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ALDI STORE, GLOSSOP: UPGRADE OF REFRIGERATION PLANT

NOISE IMPACT ASSESSMENT

On behalf of: Aldi Stores Ltd



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## ALDI STORE, GLOSSOP: UPGRADE OF REFRIGERATION PLANT

NOISE IMPACT ASSESSMENT

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## 1.0 INTRODUCTION

- 1.1 Hepworth Acoustics Ltd was commissioned by Aldi Stores Ltd to carry out a noise impact assessment in connection with proposed replacement refrigeration equipment at the Aldi Store in Glossop.
- 1.2 The noise assessment has included:
  - An inspection of the store and surrounding area;
  - Measurement of background noise levels at the nearest dwellings to the store during a nighttime period;
  - Calculation of the noise level from proposed replacement refrigeration equipment at the potentially most exposed dwellings;
  - Assessment of the noise impact by reference to the relevant standards and guidance.
- 1.3 The Aldi store is located at Arundel Street which is in the centre of Glossop. The area is a mixture of commercial and residential uses.
- 1.4 The nearest noise-sensitive premises to the proposed equipment are the rear of dwellings in Shrewsbury Street which are elevated above the store car park.
- 1.5 We understand that it is proposed to upgrade the refrigeration plant at this Aldi store. This will involve decommissioning and removing the old refrigeration equipment and installing new equipment. The equipment location is indicated in Figure 2.
- 1.6 The new equipment will consist of a bed of six condensers and an enclosure housing the compressors, positioned on the eastern elevation of the store building. The compressor enclosure is acoustically insulated and therefore the main source of noise will be the bed of condensers and associated fans. The equipment will be approximately 20 metres away from the nearest dwellings.
- 1.7 The various noise units and indices referred to in this assessment are described in Appendix I. All noise levels mentioned in the text have been rounded to the nearest decibel, as fractions of decibels are imperceptible.

## 2.0 BACKGROUND NOISE SURVEY

- 2.1 Background noise levels were measured at a location representative of dwellings on Shrewsbury Street. These dwellings would potentially be most exposed to any noise from the new plant. The noise measurement location is shown in Figure 1.
- 2.2 We understand that the equipment will operate 24 hours per day on a demand basis. Therefore, the assessment of potential noise impact associated with the equipment has been carried out for the night-time period when the background sound level will be at its lowest and potential noise impact at its highest.
- 2.3 Night is defined as being between 23:00-07:00 hours. An attended background noise survey was carried out at night on Thursday/Friday 26/27 April 2018 between approximately 23:00 hours to 01:00 hours.
- 2.4 The noise survey was carried out using a Brüel and Kjær 2260 'Type 1' sound level meter (s/n: 2467016). Field acoustic calibration checks were carried out both before and after the measurement periods with no variance in the calibrated noise levels noted. The noise measurements were taken in 'free-field' conditions and at a microphone height of approximately 1.5 metres above the ground.
- 2.5 The weather conditions during the noise survey were dry, overcast, mild (~9°C) and calm (<2 m/s) and considered acceptable for the purposes of the survey and subsequent assessment.
- 2.6 The results of the noise survey are summarised in Table 1 and the full results are shown in AppendixII.

#### **Table 1: Summary of Measured Noise Levels**

Period	LAeq, 15 mins	LA90, 15 mins
Night-time	40 – 52 dB	38 – 44 dB

2.7 The main noise source at all times was background noise from fixed plant at the national grid site on Arundel Street, there was also occasional road traffic on the surrounding roads. Noise from existing plant at the Aldi store did not contribute significantly to the measured noise levels.

# 3.0 NOISE ASSESSMENT

## British Standard 4142: 2014

- 3.1 BS 4142: 2014 describes methods for rating and assessing sound of an industrial and/or commercial nature, including sound from fixed installations which comprise mechanical and electrical plant and equipment. This requires the sound from a specific source (in L<sub>Aeq</sub>) to be compared with the existing background sound level (L<sub>A90</sub>) outside residential locations. The standard also puts weight on the importance of the context in which the sound will occur.
- 3.2 A 'character correction' is added to the specific sound level where 'certain acoustic features can increase the significance of impact' at the residential locations. Penalties ranging from 2 9 dB are added where the sound sources are considered tonal or impulsive or 'otherwise are readily distinctive against the residual acoustic environment'.
- 3.3 BS 4142 states that if the rated sound level exceeds the L<sub>A90</sub> background sound level by around 10 dB or more it *'is likely to be an indication of significant adverse impact'*. An excess of around 5 dB over the background sound level is *'likely to be an indication of an adverse impact'*.
- 3.4 The lower the rating level is relative to the measured background sound level, the less likely it *'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'.
- 3.5 BS 4142 also states in respect of background sound levels that "that values are reliable and suitably represent the particular circumstances and periods of interest... the objective is not simply to ascertain a lowest measured background sound level, but rather to quantify what is typical during particular time periods".
- 3.6 For noise at night BS4142 requires noise impact to be assessed over a 15 minute period. The standard suggests that the period at the start of the night (when people are going to sleep) and the end of the night may be more important than the middle of the night in terms of sleep disturbance. Background sound levels in urban/suburban areas are usually lower at the start of the night than at the end, therefore the background noise survey was carried out during the first 2 hours of the night.
- 3.7 The representative background sound level has been obtained from the mode of the measured L<sub>A90</sub> values rounded to the nearest decibel and was found to be 38 dB L<sub>A90, 15mins</sub>.

#### Assessment

- 3.8 The noise output from the new replacement equipment is based on measurements that were carried out by Hepworth Acoustics Ltd at a similar Aldi store that has recently been upgraded. The source noise level from the new replacement equipment was found to be 63 dB L<sub>Aeq</sub> at a distance of 1 metre from the equipment. The character of the noise from the new equipment is broadband and generally steady/continuous in nature. Therefore, an acoustic character penalty is not warranted.
- 3.9 The most exposed dwellings are on Shrewsbury Street at approximately 20 metres from the proposed new upgraded plant. The resulting plant noise levels outside these dwellings have been calculated, with appropriate allowances for distance attenuation only, and are shown in Table 2. The representative night-time background sound level is also shown.

Description	Dwellings on Edward Street
Calculated Specific Sound Level outside Dwelling	37
Acoustic feature correction	0
Rating Level of Sound at Dwelling	37
Representative Background Sound Level	38
Difference	-1
Likely Noise Impact	Low

#### Table 2: BS 4142 Assessment of fixed plant at nearest dwellings (dB)

- 3.10 The results in Table 2 show that, noise from replacement equipment will be 1 dB below the representative night-time background sound level outside the nearest dwellings. This indicates that there would not be any significant noise impact from operation of the equipment at residential locations.
- 3.11 We conclude therefore that noise from the proposed replacement equipment would not result in any unacceptable impact to residential amenity.

## 4.0 SUMMARY AND CONCLUSION

- 4.1 Hepworth Acoustics Ltd has carried a noise impact assessment in connection with proposed replacement refrigeration equipment at the Aldi Store in Glossop.
- 4.2 In common with the existing refrigeration plant, the new replacement refrigeration equipment may operate at any time of day or night.
- 4.3 A noise survey has been carried out to establish existing background noise levels at the potentially most exposed dwellings. The survey was carried out at night.
- 4.4 Noise calculations have been carried out for the replacement equipment which demonstrates that there will be no significant noise impact at the nearest dwellings resulting from the operation of the proposed replacement equipment.



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## Appendix I: Noise Units & Indices

#### Sound and the decibel

A sound wave is a small fluctuation of atmospheric pressure. The human ear responds to these variations in pressure, producing the sensation of hearing. The ear can detect a very wide range of pressure variations. In order to cope with this wide range of pressure variations, a logarithmic scale is used to convert the values into manageable numbers. Although it might seem unusual to use a logarithmic scale to measure a physical phenomenon, it has been found that human hearing also responds to sound in an approximately logarithmic fashion. The dB (decibel) is the logarithmic unit used to describe sound (or noise) levels. The usual range of sound pressure levels is from 0 dB (threshold of hearing) to 120dB (threshold of pain).

Due to the logarithmic nature of decibels, when two noises of the same level are combined together, the total noise level is (under normal circumstances) 3 dB(A) higher than each of the individual noise levels e.g. 60 dB(A) plus 60 dB(A) = 63 dB(A). In terms of perceived 'loudness', a 3 dB(A) variation in noise level is a relatively small (but nevertheless just noticeable) change. An increase in noise level of 10 dB(A) generally corresponds to a doubling of perceived loudness. Likewise, a reduction in noise level of 10 dB(A) generally corresponds to a halving of perceived loudness.

The ear is not equally sensitive to sound at all frequencies. It is less sensitive to sound at low and very high frequencies, compared with the frequencies in between. Therefore, when measuring a sound made up of different frequencies, it is often useful to 'weight' each frequency appropriately, so that the measurement correlates better with what a person would actually hear. This is usually achieved by using an electronic filter called the 'A' weighting, which is built into sound level meters. Noise levels measured using the 'A' weighting are denoted dB(A) or dBA.

#### Frequency and Hertz (Hz)

As well as the loudness of a sound, the frequency content of a sound is also very important. Frequency is a measure of the rate of fluctuation of a sound wave. The unit used is cycles per second, or hertz (Hz). Sometimes large frequency values are written as kiloHertz (kHz), where 1 kHz = 1000 Hz. Young people with normal hearing can hear frequencies in the range 20 Hz to 20 kHz. However, the upper frequency limit gradually reduces as a person gets older.

## **Glossary of Terms**

When a noise level is constant and does not fluctuate, it can be described adequately by measuring the dB(A) level. However, when the noise level varies with time, the measured dB(A) level will vary as well. In this case it is therefore not possible to represent the noise climate with a simple dB(A) value. In order to describe noise where the level is continuously varying, a number of other indices can be used. The indices used in this report are described below.

- L<sub>Aeq</sub> This is the A-weighted 'equivalent continuous noise level' which is an average of the total sound energy measured over a specified time period. In other words, LAeq is the level of a continuous noise which has the same total (A-weighted) energy as the real fluctuating noise, measured over the same time period. It is increasingly being used as the preferred parameter for all forms of environmental noise.
- L<sub>Amax</sub> This is the maximum A–weighted noise level that was recorded during the monitoring period.
- L<sub>A90</sub> This is the A-weighted noise level exceeded for 90% of the time period. L<sub>A90</sub> is used as a measure of background noise.

# Appendix II: Background Noise Survey Results

Date(s):	Night-time – Thursday/Friday 26/27 April 2018
Equipment:	B&K 2260 'Type 1' sound analyser (serial no. 2467016) with tripod and calibrator
Weather:	Dry, overcast, mild (~9°C) and calm (<2 m/s)

All levels in dB(A)

Location 1: In store car parl	near dwellings on	<b>Shrewsbury Street</b>
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Time		Measured Noise Levels (dB)		els (dB)	Comments
Start	End	LAmax	LAeq	L <sub>A90</sub>	Comments
23:06	23:21	63.0	47.9	43.8	Occasional road traffic, fixed plant from national grid site, overhead aircraft
23:21	23:36	67.3	51.6	43.2	Occasional road traffic, fixed plant from national grid site, overhead aircraft
23:36	23:51	57.4	43.8	41.2	Distant road traffic, fixed plant from national grid site
23:57	00:12	65.6	44.6	39.8	Distant road traffic, fixed plant from national grid site, overhead aircraft
00:12	00:27	52.8	41.0	39.0	Distant road traffic, fixed plant from national grid site
00:27	00:42	52.0	40.0	38.2	Distant road traffic, fixed plant from national grid site