



**Armstrong House
3 Bassett Avenue
Southampton
SO16 7DP**

**T: 02381 555 000
E: info@24acoustics.co.uk**

**2 OLD PALACE PLACE
RICHMOND
PLANT NOISE ASSESSMENT**

Technical Report: R8685-1 Rev 1

Date: 2nd September 2020




For: Mr Richard Peirson
2 Old Palace Place
The Green
Richmond
TW9 1NQ

24 Acoustics Document Control Sheet

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	Name	Position	Signature	Date
Prepared by	Kiel Edwards BSc AMIOA	Technician		02/09/2020
Reviewed by	Chris McConnell BSc MSc MIOA	Senior Consultant		02/09/2020
Approved by	Stephen Gosling BEng MIOA	Principal Consultant		02/09/2020
For and on behalf of 24 Acoustics Ltd				

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1.0 INTRODUCTION

- 1.1 24 Acoustics Ltd has been instructed by Michael Jones Architects, on behalf of Mr Richard Peirson, to undertake an assessment of the noise impact from a proposed condenser unit at 2 Old Palace Place, Richmond.
- 1.2 This report presents the results of the assessment, following site visits and a background noise survey undertaken between 22nd and 29th July 2020.
- 1.3 All sound pressure levels quoted in this report are in dB relative to 20 μ Pa. A glossary of the acoustic terminology used in this report is provided in Appendix A.

2.0 SITE DESCRIPTION

- 2.1 Planning permission is sought to install a new replacement condensing unit, to be located within the northern lightwell at the front of the property, to replace an existing condenser unit.
- 2.2 The nearest sensitive property to the condenser is the neighbouring property, 1 Old Palace Place, Located to the east.
- 2.3 It is understood that the condenser unit will operate at any time of day or night. Therefore, this assessment will consider the specific noise level against daytime (07:00 to 23:00 hours) and night-time (23:00 to 07:00 hours) background noise levels.
- 2.4 An aerial view of the site and the noise survey measurement location is shown in Figure 1, and the proposed location of the replacement plant is shown in Figure 2.

3.0 RELEVANT CRITERIA

National Planning Policy Framework and Noise Policy Statement for England

- 3.1 Paragraph 180 of the National Planning Policy Framework (NPPF) [Reference 1] states that planning policies and decisions should:
- a) mitigate and reduce to a minimum potential adverse impacts resulting from noise from new development – and avoid noise giving rise to significant adverse impacts on health and the quality of life;
 - b) identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason.

3.2 The NPPF also refers to the Noise Policy Statement for England (NPSE) [Reference 2] which is intended to apply to all forms of noise, including environmental noise, neighbour noise and neighbourhood noise. The NPSE sets out the Government's long-term vision to 'promote good health and a good quality of life through the effective management of noise within the context of Government policy on sustainable development' which is supported by the following aims.

- Avoid significant adverse impacts on health and quality of life;
- Mitigate and minimise adverse impacts on health and quality of life.

3.3 The NPSE defines the concept of a 'significant observed adverse effect level' (SOAEL) as 'the level above which significant adverse effects on health and quality of life occur'. The following guidance is provided within the NPSE:

"It is not possible to have a single objective noise-based measure that defines SOAEL that is applicable to all sources of noise in all situations. Consequently, the SOAEL is likely to be different for different noise sources, for different receptors and at different times. It is acknowledged that further research is required to increase our understanding of what may constitute a significant adverse impact on health and quality of life from noise. However, not having specific SOAEL values in the NPSE provides the necessary policy flexibility until further evidence and suitable guidance is available."

3.4 The NPPF and NPSE documents do not refer to specific noise criteria. When considering the impact of noise from new plant 24 Acoustics considers that the spirit of the requirements of the NPPF and NPSE will be complied with if criteria from British Standard 4142:2014 [Reference 3] are adopted.

BS 4142:2014 Methods for Rating Industrial and Commercial Sound

3.5 BS 4142:2014 provides a method for rating the effects of industrial and commercial sound on residential receptors.

3.6 The standard advocates a comparison between the representative measured L_{A90} background noise level and L_{Aeq} noise level from the source being considered. For rating purposes if the noise source is tonal, intermittent or otherwise distinctive in character, a rating correction should be applied.

- 3.7 The standard states that a difference between the rating level and the background level of around +10 dBA is an indication of a significant adverse impact, depending on the context and a difference of around +5 dBA is likely to be an indication of an adverse impact, also depending on the context. Where the rating level does not exceed the background noise level, this is an indication of the specific sound source having a low impact (depending upon the context).
- 3.8 BS 4142 requires the noise impact to be assessed depending on the context. In relation to situations where background noise levels are low, the standard states "Where background sound levels and rating levels are low, absolute levels might be as, or more, relevant than the margin by which the rating level exceeds the background. This is especially true at night."

Local Authority Requirements

- 3.9 Richmond Borough Council's Supplementary Planning Documents and Guidance includes the document "Development Control for Noise Generating and Noise Sensitive Development", which states that BS 4142 assessment levels that are equal to or below background noise levels "may be acceptable from a noise perspective but will be more context dependant". BS 4142 assessment levels of up to 5 dBA above background noise levels are "less likely to be acceptable from a noise perspective and will be context dependant".
- 3.10 The document also recognises that internal noise levels in nearby dwellings are also necessary to consider in some cases, e.g. for steady continuous noise without specific character internal noise levels from BS 8233: 2014 may be relevant.
- 3.11 Based on the requirements of Richmond Borough Council and BS 4142, a plant noise level equal to or below the typical background noise level will be targeted at the nearest noise sensitive façades. Consideration of internal noise levels due to any proposed plant should also be considered.

4.0 NOISE MEASUREMENTS

Background Noise Survey

- 4.1 A noise survey was undertaken between 22nd and 29th July 2020 to assess the existing background noise levels, using the following equipment:
- Rion precision sound level meter Type NL-32;
 - Brüel & Kjær acoustic calibrator Type 4231.
- 4.2 The noise monitoring equipment was located to the front of the property, adjacent to the neighbouring noise sensitive building, at 1.5m above ground floor level. This location is considered representative of the noise climate at nearby residential properties.
- 4.3 Measurements were undertaken in samples of 5 minutes in terms of the overall free-field A-weighted L_{eq} , L_{90} and $L_{max,f}$ noise levels. Measurements were made in accordance with BS 7445:1991 "Description and measurement of environmental noise Part 2 - Acquisition of data pertinent to land use" [Reference 5].
- 4.4 The instrumentations' calibration was checked before and after the survey in accordance with the manufacturer's instructions. No significant drift in calibration was recorded. Calibration of 24 Acoustics' equipment is traceable to National Standards.
- 4.5 The instrumentation was fitted with environmental weather shields during the surveys. Weather conditions during the surveys were typically fine and dry with wind speeds typically lower than 5 m/s.
- 4.6 The results of the background noise surveys are shown graphically in Appendix B and are summarised in Table 1.

Date	Typical Background Noise Level dB LA90,5min	
	Daytime (07:00 - 23:00)	Night-Time (23:00 - 07:00)
Wednesday 22nd July	44*	34
Thursday 23rd July	45	35
Friday 24th July	45	35
Saturday 25th July	44	35
Sunday 26th July	42	34
Monday 27th July	44	35
Tuesday 28th July	46	37
Wednesday 29th July	45*	-
Average Level	44	35

Table 1: Summary of Measured Noise Levels at Location 1. * incomplete measurement period

- 4.7 24 Acoustics determines the typical background noise level to be the average minus one standard deviation.

5.0 PLANT NOISE ASSESSMENT

Plant Noise Data

- 5.1 It is proposed to install a new Daikin condensing unit (model: RZAG50A9) to replace existing equipment. The location of the existing and proposed plant is shown in Figure 2.
- 5.2 The nearest sensitive receptor is located on the northern façade of the adjacent property at 1 Old Palace Place. The ground and first-floor windows on this façade are considered the most sensitive.
- 5.3 The manufacturer's sound power level data for the proposed condenser unit has been provided and is shown in Table 2.

Unit Make/Model	Sound Power Level (dB) Octave Band Centre Frequency (Hz)							dBA
	125	250	500	1k	2k	4k	8k	
Daikin RZAG50A9	66	63	63	58	52	46	40	64

Table 2: Manufacturer's Sound Power Level Data.

- 5.4 Calculations have been undertaken to determine the level of noise from the proposed replacement plant at the nearest noise sensitive window including corrections for reflections from the lightwell, distance and screening. Calculations indicate that noise from the proposed new plant will be in the order of 34 dBA.

BS 4142:2014 Assessment

- 5.5 A BS 4142 assessment for the proposed unit has been undertaken and is shown in Table 3. The proposed unit is not considered to contain tonal or other distinctive characteristics, therefore no rating noise penalty has been applied to the specific noise levels produced by the proposed plant.

	Daytime	Night-Time
Representative Background Noise Level	44 dB $L_{A90,1hr}$	35 dB $L_{A90,15 min}$
Specific Source Noise Level	34 dB L_{Aeq}	34 dB L_{Aeq}
Rating Noise Level	34 dBA	34 dBA
BS 4142 Assessment Level	-10 dBA	-1 dBA

Table 3: BS 4142 Assessments at the receptor location.

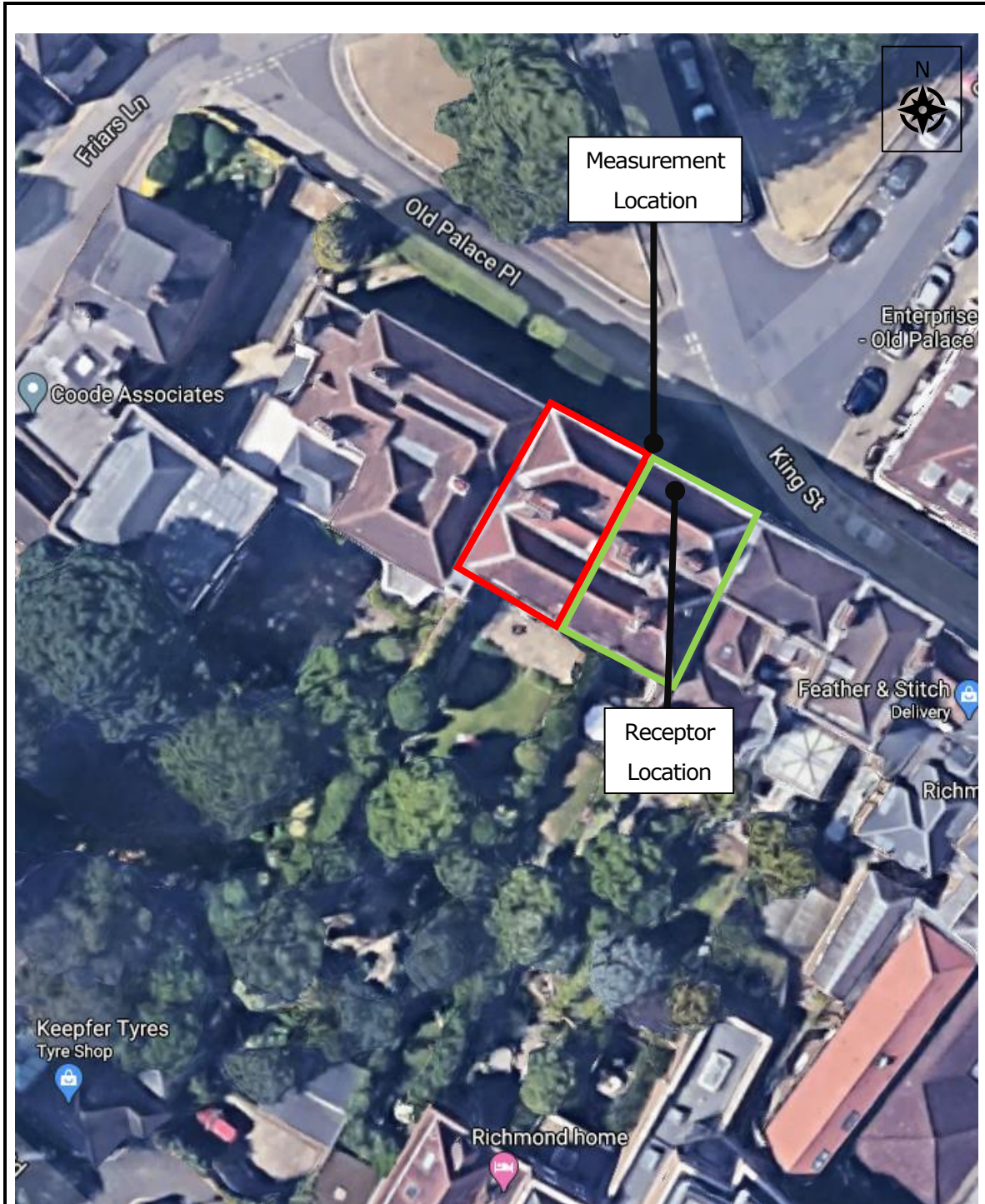
- 5.6 Table 3 shows that the BS 4142 rating levels at the nearest receptor location will be lower than the background noise level during daytime and night-time periods. Given the context of low background noise levels at night, this is considered a low noise impact based on Richmond Borough Council's guidance and BS 4142: 2014.
- 5.7 The internal noise levels at the receptor location will be in the range 19-24 dBA, assuming a reduction of 10-15 dBA through an open window. These absolute levels are significantly below BS 8233:2014 guideline levels of 30 dBA for bedrooms at night and are, therefore, considered acceptable.
- 5.8 The above assessment demonstrates that noise levels at the nearest noise sensitive receptor will be in line with the guidance of Richmond Borough Council and BS 4142: 2014 and hence acceptable.


6.0 CONCLUSIONS

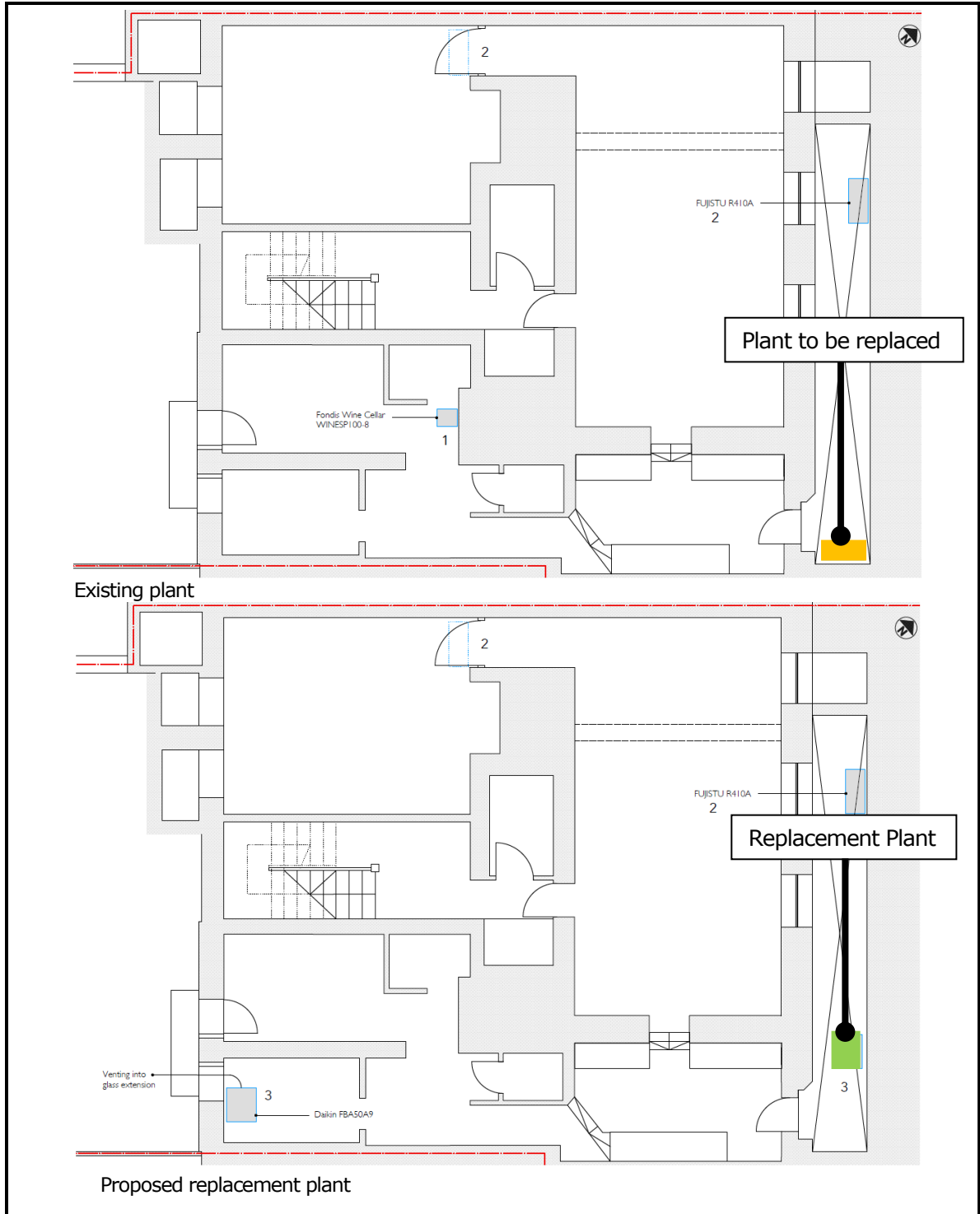
- 6.1 Mr Richard Peirson has instructed 24 Acoustics Ltd to undertake a noise impact assessment for a new replacement condensing unit at 2 Old Palace Place, Richmond.
- 6.2 An environmental noise survey has been undertaken to determine the existing background noise levels representative of nearby residential properties.
- 6.3 Calculations have been undertaken, based on manufacturer's noise data, to determine the plant noise levels at the nearest noise sensitive windows.
- 6.4 The assessment demonstrates that noise from proposed new condensing plant will be in line with the guidance of Richmond Borough Council and BS 4142 and hence acceptable.


REFERENCES

1. Department for Communities and Local Government. National Planning Policy Framework, 2019.
2. DEFRA, Noise Policy Statement for England, March 2010.
3. British Standards Institution. British Standard 4142:2014. Methods for Rating Industrial and Commercial Sound, 2014.
4. British Standards Institution. British Standard 7445:1991 Description and measurement of environmental noise Part 2 - Acquisition of data pertinent to land use, 1991.



Project: 2 Old Palace Place, Richmond		Title: Aerial view, survey location, and nearest sensitive receptor.		 24Acoustics
DWG No: Figure 1	Scale: N.T.S.	Rev: 0		
Date: September 2020	Drawn By: KE	Job No: 8685		



<p>Project: 2 Old Palace Place, Richmond</p>	<p>Title: Plant location.</p>		
<p>DWG No: Figure 2</p>	<p>Scale: N.T.S.</p>	<p>Rev: 0</p>	
<p>Date: September 2020</p>	<p>Drawn By: KE</p>	<p>Job No: 8685</p>	

APPENDIX A – ACOUSTIC TERMINOLOGY

Noise is defined as unwanted sound. The range of audible sound is from 0 to 140 dB. The frequency response of the ear is usually taken to be around 18 Hz (number of oscillations per second) to 18000 Hz. The ear does not respond equally to different frequencies at the same level. It is more sensitive in the mid-frequency range than the lower and higher frequencies and because of this, the low and high frequency components of a sound are reduced in importance by applying a weighting (filtering) circuit to the noise measuring instrument. The weighting which is most widely used and which correlates best with subjective response to noise is the dBA weighting. This is an internationally accepted standard for noise measurements.

For variable sources, such as traffic, a difference of 3 dB is just distinguishable. In addition, a doubling of traffic flow will increase the overall noise by 3 dB. The 'loudness' of a noise is a purely subjective parameter, but it is generally accepted that an increase/ decrease of 10 dB corresponds to a doubling/ halving in perceived loudness.

External noise levels are rarely steady, but rise and fall according to activities within an area. In attempt to produce a figure that relates this variable noise level to subjective response, a number of noise indices have been developed. These include:

- i) The L_{Amax} noise level

This is the maximum noise level recorded over the measurement period.

- ii) The L_{Aeq} noise level

This is "equivalent continuous A-weighted sound pressure level, in decibels" and is defined in British Standard BS 7445 as the "value of the A-weighted sound pressure level of a continuous, steady sound that, within a specified time interval, T, has the same mean square sound pressure as a sound under consideration whose level varies with time".

It is a unit commonly used to describe construction noise and noise from industrial premises and is the most suitable unit for the description of other forms of environmental noise. In more straightforward terms, it is a measure of energy within the varying noise.

- iii) The L_{A10} noise level

This is the noise level that is exceeded for 10% of the measurement period and gives an indication of the noisier levels. It is a unit that has been used over many years for the measurement and assessment of road traffic noise.

- iv) The L_{A90} noise level

This is the noise level that is exceeded for 90% of the measurement period and gives an indication of the noise level during the quieter periods. It is often referred to as the background noise level and is used in the assessment of disturbance from industrial noise.

APPENDIX B – AMBIENT NOISE SURVEY RESULTS

