

ENVIRONMENTAL NOISE ASSESSMENT

PROPOSED ARDWICK GREEN DEVELOPMENT, LAND OFF ARDWICK GREEN NORTH & COTTER STREET, MANCHESTER, M12 6FZ

REPORT REFERENCE NO. J004076-5851-LK-01

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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

PDA Ltd was commissioned by Step Places to carry out an environmental noise and building envelope assessment report for the proposed new build development of 16 no. residential dwellings to the currently vacant land at the corner of Ardwick Green North & Cotter Street in Manchester.

A noise level survey was undertaken at the site representative of daytime and night time hours. The local noise climate is a combination of road traffic noise from Ardwick Green South (A6) and intermittent contributions from Ardwick Green North. Other intermittent noise sources were from nearby road works vehicles and people in the streets.

Based upon the measured and predicted noise levels, calculations have been undertaken for the Bedrooms and Living Spaces to evaluate the internal noise levels. Recommendations are given for glazing, ventilation and building façade elements to meet the internal noise level requirements of good practice guidance given in BS8233:2014 Guidance on Sound Insulation and Noise Reduction for Buildings. Calculations suggest that the noise level criteria of BS8233:2014 can be achieved within the proposed accommodation.

Additionally for the first floor facade of the proposed dwellings facing Ardwick Green North as identified in Section 5.5 the overheating mitigation strategy as required by ADO must provide an alternative method to removing heat other than relying on windows remaining open during the night time periods.

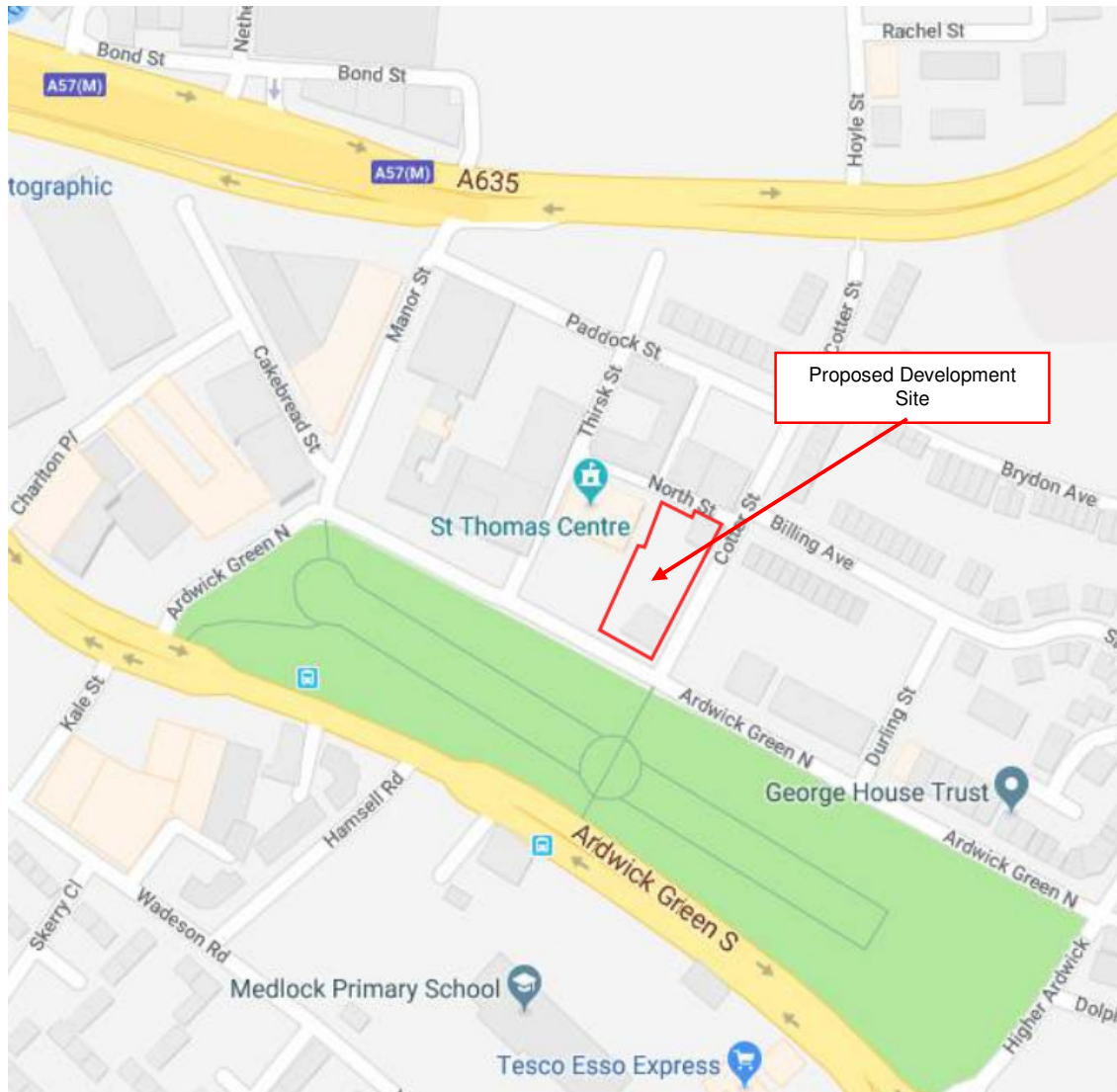
2.0 SITE DESCRIPTION

The proposed new build development consists of 16 no. residential townhouse dwellings to the currently vacant land at the junction of Ardwick Green North & Cotter Street in Manchester

The proposed development site is located in the Ardwick Ward, to the south-east of Manchester City Centre. The surrounding area is made up of office space, schools, event spaces, a park and light industrial uses however the area is predominately residential. Ardwick Green South (A6) runs approximately 70m from the nearest boundary of the proposed development.

A site plan showing the location of the site and surrounding local area is shown in Figure 1 below.

Figure 1. Site overview showing proposed site location (in red) and surrounding area



3.0 NOISE 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' and 'adverse' impacts 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 '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, updated in July 2019. A summary is reproduced in Section 4.2 below, and the full document is published at <https://www.gov.uk/guidance/noise--2>. It is considered that guidance from other acoustic standards may be employed to determine suitable levels within the overall principal of the National Planning Policy Framework.

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, reproduced in the table below.

Table 1. Planning Practice noise level guidance

Response	Examples of Outcomes	Increasing Effect Level	Action
No Observed Effect Level			
Not Present	No Effect	No Observed Effect	No specific measures required
No Observed Adverse Effect Level			
Present and not intrusive	Noise can be heard, but does not cause any change in behaviour, attitude or other physiological response. Can slightly affect the acoustic character of the area but not such that there is a 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, attitude or other physiological response, 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 small actual or 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, attitude or other physiological response, 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, attitude or other physiological response and/or an inability to mitigate effect of noise leading to psychological stress, 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 BS8233:2014 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 1. BS8233 recommended indoor ambient noise levels

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

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.

In addition BS 8233 suggests, ‘*regular individual noise events (for example, scheduled aircraft or passing trains) can cause sleep disturbance. A guideline value may be set in terms of SEL or $L_{Amax,F}$, depending on the character and number of events per night. Sporadic noise events could require separate values*’.

With regard to external areas of residential developments BS8233:2014 states the following;

For traditional external areas that are used for amenity space, such as gardens and patios, it is desirable that the external noise level does not exceed 50 dB $L_{Aeq,T}$, with an upper guideline value of 55 dB $L_{Aeq,T}$ which would be acceptable in noisier environments. However, it is also recognized that these guideline values are not achievable in all circumstances where development might be desirable. In higher noise areas, such as city centres or urban areas adjoining the strategic transport network, a compromise between elevated noise levels and other factors, such as the convenience of living in these locations or making efficient use of land resources to ensure development needs can be met, might be warranted. In such a situation, development should be designed to achieve the lowest practicable levels in these external amenity spaces, but should not be prohibited.

3.4 WHO Guidelines for Community Noise

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

Table 2. 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.

3.5 Approved Document O (ADO)

Approved Document O (APO) 2021, provides guidance on meeting the requirements of the Building Regulations 2010, part 'O1 Overheating mitigation'. The aim of the Building Regulations part O1 is to protect the health and welfare of occupants of the building by reducing the occurrence of high indoor temperatures.

Building Regulations part O1 requires that dwellings, institutions or any other buildings containing one or more rooms for residential purposes (other than a room in a hotel) to:

- (a) *Limit unwanted solar gains in summer:*
- (b) *Provide an adequate means to remove heat from the indoor environment*

However in meeting the obligations of ADO the buildings overheating mitigation strategy for use by occupants must consider 'Noise at night' in addition to other non-noise related considerations.

In regards to 'Noise at night', ADO stipulates the following.

In locations where external noise may be an issue (for example, where the local planning authority considered external noise to be an issue at the planning stage), the overheating mitigation strategy should take account of the likelihood that windows will be closed during sleeping hours (11pm to 7am).

Windows are likely to be closed during sleeping hours if noise within bedrooms exceeds the following limits.

- a. **40dB $L_{Aeq,T}$, averaged over 8 hours (between 11pm and 7am).**
- b. **55dB L_{AFmax} , more than 10 times a night (between 11pm and 7am)**

It should be noted that the above noise limits are with reference to internal noise levels within a bedroom. BS 8233 advises that based on a partially opened window noise at the external façade of the building will be reduced by approximately 15 dB. Therefore ADO infers that windows will be required to remain closed when the external noise climate exceeds the following external noise limits.

55dB $L_{Aeq,T}$, averaged over 8 hours (between 11pm and 7am)

70dB L_{AFmax} , more than 10 times a night (between 11pm and 7am)

Subsequently, where windows are required to be closed at night (due to the above noise limits being exceeded), the overheating mitigation strategy as required by ADO must provide an alternative method to removing heat other than relying on windows remaining open.

4.0 SURVEY DETAILS AND RESULTS

Monitoring surveys have been undertaken to establish the level of noise currently experienced upon the existing site including for noise from the surrounding roads and other local noise sources.

4.1 Survey Dates and Times

Noise level surveys were undertaken at the site between 07:20 – 10:00 hours on Wednesday 12th October 2022, 06:40 – 10:15 hours on Thursday 20th October 2022 and 22:15 – 01:05 hours on Thursday/Friday 20th/21st February 2022. The noise level surveys were chosen to be representative of the worst case night time and daytime periods. It should also be noted that measurements from the surveys have been grouped into “day” and “night” categories in accordance with the following times:-

Daytime: Between 0700 and 2300 hours

Night-time: Between 2300 and 0700 hours

5 minute sample durations were taken over the daytime and night time measurement periods. The measurements were made and fully attended by Mr Joe Meadows and Mr Sam Iles, both of PDA Ltd.

4.2 Equipment Used

Throughout the survey measurements were undertaken with a NTi XL2 sound level meter and a Rion NL-52 sound level meter. The meters are precision grade Class 1 sound level meters (as per BS EN 61672-1: 2002) for which current calibration certificates are held. The meters were set to A-Weighted and fast response. The meters were calibrated directly before any measurement took place and immediately afterwards and no significant drift was observed.

4.3 Weather

Weather conditions varied throughout the monitoring; however weather conditions were conducive to undertake noise measurements

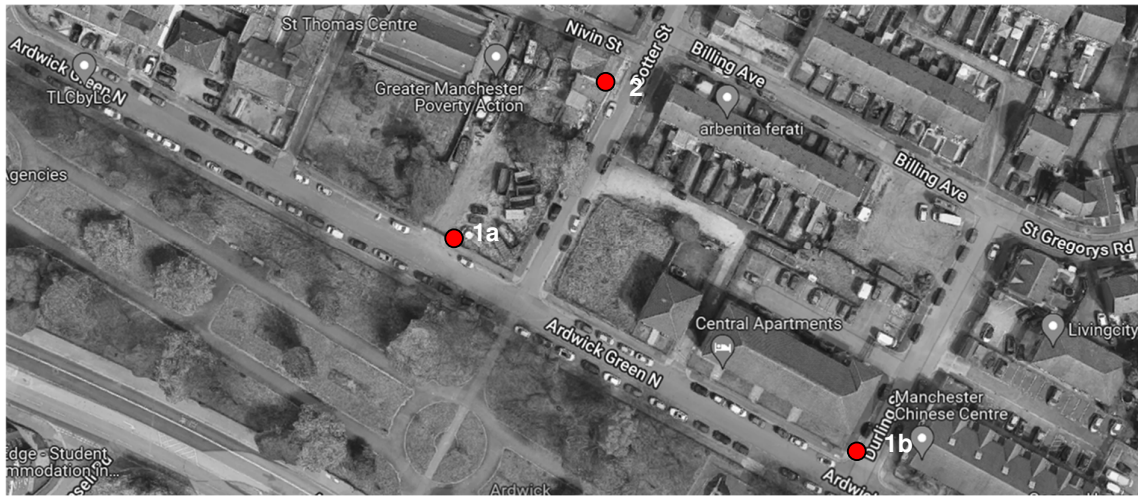
4.4 Measurement Locations

Short term manned measurements were taken at 3 no. positions to describe the noise level around the vicinity of the proposed development site and were as follows:

- Position 1a – microphone located on a pole approximately 1.5m above ground level approximately 7m from the centre of the Ardwick Green North carriageway. This was deemed to have no reflective surfaces affecting the noise level measurements.
- Position 1b – microphone located on a pole approximately 1.5m above ground level approximately 7m from the centre of the Ardwick Green North carriageway at the junction of Durling Street. The position was undertaken to allow a comparison with Position 1a as road works were being carried out on Ardwick Green North adjacent to the proposed development site. This was deemed to have no reflective surfaces affecting the noise level measurements.
- Position 2 – microphone located on a tripod approximately 1.5m above ground level towards the rear of the site approximately 4m from the centre of the carriageway of Cotter Street. This was deemed to have no reflective surfaces affecting the noise level measurements.

The microphone of the sound level meters were all mounted at least 3m from surrounding structures and can be assumed to be a free field measurements. All measurements were undertaken with a fast time-weighting and broadband statistics were measured throughout. In addition, octave band frequency spectra were recorded. The measurement positions are detailed in Figure 2 below.

Figure 2. Measurement Locations



4.5 Description of Ambient Noise Climate

The local noise climate is a combination of road traffic noise from Ardwick Green South (A6) and intermittent contributions from Ardwick Green North. Other intermittent noise sources were from nearby road works vehicles and people in the streets.

4.6 Measurement Results

Full details of the measured results can be seen in Appendix C included at the end of this report. Measurement positions on site are shown on Figure 2 above. A summary of the results is given below:

Table 3. Summary of environmental noise measurements – Position 1a

Date	Time Period (hh:mm)	Duration (hh:mm)	L _{Aeq,T} (dB)	Range of L _{Amax,5mins} (dB)	Range of L _{A90,5mins} (dB)
Thursday 20 th October	Day 07:00 – 10:15 Day 22:25 – 23:00	03:50	60	67 – 87	49 – 59
20 th – 21 st October	Night 23:00 – 01:05	02:05	55	57 – 76	46 – 52

Table 4. Summary of environmental noise measurements – Position 1b

Date	Time Period (hh:mm)	Duration (hh:mm)	L _{Aeq,T} (dB)	Range of L _{Amax,5mins} (dB)	Range of L _{A90,5mins} (dB)
Thursday 20 th October	Day 09:25 – 10:15	00:50	61	73 – 84	53 – 56

Table 5. Summary of environmental noise measurements – Position 2

Date	Time Period (hh:mm)	Duration (hh:mm)	L _{Aeq,T} (dB)	Range of L _{Amax,5mins} (dB)	Range of L _{A90,5mins} (dB)
Wednesday 12 th October	Day 07:20 – 10:00	02:40	57	70 – 82	52 – 54
Thursday 20 th October	Day 07:00 – 09:20 Day 22:15 – 23:00	03:05	57	66 – 85	48 – 54
20 th – 21 st October	Night 06:40 – 07:00 Night 23:00 – 01:00	02:20	53	56 – 75	46 – 53

4.7 Noise Modelling

Using the measured and predicted noise level data above, a 3-dimensional computer noise model has been constructed using Soundplan noise modelling software to determine the noise level impact upon the proposed development. All calculations have followed the methodology contained within ISO 9613-2:1996 *Attenuation of sound during propagation outdoors - Part 2: General method of calculation*.

For the road sources the model was initially calibrated to the noise levels measured on-site. From this the proposed layout of the new buildings has been added. It should be noted that within the model, noise sources (e.g. roads) are modelled as continuous line sources.

A ground absorption coefficient of 0.5 has been used to take into account the mixture of hard and soft surfaces of roads, hard standing, grass, area of park etc. The noise model in Figure 3 shows good correlation with the measured survey data.

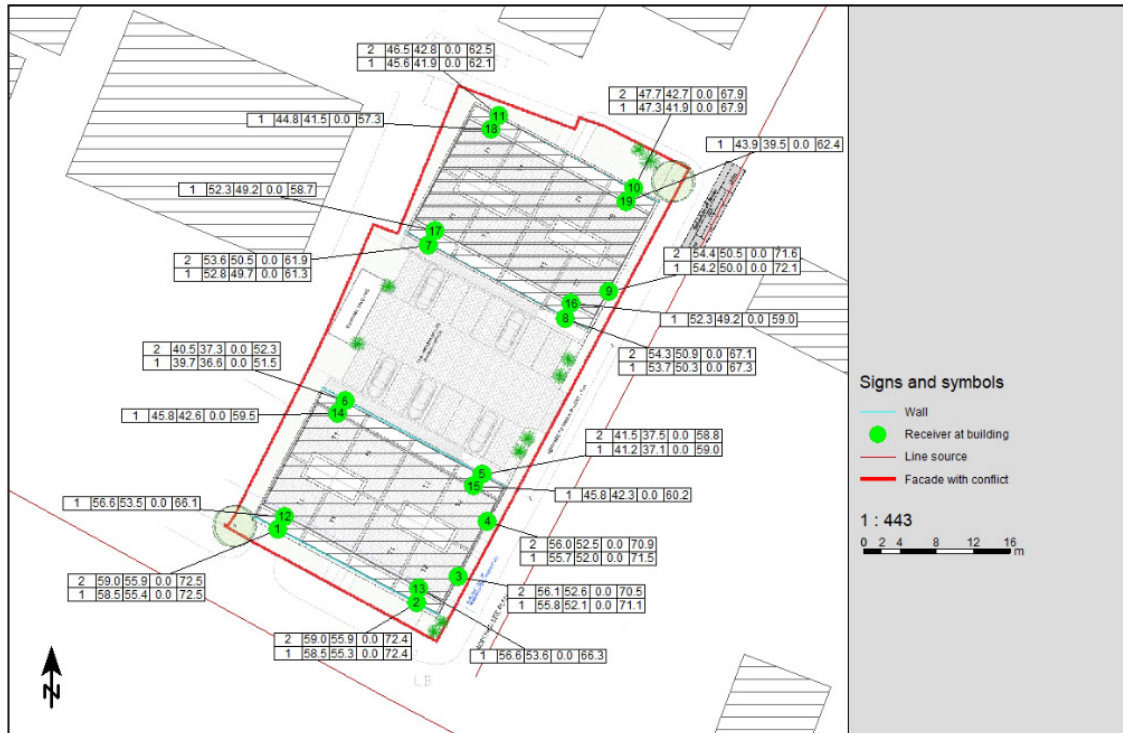
From this the proposed layout of the new buildings has been added. Noise levels incident upon the proposed building are calculated at 1.5m above ground level for the first floor level living. The Soundplan noise model in Figure 4 shows the predicted noise incident upon the proposed building façades based on road traffic noise.

Figure 3. Soundplan noise model calibration map



NB. Noise Levels for each position are given as [Day LAeq][Night LAeq][Night LAmax]

Figure 4. Soundplan noise model with the proposed building



NB. Noise Levels for each position are given as [Floor][Day L_{Aeq}][Night L_{Aeq}][Night L_{Amax}]

5.0 NOISE LEVEL PREDICTIONS

Based upon the measured and predicted noise levels in Section 5, calculations have been undertaken to determine internal noise levels for the proposed living accommodation. The proposed Site and Internal GA Layouts are as per design plans and elevations drawings within the received Ardwick Green Pre-application Document, dated June 2022.

5.1 Glazing and Ventilation Attenuation Requirements

The dominant paths for noise transfer to the interior of buildings are generally the glazing and ventilation elements of the façade constructions. Based on this premise, to achieve the required internal noise levels from Section 4 would require the following glazing and ventilation specifications.

The calculation of noise break-in to the residential rooms has been undertaken in accordance with the calculation methods of 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*, in octave bands. Reverberation time is 0.5 seconds as per the BS EN 12354-3 reference time for dwellings.

Figure 5. Glazing and ventilator requirements at Ground Floor Level (Living Rooms)

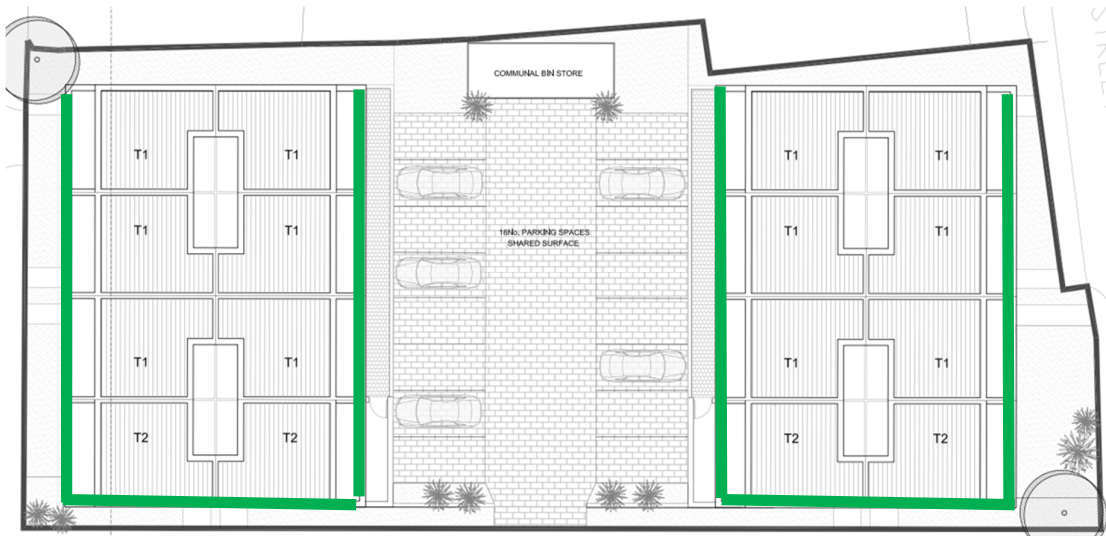


Figure 6. Glazing and ventilator requirements at First & Second Floor Level (Bedrooms)

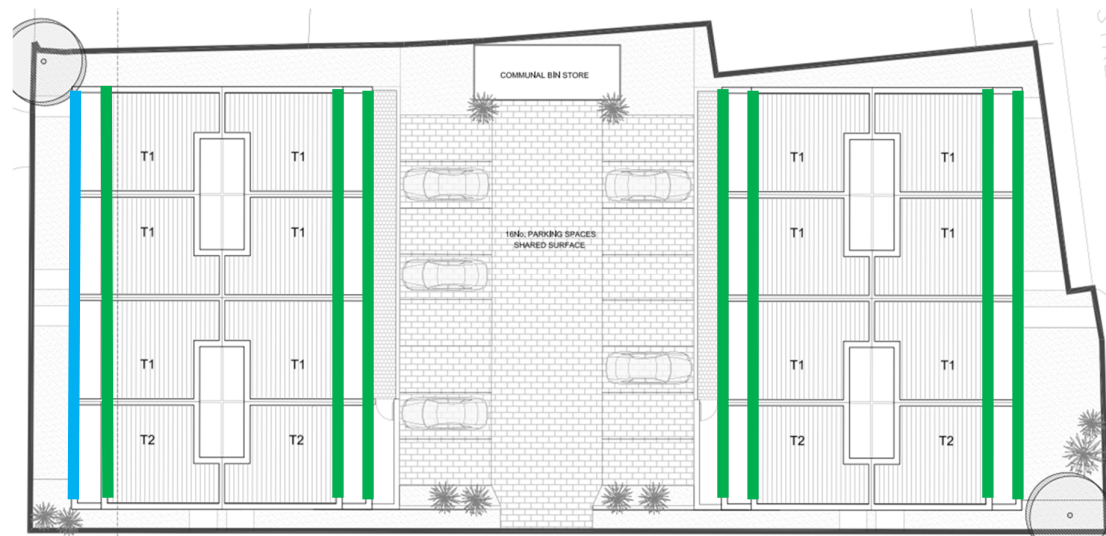


Table 5. Glazing and Ventilator Schedule on Worst Case Rooms

Colour	Floor	Room	Minimum Glazing Rating R_w dB	Minimum combined Ventilator Rating $D_{n,e,w}$ dB	Internal Noise Level Target	Calculated Internal Noise Level
					$L_{Aeq,T}$ dB Day/Night	$L_{Aeq,T}$ dB Day/Night
Green	Ground	Type 1 Living	33	33	35/-	30/-
Green	Ground	Type 2 Living	33	33	35/-	34/-
Blue	First	Type 1 Bedroom 2	38	38	35/30	29/28
Green	First	Type 1 Bedroom 2	33	33	35/30	29/26
Green	Second	Type 1 & 2 Bedroom 3	33	33	35/30	31/28

With the glazing and ventilator specification proposed in Table 5 above, calculations suggest that the internal Day and Night time BS8233:2014/WHO noise level requirements can be achieved.

In addition to the above, calculations have been undertaken to determine L_{Amax} noise levels within the bedrooms at night time. Using typical L_{Amax} noise levels for road traffic events measured during the night time, with the glazing and ventilation specifications above, calculations suggest the internal noise level of 45 dB L_{Amax} would be achieved.

5.1.1 Glazing Specification and Installation Notes

Notes on Glazing Installation

For the glazing specifications in Table 5, all sound insulation values quoted 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.

Minimum performance requirements for the combination of glazing and framing recommended in the above tables are as follows:

Table 6. Required Minimum Sound insulation of Combined Glazing and Framing

Typical Construction	Minimum Sound Reduction Index R (dB) at Octave Band Centre Frequency (Hz)							R _w dB
	63	125	250	500	1k	2k	4k	
Standard double glazing e.g. 6/12/6mm	18	20	19	29	38	36	45	33
Acoustic double glazing e.g. 10/12/6mm	20	26	27	34	40	38	46	38

Figures stated in the table above are based on Saint Gobain manufacturer quoted data. Acoustic ratings should be checked with the manufacturer and supported by laboratory test reports where necessary.

5.1.2 Ventilator Requirements

BS8233:2014 would suggest, *the Building Regulations' supporting documents on ventilation recommend that habitable rooms in dwellings have background ventilation. Where openable windows cannot be relied upon for this ventilation, trickle ventilators can be used and sound attenuating types are available. However, windows may remain openable for rapid or purge ventilation, or at the occupant's choice.*

BS8233:2014 further states, *if partially open windows were relied upon for background ventilation, the insulation would be reduced to approximately 15 dB, resulting in the target levels being exceeded. However, windows may still be openable for rapid or purge ventilation, or occupant's choice.*

The ventilator inlet described in the following table is calculated to provide adequate sound insulation to maintain internal noise levels compliant with the guidance criteria when used in conjunction with the selected glazing. Example ventilator product is noted below.

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 table below,

e.g. for 2 no. ventilators, the acoustic performance of each will need to be $D_{n,e,w}$ 41 dB to meet a combined specification of $D_{n,e,w}$ 38 dB.

Requirements should be checked with the manufacturer. Please note that the treatment is generally not considered necessary for non-habitable rooms such as bathrooms etc.

Table 7 below gives the acoustic performance of the ventilator used in the calculations. Any alternative vent should achieve the same performance or greater in each octave band.

Table 7. Required ventilator performance

Example Product	Minimum Normalised Element Level Difference $D_{n,e}$ (dB) at Octave Band Centre Frequency (Hz)						$D_{n,e,w}$ dB
	125	250	500	1k	2k	4k	
Acoustic trickle vent, e.g. Simon Acoustic Slimline	38	35	35	31	32	35	33
Acoustic trickle vent, e.g. Simon Acoustic EHAS	40	36	34	35	44	40	38

Please note that the specification of vents is in terms of acoustic performance only. Ventilation strategy needs to be checked with Local Authority and other standards and regulations for compliance. It should be noted that inclusion of ventilators alone does not ensure compliance with Building Regulations or other regulatory requirements for ventilation. The ventilation strategy should be checked by others.

5.2 External Walls

For calculation purposes the proposed building envelope has been assumed to be a traditional cavity brick/blockwork construction, consisting of 100mm brick/block outer leaf, minimum 75mm cavity and 100mm blockwork inner leaf with internal finish.

For the second floor bedroom we have assumed the pitched roof/façade will be made up of a traditional concrete tile construction with insulation below, with the ceiling comprising of 1 no. layer 12.5mm Soundbloc plasterboard (total min. mass per unit area 20kg/m²).

Using Insul sound insulation prediction software, it is calculated that the above build-ups would provide laboratory sound insulation in excess of 54 dB R_w and 43 dB R_w respectively, which are both considered acceptable.

Please note that the external façade should have no unsealed penetrations, and any openings for ventilation should meet the specifications for ventilators above.

5.3 Roof

Within the calculations the roof has been assumed to be a concrete slab roof construction with insulation and plasterboard ceiling within the top floor rooms. It is considered that this is likely to be acceptable.

Insul sound prediction software would suggest the a typical minimum 150mm concrete slab structure has a laboratory sound insulation of at least 55 dB R_w , which is considered to be acceptable.

5.4 Quality Control

Please note that achieving performance standards requires strict adherence to best practice construction methodology on site. A checklist of acoustic requirements for quality control is attached at the rear of this report.

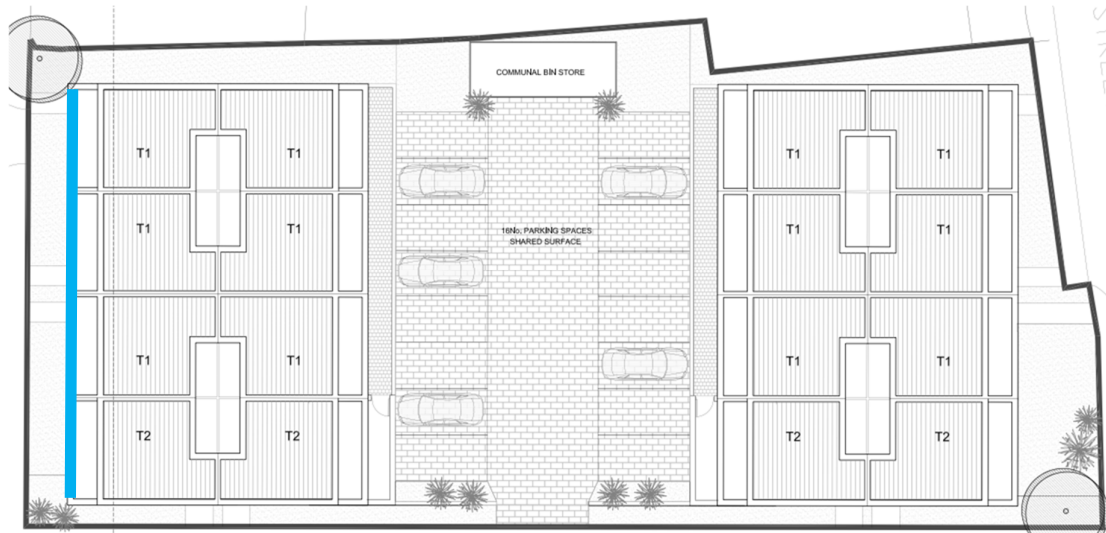
5.5 Approved Document O (ADO), Method of Removing Heat

With reference to the noise survey results and noise modelling around site it should be noted that noise at the following façades of the proposed development are predicted to exceed the following criteria.

55dB $L_{Aeq,T}$, averaged over 8 hours (between 11pm and 7am)

70dB L_{AFmax} , more than 10 times a night (between 11pm and 7am)

Figure 7. First Floor Front Façade Only (highlighted in blue) Predicted to Exceed ADO Criteria



Consequently based on a partially open window, noise within the first floor bedrooms to the front façade facing onto Ardwick Green North illustrated above are predicted to exceed the following ADO limits above which windows are expected to remain closed to control the ingress of external noise.

40dB $L_{Aeq,T}$, averaged over 8 hours (between 11pm and 7am)

55dB L_{AFmax} , more than 10 times a night (between 11pm and 7am)

Therefore for the identified facade above the overheating mitigation strategy as required by ADO must provide an alternative method to removing heat other than relying on windows remaining open during the night time period.

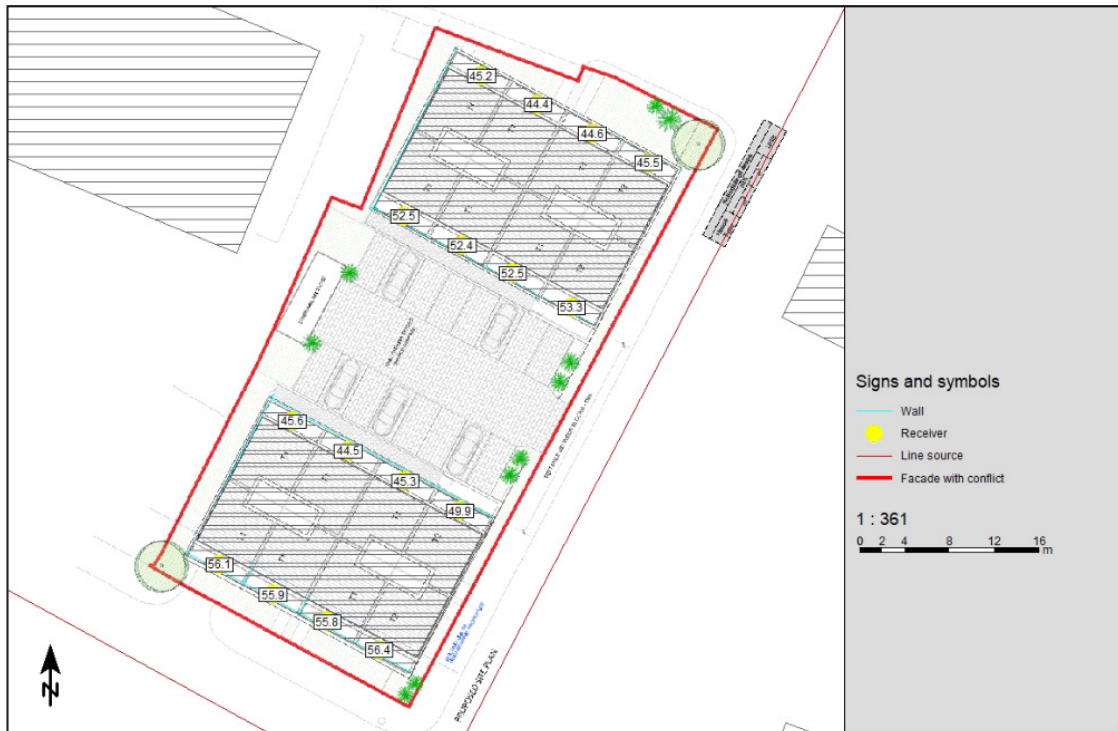
5.6 External Amenity Space

The Sound Plan model as detailed in Section 4.7 has been used to produce the following noise map depicting the predicted the noise climate to the external second floor roof terrace amenity spaces. The external amenity space guidance from BS 8233:2014 and WHO Guidelines suggest an upper limit of 55 dB L_{Aeq} during daytime.

With reference to Figure 8 below it can be noted that a large proportion of the proposed development site is expected to achieve the upper (55 dBA) recommended BS 8233 criteria.

Second floor roof terrace amenity spaces facing onto Ardwick Green North and Ardwick Green South (A6) are expected to marginally exceed 55 dBA.

Figure 8. Soundplan noise map of external second floor roof terrace amenity space



With regards to external noise levels within amenity spaces BS 8233:2014 (section 7.7.3.2) gives the following advice:

For traditional external areas that are used for amenity space, such as gardens and patios, it is desirable that the external noise level does not exceed 50dB $L_{Aeq,T}$, with an upper guideline value of 55dB $L_{Aeq,T}$ which would be acceptable in noisier environments. However, it is also recognized that these guideline values are not achievable in all circumstances where development might be desirable. In higher noise areas, such as city centres or urban areas adjoining the strategic transport network, a compromise between elevated noise levels and other factors, such as the convenience of living in these locations or making efficient use of land resources to ensure development needs can be met, might be warranted. In such a situation, development should be designed to achieve the lowest practicable levels in these external amenity spaces, but should not be prohibited.

In regards to the proposed development, the site is within close proximity of the A6 and can be considered an 'urban areas adjoining the strategic transport network'. Therefore the necessity to achieve the recommended 55 dBA external criteria should be considered against the benefits of including a garden amenity space to the proposed development.

It should be noted that the BS8233 advisory guidelines have not been adopted in UK noise or planning policy. In addition using the 55 dBA guideline as a fixed threshold beyond which noise sensitive development should be prohibited is unrealistic. The National Noise Incidence Study undertaken by DEFRA in 2009 indicates that more than 50% of the UK population is exposed to day time noise levels of more than 55 dBA however the majority of persons surveyed do not report being highly annoyed within the National Noise Attitude Survey 2000 undertaken by Defra. In addition the National Noise Attitude Survey 2012 (NNAS2012) Summary Report December 2014 - reports that "In general 72% of respondents had a positive attitude to their local noise environment".



6.0 CONCLUSIONS

PDA Ltd was commissioned by Step Places to carry out an environmental noise and building envelope assessment report for the proposed new build development of 16 no. residential dwellings to the currently vacant land at the corner of Ardwick Green North & Cotter Street in Manchester.

A noise level survey was undertaken at the site representative of daytime and night time hours. The local noise climate is a combination of road traffic noise from Ardwick Green South (A6) and intermittent contributions from Ardwick Green North. Other intermittent noise sources were from nearby road works vehicles and people in the streets.

Based upon the measured and predicted noise levels, calculations have been undertaken for the Bedrooms and Living Spaces to evaluate the internal noise levels. Recommendations are given for glazing, ventilation and building façade elements to meet the internal noise level requirements of good practice guidance given in BS8233:2014 Guidance on Sound Insulation and Noise Reduction for Buildings. Calculations suggest that the noise level criteria of BS8233:2014 can be achieved within the proposed accommodation.

Additionally for the first floor facade of the proposed dwellings facing Ardwick Green North as identified in Section 5.5 the overheating mitigation strategy as required by ADO must provide an alternative method to removing heat other than relying on windows remaining open during the night time periods.



APPENDIX A – 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 B – 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.

APPENDIX C – NOISE SURVEY RESULTS

Environmental Noise measurements – Position 1a – Daytime

Date	Time (hh:mm)	L _{eq} Octave Band Centre Frequency								L _{Aeq}	L _{Amax}	L _{A90}
		63	125	250	500	1000	2000	4000	8000			
Thursday 20th October 2022												
20/10/22	07:00	65	58	55	51	55	53	45	37	59	73	54
20/10/22	07:05	66	60	56	51	56	53	46	39	60	73	54
20/10/22	07:10	66	60	56	55	58	55	49	47	62	82	55
20/10/22	07:15	65	62	55	52	57	54	47	40	60	73	55
20/10/22	07:20	66	59	55	52	56	53	47	39	59	72	55
20/10/22	07:25	65	59	53	49	54	52	46	38	58	70	55
20/10/22	07:30	65	57	55	51	56	53	47	39	59	71	55
20/10/22	07:35	65	58	55	51	55	52	46	38	58	73	55
20/10/22	07:40	65	59	55	53	58	54	47	44	61	77	54
20/10/22	07:45	65	59	58	54	57	54	46	39	60	76	54
20/10/22	07:50	68	63	59	54	56	54	48	47	60	72	58
20/10/22	07:55	70	62	58	54	56	54	52	50	61	71	58
20/10/22	08:00	68	62	57	53	56	54	52	51	61	75	58
20/10/22	08:05	67	60	56	52	56	54	53	54	62	73	59
20/10/22	08:10	66	59	55	52	56	54	50	43	60	75	54
20/10/22	08:15	66	60	54	51	58	54	47	40	61	83	54
20/10/22	08:20	69	61	59	53	57	54	51	50	61	74	58
20/10/22	08:25	65	61	57	54	55	53	51	50	60	71	57
20/10/22	08:30	68	59	56	54	55	53	47	40	59	72	55
20/10/22	08:35	71	70	59	51	55	53	45	36	60	81	54
20/10/22	08:40	68	63	56	53	57	54	46	38	60	79	53
20/10/22	08:45	66	57	54	52	56	53	52	41	60	85	52
20/10/22	08:50	66	57	53	50	56	52	44	37	59	76	52
20/10/22	08:55	65	60	58	52	57	54	46	38	61	76	53
20/10/22	09:00	66	57	54	53	55	52	45	38	59	76	53
20/10/22	09:15	66	59	56	53	55	52	46	42	59	77	56
20/10/22	09:20	68	60	57	54	55	52	46	42	59	72	55
20/10/22	09:25	69	60	55	54	57	54	49	45	61	73	56
20/10/22	09:30	70	61	57	56	57	54	48	43	61	76	55
20/10/22	09:35	69	59	55	53	56	53	47	43	60	75	55
20/10/22	09:40	69	60	56	53	56	54	49	45	60	77	55
20/10/22	09:45	69	59	54	50	54	51	46	42	58	79	55
20/10/22	09:50	69	59	55	51	54	51	46	42	58	71	55
20/10/22	09:55	69	60	57	54	55	53	48	44	60	79	54
20/10/22	10:00	68	58	56	50	53	50	44	41	57	67	54
20/10/22	10:05	69	58	55	52	54	51	50	42	59	72	54
20/10/22	10:10	67	58	54	52	56	52	46	43	59	76	52
20/10/22	22:25	64	57	51	47	50	49	41	34	54	74	51
20/10/22	22:30	70	64	54	49	54	51	43	35	58	76	52
20/10/22	22:35	64	62	53	48	53	50	42	34	57	70	49

Date	Time (hh:mm)	Leq Octave Band Centre Frequency								LAeq	LAmax	LA90
		63	125	250	500	1000	2000	4000	8000			
20/10/22	22:40	65	59	59	55	59	58	49	39	63	87	51
20/10/22	22:45	63	55	52	47	52	51	42	32	56	74	50
20/10/22	22:50	67	59	55	54	57	54	47	39	61	76	53
20/10/22	22:55	67	61	55	52	57	54	45	37	60	71	53

Environmental Noise measurements – Position 1b – Night time

Date	Time (hh:mm)	Leq Octave Band Centre Frequency								LAeq	LAmax	LA90
		63	125	250	500	1000	2000	4000	8000			
20/10/22	23:00	65	60	54	50	55	53	45	35	58	74	52
20/10/22	23:05	65	62	55	46	51	50	42	30	56	66	51
20/10/22	23:10	62	55	51	46	52	50	41	33	56	72	50
20/10/22	23:15	64	56	53	45	51	50	41	29	55	60	51
20/10/22	23:20	61	55	51	45	50	49	41	29	54	60	50
20/10/22	23:25	61	54	51	45	50	49	41	31	54	59	51
20/10/22	23:30	63	55	52	51	56	54	44	37	59	75	50
20/10/22	23:35	61	56	52	47	51	49	42	33	55	69	49
20/10/22	23:40	62	58	58	47	52	50	41	30	56	69	50
20/10/22	23:45	62	57	52	47	51	50	42	34	55	70	49
20/10/22	23:50	62	55	51	44	50	48	41	30	54	60	50
20/10/22	23:55	62	56	50	44	50	49	39	28	54	60	47
21/10/22	00:00	61	53	51	45	52	50	41	30	55	69	50
21/10/22	00:05	59	53	48	43	48	47	38	27	52	58	48
21/10/22	00:10	60	53	48	42	48	46	37	25	51	60	46
21/10/22	00:15	60	54	51	44	50	49	40	28	54	60	49
21/10/22	00:20	63	56	51	44	50	48	40	28	54	60	51
21/10/22	00:25	58	51	48	43	49	48	38	26	53	59	48
21/10/22	00:30	58	52	48	42	48	47	37	25	52	57	46
21/10/22	00:35	60	53	49	45	50	48	39	30	53	70	46
21/10/22	00:40	58	52	48	43	49	47	38	32	53	59	48
21/10/22	00:45	59	54	53	45	49	48	39	28	54	62	46
21/10/22	00:50	62	56	53	48	53	52	43	33	57	76	48
21/10/22	00:55	59	53	51	43	48	47	39	27	52	59	47
21/10/22	01:00	61	56	52	46	49	48	40	29	53	66	46

Environmental Noise measurements – Position 2 – Daytime

Time (hh:mm)	Duration (hh:mm)	Leq Octave Band Centre Frequency								LAeq	LAmax	LA90
		63	125	250	500	1000	2000	4000	8000			
20/10/22	07:00	-	-	-	-	-	-	-	-	57	72	53
20/10/22	07:05	-	-	-	-	-	-	-	-	57	75	53
20/10/22	07:10	-	-	-	-	-	-	-	-	54	63	53
20/10/22	07:15	-	-	-	-	-	-	-	-	55	62	54
20/10/22	07:20	-	-	-	-	-	-	-	-	58	75	54

Time (hh:mm)	Duration (hh:mm)	Leq Octave Band Centre Frequency								LAeq	LAmax	LA90
		63	125	250	500	1000	2000	4000	8000			
20/10/22	07:25	-	-	-	-	-	-	-	-	56	72	53
20/10/22	07:30	-	-	-	-	-	-	-	-	55	62	53
20/10/22	07:35	-	-	-	-	-	-	-	-	55	66	54
20/10/22	07:40	-	-	-	-	-	-	-	-	56	64	53
20/10/22	07:45	-	-	-	-	-	-	-	-	57	75	54
20/10/22	07:50	-	-	-	-	-	-	-	-	59	76	54
20/10/22	07:55	-	-	-	-	-	-	-	-	58	75	54
20/10/22	08:05	-	-	-	-	-	-	-	-	56	61	54
20/10/22	08:10	-	-	-	-	-	-	-	-	60	79	54
20/10/22	08:15	-	-	-	-	-	-	-	-	57	75	53
20/10/22	08:20	-	-	-	-	-	-	-	-	57	70	54
20/10/22	08:25	-	-	-	-	-	-	-	-	56	71	54
20/10/22	08:30	-	-	-	-	-	-	-	-	59	77	54
20/10/22	08:35	-	-	-	-	-	-	-	-	57	71	53
20/10/22	08:40	-	-	-	-	-	-	-	-	58	72	52
20/10/22	08:45	-	-	-	-	-	-	-	-	58	71	52
20/10/22	08:50	-	-	-	-	-	-	-	-	57	70	52
20/10/22	08:55	-	-	-	-	-	-	-	-	58	72	53
20/10/22	09:00	-	-	-	-	-	-	-	-	58	77	53
20/10/22	09:05	-	-	-	-	-	-	-	-	58	85	51
20/10/22	09:10	-	-	-	-	-	-	-	-	54	65	52
20/10/22	09:15	-	-	-	-	-	-	-	-	55	65	52
20/10/22	22:15	-	-	-	-	-	-	-	-	53	62	51
20/10/22	22:20	-	-	-	-	-	-	-	-	53	61	50
20/10/22	22:25	-	-	-	-	-	-	-	-	52	56	50
20/10/22	22:30	-	-	-	-	-	-	-	-	57	78	50
20/10/22	22:35	-	-	-	-	-	-	-	-	52	66	50
20/10/22	22:40	-	-	-	-	-	-	-	-	52	69	49
20/10/22	22:45	-	-	-	-	-	-	-	-	53	68	48
20/10/22	22:50	-	-	-	-	-	-	-	-	55	77	49
20/10/22	22:55	-	-	-	-	-	-	-	-	56	76	50

Environmental Noise measurements – Position 2 – Nighttime

Time (hh:mm)	Duration (hh:mm)	Leq Octave Band Centre Frequency								LAeq	LAmax	LA90
		63	125	250	500	1000	2000	4000	8000			
20/10/22	06:40	-	-	-	-	-	-	-	-	56	67	53
20/10/22	06:45	-	-	-	-	-	-	-	-	55	63	53
20/10/22	06:50	-	-	-	-	-	-	-	-	56	66	53
20/10/22	06:55	-	-	-	-	-	-	-	-	56	62	53
20/10/22	23:00	-	-	-	-	-	-	-	-	52	64	49
20/10/22	23:05	-	-	-	-	-	-	-	-	52	62	50
20/10/22	23:10	-	-	-	-	-	-	-	-	53	63	50
20/10/22	23:15	-	-	-	-	-	-	-	-	52	64	50

Time (hh:mm)	Duration (hh:mm)	Leq Octave Band Centre Frequency								LAeq	LAmax	LA90
		63	125	250	500	1000	2000	4000	8000			
20/10/22	23:20	-	-	-	-	-	-	-	-	51	57	49
20/10/22	23:25	-	-	-	-	-	-	-	-	54	74	49
20/10/22	23:30	-	-	-	-	-	-	-	-	54	70	48
20/10/22	23:35	-	-	-	-	-	-	-	-	54	73	48
20/10/22	23:40	-	-	-	-	-	-	-	-	56	75	49
20/10/22	23:45	-	-	-	-	-	-	-	-	53	72	48
20/10/22	23:50	-	-	-	-	-	-	-	-	51	56	48
20/10/22	23:55	-	-	-	-	-	-	-	-	51	57	47
21/10/22	00:00	-	-	-	-	-	-	-	-	50	59	47
21/10/22	00:05	-	-	-	-	-	-	-	-	51	64	47
21/10/22	00:10	-	-	-	-	-	-	-	-	50	56	46
21/10/22	00:15	-	-	-	-	-	-	-	-	51	58	48
21/10/22	00:20	-	-	-	-	-	-	-	-	51	56	48
21/10/22	00:25	-	-	-	-	-	-	-	-	50	57	46
21/10/22	00:30	-	-	-	-	-	-	-	-	51	65	46
21/10/22	00:35	-	-	-	-	-	-	-	-	51	68	46
21/10/22	00:40	-	-	-	-	-	-	-	-	51	65	46
21/10/22	00:45	-	-	-	-	-	-	-	-	50	56	46
21/10/22	00:50	-	-	-	-	-	-	-	-	51	63	47
21/10/22	00:55	-	-	-	-	-	-	-	-	50	56	47