Land at Heaton Grange, Batley

Noise impact assessment

11457.2

5th March 2026

Revision C

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Noise impact assessment

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Revision	Description	Issued by	Date
A	First issue	SB	11th February 2026
B	Amendment to façade sound insulation calculations and specification	SB	12th February 2026
C	Update to site layout	SB	5th March 2026

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1 Summary

1.1 This noise impact assessment report has been prepared to support a full planning application for a residential development on a parcel of land to the east of Mill Lane, Heaton Grange in Batley.

1.2 Noise levels affecting the proposed development predominantly from road traffic and rail traffic have been measured during the day and night, and the façade noise impact calculated.

1.3 Noise propagation across the site is calculated in environmental noise modelling software, CadnaA.

1.4 The existing noise risk at the site is assessed in accordance with relevant noise guidelines.

1.5 For the most exposed gardens to the west of the site (Plots 10 – 18), barriers of minimum 2.4 m height are required to reduce external noise levels to be below the ProPG guideline upper limit of 55 dB $L_{Aeq, 16\,hr}$. The location of the proposed barrier is shown by the green line in Figure 1**.** Noise levels in the majority of gardens are calculated to be below the guideline lower limit of 50 dB $L_{Aeq, 16\,hr}$.

1.6 To be effective in practice, the barrier should have no cracks or gaps, be continuous to the ground, and have a surface density ≥ 10 kg/m^2 such as a closeboard timber fence, earth mound, brick wall or any combination of these.

1.7 With the acoustic barrier, the indoor ambient noise level targets can be achieved in the majority of plots with the windows open. The only exceptions are to the western elevations of the plots shown red in Figure 1.

1.8 The acoustic performance requirements for glazing and ventilators are summarised in Table 1. The performance for the glazing and ventilators, are representative of standard specifications.

1.9 Whilst there is a limit on the trickle ventilator number and performance to those worst affected elevations, there is unlikely to be a constraint on the Approved Document F whole dwelling ventilation strategy.

1.10 The potential for noise impact when utilising open windows to provide thermal comfort during the daytime period is also assessed according to the *Acoustics Ventilation and Overheating Residential Design Guide*; results indicate that open windows may be relied upon for the purpose of overheating mitigation during the daytime.

1.11 Based on the details outlined in this report, the noise risks identified are mitigated and minimised, and the site is considered suitable for residential development.

Façade (mark-ups as per Figure 1)	Habitable Rooms affected	Glazing performance	Trickle ventilator performance	Potential AD-F whole dwelling ventilation strategy
Red	Western elevations: All habitable rooms, All levels	**≥ 31 dB R_w** E.g. Standard 4mm double glazing	Up to 1 no. vent **≥ 30 dB $D_{ne,w}$** *or* Up to 2 no. vents **≥ 33 dB $D_{ne,w}$**	No acoustic constraints on ventilation strategy
	Eastern elevations: All habitable rooms, All levels	No acoustic constraints; openable windows acceptable		
Yellow	All habitable rooms, any elevation			
Example trickle ventilators that achieve the minimum performance standards are identified in Table 9.				

Table 1: Summary of minimum façade sound insulation treatment

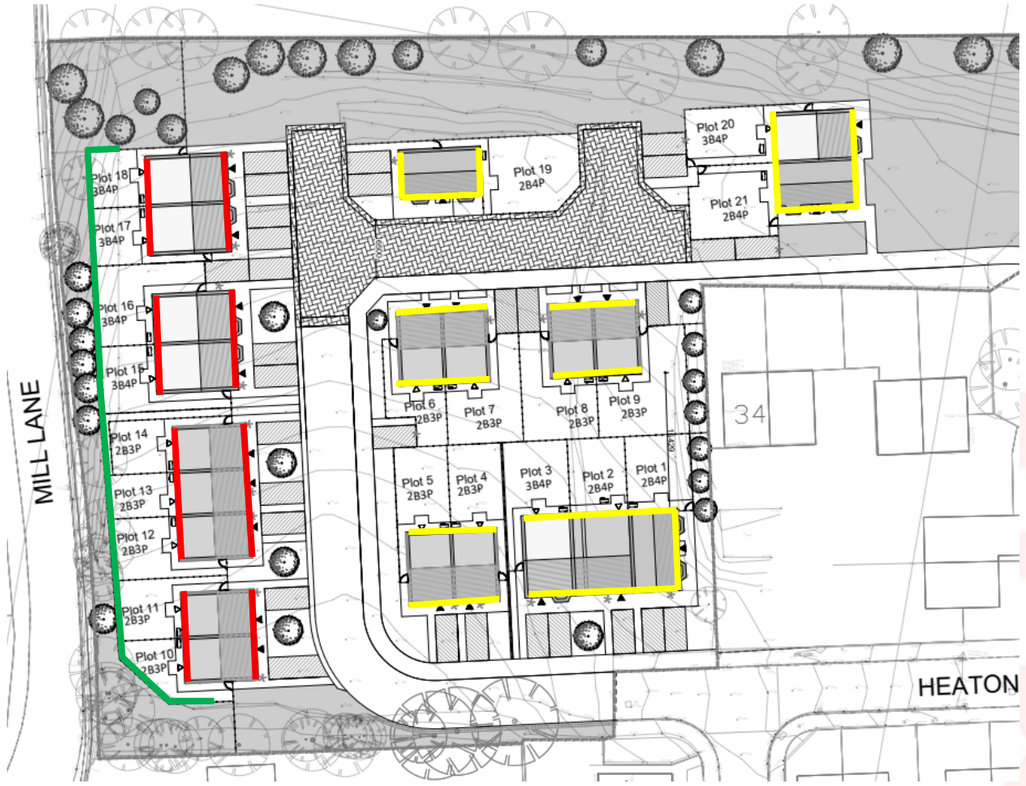

Figure 1: Key of the proposed minimum façade sound insulation treatment (mark-ups detail as per Table 1) and acoustic barrier location (green line)

2 Introduction

2.1 A residential development of 21 no. new dwellings has been proposed at land to the east of Mill Lane, Heaton Grange in Batley.

2.2 Apex Acoustics has been commissioned to undertake an assessment of the potential noise impact on the proposed site.

2.3 The primary noise sources considered in this assessment are:

- Road traffic noise on Mill Lane located immediately to the west of the proposed site;
- Rail traffic from the railway to the west of both the proposed site and Mill Lane road;
- Industrial site at the neighbouring area to the north, west and east of the proposed site.

2.4 The site location is shown in Figure 2.

2.5 The purpose of this report is to identify appropriate acoustic design parameters and the manner in which these may be achieved in practice.

2.6 The scope of our appointment includes:

- Consider the existing noise environment over a 24-hour period at two locations;
- Noise modelling based on the proposed layouts to determine noise levels impacting across the site;
- Determine potential noise impact under whole dwelling ventilation conditions according to Approved Document F strategies and when utilising an open windows for mitigation of overheating risks during the daytime;
- Provide a detailed scheme for the mitigation of noise to address typical Local Authority requirements.

Figure 2: Site location outlined in red and measurement positions P1 and P2 indicated by yellow markers

3 Planning policy and noise criteria

3.1 National Planning Policy Framework (NPPF)

3.2 The National Planning Policy Framework (NPPF) Reference 1, sets out the Government's planning policies for England and how these should be applied. It provides a framework within which locally-prepared plans for housing and other development can be produced. In respect of noise, Paragraph 187, 198 and 200 of the NPPF states the following:

3.3 Paragraph 187:

"e) 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…"

3.4 Paragraph 198:

"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:

a) 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[65 [See Explanatory Note to the Noise Policy Statement for England];

b) identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason;

3.5 Paragraph 200:

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

3.6 **Noise Policy Statement for England (NPSE)**

3.7 The Noise Policy Statement for England, Reference 2, states three policy aims 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."

3.8 The NPSE defines adverse noise impact as follows:

- No Observed Effect Level (NOEL)
  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.
- Lowest Observed Adverse Effect Level (LOAEL)
  This is the level above which adverse effects on health and quality of life can be detected.
- Significant Observed Adverse Effect Level (SOAEL)
  This is the level above which significant adverse effects on health and quality of life occur

3.9 The first two aims of the NPSE require that no significant adverse impact should occur and that, where a noise level which falls between a level which represents the lowest observable adverse effect and a level which represents a significant observed adverse effect, then according to the explanatory notes in the statement:

"… all reasonable steps should be taken to mitigate and minimise adverse effects on health and quality of life whilst also taking into consideration the guiding principles of sustainable development. This does not mean that such effects cannot occur."

3.10 It is considered that meeting the internal ambient noise level limits given in BS 8233, Reference 3, which are in line with those given by the World Health Organisation, Reference 4, adequately achieve the first and second aims of the NPSE.

3.11 **Local plan**

3.12 The relevant Kirklees Local Plan policy, Reference 5, on noise has been identified and included below in Figure 3.

Policy LP52

Protection and improvement of environmental quality

Proposals which have the potential to increase pollution from noise, vibration, light, dust, odour, shadow flicker, chemicals and other forms of pollution or to increase pollution to soil or where environmentally sensitive development would be subject to significant levels of pollution, must be accompanied by evidence to show that the impacts have been evaluated and measures have been incorporated to prevent or reduce the pollution, so as to ensure it does not reduce the quality of life and well-being of people to an unacceptable level or have unacceptable impacts on the environment.

Such developments which cannot incorporate suitable and sustainable mitigation measures which reduce pollution levels to an acceptable level to protect the quality of life and well-being of people or protect the environment will not be permitted.

Where possible, all new development should improve the existing environment.

Figure 3: Policy LP52 from Kirklees Local Plan

3.13 **Professional Practice Guidance on Planning & Noise**

3.14 Professional Practice Guidance on Planning & Noise: New Residential Development (ProPG), Reference 6, is a guidance document on the management of noise within the planning system in England for new build housing developments.

3.15 The document draws together guideline limits for internal noise levels from external transport sources from other sources of guidance, including BS 8233, and the World Health Organisation (WHO) Guidelines for Community Noise.

3.16 These criteria are consistent with those usually adopted by the Local Environmental Health Department and are presented in Table 2.

Activity	Location	Guideline upper limit, dB		
		$L_{Aeq,\ daytime}$	$L_{Aeq,\ night\text{-}time}$	L_{AFmax}
Resting	Living room	35	-	-
Dining	Dining room	40	-	-
Sleeping (daytime resting)	Bedroom	35	30	45

Table 2: Internal noise level requirements

3.17 The daytime period is defined as the 16 hours between 07:00 to 23:00 hours and the night-time period is defined as the 8 hours between 23:00 to 07:00 hours.

3.18 With regards to the night-time L_{AFmax} criterion, ProPG states:

"In most circumstances in noise-sensitive rooms at night (e.g. bedrooms) good acoustic design can be used so that individual noise events do not normally exceed 45 dB $L_{Amax,F}$ more than 10 times a night."

3.19 It is considered that the adopted internal ambient noise level targets align with the LOAEL following the terminology of the NPSE, such that meeting these targets adequately achieves the aims of the NPPF and NPSE.

3.20 ProPG states:

"Once internal L_{Aeq} levels exceed the target levels by more than 10 dB, they are highly likely to be regarded as "unacceptable" by most people, particularly if such levels occur more than occasionally."

3.21 Internal ambient noise levels 10 dB above the daytime and night-time values in Table 2 are therefore identified as the SOAEL.

3.22 Appendix A of the ProPG collates the results of various studies on sleep disturbance due to individual noise events, and states the following:

"it can be concluded that at night (2300 - 0700 hrs) a significant effect on sleep disturbance e.g. behavioural awakening, is likely to occur where the maximum sound level at the façade of a building with partially open windows is above:

- 85 dB $L_{Amax,\ F}$ (where the number of events exceeding this value is ≤ 20); or
- 80 dB $L_{Amax,\ F}$ (where the number of events exceeding this value is > 20)."

3.23 These values are identified as a SOAEL in the situation where windows are partially open.

3.24 ProPG guidance on external amenity area assessments "reflects and extends the advice contained in BS 8233:2014 and the current Government guidance in PPG-Noise". Relevant guidance from these sources is summarised in the document as follows:

- "If external spaces are an intrinsic part of the overall design, the acoustic environment of those spaces should be considered so that they can be enjoyed as intended."
- "The acoustic environment of external amenity areas that are an intrinsic part of the overall design should always be assessed and noise levels should ideally not be above the range 50-55 dB $L_{Aeq,\ 16\ hr}$."
- "These guideline values may not be achievable in all circumstances where development might be desirable. In such a situation, development should be designed to achieve the lowest practicable levels in these external amenity spaces."

3.25 The BS 8233 'desirable' value of 50 dB $L_{Aeq,\ 16\ hr}$ in external amenity areas is identified as the LOAEL.

3.26 **AVO Guide**

3.27 Overheating risks associated with the daytime noise impact for this scheme are addressed in this planning report based on Acoustics Ventilation and Overheating Residential Design Guide (AVO Guide) Reference 7.

3.28 In each case, there are separate guidelines for environmental noise from transportation sources, and for internal noise from mechanical services such as ventilation.

3.29 Following a process of Good Acoustic Design for the site layout, the AVO Guide suggests three steps to consider the impact of noise on potential amenity:

- Characterise the noise impacts on the proposed development
- Evaluate and advise the implications and constraints for ventilation strategies
- Evaluate and advise the implications and constraints for strategies to mitigate overheating.

3.30 The AVO Guide indicates a two-stage process to determine the risk of adverse noise effects while using opening windows for ventilative cooling. The guidance is discussed in Appendix A.

3.31 **Noise and Approved Document O**

3.32 Acceptable night-time $L_{Aeq,8hr}$ and L_{AFmax} noise limits under overheating conditions is regulated by Approved Document O (AD-O) of the Building Regulations, Reference 8. Government guidance, www.gov.uk/guidance/use-of-planning-conditions states:
"*Conditions requiring compliance with other regulatory regimes will not meet the test of necessity and may not be relevant to planning. Use of informatives to remind the applicant to obtain further planning approvals and other consents may be more appropriate.*"

3.33 Therefore the night-time $L_{Aeq,8hr}$ and L_{AFmax} assessment is not presented in this planning report; such assessment should be addressed through compliance with Approved Document O noise limits. It is noted that the ADO assessment may limit window open areas, or further preclude the use of an open window for thermal comfort reasons, where the AD-O noise limits are exceeded.

4 Noise sources and measurements

4.1 Measurements

4.2 Measurements of the existing noise environment were made for a 24-hour period from 13:01 hours on 9th January 2024 using the guidance of BS 7445, Reference 9.

4.3 The measurement locations, P1 and P2, are shown in Figure 2.

4.4 The microphones were located approx. 2 m above ground level, away from other reflecting surfaces, such that the measurements are considered to be free-field.

4.5 The equipment used is listed in Table 3.

Equipment	Model	Serial no.
Sound Level Meter	NTi XL2	A2A-09585-E0
Calibrator	Larson Davis CAL 200	12573
Sound Level Meter	NTi XL2	A2A-12269-E0
Calibrator	Larson Davis CAL 200	13404

Table 3: Equipment used

4.6 All sound level meters and calibrators used meet the technical specifications of BS 7445 and have current calibration certificates traceable to national standards. The equipment was field-calibrated before and after the measurement with no significant drift in sensitivity noted.

4.7 Weather conditions were dry with wind speeds below 5 m/s.

4.8 Noise sources

4.9 The most significant noise sources affecting the proposed development during both daytime and night-time periods were passing trains on the railway to the west of the proposed site. The second most dominant noise source identified was road traffic associated with Mill Lane to the west of the proposed site.

4.10 The measurement positions were therefore selected as those most exposed to noise from a combination of the most dominant sources.

4.11 Other noise sources included birdsong and sporadic works at surrounding sites e.g. forklift activity.

4.12 A steady, continuous, low-frequency noise coming from the further site located to the east of the development have been noted during the night from approx. 6 AM, and during the daytime at position P2 (ceased just before 5 PM). It was not possible to identify a specific source of noise during the site inspection. No other plant impact was noted.

4.13 An identified plant noise impact assessment has been undertaken as per Section 4.19.

4.14 On the second day of the noise surveys, construction activities were occurring within the site affecting mainly noise data measured at position P2. Given that such activities are temporary and not representative of the typical sound environment, the sound data affected by the construction noise are excluded from the assessment.

4.15 Survey results

4.16 The time histories of the $L_{Aeq,\ 1\ sec}$ recorded are shown in Figure 4.

4.17 The measured daytime and night-time noise levels are shown in Table 4.

Position	Parameter	dB(A)	Octave band centre frequency, Hz					
			125	250	500	1k	2k	4k
P1	Daytime, $L_{Aeq,\ 16\ hr}$	**54**	39	43	47	51	47	39
	Night-time, $L_{Aeq,\ 8\ hr}$	**47**	30	35	41	44	40	35
	Night time, $L_{AF,max}$	**66**	-	-	-	-	-	-
P2	Daytime, $L_{Aeq,\ 16\ hr}$	**49**	38	39	42	45	40	32
	Night-time, $L_{Aeq,\ 8\ hr}$	**44**	32	33	38	41	34	30

Table 4: Measured free-field noise levels

4.18 The single event maximum noise level presented in Table 4 is exceeded no more than 10 times during the night at position P1, therefore is used as the design case to determine compliance against ProPG Note 4 of Figure 2.

4.19 **Existing plant noise BS 4142 assessment**

4.20 The plant noise impacts identified has been analysed and assessed using the guidance of BS 4142, Reference 10, to determine the potential for adverse effects on the proposed development.

4.21 A summary of the assessment process and result for the night-time period is presented in Table 5. *Note*: As the background sound is higher at night than during the daytime period due a dominant character of the transportation noise sources, whereas plant impact observed does not increase during the daytime, the night-time assessment will represent the worst-case scenario.

Parameter	Night-time assessment	Relevant clause of BS 4142	Commentary
Measured ambient sound level L_a,	48 dB $L_{Aeq,\ 15\text{-}min}$	7.3.1	The plant noise source was turned on for the duration of the measurement period at position P2
Measured residual sound level L_r,	47 dB $L_{Aeq,\ 15\text{-}min}$	7.3.2	The L_r was measured at P2 location just before the plant noise source was operational; the L_r is considered representative of the assessment position.
Representative background sound level	46 dB $L_{A90,\ 15\text{-}min}$	8.1.2	Presented a 15-minute L_{A90} sample of background sound from a period 5:45 AM-6:00 AM, just before the plant was operational.
Specific sound level L_s	37 dB $L_{Aeq,\ 15\text{-}min}$	7.2 7.3.3 – 7.3.4	Based on survey findings, the plant operates continuously between 6 AM and 7 AM during the night-time. Specific plant noise level was calculated by subtracting the residual noise level from ambient noise level in frequency bands; for frequency bands over 1 kHz the residual noise slightly exceeds the ambient level due to other noise sources impact; as a prudent assumption, plant noise impact for these frequency bands is deemed to be at least 10 dB below the measured ambient noise level
Acoustic feature correction	+3 dB	9.2 9.3	An objective assessment of tonality has not identified any prominent tonal components of measured plant noise. Based on the audio recordings, a subjective assessment to determine acoustic features is undertaken, and a 3 dB penalty due to audible tonal component is considered. No other penalties are considered relevant in this assessment.
Rating level, $L_{Ar,Tr}$	40 dB		
Uncertainty of assessment	--	10	The measurement of background sound level taken from the period just before the plant was operational is likely to be representative for the assessment period, however there is an associated uncertainty that the background sound representative for the assessment period when the plant operates (post 6 AM) may be higher due to increase of transportation noise.
Context	--	11	The calculated specific plant noise level is 11 dB lower than ambient noise level for the quietest period; the ambient noise level across the proposed site is predominantly determined by transportation noise. The existing plant noise impact is likely to pose a low risk in terms of restricting opening windows during the night-time. The impact is expected to be mitigated even further with any standard glazing and trickle vents provision.
Excess of $L_{Ar,Tr}$ over background sound level	-6 dB		With a consideration of the context of the existing acoustic environment, the **assessment result indicates the likelihood of a low impact.**

Table 5: BS 4142 assessment of the observed plant noise impact measured during the sound surveys

4.22 On the basis of the BS 4142, the plant noise impact is considered to be below a LOAEL and no further mitigation needs to be considered.

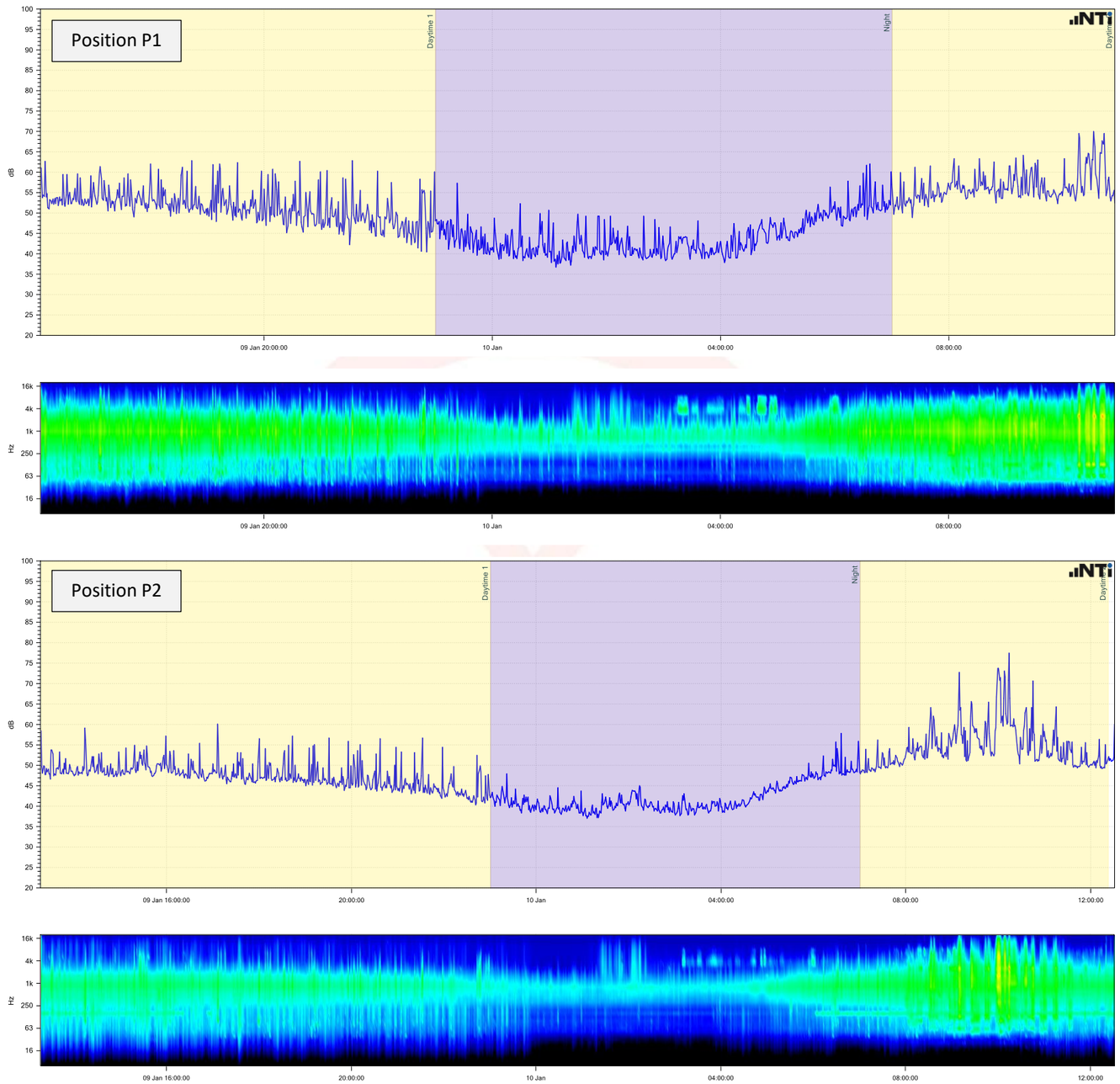

Figure 4: Time history of the recorded $L_{Aeq, 5min}$ for each noise survey location

5 Noise impact on the site

5.1 Noise transmission and propagation is modelled using proprietary software, Cadna/A, Reference 11. This models noise propagation outdoors according to ISO 9613, Reference 12.

5.2 The modelling parameters used, source of data and details are described in Table 6.

Parameter	Source	Details
Model dimensions	Google Earth	British Transverse Mercator coordinates
Site location and layout	Architects' drawings	Architects' drawings, Reference 13
Topography –within and outside of the site	Department for Environment Food & Rural Affairs Data Services Platform	LIDAR Composite DTM 1 m (2022)
Building heights – proposed buildings	Drawings	Architects' drawings, Reference 13
Building heights – outside of site	Site observations and Google Street view	3 m per storey + 2 m roof (residential properties)
Receptor positions	Site observations and Google Street view	On the façade closest to the source at a height of 1.5 m, 4.5 m to represent ground and first floor window heights, respectively
Building and barrier absorption coefficient	ISO 9613-2	0.21 to represent a reflection loss of 1 dB (smooth surface) and 0.37 to represent a reflection loss of 2 dB (structured surface)
G, Ground factor	ISO 9613-2	Porous ground, G = 1, Hard ground, G = 0 (locally on model)
Max. order of reflections	Apex Acoustics	Three

Table 6: Modelling parameters and assumptions

5.3 Measured daytime and night-time noise levels have been used to ascribe sound power levels to the surrounding road and railway line, and the noise impact at the proposed building façades has been calculated.

5.4 Measured maximum noise levels due to train movements and vehicle passes have been used to attribute a sound power level to a point source for each railway noise event and road traffic noise event. The position of each point source has been shifted along the road / railway line to calculate the potential worst-case noise impact at each building façade.

5.5 A plan view and a 3D perspective of the CadnaA model are shown in Figure 5 and Figure 6.

Figure 5: Plan view of the CadnaA model

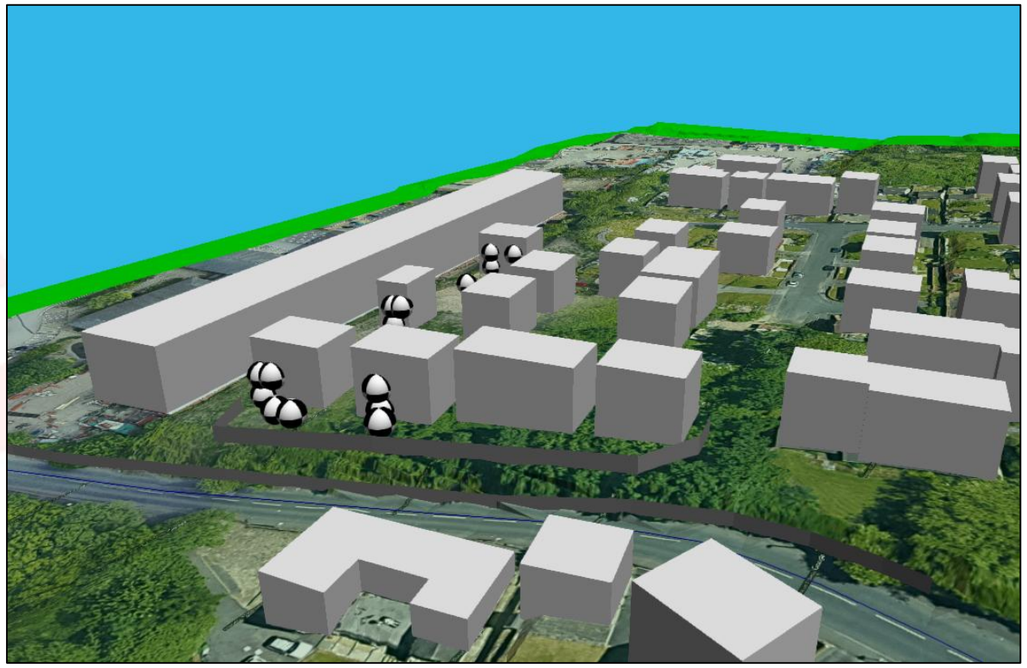

Figure 6: 3D view of the CadnaA model from the western side of the site, with receivers in black and white

5.6 The calculated noise contours results for the daytime $L_{Aeq,\ 16\ hr}$ and night-time $L_{Aeq,8\ hr}$ are shown in Figure 11 and Figure 12 respectively in Appendix B. Note – the model and sound contours presented include the measures proposed for external amenity area discussed in Section 6.

6 External amenity area assessment

6.1 The gardens for all plots are considered as an intrinsic part of the overall design.

6.2 Noise levels in gardens associated with Plots 1-9 and 19-21 are calculated to be below 50 dB $L_{Aeq, 16\ hr}$, which is a lower guideline criterion from ProPG, and therefore noise mitigation measures are not required to these plots.

6.3 For the most exposed gardens associated with Plots 10-18, noise levels are calculated to exceed the ProPG upper guideline limit of 55 dB $L_{Aeq, 16\ hr}$ without mitigation. Installing noise barriers of 2.4 m height in locations as shown with the **green line** in Figure 1, will reduce external noise levels to below the guideline upper limit.

6.4 To be effective in practice, the barrier should have no cracks or gaps, be continuous to the ground, and have a surface density ≥ 10 kg/m^2 such as a closeboard timber fence, earth mound, brick wall or any combination of these.

6.5 Given the proximity of the train line located on a higher elevation, it is considered that external amenity noise levels for the most exposed gardens are mitigated as far as reasonably practicable, in line with the ProPG guidance.

6.6 The proposed barriers and their acoustic benefit are considered in the noise contour results shown in Appendix B, and included within the calculations detailed further in this report.

7 Achieving internal noise levels

7.1 **Façade sound insulation calculations**

7.2 Free-field noise levels at the windows of the most exposed rooms which are used in the façade sound insulation calculations are shown in Table 7.

7.3 Octave band $L_{Aeq,T}$ noise levels in the 125 Hz to 2 kHz calculation range indicated in BS 8233 have been adjusted to match the single figure calculated A-weighted noise level.

Worst impacted facades	Parameter	dB(A)	Octave band centre frequency, Hz A-weighted free-field noise level, dB				
			125	250	500	1k	2k
Red (West First floor)	$L_{Aeq,16\ hr}$	**58**	41	46	51	54	51
	$L_{Aeq,8\ hr}$	**52**	33	39	45	48	45
	L_{AFmax}	**68**	-	-	-	-	-
Red (West Ground floor)	$L_{Aeq,16\ hr}$	**52**	38	41	44	48	44
	$L_{Aeq,8\ hr}$	**46**	30	34	39	42	38
	L_{AFmax}	**64**	-	-	-	-	-
Yellow	$L_{Aeq,16\ hr}$	**49**	32	41	44	45	41
	$L_{Aeq,8\ hr}$	**43**	24	32	37	39	35
	L_{AFmax}	**50**	-	-	-	-	-

Table 7: A-weighted external free-field noise levels for worst-case elevations used to calculate façade sound insulation

7.4 The noise levels to all the yellow facades and red (eastern facades) present a negligible risk according to ProPG, indicating mitigation is not required. Based on a 15 dB level difference through a partially open window, the indoor noise targets would be achieved.

7.5 To red (West Façade), the internal noise levels would not be achieved with an open window, therefore noise ingress is calculated with closed windows.

7.6 The calculation method for façade sound insulation is in accordance with BS 8233 and the principles of BS EN 12354-3, Reference 14.

7.7 From ISO 16283, Reference 15, the reverberation time is typically 0.5 seconds across the relevant frequency range for a furnished living room. This value is used for both living rooms and bedrooms.

7.8 Details of the methodology used to calculate internal noise levels are provided on our website: https://www.apexacoustics.co.uk/calculation-facade-sound-insulation/.

7.9 The minimum glazing and ventilator performances presented in the summary table are calculated to be required to reduce noise levels to guideline internal noise levels in those rooms most exposed to external noise ingress.

7.10 Noise levels in less exposed but similarly protected rooms will be lower and therefore also comply with the internal noise level targets.

7.11 The most exposed rooms are those with the largest ratio of window area to room volume, as well as those closest and most exposed to the noise sources.

7.12 It is calculated that typical double-glazing units are sufficient to achieve the performance standards for all plots, as shown in Table 1 along with the window product examples.

7.13 The room and window dimensions used in the calculations are taken from the architects' plans and elevations, Reference 13.

7.14 The sound reduction of the masonry portion of the facade is much higher than that of the glazing and ventilation provision. Therefore, noise penetration through the masonry is disregarded as relatively insignificant.

7.15 Calculated internal noise levels on the basis of the identified minimum performance requirements are presented in Table 8.

7.16 An example full calculation for the worst affected location is shown in Appendix C based on manufacturers test data from the example glazing and ventilator products.

Façade	Room affected	Calculated internal level		
		Daytime dB $L_{Aeq,\ 16\ hr}$	Night-time dB $L_{Aeq,\ 8\ hr}$	Night-time dB $L_{Amax,\ F}$
Red (West First floor)	Bedroom	33	26	42

Table 8: Summary of calculated worst-case internal noise levels

7.17 Based on the proposed façade sound insulation provision and the level and frequency of the measured maximum noise event, 45 dB $L_{Amax,\ F}$ is unlikely to be exceeded more than 10 times per night and is therefore in line with the ProPG guidance.

7.18 **Noise and Approved Document F ventilation conditions**

7.19 The proposed development will be required to meet Part F of the Building Regulations with regard to the whole dwelling ventilation condition, as described in Approved Document F (AD-F), Reference 16.

7.20 Constraints on the trickle ventilator number and performance is identified to Bedrooms located on the Red elevations, on the First Floor only, as shown in Table 1.

7.21 Habitable rooms to all other facades can achieve indoor noise targets with windows open, and therefore no constraints on trickle ventilators.

7.22 On the basis of the acoustic constraints identified, there is unlikely to be a constraints on the Part F ventilation strategy, subject to review by others.

7.23 Example ventilators that achieve the performance standards are identified in Table 9. This list of examples is not exhaustive, and other vents are feasible that meet the specified performance standard.

Performance requirement	Trickle ventilator performance and example products (others also feasible)
≥ 30 dB $D_{ne,w}$	*Greenwood 8000 HD*
≥ 33 dB $D_{ne,w}$	*Greenwood 5000EA*

Table 9: Example trickle ventilators

7.24 Purge ventilation conditions as described by AD-F is manually controlled ventilation of rooms or spaces at a relatively high rate to rapidly dilute pollutants and/or disperse water vapour. Purge ventilation may be provided by natural means (e.g. an openable window) or mechanical means (e.g. a fan).

7.25 For AD-F purge ventilation conditions, ProPG states:

"It should also be noted that the internal level guidelines are generally not applicable under "purge ventilation" conditions as defined by Building Regulations Approved Document F, as this should only occur occasionally (e.g. to remove odour from painting and decorating or from burnt food)."

7.26 Considering this guidance, opening windows is considered acceptable for these occasional events without giving risk to potential adverse effect on occupants.

7.27 It should be emphasised that the above is not intended to constitute a ventilation strategy design, which is the responsibility of others. Once the ventilation strategy is established, if the details vary from those described above, the proposed details should be reassessed for acoustic performance.

7.28 **Noise and overheating**

7.29 The assessment of overheating risk for the daytime noise impact $L_{Aeq,16hr}$ has been analysed based on the AVO Guide.

7.30 The night-time $L_{Aeq,8hr}$ and L_{AFmax} assessment should be addressed through compliance with Approved Document O noise limits. A further discussion is shown in Section 3.32.

7.31 The AVO guide states:

"The Level 1 site risk assessment is based on external free-field noise levels and the assumed scenario where a partially open window is used to mitigate overheating. The Level 1 assessment is sufficient for developments on 'Negligible' risk sites (as defined by Table 3-2). The Level 2 assessment is recommended for 'High' risk sites. For 'Low' and 'Medium' risk sites, a Level 2 assessment can optionally be undertaken to give more confidence regarding the suitability of internal noise conditions. This may be particularly appropriate for sites in the 'Medium' risk category."

7.32 Considering the highest daytime period noise levels impacting on the site, a Level 1 assessment is undertaken as shown in Figure 7.

Table 3-2 Guidance for Level 1 site risk assessment of noise from transport noise sources [Note 1] relating to overheating condition

Risk category for Level 1 assessment [Note 5]	Potential Effect without Mitigation	Recommendation for Level 2 assessment
$L_{Aeq,T}$ [Note 3] during 07:00 - 23:00 / $L_{Aeq,8hr}$ during 23:00 - 07:00 High: 65 dB / 55 dB Medium: 60 dB / 50 dB Low: 55 dB / 45 dB Negligible: 50 dB / 45 dB	Increasing risk of adverse effect	Recommended Optional
	Use of opening windows as primary means of mitigating overheating is not likely to result in adverse effect	Not required

Figure 7: AVO Guide – Level 1 risk assessment for the daytime period (considering ground floor habitable rooms typically used during the daytime period). Red arrow shows noise risk for the most exposed elevation for western plots, yellow arrow shows the most significant noise risk for the remaining plots.

7.33 It should be borne in mind that this is one scale of risk for all dwellings in England, i.e. it spans single aspect flats in London to houses in the north.

7.34 A risk between "Low" and "Negligible" is identified for the purpose of utilising open windows to provide thermal comfort for the most exposed Plots located to the west of the site; for other plots located at the central and eastern part of the proposed site, a "Negligible" risk is. As such, level level 2 assessment is "Not required" for this site.

7.35 Based on this assessment, open windows may be used as part of an overheating control strategy during the daytime period. This assessment does not indicate that window openings should be restricted in any way; rather, that occupants may find their own personal balance between passive ventilative cooling and noise. It is considered on the basis of the AVO Guide that a reasonable balance should be available that is comfortable for occupants, without requiring provisions other than opening windows to mitigate overheating.

8 Conclusion

8.1 The existing noise impact across the proposed development site has been assessed in support of a full planning application.

8.2 An acoustic design process is undertaken to demonstrate how the identified risks of adverse noise impact can be mitigated and minimised in the finished development addressing the typical requirements of the Local Authority.

8.3 Based on the details outlined in this report, the site is considered suitable for residential development.

9 References

1 National Planning Policy Framework, Department for Communities and Local Government, December 2024.

2 Noise Policy Statement for England, Department for Environment, Food and Rural Affairs, March 2010.

3 BS 8233: 2014, Guidance on sound insulation and noise reduction for buildings.

4 Guidelines for Community Noise, Edited by Birgitta Bergland, Thomas Lindvall, Dietrich H Schwela, World Health Organisation, 1999.

5 Kirklees Local Plan: Kirklees Local Plan Strategy and Policies, Adopted 27 February 2019

6 Association of Noise Consultants (ANC), Institute of Acoustics (IOA) and Chartered Institute of Environmental Health (CIEH), "ProPG: Planning & Noise - New Residential Development," May 2017

7 Association of Noise Consultants (ANC), Institute of Acoustics (IOA): Acoustics Ventilation and Overheating Residential Design Guide Version, 1.1, January 2020

8 Approved Document O 2021 Edition, The Building Regulations 2010.

9 BS 7445:2003, Description and measurement of environmental noise. Guide to quantities and procedures.

10 BS 4142: 2014, Method for rating and assessing industrial and commercial sound.

11 CadnaA environmental noise modelling software, version 2024, Datakustik GmbH.

12 ISO 9613:2024 Acoustics - Attenuation of sound during propagation outdoors.

13 Architects Drawings: Jack Lunn, Acanthus WSM Architects: 1260.81-AWSM-XX-XX-DR-A-010 P6; 1260.81- AWSM- ZZ- ZZ- DR- A- 160 P1; 1260.81- AWSM- ZZ- ZZ- DR- A- 161 P1; 1260.81- AWSM- ZZ- ZZ- DR- A- 162 P1; 1260.81- AWSM- ZZ- ZZ- DR- A- 163 P1, 1260.81- AWSM- ZZ- ZZ- DR- A- 164 P1; 1260.81- AWSM- ZZ- ZZ- DR- A- 165 P1; 1260.81- AWSM- ZZ- ZZ- DR- A- 166 P1; 1260.81- AWSM- ZZ- ZZ- DR- A- 167 P1; 1260-81-AWSM-XX-XX-DR-A-010 P10

14 BS EN 12354-3:2000, Building Acoustics – Estimation of acoustic performance of buildings from the performance of elements – Part 3: Airborne sound insulation against outdoor sound.

15 BS EN ISO 16283-1:2014 Acoustics – Field measurement of sound insulation in buildings and of building elements – Part 1: Airborne sound insulation.

16 Approved Document F 2021 Edition, The Building Regulations 2010.

17 Practical Acoustic Design – the Apex Method, Proceedings of the Institute of Acoustics Vol 36 Pt 3 2014. Full paper and Poster presentation at Institute of Acoustics Conference 2014, available to download from www.apexacoustics.co.uk

18 How loud is too loud? noise from domestic mechanical ventilation systems, International Journal of Ventilation, 2019. J Harvie-Clark, N Conlan, W Wei, M Siddall. https://doi.org/10.1080/14733315.2019.1615217.

19 Assessing noise with provisions for ventilation and overheating in dwellings. Harvie-Clark J, Chilton A, Conlan N, Trew D; Building Services Engineering Research and Technology. 2019;40(3):263-273. https://doi.org/10.1177%2F0143624418824232.

20 The London Plan, Chapter 5: London's response to climate change, Policy 5.9. https://www.london.gov.uk/what-we-do/planning/london-plan/current-london-plan/london-plan-chapter-five-londons-response/poli-8.

Appendix A Acoustics, Ventilation and Overheating

A.1 Ventilation conditions

A.2 The term "ventilation" is used here to refer to the ventilation required for reasonable indoor air quality (IAQ), as described in Approved Document F (AD-F).

A.3 There are three types of ventilation considered necessary to achieve good indoor air quality:

- **whole dwelling ventilation**, required continuously while the dwelling is occupied, for fresh air for the occupants to breathe and to disperse pollutants;
- **extract ventilation**, required to overcome the build up of water vapour in wet rooms (e.g. kitchens and bathrooms); and
- **purge ventilation**, which is manually controlled ventilation at a relatively high rate to rapidly dilute pollutants and / or water vapour from occasional activities, such as painting and decorating, or smoke from burnt food.

A.4 The AVO Guide links the indoor ambient noise levels identified as LOAELS with the provision of whole dwelling ventilation, as described in AD-F. Table 3-1 from the AVO Guide is reproduced in Figure 8.

Table 3-1 Indoor Ambient Noise Levels resulting from transport noise sources - ADF ventilation condition

Ventilation condition	Operational condition of System	Desirable internal ambient noise level from transport noise sources
Part F - Whole dwelling ventilation	Systems 1 & 2: Background ('trickle') ventilators open to provide whole dwelling ventilation in the winter period. Additional ventilation required at other times of the year – windows are assumed to be ajar for assessment [Note 2].	Guideline values from Table 4 of BS 8233:2014.
	System 3: Continuous mechanical extract with background ('trickle') ventilators open [Note 2].	
	System 4: Continuous mechanical supply and extract with heat recovery (MVHR) – no trickle vents required.	
Part F – Purge Ventilation [Note 1]	Option 1: Opening external window(s) meeting requirements described in Appendix B of Part F.	No specific acoustic criterion needs to be met in a room using purge ventilation for the purpose of rapidly diluting indoor pollutants.
	Option 2: Manually controlled fan extracting 4 air changes per hour.	

Figure 8: AVO Guide noise level guidance while providing whole dwelling ventilation

A.5 The AVO Guide approach - noise from mechanical services

A.6 Recommended guideline levels for internal ambient noise limits from mechanical services are taken from Figure 3-4 the AVO Guide, reproduced in Figure 9, which collates guidance from various sources.

A.7 For bedrooms, a more prudent limit of 26 dB(A) is adopted based on the conclusions of "How loud is too loud? noise from domestic mechanical ventilation systems" by Harvie-Clark et al, Reference 18, which reviews research from across Europe and North America into the impacts of noise from domestic mechanical services.

A.8 The proposed levels adopted for this assessment are taken from these guidelines.

Ventilation condition	Possible system or design solution	Desirable internal ambient noise levels from mechanical services
ADF – Whole Dwelling Ventilation	System 3: Continuous mechanical extract (MEV), minimum low ventilation rates System 4: Continuous mechanical supply and extract with heat recovery (MVHR), minimum low ventilation rates	Bedrooms ≤ L_{Aeq} 26 or 30 dB [Note 1] Living Rooms ≤ L_{Aeq} 30 dB
ADF – Extract Ventilation	System 1: Intermittent extract fans System 3: Continuous mechanical extract (MEV), minimum high ventilation rates System 4: Continuous mechanical supply and extract with heat recovery (MVHR), minimum high ventilation rates	Bedrooms ≤ L_{Aeq} 26 or 30 dB Living / Dining Rooms ≤ L_{Aeq} 35 dB Bathroom / WC / Kitchen ≤ L_{Aeq} 45 dB
ADF – Purge Ventilation	Manually controlled fan exchanging a minimum 4 air changes per hour	No desirable noise levels are currently proposed based on the lack of evidence of acceptable noise levels when providing purge ventilation for the purpose of rapidly diluting indoor pollutants.

Figure 9: Desirable internal ambient noise levels from mechanical services for ventilation

A.9 The AVO Guide – noise and overheating

A.10 The AVO Guide has an implicit concept of *adaptive acoustic comfort*, i.e. where occupants have control over the internal environment, they are likely to have greater tolerance of increased noise levels when they are balancing their exposure to external noise and thermal comfort with opening windows.

A.11 This concept is explained by the main authors of the AVO Guide in "Assessing noise with provisions for ventilation and overheating in dwellings" by Harvie-Clark et al, Reference 19.

A.12 Different noise criteria are appropriate when considering ventilation for IAQ of for mitigating overheating. Using ventilation to mitigate overheating is described as ventilative cooling. The most common form of ventilative cooling is to open windows.

A.13 Where ventilation for IAQ is required all year round while occupied, ventilative cooling is only required for a part of the year, and intermittently, under the control of the occupants when using opening windows.

A.14 The AVO Guide proposes different criteria for the assessment of noise and ventilative cooling compared with noise guidelines that are adopted for all-year-round performance.

A.15 The AVO Guide indicates a two-stage process to determine the risk of adverse noise effects while using opening windows for ventilative cooling. The first stage of the process considers only noise levels outside, with an assumption of an outside-to-inside level difference of 13 dB for an open window.

A.16 The AVO Guide criteria and guidance for a Level 1 assessment is reproduced in Figure 10.

A.17 The second stage is to consider internal noise levels, based on the detailed design proposals and an assessment of overheating. As demonstrated in the planning report, this assessment is not relevant for the current scheme.

A.18 When considering strategies to mitigate overheating, the Cooling Hierarchy, Policy 5.9 of The London Plan, Reference 20, is followed as far as possible. This hierarchy prioritises sustainable solutions: natural ventilation over mechanical ventilative cooling over mechanical cooling, for the purpose of sustainable development in minimising operational energy use.

Table 3-2 Guidance for Level 1 site risk assessment of noise from transport noise sources [Note 1] relating to overheating condition

Risk category for Level 1 assessment [Note 5]	Potential Effect without Mitigation	Recommendation for Level 2 assessment
$L_{Aeq, T}$ [Note 3] during 07:00 - 23:00 / $L_{Aeq, 8hr}$ during 23:00 - 07:00 High: 65 dB / 55 dB Medium: 60 dB / 50 dB Low: 55 dB / 45 dB Negligible: 50 dB	Increasing risk of adverse effect	Recommended Optional
	Use of opening windows as primary means of mitigating overheating is not likely to result in adverse effect	Not required

Figure 10: AVO Guidance for a Level 1 risk assessment of noise levels *externally*

Appendix B Modelling results: noise contours

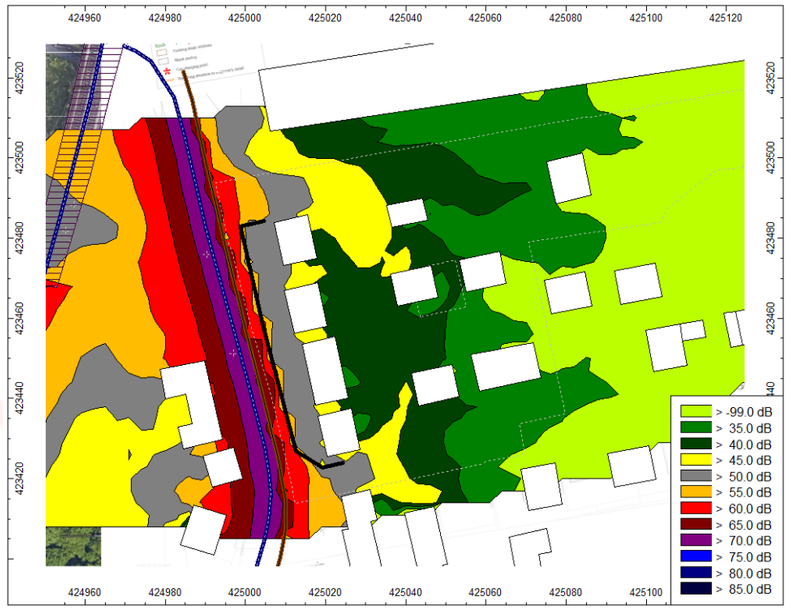

Figure 11: Plan viewing daytime $L_{Aeq, 16\,hr}$ sound contours at ground floor level (1.5 m receiver height)

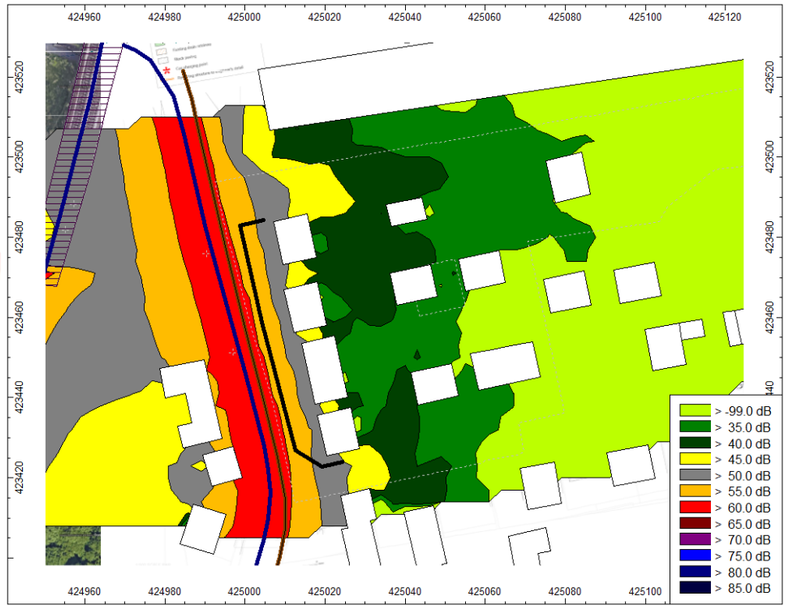

Figure 12: Plan viewing night-time $L_{Aeq, 8\,hr}$ sound contours at upper floor level (4.5 m receiver height)

Appendix C Example façade sound insulation calculations

Plot 16 Bedroom Floor 1	
Volume, V / m^3	29
Window area, S / m^2	1
Reverberation Time, T / s	0.5
Number of vents feasible	1

Daytime $L_{Aeq,T}$ (dB)	dB(A)	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz
External free-field noise, L_{1in}	**58**	41	46	50	54	51
Glazing: 4/12/4 mm, R		24	20	25	35	38
Equation 1, L_2(a)	**25**	12	21	20	14	8
Vent: 8000HD, $D_{n,e}$		33	32	29	28	30
Equation 2, L_2(b)	**32**	12	18	25	29	24
Total noise through all elements, L_2	**33**					

Night-time $L_{Aeq,T}$ (dB)	dB(A)	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz
External free-field noise, L_{1in}	**53**	33	39	45	48	5
Glazing: 4/12/4 mm, R		24	20	25	35	38
Equation 1, L_2(a)	**18**	4	14	15	8	1
Vent: 8000HD, $D_{n,e}$		33	32	29	28	30
Equation 2, L_2(b)	**26**	4	11	19	23	18
Total noise through all elements, L_2	**26**					

Night-time L_{AFmax} (dB)	dB(A)
External free-field noise, L_{1in}	**68**
Glazing: 4/12/4 mm, R_w	31
Equation 1, L_2(a)	32
Vent: 8000HD, $D_{n,ew}$	30
Equation 2, L_2(b)	42
Total noise through all elements, L_2	**42**

Table 10: Example calculation for the worst-case habitable room – First Floor Bedrooms Western elevation (Red)