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47 MARCHMONT STREET, LONDON, WC1

Technical Note

Acoustic Assessment Report

28th April 2015 Peter Clark

1. INTRODUCTION

1.1 A noise assessment has been carried out for the property at 47 Marchmont Street, London, WC1. Currently there is a restaurant at ground floor level with basement below which is principally vacant but has an extent use of B1 Office. The basement area is largely used for storage purposes for the upstairs restaurant. The proposed re-development of the basement area provides a new pizzeria restaurant. Marchmont Street itself has little traffic, hence there is little traffic noise, and there are a number of cafes, bars, restaurants etc (including the restaurant at ground floor level above) nearby. The existing restaurant above has air conditioning and ventilation plant adjacent namely air conditioning condenser units in the front lightwell and kitchen ventilation/extraction plant to the rear. There is sufficient spare capacity within the current HVAC systems such that NO additional mechanical plant and equipment is required to serve the lower ground floor. A noise assessment report is required to accompany the Planning Application/Listed Building Consent for the proposed lower ground floor use. The assessment considers the potential noise from adjacent plant on the existing, neighbouring residential uses. Details are also contained in this report pertaining to the existing and proposed sound insulation requirements between the lower ground floor area and neighbouring properties – most notably the residential properties either side at this level.

1.2 The measurements and assessment have shown that no additional noise insulation measures are required to ensure that the proposed lower ground floor restaurant meets with the requirements of the London Borough of Camden (LBC) Noise Policies.

1.3 The site location and surroundings are given in Figure 1 below:

Figure 1: Site Location (© Google Maps)

2.0 NOISE MEASUREMENTS

Environmental Noise Measurements

2.1 Previously in September 2014[1], noise measurements were carried out by positioning noise monitors in both the front lightwell and the rear courtyard at the property. Measurements were carried out between from 1pm Monday 22nd and 2.30pm on Thursday 25th September 2014 and used to log noise levels over the three day period. Photographs of noise monitors and their locations are shown in Figures A.1.1 and A.1.2 at the end of this report.

Sound Insulation Measurements

2.6 Due to restrictions on access (access to neighbouring residential properties was not possible), no specific sound insulation performance tests on the party walls between the lower ground floor levels have been carried out. Notwithstanding this, many of the properties in Marchmont Street were built in the 19th Century and as such the construction of the lower ground floor walls is substantial. It is further understood that the party wall on either side of 47 Marchmont Street each comprise very thick brickwork with each wall being a solid brick construction no less than 450mm thick, with plaster both sides giving a total mass per unit area of some 960 kg/m^2. Although the sound insulation performance of the walls could not be tested, comparing the mass of these walls with those required to achieve

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[1] As a part of a previous application that was withdrawn, noise measurements were undertaken at both the front and rear of 47 Marchmont Street. There have been no significant changes to plant and equipment since then and the data measured is therefore considered to be current.

minimum requirements of building regulations standards[2] shows that the expected sound insulation performance of the party walls is very high.

3.0 RESULTS

Environmental Noise Measurements

3.1 Noise level measurements were carried out at 5 minute intervals during the survey period. Ambient (L_{Aeq}) and background (L_{A90}) noise levels were measured. Minimum noise levels for the day-time (07:00 to 19:00 hrs), evening time period (19:00 to 23:00 hrs) and night time period (23:00 to 07:00 hrs) have been determined.

Table 2.1: Summary Results (Front)

	Day	Evening	Night
L_{A90}	49.4	49.6	36.9(35.2)*
L_{Aeq}	58.2	56.9	48.1

*Note: The lowest night time background noise level measured during the survey period was 35.2 dB(A) and occurred at 3.15am on Thursday 25th September 2014.

Table 2.2: Summary Results (Rear)

	Day	Evening	Night
L_{A90}	61.6	54.7	36.8(34.2)†
L_{Aeq}	68.9	67.8	42.8

†Note: The lowest night time background noise level measured during the survey period was 34.2 dB(A) and occurred at 1.45am on 25th September 2014.

[2] Approved Document E of Building Regulations (2010) gives guidance on the required mass of party walls (single and double leaf) to achieve minimum standards. This mass is in the region of 375 to 415 kg/m^2 depending on wall type.

3.2 A full listing of 5 minute interval data for the period is given in the graph at the end of this report (Figure A2.1 for the front and A2.2 for the rear noise measurements respectively).

3.3 The London Borough of Camden Replacement Unitary Development Plan – Appendix 1; Table E "Noise levels from plant and machinery at which planning permission will not be granted" is listed below.

Noise description and location of measurement	Period	Time	Noise Level
Noise at 1 metre external to noise sensitive façade	Day, evening & night	0000-2400	5dB(A)<L_{A90}
Noise that has a distinguishable discrete continuous note	Day, evening & night	0000-2400	10dB(A)<L_{A90}
Noise that has distinct impulses	Day, evening & night	0000-2400	10dB(A)<L_{A90}
Noise at 1 metre external to sensitive façade where L_{A90}>60dB	Day, evening & night	0000-2400	55dB L_{Aeq}

3.4 The proposed air conditioning equipment does not attract the + 5 dB(A) correction referred to in " *paragraph 8 of BS4142*" (i.e. contains no distinguishable discrete continuous note or distinct impulses)

3.5 It therefore follows that the criterion to meet is 30.2 dB(A) for the nearest neighbouring residential property which is the first floor flat of 47 Marchmont Street itself. The condenser unit is Panasonic Model U-6LE1E8 with manufacturer's specified noise data of 55 dB(A) when measured at

1m (see Figure A.3 in Appendix A). Calculated noise levels at the front ground floor windows on either side are then:

- Unit SPL at 1m: 55 dB(A)
- Barrier and directivity effect from lightwell/pavement roof etc: -12dB(A)
- Distance correction (5m): -14.0 dB(A)
- Predicted noise level at first floor window: 29.0 dB(A)

3.6 Noise measurements taken in the rear courtyard are dominated by the extract/ventilation fan which exhausts into the courtyard via a louvre at basement level. The noise level spectrum, which represents an overall noise level of 68.5 dB(A), taken 1m from the louvre is given in Figure 2 below:

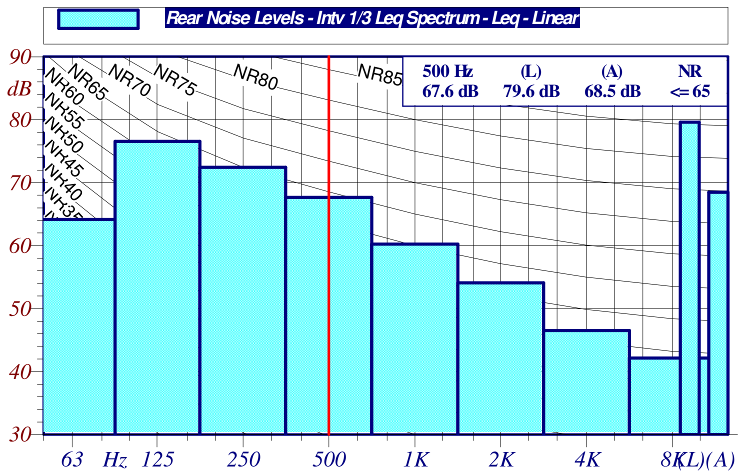

Figure 2: Noise from ventilation fan in Rear Courtyard

3.7 The noise level v. time plot (Figure A.2.2.) indicates that noise levels in the rear when the fan is not operational have a minimum background ($L_{A90,5min}$) of 34.2 dB. It therefore follows that to meet LBC noise criteria, the fan noise level should be reduced to 29.2 dB(A). A silencer, typically not less than 1200mm long, will need to be fitted into the extract system ductwork down-stream of the fan itself.

3.8 Noise levels internal to the basement area were also measured. Dominant noise at the time of the measurements arose from the extract fan installation (casing noise). Noise levels were shown to be typically 60 dB(A) with octave band spectrum as measured below:

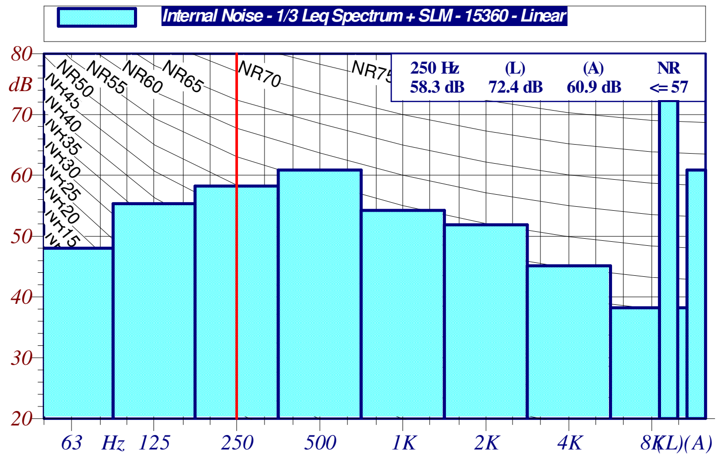

Figure 3: Internal noise level in basement (from extract fan)

3.9 Internal noise levels should be reduced to be no more than 50 dB $L_{Aeq,T}$ to represent a "good standard" as specified in BS8233: 1999[3]. To reduce noise levels by a minimum of 10 dBA, the party wall between the proposed restaurant space and ventilation fan plantroom should be constructed from with standard plasterboard stud partition with mineral fibre blanket sandwiched between and at least the internal (restaurant side) plasterboard skim plastered.

[3] BS8233: 1999 provides useful guidance on acceptable levels of internal noise for a variety room applications/uses.

Sound Insulation Measurements

3.10 As previously stated, a measurement of the existing party wall sound insulation performance has not been possible. However, details of the existing wall constructions are such that the walls themselves are of a very substantial construction, considerably in excess of those that would be required to meet with the minimum requirements as set out in Building Regulations "Approved Document E (2010)". This document contains guidance on the likely wall mass that is required to achieve minimum standards of insulation for a "new-build" property (i.e. to achieve an airborne insulation ($D_{nT,w}$ + C_{tr}) be 45 dB or greater requires a wall mass of some 375 to 415 kg/m^2). In addition to this, to provide additional acoustic insulation, it is also proposed that an additional two layers of acoustic plasterboard, resiliently mounted to the existing structure be applied to the inner face of each of the party walls. Given the intended wall construction will now be, as a minimum, a double wall with overall mass greater than 960 kg/m^2, the expected sound insulation performance will be in excess of 52 dB ($D_{nT,w}$ + C_{tr}) and as such neighbouring properties will be well insulated from the proposed lower ground floor restaurant.

4.0 CONCLUSION

4.1 A noise measurement survey and assessment has been carried out at 47 Marchmont Street, London WC1. The surveys and assessments have been concerned with both internal and external noise levels as it is proposed that the existing lower ground floor area at the property be re-furbished and developed as a new pizzeria restaurant, which will be run as a separate entity to the existing restaurant business above.

4.2 The noise measurements and assessment have shown that no additional noise attenuation measures are required to meet nationally accepted acoustic design criteria and LBC specific requirements.

APPENDIX A: GRAPHS AND FIGURES.

Figure A1.1: Noise Monitor in Front Lightwell

Figure A1.2: Noise Monitor in Rear Courtyard

Figure A2.1 Environmental Noise Data (Front Lightwell) – Monday 22nd to Thursday 25th September 2014.

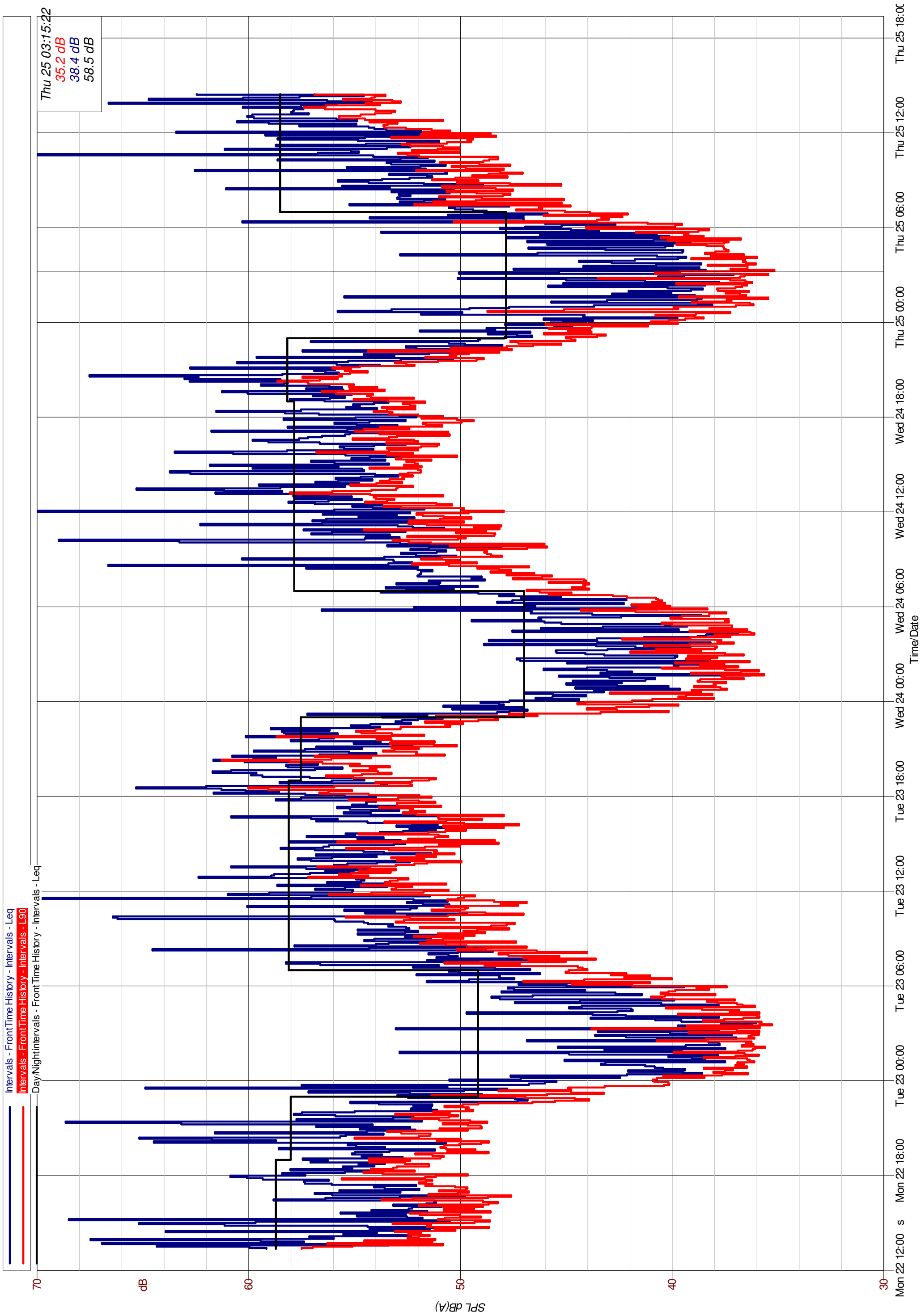

Figure A2.2 Environmental Noise Data (Rear Courtyard) – Monday 22nd to Thursday 25th September 2014.

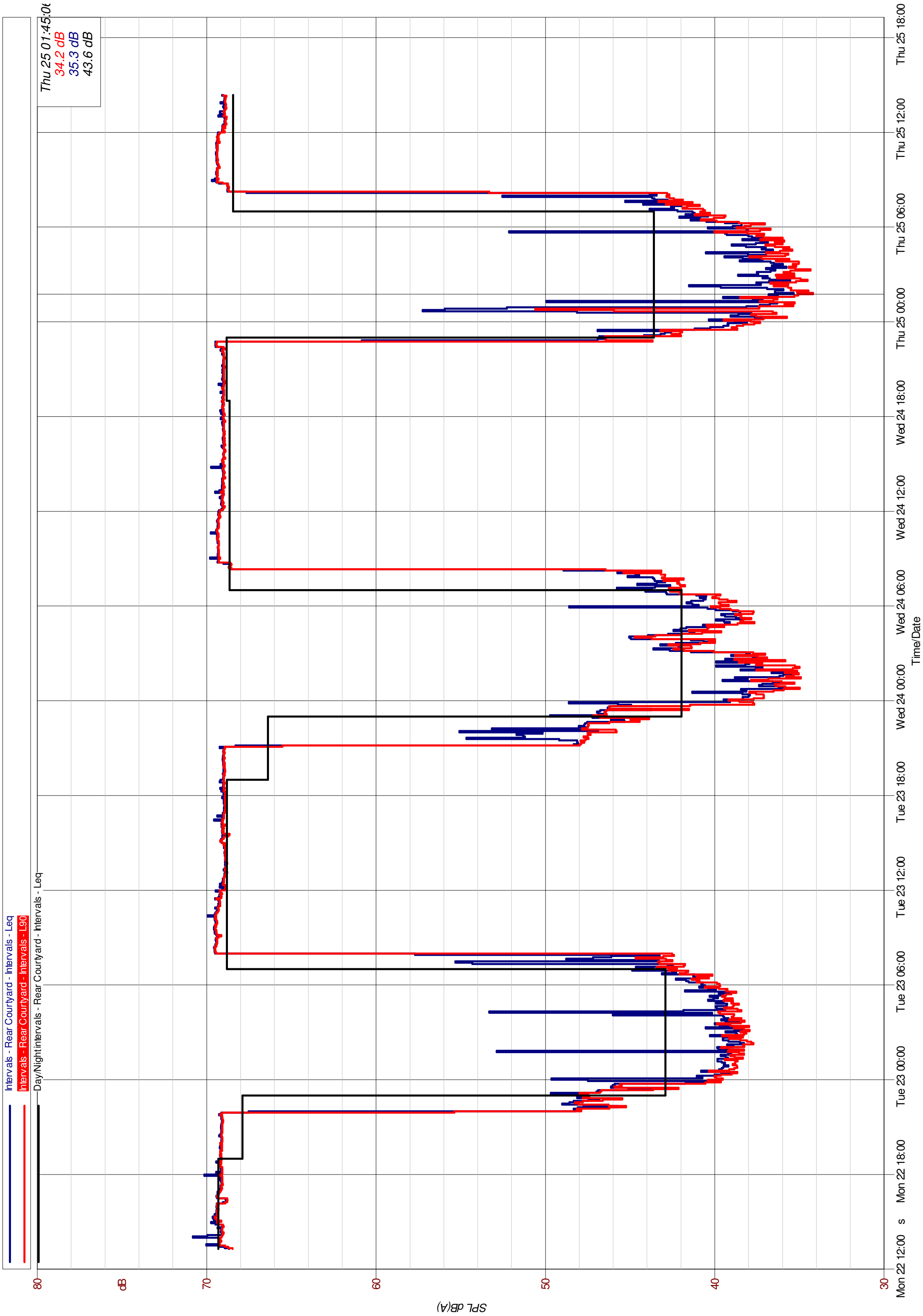

Figure A.3: External Condenser Unit Noise Data

Panasonic U-6LE1E8

Panasonic

MINI ECOi HIGH EFFICIENCY

FOR LIGHT COMMERCIAL USE

Panasonic's Mini ECOi, the 2-Pipe heat pump small VRF system, is specifically designed for the most demanding applications. Offering between 11 kW and 16 kW cooling capacity in 3 sizes and up to 9 indoor units connected, the Mini ECOi sets standards of performance and flexibility. Utilising R410A and DC inverter technology, Panasonic offers VRF to a new and growing market. Forming a new key part of the Panasonic VRF line up, the Mini ECOi is compatible with the same indoor units and controls as the rest of the ECOi range.

AUTHORISED INSTALLERS ONLY

TECHNICAL FOCUS

- SINGLE PHASE OR THREE PHASE POWER SUPPLY
- ONE AMP START CURRENT
- DC INVERTER TECHNOLOGY COMBINED WITH R410A
- DIVERSITY RATIO 50-130%
- COOLING OPERATION TO -10 °C
- COMPACT OUTDOOR UNIT 1,330 x 940 x 410 mm

HP			4.0 HP		5.0 HP		6.0 HP	
Model name			U-4LE1E5	U-4LE1E8	U-5LE1E5	U-5LE1E8	U-6LE1E5	U-6LE1E8
Power supply			220/230/240 V, 50 Hz	380/400/415 V, 50 Hz	220/230/240 V, 50 Hz	380/400/415 V, 50 Hz	220/230/240 V, 50 Hz	380/400/415 V, 50 Hz
Cooling capacity		kW	12.1	12.1	14.0	14.0	15.5	15.5
		BTU/h	41,300	41,300	47,800	47,800	52,900	52,900
EER		W/W	4.30	4.30	4.20	4.20	3.45	3.45
Heating capacity		kW	12.5	12.5	16.0	16.0	18.0	18.0
		BTU/h	42,700	42,700	54,600	54,600	61,400	61,500
COP		W/W	4.62	4.62	4.30	4.30	3.95	3.95
Dimensions	H x W x D	mm	1,330 x 940 x 340 (410)	1,330x 940 x 340 (410)	1,330 x 940 x 340 (410)	1,330 x 940x 340 (410)	1,330 x 940 x 340 (410)	1,330 x 940x 340 (410)
Piping connection	Gas	mm	15.88	15.88	15.88	15.88	19.05	19.05
	Liquid	mm	9.52	9.52	9.52	9.52	9.52	9.52
Sound pressure level	Cooling	dB(A)	50	50	51	51	52	52
	Heating	dB(A)	52	52	53	53	55	55
Maximum number of indoor units			6	6	8	8	9	9

Preliminary specifications, subject to change without notice.

GLOBAL REMARKS

Rated conditions:	Cooling	Heating
Indoor air temperature	[illegible]	[illegible]
Outdoor air temperature	[illegible]	[illegible]

Specifications subject to change without notice.

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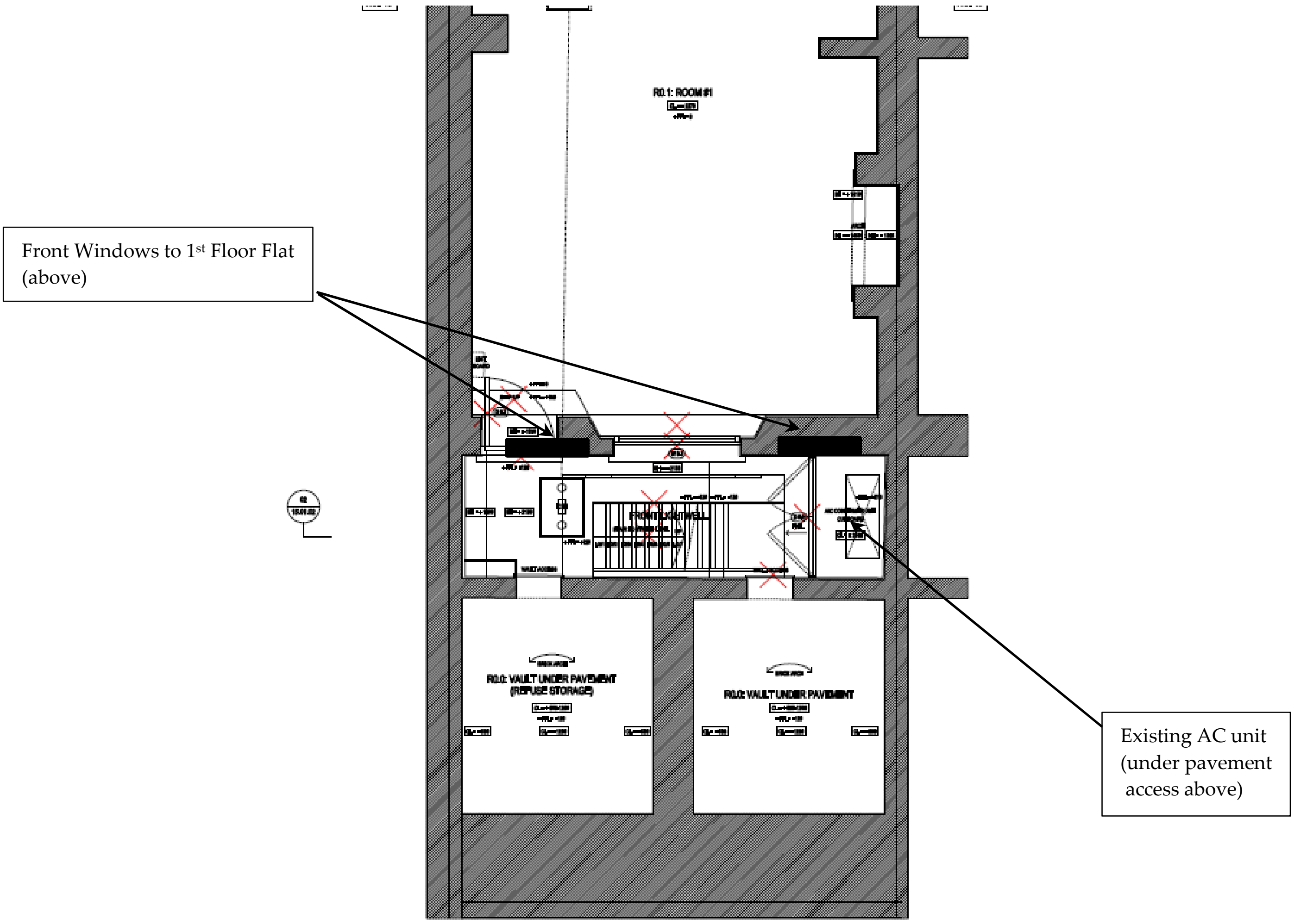
Figure A.4: Layout Drawings

Front Lightwell Area



Extract from Seary Architects Drawing 15-01-01 dated 19th March 2015

APPENDIX B: GLOSSARY OF NOISE TERMS AND UNITS.

1.0 Noise

1.1 The sounds that we hear are as a result of successive air pressure changes. These air pressure changes are generated by vibrating sources, such as train engines or wheels, and they travel to a receiver, i.e. the human ear, as air pressure waves.

1.2. The human ear is capable of detecting a vast range of air pressures, from the lowest sound intensity that the normal ear can detect (about 10^{-12} watts/m^2) to the highest that can be withstood without physical pain (about 10 watts/m^2). If we were to use a linear scale to represent this range of human sensitivity it would encompass more than a billion units. Clearly this would be an unmanageable scale yielding unwieldy numbers.

1.3. The scale can be compressed by converting it to a logarithmic or Bel scale, the number of Bels being the logarithm to the base 10 of one value to another (as applied by Alexander Graham Bell to measure the intensity of electric currents). The Bel scale gives a compressed range of 0 to 12 units which in practice is a little too compressed. A more practical operating range of 0 to 120 is obtained by multiplying by 10, ie. 10 x Bel, which produces the scale units known as decibels or dB.

1.4. Examples of typical sound intensity levels within the decibel range of 0 to 120 dB are listed below:

Commercial four-engine jet aircraft at 100m	120dB
Riveting of steel plate at 10m	105dB
Pneumatic drill at 10m	90dB
Circular wood saw at 10m	80dB
Heavy road traffic at 10m	75dB

Male speech, average, at 10m	50dB
Whisper at 10m	25dB
Threshold of hearing, 1000Hz	0dB

1.5. Due to this logarithmic scale noise levels have to be combined logarithmically rather than arithmetically. For example, two equal sound sources of 70 dB each, when operated simultaneously, do not produce a combined level of 140 dB but instead result in a level of 73 dB, ie. A rise of 3dB for each doubling of sound intensity. Subjectively, a 3dB change does not represent a doubling or halving of loudness; to make a sound appear twice as loud requires an increase in sound pressure level of about 10dB.

1.6. The subjective loudness of noise can be measured by applying a filter or weighting which equates to the frequency response of the human ear. This is referred to as an A-weighting and when applied results in noise levels expressed as dB(A).

1.7. dB(A) noise levels can be measured using a variety of noise indices. The index which correlates best with human response due to machinery noise is the L_{Aeq} this is the A-weighted L_{eq} which is referred to as the 'equivalent continuous noise level' and is a measure of the total sound energy generated by a fluctuating sound signal within a given time period.