RBA ACOUSTICS

DRAKE & MORGAN
1-5 BROCK STREET
LONDON

Plant Noise Assessment

REPORT 6244/PNA
Prepared: 16 July 2014
Revision Number: 0

StuArt Consultancy
7 The Workshops
Pulloxhill Business Park
Greenfield Road
Pulloxhill, Bedfordshire
MK45 5BF

Plant Noise Assessment

DRAKE & MORGAN
1-5 BROCK STREET

REPORT 6244/PNA
Prepared: 16 July 2014

Revision	Comment	Date	Prepared By	Approved By
0	First issue of report	16 July 2014	Paul Taylor	Andrew Heath

Terms of contract:

RBA Acoustics Ltd has prepared this report in accordance with our standard terms and conditions. RBA Acoustics Ltd shall not be responsible for any use of the report or its contents for any purpose other than that for which it was provided. Should the Client require the distribution of the report to other parties for information, the full report should be copied. No professional liability or warranty shall be extended to other parties by RBA Acoustics Ltd without written agreement from RBA Acoustics Ltd.

In line with our Environmental Policy, up to two hard copies of the report will be provided upon request. Additional copies of the report, or further hard copies of revised reports, would be subject to an administrative cost of £20.00 (+VAT) per copy.

RBA ACOUSTICS
44 Borough Road
London SE1 0AJ
T. +44 (0) 20 7620 1950
W. www.rba-acoustics.co.uk

Contents

1.0 INTRODUCTION

In order to ensure the acceptability of new mechanical services serving the Drake & Morgan Restaurant at 1-5 Brock Street, London, the Base Building Definition (BBD) requires consideration be given to atmospheric noise emissions from the proposed equipment at the roof edge.

RBA Acoustics have been commissioned to determine the atmospheric noise emissions in accordance with the BBD requirements. This report presents the results of the noise measurements, associated criteria and provides the required assessment.

2.0 CRITERIA

The requirements regarding new building services plant are confirmed within Section 3.4 of the BBD dated April 2014 and are as follows:

"The noise criteria established by building control requires that plant noise should be limited to NR 48 1m from the building face with all plant running..."

Therefore, noise levels 1m from the building façade are to be NR 48 or below when all restaurant related plant items are operating.

3.0 ASSESSMENT

Our assessment has been based upon the following information:

3.1 Proposed Rooftop Plant Items

1No. Air Vent Technology Air Handling Unit STP06/S 4m^3/s @ 800Pa
1No. Air Vent Technology Fan STP500/E/DUP 6m^3/s @ 1400Pa
1No. Mitsubishi PUHY-P500YSJM-A VRF Unit

Other mechanical plant items are proposed in the basement and include five outdoor heat pumps, two cellar condenser units, and one other condenser unit. Noise levels from these units have been assessed in terms of their suitability in the basement area. Our assessment shows that these basement units should not give rise to any airborne noise issues. It is assumed the nearest atmospheric connection to the plant is the louvre above. These plant items generate relatively low noise levels and will be compliant with the BBD. Furthermore, we predict that noise levels within the car park area achieve levels of NR55 or below.

3.2 Position of Units

The rooftop plant is to be located within the designated rooftop plant area at floor level 10. The equipment positions are indicated on the attached Site Plan 6244/SP1 and Site Plan 6244/SP2.

3.3 Noise Levels

Information regarding the noise levels of the proposed plant items has been provided by the manufacturers of the units. The octave band noise levels of the units are detailed as follows:

Table 6244/T1 – Manufacturer's Noise Levels

Unit	Parameter	Sound Level (dB) at Octave Band Centre Frequency (Hz)							
		63	125	250	500	1k	2k	4k	8k
Air Vent Technology Air Handling Unit STP06/S 4m3/s @ 800Pa – Supply Inlet	SWL	67	77	82	76	79	79	75	72
Air Vent Technology Air Handling Unit STP06/S 4m3/s @ 800Pa - Breakout	SPL@3m	49	51	52	40	34	31	26	19
Air Vent Technology Fan STP500/E/DUP 6m3/s @ 1400Pa – Extract Outlet	SWL	81	79	90	90	92	87	83	82
Air Vent Technology Fan STP500/E/DUP 6m3/s @ 1400Pa – Breakout	SPL@3m	54	50	59	44	40	34	30	28
Mitsubishi PUHY-P500YSJM-A VRF Unit	SPL@1m	62	65	63	57	53.5	49	44	38

3.4 Assessment Location

Noise levels have been assessed at 1m from the façade of the building at floor level 11, in order to ensure a worst-case assessment.

3.5 Calculation of Noise Levels

Our calculation method for predicting noise levels from the proposed units, 1m from the building façade, based on the information stated above, is summarised below.

- Source Term SPL / SWL
- Duct Losses
- Directivity
- Reflections
- 20LogR Distance Attenuation

The results of the calculations indicate the following noise levels 1m from the building façade:

Table 6244/T2 – Predicted Noise Levels

Parameter	Prediction	Criterion
Noise level 1m from building façade	NR 68	NR 48

Noise from the proposed units is above the target criteria. We therefore recommend mitigation is included in the design and installation.

3.6 Mitigation

We recommend that silencers are installed to the AHU supply duct and the extract exhaust duct. The silencers should be capable of achieving the performance levels detailed in the specifications below.

Table 6244/T3 – Acoustic Attenuators

Item	Example Configuration	Transmission Loss (dB) at Octave Band Centre Frequency (Hz)							
		63	125	250	500	1k	2k	4k	8k
AHU Supply Duct	50% Free Area 600mm long	1	2	7	10	11	9	8	7
Extract Outlet Fan	35% Free Area 1200mm long	5	11	19	29	36	37	29	18

Adoption of silencers with the above specifications would ensure that noise levels due to the mechanical services are within the criteria required.

The attenuators should be selected such that they do not lead to an unacceptable pressure drop, to be confirmed by Chapman Ventilation.

4.0 VIBRATION CONTROL

In addition to the control of airborne noise transfer, it is also important to consider the transfer of noise as vibration to adjacent properties (as well as to any sensitive areas of the same building).

We would typically advise that plant be isolated from the supporting structure by means of either steel spring isolators or rubber footings. For particularly sensitive locations, or when on lightweight structures the mounts should ideally be caged and be of the restrained type. We would also recommend that the manufacturers' installation recommendations are followed with regards to mounting and installing all plant items.

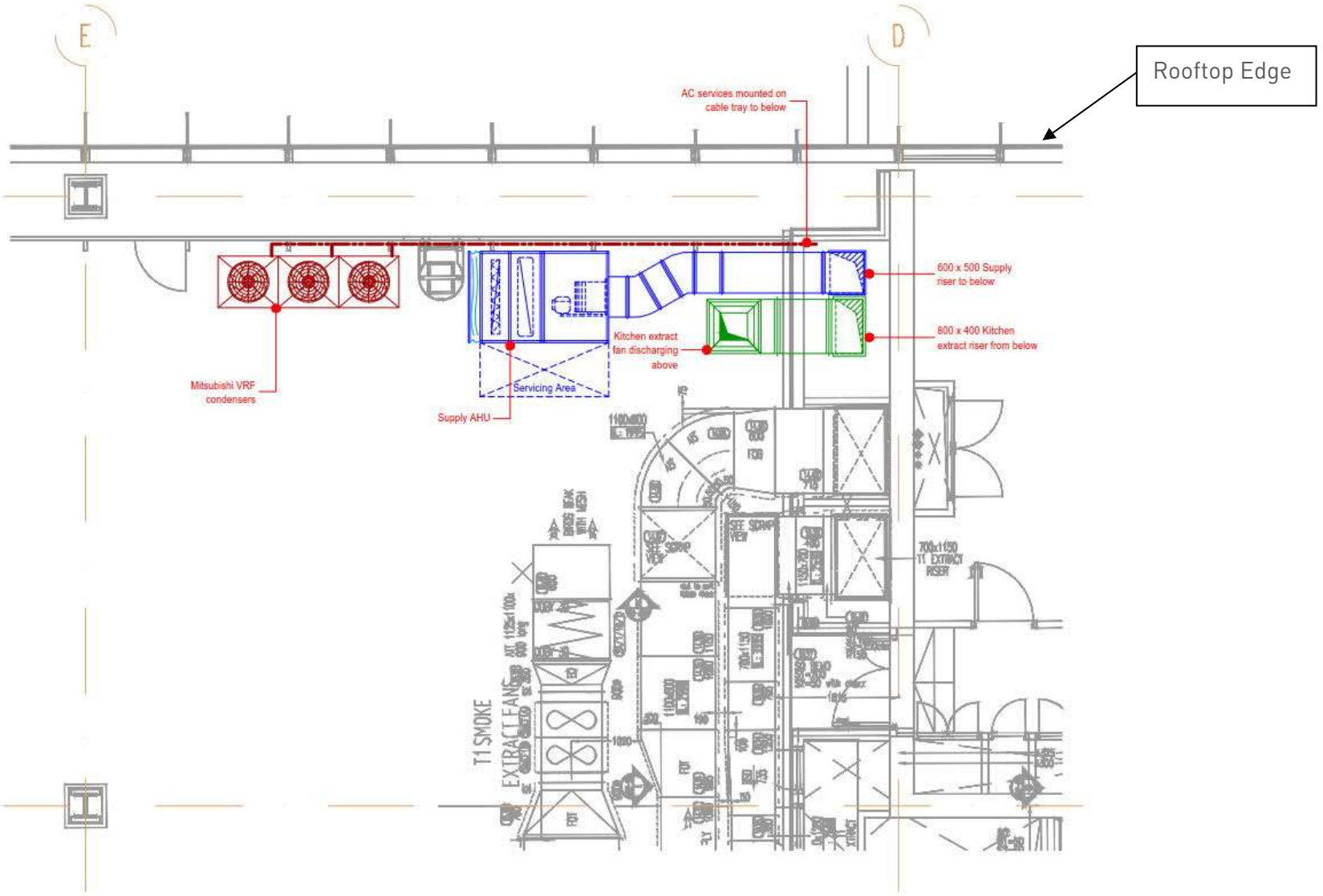
It is important the isolation is not "short-circuited" by associated pipework or conduits. To this end, any conduits should be looped and flexible connectors should be introduced between the plant and any associated pipework. Pipework should be supported by brackets containing neoprene inserts.

5.0 CONCLUSION

The results of the assessment indicate atmospheric noise emissions from the plant are within the criteria required by the Base Building Definition document providing suitable mitigation measures are employed. With such measures in place, the proposed plant installations should be considered acceptable.

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.



Drake & Morgan, 1-5 Brock Street

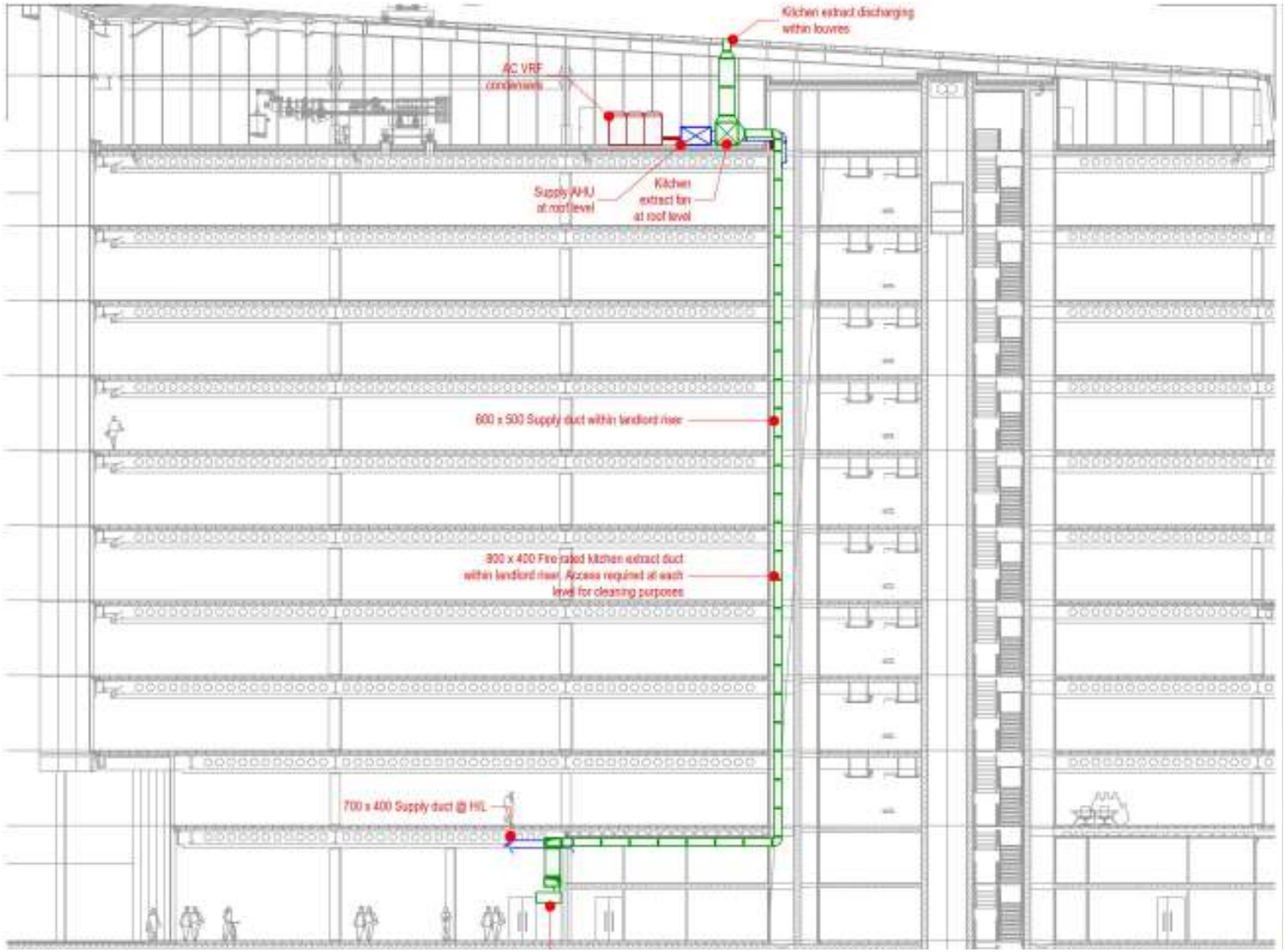
Site Plan Showing Roof Layout

Figure 6244/SP1

16 July 2014

Not to Scale

RBA ACOUSTICS



Drake & Morgan, 1-5 Brock Street

Section Showing Plant Layout

Figure 6244/SP2

16 July 2014

Not to Scale

RBA ACOUSTICS

RBA ACOUSTICS

44 Borough Road

London SE1 0AJ

T. +44 (0) 20 7620 1950

W. www.rba-acoustics.co.uk