



Report No. DJB/7542/A

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ACOUSTIC DESIGN STATEMENT
LAND TO THE WEST OF NURSERY MEWS,
GRAVESEND, KENT

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1. INTRODUCTION

The environmental noise effects of proposals to redevelop land off Nursery Mews, Gravesend, Kent have been assessed.

The proposals are for the erection of 6 no. affordable residential dwellings, emergency access / pedestrian / cycle route with associated parking and landscaping.

The assessment has been based on a sound measurement survey at the site and the guidance given in ProPG: Planning & Noise, Professional Practice Guidance on Planning & Noise, New Residential Development (ref 1).

2. NOISE SOURCES AND ASSESSMENT GUIDANCE

The site where residential development is proposed is subject to noise from a mixture of sources. This includes noise from vehicles arriving and departing the adjacent MEAPA gymnastics facility immediately to the south and also the nearby football pitches, noise from external areas of the nearby school premises during break periods and to a lesser extent noise from the football pitches whilst they are in use.

There is no national guidance regarding the assessment of noise levels from this mixture of sources and therefore a pragmatic approach must be adopted that considers the likely effects on the residential properties.

Consideration of nationally recognised documents that guide noise assessments has been carried out. The most appropriate in this instance is considered to be ProPG: Planning & Noise, Professional Practice Guidance on Planning & Noise, New Residential Development (ref 1) (ProPG). ProPG says that its scope is restricted to sites that are exposed predominantly to noise from transportation sources. Whilst the assessment site is subjected to noise from vehicle movements it is recognised

that this is in relation to relatively slow moving vehicles arriving and departing the adjacent facilities, rather than typical roads. The document does however provide an assessment structure and targets internal noise levels for residential premises that is considered to be reasonable in this case. Noise levels from the opening and closing of vehicle doors as well as from the other sources noted above would not strictly be covered by ProPG. Consideration is therefore also given to raised noise levels arising from the surrounding activities.

3. **PROPG: PLANNING & NOISE**

The guidance in ProPG describes two sequential stages: Stage 1 – an initial noise risk assessment of the proposed development site and Stage 2 – a systematic consideration of four key elements, leading to an Acoustic Design Statement.

The four elements of the Stage 2 assessment are:

Element 1 – demonstrating a “Good Acoustic Design Process”

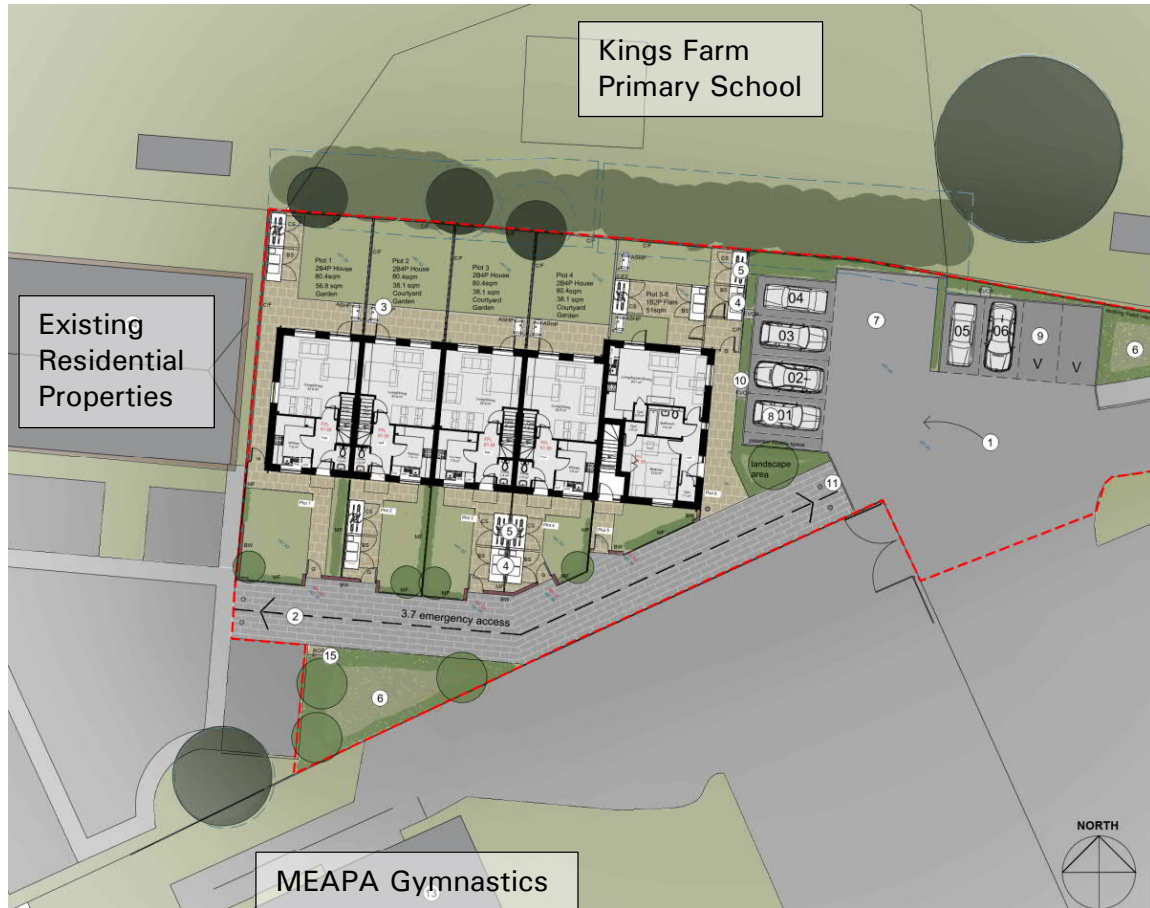
Element 2 – observing internal “Noise Level Guidelines”

Element 3 – undertaking an “External Amenity Area Noise Assessment”

Element 4 – consideration of “Other Relevant Issues”

4. **INITIAL SITE NOISE RISK ASSESSMENT**

The assessments set out in this report relate to the scheme as shown on ECE Architecture’s drawing no.7289-100 rev K dated 2 July 2024 together with associated layouts and elevations (ref 2). An extract showing the proposed scheme may be seen in Figure 1.

Figure 1 – Extract Proposed site plan


An environmental sound measurement survey has been carried out at the site on 13 and 14 September 2024. Details of the measurement survey are reported in Appendix A.

The attended measurements indicate that the highest noise levels are at times when vehicles are arriving or departing from the gymnastics facility and / or football pitch parking area. The highest measured L_{Aeq} noise level measured was 59 dB. This is significantly above the daytime (16 hour) L_{Aeq} noise level measured at Position A, which was 48 dB. For the purposes of the Initial Noise Risk Assessment the raised noise levels are considered appropriate in order to ensure that the risk is fully considered.

The noise levels measured at Position A resulted in a night-time period L_{Aeq} of 50 dB. Given that the football pitches and gymnastics facility do not operate

during the night-time period the Position A measured levels are considered representative of the levels likely outside the proposed dwellings.

Table 1 sets out the initial noise risk assessment based on the measured noise levels and the categories set out in Figure 1 of ProPG.

Table 1 – Initial Noise Risk Assessment (ProPG)		
Period	Free-field Noise Level $L_{Aeq,T}$ (dB)	Noise Risk Assessment
Daytime	59	Low
Night-time	50	Low to Medium

The relevant advice from Figure 1 in ProPG in relation to risk is reproduced below:

“At low noise levels, the site is likely to be acceptable from a noise perspective provided that a good acoustic design process is followed and is demonstrated in an ADS which confirms how the adverse impacts of noise will be mitigated and minimised in the finished development.”

“As noise levels increase, the site is likely to be less suitable from a noise perspective and any subsequent application may be refused unless a good acoustic design process is followed and is demonstrated in an ADS which confirms how the adverse impacts of noise will be mitigated and minimised, and which clearly demonstrate that a significant adverse noise impact will be avoided in the finished development.”

“High noise levels indicate that there is an increased risk that development may be refused on noise grounds. This risk may be reduced by following a good acoustic design process that is demonstrated in a detailed ADS. Applicants are strongly advised to seek expert advice.”

5. FULL PROPG ASSESSMENT

The four elements of assessment are set out below.

5.1 Element 1 – Good Acoustic Design Process

ProPG sets out a checklist of 7 items for consideration as part of Element 1.

Table 2 below sets out the checklist and the responses in relation to the proposed development.

Table 2 – Element 1 Checklist		
	The Planning Application Must	Response
(a)	Check the feasibility of relocating or reducing noise levels from relevant sources.	The existing sources cannot be relocated.
(b)	Consider options for planning the site or building layout.	The site is relatively small with restricted options available.
(c)	Consider the orientation of proposed buildings.	Living areas are located to the rear facing the school as much as possible.
(d)	Select construction types and methods for meeting building performance requirements.	See Section 5.2 for windows and ventilator performance requirements.
(e)	Examine the effects of noise control measures on ventilation, fire regulations, health and safety, cost, CDM (Construction, design and management) etc.	Only conventional noise control measures needed which are unlikely to significantly affect the areas cited.
(f)	Assess viability of alternative solutions.	See (b) above.
(g)	Assess external amenity area noise.	See Section 5.3.

5.2 Element 2 – Internal Noise Level Guidelines

ProPG cites BS 8233 (ref 3) as suitable guidance for internal noise levels. ProPG provides additional guidance compared with BS 8233 in respect of maximum noise levels from regular individual noise events at night. Table 3 below summarizes the relevant internal noise level limits for environmental noise from these sources.

Table 3 – Internal Noise Level Design Limits			
Activity	Location	07:00 – 23:00	23:00 – 07:00
Resting	Living Room	35 dB $L_{Aeq,16h}$	--
Dining	Dining Room/area	40 dB $L_{Aeq,8h}$	--
Sleeping (daytime resting)	Bedroom	35 dB $L_{Aeq,16h}$	30 dB $L_{Aeq,8h}$ Not normally exceed 45 dB L_{AFmax} more than 10 times a night

From the measured period noise levels (see Table 1), the required minimum reductions in noise level from outside to inside are shown below in Table 4.

Table 4 – Minimum Outside to Inside Period Noise Level Reductions			
Period	Free-field Noise Level $L_{Aeq,T}$ (dB)		Minimum Reduction (dB)
	Outside	Inside	
Daytime	59	35	24
Night-time	50	30	20

It may be seen that, during both the daytime and night-time a reduction from outside to inside of 24 dB would be satisfactory to reduce the noise levels in each room to within the limits set out in BS 8233: 2014, and therefore also for ProPG.

In addition to the period noise levels consideration of the maximum noise levels likely during night-time hours is required. ProPG says that L_{AFmax} noise levels should not normally exceed 45 dB more than 10 times a night.

The highest L_{AFmax} noise level measured at Position A during the night-time period was 91 dB. Analysis of the time history noise level data indicates that this was an A-typical event with typical levels being much lower. Our analysis indicates that there will be no more than 10 events exceeding 70 dB L_{AFmax} . Figure 2 provides the time history plot for Position A night-time measurements that illustrates that typically noise levels were much lower than the 91 dB L_{AFmax} event.

Figure 2 – Night-time L_{Aeq} Noise Level Time History with 4 second resolution

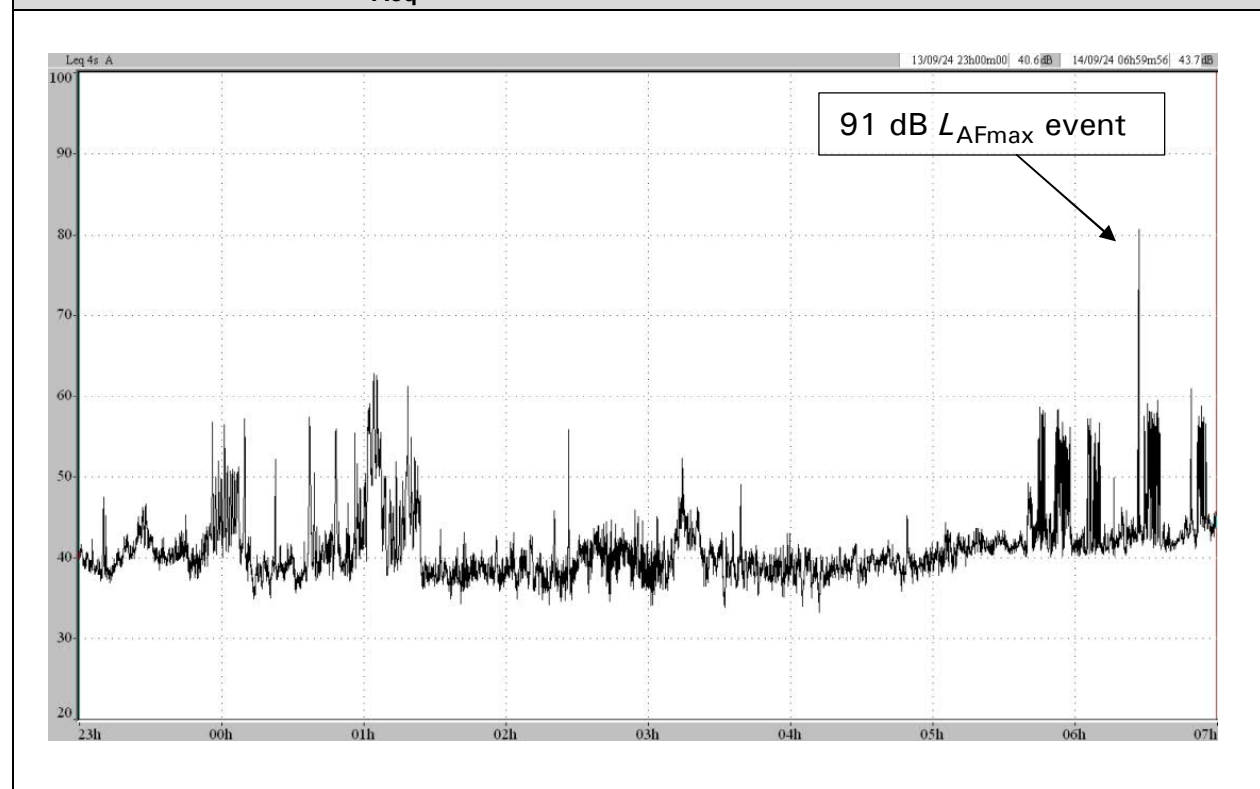


Table 5 identifies the minimum noise level reductions from outside to inside based on these data.

Table 5 – Minimum Outside to Inside Night-time Maximum Noise Level Reductions

Position	Night-time Maximum Noise Level L_{AFmax} (dB)		Minimum Reduction (dB)
	Outside	Inside	
A	70	45	25

Overall therefore, at night the minimum reduction required from outside to inside is 25 dB. The reductions needed at night being controlled by the maximum noise levels.

Paragraphs 2.33 and 2.34 of ProPG say:

***“2.33 It should be noted that the acoustic performance of the building envelope will be reduced in the event windows are opened for ventilation or cooling purposes, typically reducing the insulation to no more than 10 to 15 dB(A). 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.*”**

2.34 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. trickle ventilators) in the open position (see Supplementary Document 2). Furthermore in this scenario the internal L_{Aeq} target noise levels should not generally be exceeded.”

The minimum reductions necessary outlined above (see Tables 4 and 5) exceed the reduction provided through a partially open window.

It may be noted that in order to ensure that the assessment is robust the daytime noise level used above is for the shortened busy time periods when vehicles are arriving and departing the adjacent facilities. The overall daytime period noise level measured at Position A was 48 dB L_{Aeq} (13 dB above the internal noise level requirement). This suggests that during the daytime a partially open window could provide sufficient reductions from outside to inside, particularly during times when vehicle movements are not present nearby.

At night this is not the case, with partially open windows not capable of providing the necessary noise level reductions from outside to inside.

With windows closed, the reduction in sound level from outside to inside a dwelling with ordinary trickle ventilators in the open position is typically about 25 dB(A).

The measurement data suggest that ordinary double-glazed windows combined with ordinary trickle ventilators in the open position should provide sufficient sound insulation performance from outside to inside.

5.3 Element 3 – External Amenity Area Noise Assessment

ProPG says:

“3(11) 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 $L_{Aeq,16h}$.”

The full daytime period L_{Aeq} noise level measured at Position A was 48 dB, below the threshold values set out above.

The attended measurements indicate that noise levels on the development site itself, and therefore within garden areas to the front of proposed properties, may rise above the threshold external noise levels for short periods, at times when vehicles arrive and depart nearby. The full period daytime noise levels are expected to be within the required limits.

Given that rear gardens will be shielded from vehicle movement noise by the proposed buildings, it is considered likely that the daytime L_{Aeq} noise level within the proposed rear gardens will satisfy the external noise level requirements.

5.4 Element 4 – Assessment of Other Relevant Issues

Air Source Heat Pumps (ASHPs)

In AIRO’s experience, planning authorities often require a rating level of external plant such as air source heat pumps (ASHPs) to not exceed the background sound level at the nearest noise sensitive receptor (not including the building served by the plant).

Based on the measurement data (see Appendix A), the lowest hourly background sound level at Position A was 34 dB. This is considered to be representative of the lower levels likely at each of the proposed dwellings.

As such the rating level of ASHPs (including any cumulative effects) should not exceed 34 dB as determined at 1 metre outside the nearest window into a residential unit (excluding the residential unit served by the ASHP itself).

Currently 1 no. Mitsubishi Ecodan PUZ-WM50VHA ASHP unit is proposed to serve each dwelling. The proposals are for the units to be located in the rear gardens of each property. 2 no. units are proposed to the rear of the flats, 1 no. to serve each flat.

Manufacturer data indicates that the sound pressure level at 1 metre distance from the unit is 52 dB(A), whilst the sound power level is 61 dB(A).

The worst case scenario, in terms of potential noise impact, is where a unit is proposed to the rear of the ground floor flat, with the bedroom window of the upper flat overlooking it.

Drawings of the proposals indicate that the window is around 3.3 metres away from the centre of the ASHP unit. This would mean that the sound pressure level outside the bedroom window would be approximately 43 dB(A).

If the ASHP units are maintained in their proposed locations an alternative ASHP model and / or appropriate noise attenuating enclosures are likely to be required.

6. CONCLUSIONS

This report has set out an Acoustic Design Statement according to the process described in ProPG for the proposed development at Nursery Mews, Gravesend, Kent.

The initial site risk assessment shows the site to be of low to medium risk. Therefore, in relation to the environmental noise exposure of the site and based on guidance in ProPG, the recommendation to the decision maker is:

B – Grant consent with suitable noise conditions

Sound levels for amenity areas are expected to meet design standards.

Sound levels inside the proposed dwellings are expected to satisfy design standards with windows shut and trickle ventilation provided.

A rating level criterion for air source heat pumps has been proposed.

Report Approved by:

Report Author:

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D J Boaden

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Technical Director

D J Boaden BSc MInstP MIOA
Managing Consultant

REFERENCES

1. ProPG: Planning & Noise,
Professional Practice Guidance on Planning and Noise,
New Residential Development
Association of Noise Consultants, Institute of Acoustics and Chartered
Institute of Environmental Health
June 2017
2. ECE Architecture Drawings:

No.	Rev	Date	Title
7289-100	K	02.07.24	Proposed Site and Ground Floor Plan
7289-102	G	03.07.24	Proposed Floor Plans
7289-103	H	03.07.24	Proposed Elevations – Sheet 1
7289-104	F	03.07.24	Proposed Elevations – Sheet 2
3. British Standard BS 8233:2014
Guidance on sound insulation and noise reduction for buildings
British Standards Institution, 2014

APPENDIX A**Noise Survey Details**

The environmental sound level survey was carried out on 13 and 14 September 2024. Position 1 was located in the central area of the development site. Position 2 was located on the development site in line with the rear façade of the proposed dwellings. Position 3 was located on the development site close to the boundary with MEAPA Gymnastics Club. Measurements at these positions were attended such that the activity generating the dominant noise levels could be witnessed.

Position A was within the MEAPA Gymnastics Club boundary, at a similar distance from the cars and entrance path to where the proposed residential units are proposed. An automatic data logging sound level meter was used at Position 2 for the duration of the survey period. This position was primarily targeted towards measuring the noise levels overnight when background levels would be generally consistent with those at the proposed development site.

The measurement positions as shown in Figure A1.

Figure A1 – Plan Indicating Measurement Locations



Attribution: Google Maps

Imagery: Airbus, Maxar Technologies

Map Data: © 2024

Summaries of the measured sound levels are presented in Tables A1, A2 and A3.

Details of the measurement equipment is provided in Table A4 whilst recorded weather conditions are presented in Table A5. A statement regarding calibration of the equipment is also provided.

Table A1 – Attended Sound Level Measurements on 13 September 2024						
Pos.	Start Time	Duration (mm:ss)	Sound Level (dB)			Comments
			L_{AFmax}	L_{Aeq}	L_{A90}	
1	12:09	49:10	75	55	49	Includes school lunch break activity and MEAPA closing, with gate closed and locked at approx. 12:30
1	13:02	35:01	73	48	38	Primary School break in progress until approx. 13:10. Sound levels drop immediately afterwards.
2	13:41	20:01	65	41	38	Generally quiet. Occasional pedestrian passing by. Occasional aircraft overhead. Road traffic noise can be heard in the background.
2	14:11	48:01	72	50	40	Primary School afternoon breaktime. Lawnmower noise in background. Breaktime finishes around 14:30. No. of pedestrians passing through the development area increases towards 15:00, presumably in connection with school end. Car drives on to development land causing L_{Amax} value.
2	15:05	18:31	66	48	40	School grounds quieter. Pedestrians passing by. Cars arriving and turning around on the development land then parking in Nursery Mews.
2	15:24	30:02	70	49	39	Hubbub from school end / pickup, including from lots of people walking through the school grounds. Approx. 15:30 car on development grounds turning around causes L_{Amax} .
3	16:23	14:13	77	55	43	From around 16:00 people start arriving outside MEAPA. Gates opened at 16:20 and people/vehicles enter plus park in the football parking area. Noise from door slams, people talking etc. School completely quiet. Cheerleading session starts 16:30.

Table A1 – Continued						
3	16:58	60:00	96	58	37	Football pitches in use, although low seemingly low numbers. Can only hear football activity at very low levels. Cheerleading activity inside MEAPA not audible. L _{Amax} caused by single very noisy car passing the measurement position. All other cars result in sound levels of around 75 dB(A). Vehicle arrivals and departures as sessions start and end dominate the noise climate. Towards the end of the hour football activity noise increases but still relatively low levels. ‘Thump’ of the football being kicked can be heard.
3	18:01	58:24	79	50	37	Continuation of previous hour. L _{Amax} caused by car door slam nearby. Cars using MEAPA car park and football pitch parking.
3	19:01	60:00	82	52	39	Motorbike noise in distance beyond the schools. Football pitch use decreasing as people depart. Maximum levels caused by vehicle movements and car horn.
3	20:01	20:26	64	45	43	Football pitches now seemingly empty as now dark.
3	20:35	26:07	72	51	45	Continuation of vehicles arriving / departing causing the higher noise levels. Generally quiet between these events.
3	21:01	21:25	79	55	45	People / vehicles departing. Numbers remaining decreasing. By end of this measurement MEAPA activity finished. Car park empty and gates locked.

Table A2 – Attended Sound Level Measurements on 14 September 2024

Pos.	Start Time	Duration (mm:ss)	Sound Level (dB)			Comments
			L_{AFmax}	L_{Aeq}	L_{A90}	
3	10:11	49:57	81	59	46	School grounds empty and quiet. Football activity in progress with increasing numbers of cars / people arriving. Neighbourhood noise can be heard in background. MEAPA also active with cars arriving / departing. Generally, quite busy with car noise, music, shouting etc. A total of 17 cars parked on the development land, 3 along Nursery Mews, MEAPA and football parking both full. L _{Amax} caused by car on development land.
3	11:01	60:15	86	55	45	Extremely busy with cars arriving and departing – almost gridlocked at junction between the parking areas and Nursery Mews. L _{Amax} caused by car horn. After approximately 10:45 everything eases and sound levels decrease. Cannot see properly but sounds like trees / hedges are being cut in the school grounds. Towards 11am arrivals and departures have lessened and sound levels decreased.

Table A3 – Free-field Sound Levels measured at Position A

Start	Noise Level in dB		
	L_{AFmax}	L_{Aeq}	L_{A90}
Friday 13/09/2024			
12:00	--	52	45
13:00	--	45	35
14:00	--	50	37
15:00	--	47	37
16:00	--	49	35
17:00	--	43	34
18:00	--	50	34
19:00	--	46	37
20:00	--	47	38
21:00	--	46	39
22:00	--	41	37
23:00	59	42	38
Saturday 14/09/2024			
00:00	60	44	37
01:00	64	48	36
02:00	64	40	36
03:00	56	41	36
04:00	50	39	37
05:00	70	46	39
06:00	91	55	40
07:00	--	51	43
08:00	--	49	41
09:00	--	52	36
10:00	--	56	43
11:00	--	50	40
Day (07:00 - 23:00)	--	48	34 to 45
Night (23:00 - 07:00)	91	50	36 to 40

Table A4 - Schedule of Instrumentation

Use	Type	Serial No.
Measuring System	Nor140	1407333
Microphone	Nor 1225	305223
Calibrator	B&K 4231	2342748
Measuring System	CR703B	43057
Microphone	MK 224	891199
Calibrator	B&K 4230	543357

CALIBRATION

AIRO is accredited by the United Kingdom Accreditation Service as a UKAS testing laboratory No. 0483 and although the measurements carried out for this survey are not listed on our schedule of accreditation, all of AIRO's noise and vibration measurement equipment is routinely calibrated as part of the calibration regime in our Quality Manual and these calibrations are traceable to National Standards.

In addition, the calibration level of the measuring equipment was checked at the start and the end of each survey period using the appropriate calibrator for the relevant meter.

Table A5 – Recorded Weather Conditions

	13 Sept 2024	14 Sept 2024
Temperature °C	19	18
Relative Humidity %	60	50
Wind Speed m/s	Negligible	< 1
Wind Direction	n/a	SW