

ACOUSTIC DESIGN TECHNOLOGY
Noise and Vibration Consultants

ADT 2998

20 February 2020

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CROFT MEDICAL CENTRE
ENVIRONMENTAL NOISE IMPACT ASSESSMENT
ACOUSTIC CONSULTANCY REPORT ADT 2998/ENIA

Revision	Date	Issued By	Revision Notes
-	20 February 2020	Chris Middleton	first issue

1.0 SUMMARY

Planning permission 2014/62/90774/W has been granted for the construction of a medical centre at Cobcroft Road, Huddersfield.

Condition 5 requires an assessment of noise from external plant and extract ventilation.

Acoustic Design Technology Limited have undertaken an environmental noise survey to determine the existing ambient noise levels in the vicinity of nearby noise sensitive properties over samples of the day time and night time periods.

Noise levels have been calculated at the surrounding noise sensitive properties, based on manufacturers' data for the installed plant.

The calculated BS 4142 rating levels from the proposed plant are at least 13 dB below the typical background levels during the proposed hours of operation at the identified noise sensitive areas. This is in line with the requirements set out in Section 1.1 of the 'Kirklees Noise Design Advice' document.

In addition, the specific sound levels at the identified noise sensitive areas are well below the absolute noise criteria referenced in Section 1.1 of the 'Kirklees Noise Design Advice' document.

It is therefore reasonable to conclude that environmental noise emissions from fixed plant are within the Kirklees Council technical requirements, and should be sufficient for discharge of planning condition 5.

2.0 BASIS OF ASSESSMENT

2.1 Introduction

This assessment has been prepared towards discharge of condition 5 of planning permission 2014/62/90774/W.

Although the development is nearly complete, it is not practical to determine compliance by measurements, as there are a number of items of plant spread around the building, and it is not feasible to isolate the plant noise from the background noise at the nearby noise sensitive properties.

The assessment is therefore based on calculations using the manufacturers' noise data, for comparison with measured background noise levels, all in accordance with the 'Kirklees Noise Design Advice' document.

2.2 Site Location

The site is located on Cobcroft Road in Huddersfield.

The surrounding area is mainly residential, with some local shops including the 'Haji Superstore' to the east and 'Pak Medina' at the west end of Cobcroft Road.

The nearest houses are on Halifax Old Road to the west on Yew Street to the north.

2.3 Development Details

The development comprises the construction of a two storey medical centre and pharmacy with associated access and landscaping. New fixed plant includes ventilation fans operating during surgery opening hours, and some air conditioning condensers which could potentially operate 24 hours a day.

2.4 Assessment Criteria

Section 1.1 of the 'Kirklees Noise Design Advice' states that:

during normal daytime hours (0700 to 2300 hours), the BS4142 rating level, measured over 1 hour, should be 5dB below the background (LA90). During the night-time period (2300 to 0700 hours), the BS4142 rating level, measured over 5 minutes, should be 5dB below the background (LA90).

The following noise levels are also not to be exceeded:

Room/Area	L _{Aeq} (16 hr) 0700-23.00	L _{Aeq} (8 hr) 23.00-07.00	L _{A1} (15 min) 23.00-07.00	L _{Amax} 23.00-07.00
Living Rooms/Studies	35dB	-	-	-
Gardens	55dB	-	-	-
Bedrooms	-	30dB	45dB	55dB

The levels tabulated above are from Appendix 1 of the Kirklees Noise Design Advice, with a note that a facade with open windows can be assumed to provide sound reduction of 12 dB(A).

The applicable technical requirements can therefore be summarised as follows:

Period	Noise limits applicable outside dwellings	
	BS 4142 Rating level	$L_{Aeq, T}$
Day 07:00 – 23:00	L_{Ar} , 1 hour 5 dB below L_{A90}	L_{Aeq} , 16 hour ≤ 47 dB
Night 23:00 – 07:00	L_{Ar} , 5 mins 5 dB below L_{A90}	L_{Aeq} , 8 hour ≤ 42 dB L_{Aeq} , 15 mins ≤ 57 dB $L_{Amax} \leq 62$ dB

2.5 Nearest Noise Sensitive Properties

The noise sensitive properties in the surrounding area have been grouped into three noise sensitive areas (NSA), as described below and as indicated on the attached site plan 2998/SP1.

NSA	Location	Direction	Approximate distance from proposed building (metres)
1	Houses on Halifax Old Road	West	18
2	Houses on Cobcroft Road	South	34
3	Houses on Yew Street	North	35

The above NSA represents 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.

2.6 Strategy for Noise Impact Assessment

Based on the information in Sections 2.1 to 2.5 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 background noise levels over representative samples of the day time and night time operating periods.

3.2 Scope of Survey

An attended environmental noise survey was undertaken over two periods, the first between 16:00 and 18:00 hours on Thursday 6 February 2020 and the second between 02:00 and 04:00 hours on Friday 7 February 2020.

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

Two measurement positions were selected as described below and indicated on the attached site plan 2998/SP1:

- i. in the alleyway to the west of the site, at approximately the same distance from Cobcroft Road as the front elevation of No. 3 Cobcroft Road.
- ii. at the end of the alleyway to the rear of the site

Position 1 was chosen to obtain representative background levels for noise sensitive areas NSA1 (the Halifax Old Road houses) and NSA2 (the Cobcroft Road houses).

Position 2 was chosen to obtain representative background levels for noise sensitive area NSA3 (the Yew Street houses).

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

Measurements were taken hourly at each position using the 01dB Solo 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 are listed in the attached tables 2998/T1 and 2998/T2 for measurement positions 1 and 2 respectively.

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

3.6 Weather Conditions

Throughout both survey periods, the weather was dry and still, with no significant effect on the measured levels.

3.7 Description of Existing Acoustic Environment

During the first survey period during the day the noise levels were generally controlled by local traffic and activity on the surrounding streets. During the second (night time) period the background levels were controlled by more distant traffic noise.

4.0 NOISE IMPACT ASSESSMENT

4.1 Introduction

As already mentioned in Section 2.3 above, the requirement is to calculate specific noise levels and BS 4142:2014 rating levels at the surrounding dwellings for comparison with the technical requirements in the Kirklees acoustic design guide.

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.

Please refer to Appendix C 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 building to the identified noise sensitive areas.

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, a typical upper floor window.

4.2.2 Source Sound Levels

Manufacturers' noise data for the installed plant is set out on the attached plant noise schedule 2998/PNS, with associated atmospheric silencers detailed on the attached silencer schedule 2998/SSA. The plant locations are briefly described on the plant noise schedule, with more detailed information on the CM Oxendale Ltd mechanical services drawings.

4.3 Predicted Sound Levels

The scheduled plant noise levels and insertion losses have been input into the Cadna/A computer model, and the predicted noise levels at the identified noise sensitive areas for the surgery opening hours during the day, with all plant running 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 Halifax Old Road	29	29	25	28	25	21	14	4	29
NSA2 Cobcroft Road	31	31	22	20	17	12	5	-6	22
NSA3 Yew Street	27	27	24	22	19	14	7	-4	24

Overnight, there is only the single server room condenser running, and the resultant noise levels 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 Halifax Old Road	12	10	3	-6	-11	-13	-21	-31	-1
NSA2 Cobcroft Road	15	16	17	12	7	6	-3	-13	14
NSA3 Yew Street	18	20	17	12	8	7	-1	-11	15

All of the above noise levels are well below the absolute noise criteria set by Kirklees Council as described in Section 2.4 above.

4.4 Background Sound Level

Reference to the survey results reveals background levels applicable to the identified noise sensitive areas as follows:

	L _{A90} day dB	L _{A90} night dB
NSA1 Halifax Old Road (data from position 1)	42	32
NSA2 Cobcroft Road (data from position 1)	42	32
NSA3 Yew Street (data from position 2)	42	32

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. On that basis a correction for tonality is not required.

4.5.2 Impulsivity

The plant will not operate in an impulsive way, 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

During the day, the plant will run continuously, and no correction for intermittency is required. At night, the single condenser will run intermittently, and a correction of +3 dB is therefore applicable.

Applying the corrections for character outlined above, the rating levels are as follows:

	L _{Ar} , 1 hour dB	L _{Ar} , 5 mins dB
NSA1 Halifax Old Road (data from position 1)	29	2
NSA2 Cobcroft Road (data from position 1)	22	17
NSA3 Yew Street (data from position 2)	24	18

Reference to Section 4.4 above reveals that these rating levels are at least 13 dB below the otherwise prevailing background levels.

4.6 Assessment

The BS 4142 rating levels in Section 4.5 above are in all cases more than 5 dB below the otherwise prevailing background levels as set out in Section 4.4 above, and are therefore in accordance with the Kirklees criteria in Section 2.4 above. The predicted noise levels in Section 4.3 above are also well below the absolute noise criteria set by Kirklees Council, as outlined in Section 2.4 above.

This assessment has therefore demonstrated that noise emissions from the installed plant are in accordance with the Kirklees Council requirements.

FOR ACOUSTIC DESIGN TECHNOLOGY

Measurement
Position 1

Measurement
Position 2



Notes

Description

Noise monitoring locations and noise sensitive areas

Project

Croft Medical Centre

Date

20 February 2020

Drawing No.

2998/SP1



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POSITION 1 SURVEY RESULTS (A WEIGHTED TIME HISTORY)

Period	L _{Aeq, 15mins} dB	L _{Amax} dB	L _{A90} dB
16:00 – 17:00	52	77	42
17:00 – 18:00	52	69	44
02:00 – 03:00	40	63	32
03:00 – 04:00	43	74	36

TABLE 2998/T1

POSITION 2 SURVEY RESULTS (A WEIGHTED TIME HISTORY)

Period	L _{Aeq, 15mins} dB	L _{Amax} dB	L _{A90} dB
16:00 – 17:00	46	65	42
17:00 – 18:00	49	74	43
02:00 – 03:00	39	63	32
03:00 – 04:00	37	46	34

TABLE 2998/T2

APPENDIX A – INSTRUMENTATION

Manufacturer	Type and / or Model	Serial Number	Last Laboratory Calibration	Calibrator Output (dB)	Free Field Correction (dB)	Initial reading (dB)	Final reading (dB)
01dB	(Blue) Solo Class 1 Sound Level Meter	60320	May 2019		-0.10	114.0	114.2
01dB	PRE 21 S Pre-Amplifier	16866	May 2019				
01dB	MCE 212 ½ inch Microphone	90549	May 2019				
Norsonic	Nor1251 Calibrator (Cal 4)	33453	February 2019	114.09			

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

APPENDIX C

Definitions from BS 4142 : 2014

reference time interval, T_r

specified interval over which the specific sound level is determined (1 h during the day, and 15 min during the night)

specific sound level, L_{Aeq,T_r}

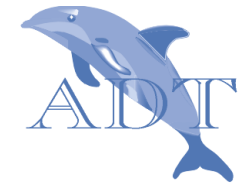
equivalent continuous A-weighted sound pressure level produced by the specific source at the assessment position produced over a given reference time interval, T_r

rating level, L_{Ar,T_r}

specific sound level plus any adjustment for the characteristic features of the sound

background noise level, $L_{A90,T}$

see Appendix A

CROFT MEDICAL CENTRE**PLANT NOISE SCHEDULE ADT 2998/PNS****FIRST ISSUE**

ACOUSTIC DESIGN TECHNOLOGY
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20 February 2020

Ref.	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
	Ground floor disabled WC extract Silhouette 100 Low Carbon	Ground Floor WC venting to east wall	0.017	L _p at 3 metres	34 dB(A)							
	Ground floor disabled WC extract Silhouette 100 Low Carbon	Ground Floor Disabled WC venting to west wall	0.017	L _p at 3 metres	34 dB(A)							
	Ground floor WC extract - Silhouette 100 Low Carbon	Ground Floor Disabled WC venting to west wall	0.012	L _p at 3 metres	34 dB(A)							
	1 st Floor Shower Room extract - Silhouette 100 Low Carbon	1 st Floor Shower Room ceiling venting to west wall	0.026: -	L _p at 3 metres	34 dB(A)							
	1 st Floor Disabled WC extract - Silhouette 100 Low Carbon	1 st Floor Disabled WC ceiling – venting to south wall	0.017: -	L _p at 3 metres	34 dB(A)							
	1 st Floor Staff Kitchen extract - Silhouette 150 Low Carbon	1 st Floor Staff Room Wall – venting to west wall	0.067: -	L _p at 3 metres	43 dB(A)							

CROFT MEDICAL CENTRE

PLANT NOISE SCHEDULE ADT 2998/PNS

FIRST ISSUE



ACOUSTIC DESIGN TECHNOLOGY
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20 February 2020

Ref.	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
	1 st Floor Dirty Utility extract - Silhouette 125 Low Carbon	1 st Floor venting to east Wall	0.036: -	L _p at 3 metres	37 dB(A)							
	1 st Floor Cleaners Room extract - Silhouette 100 Low Carbon	1 st Floor Venting to east wall	0.01: -	L _p at 3 metres	34 dB(A)							
	1 st Floor Clean utility supply – ACM 125 inline fan & heater	1 st Floor clean utility venting to east elevation	0.036: -	L _w inlet	38	42	45	48	45	41	35	26
	1 st Floor Treatment room AHU RIS400PE	Treatment room ceiling, venting to roof cowl	0.12 : 40	Fresh air intake L _w		56	45	35	20	18	24	24
				Extract exhaust L _w		62	54	46	27	27	32	30
	1 st Floor Minor Surgery AHU RIS700PE	1 st Floor Minor surgery ceiling, venting to roof cowl	0.17: 40	Fresh air intake L _w		59	47	36	22	19	24	26
				Extract exhaust L _w		67	55	39	30	27	32	38
	3 no. ??? air conditioning condenser units		-									

CROFT MEDICAL CENTRE

PLANT NOISE SCHEDULE ADT 2998/PNS

FIRST ISSUE



ACOUSTIC DESIGN TECHNOLOGY
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20 February 2020

Ref.	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
C1	Treatment room condenser Mitsubishi MUZ-AP25VG	east elevation	-	L _p at 1 metre	53	51	53	45	42	35	32	27
C2	Minor surgery room condenser Mitsubishi MUYTP35VF	east elevation	-	L _p at 1 metre	50	50	47	43	41	34	29	22
C3	Server room condenser Mitsubishi SUZ-M25VA	east elevation	-	L _p at 1 metre	51	53	50	45	41	40	33	27

CROFT MEDICAL CENTRE

ATMOSPHERIC SILENCER SCHEDULE ADT 2998/SSA

FIRST ISSUE



ACOUSTIC DESIGN TECHNOLOGY
Noise and Vibration Consultants

20 February 2020

Ref	Plant Description	Length (mm)	Width (mm)	Height (mm)	No. Off	Vol (m³/s)	Max. (Pa)	Insertion Loss (dB) at Centre Frequency (Hz)							
								63	125	250	500	1k	2k	4k	8k
	Fresh air intake to 1 st Floor Treatment room AHU intake silencer SRSD 200-900	900	200 dia.		1	-	-	-	-	8	20	42	41	18	15
	Extract exhaust to 1 st Floor Treatment room AHU intake silencer SRSD 200-600	600	200 dia.		1	-	-	-	-	7	14	30	26	15	11
	Fresh air intake to 1 st Floor Minor Surgery room AHU intake silencer SRSD 250-900	900	250 dia.		1	-	-	-	-	8	16	30	27	12	9
	Extract exhaust to 1 st Floor Minor Surgery room AHU intake silencer SRSD 250-600	600	250 dia.		1	-	-	-	-	6	12	25	18	10	7