Brockton Capital & Oxford Properties

The Post Building – Marketing Suite

Building services noise assessment

Rev A | 6 November 2017

Job number 255569-01
255569-01

Ove Arup & Partners Ltd
The Arup Campus
Blythe Gate
Blythe Valley Park
Solihull B90 8AE
United Kingdom
www.arup.com

ARUP

Document Verification

ARUP

Job title		The Post Building – Marketing Suite			**Job number** 255569-01
Document title		Building services noise assessment			**File reference**
Document ref					
Revision	**Date**	**Filename**	2017-10-27 MarketingSuiteNoiseAssessmentISSUE.docx		
Issue	27 Oct 2017	**Description**	Issue		
			Prepared by	Checked by	Approved by
		Name	Angus Deuchars BEng CEng MIOA	Angus Deuchars BEng CEng MIOA	Ian Knowles BSc FIOA CPhys
		Signature			
Rev A	6 Nov 2017	**Filename**	2017-11-06_MarketingSuiteNoiseAssessmentISSUE.docx		
		Description	Updated following design team comments		
			Prepared by	Checked by	Approved by
		Name	Angus Deuchars BEng CEng MIOA	Angus Deuchars BEng CEng MIOA	Ian Knowles BSc FIOA CPhys
		Signature			
		Filename			
		Description			
			Prepared by	Checked by	Approved by
		Name			
		Signature			
		Filename			
		Description			
			Prepared by	Checked by	Approved by
		Name			
		Signature			

Issue Document Verification with Document ✓

Contents

Appendices

1 Introduction

This report summarises the building services noise assessment that has been carried out for the fit-out of a vacant retail unit within the Travel Lodge hotel located at 10 Drury Lane, London WC2B 5RE. Planning permission is sought for the temporary change of use of the retail unit to a marketing suite. The vacant retail unit is intended to be used as a marketing suite for The Post Building (TPB) mixed-use development, which is currently under construction.

2 Site description

The proposed location for the marketing suite is a retail unit within the Travel Lodge at 10 Drury Lane, London WC2B 5RE. The retail unit is located at the intersection of Drury Lane and High Holborn, accessible from grade and occupies a single story. The development is located in a built-up area with a high density of commercial, hotel and retail developments. Figure 1 shows a site plan that has been marked up to show the location of the proposed development, the nearest noise sensitive premises and baseline noise measurement locations.

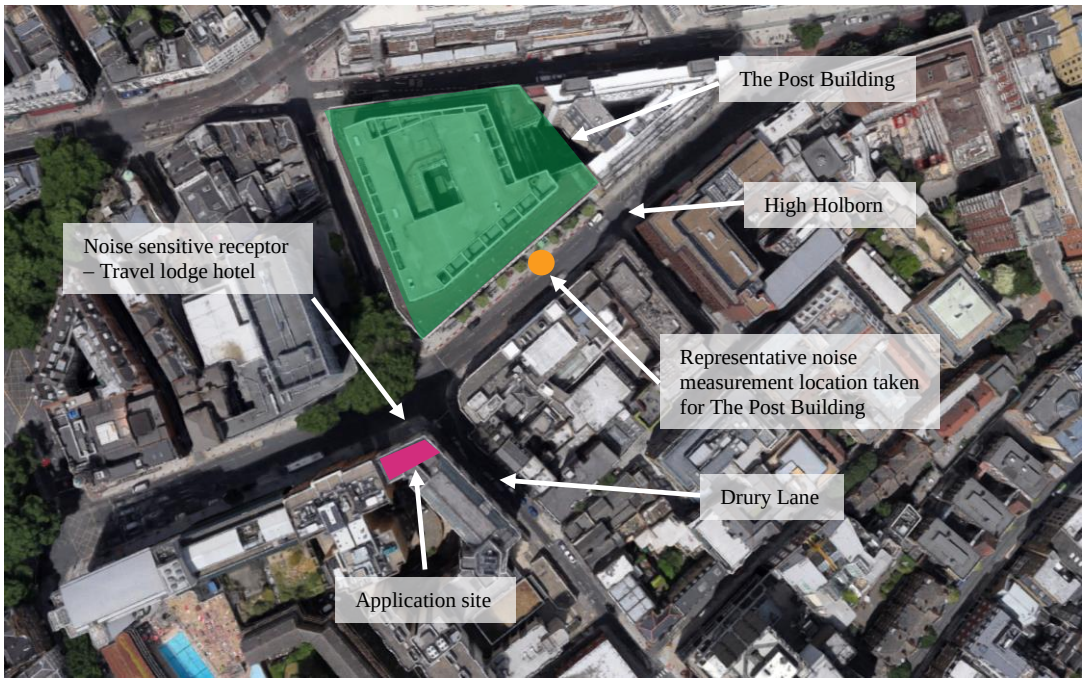

Figure 1: Context of the application site

Figure 2 and 3 show street views looking east and west to further describe the context of the application site.

Figure 2: Street view showing context of application site – view looking west along High Holborn – image taken in March 2017

Figure 3: Street view showing context of application site – view looking east along High Holborn – image taken in March 2017

The images in Figures 1 - 3 demonstrate that TPB and the marketing suite share the same noise context along the High Holborn corridor. The sites are dominated by traffic noise along High Holborn, with Museum Street and Drury Lane contributing to the prevailing traffic noise climate. The nearest noise sensitive receptor for TPB is the Travel Lodge along Museum St; the nearest noise sensitive receptor for the marketing suite is the Travel Lodge at the intersection of High Holborn and Drury Street.

3 Noise survey

Noise data from the survey that was carried out for TPB has been used for the marketing suite on the basis that both sites share the same context along this section of the High Holborn corridor.

Long-term noise monitoring was carried out at several locations for TPB, with a location along High Holborn being representative for the marketing suite. Noise was continually monitored (see location marked on Figure 1) along High Holborn using a noise logger between 7 June and 11 June 2013. The measurements were taken at 8m above FFL at 1m from the façade of the postal sorting office, which used to occupy the site.

Table 1 lists the results from the measurement location along High Holborn for the time periods required by LBC for setting building services noise emission limits. Note – the daytime period is reported because the plant will only operate during the daytime period.

Location	Time period	Noise level, dB	
		Typical $L_{Aeq,18hr}$	**Minimum** $L_{A90,\ 8hr}$
High Holborn	07:00 – 23:00	69	52

Table 1: Measure noise data

4 Noise emission limits

LBC Local Plan[1] includes permissible limits for building service noise from commercial developments. Table 2 lists the policy that applies to sensitive premises near the application site.

Existing noise sensitive receptor	**Period**	**Time**	**Noise level**
Noise at 1m external to a sensitive façade/premises	Day	07:00 – 23:00	10dB(A) $<L_{A90}$
Noise at 1m external to a sensitive façade/premises that has a distinguishable discrete continuous note (whine, hiss, screech, hum)	Day	07:00 – 23:00	15dB(A)$<L_{A90}$

Table 2: London Borough Camden building services noise policy

Table 3 lists the building services noise emission limits for the marketing suite along the High Holborn corridor. Limits have been established for the daytime period only because the plant will not operate at night.

[1] London Borough of Camden, Local Camden Plan, Adopted Version, June 2017

Sensitive façade location	Building services noise emission limit at 1m external to sensitive façade, $dBL_{Ar, Tr}$	
	Type	**07:00 – 23:00**
High Holborn corridor	Noise from plant	42
	Noise from plant that has a distinguishable discrete continuous note (whine, hiss, screech, hum)	37

Table 3: Building services noise emission assessment

4.1 Proposed building services plant

Table 4 lists the sound power data for the marketing suite plant. The data is for the noise level emitted to atmosphere without any attenuation. Figure 5 shows the proposed approximate location of the plant.

Item of plant	Octave Band Centre Frequency, Hz							
	63	**125**	**250**	**500**	**1k**	**2k**	**4k**	**8k**
Condenser	78	71	69	66	62	58	54	46
Exhaust fan no. 1 (TEC-018)	36	41	52	52	53	44	39	28
Exhaust fan no. 2 (TEC-019)	79	79	74	71	69	69	65	59

Table 4: Plant sound power levels, dB

Neither the noise data nor plant selection suggests the character of noise will include a distinguishable discrete continuous note (whine, hiss, screech, hum). Therefore, it is considered that the policy for plant that does not exhibit these characteristics apply to the application development.

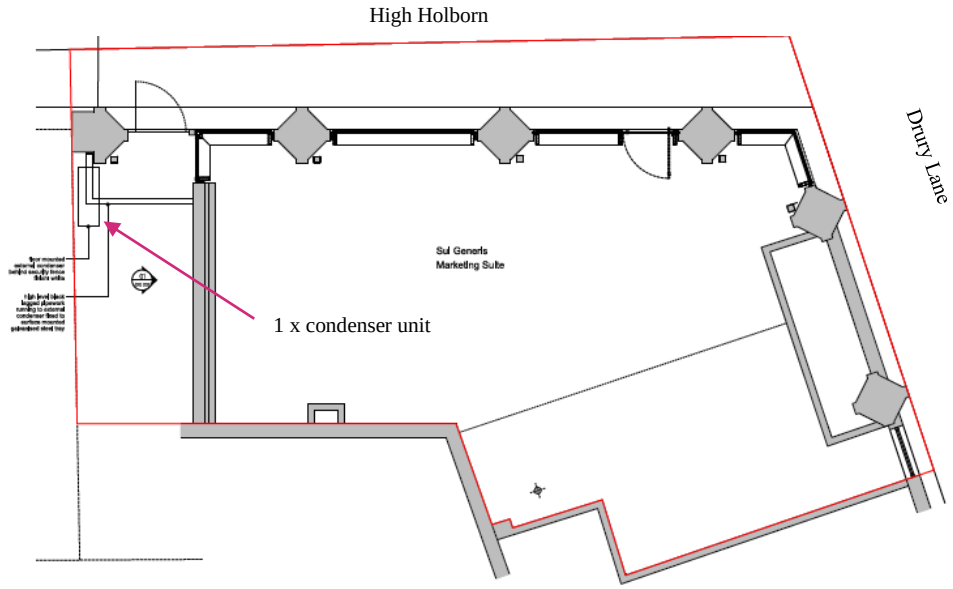

Figure 4: Location of condenser plant

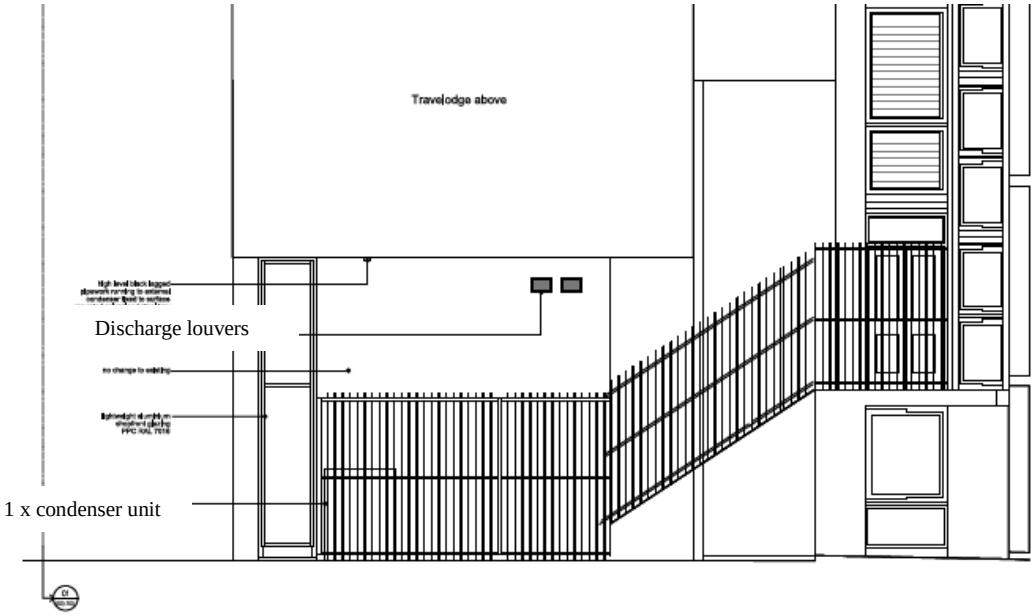

Figure 5: Location of intake and discharge louvers

4.2 Assessment

Table 5 lists the noise level that has been calculated from the building services plant at the nearest noise sensitive receptors. The calculations take into account attenuation of noise over distance, directivity, and screening effects.

Item of plant	Location of calculated noise level	Calculated noise level, dBA	LBC requirements achieved
Condenser and 2 x discharge fans	1st floor Travel Lodge – High Holborn	42[1]	Yes
[1] The requirements are achieved by installing a ducted attenuator on the discharge of "Exhaust fan no. 2 (TEC-019)" – see recommended performance in Table 6			

Table 5: Building services noise assessment

Table 6 lists the minimum insertion loss performance for the ducted attenuator that is required on discharge fan "TEC-019".

Item of plant	Octave Band Centre Frequency, Hz							
	63	125	250	500	1k	2k	4k	8k
Exhaust fan no. 2 (TEC-019)	-7	-11	-15	-15	-23	-30	-28	-20

Table 6: Minimum insertion loss performance for ducted attenuator, dB

5 Conclusions

This report summarises the building services noise assessment that has been carried out for The Post Building marketing suite located within the Travel Lodge hotel. Noise data from the survey undertaken for The Post Building has been used

for setting building services noise emission limits on the basis that the context along the High Holborn corridor is the same as the marketing suite. The assessment of building services noise indicates that noise mitigation for one of the extract fans is required to achieve LBC planning requirements; recommended mitigation measures have been provided in this report.

Appendix A

Acoustic terminology

A1 Glossary of acoustic terminology

Decibel

The ratio of sound pressures, which we can hear, is a ratio of 10^6 (one million: one). For convenience, therefore, a logarithmic measurement scale is used. The resulting parameter is called the 'sound pressure level' (L_p) and the associated measurement unit is the decibel (dB). As the decibel is a logarithmic ratio, the laws of logarithmic addition and subtraction apply.

dB(A)

The unit used to define a weighted sound pressure level, which correlates well with the subjective response to sound. The 'A' weighting follows the frequency response of the human ear, which is less sensitive to low and very high frequencies than it is to those in the range 500Hz to 4kHz.

In some statistical descriptors the 'A' weighting forms part of a subscript, such as L_{A10}, L_{A90}, and L_{Aeq} for the 'A' weighted equivalent continuous noise level.

Equivalent continuous sound level

Another index for assessment for overall noise exposure is the equivalent continuous sound level, L_{eq}. This is a notional steady level which would, over a given period of time, deliver the same sound energy as the actual time-varying sound over the same period. Hence fluctuating levels can be described in terms of a single figure level.

Statistical noise levels

For levels of noise that vary widely with time, for example road traffic noise, it is necessary to employ an index which allows for this variation. The L_{10}, the level exceeded for ten per cent of the time period under consideration, has been adopted in this country for the assessment of road traffic noise. The L_{90}, the level exceeded for ninety per cent of the time, has been adopted to represent the background noise level. The L_1, the level exceeded for one per cent of the time, is representative of the maximum levels recorded during the sample period. A weighted statistical noise levels are denoted L_{A10}, dBL_{A90} etc. The reference time period (T), is normally included, e.g. $dBL_{A10,\ 5min}$ or $dBL_{A90,\ 8hr}$.

Sound pressure level

The sound power emitted by a source results in pressure fluctuations in the air, which are heard as sound.

The sound pressure level (L_p) is 10 times the logarithm of the ratio of the measured sound pressure (detected by a microphone) to the reference level of 2 x 10^{-5}Pa (the threshold of hearing).

Thus L_p (dB) = 10 log $(P1/P_{ref})^2$ where P_{ref}, the lowest pressure detectable by the ear, is 0.00002 pascals (i.e. $2x10^{-5}$ Pa).

The threshold of hearing is 0dB, while the threshold of pain is approximately 120dB. Normal speech is approximately 60dB(A) or more and a change of 3dB is only just detectable. A change of 10dB is subjectively twice, or half, as loud.

Typical noise levels

Some typical noise levels are given below:

Noise level, dB(A)	Example
130	Threshold of pain
120	Jet aircraft take-off at 100m
110	Chain saw at 1m
100	Inside disco
90	Heavy lorries at 5m
80	Kerbside of busy street
70	Loud radio (in typical domestic room)
60	Office or restaurant
50	Domestic fan heater at 1m
40	Living room
30	Theatre
20	Remote countryside on still night
10	Sound insulated test chamber
0	Threshold of hearing