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The Lodge & The Annexe, Harmondsworth Lane, Harmondsworth, Middlesex ,UB7 0LQ

Acoustic Investigation Report

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James Tomalin

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Acoustic Investigation Report

Introduction

Aulos Acoustics has been appointed to undertake an acoustic investigation relating to The Lodge & The Annexe, Harmondsworth Lane, Harmondsworth, Middlesex ,UB7 0LQ.

The project is a proposed change of use from B1(a) (office) to D1 (non-residential institution). The application site is a potential noise-sensitive and noise-generating use requiring an investigation of the effect of noise exposure on nearby or adjacent neighbours, occupants and users. The principal noise sources of concern are:

- Air traffic
- Road traffic
- People

The Lodge is a Grade II listed property with significant early 19th Century features, particularly regarding the windows and doors, as well as the general building form. The Annexe is a modern open plan office directly adjoining The Lodge.

The Lodge will provide accommodation for formal education of children in an independent, small group setting. The upper ground and first floors will be utilised.

The Annexe will provide accommodation for dining, PE and indoor, active play at ground floor only.

The following reports the results and conclusions of the investigation made in accordance with local, regional, national requirements.

Prevailing Noise Climate

The application site is subject to a variable noise climate. The underlying conditions for most elevations and outside space are considered to be subjectively quiet.

Facing Holloway Lane the moderate road traffic noise is the determining characteristic, but is characterised by relatively low speed and flow, subjectively.

In other areas, direct views of the road are restricted or well-screened by the boundary walls. The road is less important.

The Annexe is well-screened by the The Lodge and the boundary walls.

Aircraft noise was noticeable, but was not as loud as expected within close proximity to Heathrow. Only some large aircraft on short take-off were subjectively loud. Most aircraft were not visible.

London Heathrow was operational on westerlies using the northern runway (09L/27R) for take-off at the time of the site visit.

Planning Requirements

There are no specific requirements for the treatment of minor, independent schools in Hillingdon.

The Noise SPD (1) refers to consideration of an upper desirable noise limit for major schools and hospitals of $L_{Aeq,1h}$ 60dB in clause 4.20 and 4.21 refers to Table 3 Section 5.0. The table indicates a desirable internal noise level of $L_{Aeq,1h}$ 35-40dB for a classroom and $L_{Aeq,1h}$ <55dB in playgrounds.

Assessment of noise exposure is completed under the Noise SPD by reference the airport noise exposure contours and to local environmental noise surveys.

It must be noted extensive reference is made in the SPD to PPG24 which is an obsolete document withdrawn in favour of the current approach to National Planning Policy Framework (2), Noise Policy Statement for England (3) and the Planning Practice Guidance Noise (4). These documents broadly apply a requirement that significant adverse effects of noise should be avoided within a sustainable and reasonable framework.

PPG Noise advises that it be determined if noise exposure is above or below the significant and lowest observed adverse effect level, which are explained as follows:-

- Significant observed adverse effect level: This is the level of noise exposure above which significant adverse effects on health and quality of life occur.
- Lowest observed adverse effect level: this is the level of noise exposure above which adverse effects on health and quality of life can be detected.

PPG Noise summarises the noise exposure hierarchy, based on the likely average response as follows:-

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

London Heathrow Noise Exposure

Close proximity to Heathrow means there is a risk that aircraft noise may have a major impact. The current noise contours have been reviewed accordingly.

The ERCD Report 1501 (2) provides the most recent contours for 2014.

Based on Figure 12 Standard Modal Split Day, the application site is set outside the LAeq,16h 57dB contour by 0.1km approximately.

In general, on a typical summer day aircraft noise levels can be expected to be 57dB or less at the application site over the 16-hour period.

As aircraft numbers are relatively steady during the core of each runway operational period (i.e. north and south runways swap operation at around 15.00 hours) the hourly noise level is likely to be similar.

Where this is the case, the upper limit of the LB Hillingdon Noise SPD for major schools is achieved.

The playground noise limit is exceeded ostensibly, but there is significant localised screening in the acoustic shadow on the northern side of each of The Annexe wings. Such screening is expected to decrease noise levels substantially and ensure these open areas are sufficiently quiet for the outdoor congregation and learning spaces envisaged. No outside active play areas are proposed.

Environmental Noise Survey

An environmental noise survey has been completed in general accordance with the requirements of the following documents:-

- BS 7445 (1) (2) *Description and measurement of environmental noise.* (current standards for UK)
- BS8233:2014 (3)
- BS 4142:2014 (4)
- CRTN 1988 - *Calculation Of Road Traffic Noise: 1988 DoT – Welsh Office, HM Government* (5)
- DMRB HD213/11 Rev.1 - *Design Manual for Roads and Bridges Volume 11 Environmental Assessment Section 3 Environmental Assessment Techniques Part 7 HD 213/11 - Revision 1 Noise & Vibration* (6)

Measurements of the following sound pressure level (Lp) parameters has been completed:-

- Continuous equivalent sound pressure level LAeq,T
- Statistical Lp indices LA10, LA50, LA90
- Maximum Lp LAmax

All frequency weightings are “A” and all time weightings are FAST. Octave band frequency spectra have been measured and some measurements have equivalent SLOW time-weighted results. The spectra and SLOW results are for use in design.

The period of measurement, T, was 900 seconds (15 minutes) with a resolution of 30 seconds; a sample measurement is made and recorded every 30 seconds and the results reported for each 900 seconds period.

The recorded measurement positions are shown on the site measurement location plan below.

These positions are described as follows:-

Position	Description	Source	Location	Field
1	The Lodge terrace; 15-minute manual	Road traffic, aircraft, birdsong	3m from east elevation	Free
2	The Lodge north elevation; 15-minute manual	Road traffic, minor aircraft & birdsong	2.5m from north elevation	Free
3	The Annexe entrance; sample manual	Road traffic, aircraft, birdsong	3m from N elevation of south wing & 5m from entrance	Free
M	Car park continuous monitor reference	Road traffic, aircraft, birdsong	5m from The Lodge path	Free

The key measurements are those made at Positions 1 and 2. Position 3 is a sample measurement only.

The measurements made at Position M were made for reference only as these do not represent the buildings. The equipment used is two months outside laboratory calibration, but calibrated consistently on site against the reference calibrator.

All equipment details are available on request.

Manual Measurement

The manual survey measurement results are as follows. The mean is presented as a typical sound level and each period may be considered to be statistically representative of the hour in which it was recorded:-

Position	Time	LAeq	LA10	LA50	LA90	LAmax	
1	10:15:01	51.6	54.1	48.5	43.8	71	dB
1	11:12:27	53.8	56.6	50.3	45.4	75.1	dB
1	12:04:59	54.9	54.9	49.8	45.6	75.3	dB
Mean		**53.4**	**55.2**	**49.5**	**44.9**	**73.8**	**dB**
2	10:37:33	63.9	67.4	61.3	51.9	80.2	dB
2	11:31:52	65.3	67	60.2	50.8	85.9	dB
2	12:22:20	65.2	67.6	61.3	52	90	dB
Mean		**64.8**	**67.3**	**60.9**	**51.6**	**85.4**	**dB**
3	11:49:06	50.8	55	47.6	42.9	63.6	dB
Mean	*Implied estimate*	**49.3**	**55.3**	**47.3**	**42.2**	**62.1**	**dB**
CRTN/PPG24	**Approximation**		*	*Approximation is applicable to moderate road traffic flow and has limited application to these positions*			
1 *		16h 52	18h 54	Min 43.8			dB
2		16h 64	18h 66	Min 50.8			dB
3 *		16h 52	18h 54	Min 41.1			dB

Manual Measurement Results

The sound levels in the vicinity of The Lodge and The Annexe within the boundary of the application site meet the Noise SPD upper limit and the desirable limit for playgrounds for major schools. The results are obtained despite the open aspect of the measurement positions due to screening from buildings to the south: views of Heathrow take-offs are obscured for the most part.

Road traffic noise is reasonably well-screened by the boundary wall, although the elevated recording position at Position 1 and audible reflection from the façade means that this is limited. It is estimated sound levels at first floor may be some 5dB higher than at ground level on the east elevation, which implies sound levels of $L_{Aeq,1h}$ 58dB mean.

Sound levels at the basement levels are expected to be similarly lower due to increased screening from the road and aircraft, which implies sound levels of $L_{Aeq,1h}$ 48dB mean.

At the south elevation, sound levels are expected to be comparable to Position 1, but may be slightly elevated at times. Even were there a doubling in the number of visible aircraft take-offs – unlikely due to the intervening buildings and activity seen – any increase would be limited to 3dB on average and probably less due to the reduced road traffic noise there.

The western elevation at first floor level will be similar to the northern elevation, but with the effect of an obscured and reduced view of the road. The reduction is limited to 3dB which implies sound levels of $L_{Aeq,1h}$ 62dB mean.

The above refer to the loudest periods during use of the northern runway for take-off. When the southern runway is being used aircraft sound levels will fall significantly. The degree to which this occurs can be variable around Heathrow, but even based on the distance alone the difference between 1.2km and 2.7km distance the reduction will be 3-7dB depending on propagation.

As greater screening will apply due to the low altitude of the aircraft when nearest the site, greater reductions are not unexpected.

The above measured sound levels at Position 1 and 3 are within expectations based on the noise contours, particularly when reference is made to the ERCD Report 1501 (5) Actual Model Day contours for 2014. The contours indicate the 57dB contour is further from the application site at 0.19km approximately: aircraft noise in 2014 was relatively quieter than under the standard model.

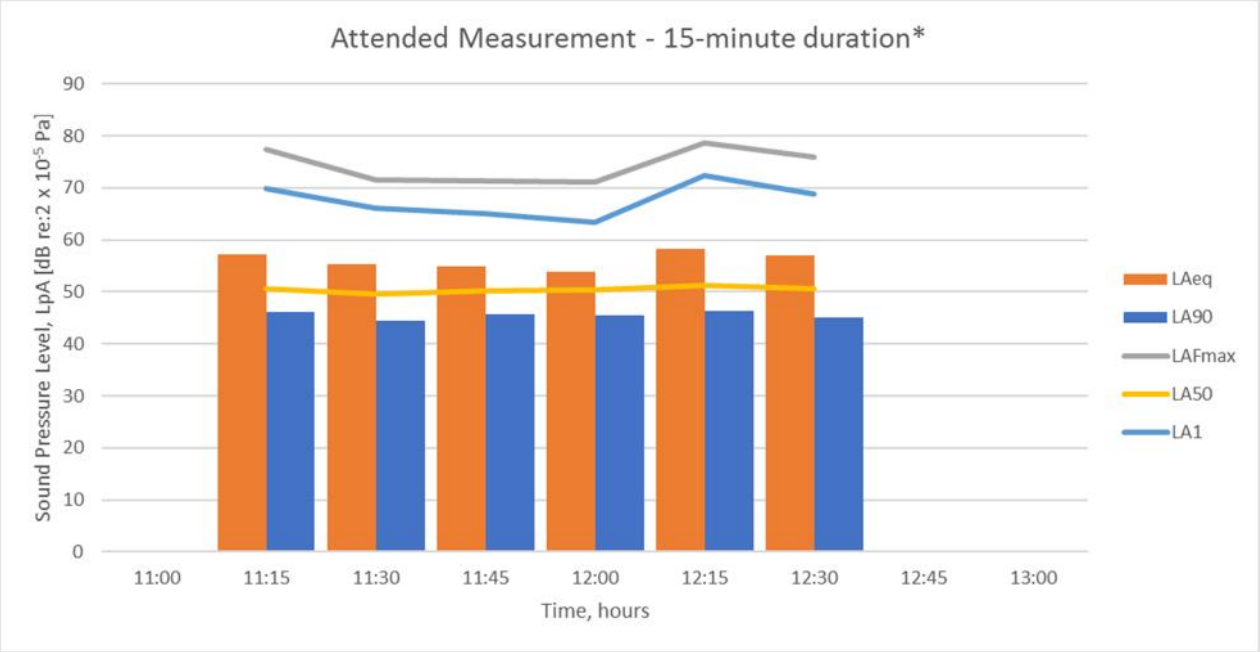
Position 2 sound levels are within expectations, based on inspection of the current strategic noise maps for road traffic in the area, although these are first order approximations of road traffic flows and noise.

Reference Monitoring

Basic monitoring of noise exposure was completed for reference between 11.15 and 12.45 hours in consecutive 15-minute periods.

Overall, the mean of successive one-hour periods is $L_{Aeq,1h}$ 55.9dB, which is slightly higher than at Position 1 as expected for the more open position in the car park.

The time history of results is shown below.



Reference Monitoring Results

All ambient noise exposure L_{Aeq} results are below the 60dB desirable upper limit for major new schools and hospitals.

These results indicate that the progression of noise was similar through the core of the survey and only minor variations occurred. The highest levels at 12.15 hours are considered to be due to larger aircraft take-off, which was noted to be subjectively louder due to its rotate position being further east on the

runway than most other, observed take-offs. The aeroplane was more clearly seen whereas most take-offs were only heard further to the west.

The reference monitoring used a meter with consistent self-calibration and maintaining consistent comparison with the primary sound level meter used in manual measurements during the survey.

Environmental Noise Assessment

Noise Affecting the Application Site

Overall, the site meets the desirable upper limit (1) for major new schools and hospitals for environmental noise, except on elevations with a substantial view of the road.

The proposed independent school is a minor school and one not requiring the same degree of control from the outset as state school expansion or new development, where the ability to manage noise exposure is more constrained.

The number of pupils in each class is small at 15 per class. Management of classes is within the direct control of the teachers and school leaders.

Notwithstanding the above, air quality and noise levels are important for the learning outcomes of all children.

The current noise exposure of the proposed school is such that closed windows would be required during key learning periods (i.e. not during play or relaxed periods). Provision of fresh air management would need to be provided through careful management of open windows outside key learning periods (e.g. before school start, lesson breaks, unoccupied periods, etc.).

The sound level difference of a closed sliding sash window in thick solid masonry walls is expected to be approximately 20-25dB(A).

Internal noise levels in the classrooms at ground level may be up to 40-45dB(A) facing Holloway Lane and are manageable within the context of small, independent teaching groups. Consideration will be given to:-

- Secondary glazing provision
- Upgrading primary windows
- Improving reverberant sound control in each room (i.e. more sound absorption)
- Restricting proximity of children to exposed windows

Listed building restrictions mean that substantial measures at the windows and affecting the building fabric may be precluded, but sound leakage through frames and junctions may be reduced without substantive, disruptive or visible measures.

The classrooms would use the current floor plan meaning that sizes are small compared to modern classroom standards. Teacher-pupil distances will be low compared to state schools where 6-8m separation is common. Such conditions will ensure more manageable conditions and overcome the need for significant speech effort increase. Intelligibility is expected to remain similar for similar or less speech effort compared to that used in state schools of 30 children per class over greater distances.

In general terms, the slightly higher noise levels than ideal on the most exposed elevations do not mean that teaching and learning will be undermined.

Use of the less exposed rooms will also limit noise exposure and it is suggested that ground floor rooms with aspects to the rear of The Lodge are used for any language or SEN teaching, to enable greater communication standards here.

The Annexe is to be used to provide non-critical accommodation for dining, assembly, PE and indoor play. Some teaching may take place, but this is expected to be restricted in application and non-critical.

The lower noise exposure here is entirely adequate for the purposes proposed. During non-critical activity windows may be opened, although care will need to be taken during louder activity to avoid creating disturbance elsewhere.

It should be noted that Building Regulations requirements are not considered to apply as no significant alterations to the buildings are proposed, despite the proposed change of use. Works are limited to minor alterations and refurbishment with the exception of additional sound insulation to The Annexe to separate office and school, as addressed below.

Noise Affecting Commercial Office Space

No commercial office space for users other than the school will be retained in The Lodge except at basement level.

The Annexe may have office space retained and occupied at first floor level by other users. These users will be adjacent to proposed dining and PE spaces of the school at ground floor level.

Sound insulation testing in The Annexe has demonstrated the following typical performance. Tests have been completed in accordance with The Building Regulations requirements.

Source	Receiver	Measured		Typical Required
First Floor Open Plan	Ground Floor Open Plan	$D_{nT,w}$ 57dB	equal to or more than	$D_{nT,w}$ 45-50dB
First Floor Canteen	Ground Floor Office	$D_{nT,w}$ 56dB	equal to or more than	$D_{nT,w}$ 45-50dB
Lodge Floor Typical		$D_{nT,w}$ 42dB	equal to or more than	$D_{nT,w}$ 40-45dB

Tested Airborne Sound Insulation

Source	Receiver	Measured		Typical Required
First Floor Open Plan	Ground Floor Open Plan	$L_{nT,w}$ 58dB	equal to or less than	$D_{nT,w}$ 60-65dB
First Floor Canteen	Ground Floor Office	$L_{nT,w}$ 68dB	equal to or less than	$D_{nT,w}$ 60-65dB
Lodge Floor Typical		$L_{nT,w}$ 72dB	equal to or less than	$D_{nT,w}$ 60-65dB

Tested Impact Sound Insulation

Airborne sound insulation performance is reasonable for the separation of uses, although the office spaces may not be suitable for spaces with a low tolerance for noise intrusion. The sound insulation may not be suitable for high music noise levels or uncontrolled play, as these can generate significant sound levels and be obtrusive in adjoining separate spaces.

As pupil numbers are low and groups small, the likelihood of high noise levels is significantly less than in, for example, community centres or public performance spaces. Younger children are more easily controlled by active staff engagement also.

Amplified music and public address will be controlled and managed in conjunction with the landlord.

Disturbance of school activity by airborne sound from the offices is unlikely unless a noisy use is proposed, which would not normally be suitable for the use.

Impact sound – footfalls and moving furniture for example – has the potential to disturb teaching and learning in assembly and PE activity in The Annexe. Whilst this is not considered the most critical activity due to the small teaching groups proposed, quieter activities may well be disturbed.

Within The Lodge the office use at lower ground floor may be disturbed by footfall if typical sound insulation performance applies to the whole building.

The most effective means of reducing impact sound is to treat the upper floor surface with a resilient material or floor finish. A direct resilient finish such as resilient floor tile or carpet (e.g. Flotex) can provide a significant reduction over the current harder materials.

Floated hard floor finishes supported on an acoustically-rated and tested underlayment are effective also.

The landlord is considering the potential for sound insulation improvement and is understood to propose sound insulation measures to improve conditions. The focus should be on impact sound insulation, but moderate increases in airborne sound insulation may be feasible with some floor surface works (e.g. some acoustically battened floors or high-mass resilient layers).

Airborne sound insulation works may be strictly limited in The Lodge due to listed building constraints.

Reverberant Conditions

Reverberation is the result of reflection and absorption of sound in a space. Too little sound absorption leads to significant reverberation which can interfere with speech and communication.

Reverberant conditions in The Annexe open plan rooms are adequate for the control of noise build-up with mid-frequency reverberation time Tmf 1.5 seconds. Improvement should be sought with the use of soft wall or floor finishes rather than disturbing the ceiling, as the latter provides part of the sound insulation control. The ceiling does not appear to be a high sound absorption material from inspection so may benefit from improvement provided it is with a material of the same sound insulation properties.

Reverberant conditions in The Lodge are not ideal for teaching and consideration will be given to improvement with the use of localised temporary wall and ceiling sound absorption over the medium term. The provision of full sound absorptive ceilings and similar extensive works are unlikely to be compatible with listed building restrictions.

Sound absorbent baffles or islands in conjunction with wall panels will provide the best form of optimising conditions.

The first floor rooms tested had reverberation times of 1.5-1.7 seconds, which is greater than the 1.0-1.2 seconds advisable. It must be noted though close proximity to only 15 children per class is likely to offset some of the more problematic reverberant issues.

With such low sound absorption, the introduction of more sound absorption provides a suitable means of improving intrusive noise and will be considered in the medium term.

Noise Affecting Residents

Often the primary concern with new schools is noise from new play areas. The application site has no active play areas or playgrounds proposed outside. Some outside congregation and outdoor learning space will be provided, but active play and exercise will occur within The Annexe.

Outside congregation will be staff-supervised and is intended for socialisation and conversation, rather than active play. The current areas are inadequate as active play areas and would require improvement and landscaping, which is not proposed.

School drop-off and collect is normally a concern also, but this tends to relate more to fears of door slamming and children noise, rather than vehicles themselves. All such activity will be contained on-site within the designated parking areas and will be staff-supervised and controlled. The event noise associated with the activity is highly unlikely to affect residents due to significant distance and the high boundary wall screening.

Vehicle noise is not expected to be significant compared to current sound levels generated by Holloway Lane and Heathrow Airport. At the residential property opposite the entrance on Harmondsworth Lane, noise exposure levels are expected to vary between $L_{Aeq,1h}$ 60-65dB, although screened rear elevations may decrease to $L_{Aeq,1h}$ 55dB.

The sound is due, primarily, to noise from Holloway Lane which can be expected to be louder during the AM peak period, but approximately as stated during the PM peak period. Aircraft will contribute to a degree depending on operation.

Individual vehicles moving between Harmondsworth Lane and the car park under controlled conditions at restricted speeds are highly unlikely to generate comparable levels of noise at the housing or increase the current sound levels.

No additional mechanical equipment is proposed.

Effects on Amenity

Residential

No significant observed adverse effects are expected on residential amenity due to the proposed change of use.

The lowest observed adverse effect level is unlikely to be exceeded either by causing key external noise targets of BS8233:2014 to be exceeded or by generating a perceptible change in sound level of 3dB or more.

No effect on residential amenity is expected due to noise.

Office

The conditions within offices and other commercial developments are normally the responsibility of the landlord and tenants of the property, as the LB Hillingdon Noise SPD confirms.

Awareness of potential effects on office amenity are advisable, but there should not be a material consideration.

Tested airborne sound insulation performance between the areas of proposed change of use in The Annexe are relatively high and are expected to provide adequate separation of uses.

Careful management of noise will be required, but improvement of airborne sound insulation would require works, which could have a negative effect on achieved conditions simply by disturbing the current floor and ceiling.

Any works should be concentrated on the upper floor surface, which would have the added benefit of improving impact sound affecting the school.

Improvement of sound absorption in the spaces would have a positive effect on sound heard in the offices above.

Even without any sound insulation or absorption measures, the effect on office amenity will not be a significant observed adverse effect. In most circumstances, sound from the school would be "noticeable but not intrusive" indicating No Observed Adverse Effect.

Sensitive uses such as high quality meeting rooms and confidential spaces may require additional localised sound insulation within the offices, which is manageable within the context of commercial management of the property.

School

The proposed school is a minor, independent school providing small teaching groups. Teaching areas will be adequate due to small teaching groups and rooms compared to current state school standards.

As with commercial offices, management of conditions is within the remit of the school provided they meet their obligations under their regular Ofsted licensing and inspection regime.

Control of ventilation from outside will be necessary to ensure key teaching periods attain reasonable conditions within the school, but such active use of ventilation by staff is not unusual.

Improved conditions with the addition of sound absorption and potential sound insulation will be considered, but the controlling factor in The Lodge teaching areas will be the listed building restrictions.

Provided management of the ventilation and open windows is maintained to control noise levels and the staff apply a planned regime relative to Heathrow Airport operation, significant effects on the amenity of the school will be avoided.

Outcome

The proposed change of use avoids significant observed adverse effects on residents, potential future office occupants and the school, in accordance with the requirements of the NPPF and PPG Noise.

No effect is expected on residential amenity.

Minor adverse effects on office and school amenity may occur in The Annexe, but may be ameliorated by the provision of additional sound insulation and sound absorption, as proposed by the landlord.

Minor adverse effects on school amenity may occur in The Lodge teaching spaces, which will be offset by small class sizes and separation distances between teachers and pupils. Management of ventilation via open windows will be required and consideration of acoustic improvement will be given, in the context of listed building constraints. If improvements are feasible, such as secondary glazing, then adverse effects should be ameliorated.

Conclusions

Aulos Acoustics has completed an investigation of the environmental noise exposure expected of the application site at The Lodge & The Annexe, Harmondsworth Lane, Harmondsworth, Middlesex ,UB7 0LQ.

The Local Planning Authority is London Borough of Hillingdon. The investigation has taken due account of the national, regional and local planning policy relating to noise affecting the amenity and use of neighbouring sensitive buildings, including residential buildings.

An environmental noise survey has been completed and sound insulation tests within the building undertaken. Consideration has been given to the ERCD noise contours for Heathrow Airport and to strategic noise maps for road traffic in the vicinity.

The proposed change of use will not result in significant observed adverse effects, as described by the current PPG Noise. The scheme therefore complies with the main principle of national planning and noise policy.

No effect is expected on residential amenity due to the change of use.

Commercial office amenity is normally the responsibility of the landlord and tenant of a property, rather than a planning matter, as indicated with the LB Hillingdon SPG Noise. Nevertheless, consideration has been given to the sound insulation between potential first floor office and the ground floor school spaces. Performance has been tested in accordance with The Building Regulations requirements.

Airborne sound insulation performance is sufficient to provide suitable separation between normal uses of these spaces. Some improvement may be feasible, but represents a risk of decreasing current sound insulation.

Impact sound insulation performance is marginally higher than normally suitable for critical use of assembly spaces. Some improvement of first floor surface impact sound insulation will be considered as a commercial undertaking of the landlord and tenant.

The external noise levels are within the desirable upper limit of the Noise SPD for major schools (presumed state schools) and adequate internal noise levels can be attained.

The amenity of the school teaching areas will experience a minor observed adverse effect due to external noise intrusion. Management of the ventilation will be required to ensure adequate conditions during the key teaching and learning periods, which will include closing windows. Improvement of the sound insulation and sound absorption within these spaces is being considered within the context of the listed building constraints.

Critically, the small class sizes and low teacher separation distances in these small teaching spaces is a major mitigating factor, meaning that adequate communication can be maintained for similar speech effort despite a moderate ambient noise level. It should be noted that state-school teaching sizes are up to twice as high and separation distances of 6-8m are common.

The proposed change of use will provide D4 (non-residential institution) use for the provision of a small, independent school. The property and facilities are suitable for such accommodation with management of use and ventilation and the provision of acoustic improvements where feasible.

James Tomalin MIOA

Term	Description	
Sound	Physical oscillation of air or other material which is normally detected by the ear as a complex, time-varying and detailed description of the environment around the listener. Interpretation and subjective filtering of sound by the brain results in comprehension, emotional response and physical reactions to sound. Sound can also be detected by touch when transmitted in a solid medium and be perceived as motion at very low frequencies (i.e. vibration).	
Noise	Generally defined as unwanted sound, which as a highly subjective description is subject to wide interpretation. Some describe noise as harsh or dissonant conditions, but such descriptions tend to be value-based and will vary from person to person.	
Ambient Noise	The noise climate heard over a period of time due to all normal sources, in the absence of extraneous or atypical sounds. Used to describe noise in the absence of the introduced sound, generally.	
Ambient Noise Level	Describes the average noise level of the ambient noise over a stated period of time, e.g. hourly noise	
	Parameter: A-weighted Continuous Equivalent Sound Pressure Level determined over the time period T. Expressed in decibels / A-weighted decibels	$L_{eq,T}$ or $L_{Aeq,T}$ dB(A) or dB
Note:	Used in the reports generically to represent both current noise climate and noise level of vehicle noise to encourage direct comparison	
Leq,T	the notionally-steady sound level having the same acoustic energy as the time varying sound pressure level over the same period	
Background Noise	The underlying noise climate in the absence of an introduced or extraneous noise. Describes the quieter periods in the noise climate.	
Background Noise Level	Describes the “average minimum” level of the background noise climate over a stated period of time	
	Parameter: A-weighted Statistical Index 90% Sound Pressure. The quietest decile of the sound pressure levels or level exceeded for 90% of the time period, T Expressed in decibels / A-weighted decibels	$L_{90,T}$ or $L_{A90,T}$ dB(A) or dB
Acoustic screening	Physical barrier to sound formed by fence, wall, building or other structure, which has the effect of reducing the sound transmitted.	
Individual Event Noise	The noise of a distinctive event with the varying noise climate, usually a transient activity, such as a vehicle pass-by, aircraft flyover or similar, rather than an isolated impulsive noise.	
Event Noise Level	Highest noise level during the event as measured under particular conditions of time-weighting	
	Parameter: A-weighted Maximum Sound Pressure Level with FAST or SLOW time weighting Expressed in decibels / A-weighted decibels	$L_{Amax,FAST}$ or $L_{Amax,F}$ $L_{Amax,SLOW}$ or $L_{Amax,S}$ dB(A) or dB
Event Frequency	The number of times an individual event of a similar type occurs in the time period under consideration. Important descriptor as the impact of Individual Event Noise is dependent on changes in both level and event frequency.	
Time Weighting	The sampling rate at which a sound level meter measures the time-varying sound pressure level: originally described how fast the needle moved on analogue meters. Ensures the measurements respond to the type of noise source accurately and are representative. FAST = 125ms sampling rate = 480 samples / minute SLOW = 1s sampling rate = 60 samples / minute	

Appendix B - References

1. **LB Hillingdon.** *Hillingdon Local Development Framework April 2006 Noise SPD.* Planning and Transportation Group , LB Hillingdon. London : LB Hillingdon. p. 28, SPD.

2. **HM Government.** *National Planning Policy Framework.* DCLG, HM Government. London : HM Government, 2012. p. 65, Policy. ISBN 9781409834137.

3. —. *Noise Policy Statement for England (NPSE).* London : DeFRA, 2010. p. 10, Policy. NPSE2010.

4. —. *Planning Practice Guidance – Noise ID30.* DCLG. London : HM Government, 2014. Guidance. Active guidance.

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