

ACOUSTIC DESIGN TECHNOLOGY
Noise and Vibration Consultants

ADT 3840

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452 BARLOW MOOR ROAD, MANCHESTER
ENVIRONMENTAL NOISE IMPACT ASSESSMENT
ACOUSTIC CONSULTANCY REPORT ADT 3840/ENIA

Revision	Date	Issued By	Checked by	Revision Notes
-	07 April 2025	Bidrohi Sheikh	Chris Middleton	first issue

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1.0 SUMMARY

Planning permission has been granted for an extension to the Wood and Woolfstein Dental Practice, 452 Barlow Moor Road, Manchester. The development includes the installation of a single new air conditioning unit at the rear of the building, as shown on the planning application drawings.

Condition 5 requires noise from the new plant to be controlled to a BS 4142 rating level 5 dB below the otherwise prevailing background sound level at the nearest noise sensitive location.

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

Noise from the proposed plant has been calculated at the various noise sensitive properties, and the BS 4142 rating levels are at least 5 dB below background levels. Compliance with planning condition 5a) would therefore be achieved.

On completion of the development, measurements of noise from the installed and operating plant can be measured at source, to verify compliance and thereby discharge part b) of condition 5.

2.0 BASIS OF ASSESSMENT

2.1 Site Location

The site is the Wood & Woolfstein dental practice located at 452 Barlow Road, Manchester. The surrounding area is primarily residential, although there is a mixture of businesses on Barlow Moor Road, including restaurants, solicitors' offices, a tuition centre, and beauty/nail salons. The neighbouring building to the north is 'The Beagle Pizza' while the building to the south is 'Pennine Kennedy Solicitors'.

The rear garden of the property is grassed and surrounded by a 2 metre high timber fence.

Chorlton Square, located opposite the site, is an old shopping centre with empty buildings and is not considered noise-sensitive.

Barlow Road is a frequently used route, contributing to the local noise climate, with traffic from both local vehicles and passing traffic.

2.2 Proposed Development

Planning permission 141521/FO/2024 has been granted for 'Erection of a ground floor rear extension to facilitate a new surgery and decontamination room, and other associated works'. The development includes a single new air conditioning unit, as shown on the planning application drawings.

The applicant is seeking permission for the plant to be in operation during their opening hours. These are from 09:00 – 20:00 Monday-Thursdays and 08:00 – 20:00 on Fridays and Saturdays, with the surgery closed on Sundays.

2.3 Assessment Criteria

Planning condition 5 of the planning permission document issued by Manchester City Council states:

a) Externally mounted ancillary plant, equipment and servicing shall be selected and/or acoustically treated in accordance with a scheme designed so as to achieve a rating level of 5dB (L_{Aeq}) below the typical background (L_{A90}) level at the nearest noise sensitive location. Prior to commencement of the use hereby approved the scheme shall be submitted to and approved in writing by the City Council as local planning authority in order to secure a reduction in the level of noise emanating from the site. The scheme shall be implemented in full before the use commences or as otherwise agreed in writing by the City Council as local planning authority.

b) Prior to the operation of the scheme a verification report shall be submitted to and approved in writing by the City Council as local planning authority to validate that the work undertaken throughout the development conforms to the recommendations and requirements in the approved acoustic report. The report shall also undertake post completion testing to confirm that the noise criteria have been met. Any instances of non-conformity with the recommendations in the verification report shall be detailed along with any measures required to be undertaken prior to operation of the scheme to ensure compliance with the agreed noise criteria.

2.4 Nearest Noise Sensitive Properties

The noise sensitive properties in the surrounding area have been grouped into two noise sensitive areas (NSAs), as described below and as indicated on the attached site plan 3840/SP1.

NSA	Location	Direction	Approximate distance from proposed building (metres)
1	Houses on Keppel Road and Warwick Road	east / south-east	21
2	Houses on Selborne Road	north-east	19

The above NSAs 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 a typical period of proposed plant operation.

3.2 Scope of Survey

An attended environmental noise survey was undertaken between 12:01 hours and 14:22 hours on Friday 14 March 2025.

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

A single measurement position was selected as described below and indicated on the attached site plan 3840/SP1. This was located in the middle of the back garden of the property, in order to obtain representative background levels for the various houses in the surrounding area.

At this position, 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.

The noise levels were logged continuously for the duration of the survey period, using the Norsonic 140 sound level meter set to store the octave band and 'A' weighted 100ms short-term L_{eq} for subsequent post processing.

3.5 Results

The logged data has been post processed to determine $L_{Aeq,T}$ and L_{90} and these are listed in the attached table 3840/T1.

$L_{Aeq,100ms}$ for the entire survey is also plotted on the time history graph attached 3840/TH1.

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

3.6 Weather Conditions

For the duration of the survey the temperature was between 8-9 degrees Celsius with wind speeds not exceeding 5 m/s. It remained dry with little cloud cover.

3.7 Description of Existing Acoustic Environment

For the majority of the survey period the background sound levels were controlled by a fan located to the rear of 'The Beagle' pizza restaurant. It was not possible to find a location in the garden where this did not completely control the background sound levels.

There was a short period at the beginning of the survey when the fan was not running, and during that period the noise levels were controlled by traffic on the surrounding roads.

4.0 NOISE IMPACT ASSESSMENT

4.1 Introduction

As already mentioned in Section 2.3 above, the Manchester City Council requirement is to assess noise emissions from the new plant installations following the guidance of BS 4142:2014+A1:2019.

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 2024 to predict how the sound will radiate from the plant 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 - the approximate height of the closest residential windows.

4.2.2 Source Sound Levels

Manufacturers' noise data for the new air conditioning plant is set out on the attached plant noise schedule ADT 3840/PNS. The plant location is described in the schedule and shown in more detail on the application drawings.

4.3 Predicted Sound Levels

The scheduled plant noise levels have been input into the Cadna/A computer model, and the predicted cumulative noise levels with all plant running 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	41	27	22	23	22	16	13	2	26
NSA2	42	29	23	26	25	19	15	4	28

The $L_{Aeq,T}$ in the above table are the specific sound levels.

4.4 Background Sound Level

As noted in Section 3.7 above, for the majority of the survey the background levels were completely controlled by noise from a fan at the nearby pizza restaurant, with a resulting level of 52 dB $L_{A90, 1 \text{ hour}}$. While this is the reality of the background noise climate in the area to the rear of the building, it would not be appropriate to compare the noise from the new plant with that background sound level. Based on the results from the short period when the fan was not operating, the background sound level is estimated to be 40 dB $L_{A90, 1 \text{ hour}}$, which is more typical of this type of location.

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. It is important to note that these distinctive features are determined at the assessment location, not at the plant noise source.

4.5.1 Tonality

BS 4142 contains detailed objective methods for determining tonality including narrow band analysis. In this case the manufacturers' noise data is only available in octave bands, so those methods are not usable. For the purposes of this assessment, clear tonality is defined as an $L_{eq,T}$ in one octave band rising 5 dB above the levels in both adjoining octave bands.

According to that definition, a tonal correction is not required.

4.5.2 Impulsivity

The noise emissions from plant of the type proposed for this development would 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 plant operation is dependent on internal conditions, periods of operation may be intermittent. As such, a correction of +3dB has been applied.

4.6 Initial Assessment of Impact

The initial assessment of impact for the day time period (07:00 – 23:00 hours) is set out in the following table:

Initial assessment of impact – day time period		
	NSA1	NSA2
Specific Sound Level <i>L_{Aeq, 1 hour}</i> (dB)	26	28
Tonality correction (dB)	0	0
Intermittency correction (dB)	3	3
Other distinctive character (dB)	0	0
Predicted Rating Level <i>L_{Ar, 1 hour}</i> (dB)	29	31
Background level <i>L_{A90, 1 hour}</i> (dB)	40	40
Excess of rating level over background sound level (dB)	-11	-9

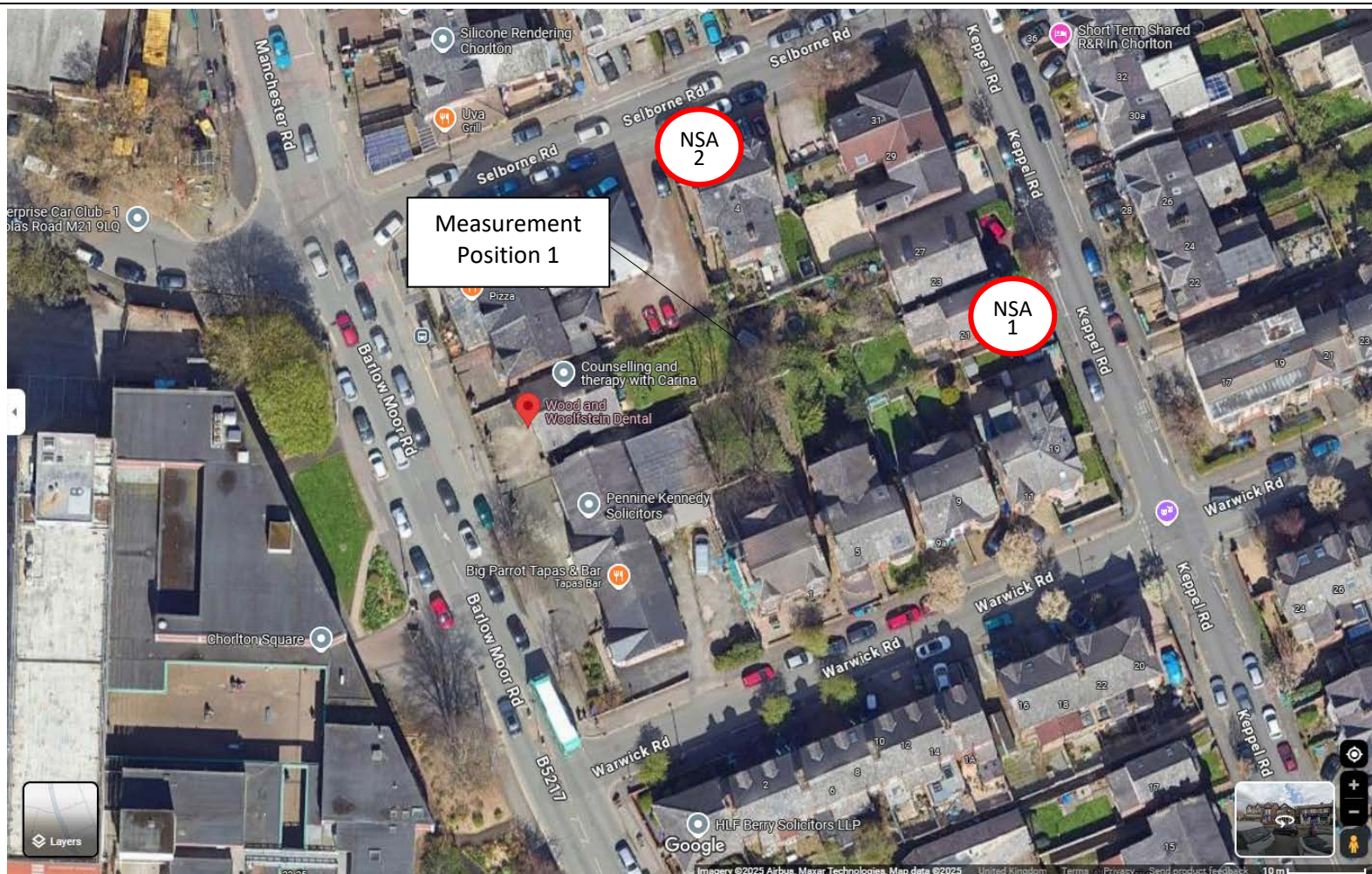
The assessment of impact for the night time period (23:00 – 07:00 hours) is not needed since the surgery will be closed and the plant will not be in operation during this time.

4.7 Conclusion

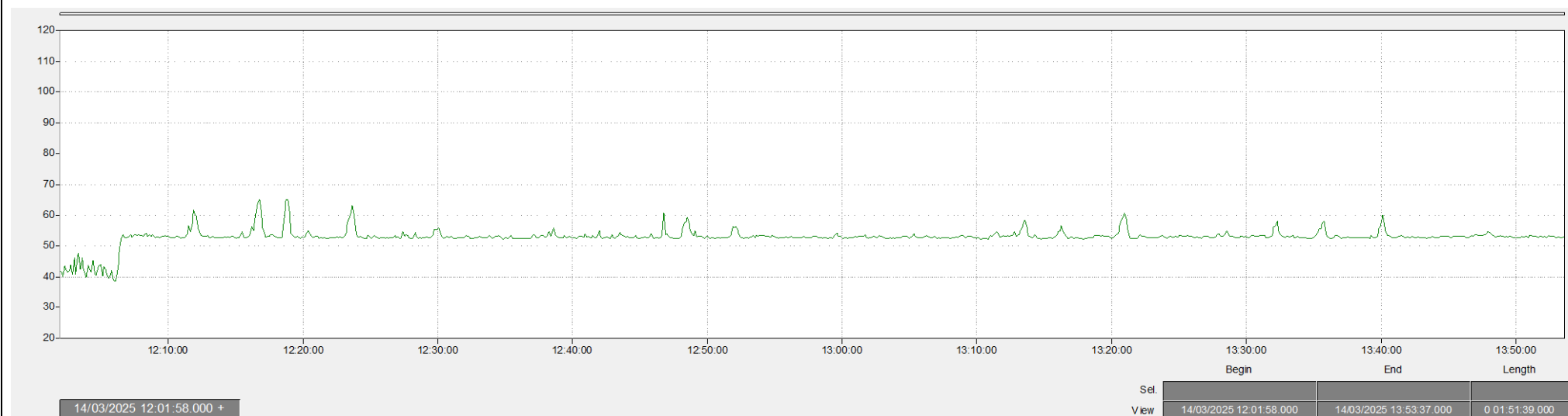
This assessment has demonstrated that rating levels at the nearby noise sensitive properties are at least 5dB below typical background levels and therefore the requirements of planning condition 5 are achievable.

The conclusion of this report is therefore that the plant is suitable for this development.

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> Wood and Woolfstein Dental Practice		
	<u>Survey Date</u> 14 March 2025	<u>Drawing No.</u> 3840/SP1	



<u>Notes</u>	<u>Description</u>		
	Measured L _{Aeq, 100ms}		
	<u>Project</u>		
	Wood and Woolfstein Dental Practice		
	<u>Survey Date</u>	<u>Drawing No.</u>	
	14 March 2025	3840/TH1	

SUMMARY OF AVERAGE MEASURED LEVELS (L_{EQ})

Position	Date	Period	Average L _{eq} (dB) at octave band centre frequency (Hz)								L _{Aeq}	L ₉₀
			63	125	250	500	1k	2k	4k	8k		
Position 1	13 th March 2025	2 hours	61	61	57	52	47	41	35	29	54	52

Table 3840/T1

WOOD AND WOOLFSTEIN DENTAL PRACTICE

PLANT NOISE SCHEDULE ADT 3840/PNS

FIRST ISSUE

Ref.	Plant Description	Location	Duty m ³ /s : Pa	Data L _w / L _p	Octave Band Centre Frequency - Hz								dB(A)
					63	125	250	500	1k	2k	4k	8k	
New AC unit	Toshiba RAS 13E2AVG-E	Outdoor rear elevation		L _p at 1 metre	64	50	45	46	45	39	36	27	49 ¹

¹Data provided is for the heating mode. There are no octave band sound power levels, although the manufacturer provides an L_w(A) 62 dB.

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)
Norsonic	Nor140 Class 1 Sound Level Meter (SLM10)	1407647	February 2025		-0.2	113.8	113.8
Norsonic	Nor1251 Calibrator (Cal 5)	34220	February 2025	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

APPENDIX C
Definitions from BS 4142:2014+A1:2019

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_{At,T_r}

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

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

see Appendix B