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Acoustic Assessment Report

Proposed Residential Care Home:

Varley Street, Collyhurst, Manchester

Prepared for: GRH Properties Ltd
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ACOUSTIC ASSESSMENT REPORT FOR A PROPOSED RESIDENTIAL CARE HOME DEVELOPMENT:

SITE OF FORMER APOLLO PUBLIC HOUSE, VARLEY STREET, COLLYHURST, MANCHESTER

Report date: 20th February 2009

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ACOUSTIC ASSESSMENT REPORT FOR A RESIDENTIAL CARE HOME DEVELOPMENT:

FORMER APOLLO PUBLIC HOUSE SITE, VARLEY STREET, COLLYHURST, MANCHESTER

Azymuth Acoustics is appointed by GRH Properties Ltd to provide an acoustic assessment of a site at Varley Street in Manchester. The proposed development involves construction of a residential care home on the site of the former Apollo public house.

This report is intended to provide information relating to the potential noise levels affecting the site as required by Manchester City Council in order to support the planning application for the residential development. In particular the report sets out the following details:

- The results of a baseline noise survey undertaken at the proposed development site.
- The appropriate assessment criteria and guidance relating to noise in the environment as associated with this kind of development.
- An assessment of the appropriate level of protection against noise that should be provided as part of the development so as to protect the occupiers of the proposed dwellings from environmental noise.

2.2 Summary of Measured Noise Levels

Full results of the noise levels recorded by Azymuth Acoustics during the course of the noise survey are included in Appendix B of this report.

The following table summarises the results of the noise measurements undertaken at the proposed site in terms of the average daytime (07:00 to 23:00 hours) and night-time (23:00 to 07:00 hours) statistical noise levels.

Measurement Location	Period	L_{max}	L_{90}	L_{eq}	L_{10}	L_{max}
1 Thorndon Road (flat gable approx 6m from kerb)	Day	65.2	54.1	60.0	56.5	49.2
2 Varley Street (approx 15m from kerb)	Day	84.8	64.2	73.3	68.2	51.2
2 Varley Street	Night	76.7	55.2	67.3	55.2	37.3

Table 1: Summary of noise survey results (free field levels, dB)A

2.3 Description of the Noise Climate

The dominant source of noise during all times of day and night is road traffic using Varley Street and Oldham Road (the A62). Traffic on Varley Street is generally fairly moderate in flow, predominantly cars and light commercial vehicles with very occasional HGV movements. The more distant Oldham Road, some 80m away, experiences significantly higher volume of traffic and contributes to the overall background noise levels in the area.

Trains using the Manchester to Rochdale and Ashton-u-Lyne railway line are occasionally audible, but are not significant contributors to the ambient noise levels in the area.

In order to assess the extent of any measures which might be necessary in order to comply with planning conditions relating to external noise, Azymuth Acoustics has reviewed various guidance documents and standards, these include:

- PPG24 - Planning and Noise
- World Health Organisation Guidance
- British Standard 8233
- British Standard 4142

3.1 Planning Policy Guidance Note PPG24

PPG24 sets out government guidance on the use of planning powers by local authorities in order to minimise the adverse effects of noise in the built environment.

In particular, PPG establishes Noise Exposure Categories that are applicable in the case of new residential developments affected by transport noise or by mixed noise sources in which industrial noise does not dominate.

The survey results indicate that measurement locations (more 5m) away from Varley Street are exposed to fall within Noise Exposure Category B during both daytime and night time periods.

The measurement location close to Varley Street indicates that this elevation falls within Noise Exposure Category C during both daytime and NEC B during the night time period.

3.2 World Health Organisation

In 1999 the World Health Organisation proposed environmental health criteria for community noise including consideration of noise levels at which sleep disturbance may take place. These guidelines were amended by the World Health Organisation in 2004. The guidance suggests that an internal L_{eq} below 30 dB is required to fully preserve the restorative process of sleep.

3.3 British Standard 8233

BS 8233 provides a code of practice for the sound insulation of a variety of building types affected by general environmental noise.

It provides recommendations for control of noise in and around buildings and suggests appropriate criteria / limits for a variety of different situations including residential properties.

The following table summarises the noise limits suggested by BS 8233 applying to residential properties.

Criterion	Room	Design Range L_{Aeq}, dB	
		Good	Reasonable
Reasonable resting / sleeping conditions	Living rooms	30	40
	Bedrooms*	30	35

* For a reasonable standard in bedrooms at night, individual noise events should not normally exceed 45 dB L_{Amax}

Table 2: Noise limits for residential properties suggested in BS 8233

It should be noted that the night-time 45 dB L_{Amax} value for bedrooms is considered to be over onerous in most instances and there is no simple solution of how frequent an L_{Amax} event would need to be in order to be considered disturbing. Some local authority environmental health departments recommend a value of 45 dB L_{Amax} as a reasonable alternative, this has been adopted for the purposes of this assessment.

3.4 British Standard 4142

The test that is generally applied to assess the potential for noise from fixed installations to give rise to community response is contained in British Standard BS 4142: 1997. This standard predicts the likelihood of complaint due to noise from a new or modified source. BS 4142 recommends that the following factors are considered when determining the noise impact of a new or modified source:

- Daytime noise levels not to exceed L_{Aeq} 35 dB.
- Night-time noise levels not to exceed L_{Aeq} 30 dB (in addition, internal noise levels should not generally exceed L_{Amax} 45 dB more than occasionally.)

It is important to note that in both cases the noise levels detailed above should be deemed to apply with windows closed but with other forms of ventilation open (e.g. trickle vents or other passive systems).

3.5 Summary of Noise Assessment Criteria

3.5.1 Protection of Residential Care Accommodation from Traffic Noise

Based on the guidance outlined above, Azymuth Acoustics has carried out a noise assessment with the primary aim of providing satisfactory conditions inside the residences themselves. The criteria adopted are:

- Daytime noise levels not to exceed L_{Aeq} 35 dB.
- Night-time noise levels not to exceed L_{Aeq} 30 dB (in addition, internal noise levels should not generally exceed L_{Amax} 45 dB more than occasionally.)

BS 8233 assessment methodology involves comparing the existing Background Level with the Ambient Level that would result from the development. The predicted level is adjusted to allow for any tonal or impulsive characteristics to arrive at the Rating Level. The difference between the two levels can be used to indicate the likelihood of complaints arising, e.g. a predicted level 10 dB greater than the background level indicates that complaints are likely; an increase of around 5 dB is of marginal significance; and a predicted level 10 dB below the background level is a positive indication that complaints are unlikely.

3.5 Summary of Noise Assessment Criteria

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It is important to note that in both cases the noise levels detailed above should be deemed to apply with windows closed but with other forms of ventilation open (e.g. trickle vents or other passive systems).

3.5.2 Environmental Noise Limits for Kitchen Extract and other Fixed Plant

Based on guidance set out in BS 4142 and measured background L_{A90} levels it is recommended that the following criteria represent suitable targets for noise levels from plant installed or having atmospheric connections anywhere on the outside of the proposed new premises.

Location	Daytime Noise Limit	Night-time Noise Limit
Total external noise from kitchen extract system and any externally mounted condenser units etc.	45dB L_{Aeq} @ 1m 58dB L_{Aeq} @ 1m	35dB L_{Aeq} @ 1m 48dB L_{Aeq} @ 1m

Table 3: Noise limits for external mounted plant (dB)A

Where the kitchen extract system or other elements of the heating and ventilation systems are are capable of running at any time of day or night then the lower (night-time) noise limit should be deemed to apply.

Daytime free-field noise levels at locations near Varley Street are generally around 60dB L_{Aeq}, night-time free-field noise levels on this side of the site typically fall within the range 48-54dB L_{Aeq}. As such, this would place this side of the site at the lower end of Noise Exposure Category C during the daytime and in NEC B during the night-time period. Measurements at Category C during the daytime and in NEC B during the night-time period. Measurements from noise levels suggest that some care will be required in order to protect the residences from environmental noise.

On the basis of the measured noise levels it is estimated that an overall noise reduction of approximately 35 dB from outside to inside will be required in order to achieve satisfactory conditions for residential accommodation will be required in order to achieve satisfactory conditions for elevations facing away from Varley Street and which are +10m from this side of the site an overall noise reduction of approximately 25 dB from outside to inside the residential accommodation will be required.

This section sets out the recommended minimum noise mitigation measures which need to be employed in order to satisfy the requirements of the noise assessment criteria and ensure satisfactory noise conditions inside the residential properties.

5.1 Glazing Specifications

Good quality sealed thermal double glazing units should be installed to windows in all residences on the site. The appropriate specification for the glazing to the bedrooms or other residential accommodation is summarised in Table 4 below:

Location	External Free-Field Noise Levels	Glazing Specifications	Appropriate Glazing Types
A (locations away from Varley Street)	Day 54-58L_{Aeq} Night (estimated) 45dB L_{Aeq}	Airborne sound insulation of R_w 26dB or greater and $R_w + C_{tr}$ 21dB or greater	Any good thermal double glazing types, e.g. Pilkington 4/12/4mm sealed unit
B (Locations within +10m of Varley Street elevation)	Day 54-58L_{Aeq} Night 55-58L_{Aeq}	Airborne sound insulation of R_w 35dB or greater and $R_w + C_{tr}$ 27dB or greater	Acoustic double glazing types, e.g. Pilkington 4/12/6.4mm laminated sealed unit

Table 4: Recommended glazing specifications for the Varley Street site

The specification outlined above will result in satisfactory noise levels inside the residential properties as set out in Section 3.0 of this report.

The double glazing units detailed in Table 4 should be fitted into a frame which provides a good acoustic (as well as thermal) seal.

5.2 Other Elements of the Building Envelope

Other elements of the building envelope should have the following minimum sound insulation performance:

- External walls: minimum sound insulation R_w 50dB. This minimum is likely to be significantly exceeded by normal brickwork/ blockwork.
- Roof: minimum sound insulation R_w 45dB. This should normally be exceeded by tiled or slate pitched roof constructions with adequate thermal insulation. Numerous flat roof constructions would also be able to satisfy this minimum requirement.

5.3 Acoustically Rated Ventilation

For all elevations, ventilation should be provided by acoustic trickle ventilation having a sound insulation performance of $D_{nE,w}$ = 36 dB (Equivalent to Vent-Axia Acoustic Trickle Vent Ultra Silver 'S' or 'L' slot vents Environmental Data Sheet 011021) Similar products are available from other manufacturers including Titon (Ref. 07771 837962).

5.4 Noise Limits for Kitchen Extract system and any other External Plant

The noise limits for the kitchen extract system are set out in section 3.5. These noise limits can be summarised as follow:

- Daytime noise levels not to exceed 35 dBA @ 1m from the building
- Night-time noise levels not to exceed 25 dBA @ 1m from the building

Azymuth Acoustics has undertaken an environmental noise assessment of a proposed residential development at Varley Street in Collyhurst, Manchester.

Measured noise levels on the site are around 60-66dB L_{Aeq} during the daytime and typically 48-54dB L_{Aeq} during the night time.

The measured noise levels place the Varley Street side of the site in Noise Exposure Category 'C' during the daytime and within NEC 'B' for the night time period, as defined in PPG24. For this reason the residential development should be protected by noise mitigation measures including:

- R_w 30-35dB glazing to all facades (units / specifications)
- Adequate sound insulation of the building fabric and roofing elements of the building.
- Acoustic trickle vents to all habitable rooms in the development.

The noise levels from the kitchen extract system (and any other externally mounted plant) should be kept to within the following noise limits:

- Daytime noise levels not to exceed 35 dBA @ 1m from the building
- Night-time noise levels not to exceed 25 dBA @ 1m from the building

Appendix A

Glossary of Acoustic Terms

Decibel (dB)
This is the unit used to measure sound. The human ear has an approximately logarithmic response to acoustic pressure over a very large dynamic range (typically 20 micro Pascal to 100 Pascals).

dB(A)
This is a measure of the overall noise level of sound across the audible spectrum with a frequency weighting (i.e. A-weighting) to compensate for the sensitivity of the human ear to sound at different frequencies. The A-weighting curve is implemented in sound level meters using an electronic filter that approximately corresponds to the frequency response of the ear.

Octave Band Noise Level
The human hearing system can hear sound over a range of frequencies between approximately 20 Hz to 20 kHz. The ear is also generally more sensitive to medium and high frequencies than to low frequencies. In order to define the frequency content of a noise, the spectrum can be divided into frequency bands. The most commonly used frequency bands are octave bands, in which the mid-frequency of each band is twice that of the band below it.

L_{eq}
This is the equivalent steady sound level in dB(A) containing the same acoustic energy as the actual fluctuating sound level over a given time period.

Reverberation Time (RT or equivalently, T_{60})
This is the time taken for the reverberant sound energy in an enclosure to decay by 60 dB after the source has stopped. In a room, after the source has been switched off, is known as the reverberation time. The reverberation time is frequency dependent and it is customary to measure its value in octave or one-third octave bands. Reverberation occurs when sound waves are repeatedly reflected from each surface of the room.

Sound Reduction Index (SRI)
Difference measured between the amount of energy flowing towards the wall in the source room and the amount of energy flowing through the wall into the receiving room. The ratio of the sound and the total amount of energy entering the receiving room (usual range 100 - 3150 Hz for one third octave band values). The SRI varies with frequency and is measured in a laboratory (either octave or one-third octave bands.

SRI = L1 - L2 + 10 log (S/A)
Where: L1 = Noise level in the source room
L2 = Noise level in the receiving room
S = Surface area of test specimen
A = Equivalent acoustic absorption area in the receiving room

Weighted Sound Reduction Index (R_w)
This is a weighted single figure description of the sound insulation performance of a partition measured in a laboratory. The reference curve is used to quantify the R_w to compare the sound reduction index (SRI) in each of the one-third octave bands from 100Hz to 3150 against a set of standard reference curves.

Appendix B

Full Results of Noise Survey

Octave Band Data Summary Sheet

Date	Location	Time	63	125	250	500	1K	2K	4K	8K	16K	dB(A)	Leq	L90	L10	Lmax
19/02/09	1 Thorndon Rd (flat gable approx 6m from kerb)	15:00	63.4	60.4	57.4	54.4	51.4	48.4	45.4	42.4	39.4	60.0	60.0	54.1	56.5	65.2
	2 Varley Street (approx 15m from kerb)	15:15	71.4	68.4	65.4	62.4	59.4	56.4	53.4	50.4	47.4	73.3	73.3	64.2	68.2	84.8
	2 Varley Street	23:00	69.4	66.4	63.4	60.4	57.4	54.4	51.4	48.4	45.4	67.3	67.3	55.2	55.2	76.7