

Ref: KR/8072215

4<sup>th</sup> September 2023

Dear Sirs,

Re: Bento House, 200 Cheltenham Rd, Cotham, Bristol BS6 5QZ, – External Background Noise Assessment.

We are happy to present our environmental noise report in regards with the current kitchen extraction system.

On the 24<sup>th</sup> August 2023, we visited The Site to inspect the location and the current kitchen ventilation system. Noise measurements were taken to establish the background and the mechanical plant sound levels. The nearest noise sensitive receptor is deemed to be approx. 9m away from the current mechanical plants at the rear of The Site's roof top level. The current operational hours are from 12:00hrs to 22:30hrs.

The typical background noise levels have been calculated at The Site to be 47.3dBA  $L_{A90t}$ .

Noise calculations of the mechanical plants have been undertaken using all measurements to deduce the impact to the NSR to form the basis of the assessment. Noise criteria at the nearest sensitive receptors (NSR) have been assessed based on British Standard BS 4142:2014+A1:2019.

In accordance with BS 4142:2014+A1:2019 guidance, the assessment level as compared to the background noise levels – daytime has been determined to be -5.8 dB; and as such the noise impact due to the operation of the mechanical plants “is an indication of the specific sound source having a low impact” and no additional noise mitigations are required.

Yours faithfully,



H.Lo MEng, PhD, CEng Prof Mem ICME, Tech IOA

## 1.0 INTRODUCTION

Xcellence Consultancy Group has been appointed by Bento House Japanese/Korean Takeaway to undertake an environmental noise assessment to assess the noise emissions from the current mechanical services associated with the kitchen ventilation upon nearby noise sensitive receptors. An environmental noise survey has been conducted to determine the prevailing background sound levels in the surrounding area. Using the results of the acoustic measurements and the BS4142 guidelines, the impact of the current ventilation system has been determined. This report describes the noise survey, its results and the outcomes of the subsequent assessment. Noise mitigation measures have been proposed where necessary.

## 1.1 SITE DESCRIPTION

The Site is located within a busy commercial town centre area at 200 Cheltenham Rd, Cotham, Bristol BS6 5QZ (see Figure 1). The immediate neighbouring businesses are an Indian Restaurant and a retail shop. The Site falls within the jurisdiction of Bristol City Council. The Site is sandwiched between Station Road and Cheltenham Road. Subjectively, the dominant noise sources on The Site were considered to be the heavy traffics from Cheltenham Road and the railway line (see Figures 1 and 4).



Figure 1 The Site (Bento House)

## 2.0 Current Mechanical Plants

Bento House is a Japanese/Korean Takeaway, predominately with a kitchen and reception space. The operational times run between 12:00hrs and 22:30hrs every day. The main mechanical plant is the ventilation fan serving the kitchen (Fan Model: Elta Fans Turboflow TF500/4-1AC).

The fan and exhaust are externally mounted on the roof top (see Figure 2). The main system fan does have silencer attenuators installed and there were evidences of the use of acoustic noise reduction blanket and anti-vibration mounts for the system (Figure 3). One of the top rear windows to the left of Bento House is considered the closest to the ventilation system and has been considered noise sensitive receptor (NSR) and this window is approx. 9m to the fan and the exhaust (Figures 2). The top rear bathroom window to the right of Bento House is not considered to be NSR for the purpose of this assessment.



Figure 2 Nearest NSR at 9m away from Bento House's mechanical service



Figure 3 Evidences of the extraction system serving Bento House with use of a) acoustic noise reduction blanket and b) anti-vibration mounts

### 3.0 GUIDANCE AND CRITERIA

BS 7445-2:1991 'Description and Measurement of Environmental Noise'

BS 7445-2:1991 'Description and Measurement of Environmental Noise - Part 2: Guide to the acquisition of data pertinent to land use' defines parameters, procedures and instrumentation

required for noise measurement and analysis. Accordingly, together with associated guidance within the documents below, this Standard has been used to ensure the survey and data are fit for purpose.

BS 4142:2014+A1:2019 'Method for Rating and Assessing Industrial & Commercial Sound'. BS 4142 is the generally adopted method for assessing plant noise emissions affecting residential areas and is specifically referenced as the assessment methodology and is also specified by the majority of local authorities for such instances commercial & industrial sound affecting residential properties.

Comparing the rating level with the background sound level, BS 4142 states:

- "Typically, the greater this difference, the greater the magnitude of 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."

#### Bristol City Council Guidance

For this development, the planning authority have stated that the rating level of any plant and equipment should be 5dB below the existing background noise level at the most affected window such to protect the amenity of the local residents.

## 4.0 NOISE MEASUREMENT EQUIPMENT

The instrumentation used for the noise measurements was a Svantek SV971A precision grade Class 1 real time analysing sound level meter, serial number 121091 with a Svantek ½" 7152 prepolarized condenser microphone (last calibrated 29 June 2022), serial number 83677. The instrument was field-calibrated before and after measurements using the Svantek SV33B acoustic calibrator, serial number 116638 (last calibrated 10 July 2023). Field calibration of instrumentation was carried out at the beginning and end of each monitoring period, in accordance with good practice. No sign of significant drift in calibration level was recorded.

### 4.1 WEATHER CONDITIONS

Measurements were undertaken in dry sunny conditions. The temperature recorded on the day was 23°C and 45% humidity with no significant signs of wind.

### 4.2 NOISE MEASUREMENTS PROCEDURE

The purpose of the assessment is to determine the impact of noise from the operation of the current ventilation system at the NSR. This assessment looks especially at the worst affected dwellings close to The Site.



Xcellence Consultancy group have carried out a fully manned environmental noise survey from 18:30 hours to 20:30 hours on the 24<sup>th</sup> August 2023 to establish the existing background noise levels at locations representative of the NSR. Measurements were carried out across 2 different locations (see Figure 4) upon nearby noise sensitive receptors to the current ventilation system at Bento House. The noise levels measured are therefore assumed to be representative of the noise climate during the hour in which the measurements were taken.

In order to evaluate the impact of noise from the current operation of the ventilation system, measured background noise levels have been compared against the noise without the ventilation mechanical plants running from Bento House. This assessment has been undertaken in accordance with methodology outlined within BS4142:2014 “Methods for rating and assessing industrial and commercial sound” as typically required for planning purposes.

A fixed microphone position was used to determine the change in noise levels during typical operating hours of the takeaway with sound level meter set to measure consecutive “A” weighted 15 minute time samples. The measurement locations of the fixed microphone are shown in Figure 4. These were considered to be representative of the conditions at the nearest sensitive receptor. The microphone was positioned on a tripod of 1.3 metres above ground level and at least 3m from the closest façade at the selected monitoring positions. Measurements have been taken in free-field conditions except at Measurement Location 2 where the sound level meter was at 2.5m to the ventilation system (a façade correction will be applied in the subsequent assessment). Ambient and background noise levels ( $L_{Aeq}$  and  $L_{A90}$  respectively) were measured throughout the noise survey in continuous 15 minute periods. Measurement periods of 15 minutes were used during the survey to ensure these periods are considered an adequate range of measurements to be taken.

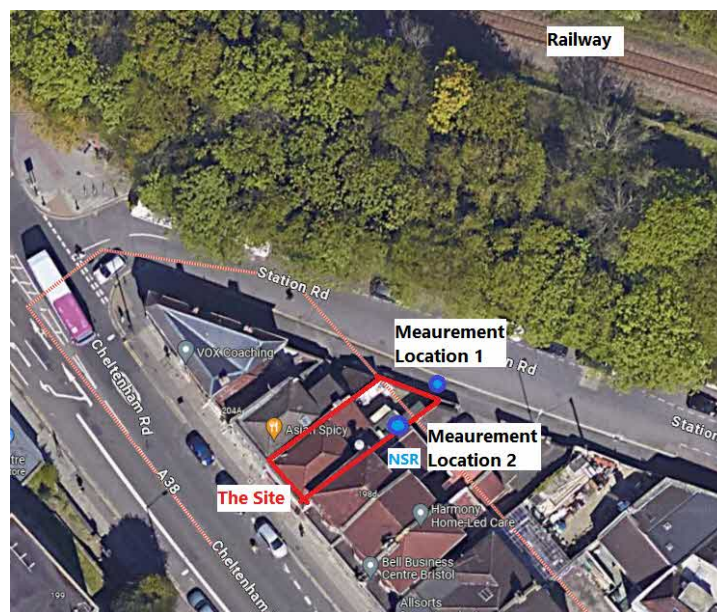


Figure 4 Bird’s eye view of measurement locations in relation to The Site, (courtesy of Google Maps)

#### 4.2.1 Measurement Location 1:

- 11m line of sight to Bento House's extraction system
- Sound level meter was placed on the north boundary of The Site at road level on Station Road

#### 4.2.2 Measurement Location 2:

- 2.5m Line of sight to Bento House's extraction system
- Sound level meter was placed at the rear of The Site at first floor flat roof level

### 5.0 NOISE MEASUREMENT RESULTS - BACKGROUND NOISE

The noise levels measured are assumed to be representative of the noise climate during the hour in which the measurements were taken.

The table below provides a summary of the measured noise levels at the measurement locations during the daytime period.

Measurement Locations	Times	L <sub>Aeq, 15min</sub> , dB	L <sub>Afmax, 15min</sub> dB	L <sub>A90, 15min</sub> dB	Was Bento House's Ventilation System Running
Position 1	18:30	58.6	76.7	47.5	No
Position 1	18:45	56.4	77.2	47.3	No
Position 1	19:00	60.2	81.2	47.9	No
Position 1	19:15	60.9	80.2	52.1	Yes
Position 2 (Note1)	20:00	62.2	69.1	52.9	Yes
Position 2 (Note1)	20.15	63.2	80.4	59.7	Yes

Note 1: due to close distance to the ventilation resulting in a reflection effect, a façade correction of 2dB is to be applied to the measurements in subsequent calculations

Table 1. Sound pressure levels at the measurement survey locations

### 6.0 NOISE IMPACT ASSESSMENT

Short-term noise surveys around the subject area were undertaken to measure the existing noise climate across The Site. Existing representative background sounds levels have been determined, following the methodology of BS4142:2014, and used to define the plant noise rating limits at nearest sensitive receptors.

In order to deduce the pure sound source from the fan at Measurement Location 2, the logarithmic average of the L<sub>Aeq</sub> (60.2, 61.2) with the fan on is to logarithmic subtract the logarithmic average of the L<sub>Aeq</sub> (58.6, 56.4, 60.2) with the fan off. The L<sub>Aeq</sub> contribution of the fan at Measurement Location 2 is thus calculated to be 56.5dBA.

With the external building layout, the buildings behind the ventilation system will result the space behind the ventilation system into two: an illuminated zone and a shadow zone. The current NSR will be partially in the illuminated and shadow zones. Thus, it is deemed that there are advantages from this inherent building barrier, see Figure 5. As such, conservatively, an attenuation effect of about 5dB is assumed which is equivalent to 6m sound pressure level propagation.

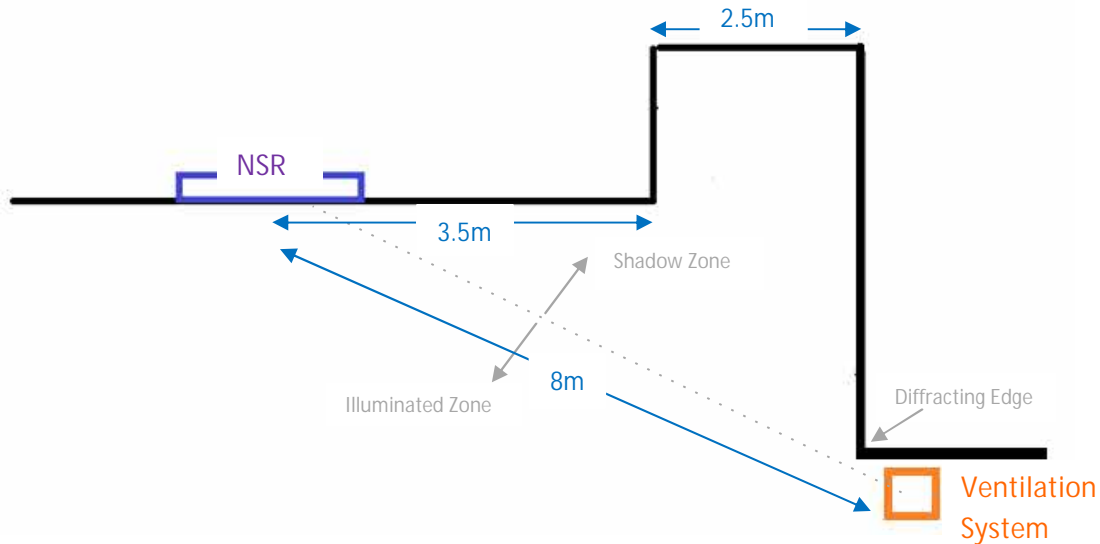


Figure 5 Detailed top view of how the sound source is perceived at the NSR

Using the deduced data, a back-calculation approach was adopted to determine the sound level contribution from Bento House’s mechanical plant at source and thereby the noise at the NSR can be extrapolated. As such, along with the shadowing effect, the breakout noises from the fan and exhaust have been calculated to be 41.5dBA at 8m distance i.e at 1m from the nearest noise sensitive window.

There is no quantitative definition of statutory noise nuisance. It is generally accepted however, that if the plant noise level is at least 5dB below the minimum background  $L_{90}$ (15minutes) at 1m from the nearest noise sensitive window, then the risk of a statutory noise nuisance is avoided. By adopting this as a design criterion the guidance contained in BS 4142:2014 should also be complied with.

On the basis of the aforementioned guidance, the Local City Council policies and the results of the environmental noise survey, we propose that the following plant noise emission criteria be achieved at 1 metre from the nearest noise sensitive residential window as shown in Table 2.

	Daytime (07:00 – 23:00 hours)
At NSR	42.3dBA

Table 2 Noise Emission Limit (dBA)

For the purpose of the noise impact assessment the lowest  $L_{A90}$  value (see Table 1) has been used.

Below in Table 3, the difference between the rating level and background daytime noise level has been calculated to be -5.8dB which is more than 5dB below the background noise level. In regards with the BS4142 guidelines, a difference of around -5 dB is an indication of the specific sound source having a low impact.

Total Rating Level, dBA $L_{Aeq, T}$	Background Noise Level Day (07:00-24:00), dBA	Assessment Level, dB
41.5	47.3	-5.8

Table 3. Daytime BS4142 assessment level at NSR

## 7.0 CONCLUSIONS

Xcellence Consultancy Group has been appointed by Bento House to conduct a background external noise assessment impact of the current full ventilation system upon nearby noise sensitive receivers. The calculations within this report are based upon sourced and/or calculated data. Uncertainties in these assessments do exist in terms of potential seasonal and future variance of background levels over time but these are not thought to be significant here. The opinions and interpretations presented in this report represent our best technical interpretation of the data made available to us.

An environmental noise survey has been undertaken to determine prevailing background noise levels in the surrounding area which have been used as the basis of the assessment.

The noise survey results collected have been applied at the closest noise sensitive receptor. It is considered that the measured noise levels are reasonable given the location of the measurement positions. Upon the results of the noise surveys external noise criteria have been applied at the façade of the nearest receptor. A robust assessment of the noise levels associated to the current mechanical plant has been undertaken.

The assessment indicates that the current mechanical services have achieved the environmental noise criteria at the nearest noise sensitive residential window. In accordance with BS 4142:2014+A1:2019 guidance and Local City Council noise guidelines the predicted noise impact due to the operation of the current mechanical plant “is an indication of the specific sound source having a low impact”. Additional measures are not necessary to reduce further noise breakout.