

No.–Report 1210/ADS

Noise Assessment 1 – Air Conditioning Unit
Pharmacy – Ruabon, Wrexham, Wales

REPORT

1210/ADS

Acoustic Consultants Report by:

Dr Roger Hill

F.Inst.P, MIOA, FRSA

PREPARED AT THE REQUEST OF:

Andrew Design Services based in Chirk

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1. SUMMARY CONCLUSIONS

- i. **EARLY MORNING NOISE ENVIRONMENT:** background noise measurements were taken over a period of 3 hours from 6.30am until 9.30am.
- ii. **NOISE ENVIRONMENT DUE TO AIR-CONDITIONING UNIT:**
Calculations have been undertaken based on measured background noise and manufacturer's data for the proposed air-conditioning unit. This data suggests that noise complaints due to the operation of the air-conditioning unit are unlikely and the contribution falls below the existing early morning background noise levels.
- iii. **ACOUSTIC ENCLOSURE:** since the perception of noise annoyance depends on a number of factors, we recommend mounting the unit of the rear wall of the pharmacy and providing a visual and acoustic enclosure

around it, to minimise any air-conditioning noise further. We have not at this stage undertaken design of such an enclosure. It seems likely that commercial enclosures would provide an unnecessary level of noise suppression based on the outcome of our assessment using BS4142.

- iv. PREDICTION METHODS: Our recommendations are based on the use of current acoustic standards, calibrated instrumentation, extrapolations and the use of the physics of sound propagation. Site noise measurements have been made and summary data and recommendations are presented. However, this data represents the particular noise conditions at the particular time and day when they were made. While we have select suitable times that reflect the likely prevailing conditions at other times, we cannot guarantee that measurements made for these times will reflect all situations now or in the future. Acoustic standards are devised to take account of this fact and provide confidence in the data acquired according to these standards.

2. INSTRUCTIONS and ISSUES

This report offers advice and opinions concerning the acoustic environment relating to a proposed installation of an air conditioning unit at the rear of a pharmacy premised in Ruabon near Wrexham. The pharmacy forms part of a new Medical Centre. The rear of the pharmacy is within a few metres of the property boundary and adjacent to the rear gardens of a row of 19th or early 20th century terraced residential properties.

Andrew Design Services are advising on the installation of an air-conditioning unit. The main noise issues arise from the proximity of domestic gardens and the presence of the air conditioning unit on the rear pharmacy wall, still to be installed.

We are commissioned to carry out site noise measurements, quantify the existing noise environment and recommend any changes that improve the acoustic environment due to the proposed installation.

3. DOCUMENTATION

Plans of the proposed site and documentation regarding the need for a noise assessment, were provided. Malcolm Andrew of Andrew Design Services who also provided us with sample acoustic data for the air conditioning unit to be installed and manufactured by Mitsubishi Heavy Industries. Various backup information searches were done by ourselves.

4. CHRONOLOGY

Kogan Communications Ltd. (Kogan Acoustic Consulting) have been asked to advise on issues related to the site, including site measurement of noise, following email exchanges and submission and approval of our costing by Malcolm Andrew. This approval was received on 19th November 2010. Site noise measurements were made on the morning of the 24th November 2010. This report was finalised and submitted in electronic format to Andrew Design Services on 1st December 2010 with printed versions by post.

We understand the planning application is still pending and that this report will form part of this application.

5. TECHNICAL ASSESSMENT

Equipment Used:

Noise measurements were made using a Norsonic 140, class 1 sound level meter. Data collected during noise monitoring was transferred to PC for analysis. Limited data was also recorded manually on site. Before each noise

measurement, the sound level meter was calibrated using a Norsonic calibrator model 1251. All instrumentation had a valid calibration certificate traceable to national standards.

Procedure on Site:

The new pharmacy is seen in fig.1. Noise was monitored at 3 positions; at the end of the ramp (approximately the camera position in fig.1 – position 1); at a position approximately 5m up the ramp (tripod position in fig. 2 – position 2) and by the rear door of the pharmacy at the top of the ramp (position 3).

Measurements in positions 1 and 2 were made in acoustically “free field conditions”. The measurement locations were chosen to provide a representative indication of the typical ambient noise levels across the residential rear gardens. Since noise measurements were required to cover the early morning from 7 to 9am, repeat measurements were not possible from a single visit.

The sky was clear and the weather calm, dry and frosty.

Fig 1: Pharmacy to the right (carrying the Medical Centre sign)



Fig 2: Ramp to the right of the pharmacy shown in fig1



The new Medical Centre location – comments on noise environment:

The new Medical Centre at Ruabon is located approximately 100m off the High Street in Ruabon on Cae'r Llan. It is a relatively open site with single storey buildings between the Medical Centre and the High Street. The Pharmacy backs on to the gardens of terraced houses in Henry Street with a brick ramp to the rear as seen in fig. 2. The ramp overlooks the gardens and is elevated above the garden level.

During the monitoring period, a few features of the noise environment were noted.

- The early morning noise had a component from a distant major road – probably the A483 north/south road which continued throughout the test period.
- The car park outside the Medical Centre and other roads were relatively quiet with some departing staff around 7am, staff arrivals around 8am

and the general public around 9am. Traffic on the High Street gradually increased between 8 and 9am. All these movements contributed to the environmental noise level.

6. NOISE DATA AND BS4142

Noise standard BS4142 (ref.1) is formulated to assess the likelihood of complaint with reference to the prevailing background noise. We present measured noise values and comment with respect to BS4142.

Table 1

Time	Location	$L_{A,eq}(15min)$	$L_{A,90}(15min)$	$L_{A,10}(15min)$
6.42 am	Position 1	47.9	44.8	49.3
7.00 am	Position 2	47.9	44.6	49.8
7.24 am	Position 3	48.1	45.4	50.1
7.43 am	Position 2	51	48.8	52.6
8.01 am	Position 2	51.6	48	53.6
8.19 am	Position 2	56	48.7	57.8
8.37 am	Position 2	53.9 (7min)	47 (7 min)	56.2 (7min)
9.22 am	Position 2	48.8	41.6	50.6
AVERAGE		<u>50.65</u>	<u>46.11</u>	
		dB(A)	dB(A)	

Other values taken from the table (**rounded values in brackets**):

Table 2

Time period	$L_{A,eq} (15min)$	$L_{A,90} (15min)$	
7 to 9 am	51.42 (51)	47.08 (47)	
7.30 to 9 am	52.12 (52)	47.58 (48)	

Calculations in section 7 use data from table 2 and particularly for the period from 7.30 to 9am when we understand the air-conditioning unit would be operational. Table 1 gives a more complete picture of the data set.

7. NOISE CALCULATIONS and BS4142

No measurements were made on the proposed sound source since installation has not yet taken place. All noise source data is taken from manufacturer's information.

The air conditioning unit is stated as generating 50 dB(A) in anechoic conditions (Appendix 1).

We understand mounting options for the air-conditioning unit are:

- i. on the face of the ramp facing the gardens and behind the end garden fence
- ii. on the rear face of the pharmacy

We assume solution (ii), a nominal distance of 5m which places the point of reference within the rear garden boundary of the nearest house in Henry Street

Definitions from BS4142:

Specific noise level:

Leq at the assessment position produced by the noise source = **39 dB(A)**

Rating level:

the specific noise level + any adjustments (none in this case) = **39 dB(A)**

Residual noise level:

The Leq with the noise source off = **52 dB(A)**

Background noise level ($L_{A,90}$):

A weighted sound level exceeded for 90% of the time = **48 dB(A)**

Assessment method:

Rating level – background noise level = 39 – 48

= **(-9 dB(A))**

i.e.[= minus 9 db(A)]

BS4142 states:

Difference + 10dB(A) and complaints likely

Difference + 5dB(A) is of marginal significance

Summary

The value of minus 9 db(A) means that complaints are unlikely for the residence closest to the air-conditioning unit. The noise contribution from the air-conditioning unit will be less in other gardens due to the greater distance from the source.

8. CONCLUSIONS AND RECOMMENDATIONS

Assessing the noise environment according to BS4142 indicates that installing the air-conditioning unit on the rear wall of the pharmacy and assuming all data provided by the manufacturer is correct, we conclude that complaint by local residents “are unlikely”. This situation pertains to a position of 5m from the air-conditioning unit. Most of the nearest garden, and all other gardens will

experience lower noise levels generated by the air-conditioning unit and this contribution will be less than the prevailing background noise already present.

We have undertaken measurements of the acoustic background noise and base our assessment on this data and manufacturers data for the air-conditioning unit.

We recommend:

- i. Installation of the air-conditioning unit on the rear face of the pharmacy.
- ii. Since perception of noise has a subjective component and since the operational condition and level of activity of the unit may vary for different parts of the year, we suggest the construction of a suitable wooden or other acoustic enclosure around the unit of suitable design to provide some visual and acoustic screening. Our data suggests a minimum cost solution will meet this requirement. (the screening for the waste bins might be an external style)
- iii. We understand an acoustic cover is available to reduce the noise contribution generated by the compressor. This is an option assuming the efficiency of the air-conditioning unit is not significantly reduced.

Although recommending an acoustic enclosure we have not, at this stage, undertaken the specific design of such a unit and this design might need to take into account air-flows or other factors needed for the efficient functioning of the air-conditioning unit. We are not able to comment further on this matter.

A summary of conclusions is provided in section 1 of this report.

9. PARTICULAR REFERENCES

- 1) BS4142: 1997, Method for rating industrial noise affecting mixed residential and industrial areas.

10. Appendix 1 – Air Conditioning Unit, Manufacturers Noise Data

The proposed air-conditioning unit to be installed is manufactured by Mitsubishi Heavy Industries Ltd. Acoustic data is provided by the manufacturers for these units, including octave band analysis and overall dB(A) values. The range of data provided is limited and the data indicates it was acquired according to procedures in Japanese standard “JIS B 8616”. We understand this standard requires noise data gathered in anechoic conditions. The quoted dB(A) value at 1m is stated to be 50dB(A) for the air conditioning unit to be installed (type code-FDC 125VN).

11. KOGAN ACOUSTIC CONSULTING

Roger Hill

Managing Director / Principal Consultant with Kogan Communications Ltd. (Kogan Acoustic Consulting) and has expertise in engineering applications of acoustics developed over the past 35 years. Roger Hill holds B.Sc. and Ph.D. degrees of the University of London, He is Fellow of the Institute of Physics and Member of the Institute of Acoustics. These professional bodies have a professional interest in the physics and application of acoustics. Roger Hill has taught many courses on acoustics at university degree level and has carried out research on industrial applications of acoustics and attended many national and international conferences connected with the application of acoustics in industrial and built environments. This report has been prepared by Roger Hill (on behalf of Kogan Communications Ltd.) All opinions are given in good faith.

END

DECLARATION

1. This report is held to be accurate and complete. We have mentioned all matters, which we regard as relevant to the opinions expressed.
2. We have drawn to the attention of the readers all matters, of which we are aware, which might adversely affect our opinion.
3. Wherever we have no personal knowledge, we have indicated the source of factual information.
4. We have not included anything in this report, which has been suggested by anyone, without forming our own independent view of the matter.
5. Where, in our view, there is a range of reasonable opinion, we have indicated the extent of that range in the report.
6. At the time of signing the report we consider it to be complete and accurate. We will notify those instructing us if, for any reason, we subsequently consider that the report requires any correction or qualification.
7. We have indicated in this report a statement setting out the substance of all facts and instructions given to us, which are material to the opinions expressed in this report or upon which those opinions are based.

Signature: _____ Date: _____

Director / Principal Consultant:

On Behalf of Kogan Communications Ltd.