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ASSESSMENT OF AIR CONDITIONING NOISE

13 PRINCE ALBERT ROAD, REGENTS PARK LONDON NW1 7SR

Client: Hugh Cullum Architects Limited
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CONTENTS

1. SUMMARY

1. An assessment of noise has been carried out at 13 Prince Albert Road, where a new air conditioning condensing unit is to be installed in a basement plant room.

2. Ambient noise levels in the vicinity of the installation have been measured, and this exercise indicated that the background noise level, L_{A90}, falls regularly to a level of 32 dB(A) in the middle of the night.

3. Calculations of noise radiating from the condenser have indicated that a level of 22 dB(A) at nearest residential façades can be achieved, with the installation of an acoustic louvre plantroom door and acoustically absorbent panels to the plant room ceiling(see page 6).

4. The predicted noise emitted from the condenser would be some 10 dB below the minimum background noise level during the night. As the noise from the proposed unit will not feature any strong tonal concentration, this difference would be described by BS4142 as being a "positive indication that complaints are unlikely".

5. Subject to any specific conditions issued by the Local Authority, it is concluded that the installation of the condensing unit will have negligible impact on the surrounding environment.

2. INTRODUCTION

An assessment has been undertaken at 13 Prince Albert Road, London to determine the impact of an air conditioning unit on the existing ambient noise climate.

The site is located on the north side of Regents Park, in a largely residential area (Figure 1). The site is a semi-detached house, which will be subject to extension and refurbishment in the near future. One part of the project will see the addition of a new air conditioning condenser in a basement plant room (Figures 2 - 4).

Concern has been expressed that noise from the new plant may adversely affect the amenity other occupants in the immediate vicinity. It is also recognised that any Planning Permission for such equipment may be accompanied by a Condition limiting the noise emitted.

An assessment has been therefore been commissioned to demonstrate that the predicted noise due to the proposed plant will be suitable when compared to either the existing ambient noise climate or absolute levels of acceptable noise.

The objectives of the present exercise may be summarised as follows:

(a) To determine the existing noise levels in the area;
(b) To propose a design criterion for limiting noise emission from new building services plant;
(c) To predict the noise likely to be generated by the proposed building services plant, and to assess these levels against the design criterion;

This report describes the work carried out on each of those objectives and summarises the conclusions that can be drawn from the results.

3. SURVEY OF AMBIENT NOISE

For developments which involve the installation of building services plant, the descriptor of the ambient noise climate which is most of interest for the setting of design targets is the L_{A90} parameter. This is the sound pressure level which is exceeded for 90% of a defined sampling period. The unit can be taken as representative of the ambient background noise level for the area, and as the criterion of acceptability for the assessment of any new noise, as recommended in BS 4142[1]. The value normally taken for the assessment of continuously running plant is the lowest reached during the twenty-four hour period.

To clarify the existing ambient noise climate, reference is made to a previous noise survey, which was undertaken in the adjacent property, No. 12 Prince Albert Road. Together with No. 13 Prince Albert Road, these form a pair of semi-detached houses.

A Rion NL-31 sound level meter was set in the side garden of the adjacent property (see Figure 1). The meter was configured to measured 15 minutes samples of the following acoustic parameters:

L_{Aeq} The A-weighted equivalent continuous sound pressure level which, over the sample period, contains the same acoustic energy as the time-varying signal being recorded.

L_{Amax} The A-weighted maximum sound pressure level recorded during each sample period (as measured on fast response).

L_{A90} A statistical parameter, representing the A-weighted noise level exceeded for 90% of each sample period. This gives a measure of the underlying noise, and is commonly used to describe the ambient background noise.

The equipment was calibrated before and after the survey.

The original survey ran for 7 days from Wednesday 11th November 2008 to Tuesday 18th November 2008. The variation of noise is shown graphically in Figure 5.

The key measurement for this exercise is the minimum value of the background noise. This was found to be a level of 32 dB(A) L_{A90}, at 03.45 on the 17th November 2008. It is noted that levels of 32 – 35 dB(A) were reached on a number of nights during the survey.

[1] British Standard 4142 1997 "Method for rating industrial noise affecting mixed residential and industrial areas"

4. CRITERIA FOR NOISE AFFECTING ADJACENT PROPERTIES

The impact of commercial noise sources, such as air conditioning equipment, on adjacent residential properties is commonly judged using the methodology of British Standard 4142:1997 "Method for rating industrial noise affecting mixed residential and industrial areas".

In brief, this rating method determines "specific noise level" generated by the plant under consideration, assessed immediately outside the residential properties most likely to be affected. The value may be measured, if the plant is operating, or calculated, if the plant is being designed. For night time operation of the equipment (2300 - 0700), the noise would be assessed over a 5 minute operational period.

A correction of + 5 dB(A) is made to the “specific noise level” if the new noise is noticeably tonal in content or intermittent. The result of any such adjustment is then termed the "Rating Noise Level".

A comparison is then made between the Rating Noise Level and the ambient background noise level[2], at each location of interest .

If the Rating Noise Level exceeds the ambient background noise level by more than 10 dB(A), complaints are to be expected. An excess of 5 dB(A) is said to be "of marginal significance". If the Rating Noise Level is 10 dB below the ambient background noise level, this is “a positive indication that complaints are unlikely”.

Subject to any specific conditions arising from the Local Authority Planning Consent, it is good practice to limit new noise to a Rating Level not more than 5 dB below the minimum background noise level and preferably 10 dB below.

[2] That is the noise level which would prevail at that time and place, in the absence of any noise from the new plant under consideration. The background noise is normally measured and described as the L_{A90} parameter

5. PREDICTION OF CONDENSING UNIT NOISE

The plant to be situated at No. 13 Prince Albert Road is likely to be a Daikin RXYQ5P VRV 111 condensing unit (635W x 765D x 1680H). This will provide cooling capacity for the swimming pool.

It is understood that the condenser will be located within a basement plant room (see Figure 2). The plant room will be ventilated to the light well, which is open at ground floor level (see Figures 3 & 4)

The condensing unit is rated at a sound pressure level of 54 dB(A) measured in free field conditions at a distance of 1m from the unit

Table I details a calculation of the noise transmission from the unit to the nearest neighbouring windows, 10 meters from the top of the light well. The prediction takes account of the reverberant sound pressure level within the plant room, the break-out of noise through the attenuated plant room doors into the light well, and the radiation of residual noise from the top of the light well.

The predicted noise level for condensing unit is 22 dB(A) at a distance of 1m from the nearest window.

In order to achieve this level, it is noted that:

(i) The doors between the plant room and light well will be 300mm deep acoustic louvre doors, with nom. 35% open area.

(ii) The soffit to the plant room will need to be acoustically absorptive. This can be achieved by lining the soffit with either 50mm thick proprietary acoustic panels, or finishing the soffit with 50mm battens, 50mm insulation between the battens and a perforated plasterboard such as Gypsum Gyptone Quattro 44 board.

The predicted noise level is therefore some 10 dB below the minimum background noise level during the night. Since such units rarely emit a strong tone, the Rating Level would be expected to be the same. This is a condition which BS4142 would describe as being a “positive indication that complaints are unlikely”.

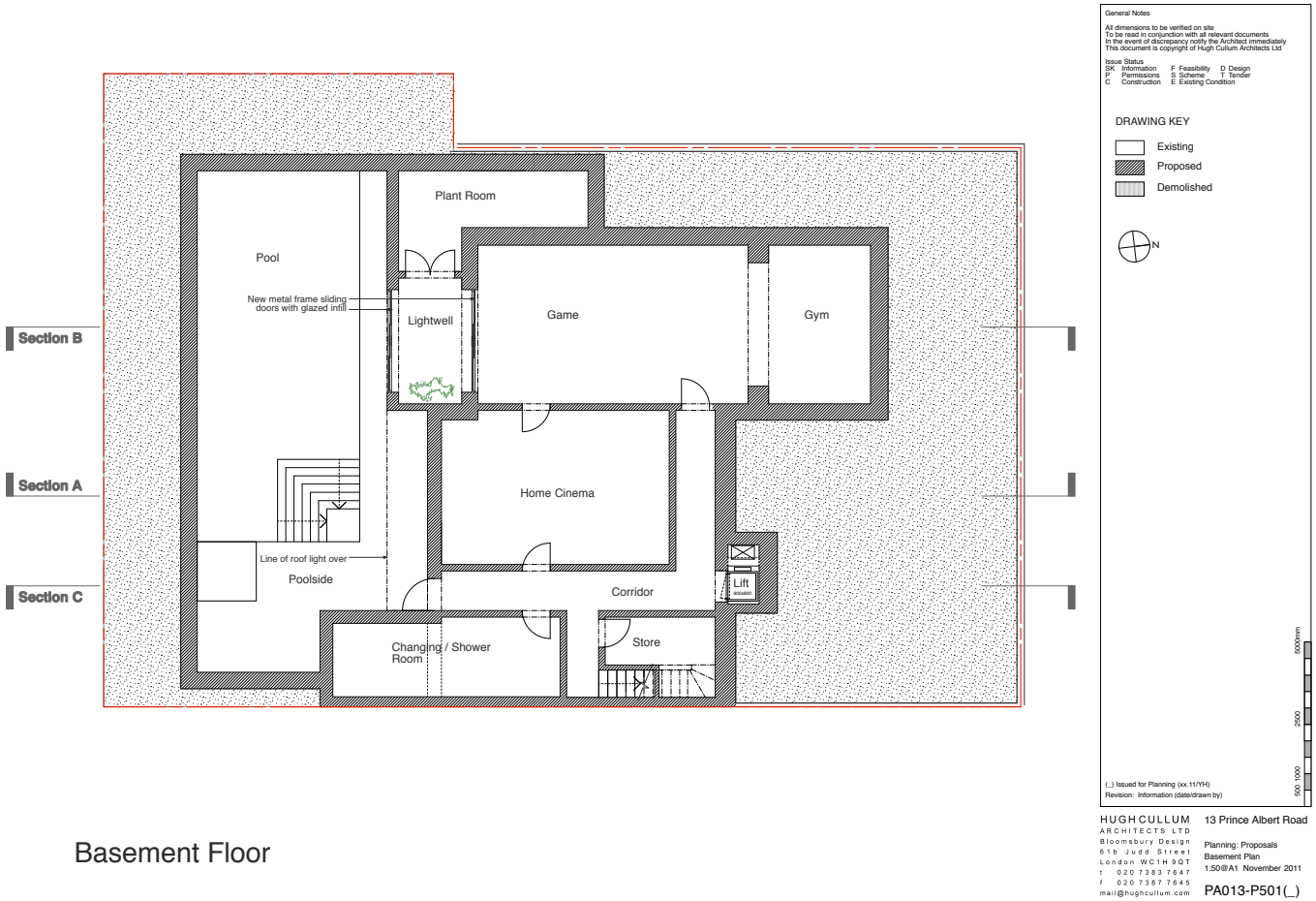
On that basis, it would be concluded that the unit is very unlikely to have an adverse impact on the local environment.

Table I – Prediction of Emitted Noise

Frequency	**Hz**	**63**	**125**	**250**	**500**	**1K**	**2K**	**4K**	**8K**	**dB(A)**
Sound Pressure Level @1m	dB	58	59	56	53	47	42	37	35	54
Extrapolated Sound Power Level	dB	66	67	64	61	55	50	45	43	62
Acoustic Absorption in Plant Room (nom. 6m x 2m x 2.5m high)										
Floor		1.2	1.2	1.2	1.2	1.2	1.2	1.2	1.2	
Walls x2		2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	
Walls x2		1	1	1	1	1	1	1	1	
Ceiling (absorptive)		3.6	6	8.4	9.6	10.8	10.8	10.8	10.8	
Total Acoustic Absorption		8.2	10.6	13	14.2	15.4	15.4	15.4	15.4	
Average Absorption coefficient		0.13	0.17	0.20	0.22	0.24	0.24	0.24	0.24	
Room Constant		12.34	16.67	21.41	23.95	26.62	26.62	26.62	26.62	
Reverberant Sound Pressure Level in Plant Room	dB	61.1	60.8	56.7	53.2	46.8	41.8	36.8	34.8	54
Sound Power Entering Lightwell via Louvred Plant Room Doors										
Area Correction	dB	-1	-1	-1	-1	-1	-1	-1	-1	
Acoustic Louvre Door-set	dB	-6	-8	-10	-19	-25	-20	-18	-15	
SWL entering Lightwell	dB	54	52	46	33	21	21	18	19	
Acoustic Absorption in Lightwell (nom. 4m x 2m x 6m high)										
Floor		0.8	0.8	0.8	0.8	0.8	0.8	0.8	0.8	
Walls x2		4.8	4.8	4.8	4.8	4.8	4.8	4.8	4.8	
Walls x2		2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	
Ceiling (open)		8	8	8	8	8	8	8	8	
Total Acoustic Absorption		16	16	16	16	16	16	16	16	
Average Absorption coefficient		0.18	0.18	0.18	0.18	0.18	0.18	0.18	0.18	
Room Constant		18.67	18.67	18.67	18.67	18.67	18.67	18.67	18.67	
Plenum Loss through Lightwell		-2	-2	-2	-2	-2	-2	-2	-2	
SWL exiting Lightwell		56	54	48	36	23	23	20	21	
Transmission from Atmospheric Top of the Lightwell										
Area of Lightwell, nom. 6 x 2m	dB	11	11	11	11	11	11	11	11	
Directivity	dB	-14	-14	-14	-14	-14	-14	-14	-14	
Distance Correction to 10m	dB	-20	-20	-20	-20	-20	-20	-20	-20	
Façade Reflection	dB	3	3	3	3	3	3	3	3	
Net Sound Pressure Level at Façade	dB	36	34	28	15	3	3	0	1	22

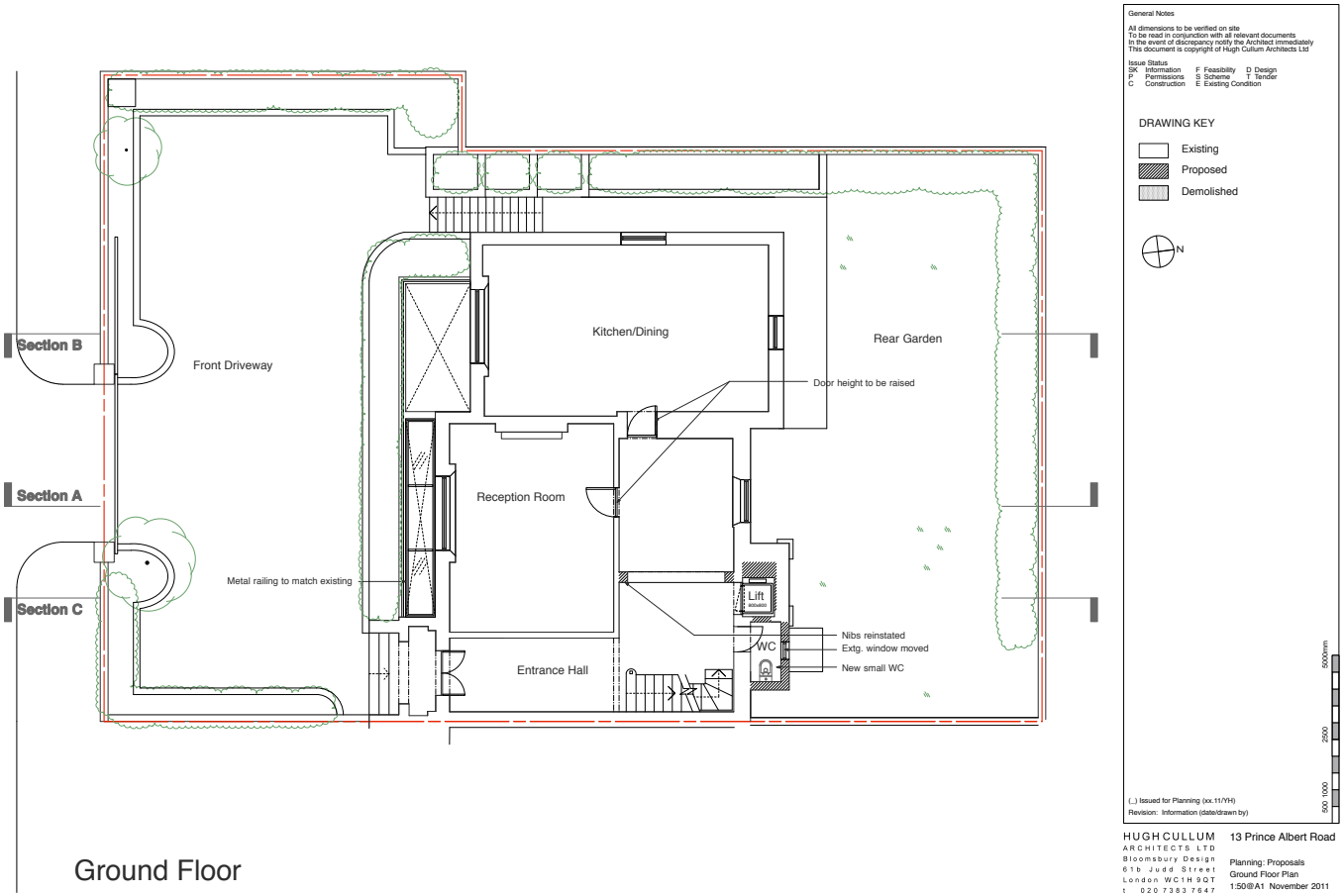
Figure 1 - Site Location Plan

Figure 2 – Proposed Basement Plan (indicating plant room and light well)



Basement Floor

Figure 3 - Ground Floor Plan



General Notes

All dimensions to be verified on site
To be read in conjunction with all relevant documents
In the event of discrepancy notify the Architect immediately
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Issue Status
SK Information F Feasibility D Design
P Permissions S Scheme T Tender
C Construction E Existing Condition

DRAWING KEY

Existing
Proposed
Demolished

N

5000mm
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(_) Issued for Planning (xx.11/YH)
Revision: Information (date/drawn by)

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13 Prince Albert Road

Planning: Proposals
Ground Floor Plan
1:50@A1 November 2011

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Figure 4 - Proposed Section

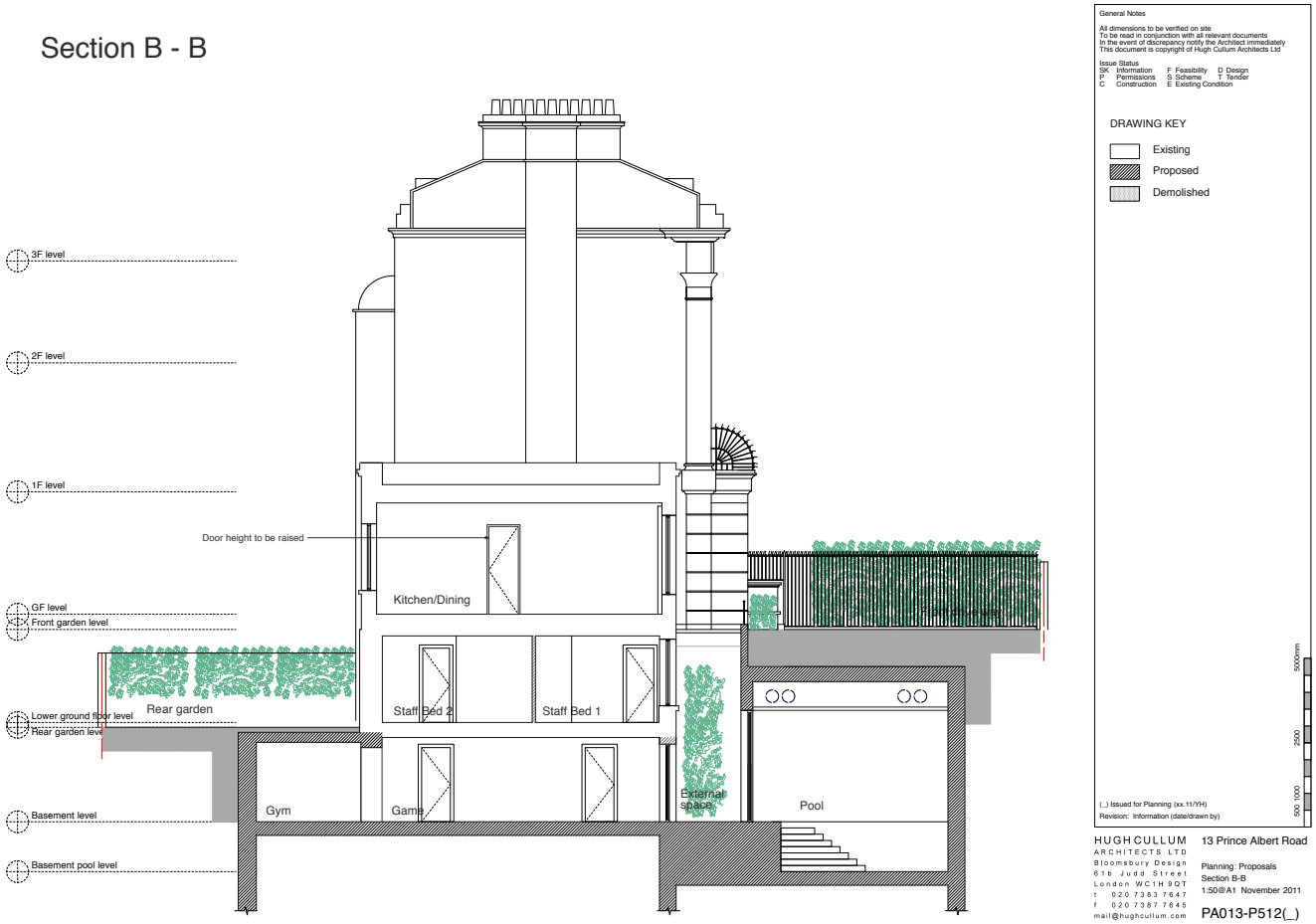

Figure 5 - Measured Noise Levels, 12 Prince Albert Road