ZONA ACOUSTICS

7 Waterside Place

London

Plant Noise Assessment

3 September 2024

For

Mr Kaushik Ray

CONTENTS

Summary

Zona Acoustics has been appointed to carry out a retrospective noise assessment in relation to the external plant installation at 7 Waterside Place in London. The plant includes one AC condenser unit installed on the rear first floor level balcony.

The local authority, Camden Council, has requirements in relation to building services noise affecting noise sensitive receptors.

Noise limits have been set for the plant, based on the existing background noise levels and the Camden Council requirements.

Noise emissions from the existing plant installation were found to exceed the Camden Council requirements. Mitigation in the form of an acoustic enclosure has therefore been recommended.

The predicted rating level of the plant was found to be in line with the Camden Council requirements, subject to the unit being housed within a suitable acoustic enclosure. This is seen to relate to the No Observed Effect Level (NOEL), under national planning guidelines.

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1.0 Introduction

Zona Acoustics has been appointed to carry out a retrospective noise assessment in relation to the external plant installation at 7 Waterside Place in London. The plant includes one AC condenser unit installed on the rear first floor level balcony.

This report presents the methodology and results of a noise survey to determine background noise levels that are representative of the nearest noise sensitive receptors, as well as an assessment of noise from the installed plant in relation to the Camden Council requirements.

The report is technical in nature, and such, a summary of noise units and acoustic terminology are included in Appendix A for reference.

2.0 Description of Site

The site is located at 7 Waterside Place, London, NW1 8JT.

The installed condenser unit is located on the rear first floor level balcony.

The nearest / most exposed noise sensitive receptor locations are taken to be the neighbouring balcony (also representative of the rear sliding doors to the balcony) which is partially screened from the unit by the side walls of the balcony, and the neighbouring second floor window which has direct line of sight to the unit.

The balcony / rear sliding doors will be used to assess the daytime period (07:00 – 23:00), i.e. when the living areas and balcony terrace would generally be in use. The nearest second floor window (i.e. potential bedroom) will be used to assess the night time period (23:00 – 07:00) i.e. when the bedrooms would generally be used for sleeping.

Figure 2.1 shows the site extent in **red**, the approximate location of the AC unit in **green**, and the nearest noise sensitive receptors in **blue**.

Figure 2.1 Site View

3.0 Noise Policy and Guidance

3.1 Camden Council Requirements

The Camden Council typical requirements for noise from fixed external plant are included in the Camden Local Plan 2017.

The requirement is for the rating level of the plant to be at least 10 dB below the existing background noise level (15dB if tonal components are present) at the assessment location, when assessed in accordance with British Standard 4142:2014 '*Methods for rating and assessing industrial and commercial sound*'.

3.2 British Standard 4142: 2014

British Standard (BS) 4142: 2014 (superseded by BS 4142: 2014+A1: 2019) provides a procedure for the measurement and rating of noise levels form industrial and commercial noise sources. A methodology for predicting the likelihood of adverse impact is provided in the document.

The rating level ($L_{Ar,Tr}$) is defined in BS 4142 and is used to rate the industrial source (known as the specific noise source) at the assessment location. This level is obtained by adding a correction of between 0 and 6 dB, for tonal noise sources, and a correction of between 0 and 9 dB for impulsive sources. Additionally, corrections of 3 dB can be made for other sound characteristics and intermittency of the noise source.

The rating level is assessed in terms of $L_{Ar,Tr}$, where 'T' is a reference period of one hour during the daytime period (07:00 - 23:00) and fifteen minutes during the night-time period (23:00 – 07:00).

The method for predicting the likelihood of complaints is based on differences between the rating level and the background $L_{A90,T}$ noise level. The standard states that:

a) *"Typically, the greater this difference, the greater the magnitude of the impact.*

b) A difference of around +10dB or more is likely to be an indication of a significant adverse impact, depending on the context.

c) A difference of around +5 dB is likely to be an indication of an adverse impact, depending on context.

The lower the rating level is relative to the measured background sound level, the less likely it is that the specific sound source will have an adverse impact or 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."

In this case, the rating level requirement is 10 dB below the existing background noise level, as required by Camden Council.

4.0 Noise Survey

4.1 Methodology

An unattended noise survey was carried out over a 48-hour period between 13:00 on Monday 1 July and 13:00 on Wednesday 3 July 2024 to determine existing background noise levels at a position representative of the nearest noise sensitive receptors.

The measurement microphone was installed at a height of 1.5m above ground on the rear first floor balcony.

The measurement position is considered representative of the nearest noise sensitive receptors.

The approximate location of the measurement position is shown in **orange** in Figure 4.1 below.

Figure 4.1 Noise Measurement Position

The equipment used for the noise survey is summarised in Table 4.1

Table 4.1 Noise Survey Equipment

Item	Make & Model	Serial Number
Type 1 automated logging sound level meter	Rion NL-52	00231646
Type 1 ½" microphone	Rion UC-59	04684
Calibrator	Casella CEL 120-1	3864607

L_{Aeq} and L_{A90} sound pressure levels were measured throughout the noise survey over continuous 15-minute intervals.

The noise monitoring equipment was calibrated before and after the noise survey period. No significant change was found. Laboratory equipment calibration certificates can be provided upon request.

Due to the nature of the noise survey, i.e. unattended, we are unable to comment on the weather conditions throughout the entire noise survey period, however at the beginning and end of the survey, there was noted to be no rainfall, dry ground, and only light wind (measured

less than 5 m/s on site). Online weather history shows similar conditions throughout the survey period. Weather conditions are not considered to have had any significant effect on the measured noise levels.

4.2 Results

Appendix B presents a time history graph showing the sound pressure levels measured throughout the noise survey.

Due to the nature of the noise survey, i.e. unattended, we are unable to comment on the exact noise climate throughout the entire survey period. However, at the beginning and end of the survey period, the noise climate was noted to be dominated by a mixture of distant road traffic noise, school playground and occasional trains and canal boats passing.

The AC unit was switched OFF for the duration of the background noise survey.

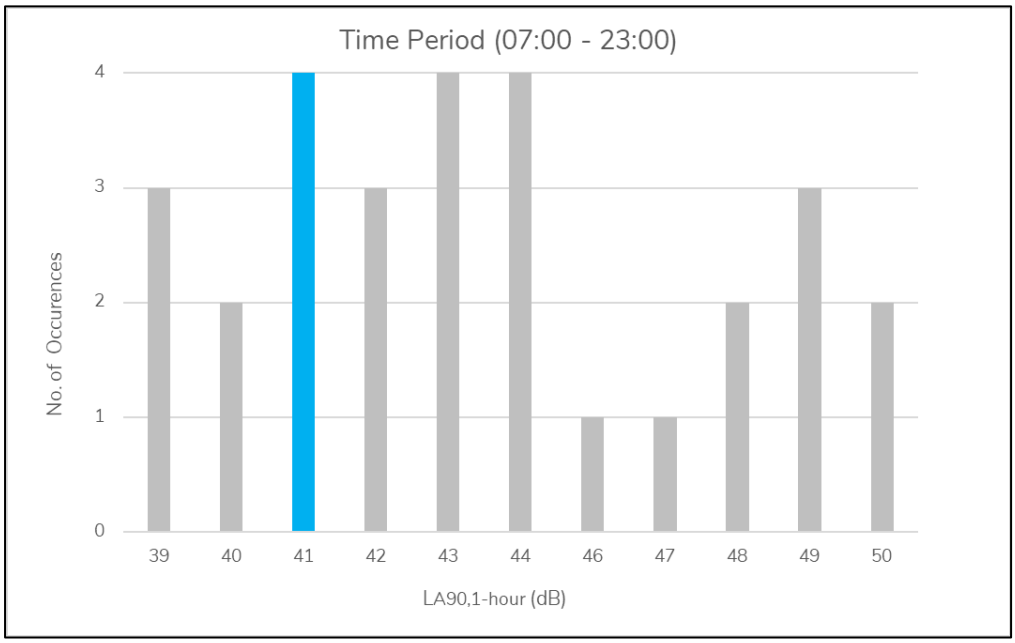
In accordance with BS 4142, the rating level should be assessed against a 'representative' background level.

BS 4142 states that "*a representative level ought to account for the range of background sound levels and ought not automatically to be assumed to be either minimum or modal value*".

The proposed plant has the potential to operate at any time. Our assessment will therefore consider both the day and night-time periods.

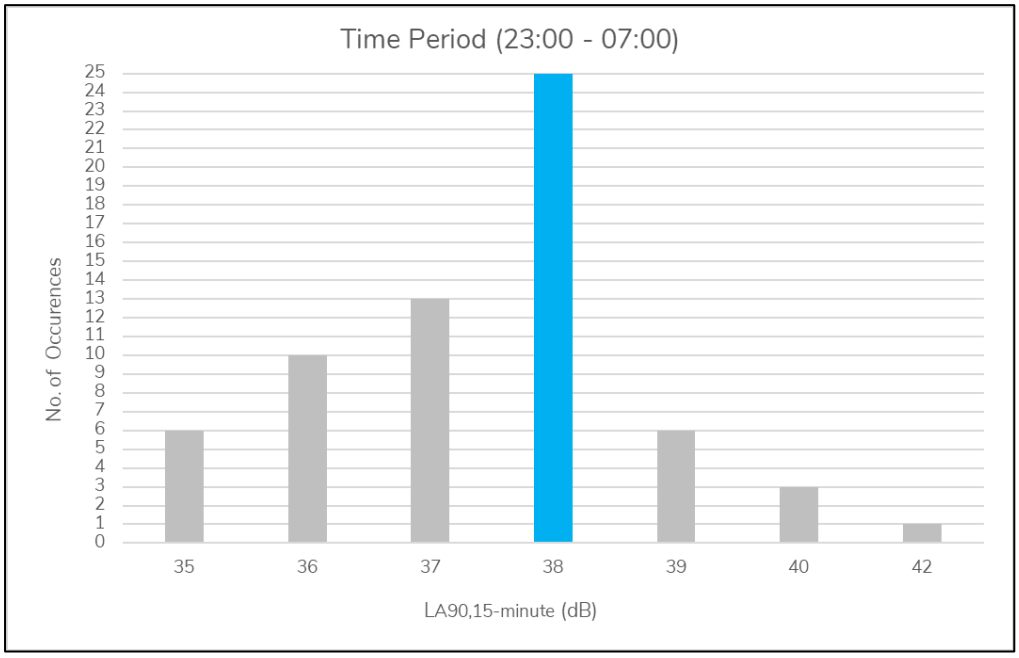
Figures 4.2 and 4.3 below present an analysis of the measured background noise levels during the day and night-time periods of the noise survey.

Figure 4.2 Background Noise Level Analysis – Daytime



Based on the analysis above, we have considered **41 dB $L_{A90\ (1\text{-}hour)}$** as the representative background noise level for the daytime.

Figure 4.3 Background Noise Level Analysis – Night-time



Based on the analysis above, we have considered **38 dB $L_{A90\ (15\text{-}minute)}$** as the representative background noise level for the night-time.

5.0 Plant Noise Assessment

5.1 Plant Noise Limits

Table 5.1 presents the plant noise limits for this assessment, based on the representative background noise levels determined above and the Camden Council requirements (as detailed in Section 3.1).

Table 5.1 Plant Noise Limits

Period	Rating Level Noise Limit $L_{Ar,Tr}$ (dB)
Daytime (07:00 - 23:00)	31
Night-time (23:00 – 07:00)	28

5.2 Installed Plant

The installed plant under assessment includes one Hitachi RAS-4HVNP2E AC condenser unit.

Specific/rating noise levels for the AC unit have been determined by source measurements taken 1m from the unit, and by way of calculations using standard acoustic formulae to account for screening and distance loss to the nearest noise sensitive receptors. Calculations have been used as the dominance of residual noise (road traffic noise etc) meant that specific

noise levels (from the plant) at the receptor locations could not be determined through measurement alone.

Source measurements were taken 1m in front of the unit. The AC unit was operated by setting the temperature in each room to the coldest setting. The source noise measurements are considered to provide a representative worst-case scenario.

Noise measurements were also taken in the same positions with the plant switched off, with the results used to correct the plant measurement levels for the influence of residual noise.

Measurements were taken in 1 second intervals and one third octave band frequencies. The measurements used are based on the average of approximately 30-second-long measurement periods where residual noise was steady and least fluctuating.

Table 5.2 presents the results of the measurements taken 1m in front of the units, with the plant switched both on and off.

Table 5.2 Plant Noise Measurement Results at 1m

Measurement	Measured Sound Pressure Level $L_{Aeq,T}$ (dB)
AC Unit Switched ON at 1m (Specific)	52
AC Unit Switched OFF at 1m (Residual)	40

Our calculations are based on the derived sound power level of the plant, based on the measured sound pressure level at 1m and the unit dimensions, using the BS EN ISO 3746 parallelepiped calculation method. The calculated sound power levels and octave band noise levels used in this assessment are included in the detailed plant noise calculations in Appendix C.

Table 5.3 presents the corrected sound pressure level at 1m (i.e. the source noise measurements at 1m corrected for the influence of residual noise with the plant switched off) and the calculated sound power levels. The sound power levels presented below are those used in the plant noise calculations in Appendix C.

Table 5.3 Plant Sound Power Level Calculation

Corrected Sound Pressure Level at 1m $L_{Aeq,T}$ (dB)	Sound Power Level Correction (Parallelepiped) (dB)	Calculated Sound Power Level L_w (dB)
52	+14	66

The octave band noise levels of the plant are included in the detailed plant noise calculations in Appendix C. Analysis of the data, as well as on site observations indicate that the noise is non-tonal in character. The plant is also expected to operate continuously i.e. non-intermittently. No additional rating level character corrections are therefore considered necessary

5.3 Mitigation

Calculated noise emissions from the existing plant installation were found to be 11 dB above the noise limit for the daytime period and 17 dB above the noise limit for the night-time period.

Mitigation is therefore required to reduce the plant noise emissions.

In order to achieve the required noise limits it is recommended that the unit be housed in an acoustic enclosure providing a minimum insertion loss of 17 dBA.

For this we recommend the Environ Lite Acoustic Enclosure.

The manufacture's transmission loss values for the Environ Lite Acoustic Enclosure are included in the detailed plant noise calculations in Appendix C.

An alternative acoustic enclosure may also be suitable. The successful supplier should confirm that the supplied acoustic enclosure would allow for the required noise limits to be achieved based on this assessment.

5.4 Assessment

We have carried out calculations to predict the plant noise emissions at the nearest noise sensitive receptor locations.

Assessment results for the day and night-time periods are presented in Tables 5.4 and 5.5 below and include the influence of the mitigation described above. Detailed plant noise calculations are included in Appendix C.

Table 5.4 Plant Noise Calculation Results – Balcony / Sliding Doors – Daytime

Element	Noise Level (dBA)
Predicted AC Unit Noise Level ($L_{Ar,Tr}$)	26
Noise Limit	31
Difference	-5

Table 5.5 Plant Noise Calculation Results – Second Floor Window – Night-time

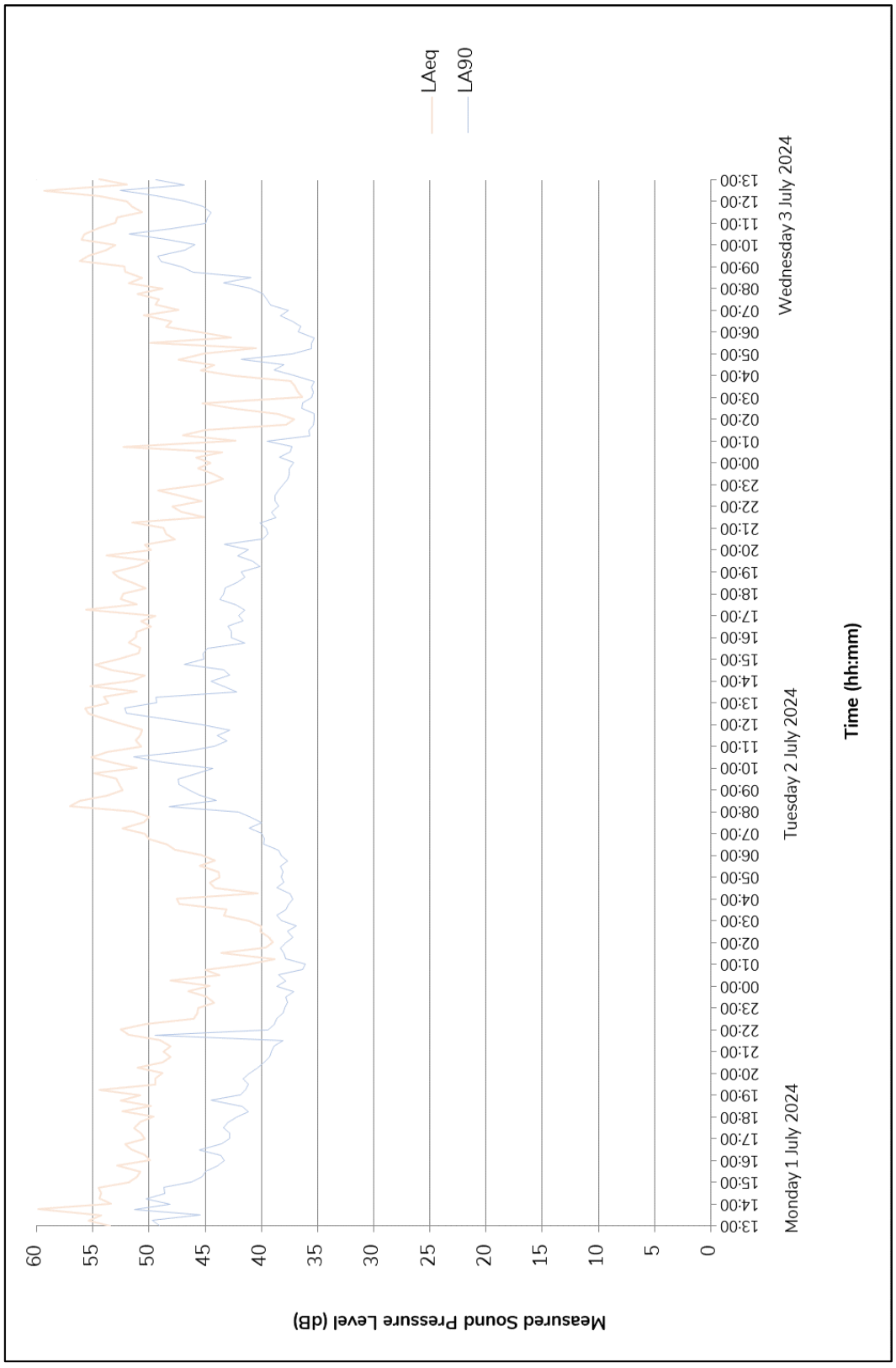
Element	Noise Level (dBA)
Predicted AC Unit Noise Level ($L_{Ar,Tr}$)	27
Noise Limit	28
Difference	-1

As can be seen, the predicted rating level is in line with the Camden Council requirements, subject to the units being housed in a suitable acoustic enclosure. This is seen to relate to the No Observed Effect Level (NOEL), under national planning guidelines.

Appendix A – Acoustic Terminology

Parameter	Description
Decibel (dB)	A logarithmic scale representing the sound pressure or power level relative to the threshold of hearing ($20x10^{-6}$ Pascals).
Sound Pressure Level (L_p)	The sound pressure level is the sound pressure fluctuation caused by vibrating objects relative to the threshold of hearing.
Sound Power Level (L_w)	A measure of the acoustic energy emitted from a source of noise, expressed in decibels.
A-weighting (dBA)	The sound level in dB with a filter applied to increase certain frequencies and decrease others to correspond with the average human response to sound.
$L_{Aeq,T}$	The A-weighted equivalent continuous noise level over the time period T (typically T= 16 hours for daytime periods, T = 8 hours for night-time periods). This is the sound level that is equivalent to the average energy of noise recorded over a given period.
$L_{A90\ (15\ min)}$	The noise level exceeded for 90% of the time (also referred to as the background noise level), measured over a 15-minute period

Appendix B – Time History Graph



Appendix C – Detailed Plant Noise Calculations

7 Waterside Place	ZONA ACOUSTICS								
Plant Noise Calculations - Balcony / Sliding Doors - Daytime									
Hitachi RAS-4HVNP2E	dBA	63	125	250	500	1k	2k	4k	8k
Derived Sound Power Based on Sound Pressure Levels at 1m	66	79	74	64	65	59	53	50	40
Acoustic Enclosure (Environ Lite Acoustic Enclosure)		-11	-13	-19	-28	-34	-36	-36	-37
Screening (Balcony Wall)		-6	-7	-8	-10	-12	-14	-17	-20
Distance Attenuation (2m)		-14	-14	-14	-14	-14	-14	-14	-14
Sound Pressure Level at Nearest Noise Sensitive Receptor	26	48	40	23	13	0	0	0	0
Noise Limit	31								
Difference	-5								

7 Waterside Place	ZONA ACOUSTICS								
Plant Noise Calculations - Second Floor Window - Night-time									
Hitachi RAS-4HVNP2E	dBA	63	125	250	500	1k	2k	4k	8k
Derived Sound Power Based on Sound Pressure Levels at 1m	66	79	74	64	65	59	53	50	40
Acoustic Enclosure (Environ Lite Acoustic Enclosure)		-11	-13	-19	-28	-34	-36	-36	-37
Distance Attenuation (4m)		-20	-20	-20	-20	-20	-20	-20	-20
Sound Pressure Level at Nearest Noise Sensitive Receptor	27	48	41	25	17	5	0	0	0
Noise Limit	28								
Difference	-1								