Blue Acoustics NS309

150A Hinckley Road, Leicester Forest East LE3 3JT

Planning Application : 20/0250/FUL

Prepared by :
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23.06.2020

On behalf of :
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Contents

1 Executive Summary

ProPG assessment levels indicate a medium risk through the day and a high risk by night.

Assessment levels for delivery noise indicate a significant adverse impact. However, these occur during daytime hours (07:00 - 10:00) and are generated by one delivery alone.

Assessment levels for the rear plant area are high and it is therefore recommended south facade windows be restricted to bath / utility rooms only.

Calculations and computer modelling based on the existing floor makeup indicate that all but the noisiest voice noise events would inaudible in the flats above.

2 Introduction

Blue Acoustics has been instructed to carried out a noise impact assessment to support a planning application for a proposed development at 150A Hinckley Road, Leicester Forest East. The development is for the conversion of the 1st floor flat to form 5 apartments.

The site covers the entire 1st floor area, with a Sainsbury's Local store occupying the ground floor space below. The site is subjected to traffic noise to the front of the site, delivery noise to the side, and plant noise to the rear.

Figure 1 : Existing building

The site was attended on 3rd-4th June 2020 during which a number of measurements were taken to establish noise levels around the site, including 24hr measurement of traffic and plant noise, and fully attended measurement of delivery noise for a typical morning.

It should be understood that whilst the country was under partial lockdown during the measurement period, supermarkets hardware stores and some schools were open.

The following government advice for employees was in place : “Employees who cannot work from home, for example, those in construction and manufacturing, are now encouraged to go to work.”

These fact were factored into the noise calculations within this report. It was conservatively estimated that traffic levels were at approximately 1/3 of their typical state. To increase noise levels by 3 fold, +5dB was applied to all LAeq values.

LAFMax values were not altered because whilst fewer in numbers, they would still register the same levels.

This report includes a BS4142 assessment to determine the noise impact generated by shop borne activities, in particular delivery noise. It also includes a ProPG assessment, which provides advice on layout and glazing and ventilation noise specifications to meet BS8233 criteria for internal noise levels.

3 Guidance & References

3.1 BS 8233:2014 advises that in general, for steady external noise sources, it is desirable that the internal ambient noise level does not exceed the following guideline values :

Activity	**Location**	**07:00 to 23:00**	**23:00 to 07:00**
Resting	Living Room	35 dB $L_{Aeq, 16hour}$	-
Dining	Dining Room	40 dB $L_{Aeq, 16hour}$	-
Sleeping (daytime resting)	Bedroom	35 dB $L_{Aeq, 16hour}$	30 dB $L_{Aeq, 8hour}$
Maximum levels inside bedrooms			45 dB LAFMax

Table 1 : BS8233:2014 guidelines for Indoor ambient noise levels for dwellings

WHO guidelines state that "based on limited data available, a level of less than 35 dB(A) is recommended to preserve the restorative process of sleep" and advises an internal LA,max of 45 dB

WHO guidelines 1999 similarly state that external amenity areas should not be subjected to daytime averaged noise levels of greater than **55dB LAeq**, and ideally **50dB**.

3.2 BS4142:2014 + A1:2019

"Method for rating industrial noise affecting mixed residential and industrial areas". The standard provides guidance on the measurement and assessment industrial noise with respect to it's impact on sensitive residential developments.

The method involves the measurement of the **ambient noise level** and the **residual and background noise levels**.

A pre-determined method is then carried out to ascertain the **'specific' industrial noise level**.

This is then adjusted to reflect tonal characteristics to give a **rating level**.

The **background noise leve**l is then subtracted from **the rating level** to give an **assessment level** to determine the likelihood of complaints using the following table :

Result of subtraction of the Measured Background LAF90 from the BS4142 Rating Level, LAr,*Tr*	**BS4142:2014 noise assessment**
+ 10 dB or more	**Likely to be an indication of a significant adverse impact, depending on the context**
Around + 5 dB	**Likely to be an indication of an adverse impact, depending on the context**
Below + 5 dB	**The lower the rating level is relative to the measured background sound level, the less likely it is that the specific sound source will have an adverse impact or a significant adverse impact. Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending on the context**

Table 2 : BS4142:2014 assessment table

3.3 ProPG

ProPG: Planning and Noise – Professional Practice Guidance on Planning & Noise

Pro-PG was created to provide a consistent approach to noise assessments for new build residential developments exposed to predominantly airborne noise from transport sources, in line with current government guidance, the Noise Policy Statement of England (*NPSE 2010*) and the National Planning Policy Framework (*NPPF 2012, revised 2018*). The document encourages better acoustic design for new residential development and aims to protect people from the harmful effects of noise. This industry professional guidance encourages planners, consultants and developers to consider noise issues at the start of planning with a two-stage approach.

Stage 1 is an initial noise risk assessment of the proposed development site and examines the existing noise levels at a site being considered for development and if mitigation is required. The level of risk is assessed from a (minimum) 24-hour measurement of a "worst case scenario" that records noise data from all dominant transport noise sources.

Industrial and commercial noise sources (when not dominant) can also be included in this assessment although separate BS4142:2014 assessments may still be required. In line with current government guidance, the Noise Policy Statement of England (*NPSE 2010*) and the National Planning Policy Framework (*NPPF 2012, revised 2018*).

Stage 2 is a full assessment of noise levels and the risk level associated with them to create a good acoustic design for the residential development which mitigates this risk and results in internal and external sound levels in line with BS8233:2014 and WHO guidance. ProPG guidance accepts that certain noise climates cannot be mitigated to these levels and recommends a relaxing of targets in these cases.

This should be assessed in the context of positive economic and social impacts as well as the build costs of a proposed residential development especially in cases of prohibitively high costing for some levels of mitigation.

4 Site Detail

The site is situated on Hinckley Road in Leister Forest East, approximately 5km west of Leicester city centre. The building is occupies by a Sainsburys Local outlet on the ground floor, with the existing residence occupying the 1st floor space. The building is set back approximately 25m from the road, with a parking area (approx. 10 vehicles) in between.

To the east is an access road and further to this a semi-detached property with 2 ground floor shops, a vape shop and a chip shop. The chip shop has external plant located on its eastern facade with no line of sight to 150A Hinckley Road.

To the west is a detached property and to the south is the rear garden of another property. The access road to the east leads to an alley way which runs south down past the rear portion of the site, providing access to Acres Road.

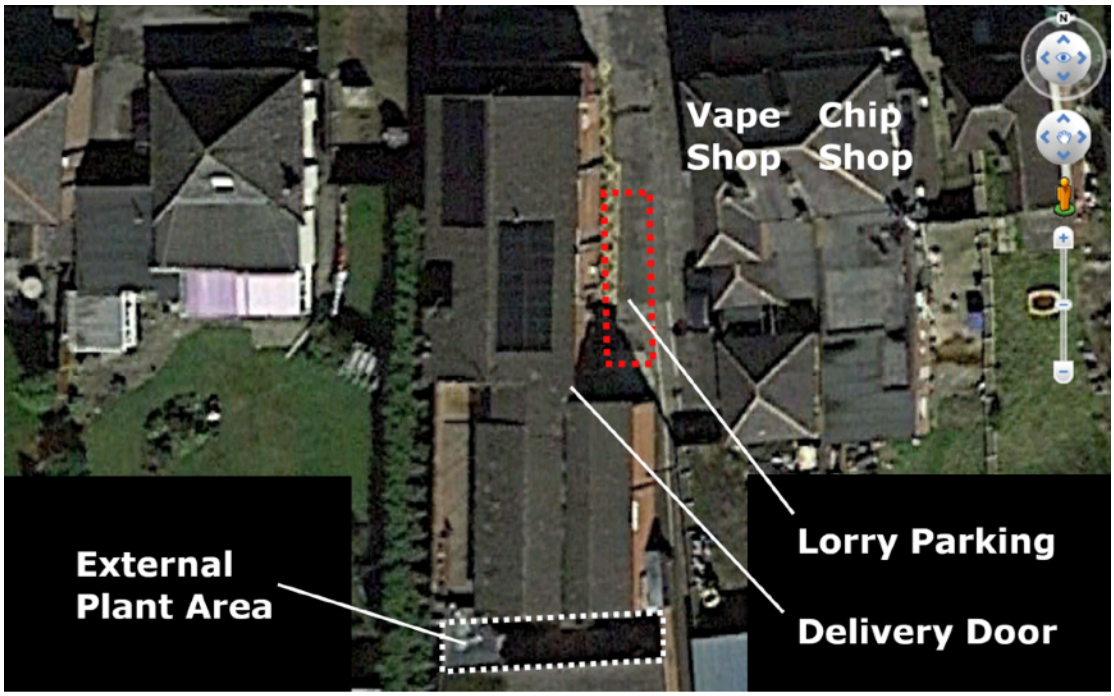


Figure 2 : Aerial view of immediate area with site plan overlay

The Sainsburys condensers are located in an external plant area at the rear of the building. There is no effective housing around the plant to attenuate noise at the rear 1st floor windows.

Deliveries are made by reversing lorries down the access road to the delivery door. There is a shuttered doorway which is rarely used.

Figures 3 & 4 : Rear delivery door and plant area

5 Noise Climate

The noise climate is dominated by traffic noise along Hinckley Road. Occasional local traffic movements within the front car park are audible yet low in level and mainly limited to engine noise.

Every morning between 07:00 and 07:30 (approx), 4 deliveries take place. Two were witnessed to take place on foot and therefore be relatively silent. A bread delivery involved pushing a plastic basket stack down the side of the building to the delivery door. However, the main delivery involves a lorry reversing down the side of the building to the delivery door and unloading a number of roll cages into the store. This process generates significant noise levels from the movement of empty roll cages and the raising of the tail lift, with high level LAFMax events generated by removal and re-fitting the tail lift safety plates. Occasional shouts and/or conversations are also likely.

The plant area at the rear of the site generates significant fan noise from 5 condenser units. This noise is greater through the day when the opening of the fridges exerts greater demand on the cooling systems. Condenser activity subsides at night but remains significant at times.

6 Measurement Details

6.1 Personnel & Equipment

All testing, calculation & evaluation was conducted by Timothy Sherlock-Brown M.I.O.A. of Blue Acoustics. Timothy is a Member of the Institute of Acoustics and possesses an MSc in Applied Acoustics.

Device	Serial Number	Calibration Date	Calibration Cert. No
Cirrus 171B Class 1 Meter (1)	G068016	13.01.2020	136387
Cirrus 822B Class 2 Meter (1)	C17563FB	13.03.2019	117536
Cirrus 513 Calibrator	29834	05.02.2019	267707
Cirrus 515 Calibrator	69304	13.01.2020	136391

Table 3 : Measurement equipment table

Care was taken to eliminate external influence on the measurements by the application of a windshield, and with particular attention paid to wind speed when selecting measurement periods. Unless otherwise stated, meters were tripod mounted at a height of 1.2-1.5m at an angle of approximately 60 degrees.

Calibration was performed before and after each measurement or set of measurements with no notable drift. A drift of up to 0.5dB with a Class 1 meter is considered reasonable and is generally the cause of gradients in variables such as temperature, humidity and battery power.

6.2 Weather Conditions

Dry with occasional light rain and cloudy; Temp 9c to 13c; Windspeed 0-5m/s northerly; variable cloud cover

6.3 Measurement Positions

The following measurement positions were adopted to establish noise levels around the site over a 24hr period :

P1	1st floor balcony at the front of the building overlooking the car park and Hinckley Road. 1m from the front facade. This position was chosen to measure noise levels at the noisiest facade and establish traffic noise levels incident upon the site from Hinckley Road.	
P2	Mic extended out of 1st floor window directly above the loading bay. Mic positioned 1m from facade and 3m from side wall to minimise error through reflection. This position was chosen to measure loading noise and background noise levels at the nearest 1st floor window from 07:00	
P3	Mic extended out of 1st floor window at the rear of the building. Mic positioned 1m from the facade. This position was chosen to measure plant noise and background noise levels at the nearest 1st floor window.	

Table 4 : Measurement position table

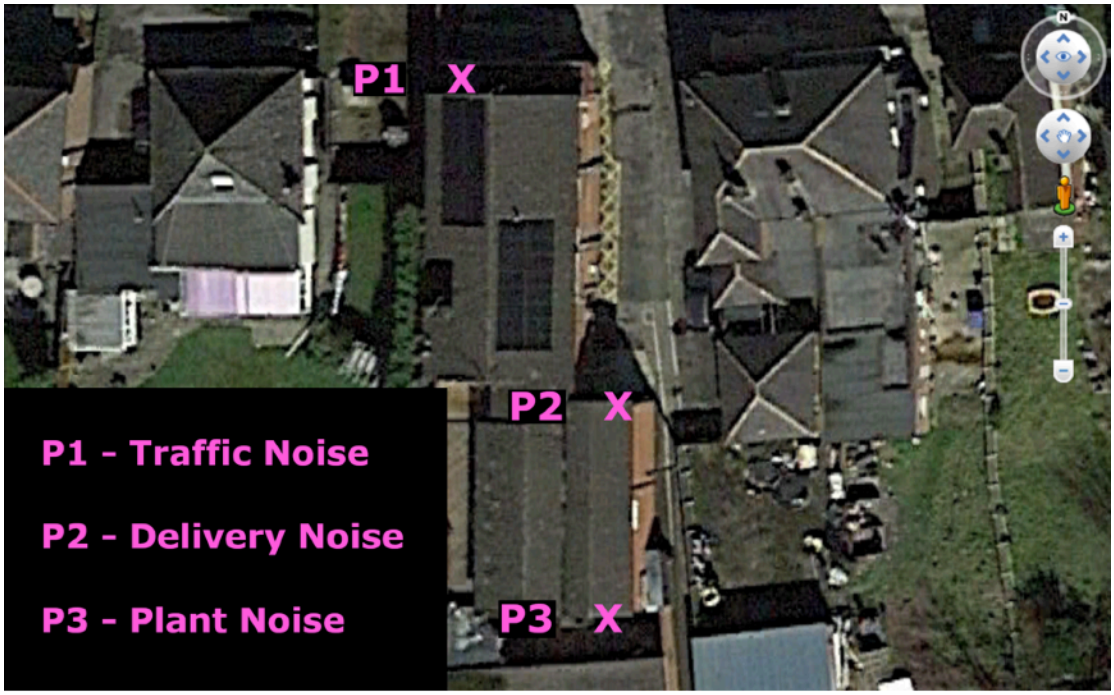


Figure 5 : Aerial view of measurement positions

7 Presentation of Measurement Results

The following table details the measurement data for positions 1 and 3 in BS8233 format. Leq's for both positions have been adjusted by -3dB for (1m) facade reflection. P1 has also been adjusted by +3dB to account for the lower traffic levels caused by Covid 19 restrictions.

Position	Measurement	Period	Value
P1	LAeq,16hr	07:00 - 23:00	66 dB
	LAeq,8hr	23:00 - 07:00	61 dB
	LAFMax,5min (night)	23:00 - 07:00	82.5 dB
P3	LAeq,16hr	07:00 - 23:00	53 dB
	LAeq,8hr	23:00 - 07:00	50 dB
	LAFMax,5min (night)	23:00 - 07:00	72.5 dB

Table 5 : 24hr noise data for positions P1 & P3

The following table details the measured delivery noise which was corrected for the presence of residual noise and rounded to give LAeq,1hr = 70dB. Whilst the noise producing delivery lasted approx 45mins, no on-time correction was made to reflect the fact that a large delivery may well last an hour.

Measurement	Time	Period	LAeq	LAFMax	LA90
Delivery Noise	07:00	60 min	71.3 dB	102.0 dB	
Residual Noise	08:00	15 min	62.7 dB	70.8 dB	59.5 dB

Table 6 : Delivery noise data

The following tables details the noise data for the condensers measured at position P3.

Measurement	Time	Period	LAeq	LAFMax	LA90
Plant Noise	22:16	24 min	53.2 dB	61.9 dB	

Table 7 : P3 plant noise data

Leq,15min	63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz	LpA
Condensers 04:00 - 04:15	58	55	54	52	49	41	34	28	53 dB

Table 8 : P3 Octave band plant noise data

8 Noise Impact Assessment

8.1 Specific Noise Sources

Delivery Noise

The following noise sources are associated with deliveries which occur every day between 07:00 - 10:00, usually 07:00 - 08:00. Delivery noise generally impacts the east facade only.

Roll Cages : Roll cages are generally quiet when loaded and noisy when empty. This is because the cages are free to vibrate and rattle when empty.

Tail Lift : The tail lift is relatively silent when being lowered but an electric motor emits noise when raised.

Safety Plates : These are large steel plates fitted to the tail lift perimeter. These are positioned in an upright position to stop cages rolling off the sides of the tail lift. When the lift is lowered, the plates are dropped flat against the tail lift and this action generates very high LAFMax levels. These events drive the overall delivery noise level to some extent, the highest safety plate event measured 102dBA at the 1st floor window.

Voices : Occasional shouts and conversations between the delivery driver and the shop manager are common as conversation is necessary. However, this was not considered excessive.

Vehicle Noise : Lorry noise is present as the vehicles reverse down the side road close to the building facade.

Plant Noise

Plant noise is limited to the plant area at the rear of the shop. Plant is in operation through the majority of the night time period and is clearly audible at the 1st floor windows.

8.2 Specific Noise Levels

The following table details the specific noise levels for both delivery and plant noise :

Position	Noise Source	LAeq,1hr (day)	LAeq,15min (night)
P2	Delivery Noise	71 dB	
P3	Plant Noise	53 dB	53 dB

Table 9 : Specific noise calculation table

8.3 Background Noise Level

BS4142:2014 states : “In using the background sound level in the method for rating and assessing industrial and commercial sound it is important to ensure that values are reliable and suitably represent both the particular circumstances and periods of interest. For this purpose, the objective is not simply to ascertain a lowest measured background sound level, but rather to quantify what is typical during particular time periods.”

With this in mind, the mode LA90’s have been adopted for the P3 plant noise assessment.

For delivery noise, the background noise level has been taken from a 15min measurement straight after delivery noise ceased.

Noise Source / Position	Period	LA90
Delivery / P2	Day (1hr)	60 dB
	Night (15min)	NA
Plant / P3	Day (1hr)	54 dB
	Night (15min)	43 dB

Table 10 : LA90 table

8.4 Rating Penalty

Section 9 of BS4142:2014 describes how the rating sound level should be derived from the specific sound level, by the application of a rating penalty.

Due to the nature of the development the subjective method has been adopted to derive the rating sound level from the specific sound level.

Noise Source	Tonality	Impulsivity	Intermittency	Total
Delivery / P2	+6 dB	-	+3 dB	+9 dB
Plant / P3	+3 dB	-	-	+3 dB

Table 11 : BS4142:2014 rating penalty table

8.5 BS4142:2014 Assessment

The following table calculates the BS4142 assessment levels for both positions.

Noise Source	Period	Specific Noise Level	Tonal Correction	Rating Level	LA90	Assessment Level
Delivery / P2	Day	71 dB	+ 6 dB	77 dB	60 dB	+17 dB
Plant / P3	Day	53 dB	+3 dB	56 dB	54 dB	+2 dB
	Night	53 dB	+3 dB	56 dB	43 dB	+13 dB

Table 12 : BS4142:2014 assessment table for extract noise

The assessment level of +17 for day time delivery noise at the east facade windows is an indication of a significant adverse noise impact depending upon the context.

The assessment level of +2 for day time plant noise at the south facade windows is an indication of an adverse noise impact depending upon the context.

The assessment level of +13 for night time plant noise at the south facade windows is an indication of a significant adverse noise impact depending upon the context.

8.6 Context

Delivery Noise : Deliveries occur on a daily basis and generally follow the same pattern with the same vehicles and delivery methods every day. Whilst the assessment level is high, noise is generally only produced by one delivery with a period of approximately 40mins. Noise events are relatively brief with long periods of silence in between.
Deliveries typically take place between 07:00 - 08:00 with no delivery noise there after. Delivery noise affects windows along the east facade only.

Plant Noise : Whilst the day time assessment level is acceptable, night time plant noise would be clearly audible within the 1st floor rooms with open windows. It is therefore advised that southern windows be restricted to bathrooms or toilets.

8.7 Other Commercial Considerations

The vape shop produces little noise. Customers parking vehicles are audible at the north and east but this noise is not readily distinguishable over the existing noise climate of Hinckley Road traffic noise.

The chip shop (Fish & Chip Co) is situated on the far side of the vape shop, with associated plant located on the east facade. Customers use the front car park area to park, generating audible noise at the north and potentially east facades.

9 Pro PG Acoustic Design Statement

The scope of ProPG is restricted to the consideration of new residential development that will be exposed predominantly to airborne noise from transport sources. New apartments, flats and houses are the most common type of new residential development, however the guidance can also be applied to other types of residential developments such as residential institutions, care homes etc. As such it is directly applicable to this development.

9.1 Stage 1 Assessment

The following image details the various ProPG stage 1 risk assessment levels, along with pre-planning advice.

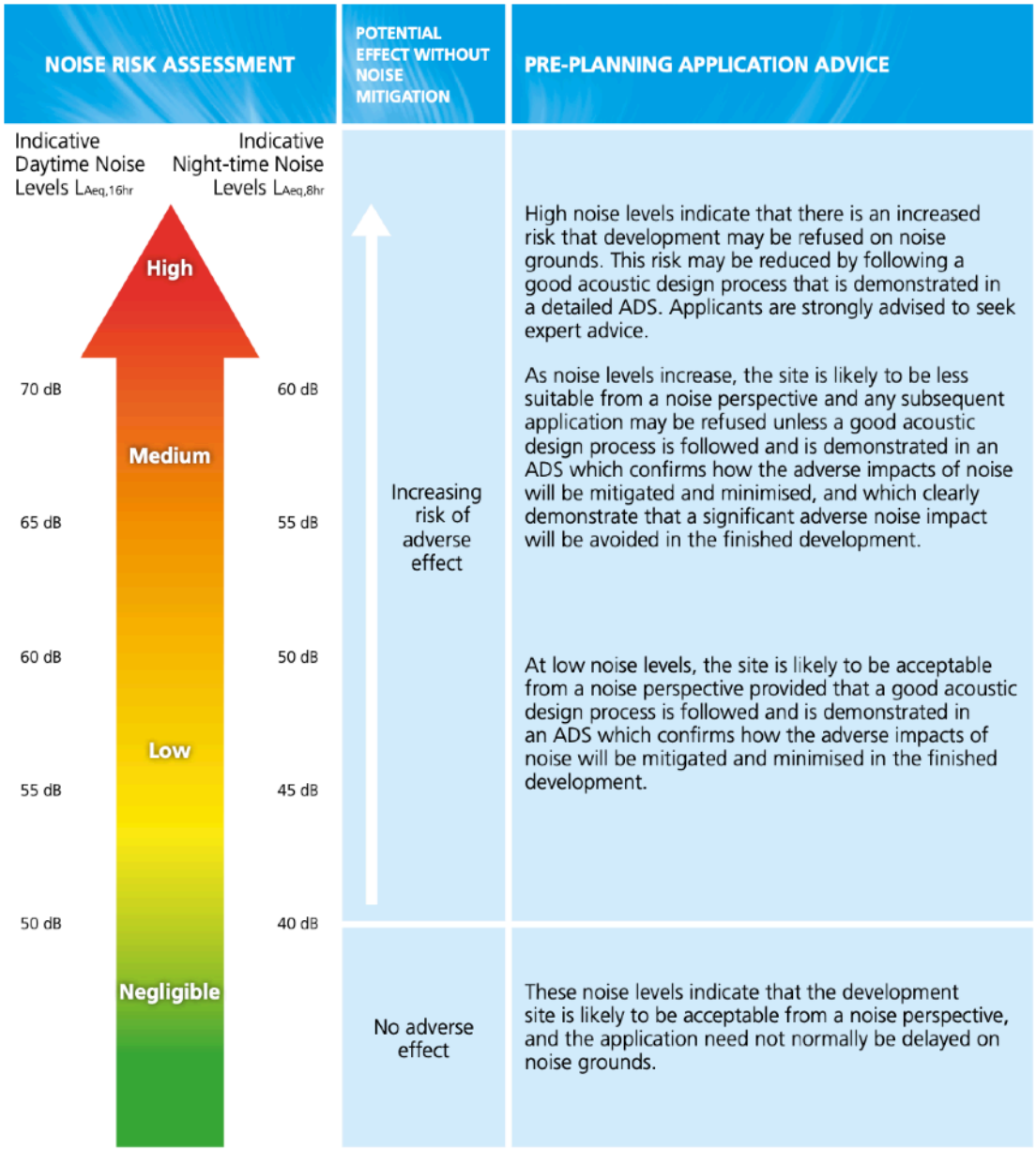


Figure 6 : ProPG Noise risk assessment guide

The following table assesses the ProPG noise risk for the measured data. The purpose of this is to provide a view of the noise risk at the site.

		Day LAeq,16hr 07:00 - 23:00	Night LAeq,8hr 23:00 - 07:00
P1	Noise Level	66 dB	61 dB
	ProPG Noise Risk	Medium	High

Table 13 : ProPG Stage 1 Assessment table

ProPG states that "Particular care should be taken to ensure that any noise events (as quantified by $L_{Amax,F}$) have been properly identified and assessed".

On attendance, the greatest LAFMax events were found to be generated by vehicle movements. No other noise source was found to potentially generate comparable LAFMax levels through the night.

9.2 Noise Control

Noise Sources : Barriers are not an option at this site and so the only means of controlling traffic noise is by glazing specification alone.

Building Layout : Room layout may be used to reduce the noise impact on residents. Bedroom windows may be positioned along the east and west facades to reduce the impact of traffic noise, with windows opening southwards to minimise traffic noise ingress. Living space may be situated along the north facade.
It is recommended that no bedrooms should have windows on the southern facade overlooking the Sainsbury's plant compound.

Building Orientation : The building orientation is fixed.

9.3 Open Window Noise Assessment

ProPG (2.33) States : "Most residents value the ability to open windows at will, for a variety of reasons, and LPAs should therefore normally request that designers principally aim, through the use of good acoustic design, to achieve the internal noise level guidelines in noise-sensitive rooms with windows open. Where internal noise levels are assessed with windows closed the justification for this should be included in the ADS.

BS8233 internal noise levels cannot be achieved through good acoustic design alone due to physical constrictions pertaining to building orientation.

The following table predicts internal noise levels through an open window attenuation of -12dB.

Facade	LAeq,16 (Day)	BS8233	LAeq,8 (Night)	BS8233
P1	54 dB	35 dB **(+19dB over)**	49 dB	30 dB **(+19dB over)**

Table 14 : Open window noise assessment table

BS8233 internal noise levels (with open windows) are not deemed to be possible at this site, As such, internal noise levels have been assessed with windows closed in the following section.

9.4 BS8233:2014 Assessment

WHO 1999 Guidelines to Community Noise states: "For a good sleep, it is believed that indoor sound pressure levels should not exceed **approximately** 45 dB LAFmax **more than 10-15** times per night"

The night time LAFMax,5min of 83.3dB measured at 05:59 was a relatively isolated incident. As such, a more representative LAFMax of 70dB has been adopted for the purpose of BS8233 assessment, exceeded on 2 occasions through the night.

	Value	BS8233:2014 & WHO Inside Bedroom	Bedroom Glazing Rw + Ctr	Living Room Glazing (35dB Day resting)
LAeq,16hrs (Day)	66 dB	35 dB		**31 dB**
LAeq,8hrs (Night)	61 dB	30 dB	**31 dB**	
LAFMax,5min (Night)	70 dB	45 dB	25 dB	

Table 15 : BS8233:2014 assessment table (Position P1)

9.5 Ventilation Assessment

BS8233:2014 states that "If relying on closed windows to meet the guide values, there needs to be an appropriate alternative ventilation that does not compromise the facade insulation or the resulting noise level"

ProPG (2.34) States : "Where the LPA accepts that there is a justification that the internal target noise levels can only be practically achieved with windows closed, which may be the case in urban areas and at sites adjacent to transportation noise sources, special care must be taken to design the accommodation so that it provides good standards of acoustics, ventilation and thermal comfort without unduly compromising other aspects of the living environment. In such circumstances, internal

noise levels can be assessed with windows closed but with any façade openings used to provide "whole dwelling ventilation" in accordance with Building Regulations Approved Document F (e.g. 2.38 trickle ventilators) in the open position (see Supplementary Document 2). Furthermore, in this scenario the internal LAeq target noise levels should not generally be exceeded."

The following ventilation strategies may be considered, though proper ventilation design is beyond the capabilities of Blue Acoustics.

Ventilation Strategy	
Trickle Vents	Considering the measured noise levels, adequate noise insulation is possible through the implementation of acoustic window trickle vents throughout all plots.
Wall Vents	Wall vents terminating at the rear facade would provide a viable means of ventilating whilst minimising noise ingress.
HVAC	Should a mechanical air management system be introduced, the system should achieve a noise rating of NR20 or lower.

Table 16 : Ventilation strategy table

9.6 Proposed Glazing & Ventilation Design

The following table details the recommended glazing and ventilation insulation strategy. The upper noise levels for each position have been adopted to reflect the fact that rooms may be changed from bedroom to living room and vice versa, and thus protecting the future amenity of all residents. The required sound insulation criteria for the trickle vents have been increased by 6dB to provide adequate sound insulation for larger rooms with 4 window vents installed. Should more specific sound insulation values be required, this can be achieved through the following formula : **Minimum Glazing + 10 log (N), where N = number of window vents.**

Room	Minimum Glazing Rw + Ctr	Facade Ventilation (Open) Dn,e,w + Ctr	Proposed System
Bedroom	31 dB	37 dB	Double Glazing : Generic 10mm / 6-16mm / 6mm Ventilation : Titon V50 + C25 window vents
Living	31 dB	37 dB	Double Glazing : Generic 10mm / 6-16mm / 6mm Ventilation : Titon V50 + C25 window vents

Table 17 : Glazing and ventilation design table

9.7 External Amenity Noise

BS8233:2014 states that "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 $L_{Aeq,16hr}$"

There are no external amenity spaces that apply to this development.

9.8 Ground to 1st Floor Partition Design

The following ground to 1st floor partition specification has been provided by the client : Floor Boards / thermal insulation / floorboards on 12" joists with insulation / plasterboard / 24" suspended ceiling

From this it has been assumed that insulation refers to thermal insulation, and that the plasterboard is standard wall board of 12.5mm thickness.

This was used to model the existing ceiling structure to determine the existing sound insulation from ground to 1st floor in INSUL9.0. This provided the following transmission loss data :

	63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	Rw	(C,Ctr)
Ground to 1st floor partition	23	39	51	56	61	66	68	58	-3, -9

Table 18 : Insulation data for model of existing floor partition

The following table estimates the noise ingress for both normal and raised voice voice levels on the Sainsburys shop floor. Voice spectra for a normal human voice has been taken from the acoustic standard BS ISO 3382-3:2012.

	63 Hz	125 Hz	250 Hz	500 Hz	1 kHz	2 kHz	4 kHz	LpA
Ground to 1st floor transmission loss	23	39	51	56	61	66	68	
Normal Voice LpA @ 1m	-	44	46	55	52	46	40	
Noise Ingress to flats above	-	5	0	0	0	0	0	5 dB
Raised Voice LpA @ 1m (+6dB)	-	50	52	61	58	52	46	
Noise Ingress to flats above		11	1	5	0	0	0	13 dB

Table 19 : Noise ingress from the human voice in Sainsburys

10 Conclusions

ProPG assessment levels indicate a medium risk through the day and a high risk by night.

The assessment level of +17 for day time delivery noise at the east facade windows is an indication of a significant adverse noise impact depending upon the context.

The assessment level of +2 for day time plant noise at the south facade windows is an indication of an adverse noise impact depending upon the context.

The assessment level of +13 for night time plant noise at the south facade windows is an indication of a significant adverse noise impact depending upon the context.

Calculations and computer modelling based on the existing floor makeup indicate that all but the noisiest voice noise events would inaudible in the flats above.

BS8233 internal noise levels are not achievable with windows open, through good acoustic design. However, BS8233 internal noise levels are achievable through the installation of the glazing and acoustic window vents specified within this report.

11 Uncertainty

This report relies on ambient noise level measurements. Ambient noise at a given location can vary substantially from day to day with variations in road traffic and other sources, and propagation of noise can be strongly affected by weather and atmospheric conditions. We believe our assessment to be representative of typical conditions, but only very long-term noise monitoring could establish the range of variation in these conditions.

BS4142:2014 section 10.0 states that uncertainty in the calculation of sound levels during the assessment process can arise from both the measured values and calculation methods.

To ensure the accuracy of the assessment consideration has been taken for the level of uncertainty in the measured data and associated calculations in the proposed methodology used to undertake the assessment. Where the level of uncertainty could affect the conclusion, reasonably practicable steps have been taken to minimise the level of uncertainty. Where the level of uncertainty is excessive, additional measurements and site visits have been conducted to increase the confidence in the results. In all instances the following steps have been taken to address the uncertainty;

1 Measured Values; A detailed understanding of the source of noise under investigation has been conducted including consideration for the complexity, variability over time and location, the character and effect of the residual sound level in comparison with the source, the measurement location, quantity of measurements and distance/intervening ground conditions, measurement time interval and the range of times measurement were taken, the suitability of weather conditions, the level of rounding and the classification of the instrumentation used to conduct the assessment.

2 Calculation Methods; Consideration has been taken for the accuracy of the measured sound levels, the character of the sound emissions in question, the calculation method and the simplification of the real situation to “fit” the modelled situation. Recognised standards and validated methods and processes have been used to establish accurate values during the calculation process.

For the avoidance of doubt, the level of uncertainty will not be quantified. If appropriate consideration is taken for points 1 and 2 during the collection of data and analysis thereof, then the influence of uncertainty in the final result is at its lowest practical value.

12 Disclaimer

Blue Acoustics takes no responsibility for any physical implementation & strongly suggests the client seek structural advice before carrying out the proposed work. Recommendations in this report are for acoustics purposes only, and it is the responsibility of the Project Manager or Architect to ensure that all other requirements are met including (but not limited to) structure, fire and Building Controls.

The calculations within this report are based upon sourced and or calculated data. It should be understood that complex flanking transmission paths through the structure can lead to excess vibration transmission and that mitigation measures within the rooms may have to be 'tweaked' after construction. Also, build quality can greatly affect partition performance and Blue Acoustics takes no responsibility for the integrity of any physical work carried out.

The opinions and interpretations presented in this report represent our best technical interpretation of the data made available to us. However, due to uncertainty inherent in the estimation of all parameters, we cannot, and do not guarantee the accuracy or correctness of any interpretation and we shall not, except in the case of gross or wilful negligence on our part, be liable or responsible for any loss, cost, damages or expenses incurred or sustained by anyone resulting from any interpretation made by any of our officers, agents or employees. The findings and opinions expressed are relevant to the dates of the site works and should not be relied upon to represent conditions at substantially later dates. If additional information becomes available which may affect our comments, conclusions or recommendations, the author reserves the right to review the information, reassess any new potential concerns and modify our opinions accordingly.

Except for the provision of professional services on a fee basis, Blue Acoustics does not have a commercial arrangement with any person or company involved in the interests that are the subject of this report. Blue Acoustics cannot accept any liability for the correctness, applicability or validity for the information they have provided, or indeed for any consequential costs or losses in this regard. Our efforts have been made on a "best endeavours" basis and no responsibility or liability is warranted or accepted by Blue Acoustics.

Appendix 1 – Glossary of Terms

'A' weighting (dB(A)): A frequency dependent correction which weights sound to correlate with the sensitivity of the human ear to sounds of different frequencies.

dB(A): decibels measured on a sound level meter incorporating a frequency weighting (A weighting) which differentiates between sounds of different frequency (pitch) in a similar way to the human ear. Measurements in dB(A) broadly agree with people's assessment of loudness. A change of 3 dB(A) is the minimum perceptible under normal conditions, and a change of 10 dB(A) corresponds roughly to halving or doubling the loudness of a sound. The background noise level in a living room may be about 30 dB(A); normal conversation about 60 dB(A) at 1 metre; heavy road traffic about 80 dB(A) at 10 metres; the level near a pneumatic drill about 100 dB(A).
Ambient Noise: A measure of the typical noise (excluding any unusual events) present at a site. This is usually described in terms of $L_{Aeq,T}$.

Anonymous noise: Noise that cannot be attributed to a single (specific source). For example noise from cars on a road would be considered anonymous whereas a noisy ventilation unit would not.

Attenuation: A reduction in the intensity of a sound signal.

Audible: Sound that can be heard or is perceptible by the human ear.

Background Noise: A measure of the underlying noise (excluding any unusual events) which is present at a site before a new noise source is introduced. This is usually described in terms of the L_{A90} level: the sound pressure level exceeded for 90% of the time.

C_{tr} Spectrum adaptation term: A correction added to a sound insulation quantity (such as R_W) to take account of a specific (traffic noise) spectra. See BS EN ISO 717-1:1997. For example the difference between internal and external traffic noise levels in dB(A) is calculated using $R_W + C_{tr}$ (equivalent to $R_{traffic}$)

Clearly audible: There is no acoustic definition for clearly audible and as such a noise source may be deemed to be clearly audible if it is both easily identifiable and deemed likely to adversely affect the amenity of residents of any (proposed) development.

$D_{ne,W}$ Weighted element normalized level difference: A single-number quantity which characterizes the airborne sound insulation of a small building element. See BS EN ISO 717-1: 1997

$D_{nT,W}$ Standardised level difference: A single-number quantity which characterizes the airborne sound insulation between rooms. See BS EN ISO 717-1: 1997

Decibel (dB): A unit used for many acoustic quantities to indicate the level of sound with respect to a reference level.

EPU: Environmental Protection Unit, a service within the Environmental Health section of the Regulatory Services Department of Birmingham City Council.

Façade measurement: Noise measurements made outside an external wall of a structure (usually 1 metre from the wall).

Free Field: 1. A free sound field is a field in a homogeneous, isotropic medium free from boundaries. In practice it is a field in which the effects of the boundaries are negligible over the region of interest. The actual pressure impinging on an object (e.g., a microphone) placed in an otherwise free sound field will differ from the pressure which would exist at the point with the object removed, unless the acoustic impedance of the object matches the acoustic impedance of the medium.
2. An environment in which there are no reflective surfaces within the frequency region of interest. 3. A region in which no significant reflections of sound occur.
4. [BS4142] suggests that free-field environmental noise measurements need to be made at least 3.5m from any reflecting structure.

Habitable room: A room used for sleeping or recreation / relaxation.

Hertz (Hz): unit of frequency, equal to one cycle per second. Frequency is related to the pitch of a sound.

Inaudible: Sound that cannot be heard or is imperceptible to the human ear.

Industrial-type noise sources: Noise sources that are industrial in character. For example noise from plant and machinery, materials handling operations, or manoeuvring of heavy vehicles.

Institute of Acoustics: A professional body representing persons at all levels working in the field of acoustics. http://www.ioa.org.uk/

$L_{A90,T}$: Sound pressure level exceeded for 90% of the measurement period "T" or 'background level'.

$L_{Aeq,T}$: Equivalent continuous sound pressure level measured over the time period "T"

L_{Amax}: The maximum RMS A weighted sound pressure level

Mixed Use: Premises or development which will include both residential and non-residential uses

Noise: Unwanted sound.

Noise with a specific character: Noise has a specific character if it contains features such as a distinguishable, descrete and continuous tone, is irregular enough to attract attention, or has strong low frequency content .

Noise Nuisance: A legal term used to describe noise at a level that is disturbing as perceived by a reasonable person. The meaning of nuisance is defined by precedent in common law.

Outdoor Amenity Area: An outdoor area adjacent to a residential building which is designed and intended primarily for the leisure and recreation of the occupants of the dwelling. This will include gardens, landscaped areas, balconies.

R, Sound reduction index: A quantity which characterizes the airborne sound insulation of a material or building element in a stated frequency band. See BS EN ISO 140-3:1995

R_W, Weighted sound reduction index: A single-number quantity which characterizes the airborne sound insulation of a material or building element measured in the laboratory. See BS EN ISO 717-1: 1997

Rating Level: The noise level of an industrial noise source which includes an adjustment for the character of the noise. Used in BS4142.

Residual Noise : The ambient noise remaining at a given position in a given situation when the specific noise level is suppressed to a degree such that it does not contribute to the ambient noise.

Sound insulation: A quantity which is used to characterize the reduction in sound pressure level across an element or partition. (See R, R_W, $D_{nT,W}$, $D_{ne,W}$, C_{tr})

Specific noise source : The noise source under investigation for assessing the likelihood of complaints.

Steady State Noise: Noise that gives fluctuations over a range of not more than 5 dB on a sound level meter set to frequency weighting A and time weighting S. [BS 4142:2014]

Structure borne noise: Noise that propagates through a structure, for example through a building.

Appendix 2 Glazing And Ventilation Examples

Pilkington Optiphon Data

Glass	Sound reduction index (dB)									
	Octaveband Centre Frequency (Hz)						$R_w(C;C_{tr})$	R_w	R_w+C	R_w+C_{tr}
	125	250	500	1000	2000	4000				
Single glazing										
6.8 mm Pilkington **Optiphon**™	26	27	31	36	40	39	36 (-1; -4)	36	35	32
8.8 mm Pilkington **Optiphon**™	24	28	34	38	37	43	37 (-1; -4)	37	36	33
9.1 mm Pilkington **Optiphon**™	26	29	34	38	38	43	37 (-1; -3)	37	36	34
12.8 mm Pilkington **Optiphon**™	30	32	37	39	41	51	39 (0; -2)	39	39	37
13.1 mm Pilkington **Optiphon**™	30	33	37	40	41	50	40 (0; -2)	40	40	38
Insulating glass units										
6 mm / 16 mm argon / 6.8 mm Pilkington **Optiphon**™	22	27	35	42	41	48	38 (-2; -5)	38	36	33
6 mm / 16 mm argon / 8.8 mm Pilkington **Optiphon**™	24	26	40	48	46	54	41 (-3; -7)	41	38	34
8 mm / 16 mm argon / 9.1 mm Pilkington **Optiphon**™	24	29	41	47	47	55	43 (-3; -7)	43	40	36
10 mm / 16 mm argon / 9.1 mm Pilkington **Optiphon**™	29	33	44	46	49	57	45 (-2; -5)	45	43	40
8.8 mm Pilkington **Optiphon**™ / 16 mm argon / 12.8 mm Pilkington **Optiphon**™	26	36	46	50	52	63	47 (-2; -7)	47	45	40
9.1 mm Pilkington **Optiphon**™ / 20 mm argon / 13.1 mm Pilkington **Optiphon**™	29	39	49	52	55	63	50 (-3; -8)	50	47	42

Measurements undertaken in accordance with BS EN ISO 10140 and R_w (C; C_{tr}) determined in accordance with BS EN ISO 717-1
For insulating glass units, there is little difference in the sound insulation for cavity widths in the range 6 to 16 mm
Pendulum body impact resistance to BS EN 12600 for all Pilkington **Optiphon**™ is Class 1 (B) 1
To achieve low U values in insulating glass units, Pilkington **Optiphon**™ can be combined with low emissivity glass from the Pilkington **K Glass**™ or Pilkington **Optitherm**™ ranges
To calculate performance data for Pilkington products, please use our Spectrum online calculator at www.pilkington.co.uk/spectrum
For glass combinations to achieve an R_w value higher than 50 dB, please contact us for more details

Titon Trickle Vents

Sound Attenuation level:

	Open	Closed
V75 + C75	Dn,e,w (C;Ctr) = 44 (-2;-3)dB	Dn,e,w (C;Ctr) = 55 (-1;-5)dB
V75 + C50	Dn,e,w (C;Ctr) = 42 (-1;-2)dB	Dn,e,w (C;Ctr) = 55 (-2;-5)dB
V75 + standard canopy	Dn,e,w (C;Ctr) = 40 (-1;-2)dB	Dn,e,w (C;Ctr) = 53 (-1;-4)dB
V50 + C25	Dn,e,w (C;Ctr) = 39 (-1;-2)dB	Dn,e,w (C;Ctr) = 55 (-2;-5)dB
V50 + standard canopy	Dn,e,w (C;Ctr) = 38 (-1;-2)dB	Dn,e,w (C;Ctr) = 55 (-2;-5)dB
V25 + C25	Dn,e,w (C;Ctr) = 36 (-0;-2)dB	Dn,e,w (C;Ctr) = 55 (-1;-5)dB
V25 + standard canopy	Dn,e,w (C;Ctr) = 35 (-0;-1)dB	Dn,e,w (C;Ctr) = 54 (-1;-4)dB
Standard vent + C25	Dn,e,w (C;Ctr) = 35 (-0;-1)dB	Dn,e,w (C;Ctr) = 55 (-1;-5)dB
Standard vent + standard SF canopy	Dn,e,w (C;Ctr) = 32 (-1;-0)dB	Dn,e,w (C;Ctr) = 52 (-2;-4)dB
Standard vent + C25	Dn,e,w (C;Ctr) = 35 (-1;-2)dB	Dn,e,w (C;Ctr) = 54 (-2;-6)dB

Appendix 3 INSUL Data sheets
Ground to 1st floor partition

Sound Insulation Prediction (v9.0.20)

Program copyright Marshall Day Acoustics 2017
Margin of error is generally within Rw ±3 dB
- Key No. 5513
Job Name:
Job No.: Initials:sonic
Date:23/06/2020
File Name:150A Hinckley rd Floor.ixl

Notes:

Rw 60 dB
C -2 dB
Ctr -7 dB

Mass-air-mass resonant frequency = =0 Hz , 0 Hz

Panel Size = 2.7 m x 4.0 m

Partition surface mass = 50.9 kg/m²

System description

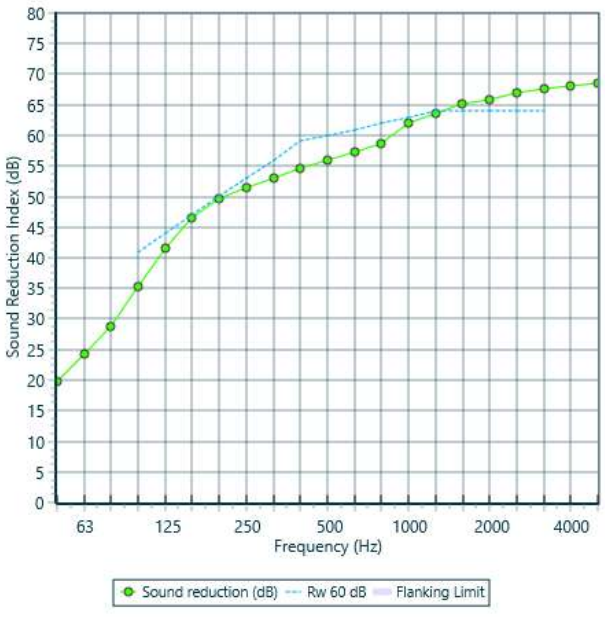
Panel 1 : 1 x 25 mm Oak (American)
+ 1 x 18 mm Particle Board

+ 1 x 50 mm PIR Board (50mm)

Frame: Timber stud (3E2 mm x 40 mm), Stud spacing 600 mm ; Cavity Width 300 mm
Panel 2 : 1 x 12.5 mm Gyproc Wallboard 12.5mm

Frame: Suspended Light Steel Grid (5E2 mm x 45 mm), Stud spacing 600 mm ; Cavity Width 500 mm
Panel 3 : 1 x 19 mm Mineral fibre ceiling tile (Generic)

freq.(Hz)	R(dB)	R(dB)
50	20	
63	24	23
80	29	
100	35	
125	42	39
160	46	
200	50	
250	52	51
315	53	
400	55	
500	56	56
630	57	
800	59	
1000	62	61
1250	64	
1600	65	
2000	66	66
2500	67	
3150	68	
4000	68	68
5000	68	



Appendix 4 Measurement Data Sheets
P1

Environmental Noise Measurement Report

Measurement Details

Location: 150A Hinckley rd, Leicester
Description: 1st floor balcony front
Date of Measurement: 04/06/2020 08:30

Instrumentation Details

Sound Level Meter: Cirrus Research plc CR:800B C19443FB
Acoustic Calibrator: Cirrus Research plc CR:511E
Calibration: +0.2dB Drift
Recalibration Due: 05/02/2020
Level Range: 30-100 dB
Time Weighting: Fast (for Lmax and Lns)

Measurement Data

Start of Measurements: 03/06/2020 07:08
No. of Measurements: 107
Total Duration: 26:24:51
Highest Lmax: 92.7
Lmax Exceedance Count: 0, at or above 115dB

Date	Time	Run Duration (hh:mm:ss)	Leq dB	Lmax dB	Peak dBC	L1	L10	L50	L90	L95	Lmin
03/06/2020	07:08:10	00:06:49	66.4	80.0	105.0	74.2	69.0	65.2	57.9	54.3	48.4
03/06/2020	07:15:00	00:15:00	65.5	75.9	99.4	70.8	67.9	64.9	61.6	61.0	58.9
03/06/2020	07:30:00	00:15:01	66.2	78.8	96.5	71.2	68.6	65.6	62.4	61.8	59.5
03/06/2020	07:45:00	00:15:00	66.0	73.3	97.9	70.7	68.6	65.7	61.9	61.0	58.1
03/06/2020	08:00:00	00:14:59	65.8	74.9	98.1	70.1	68.2	65.5	62.2	61.5	59.1
03/06/2020	08:15:00	00:15:00	66.2	75.5	99.6	70.2	68.5	65.9	62.4	61.6	59.4
03/06/2020	08:30:00	00:14:59	66.3	72.6	97.7	70.6	68.7	66.0	63.0	62.3	59.5
03/06/2020	08:45:00	00:14:59	66.5	74.6	98.5	71.4	68.7	66.1	63.1	62.3	59.2
03/06/2020	09:00:00	00:14:59	66.0	74.0	95.3	71.2	68.6	65.5	62.1	61.5	59.6
03/06/2020	09:15:00	00:14:59	66.0	73.4	97.5	70.8	68.6	65.6	62.4	61.7	58.8
03/06/2020	09:30:00	00:15:00	67.2	90.2	106.1	73.9	68.6	65.2	62.1	61.5	58.8
03/06/2020	09:45:00	00:15:01	65.4	73.5	95.0	69.9	67.6	65.1	62.1	61.1	58.0
03/06/2020	10:00:00	00:15:00	65.7	76.6	100.4	70.6	68.2	65.2	61.6	60.7	58.8
03/06/2020	10:15:00	00:14:59	65.1	75.2	98.3	69.5	67.4	64.6	61.8	61.3	58.6
03/06/2020	10:30:00	00:15:00	65.3	75.3	98.2	70.5	67.8	64.7	61.5	60.8	57.7
03/06/2020	10:45:00	00:14:59	65.3	74.3	99.4	70.0	67.6	64.9	61.6	61.0	58.5
03/06/2020	11:00:00	00:14:59	65.3	73.0	99.1	70.3	67.8	64.8	61.6	61.0	58.5
03/06/2020	11:15:00	00:15:02	65.8	74.3	103.1	71.0	68.2	65.3	62.1	61.4	58.3
03/06/2020	11:30:00	00:15:00	65.6	73.3	96.0	70.0	67.9	65.2	62.4	61.7	58.6
03/06/2020	11:45:00	00:15:00	65.3	76.0	97.9	70.4	67.6	64.8	61.9	61.0	58.2
03/06/2020	12:00:00	00:14:59	65.8	74.3	99.1	71.0	68.1	65.3	62.7	62.1	59.4
03/06/2020	12:15:00	00:14:59	65.8	81.3	101.7	70.7	68.1	65.4	62.4	61.3	58.0
03/06/2020	12:30:00	00:14:59	65.6	73.7	98.5	70.2	67.9	65.1	62.4	61.9	59.6
03/06/2020	12:45:00	00:14:59	66.5	86.3	102.7	73.9	68.1	64.8	61.3	60.6	57.9

Environmental Noise Measurement Report

Date	Time	Run Duration (hh:mm:ss)	Leq dB	Lmax dB	Peak dBC	L1	L10	L50	L90	L95	Lmin
03/06/2020	13:00:00	00:15:02	65.4	84.4	101.8	70.4	67.6	64.9	62.3	61.8	59.7
03/06/2020	13:15:00	00:15:00	67.3	90.5	104.7	71.3	68.3	65.4	61.7	61.0	58.4
03/06/2020	13:30:00	00:15:00	65.7	75.3	100.3	70.5	68.0	65.3	62.2	61.5	58.4
03/06/2020	13:45:00	00:14:59	66.3	86.2	98.8	69.9	67.8	65.2	62.3	61.6	58.1
03/06/2020	14:00:00	00:15:00	66.5	75.6	97.9	71.1	68.7	66.1	63.2	62.3	60.4
03/06/2020	14:15:00	00:14:59	66.0	76.8	105.1	71.2	68.4	65.4	62.5	61.8	59.1
03/06/2020	14:30:00	00:15:00	65.9	73.2	96.8	70.6	68.0	65.6	62.6	61.7	59.5
03/06/2020	14:45:00	00:14:59	65.3	73.6	98.8	69.5	67.5	65.1	61.9	61.1	58.2
03/06/2020	15:00:00	00:14:59	65.9	79.9	102.1	72.8	68.1	65.2	61.9	61.1	58.6
03/06/2020	15:15:00	00:15:00	66.3	78.8	100.2	71.8	68.4	65.6	62.8	62.1	59.1
03/06/2020	15:30:00	00:14:59	65.7	72.5	101.0	70.3	68.1	65.1	62.2	61.5	59.8
03/06/2020	15:45:00	00:15:01	66.3	76.3	98.8	72.0	68.5	65.8	62.9	62.3	59.6
03/06/2020	16:00:00	00:14:59	66.4	74.7	97.5	71.1	68.7	66.2	63.0	62.2	59.8
03/06/2020	16:15:00	00:14:59	69.5	92.7	106.4	78.6	69.6	66.3	63.0	62.4	59.9
03/06/2020	16:30:00	00:15:00	67.5	75.2	100.0	72.5	69.7	67.2	64.4	63.7	60.7
03/06/2020	16:45:00	00:15:00	67.4	77.2	98.3	71.9	70.0	66.8	63.6	62.9	60.4
03/06/2020	17:00:00	00:14:59	68.4	73.1	99.5	72.4	71.0	68.0	63.9	63.0	59.8
03/06/2020	17:15:00	00:15:01	68.2	76.5	97.7	73.4	70.9	67.6	63.2	62.6	60.1
03/06/2020	17:30:00	00:15:00	67.7	79.8	106.0	73.1	70.2	67.1	63.6	62.7	59.9
03/06/2020	17:45:00	00:14:59	67.6	88.5	101.1	72.0	69.9	67.1	63.3	62.5	60.4
03/06/2020	18:00:00	00:15:00	67.3	76.8	100.2	72.0	69.6	67.0	63.8	62.9	60.0
03/06/2020	18:15:00	00:15:01	67.0	74.2	109.3	71.9	69.6	66.6	62.6	61.8	58.6
03/06/2020	18:30:00	00:14:59	66.7	72.4	99.0	71.2	69.5	66.0	62.5	61.8	59.1
03/06/2020	18:45:00	00:15:00	66.7	74.7	102.0	72.2	69.5	65.9	62.1	61.2	58.8
03/06/2020	19:00:00	00:15:01	66.0	73.4	99.7	71.1	68.9	65.4	61.9	61.3	58.9
03/06/2020	19:15:00	00:14:59	66.2	75.3	97.8	71.6	69.1	65.6	61.2	60.4	57.0
03/06/2020	19:30:00	00:14:59	66.6	90.0	108.0	72.0	68.8	64.7	60.9	60.2	56.9
03/06/2020	19:45:00	00:14:59	65.2	74.1	102.3	71.3	68.3	63.9	60.4	59.7	56.4
03/06/2020	20:00:00	00:15:00	65.4	76.8	100.2	71.0	68.5	64.1	60.7	60.1	57.7
03/06/2020	20:15:00	00:15:01	65.0	73.8	99.5	71.6	68.3	63.5	59.2	58.6	56.4
03/06/2020	20:30:00	00:15:00	63.6	72.5	103.7	70.0	66.9	62.3	59.0	58.4	55.5
03/06/2020	20:45:00	00:15:01	64.3	77.8	100.0	71.0	67.9	62.3	58.5	57.7	53.7
03/06/2020	21:00:00	00:14:59	63.6	73.8	100.0	70.6	67.1	61.7	58.4	57.9	55.8
03/06/2020	21:15:00	00:15:00	63.0	77.8	100.4	69.3	66.4	61.3	58.2	57.6	55.3
03/06/2020	21:30:00	00:14:59	63.1	83.3	96.8	70.3	66.2	60.4	56.8	56.2	53.0
03/06/2020	21:45:00	00:15:00	62.6	72.3	96.8	69.3	66.2	60.6	57.8	56.9	52.9
03/06/2020	22:00:00	00:14:59	62.1	71.8	97.8	68.9	65.4	60.3	57.1	56.4	53.7
03/06/2020	22:15:00	00:14:59	61.9	74.1	103.6	68.5	65.4	59.7	56.2	55.5	53.1
03/06/2020	22:30:00	00:15:00	61.1	70.8	98.1	68.2	65.0	58.9	55.5	54.9	52.6
03/06/2020	22:45:00	00:14:59	60.0	70.8	107.2	68.8	63.7	57.1	53.7	53.0	50.5
03/06/2020	23:00:00	00:15:00	61.6	74.5	94.1	69.2	66.3	57.7	53.1	52.2	48.6
03/06/2020	23:15:00	00:14:59	60.4	73.7	96.3	69.3	64.5	57.1	53.2	51.9	47.1
03/06/2020	23:30:00	00:14:59	59.3	70.4	95.6	67.5	63.3	56.6	53.3	52.3	48.3

Environmental Noise Measurement Report

Date	Time	Run Duration (hh:mm:ss)	Leq dB	Lmax dB	Peak dBC	L1	L10	L50	L90	L95	Lmin
03/06/2020	23:45:00	00:15:00	57.4	74.1	98.0	66.9	59.4	55.4	51.7	50.7	46.3
04/06/2020	00:00:00	00:15:00	59.6	74.2	95.3	69.8	62.9	55.9	52.9	52.0	48.9
04/06/2020	00:15:00	00:15:00	59.1	73.5	91.5	69.1	62.8	55.6	52.0	51.0	47.7
04/06/2020	00:30:00	00:14:59	57.5	71.2	93.3	67.0	59.9	55.2	51.6	50.9	48.0
04/06/2020	00:45:00	00:14:59	58.5	73.8	97.3	68.8	61.0	55.1	51.5	50.8	47.9
04/06/2020	01:00:00	00:15:01	57.5	72.2	97.0	68.5	59.3	54.2	51.3	50.5	48.1
04/06/2020	01:15:00	00:15:00	58.0	74.9	96.3	68.6	59.3	54.8	51.7	50.8	47.7
04/06/2020	01:30:00	00:15:00	56.6	72.8	93.5	65.8	57.8	54.5	51.9	51.2	48.7
04/06/2020	01:45:00	00:15:00	56.1	69.2	98.8	66.0	57.7	54.2	50.9	50.2	47.7
04/06/2020	02:00:00	00:14:59	57.0	71.7	92.6	66.6	59.1	54.7	51.3	50.2	46.3
04/06/2020	02:15:00	00:15:01	55.7	71.0	94.3	65.3	57.4	53.2	49.5	48.5	45.9
04/06/2020	02:30:00	00:14:59	55.0	71.8	91.0	66.0	56.4	52.2	48.4	47.7	45.0
04/06/2020	02:45:00	00:14:59	57.1	71.8	95.6	67.4	59.1	54.2	50.6	49.1	45.8
04/06/2020	03:00:00	00:15:00	57.4	72.8	98.5	68.2	59.3	54.5	51.8	51.2	48.9
04/06/2020	03:15:00	00:15:01	56.0	67.9	99.9	65.6	57.9	54.1	50.4	49.6	46.6
04/06/2020	03:30:00	00:14:59	57.9	72.5	100.6	68.0	60.6	54.9	51.4	50.1	47.1
04/06/2020	03:45:00	00:14:59	58.4	71.5	100.0	68.6	60.1	55.4	52.6	51.9	48.7
04/06/2020	04:00:00	00:15:02	56.6	69.0	89.7	64.9	58.9	55.0	52.5	51.9	49.4
04/06/2020	04:15:00	00:15:01	58.4	75.0	92.0	68.0	59.9	56.1	53.5	52.6	49.5
04/06/2020	04:30:00	00:15:00	58.9	70.5	98.3	67.3	61.7	57.0	54.1	53.2	48.9
04/06/2020	04:45:00	00:14:59	60.0	76.4	95.1	69.6	63.1	57.1	54.1	53.1	50.2
04/06/2020	05:00:00	00:15:00	61.5	78.7	106.7	70.4	65.2	58.6	56.0	55.5	53.1
04/06/2020	05:15:00	00:15:00	62.6	73.8	96.5	70.0	66.6	59.9	56.9	56.1	53.3
04/06/2020	05:30:00	00:14:59	63.5	71.6	93.2	70.2	67.6	60.8	57.3	56.9	55.2
04/06/2020	05:45:00	00:14:59	64.4	80.2	104.0	71.5	68.1	62.0	58.0	57.3	53.4
04/06/2020	06:00:00	00:15:00	63.9	74.5	101.7	70.6	67.7	61.6	58.4	57.6	54.2
04/06/2020	06:15:00	00:15:01	65.1	73.0	97.8	70.7	68.6	63.7	59.4	58.9	56.3
04/06/2020	06:30:00	00:14:59	65.6	78.3	108.8	71.1	68.5	64.6	60.7	59.9	57.5
04/06/2020	06:45:00	00:15:01	65.8	82.5	101.7	72.0	68.8	64.4	61.0	60.4	58.2
04/06/2020	07:00:00	00:14:59	66.0	80.4	103.8	71.4	69.1	65.0	61.0	60.3	57.9
04/06/2020	07:15:00	00:14:59	66.1	73.4	98.5	70.9	68.7	65.5	62.3	61.5	59.6
04/06/2020	07:30:00	00:15:00	66.1	77.0	100.2	73.0	68.6	65.3	61.4	60.7	57.9
04/06/2020	07:45:00	00:14:59	65.5	75.5	97.2	69.9	68.2	64.9	60.7	59.6	57.6
04/06/2020	08:00:00	00:15:00	65.3	73.6	101.2	70.7	68.1	64.7	58.9	57.7	55.0
04/06/2020	08:15:00	00:14:59	65.8	87.1	105.9	71.3	68.8	65.0	58.8	57.9	54.2
04/06/2020	08:30:00	00:14:59	64.8	74.5	98.2	69.9	67.5	64.4	58.6	57.5	53.4
04/06/2020	08:45:00	00:14:59	64.3	75.0	99.2	70.5	67.6	63.4	56.5	55.0	52.6
04/06/2020	09:00:00	00:15:00	64.3	74.7	97.0	70.5	67.7	63.4	57.0	55.9	52.8
04/06/2020	09:15:00	00:14:59	64.3	72.9	97.0	69.7	67.5	63.5	56.4	54.6	50.9
04/06/2020	09:30:00	00:03:32	63.8	79.1	104.3	69.4	66.4	63.2	56.7	55.6	53.8

Delivery Noise

23/06/2020

Cirrus Research plc

Measurement Summary Report

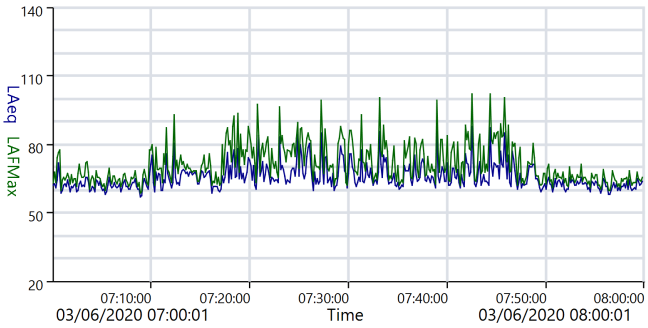
Name	Delivery Noise			
Time	03/06/2020 07:00:01	**Person**	**Place**	**Project**
Duration	01:00:00			150A Hinckley Rd,
Instrument	G066520, CR:171B			

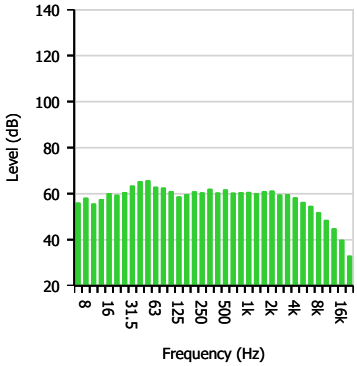
Calibration

Before 03/06/2020 06:48 Offset 0.04 dB **After** 04/06/2020 09:43 Offset -0.03 dB

Basic Values	
LAeq	71.3 dB
LAE	106.9 dB
LAFMax	102.0 dB

Statistical Levels (Ln)	
LAF1	81.2 dB
LAF5	73.5 dB
LAF10	69.5 dB
LAF50	62.7 dB
LAF90	59.3 dB
LAF95	58.6 dB
LAF99	57.5 dB
LAF99.9	56.6 dB





ReportId

MB6E70100000096 Cirrus Research NoiseTools Page 1 of 1

P3 Data

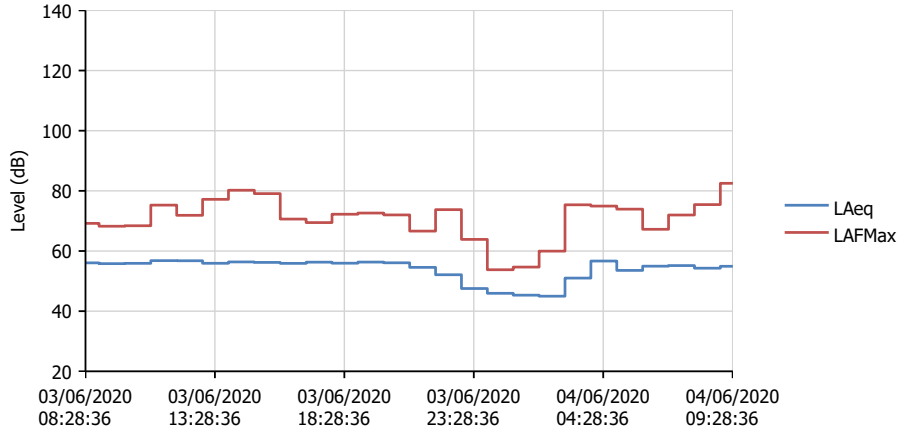
23/06/2020

Cirrus Research plc

Measurement List Report

Name Rear facade (with plant noise)
Start Time 03/06/2020 08:28:36
End Time 04/06/2020 09:29:03

Calibration Before	03/06/2020 06:48:36	Offset	0.04 dB
Calibration After	04/06/2020 09:43:42	Offset	-0.03 dB



Start Time	End Time	Duration	LAeq (dB)	LAFMax	Ln1	Ln2	Ln3	Ln4	Ln5	Ln6	Ln7
03/06/2020 08:28:36	03/06/2020 09:00:01	00:31:25	56.1	69.2	61.6	58.5	57.2	55.5	53.9	53.4	52.4
03/06/2020 09:00:02	03/06/2020 10:00:02	01:00:00	55.8	68.2	60.8	57.8	56.7	55.3	54.1	53.6	52.6
03/06/2020 10:00:01	03/06/2020 11:00:01	01:00:00	55.9	68.4	61.4	58.3	57.0	55.3	53.8	53.1	52.3
03/06/2020 11:00:01	03/06/2020 12:00:01	01:00:00	56.8	75.3	64.4	60.0	57.8	55.7	54.2	53.8	52.7
03/06/2020 12:00:01	03/06/2020 13:00:01	01:00:00	56.8	71.9	63.1	59.6	58.0	55.9	54.6	54.2	53.6

ReportId

GB6E70100000007 Cirrus Research NoiseTools Page 1 of 2