GRENFELL TOWER REGENERATION PROJECT

NOISE ASSESSMENT (REV B)

PLANNING APPLICATION
OCTOBER 2012
## CONTENTS

1.0 Introduction 2
2.0 Noise Assessment Criteria 2
  2.1 Core Strategy (2010) 2
  2.2 Plant Noise Emissions 2
  2.3 Internal Noise Levels 2
3.0 Noise Survey 3
4.0 Plant Noise Assessment 4
  4.1 Proposed Plant Equipment 4
  4.2 Tonal and Impulsive Noise 5
  4.3 Plant Noise Calculation 6
5.0 Façade Refurbishment 6
  5.1 Façade Noise Exposure 6
  5.2 Façade Sound Insulation Improvements 7
6.0 Assessment of Noise From Boxing Gym 7
7.0 Summary 7
8.0 Appendix A 9
  Glossary of acoustic terminology 9
1.0 INTRODUCTION

Max Fordham LLP has been appointed to undertake a noise assessment to support a Planning Application for a refurbishment of Grenfell Tower in the Royal Borough of Kensington and Chelsea (RBKC). The proposed scheme will make improvements to the external façade including replacing the windows and installing acoustic trickle vents. A number of items of mechanical plant will be installed on the roof to provide heating to the building.

This report sets out an assessment of internal noise levels after the façade refurbishments are made, and the impact of noise emissions from the plant to nearby residential properties. Also included is an assessment of the noise impact of relocating a boxing club from the ground floor to walkway level.

A summary of technical terminology used in this report is provided in Appendix A.

2.0 NOISE ASSESSMENT CRITERIA

2.1 Core Strategy (2010)

The Royal Borough of Kensington and Chelsea Core Strategy sets out the Council’s policies in relation to planning and noise. Policy CE6 states that the Council will:

“require that noise and vibration sensitive development is located in the most appropriate location and protected against existing sources of noise and vibration, through careful design, layout and use of materials, to ensure adequate insulation from sound and vibration”, and

“resist all applications for noise and vibration generating development and plant that would have an unacceptable noise and vibration impact on surrounding amenity”.

2.2 Plant Noise Emissions

The Supplementary Planning Document (SPD) released in 2009 provides further details of the Council’s policies in relation to planning and noise. It is stated that all noise generating development such as building services plant and equipment will be subject to the imposition of a planning condition to protect residential amenity. The typical condition given in the SDP is that plant and equipment shall not increase the LA90 background noise level at 1m from the nearest residential window at any time when the plant is operation. This is normally interpreted as meaning that the plant noise level must be at least 10 dB lower than the lowest LA90 background noise level, or 15 dB lower if the noise is tonal or impulsive.

2.3 Internal Noise Levels

The SPD does not provide any specific guidance in relation to internal noise targets within refurbished residential buildings. However, RBKC have indicated that they would require an assessment to be made of the expected reduction in internal noise levels as a result of the refurbishment.
3.0 NOISE SURVEY

A 48-hour noise survey was undertaken from the 23rd – 25th July 2012 to establish existing background noise levels.

A measurement position was chosen to be representative of the lowest background noise level experienced by residents. This position would consequently be the most affected by any increase in noise level due to the installation of new plant.

The results from this measurement can be used to calculate the noise levels on other facades.

Survey procedure
A sound level meter was set up to make consecutive 5-minute noise measurements over the 48-hour period.

The microphone of the sound level meter was mounted on a tripod and extended 1m outside a window on the 9th floor of Grenfell Tower’s eastern façade (see Figure 1). This position is considered to be free field and representative of noise levels experienced by residences in Grenfell Tower and nearby locations. A weather protection kit was used. The sound level meter was calibrated at the beginning and end of the survey period and no significant drift occurred.

The weather conditions throughout the survey period were warm with low winds and no precipitation. They are not considered to have affected the survey results.

Figure 1 – Aerial image of site including measurement location

Survey equipment
NOR 118 (S/N 31419) sound level meter Cert no. U7288

NOR 1206 (S/N 30457) preamplifier (with SLM)
NOR 1225 (S/N 51319) microphone Cert no. 7298
NOR 1251 (S/N 30895) calibrator Cert no. U7299

Survey results
The results of the noise survey are presented graphically in Figure 2 below.

Figure 2 – Summary of Noise Survey Results

The logarithmic average values for the full day and night periods are as follows:

- \( L_{Aeq, day}(16\text{hr, 07:00-23:00}) = 57.0\text{dB} \)
- \( L_{Aeq, night}(8\text{hr, 23:00-07:00}) = 54.5\text{dB} \)

The lowest measured background noise level in the survey was 44dB \( L_{A90} \).

Therefore in order to ensure that the RBKC requirement is met at all times, the combined plant noise level must be less than 34dB \( L_{Aeq} \) at a position 1m in front of the window of the most affected residence. A 5dB penalty is applied if the noise that is tonal or impulsive in character.

4.0 PLANT NOISE ASSESSMENT

4.1 Proposed Plant Equipment

The main external mechanical plant equipment currently proposed is listed in Figure 3 below. This equipment would be installed on top of the plant enclosure on the roof of Grenfell Tower, in the location indicated in red in Figure 5. Also listed are the noise levels emitted by the units, as advised by the manufacturer (based on initial worst-case selections).
Noise data provided by the manufacturer is in the form of single figure A-weighted values. Octave band data from similar items of plant was used in the assessment, scaled appropriately.

<table>
<thead>
<tr>
<th>Item</th>
<th>Quantity</th>
<th>Noise Level</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bosch Floor Standing Condensing Boiler GB312</td>
<td>2</td>
<td>Sound Power Level = 55dBA</td>
</tr>
<tr>
<td>Bosch Gas Absorption Heat Pump GWPL38 L5 (5x38kW)</td>
<td>1</td>
<td>Sound Pressure Level at 10m =49dBA</td>
</tr>
</tbody>
</table>

**Figure 3 – Proposed external plant equipment**

### 4.2 Tonal and Impulsive Noise

MFLLP have measured noise from similar installed heat pump units in third octave bands. A typical measurement is presented in Figure 4 below. The graph contains no significant third octave peaks, which indicates that noise emitted by this type of unit is not tonal in character. The operation of the unit is continuous and does not result in any impulsive noise. It is therefore not appropriate to apply the penalty for tonal or impulsive noise.

No spectral data is available for a unit similar to the condensing boiler. However, the units are much quieter operationally than the heat pump and will not contribute significantly to the overall plant noise level.

Thus the requirement for the combined plant equipment is a noise level less than **34 dBA** $L_{Aeq}$ at a position 1m in front of the window of the most affected residence.

**Figure 4 – Sound pressure level spectrum for typical heat pump.**
4.3 Plant Noise Calculation

Plant noise levels are calculated in octave bands at a position 1m from the window of the most affected top floor residence of Grenfell Tower using noise data provided by the manufacturers and considering the attenuation over distance and screening effects of barriers. Noise levels were also calculated at nearby residences on Grenfell Road, which are further away from the plant but benefit less from screening (see Figure 5).

![Diagram of plant noise screening]

Figure 5 – Illustration of plant noise screening at nearby residences on Grenfell Road. The proposed location of the plant is shown in red.

The total plant sound power level is 80dBA. The distance to a position 1m from the window of the most affected top floor residence in Grenfell Tower is 12m with a corresponding noise attenuation of 30dB. The screening effect of the corner of Grenfell Tower reduces noise levels by 19dB. The total sound pressure level from the proposed plant at the top floor position is **31dBA**. The noise level at all other positions is less than 29dBA.

The calculated noise level falls below the target level of 34dBA. Therefore the RBKC plant noise requirement is met with no additional acoustic screening needed.

5.0 FAÇADE REFURBISHMENT

5.1 Façade Noise Exposure

Internal noise levels have been calculated for a residence on the north or west façade of Grenfell Tower, which are the façades with the highest noise exposure. The external noise level incident on these façades is approximately 62dBA which was calculated from the measurement on the eastern façade, corrected for screening.
5.2 Façade Sound Insulation Improvements

An assessment has been made of the sound insulation provided by the existing façade and the resulting internal noise level. The improvements in façade sound insulation have been predicted based on the proposed façade refurbishment works. The current single glazing will be replaced by insulated double glazing and an acoustic trickle ventilator will be installed. It is assumed that the ventilator will have a sound insulation performance of at least 38 dB $D_{no,w}$. This can be achieved with a Renson AK35 or similar product.

<table>
<thead>
<tr>
<th>Façade condition</th>
<th>Period</th>
<th>Internal Noise Level (dBA)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current</td>
<td>Day</td>
<td>48</td>
</tr>
<tr>
<td></td>
<td>Night</td>
<td>46</td>
</tr>
<tr>
<td>Upgraded windows and new acoustic trickle vents</td>
<td>Day</td>
<td>38</td>
</tr>
<tr>
<td></td>
<td>Night</td>
<td>36</td>
</tr>
</tbody>
</table>

Figure 6 – Internal noise levels before and after upgrade

The results show that upgraded windows and new acoustic trickle vents will reduce internal noise levels by approximately 10dB. The façade sound insulation performance is therefore improved significantly.

It should be noted that external noise levels are predicted to rise during the construction of the proposed Kensington Academy and Leisure Centre. Therefore internal noise levels are indicative only.

6.0 ASSESSMENT OF NOISE FROM BOXING GYM

As part of the proposed refurbishment, the boxing club (which is currently on the ground floor) would be relocated to the walkway level with flats on the floors directly above and below. As high levels of noise may be generated within the boxing gym, it is appropriate to assess the likely impact on residents of the tower.

Typical noise sources associated with the boxing gym are shouts, impacts of punch-bags, skipping and other exercises. It is understood that the gym does not use klaxons or regular amplified music.

We are advised that the floor construction comprises 250mm thick concrete slabs and that there are to be suspended plasterboard ceilings within the new flats (below the boxing gym).

It is expected that the concrete floors would provide adequate control of airborne noise transmission to above and below due to their high mass. However, as a precautionary measure, it is recommended that the ceiling of the boxing gym and the flats below comprises two layers of plasterboard suspended at least 100mm below the slab to further reduce airborne sound transmission.

It is also recommended that a resilient floor system is provided to the boxing gym to reduce impact noise. It is recommended that this provides an impact sound pressure level improvement $\Delta L'_{nTw}$ of at least 20dB. This could be in the form of either a sheet of resilient material or a resiliently supported deck.

7.0 SUMMARY

- This report assesses the noise impact of the refurbishment of Grenfell Tower in the Royal Borough of Kensington and Chelsea.
• The proposed scheme will make improvements to the external façade including replacing the windows and installing acoustic trickle vents.

• A number of items of mechanical plant will be installed on the roof of Grenfell Tower to provide heating to the building.

• A noise survey was undertaken to establish the average noise level incident on the façade during the daytime and night time periods, and the minimum background noise level at local residential properties.

• Internal noise levels were calculated before and after the proposed façade refurbishment and are found to be reduced by 10dB. The façade sound insulation performance is improved significantly.

• The noise level generated by the proposed plant was calculated and found to meet RBKC requirements with no additional acoustic screening needed.

• Recommendations for measures to control noise generated within the boxing gym have been provided.
8.0 APPENDIX A

Glossary of acoustic terminology

Sound Pressure Level, SPL or $L_P$ (decibels, dB)

A measure of the instantaneous sound pressure at a point in space. The threshold of hearing occurs at approximately SPL=0 dB (which corresponds to a reference sound pressure of 20$\mu$Pa).

$$L_P(dB)=20\log_{10}(\text{Measured RMS Sound Pressure (Pa)}/20\mu\text{Pa})$$

where RMS Sound Pressure is the Root-mean-square of the sound pressure at a point, relative to mean atmospheric pressure, over a time period defined by the sound level meter used.

A-Weighted Sound Pressure Level, $L_A$ (dBA)

SPL values are weighted in a way that approximates the frequency response of the human ear and allows sound levels to be expressed as a single figure value.

Equivalent Continuous A-Weighted SPL, $L_{A_{eq},T}$ (dBA)

Energy average of the A-weighted sound pressure level over a time period, $T$. The level of a notional continuous sound that would deliver the same A-weighted sound energy as the actual fluctuating sound over the course of the defined time period, $T$

Background Noise Level A-Weighted $L_{A_{90},T}$ (dBA)

A-weighted sound pressure level that is exceeded 90% of the time.