NSL
Noise Solutions Ltd

Rosa's Thai Cafe
26 Earlham Street
London
WC2H 9LN

Plant noise impact assessment for extract fan

On behalf of

Rosa's Thai Cafe

Project Reference: 88299| Revision: 1 | Date: 7th May 2020
Revised: 16th July 2020

T: 01252 519881
W: noisesolutions.co.uk
E: hello@noisesolutions.co.uk

Document Information

Project Name	:	**26 Earlham Street, Rosa's Thai**
Project Reference	:	**88299**
Report Title	:	**Plant noise impact assessment for extract fan**
Doc Reference	:	**88299/NIA rev1**
Date	:	**7th May 2020**

	Name	Qualifications	Initials	Date
Prepared by:	Oliver Roberts	BSc (Hons), AMIOA	OJR	7th May 2020
Reviewed and approved by:	Jon Stump	BSc (Hons), MIOA	JS	11th May 2020
For and on behalf of Noise Solutions Ltd				

Revision	Date	Description	Prepared	Reviewed/ Approved
1	16th July 2020	Extract fan relocated inside building	JS	DMB

Reg no. 3483481 Trading office Unit 5 Oriel Court, Omega Park, Alton GU34 2YT

Contents

Appendices

1.0 Introduction

1.1. Noise Solutions Ltd (NSL) has been appointed by Rosa's Thai to undertake a plant noise impact assessment of the proposed new extract fan and associated external ductwork to be installed at Rosa Thai, 26 Earlham Street. The replacement extract system is in response to complaints from nearby residents regarding excessive levels of plant noise.

1.2. A new design has been proposed with a replacement fan. This report assesses the impact of the new fan design against the local authority's requirements.

2.0 Site conditions and background

2.1. The existing restaurant occupies the whole of 26 Earlham Street. The kitchen is located in the basement; the restaurant occupies the ground floor to the second floor, with an office for the restaurant on the upper floor.

2.2. The ventilation system consists of a kitchen extract fan and an intake unit. Both of these systems are located to the south of the restaurant in a lightwell. The intake for the air handing unit is at ground level. The kitchen extract discharge is ducted to the roof of the building and discharges at roof level.

2.3. A kitchen extract serving another premises is also located in the lightwell and is similarly ducted to roof level.

2.4. Work has already been undertaken to the intake fan and the unit was replaced in 2019. The new intake system was commissioned in February 2020 by NSL and the full results of the assessment can be found in a commissioning report dated 12th February 2020.

2.5. It is proposed to replace the extract system with new ductwork and attenuation. The fan will be relocated inside the building, along with the required attenuation, and the discharge will be ducted to roof level, discharging in a similar location to the existing system.

3.0 Nearest noise sensitive receptors

3.1. The area surrounding the site is mixed residential and commercial in use. A review of the council tax website confirmed that the nearest noise sensitive property to the plant is the flat located on the upper floor of 24 Earlham Street, approximately 7m away from the intake and 3.5m away from the discharge. The plant is partially screened from the nearest windows.

4.0 Noise assessment criteria

Background noise levels

4.1. A background noise survey was undertaken at the premises by Noise Solutions Limited in January 2019 in order to establish the existing background noise levels. Results of the assessment can be found in the noise impact assessment issued by NSL in January 2019.

Camden Local Policy

4.2. The Camden Local Policy document dated 2016 states in Policy A1 *'Managing the impact of development'* that for noise and vibration:

> *"Noise and vibration can have a major effect on amenity. The World Health Organisation (WHO) for example states that excessive noise can seriously harm human health, disturb sleep and have cardiovascular and behavioural effects. Camden's high density and mixed-use nature means that disturbance from noise and vibration is a particularly important issue in the borough.*
>
> *Where uses sensitive to noise are proposed close to an existing source of noise or when development that is likely to generate noise is proposed, the Council will require an acoustic report to accompany the application. Further detail can be found in Policy A4 - Noise and Vibration and our supplementary planning document Camden Planning Guidance 6: Amenity."*

4.3. Policy A4 *'Noise and Vibration'* states under the section titled *'Plant and other noise generating equipment'* that:

> *"Planning conditions will be imposed to require that plant and equipment which may be a source of noise is kept working efficiently and within the required noise limits and time restrictions. Air conditioning will only be permitted where it is demonstrated that there is a clear need for it after other measures have been considered (Policy CC2 Adapting to climate change). Conditions may also be imposed to ensure that attenuation measures are kept in place and are effective throughout the life of the development."*

4.4. The policy document goes on to describe noise thresholds in Appendix 2 and states in the *'Industrial and Commercial Noise Sources'* section:

> *"A relevant standard or guidance document should be referenced when determining values for LOAEL and SOAEL for non-anonymous noise. Where appropriate and within the scope of the document it is expected that British Standard 4142:2014 'Methods for rating and assessing industrial and commercial sound' (BS 4142) will be used. For such*

cases a 'Rating Level' of 10 dB below background (15dB if tonal components are present) should be considered as the design criterion)."

4.5. Table 2 of that appendix states the criteria at which development related noise levels will be acceptable:

Table 1: Excerpt from Camden Local Policy A1; Noise levels applicable to proposed industrial and commercial development (including plant and machinery)

Existing noise sensitive receptor	Assessment Location	Design Period	LOAEL (green)	LOAEL to SOAEL (Amber)	SOAL (Red)
Dwellings**	Garden used for main amenity (free field) and Outside living or dining or bedroom window (façade)	Day	'Rating level' 10dB* below background	'Rating level' between 9dB below and 5dB above background	'Rating level' greater than 5dB above background
Dwellings**	Outside bedroom window (façade)	Night	'Rating level' 10dB* below background and no events exceeding 57dBL_{Amax}	'Rating level' between 9dB below and 5dB above background or noise events between 57dB and 88dBL_{Amax}	'Rating level' greater than 5dB above background and/or events exceeding 88dBL_{Amax}

**10dB should be increased to 15dB if the noise contains audible tonal elements. (day and night). However, if it can be demonstrated that there is no significant difference in the character of the residual background noise and the specific noise from the proposed development then this reduction may not be required. In addition, a frequency analysis (to include, the use of Noise Rating (NR) curves or other criteria curves) for the assessment of tonal or low frequency noise may be required.*

***levels given are for dwellings, however, levels are use specific and different levels will apply dependent on the use of the premises.*

BS 4142:2014 Methods for rating and assessing industrial and commercial sound

4.6. BS 4142:2014 is intended to be used to assess the likely effects of sound on people residing in nearby dwellings. The scope of BS 4142:2014 includes *"sound from fixed plant installations which comprise mechanical and electrical plant and equipment"*.

4.7. The procedure contained in BS 4142:2014 is to quantify the *"specific sound level"*, which is the measured or predicted level of sound from the source in question over a one hour period for the daytime and a 15 minute period for the night-time. Daytime is defined in the standard as 07:00 to 23:00 hours, and night-time as 23:00 to 07:00 hours.

4.8. The specific sound level is converted to a rating level by adding penalties on a sliding scale to account for either potentially tonal or impulsive elements. The standard sets out objective methods for determining the presence of tones or impulsive elements but notes that it is acceptable to subjectively determine these effects.

4.9. The penalty for tonal elements is between 0dB and 6dB, and the standard notes: *"Subjectively, this can be converted to a penalty of 2 dB for a tone which is just perceptible at the noise receptor, 4 dB where it is clearly perceptible, and 6 dB where it is highly perceptible."*

4.10. The penalty for impulsive elements is between 0dB and 9dB, and the standard notes: *"Subjectively, this can be converted to a penalty of 3 dB for impulsivity which is just perceptible at the noise receptor, 6 dB where it is clearly perceptible, and 9 dB where it is highly perceptible."*

4.11. The assessment outcome results from a comparison of the rating level with the background sound level. The standard states:

- *Typically, the greater this difference, the greater the magnitude of the impact.*
- *A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context;*
- *A difference of around +5 dB 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 source 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.*

4.12. The standard does state that "*adverse impacts include, but are not limited to, annoyance and sleep disturbance. Not all adverse impacts will lead to complaints and not every complaint is proof of an adverse impact."*

4.13. The standard goes on to note that: *"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."*

4.14. In addition to the margin by which the Rating Level of the specific sound source exceeds the Background Sound Level, the 2014 edition places emphasis upon an appreciation of the context, as follows:

"An effective assessment cannot be conducted without an understanding of the reason(s) for the assessment and the context in which the sound occurs/will occur. When making assessments and arriving at decisions, therefore, it is essential to place the sound in context."

4.15. BS 4142:2014 requires uncertainties in the assessment to be considered, and where the uncertainty is likely to affect the outcome of the assessment, steps should be taken to reduce the uncertainty.

4.16. Based on the environmental noise survey and the Camden Local Policy, Camilo Castro-Llarch, the environmental health officer on this case, has agreed in an email on 24th March that 34dB(A) is an acceptable limit 1m from the receptor window.

5.0 Plant noise impact assessment of new intake system

5.1. Cumulative noise emissions from the new proposed intake fan have been predicted at the nearest residential properties to the site based on the noise output information shown in **Appendix F**.

5.2. Noise levels for the proposed extract fan have been predicted taking into account ductwork system losses, aperture size, directivity of sound propagation and distance attenuation. Predictions are inclusive of the following atmospheric-side attenuation fitted to the ventilation systems.

Table 2 Proposed atmospheric side attenuators to ventilation system

Attenuator	Insertion losses dB, at octave band centre frequencies (Hz)							
	63Hz	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	8kHz
Extract	-10	-20	-36	-40	-40	-36	-31	-26

5.3. The predictions have been based on all proposed plant operating at full capacity.

5.4. The cumulative noise of all the Rosa Thai plant, i.e. noise from the extract and the intake fan, must not exceed the limit at the window. Noise from the recently installed intake fan was measured to be 33dB when commissioned (full results in NSL commissioning report issued February 2020). Table 3 presents the cumulative level of the predicted noise from the extract fan, and the measured noise from the intake fan at the receptor. The calculation for the predicted level of the extract fan (based on manufacturers noise levels) can be found in **0**.

Table 3 Assessment of predicted noise levels at nearest noise sensitive receptor

Receptor	Period	Predicted cumulative noise level at receptor, L_{Aeq} (dB)	Design criterion (dB)	Difference (dB)
Upper floor flat, 24 Earlham Street	07.00 – 23.00 hours (all proposed plant will operate)	34	34	0

5.5. The above assessment indicates that the plant noise from all plant will meet the criteria set out by the local authority, providing the recommended mitigation is installed.

5.6. As BS 4142:2014 advises, the impact must be considered within the context of the site and the surrounding acoustic environment. The following must, therefore, also be taken into consideration when determining the potential impact that may be experienced:

- The assessment is undertaken at the nearest residential windows. The impact on all other nearby residential windows will be lower due to screening and distance attenuation.
- The plant is replacing existing plant, therefore there is already precedent for external plant in this area. It should also be noted that the new plant is expected to be significantly quieter than the existing equipment.
- The plant is located in a busy city area with high levels of noise expected into the evening.

5.7. Uncertainty in the calculated impact has been reduced by the use of a well-established calculation method.

5.8. All reasonable steps have been taken to robustly assess noise from the proposed plant. In support of the above assessment, noise from fixed plant can should therefore be acceptable to London Borough of Camden.

6.0 Summary

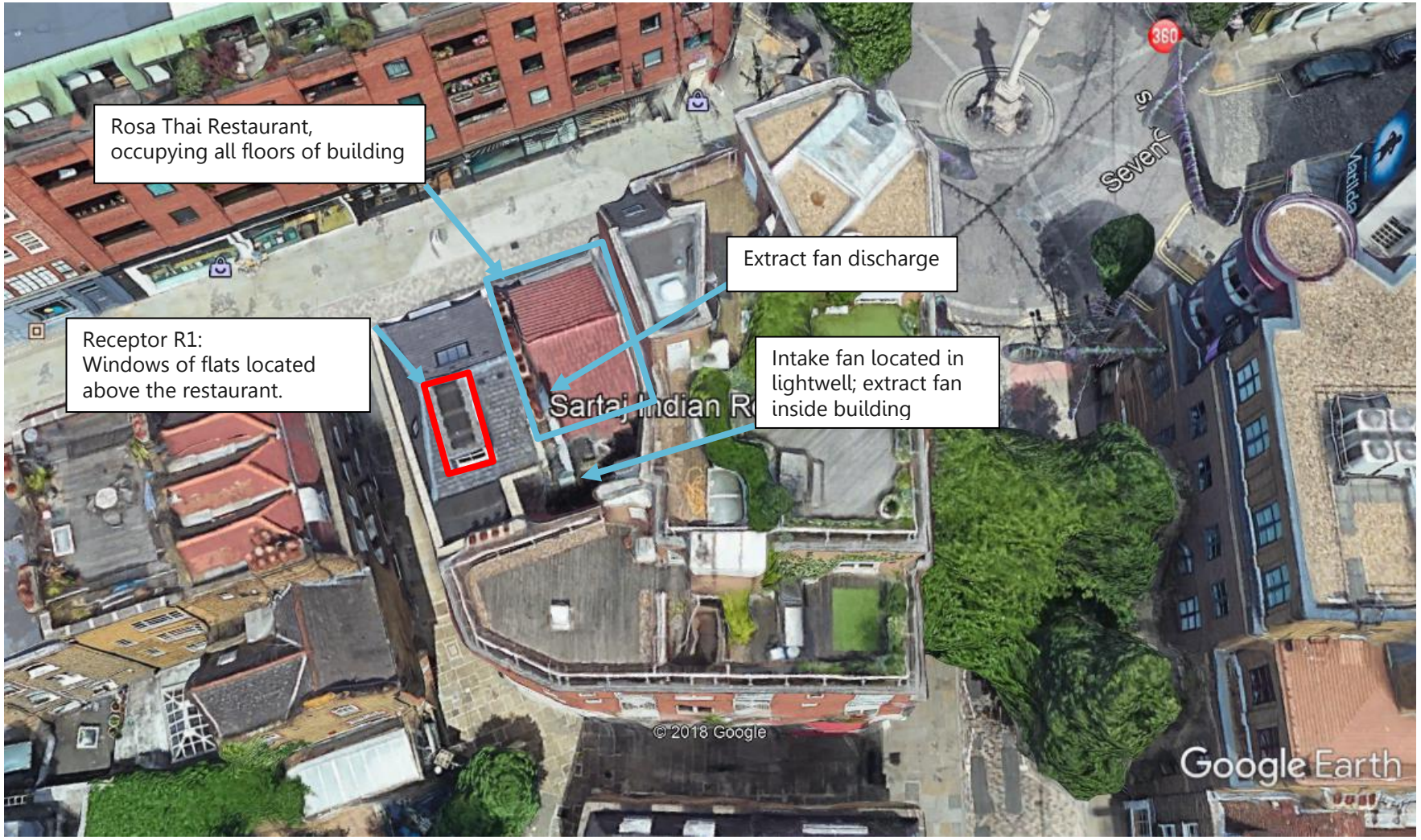
6.1. Noise Solutions Ltd (NSL) has been appointed by Rosa's Thai to undertake a plant noise impact assessment of the proposed internal extract fan to be installed at Rosa Thai at 26 Earlham Street in London.

6.2. The results of the assessment indicate that the cumulative levels of all Rosa Thai plant, i.e. the intake and extract fan, will be within the criteria agreed with London Borough of Camden.

Appendix A Acoustic terminology

Parameter	Description
Ambient Noise Level	The totally encompassing sound in a given situation at a given time, usually composed of a sound from many sources both distant and near ($L_{Aeq,T}$).
Decibel (dB)	A scale for comparing the ratios of two quantities, including sound pressure and sound power. The difference in level between two sounds s1 and s2 is given by 20 log10 (s1/s2). The decibel can also be used to measure absolute quantities by specifying a reference value that fixes one point on the scale. For sound pressure, the reference value is 20μPa. The threshold of normal hearing is in the region of 0 dB and 140 dB is the threshold of pain. A change of 1 dB is only perceptible under controlled conditions.
dB(A), L_{Ax}	Decibels measured on a sound level meter incorporating a frequency weighting (A weighting) which differentiates between sounds of different frequency (pitch) in a similar way to the human ear. Measurements in dB(A) broadly agree with people's assessment of loudness. A change of 3 dB(A) is the minimum perceptible under normal conditions, and a change of 10 dB(A) corresponds roughly to halving or doubling the loudness of a sound. The background noise in a living room may be about 30 dB(A); normal conversation about 60 dB(A) at 1 metre; heavy road traffic about 80 dB(A) at 10 metres; the level near a pneumatic drill about 100 dB(A).
Fast Time Weighting	Setting on sound level meter, denoted by a subscript F that determines the speed at which the instrument responds to changes in the amplitude of any measured signal. The fast time weighting can lead to higher values than the slow time weighting when rapidly changing signals are measured. The average time constant for the fast response setting is 0.125 (1/8) seconds.
Free-field	Sound pressure level measured outside, far away from reflecting surfaces (except the ground), usually taken to mean at least 3.5 metres
Façade	Sound pressure level measured at a distance of 1 metre in front of a large sound reflecting object such as a building façade.
$L_{Aeq,T}$	A noise level index called the equivalent continuous noise level over the time period T. This is the level of a notional steady sound that would contain the same amount of sound energy as the actual, possibly fluctuating, sound that was recorded.
$L_{max,T}$	A noise level index defined as the maximum noise level recorded during a noise event with a period T. L_{max} is sometimes used for the assessment of occasional loud noises, which may have little effect on the overall L_{eq} noise level but will still affect the noise environment. Unless described otherwise, it is measured using the 'fast' sound level meter response.
$L_{10,T}$	A noise level index. The noise level exceeded for 10% of the time over the period T. L_{10} can be considered to be the "average maximum" noise level. Generally used to describe road traffic noise. $L_{A10,18h}$ is the A –weighted arithmetic average of the 18 hourly $L_{A10,1h}$ values from 06:00-24:00.
$L_{90,T}$	A noise level index. The noise level that is exceeded for 90% of the measurement time interval, T. It gives an indication of the lower levels of fluctuating noise. It is often used to describe the background noise level and can be considered to be the "average minimum" noise level and is a term used to describe the level to which non-specific noise falls during quiet spells, when there is lull in passing traffic for example.

Appendix B Arial photograph showing key areas and elevation view identifying receptor



Photograph 1 Courtesy of Google Earth ©

Appendix C Manufacturer's plant noise details

Plant item (make/model)	No. units	Notes	Sound levels, dB, at octave band frequencies (Hz)								dBA
			63	125	250	500	1K	2K	4K	8K	
Flatwoods/MaXfan2	1	Outlet L_w	80.5	88.2	85.4	83.8	83.7	82.7	78.0	71.1	**96**

Appendix D Plant noise impact assessment calculations

Summary

Plant	Resultant at Receptor (dBA) R1
Extract Discharge (predicted)	26
Intake fan (measured)	33

DAY

Cumulative for all plant	**34**

Extract calculations

Description	Notes.	Sound level (dB) at octave band centre frequencies (Hz)								dBA
		63	125	250	500	1k	2k	4k	8k	
Source noise level (unattenuated)	In-duct L_w	80.5	88.2	85.4	83.8	83.7	82.7	78.0	71.1	**89**
System losses		-13	-8	-4	-5	-7	-9	-7	-7	
Atmospheric side attenuator	I.L.	-10	-20	-36	-40	-40	-36	-31	-26	
Sound power level leaving terminal		**57.5**	**60.2**	**45.4**	**38.8**	**36.7**	**37.7**	**40**	**38.1**	**48**
Receptor R1										
Directivity correction	600 x 600 (0,90)	0	0	0	0	-4	-7	-7	-7	
Distance correction	4 m	-20	-20	-20	-20	-20	-20	-20	-20	
Resultant at Receptor R1	**L_p**	**37.5**	**40.2**	**25.4**	**18.8**	**12.7**	**10.7**	**13.0**	**11.1**	**26**