Tollgate House, Barrington Road, Northumberland

Noise impact assessment

9573.1

22nd February 2022

Revision A

Tollgate House, Barrington Road, Northumberland

Noise impact assessment

9573.1A

Revision	Description	Issued by	Date
A	First issue	NC	22nd February 22

Prepared for

George F White (Alnwick Office)

4-6 Market Street, Alnwick, Northumberland, NE66 1TL.

Prepared by

[redacted]

Kaelyn Tan MSc AMIOA

Checked by

[redacted]

Nick Conlan BEng MIOA AIFireE

Apex Acoustics Limited Reg. in England no. 05656507
Design Works, William Street, Gateshead, NE10 0JP

T 0191 620 0750
E info@apexacoustics.co.uk
W www.apexacoustics.co.uk

Accredited Contractor

Contents

1 Summary

1.1 This report has been prepared in support of a planning application for a residential development at Barrington Road, Northumberland.

1.2 Noise levels affecting the proposed development from road traffic, rail traffic and other sources 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 current planning policy, relevant standards and noise practice guidance.

1.5 The façade sound insulation design is considered with windows closed to reduce the calculated noise impact to below the lowest adverse effect level. Alternative provision should be made for whole dwelling ventilation according to the Building Regulations, Approved Document F (AD-F).

1.6 The acoustic performance requirements for glazing and ventilators (if required) are summarised in Table 1. The sound insulation treatments required for each façade are shown in Figure 1.

1.7 Noise levels in specific number of gardens which are away from Barrington Road are calculated to be within the range of 50 to 55 dB $L_{Aeq,16\ hr}$ without requiring any further noise mitigation.

1.8 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.

1.9 The potential for noise impact when utilising an open window for mitigation of overheating risks will need to be undertaken and be dealt with Part O of the Building Regulations.

Requirement	Glazing performance	Trickle ventilator performance – If required
No requirement	No restriction	
1 (South – facing Barrington Road) (Refer to Figure 1)	**25 dB $R_w + C_{tr}$**	Combined performance of vents for each bedroom & living room, **38 dB $D_{ne,w} + C_{tr}$**
2 (North) (Refer to Figure 1)		Combined performance of vents for bedroom & living room, **31 dB $D_{ne,w} + C_{tr}$**

Table 1: Summary of minimum façade sound insulation treatment

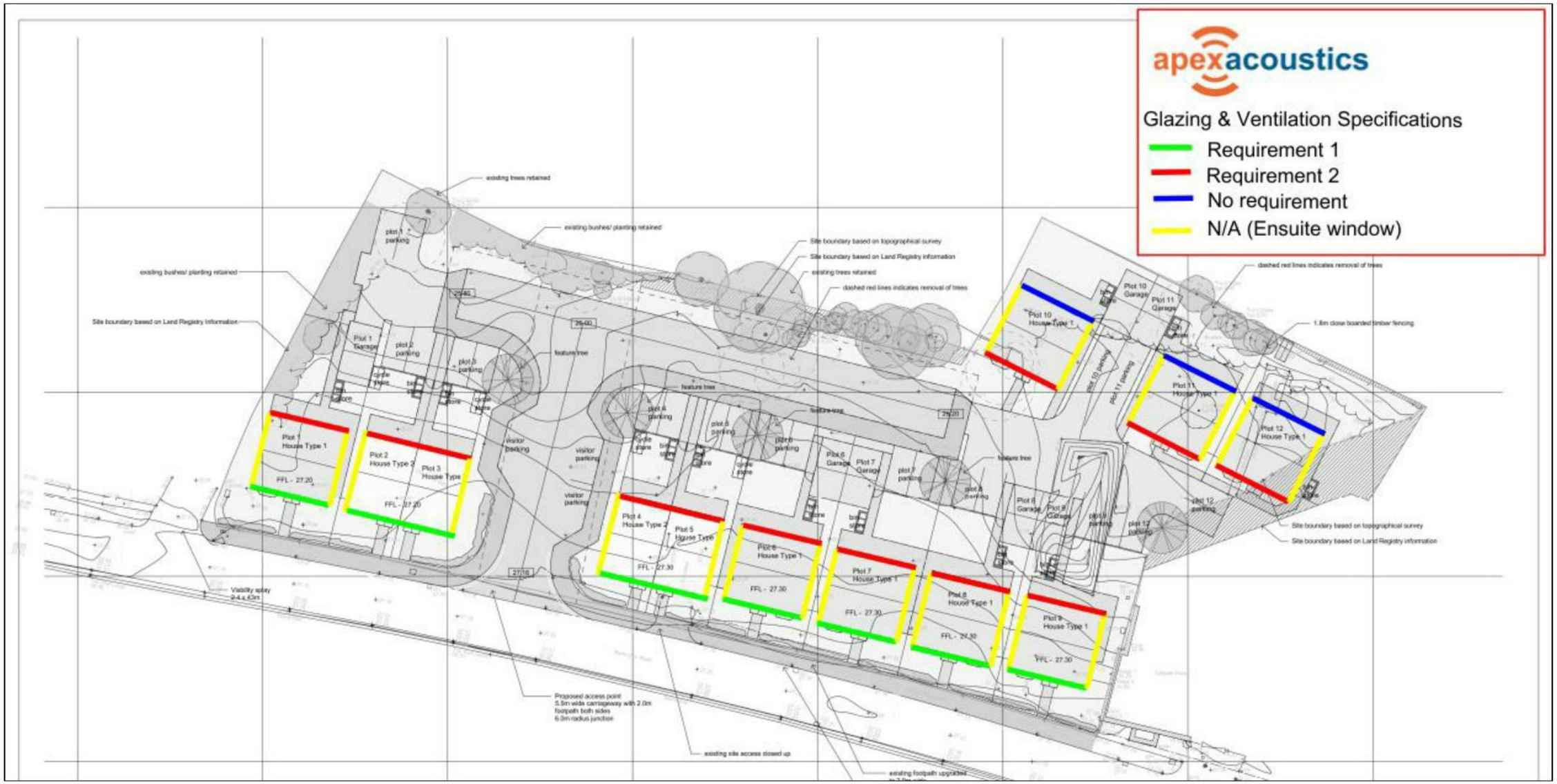

Figure 1: Façade sound insulation mark-up

2 Introduction

2.1 A residential development has been proposed at Barrington Road, Northumberland.

2.2 Apex Acoustics has been commissioned to undertake a noise survey and assessment of the potential noise impact on the proposed development site in support of a planning application.

2.3 The primary noise sources considered in this assessment are:

- Road traffic noise on Barrington Road to the south of the site; and
- Potential noise impact from nearby commercial sources

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:

- Measure the existing noise environment over a 48-hour period at several locations;
- Noise modelling based on the proposed layouts to determine noise levels impacting across the site;
- Determine potential noise impact under whole dwelling ventilation condition according to Approved Document F strategies
- Provide a detailed scheme for the mitigation of noise to reduce the risk of adverse effect, in accordance with local and national policy requirements.

Figure 2: Site location outlined in red

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 174, 185 and 187 of the NPPF states the following:

3.3 Paragraph 174:

"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 185:

"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 187:

"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, which are in line with those given by the World Health Organisation, Reference, adequately achieve the first and second aims of the NPSE.

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

3.12 Professional Practice Guidance on Planning & Noise: New Residential Development (ProPG), Reference 4, is a guidance document on the management of noise within the planning system in England for new build housing developments.

3.13 The document draws together guideline limits for internal noise levels from external transport sources from other sources of guidance, including BS 8233, Reference 5, and the World Health Organisation (WHO) Guidelines for Community Noise, Reference 6.

3.14 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

3.15 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.

3.16 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."

3.17 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.

3.18 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."

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

3.20 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."

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

4 Noise sources and measurements

4.1 Measurements

4.2 Measurements of the existing noise environment were made for a 48-hour period from around 10:20 hours on 5th January 2022 using the guidance of BS 7445, Reference 7.

4.3 The measurement locations are shown in Figure 3.

Figure 3: Measurement positions indicated by yellow markers

4.4 The microphones, P1 and P2 were located at 3.2 m and 1.8 m above ground level respectively, away from other reflecting surfaces, such that the measurements are considered to be free-field.

4.5 Short-term measurement at P3 was undertaken between 10:40 and 12:40 hours on 5th January 2022 to capture noise associated with the car workshop to the east of the site. The microphone was located at 3.6 m above ground level away from other reflecting surfaces.

4.6 The equipment used is listed in Table 3.

Equipment	Model	Serial no.
Sound Level Meter	NTi XL2	A2A-12269-E0
Calibrator	Larson Davis CAL 200	13404
Sound Level Meter	NTi XL2	A2A-14205-E0
Calibrator	Larson Davis CAL 200	15308

Table 3: Equipment used

4.7 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.

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

4.9 **Noise sources**

4.10 The most significant noise source affecting the proposed development during the daytime and night time was road traffic noise on Barrington Road situated to the south of the site.

4.11 Other noise sources included occasional railway noise from the railway line situated next to Barrington Road and occasional distant bangs from the car workshop to the east of the site.

4.12 It is understood that the railway line that runs through Bedlington Railway Station is currently closed to passenger and only serves freight traffic.

4.13 No noise from the scrap yard to the north of the site was audible during the assessment period.

4.14 **Results**

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

	Parameter	dB(A)	Octave band centre frequency, Hz Measured A-weighted noise levels, dB							
			63	125	250	500	1k	2k	4k	8k
P1	Daytime, $L_{Aeq,\ 16\ hr}$	66	41	48	53	57	62	61	52	46
	Night time, $L_{Aeq,\ 8\ hr}$	57	38	42	46	49	53	51	43	36
	Night time, $L_{AF,max}$	82	-	-	-	-	-	-	-	-
P2	Daytime, $L_{Aeq,\ 16\ hr}$	51	30	32	38	42	47	43	41	38
	Night time, $L_{Aeq,\ 8\ hr}$	45	24	27	33	38	41	38	35	31
	Night time, $L_{AF,max}$	62	-	-	-	-	-	-	-	-
P3	Daytime, $L_{Aeq,\ 2\ hr}$	60	37	40	46	51	57	55	48	40

Table 4: Measured A-weighted noise levels

4.16 The single event maximum noise level presented in Table 4 is exceeded no more than 10 times during the night at Position 1 and 2, and therefore is used as the design case to determine compliance against ProPG Note 4 of Figure 2.

5 Noise impact on the site

5.1 Noise transmission and propagation is modelled using proprietary software, Cadna/A, Reference 8. This models noise propagation outdoors according to ISO 9613, Reference 9.

5.2 The modelling parameters used, source of data and details are described in Table 5.

Parameter	Source	Details
Model dimensions	Google Earth	British Transverse Mercator coordinates
Site location and layout	Architects drawings	Architects drawings, Reference 10
Topography –within site	Site observations and Google Street view	Modelled with no changes in topography
Topography –Outside of site	Site observations and Google Street view	Modelled with no changes in topography
Building heights – proposed buildings	Drawings	Architects drawings
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 and 4 m to represent ground and first and floor window heights respectively
Building and barrier absorption coefficient	ISO 9613-2	0.21 to represent a reflection loss of 1 dB
G, Ground factor	ISO 9613-2	Hard ground, G = 0; (locally on model)
Max. order of reflections	Apex Acoustics	Three

Table 5: Modelling parameters and assumptions

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

5.4 Measured maximum noise levels due to vehicle passes have been used to attribute sound power levels to a point source. The position of the point source has been shifted along the road to calculate the potential worst-case noise impact at each building façade.

5.5 The calculated noise contours results for the daytime $L_{Aeq,\ 16\ hr}$ and night-time $L_{Aeq,8\ hr}$ are shown in Figure 4 and Figure 5 respectively.

5.6 The calculated noise contours results for the night-time L_{AFmax} due to vehicle passes are shown in Figure 6 and Figure 7.

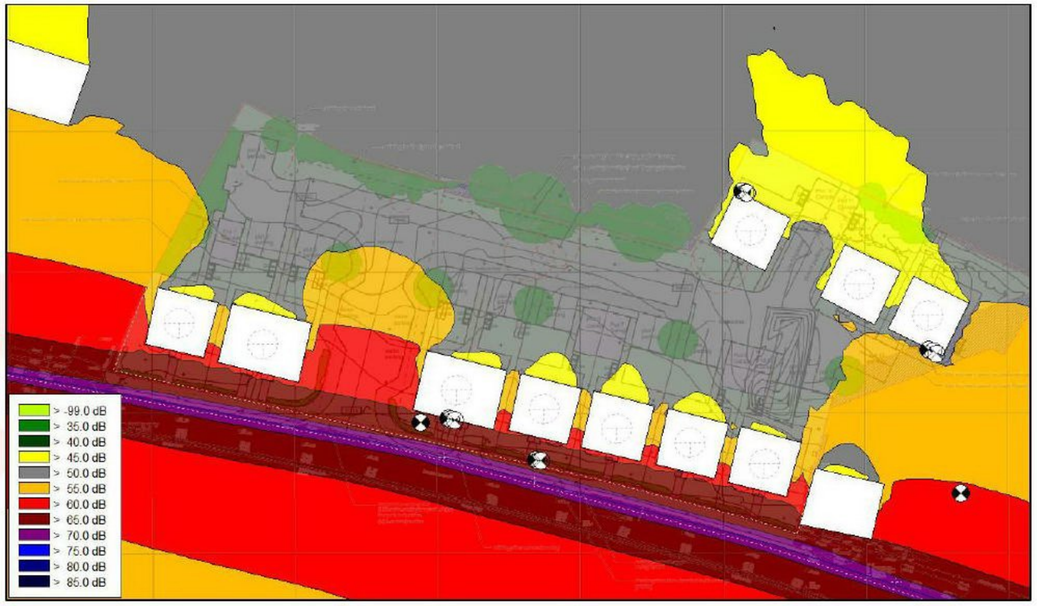

Figure 4: Plan viewing $L_{Aeq,\ 16\ hr}$ sound contours at 1.5 m above ground

Figure 5: Plan viewing $L_{Aeq,\ 8\ hr}$ sound contours at 4 m above ground

Figure 6: Plan viewing L_{AFmax} sound contours at 4 m above ground due to vehicle passes, affecting proposed houses directly facing Barrington Road

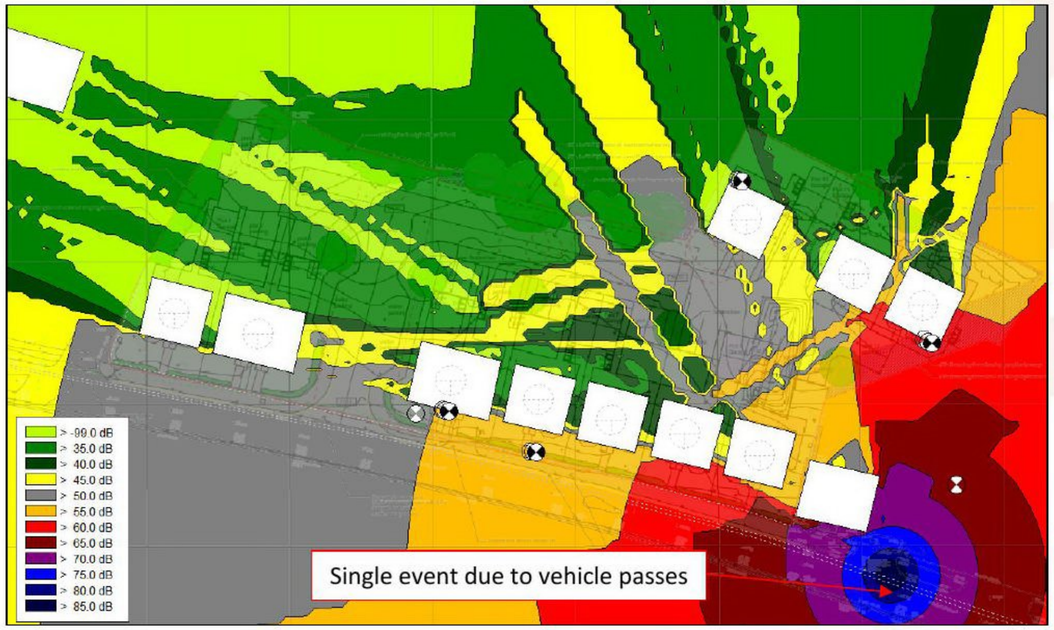

Figure 7: Plan viewing L_{AFmax} sound contours at 4 m above ground due to vehicle passes, affecting proposed houses away from Barrington Road

6 External amenity area assessment

6.1 The gardens for specific number of plots which are away from Barrington Road are considered as an intrinsic part of the overall design.

6.2 Noise levels are calculated to be below 55 dB $L_{Aeq,\ 16\ hr}$ in those gardens without requiring any further noise. All the gardens have part of the garden with predicted levels less than 50 dB $L_{Aeq,\ 16\ hr}$.

6.3 It is therefore considered that external amenity noise levels are mitigated as far as reasonably practicable, in line with the aims of the NPPF and NPSE.

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 6.

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.

Façade affected	Parameter	dB(A)	Octave band centre frequency, Hz A-weighted free-field noise level, dB				
			125	250	500	1k	2k
South (facing Barrington Road)	$L_{Aeq,16\ hr}$	65	47	53	56	62	60
	$L_{Aeq,8\ hr}$	56	40	44	47	52	50
	L_{AFmax}	77	-	-	-	-	-
North	$L_{Aeq,16\ hr}$	54	36	42	45	51	49
	$L_{Aeq,8\ hr}$	45	30	34	36	41	39
	L_{AFmax}	61	-	-	-	-	-

Table 6: A-weighted external free-field noise levels used to calculate façade sound insulation

7.4 The calculation method for façade sound insulation is in accordance with BS 8233 and the principles of BS EN 12354-3, Reference 12.

7.5 From ISO 16283, Reference 13, 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.

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

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

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

7.9 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.

7.10 The room and window dimensions used in the calculations are taken from the architects' plans and elevations, Reference 10.

7.11 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.

7.12 Calculated internal noise levels based on manufacturer's test data for the example glazing and ventilation products listed in the summary table are presented in Table 7.

Façade affected	Room affected	Calculated internal level		
		Daytime dB $L_{Aeq, 16\ hr}$	Night-time dB $L_{Aeq, 8\ hr}$	Night-time dB $L_{Amax, F}$
South (facing Barrington Road)	Bedroom	35	26	45
	Living room	35	N/A	N/A
North	Bedroom	28	19	34
	Living room	28	N/A	N/A

Table 7: Summary of calculated worst-case internal noise levels

7.13 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 below the LOAEL described in paragraph 3.16.

7.14 **Noise and ventilation**

7.15 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 11.

7.16 If a ventilation strategy adopting trickle vents is used, the combined minimum acoustic performance of the trickle ventilators is shown in Table 1 for in each bedroom or living room.

7.17 The combined performance is the value of all vents combined for each room. If more than one vent is required per room, the suppliers should provide the combined performance for the total number of vents. As a rough guide, if there are two vents, the performance of each should be increased by 3dB, and if there are four vents the performance should be increased by 6dB.

7.18 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 water vapour as released from occasional activities, such as painting and decorating or accidental releases such as smoke from burnt food or spillage of water. This type of ventilation is typically provided by opening windows.

7.19 For 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)."

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

7.21 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.

7.22 **Noise and overheating**

7.23 Due to the recent changes where all developments that start work on site after 15 June 2023 will be required to meet Part O of the Building Regulations, to control overheating.

7.24 The potential for noise impact when utilising an open window for mitigation of overheating risks will need to be undertaken and be dealt with Part O of the Building Regulations.

7.25 Approved Document O (AD-O), Reference 14 suggests that windows are likely to be closed during sleeping hours if noise within bedrooms exceeds 40 dB $L_{Aeq,T}$ during the night time and 55 dB L_{AFmax} more than 10 times a night.

7.26 These levels would be exceeded in rooms which have open windows located closest to Barrington Road.

7.27 Alternative ventilation is likely to be required to provide sufficient ventilation to control overheating without relying on opening windows.

8 Conclusion

8.1 The existing noise impact across the proposed development site has been assessed in support of a Planning Application.

8.2 Noise levels in specific number of gardens which are away from Barrington Road are calculated to be below the guideline upper limit of 55 dB $L_{Aeq,\,16\,hr}$ without requiring any further noise mitigation.

8.3 The potential implications for the design of the façade sound insulation under whole dwelling conditions as described by AD-F is discussed, and the glazing and ventilator acoustic performance requirements to achieve the indoor noise level targets are identified in Table 1.

8.4 Based on the existing noise risks and details outlined in this report, the site is considered suitable for residential development.

8.5 The potential for noise impact when utilising an open window for mitigation of overheating risks will need to be undertaken and be dealt with Part O of the Building Regulations.

9 References

1 National Planning Policy Framework, Department for Communities and Local Government, July 2021 .

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

3 Planning Practice Guidance – Noise: http://planningguidance.planningportal.gov.uk/blog/guidance/noise/noise-guidance/

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

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

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

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

8 Cadna/A environmental noise modelling software, version 2020, Datakustik GmbH.

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

10 Architects Drawings: Proposed Site Plan, NCL400628_1100_P01 and Proposed Plans/ Elevations, NCL400628_1110_P01, Nov 2021.

11 Approved Document F 2010 Edition, The Building Regulations 2000.

12 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.

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

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