

Ian Sharland LIMITED

Noise & Vibration Control Specialists

Ashfield House
Back lane
Marlborough
Wiltshire
SN8 1JJ

Telephone: (01672) 515761

Facsimile: (01672) 512761

Email: office@iansharland.co.uk

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ASSESSMENT OF NOISE FROM A NEW AIR CONDITIONING UNIT

OAK PARK CHILDRENS CENTRE LAVANT ROAD, HAVANT

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Client: Morgan Sindall Construction Limited
1650 Parkway
Solent Business Park
Fareham
Hampshire PO15 7AH

R Sharland MA(Cantab), CEng, MSc, MIOA
P Ashford BSc (Eng), MIOA
M Sharland
Ian J Sharland BSc (Eng), CEng, MRAs, FIOA (Associate)

Registered in England & Wales No. 1293250
Reg'd Office: 25 St Thomas St. Winchester SO23 9DD
Also at: Pinecroft Airlie Road Winchester Hampshire SO22 4NQ
Bampfylde House Poltimore Exeter Devon EX4 0AF

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1. SUMMARY

1. An assessment of noise has been carried out at the Oak Park Children's Centre on behalf of Morgan Sindall Construction.
2. The impact of noise from new air conditioning plant has been considered in relation to the existing ambient noise climate.
3. A survey of existing conditions in the vicinity of the installation have confirmed that the background noise level, L_{A90} , falls to a minimum level of 40 dB(A) in the middle of the night, or 46 dB(A) during normal working hours
4. Calculations of noise radiating from the proposed plant have predicted a level of 31 dB(A) at nearest residential façades.
5. The predicted noise emitted from the condenser would be some 15 dB below the minimum background noise level during the intended hours of use. This prediction would be described by BS4142 as being a "positive indication that complaints are unlikely".
6. In comparison with the specific requirements of the Local Authority, as set out in Condition 21 of the Planning Permission, it has been shown that the proposed plant will fall comfortably below the limits specified therein.

2. INTRODUCTION

An assessment has been undertaken on behalf of Morgan Sindall Construction Limited, to determine the impact of building services plant noise on residential properties adjacent to the Oak Park Children's Centre.

The existing Centre is to be remodelled and extended (Figures 1 & 2). The works will include the addition of a new external condensing unit on the south elevation of the building. The Planning Consent for the development includes a condition which requires the noise from any new equipment to be limited:

21 - Noise resulting from the use of any/all plant, machinery or equipment shall not exceed a level of 5 dB(A) below the existing lowest background noise level on the sites boundaries during the time of operation or 10 dB(A) below if there is a particular tonal quality, when measured according to British Standard BS4142-1997.

An acoustic assessment has been therefore been commissioned to demonstrate that the predicted noise due to the proposed plant will be acceptable when considered against these requirements.

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

- (a) To determine the existing ambient noise levels in the area of the new plant installation;
- (b) To confirm the design criterion for limiting noise emission from the new equipment;
- (c) To predict the noise likely to be generated by the proposed plant, and to assess these levels against the design criterion;
- (d) If necessary to provide recommendation for the required form of noise control.

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 4142¹.

The value normally taken for the assessment of continuously running plant is the lowest reached during the twenty-four hour period. If, however, plant is limited in its hours of operation, the key value will be the minimum during that period only.

To clarify the existing ambient noise climate, a noise survey was undertaken on the site. A Rion NL-31 sound level meter was positioned on the roof of the existing building, as close to the location of the new plant and the nearest residential properties as possible (See Figure 1). It is noted that there is existing plant on the roof of the building, and that this plant is to be retained.

The meter was configured to measured 10 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_{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, and showed no variation. The survey ran for 24 hours from Tuesday 16th November 2010 to Wednesday 17th November 2010. Weather conditions across this period varied, with the following conditions

Date	Mean wind speed	Mean Wind Direction	Rainfall
16/11/2010	1 m/s	S	None
17/11/2010	5 m/s	SSE	None

The variation of noise is shown graphically in Figure 3.

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

The key measurement for this exercise is the minimum value of the background noise. During office hours², this was found to be a level of 46 dB(A) L_{A90}. The minimum level (in the middle of the night) was 40 dB(A) L_{A90}.

The significance of these figures will be discussed below.

² Nominally taken to be 0700 – 2100.

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 level³, 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".

With the requirements of Planning Condition 21 stated earlier, it is recommended that any new noise be limited to a level 5 dB below the existing ambient climate, to prevent 'creep' in ambient levels.

This would suggest the following limiting noise target:

The Rating Noise Level produced by the new plant during the hours 0700 - 2100 should not exceed 41 dB(A) $L_{Aeq, 5 \text{ mins}}$ when measured @1m from the nearest residential window, or 36 dB(A) if that noise contains a strong tonal element.

If plant operates in the period 2100 - 0700, the above limits should be reduced by 6 dB, to 35 dB(A) and 30 dB(A) respectively.

³ 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. ASSESSMENT OF NEW PLANT NOISE

The proposed plant for the new building comprises a single air conditioning unit, set on the southern façade of the existing building (see Figure 2). It is understood that the unit would operate only when the Centre is open (taken here to be 0700 – 2100). For completeness, however, consideration will be given to night time operation also.

The proposed unit will be a Mitsubishi PUMY-P100YHM-B, which is rated at 53 dB(A) @1m. The octave band frequency spectrum for the unit is provided below and this indicates no strong tonal concentration (which bears out subjective experience of new units of this size and type).

Frequency	Hz	63	125	250	500	1K	2K	4K	8K
SPL	dB	58	53	50	49	46	41	35	38

The nearest property is situated some 18m to the south-west of the proposed location of the plant.

A formal BS 4142 assessment would therefore be as follows:

	Day Time Operation 0700 – 2100	Night Time Operation 2100 – 0700
Rated noise level of Condenser @1m	53 dB(A)	53 dB(A)
Distance Correction to 18m	- 25 dB(A)	- 25 dB(A)
Façade Correction	+ 3 dB(A)	+ 3 dB(A)
Tonal/Intermittent Character Correction	None	None
Rating Noise Level	31 dB(A)	31 dB(A)
Typical Background Noise Level, L _{A90}	46 dB(A)	40 dB(A)
RATING, dB	-15 dB	-9 dB(A)

The assessment for day time operation indicates a Rating of less than -10dB. BS4142 would conclude that this is a positive indication that complaints would not be expected.

During the 2100 - 0700 period, the Rating is -9 dB. This is to all intents and purposes a similarly positive indication that complaints would not be expected.

Referring to the various noise targets specified in Section 4 above, it is noted that the predicted facade level of 31 dB(A) is below the Planning Condition target of 41 dB(A) for day time operation, and 35 dB(A) for night time operation.

Figure 1 – Site Location



Figure 2 – Proposed Site Plan

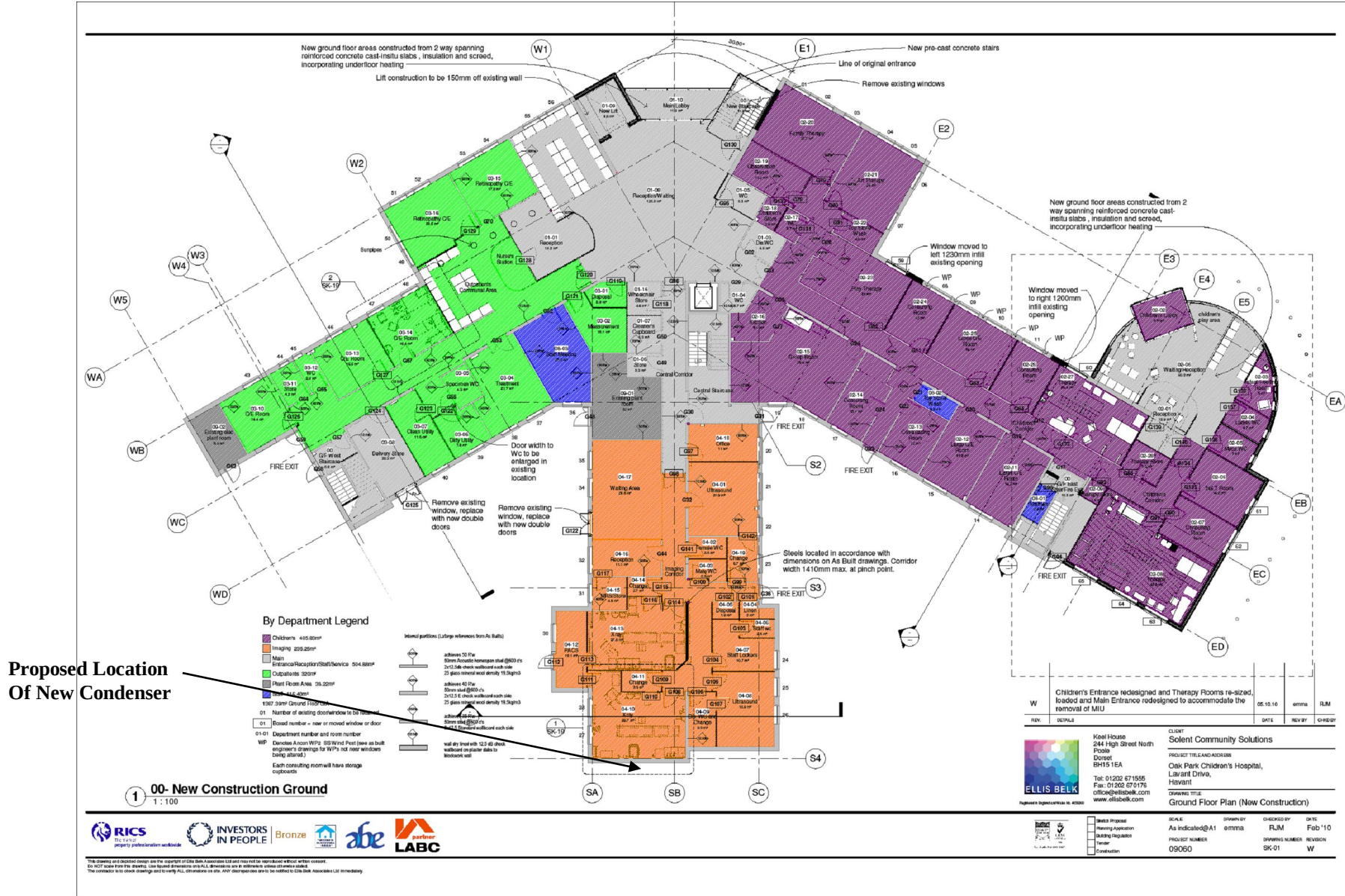


Figure 3 - Measured Noise Levels

