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7 THE QUADRANT,
RICHMOND

PLANT NOISE ASSESSMENT

Technical Report: R10311-1 Rev 1

Date: 20th February 2024

For: Koyo Wellness Limited
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For and on behalf of 24 Acoustics Ltd				

Document Status and Approval Schedule

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0	Approved for Issue	Miles Hodge	Chris McConnell	Stephen Gosling

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1.0 INTRODUCTION

1.1 24 Acoustics Ltd has been appointed by Koyo Wellness Limited to undertake an assessment of noise from new plant at no. 7 The Quadrant, Richmond to accompany a planning application. New building services plant is proposed to be installed at the rear of the building. This noise assessment has included:

- Environmental noise monitoring;
- Consideration of background noise levels at nearby noise sensitive properties;
- Assessment of noise from the new plant.

1.2 This report presents the results of the assessment, following site visits and an environmental noise survey undertaken between 10th to 16th November 2023.

1.3 All sound pressure levels quoted in this report are in dB relative to 20 µPa. A glossary of the acoustic terminology used in this report is provided in Appendix A.

1.4 An aerial view and site location are shown in Figure 1.

2.0 SITE DESCRIPTION

2.1 No. 7 The Quadrant, Richmond is a terraced building located in a mixed commercial and residential area, within the jurisdiction of the London Borough of Richmond upon Thames. It is proposed to install new plant for the commercial unit.

2.2 Commercial premises are located on the ground and first floor of no. 7 The Quadrant, with residential properties above on the second, third and fourth floors. To the east is The Quadrant with Quadrant Road running along the west side of the building. The terrace continues to the north and south of no. 7, with commercial premises on the lower floors and residential properties above. To the west on the other side of Quadrant Road are residential properties. The site is shown in Figure 1.

2.3 Plant associated with neighbouring buildings is the main source of ambient noise in the area.

2.4 It is proposed to install a heat recovery ventilation unit and dry cooler which will serve the new commercial space. It is understood that the plant will operate on demand over a 24 hour period, 7 days a week.

2.5 The units are proposed to be installed internally at ground floor level, with louvres at the rear of the building as shown in Figure 2.

2.6 The nearest receptors to the units are described below and shown on Figure 1:

- Receptor 1 – Second floor of no. 7 The Quadrant
- Receptor 2 – To the west at no. 1 Quadrant Road

2.7 The rear windows at no. 7 The Quadrant are to the shared stairwell and are therefore not habitable so have not been considered as receptors.

3.0 CRITERIA

NPPF and NPSE

3.1 The National Planning Policy Framework (NPPF) [Reference 1] states that planning policies and decisions should aim to:

- 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;
- 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 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 Planning Practice Guidance (PPG) was updated in 2019 [Reference 3]. This is written to support the NPPF with more specific planning guidance. The PPG reflects the NPSE and states that noise needs to be considered when new developments may create additional noise and when new developments would be sensitive to the prevailing acoustic environment. It also states that opportunities should be taken, where practicable, to achieve improvements to the acoustic environment. The PPG states that noise can over-ride other planning concerns but should not be considered in isolation from the other economic, social and environmental dimensions of the proposed development.

3.5 The PPG expands upon the concept of SOAEL (together with Lowest Observable Adverse Effect Level, LOAEL and No Observed Effect Level, NOEL) as introduced in the NPSE and provides a table of noise exposure hierarchy for use in noise impact assessments in the planning system.

3.6 In general terms it is considered that a noise impact with an effects level which is lower than SOAEL is acceptable (providing the effect is mitigated to a minimum). There is currently, however, a major discontinuity between the above guidance and objective technical criteria for use in planning noise impact assessments.

<u>BS 4142:2014 Methods for Rating Industrial and Commercial Sound</u>

3.7 BS 4142:2014 + A1 2019 [Reference 5] provides a method for rating the effects of industrial and commercial sound on residential areas.

3.8 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.

3.9 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).

Local Authority Guidance

3.10 Richmond Borough Council's Supplementary Planning Documents and Guidance includes the document "Development Control for Noise Generating and Noise Sensitive Development" [Reference 4], 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".

3.11 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.

Summary

3.12 Based on the requirements of Richmond Borough Council and BS 4142, a plant noise level at least 5 dB below the typical background noise level will be targeted at the nearest noise sensitive façades, during the proposed plant operating hours.

4.0 ENVIRONMENTAL NOISE SURVEY

4.1 An environmental noise survey was undertaken between 10th and 16th November 2023 to determine the prevailing background noise levels at the site.

4.2 Noise monitoring equipment was set-up to the rear of the building at third floor level. This location is considered representative of the background noise levels at the nearest façades of the residential properties facing Quadrant Road. The survey location is shown in Figure 1.

4.3 Background noise levels were measured using the following equipment:

- Rion precision sound level meter — Type NL-32
- Brüel & Kjær acoustic calibrator — Type 4231

4.4 Noise 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 6].

4.5 The instrumentation's 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. All instruments were fitted with environmental weather shields during the surveys. The weather during the survey was mixed with periods of adverse weather omitted from the analysis.

Background Noise Measurements – Results

4.6 The results of the environmental survey are presented in graphical format in Appendix B.

4.7 Existing building services plant associated with adjacent buildings was operating consistently during the survey period. The measured noise levels are considered representative of the prevailing background noise climate at the nearest sensitive properties.

4.8 As the background noise levels were affected by noise from existing plant, in this instance the lowest background noise levels have been used in order to provide a robust and conservative assessment. The measured background noise levels (L_{A90}) are presented in Table 1

Date	Measured Minimum Background Noise Level	
	Day 07:00 to 23:00 dB $L_{A90, 1\ hour}$	**Night-time 23:00 to 07:00 dB $L_{A90, 15\ mins}$**
Friday 10/11/2023	53	50
Saturday 11/11/2023	53	51
Sunday 12/11/2023	51	51
Monday 13/11/2023	52	50
Tuesday 14/11/2023	52	49
Wednesday 15/11/2023	52	50
Thursday 16/11/2023	51	-
Minimum Value	**51**	**49**

Table 1: Summary of Measured Background Noise Levels.

5.0 PLANT NOISE ASSESSMENT

5.1 The plant will operated on demand over the 24 hour period, 7 days a week. The proposed plant consists of a heat recovery ventilation unit and a dry cooler, to be installed internally on the ground floor with louvres at rear of the building as shown in Figure 2.

5.2 The heat recovery unit will be ducted to the intake and discharge louvres. The dry air cooler will have a separate intake and discharge louvre.

5.3 The manufacturer's noise data is summarised in Table 2.

Unit	Sound Power Level (dB) Octave Band Centre Frequency (Hz)								dBA
	63	**125**	**250**	**500**	**1k**	**2k**	**4k**	**8k**	
Daikin VAM800J Heat Recovery Unit	64	54	52	49	45	40	34	28	**51**
Gütner GFVC FD 050.1/11-42 Dry Air Cooler	-								**73**

Table 2: Manufacturer's Sound Power Level (dB) Source Data

5.4 Octave band sound power levels are not available for the dry air cooler, so a typical spectrum has been assumed for calculation purposes.

5.5 The closest residential window is to the west at no. 1 Quadrant Road at an approximate distance of 9 m from the nearest plant louvres. The nearest residential windows on the upper floors of No. 7 The Quadrant are at an approximate distance of 9 m from the proposed plant louvres and benefit from significant screening provided by the building.

5.6 Attenuators are shown on the heat recovery unit intake and discharge ducts, Table 3 presents the minimum required performances.

Minimum Insertion Loss, dB Octave Band Centre Frequency (Hz)							
63	**125**	**250**	**500**	**1k**	**2k**	**4k**	**8k**
1	2	6	10	14	12	10	8

Table 3: Acoustic Performance Specification for Attenuators to Heat Recovery Ventilation Unit – Intake and Discharge

5.7 Initial calculations indicated the need for an attenuated louvre be provided to the intake and exhaust louvres of the dry cooler. The minimum acoustic performance for the louvres is provided in Table 4.

Minimum Insertion Loss, dB Octave Band Centre Frequency (Hz)							
63	**125**	**250**	**500**	**1k**	**2k**	**4k**	**8k**
2	3	4	8	13	11	9	8

Table 4: Acoustic Performance Specification for Dry Air Cooler Louvres – Intake and Exhaust

5.8 With corrections for distance, attenuation and screening where appropriate, calculations have been undertaken to confirm the plant noise levels at each receptor. The plant is not expected to emit tonal or other distinctive characteristics.

5.9 Tables 5 & 6 present the calculated noise levels at each receptor, during daytime and night-time hours, compared to the background noise levels.

	Daytime 07:00 to 23:00 dB $L_{Aeq,\ 1\ hour}$	**Night-time 23:00 to 07:00 dB $L_{Aeq,\ 15\ mins}$**
Predicted Plant Noise Level	41	41
Background Noise Level	51	49
Level Difference	**-10**	**-8**

Table 5: Predicted Plant Noise Levels – 1 Quadrant Road

	Daytime 07:00 to 23:00 dB $L_{Aeq, 1\ hour}$	**Night-time 23:00 to 07:00 dB $L_{Aeq, 15\ mins}$**
Predicted Plant Noise Level	28	28
Background Noise Level	51	49
Level Difference	**-23**	**-21**

Table 6: Predicted Plant Noise Levels – 7 The Quadrant

5.10 The calculations demonstrate that, with the recommended mitigation, noise levels from the proposed plant would be at least 5 dB below the background noise levels during daytime and night-time periods. Noise from the plant is therefore considered to meet the requirements of the London Borough of Richmond upon Thames and is acceptable in planning terms.

6.0 CONCLUSIONS

6.1 24 Acoustics Ltd has been instructed by Koyo Wellness Limited to undertake a noise impact assessment for new plant at 7 The Quadrant, Richmond.

6.2 A noise survey has been carried out at the site to determine the prevailing background noise levels during daytime and night-time periods.

6.3 Calculations have determined that, with the recommended mitigation, noise from the proposed plant will meet the requirements set out by the London Borough of Richmond upon Thames at all receptors.

REFERENCES

1. Department for Levelling Up, Housing & Communities. The National Planning Policy Framework (NPPF), 2023.

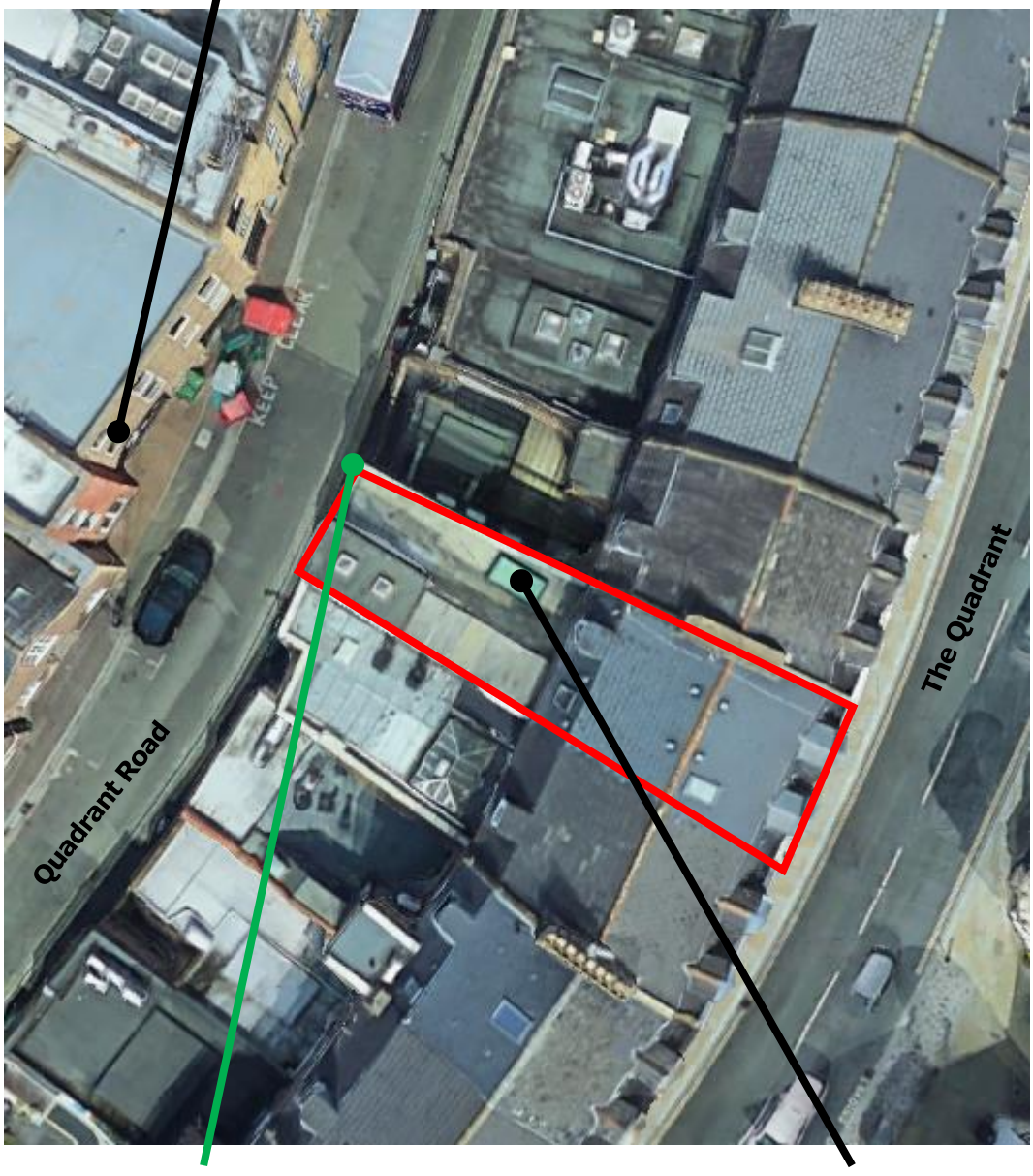
2. Noise Policy Statement for England, Defra, 2010.

3. Planning Practice Guidance, Department of Communities and Local Government, 2019.

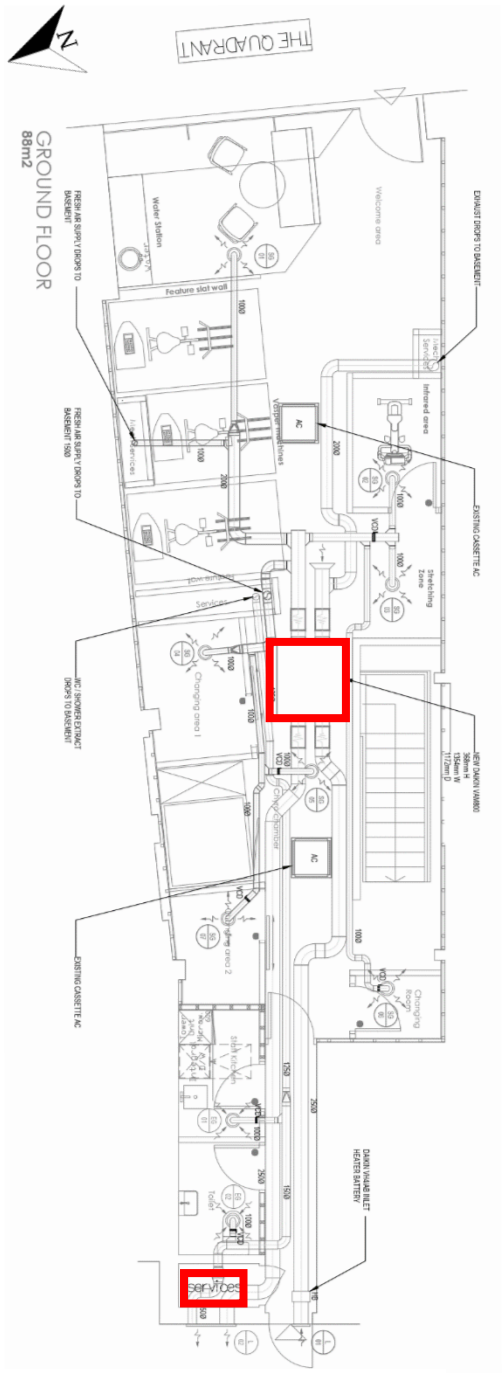
4. London Borough of Richmond Upon Thames, Supplementary Planning Document, Development Control for Noise Generating and Noise Sensitive Development, 2018.

5. British Standards Institution. British Standard 4142 + A1 2019. Methods for Rating Industrial and Commercial Sound, 2014.

6. British Standards Institution. British Standard 7445:1991 Description and measurement of environmental noise Part 2 - Acquisition of data pertinent to land use, 1991.



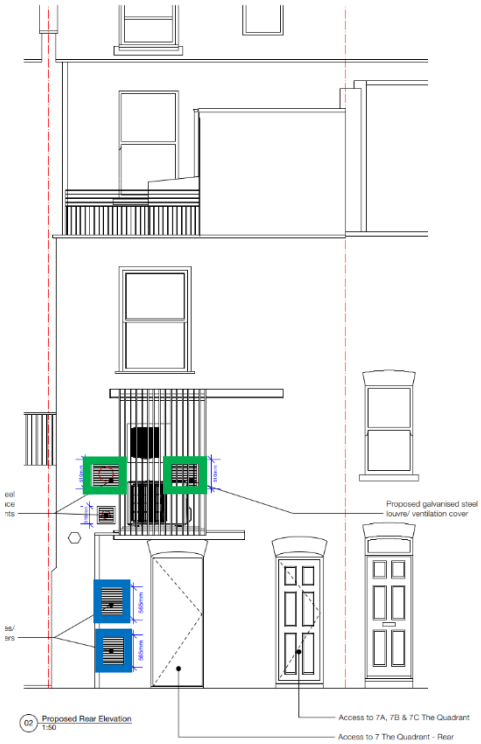
Project: 7 The Quadrant, Richmond	**Title**: Aerial view, measurement location & nearest receptors	
DWG No: Figure 1	**Scale:** N.T.S.	**Rev**: 0
Date: January 2024	**Drawn By:** MH	**Job No**: 10311



Proposed Louvre Locations

Dry Cooler (Attenuated)

Heat Recovery Ventilation Unit



Project: 7 The Quadrant, Richmond	**Title**: Proposed Plant Locations (Internal)	
DWG No: Figure 2	**Scale:** N.T.S.	**Rev**: 1
Date: February 2024	**Drawn By:** MH	**Job No**: 10311

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 internal, 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 – NOISE MEASUREMENT RESULTS