LSHTM TP2 DATA CENTRE CONDENSERS

PLANT NOISE EMISSIONS ASSESSMENT

Acoustics Report A2149 R01

21st June 2024

Report for:

Up North Group
Attention: Stephen Gregory

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Issue/Revision number:

A2149 R01

Date:

21/06/2024

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Contents

1 Introduction

Ion Acoustics is appointed by Up North Group who are providing a new data centre and associated plant for the London School of Hygiene & Tropical Medicine (LSHTM) at their building TP2 on Tavistock Place in London. The works include the provision of three new external condensers at the rear of the building. There is a hotel nearby at the rear, and as this is a sensitive receptor, a noise impact assessment is expected to be required for a planning application to London Borough of Camden.

This report contains the details of a baseline noise survey and plant noise emissions assessment. Full details of the noise survey are given, and appropriate plant noise limits have been derived from this survey based on plant operating 24 hours a day, seven days a week. The plant noise limits are set at 10 dB below the representative background noise level in line with the requirements of London Borough of Camden, the local planning authority.

It is proposed to locate the new plant equipment at ground level in the rear walkway behind the recently constructed building. The background noise has been measured and plant noise has been assessed to the closest/most exposed residential receptor locations and assessed against the derived planning noise limits.

2 Proposed Scheme Details

The building TP2 is located on the north side of Tavistock Place and is behind an older building, TP1, which is currently being refurbished. The site is illustrated on Figure 1 below along with the external noise measurement position, which has been chosen to be representative of the rear elevation of hotels on Cartwright Gardens including The Harlingford Hotel and the George Hotel (AP1).

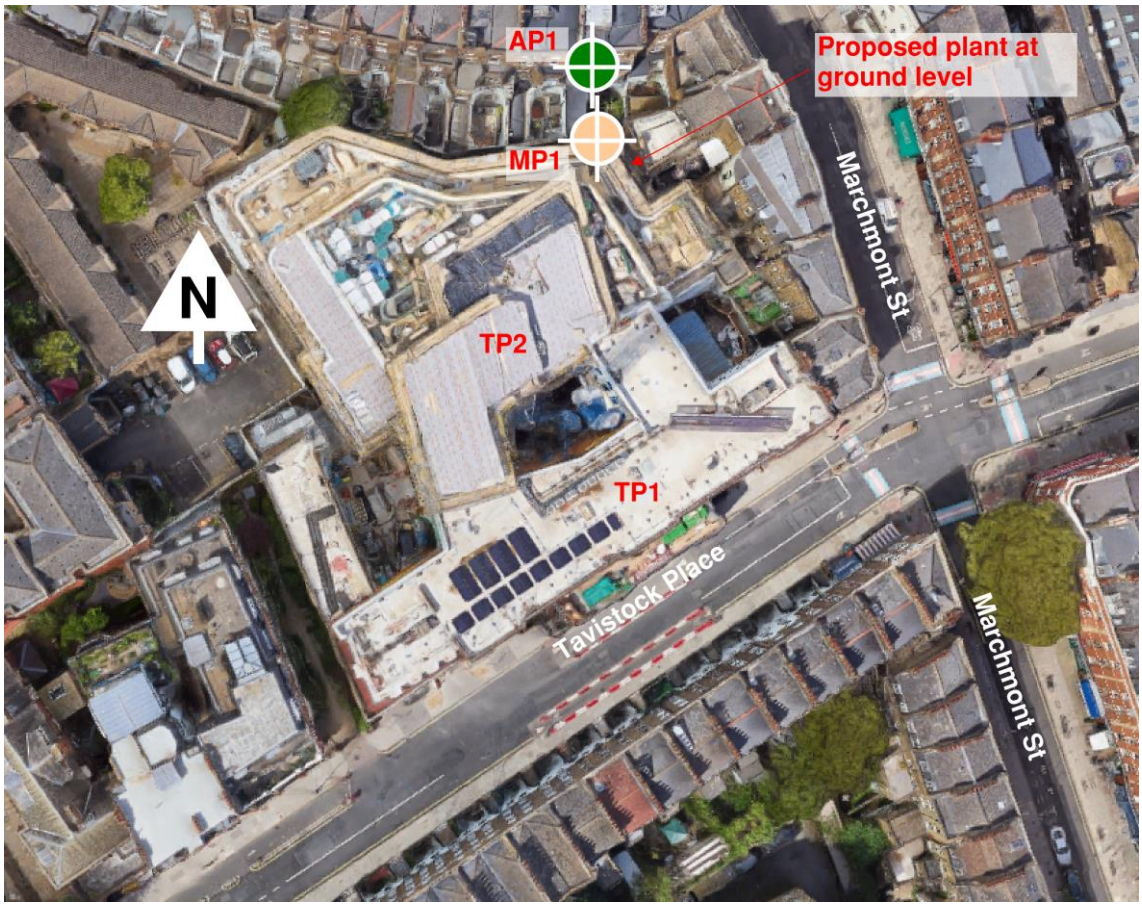

Figure 1 – Site location with scheme assessment and measurement positions indicated.

The site is in a busy central London location and there is a busy foot and vehicle traffic at the front on Tavistock Place. However, TP2 is shielded from the road by TP1 and also the plant location at the rear, and the back of the nearby hotel, is further shielded by TP2. So road noise is not significant at the rear and the noise levels are generally determined by plant noise from other buildings.

3 Acoustic Criteria

As there is a residential use nearby (a hotel) a planning noise assessment is likely to be required. Furthermore, it is prudent to carry out such an assessment in any case to ensure that noise levels do not give rise to complaints from hotel guests.

3.1 Local Authority Guidance

The site is in the London Borough of Camden who are the local authority responsible for planning and will be herein referred to as the LA. The LA's current local plan was adopted in 2017 and policy A4 relates to protecting amenity from noise and vibration. It requires assessments to be completed where noise-sensitive receptors are to be introduced close to an existing source of noise, or where development is likely to generate noise affecting dwellings. Regarding plant noise it states a BS 4142:2014 assessment is expected and a rating level of 10 dB below the background (15dB if tonal components are present) should be considered as the design criterion at dwellings. This refers to background and using BS4142:2014, so in line with that Standard the background would be typical LA90 rather than the lowest. The Camden guidance does not give any specific

limits for hotels, but does say that levels are use specific and different levels will apply dependent on the use of the premises. We are aware that some planning conditions in Camden have required the plant rating level to be a less onerous 5dB below the background noise, for example at LSHTM's Keppel Street building for Phase 2B. This may be because of context or type of receptors perhaps.

We note also that BS4142 only requires the plant rating level go be no higher than the background noise for this to be an indication of low noise impact. Therefore, setting a rating limit at 5dB below background is in fact a good limit in respect of protecting amenity, and 10dB below background is more than required for amenity. It can be imposed to control background creep however.

However, we understand that LB Camden has been contacted by the architects and they have confirmed that the limit of 10dB below background for non-tonal noise would apply. Therefore, that limit is implemented at the hotel windows.

This plant noise assessment has therefore been prepared to form of the planning application with the assessment following the guidance of BS 4142:2014+A1:2019 which is discussed in the next section. Plant noise limits have been set with the rating level at a limit 10 dB below the existing typical L_{A90} baseline noise levels at the nearby hotel windows.

3.2 BS 4142:2014 +A1: 2019 – Assessment Principles

The standard method for assessing of plant noise is British Standard BS 4142 "Method for rating and assessing industrial and commercial sound". A BS 4142 assessment is typically made by determining the difference between the plant noise under consideration and the background sound level as represented by the L_{A90} parameter, determined in the absence of the proposed plant noise. The L_{A90} parameter is defined as the level exceeded for 90% of the measurement time, representing the underlying noise in the absence of short-term events.

The plant noise under consideration is assessed in terms of the ambient noise level, L_{Aeq}, but a character correction penalty can be applied where the noise exhibits certain characteristics such as distinguishable tones, impulsiveness or, if the noise is distinctively intermittent. The ambient noise level, L_{Aeq} is defined as the steady-state noise level with the same energy as the actual fluctuating sound over the same time period. It is effectively the average noise level during the period. The plant noise level (L_{Aeq}) with the character correction (if necessary) is known as rating level, L_{Ar}, and the difference between the background noise and the rating level is determined to make the BS 4142 assessment. The standard then states:

- *"Typically, the greater the difference, the greater the magnitude of the impact.*
- *A difference of around +10dB or more is likely to be an indication of a significant adverse impact, depending on the context.*
- *A difference of around +5dB is likely to be an indication of an adverse impact, depending on the context*
- *The lower the rating level is relative to the measured background sound level, the less likely it is that the specific sound will have an adverse impact or a significant adverse impact. Where*

the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending on the context."

The standard outlines a number of methods for defining appropriate 'character corrections' to determine the rating levels to account for tonal qualities, impulsive qualities, other sound characteristics and/or intermittency.

The standard also highlights the importance of considering the context in which a sound occurs. Factors including the absolute sound level, the character of the sound, the sensitivity of the receptor and the existing acoustic character of the area should be considered when assessing the noise context.

Such an assessment should be carried out be a suitably qualified acoustician. In this case, this is David O'Neill BEng CEng MSc MIOA and he is a full member of the Institute of Acoustics with over 30 years of experience as an acoustic consultant. Ion Acoustics is also a member of the Association of Noise Consultants (ANC).

4 Baseline Noise Survey

4.1 Methodology and Equipment

A baseline noise survey was carried out according to the requirements of BS4142:2014 to determine the existing noise levels at the rear of the building near the closest affected noise-sensitive receptors. The noise monitoring equipment was left for a period of over 24 hours from Thursday 23rd May to Friday 24th May 2024. The equipment was installed by David O'Neill and collected by Jonathan Croft AMIOA.

The measurement position is shown on the site plan in Figure 1 above (MP1) and in Figure 2. The microphone was mounted at approximately first floor level above the boundary wall at the rear of TP2 close to the rear windows of the nearby hotel. This represented a free-field location that is not immediately next to reflecting facades.

Figure 2 – Photo looking west from the courtyard to MP1 and the hotel windows beyond

A Rion NL-52 logging sound level meter was used and set to measure various octave band noise indices as well as standard broadband A-weighted indices including L_{Aeq}, L_{A90}, L_{AFmax} during consecutive 15-minute measurement periods. The microphone was fitted with a type WS-15 windshield.

The sound level meter was calibration checked using a Brüel & Kjær Type 4231 calibrator at the start and end of the survey and no significant drift was observed. The meter and calibrator were within their respected third party calibration periods and calibration certificates are available for all if required.

Weather conditions during the survey were suitable for noise measurement, with mild and dry conditions, mix of overcast and clear skies, and wind speed below acceptable levels. The wind speed generally was around 5 m/s at set up and during the afternoon, however in this very sheltered position at the rear there was no evidence of any significant air movement.

4.2 Results

A time history graph of the L_{Aeq}, L_{AMax} and L_{A90} values at MP1 during the entire survey period are given below in Figure 3 below. The tabulated broadband measurements at MP1 are provided in Appendix A along with the L_{A90} distribution graphs.

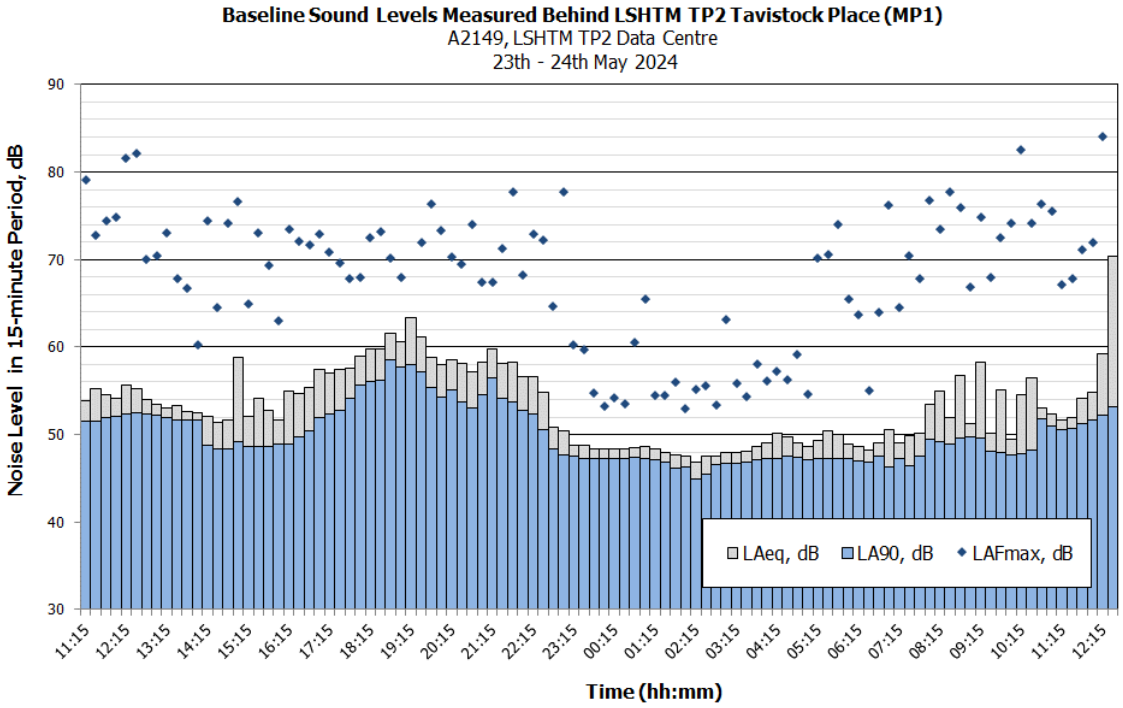

Figure 3 – Time history graph of noise measurements at MP1

4.3 Noise Sources

At set up and collection, the dominant existing noise source was steady plant noise from condenser units serving the hotel which are located through a gate off the LSHTM courtyard. These were not all visible, but could clearly be identified as the dominant underlying noise source. There was also some intermittent noise from construction and delivery type noise at TP1 at the front of the site, but this was not significant and only from time to time. During the periods we were on site, this was occasional and did not have any impact on the background noise level L_{A90}.

Some occasional vehicle noise from the roads could be heard, but this was not significant and again was not a factor in determining the background noise (dB L_{A90}).

From the time history graph it can be seen that the background noise level drops at around 1400 hrs to around 48dB L_{A90}, rising again at around 1700 hrs and then dropping at around 2300 hrs to a relatively steady level of around 47dB L_{A90} during the night. It is assumed therefore that some or all of the condensers witnessed on site go off during the afternoon and overnight, but with the very steady levels measured during that period, the background noise appears to still be controlled by plant noise. From listening to the audio files sampled that is supported as the background noise does seem to be from plant overnight. Therefore, the current noise environment is primarily from plant noise, which was observed to be generally condenser noise.

4.4 Measurements Summary

A summary of the noise levels measured at MP1 are presented in Table 2. The summary values are all presented as free-field values. The typical L_{A90} values have been determined in line with the intent of BS 4142 to determine a typical level rather than lowest and have been derived based on the distribution graphs presented in Appendix A.

Table 2 – Summary of free-field noise levels at MP1

Period	Time hh:mm	Average[1] Noise Level, dB $L_{Aeq,T}$	Typical Background Noise Level, dB L_{A90}
Day	07:00 – 2300	56	49
Night	23:00-07:00	49	47
[1]Logarithmic average of measured $L_{Aeq,T}$ during day and night period.			

The summary tables above illustrate that the background noise level is fairly steady for day and night. At night there is only 2dB between the L_{Aeq} and L_{A90} which shows that there source generating the L_{A90} (plant) is the main source with limited contribution from other sources.

4.5 Proposed Plant Noise Limits

Plant noise limits at the hotel windows have been set as a rating level (L_{Ar}) equal to 10 dB below the typical background noise levels (L_{A90}) quantified in the survey. This is significantly more onerous than the relative value discussed in BS 4142:2014 where a rating level at parity with the background noise level is considered a low impact. This limit 10dB below background is far more onerous than the standard interpretation of the requirement from BS4142.

One key assessment position has been used which is the rear upper floor windows of hotel overlooking flat single-storey roof and rear yard of TP2 (AP1 in Figure 1). The upper floor windows will have a line of sight to the top of the condenser units in the courtyard. We measured the distance on site with a laser measure from the condensers to the most affected window as 14.1m.

Plant noise limits are given in Table 4 below

Table 3 - Proposed plant noise limits (free-field values) at sensitive receptors

Assessment Position	Period	Existing Typical L_{A90}, dB	Camden Requirement dB	Plant Limit L_{Ar}, dB
AP1	Day	49	-10	39
	Night	47	-10	37

The plant noise limits given above apply as a cumulative value for the new plant introduced by the scheme at the assessment position. As the limit is set as a rating level, it is inclusive of any character corrections that apply such as tonality, intermittency, or impulsivity etc.

5 Plant Noise Assessment

5.1 Plant Details

In total there are three new condensers proposed which will be located in the yard at ground floor. These would be against the wall shown to the right of the bike lock hoop in Figure 3. The layout is shown in Figure 4. The plant comprises:

- 2 x DMF030D units (operating on a duty/standby basis, only one at a time). Sound power level 65 dB L_{WA} each unit.
- 1 x DMA018D unit (operating on demand). Sound power level 65 dB L_{WA}.

So only two units at most would operate at any time (1 x DMF030D and 1 x DMA 018), but this could occur during day or night.

The noise levels for the units have been provided by the suppliers based on the specific duty settings and are based on using a low fan speed (set within the unit). The fully duty gives a sound power of 75 dB L_{WA}, but the units will be controlled to ensure they cannot run at full duty. We are advised also that the units will not work at these levels most of the time and will actually operate lower speed and noise levels for most of the operating time as this duty is for 30 degrees C.

The two DMF030D units will be installed side by side on the ground with the fan facing south. The single smaller unit will be double stacked above this, also with the fan facing south.

Calculations have been prepared based on this plant and the layout in Figure 6.

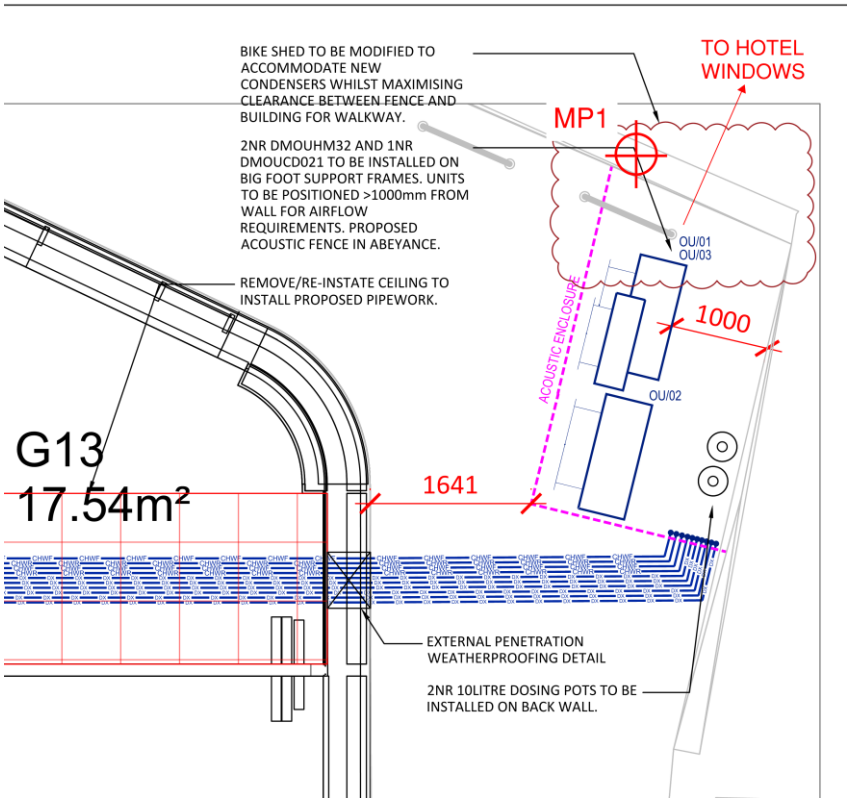

Figure 4 – Proposed Plant Layout

5.2 Calculation Results

Calculations have been prepared with the noise source information as described in section 5.1. The full calculations are provided in Appendix B. The predictions indicate that with no additional treatment (ie the units sitting in free space in the yard) the noise level would be L_{Aeq} 40dB from both units. Allowing a 3dB character correction for potential intermittency, would result in a noise level of 43 dB which is 4 dB below the background level (ie 6dB above the night time limit). Whilst this would, according to BS4142:2014 be a low noise impact, it does not meet the Camden requirement.

Therefore, to meet the performance requirement some mitigation is required to reduce the levels by 6dB. The hotel windows are above the plant and to provide line of sight shielding, a lid is proposed over the plant, this can be either solid or acoustically louvred (a minimum specification is given below). To reduce reflections of the rear wall behind the plant to the front it is proposed

to provide acoustic absorption along the rear wall. The main sound path is from the front of the plant out towards the pathway, where there will be some reflections off walls which are accounted for.

The noise control measures therefore are:

- Plant installed along wall as shown and not facing towards hotel rooms
- Main condensers work on duty/standby only
- Acoustic lid over plant comprising either a solid panel with min 50mm mineral fibre lining to the underside or 150mm deep acoustic louvre (eg Allaway 1515)
- Acoustic absorption lining to rear wall behind plant (eg 50mm mineral fibre with perforate metal facing).

The minimum sound reduction index for the louvre is given below:

	Minimum sound reduction R (dB) at octave band centre frequencies (Hz)						
	63	125	250	500	1000	2000	4000
150mm louvre	0	2	4	7	10	10	8

BS4142 Character Correction

The plant is likely to potentially come on and off to demand from time to time, so could potentially have an intermittency correction. Strictly speaking if they are intermittent, then they will not run continually so an on-time correction would usually apply. For this we have included a 3dB intermittency correction. The plant is not expected to be tonal, however.

The BS 4142:2014 assessments for each position are given in Table 4 below.

Table 4 –BS 4142:2014 assessment

Location / Period	Item	Calculated L_{Aeq} (specific noise)	BS 4142 2014 character correction	Rating Level L_{Ar}	Limit L_{Ar}
AP1	DMF030D	30			
	DMA018D	30			
Day	Total	33	3	36	39
AP1	DMF030D	30			
	DMA018D	30			
Night	Total	33	3	36	37

The results of the BS 4142:2014 assessment above indicate that plant noise levels with the specified equipment and mitigation would comply with the proposed plant noise limits during the day and night.

5.3 Context and Uncertainty

BS 4142 requires consideration of context and uncertainty. In this case, the context is that the noise environment is already controlled by building services plant and hence the new plant would not be a new type of noise. The new plant specific sound level is at least 14dBA below the existing background noise, even at night, so would not be a significant factor in terms of the

noise heard at the hotel windows and is unlikely to be noticed given the other plant noise sources in the area.

We note also that the receptors are hotel bedrooms, and whilst they need an appropriate level of protection for amenity are arguably less sensitive than permanent residential accommodation.

The background noise measurements are subject to uncertainty in this case are reasonably steady so it is straightforward to establish the typical value.

Calculations have used noise data for plant operating at the proposed upper design duty when in practice this will typically require less cooling and therefore the noise levels calculated should be viewed as worst case noise levels. Most operations will be at a lower level.

A robust and conservative approach has been adopted within this assessment and it is not expected that uncertainty in the survey, setting of limits, or calculations will make a material change to the assessment outcome.

6 Conclusion

This assessment has documented the external noise survey completed at LSHTM TP2 specifically at the rear of the building close to the nearest sensitive receptors, a hotel. The noise survey is documented and measurement results given in the appendix and summary values provided in the main body of the report and discussed above.

A plant noise assessment has been carried out, considering the proposed new equipment for a new data centre for TP2. Full details of the expected plant equipment, mitigation measures, and calculation details have been included within this report. Plant noise limits have been set based on the local authority requirements and guidance in BS4142.

The findings are that the plant noise levels are expected to comply with limits during all time periods and therefore there is no reason to refuse the application on the grounds of noise.

Glossary of Acoustic Terms

dB – Decibel. The unit used to describe noise levels. It is a logarithmic ration of the sound pressure.

A Weighting – A frequency weighted applied to the measured sound spectrum which corrects the level to simulate the frequency response of the hearing system to sound levels of varying frequencies.

L_{eq}– This is a quasi-average noise level which includes all the sound energy during the measurement period averaged out across the period. It is typically used to describe the ambient noise level. The A weighted value is the L_{Aeq}.

L_{90} – This is the level exceeded for 90% of the measurement period and indicates the steady underlying background noise level. The A weighted Level is the L_{A90}.

R_w - Weighted sound reduction index of a single element only: dB. This is generally tested in a laboratory and does not account for any flanking or other sound paths.

D_w - Weighted level difference: dB. This is the sound level difference between two rooms and also includes the effect of flanking, other sound paths, workmanship, on site construction and absorption in the receiver room.

RT - Reverberation Time: seconds. This is the time taken for reverberant sound in the room to decay by 60 dB. A dead space with many soft finishes would have a short RT whereas a lively space, comprising mainly hard surfaces, would have a long RT.

NR - The Noise Rating, NR, is used to describe steady noise levels such as mechanical services noise. A family of curves is defined in octave frequency bands and the NR rating for a particular noise is the lowest NR curve which is entirely above the spectrum of the noise under consideration.

Time	L_{Aeq} dB	$L_{Amax,F}$ dB	L_{AF90} dB	Time	L_{Aeq} dB	$L_{Amax,F}$ dB	L_{AF90} dB
23/05/2024 11:00	64.7	96.5	51.4	23/05/2024 23:00	50.4	77.7	47.7
23/05/2024 11:15	53.9	79.1	51.5	23/05/2024 23:15	48.8	60.3	47.5
23/05/2024 11:30	55.2	72.8	51.5	23/05/2024 23:30	48.8	59.7	47.3
23/05/2024 11:45	54.6	74.4	52.0	23/05/2024 23:45	48.3	54.7	47.2
23/05/2024 12:00	54.2	74.9	52.1	24/05/2024 00:00	48.3	53.3	47.3
23/05/2024 12:15	55.6	81.6	52.3	24/05/2024 00:15	48.3	54.2	47.3
23/05/2024 12:30	55.3	82.1	52.5	24/05/2024 00:30	48.3	53.5	47.3
23/05/2024 12:45	54.0	70.0	52.4	24/05/2024 00:45	48.5	60.6	47.4
23/05/2024 13:00	53.5	70.4	52.2	24/05/2024 01:00	48.6	65.5	47.3
23/05/2024 13:15	53.0	73.1	52.0	24/05/2024 01:15	48.3	54.5	47.1
23/05/2024 13:30	53.3	67.9	51.6	24/05/2024 01:30	48.0	54.5	46.9
23/05/2024 13:45	52.6	66.7	51.6	24/05/2024 01:45	47.7	56.0	46.1
23/05/2024 14:00	52.5	60.2	51.7	24/05/2024 02:00	47.5	53.0	46.3
23/05/2024 14:15	52.1	74.5	48.8	24/05/2024 02:15	46.9	55.2	44.9
23/05/2024 14:30	51.4	64.5	48.4	24/05/2024 02:30	47.5	55.6	45.5
23/05/2024 14:45	51.6	74.1	48.4	24/05/2024 02:45	47.6	53.4	46.6
23/05/2024 15:00	58.8	76.6	49.2	24/05/2024 03:00	48.0	63.1	46.7
23/05/2024 15:15	52.1	64.9	48.7	24/05/2024 03:15	47.9	55.8	46.7
23/05/2024 15:30	54.1	73.1	48.7	24/05/2024 03:30	48.1	54.3	46.9
23/05/2024 15:45	52.8	69.4	48.7	24/05/2024 03:45	48.7	58.1	47.1
23/05/2024 16:00	51.7	63.0	48.9	24/05/2024 04:00	49.1	56.1	47.2
23/05/2024 16:15	55.0	73.5	48.9	24/05/2024 04:15	50.1	57.3	47.3
23/05/2024 16:30	54.7	72.1	49.8	24/05/2024 04:30	49.7	56.3	47.5
23/05/2024 16:45	55.4	71.7	50.4	24/05/2024 04:45	49.1	59.2	47.4
23/05/2024 17:00	57.4	72.9	52.0	24/05/2024 05:00	48.7	54.6	47.1
23/05/2024 17:15	57.0	70.8	52.3	24/05/2024 05:15	49.3	70.2	47.2
23/05/2024 17:30	57.4	69.6	52.8	24/05/2024 05:30	50.4	70.6	47.3
23/05/2024 17:45	57.6	67.8	54.1	24/05/2024 05:45	50.0	74.0	47.3
23/05/2024 18:00	58.9	68.0	55.7	24/05/2024 06:00	48.9	65.5	47.2
23/05/2024 18:15	59.8	72.5	56.1	24/05/2024 06:15	48.6	63.7	47.0
23/05/2024 18:30	59.8	73.2	56.2	24/05/2024 06:30	48.2	55.1	46.8
23/05/2024 18:45	61.6	70.2	58.5	24/05/2024 06:45	49.0	64.0	47.5
23/05/2024 19:00	60.6	68.0	57.7	24/05/2024 07:00	50.6	76.2	46.3
23/05/2024 19:15	63.3	91.4	58.0	24/05/2024 07:15	49.1	64.5	47.2
23/05/2024 19:30	61.1	72.0	57.1	24/05/2024 07:30	49.9	70.4	46.4
23/05/2024 19:45	58.8	76.3	55.4	24/05/2024 07:45	50.1	67.9	47.5
23/05/2024 20:00	58.0	73.3	54.3	24/05/2024 08:00	53.5	76.8	49.5
23/05/2024 20:15	58.5	70.3	55.1	24/05/2024 08:15	55.0	73.5	49.2
23/05/2024 20:30	58.1	69.5	53.7	24/05/2024 08:30	52.0	77.7	48.9
23/05/2024 20:45	57.1	74.0	53.0	24/05/2024 08:45	56.8	76.0	49.6
23/05/2024 21:00	58.3	67.4	54.6	24/05/2024 09:00	51.3	66.9	49.8
23/05/2024 21:15	59.8	67.4	56.5	24/05/2024 09:15	58.2	74.8	49.6
23/05/2024 21:30	58.1	71.3	54.2	24/05/2024 09:30	50.2	68.0	48.1
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23/05/2024 22:30	54.8	72.3	50.5	24/05/2024 10:30	56.5	74.2	48.2
23/05/2024 22:45	50.8	64.7	48.3	24/05/2024 10:45	53.0	76.3	51.8

Time	L_{Aeq} dB	$L_{Amax,F}$ dB	L_{AF90} dB	Time	L_{Aeq} dB	$L_{Amax,F}$ dB	L_{AF90} dB
24/05/2024 11:00	52.4	75.5	51.0	00/01/1900 00:00	0.0	0.0	0.0
24/05/2024 11:15	51.7	67.1	50.6	00/01/1900 00:00	0.0	0.0	0.0
24/05/2024 11:30	51.9	67.8	50.7	00/01/1900 00:00	0.0	0.0	0.0
24/05/2024 11:45	54.1	71.2	51.3	00/01/1900 00:00	0.0	0.0	0.0
24/05/2024 12:00	54.8	71.9	51.7	00/01/1900 00:00	0.0	0.0	0.0
24/05/2024 12:15	59.3	84.1	52.2	00/01/1900 00:00	0.0	0.0	0.0
24/05/2024 12:30	70.4	92.8	53.2	00/01/1900 00:00	0.0	0.0	0.0
00/01/1900 00:00	0.0	0.0	0.0	00/01/1900 00:00	0.0	0.0	0.0
00/01/1900 00:00	0.0	0.0	0.0	00/01/1900 00:00	0.0	0.0	0.0
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00/01/1900 00:00	0.0	0.0	0.0	00/01/1900 00:00	0.0	0.0	0.0
00/01/1900 00:00	0.0	0.0	0.0	00/01/1900 00:00	0.0	0.0	0.0
00/01/1900 00:00	0.0	0.0	0.0	00/01/1900 00:00	0.0	0.0	0.0
00/01/1900 00:00	0.0	0.0	0.0	00/01/1900 00:00	0.0	0.0	0.0

LSHTM TP2 Data Centre: External Condenser Plant Noise Calculations				
SPL = SWL - 20 log r - 8 + reflections + shielding (hemispherical spreading)				
20/06/2024				
	main unit	smaller unit	summary	
SWL	65	65		dBA
distance	14.1	14.1		m
distance loss	-22.98	-22.98		dB
hemispherical spreading	-8	-8		dB
reflections off rear wall (absorptive lining)	1	1		dB
reflections off opposite wall	3	3		dB
shielding (acoustic louvre lid)	-5	-5		dB
directivity - off axis approx 80-90 degrees	-3	-3		dB
(directivity conservative correction taken from values measured for other similar condenser units)				
SPL =	30.0	30.0		dBA
total SPL - specific level			33	dBA
character correction BS4142 intermittency			3	dB
rating level			36	
background level (night)			47	dBA
difference		compliant	-11	dB
background level (day)			49	dBA
difference		compliant	-13	dB