

HEPWORTH
ACOUSTICS
Noise and Vibration Consultants

LAND TO REAR OF POND HOUSE PH, 738 OXFORD ROAD, READING

NOISE ASSESSMENT

On behalf of:
Taylor and Co. Architects

Report No: P15-264-R01
June 2015

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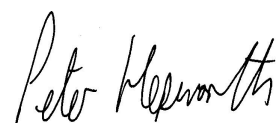
Report prepared by:
Hepworth Acoustics Ltd
First Floor Aztec Centre
Aztec West
Almondsbury
Bristol
BS32 4TD

On behalf of:
Taylor and Co. Architects

Report prepared by:
Graham Bowland BSc MIOA – Chief Consultant



Report checked by:
Peter Hepworth BSc FIOA – Director



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1.0 INTRODUCTION

- 1.1 Hepworth Acoustics Ltd was commissioned to carry out a noise assessment relating to a planning application for a proposed development of 3 terraced houses at land to the rear of the Pond House PH, 738 Oxford Road, Reading.
- 1.2 The site is currently a level car parking area to the rear of a parade of premises fronting Oxford Road, including Pond House PH.
- 1.3 Noise at the site includes residual road traffic from Oxford Road and the surrounding highway network, noise sources associated with the operation of the Pond House PH, noise sources associated with the operation of Exotic Superstore, which neighbours the site to the east, distant rail and air traffic and distant industrial noise.
- 1.4 The site location and ground floor proposed layout is presented in Figure 1. It is noted that at ground floor level, kitchens are proposed to the east elevation, to which the primary local noise sources are exposed. At first floor level there is one bedroom to this façade (per house) and at second floor no habitable rooms are proposed to this façade (storage room only).
- 1.5 Further, a 1.8m fence to the rear boundary of the proposed gardens is already included within development proposals
- 1.6 The scope of this assessment has been discussed and agreed with Ms Alison Shaw, Senior Environmental Health Officer at Reading Borough Council. The assessment has been undertaken on the basis of the agreed approach.
- 1.7 The various noise indices referred to in this report are described in Appendix I. All noise levels mentioned in the text have been rounded to the nearest decibel, as fractions of decibels are imperceptible.

2.0 ACOUSTIC CRITERIA

- 2.1 The *National Planning Policy Framework* (NPPF) 2012 provides some general guidance to local authorities on taking noise in to account in planning policies and decisions. This includes guidance that local authorities should ‘*aim to avoid noise from giving rise to significant adverse impacts on health and quality of life as a result of new development*’ and also ‘*recognise that development will often create some noise and existing businesses wanting to develop in continuance of their business should not have unreasonable restrictions put on them because of changes in nearby land uses since they were established.*’
- 2.2 However, there is as yet no specific guidance on numerical acoustic assessment/design criteria for proposed new housing developments provided in the NPPF, accompanying Technical Guidance document, National Planning Practice Guidance ‘Noise’, nor the *Noise Policy Statement for England* (NPSE) 2010.
- 2.3 Therefore, it is necessary to refer to established national guidance such as the acoustic design goals for residential development that are set out in BS8233: 2014, *Guidance on sound insulation and noise reduction for buildings*, which carries the full weight of an adopted British Standard. The design criteria recommended in BS8233 for the daytime (0700-2300hrs) and night-time (2300-0700hrs) periods are summarised in Table 1.

Table 1 : BS8233 Recommended Acoustic Design Criteria

Activity	Location	Internal Noise Levels	
		Daytime 0700-2300hrs	Night-time 2300-0700hrs
Resting	Living room	35 dB L _{Aeq,16hr}	30 dB L _{Aeq,8hr}
Dining	Dining room/area	40 dB L _{Aeq,16hr}	
Sleeping (daytime resting)	Bedroom	35 dB L _{Aeq,16hr}	

- 2.4 BS8233 also recognises that regular individual noise events at night can cause sleep disturbance. Peaks of noise from individual events are usually described in terms of L_{Amax} values and these can be highly variable and unpredictable such that for design purposes it is usual to take into account the findings of research described in WHO *Community Noise Guidelines* that states *“for a good sleep, it is believed that indoor sound pressure levels should not exceed approximately 45 dB L_{Amax} more than 10-15 times per night”*.
- 2.5 BS8233 states that if there is a reliance on closed windows to meet the guide values, *“there needs to be an appropriate alternative ventilation that does not compromise the façade insulation or the resulting noise level”*. Further, it is stated that assessments should be based on a room with *“adequate ventilation provided (e.g. trickle ventilators should be open)”*.
- 2.6 Regarding outdoor living areas, BS 8233 states that *“it is desirable that the external noise level does not exceed 50dB $L_{Aeq,T}$, with an upper guideline value of 55dB L_{Aeq} , which would be acceptable in noisier environments. However, it is recognised that these guideline values are not achievable in all circumstances where development might be desirable. In higher noise areas such as city centres or urban areas adjoining the strategic transport network, compromise between elevated noise levels and other factors, such as the convenience of living in these locations or making efficient use of land resources to ensure development needs can be met, might be warranted. In such a situation, developments should be design to achieve the lowest practicable levels in these external amenity spaces, but should not be prohibited”*.
- 2.7 Further relevant guidance is provided in British Standard 4142: 2014 *‘Methods for rating and assessing industrial and commercial sound’*, provides methods for rating and assessing sound of an industrial and/or commercial nature.
- 2.8 BS 4142 requires the ‘rating’ noise level for the operation to be compared with the L_{A90} background noise level in the absence of the operational noise.
- 2.9 With regard to the background noise level, BS 4142 states that *“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.”*

- 2.10 The 'rating' level is derived based on the 'specific' L_{Aeq} noise level attributable to the operation with an 'acoustic feature' penalty added for any noise sources which give rise to tonal, impulsive, intermittent, or other characteristics readily distinctive against the residual acoustic environment.
- 2.11 BS 4142 stipulates that impacts should be assessed over a reference time interval of 1-hour during the daytime (0700-2300hrs) and 15-minutes during the night-time (2300-0700hrs).
- 2.12 An initial estimate of the impact of the operation is determined by subtracting the background level from the 'rating' level. BS 4142 states that:
- Typically, the greater this difference, the greater the magnitude of the impact
 - A difference of around +10dB or more is likely to be an indication of a significant adverse impact, depending on the context
 - A difference of around +5dB is likely to be an indication of an adverse impact, depending on the context
 - The lower the 'rating' level is relative to the measured background level, the less likely it is that the operation 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.
- 2.13 Where the initial estimate of the impact needs to be modified due to the context, BS 4142 states that all pertinent factors should be taken into account in determining whether the initial estimate of the impact needs to be modified, including:
- The absolute level of sound, including *"where background sound levels and rating levels are low, absolute levels might be as, or more, relevant than the margin by which the rating level exceeds background"*
 - The character and level of the residual sound
 - The sensitivity of the receptor and whether dwellings ... will already incorporate design measures that secure good internal and/or outdoor acoustic conditions, such as:
 - i) façade insulation treatment, ii) ventilation and/or cooling, and iii) acoustic screening.

3.0 NOISE SURVEY

- 3.1 Noise surveys have been undertaken at the site during the evening of Saturday 6 June 2015, which coincided with an entertainment event (disco/karaoke) at the Pond House PH, and during the daytime of Tuesday 9 June 2015, which coincided with a degree of delivery/forklift activity to the rear of Exotic Superstore for part of the survey period.
- 3.2 All noise measurements were undertaken in 5-minute sample periods at the location identified in Figure 1 using a Bruel & Kjaer 2260 Type 1 Integrating Sound Level Meter (serial no. 2467014). The Sound Level Meter was calibrated before and after each survey period using a Bruel & Kjaer Acoustic Calibrator, Type 4231 (serial no. 2389221) and no variation in the calibration levels was noted.
- 3.3 The measurement microphones was fitted with a windshield and mounted in 'free-field' conditions at 1.5m above local ground. The weather during the noise surveys was dry with wind speeds typically below 5m/s.
- 3.4 All measured noise levels are fully detailed in Appendix II.
- 3.5 During the Saturday evening survey, the dominant sources of noise at the site were continuously operating mechanical plant items mounted to the rear facade of Exotic Superstore and residual road traffic noise from Oxford Road.
- 3.6 Noise break-out from the Pond House PH disco/karaoke event was barely audible, and only during lulls in road traffic noise.
- 3.7 A number of noise measurements were undertaken during the evening, however it is not considered that the measured noise levels were affected by noise break-out from the Pond House PH disco/karaoke event.
- 3.8 It was also noted that the rear section of PH is no longer in use, including the former outdoor rear terrace, and that there are no mechanical plant items to the rear of the building.
- 3.9 The noise measurements were undertaken over the period 2127-2216hrs. The noise levels for each sample period were consistently 49dB $L_{Aeq,5min}$ and 47dB $L_{A90,5min}$.

- 3.10 During the Tuesday daytime survey, the dominant sources of noise at the site were continuously operating mechanical plant items mounted to the rear facade of Exotic Superstore, residual road traffic noise from Oxford Road as well as more distant road traffic noise from the wider environment, rail and air traffic noise and distant industrial noise.
- 3.11 In addition, during the first part of the survey, delivery/forklift activity to the rear of Exotic Superstore was taking place. This comprised van and forklift manoeuvring noise and occasional forklift reversing alarms, and occasional general clatter of pallets etc.
- 3.12 A number of noise measurements were undertaken, firstly during delivery/forklift activity over the period 1337-1432hrs, and subsequently in the absence of this activity over the period 1433-1456hrs. Noise levels during the activity were in the range 55-56dB $L_{Aeq,5min}$ and 52-53dB $L_{A90,5min}$. In the absence of the activity noise levels were in the range 54-55dB $L_{Aeq,5min}$ and 51-53dB $L_{A90,5min}$.
- 3.13 The measured noise levels affirm the subjective impression formed, that the delivery activity noise was at a low level relative to the residual environmental noise, being just audible most of the time that the activity was occurring and more clearly audible only for short periods, particular during lulls in other noise sources.

4.0 NOISE ASSESSMENT AND MITIGATION MEASURES

- 4.1 Based on the measured noise levels at the site, it is not considered that any specific noise mitigation measures are required to the proposed development, with the exception of a 1.8m fence to the rear of the proposed gardens, as discussed below which is already included within development proposals.
- 4.2 In all areas of the proposed development, internal noise levels attributable to the external sources will be within the BS 8233 / WHO guideline values with windows closed and trickle ventilators open, based on an assumption of standard thermal double glazing of nominal specification (typically 2x 4mm thick standard panes on a minimum 12mm air cavity; i.e. 4-12-4) with standard non-acoustic trickle ventilators.
- 4.3 Further, external noise levels within the proposed garden areas attributable to these external sources will also be within the BS 8233 / WHO upper guideline values
- 4.4 As noted in the previous section, entertainment break-out noise from the Pond House PH was found to be at a very low level, both in absolute terms and relative to the residual noise climate, and was barely audible. Accordingly, no further consideration of this source is considered necessary.
- 4.5 Regarding noise from delivery/forklift activity at the rear of Exotic Superstore, based on the logarithmic average of the measured noise levels during the activity, and those without the activity taking place (i.e. residual noise), a specific noise level (i.e. that attributable only to the activity) of 50dB L_{Aeq} is calculated. This has been taken to be representative of the worst-case 1-hour daytime value.
- 4.6 In line with BS 4142, given the intermittent and impulsive nature of the delivery/forklift noise, and accounting for the low level of the noise relative to the residential noise climate, an 'acoustic feature' penalty of +3dB is considered applicable, to hence derive a 'rating' level of 53B.

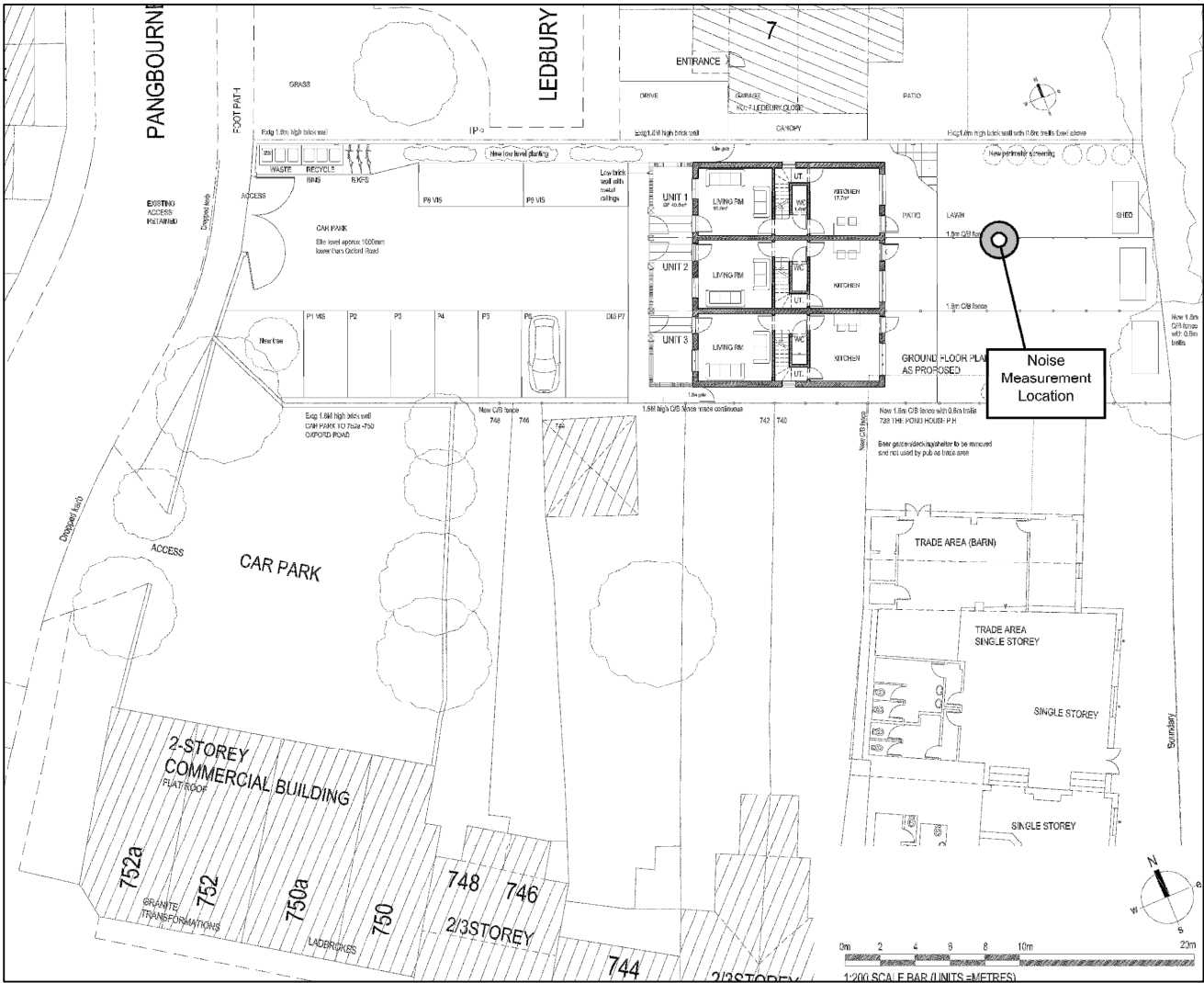
- 4.7 The initial assessment of the potential impact, in line with BS 4142, based on the daytime background noise levels in the absence of delivery/forklift activity, shows that the rating level is 0-2dB above the background noise level. This is an indication of the specific sound source having a low impact, depending on the context.
- 4.8 Further, for robustness, to provide a worst-case initial assessment, based on the Saturday evening background noise levels the rating level is up to 6dB above the background noise level. This is an indication of a potential adverse impact, depending on the context, however not a significant one in line with BS 4142.
- 4.9 Where the initial estimate of the impact needs to be modified due to the context, BS 4142 states that all pertinent factors should be taken into account in determining whether the initial estimate of the impact needs to be modified, including the absolute level of sound and the character and level of the residual sound, and the sensitivity of the receptor, including whether dwellings will incorporate design measures that secure good internal and/or outdoor acoustic conditions.
- 4.10 In this case, the context is that the delivery/forklift activity noise levels are low, both in absolute terms, and also relative to the residual sound, hence lessening the potential impact. Further it is noted that a 1.8m close-boarded fence is proposed to the rear of the garden boundaries towards the rear of Exotic Superstore.
- 4.11 To maximise the potential acoustic efficacy of this fence, it is recommended that the fence should be of overall mass not less than 10kg/m^2 and nominal thickness not less than 20mm (e.g. close boarded timber, brickwork, blockwork). The construction should be imperforate with no holes or gaps and should be sealed at the base.
- 4.12 It is anticipated that a reduction of up to 5dB in the specific noise level may be achieved in areas of the proposed gardens as a result of the fence, hence minimising the potential impact.

- 4.13 Finally, it is also relevant context in this case that there are existing dwellings (some without the benefit of solid garden fencing) in equivalent proximity to the delivery/forklift activity area to the rear of Exotic Superstore. As such, if a nuisance were to be caused by this noise source, then the onus is already on the commercial operation to control the noise for the existing properties. This situation would not be changed or worsened by the introduction of three new houses in no greater proximity and with a better standard of protection against noise, and hence the proposed development does not prejudice the commercial operation.
- 4.14 Accounting for all of the above, it is considered that noise from the delivery/forklift activity attributable to Exotic Superstore does not present any impediment to the proposed development.

5.0 SUMMARY AND CONCLUSIONS

- 5.1 Hepworth Acoustics has undertaken a noise assessment relating to a proposed development of 3 terraced houses at Land to rear of Pond House PH, 738 Oxford Road, Reading
- 5.2 Noise surveys have been undertaken to determine the prevailing noise climate at the site.
- 5.3 It has been demonstrated that, moreover, no specific mitigation measure are required in order to achieve appropriate acoustic criteria in line with relevant British Standard guidelines. However, recommendations have been provided to maximise the potential acoustic efficacy of the rear garden fences already included within development proposals.

Figure 1 – Site Layout Plan and Noise Measurement Location



Appendix I: Noise Units & Indices

Sound and the decibel

A sound wave is a small fluctuation of atmospheric pressure. The human ear responds to these variations in pressure, producing the sensation of hearing. The ear can detect a very wide range of pressure variations. In order to cope with this wide range of pressure variations, a logarithmic scale is used to convert the values into manageable numbers. Although it might seem unusual to use a logarithmic scale to measure a physical phenomenon, it has been found that human hearing also responds to sound in an approximately logarithmic fashion. The dB (decibel) is the logarithmic unit used to describe sound (or noise) levels. The usual range of sound pressure levels is from 0 dB (threshold of hearing) to 120dB (threshold of pain).

Due to the logarithmic nature of decibels, when two noises of the same level are combined together, the total noise level is (under normal circumstances) 3 dB(A) higher than each of the individual noise levels e.g. 60 dB(A) plus 60 dB(A) = 63 dB(A). In terms of perceived 'loudness', a 3 dB(A) variation in noise level is a relatively small (but nevertheless just noticeable) change. An increase in noise level of 10 dB(A) generally corresponds to a doubling of perceived loudness. Likewise, a reduction in noise level of 10 dB(A) generally corresponds to a halving of perceived loudness.

Frequency and Hertz (Hz)

As well as the loudness of a sound, the frequency content of a sound is also very important. Frequency is a measure of the rate of fluctuation of a sound wave. The unit used is cycles per second, or hertz (Hz). Sometimes large frequency values are written as kilohertz (kHz), where 1 kHz = 1000 Hz.

Young people with normal hearing can hear frequencies in the range 20 Hz to 20 kHz. However, the upper frequency limit gradually reduces as a person gets older.

Sound and the decibel

The ear is not equally sensitive to sound at all frequencies. It is less sensitive to sound at low and very high frequencies, compared with the frequencies in between. Therefore, when measuring a sound made up of different frequencies, it is often useful to 'weight' each frequency appropriately, so that the measurement correlates better with what a person would actually hear. This is usually achieved by using an electronic filter called the 'A' weighting, which is built into sound level meters. Noise levels measured using the 'A' weighting are denoted dB(A) or dBA.

Glossary of Terms

When a noise level is constant and does not fluctuate, it can be described adequately by measuring the dB(A) level. However, when the noise level varies with time, the measured dB(A) level will vary as well. In this case it is therefore not possible to represent the noise climate with a simple dB(A) value. In order to describe noise where the level is continuously varying, a number of other indices can be used. The indices used in this report are described below.

- | | |
|------------|---|
| L_{Aeq} | This is the A-weighted 'equivalent continuous noise level' which is an average of the total sound energy measured over a specified time period. In other words, L_{Aeq} is the level of a continuous noise which has the same total (A-weighted) energy as the real fluctuating noise, measured over the same time period. It is increasingly being used as the preferred parameter for all forms of environmental noise. |
| L_{Amax} | This is the maximum A-weighted noise level that was recorded during the monitoring period. |
| L_{A10} | This is the A-weighted noise level exceeded for 90% of the time period. L_{A10} is used as a measure of road traffic noise. |
| L_{A90} | This is the A-weighted noise level exceeded for 90% of the time period. L_{A90} is used as a measure of background noise. |

Appendix II: Noise Survey Results

Date(s): Saturday 6 / Tuesday 9 June 2015

Equipment: B&K 2260 Type 1 Integrating Sound Level Meter (s/n: 2467014)

Weather: Dry and calm (wind speeds typically below 5m/s)

Date	Time		Noise Level dB				Comments
	Start	End	L _{Aeq}	L _{Amax}	L _{A10}	L _{A90}	
6 June '15	21:27	21:32	49	65	50	47	Disco/ karaoke event at PH
6 June '15	21:43	21:48	49	59	50	47	
6 June '15	21:57	22:02	49	60	51	47	
6 June '15	22:11	22:16	49	60	50	47	
9 June '15	13:37	13:42	56	67	57	53	Delivery/forklift activity at Exotic Superstore
9 June '15	13:42	13:47	56	76	57	53	
9 June '15	14:02	14:07	56	73	57	53	
9 June '15	14:12	14:18	56	71	58	52	
9 June '15	14:21	14:26	56	73	58	53	
9 June '15	14:27	14:32	55	62	57	52	
9 June '15	14:33	14:38	55	62	57	53	No delivery/forklift activity at Exotic Superstore
9 June '15	14:38	14:43	54	66	55	52	
9 June '15	14:44	14:49	54	65	56	52	
9 June '15	14:51	14:56	54	64	56	51	