.
- A difference of around +5 dB is likely to be an indication of an adverse impact, depending on the context.
- The lower the rating level is relative to the measured background sound level, the less likely it is that the specific sound source will have an adverse impact or a significant adverse impact. Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending on the context.

Adverse impacts include, but are not limited to, annoyance and sleep disturbance. Not all adverse impacts will lead to complaints and not every complaint is proof of an adverse impact.”

The standard goes on to note that: “Where background sound levels and rating levels are low, absolute levels might be as, or more, relevant than the margin by which the rating level exceeds the background. This is especially true at night.”

In addition to the margin by which the Rating Level of the specific sound source exceeds the Background Sound Level, the 2014 edition places emphasis upon an appreciation of the context, as follows:

“An effective assessment cannot be conducted without an understanding of the reason(s) for the assessment and the context in which the sound occurs/will occur. When making assessments and arriving at decisions, therefore, it is essential to place the sound in context.”

BS4142 requires uncertainties in the assessment to be considered, and where the uncertainty is likely to affect the outcome of the assessment, steps should be taken to reduce the uncertainty.

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 opening⁵ 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 say⁶ that "*Purge 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.

⁵ Meaning without any restrictions on opening size

⁶ Paragraph 4.15 in Approved Document F

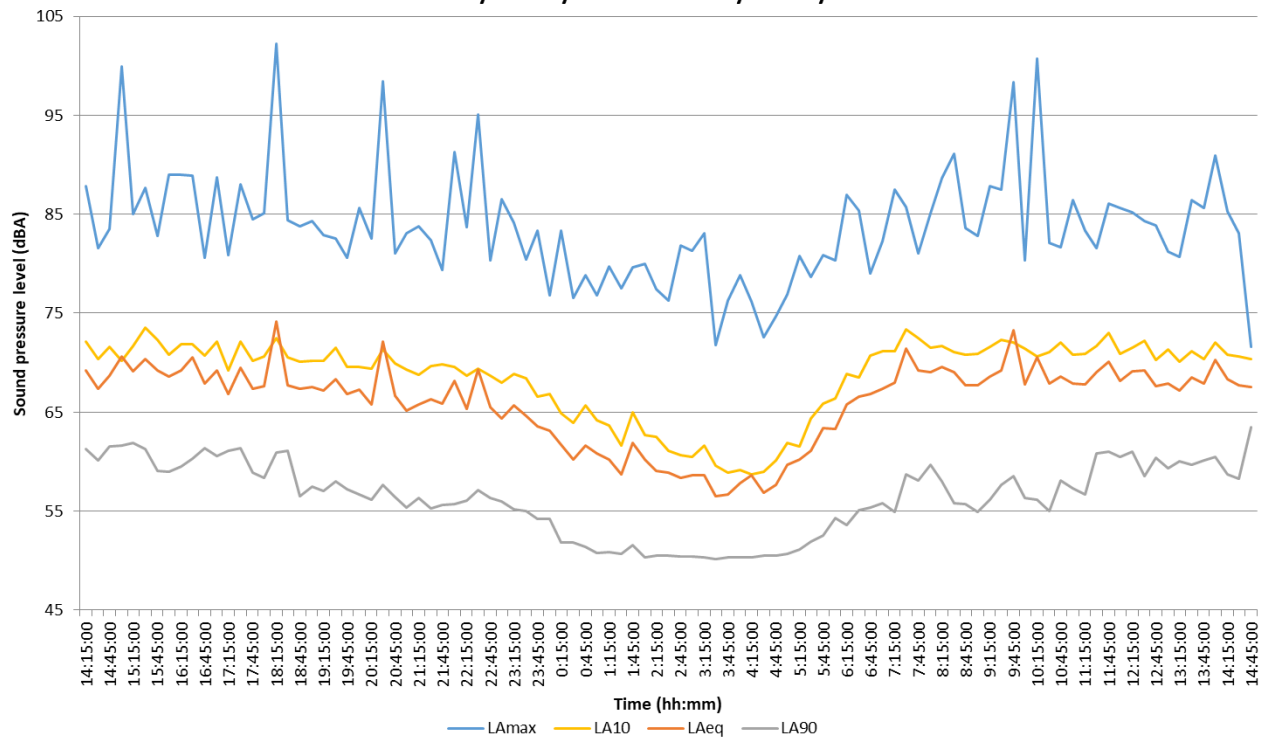


APPENDIX 2

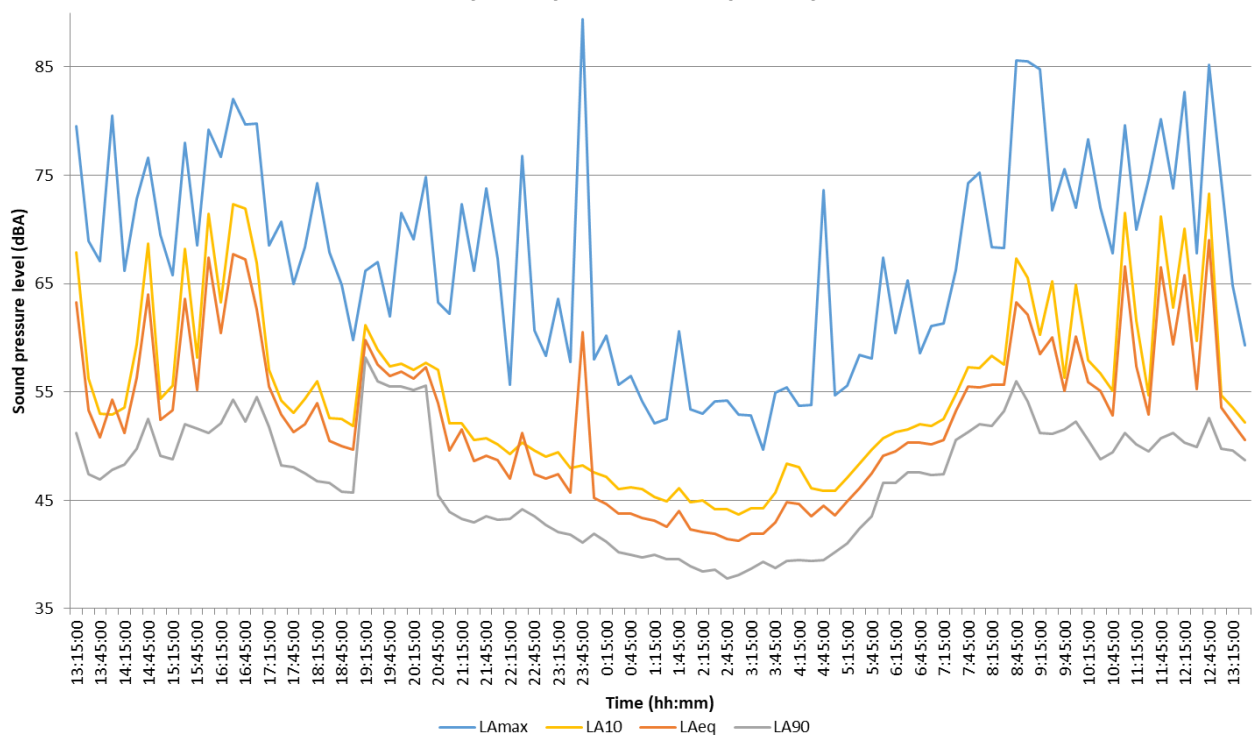
RESULTS OF NOISE SURVEY



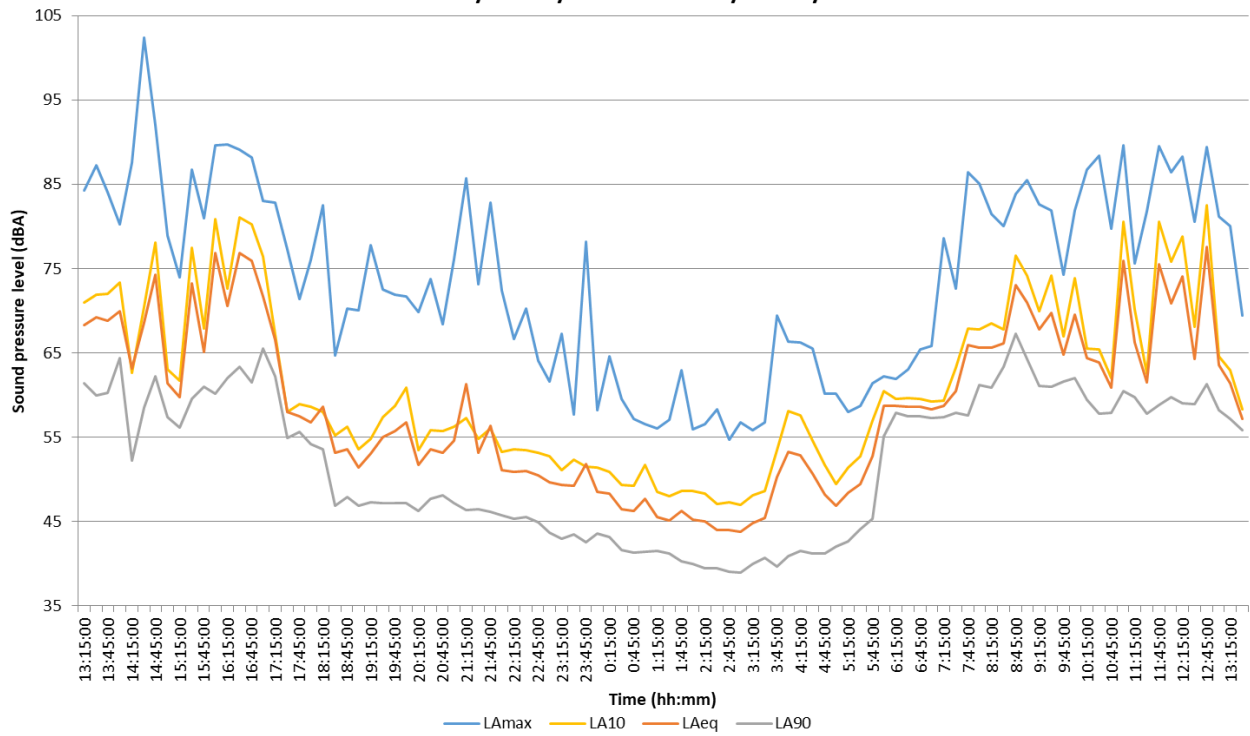
43 and 43a London Street
Environmental Noise Survey at Position 1
Wednesday 22 May 2019 - Thursday 23 May 2019



43 and 43a London Street
Environmental Noise Survey at Position 2
Wednesday 22 May 2019 - Thursday 23 May 2019



43 and 43a London Street
Environmental Noise Survey at Position 3
Wednesday 22 May 2019 - Thursday 23 May 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.

