



Huyton Cricket Club, Liverpool L36:

Noise Assessment

Breck Homes

18 June 2025

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EXECUTIVE SUMMARY

The results of a noise measurement survey and desk-based assessment of noise are presented, with respect to the proposed residential development of land at the former Huyton Cricket & Bowling Club, Liverpool L36.

The assessment shows that the site is principally affected by traffic noise from Huyton Lane, including the passing of emergency vehicles, with lesser contributions of noise from distant railway movements and aircraft overflights; the boundary of the site adjacent to Huyton Lane is shown to be at a “low” to “medium” risk from noise during the day time and a “medium” risk at night (ProPG).

However, the assessment shows that the opening of windows for some habitable rooms within 100 metres of Huyton Lane, gives rise to internal noise levels greater than recommended/guideline values (BS 8233).

Consequently, for these rooms, windows may need to remain closed to achieve guideline noise values commensurate with the preservation of residential amenity and, therefore, alternative means of providing ventilation will be required.

The assessment also shows the night time noise aspects of Approved Document O of The Building Regulations 2010 (bedroom windows likely to be closed at night), do not apply to this development.

The assessment concludes that, with the provision of suitable means of ventilation, where necessary, residential amenity for future occupants of the development will be suitably protected and noise need not be a reason for refusal of planning permission.

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1. INTRODUCTION

- 1.1. EnviroSolution Ltd was commissioned by Breck Homes to undertake an assessment of noise affecting the proposed residential development at the former Huyton Cricket Club, Liverpool L36.
- 1.2. The site, indicated in Figure 1 comprises the former cricket pitches and club house, currently derelict and unused. Existing housing surrounds the site on its northern, western and eastern boundaries, with Huyton Lane along its south-eastern boundary.
- 1.3. To the south of the site, beyond a number of residential properties, is a retail park consisting of an Asda Superstore, with associated multi-storey car park, and a number of other high-street retail stores such as B&M, Decathlon etc.
- 1.4. The ambient noise situation is dominated by traffic noise from Huyton Lane with additional contributions of noise from local domestic activities. A railway line lies approximately 550 metres to the south of the site.
- 1.5. The site area, in the context of its surroundings, is presented in Figure 1.

Figure 1: Site area and surroundings



- 1.6. The proposals, presented in Figure 2, compromise a mix of 1 to 4 bedroom dwellings and apartments, with retention of the cricket pavilion as a Community Hub.

Figure 2: Indicative site layout (drawing: Huyton Lane / Proposed Site Layout - Option A, Rev E)



- 1.5 This report presents the results of a noise measurement survey and a desk-based assessment of environmental noise affecting the site with respect to its use for residential development. Where appropriate, recommendations for suitable noise control and mitigation measures are discussed.
- 1.6 A glossary of acoustic terminology is provided at Appendix A.

2. GUIDANCE

Noise – national policy guidance

- 2.1 Planning policies are set at both a national and local level. With respect to national policy, assessment of the suitability of a site for residential development is guided by the National Planning Policy Framework (NPPF), issued in March 2012 and amended in 2018, 2019, 2023 and 2024.
- 2.2 With regard to noise, the NPPF (“the Framework”) does not provide specific noise policies or defined noise limits but, rather, is intended to enable the planning system to support the Government’s aims and objectives with respect to sustainable development and *“provides a framework within which locally-prepared plans can provide for housing and other development in a sustainable manner”*.
- 2.3 None of the current local or national planning policies preclude recreational development of the site for residential use.
- 2.4 The National Planning Policy Framework does state that “Planning policies and decisions should contribute to and enhance the natural and local environment by ... preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability”.
- 2.5 Additional national planning guidance is provided in the Government’s Noise Policy Statement for England (NPSE – “the Noise Policy”), to which the Framework makes specific reference as the main source of national guidance specifically on planning and noise.
- 2.6 The Noise Policy has a long term vision to *“Promote good health and a good quality of life through the effective management of noise within the context of Government policy on sustainable development”*. The vision is supported by three key aims intended to promote sustainable development with respect to noise so that *“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”*.
- 2.7 Health is defined by the World Health Organisation as *“a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity, and recognises the enjoyment of the highest attainable standard of health as one of the fundamental rights of every human being”* and the Noise Policy makes *“a distinction between ‘quality of life’ which is a subjective measure that refers to people’s emotional, social and physical well being and ‘health’ which refers to physical and mental well being”*.
- 2.8 However, the Noise Policy recognises that it is not currently possible to define a single objective noise level having specific effects on people, hence the emphasis on “promoting” improvements to health and quality of life through effective management of noise, considered in the context of the wider environment and factors other than noise.
- 2.9 Additional guidance is given in the Planning Practice Guidance Note (PPG) on noise, issued in March 2014, alongside the NPPF and updated in 2018 and July 2019. This *“advises on how*

planning can manage potential noise impacts in new development". The PPG suggests the following noise exposure hierarchy, based on average responses to noise.

Table 1: PPG noise exposure and response hierarchy

Perception	Examples of outcomes	Increasing effect level	Action
<i>No Observed Effect Level (NOEL)</i>			
Not noticeable	No Effect	No Observed Effect	No specific measures required
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	No specific measures required
<i>Lowest Observed Adverse Effect Level (LOAEL)</i>			
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	Mitigate and reduce to a minimum
<i>Significant Observed Adverse Effect Level (SOAEL)</i>			
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	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	Prevent

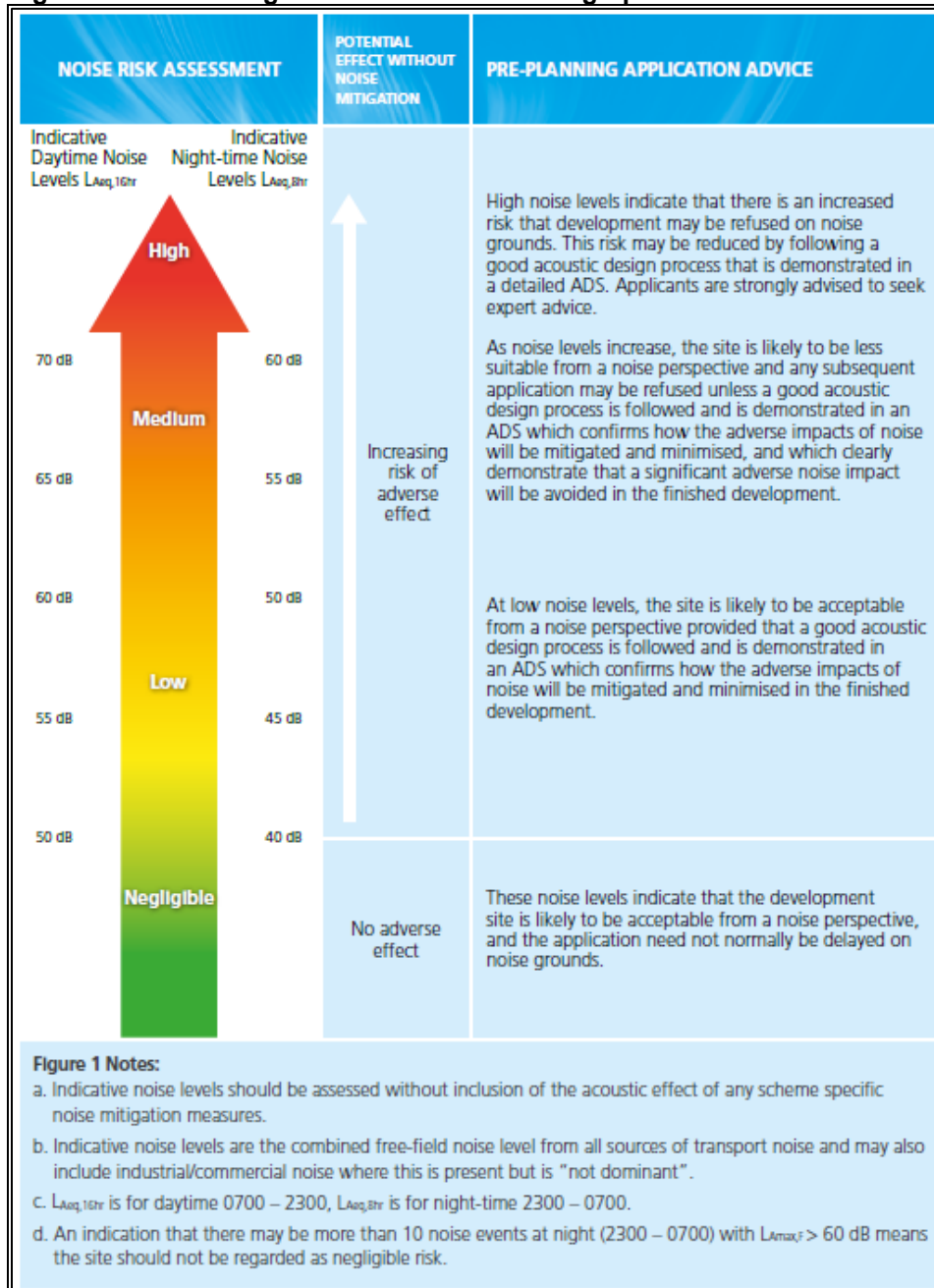
- 2.10 Beyond this, however, the guidance is relatively generic. It avoids specifying ‘acceptable’ environmental noise levels as the acceptability of a source of is both subjective and context-dependant.

Noise – technical guidance

- 2.11 In May 2017, a Working Group consisting of representatives of the Association of Noise Consultants (ANC), Institute of Acoustics (IOA) and Chartered Institute of Environmental Health (CIEH) produced a Professional Practice Guidance (Pro PG) document¹. The guidance was produced *“to provide practitioners with guidance on a recommended approach to the management of noise within the planning system in England”* and *“which encourages better acoustic design for new residential development and aims to protect people from the harmful effects of noise”*. Its primary aim is *“to assist the delivery of sustainable development by promoting good health and wellbeing through the effective management of noise. It seeks to do that through encouraging a good acoustic design process in and around proposed new residential development having regard to national policy on planning and noise”*.
- 2.12 The guidance identifies that *“Good acoustic design is about more than the numbers. It is a holistic design process that creates places that are both comfortable and attractive to live in, where acoustics is considered integral to the living environment.*
- Good acoustic design can involve, for example, careful site layouts and better orientation of rooms within dwellings. Good acoustic design does not mean “gold plating” or significantly increasing costs. This guidance seeks to encourage and promote design outcomes that are proportionate and reasonable in the particular circumstances of each development site”*.
- 2.13 It should be noted that the Pro PG *“does not constitute an official government code of practice and neither replaces nor provides an authoritative interpretation of the law or government policy on which users should take their own advice as appropriate”*.
- 2.14 The guidance *“advocates a systematic, proportionate, risk based, 2-stage, approach. The approach encourages early consideration of noise issues, facilitates straightforward accelerated decision making for lower risk sites, and assists proper consideration of noise issues where the acoustic environment is challenging”*. The two sequential stages are:
- Stage 1 – an initial noise risk assessment of the proposed development site; and
 - Stage 2 – a systematic consideration of four key elements.
- 2.15 Figure 1 of the guidance provides a useful graphical overview of the Stage 1 risk assessment considerations, reproduced as Figure 3.

¹ ANC, IOA & CIEH (2017) *Pro PG: Planning & Noise Professional Practice Guidance on Planning & Noise: New Residential Development*

Figure 3: Pro PG Stage 1 risk assessment infographic



2.16 The four key elements to be undertaken in parallel during Stage 2 of the recommended approach are:

- Element 1 – demonstrating a “*Good Acoustic Design Process*”;
- Element 2 – observing internal “*Noise Level Guidelines*”;
- Element 3 – undertaking an “*External Amenity Area Noise Assessment*”; and
- Element 4 – consideration of “*Other Relevant Issues*”.

2.17 “*The approach is underpinned by the preparation and delivery of an “Acoustic Design Statement” (ADS). An ADS for a site assessed as high risk should be more detailed than for a site assessed as low risk. An ADS should not be necessary for a site assessed as negligible risk.*”

- 2.18 With respect to noise affecting residential amenity, BS 8233: 2014 *Guidance on sound insulation and noise reduction for buildings* gives recommendations for external and internal noise levels for residential dwellings in order to protect residential amenity, based on health-based research, as follows.
- 2.19 Table 4 at Section 7.7.2 of the Standard suggests the following guideline noise levels in habitable rooms:
- Living rooms during the day 35 dB $L_{Aeq,16hour}$
 - Dining rooms during the day 40 dB $L_{Aeq,16hour}$
 - Bedrooms during the day 35 dB $L_{Aeq,16hour}$
 - Bedrooms during the night 30 dB $L_{Aeq,8hour}$
- 2.20 These values can be taken to be broadly equivalent with the LOAEL in the PPG. Note that these are not specific criteria or 'target' noise levels, merely indicative recommendations which will be context-dependant. However, most Local Authorities tend to apply the recommended noise levels as strict criteria.
- 2.21 In most standard modern buildings, the walls and roof provide relatively high levels of sound insulation of greater than 40 dB; the weakest part of a building facade, with respect to noise, is generally the windows. Modern construction methods for new residential properties incorporate standard thermal double-glazing which, the standard suggests, will provide approximately 33 dB R_w of sound attenuation when closed. The standard does not specifically give sound attenuation values for partially open windows, although the worked example (G.1) at Annex G of the Standard indicates that a partially open window would provide 15 dB of sound attenuation.
- 2.22 For calculation of noise ingress through a closed window, this requires that the external measured/calculated sound pressure level is a 'façade' level i.e. subject to the addition of façade-reflected sound energy; this requires the addition of 3 dB to any measured/calculated 'free-field' levels.
- 2.23 Conversely, calculation of noise ingress through a partially open window, requires that the external measured/calculated sound pressure level is a 'free-field' level i.e. without the addition of façade-reflected sound energy; this requires the subtraction of 3 dB from any measured/calculated 'façade' levels.
- 2.24 With regard to night time maximum (L_{AFmax}) noise levels, BS 8233 (Note 4) states the following:
- 2.25 *"Regular individual noise events (for example, scheduled aircraft or passing trains) can cause sleep disturbance. A guideline value may be set in terms of SEL or $L_{Amax,F}$, depending on the character and number of events per night. Sporadic noise events could require separate values".*
- 2.26 Other recent guidance states *"it is considered that if, in bedrooms at night, the $L_{Amax,F}$ from individual noise events (from all sources) would not normally exceed 45dB more than 10 times a night, then this represents a reasonable threshold below which the effects of individual noise events on sleep can be regarded as negligible"*. Consequently, the 10th highest measured night time maximum noise level is used.
- 2.27 The assessment also makes reference to the recently published Approved Document (AD) O of the Building Regulations 2010 "Overheating". This is applicable to new dwellings and, whilst, technically, an issue for Building Control determination at a later stage in the development process, the requirements for ventilation affect the noise mitigation provided by the building

envelope and its design; hence, it is necessary to consider the implications of the AD at the Planning Stage.

2.28 Requirement 01 of the AD “Overheating mitigation” states that:

“(1) Reasonable provision must be made in respect of a dwelling, institution or any other building containing one or more rooms for residential purposes, other than a room in a hotel (“residences”) to-

(a) limit unwanted solar gains in summer;

(b) provide an adequate means to remove heat from the indoor environment.

(2) In meeting the obligations in paragraph (1)-

(a) account must be taken of the safety of any occupant, and their reasonable enjoyment of the residence; and

(b) mechanical cooling may only be used where insufficient heat is capable of being removed from the indoor environment without it”.

2.29 With respect to categorising residential buildings, the document provides a “Simplified method” under which this site would be categorised as being a “moderate risk location” for overheating; this applies to all properties in “England, excluding high risk parts of London in (b)”.

2.30 Paragraph 1.4 states:

“For the purposes of following the simplified method, it should be identified whether the dwellinghouse or each residential unit, shared communal room and common space is able to have cross-ventilation, i.e. it has openings on opposite façades”. Openings on adjacent facades is insufficient.

2.31 The significance of referencing the AD is demonstrated in Section 2 of the document:

“2.10 Excess heat should be removed from the residential building by any of the following means.

a. Opening windows (the effectiveness of this method is improved by cross-ventilation).

b. Ventilation louvres in external walls.

c. A mechanical ventilation system.

d. A mechanical cooling system

2.11 The building should be constructed to meet requirement O1 using passive means as far as reasonably practicable. It should be demonstrated to the building control body that all practicable passive means of limiting unwanted solar gains and removing excess heat have been used first before adopting mechanical cooling. Any mechanical cooling (air-conditioning) is expected to be used only where requirement O1 cannot be met using openings”.

2.32 In other words, any requirement for windows to remain closed to achieve suitable (guideline) internal noise conditions, may affect the overheating/cooling strategy and, subsequently, the design of the building(s). This is clarified further on in Section where it is stated that:

2.33 *“In the Secretary of State’s view, requirement O1(2)(a) is met in a new residential building if the building’s overheating mitigation strategy for use by occupants takes account of all of the following.*

a. Noise at night – paragraphs 3.2 to 3.4.

- b. *Pollution – paragraph 3.5.*
- c. *Security – paragraphs 3.6 and 3.7.*
- d. *Protection from falling – paragraphs 3.8 to 3.10.*
- e. *Protection from entrapment – paragraph 3.11”.*

2.34 Section 3 of the AD provides the following noise-specific guidance:

“Noise

3.2 In locations where external noise may be an issue (for example, where the local planning authority considered external noise to be an issue at the planning stage), the overheating mitigation strategy should take account of the likelihood that windows will be closed during sleeping hours (11pm to 7am).

3.3 Windows are likely to be closed during sleeping hours if noise within bedrooms exceeds the following limits.

- a. 40dB LAeq,T , averaged over 8 hours (between 11pm and 7am).*
- b. 55dB LAFmax , more than 10 times a night (between 11pm and 7am)”.*

- 2.35 With respect to noise from the commercial/retail uses to the south, the principal concern relates to the operation of fixed air handling/cooling equipment, particularly during the night time. This was assessed using the guidance in British Standard (BS) 4142: 2014 ***Methods for rating and assessing industrial and commercial sound***.
- 2.36 BS 4142 provides a method for determining the *sound*² arising from an industrial or commercial site, defined as the site’s ‘specific’ sound level (dB LAeq) to which is added a correction for tonal, impulsive or intermittent elements, to provide the site’s ‘rating’ sound level (dB LA_{r,Tr}). The rating sound level is then compared with the background (dB LA₉₀ or 90th percentile) sound level as measured or calculated outside a building, usually a residential property.
- 2.37 The standard applies a ‘penalty’ to tonal, impulsive and intermittent sounds, as separate entities. The simplest method is a subjective assessment with a sliding scale of up to +6 dB for tonal sound, up to +9 dB for impulsive sound and +3 dB for intermittency. The objective methods provided only allow for the assessment of tonal sound.
- 2.38 The standard indicates significance of sound according to varying degrees of “*adverse impact*”: a difference between the background sound and industrial (‘rating’ sound) of +10 dB “*is likely to be an indication of a significant adverse impact, depending on the context*”, whilst “*a difference of around +5dB is likely to be an indication of an adverse impact, depending on the context*” and that “*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*”.
- 2.39 The Standard includes a specific requirement that assessments should take account of “context” in determining the significance of any predicted impact, which is critical in providing a reasoned and pragmatic assessment, avoiding rigid adherence to limit values at the exclusion of any other considerations.

² BS 4142 uses the term “sound” instead of “noise”

3. METHODOLOGY

- 3.1 The assessment incorporated a noise measurement survey comprising the use of 2 sound level meters placed at the locations presented in Figure 4.



- 3.2 Position 1, located on the site's south-eastern corner, was intended to record the sound arising from traffic on Huyton Lane. The position was approximately 4 metres from the edge of the road.
- 3.3 Position 2, approximately 100 metres from the edge of Huyton Road, was selected to determine the presence of any low frequency noise arising from the commercial uses to the south, particularly with respect to night time periods.
- 3.4 Data was gathered between 1:30pm on Monday 7 April and 8:30am on Wednesday 9 April 2025. The data gathered at both positions comprised continuous, consecutive 1-second and 5-minute 'free-field' noise levels and the meter at position 2 also gathered a continuous audio recording throughout the survey.
- 3.5 The measurements were undertaken using a Casella CEL 633C Class 1 (IEC 61672: 2013) integrating, averaging sound level meter at Position 1 and an NTi XL2 Class 1 (IEC 61672: 2013) integrating, averaging sound level meter at Position 2.
- 3.6 The meters were placed in locked, weatherproof cases with the microphones mounted on a tripod at a height of approximately 1.5m above ground and firmly affixed to solid objects. The microphones were protected by proprietary wind-shields.
- 3.7 The meters were field-calibrated before and after the survey and no variation in calibration tone was observed.
- 3.8 The weather during the survey was warm and dry throughout with light winds.

4 DATA, RESULTS, ASSESSMENT & DISCUSSION

Survey results

- 4.1 The recorded measurement data, rounded to the nearest whole integer, for the day time (7:00am to 11:00pm) and night time (11:00pm to 7:00am) periods, are summarised in Table 2. The average equivalent continuous level is presented and the night time maximum (L_{AFmax}) is the 10th highest level.

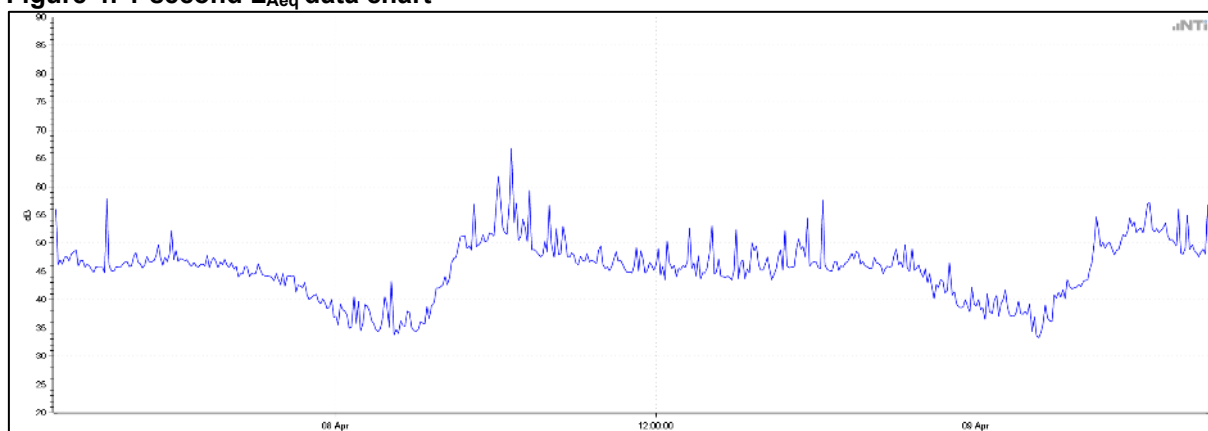
Table 2: Measurement data

Position	Period	Measured noise (dB)	
		L_{Aeq}	L_{Amax}^*
P1	Day	66	-
	Night	57	74
	Day	63	-
	Night	57	75
	Day	64	-
Average:		64	-
		57	75
P2	Day	49	-
	Night	51	71
	Day	48	-
	Night	46	64
	Day	51	-
Average:		49	-
		49	71

* 10th highest

- 4.2 The 1-second and 5-minute data are too numerous to present in this report but are available on request, as is the audio recording.
- 4.3 Figure 4 presents the 5-minute ambient (dB L_{Aeq}) data, recorded at position 2, for the entire survey period in graphical form. The frequent peaks in the data are mostly bird song but also occasional emergency service vehicle siren noise, aircraft overflights and, particularly at night, the occasional distant sound of trains on the railway line approximately 550 metres to the south.

Figure 4: 1-second L_{Aeq} data chart



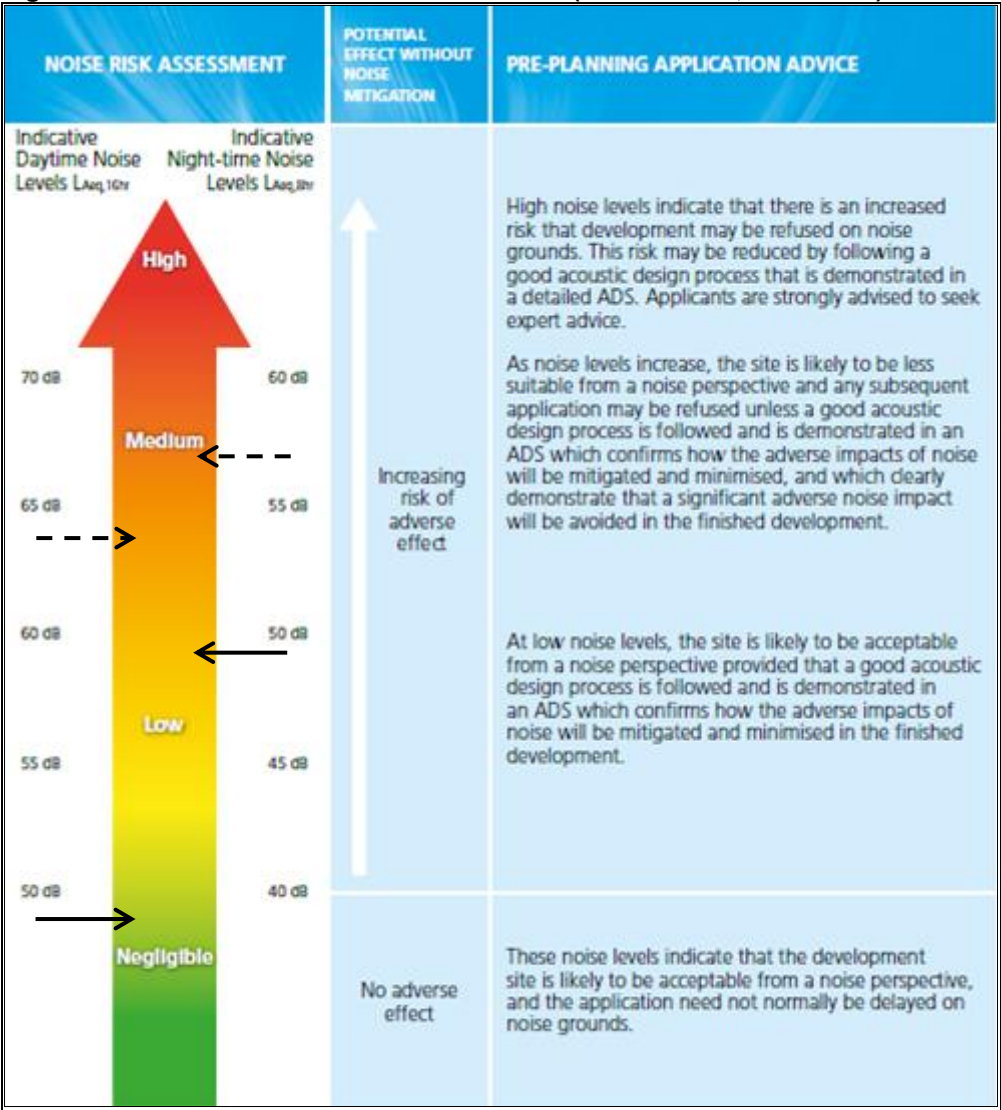
- 4.4 Detailed examination of the data and the audio recording at Position 2 found no evidence of audible tones other unusual/characteristic commercial sounds which might be a cause for

concern; the ambient noise situation is dominated by transportation noise. Consequently, no BS 4142 assessment was considered necessary.

Pro-PG risk assessment

- 4.1 With respect to the Pro PG Stage 1 risk assessment (Figure 5), the data indicate that the south-eastern boundary of the site, adjacent Huyton Lane, is at a “low” to “medium” risk from noise during the day time and a “medium” risk at night.
- 4.2 At Position 2, the site is shown to be at “negligible” risk from noise during the day time and a “low” risk during the night time.
- 4.3 As a consequence of these findings, further detailed, technical assessment is required, principally to address issues around low-frequency commercial plant equipment noise; this assessment is provided as the Acoustic Design Statement (ADS) for the development.

Figure 5: Site Pro PG risk assessment levels (dashed – P1, solid – P2)



BS 8233 external noise assessment

- 4.5 The current layout shows that the centre of the closest garden area, which is side-on to Huyton Lane, is approximately 20 metres from the edge of Huyton Lane. The data measured at Position 1, approximately 4 metres from the edge of the road, must be adjusted to allow for

attenuation due to distance plus a further reduction of approximately 10 dB due to the presence of a solid garden fence.

- 4.6 The results of this calculation was a free-field noise level of 49 dB $L_{Aeq, 16h}$.
- 4.7 This is below the BS8233 lower guideline value of 50 dB $L_{Aeq, 16h}$ and, consequently, **no specific noise mitigation measures are required**

BS 8233 internal noise assessment – road traffic

- 4.8 BS 8233 is applicable to relatively 'steady' i.e. non-varying noise such as traffic. Despite the fact that traffic movements on Flockton Road are intermittent, rather than continuous, BS 8233 remains the only, and best, method of *quantitatively* assessing traffic noise effects.
- 4.9 External walls are expected to be of a brickwork/cavity/blockwork construction. The sound insulation performance of such a construction is typically in the region of 45 to 55 dB $R_W + C_{tr}$.
- 4.10 Standard double glazing typically provides a sound insulation performance in the region of 25 to 30 dB $R_W + C_{tr}$.
- 6 mm glass / 12 mm - 20 mm cavity / 4 mm glass (28 - 30 dB $R_W + C_{tr}$)
 - 6 mm glass / 12 mm - 20 mm cavity / 6 mm glass (27 - 29 dB $R_W + C_{tr}$)
 - 4 mm glass / 12 mm - 20 mm cavity / 4 mm glass (25 - 27 dB $R_W + C_{tr}$)
- 4.11 Laminated (acoustic) double glazing as is commonly used within dwellings provides a sound insulation performance in the region of 31 to 37 dB $R_W + C_{tr}$.
- 6 mm glass / 16 mm - 20 mm cavity / 10.8 mm acoustic laminate (35 - 37 dB $R_W + C_{tr}$)
 - 6 mm glass / 16 mm - 20 mm cavity / 8.8 mm acoustic laminate (33 - 35 dB $R_W + C_{tr}$)
 - 6 mm glass / 16 mm - 20 mm cavity / 6.8 mm acoustic laminate (31 - 33 dB $R_W + C_{tr}$)
- 4.12 The glazing is expected to be the weakest element with regard to the building envelope sound insulation (excluding ventilator units).
- 4.13 The quantity R_W is the weighted sound reduction index expressed in dB; it is a single number quantity for rating airborne sound insulation. The ' C_{tr} ' term is added to the single number rating R_W to take account of the characteristics of particular sound spectra (e.g. road traffic), particularly where low frequency sound energy from diesel engines is present.
- 4.14 The acoustic performance of a particular construction may differ slightly between manufacturers and therefore the sound insulation performance should be verified where possible.
- 4.15 To achieve the optimum performance, external windows should be well sealed around the frame when installed. Large gaps between the frame and the brickwork and poorly sealed frames can notably reduce performance.
- 4.16 The current layout shows that the maisonettes will be the closest properties to the roads, with bedroom and lounge with windows obliquely exposed to the road, approximately 10 metres from the edge of the road.
- 4.17 Traffic noise ingress calculations are presented below for the bedroom and lounge of the maisonette closest to Flockton Road assuming propagation through an open and closed window, respectively.
- 4.18 The calculation of noise break-in through a partially open window uses the single figure,

broadband sound pressure (noise) levels presented in Table 2.

- 4.19 The calculation of noise break-in through a closed window is more detailed and uses octave-band frequency data which were adjusted, using atmospheric corrections provided in International Standard (ISO) 9613-2: 2024 *Acoustics — Attenuation of sound during propagation outdoors Part 2: General method of calculation*, to allow for the reduced distance between the road and property façade, relative to the measurement position. The calculated free-field sound pressure level was corrected by +3 dB in order to represent a facade sound pressure level.
- 4.20 The calculations take into account the typical sound insulation performance of each building element, surface area and internal room dimensions.
- 4.21 Standard thermal double glazing consisting of 4 mm glass / 12 mm cavity / 4 mm glass was assumed for habitable rooms. The measured octave band sound levels and the typical reverberation time for a habitable room were assumed.
- 4.22 Figures 7 to 9 present the detailed calculation results, in Plots 70 to 81³, for the 1st floor living/dining rooms and the ground floor bedroom, with windows closed. The data were adjusted to account for the additional distance (11m) of the façade relative to the measurement position (4m).

Figure 6: Plots 70 to 81, 1st floor, daytime traffic internal noise level in living/dining room

Title: Plot 70-81 Living/dining_Traffic_day												
Noise Break In (ISO 12354-3)												
Formula/Comment	Single Value		63	125	250	500	1000	2000	4000	8000	Rw	(C, C _{tr})
			22.9	25.9	25.8	33.0	38.7	41.7	38.8			
L _{in}			16.7	15.7	23.8	23.0	22.8	15.6	8.3			
Materials												
4mm glass/12 - 20 mm cavity/4mm glass	2.2		18.0	21.0	17.0	25.0	35.0	37.0	31.0		29	(-1,-4)
Brickwork wall	11.0		37.0	40.0	44.0	45.0	51.0	56.0	60.0		51	(-1,-4)
Tiled roof, insulation, plasterboard ceiling	19.8		25.0	28.0	34.0	40.0	45.0	49.0	50.0		44	(-2,-5)
L _{out,s}												
L _{out,2m}	Add Element		39.6	41.6	49.6	56.0	61.5	57.2	47.2	64.0	66	
L _{out,free field}			36.6	38.6	46.6	53.0	58.5	54.2	44.2	61.0	63	
Element 1			22.9	25.9	25.8	33.0	38.7	41.7	38.8			
Plane façade	ΔL _{fs}	33.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Visible	x _{fs}	0.0	22.9	25.9	25.8	33.0	38.7	41.7	38.8			
L _{p,out,2m}			39.6	41.6	49.6	56.0	61.5	57.2	47.2	64.0	66	
L _{p,in}			16.7	15.7	23.8	23.0	22.8	15.6	8.3		28	dBA

³ The data are taken to be sufficiently representative for the apartments

Figure 7: Plots 70 to 81, ground floor, daytime traffic internal noise level in bedroom

Title: Plot 70-81 GF bedroom_Traffic_day											
Noise Break In (ISO 12354-3)											
Formula/Comment	Single Value	63	125	250	500	1000	2000	4000	8000	R _w	(C, C _{tr})
L _{in}		25.1	28.1	24.5	31.8	36.5	39.3	36.6			
		14.5	13.6	25.1	24.2	24.9	17.9	10.6			
Materials											
4mm glass/12 - 20 mm cavity/4mm glass	1.4	18.0	21.0	17.0	25.0	35.0	37.0	31.0		29	(-1,-4)
Brickwork wall	8.0	37.0	40.0	44.0	45.0	51.0	56.0	60.0		51	(-1,-4)
L _{out,s}											
L _{out,2m}	Add Element	39.6	41.6	49.6	56.0	61.5	57.2	47.2	64.0	66	
L _{out,free field}		36.6	38.6	46.6	53.0	58.5	54.2	44.2	61.0	63	
Element 1		25.1	28.1	24.5	31.8	36.5	39.3	36.6			
Plane façade	ΔL _{fs} 9.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Visible	X _{fs} 0.0	25.1	28.1	24.5	31.8	36.5	39.3	36.6			
L _{p,out,2m}		39.6	41.6	49.6	56.0	61.5	57.2	47.2	64.0	66	
L _{p,in}		14.5	13.6	25.1	24.2	24.9	17.9	10.6		28	dBA

Figure 8: Plots 70 to 81, ground floor, night time traffic internal noise level in bedroom

Title: Plot 70-81 GF bedroom_Traffic_night											
Noise Break In (ISO 12354-3)											
Formula/Comment	Single Value	63	125	250	500	1000	2000	4000	8000	R _w	(C, C _{tr})
L _{in}		25.2	28.2	24.6	31.9	36.6	39.4	36.7			
		9.9	4.9	15.6	13.5	14.9	9.1	17.3			
Materials											
4mm glass/12 - 20 mm cavity/4mm glass	1.3	18.0	21.0	17.0	25.0	35.0	37.0	31.0		29	(-1,-4)
Brickwork wall	8.0	37.0	40.0	44.0	45.0	51.0	56.0	60.0		51	(-1,-4)
L _{out,s}											
L _{out,2m}	Add Element	35.2	33.2	40.2	45.5	51.5	48.5	54.0	57.1	60	
L _{out,free field}		32.2	30.2	37.2	42.5	48.5	45.5	51.0	54.1	57	
Element 1		25.2	28.2	24.6	31.9	36.6	39.4	36.7			
Plane façade	ΔL _{fs} 9.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0			
Visible	X _{fs} 0.0	25.2	28.2	24.6	31.9	36.6	39.4	36.7			
L _{p,out,2m}		35.2	33.2	40.2	45.5	51.5	48.5	54.0	57.1	60	
L _{p,in}		9.9	4.9	15.6	13.5	14.9	9.1	17.3		21	dBA

- 4.23 The data show that, with windows closed, traffic-related ambient (L_{Aeq}) noise levels in habitable rooms of the properties will be significantly below the daytime guideline levels of 35 dB L_{Aeq, 16h} in the living rooms and bedrooms, and below the night time guideline level of 30 dB L_{Aeq, 16h} in bedrooms; the calculation includes the provision of a trickle ventilation unit in the open position.
- 4.24 With respect to night time maximum noise levels, assuming 30 dB R_w of sound attenuation through a closed window, the calculated internal maximum sound level will be **41 dB L_{AFmax, 5min}**. This is below the BS 8233 guideline value, of 45 dB L_{Amax}, for night time noise in bedrooms.
- 4.25 With respect to internal noise levels with windows open, Table 3 presents the calculated, single-figure internal noise levels through a partially open window, assuming 15 dB of sound attenuation. The data were distance-corrected as previously.

Table 3: Plots 21 & 22 - calculated internal noise levels through partially open window

Day	Period	Calculated noise (dB)	
		L _{Aeq}	L _{AFmax}
Median	Day	45	-
	Night	38	51

4.26 The data in Table 3 show that internal noise levels, in properties closest to the road, would be:

- 10 dB greater than the day time guideline ambient value for living rooms and bedrooms used during the day time (35 dB L_{Aeq}, 16h).
- 8 dB greater than the night time guideline ambient value for bedrooms at night (30 dB L_{Aeq}, 8h).
- 6 dB greater than the night time guideline maximum value for bedrooms (45 dB L_{Amax}).

4.27 It was calculated that a separation distance of approximately 100 metres from the edge of Huyton Lane would be required before internal noise levels, with windows open, would achieve the guideline values; the extent of this is presented in Figure 9, which is an overlay of the Rev E scheme on Google Earth imagery.

Figure 9: Projection of 100 metre setback from road on site plan



4.28 It is evident, therefore, that in Plots 1 to 43 and 62 to 81, the windows in some habitable rooms will need to remain closed in order to achieve the BS 8233 guideline values.

4.29 The facades to which this applies are presented in Figure 10.

Figure 10: Facades on which habitable room windows will need to remain closed



4.30 Facades within 100 metres of Huyton Lane but not identified in Figure 10, are considered to be sufficiently screened from the noise by intervening buildings and structures.

4.31 BS 8233 states where occupants rely on closed windows to meet the internal noise limits, there needs to be appropriate alternative ventilation that does not compromise the facade sound insulation or resulting internal noise level.

4.32 BS 8233 also provides the following comment with regard to ventilation:

“The Building Regulations’ supporting documents on ventilation recommend that habitable rooms in dwellings have background ventilation. Where openable windows cannot be relied upon for this ventilation, trickle ventilators can be used and sound attenuating types are available. However, windows may remain openable for rapid or purge ventilation, or at the occupant’s choice”.

4.33 It may, therefore, be necessary to consider **alternative means of ventilation for habitable rooms on facades identified in Figure 10.**

4.34 Typically, background air exchange may be achieved through the use of acoustically-attenuating trickle ventilator units and the opening of windows will be an appropriate method of providing rapid/cooling ventilation for these rooms.

4.35 It will be necessary, therefore, to consider the use of a positive input ventilation (PIV) or mechanical ventilation and heat recovery (MVHR) system in the identified habitable rooms, to provide both fresh air to habitable rooms and also room cooling during the warmer months (e.g. PIV or MVHR system); this will likely form a part of the wider overheating

prevention/cooling ventilation strategy in accordance with Approved Document O of the Building Regulations. Further guidance regarding ventilation products and systems are provided in a later section of this report.

- 4.36 In all cases, windows should not be sealed; fully opening windows are appropriate for providing rapid or purge ventilation (e.g. to remove odour from painting and decorating or from burnt food) and for occupant choice.

Overheating assessment (AD(O))

- 4.37 Section 3 of Approved Document O of the Building Regulations suggests that:
- 4.38 *“Windows are likely to be closed during sleeping hours if noise within bedrooms exceeds the following limits.*
- 4.39 *a. 40dB $L_{Aeq,T}$, averaged over 8 hours (between 11pm and 7am).*
- 4.40 *b. 55dB L_{AFmax} , more than 10 times a night (between 11pm and 7am)”.*
- 4.41 The data in Table 3 show that **this does not apply to this development.**

5 VENTILATION & NOISE MITIGATION

Approved Document F, Volume 1: Dwellings

- 5.1 Approved Document F (Volume 1: Dwellings) provides guidance on how to comply with Part F of Schedule 1 to the Building Regulations 2010 and came into effect on 15th June 2022.
- 5.2 The aim of the document is to protect the health of occupants within a dwelling by providing adequate ventilation. Without adequate ventilation, mould and internal air pollution may become hazardous to health.

Ventilation strategy

- 5.3 Ventilation of a property may be delivered through natural ventilation (without the use of mechanically driven equipment), mechanical ventilation or a combination of both methods.
- 5.4 The ventilation systems in Approved Document F are examples of systems that comply with the Building Regulations. Other ventilation systems may be acceptable if they can be shown to meet an equal level of performance.
- 5.5 The ventilation strategy in the approved document relies on a combination of all of the following:
- a) Extract ventilation from rooms where water vapour or pollutants are likely to be released (e.g. bathrooms, WC's, kitchens and utility rooms), to minimise their spread to the rest of the building. Ventilation fans may be either intermittent operation or continuous operation.
 - b) Whole dwelling ventilation to provide fresh air to the building and to dilute, disperse and remove water vapour and pollutants not removed by extract ventilation.
 - c) Purge ventilation to remove high concentrations of pollutants and water vapour. Purge ventilation is used intermittently and required only for pollutants produced by occasional activities (e.g. fumes from painting).
- 5.6 With regard to whole dwelling ventilation, supply air for the dwelling should be delivered by either continuous supply fans or background ventilator units.
- 5.7 The minimum whole dwelling ventilation rate for the supply of air to the habitable rooms in a dwelling should meet a minimum rate of 0.3 litres per second per m² of internal floor area and also a minimum rate (l/s) determined by the number of bedrooms, as specified in Table 1.3 of the document.
- 5.8 The document also provides minimum standards for purge ventilation for rapidly diluting indoor air pollutants and extracting water vapour where necessary in habitable rooms. For domestic-type buildings, Part O (overheating) may require a higher standard in order to remove excess heat.

Acoustically rated ventilator units

- 5.9 Manually controlled trickle ventilators (the most common type of background ventilators) can be located over the window frames, in window frames or just above the glass. Background ventilators are intended to normally be left open.
- 5.10 Ventilation should be controllable; controls may be either manual (i.e. operated by the occupant) or automatic. Background ventilators should be at least 1700 mm above floor level, to reduce cold draughts, but still be easy for the occupant to reach.
- 5.11 Installing a background ventilator directly through a wall that provides the equivalent areas described in Approved Document F can also be an acceptable route to compliance.

- 5.12 If this strategy is used, sound attenuating ventilator units should be installed, to allow background ventilation whilst maintaining a high sound insulation performance from the façade. The ventilator unit, in the open position, should provide a sound insulation performance of at least 30 dB $D_{n,e,W}$.
- 5.13 For guidance, example manufacturers of acoustically-rated ventilator units include:
- [EHA² | Aereco](#)
 - [2500EA/5000EA AC1 \(greenwood.co.uk\)](#)
 - [glazed in acoustic vents - Airvent DGL SUPER \(brookvent.co.uk\)](#)
- 5.14 The minimum 'equivalent area' of background ventilators for natural ventilation should follow the guidance in Table 1.7 of Approved Document F for each room type.
- 5.15 Bathrooms, toilets, utility rooms and circulation areas do not require sound attenuating ventilator units. Standard (non-acoustic) trickle vents may be fitted to achieve the required equivalent area.
- 5.16 It should be noted that a window with a 'night-latch' position is not adequate for background ventilation, due to the risk of draughts, security issues and the difficulty of measuring the equivalent area.

Mechanically assisted ventilation

- 5.17 Potentially, the only option with regard to ventilating and cooling habitable rooms in the properties, whilst achieving a high facade sound insulation, would be to use some form of continuous mechanical extraction.
- 5.18 Appropriate dwelling ventilation rates will depend on the number of bedrooms within the dwelling and the anticipated occupancy rate (refer to Approved Document F for guidance).
- 5.19 Such systems can also be supplied with a 'boost' function in order to reduce the need to open windows for purge ventilation.
- 5.20 To avoid unintended air pathways, background ventilators should not be installed with mechanical ventilation with heat recovery.
- 5.21 Particular attention should be paid to the construction of bedroom ceilings and the mounting of the motor unit in order to minimise the noise transmission into adjacent rooms.
- 5.22 It is recommended that a double-boarded ceiling/partitioning construction and/or acoustically enhanced loft/cavity-hatch is used where there is a loft/cavity mounted motor/control unit.

Noise from mechanical systems (comments within Approved Document F)

- 5.23 With regard to noise from mechanical systems, page 6 of Approved Document F states the following:

1.5 Mechanical ventilation systems, including both continuous and intermittent mechanical ventilation, should be designed and installed to minimise noise. This includes doing all of the following.

- a. Correctly sizing and jointing ducts.*
- b. Ensuring that equipment is appropriately and securely fixed, such as using resilient mountings where noise carried by the structure of the building could be a problem.*
- c. Selecting appropriate equipment, including following paragraph 1.6.*

1.6 For mechanical ventilation systems, fan units should be appropriately sized so that fans operating in normal background ventilation mode are not overly noisy. This might require fans to be sized so that they do not operate near maximum capacity when in normal background ventilation mode.

1.7 Account should be taken of outside noise when considering whether openable windows are appropriate for purge ventilation.

Note: Although there is no requirement to undertake noise testing, achieving the levels in the following guidance would ensure good acoustic conditions. The average A-weighted sound pressure level for a ventilator operating under normal conditions and not at boost rates should not exceed both of the following.

- a. 30 dB $L_{Aeq,T}^*$ for noise-sensitive rooms (e.g. bedrooms and living rooms) when a continuous mechanical ventilation system is running on its minimum low rate.*
- b. 45 dB $L_{Aeq,T}^*$ in less noise-sensitive rooms (e.g. kitchens and bathrooms) when a continuous operation system is running at the minimum high rate or an intermittent operation system is running.*

** The noise index $L_{Aeq,T}$ is used in BS 8233, where T is the duration of the measurement. If the noise from the sound source is steady (i.e. fluctuating by up to 3dB), a measuring time of 1 minute will be adequate and the $L_{Aeq, 1 min}$ level will be similar to the dB(A) level used elsewhere. If the noise from the sound source fluctuates more than this, a longer measuring time (T) may be required, but the higher portion of the fluctuating level should be considered, and the sound may attract more attention due to the changes in level.*

Note: Methods for measuring the sound power level produced by the fan unit of decentralised extract ventilation, centralised extract ventilation and balanced mechanical ventilation with heat recovery systems are described in BS EN 13141.

6 CONCLUSION

- 6.1 The assessment has shown that the site is principally affected by general urban and transportation noise, predominantly road traffic, but also including distant rail movements and aircraft overflights.
- 6.2 Traffic levels during the day and night time have been shown to necessitate that in Plots 1 to 43 and 62 to 81, the windows in some habitable rooms will need to remain closed in order to achieve the BS 8233 guideline values; for these rooms, it may be necessary to provide alternative means of ventilation.
- 6.3 The assessment has also shown that the night time noise aspects of Approved Document O of The Building Regulations 2010 i.e. that bedroom windows are likely to remain closed at night, do not apply to this development. Other requirements of AD(O) will apply.
- 6.4 Consequently, the assessment concludes that, with the provision of suitable means of ventilation, where necessary, residential amenity for future occupants of the development will be suitably protected and noise need not be a reason for refusal of planning permission.

APPENDIX A

Glossary of acoustic terms

Ambient noise: the noise from all sources, both near and far, at any given time. Conventionally defined using the A-weighted equivalent continuous noise level (L_{Aeq}) [see below].

Background noise level (dB L_{A90}): In the UK, the 90th percentile noise level (L_{A90}) is generally used to define 'background' noise. This is a statistical parameter describing the noise level that is exceeded for 90% of the measurement or assessment time. Its value lies in the fact that it is a statistical value, towards the lower end of a measured range of data, and which is relatively 'stable' i.e. not adversely affected by occasional high-energy noise events.

Decibel (dB): a unit of level derived from the logarithm of the ratio between the value of a quantity and a reference value. It is used to describe the level of many different quantities. For sound pressure level the reference quantity is 20 micro-Pascals (μPa), 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) / A-weighting: decibels measured on a sound level meter incorporating a frequency weighting (A weighting) which 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 (in steady noise) 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 level 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).

$L_{Aeq,T}$: the equivalent continuous sound level - the sound level of a notionally steady sound having the same energy as a fluctuating sound over a specified measurement period (T). L_{Aeq} is used to describe many types of noise and can be measured directly with an integrating sound level meter.

L_{Amax} : the maximum single-event noise level attained during a measurement period.

Noise: any audible sound. Often defined as unwanted sound. Can be damaging to hearing if it is too loud or can be just annoying if it interferes with the normal enjoyment of others.

Sound / sound pressure: a fluctuation in air pressure over the static ambient pressure.

Sound pressure level: the sound pressure relative to a standard reference pressure of 20 μPa (20×10^{-6}) on the decibel scale.