

Aldi Food Store Wilmslow Road, Didsbury, Manchester, M20 2DN

Mechanical Services Plant Noise Impact Assessment

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Issued to

Aldi Stores Limited

Prepared by

Rob Kirkaldy BSc (Hons) MIOA
Principal Consultant

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1. INTRODUCTION

Complaints relating to noise have been received from a neighbour residing at the rear of an Aldi store off Wilmslow Road in Didsbury. It is understood that the noise emanates from the mechanical services plant at the rear of the store. Accordingly, Spectrum Acoustic Consultants have been instructed by Aldi Stores Limited to investigate noise emanating from the mechanical services plant.

Accordingly, Spectrum Acoustic Consultants has been commissioned by Aldi Stores to carry out a noise assessment for the purpose of establishing the noise impact associated with the plant. This report is submitted with the intention of providing the sufficient information required to both inform and satisfy the requirements of the Local Planning Authority.

2. SITE DESCRIPTION AND PROPOSALS

Aldi currently operate a food store at Wilmslow Road, Didsbury, Manchester, M20 2DN. Wilmslow Road bounds the site to the east. There are a number of commercial properties located along Wilmslow Road. At the rear of the store to the west are houses on Pine Road. To the north of the site are the gardens of the properties fronting on to Pine Road, with a tram line located beyond. To the south of the store are commercial properties, along with a church fronting on to Barlow Moor Road.

The store includes a loading bay which is located on the southern side of the store in the service area to accommodate deliveries. The existing mechanical plant serving the store is located in a dedicated plant area at the back of the store, facing the rear of the houses on Pine Road. A satellite image showing the Aldi store is included in Appendix A.

The existing mechanical services plant run 24 hours per day.

3. ASSESSMENT METHODOLOGY

To assess the environmental noise impact of mechanical services plant, it is generally accepted that the noise levels from the plant need to be compared with the existing background noise levels at the nearest noise sensitive receptor locations to the site.

This assessment adopts the assessment methodology set out in BS 4142:2014+A1:2019 *Methods for rating and assessing industrial and commercial sound*, by comparing the noise levels from mechanical plant, with the existing background noise levels, as measured at locations representative of the nearby residential receptor locations. Further detail on the BS 4142 assessment procedure is provided in Section 5 of this report.



4. BACKGROUND NOISE MEASUREMENT SURVEY

4.1 MEASUREMENT LOCATION

For the purpose of the noise assessment, the following noise measurement location has been identified as being representative of the most sensitive residential position to the plant:

- Position A – North-west corner of the site, representative of the rear of No.43 Pine Road.

The measurement location is illustrated on the existing site location plan, included in Appendix A.

4.2 NOISE SURVEY DETAILS AND INSTRUMENTATION

The background noise measurement survey, completed for providing information to use in the noise impact assessment, was carried out from Monday 17 to Tuesday 18 June 2024. The noise survey consisted of unattended measurements at Position A during the most sensitive night-time period between 22:00 and 12:00. All noise measurements were carried out in accordance with the procedures outlined in BS 4142:2014, with noise samples recorded in terms of 15-minute periods, at 3m above ground. During the survey, existing mechanical services plant at the store was switched off between 22:45 and 00:00.

The parameters recorded during the measurement survey included L_{Aeq} , L_{A90} and L_{AFmax} . In accordance with BS 4142 guidance, L_{A90} is used for describing background noise and, as such, will be used for the purpose of the noise impact assessment. L_{Aeq} is used to describe the ambient noise level, with L_{Amax} representing the maximum noise level measured during the sample period.

The following instrumentation was used during the background noise measurement survey:

- Bruel & Kjaer Type 2250 Light Sound Level Meter s/n 3006950
- Bruel & Kjaer Type 4952 Microphone s/n 2922638
- Bruel & Kjaer Type 4231 Acoustic Calibrator s/n 3030452

Before and after the survey, the sound level meter was field-calibrated in accordance with the manufacturer's guidelines, and no significant drift was observed. The field calibrator is laboratory calibrated annually and the meter and microphone are laboratory calibrated at 2 yearly intervals, all in accordance with UKAS procedures by a UKAS-accredited laboratory.

During the noise survey, the weather was warm and dry, with low wind speeds. The conditions were suitable for noise measurement purposes.

4.3 NOISE SURVEY RESULTS

During the survey, ambient noise levels were controlled by road traffic movements on Wimslow Road and Barlow Moor Road, as well as occasional tram movements. The measured noise profile at Position A is shown in the following chart.

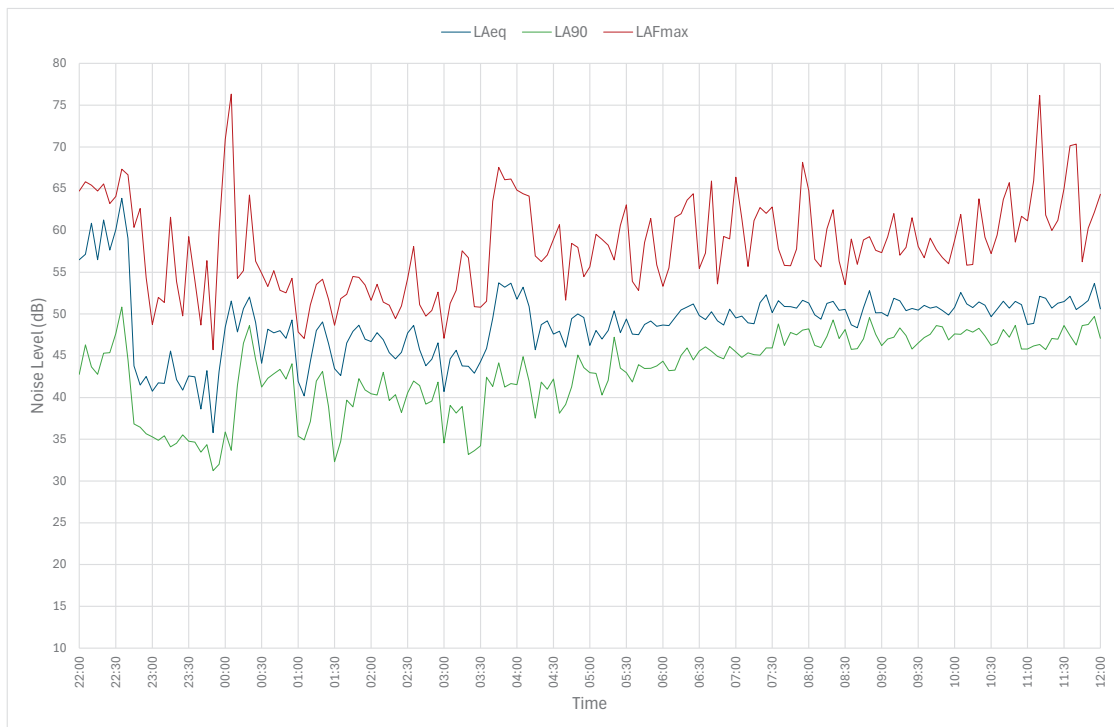


Chart 1: Noise measurement results at Pos A - North-west corner of the site, representative of the rear of No.43 Pine Road - Monday 17 to Tuesday 18 June 2024.

When determining the representative background $L_{A90,T}$ levels for the relevant periods, BS 4142¹ guidance states “a representative level ought to account for the range in background levels and ought not automatically to be assumed to be either the minimum or modal value.” With this in mind, statistical analysis has been used to determine the representative background $L_{A90,T}$ noise levels for each of the sensitive periods. The analysis derives the mode, mean, and median values. Once these values have been established, the lowest of these values is considered representative. In this instance, the mean value was used.

Table 1 shows the representative background noise levels during the sensitive night-time period at the noise measurement location.

Noise Measurement Location (NML)	Representative Night-time Background Sound Level $L_{A90,15min}$ (dB)
North-west corner of the site, representative of the rear of No.43 Pine Road.	34

Table 1: Representative background sound level during the sensitive night-time period

¹ BS 4142:2014+A1:2019 Methods for rating and assessing industrial and commercial sound



5. ASSESSMENT CRITERIA

The noise impact assessment relating to the mechanical services plant at the store will be carried out in accordance with the procedures set out in BS 4142:2014+A1:2019 *Methods for rating and assessing industrial and commercial sound*. The principle of BS 4142 is to determine an initial estimate of impact of industrial/commercial sound on nearby residents by comparing the Rating Level (sound level from the industrial/commercial source, with a correction applied for any acoustic features that characterise the sound) with the Background Sound Level (L_{A90} as measured in absence of the industrial/commercial source).

Generally, the greater the difference by which the Rating Level exceeds the Background Sound Level, the greater the magnitude of impact. BS 4142 states that *'a difference of around +10 dB or more is likely to be an indication of a significant adverse impact [...]. A difference of around +5 dB is likely to be an indication of an 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.'*

However, BS 4142 also advises that *'when making assessments and arriving at decisions [...] it is essential to place the sound in context'* so in each case, the context in which the sound is placed must be considered and the initial estimate of impact should be modified accordingly.

For example, it advises *'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.'* It also indicates that impacts estimated during *'the middle of the night can be distinctly different (and potentially of lesser importance) compared to the start or end of the night-time period for sleep purposes.'*

Additionally, Guidelines for Community Noise - World Health Organization, 1999 (GCN) was published in 1999 with the aim of informing legislation and guidance produced at the national and regional levels for the purposes of minimising any potential adverse health effects resulting from noise in the community. It presents guideline noise level criteria for the avoidance of adverse effects such as sleep disturbance and annoyance in a range of specific environments. The preface to WHO states that community noise includes road, rail and air traffic, industries, construction and public work, and the neighbourhood.

The GCN document advises that for outdoor living areas during the daytime period (07:00-23:00), table 4.1 of WHO references a guideline façade level of $L_{Aeq(16\text{-hour})}$ 50dB(A). For outside bedrooms (with windows open) during the night-time period (23:00-07:00), table 4.1 of WHO references a guideline façade level of $L_{Aeq(8\text{-hour})}$ 45dB(A).

New guidance from WHO titled Environmental Noise Guidelines for the European Region (ENG) was published in 2018. The document takes a very different approach to guidance set out in the previous GCN document by identifying separate thresholds for specific sources rather than for community noise as a whole. Consequently, much of the earlier guidance set out in GCN is now absent from ENG. While ENG was intended to supersede GCN, it recognises this absence and states that *'indoor guideline values and any values not covered by the current guidelines (such as industrial noise and shopping areas) should remain valid.'*



For the assessment of the noise impact, consideration will therefore be given to the BS 4142:2014+A1:2019 assessment level, together with the precautionary guideline noise limits defined by the WHO Guidelines.

6. POTENTIAL NOISE IMPACT

For the purpose of this assessment, the specific L_{Aeq} noise levels produced by the existing mechanical services plant, directly outside each of the nearby residential receptor locations, will be established by prediction.

Whilst on site, it was possible to measure sound pressure levels close to each of the plant items in isolation. The following instrumentation was used during the plant noise measurement survey:

- Bruel & Kjaer Type 2250 Sound Level Meter s/n 2739650
- Bruel & Kjaer Type 4189 Microphone s/n 2983518
- Bruel & Kjaer Type 4231 Acoustic Calibrator s/n 3030452

Before and after the survey, the sound level meter was field-calibrated in accordance with the manufacturer's guidelines, and no significant drift was observed. The field calibrator is laboratory calibrated annually and the meter and microphone are laboratory calibrated at 2 yearly intervals, all in accordance with UKAS procedures by a UKAS-accredited laboratory.

Prediction methodologies use the sound power level (L_w) of a source as input data, so for this purpose, the measured mechanical plant noise levels, expressed in terms of $L_{Aeq,T}$, need to be converted to the equivalent sound power levels. This is derived using the measured plant $L_{Aeq,T}$ (where T is the measurement period), corrected for the measurement surface area enveloping the noise source. A summary of the calculated sound power levels associated with the existing plant items is shown in Table 2 below.

Plant Item	Measured Sound Pressure Level at 1m (dB)	L_p to L_w Correction (dB)	Sound Power Level L_w (dB)
A1 Compressor Pack and Gas Cooler	85	15	99

Table 2: Summary of the plant equipment noise levels (each at full duty)

Note, the noise levels stated in Table 2 are representative of the equipment at full duty where all of the cooling fans are operating. During the night-time, it is understood that the equipment has a limiter set to prevent the fans from operating excessively.

To accurately evaluate the overall effect of the existing plant, it is necessary to consider the noise that is generated by the equipment, at the nearby residential receptor locations.

The equipment operates on thermostatic, speed and timer controls according to heat loads and occupation rates and so would not be operating 100% of the time. Whilst a typical on-time for this type of equipment might only 20-35%, a conservative and therefore more robust assessment assumes a 50% on-time for a typical worst-case scenario.



Predictions of how the noise from each of the mechanical plant sources propagates to sensitive community receptors, together with the cumulative effect of all these noise sources, has been determined by noise modelling using proprietary software (iNoise²) which meets the requirement of ISO 9613 Part 2:1996³.

The noise model takes account of the following in its calculations procedures:

- Source sound power level (for point, line and area sources)
- Reflection from nearby structures and source directivity
- Distance from noise source (geometric spreading)
- Atmospheric absorption
- Acoustic screening of intervening structures and topography
- Ground absorption
- Ground effects (which includes the height of ground relative to the noise source)

Detailed noise calculations, providing information on total specific noise at each receptor, together with the contributions from each individual noise source, at each receptor location, are computed. To illustrate the model, a diagram showing the distribution and locations of mechanical plant noise sources, superimposed on a 3D view of the site, is included in Appendix B. A noise map, showing the noise contours produced by the existing mechanical services plant is also provided in Appendix B of this report.

Predicted specific noise levels from the existing mechanical plant at the closest noise sensitive receptors is provided in Table 3 below.

Receptor	L_{Aeq} dB(A)	L_{Aeq} Octave Band Centre Frequency (Hz)							
		63	125	250	500	1k	2k	4k	8k
R1. No.43 Pine Road (GF L/R)	54	29	42	49	50	47	41	32	18
R2. No.43 Pine Road (FF B/R)	55	27	41	49	50	48	43	35	22
R3. No.45 Pine Road (GF L/R)	54	28	42	49	49	46	41	32	17
R4. No.45 Pine Road (FF B/R)	54	27	41	49	50	48	43	35	21
R5. No.41 Pine Road (GF L/R)	45	22	34	41	40	39	33	23	6
R6. No.41 Pine Road (FF B/R)	53	25	38	47	48	46	42	34	20

Table 3: Predicted specific noise contribution from the existing mechanical services plant at the closest noise sensitive receptor.

As indicated in Table 3, the predicted noise levels at the closest noise sensitive receptors from the combined existing mechanical services plant are L_{Aeq} 45-55dB(A).

7. ASSESSMENT OF NOISE IMPACT

The mechanical plant items operate continuously throughout the daytime and night-time periods. Consequently, for the purposes of this assessment, the predicted plant rating levels will be compared with the background sound levels measured during the sensitive night-time period, at the nearby residential receptor locations.

² iNoise – V2024.1 Environmental Noise Calculation Software Package

³ ISO 9613-2:1996 "Acoustics – Attenuation of sound during propagation outdoors – Part 2: General method of calculation to determine Noise Levels

Table 4 shows a BS 4142 assessment covering the noise impact associated with the existing mechanical plant. None of the plant items emit any distinct impulses or tones. However, the plant does emit other characteristics that are distinctive against the existing residual acoustic environment. Therefore, a feature correction has been included in the rating level.

Residential Position	Specific Level (dB)	Character Correction (dB)	Rating Level (dB)	Background L_{A90} (dB)	Assessment Level (dB) (Background excess)
R1. No.43 Pine Road (GF L/R)	54	+3	57	34	+23
R2. No.43 Pine Road (FF B/R)	55	+3	58	34	+24
R3. No.45 Pine Road (GF L/R)	54	+3	57	34	+23
R4. No.45 Pine Road (FF B/R)	54	+3	57	34	+23
R5. No.41 Pine Road (GF L/R)	45	+3	48	34	+14
R6. No.41 Pine Road (FF B/R)	53	+3	56	34	+22

Table 4: Predicted rating levels from existing mechanical plant at the nearby residential properties, compared with the representative night-time background $L_{A90,15min}$ level

Table 4 indicates that there is currently a significant noise impact at the nearest residential properties to the store. Furthermore, noise levels from the plant currently exceed the WHO guideline noise levels.

Whilst it is noted that the equipment duty is limited during the sensitive night-time period, the excesses over the background noise levels are significant, and the impact is still expected to be significant during this period. Consequently, mitigation measures should be considered in order to further reduce noise levels from the plant equipment. These are discussed in the following section.

8. RECOMMENDED MITIGATION MEASURES

The noise emitted from the plant equipment is dominated by the six fans located on top of the gas cooler. When the load on the unit is increased, the fan speeds increase significantly. The broadband fan noise is highly perceptible at the nearby residential properties. Noise from the compressor housing is less dominant. Overall, noise levels from the plant need to be reduced by 20-25dB in order to reduce the impact, which is significant.

In order to reduce noise levels from the equipment as effectively as possible, all of the equipment should be enclosed within a bespoke acoustic enclosure provided by a specialist hardware noise control manufacturer. This would offer the highest level of noise attenuation.

If a full enclosure cannot be installed, bespoke silencers should be installed on each of the cooling fans. The fan speed should also be reduced to as low as possible. This is unlikely to achieve 20-25dB attenuation required. However, it would offer some improvement over the current situation.

Screening options have been suggested. However, in order to break the line of sight to the first-floor bedrooms of the nearby houses, a significantly high barrier would be required (approximately 5-6m high). Even with such a barrier in place, a barrier of such size would only likely provide a maximum overall attenuation of 10dB. Consequently, it is unlikely that this would be an effective option here.



9. CONCLUSIONS

Spectrum have been asked to assist in investigating and advising appropriate actions in relation noise complaints made by a local resident in connection with mechanical services plant at the rear of an Aldi supermarket store in Didsbury, Manchester.

A background noise measurement survey has been conducted at a location representative of the closest noise sensitive receptors to the site and predictions of noise from the cumulative existing mechanical plant equipment has been completed, utilising a proprietary software package.

The assessment indicates that there is currently a significant noise impact at the nearest residential properties to the store during the most sensitive night-time period. As the noise impact is significant, mitigation measures should be considered in order to reduce noise levels from the plant equipment.

In order to reduce noise levels from the equipment as effectively as possible, all of the equipment should be enclosed with a bespoke acoustic enclosure provided by a hardware noise control manufacturer. This would offer the highest level of noise attenuation.

APPENDIX A

Site Location Plan



N

Day Nursery School

Moorland Rd

Moorland Rd

Didsbury Tunnel
(tram) north portal

Oakfield Rd

Pine Rd

Wilmslow Rd

Position A

ALDI

Slug & Lettuce
- Didsbury

Didsbury Pharmacy

Pine rd

A5145

Pine Rd

Norgate St

Didsbury village

B5095

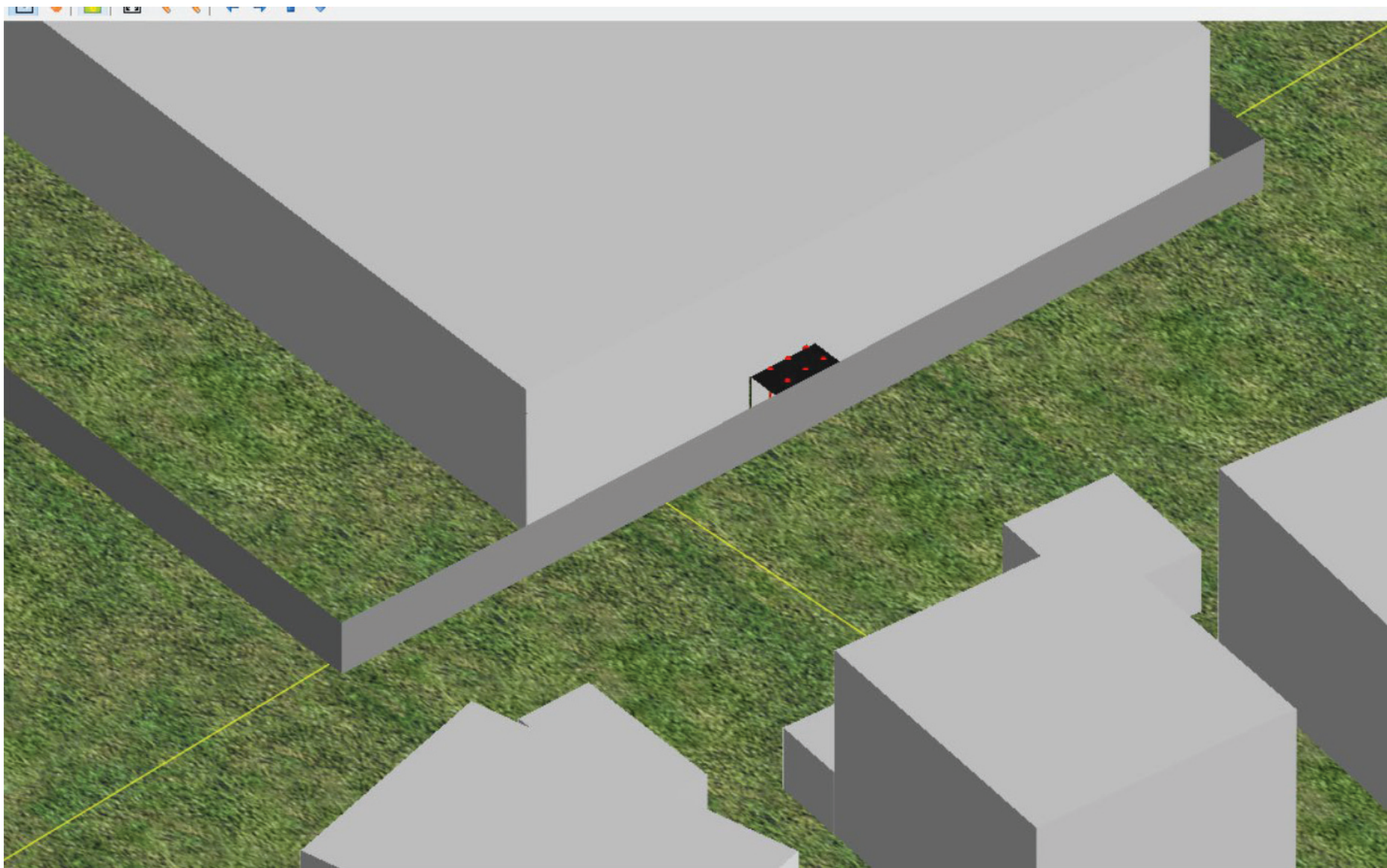
Rudy's Pizza
Napoletana - Didsbury
Neapolitan • £

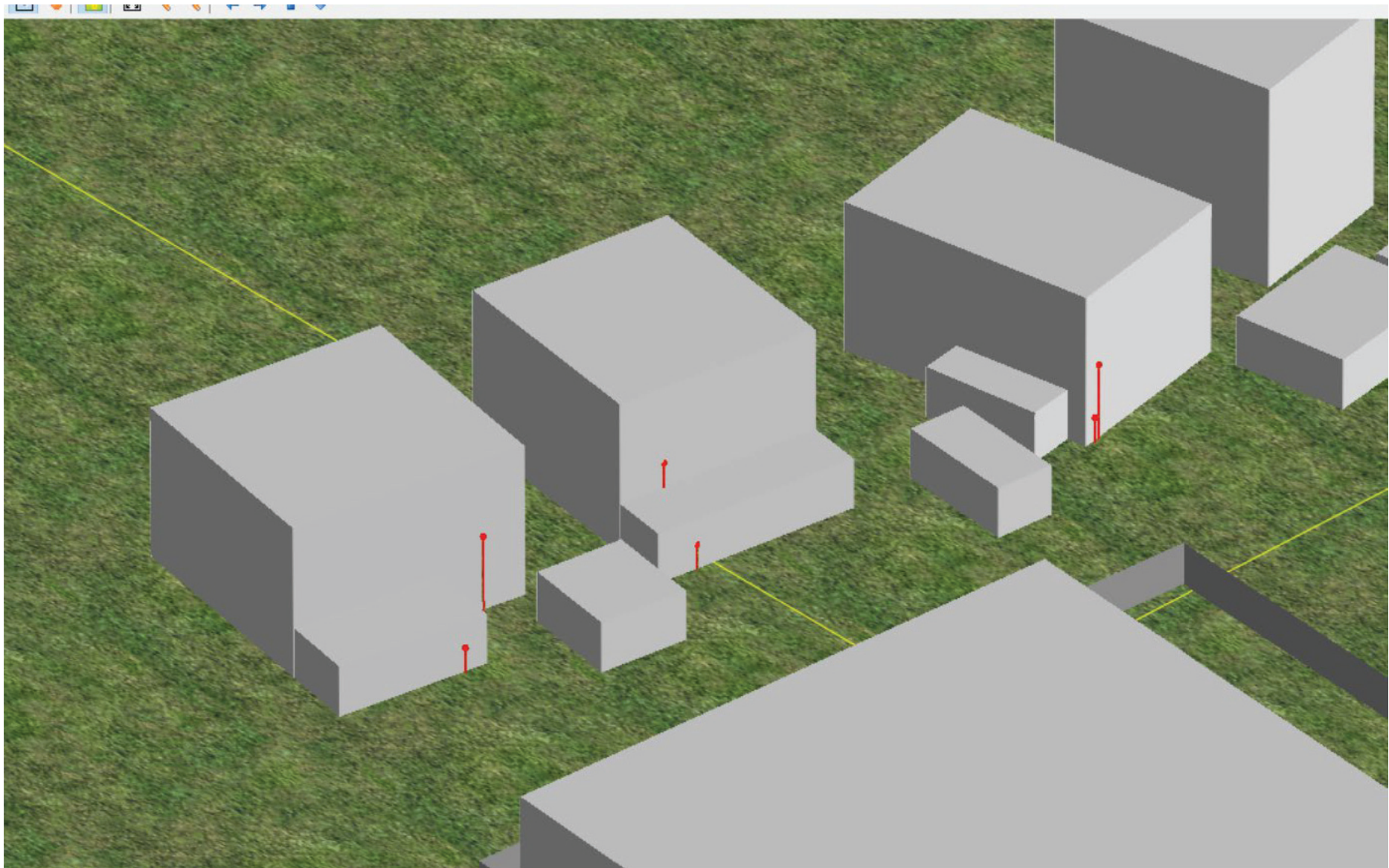
Barlow M

Osborne St

APPENDIX B

Noise Model





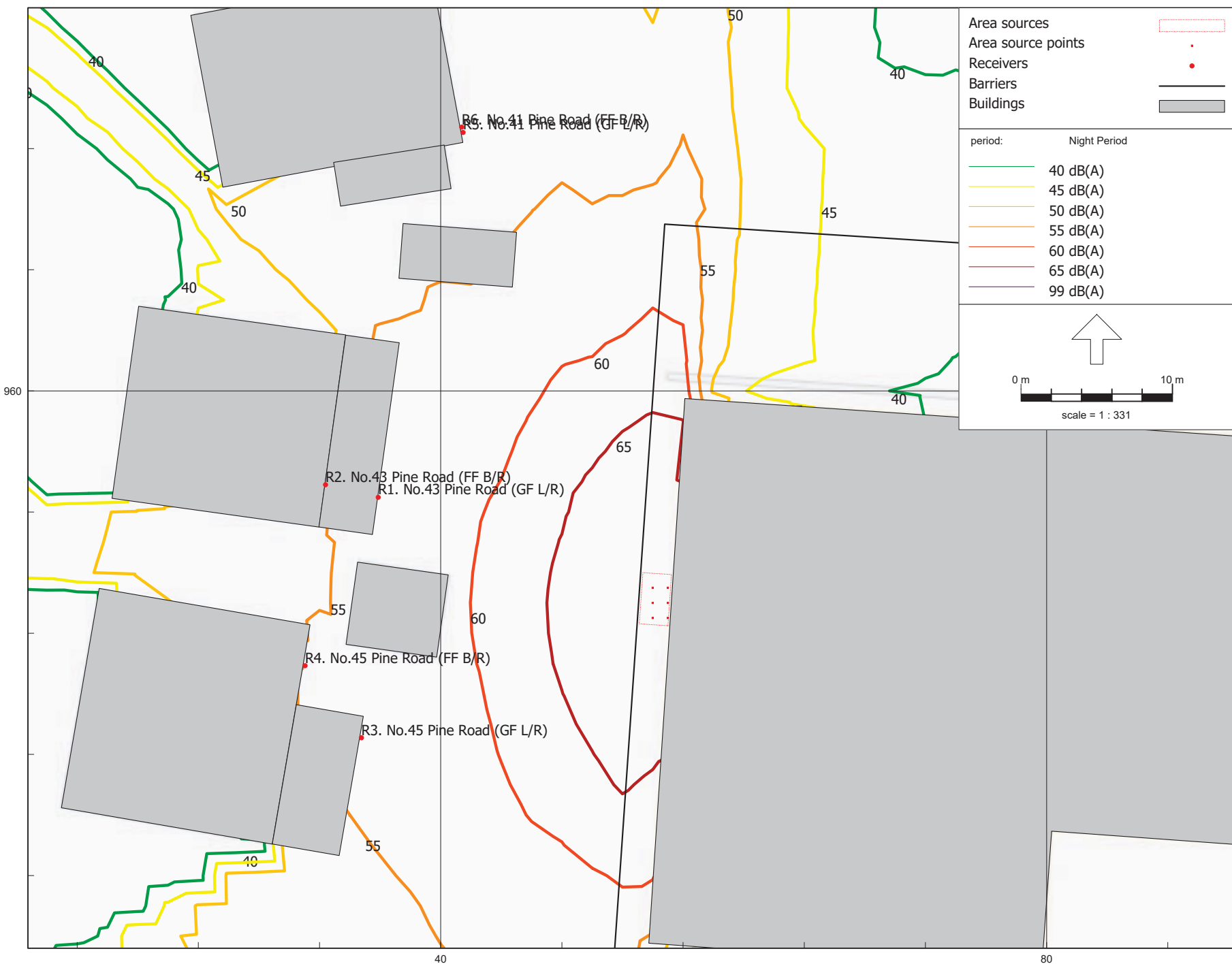
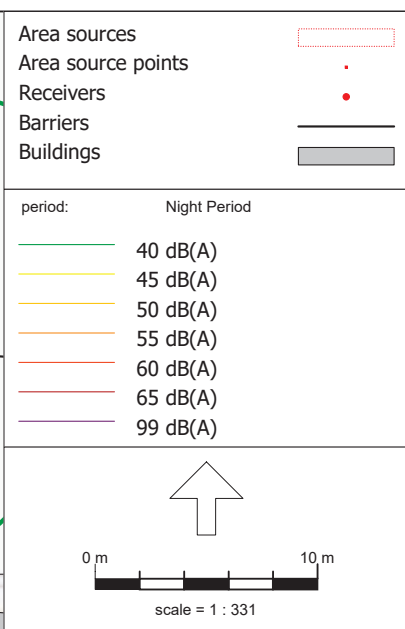
Aldi Didsbury
Predicted Noise Levels - Existing Mechanical Plant

Report: Table of Results
Model: Existing Plant model
LAeq per octave: total results for receivers
Group: (main group)
Group Reduction: No

Name		Night										
Receiver	Description	Total	31	63	125	250	500	1000	2000	4000	8000	
_A	R1. No.43 Pine Road (GF L/R)	54	--	29	42	49	50	47	41	32	18	
_A	R2. No.43 Pine Road (FF B/R)	55	--	27	41	49	50	48	43	35	22	
45_A	R3. No.45 Pine Road (GF L/R)	54	--	28	42	49	49	46	41	32	17	
_A	R4. No.45 Pine Road (FF B/R)	54	--	27	41	49	50	48	43	35	21	
_A	R5. No.41 Pine Road (GF L/R)	45	--	22	34	41	40	39	33	23	6	
_A	R6. No.41 Pine Road (FF B/R)	53	--	25	38	47	48	46	42	34	20	

All shown dB values are A-weighted

Predicted Noise Levels - Existing Mechanical Plant



Head Office

Spectrum Acoustic Consultants Ltd
27-29 High Street
Biggleswade
Bedfordshire
SG18 0JE
UNITED KINGDOM

 +44 (0)1767 318871

 enquiries@spectrumacoustic.com

 www.spectrumacoustic.com