PHASE 2, KIDDERPORE AVENUE, LONDON NW3 7SU

EXTERNAL BUILDING FABRIC ASSESSMENT

REPORT 6573/EBF
Prepared: 22 May 2015
Revision Number: 0

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External Building Fabric Assessment

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0	First Issue	22 May 2015	Gareth Davies AMIOA	Alex J Wyatt MIOA

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Contents

1.0 INTRODUCTION

The redevelopment of the site at Kidderpore Avenue, London is proposed. Phase 2 of the redevelopment includes the demolition of the existing buildings along Finchley Road and Platt's Lane to provide four blocks of flats (Blocks J, K, L and M) and attached house (on Block K).

The site is located in North London with the main thoroughfare Finchley Road (A41) running the South-Western boundary of the site, Kidderpore Avenue to the North and Platt's lane to the West. Please also see attached Site Plan 6573/SP1.

RBA Acoustics have been commissioned to undertake the full acoustic design services for the proposed redevelopment.

This report details the results of the noise survey and sets out the acoustic performance requirements of the external building fabric elements. In addition, suitable plant noise emission criteria have also been developed based upon the survey results and the likely requirements of the Local Authority.

This report is based upon application drawings and details and is suitable for the discharge of Planning Condition 28.

2.0 ENVIRONMENTAL NOISE SURVEY

2.1 Survey Methodology

General

Continuous noise monitoring was undertaken at the redevelopment site between Friday 17th April and Monday 20th April in order to determine the corresponding noise levels over typical day and night-time periods. Weather conditions over the monitoring period were generally dry with only light wind speeds and were considered suitable for noise monitoring.

Instrumentation

The following instrumentation was used for the survey:

Table 6573/T1 – Equipment Details

Manufacturer	Model Type	Serial No.	Calibration	
			Certificate No.	Expiry Date
Norsonic Type 1 Sound Level Meter	Nor140	1406116	473728419	13 November 2016
Norsonic Pre Amplifier	1209	20295		
Norsonic ½" Microphone	1225	215486		
Norsonic Sound Calibrator	1251	34307	CAL 022-2015-5048	13 January 2017
Norsonic Type 1 Sound Level Meter	Nor140	1406007	473728419	10 June 2016
Norsonic Pre Amplifier	1209	20043		
Norsonic ½" Microphone	1225	208146		
Norsonic Sound Calibrator	1251	34127	CAL 022-2014-4647	1 July 2016

The sound level meters were calibrated both prior to and on completion of the survey with no calibration drifts observed.

Measurement Positions

Position 1 – Finchley Road

A microphone was positioned on the West boundary of the site at the junction of Finchley Road and Platt's Lane approximately 5m above ground level. The microphone was considered to be in free-field conditions.

Position 2 – Platt's Lane

A microphone was positioned at the North-West corner of the site at the junction of Platt's Lane and Kidderpore Avenue approximately 5m above ground level. The microphone was considered to be in free-field conditions.

The measurement positions are also shown on the attached Site Plan 6573/SP1 and Photographs 6573/P1-P2.

The measurement positions are considered to be representative of worst-case noise levels incident on the proposed residential aspects of the redevelopment.

2.2 Site Conditions

Since the measurements were unattended it is not possible to comment upon the noise climate at each measurement position over the entire monitoring period with absolute certainty. However, during our time on site it was noted that noise levels at Measurement Position 1 were dominated by road traffic movements along Finchley Road running the length of the south-western boundary of the site. Finchley Road was noted to be very busy with constant traffic movements in both northbound and southbound directions of moderate speed with accelerating and braking noise due to the traffic lights at the crossroads with Platt's Lane. The traffic was noted to consist of passenger vehicles, HGVs and main bus routes in both directions. The road traffic movements are likely to provide the maximum noise levels to the general noise climate to the south-west of the site.

At Measurement Position 2 it was noted that noise levels were affected predominantly by road traffic movements along Platt's Lane and Kidderpore Avenue and, to a lesser extent, the wider surrounding road networks. It is considered that road traffic movements along Platt's Lane are likely to provide the maximum noise levels to the west of the site.

2.3 Results

The measured L_{Aeq}, L_{A90} and L_{Amax} 15 minute period levels are shown as time-histories on the attached Graphs 6573/G1-4. The averaged daytime and night-time L_{Aeq} noise levels are summarised in the following Table 6573/T2 below.

Table 6573/T2 – L_{Aeq} Noise Levels

Measurement Position	Average $L_{Aeq, period}$ Noise Level (dB)	
	Daytime (07:00 – 23:00)	Night-time (23:00 – 07:00)
Position 1 – Finchley Road	72	69
Position 2 – Platt's Lane	62	58

The minimum background noise levels ($L_{A90,\ 15mins}$) at each measurement position are summarised in the following Table 6573/T3 below. This data can be used to set plant noise emission criteria for use in the assessment of noise emissions from any proposed plant at the development.

Table 6573/T3 – Minimum Measured $L_{A90,\ 15mins}$ Noise Levels

Measurement Position	Minimum $L_{A90,\ 15mins}$ Noise Level during period (dB)	
	Daytime (07:00 – 23:00)	Night-time (23:00 – 07:00)
Position 1 – Finchley Road	53	41
Position 2 – Platt's Lane	43	34

Averaged spectral noise levels are graphically represented on the attached Graphs 6573/G5-6.

3.0 NOISE MODELLING

In order to predict the noise levels at the different façades with increasing height an acoustic model of the proposed site, including all proposed buildings and existing surrounding buildings, has been generated using the CadnaA platform.

The software allows the site topography, existing buildings and sound sources to be built into the model such that the sound sources (i.e. the main surrounding roads) can then be calibrated according to the on-site measurements. The noise levels stated herein have been used in addition to the noise levels previously measured for the Phase 1 development; please see our 6015/EBF report dated 31 March 2014 for more information. The proposed buildings are subsequently built into the model and calculations using the methodology outlined in ISO9613 are undertaken to predict façade incident noise levels at all floor heights and to produce noise contours for the site. The incident noise levels, where not measured directly on site, have then been used in the assessment of façade elements.

The attached Figure 6573/Cad1 illustrates the basic model, façade incident daytime L_{Aeq} noise levels and the daytime noise contours for the site at a height of 1.5 metres above (relative) ground level.

4.0 PLANT NOISE EMISSION CRITERIA

With reference to planning Condition 27 from Camden Borough Council's Decision document (ref: 2013/0685/P dated 13 September 2013) the requirements with regards to plant noise emissions are confirmed as follows:

> *"Noise levels at a point 1 metre external to sensitive facades shall be at least 5dB(A) less than the existing background measurement (LA90), expressed in dB(A) when all plant/equipment (or any part of it) is in operation unless the plant/equipment hereby permitted will have a noise that has a distinguishable, discrete continuous note (whine, hiss, screech, hum) and/or if there are distinct impulses (bangs, clicks, clatters, thumps), then the noise levels from that piece of plant/equipment at any sensitive façade shall be at least 10dB(A) below the LA90, expressed in dB(A).*
>
> *For each of the octave bands of centre frequencies 63Hz-8kHz inclusive, noise levels from all plant/equipment (measured in LAeq) when in operation shall at all times add not more than 1 decibel to the existing background noise level LA90, expressed in dB(A), in the same octave band as measured 1 metre external to sensitive facades."*

In line with the above, we propose the following cumulative plant noise emission limits:

Table 6573/T4 – Plant Noise Emission Limits

Measurement Position	L_{Aeq} Noise Level limit of all operating plant (dB) at 1m from the nearest noise sensitive façade	
	Daytime (07:00 – 23:00)	Night-time (23:00 – 07:00)
Position 1 – Finchley Road	48	36
Position 2 – Platt's Lane	38	29

In line with planning Condition 27, should noise emissions from any item of proposed plant be identified as having characteristics outlined within the condition, a further 5dB should be subtracted from the applicable proposed noise emission limit for that individual item plant item.

In addition, the octave band centre frequency noise emission levels should be designed to 5dB below the background L_{90} levels as indicated on the attached Graphs 6573/G5-G6.

5.0 NOISE INTRUSION CRITERIA

The sections below outline the assessment criteria required by Camden Borough Council and reference additional relevant standards.

5.1 Planning Condition

Planning Condition 28 of Camden Borough Council's 'Notification of Grant of Permission to Develop Land', states:

> *"Noise levels arising from external sources within all habitable rooms during the night period (23:00 - 07:00) shall not exceed 30dB L_{Aeq} (8 hours) nor 45dB $L_{Amax\ (fast)}$. Similarly, noise levels in habitable rooms shall not exceed 35 dB L_{Aeq} (16 hours) during the day time (07:00 - 23:00). Before the relevant part of each Phase commences details of sound insulation measures for all relevant residential windows shall be submitted to and approved in writing by the Local Planning Authority. The approved sound insulation measures shall be installed prior to occupation of any of the residential units, and retained and maintained thereafter."*

5.2 BS 8233

BS 8233:2014 "Guidance on sound insulation and noise reduction for buildings" draws on the results of research and experience, such as that detailed in WHO 'Guidelines for Community Noise', to provide information on achieving internal acoustic environments appropriate to their functions. As part of this document recommendations are given to the internal noise levels which are commensurate with achieving good/reasonable resting and sleeping conditions within residential properties. The values given are generally in terms of an L_{Aeq} level although guidance is also given on the maximum noise level considered reasonable within bedrooms at night. The values given are detailed below:

Table 6573/T5 – BS 8233 Residential Criteria

Activity	Location	07:00 to 23:00 (Daytime)	23:00 to 07:00 (Night-time)
Resting	Living Rooms	35 dB $L_{Aeq,16hour}$	-
Dining	Dining room/area	40 dB $L_{Aeq,16hour}$	-
Sleeping (daytime resting)	Bedrooms *	35 dB $L_{Aeq,16hour}$	30 dB $L_{Aeq,8hour}$

* In addition individual noise events within bedrooms at night should not normally exceed 45dBA L_{max} (measured with F time-weighting) according to BS 8233:1999.

It should be noted that the glazing specifications for bedrooms are usually dictated by the L_{max} noise levels with the average L_{eq} noise levels achieving the BS 8233 criteria by default.

5.3 World Health Organisation: Guidelines for Community Noise

The document describes guideline levels that are *"essentially values for the onset of health effects from noise exposure"*.

A table of guideline values is included, relating to adverse health effects, referred to as any temporary or long term deterioration in physical, psychological, or social functioning that is associated with noise exposure.

The following is an extract from *Table 4.1: Guideline values for community noise in specific environments*, as stated in the document.

Table 6573/T6 – Guideline Values for Community Noise

Specific Environment	Critical Health Effect(s)	L_{Aeq} (dB)	Time Base (hours)	$L_{Amax,f}$ (dB)
Outdoor living area	Serious annoyance, daytime and evening	55	16	-
	Moderate annoyance, daytime and evening	50	16	-
Dwelling, indoors	Speech intelligibility and moderate annoyance, daytime and evening	35	16	-
Inside bedrooms	Sleep disturbance, night-times	30	8	45 *
Outside bedrooms	Sleep disturbance, window open (outdoor values)	45	8	60

* In addition, the WHO guidance suggests that for bedrooms, individual noise events should not normally exceed 45dB L_{Amax} during the night-time. It should however be noted that, despite setting this apparent 'absolute' design limit of 45dB L_{Amax}, the WHO guidelines also advise that, for good sleeping conditions, sound levels of about 45dB L_{Amax} should not occur more than 10-15 times per night.

5.4 Summary

The project criteria adopted are therefore as follows;

Habitable rooms	Daytime (07:00-23:00 hours)	35dB L_{Aeq}
	Night-time (23:00-07:00 hours)	30dB L_{Aeq} and $L_{Amax,f}$ typically < 45dB

6.0 EXTERNAL BUILDING FABRIC ASSESSMENT

6.1 Background

External noise levels are such that noise control measures are required in order for the development to be considered acceptable. Appropriate internal noise levels can be achieved providing suitable building envelope constructions are employed. Analyses of the external building fabric have been undertaken in order to ascertain the required acoustic performance of the glazing and other external fabric elements to achieve the project criteria.

6.2 Assumptions

Our external building fabric analyses have assumed the following:

(a) Drawings

Our assessment has been based on the latest GA Floor plan and elevation drawings prepared by Allies and Morrison architects.

(b) Noise Levels

The assessment has been based on the measured noise levels as detailed in Section 2.3 and results from the CadnaA model (Section 3.0).

(c) Room Absorption

We have assumed the bedrooms to be acoustically "soft" with carpets, curtains and other soft furnishings. For the purposes of our analyses we have assumed the following absorption coefficients.

Table 6573/T7 – Bedroom Absorption Coefficients

Absorption Coefficient (α) at Octave Band Centre Frequency (Hz)							
63	125	250	500	1k	2k	4k	8k
0.15	0.18	0.25	0.27	0.31	0.32	0.32	0.32

We have assumed the living rooms to be less acoustically absorptive (with a hard floor finish, although with furnishings). For the purposes of our analyses we have assumed the following absorption coefficients.

Table 6573/T8 – Living Room Absorption Coefficients

Absorption Coefficient (α) at Octave Band Centre Frequency (Hz)							
63	125	250	500	1k	2k	4k	8k
0.15	0.18	0.20	0.22	0.22	0.22	0.23	0.27

(d) External Wall

We understand that external non-glazed areas to blocks J, K, L and M are to comprise the following:

- Brickwork
- Thermal insulation and cavity
- Metsec type frame with mineral wool in void
- 2 x layers 15mm dense plasterboard

The only exception to the above is to the House at the end of Block K, which comprises;

- Render
- Insulation
- Dense blockwork
- Plasterboard-on-dabs internal finish

As such, we have assumed the following sound reduction indices (equating to an overall R_W of 58dB) for all non-glazed façade areas comprising the above constructions:

Table 6573/T9 – Non-Glazed SRIs

Assumed Sound Reduction Index (dB) at Octave Band Centre Frequency (Hz)							
63	125	250	500	1k	2k	4k	8k
35	42	48	53	63	70	74	74

Should the proposals for non-glazed areas change, it is critical we are informed at the earliest opportunity as this could have a significant impact on the sound insulation performance requirements of the glazing systems.

(e) Ventilation

It is understood the preferred ventilation strategy is via a fully ducted mechanical ventilation with heat recovery (MVHR) fan system.

It should be noted the MVHR system provides background trickle ventilation only and that windows are to generally be openable to provide rapid ventilation. During those periods where windows are opened for purge/rapid ventilation, noise levels will naturally be increased internally.

6.3 Specification & Guidance Constructions

Appendix B (attached) details the sound reduction performance specification for the glazed elements of the external building fabric.

The glazing performance specifications apply to the glazing package as a whole inclusive of glazing, louvres, spandrel panels, framing, opening lights, doors, seals, etc. The performance of the glazing system will depend on many factors such as the glazing configuration, size of window panels, quality of framing, quality of sealing, etc.

For guidance purposes we would typically expect the following glazing configurations detailed below to prove commensurate with achieving the sound insulation performance specifications detailed within Appendix B.

Please note – *The guidance constructions described in Table 6573/T10 are given for costing purposes only. All window systems should be capable of meeting the performance specifications shown in Appendix B, with laboratory test certificates being made available in support of the quoted performance. Glazing proposals which simply reflect the guidance constructions indicated in this report will not, in isolation, be sufficient evidence that a window configuration will meet the performance specification.*

Table 6573/T10 – Glazing Guidance Constructions

Glazing Type	Glazing Configuration
G1	High spec double glazing comprising 10mm glass / 12mm cavity / 8.4mm acoustically laminated glass
G2	Standard thermal double glazing with differing pane thicknesses, e.g. 4mm glass/12mm cavity/6mm glass
G3	Specialist extremely high spec double glazing comprising 13.5mm acoustically laminated (4 interlayers) glass / 16mm cavity / 9.14mm acoustically laminated (3 interlayers) glass

It should be noted that due to the necessity for security laminated glass on the ground (lower / accessible) floors, the specifications may exceed those stated above (G2 type) in some locations.

6.4 Applicable Zoning

Due to the differences in the prevailing noise climate around the site, three primary glazing zones have been defined, as indicated on the attached Façade Zoning Plans 6573/FZP-03 to 6573/FZP02.

(i) Zone 1 – Glazing Type: G1

(ii) Zone 2 – Glazing Type: G2

(iii) Zone 3 * – Glazing Type: G3

* Specialist acoustic glazing is required in Zone 3 – Platt's Lane façade of Block K – primarily due to the large glazed areas of the façade, but also the high noise levels experienced at the junction.

6.5 Flanking Specification

We also advise on the flanking specification for any curtain walling or continuous glazing systems proposed as follows to aid the development of such systems.

Flanking Performance Specification

The previous Sections are in relation to external noise intrusion through any curtain walling systems to internal areas. Separating wall and floor sound insulation performance can often be compromised by curtain walling systems. It is thus important that an additional specification for the curtain walling package be introduced, which will limit the amount of sound transfer across separating wall and floor lines through the curtain walling system. A flanking performance specification is attached within Appendix B – Section 2.0.

Achievement of the specification can be demonstrated by laboratory acoustic testing in general accordance with BS EN ISO 10848-2:2006. This is admittedly a complex and costly testing procedure and therefore the supplier may – following tender reviews – be allowed to demonstrate by other means that the specification can be achieved. This is reflected in the specification wording.

The specification should also be incorporated within any other packages, which could affect the transmission of flanking sound at separating wall and floor lines.

It is likely insulated double/split mullions and transoms will be required in order to achieve the attached flanking specification. This obviously has a large impact on the design and style of any curtain walling system and should be investigated at the earliest opportunity to ensure the specification is achieved.

7.0 CONCLUSION

RBA Acoustics have undertaken noise monitoring at the proposed development site at Phase 2 Kidderpore Avenue, London. The measured noise levels are presented herein. The resultant noise levels have been used in our assessment of the glazing requirements to ensure suitable internal noise levels are achieved at the proposed development with reference to the requirements of Camden Council stated in Planning Condition 28.

General guidance configurations have been suggested for the glazing constructions that should be capable of achieving the required specifications detailed within Appendix B. A worst case configuration of very high performance specialist acoustically laminated double glazing is required in the worst affected flats of Block K facing the junction of Finchley Road and Platt's Lane to protect the residences from any potential noise impact arising from traffic movements. However, the majority of other areas only require more standard double glazing.

The data has also been used to set plant noise emission criteria for future assessment of any proposed plant at the development to ensure the adjacent neighbour's amenity spaces are protected from plant noise emissions in line with the Local Authority requirements of Planning Condition 27.

Appendix A - Acoustic Terminology

dB	Decibel - Used as a measurement of sound pressure level. It is the logarithmic ratio of the noise being assessed to a standard reference level.
dB(A)	The human ear is more susceptible to mid-frequency noise than the high and low frequencies. To take account of this when measuring noise, the 'A' weighting scale is used so that the measured noise corresponds roughly to the overall level of noise that is discerned by the average human. It is also possible to calculate the 'A' weighted noise level by applying certain corrections to an un-weighted spectrum. The measured or calculated 'A' weighted noise level is known as the dB(A) level. Because of being a logarithmic scale noise levels in dB(A) do not have a linear relationship to each other. For similar noises, a change in noise level of 10dB(A) represents a doubling or halving of subjective loudness. A change of 3dB(A) is just perceptible.
L_{eq}	L_{eq} is defined as a notional steady sound level which, over a stated period of time, would contain the same amount of acoustical energy as the actual, fluctuating sound measured over that period (1 hour).
L_{Aeq}	The level of notional steady sound which, over a stated period of time, would have the same A-weighted acoustic energy as the A-weighted fluctuating noise measured over that period.
L_{An} (e.g. L_{A10}, L_{A90})	If a non-steady noise is to be described it is necessary to know both its level and the degree of fluctuation. The L_n indices are used for this purpose, and the term refers to the level exceeded for n% of the time, hence L_{10} is the level exceeded for 10% of the time and as such can be regarded as the 'average maximum level'. Similarly, L_{90} is the average minimum level and is often used to describe the background noise.
$L_{max,T}$	The instantaneous maximum sound pressure level which occurred during the measurement period, T. It is commonly used to measure the effect of very short duration bursts of noise, such as for example sudden bangs, shouts, car horns, emergency sirens etc. which audibly stand out from the general level of, say, traffic noise, but because of their very short duration, maybe only a very small fraction of a second, may not have any effect on the L_{eq} value.