

New Residential Development, Francis Road, Withington M20 4XP

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This report has been prepared based upon a scope of works and associated resources agreed between the client and Philip Dunbavin Acoustics Ltd (PDA). This report has been prepared with all reasonable skill, care and diligence and has been based upon the interpretation of data collected. This has been accepted in good faith as being accurate and valid at the time of the collection. This report has been based solely on the specific design assumptions and criteria stated herein.



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1.0 SUMMARY

At the request of Step Places Ltd, PDA has carried out a noise impact assessment in relation to the proposed new residential development to Francis Road, Withington, M20 4XP. The new residential development will consist of a single block providing 24no residential apartments.

A noise survey has been conducted at site to establish the existing acoustic climate.

Internal ambient noise levels for the proposed residential dwelling have been calculated based on the results of the noise survey, and dimensions for the room volumes and external façade/window areas. Based on the proposed acoustic specifications for the external windows and trickle vents as detailed in Section 5.4 of this report, the predicted internal ambient noise levels achieve the recommended criteria for residential dwellings as given by BS 8233 & WHO 1999. Additionally as the proposed development is residential it is not predicted to introduce any significant new noise sources to the existing ambient noise climate.

It should be noted that the noise impact assessment is dependent on assumed construction details as described in Section 5.2-5.3 of this report. PDA should be consulted on any deviations from the assumed details as described in this report as this may affect the outcome of the assessment.

Southway Housing Trust is a beneficiary of this report.

Southway Housing Trust
Southern Gate
729 Princess Road
Didsbury
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2.0 SITE DESCRIPTION

The new residential dwelling will consist of a single block providing 24no residential apartments to Francis Road, Withington, M20 4XP. The existing industrial building to site will be demolished as part of the development. The site is located within an urban area and is predominately surrounded by existing residential properties.

An overview of the proposed site is illustrated below:

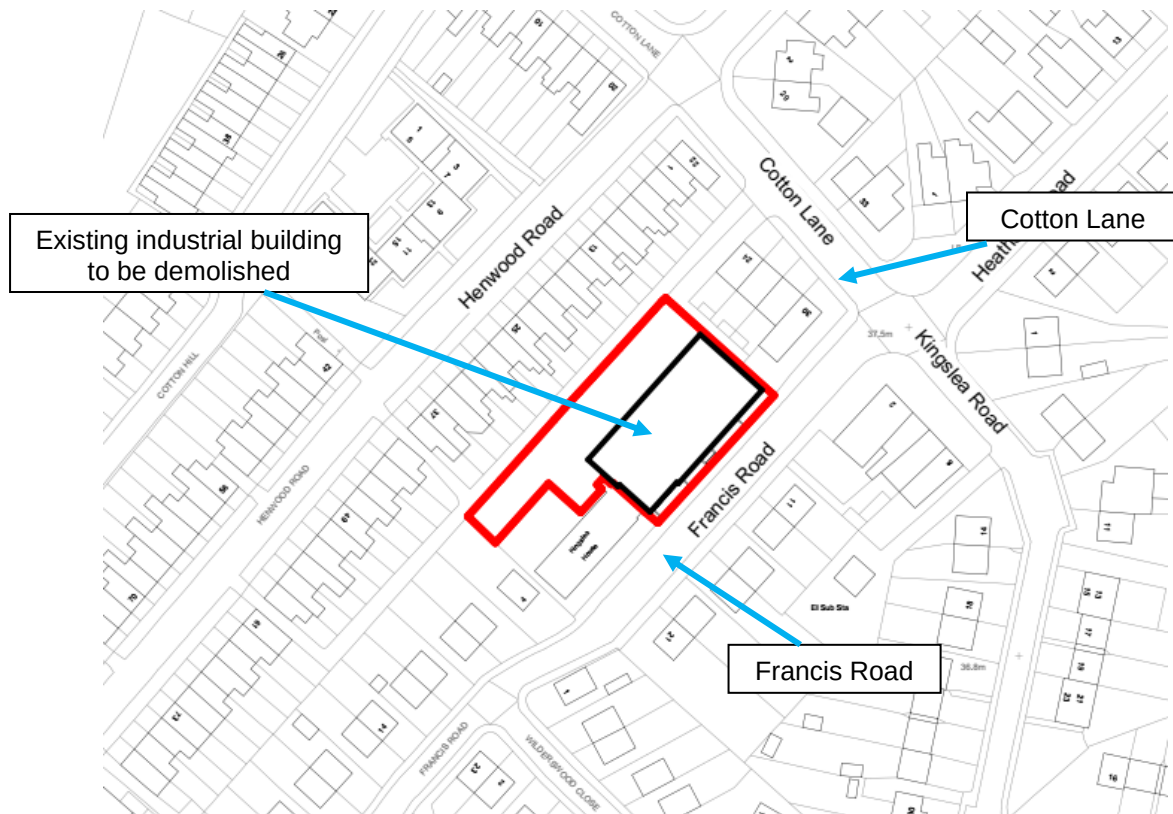


Figure 1. Existing Site (site boundary highlighted red)

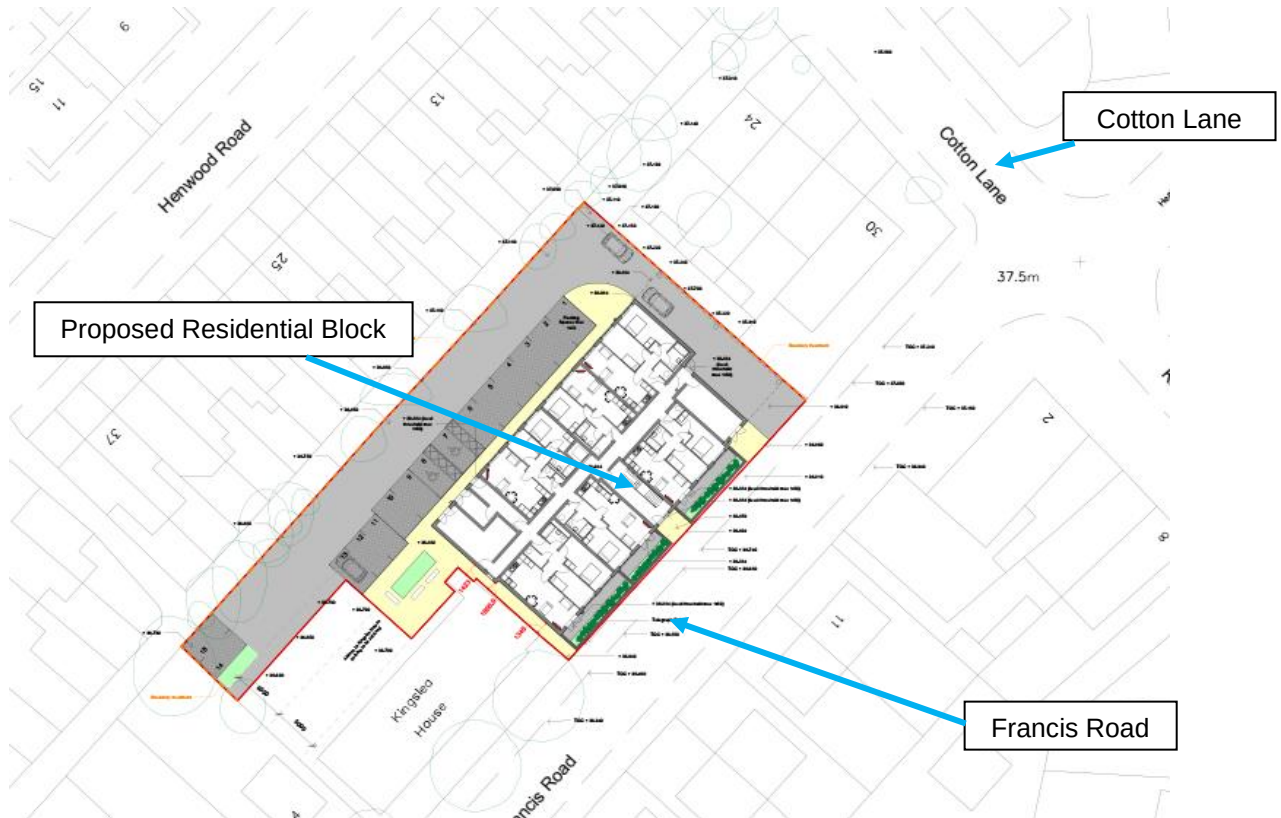


Figure 2. Proposed Residential Block

3.0 ASSESSMENT CRITERIA

3.1 National Planning Policy Framework

National Planning Policy is guided by the National Planning Policy Framework (NPPF) updated in July 2021. With regard to Noise the Framework states the following;

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

- *preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability.*

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:

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

The terms 'significant adverse impact' and 'adverse impact' are defined in the explanatory notes of the 'Noise Policy Statement for England (NPSE)' which states;

There are two established concepts from toxicology that are currently being applied to noise impacts, for example, by the World Health Organisation. They are:

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.

Extending these concepts for the purpose of this NPSE leads to the concept of a significant observed adverse effect level.

SOAEL – Significant Observed Adverse Effect Level

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

The notes also offer an explanation of the term 'other adverse impacts' as follows;

... 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.

Although no specific noise limits for LOAEL and SOAEL have been defined, in 2014 the UK Government published a planning practice guidance document for noise which indicates where these limits fall with relation to the perception of noise. A summary is reproduced in Section 3.2 below; the full document is published at <https://www.gov.uk/guidance/noise--2>.

3.2 Planning Practice Guidance – Noise

The UK Planning Practice Guidance on noise offers further guidance on the typical levels which constitute the NOEL, LOAEL and SOAEL and is reproduced in the table below;

Table 1. Planning Practice Noise Level Guidance

Perception	Examples of Outcomes	Increasing Effect Level	Action
Not present	No Effect	No Observed Effect	No specific measures required
Present and not intrusive	Noise can be heard but does not cause any change in behaviour or attitude. Can slightly affect the acoustic character of the area but not such that there is a perceived change in the quality of life.	No Observed Adverse Effect	No specific measures required
		Lowest Observed Adverse Effect Level	
Present and intrusive	Noise can be heard and causes small changes in behaviour and/or attitude, e.g. turning up volume of television; speaking more loudly; where there is no alternative ventilation, having to close windows for some of the time because of the noise. Potential for some reported sleep disturbance. Affects the acoustic character of the area such that there is a perceived change in the quality of life.	Observed Adverse Effect	Mitigate and reduce to a minimum
		Significant Observed Adverse Effect Level	
Present and disruptive	The noise causes a material change in behaviour and/or attitude, e.g. avoiding certain activities during periods of intrusion; where there is no alternative ventilation, having to keep windows closed most of the time because of the noise. Potential for sleep disturbance resulting in difficulty in getting to sleep, premature awakening and difficulty in getting back to sleep. Quality of life diminished due to change in acoustic character of the area.	Significant Observed Adverse Effect	Avoid
Present and very disruptive	Extensive and regular changes in behaviour and/or an inability to mitigate effect of noise leading to psychological stress or physiological effects, e.g. regular sleep deprivation/awakening; loss of appetite, significant, medically definable harm, e.g. auditory and non-auditory	Unacceptable Adverse Effect	Prevent

3.3 BS 8233:2014 Guidance on Sound Insulation and Noise reduction for Buildings

Dwelling houses, flats and rooms in residential use

British Standard 8233:2014, Guidance on Sound Insulation and noise reduction for buildings, gives guidance on internal noise levels within dwellings, flats and rooms in residential use when unoccupied. The following criteria are for Living and Dining Rooms for daytime use and Bedrooms for night time.

Table 2. BS 8233 Recommended Indoor Ambient Noise Levels

Activity	Location	07:00 to 23:00	23:00 to 07:00
Resting	Living room	35 L _{Aeq,16hour}	—
Dining	Dining room/area	40 L _{Aeq,16hour}	—
Sleeping (daytime resting)	Bedrooms	35 L _{Aeq,16hour}	30 L _{Aeq,8hour}

It should however be stressed that the above criterion relates to steady noise, in this case from road traffic etc., excluding unusual noise events departing from the typical noise character of the area.

3.4 WHO Guidelines for Community Noise

In 1999, the WHO (World Health Organisation) published Guidelines for Community Noise, stating the following noise levels are applicable to residential dwellings.

Table 3: WHO Guidelines for Community Noise Criteria

Specific Environment	Critical Health Effect(s)	L _{Aeq} dB	Time Base (hours) *
Dwelling, indoors	Speech intelligibility & moderate annoyance, daytime & evening	35	16
Inside bedrooms	Sleep disturbance, night-time	30	8

* Typically taken to be daytime/evening - 07:00 – 23:00 hours and night time 23:00 – 07:00 hours.

In addition to the above continuous equivalent noise levels, WHO guidelines indicates that exceedances of 45 dB L_{Amax} for single sound events should be limited to no more than 10 – 15 times per night, when measured with a ‘fast’ time weighting.

4.0 SURVEY DETAILS AND RESULTS

4.1 Noise Survey Details

An ambient noise survey was carried out between 23:05 hours, Thursday 19th August 2021 and 10:30 hours, Friday 20th August 2021. All measurements were conducted in 5-minute samples by Tom Dixon and Jack Perry both of PDA. The measurements were fully attended. The measurement height was 1.2m above ground level.

The location for the measurement positions utilised for the noise survey is illustrated in Figure 3 below.

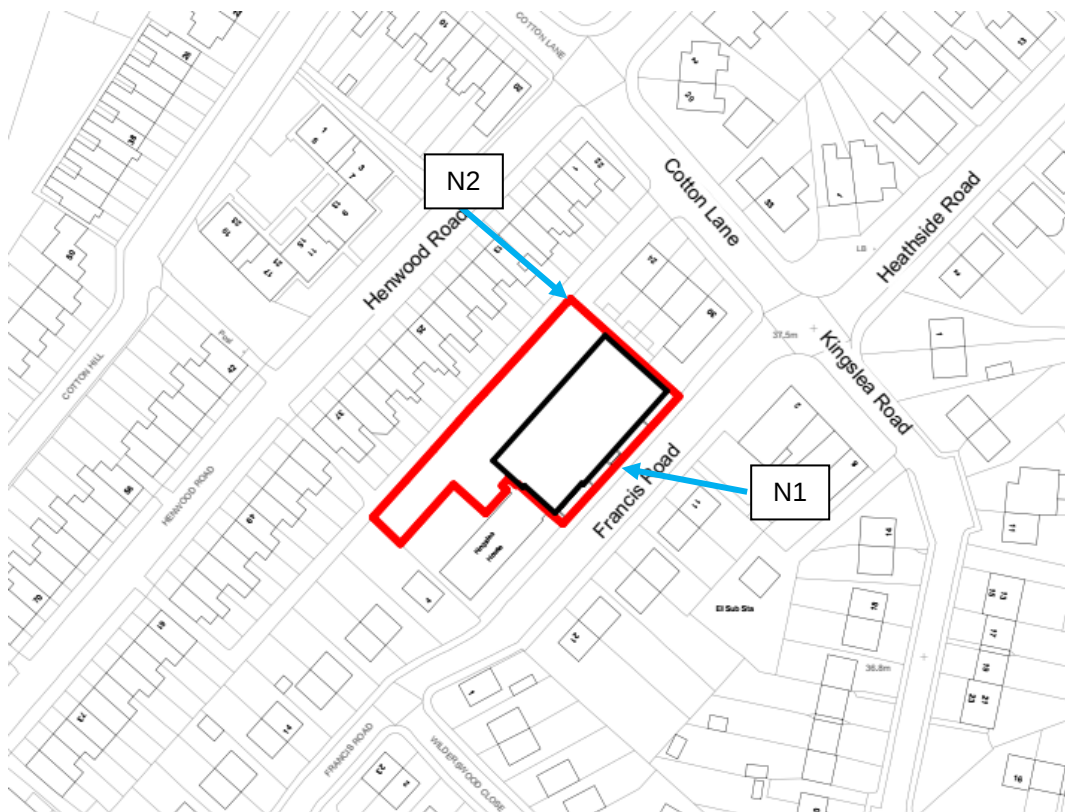


Figure 3. Noise survey monitoring position (indicative site boundary highlighted red)

Noise measurements were conducted at position N1 (Figure 3) during the following periods

-23:05-23:32 (19/08/21)
-00:05-00:35 (20/08/21)
-06:00-06:30 (20/08/21)
-07:10-07:40 (20/08/21)
-08:19-08:49 (20/08/21)
-09:27-09:57 (20/08/21)

Noise measurements were conducted at position N2 (Figure 3) during the following periods

-23:37-00:02 (19-20/08/21)
-00:39-01:12 (20/08/21)
-06:34-07:04 (20/08/21)
-07:46-08:16 (20/08/21)
-08:53-09:23 (20/08/21)
-10:01-10:31 (20/08/21)

All noise measurements were conducted utilising the following equipment

NTI XL2 (SN- A2A-15820-E0) -Sound Level Meter
NTI XL2 (SN- A2A-17853-E0) -Sound Level Meter

In accordance with IEC 61672-1:2002 the sound level meters have a Class 1 frequency response and can operate as an integrating sound level meter with frequency analysis and statistical functions.

The sound level meters were set to measure 'A' weighted, broadband and octave band sound pressure levels and various statistical parameters. The meter was field calibrated both before and after each measurement, in addition to this a valid calibration certificate is held for the meter and calibrator. It was ensured that the sound level meter was fitted with a windshield at all times.

Weather

Typical weather conditions throughout the survey were as follows.

Temperature- 20°C
Wind - 0m/s
Cloud - 100%
Rain - dry, no rain

4.2 Noise Sources

The ambient noise climate throughout the site consisted of distant traffic sources. There were short intermittent contributions to the overall climate from traffic to Francis Rd and Cotton Ln. Distant aircraft noise was audible on occasion. Additionally during the night time some noise emanating from within an existing residential property (with the window open) was also audible on occasion at N2.

4.3 Results

The full results of the noise survey are available in the Appendix. An overview of the results is provided below.

Table 4. Summary of noise survey results

Noise Monitoring Position	L _{Aeq,T} Day dBA	L _{Aeq,T} Night dBA	L _{Amax} Range Night dBA
N1	50	44	36-80
N2	46	43	38-81

5.0 RESIDENTIAL DEVELOPMENT, NOISE BREAK-IN CALCULATIONS & MITIGATION

5.1 Break-in Calculation Method

An assessment of the required acoustic insulation performance for the new residential development has been conducted. The assessment has been based on achieving the internal ambient acoustic conditions specified in Section 3 to this report.

Internal noise levels have been determined by calculating the noise break-in through the façade elements in octave frequency bands from 63 Hz – 8kHz. The internal noise levels have been determined, taking into account the sound insulation and area of each element, the room volume and reverberation time, and finally A-weighting the resulting spectrum to determine the internal noise levels. In accordance with the reverberation time standardisation detailed within ISO 140-4 the reverberation time within residential habitable rooms is assumed to be 0.5 seconds.

Calculated internal noise levels have been based the noise survey results as detailed in Section 4 and on typical details for this type of development as described in Sections 5.2-5.3 below. Minimum acoustic specifications have been identified for the glazing and trickle ventilators. These have been summarised as detailed in Section 5.4 below.

5.2 External Walls

Internal noise levels have been calculated on the basis that the building envelope construction achieves the following composite sound reduction index's (R's).

Table 5. Sound Reduction Index Values, Basic Façade Construction, Break In Calculations

Frequency	External Walls, Composite R's dB							
	63	125	250	500	1k	2k	4k	8k
Sound Reduction Index, R, dB	23	26	37	37	46	55	63	58

It is understood that the external walls to the proposed development are likely to be of blockwork cavity type construction. The general proposed construction is considered suitable to achieve the composite sound reduction index's as indicated in Table 5 above.

5.3 Room Dimensions & Volumes

Internal noise levels to the proposed development have been calculated based on the following room dimensions. Room dimensions have been taken room layout and facade drawings for the development.

Table 6. Room Dimensions

Room	External Wall Area m ²	Window Area m ²	Room Volume m ³
Bedroom	3.1	3.8	18
Lounge/Kitchen	3.4	3.0	47

5.4 Mitigation Strategies

The following required mitigation strategy has been derived based on the results of the noise survey and assumed details as described in Sections 5.2-5.3, to achieve the recommended internal noise level criteria as detailed in BS 8233 & WHO 1999.

Table 7. Mitigation Strategy -All Bedrooms

Windows/Glazing Noise Insulation								
Typical Product	Minimum Sound Reduction Index R (dB) at Octave Band Centre Frequency (Hz)							R_w
	63	125	250	500	1000	2000	4000	
6/12/8	23	23	23	30	38	36	43	35
Ventilation Noise Insulation								
Typical Product	Minimum $D_{n,e}$ (dB) at Octave Band Centre Frequency (Hz)							$D_{n,e,w}$
	63	125	250	500	1000	2000	4000	
Renson 771AK/787AK	44	44	38	35	39	42	46	40

Table 8. Mitigation Strategy -All Lounge/Kitchens

Windows/Glazing Noise Insulation								
Typical Product	Minimum Sound Reduction Index R (dB) at Octave Band Centre Frequency (Hz)							R_w
	63	125	250	500	1000	2000	4000	
4/12/4	20	24	20	25	35	38	35	31
Ventilation Noise Insulation								
Typical Product	Minimum $D_{n,e}$ (dB) at Octave Band Centre Frequency (Hz)							$D_{n,e,w}$
	63	125	250	500	1000	2000	4000	
Simon Airstrip	23	28	26	29	29	29	29	29

Notes on Glazing Insulation

For the glazing specifications in Tables 7-8, all sound insulation values quoted above must be achieved by the overall combination of frame and glazing, and not just by the glazing alone. The frame should not reduce the performance of the system overall.

Glazing framing systems must be fully sealed with any small gaps (<10mm nominal) around the perimeter to be stuffed with dense mineral wool to full frame depth and sealed both sides with acoustic non-setting mastic, with additional weathering protection to be applied additionally externally to this. No gaps should be left unsealed.

Notes on Ventilation Insulation

The ventilator inlets described in Tables 7-8, is calculated to provide adequate sound insulation to maintain internal noise levels compliant with the guidance criteria when used in conjunction with the specified glazing described in Tables 7-8. Selected ventilation inlets should provide equal or greater sound insulation performance across the frequency range to the values in Tables 7-8. Specifications are based on the use of one (1) ventilator per room only.

The acoustic specification relates to the combined performance of all ventilation elements. Where two or more ventilators are required to meet the ventilation requirement, the acoustic performance for a single ventilator must be selected so that the combined performance is as stated in the Tables 7-8. As an example, to achieve an overall acoustic insulation performance of $D_{n,e,w}$ 40 dB utilising two ventilators in a single wall, both individual ventilators should be rated at $D_{n,e,w}$ 43 dB. Requirements should be checked with the manufacturer.

Please note that the specification of vents is in terms of acoustic performance only. It should be checked by others that the ventilation requirements of the Building Regulations are also met.

Fan-assisted ventilation systems should be reviewed to ensure that the fan itself does not exceed the noise criteria as specified in Section 3.

5.5 Break-In Noise Calculations Results

Based on mitigation strategies as outlined in Section 5.4 being implemented into the final building envelope design and results of the noise survey, the following predicted internal noise levels have been calculated.

Table 9. Calculated Internal Ambient Noise Levels With Mitigation

Room Type	$L_{Aeq16hr}$, Day 07:00-23:00, dBA	L_{Aeq8hr} , Night 23:00-07:00, dBA	L_{Amax} 23:00-07:00 dBA
Bedrooms	23	18	44
Lounge/Kitchen	26	-	-

As can be seen from Table 9, with the implementation of the mitigation strategy as outlined in Section 5.4 of this report the internal ambient noise levels are expected to be within the internal noise level limit criteria stipulated by BS 8233:2014 & WHO 1999.

6.0 CONCLUSION

At the request of Step Places Ltd, PDA has carried out a noise impact assessment in relation to the proposed new residential development to Francis Road, Withington, M20 4XP. The new residential development will consist of a single block providing 24no residential apartments.

A noise survey has been conducted at site to establish the existing acoustic climate.

Internal ambient noise levels for the proposed residential dwelling have been calculated based on the results of the noise survey, and dimensions for the room volumes and external façade/window areas. Based on the proposed acoustic specifications for the external windows and trickle vents as detailed in Section 5.4 of this report, the predicted internal ambient noise levels achieve the recommended criteria for residential dwellings as given by BS 8233 & WHO 1999. Additionally as the proposed development is residential it is not predicted to introduce any significant new noise sources to the existing ambient noise climate.

It should be noted that the noise impact assessment is dependent on assumed construction details as described in Section 5.2-5.3 of this report. PDA should be consulted on any deviations from the assumed details as described in this report as this may affect the outcome of the assessment.

APPENDIX I -NOISE SURVEY FULL RESULTS

Noise levels recorded during the noise survey are presented below. All noise levels are of 5-minute sample periods.

N1, Francis Rd

Date	Time	L _{Aeq} dBA	L _{eq} Octave Band Centre Frequency								L _{A90} dBA	L _{Amax} dBA
			63	125	250	500	1k	2k	4k	8k		
19/08/2021	23:05	42.8	42.1	42.3	37.2	33.6	33.1	30.7	27.5	43.4	30.5	65.3
19/08/2021	23:10	36.8	45.3	50.2	40.8	31.3	28	21.9	17.8	16.8	30.5	51.3
19/08/2021	23:15	49.6	54.1	51.9	47.5	45.2	46.7	40.6	33.2	27.8	30.4	70.8
19/08/2021	23:20	49.9	50.6	51.1	45.7	46.4	46.4	41.8	36.3	32.7	30.7	70.8
19/08/2021	23:25	38.8	44.8	45.3	38.6	37.6	33.4	27.8	21.4	19.9	30.9	58.3
19/08/2021	23:30	42.3	45.1	42.8	37.6	34.4	35.5	34.4	32.1	38.8	30.8	60.5
-	-	-	-	-	-	-	-	-	-	-	-	-
20/08/2021	00:05	38.1	42.6	37.5	33.4	31.9	33.2	29	25.4	34.6	28.4	62.8
20/08/2021	00:10	32.6	39.8	37.1	33.7	27.3	27.4	24.4	20.1	21	28.7	51.2
20/08/2021	00:15	29	37.9	34.1	29.9	25.3	24.5	17.4	16	16.6	27.7	35.7
20/08/2021	00:20	32	39.1	35.4	30.4	28.5	28.2	23.1	17.4	16.7	27.2	48.5
20/08/2021	00:25	30.6	40.4	36.8	30.7	26.6	26.1	20.1	16.6	16.7	27.6	46.5
20/08/2021	00:30	38.6	39.6	34.9	30.5	28	30.3	31.2	30.9	34.1	27.2	63
20/08/2021	00:35	52.1	45.2	48.6	43.9	39.7	41.2	43.9	43.1	50.7	28.5	66.7
-	-	-	-	-	-	-	-	-	-	-	-	-
20/08/2021	06:00	49.8	57.1	57.2	54.4	44.6	43	41.4	35.7	27.9	33.7	80.3
20/08/2021	06:05	36.5	48.9	40.5	34.5	33.3	33.3	26	19.5	18.1	34.4	48.4
20/08/2021	06:10	39	48.9	41.9	38.2	35.9	35.2	30.5	22.8	18.7	34.4	51.8
20/08/2021	06:15	37.6	49.3	41.3	34.7	33.9	33.6	29.9	22.8	18.4	33.8	52
20/08/2021	06:20	44.8	50	47.2	43.8	40.4	42.4	34.8	25.7	22	33.8	64.1
20/08/2021	06:25	45	52.8	49.7	47	42.1	39.4	36	29.6	29.3	34.2	63.5
-	-	-	-	-	-	-	-	-	-	-	-	-
20/08/2021	07:10	53.8	60.2	53.4	55.6	48.9	50.7	44.2	40.9	32.6	40.6	81.5
20/08/2021	07:15	43.6	54.8	51.5	44.2	39.6	39.6	31.6	29.8	20.7	41.1	57
20/08/2021	07:20	44.4	55.7	47.8	41.5	39.5	39.7	33.5	37.8	26.7	41.4	62.7
20/08/2021	07:25	54.5	60.5	54.4	53.1	52.4	49.5	46.9	39.6	35.3	41.5	69.1
20/08/2021	07:30	52.2	54.8	49.7	47.9	47.2	49.8	44.2	35.8	29.9	40.7	71
20/08/2021	07:35	52.6	60.4	57.3	53.8	47.1	48.1	44.2	41.7	35.4	41.7	79.2
-	-	-	-	-	-	-	-	-	-	-	-	-
20/08/2021	08:19	49.4	58.8	55.9	52.3	43.7	43.7	40.4	37.5	39.4	36.7	77.4
20/08/2021	08:24	39.7	53.1	46.6	40	36.9	33.3	30.7	28.1	20.5	35.1	52.8
20/08/2021	08:29	40.1	57.5	47.1	38.8	35.3	33.5	32.8	28.8	22.5	35.2	50.4
20/08/2021	08:34	45.1	54.6	49.6	42.7	40.7	41.9	36.3	29	23.6	34.9	66.2
20/08/2021	08:39	51.3	60	50.4	48.7	46.8	47.9	44.1	35.8	27.9	35	69.4
20/08/2021	08:44	49.3	56.2	54.4	51.9	42.7	41.7	40.2	39.9	41.8	32.3	81.5



Date	Time	L _{Aeq} dBA	L _{eq} Octave Band Centre Frequency								L _{A90} dBA	L _{Amax} dBA
			63	125	250	500	1k	2k	4k	8k		
-	-	-	-	-	-	-	-	-	-	-	-	-
20/08/2021	09:27	55.4	54.4	58.6	54.1	47.8	46	45.5	47.4	51.5	33.7	86
20/08/2021	09:32	45.6	52.5	47.6	44.9	41.8	43	35.1	26.7	22.8	34	65.7
20/08/2021	09:37	37.8	45	38.9	34.4	32.5	33.9	31	25.2	22.3	33.7	56.1
20/08/2021	09:42	49.4	54.6	51.5	47.1	46.2	45.9	40.9	35	30.3	34.2	67.2
20/08/2021	09:47	40.5	48.8	41.1	37.4	36.2	35.9	33.3	29.4	28	34.6	59.3
20/08/2021	09:52	51.9	53.9	56.6	48.9	44.8	42.3	40.3	44.8	48.2	32.2	81.4

N2, Cotton Lane

Date	Time	L _{Aeq} dBA	L _{eq} Octave Band Centre Frequency								L _{A90} dBA	L _{Amax} dBA
			63	125	250	500	1k	2k	4k	8k		
19/08/2021	23:37	39.5	43.6	39.4	37.4	38.1	33	27.5	24.2	33.7	31.1	59.1
19/08/2021	23:42	38	42.3	45.6	36.5	36.7	32.6	25.7	19.5	17.6	31	53.4
19/08/2021	23:47	36.7	42.4	37.2	35.9	36.4	31	21.7	17.7	17.3	30.3	47.7
19/08/2021	23:52	36.7	40.8	36.1	35.3	36.7	30.9	22.1	18.2	17.1	29.1	49
19/08/2021	23:57	43.3	46.5	40	36.9	34.8	33.3	34.8	32.2	42.2	29.1	70.4
20/08/2021	00:02	39.2	40.4	35.4	35.3	40.2	32.1	23.4	16.9	17.3	31	44.8
-	-	-	-	-	-	-	-	-	-	-	-	-
20/08/2021	00:39	43.3	37.7	38.5	33.3	31.3	29.6	27.2	24.6	45.1	26.7	69.5
20/08/2021	00:44	38.8	41.5	37.5	34.3	31.5	34.8	32.8	27.3	21.1	27.7	61.2
20/08/2021	00:49	31.1	40.2	34.9	29.9	26.3	26.9	22.9	18.6	17.3	26.8	51.4
20/08/2021	00:54	28.2	37.9	34.7	29.1	24.7	23.1	15.6	15.2	16.8	26.4	38.4
20/08/2021	00:59	30.2	47.6	35.5	29.4	25.7	24.8	21	17.1	17	26	49.8
20/08/2021	01:04	31.2	41.2	40.9	34.1	24.8	24.9	19.8	16.7	17	25.9	50.4
20/08/2021	01:09	39.5	38.2	42	33.3	30.2	30.9	32.7	30.5	35.5	26.2	60.6
-	-	-	-	-	-	-	-	-	-	-	-	-
20/08/2021	06:34	50.9	57	57	55.5	45.9	42.9	41.8	41.5	35.6	35.3	81.4
20/08/2021	06:39	38.9	50.6	43.8	40.4	35.1	34.3	29.9	24.6	20.4	35	58.4
20/08/2021	06:44	39.2	50	43	40.4	35.2	35.3	28.3	26.1	26.8	36	54.5
20/08/2021	06:49	40.8	50.3	49.1	44.1	36.9	35.7	27.3	26.1	19.3	36.9	51.8
20/08/2021	06:54	43.2	49.4	49.7	47.8	41.5	36.2	26.4	22	20.6	37.7	57.5
20/08/2021	06:59	49.7	55.9	59.6	53.8	48.9	39.7	35.6	34	27.3	38	77.1
-	-	-	-	-	-	-	-	-	-	-	-	-
20/08/2021	07:46	55.2	57.8	54.6	53.2	46.5	47	41.7	47.7	52.1	37.2	87.9
20/08/2021	07:51	41.7	52.9	45.8	41.6	37.9	37.1	33.6	28.1	22.4	36.8	56.2
20/08/2021	07:56	40.6	51.4	44.8	40.9	36.9	35.5	30.9	28.5	29.6	36.7	53.4
20/08/2021	08:01	49.2	54.2	56	53.9	48.8	38.9	30.4	23.8	20.3	37.6	62.5
20/08/2021	08:06	42.5	55.2	48	41.2	39.7	37.4	34	28	21.1	36.7	64.1
20/08/2021	08:11	42.7	56.7	48.7	41.7	40.8	37.9	31.5	24	20.6	38.7	61.7



Date	Time	L _{Aeq} dBA	L _{eq} Octave Band Centre Frequency								L _{A90} dBA	L _{Amax} dBA
			63	125	250	500	1k	2k	4k	8k		
-	-	-	-	-	-	-	-	-	-	-	-	-
20/08/2021	08:53	49	55	52.1	51.6	43.5	40.6	43.8	36.5	34.5	31.6	80.1
20/08/2021	08:58	38.4	48.8	45.2	42.5	34.6	31.3	28.2	23.1	20.3	31.2	50.3
20/08/2021	09:03	37.5	48.6	39.3	36.2	34.5	32.8	29.4	24.4	20	32	53.8
20/08/2021	09:08	38.2	46.4	39.7	36.8	38.7	31.1	28.7	23.7	20	32	56
20/08/2021	09:13	41.1	45.3	39.8	34.8	33.6	32.1	37.2	32.9	27.7	32	61.4
20/08/2021	09:18	45.5	52.1	52.2	50.2	37.4	35.7	38	37	31.2	33	74.9
-	-	-	-	-	-	-	-	-	-	-	-	-
20/08/2021	10:01	47	52.6	49.5	47.2	41.9	39.3	38.9	39.8	37.9	32.2	77.9
20/08/2021	10:06	35.5	45.3	37.5	35.2	32.5	30.8	27.3	22.1	20.8	32	48.4
20/08/2021	10:11	37.5	44.9	40.2	35.6	33	31.2	29.1	29.8	27.5	32.3	53.8
20/08/2021	10:16	35.2	43.3	38.7	33.7	31	30.3	26.3	25	24.1	32.4	49.1
20/08/2021	10:21	47.4	49.7	53.2	51.8	47.4	37.3	26.6	23.6	20.6	32.5	60.7
20/08/2021	10:26	44.6	52.2	55	50.2	40.6	34.2	31.7	31.5	27.4	34.5	74.1

APPENDIX II – NOTES FOR QUALITY CONTROL

1. Blockwork

All blockwork is to be mortared to an almost fair faced standard both horizontally and vertically. Only perfect blocks may be used with no pitting or cracks. The blockwork must seal effectively to the underside of the soffit.

Where blockwork walls form a cavity wall, care should be taken to avoid rubble and snots from bridging the cavity. This is especially important where one or more of the leaves is floating.

2. Plasterboard

All plasterboard joints are to be butted tight. The rule of thumb is that the joint should be tight enough over its entire length to prevent a normal business card from being inserted. Multiple layers should be fitted with staggered joints.

Base details and deflection heads are to be as per the British Gypsum White Book unless otherwise stated, and copious amounts of mastic to be used when fitting to the walls, floor and ceiling respectively.

3. Mineral Fibre

Mineral fibre slabs are to be butted tightly together and to boundary structures, to form a homogeneous layer.

4. Windows

All window frames are to be a good tight fit into the building structure with any gaps to be filled both internally and externally with a non-setting mastic in addition to the usual weather proofing seal to the exterior. Any gaps between the frame and building that are greater than 5 mm are to be packed with a dense mineral fibre prior to mastic sealing.

5. Electrical Sockets

Electrical sockets must not be fitted back to back and removed areas of blockwork and plasterboard should be kept to an absolute minimum.

6. Water Pipes

All water pipes (and any other pipework) are to be resiliently mounted to avoid “water hammer”. This is particularly important for plasterboard walls.

7. Penetrations

Penetrations are to be dealt with as described in this report. Details for specific services penetrations may be supplied upon request.

8. Approved Samples and Inspections

Samples of each individual acoustic element should be provided for inspection at the beginning of its installation. Once approved, the Clerk of Works must ensure that the same level of quality continues throughout construction.

APPENDIX III – DEFINITION OF ACOUSTIC TERMS

The decibel

This is the basic unit of noise, denoted dB.

A Weighting

This is a weighting process which simulates the human ear's different sensitivity at different frequencies. A weighting can be shown two typical ways, 50 dB(A) L_{eq} or 50 dB L_{Aeq} . Both mean the same thing. (See below for a definition of L_{eq}). The dB(A) level can be regarded as the overall level perceived by human beings.

L_{eq} and $L_{eq(s)}$

This is the equivalent continuous noise level which contains the same acoustic energy as the actual time-varying sound. In other words it is a kind of average noise level. It is denoted dB L_{eq} or, for A-weighted figures dB(A) L_{eq} or dB L_{Aeq} . It can also be expressed in terms of frequency analysis (see later). $L_{eq(s)}$ is the sample L_{eq} level.

L_n

This is the level exceeded for n% of the time. It is denoted dB L_n or, for A-weighted figures dB(A) L_n or dB L_{An} . It can be expressed in terms of frequency analysis (see later). L_{90} is the level exceeded for 90% of the time and is a measure of the lowest level typically reached. L_{10} is the level exceeded for 10% of the time and is the highest level typically reached. L_{50} is the level exceeded for 50% of the time and, mathematically, it is the median.

L_{max}

This is the maximum level reached during a measurement period. The "time constant", or the ability of the equipment to respond to impulses is usually expressed along with it, e.g. "Fast", "Slow", etc. It is denoted dB L_{max} or, for A-weighted figures dB(A) L_{max} , dB L_{Amax} , etc. It can also be expressed in terms of frequency analysis.

Frequency Analysis

Whereas dB(A) gives a very useful overall figure, it has its limitations in that it cannot be used to model or predict the effect of noise control and mitigation as this nearly always has radically different performance at different frequencies.

Frequency analysis expresses an overall noise level at each frequency or band of frequencies in the audible range. Octave band analysis divides the audible range into 10 bands from 31.5 Hz to 16 kHz and the noise level in each band can be expressed in any form e.g. L_{eq} , L_{90} , L_{max} etc. One third octave band analysis uses 30 bands.

Narrow band analysis takes the process to resolutions of less than 1 Hz. This is useful for identifying the existence of tones (whines, hums, etc.) and in pin-pointing the sources.