NOISE ASSESSMENT REPORT:

FITNESS SUITE AT THE BOULEVARD, DIDBURY POINT, MANCHESTER

Report date: 26th November 2013

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NOISE ASSESSMENT OF A PROPOSED FITNESS SUITE AT THE BOULEVARD, DIDBURY POINT, MANCHESTER

1.0 Introduction

Azymuth Acoustics is appointed by Elm Road LLP to provide an acoustic assessment of the potential environmental noise associated with a new fitness suite at Didsbury Point close to the A5103 Princess Parkway in Manchester.

This report is intended to provide information required in order to comply with environmental noise criteria relating to the potential noise impact of outdoor plant and noise break-out from the fitness suite at nearby receptors. In particular the report sets out the following details:

- The results of a baseline noise survey undertaken at the Didsbury Point site.
- The appropriate assessment criteria and guidance relating to noise in the environment as associated with this kind of development.
- Suitable limits for noise levels from externally mounted plant which could potentially affect the wider environment.
- An assessment of the proposed plant items with calculated noise impact.
- Noise mitigation measures recommended with the aim of compliance with noise limits.

It is understood that the external plant items associated with the Fitness Suite will be located at roof level on top of the apartment building.

The client has indicated that noise levels at peak times inside the Fitness Suite will be no greater than approximately 70 dBA. When gym staff first arrive each morning, gym music levels are to be set and locked to ensure these do not exceed 70dBA.

The fitness suite and the associated plant is likely to operate predominantly during the following times: 06.00 – 22.00 hrs Monday to Friday, 08.00 – 17.00 hrs weekends.

2.0 Baseline Noise Survey

A noise survey was undertaken at the 2 locations close to the new apartment building that will accommodate the proposed fitness suite. The measurement locations were chosen to be representative of the nearest noise sensitive receivers.

2.1 Measurement Procedures

The instrumentation used for the noise survey was a SvanTek 959 Type 1 sound level meter, calibrated before and after the measurements.

The sound level meter measured A-weighted (fast response) noise levels as well as octave band noise levels for all measurements recorded.

2.2 Summary of Measured Noise Levels

Noise measurements were undertaken by Dominic McCann on 22nd and 24th November 2013; Figure 1 below details measurement locations.



Figure 1: Summary of noise measurement locations (marked in red site marked in green on aerial photo)

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.

Position	Period	L_{Amax}	L_{Aeq}	L_{A1}	L_{A10}	L_{A90}
1 - south side of the Boulevard	Weekday 11:15-11:30hrs	80.6	62.2	75.3	64.2	51.0
2 - north side of Boulevard (next to site)	Sunday 08:35-09:12hrs	75.3	55.4	66.4	56.6	47.0

Table 1: Summary of noise survey results (free field, dBA)

2.3 Description of the Noise Climate

The noise climate in the area is dominated by road traffic using the Boulevard within the Didsbury Point development as well as the fairly continuous traffic noise from the A5103 Princess Parkway, along with some occasional aircraft noise.

3.0 Noise Assessment Criteria

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

- BS 4142:1997
- WHO Guidance on Community Noise

3.2 BS 4142:1997

The test that is generally applied to assess the potential for noise from fixed installations (e.g. externally mounted plant) 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 describes a method for determining industrial and background noise levels outside residential buildings and for assessing whether the industrial noise is likely to give rise to complaints from the occupants.

BS 4142 assessment methodology involves comparing the existing background level with the predicted noise from the new development. This predicted level is adjusted to allow for any tonal or impulsive characteristics and is called the Rating Level. The difference between the two levels can be used to indicate the likelihood of complaints arising, e.g. a predicted level of 10dB greater than the background level indicates that complaints are likely; an increase of around 5dB is of marginal significance and a predicted level of 10dB less than the background level is a positive indication that complaints are unlikely.

3.3 W.H.O Guidelines on Community Noise

In 1980 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 in 1999. The guidance suggests that a night time internal L_{Aeq} below 30dB is required to preserve the restorative process of sleep. This is equivalent to a free-field level of around 42 to 45dB L_{Aeq} or a façade level of 45 to 48dB L_{Aeq} assuming open windows.

4.0 Noise Assessment

4.1 Noise from Fixed Plant and Atmosphere Connections

The following table sets out noise limits for external plant and noise break-out from the fitness suite. The noise limits have been developed to protect the nearest residential receptors and are based on noise survey results and criteria in Section 3 above.

Location	External noise limit (all periods)
Noise limit at nearest residential properties (this includes the apartments in the building directly above the proposed fitness suite)	40dB $L_{Aeq,\,\overline{Tr}}$
Noise limit for atmosphere connections in the walls of the building (e.g. any extract fans at ground floor level) and noise break-out via the glazing	45dB $L_{Aeq,\,\overline{Tr}}$ @ 1m from the building
Noise limit for roof mounted plant located behind a parapet and not directly overlook by other receptor within 25m of the building	50 dBA @ 1m from any single item of plant. Total not to exceed 55 dBA all plant operating simultaneously

Table 2: Noise limits for externally mounted plant (dBA)

4.2 Noise Break-out from Fitness Suite itself

The client has indicated that noise levels at peak times inside the Fitness Suite will be no greater than approximately 70 dBA. In addition when staff first arrive at the gym each morning, the gym music sound levels to be set and locked to ensure these do not exceed 70dBA.

Assuming the limits described above are implemented, noise break-out through sealed double glazing (all fitness suite windows closed) will be in the range 33-38 dBA @ 1m from the building. This is likely to be 10 dB or more below the background noise level at this location and is likely to be further attenuated by the distance to the nearest noise sensitive receptors.

5.0 Conclusions & Recommendations

Azymuth Acoustics has undertaken an assessment of noise from the proposed Fitness Suite at Didsbury Point in Manchester.

Noise limits have been stipulated in the report based on the results of background noise measurements carried out by Azymuth Acoustics and based on the guidance contained in BS4142 with the aim of keeping noise levels to -10dB relative to the background noise level at the nearest receptor.

Based on an internal noise level limit of approx. 70dBA, noise break-out from the premises resulting from background music or use of the equipment in the Fitness Suite (windows closed or non-openable) is likely to be well within the appropriate noise limits.

The following additional precautions would be recommended with the aim of minimising potential noise impact:

- Windows to be non-openable and comfort cooling to be provided by air conditioning.
- All exposed soil pipes which drain the flats above the gym to be boxed in with two layers 15mm Soundbloc plasterboard and mineral placed in the cavity.
- Suspended ceilings in the Fitness Suite to be specified with an appropriate acoustic rating.
- Loudspeakers for any background music system to be wall mounted rather than recessed ceiling mounted types. The noise limit of 70 dBA for this system should be set at the initial commissioning and set so as to be tamper proof.

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 Pascal.)

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 of 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 ear is sensitive to 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_{Aeq}
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.

L_{A90}
This is the dB(A) level exceeded for 90% of the time. This is indicative of the general background noise level in the absence of higher level short duration noise events that occur during the measurement period.

L_{A10}
This is the dB(A) level exceeded for 10% of the time.

Reverberation Time (RT or sometimes T_{30} or T_{60})
This is the time taken for the reverberant sound energy in an enclosure to decay one millionth of its equilibrium value, i.e. by 60 dB, after the source has been switched off, is known as the reverberation time. Reverberation occurs when sound waves are repeatedly reflected many times from each surface of the room. The sound quality is partially reduced at each reflection, the amount of reduction depending on the acoustic absorption of the surface.

Sound Reduction Index (SRI)
Difference measured between the amount of energy flowing towards the wall in the source room and the total amount of energy flowing towards the wall in the source room 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 in either octave or one-third octave bands.

$$SRI = L1 - L2 + 10 \log (S/A)$$

Where: L1 = Noise level in the source room
L2 = Noise levels 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 descriptor of the sound insulation performance of a partition measured under laboratory conditions. The procedure used to quantify the R_w is to compare the sound reduction index (SRI) in each of the one-third octave bands from 100Hz to 3150Hz against a set of standard reference curves.

Appendix B

Full Results of Noise Survey

Start Time	Pos	Duration	L_{Amax}	L_{Aeq}	L_{A1}	L_{A10}	L_{A90}	Octave Band Centre Frequency (Hz)									
								31.5	63	125	250	500	1000	2000	4000	8000	16000
22/11/13																	
11:16	1	00:05	78.8	62	75.8	63.1	50.6	69.6	67.3	56.7	54.8	54.9	56.6	56.9	53.1	47.6	33.2
11:21	1	00:05	80.6	63.7	74.9	67.4	52.1	70.6	69.7	59.3	56.9	57	58.6	57.7	55.4	52.2	38.7
11:26	1	00:05	77.5	61	75.2	62.1	50.4	70.9	67	56.2	53	52.6	55.1	56.1	53.2	48.1	33.4
24/11/13																	
08:35	2	00:05	74.9	58.2	69.4	61.3	49	60.6	61.3	56.2	56.2	56.2	54.9	49.7	38.8	27.3	17.6
08:40	2	00:05	72.6	54.1	66.5	55.1	47.1	58.6	59.6	52.1	49.5	48.3	52	46.2	35.2	31.2	23.5
08:45	2	00:05	73.8	56.6	69.3	56	47.6	58.2	62.5	57.1	51	50.2	54.1	50	38	28.6	18.9
08:50	2	00:05	59.2	50.9	56	53.9	45	56.7	59.2	49.8	46.4	46.1	49	41.8	28.5	18.6	14.8
08:57	2	00:05	72.2	54.6	66.9	55.4	45.9	58.9	60.4	52.3	49.4	48.8	52.1	47.3	38.3	29.7	18.3
09:02	2	00:04:22	75.3	57.7	70.4	58	47.2	59.7	60.7	53.6	51.6	51.2	55.2	51.1	40.3	32.9	17.8