

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

Plant noise impact assessment

On behalf of

Rosa's Thai Cafe

Project Reference: 88299 | Revision: 00 | Date: 28th February 2019

Document Information

Project Name : 26 Earlham Street, Rosa's Thai
Project Reference : 88299
Report Title : Plant noise impact assessment
Doc Reference : 88299/NIA
Date : 28th February 2019

| | Name | Qualifications | Initials | Date |
|---|----------------|-------------------|----------|--------------------------------|
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1.0 Introduction

- 1.1. Noise Solutions Ltd (NSL) has been appointed by Rosa's Thai to undertake plant noise testing at Rosa's Thai located at 26 Earlham Street in London.
- 1.2. It is understood that residents have complained about the external extraction plant located at the restaurant. NSL has undertaken measurements of the noise level due to the existing plant and assessed it against the local authority's usual requirements.
- 1.3. Following the results of this assessment, 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 air handling unit. Both of these systems are located to the south of the restaurant in a lightwell. The intake for the air handling 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. Following an initial assessment of the plant, it was found that the plant was significantly above the council's criteria. It has therefore been proposed to redesign the air handling unit (AHU) and replace the unit. The new unit will be in the same location as the existing unit.

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 3m away from the discharge. The plant is partially screened from the nearest windows.

4.0 Existing noise climate

- 4.1. An environmental noise survey was undertaken to establish the typical background sound levels at a location representative of the noise climate outside the façades of the nearest noise

sensitive receptors to the proposed plant area during the quietest times at which the plant will operate.

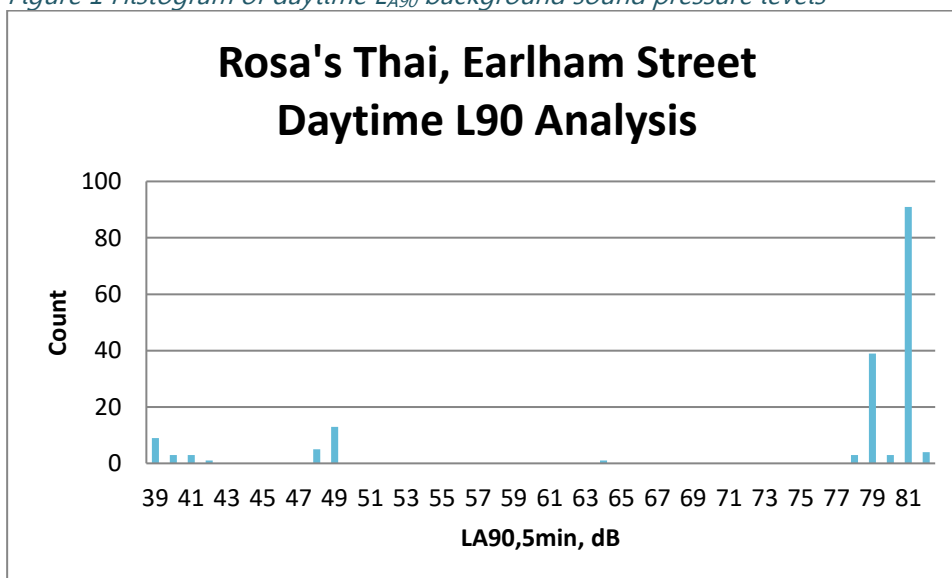
- 4.2. The results of the environmental sound survey are summarised in Table 1 below. The full set of measurement results and details of the survey methodology are presented in [Appendix C](#).
- 4.3. It is understood that for the majority of the daytime period, the noise climate was dominated by plant from Rosa's Thai and other commercial units. The meter was therefore set to integrate over 5-minute intervals in order to establish if the background noise level during periods when the plant is switched off.

Table 1 Summary of survey results

| Measurement period | Range of recorded sound pressure levels (dB) | | | |
|----------------------------------|--|---------------------------|--------------------------|--------------------------|
| | L _{Aeq} (5mins) | L _{Amax} (5mins) | L _{A10} (5mins) | L _{A90} (5mins) |
| Daytime (07.00 – 23.00 hours) | 41-82 | 47-84 | 42-83 | 39-82 |
| Night-time (23.00 – 07.00 hours) | 38-47 | 43-60 | 39-49 | 35-42 |

- 4.4. As the plant will only be operating during the daytime only these hours will be considered.

Figure 1 Histogram of daytime L_{A90} background sound pressure levels



- 4.5. It can be seen that for the majority of the time the existing plant noise was dominant. However, there are clearly identifiable periods when the plant switches off. In order to be robust, the lowest recorded interval of 39 dB has been selected to be representative of the background noise climate during the daytime when the plant is not running.

5.0 Noise assessment criteria

London Borough of Camden

- 5.1. 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."

- 5.2. 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."

- 5.3. 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."

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

Table 2: 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

- 5.5. 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"*.
- 5.6. 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.
- 5.7. 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.

- 5.8. 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."*
- 5.9. 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."*
- 5.10. 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.*
- 5.11. 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."*
- 5.12. 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."*
- 5.13. 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."*
- 5.14. 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.

Summary of criteria

- 5.15. Based on the above criteria, to fall within London Borough of Camden's "Green" category the plant noise rating level should not exceed **29dB** at the residential receptor window.

6.0 Plant noise impact assessment of new intake system

- 6.1. Cumulative noise emissions from the new proposed plant have been predicted at the nearest residential properties to the site based on the noise output information shown in [Error! Reference source not found.](#)
- 6.2. Noise levels for the proposed air supply 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, and a 10dB enclosure fitted around the fan.

Table 3 Proposed atmospheric side attenuators to ventilation systems

| Attenuator | Insertion losses dB, at octave band centre frequencies (Hz) | | | | | | | |
|------------|---|-------|-------|-------|------|------|------|------|
| | 63Hz | 125Hz | 250Hz | 500Hz | 1kHz | 2kHz | 4kHz | 8kHz |
| AHU | 5 | 10 | 19 | 31 | 39 | 37 | 33 | 26 |

- 6.3. The predictions have been based on all proposed plant operating at full capacity.
- 6.4. Table 1, below, summarises the assessment of predicted noise levels. The full set of calculations is presented in [Appendix E](#).

Table 4 Assessment of predicted noise levels at 10m from the plant location

| Receptor | Period | Predicted noise level at receptor, L _{Aeq} (dB) | Design criterion (dB) | Difference (dB) |
|--------------------|---|--|-----------------------|-----------------|
| 10m from AHU inlet | 07.00 – 23.00 hours (all proposed plant will operate) | 28 | 29 | -1 |

- 6.5. The above assessment indicates that the plant noise from the AHU will meet the criteria set out by the local authority, providing the recommended mitigation is installed.
- 6.6. As BS4142:2014 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 exiting plant, therefore there is already president for external plant in this area. It should also be noted that the new plant is expected to be significantly quieter than the existing plant.
- 6.7. Uncertainty in the calculated impact has been reduced by the use of a well-established calculation method.
- 6.8. 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 be considered of 'low impact' in accordance with BS 4142:2014.

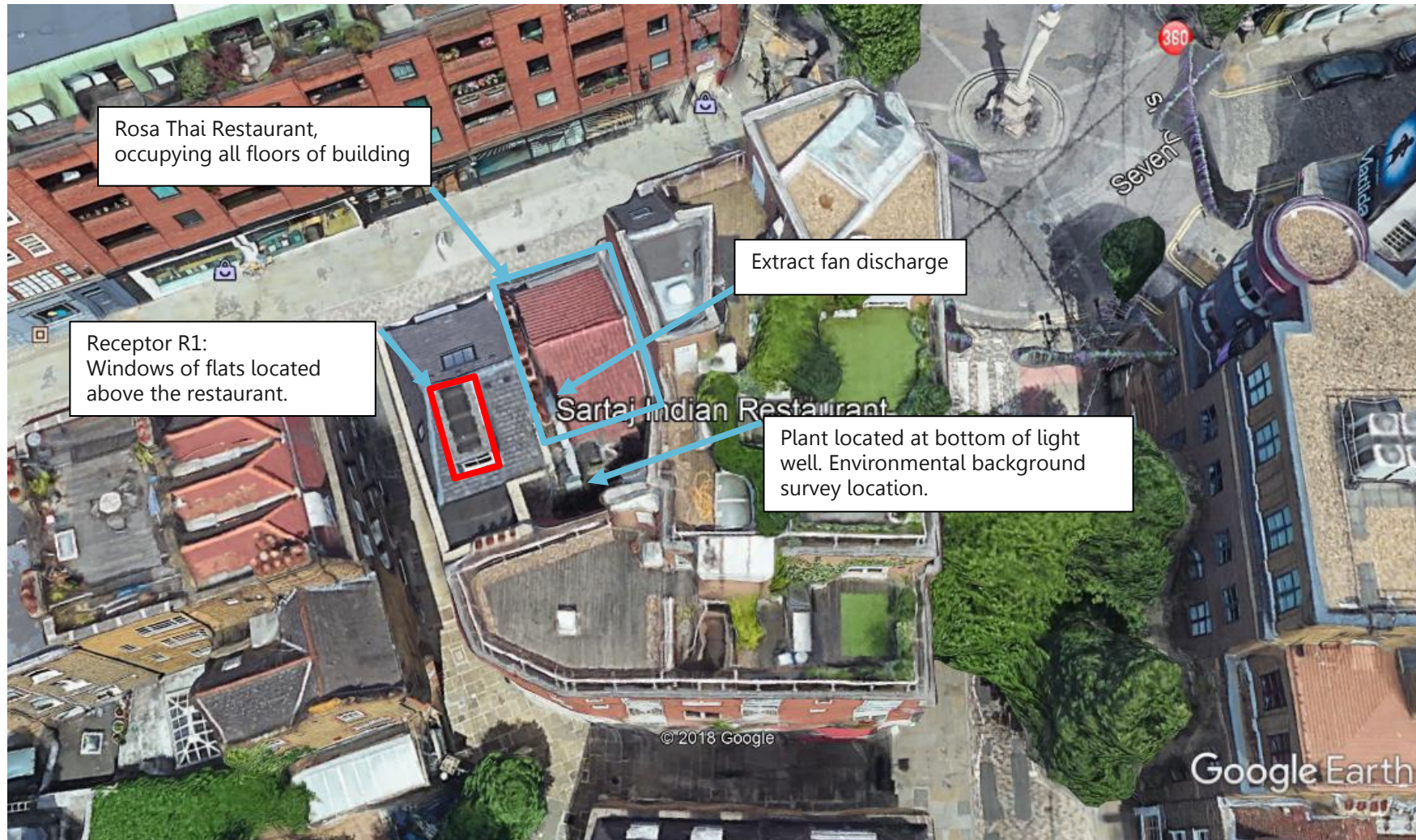
7.0 Summary

- 7.1. Noise Solutions Ltd (NSL) has been appointed by Rosa's Thai to undertake plant noise testing at Rosa's Thai, 26 Earham Street in order to establish the plant noise levels of the plant serving the restaurant. The results have been assessed against typical noise criteria from the London Borough of Camden. The report then assesses the noise from a proposed new air handling unit to be installed at the restaurant.
- 7.2. The results of the assessment indicate that the noise levels from the new air handling unit are within the criteria set by the local authority.

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 s_1 and s_2 is given by $20 \log_{10}(s_1/s_2)$. 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 $20\mu\text{Pa}$. 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 Aerial photograph showing key areas and elevation view identifying receptor



Photograph 1 Courtesy of Google Earth ©



Appendix C Noise Survey

Details of noise survey

- C.1 Measurements of the existing background noise levels were undertaken between 10.40 hours on Wednesday 23rd January and 09.30 hours on Thursday 24th January 2019. The sound level meter was programmed to record the A-weighted L_{eq} , L_{90} , L_{10} and L_{max} noise indices for consecutive five-minute sample periods for the duration of the noise survey.

Measurement position

- C.2 The sound level meter for the environmental noise survey was positioned in the lightwell near to the plant in an area representative of the nearest residential receptor (approximate location indicated on the site plan in **Appendix B**. In accordance with BS 7445-2:1991 '*Description and measurement of environmental noise – Part 2: Guide to the acquisition of data pertinent to land use*', the measurements were taken under free-field conditions).

Equipment

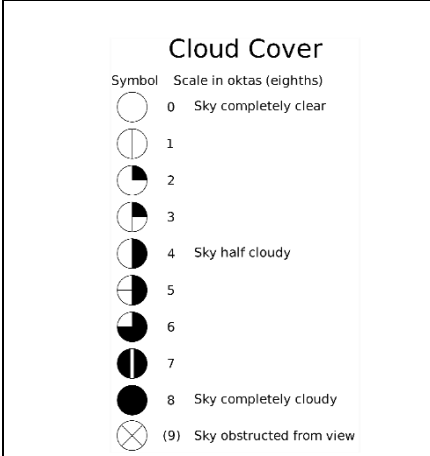
- C.3 Details of the equipment used during the survey are provided in the table below. The sound level meters were calibrated before and after the surveys; no significant change (+/-0.2 dB) in the calibration level was noted.

Equipment used for noise surveys

| Description | Model / serial no. | Calibration date | Calibration certificate no. |
|---------------------------|---------------------------|------------------|--------------------------------|
| Class 1 Sound level meter | Svantek 977/ 69747 | 17/10/2018 | Factory conformity declaration |
| Condenser microphone | ACO Pacific 7052E / 70829 | | |
| Preamplifier | Svantek SV12L / 73687 | | |
| Calibrator | Svantek SV 40A / 10843 | 26/09/2018 | 14010559 |

Weather conditions

- C.4 Weather conditions were determined both at the start and on completion of the environmental noise survey. It is considered that the meteorological conditions were appropriate for environmental noise measurements. The table below presents the weather conditions recorded on site at the beginning and end of the environmental noise survey. Appropriate weather conditions were also present during the course of the plant noise surveys.

| Weather Conditions | | | | |
|----------------------------|---------------------------------------|--|---------------------|---------------|
| Measurement Location | Date/Time | Description | Beginning of Survey | End of Survey |
| As indicated on Appendix B | 23/01/2019 10:40 – 24/01/2019 9:30 | Temperature (°C) | 2 | 1 |
| | | Precipitation: | No | Light rain |
| | | Cloud cover (oktas - see guide) | 4 | 7 |
| | | Presence of fog/snow/ice | No | Yes |
| | | Presence of damp roads/wet ground | No | No |
| | | Wind Speed (m/s) | - | - |
| | | Wind Direction | - | - |
| | | Conditions that may cause temperature inversion (i.e. calm nights with no cloud) | No | No |
| | |  <p>Cloud Cover Symbol Scale in oktas (eighths) 0 Sky completely clear 1 2 3 4 Sky half cloudy 5 6 7 8 Sky completely cloudy (9) Sky obstructed from view</p> | | |

Results

- C.5 The noise climate at the measuring location was dominated by plant noise from Rosa's Thai and one other restaurant unit. The results of the survey are presented in a time history graph overleaf.

