

Noise impact assessment

YA201.P2.2

Erection of 74 residential dwelling houses (115468/00/2017)

Land To The Rear Of
Whitehouse Club
Middleton Road
Manchester
M8 4JZ

Manchester, UK

Version 2.0

June 4, 2021

Identification

Title: Noise impact assessment: Erection of 74 residential dwelling houses
(115468/OO/2017)

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Client: Branley Homes Ltd

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Local: Manchester, UK

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Prepared for: Branley Homes Ltd and [Manchester City Council \(MCC\)](#)

Revisions

Date	Changes / Comments	Reviser
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Contents

	Contents	3
	Acronyms	5
	Glossary	6
	Summary	8
1	INTRODUCTION	9
2	PLANNING CONDITION 26 A)	10
3	SITE SURVEY	11
3.1	Methodology	11
3.2	Results	12
4	FACADE NOISE	14
4.1	Methodology	14
4.2	Results	15
5	INTERNAL AMBIENT NOISE LEVELS	16
5.1	Impacts with open windows	16
5.2	Facade acoustic requirements	16
5.2.1	Methodology	16
5.2.2	Results	17
6	EXTERNAL AMENITY AREAS	19
	Final considerations	20
	BIBLIOGRAPHY	21
	ANNEX A – NATIONAL PLANNING POLICY	23
A.1	National Planning Policy Framework (NPPF)	23
A.2	Noise Policy Statement for England (NPSE)	24

ANNEX B – CALCULATION DETAILS 26

Acronyms

ADF Approved Document F. [8](#), [17](#), [20](#)

IANLs Internal Ambient Noise Levels. [8](#), [16](#), [17](#), [20](#)

MCC Manchester City Council. [2](#), [8](#), [9](#), [10](#), [20](#)

SLM Sound Level Meter. [11](#)

SWL Sound Power Level. [14](#)

Glossary

C_{tr} correction term applied against the sound insulation single-number values (R_w , D_w , and $D_{nT,w}$) to provide a weighting against low frequency performance. [8](#), [17](#), [20](#)

$D_{ne,w}$ **element normalized level difference of small building elements** - difference of the sound pressure level produced in two rooms by a source in one room, where sound transmission is only due to a small technical element (e.g. transfer air devices, electrical cable ducts, transit sealing systems). [8](#), [17](#), [20](#)

L_{Aeq} **equivalent A-weighted sound pressure level** - value of the A-weighted sound pressure level in decibels (dB) of a steady sound that has the same mean-squared sound pressure as the sound under consideration that varies with time. [11](#)

$L_{Aeq,16hr}$ **equivalent A-weighted continuous sound pressure level** - value of the A-weighted sound pressure level in decibels (dB) of a continuous, steady sound that, within the period 07:00-23:00 hours has the same mean-squared sound pressure as the sound under consideration that varies with time. [8](#), [12](#), [17](#), [19](#), [20](#)

$L_{Aeq,1sec}$ **equivalent A-weighted continuous sound pressure level** - value of the A-weighted sound pressure level in decibels (dB) of a continuous, steady sound that, within a time interval of 1 second has the same mean-squared sound pressure as the sound under consideration that varies with time. [12](#), [13](#)

$L_{Aeq,8hr}$ **equivalent A-weighted continuous sound pressure level** - value of the A-weighted sound pressure level in decibels (dB) of a continuous, steady sound that, within the period 23:00-07:00 hours has the same mean-squared sound pressure as the sound under consideration that varies with time. [15](#), [17](#)

L_{AFmax} **maximum A-weighted sound pressure level** - value of the maximum A-weighted sound pressure level obtained using time-weighting “F”, during a specified time interval. [12](#), [13](#), [17](#)

R_w **weighted sound reduction index** - single-number quantity which characterizes the airborne sound insulating properties of a material or building element over a range of frequencies. [8](#), [17](#), [20](#)

RT reverberation time - time that would be required for the sound pressure level to decrease by 60 dB after the sound source has stopped. 16

Summary

This report has been prepared in response to **planning condition no. 26 a)** of planning application 115468/00/2017, issued by the [MCC](#), for the development of 74 new dwelling houses at Land To The Rear Of Whitehouse Club, Middleton Road, Manchester, M8 4JZ.

Condition 26 a) requires that the proposed dwellings [Internal Ambient Noise Levels \(IANLs\)](#) are below set limits.

Noise levels affecting the proposed development have been measured during the day and night and the facade noise impact calculated.

With windows open, the resulting [IANLs](#) exceed the limits set by planning condition 26 a) and as such the recommended facade solutions are considered with windows closed.

Calculations indicate that for all dwellings of the proposed development, standard double glazing with a minimum performance of 25 dB $R_w + C_{tr}$ (e.g. 4/16/4 mm) and [Approved Document F \(ADF\)](#) System 1 or System 3 with a minimum performance of 34 dB $D_{ne,w} + C_{tr}$ can be used (maximum of 2 trickle ventilators).

The development is required to achieve the minimum ventilation rates indicated in the Building Regulations [ADF](#).

Noise levels in all relevant amenity areas are calculated to be below the guideline upper limit of 55 dB $L_{Aeq,16hr}$, without requiring any further noise mitigation.

Based on the implementation of the recommendations provided in this report, **the development is considered to be in line with the requirements set out by planning condition 26 a)** as issued by the [MCC](#).

1 Introduction

A residential development consisting of 74 new dwelling houses is proposed at Land To The Rear Of Whitehouse Club, Middleton Road, Manchester, M8 4JZ.

YAcoustics Ltd has been commissioned to undertake an assessment of the potential noise impact on the proposed development, in response to planning condition no. 26 a) of the Decision Note issued by the MCC on the 11th of April 2019¹.

Thus, suitable design solutions and recommendations have been provided accordingly.

Figure 1 shows the site location and the proposed development master-plan.



Figure 1 – Proposed development master-plan and location

¹ Public reports pack 11042019 1400 Planning and Highways Committee

2 Planning condition 26 a)

Details of the requirements set by planning condition 26 a), as issued by the MCC, are presented as Figure 2.

Regarding noise emitted by the proposed adjacent club building, a sound insulation strategy to safeguard noise emissions below the limits required by the MCC has been previously provided by Y-Acoustics¹ and as such this report concerns the impacts which relate to road noise only.

26) (a) Prior to the first occupation of the residential accommodation within phase two a scheme of acoustic insulation against road noise and the adjacent club building shall be submitted for approval in writing by the City Council, as Local Planning Authority.

Noise survey data must include measurements during a rush hour period and night time to determine the appropriate sound insulation measures necessary. The internal noise criteria are as follows:

Bedrooms (night time 23:00 – 07:00) 30 dB LAeq (individual noise events shall not normally exceed 45 dB L_{Amax} F by more than 15 times)
Living rooms (daytime – 07:00 – 23:00) 35 dB LAeq
Gardens and terraces (daytime) 55 dB LAeq

Where entertainment noise is a factor in the noise climate the sound insulation scheme shall be designed to achieve internal noise levels in the 63Hz and 125 Hz octave centre frequency bands so as not to exceed (in habitable rooms) 47 dB and 41 dB respectively.

Figure 2 – Planning condition 26 a)

¹ See report no. YA201.P1

3 Site survey

3.1 Methodology

The main noise source affecting the proposed development during both the day and night-time is the road traffic on Middleton Road (A576).

To quantify its impacts, monitoring was carried out for 24 hours from the 14th to the 15th of February 2020 in line with BS 7445-2 [1].

Figure 3 illustrates the position adopted.



Figure 3 – Adopted measurement position (P1) (source: Google Earth)

The microphone was placed at a height of 1.5 meters above roof level, away from reflecting surfaces.

The **Sound Level Meter (SLM)** was setup to measure L_{Aeq} values over 1 second intervals and a wind-shield was used as a precaution against interference.

The measurements were carried out in the absence of rain or wind speeds higher than 5 m.s^{-1} .

The **SLM** used meet the technical specifications of BS 7445 [1] 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.

Table 1 – Equipment used

Equipment	Model	Serial no.
Sound Level Meter	Svantek SV307 (with built-in calibrator)	82048
Calibrator		

3.2 Results

The measured day and night-time noise levels are presented as Table 2.

The ten highest recorded values of L_{AFmax} , associated with specific events during the night are shown in Table 3.

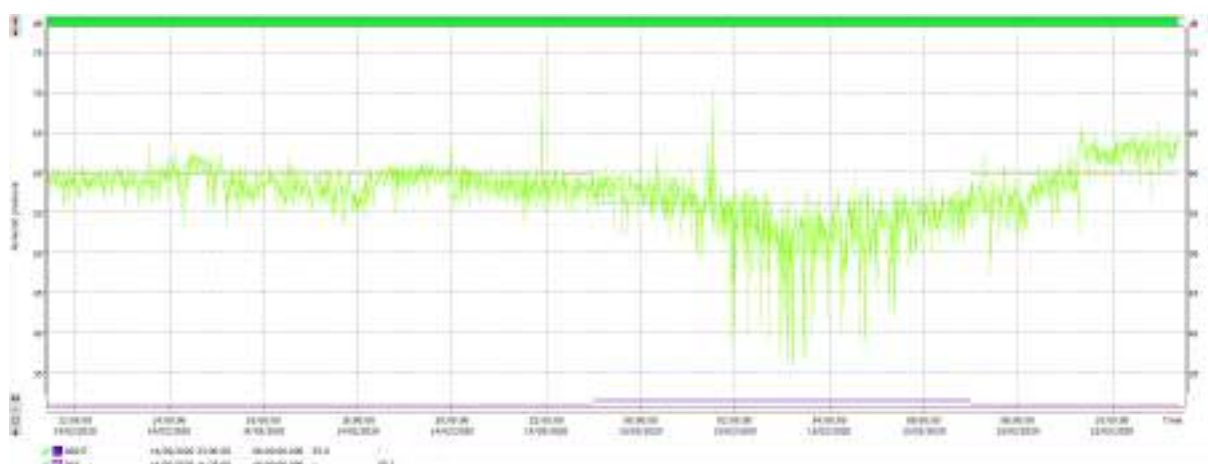
The time history values of $L_{Aeq,1sec}$ are shown as Figure 4.

Table 2 – Measured day and night-time noise levels

Meas. Position	Parameter	Octave band mid frequency in Hz							Global
		63	125	250	500	1k	2k	4k	
P1	Daytime $L_{Aeq,16hr}$	39	43	45	48	57	55	46	60
P1	Night-time $L_{Aeq,16hr}$	34	39	42	45	54	50	43	56

Table 3 – Night-time measured events - L_{AFmax}

Position P1		
Event type	Recorded L_{AFmax} dB	Time period
car pass	83	15/02/2020 01:32
car pass	79	15/02/2020 00:46
car pass	78	15/02/2020 01:31
car pass	77	15/02/2020 01:24
car pass	76	15/02/2020 01:23
car pass	75	15/02/2020 01:27
car pass	75	15/02/2020 00:21
car pass	73	15/02/2020 01:35
car pass	72	14/02/2020 23:32
car pass	71	14/02/2020 23:26
car pass	71	15/02/2020 00:23
car pass	71	15/02/2020 01:05
car pass	71	15/02/2020 00:08
car pass	70	15/02/2020 00:24
car pass	70	15/02/2020 00:54

Figure 4 – Time history - $L_{Aeq,1sec}$

4 Facade noise

4.1 Methodology

Predictions of the noise emitted by the relevant existing noise sources at the proposed development various facades have been carried out by means of a digital geometric acoustics software.

The proprietary software Olive Tree Lab - Suite developed by the Mediterranean Acoustics Research & Development (PEMARD) has been used, in line with the methodology laid out in ISO 9613-2 [2].

The input data and parameters used were the following:

- Site layout: Data of the site layout and model dimensions has been taken from the Architect drawings and from Google Earth;
- Surfaces absorption characteristics: All building surfaces absorption have been set as $\alpha = 0.1$ (0.5 dB reflection loss);
- Ground factor: Ground factor have been set as 0 (hard floor);
- Order of reflections: A reflection order of 3 has been used¹;

The **Sound Power Level (SWL)** of the relevant sources have been defined based on the measured noise levels.

Due to the fact that night time noise levels are less than 5 dB lower than daytime noise levels, predictions have been carried out for the night-time only as it represents the worst scenario.

Figure 5 shows the developed digital geometric acoustics model.

¹ A suitable reflection order has been determined based on the specific site geometry and the source-receiver positions.



Figure 5 – 3D view of the digital geometric acoustics model

4.2 Results

The calculated night-time noise levels are presented as Figure 6.

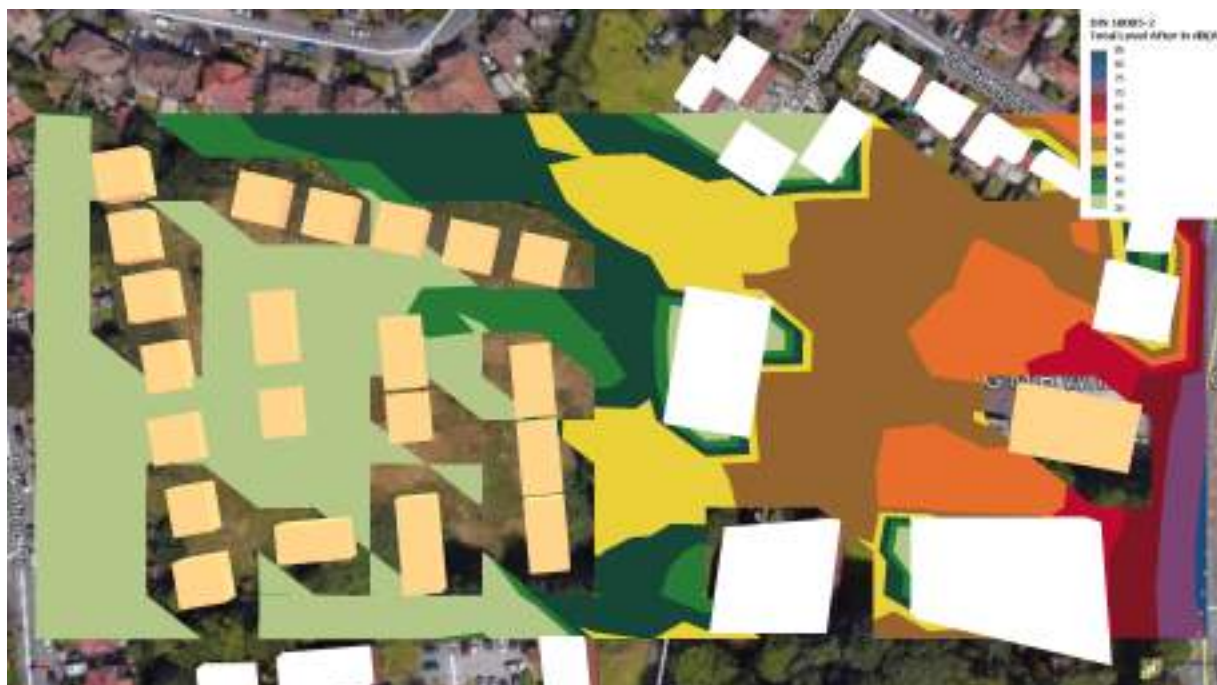


Figure 6 – $L_{Aeq,8hr}$ noise map

5 Internal ambient noise levels

5.1 Impacts with open windows

The difference between free field and internal ambient noise levels through a partially open window is approximately 13 dB [6].

Based on this assumption and the noise levels stated in Figure 6, to achieve suitable IANLs, windows are required to remain closed and to provide sufficient insulation. Therefore, suitable facade and ventilation solutions have been calculated.

5.2 Facade acoustic requirements

5.2.1 Methodology

To determine facade and ventilation solutions to achieve suitable IANLs within each relevant space, the methodology laid out in BS 8233 [4] and BS EN ISO 12354-3 [5] have been considered.

The calculations have been carried out for the night-time¹ period and for rooms which represent a worst case. Such rooms are those which are exposed to the highest noise levels and with the largest ratio of facade area to room volume; and have been identified to be the living rooms and bedrooms which form part of the 1 and 2 bed apartments buildings as identified in Figure 7.

The dimensions and characteristics of each radiating surface (i.e. windows, external walls) and room volumes have been provided by the architect.

An average reverberation time RT of 0.5 seconds for bedrooms and 0.8 seconds for living rooms was considered adequate due to the average room volumes and surface finishes characteristics.

Noise break-in through masonry elements is considered to be negligible.

Annex B, includes details for the calculations carried out.

¹ The night time period represents the worst case scenario - see Table 2.

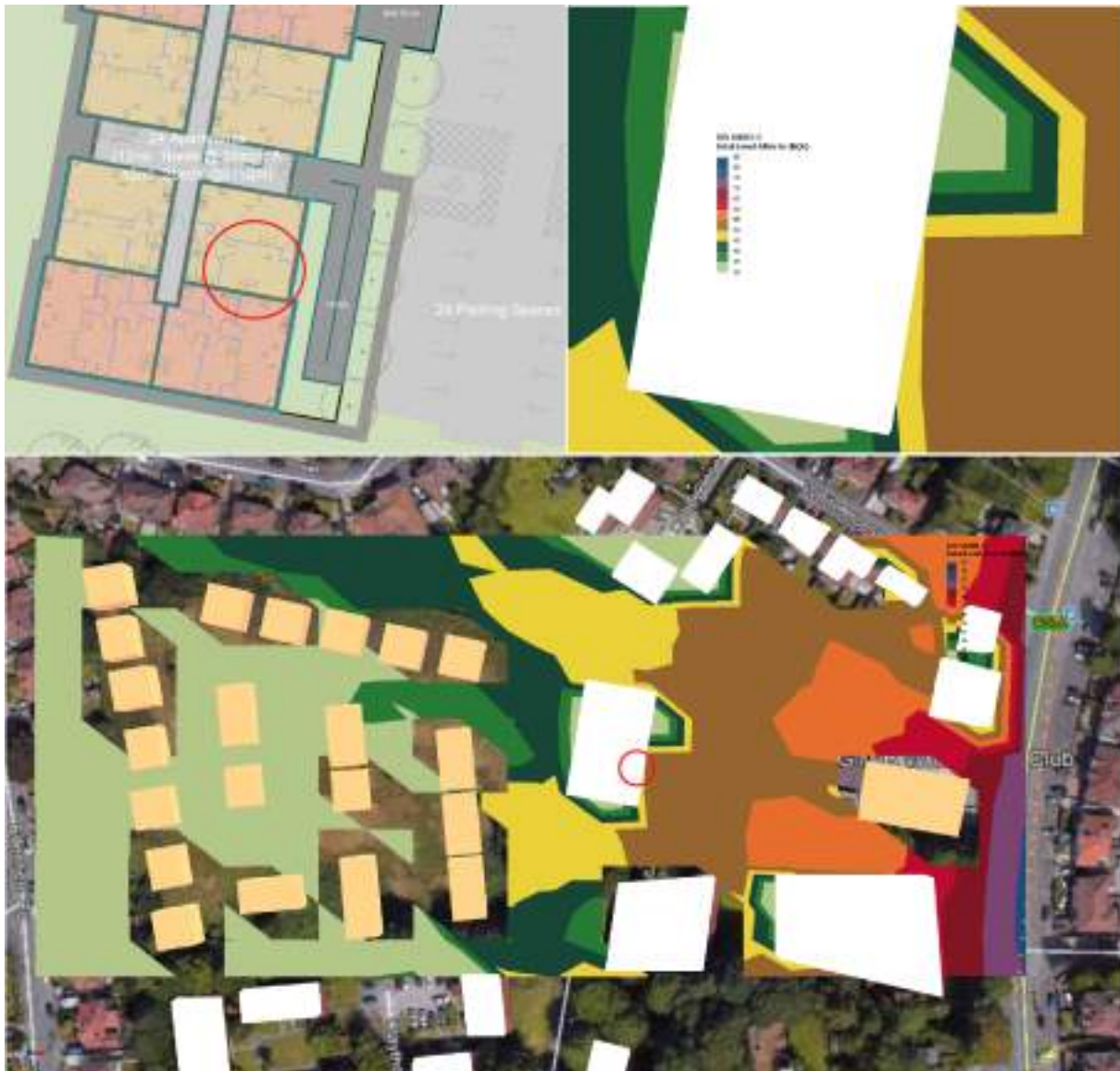


Figure 7 – Rooms exposed to the highest noise levels (red)

5.2.2 Results

Calculations indicate that for all dwellings of the proposed development, standard double glazing with a minimum performance of 25 dB $R_w + C_{tr}$ (e.g. 4/16/4 mm) and ADF System 1 or System 3 with a minimum performance of 34 dB $D_{ne,w} + C_{tr}$ can be used (maximum of 2 trickle ventilators).

For living rooms, the anticipated highest IANLs, with such solutions in place, would be 30 dB $L_{Aeq,16hr}$ and 26 dB $L_{Aeq,8hr}$. As for bedrooms the anticipated highest IANLs would be 29 dB $L_{Aeq,16hr}$, 25 dB $L_{Aeq,8hr}$ and 41 dB L_{AFmax} (for the 15th loudest individual noise

event).

The solutions above do not constitute a ventilation strategy design, which is the responsibility of the mechanical engineer.

6 External amenity areas

The amenity areas part of the proposed development consist of back gardens for the proposed houses.

Predictions of the noise emitted by the relevant existing noise sources during day-time at the proposed external amenity areas have been carried out by means of the same digital geometric acoustics model referred to in Section 4.1 in line with ISO 9613-2 [2].

The same input data and parameters were used. The calculated daytime noise levels are presented as Figure 8.

The results indicate that noise levels are expected to be below 55 dB $L_{Aeq,16hr}$ for all the external amenities and as such no mitigation solutions are required.

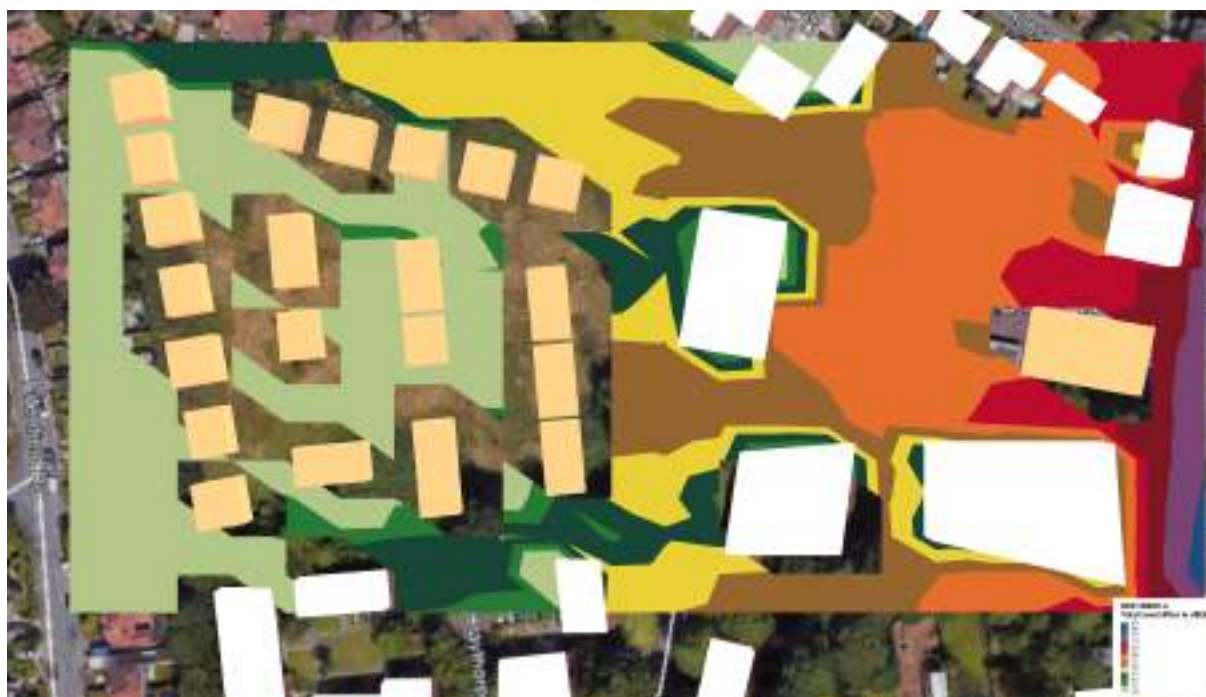


Figure 8 – $L_{Aeq,16hr}$ noise map (external amenity areas)

Final considerations

A detailed assessment of noise impacts on the proposed development has been carried out. It has been determined that windows need to be closed in order to achieve the required [IANLs](#).

Suitable facade and ventilation solutions have been calculated.

Calculations indicate that for all dwellings of the proposed development, standard double glazing with a minimum performance of 25 dB $R_w + C_{tr}$ (e.g. 4/16/4 mm) and [ADF](#) System 1 or System 3 with a minimum performance of 34 dB $D_{ne,w} + C_{tr}$ can be used (maximum of 2 trickle ventilators).

Noise levels in all gardens are calculated to be below the guideline upper limit of 55 dB [L_{Aeq,16hr}](#), without requiring any further noise mitigation.

Based on the implementation of the recommendations provided in this report, **the development is considered to be in line with the requirements set out by planning condition 26 a)** as issued by the [MCC](#).

Bibliography

- [1] BS 7445-2:1991, Description and measurement of environmental noise - Part 2: Guide to the acquisition of data pertinent to land use. Standard, BSI, 1991. Cited in page [11](#).
- [2] ISO 9613-2:1996 Attenuation of sound during propagation outdoors - Part 2: General method of calculation. Standard, ISO, 1996. Cited 2 on pages [14](#) and [19](#).
- [3] Noise Policy Statement for England (NPSE). Technical document, Department For Environmental, Food And Rural Affairs, 2010. Cited in page [24](#).
- [4] BS 8233:2014, Guidance on sound insulation and noise reduction for buildings. Standard, 2014. Cited in page [16](#).
- [5] BS EN ISO 12354-3:2017, Estimation of acoustic performance in buildings from the performance of elements - Part 3: Airborne sound insulation against outdoor sound. Standard, 2017. Cited in page [16](#).
- [6] ProPG: Planning & Noise. Technical document, Association of Noise Consultants (ANC), Institute of Acoustics (IOA) and Chartered Institute of Environmental Health (CIEH), 2017. Cited in page [16](#).
- [7] National Planning Policy Framework. Technical document, Ministry of Housing, communities and local government, 2018. Cited in page [23](#).

Annexes

ANNEX A – National Planning Policy

A.1 National Planning Policy Framework (NPPF)

The National Planning Policy Framework [7] 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 regards to noise, Paragraphs 170, 180, 204 and 205 state the following:

170. Planning policies and decisions should contribute to and enhance the natural and local environment by:

- 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. Development should, wherever possible, help to improve local environmental conditions such as air and water quality, taking into account relevant information such as river basin management plans.

180. 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;
- 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.

204. Planning policies should:

- g) when developing noise limits, recognise that some noisy short-term activities, which may otherwise be regarded as unacceptable, are unavoidable to facilitate minerals extraction.

205. When determining planning applications, great weight should be given to the benefits of mineral extraction, including to the economy. In considering proposals for mineral extraction, minerals planning authorities should:

- c) ensure that any unavoidable noise, dust and particle emissions and any blasting vibrations are controlled, mitigated or removed at source, and establish appropriate noise limits for extraction in proximity to noise sensitive properties.

A.2 Noise Policy Statement for England (NPSE)

The Noise Policy Statement for England [3] long term vision is 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 NPSE states the three following policy aims:

First Aim:

Avoid significant adverse impacts on health and quality of life from environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development;

Second Aim:

Mitigate and minimise adverse impacts on health and quality of life from environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development;

Third Aim:

Where possible, contribute to the improvement of health and quality of life through the effective management and control of environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development.

The NPSE uses two established concepts from toxicology that are currently being applied to noise impacts, for example, by the World Health Organisation. These are extended to the concept of a significant observed adverse effect level as follows:

NOEL – No Observed Effect Level

This is the level below which no effect can be detected. In simple terms, below this level, there is no detectable effect on health and quality of life due to the noise.

LOAEL – Lowest Observed Adverse Effect Level

This is the level above which adverse effects on health and quality of life can be detected.

SOAEL – Significant Observed Adverse Effect Level

This is the level above which significant adverse effects on health and quality of life occur.

The first aim of the NPSE states that significant adverse effects on health and quality of life should be avoided while also taking into account the guiding principles of sustainable development (paragraph 1.8).

The second aim of the NPSE refers to the situation where the impact lies somewhere between LOAEL and SOAEL. It requires that all reasonable steps should be taken to mitigate and minimise adverse effects on health and quality of life while also taking into account the guiding principles of sustainable development (paragraph 1.8). This does not mean that such adverse effects cannot occur.

The third aim seeks, where possible, positively to improve health and quality of life through the pro-active management of noise while also taking into account the guiding principles of sustainable development (paragraph 1.8), recognising that there will be opportunities for such measures to be taken and that they will deliver potential benefits to society. The protection of quiet places and quiet times as well as the enhancement of the acoustic environment will assist with delivering this aim.

ANNEX B – Calculation details

ROOM DETAILS	
ID	FLAT A4
Type	Living room
Volume (m3)	52.5
Wall (m2)	0.0
Window 1 (m2)	4.7
Window 2 (m2)	0.0
Roof (m2)	0.0
Wall vent (m2)	0.0
No. of passive vents	2.0
Element total area (m2)	4.7

TERM	DESCRIPTION	Rw (C;Ctr)	Octave band mid frequency in Hz							GLOBAL dB(A)
			63	125	250	500	1000	2000	4000	
LAeq,8hrs	External ff noise	-	22	36	37	38	50	51	33	54
RT (s)	RT (s)	-	0.8	0.8	0.8	0.8	0.8	0.8	0.8	-
Abs. Area (m2)	Abs. Area (m2)	-	11	11	11	11	11	11	11	-
10log A	10log A	-	10	10	10	10	10	10	10	-

R (Wall)	n/a	-	100	100	100	100	100	100	100	-
R (Window 1)	4 mm / (6-16mm) / 4 mm	29 (-1; -4)	17	21	17	25	35	37	31	-
R (Window 2)	n/a	-	100	100	100	100	100	100	100	-
R (Roof)	n/a	-	100	100	100	100	100	100	100	-
Dne (Ventilator 1)	dn vent (window mounted)	37 (-1;-3)	30	39	39	37	36	39	37	-
Dne (Ventilator 2)	dn vent (window mounted)	37 (-1;-3)	30	39	39	37	36	39	37	-
R (Vent)	n/a	-	100	100	100	100	100	100	100	-

R (Facade)	All façade elements	-	16	21	17	24	29	31	28	-
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LAeq,16hrs	IANLs	-	5	15	20	14	21	19	5	26
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ROOM DETAILS	
ID	FLAT A4
Type	Bedroom
Volume (m3)	27.5
Wall (m2)	0.0
Window 1 (m2)	2.0
Window 2 (m2)	0.0
Roof (m2)	0.0
Wall vent (m2)	0.0
No. of passive vents	2.0
Element total area (m2)	2.0

TERM	DESCRIPTION	Rw (C;Ctr)	Octave band mid frequency in Hz							GLOBAL dB(A)
			63	125	250	500	1000	2000	4000	
LAeq,8hrs	External ff noise	-	22	36	37	38	50	51	33	54
RT (s)	RT (s)	-	0.5	0.5	0.5	0.5	0.5	0.5	0.5	-
Abs. Area (m2)	Abs. Area (m2)	-	9	9	9	9	9	9	9	-
10log A	10log A	-	9	9	9	9	9	9	9	-

R (Wall)	n/a	-	100	100	100	100	100	100	100	-
R (Window 1)	4 mm / (6-16mm) / 4 mm	29 (-1; -4)	17	21	17	25	35	37	31	-
R (Window 2)	n/a	-	100	100	100	100	100	100	100	-
R (Roof)	n/a	-	100	100	100	100	100	100	100	-
Dne (Ventilator 1)	dn vent (window mounted)	37 (-1;-3)	30	39	39	37	36	39	37	-
Dne (Ventilator 2)	dn vent (window mounted)	37 (-1;-3)	30	39	39	37	36	39	37	-
R (Vent)	n/a	-	100	100	100	100	100	100	100	-

R (Facade)	All façade elements	-	15	20	17	23	25	28	26	-
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LAeq,16hrs	IANLs	-	3	12	17	12	21	19	4	25
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