

Lift Noise Impact Assessment

Victoria Mills

Manchester

M40 7DA

Stroma Built Environment Ltd.

SBE Ref: 08-20-84338 – AC - 2v1

I. Revision History

Revision	Date	Description	
2v1	25/06/2024	Initial Issue	
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1. Introduction

- 1.1 Stroma Built Environment (SBE) have been appointed by Truman Design and Build to provide a noise impact assessment for the new lift at Victoria Mill, 10 Lower Vickers Street, Manchester M40 7DA.
- 1.2 The first to fifth floors of Victoria Mill have been converted into residential units. As part of this conversion, a lift was installed into an existing lift shaft. During the planning phase for the development, Manchester City Council imposed Planning Condition 13 relating to noise on the site. Manchester City Council has confirmed that noise from the lift counts as 'external' noise.
- 1.3 The purpose of this report is to provide the results of measurements taken at Victoria Mill of the lift noise and provide an assessment. It is the aim that this report will discharge the relevant part of Planning Condition 13.
- 1.4 This document has been prepared for the sole use, benefit and information of the client for the purposes set out. The liability of SBE in respect of any information contained herein shall not extend to any third party.
- 1.5 Whilst every effort has been made to ensure that this report is easy to understand, it is technical in nature. A glossary of acoustic terms is included as Appendix I.

2. Noise Assessment Guidance and Criteria

Manchester City Council – Planning Condition 13

- 2.1 After reviewing Manchester City Council's (MCC) planning portal, it was found that there are no planning conditions that specifically refer to lift noise as part of the main planning application for this site. The only planning condition that could refer to lift noise is Planning Condition 13. It states:

“13) Before the development commences a scheme for acoustically insulating the residential accommodation against external noise shall be submitted to and approved in writing by the City Council as local planning authority. The approved noise insulation scheme shall be completed before any of the dwelling units are occupied.

Reason - To secure a reduction in noise from the surrounding area in order to protect future residents from noise nuisance, pursuant to policies SP1, H1 and DM1 of the Core Strategy.”

- 2.2 It is understood that 'external noise' in the condition refers to any noise from sources not within a residential unit. This would therefore include noise from lifts to the adjacent closest residential units.
- 2.3 The core policy DM1 references noise specifically by saying that any noise that could affect the amenity of the residents should be assessed in more detail. This, I understand, is the basis for assessing the noise from the lift.

3. Lift Noise Measurements and Assessment

Lift Noise Measurements

- 3.1 SBE attended site on 20th June 2024 to take measurements of the lift noise at Victoria Mill. Measurements were then taken in the worst affected residential room, Flat 201 Bedroom. The room is shown in Figure 1.

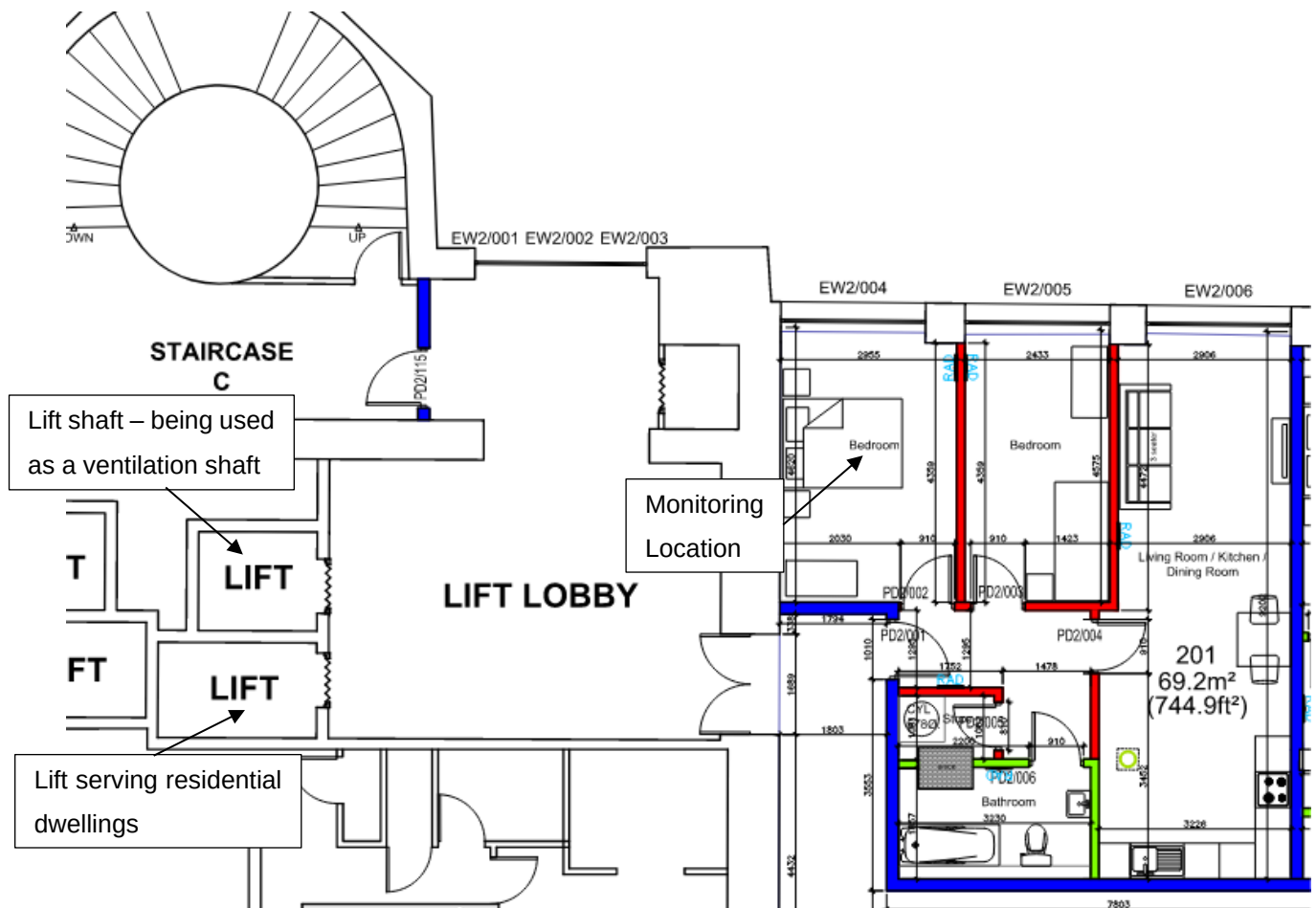


Figure 1: Measurement Location

- 3.2 Measurements were taken in four different scenarios. It is understood that both the noise from the lift movements and the noise from the voice announcing the floors would need to be assessed. The scenarios were as follows, for reference Flat 201 is on the second floor:

- Lift moving from Level 1 to Level 3 stopping at every floor with doors opening
- Lift moving from Level 3 to Level 1 stopping at every floor with doors opening
- Lift moving from Level 1 to Level 3
- Lift moving from Level 3 to Level 1

- 3.3 An additional ambient noise measurement without any lift movements was also taken so an assessment of the noise impact could be undertaken.
- 3.4 Noise levels were measured using a B&K 2250 Class 1 sound level meter. The sound level meter was field calibrated before and after the survey periods with no significant drift detected. Broadband noise was measured A-weighted and third octave band measurements were taken un-weighted.
- 3.5 The measured lift noise levels are shown in in Table 1, below.

Table 1: Summary of measured noise levels

Position	Scenario	Ambient Noise Level (dB $L_{Aeq,T}$)
Flat 201 Bedroom	Level 1 to Level 3 Stopping at every floor	35
	Level 3 to Level 1 Stopping at every floor	36
	Level 1 to Level 3 No Stopping	36
	Level 3 to Level 1 No Stopping	36
	Ambient Noise Measurement – No Lift Movements	36

Lift Noise Assessment

- 3.6 As shown by Table 1, the noise levels measured were very consistent between the different scenarios. The noise in the room was dominated by road traffic noise; differing levels of road traffic noise during the measurement periods cause the slight difference between the measurements. Any maximum noise events that were due to construction noise were excluded from the measurements.
- 3.7 The lift noise was not audible during any scenario.
- 3.8 The consistency in the measurements and the fact that the lift noise was not audible in the bedroom shows that the lift noise is not contributing to the noise environment in the bedroom. On this basis, it is assessed that the noise from the lift is not impacting the amenity of the nearby residential dwellings.
- 3.9 This aspect of Planning Condition 13 can therefore be discharged.

4. Conclusions

- 4.1 Manchester City Council have imposed Planning Condition 13 on the development of Victoria Mills, 10 Lower Vickers Street, Manchester M40 7DA. This planning condition relates to noise insulation from external sources.
- 4.2 It is understood that noise from the lift counts as an external noise source, therefore, SBE have attended site to measure the noise from the lift. Measurements were taken of the lift moving in four different scenarios in the worst affected room.
- 4.3 The measurements were incredibly consistent, with only minor variations noted due to differences in road traffic noise. The noise from the lift was not audible at the measurement position.
- 4.4 On this basis, it has been assessed that the noise from the lift will not impact the amenity of the residential dwellings. This aspect of Planning Condition13 can therefore be discharged.

Appendix I. Acoustic Glossary

Sound pressure level and the decibel, dB

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. The 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 120 dB (threshold of pain).

Frequency and hertz, Hz

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. The human range of hearing is commonly accepted to be 20 Hz to 20,000 Hz. Additionally, an octave can be used to describe the interval between a frequency in Hz and either half or double that frequency.

Frequency weighting

Different weighting networks can be applied to a given sound level in each stated octave band by a specified amount, in order to better represent the response of the human ear. The most commonly used weighting network is the 'A' weighting, and the letter 'A' will be included within a descriptor to indicate that the value has been 'A' weighted, e.g. $L_{Aeq,T}$ or L_{A90} . An 'A' weighted noise level may also be written as dB(A). Other weightings less commonly used are 'C' and 'D' weighting.

Noise indices

When a noise level varies with time, the measured 'A' weighted dB level will vary as well. In this case it is therefore not possible to represent the noise climate with a simple 'A' weighted dB value. In order to describe noise where the level is continuously varying, a number of other indices, including statistical parameters, are used. The various indices used are described as below:

$L_{Aeq,T}$	The 'A' weighted 'equivalent continuous noise level' which is an average of the total sound energy measured over a specified time period, T
L_{Amax}	The maximum 'A' weighted noise level that was recorded during the monitoring period.
L_{A10}	The 'A' weighted noise level that was recorded for at least 10% of the monitoring period.
L_{A90}	The 'A' weighted noise level that was recorded for at least 90% of the monitoring period, usually taken as the underlying 'background' noise level.

Sound level difference, D

The sound level difference between two internal spaces, or between internal and external spaces. The 'D' value is used to denote the differences at each third octave or octave band, with a single figure 'weighted' value to

describe an overall performance. Note that the 'D' value will always describe an in-situ or on-site acoustic performance. All values are described using the decibel.

D_w	Single figure weighted sound level difference, simply the measured source noise level minus receiver noise level, not adjusted to reference conditions
$D_{nT,w}$	Weighted normalised sound level difference – a single, weighted sound insulation value, normalised to a reference reverberation time using the measured reverberation time in the receive room
$D_{nT,w} + C_{tr}$	As above, with a spectral adaptation term applied to account for the effects of low frequency noise, and based on urban traffic noise
$D_{nf,w}$	Overall flanking normalised level difference - A parameter that defines the flanking transmission of sound from room to room where a dividing partition or floor construction abuts a flanking building element common to both rooms, such as the building façade or ceiling
$D_{n,e,w}$	Element normalised level difference. A level difference level derived transmission through the small technical element only, irrespective of area. This value is used to represent the sound insulation of façade ventilators.
$D_{n,e,w} + C_{tr}$	As above, with a spectral adaptation term applied to account for the effects of low frequency noise, and based on urban traffic noise

Sound reduction index, R

This describes the sound transmitted through a material or building element, such as a wall, door or window. It is measured in a laboratory with suppressed flanking transmission. The 'R' value is used to denote the differences at each third octave or octave band, with a single figure 'weighted' value to describe an overall performance. All values are described using the decibel.

R_w	Weighted single figure sound reduction index
$R_w + C_{tr}$	As above, with a spectral adaptation term applied to account for the effects of low frequency noise, and based on urban traffic noise
R'_w	The 'apparent sound reduction index', a field measurement to obtain the sound reduction index of a material or element, with all effects of site installation accepted.

Standardised impact sound pressure level, $L'_{nT,w}$

$L'_{nT,w}$ is the single figure used to characterise the impact sound pressure level in a receiving room, normalised to a reference reverberation time. Impact noise can be classified as (but is not limited to) the result of footfall impact on a separating floor to a habitable space below. All values are described using the decibel.

Reverberation time, T and T_{mf}

The reverberation time of a space is a measure of the rate at which sound decays, measured in seconds. It is defined as the time taken for the sound pressure level to reduce by 60 dB from its original impulse level.

Reverberation time is commonly quoted in terms of the mid-frequency reverberation time, T_{mf} , the arithmetic average of the reverberation times in the 500 Hz, 1 kHz and 2 kHz octave bands.

Absorption Coefficient

The acoustic absorption provided by a surface is defined as the sound absorption coefficient α , which denotes the fraction of sound energy absorbed between 0 (no absorption) and 1 (no reflection). The absorption coefficient of a material varies with the frequency of incident sound waves, therefore is considered for different frequencies.

Absorption Class

Based on the absorption coefficients, the overall sound absorption of a material is classified from Class A to Class E as defined in BS EN ISO 11654:1997, with Class A providing the highest level of acoustic absorption.

Noise rating, NR

The noise rating or NR system is commonly used in the design of noise emitted by internal building services systems. The system is frequency dependent, and was empirically derived to prevent disturbance to occupants in habitable or working areas from building services noise that exhibits 'tonal' elements, e.g. rumbles, whines, whistles etc. There is no direct relationship between the average 'A' weighted noise level in dB and the NR. However, as a guide, and assuming the absence of strong low frequency content in a given noise, the NR could generally be said to be 6 dB less than the average 'A' weighted dB value.

Privacy

Privacy is the addition of the level of sound insulation between two rooms and the background noise within a receiving room. It can be used to assess the level of privacy afforded in the 'receiving room' for speech from the 'source room'. The 'privacy factor' is a unit-less value that is the combination of the average 'A' weighted background noise level in dB and the weighted sound level difference (D_w) in dB.

Appendix II. SBE Acoustic Credentials

SBE have specialised in providing the UK Construction Industry with a range of acoustics services since 2006. Specialising in Building Acoustics, all SBE acousticians are members of the Institute of Acoustics.

SBE is accredited for on-site acoustic testing by United Kingdom Accreditation Service (UKAS) (Testing Laboratory Number 2731).

SBE meet the relevant acoustic requirements typically required in the UK, including for sound insulation testing as defined in Approved Document E for the purposes of testing for Part E to the Building Regulations 2010.

Appendix III. Report Conditions

This document has been prepared for the sole use, benefit and information of the Client. The liability of Stroma Built Environment Ltd. in respect of the information contained herein will not extend to any third party unless prior agreement is obtained in writing from Stroma Built Environment Ltd.

This report is limited to addressing the specific acoustic issues contained herein. Advice has been provided for acoustic reasons only and it is recommended that appropriate expert advice be sought on all the ramifications, e.g. safety, fire, structural, CDM etc., associated with any proposals contained herein.

The in-situ performance of acoustic measures is influenced to a large extent by the quality of workmanship and compliance with the specifications on-site during construction, as such, Stroma Built Environment Ltd. accepts no liability for issues with acoustic performance arising from such factors.

Acoustic survey and testing work carried out for the project is representative of the prevailing conditions at the time of the work. Conditions can vary and no warranty is given as to the possibility of changes in the environment of the site and surrounding area at differing times.

In particular, it should be noted that where calculations are carried out that are based on assumptions regarding certain aspects where information has not been supplied, these are provided for indicative purposes only and should be treated as such.