

Land at Parkfield House, Manchester Old Road, Middleton

Noise impact assessment

March 2023

Parkfield House, Manchester Old Road, Middleton

Noise impact assessment

9272.2

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1 Summary

- 1.1 This report has been prepared in support of a planning application for a residential development consisting of a 80-bed care home and 20 townhouses at Parkfield House, Manchester Old Road, Middleton.
- 1.2 Noise levels affecting the proposed development from road traffic and other sources have been measured during the day and night.
- 1.3 Noise propagation across the site is calculated in environmental noise modelling software, CadnaA and the façade noise impact calculated.
- 1.4 Barriers of 2.4 m height are required to reduce garden noise levels to be below the guideline upper limit of 55 dB $L_{Aeq, 16 \text{ hr}}$ and to mitigate against noise from the skate park.
- 1.5 The location of the proposed barriers indicated in Figure 1 by cyan lines. To be effective in practice, the barrier should have no cracks or gaps, be continuous to the ground, and have a surface density $\geq 10 \text{ kg/m}^2$ such as a closeboard timber fence or brick wall.
- 1.6 Noise from the skatepark to the east of the site is assessed with the proposed noise barrier, and calculated to be below limits taken from appropriate guidance at the most exposed façade.
- 1.7 To satisfy guideline indoor ambient noise targets, the acoustic performance requirements for glazing and ventilators (if required) are summarised in Table 1 and Table 2 for the houses and care homes respectively.
- 1.8 Table 1 requirements are defined based on plot numbers and Table 2 requirements are defined based on the façade mark-up in Figure 1.
- 1.9 For the dwellings, based on these ventilator acoustic constraints, potential AD-F ventilation strategies are suggested.
- 1.10 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.

Rooms applicable	House Plot	Glazing performance	Trickle ventilator performance per room	Ptential AD-F Volume 1 whole dwelling ventilation strategy
Main habitable (bedrooms; living areas) No requirements to other room types	6 - 16	≥ 31 dB R_w	Max. 5 vents ≥ 31 dB $D_{ne,w}$	Natural ventilation; Continuous mechanical extract ventilation (Reduced number of vents req.); or Mechanical ventilation with heat recovery (trickle ventilators not required)
	1 - 5 and 17 - 20	≥ 31 dB R_w	Max. 2 acoustic vents ≥ 36 dB $D_{ne,w}$	Continuous mechanical extract ventilation; or Mechanical ventilation with heat recovery (trickle ventilators not required)

Table 1: Summary of minimum façade sound insulation treatment to houses

Rooms applicable	Care home Façade shown in Figure 1	Glazing performance	Trickle ventilator performance (if required)	
Main habitable (bedrooms; living areas) No requirements to other room types		No acoustic restrictions; indoor targets met with windows open		
		≥ 31 dB R_w	Max. 5 vents ≥ 31 dB $D_{ne,w}$	AD-F Volume 2 applicable: No defined ventilator requirements. Acoustic restrictions to be considered by ventilation designer.
		≥ 31 dB R_w	Max. 2 acoustic vents ≥ 31 dB $D_{ne,w}$	

Table 2: Summary of minimum façade sound insulation treatment to care home



Figure 1: Care home façade treatment mark-up (red, orange, green) and noise barrier location (cyan)

2 Introduction

- 2.1 A residential development consisting of a 80-bed care home and 20 townhouses has been proposed at Parkfield House, Manchester Old Road, Middleton.
- 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 two separate planning applications, for the residential and care home sections of the site.
- 2.3 The primary noise sources considered in this assessment is road traffic noise on the A576 to the immediate south of the site, and noise from the skatepark to the east of the 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:
- Use existing noise survey data previously collected by Apex Acoustics.
 - 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 and measurement positions

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 life⁶⁵ [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 6, adequately achieve the first and second aims of the NPSE.

3.11 Local plan

3.12 The Rochdale Borough Council Unitary Development plan, Reference 8, has been reviewed and the following Local Policy requirements have been identified:

- Policy G9, Reducing the impact of pollution, contamination and land instability: Ensuring sensitive new developments such as housing, schools and hospitals are not adversely affected by existing sources of pollution such as roads and certain types of industry

- Policy DM1, General development requirements: Mitigate against any impacts due to noise, air, dust, light and odour pollution, traffic generation or inadequate access, where such mitigation is identified as being necessary
- Policy DM2, Delivering planning contributions and infrastructure: For all types of development, including housing, we will seek contributions for any infrastructure or other measures necessary to mitigate any on site or off-site impacts from the development

3.13 Professional Practice Guidance on Planning & Noise

3.14 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.

3.15 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.

3.16 These criteria are consistent with those usually adopted by the Local Environmental Health Department and are presented in Table 3.

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

Table 3: 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 3 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 Following DEFRA guidance, Reference 7, on the possible identification of LOAELs and SOAELs, 66 dB L_{Aeq, 16 hr} is identified as the SOAEL.

3.27 Skatepark noise sources

3.28 The most significant noise from a skatepark is typically generated by skateboards hitting the nose and tail of the board on the ground, on a rail or on the ramp ledge, but shouting / talking could also be a factor to consider.

3.29 No specific standardised guidance currently exists that details methods for assessing this type of noise source.

3.30 The Association of Noise Consultants (ANC) Environmental Noise Measurement Guide, Reference 9, provides the following guidance for sports facilities:

“In the absence of specific guidance for measurement and assessment of community facilities it is important to include contextual factors and the extent to which the noise source is integrated into the sound scape in which it is set. It is often more appropriate, and more robust, to adopt a number of assessment methodologies to provide a balanced approach, rather than relying on a single protocol (e.g. a BS 4142 assessment) which is applied beyond its documented scope. Frequency of occurrence and timings can be important factors as well as the actual noise levels”

3.31 Given the character of the noise sources, it is proposed that the assessment should consider both continuous equivalent levels, $L_{Aeq, T}$, maximum noise levels, L_{AFmax} and a comparison against the existing background noise climate.

3.32 The following guidance is considered in this assessment:

- World Health Organisation (WHO) Guidelines for Community Noise, Reference 6 – this guidance states that “During daytime, few people are highly annoyed at L_{Aeq} levels below 55 dB(A), and few are moderately annoyed at L_{Aeq} levels below 50 dB(A)
- Chartered Institute of Environmental Health: Clay Target Shooting – Guidance on the Control of Noise (CIEH), Reference 10 – The noise generated by clay target shooting is impulsive in nature, and occurs regularly throughout the duration of the activity. This is similar to the noise profile produced by impact noise during skateboard activities and is commonly used for skatepark assessments (albeit the frequency content may be different)

The guidance states that “at shooting noise levels below the mid 50’s dB(A) there is little evidence of significant levels of annoyance at any site, whereas for levels in the mid to high 60’s, significant annoyance is engendered in a majority of sites.

- BS 4142: Methods for rating and assessing industrial and commercial sound, Reference 13 – BS 4142 describes methods for rating and assessing sound of an industrial and/or commercial nature in terms of the potential adverse impact on noise sensitive receptors.

The specific sound source of an industrial and/or commercial nature is rated according to BS 4142 and compared against the measured existing background sound environment.

According to BS 4142: “A difference of around + 10 dB or more is likely to be an indication of a significant adverse impact, depending on the context.

A difference of around + 5 dB is likely to be an indication of an adverse impact, depending on the context”

The scope of the standard states it is not intended to be used for recreational activities, however it is regularly applied to recreational activities in the context of assessing likely impacts and therefore is considered in this assessment.

The guidance outlined above is considered for determining reasonable levels to minimise potential adverse impact.

It is also proposed to assess according to the assessment process principals of the ProPG which is to 1) assess the significant of the existing noise risk and 2) outline a suitable acoustic design process to mitigate risks where identified.

3.33 These methods of assessment have been adopted by several Local Authorities and Acoustic Consultants following their acceptance by the courts in the Richardson vs. Devizes Town Council case.

3.34 Fields in Trust guidance

3.35 Fields in Trust guidance, Reference 11 provides guidance on buffer zones between skateboard parks as reproduced in Figure 3.

3.36 Further guidance from Fields in Trust, Reference 12, with regards to Skate Parks states:

“Consideration must be carefully given to the buffer zone to nearest dwellings, and this may need to be greater than the 30 m recommended for a NEAP. Topography, orientation, sound-deadening and materials used in design all have a bearing on sound reduction”

Open space typology	Minimum sizes		Minimum dimensions	Buffer zones
Playing pitches	<u>Association football</u>			-
	Adult soccer	0.74ha	106 x 70 metres	
	Mini soccer U7/U8 pitch	0.14ha	43 x 33 metres	
	Mini soccer U9/U10 pitch	0.25ha	60 x 42 metres	
	<u>Rugby Union</u>	0.70ha	100 x 70 metres	-
	<u>Hockey</u>			-
Other outdoor (non-pitch) sports	Mini Hockey	0.31ha	65 x 48 metres	-
	<u>Lacrosse</u>	0.66ha	100 x 60 metres	-
	<u>Cricket</u>			-
	Senior recreational 12 pitch	1.43ha	111.56 x 128.04 metres	-
	<u>Athletics</u>			-
	6 lane track	1.51ha	172.03 x 87.64 metres	-
Equipped/designated play areas	<u>Tennis courts</u>			-
	1 recreational court	0.06ha	34.75 x 17.07 metres	
	2 recreational courts	0.11ha	34.75 x 31.70 metres	
	For each adjacent court	0.05ha	34.75 x 14.63 metres	
	<u>Bowling greens</u>			-
	Flat green	0.12ha	34.4 x 34.4 metres	
Other outdoor provision (MUGAs and skateboard parks)	Crown green	0.08ha	27.4 x 27.4 metres	
	<u>LAP</u>	0.01ha	10 x 10 metres (minimum activity zone of 100sqm)	5m min separation between activity zone and nearest property containing a dwelling
	<u>LEAP</u>	0.04ha	20 x 20 metres (minimum activity zone of 400sqm)	20m min separation between activity zone and the habitable room façade of dwellings
	<u>NEAP</u>	0.1ha	31.6 x 31.6 metres (minimum activity zone of 1,000sqm comprising an area for play equipment and structures & a hard surfaced area of at least 465sqm (the minimum needed to play five-a-side football))	30m min separation between activity zone and the boundary of the nearest property containing a dwelling

Figure 3: Fields in Trust guidance on Buffer Zones

4 Noise sources and measurements

4.1 Measurements

4.2 Measurements of the existing noise environment were made between the 2nd and 6th September 2021.

4.3 Long term measurements were made over approximately 4 consecutive days at two positions, with additional short-term measurements undertaken at one further position.

4.4 The measurement locations are shown in Figure 1.

4.5 The microphone was located 3 m above ground level at the long term positions and 1.5 m above ground level at the short term positions. The microphones were located away from other reflecting surfaces, such that the measurements are considered to be free-field.

4.6 The equipment used is listed in Table 4.

Equipment	Model	Serial no.
Sound Level Meter	NTi XL2	A2A-11084-E0
Calibrator	Larson Davis CAL 200	10665
Sound Level Meter	NTi XL2	A2A-11062-E0
Calibrator	Larson Davis CAL 200	13403

Table 4: 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 observed to generally be dry with wind speeds below 5 m/s.

4.9 Noise sources

4.10 The most significant noise source affecting the proposed development was observed to be road traffic noise on the A576.

4.11 Other noise sources included contributions from aircraft pass-overs, activity on the playing fields to the north of the site, and adjacent car park and skatepark to the east of the site.

4.12 The noise measurement positions were selected based on the layout of the proposed development in respect to the identified noise sources.

4.13 Results

4.14 The time histories of the $L_{Aeq, 5 \text{ min}}$ recorded are shown in Figure 4 and Figure 5.

4.15 The measured daytime and night-time noise levels are shown in Table 5.

Position	Date	Parameter	dB(A)	Octave band centre frequency, Hz					
				125	250	500	1k	2k	4k
LT1	03/09/2021	Daytime, $L_{Aeq, 16 \text{ hr}}$	63	41	47	54	61	57	47
		Night time, $L_{Aeq, 8 \text{ hr}}$	55	30	37	46	53	49	38
	04/09/2021	Daytime, $L_{Aeq, 16 \text{ hr}}$	62	39	45	52	60	56	46
		Night time, $L_{Aeq, 8 \text{ hr}}$	55	31	37	45	53	49	38
	05/09/2021	Daytime, $L_{Aeq, 16 \text{ hr}}$	61	40	45	52	59	55	45
		Night time, $L_{Aeq, 8 \text{ hr}}$	56	36	40	47	54	50	39
LT2	03/09/2021	Daytime, $L_{Aeq, 16 \text{ hr}}$	55	38	41	45	52	48	36
		Night time, $L_{Aeq, 8 \text{ hr}}$	47	29	33	37	45	40	27
	04/09/2021	Daytime, $L_{Aeq, 16 \text{ hr}}$	55	37	40	45	52	48	41
		Night time, $L_{Aeq, 8 \text{ hr}}$	47	30	32	37	45	40	27
	05/09/2021	Daytime, $L_{Aeq, 16 \text{ hr}}$	53	37	39	44	51	47	36
		Night time, $L_{Aeq, 8 \text{ hr}}$	48	33	36	40	46	40	29

Table 5: Measured long term free-field noise levels

4.16 The highest maximum night-time noise levels are shown in Table 6 for the night of the 5th to the 6th September 2021. Maximum noise events are due to a combination of passing vehicles and aircraft. Based on an analysis of the measurements this is considered typical of night-time maximum noise events throughout the entire measurement period.

Position	Measured 10 highest maximum noise events during the night-time										
LT1	L_{AFmax} dB	76	75	75	74	74	74	73	73	72	72
	Time	06:02	00:02	05:30	01:49	23:35	06:31	03:58	05:50	06:09	06:59

Table 6: Measured L_{AFmax} events during the night-time period

4.17 72 dB is not exceeded more than 10 times and therefore is used as the design case.

4.18 The free-field measurement at Short Term Position 1 to the north of the Parkfield House building elevation was facing the playing fields and screened from the main road. A summary of the results are shown in Table 7.

Position	Date	Parameter	dB(A)	Octave band centre frequency, Hz					
				125	250	500	1k	2k	4k
ST1	06/09/2021 15:30-16:30	$L_{Aeq, 1 \text{ hr}}$	45	35	36	38	41	39	28

Table 7: Measured short term free-field noise levels

4.19 Noise sources affecting the measurement at ST1 include noise from Children playing, noise from transport sources (road and airplane) and noise from the skatepark.

4.20 As the measured $L_{Aeq, 1, \text{ hr}}$ is below 50 dB when shielded from the transport sources, noise from the adjoining playing fields is not considered significant as part of this assessment.

4.21 It is noted for the skatepark noise, whilst the level is below 50 dB, the position of the ST1 measurement is significantly further away from the skatepark than the proposed townhouses. Currently skatepark noise is not audible at the LT1 and LT2 positions due to the masking provided by the road traffic sources. However, it is considered that once the townhouses are in place, it is possible that skatepark noise could be significant at the most exposed areas of the development.

4.22 As shown in Figure 6, a period of the ST1 period during which Skatepark Noise was one of the dominant sources is considered in order to determine suitable source noise levels for use in the assessment.

4.23 Whilst it is not possible to accurately determine the skatepark noise source in the absence of the contribution from other noise sources, the measured levels during the highlighted time period of Figure 6 are used without correction, to determine an upper bound for likely impact from the skatepark source, as shown in Table 8.

4.24 During this period, the characteristics of the skatepark noise source is that of a repetitive 'clink', which is considered to be associated with a skater using the half-pipe ramp. Based on analysis of the frequency spectrum, the maximum level is ascribed to the 2000 Hz octave band, as shown in Table 8.

Position	Parameter	dB(A)	Octave band centre frequency, Hz					
			125	250	500	1k	2k	4k
ST1	$L_{Aeq, T}$	41	28	29	31	39	34	26
	L_{AFmax}	-	-	-	-	-	45	-

Table 8: Skatepark noise levels

4.25 Measured background sound levels at Position LT2 are shown in Table 9 during a time period considered representative of likely activity in the skatepark. 52 dB L_{A90} is considered as the representative background noise level for use in the assessment of skatepark noise.

Date	Time	Background sound level, L _{A90, 15 min} dB
02/09/2021	12:45 - 13:00	53
	13:00 - 13:15	51
	13:15 - 13:30	53
	13:30 - 13:45	52
	13:45 - 14:00	52
	14:00 - 14:15	51
	14:15 - 14:30	52
	14:30 - 14:45	52
	14:45 - 15:00	52
	15:00 - 15:15	53
	15:15 - 15:30	52
	15:30 - 15:45	53
	15:45 - 16:00	52
	16:00 - 16:15	52
	16:15 - 16:30	52
	16:30 - 16:45	53
	16:45 - 17:00	53
	17:00 - 17:15	53
	17:15 - 17:30	54
	17:30 - 17:45	54
	17:45 - 18:00	54
	18:00 - 18:15	53
	18:15 - 18:30	53
	18:30 - 18:45	53
	18:45 - 19:00	53

Table 9: Background noise levels

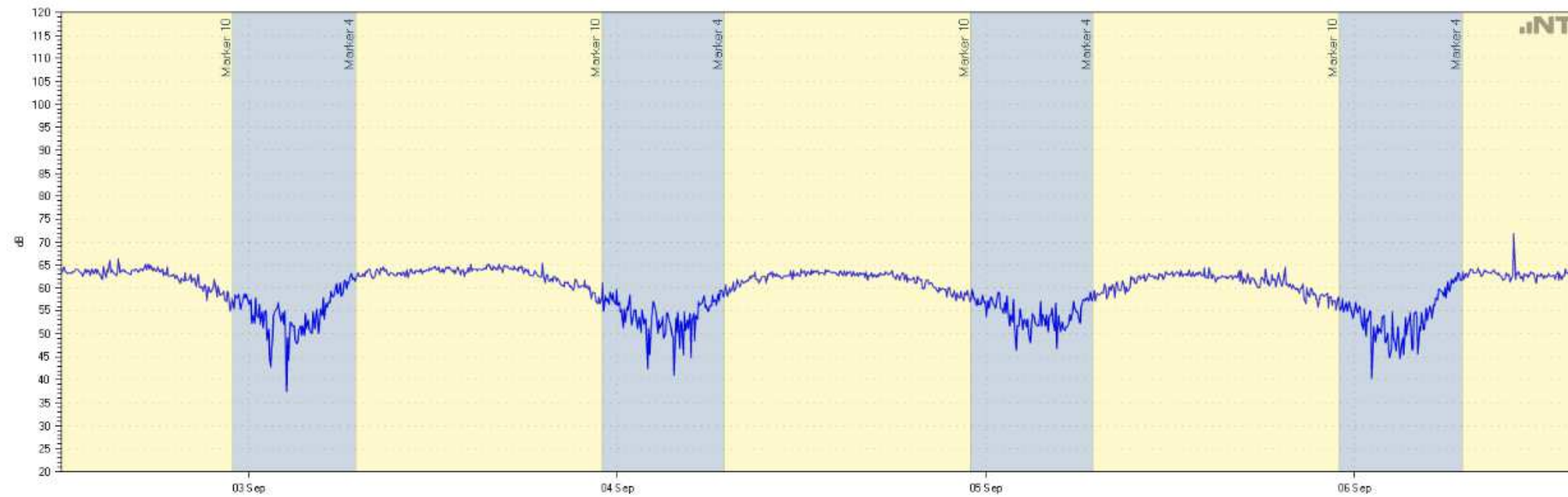


Figure 4: Time history of the recorded $L_{Aeq, 5 \text{ min}}$, LT1 Position

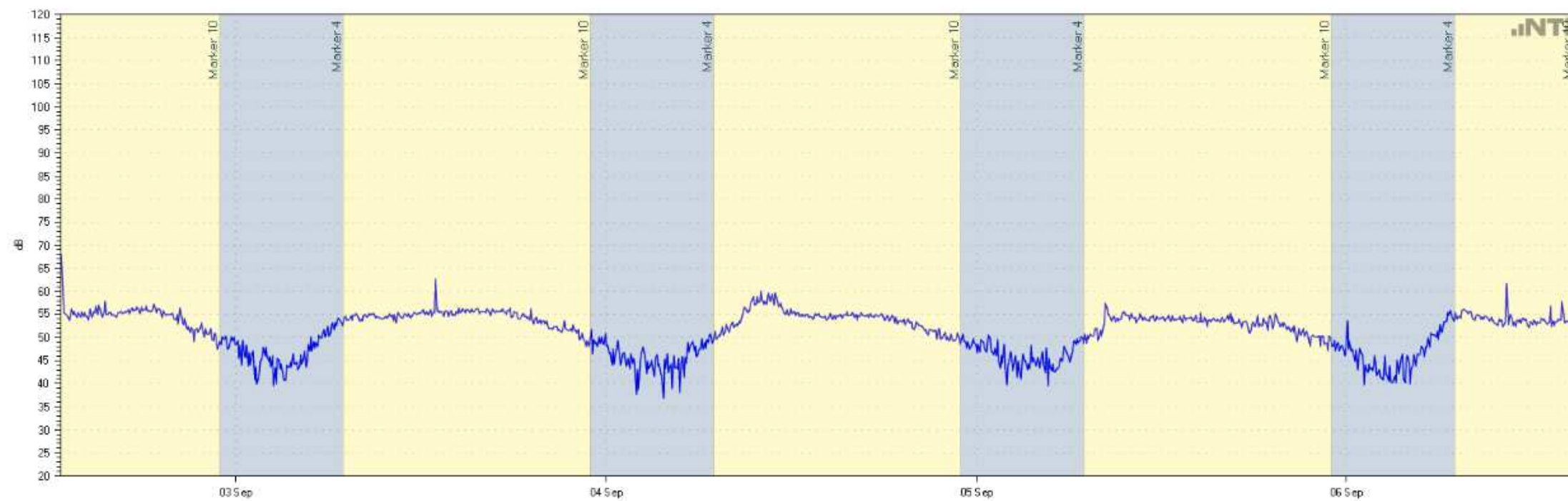


Figure 5: Time history of the recorded $L_{Aeq, 5 \text{ min}}$, LT2 Position

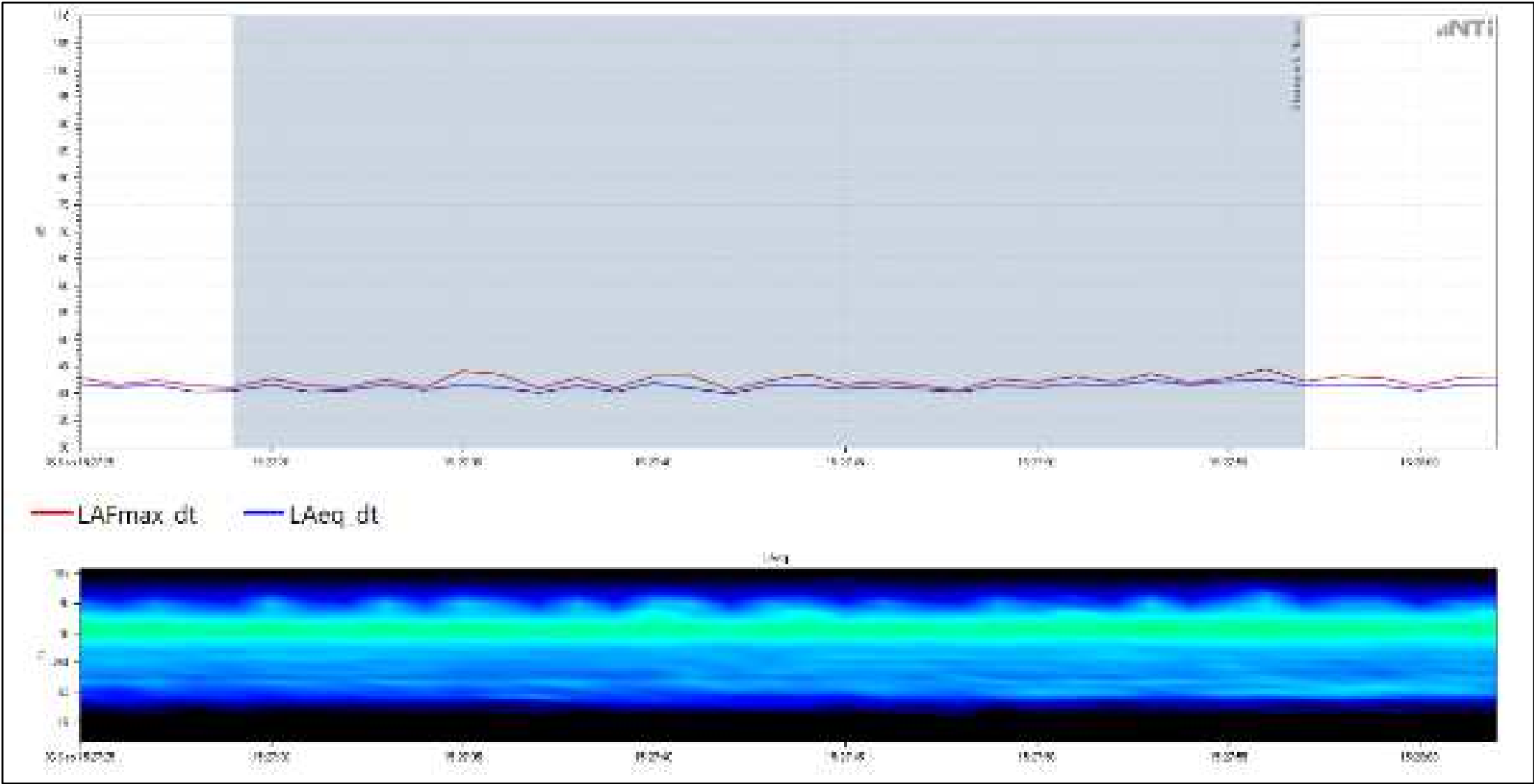


Figure 6: Time history and spectrogram of Skatepark Noise period.

5 Noise impact on the site

- 5.1 Noise transmission and propagation is modelled using proprietary software, Cadna/A, Reference 14. This models noise propagation outdoors according to ISO 9613, Reference 15.
- 5.2 The modelling parameters used, source of data and details are described in Table 10.

Parameter	Source	Details
Model dimensions	Google Earth	British Transverse Mercator coordinates
Site location and layout	Architects drawings	Architects drawings, Reference 16
Topography	DEFRA	DTM 2020 1m x 1m
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, 4 m and 6.5 m to represent ground, first and second 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; Porous ground, G = 1 (locally on model)
Max. order of reflections	Apex Acoustics	Three

Table 10: Modelling parameters and assumptions

- 5.3 Measured daytime and night-time noise levels at LT1 and LT2 have been used to ascribe sound power levels to the surrounding A576 noise source, 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 Noise levels associated with the skatepark shown in Table 8 have been used to ascribe sound power levels to a point source at the position of the half-pipe ramp in the skatepark, at a height of 2 m above the ground.
- 5.6 A plan view and a 3D perspective of the CadnaA model are shown in Figure 7 and Figure 8 respectively.



Figure 7: Plan view of the CadnaA model



Figure 8: 3D view of the CadnaA model

6 External amenity area assessment

- 6.1 The gardens for plots 1 – 16 are considered as an intrinsic part of the overall design.
- 6.2 Noise contour plots across the site are shown in Appendix A.
- 6.3 Noise levels are calculated to be below 55 dB LAeq, 16 hr in the gardens screened from the road traffic to the north of the site.
- 6.4 Where calculated noise levels exceed 55 dB LAeq, 16 hr, noise barriers of 2.4 m height are proposed as shown in Figure 1, to reduce garden noise levels to below the BS 8233 guideline upper limit. The noise barrier also provided mitigation against the skate park noise.
- 6.5 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/m² such as a closeboard timber fence, earth mound, brick wall or any combination of these.
- 6.6 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.
- 6.7 The proposed barriers and their effects are included in the further calculations detailed in this report.

7 Assessment of skatepark noise

- 7.1 As noted in Para. 4.23, it was not possible to fully isolate the skatepark noise from road traffic noise in the measurements, and the calculated noise impact is considered to be a worst-case upper bound.
- 7.2 Predicted free-field noise levels at the most exposed first floor window are shown in Table 11

Guidance	Adopted Criteria	Assessment result / calculated level	Comment
WHO Guidelines	LAeq level below 55 dB	52 dB LAeq, T	Guidance states few people are highly annoyed below 55 dB
CIEH Guidance	LAFmax level in mid 50's	55 dB LAF, max	Guidance states at levels in the mid 50's little evidence of significant annoyance
BS 4142	< 5 dB above background	3 dB above background	Representative background level (Para. 4.25) taken as 52 dB LA90. 3 dB character correction applied to 52 dB LAeq, T level Guidance states 5 dB above background is an indication of an adverse impact
Fields in Trust	Buffer zone > 30 m	40 m from skatepark to site boundary	Distance to housing is greater than recommended buffer zone

Table 11: Assessment of skatepark noise at most exposed first floor window

- 7.3 As indicated in Table 11, the calculated noise levels due to skatepark noise are within the criteria considered from the guidance in Section 3 at the most exposed area of the site.

8 Achieving internal noise levels

8.1 Façade sound insulation calculations

8.2 Considering a 15 dB level difference for a partially open window, the indoor noise targets can be achieved when windows are open to façades indicated in green in Figure 1. Therefore there are no acoustic restrictions for glazing and ventilation elements to these façades.

8.3 Where indoor noise targets cannot be achieved with upon windows, façade sound insulation provision is considered.

8.4 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 12.

Façade affected	Parameter	dB(A)	Octave band centre frequency, Hz A-weighted free-field noise level, dB				
			125	250	500	1k	2k
Plots 1-5; Plots 17-20; Care home red façades	L _{Aeq,16 hr}	59	42	47	50	56	53
	L _{Aeq,8 hr}	52	36	42	45	49	43
	L _{AFmax}	69	-	-	-	-	-
Plots 6-16; Care home orange façades	L _{Aeq,16 hr}	55	37	43	45	52	49
	L _{Aeq,8 hr}	48	33	38	40	46	41
	L _{AFmax}	65	-	-	-	-	-

Table 12: A-weighted external free-field noise levels used to calculate façade sound insulation

8.5 The calculation method for façade sound insulation is in accordance with BS 8233 and the principles of BS EN 12354-3, Reference 18.

8.6 From ISO 16283, Reference 20, 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.

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

8.8 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.

8.9 Example glazing units that achieve the performance standards shown in Table 1 are identified in Table 13.

Glazing performance	Example products (others also feasible)
≥ 31 dB R _w	Double glazing: Pilkington Insulight 4/12/4 mm Saint-Gobain Glass 4/12/4 mm

Table 13: Example glazing units

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

8.11 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.

8.12 The room and window dimensions used in the calculations are taken from the architects' plans and elevations, Reference 16.

8.13 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.

8.14 Calculated internal noise levels on the basis of the identified minimum performance requirements are presented in Table 14.

8.15 An example full calculation for the worst affected location is shown in Appendix A, 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}
Plots 1 - 5; Plots 17 – 20	Bedroom	33	26	41
	Living room	31	-	-
Plots 6 - 16	Bedroom	35	28	44
	Living room	32	-	-
Care home orange façades	Bedroom	33	26	42
Care home red façades	Bedroom	33	26	42

Table 14: Summary of calculated worst-case internal noise levels

8.16 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 3.18.

8.17 Noise and Approved Document F ventilation conditions

8.18 The dwellings associated with 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 17.

8.19 The acoustic restrictions for the potential ventilation strategies are discussed below.

8.20 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.

8.21 Houses (Part F Volume 1): Background ventilation provision

8.22 For plots 6-16 any AD-F whole dwelling ventilation strategy as described in AD-F Volume 1 is acoustically feasible.

8.23 For plots 1-5 and 17-20, the acoustic constraints on the trickle ventilators would likely prohibit a natural ventilation strategy as described by AD-F (background ventilators and intermittent extract ventilation).

8.24 Therefore, either a continuous mechanical extract or mechanical ventilation with heat recovery (MVHR) ventilation system as described by AD-F would be required. Should a MVHR system be implemented, trickle ventilators are not required.

8.25 Care home (Part F Volume 2): Background ventilation provision

8.26 Approved Document F Volume 2 does not provide specific ventilator area requirements, therefore Apex cannot comment on the acoustic restrictions for the ventilation strategy.

8.27 Acoustically, background ventilation should be provided with windows closed to achieve the indoor noise targets. Trickle ventilators are acoustically feasible to the façade, on the basis of the acoustic restrictions summarised in XX.

8.28 The ventilation designer should determine an appropriate ventilation strategy considering the acoustic restrictions.

8.29 Example ventilators that achieve the performance standards are identified in Table 15.

Trickle ventilator performance	Example products (others also feasible)
$\geq 31 \text{ dB } D_{ne,w}$	Rw Simon Framevent Greenwood 6000S
$\geq 36 \text{ dB } D_{ne,w}$	RW Simon Acoustic EHA Titon SF X V50 / SF 418

Table 15: Example trickle ventilators

8.30 Purge ventilation (AD-F)

8.31 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).

8.32 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).”

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

8.34 Noise limits under overheating conditions at night is controlled by the Building Regulations Approved Document O, and therefore is not addressed in this Planning report.

9 Conclusion

- 9.1 The existing noise impact across the proposed development site has been assessed in support of a Planning Application.
- 9.2 Barriers of 2.4 m height are required to reduce garden noise levels to be below the guideline upper limit of 55 dB $L_{Aeq, 16 hr}$, and to mitigate against skate park noise. The location of the proposed barriers are shown in Figure 1.
- 9.3 Noise levels from the skatepark to the east of the site are assessed and considered to be below limits reviewed in appropriate guidance.
- 9.4 The potential implications for the design of the façade sound insulation u is discussed, and the glazing and ventilator acoustic performance requirements to achieve the indoor noise level targets are identified in Table 1.
- 9.5 Based on the existing noise risks and details outlined in this report, the site is considered suitable for residential development.

10 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 Berglund, Thomas Lindvall, Dietrich H Schwela, World Health Organisation, 1999.
- 7 AECOM Environment on behalf of DEFRA, NANR316 Possible options for the identification of SOAEL and LOAEL in support of the NPSE, December 2015.
- 8 Rochdale Borough council, Unitary Development Plan, 2016.
- 9 ANC Guidelines – Environmental Noise Measurement Guide (Green Book), May 2021.
- 10 CIEH – Clay Target Shooting, Guidance on the control of noise, 2003.
- 11 Fields in Trust, Guidance for Outdoor Sport and Play, Beyond the Six Acre Standard, England, November 2020.
- 12 Fields in Trust, Planning and Design for Outdoor Sport and Play.
- 13 BS 4142: 2014, Method for rating and assessing industrial and commercial sound.
- 14 Cadna/A environmental noise modelling software, version 2020, Datakustik GmbH.
- 15 ISO 9613: Acoustics - Attenuation of sound during propagation outdoors.
- 16 Architects Drawings MPG.PH.HT1.E.01, MPG.PH.HT1.FP.01, MPG.PH.HT2.E.01, MPG.PH.HT2.FP.02, Received February 2023.
- 17 Approved Document F 2021 Edition, The Building Regulations 2000.
- 18 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.
- 19 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
- 20 BS EN ISO 16283-1:2014 Acoustics – Field measurement of sound insulation in buildings and of building elements – Part 1: Airborne sound insulation.

Appendix A Noise contour plots



Figure 9: Plan viewing L_{Aeq}, 16 hr sound contours at 1.5 m above ground due to road noise sources, without barriers



Figure 10: Plan viewing $L_{Aeq,16\text{ hr}}$ sound contours at 1.5 m above ground due to road noise sources, with barriers



Figure 11: Plan viewing L_{Aeq}, 8 hr sound contours at 4 m above ground due to road noise sources, without barriers



Figure 12: Plan viewing $L_{Aeq,T}$ sound contours at 4 m above ground due to road noise sources, with barriers

Appendix B Example façade sound insulation calculations

Plot 1 Bedroom							
Volume, V / m³	30						
Window area, S / m²	3						
Reverberation Time, T / s	0.5						
Number of vents feasible	2						
Daytime L _{Aeq, T} (dB)	dB(A)	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	
External free-field noise, L _{1in}	59	42	47	50	56	53	
Glazing: 4/12/4 mm, R		24	20	25	35	38	
Equation 1, L ₂ (a)	28	16	25	23	19	13	
Vent: Acoustic EHA, Dn,e		40	36	35	33	37	
Equation 2, L ₂ (b)	31	8	17	21	29	22	
Total noise through all elements, L ₂	32						
Night-time L _{Aeq, T} (dB)	dB(A)	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	
External free-field noise, L _{1in}	52	36	42	45	49	43	
Glazing: 4/12/4 mm, R		24	20	25	35	38	
Equation 1, L ₂ (a)	23	10	20	18	12	3	
Vent: Acoustic EHA, Dn,e		40	36	35	33	37	
Equation 2, L ₂ (b)	24	2	12	16	22	13	
Total noise through all elements, L ₂	26						
Night-time L _{AFmax} (dB)	dB(A)						
External free-field noise, L _{1in}	69						
Glazing: 4/12/4 mm, R	31						
Equation 1, L ₂ (a)	36						
Vent: Acoustic EHA, Dn,e	36						
Equation 2, L ₂ (b)	39						
Total noise through all elements, L ₂	41						

Table 16: Example calculation for Plot 1 bedroom



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