

The Corner Shop

BS4142 Assessment

for James Suresh

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3871_N01_EXT1, 11 March 2026

1. INTRODUCTION

- 1.1 In November 2025, Hayes McKenzie prepared a letter to the planning officer (3871_L01_EXT1) providing an initial noise assessment of the refrigeration plant associated with a retrospective planning application at The Corner Shop, The Headlands, Downton (ref. PL/2025/07697). Following this letter, comments were received from the Environmental Health department at Wiltshire Council advising that a background sound survey and BS4142 assessment would be required.

2. STANDARDS AND GUIDANCE

BS 4142:2014+A1:2019, Methods for rating and assessing industrial and commercial sounds

- 2.1 BS 4142 provides an assessment methodology for rating noise immission levels from industrial and commercial sources at residential properties. The standard describes a method for determining the noise impact based on the difference between the existing background sound level (without the noise source) measured using the L_{A90} measurement index¹ and a 'rating level' of the noise immission (from the source at a receiver location) which is derived from the measured or predicted 'specific sound level' (defined using the L_{Aeq} index²) plus any penalty for tonal or impulsive characteristics. If the specific sound level exhibits an identifiable character such as tonality or impulsiveness, then a variable penalty of up to 6 dB or 9 dB respectively is added to give the rating level.
- 2.2 The difference between the background sound level and the rating level (rating minus background) is then used to assess the noise impact, according to Table 1 below. BS 4142:2014 states that *'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*

¹ Noise level measured in dBA exceeded for 90% of the measurement period

² Noise level measured in dBA energy averaged over the measurement period

impact.

Table 1 – BS 4142 Guidance on Noise Impact

Difference	Assessment
Around +10 dB or more	Indication of a significant adverse impact
Around +5 dB	Indication of an adverse impact
<0 dB	Indication of a low impact

- 2.3 Whilst BS 4142 gives an indicative assessment of the impact on residential amenity, there are no specific guidelines on what may be acceptable in a given situation and, in this respect, the standard is left open to interpretation.
- 2.4 Section 7 of the standard provides guidance on determination of the specific sound level. It is noted at paragraph 7.3.5 that, where measurement of the specific noise level is not possible, then this can be determined by a combination of measurement and calculation. It also describes how the specific noise level is quantified as an L_{Aeq} over the 'reference time interval' which means that, where it is not continuous, it is necessary to correct the measured noise level, taken during periods when the source is operating, for the percentage 'on-time' within the relevant reference time interval. The standard details different reference time intervals for the day-time and night-time of 1 hour and 15 minutes respectively. In this case, the plant is assumed operate during the day and night so both reference time intervals are relevant for this assessment.
- 2.5 Section 8 provides guidance on determination of the background sound level. It is noted that there is no 'single' background sound level as this is a fluctuating parameter. As a result it is recommended that a series of sequential or disaggregated measurements, of duration not normally less than 15 minutes, are carried out to determine a 'representative' level which is then used as the basis of the assessment. It is noted that the data should suitably represent the particular circumstances and periods of relevance to the assessment and that weekday and weekend periods may need to be considered separately. Levels are to be reported as integer values to reflect the variability of such measurements.
- 2.6 Section 11 of BS 4142 refers to the assessment process and states:

Where the initial estimate of the impact needs to be modified due to the context, take all pertinent factors into consideration, including the following.

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.

- 2.7 It is therefore important to bear in mind that the difference between rating level and background sound is only an initial estimate of impact and that the standard allows for professional judgement when considering the context of predicted noise levels.

Adopted Methodology

- 2.8 BS 4142 is generally aimed at mechanical plant noise and is therefore entirely appropriate for assessing noise emissions from the plant associated with The Corner Shop.
- 2.9 The noise emission generated by the plant has been assessed according to the methodology described in BS 4142. The initial comparison set out in the standard indicates **low impact** for rating levels equal to background sound levels, **adverse impact** for rating levels around 5 dB higher than background sound levels and **significant adverse impacts** for rating levels more than 10 dB higher than background sound levels. In addition to the initial comparison of Background Sound Level and Rating Level, the standard also allows for a contextual assessment stating that '*absolute levels might be as, or more, relevant*' than the initial comparison. This statement about absolute noise levels is considered to be of particular relevance to the assessment at The Corner Shop.

3. SOUND LEVEL MEASUREMENTS

- 3.1 Unattended sound level measurements were conducted between 8 and 19 January 2026. The noise monitoring equipment was located on the east side of the building, in a courtyard garden associated with a flat to the rear of the shop. A weather station was also installed in the garden not far from the microphone which was positioned at GPS coordinates 50.993379°, -1.7578578°, as shown at Figure 1 and Figure 2.
- 3.2 A Rion NL-52 Sound Level Meter (serial number 01032421) fitted with a ½" microphone complying with the Class 1 standard in IEC 61672-1 was installed mounted on a tripod at a height of approximately 1.5 m. The microphone was located within a 45 mm radius foam ball windshield which was positioned within an outer windshield with a diameter of 230 mm. The measurement position was screened from nearby roads by the boundary fence and approximately 2 m from the façade of the building.
- 3.3 The ambient noise environment at the sound measurement location consisted mainly of road traffic noise from vehicles passing on the A338.
- 3.4 Calibration was carried out using a B&K type 4231 Acoustic Calibrator (s/n 3022368) with a level of 94.15 dB at the start of the survey and checked at the end. No drift in the calibration was

observed and no correction has been made to the measured levels. All equipment was within its relevant laboratory calibration period.

Figure 1 – Satellite Imagery of Site



Figure 2 – Measurement Position

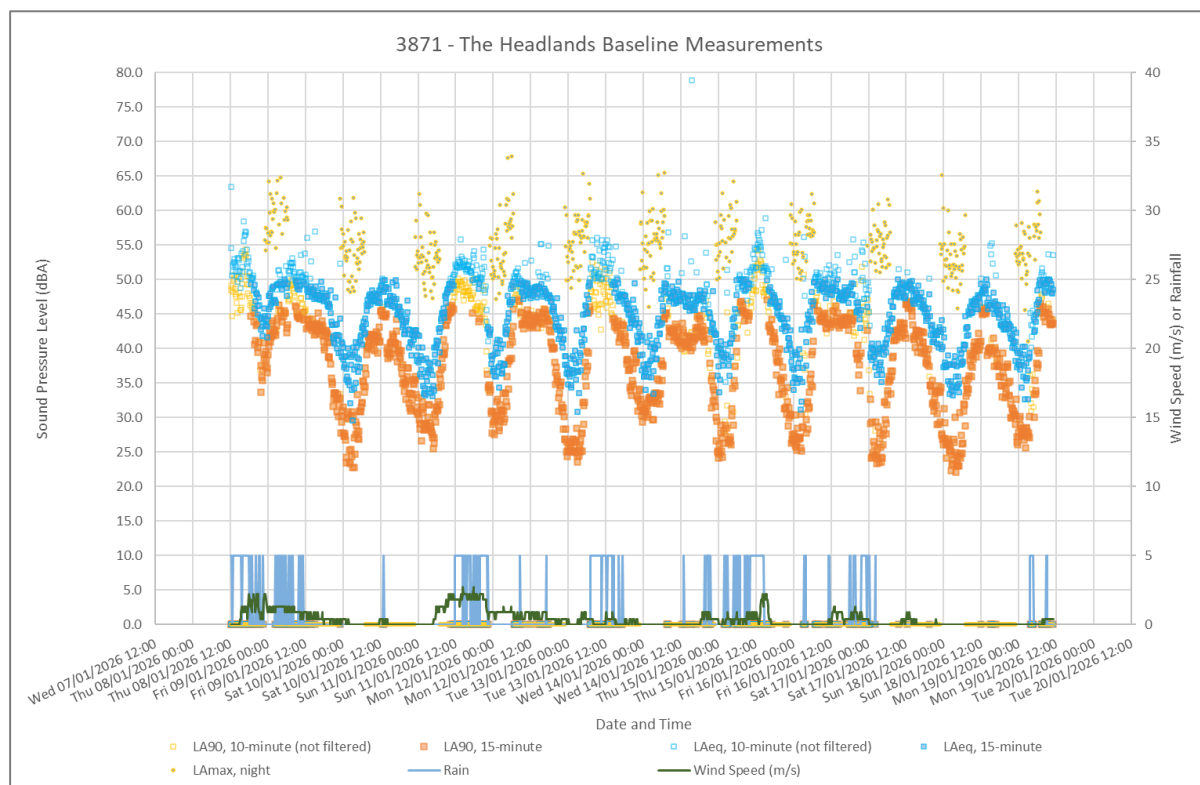


Results

- 3.5 A time history of the measured sound levels during the 10-day survey period are given at Figure 3. The variation in noise level between day and night is clear for the $L_{Aeq,15\text{-minute}}$, and $L_{A90,15\text{-minute}}$ data with a significant drop in road traffic noise levels overnight.

- 3.6 It should be noted that the measured wind speed and rainfall from the weather station are also shown on the time history chart. Wind conditions at the measurement location were relatively calm (no higher than 2.5 m/s) during the survey and wind is not considered to have affected the measured sound levels. A considerable amount of rain was recorded over the survey period and any 15-minute period where rain was recorded has been excluded from further analysis as indicated by the 'not filtered' data shown on the chart corresponding to periods of rainfall.
- 3.7 The $L_{A90,15\text{-minute}}$ is the A-weighted sound pressure level in a 15-minute period which is exceeded 90% of the time. The $L_{Aeq,15\text{-minute}}$ is the A-weighted equivalent continuous sound pressure level in a 15-minute period which is an energy average of the measured sound pressure levels. The L_{Amax} is the maximum A-weighted sound pressure level over the measurement interval (in this case 15 minutes) measured using the fast time weighting (125 ms).
- 3.8 The L_{Amax} is shown on the chart for the night hours to provide an indication of the maximum levels during car pass-bys on the A338. It shows that noise levels can regularly exceed 60 dBA due to road traffic noise which is important in understanding the context of the noise environment.

Figure 3 – Time History



- 3.9 The average measured ambient (L_{Aeq}) and background (L_{A90}) sound levels (filtered to exclude periods of rainfall) are summarised below at Table 2. The level of ambient noise during the day is very consistent, showing a range of no more than 2 dB from 46.5 to 48.5 dB L_{Aeq} which is consistent with the road traffic controlling the noise environment.

Table 2 – Average Measured Sound Levels

Period (24hrs from 0700 to 0700)	Day-time 0700 – 1900 Average Noise Level		Evening 1900 – 2300 Average Noise Level		Night-time 2300 – 0700 Average Noise Level	
	dB L_{Aeq} 12 Hour	dB L_{A90} (Ave.)	dB L_{Aeq} 4 Hour	dB L_{A90} (Ave.)	dB L_{Aeq} 8 Hour	dB L_{A90} (Ave.)
Thu 8th - Fri 9th Jan	-	-	46.2	39.8	47.7	42.1
Fri 9th - Sat 10th Jan	48.3	43.3	44.5	35.3	39.6	28.8
Sat 10th - Sun 11th Jan	47.3	41.0	42.9	34.4	38.7	30.0
Sun 11th - Mon 12th Jan	47.5	42.1	46.0	37.9	43.4	33.3
Mon 12th - Tue 13th Jan	48.3	44.1	43.6	34.4	42.5	29.2
Tue 13th - Wed 14th Jan	48.0	42.2	44.8	35.9	42.5	33.4
Wed 14th - Thu 15th Jan	47.4	42.1	45.5	37.3	42.0	29.0
Thu 15th - Fri 16th Jan	48.5	43.3	44.0	34.0	42.8	30.6
Fri 16th - Sat 17th Jan	48.5	44.1	46.0	38.8	40.6	28.6
Sat 17th - Sun 18th Jan	47.7	42.0	43.0	33.3	38.6	26.5
Sun 18th - Mon 19th Jan	46.5	39.4	42.8	33.3	43.0	31.2
-						
Overall	47.8	42.3	44.7	35.9	42.7	31.2

Representative Background Sound Levels

- 3.10 A representative value for the background sound levels to be used in the BS4142 assessment must be derived from the frequency distribution analysis of the background sound measurements shown at Figure 4 and Figure 5. Review of the distribution plot indicates that the most commonly occurring background sound levels are 44 and 27 dB L_{A90} for day and night respectively. These values are 2 dB higher than the overall average during the day and 4 dB quieter than the overall average during the night at Table 2.
- 3.11 It is considered that representative background sound levels of **42 dB L_{A90}** and **27 dB L_{A90}** are conservative values for the day-time and night-time background sound level.

Figure 4 – Day-time Background Sound Measurement Results (L_{A90} 15 min)

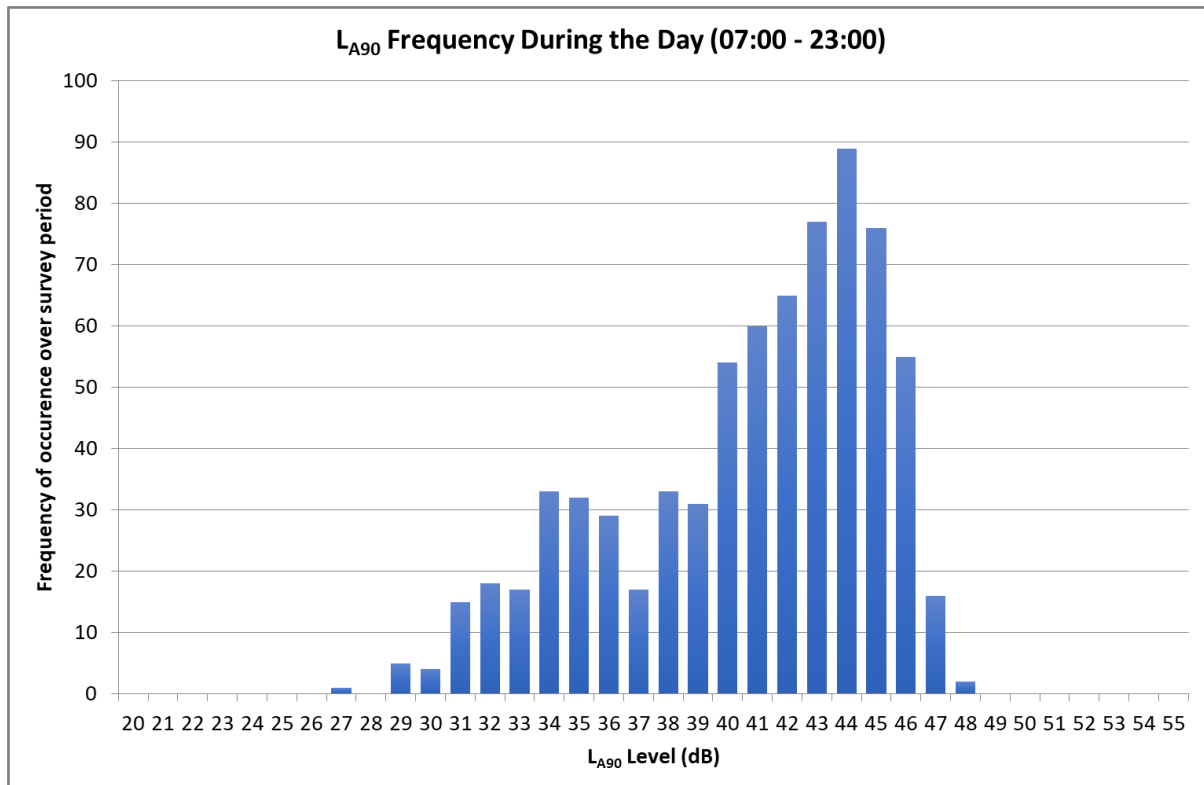
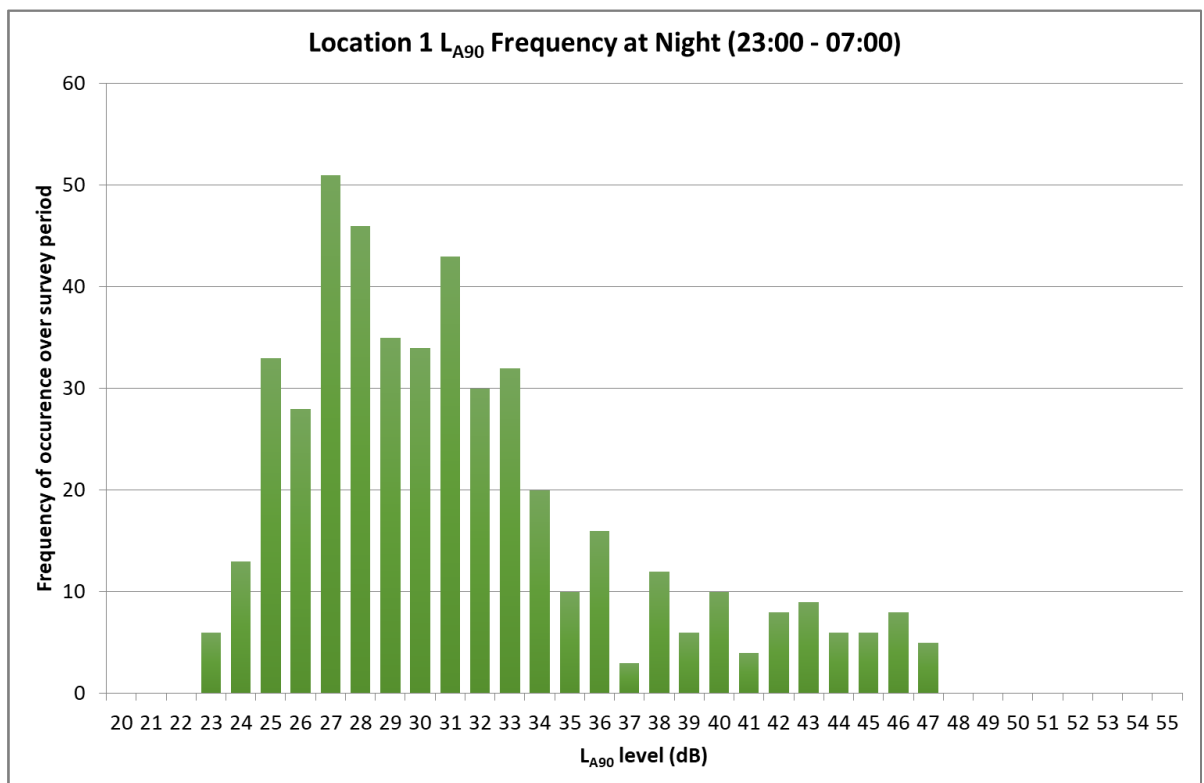


Figure 5 – Night-time Background Sound Measurement Results (L_{A90} 15 min)



Road Traffic Noise Levels

- 3.12 According to the overall averages at Table 2, the level of road traffic noise at the measurement location is estimated to be 48 dB L_{Aeq} during the day, dropping to 45 dB L_{Aeq} in the evening and 43 dB L_{Aeq} at night.
- 3.13 The results of strategic noise mapping showing the $L_{Aeq, 16 \text{ hr}}$ were presented in the Hayes McKenzie letter to the planning officer (3871_L01_EXT1) where it was noted that traffic noise is in the region of 50 dB at the rear of the property during the day and 5 dB lower at night. The strategic noise mapping would not have accounted for the boundary fence providing some screening at the measurement location where it could be expected that traffic noise would be slightly reduced. The measurement results are therefore entirely consistent with the strategic noise mapping, confirming the strong influence of road traffic noise at this site.
- 3.14 As noted at para 3.8, the sound pressure level during car pass-bys can easily exceed 60 dB which is at least 12 and 17 dB higher than the L_{Aeq} levels during the day and night respectively.

4. NOISE PREDICTIONS

- 4.1 As noted in the Letter (3871_L01_EXT1), manufacturers data has been used to calculate a sound power level of 64 dB L_{WA} , assuming hemispherical propagation from a point source, for each of the two units (Model: JEHS-0300-B2-M-1). Predictions have been carried out using ISO 9613-2³ methodology, adopting suitable assumptions about temperature, humidity and hard ground. The plant has initially been modelled as being fixed to the boundary wall, surrounded by a closed boarded fence of approximately 2 m (as installed).

Closest Residential Window

- 4.2 During visits to the site for installing and collecting the survey equipment, it was confirmed that the closest residential windows to the plant are the ground and first floor windows in the rear courtyard that can be seen between the microphone and weather station at Figure 2.
- 4.3 There are windows in the rear extension of Burnside (the adjacent property to the south) but the closest one is a bathroom that is not considered noise sensitive. The closest habitable room within the extension to the rear of Burnside is set considerably further back, much closer to the main part of the original building.

³ ISO 9613-2, Acoustics — Attenuation of sound during propagation outdoors — Part 2: General method of calculation, ISO 2024

Verification Measurements

- 4.4 During the visit to collect the equipment for the background sound survey, additional spot measurements were carried out to verify the noise output of the installed equipment. The same Rion NL-52 Class 1 Sound Level Meter (SLM) was used for these measurements (serial number 01032421). The SLM was directly mounted on a tripod, at a height of approximately 1.5 m and the microphone was fitted with a 45 mm foam ball windshield. The microphone was positioned at 1 m from the centre of the fan associated with the upper unit as shown at Figure 6.
- 4.5 The SLM was set up to record 10-minute average $\frac{1}{3}$ octave unweighted noise data along with 100 ms L_{eq} measurements and continuous audio recordings to allow further post processing of the data if required.

Figure 6 – Verification Measurements



- 4.6 The measurements highlighted that the manufacturer's data submitted in support of the planning application is not representative of the highest noise output whilst the equipment is running but are considered to be representative of an average 15-minute period under normal operation.

- 4.7 As the equipment has not been running, this made it difficult to test the noise output under normal operation as there was a large temperature differential when it was switched on causing the plant (and the compressors in particular) to work very hard to achieve/ maintain the target temperature. Under these conditions of high cooling demand, it was observed that with only the upper unit running, a level of 64 dB L_{Aeq} at 1 m was measured and the unit was running for 6 minutes out of ten (60% on-time). It should be noted that the measurement environment is within an enclosure so results are not directly comparable to manufacturer's quoted level at 1 m.
- 4.8 Allowing for the on-time over a 15-minute period, the noise output under high cooling demand is 61.8 dB L_{Aeq} and it is anticipated that under a less stringent cooling demand (normal operation), this could be expected to reduce. Predicted noise levels based on manufacturers data (and the installed enclosure) suggest a level of 57 dB L_{Aeq} at the measurement location and the observed difference of 5 dB is likely to be attributable to the increased cooling demand.

Mitigation Measures

- 4.9 Given that the enclosure around the plant does not offer any acoustic screening to the closest residential window at first floor, and the verification measurements have highlighted the potential for increased noise output under high cooling demand, it is considered that predicted noise could be higher than initially thought. Factoring in the representative background sound level of 27 dB L_{A90} at night, there is clearly some potential for an adverse impact and mitigation measures have been proposed to address this.
- 4.10 To provide a greater level of screening to the closest residential windows, it is recommended that the enclosure around the plant is upgraded to a brick-built structure with a roof that includes a mineral wool lining of at least 50mm depth. To ensure the plant receives sufficient airflow, the gate into the enclosure will need to be swapped out for a louvred door. Although the louvred door will offer less acoustic screening, this will be positioned behind the garden fence and is facing north away from residential buildings.
- 4.11 To address the potential for increased noise levels under high cooling demand, it is recommended that running only one unit at night would limit the potential increase (compared with normal operation of two units) to no more than 2 dB. For the purposes of a BS4142 assessment, night-time is assumed to be between 23:00 and 07:00 so it is recommended that one unit is switched off during these hours.

Specific Sound Level

- 4.12 Including the recommended upgrade to the enclosure outlined above, the predicted specific sound levels at the closest windows (based on manufacturer's data for normal operation) is 31 dB $L_{Aeq,15\text{-minute}}$ and 33 dB $L_{Aeq,15\text{-minute}}$ at ground floor and first floor respectively.
- 4.13 The results of these predictions are shown in the form of noise contours for ground floor and first floor height at Figure 7 and Figure 8 respectively (attached at the end of this technical note). It is apparent from the noise contours that the closest residential window is representative of the highest predicted noise levels, ensuring a worst-case assessment.

5. BS4142 ASSESSMENT

- 5.1 In order to provide an assessment of the level of noise from the plant, predictions have been compared with the representative background sound levels. It has been noted above that the manufacturers data already includes and on-time correction (see para 4.6) and therefore, the predicted specific sound levels do not require any on-time correction. During verification measurements of the equipment, no obvious tonal or impulsive characteristics were noted within the courtyard, and no penalties have been added to the predicted noise levels.

- 5.2 Table 3 and Table 4 show the derivation of the BS 4142 rating level for day and night respectively.

Table 3 – Day Hours Noise Assessment

Quantity	Value	Description or Commentary
Background Sound Level	42	Representative background sound level
Assessment reference time interval	1 hour	1 hour has been chosen as the relevant time period according to BS4142:2014
Specific Sound Level (not corrected for on time)	31	Predicted noise levels at nearest residential window (rounded to 1 dB)
Specific Sound Level	31	On-time correction already included
Penalties	0	No character penalties have been assumed
Rating level	31	$L_{Ar,Tr}$
Excess of rating over background sound level	-11	Where the rating level is below the background sound level, this is an indication of a low impact.

Table 4 – Night Hours Noise Assessment

Quantity	Value	Description or Commentary
Background Sound Level	27	Representative background sound level
Assessment reference time interval	15 minutes	15 minutes has been chosen as the relevant time period according to BS4142:2014
Specific Sound Level (not corrected for on time)	33	Predicted noise levels at nearest residential window (rounded to 1 dB)
Specific Sound Level	33	On-time correction already included

Quantity	Value	Description or Commentary
Penalties	0	No character penalties have been assumed
Rating level	33	$L_{A,r,Tr}$
Excess of rating over background sound level	+6	Where the rating level is around 5 dB above the background sound level, this is an indication of an adverse impact. However, taking into account the context of the environment (as discussed at paragraphs 5.4 and 0 below) the overall assessment conclusion is of a low impact.

- 5.3 The initial comparison presented above, indicates that noise levels are likely to have a low impact during the day but have the potential for an adverse impact at night. BS 4142 allows for a contextual assessment which is appropriate in this case. Predicted specific sound levels from the plant are relatively low within the context of the road traffic noise environment.

Context

- 5.4 In the context of a transient noise environment where a low level of background sound is punctuated by multiple cars passing by every minute (rather than a constant flow) there can be an unexpectedly large difference between L_{A90} and L_{Aeq} . It can be seen at Figure 3 and Table 2 that the L_{Aeq} is generally 5 dB above L_{A90} during the daytime hours increasing to around 10 dB higher during the evening and night hours. As noted at para 3.14, levels during individual car pass-bys can be considerably higher than the L_{Aeq} and the L_{A90} is therefore not representative of the absolute noise levels due to car pass-bys which are experienced very regularly at this site.

The average night-time L_{Aeq} level at the measurement location was 43 dB as shown at

- 5.5 The average measured ambient (L_{Aeq}) and background (L_{A90}) sound levels (filtered to exclude periods of rainfall) are summarised below at Table 2. The level of ambient noise during the day is very consistent, showing a range of no more than 2 dB from 46.5 to 48.5 dB L_{Aeq} which is consistent with the road traffic controlling the noise environment.
- 5.6 Table 2 and the night-time L_{Amax} values do not drop below 45 dB at any time during the survey. Accounting for this, the specific sound level from the plant is predicted to be 10 dB lower than the road traffic noise at the closest first floor window. In this context, it is considered unlikely that any adverse effects would be experienced at night and therefore a low-impact is predicted.

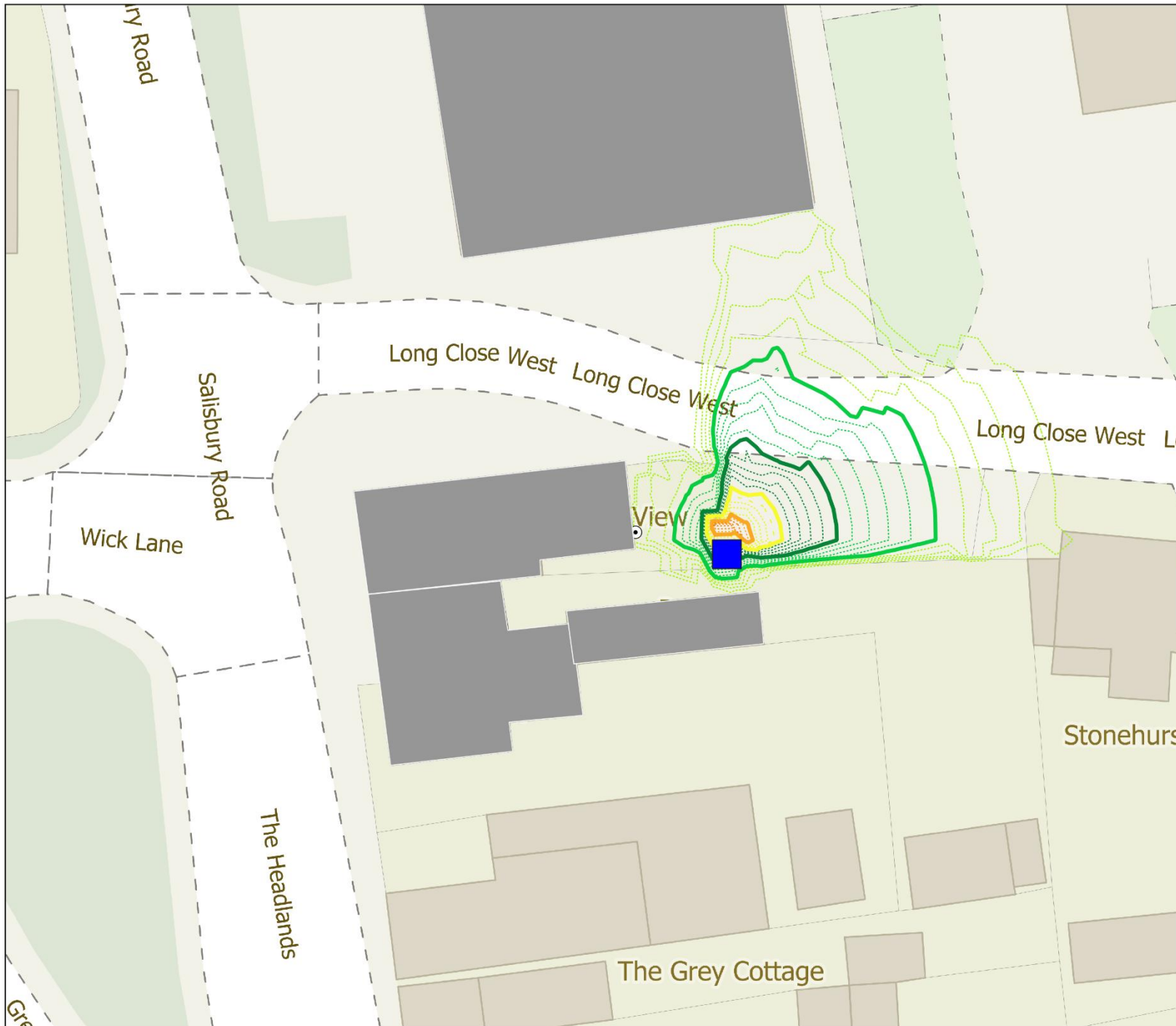
Uncertainty

- 5.7 The ambient and background sound levels measured during the survey were consistent and showed good agreement with strategic noise mapping. The uncertainty associated with the survey results is therefore low and would be unlikely to affect the outcome of the assessment.
- 5.8 The specific sound levels are considered representative of normal operation with the potential to be higher than predicted when the plant is operating under high cooling demand. Verification measurements indicate that an increase of up to 5 dB may occur. For the daytime hours, this would not be expected to affect the outcome of the assessment as rating level is well below the background sound level. During the night hours, the assessment is more sensitive to change and it has been recommended that only one unit is in operation overnight which will limit the potential increase in specific sound level to no more than 2 dB. Considering the context, an increase of 2 dB at night would result in plant noise 8 dB lower than traffic noise and this uncertainty would therefore not be considered to affect the outcome of the assessment. It is noted that the outdoor rating level at night is below 35 dB $L_{A,T,r}$ which in itself is an indication of a low rating level in the context of protecting against sleep disturbance indoors.
- 5.9 The uncertainty associated with the assessment when considered overall is not significant, and, therefore, does not affect the outcome of this assessment.

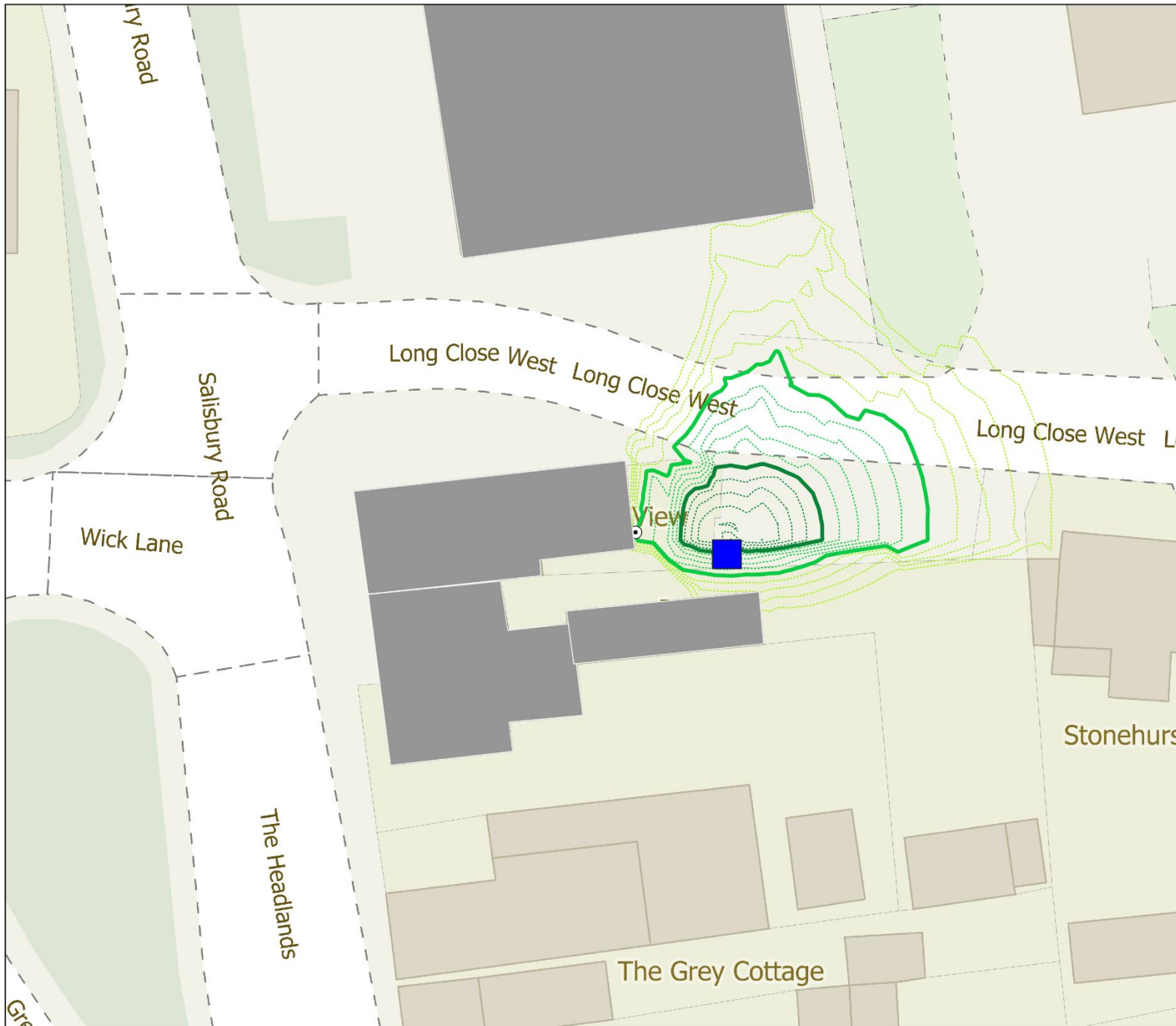
6. CONCLUSIONS

- 6.1 A noise assessment has been undertaken to consider the operational noise of a refrigeration plant at The Corner Shop, The Headlands, Downton. The assessment has been carried out according to BS 4142:2014+A1:2019, *Methods for rating and assessing industrial and commercial sounds*.
- 6.2 The BS 4142 Rating Level for the plant was found to be 11 dB **below** the daytime representative background sound level at the nearest residential window which indicates a **low impact** according to the standard.
- 6.3 The BS 4142 Rating Level for the plant was found to be 6 dB **above** the night-time representative background sound level at the nearest residential window which indicates a potentially **adverse impact** according to the standard.
- 6.4 The potential adverse impact at night was considered further within the context of the noise environment at the site. The predicted sound from the plant is expected to be 10 dB **below** road traffic noise. The absolute level from the plant is also low (below 35 dB $L_{A,T,r}$) and significantly below maximum levels during individual car pass-bys. In the context of the existing noise environment, sound from the proposed plant is considered to result in a **low impact**.

- 6.5 Mitigation measures in the form of an upgraded plant enclosure and reduced plant operation at night have been recommended and embedded into the assessment. A suitably worded planning condition requiring these measures are adopted would help ensure that the findings of this report remain valid.



Project: 3871 The Headlands		
Title: Figure 07: Refrigeration plant noise (mitigated)		
Key - Enclosure - Closest residential window Plant noise at 1.5 m height (LAeq, 15min) 55 50 45 40 35		
Scale @ A3:1:250 Coordinate System: British National Grid 0 2 4 m N		
Date: 12-03-26	Prepared by: SJR	Checked by: XXX
Ref: F07	EXT1	
Drawing by: Hayes McKenzie Partnership Ltd. Unit 3, Oakridge Office Park, Whaddon, Salisbury, UK SP5 3HT +44 (0) 1722 710091		
Hayes McKenzie — Consultants in Acoustics		



Project: 3871 The Headlands		
Title: Figure 08: Refrigeration plant noise (mitigated)		
Key - Enclosure - Closest residential window Plant noise at 4 m height (LAeq, 15min) 55 50 45 40 35		
Scale @ A3:1:250 Coordinate System: British National Grid 0 2 4 m N		
Date: 12-03-26	Prepared by: SJR	Checked by: XXX
Ref: F08	EXT1	
Drawing by: Hayes McKenzie Partnership Ltd. Unit 3, Oakridge Office Park, Whaddon, Salisbury, UK SP5 3HT +44 (0) 1722 710091		
Hayes McKenzie — Consultants in Acoustics		