



ACOUSTIC DESIGN TECHNOLOGY
Noise and Vibration Consultants

ADT 3303

25 January 2023

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65 OAKLEY ROAD, READING

ENVIRONMENTAL NOISE IMPACT ASSESSMENT

ACOUSTIC CONSULTANCY REPORT ADT 3303/ENIA

Revision	Date	Issued By	Checked by	Revision Notes
-	09 May 2022	Luke Delaney	Chris Middleton	first issue
A	25 January 2023	Chris Middleton	-	Panasonic CU-TZ20WKE condenser relocated from SE to NW elevation, updated impact assessment

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1.0 **SUMMARY**

Planning permission is being sought for the installation of two new externally mounted air conditioning units at ground floor level and also retrospectively for six externally mounted existing air conditioning units as shown on the planning application drawings.

This report has been updated following comments from Reading Borough Council in respect of the impact on the nearest noise sensitive properties (Hemdean Road), in particular, compliance with Council policy for plant noise to be controlled to a BS 4142 specific sound level 10 dB below the otherwise prevailing background sound level, in addition to the requirement that the BS 4142 rating level does not exceed the background level. The proposed new condenser nearest the most affected houses (on Hemdean Road) will now be located on the less sensitive north-west elevation.

Acoustic Design Technology Limited have undertaken an environmental noise survey to determine the existing ambient noise levels in the vicinity.

The predicted cumulative rating levels from the proposed new installations do not exceed the typical background levels during the proposed hours of operation. According to BS 4142:2014, this is "*... an indication of the specific sound source having a low impact, depending on the context*".

Furthermore, the predicted specific sound levels are at least 11 dB below the otherwise prevailing background levels during the proposed hours of operation.

On that basis it is reasonable to conclude that the environmental noise emissions should be acceptable, based on the plant data and proposed day time operating period.

2.0 BASIS OF ASSESSMENT

2.1 Site Location

The site is located on Oakley Road in Reading.

The surrounding area is primarily residential. Oakley Road, which the site fronts onto, is lined with two storey houses. Hemdean Road which lies approximately 16 metres away to the east is also lined with two storey houses, as is Grove Hill, also to the east.

Oakley Road Allotments borders the site to the west. There are more 2 storey houses on Oakley Road and Blenheim Road to the west of the allotments, and approximately 99 metres away to the west of the site.

Caversham Primary School is located approximately 220 metres away to the south of the site.

The closest main roads are Oakley Road which the site fronts onto, and Hemdean Road which runs perpendicular to the site and merges with Oakley Road at the mini roundabout approximately 7 metres to the north east of the site. Grove Hill which becomes Rotherfield Way is located approximately 20 metres away to the east of the site.

2.2 Proposed Development

Planning permission is being sought for the installation of two new air conditioning units at ground floor and retrospective planning permission is being sought for six existing air conditioning units as shown on the planning application drawings.

2.3 Assessment Criteria

The primary guidance on the control of noise emissions from new buildings of a commercial or industrial nature is to be found in BS 4142:2014+A1:2019.

2.4 Nearest Noise Sensitive Properties

The noise sensitive properties in the surrounding area have been grouped into four noise sensitive areas (NSA), as described below and as indicated on the attached site plan 3303/SP1.

NSA	Location	Direction	Approximate distance from site (metres)
1	Houses on Oakley Road	North west	22
2	Houses on Grove Hill	North east	30
3	Houses on Hemdean Road	South east	adjoining

The above NSA represent the closest noise sensitive properties, with others located further from the site and in some cases screened by the intervening buildings. A satisfactory noise impact at the defined NSA should therefore ensure a satisfactory noise impact at other noise sensitive areas.

2.5 Strategy for Noise Impact Assessment

Based on the information in Sections 2.1 to 2.4 above, the strategy for the noise impact assessment has been broken down into the following stages:

- i. undertake an environmental noise survey to obtain baseline noise data, as described in Section 3.0 below

- ii. assess the impact of noise emissions from the proposed mechanical plant as described in Section 4.0 below

3.0 ENVIRONMENTAL NOISE SURVEY

3.1 Purpose

The purpose of the survey was to obtain representative background noise levels during the most sensitive period of the proposed hours of plant operation.

3.2 Scope of Survey

An attended environmental noise survey was undertaken between 16:00 hours and 18:00 hours on Thursday 16 December 2021.

3.3 Instrumentation

The instrumentation used, and the field calibration values before and after the survey are detailed in Appendix A of this report.

3.4 Procedure

Three measurement positions were selected as described below and indicated on the attached site plan 3303/SP1:

- i. on Oakley Road, on the pavement outside of the Veterinary Centre
- ii. on Oakley Road, on the pavement outside of the nearest house to the north
- iii. on the site, at the rear of the car park

Measurement position 2 is considered representative of NSAs 1 and 2, while position 3 is considered representative of NSAs 3 and 4.

At measurement positions 1 and 3, the microphone was mounted on a tripod approximately 1.2 metres above the ground and at least 3.5 metres from any other acoustically reflective surface.

At measurement position 2, the microphone was mounted on a tripod approximately 1.2 metres above the ground and 1 metre from the low brick boundary wall surrounding the front drive of the house, approximately 1 metre in height.

Measurements were taken hourly at each position using the Svanetek 971 sound level meter set to store the octave band and A-weighted 100ms short-term L_{eq} levels over a 15 minute sample of each hour for subsequent post processing.

3.5 Results

The logged data has been post processed to determine $L_{Aeq,T}$, $L_{A90,T}$ and L_{Amax} levels for each 15 minute period, and these have been detailed in the attached table 3303/T1.

It is reasonable to assume the measured levels can be considered representative of a full 1 hour period.

Please refer to Appendix B for explanation of the noise units and the A-weighting term used in this report.

3.6 Weather Conditions

Weather conditions remained dry and still throughout the duration of the survey period and are unlikely to have had an effect on the measured levels.

3.7 Description of Existing Acoustic Environment

At all measurement positions the noise climate was controlled by road traffic noise from Oakley Road and from Grove Hill/ Rotherfield Way to the east for the full duration of the survey.

4.0 NOISE IMPACT ASSESSMENT

4.1 Introduction

As already mentioned in Section 2.3 above, the primary guidance for the assessment of noise from new buildings is provided in BS 4142: 2014.

The standard provides a methodology for assessing the likely impact of sound on people who might be inside or outside a dwelling or premises used for residential purposes upon which sound is incident. The assessment involves comparing the *rating* level of the sound source with the typical *background* levels for the period of interest. The standard concludes that if the rating level does not exceed the background levels, the noise impact should be low, depending on the context.

It is a Reading Borough Council requirement that the rating level does not exceed the otherwise prevailing background sound level, when determined at 1 metre from a residential window, and also that the specific sound level is at least 10 dB below the background level.

Please refer to Appendix B for an explanation of the technical terms defined in the Standard.

4.2 Specific Sound Level

4.2.1 Computer Model

As the analysis is relatively complex, a computer model of the proposed installation has been constructed using Datakustik Cadna/A 2020 to predict how the sound will radiate from the flat roof area to the identified NSA.

Within the model all buildings and barriers have been assumed to be acoustically reflective, with ground absorption taken into account as appropriate. The receiver height has been assumed to be 4.5 metres - the approximate height of the first floor windows.

4.2.2 Source Sound Levels

Details about the source sound levels are provided in the attached plant noise schedule 3303/PNS (Revision A).

4.3 Specific Sound Levels

The scheduled plant noise levels have been input into the Cadna/A computer model, and the predicted noise levels at the identified noise sensitive areas are as follows:-

Location	Predicted $L_{eq,T}$ (dB) at octave band centre frequency (Hz)								$L_{Aeq,T}$ dB
	63	125	250	500	1k	2k	4k	8k	
NSA1 Oakley Road	30	29	26	23	20	15	9	-1	25
NSA2 Grove Hill	28	29	24	22	18	13	8	-4	23
NSA3 Hemdean Road	31	31	29	27	24	19	14	6	29

4.4 Background Sound Level

The proposed hours of plant operation are restricted to the opening hours of the veterinary centre, between 08:00 hours and 19:00 hours. Reference to the survey results shows that the lowest measured background levels during the surveyed portion of this period were 49 dB $L_{A90,15\text{mins}}$ at NSAs 1 and 2, and 40 dB $L_{A90,15\text{mins}}$ at NSAs 3 and 4.

The veterinary centre is well established and has existing plant already in operation. However, this plant was not observed to be in operation during the survey period and therefore had no effect on the measured background noise levels.

4.5 Rating Level

To convert the specific sound level into a rating level, corrections have to be applied for impulsivity, intermittency, tonality and other sound characteristics where such features are present.

4.5.1 Tonality

Using commonly accepted definitions of tonality, the predicted specific sound levels are not tonal at the assessment locations. Therefore, a tonal correction is not required.

4.5.2 Impulsivity

The noise emissions from the air conditioning units should not be impulsive in character, so no correction is required.

4.5.3 Other Sound Characteristics

There are no additional sound characteristics which would warrant the addition of an extra correction.

4.5.4 Intermittency

As the operation of the plant is dependent on internal conditions, periods of operation may be intermittent, and a + 3 dB correction is therefore appropriate.

Applying corrections as described above, the rating levels at the identified noise sensitive areas are as follows:

Location	Rating level $L_{Ar, 1 \text{ hour}}$ dB
NSA1 Oakley Road	28
NSA2 Grove Hill	26
NSA3 Hemdean Road	32

4.6 Initial Assessment of Impact

The initial assessment of impact is demonstrated in the following table:

	NSA1 Houses on Oakley Road	NSA2 Houses on Grove Hill	NSA2 Houses on Hemdean Road
Specific Sound Level L _{Aeq} , 1 hour (dB)	25	23	29
Character correction (dB)	+ 3	+3	+ 3
Predicted Rating Level L _{Ar} , 1 hour (dB)	28	26	32
Background level L _{A90} , 15 minutes (dB)	49	49	40
Excess of rating level over background sound level (dB)	- 21	- 23	- 8
Initial assessment of impact	Low	Low	Low

The predicted rating levels are numerically lower than the typical background levels, and so the standard concludes that this is "... *an indication of the specific sound source having a low impact, depending on the context*".

Reading Borough Council set an additional requirement for the specific sound level to be at least 10 dB below the background sound level. This would be fulfilled, as set out in the following table:

	NSA1 Houses on Oakley Road	NSA2 Houses on Grove Hill	NSA2 Houses on Hemdean Road
Specific Sound Level L _{Aeq} , 1 hour (dB)	25	23	29
Background level L _{A90} , 15 minutes (dB)	49	49	40
Excess of specific sound level over background sound level (dB)	- 24	- 26	- 11

4.7 Context

4.7.1 The Absolute Level of Sound

At all of the identified noise sensitive areas the rating levels and background sound levels are relatively low, and the absolute levels are therefore relevant.

The worst case specific sound level outside any dwelling is 29 dB $L_{Aeq, 1 \text{ hour}}$, and it is generally accepted that a typical building façade with windows open will provide 10 to 15 dB overall noise reduction. That would yield indoor ambient noise levels of 14 – 19 dB $L_{Aeq, 1 \text{ hour}}$, which is well within the BS 8233 recommended level of 35 dB $L_{Aeq, 16 \text{ hour}}$ during the day when the plant will be operational. This reinforces the initial conclusion of a low impact.

4.7.2 The Character and Level of the Specific and Residual Sound

The veterinary centre and the associated existing plant are well established, and the introduction of the new plant would not significantly alter the noise climate. Some degree of low level plant noise during the day should therefore be reasonably in keeping with the established noise climate in this area.

4.7.3 The Sensitivity of the Receptor

The nearby noise sensitive receptors do not appear to be particularly sensitive, nor do they appear to have any special acoustic mitigation measures in place, and on that basis there is no reason to adjust the initial assessment of impact.

4.8 Conclusions

This assessment has demonstrated that when the noise from the existing and proposed plant is assessed following the methodology of BS 4142:2014, the initial assessment of impact would be low, and this would not be altered by the consideration of the context.

In addition, the specific sound levels are at least 10 dB below the background sound levels at all noise sensitive areas, as required by Reading Borough Council.

The existing and proposed plant should therefore be acoustically suitable for this location over the proposed day time operating period.

FOR ACOUSTIC DESIGN TECHNOLOGY



<u>Notes</u>	<u>Description</u> Site Plan Showing Noise Monitoring Locations		 ACOUSTIC DESIGN TECHNOLOGY Noise and Vibration Consultants
	<u>Project</u> 65 Oakley Road, Reading		
	<u>Survey Date</u> 16 December 2021	<u>Drawing No.</u> 3303/SP1	

SURVEY RESULTS (A WEIGHTED TIME HISTORY)

Location	Period	L _{Aeq, 15mins} dB	L _{Amax} dB	L _{A90} dB
Measurement Position 1	16:00 – 17:00	63	82	54
	17:00 – 18:00	64	83	55
Measurement Position 2	16:00 – 17:00	65	81	51
	17:00 – 18:00	66	81	49
Measurement Position 3	16:00 – 17:00	51	72	41
	17:00 – 18:00	50	67	40

TABLE 3303/T1

APPENDIX A

Instrumentation

Manufacturer	Type and / or Model	Serial Number	Last Laboratory Calibration at the time of the survey	Calibrator Output (dB)	Free Field Correction (dB)	Initial Reading (dB)	Final Reading (dB)
Svantek	Svan 971 Class 1 Sound Level Meter	34392	October 2021		-0.13	113.85	113.67
ACO	7052E ½ inch Microphone	54655					
Svantek	SV18 Preamplifier	32179					
Norsonic	Nor1251 Calibrator (Cal 5)	34220	February 2021	113.98			

APPENDIX B

Acoustic Terminology

The annoyance produced by noise is dependent upon many complex interrelated factors such as 'loudness', its frequency (or pitch) and any variations in its level. In order to have some objective measure of the annoyance, scales have been derived to allow for these subjective factors.

A-weighting 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 person. It is also possible to calculate the A-weighted noise level by applying certain corrections to an un-weighted spectrum.

When the noise being measured has variable amplitude, such as traffic noise, it is necessary to qualify the basic dB unit. This may be done using a statistical index L_n dB, where n is any value between 0 and 100, and is the percentage of the sample time for which the stated level is exceeded. In defining the use of the index, both the value of n and the length of the sample period must be stated.

L_{10} L_{10} , being the level exceeded for 10% of the time, has been shown to be a good indicator for traffic noise intrusion, and is used in assessing the effect of traffic noise on residential or commercial premises.

L_{90} L_{90} is the level exceeded for 90% of the time, and is used as a measure of background noise level, as it excludes the effects of occasional transient levels, such as individual passing cars or aircraft.

In addition to the statistical noise indices defined above, the following noise units are also used to define variable amplitude noise sources:

$L_{eq,T}$ $L_{eq,T}$ is defined as the notional steady sound pressure level which, over a stated period of time, would contain the same amount of acoustical energy as the actual fluctuating sound measured over the same period. In other words, it is a measure of the "average" noise level

L_{max} L_{max} is the maximum time-weighted sound pressure level recorded over the stated time period

PLANT NOISE SCHEDULE ADT 3303/PNS**REVISION A**

25 January 2023



ACOUSTIC DESIGN TECHNOLOGY
Noise and Vibration Consultants

Reference	Plant Description	Location	Duty m ³ /s : Pa	Data L _w / L _p	Octave Band Centre Frequency - Hz							
					63	125	250	500	1k	2k	4k	8k
Proposed	Panasonic CU-TZ20WKE	North west elevation	-	L _p @ 1m ⁽¹⁾	52	54	50	48	43	38	34	25
Proposed	Panasonic CU-TZ25WKE	North west elevation	-	L _p @ 1m ⁽¹⁾	52	54	50	48	43	38	34	25
Existing 1	Daikin RXP50L	South east elevation	-	L _p @ 1m	52	54	50	48	43	38	34	25
Existing 2	Toshiba RAS-10JAVP-E	South east elevation	-	L _p @ 1m ⁽²⁾	49	49	47	45	41	36	30	23
Existing 3	Daikin ARX35J3VIB	South east elevation	-	L _p @ 1m	48	49	49	46	43	38	32	26
Existing 4	Daikin ARX20J3VIB	North west elevation	-	L _p @ 1m	50	48	48	45	41	37	31	23
Existing 5	Daikin ARX25J3VIB	North west elevation	-	L _p @ 1m	49	49	47	45	41	36	30	23
Existing 6	Daikin RXS20L3VIB	North west elevation	-	L _p @ 1m	42	42	43	40	38	31	24	19

Notes:-

- 1) no octave band noise levels available from manufacturer, data for similar Daikin RXP50L used
- 2) no octave band noise levels available from manufacturer, data for similar Daikin ARX25J3VIB used