ACOUSTIC DESIGN TECHNOLOGY
Noise and Vibration Consultants

ADT 3714

07 June 2024

Barnsley MBC
Finance and Property Directorate
Commercial Services Payments Team
PO BOX 522
BARNSLEY
S70 9AU

DARFIELD LIBRARY

ENVIRONMENTAL NOISE IMPACT ASSESSMENT

ACOUSTIC CONSULTANCY REPORT ADT 3714/ENIA

Revision	Date	Issued By	Checked by	Revision Notes
-	07 June 2024	Calum Armstrong	Chris Middleton	first issue

ACOUSTIC DESIGN TECHNOLOGY LIMITED
CROSSLAND GRANGE, GREENWAYS, CHESTERFIELD, DERBYSHIRE S40 3HF
Telephone: 01246 554841 Facsimile: 01246 550141 Website: www.acousticdesign.co.uk E-mail: mail@acousticdesign.co.uk
Company Registered in England No. 4528227
V.A.T. Registration No. 593 7456 92

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1.0 SUMMARY

Planning permission is being sought for the installation of three external condenser units, wall mounted on the south elevation as shown on the planning application drawings, and a new heat recovery fan unit also venting to the south elevation.

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

The predicted cumulative BS 4142 rating level from the proposed installation is below the typical background level during the proposed hours of operation. According to BS 4142:2014+A1:2019, this is "…*an indication of the specific sound source having a low impact, depending on the context".*

The assessment of the local context indicates that that impact would if anything be slightly lower than that indicated by the initial assessment. The environmental noise impact of the proposed plant would therefore be low.

2.0 BASIS OF ASSESSMENT

2.1 Site Location

Darfield Library is located on Church St, Darfield, Barnsley, S73 9LG.

The surrounding area is predominantly residential with a few commercial properties. There is a pharmacy on the corner of Church Street and Barnsley Road, with a potential apartment above on the first floor, and Smart Door Solutions Ltd in single storey offices directly east of the site. There is a bowling green located north across Church Street, a doctors surgery east of this bowling green, and an assisted living home located east of the surgery.

The closest neighbouring residential properties are the houses on St Marys Road and Church Street located to the west and south of the site.

The closest main roads are the A635 Doncaster Road located approximately 496 metres to the north east, and the A6195 approximately 1.15 kilometres to the east. The A633 runs past Wombwell, approximately 1.82 kilometres to the south-west.

2.2 Proposed Development

The proposal is to install three external condenser units, wall mounted on the south elevation as shown on the planning application drawings, and a heat recovery unit venting to the south elevation.

2.3 Assessment Criteria

The primary guidance on the control of noise emissions from new external plant is to be found in BS 4142:2014+A1:2019.

2.4 Nearest Noise Sensitive Properties

The nearest noise sensitive properties are the houses on St Mary's Road and Church Street, which are approximately 18 metres away from the proposed plant, to the west, south-west and south.

Other dwellings are located further from the site and in some cases screened by the intervening buildings. A satisfactory noise impact at this location 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 typical period of proposed plant operation.

3.2 Scope of Survey

An attended environmental noise survey was undertaken between 10:00 hours and 12:00 hours on Wednesday 29 May 2024.

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 at the south boundary of the library area as indicated on the attached site plan 3714/SP1.

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.

The noise levels were logged continuously for the duration of the survey period, using the 01dB Blue Solo sound level meter set to store the octave band and A-weighted 100ms short-term L_{eq} levels 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 1 hour period, and these have been detailed in the attached table 3714/T1.

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 the survey period, weather conditions were sunny and dry, with average wind speeds not exceeding 5m/s. It is therefore considered unlikely that weather conditions had a significant impact on the measured levels.

3.7 Description of Existing Acoustic Environment

Throughout the survey period, the background noise levels were controlled by traffic noise from the centre of Wombwell and from the A6195. The L_{Aeq} and L_{max} levels were controlled by passing cars on Church Street and St Mary's Road. Throughout the second hour of the survey, there was sporadic noises from a nearby construction site to the south as well as the movement of vehicles, personnel and equipment. There were sporadic noises of birdsong and rustling of nearby bushes throughout the survey.

4.0 NOISE IMPACT ASSESSMENT

4.1 Introduction

As already mentioned in Section 2.3 above, the proposal is to assess noise emissions from the new plant installations using the guidance of BS 4142.

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 2023 to predict how the sound will radiate from the plant to the nearest noise sensitive property.

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 set to 4.5 metres, to represent the first-floor windows at the nearest dwellings.

4.2.2 Source Sound Levels

Three condenser units will be mounted outside on the south elevation and a heat recovery unit will also vent to this elevation. The manufacturers' noise data and plant locations are described on the attached plant noise schedule ADT 3714/PNS, with the locations shown in more detail on the planning application drawings.

4.3 Predicted Sound Levels

The scheduled plant noise levels have been input into the Cadna/A computer model, and the predicted noise levels at the nearest dwellings 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	
St Mary's Road	37	38	37	33	30	27	20	12	36

4.4 Background Sound Level

The plant will operate during the library opening hours. Reference to the survey results show that the lowest background level at the measurement position, representative of the nearest residential was 40 dB $L_{A90,1\ hour}$.

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 level at St Mary's Road is not tonal. Therefore, a tonal correction has not been applied.

4.5.2 Impulsivity

The noise emissions from the air conditioning unit 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 plant operation is dependent on internal conditions, periods of operation may be intermittent. As such, a correction of +3dB has been applied.

Applying the correction for tonality and intermittency to the specific sound levels results in a predicted rating level of 39 dB $L_{Ar,\ 1\ hour}$ at the houses on St Mary's Road.

4.6 Initial Assessment of Impact

The predicted rating level is below the background level at the assessment location. According to BS 4142, where the rating level does not exceed the background sound level, the initial assessment of impact would be 'low', depending on the context.

4.7 Context

4.7.1 The Absolute Level of Sound

The background sound levels and rating levels as discussed in Sections 4.4 and Section 4.5 found above are low for a suburban area during the day, and therefore the absolute levels might be as, or more, relevant than the degree by which the rating level exceeds the background level.

A specific sound level of 36 dB $L_{Aeq,\ 1\ hour}$ outside the dwellings would translate to levels of 21 to 26 dB $L_{Aeq,\ 1\ hour}$ inside the dwellings with windows open. This compares with BS 8233 criterion for dwellings of 35 dB $L_{Aeq,\ 16\ hour}$ during the day. That criterion is designed primarily for anonymous noise source such as traffic rather than plant noise, although the significant margin of compliance should compensate for that.

On that basis the absolute sound levels would suggest a slightly lower impact than what is indicated by the initial assessment of impact.

4.7.2 The Character and Level of the Specific and Residual Sound

The character of the noise from the plant is different to that of the residual sound of traffic and therefore is potentially distinct from other noise sources in the area. However, as the specific sound level is below the background level, the potentially distinctive character is unlikely to be noticeable.

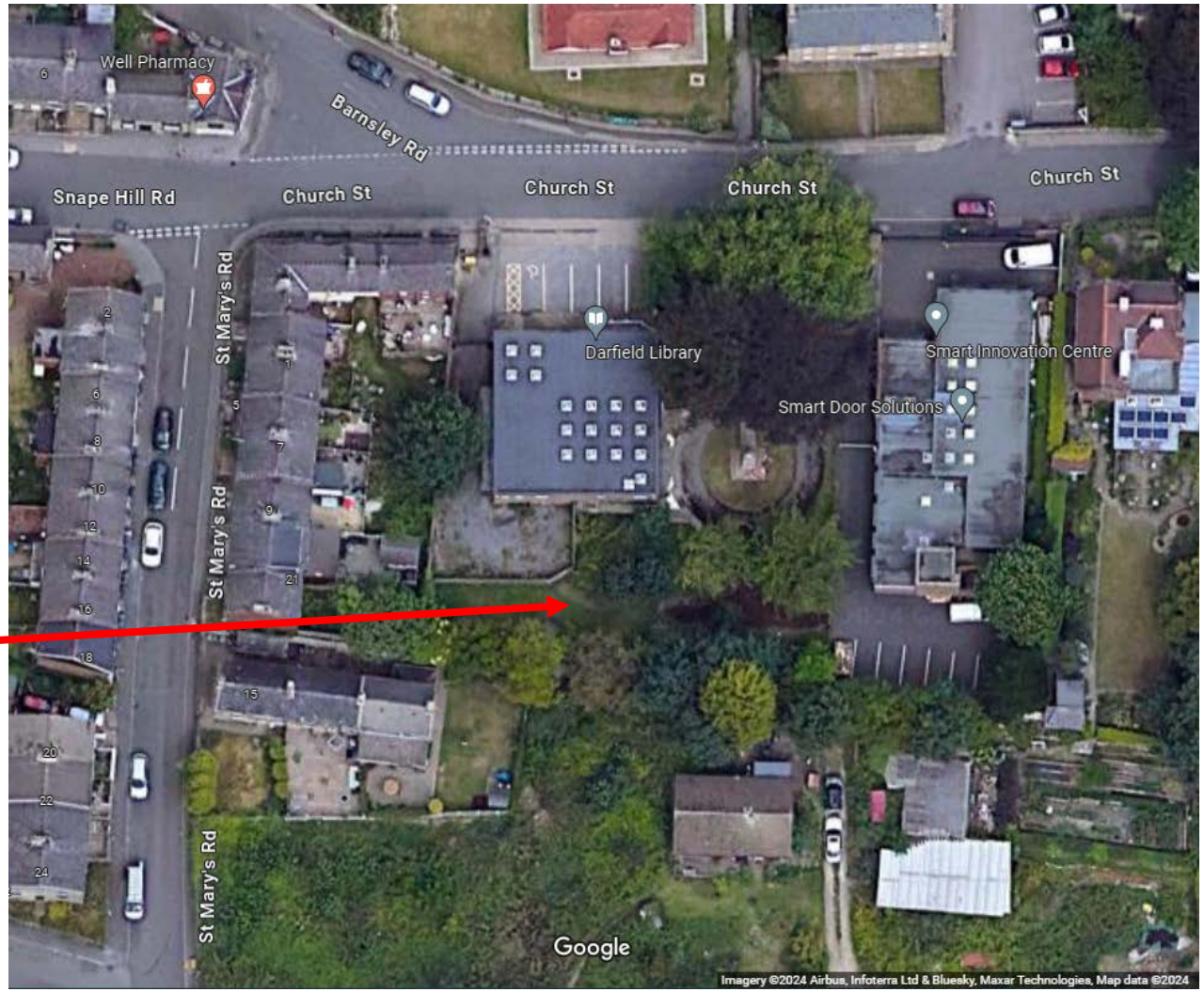
4.7.3 The Sensitivity of the Receptor

The identified noise sensitive buildings do not appear to be any more or less sensitive than typical residential buildings, and there is no evidence that they have any specific sound insulation measures. It is therefore not necessary to adjust the impact for the sensitivity of the receptor.

The assessment of context suggests that the impact would be slightly lower than that indicated by the initial assessment.

4.8 Conclusion

This assessment has demonstrated that when assessed following the methodology of BS 4142, the initial estimate of impact at the nearest house would be low, and the assessment of the context confirms this conclusion.



Notes

Description

Site plan showing noise monitoring location

Project

Darfield Library

Survey Date	**Drawing No.**
29 May 2024	3714/SP1

ADT
Acoustic Design Technology
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SURVEY RESULTS (A WEIGHTED TIME HISTORY)

Position	Period	$L_{Aeq, 1Hour}$ dB	L_{Amax} dB	L_{A90} dB
1	10:00 – 11:00	48	69	40
	11:00 – 12:00	47	67	41

Table 3714/T1

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					
01dB	PRE 21 S Pre-Amplifier	16866	March 2023		-0.10	113.9	113.9
01dB	MCE 212 ½ inch Microphone	90549					
Norsonic	Nor1251 Calibrator (Cal 4)	33453	March 2024	113.96			

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, $L_{Aeq,Tr}$

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, $L_{At,Tr}$

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

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

see Appendix B

DARFIELD LIBRARY

PLANT NOISE SCHEDULE ADT 3714/PNS

FIRST ISSUE

07 June 2024

Ref.	Plant Description	Location	Duty	Data	Octave Band Centre Frequency - Hz								dB(A)
			m^3/s : Pa	L_w / L_p	63	125	250	500	1k	2k	4k	8k	
OU01	Outdoor air source heat pump – Mitsubishi PUZ-M100VKA2	Mounted outside on south elevation, within manufacturers cage	-	L_p at 1m	54	54	53	49	46	41	36	29	-
OU02	Outdoor air source heat pump – Mitsubishi PUZ-M100VKA2	Mounted outside on south elevation, within manufacturers cage	-	L_p at 1m	54	54	53	49	46	41	36	29	-
OU03	Outdoor air source heat pump – Mitsubishi SUZ-M50VAR2	Mounted outside on south elevation, within manufacturers cage	-	L_p at 1m	57	58	57	54	51	48	42	36	-
HRU01	Heat recovery unit – Lossnay LGH-65RVX-E *	Venting to south elevation	100 : n/a	L_w	49	52	46	48	40	37	30	32	-

*Note – set to fan speed 2

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