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Project:

Waitrose Richmond

Title:

Noise Impact Assessment

quietly moving forward

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Report Title	Waitrose Richmond Noise Impact Assessment
Reference	EEC/EC20746-3
Version	1
Issue Date	18 November 2024
Client	Waitrose Ltd
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Revision	Date	Author	Checked
0	12-11-24	Jon Mudd	Tim Meed

CONTENTS:

1 INTRODUCTION

1.01 Environmental Equipment Corporation Limited has been commissioned by Waitrose Ltd to undertake a delivery noise impact assessment of operations at the existing Waitrose store in Richmond. The purpose of the assessment is to ascertain whether an extension to approved delivery times is feasible with regards to noise. The store currently operates within delivery restrictions of:

- 0700-2000hrs Monday to Saturday
- 0900-1700 Sundays

1.02 This noise assessment has been conducted in accordance with current British Standard and World Health Organisation guidance for community noise and the results of a noise survey carried out over a weekend period.

1.03 This assessment includes:

- Predictions of noise levels due HGV deliveries to the store and a review based upon a weekend noise survey carried out on site; and
- Presentation of a case to support the extension of the current permitted delivery times to 0600-2200hrs seven days a week - It is not proposed to increase the number of deliveries to the store, but to increase the window within which they can occur to provide operational and logistical benefits for the store and the surrounding area:

1.04 This report is prepared solely for Waitrose Ltd. Environmental Equipment Corporation Limited accepts no responsibility for its use by any third party.

1.05 Whilst every effort has been made to ensure that this report is easy to understand, it is necessarily technical in nature. To assist the reader, an explanation of the terminology used in this report is contained in Appendix A.

2 SITE

2.01 The Waitrose store is an established retail outlet is in a mixed commercial and residential area of Richmond.

2.02 The following Google Maps image has been annotated identifying the store and associated service yard – the image actually captures a Waitrose delivery being unloaded. The two background noise measurement locations are also indicated.

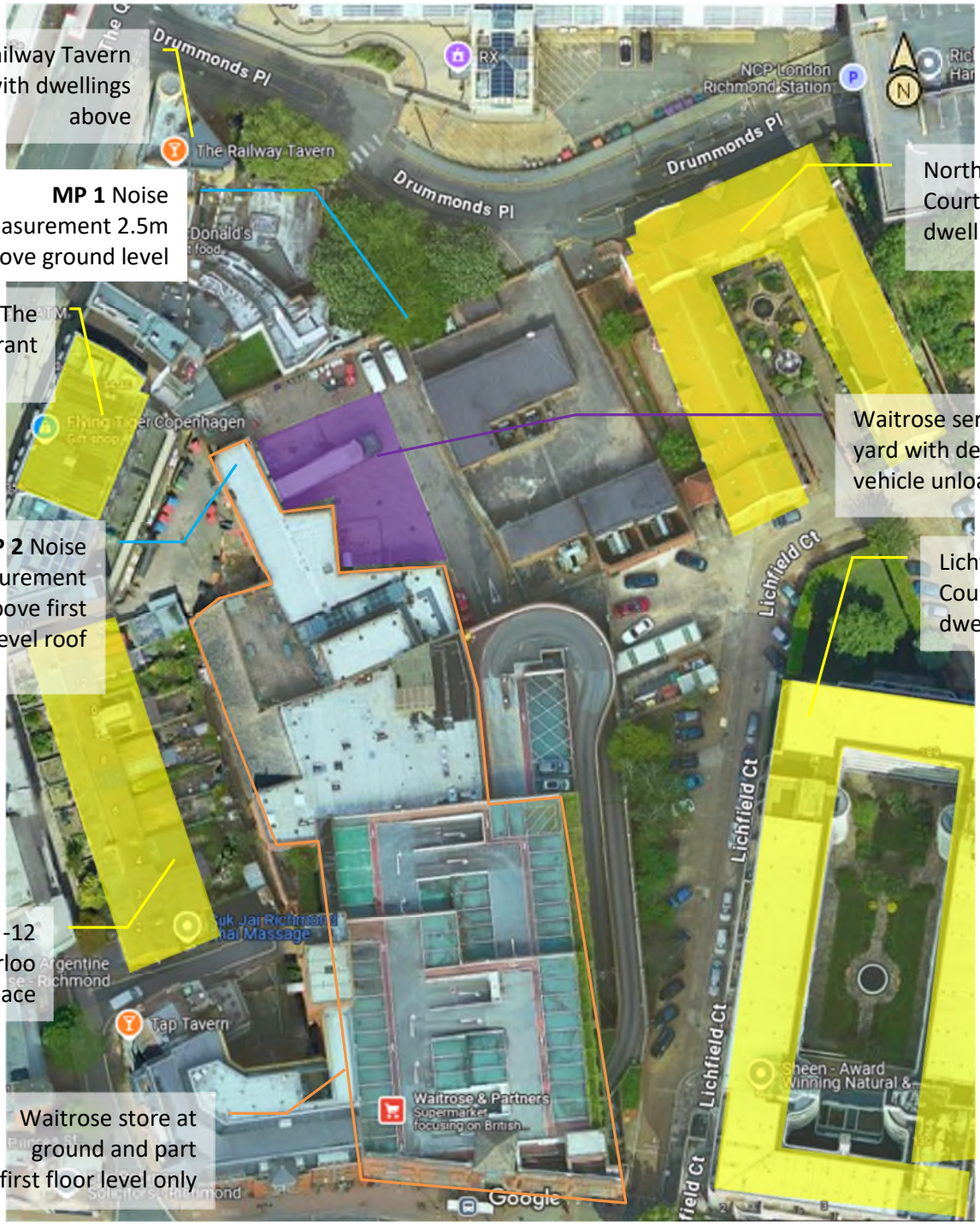

Figure 1: Aerial Site Plan and nearest noise sensitive dwellings

2.03 Residential dwellings surrounding the site are annotated in Figure 1. The properties most affected (by virtue of location and sight lines) from noise from the unloading activity in the service yard, are the three storey dwellings of Northumbria Court, to the east of the service yard. All other dwellings are either further away or benefit from more acoustic screening by the existing building structures.

3 GUIDANCE

3.01 A summary of the current National Planning Policy Framework including the Noise Policy Statement for England is presented in Appendix C of this document. We have reviewed the noise impact in line with current National Planning Policy guidance as this document is the basis upon which Local Council Plans are drawn up. The assessment methodology of 'BS4142:2014: 'Methods for rating and assessing industrial and commercial sound'' is the principle standard against which to assess potential impact in this context and that standard in turn requires that the assessment outcomes be judged and considered taking into account context and relevant guidance metrics.

3.02 Additional guidance has been taken from current British Standards and World Health Organisation and IEMA Guidance. These documents provide useful reference for assessing acceptability against established absolute noise limits and potential changes in the existing noise climate.

BS4142:2014 'Methods for rating and assessing industrial and commercial sound'

3.03 To assess the acceptability of the resultant noise levels we have consulted the relevant standards. BS 4142:2014 'Methods for rating and assessing industrial and commercial sound'. The scope of BS4142 includes that assessment of the following sources:

- Sound from industrial and manufacturing processes;
- Sound from fixed installations which compromise mechanical and electrical plant and equipment;
- Sound from the loading and unloading of goods and materials at industrial and/or commercial premises; and
- Sound from mobile plant and vehicles that is an intrinsic part of the overall sound emanating

3.04 BS4142 gives guidance on assessing the likelihood of adverse impacts by calculating a 'rating level' of the new noise source and comparing its magnitude at noise sensitive locations to the existing or underlying background noise level. The background noise level is subtracted from the 'rating level' to assess the likelihood of complaints:

- The greater the difference the greater the likelihood of complaints.
- A difference of around +10dB or more is an indication of a significant adverse impact, depending on the context.
- A difference of +5dB 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 noise level, the less likely it is that the specific sound source will have an adverse impact or 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 sound impact, depending on the context.

3.05 This assessment is carried out over a one hour period for the daytime and a fifteen minute period for the night-time. For the purposes of the standard it states that daytime and night-time are typically 07:00 to 23:00 hours and 23:00 to 07:00 hours respectively.

3.06 The 'rating level' of the noise source is obtained taking the following factors into consideration:

- The new plant noise (the specific noise) is measured or predicted in terms of L_{Aeq}.
- An additional correction shall be included if the noise contains a distinguishable, discrete continuous note, if the noise contains distinct impulses or if the noise is irregular enough to attract attention. The value for any tonal noise can be an addition of up to 6dB and for impulsive noise of up to 9dB.

3.07 The background sound level should be established in terms of the L_{A90} noise index. The standard states that the background sound level should be measured over a period of sufficient length to obtain a representative value. The standard states that *'a representative level ought to account for the range of background sound levels and ought not to automatically to be assumed to be either the minimum or modal value.'*

3.08 BS 4142 goes onto state that:

'The significance of sound of an industrial and/or commercial nature depends upon both the margin by which the rating level of the specific sound source exceeds the background sound level and the context in which the sound occurs. 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.'

3.09 BS4142 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.

BS8233:2014 'Guidance on Sound Insulation and Noise Reduction for Buildings'

3.10 To assess the noise impact from the absolute noise levels further guidance can be taken from BS8233:2014, 'Guidance on sound insulation and noise reduction for buildings', section 7 gives guidance on acoustic criteria and noise levels appropriate for various internal spaces that have different functions. Section 7.7 relates specifically to buildings having a residential purpose and offers guidance on appropriate internal ambient noise levels for dwellings (when unoccupied) with specific consideration:

i. for bedrooms, the acoustic effect on sleep; and

ii. for other rooms, the acoustic effect on resting, listening and communicating.

3.11 The guidance applies to external noise as it affects the internal acoustic environment from sources without a specific character.

3.12 Table 4 of section 7.7.2 recommends the following internal noise limits based on the presence of steady, external noise sources:

Table 4 **Indoor ambient noise levels for dwellings**

Activity	Location	07:00 to 23:00	23:00 to 07:00
Resting	Living room	35 dB $L_{Aeq,16hour}$	—
Dining	Dining room/area	40 dB $L_{Aeq,16hour}$	—
Sleeping (daytime resting)	Bedroom	35 dB $L_{Aeq,16hour}$	30 dB $L_{Aeq,8hour}$

3.13 The guidance criteria are based upon research and existing guidelines provided by the World Health Organisation.

3.14 It is generally considered that the sound insulation provided by a partially open window will be 15dB, dependent on window type, extent of opening and source frequency content.
It can be seen that in the worst case, with a partially open window reduction of 15dB, indoor ambient noise targets for bedrooms will be met where the external ambient noise level is below 45dB(A). This is based upon steady noise of an anonymous nature and is consistent with the World Health Organisations LOAEL.

Guidelines for Noise Impact Assessment 2014 (IEMA)

3.15 The Guidelines for Noise Impact Assessment 2014 produced by the Institute of Environmental Management and Assessment Working Party has been referenced in relation to the potential changes in ambient noise level during the proposed operation period.

3.16 The guidelines state that for any assessment, the noise level threshold and significance statements should be determined by the assessor, based upon the specific evidence and likely subjective response to the noise

3.17 The impact scale adopted in this assessment is shown below.

Long-term Impact Classification	Short-term Impact Classification	Sound level change dB L_{pAeqT} (Positive or Negative) T= either 16hr day or 8hr night
Negligible	Negligible	≥ 0 dB and < 1 dB
	Minor	≥ 1 dB and < 3 dB
Minor	Moderate	≥ 3 dB and < 5 dB
Moderate	Major	≥ 5 dB and < 10 dB
Major		≥ 10 dB

Impact scale for comparison of future noise against existing noise

3.18 The criteria above reflect key benchmarks that relate to human perception of sound. A change of 3dB is generally considered to be the smallest change in noise that is perceptible. A 10dB change in noise represents a doubling or halving of the noise level.

3.19 Considering the benchmarks set out above in terms of the aspirations of the NPPF, a change of +3dB is considered to be equivalent to the Lowest Observed Adverse Effect Level (LOAEL). A change in noise level of 10dB or more is considered to be equivalent to the Significant Observed Adverse Effect Level (SOAEL).

3.20 Increases in noise level of between 3dB and 10dB could require mitigation to minimise the potential effect. Increases of more than 10dB are considered to fall foul of the aspirations of the NPPF and as such should not be permitted.

4 MEASUREMENTS

4.01 Environmental noise measurements were carried out over a weekend period, between 1300 hours on Friday 21st June 2023 and concluded 1400hours Monday 24th June 2024, to establish the existing noise levels at the site. The survey methodology and results are set out below.

4.02 Noise measurements have been carried out at the following position, as shown in Appendix B and described as:

- Measurement Position 1 (MP1): located at a height of 2.5 metres above ground level in the north east corner of the service yard. The measurement was not located within 3.5 metres of any reflecting surfaces, other than the mounting surface.
- Measurement Position 2 (MP2): located at a height of 1.5 metres above the first floor level roof of the Waitrose store. The measurement was not located within 3.5 metres of any reflecting surfaces, other than the mounting surface.

4.03 MP1 is considered to be representative of the noise levels outside the windows of Northumbria Court when there is not activity in the Waitrose service yard.

4.04 MP2 is considered representative of the noise level outside the windows on the rear elevations of the Railway Tavern and 38-40 The Quadrant to the northwest and west of the store respectively.

5 EQUIPMENT

5.01 The equipment used for the survey at MP1 was as follows:-

- 01dB Fusion Integrating Sound Level Meter conforming to Class 1 BS EN 61672, Type 1 BS EN 60804 & BS EN 60651: 1994;
- GRAS 40CD Condenser Microphone, PRE22 S Pre-amp and Connecting Leads; and
- Tripod.

5.02 The equipment holds current accreditation and serial numbers as follows:

Sound Level Meter 01dB Fusion	Serial No.	14666
	Calibration Date	31st August 2023
	Verification Certificate No.	U45251
½" Condenser Mic. GRAS 40CD	Serial No.	470803
	Calibration Date	31st August 2023
	Verification Certificate No.	U45251
Calibrator CR 515	Serial No.	99534
	Calibration Date	31st August 2023
	Cal. Certificate No.	U45249

N.B. Copies of calibration certificates are available upon request.

5.03 The equipment used for the survey at MP2 was as follows:-

- 01dB Fusion Integrating Sound Level Meter conforming to Class 1 BS EN 61672, Type 1 BS EN 60804 & BS EN 60651: 1994;
- GRAS 40CD Condenser Microphone, PRE22 S Pre-amp and Connecting Leads; and
- Tripod.

5.04 The equipment holds current accreditation and serial numbers as follows:

Sound Level Meter 01dB Fusion	Serial No.	14014
	Calibration Date	2nd May 2023
	Cal Certificate No.	U44157
½" Condenser Mic. GRAS 40CD	Serial No.	383172
	Calibration Date	2nd May 2023
	Cal Certificate No.	44156
Calibrator CAL 31	Serial No.	94723
	Calibration Date	3rd May 2024
	Cal. Certificate No.	U47717

N.B. Copies of calibration certificates are available upon request.

5.05 The equipment was calibrated both before and after the survey with no difference noted in the levels.

6 RESULTS

6.01 The weather during the survey was suitable for noise measurement, it being dry with little wind for the duration of the survey.

6.02 The noise climate for the area is a mixture local and distant road traffic along with some low level noise from plant and services in the area along with occasional activity in the service yard during the current delivery window and trading hours. The area is also under the flight path for aircraft landing at Heathrow so for periods of the day and night time there are regular overflights, every 3-4 minutes of low level aircraft coming in to land. There were no other significant sources of noise during the survey.

6.03 A list of the levels measured is included in Appendix C and represented graphically in Appendix D.

6.04 The proposed extension to the delivery window is to cover the hours of 0600-0700 and 2000-2200hrs Monday – Saturday and 0600-0900 and 1700-2200hrs on Sundays. Therefore, the relevant assessment would be against the representative background noise levels during those times. To provide a suitable assessment of the existing noise climate during these periods, we have summarised the ambient and background noise levels recorded over these periods in Table 6.1 below for each day for the survey. The readings are presented as 15 minute samples to provide some detail as to the variance in noise levels during each period.

		MP1		MP2	
Day	**Time**	**Ambient $L_{Aeq,15min}$ dB**	**Background $L_{A90,15min}$ dB**	**Ambient $L_{Aeq,15min}$ dB**	**Background $L_{A90,15min}$ dB**
Friday 21st June 2024	*20:00*	*62.7*	*53.8*	*64.3*	*51.1*
	20:15	*64.8*	*54.4*	*64.4*	*52.0*
	20:30	*63.2*	*53.1*	*64.8*	*51.1*
	20:45	*63.4*	*52.8*	*61.3*	*50.9*
	21:00	*60.8*	*51.2*	*62.3*	*51.0*
	21:15	*59.4*	*51.0*	*60.6*	*50.2*
	21:30	*61.0*	*51.7*	*62.8*	*51.5*
	21:45	*58.9*	*50.5*	*60.8*	*50.9*
Saturday 22nd June 2024	*06:00*	*61.5*	*50.6*	*63.7*	*50.2*
	06:15	*61.8*	*50.7*	*63.9*	*49.6*
	06:30	*62.2*	*50.8*	*64.3*	*49.7*
	06:45	*60.7*	*50.6*	*63.0*	*49.8*
	20:00	*60.9*	*54.6*	*62.4*	*51.1*
	20:15	*60.8*	*54.7*	*62.3*	*51.2*
	20:30	*59.0*	*54.9*	*60.0*	*50.9*
	20:45	*60.7*	*55.1*	*62.1*	*51.0*
	21:00	*58.9*	*49.7*	*61.1*	*48.8*
	21:15	*60.1*	*50.1*	*62.4*	*48.2*
	21:30	*56.7*	*49.8*	*58.1*	*47.5*
	21:45	*57.7*	*49.9*	*59.7*	*47.9*

		MP1		MP2	
Day	**Time**	**Average $L_{Aeq,15min}$ dB**	**Background $L_{A90,15min}$ dB**	**Average $L_{Aeq,15min}$ dB**	**Background $L_{A90,15min}$ dB**
Sunday 23rd June 2024	*06:00*	*62.8*	*50.0*	*65.2*	*48.7*
	06:15	*61.2*	*49.3*	*63.1*	*46.5*
	06:30	*62.0*	*50.4*	*64.1*	*47.4*
	06:45	*51.9*	*49.4*	*52.9*	*47.7*
	07:00	*52.8*	*49.5*	*53.9*	*48.6*
	07:15	*52.2*	*49.4*	*52.5*	*48.1*
	07:30	*57.8*	*49.0*	*53.1*	*48.4*
	07:45	*53.7*	*49.9*	*52.9*	*49.6*
	08:00	*51.7*	*49.5*	*52.8*	*50.5*
	08:15	*51.0*	*49.1*	*52.4*	*50.2*
	08:30	*52.3*	*49.4*	*53.6*	*50.7*
	08:45	*54.6*	*49.8*	*52.5*	*50.6*
	17:00	*61.9*	*51.2*	*64.5*	*49.3*
	17:15	*60.6*	*51.0*	*62.8*	*49.4*
	17:30	*58.4*	*50.8*	*59.9*	*49.2*
	17:45	*61.4*	*51.1*	*58.4*	*49.6*
	18:00	*61.3*	*51.0*	*63.5*	*48.6*
	18:15	*60.9*	*50.9*	*63.0*	*48.9*
	18:30	*60.1*	*50.9*	*62.2*	*48.9*
	18:45	*62.5*	*50.8*	*65.0*	*48.5*
	19:00	*60.1*	*50.8*	*62.2*	*48.6*
	19:15	*60.5*	*50.5*	*63.0*	*48.2*
	19:30	*60.0*	*50.6*	*62.3*	*48.4*
	19:45	*59.1*	*50.6*	*61.1*	*48.4*
	20:00	*62.9*	*51.0*	*65.3*	*48.7*
	20:15	*60.2*	*50.6*	*62.5*	*47.8*
	20:30	*59.2*	*50.7*	*61.7*	*49.2*
	20:45	*58.2*	*50.5*	*60.1*	*48.2*
	21:00	*59.7*	*50.8*	*61.8*	*47.9*
	21:15	*59.9*	*50.1*	*62.7*	*47.3*
	21:30	*59.0*	*50.3*	*61.2*	*47.9*
	21:45	*57.8*	*50.4*	*59.6*	*47.8*

Day	Time	MP1		MP2	
		Average $L_{Aeq,15min}$ dB	Background $L_{A90,15min}$ dB	Average $L_{Aeq,15min}$ dB	Background $L_{A90,15min}$ dB
Monday 24th June 2024	*06:00*	*63.1*	*52.0*	*65.6*	*51.9*
	06:15	*62.4*	*50.7*	*64.9*	*50.0*
	06:30	*61.8*	*51.2*	*64.4*	*50.9*
	06:45	*63.6*	*51.3*	*65.3*	*50.4*

Table 6.1: Free-Field Measured Ambient and Background Noise Levels

6.05 Reviewing the data presented in Table 6.1 the background noise level ($L_{A90,15min}$) is consistently between 47-52dB(A) across the measurements periods with the ambient level being around 60dB(A) for periods when there are regular overflights from aircraft. In the absence of overflights, the ambient noise level is 51dB(A).

6.06 Reviewing the data in more detail the screenshot below shows a noise plot, based on 5 second readings, from the data recorded on the Saturday morning from 0530-0700hrs. The regular peaks that start at 0600 hrs are when the aircraft start flying over with typically levels as the aircraft fly over of 70-75dB(A) L_{eq} every two to three minutes.

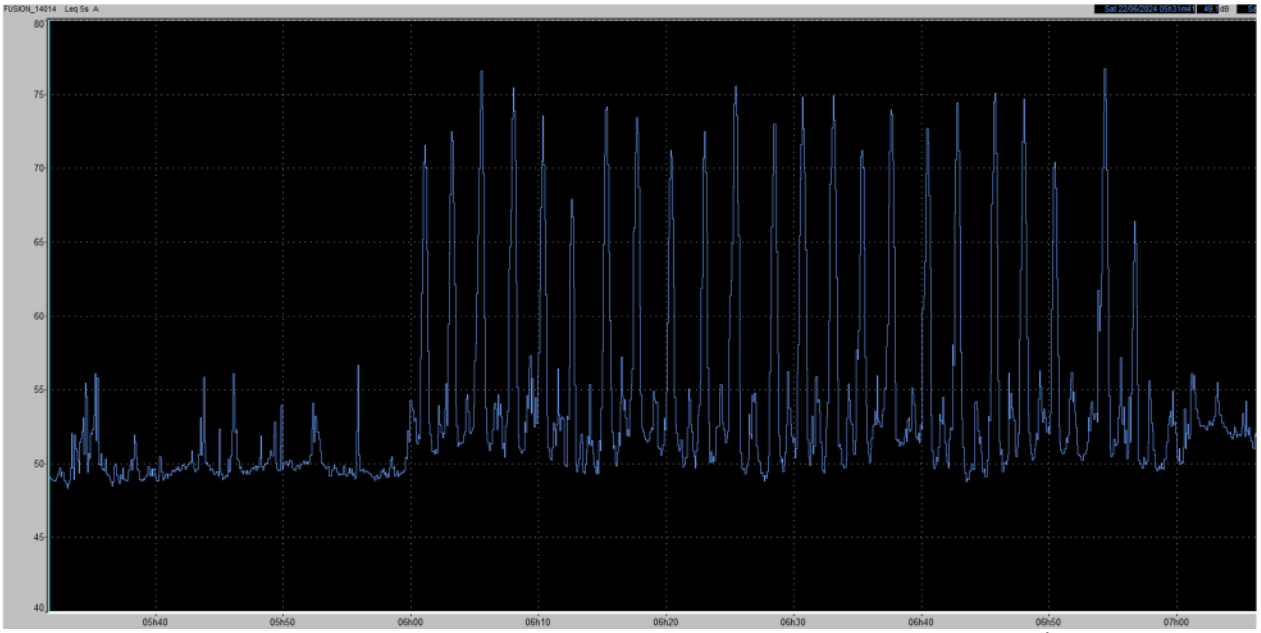

Figure 2: Noise plot of L_{eq} Level measured between 0530-0715hrs on Saturday 22nd June, 2024

7 DELIVERY NOISE ASSESSMENT

7.01 The delivery operation has been modelled using CadnaA software by Datakustik. Calculations are undertaken using the General Method of Calculation from ISO9613-2:2024. Within the noise model, buildings and the immediate local topography have been accounted for

7.02 The source data used in the model is taken from measurements of sound pressure levels of specific delivery activities made at a number of existing Waitrose stores around the country along with the actual noise levels recorded for the deliveries at the Waitrose Richmond site during this survey. A single main store HGV delivery takes up to 1 hour. The following data has been used in our calculation model based on a single delivery occurring in a 1 hour period. The values include noise associated with the lorry arrival, manoeuvring into position, unloading via a scissor lift or docking bay and the departure of the lorry. The noise levels assume that the refrigeration unit on the unit will not be operational and that only white noise reversing alarms would be used:

- Waitrose delivery operation- 97.7dB(A) Sound power level $L_{eq,1hour}$/69.7dB(A) at 10m sound pressure level $L_{eq,1hour}$;
- Max Noise Levels (door slam/cage movements) – 74dB(A) at 10m L_{max}

7.03 Figures 3 & 4 present the results of the model carried out with CadnaA for a single 1 hour delivery to the store. This is consistent with the current permitted daytime deliveries over a BS4142 reference assessment period of 1 hour for the daytime period of 0700-2300hrs.

7.04 The results of the model indicate the properties most affected by noise from the delivery operation are the Northumbria Court dwellings to the east. The specific noise level including the arrival, unloading and departure of the lorry will be:

- 55 dB $L_{Aeq,1hour}$.at Northumbria Court dwellings

7.05 Typically, the arrival and initial unloading is the noisiest element of the delivery process and incorporating this as a worst case for potential impact at night over the required BS4142 reference period of 15 minutes yields an L_{Aeq} that is 2.2dB higher than the 1 hour L_{Aeq} values reported in the CadnaA images reproduced below.

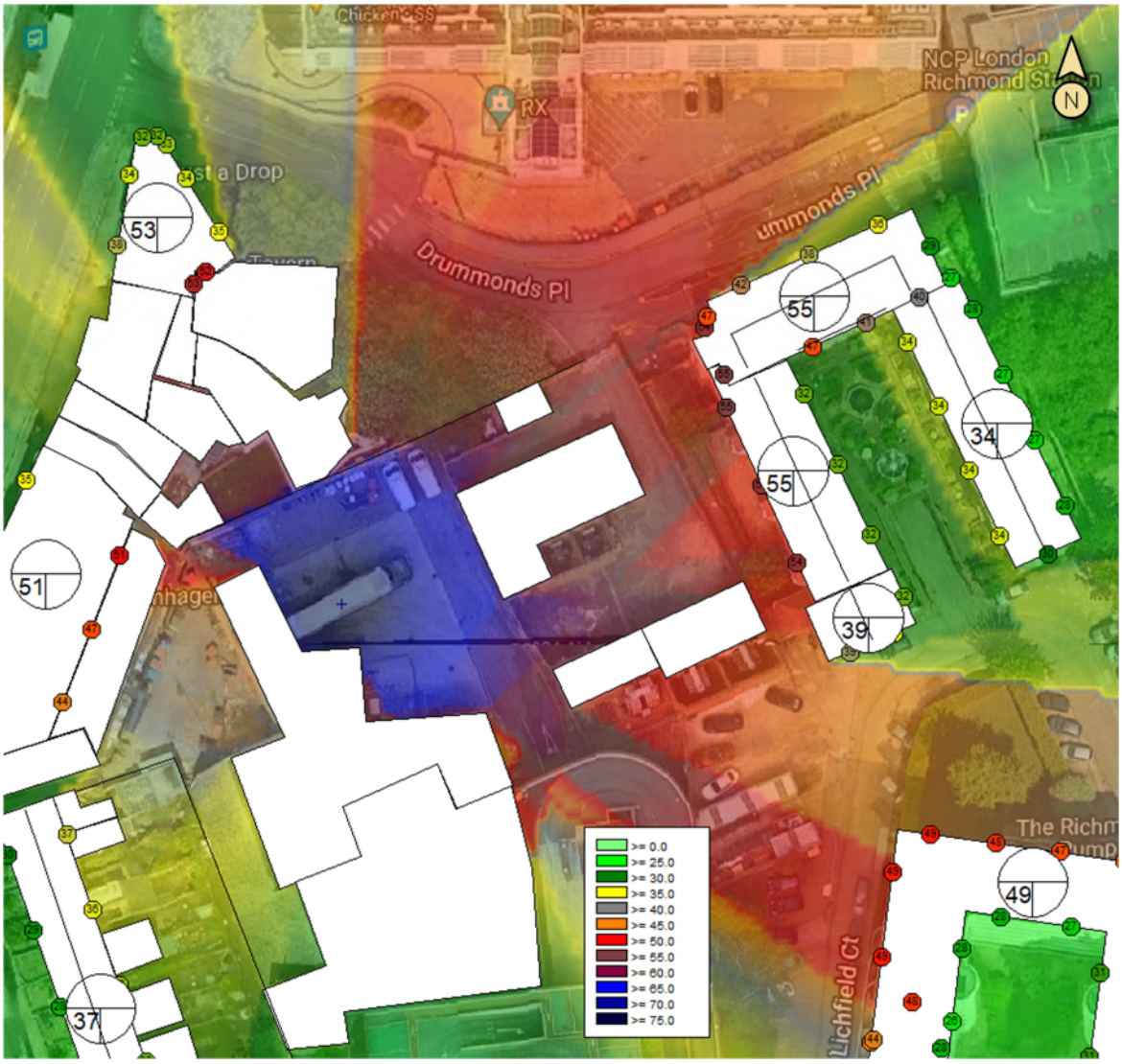

Figure 3: Specific Noise Level for the single delivery – $L_{Aeq,1\ hour}$

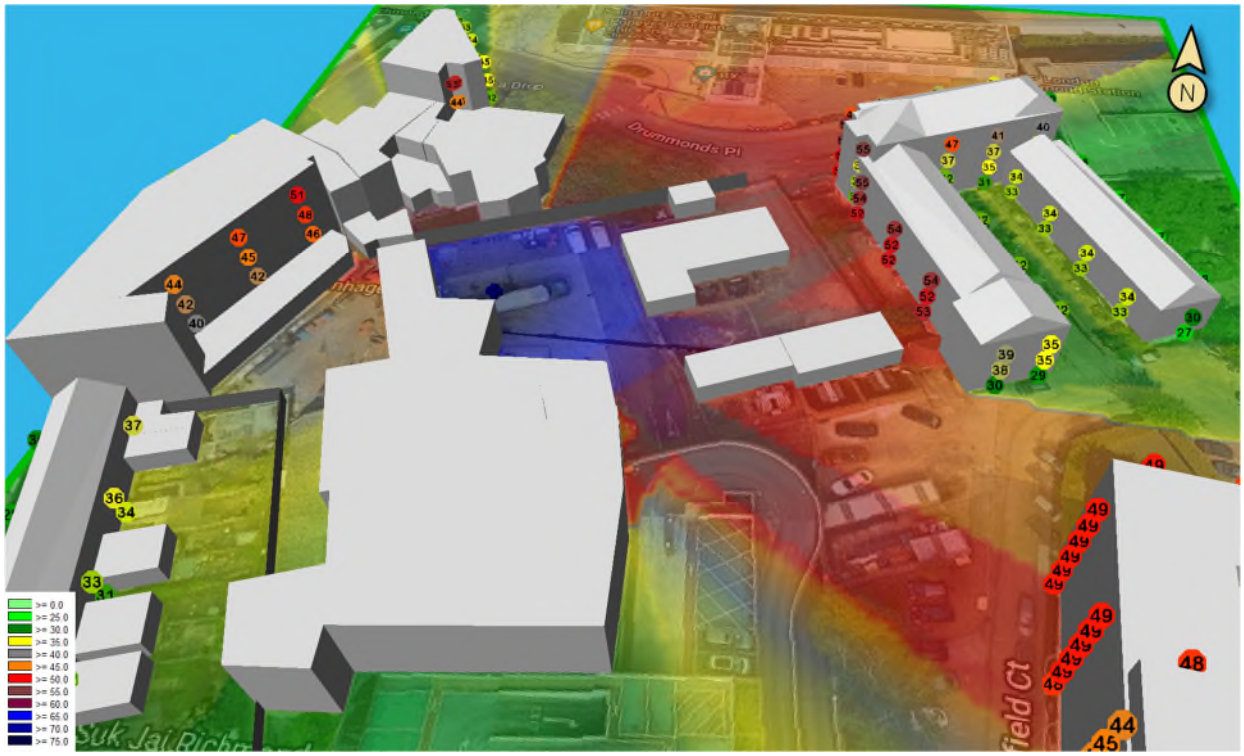

Figure 4: Isometric view of delivery noise propagation

7.06 In line with the requirements of current national planning policy an assessment in accordance with BS 4142:2014 has been carried out to assess the noise impact from the proposed delivery operation occurring during this period.

7.07 As detailed in Table 6.1 the background noise levels range from 47-52dB(A) L_{90}. The lower values of 47dB(A) were recorded when regular aircraft overflights are not occurring and typically 51dB(A) when aircraft were regularly flying over.

7.08 The following BS4142 assessment includes a 3dB character correction for the noise being 'intermittent' and a further 3 dB correction for 'impulsivity' for items such as cage movements within the trailer, based on guidance contained within BS4142.We have based our assessments on the noise impact from deliveries occurring during a period that would be classified as night time 0600-0700hrs and then also the daytime period, considering quieter background noise conditions in the absence of aircraft flyovers.

Results		Relevant Clause	Commentary
Assessment made during the daytime, so reference time interval is 1 hour		7.2	
Calculated Specific Noise	55 dB $L_{Aeq,1\ hour}$	7.3.4 7.3.5	1 hour delivery operation
Acoustic Character Correction	+ 6 dB	9.2	Intermittent & Impulsive 3dB + 3dB
Rating Sound Level	(55+6)dB=61 dB $L_{Aeq,1\ hour}$	9.2	Overall 1 hour level
Background Noise Level	48 dB $L_{A90,1\ hour}$	8	Representative Background Noise Level no aircraft flying over
Difference	(61-48)dB= +13 dB	11	
Assessment indicates that the noise could be classified as being of significant adverse impact, depending on context		11	See further discussion below
Uncertainty of assessment	-	10	Test data has been used and background noise levels during the survey period are considered to be representative

Table 7.1: Daytime period BS4142 Assessment for deliveries between 0700-2300hrs for Northumbria Court dwellings

Results		Relevant Clause	Commentary
Assessment made during the night time, so reference time interval is 15 minutes		7.2	
Calculated Specific Noise	57 dB $L_{Aeq,1\ hour}$	7.3.4 7.3.5	1 hour delivery operation
Acoustic Character Correction	+ 6 dB	9.2	Intermittent & Impulsive 3dB + 3dB
Rating Sound Level	(57+6)dB=63 dB $L_{Aeq,1\ hour}$	9.2	Overall 1 hour level
Background Noise Level	48 dB $L_{A90,1\ hour}$	8	Representative Background Noise Level no aircraft flying over
Difference	(63-48)dB= +15 dB	11	
Assessment indicates the impact would be considered low depending on context.		11	See further discussion below
Uncertainty of assessment	-	10	Test data has been used and background noise levels during the survey period are considered to be representative

Table 7.2: BS4142 Assessment for night time deliveries (0600-0700hrs) for Northumbria Court dwellings

7.09 As detailed in table 7.1 and 7.2 the BS 4142 assessment indicates that there is the possibility for significant adverse impact 'depending on context'.

7.10 In the context of the existing ambient noise the results of the noise survey showed these to be consistently over 61dB L_{Aeq} for the 15 minutes and noise levels of between 70 -75 dB(A) when the aircraft are directly overhead. During the four days of our survey that started on Friday lunch time through to 1430hrs on the Monday, the flightpath over the site was used for the following hours:

- Friday 21st June 2024 - 1500-2330hrs
- Saturday 22nd June 2024 - 0600-0700hrs & 1500-2330hrs
- Sunday 23rd June 2024 - 0600-0700hrs & 1500-2300hrs
- Monday 24th June 2024 – 0600-1430hrs*(meter collection)

7.11 During our survey period there were consistently aircraft flying over the area from 0600hrs for at least an hour, and then again during the afternoon/evening time up until 2330hrs. These are within the proposed delivery hours, 0600-2200hrs that Waitrose are applying for.

7.12 Looking at online flight tracking tools it appears that typically at least for three to four days a week flights will fly over Richmond during these early hours and also in the evening. It appears to be a factor of where the aircraft are arriving from, the runway that is being used for landings at Heathrow and then finally any wind direction that needs to be factored in. There also seems to be some seasonal variation with the flightpath being used most days during the summer holiday period and then ramping down to the three to four days a week during other times.

7.13 As detailed in the results presented in Table. 6.1 and section 6.06, when the aircraft are flying over the ambient level is around 61dB(A) with peak level levels when the aircraft is overhead of 70-75 dB(A). The noise level from the unloading noise is 55dB(A) $L_{eq,15min}$. Whilst this shows it could be above the underlying background noise level in the context of the typical noise climate when the flightpath is active the noise from the unloading activity will be significantly less.

7.14 BS8233:2014, 'Guidance on sound insulation and noise reduction for buildings' gives guidance on guideline values to be achieved within dwellings for reasonable conditions for resting and sleeping based on anonymous noise sources. The intermittent noise from close, overflying aircraft would typically not be classified as anonymous and therefore for the residents not to be affected by noise from the aircraft during the night time period it would be reasonable to expect them to have glazing and alternative means of ventilation in place not to be adversely affected by noise from the aircraft and at least have noise levels within the dwellings that satisfy the guideline values for anonymous noise. Based on not exceeding 30dB(A) L_{eq} and 45dB(A) L_{max} the glazing should provide at least 31 dB noise reduction.

7.15 The relative magnitude of the delivery activity noise can also be assessed in the context of absolute guideline noise limits for noise in dwellings as described in BS8233:2014, 'Guidance on sound insulation and noise reduction for buildings' as well as the IEMA Guidelines for Noise Impact Assessment 2014.

7.16 The following review considers levels of noise that will result within the properties accounting for the noise reductions that will occur as sound passes across the building facades.

7.17 The sound insulation of the façade is very much governed by the type of glazing and whether the windows are open or not. As described in section 7.14 based on the current noise climate when aircraft are flying over it would be reasonable to expect that the dwellings would have suitable noise mitigation in place to ensure desirable noise levels within the property are achieved or have a higher tolerance for excess noise. We have assumed that the dwellings would have glazing that will provide at least 31dB noise reduction for noise passing through it.

7.18 Table 7.3 presents the noise levels that could be expected within the dwellings against the relevant BS 8233 design criteria based on the existing reduction from expected mitigation measures required to control the impacts of noise from aircraft flyovers.

Location	Condition	Calculated $L_{Aeq,1hour}$ external	Minimum sound reduction loss	Resultant internal ambient noise level	BS8233 Design Criterion
Northumbria Court	Windows Closed	55 dB	31 dB	<24dB(A) $L_{eq,1\ hour}$	30dB(A) $L_{eq,8\ hour}$

Table 7.3: Calculated Worst Case Internal Ambient Noise levels within closest dwellings

7.19 Table 7.3 indicates that the guideline internal noise values would be achieved with windows closed, the noise level from the unloading activity being less than the noise from aircraft against which the existing acoustic performance has been assumed.

7.20 Table 7.4 presents the expected change in ambient noise levels based on the calculated noise levels and the typical ambient noise level during the proposed extended delivery window period for both periods when the aircraft are regularly flying over and periods when they are not. We have used the worst case hourly L_{Aeq} value of the delivery operation as discussed in section 7.04.

Condition	Calculated $L_{Aeq,1hour}$ external	Typical existing ambient Level	Cumulative Ambient Noise Level	Change in Level	IEMA Long Term Impact Assessment
Flightpath in use	55 dB	61 dB(A)	61.0 dB(A) L_{eq}	=1 dB	Negligible
No aircraft overflying	55dB	53dB(A)	57.1 dB(A) L_{eq}	<5dB	Minor

Table 7.4: Change in ambient level and IEMA Impact Assessment

7.21 The change in the typical ambient level during the proposed extended delivery window should be only 1dB when the flightpath is in use which in accordance with the IEMA Guidance for Noise Impact Assessment would conclude that the actual long term impact would be negligible and only a minor long term impact when the flight path is not in use, however as mentioned in section 7.14 it is expected that the dwellings already have noise mitigation in place, such as uprated double/secondary glazing to account for the higher noise levels that regularly occur when the flight path is in use so a small change in ambient level outside will not breach guideline internal ambient noise levels.

8 CONCLUSIONS

8.01 Waitrose Ltd has appointed Environmental Equipment Corporation Limited to undertake a noise assessment associated with HGV deliveries to the store.

8.02 The assessment has been carried out in accordance with national planning guidance and incorporates the current joint guidance from the industry bodies ANC and IOA. This assessment is based on an environmental noise survey carried out to establish the current local noise climate.

8.03 Using measured and library data for typical deliveries to Waitrose stores, the resultant noise levels have been calculated outside the nearest dwellings.

8.04 Whilst predictions have shown that following the procedures of a BS 4142 assessment noise from deliveries occurring during the proposed extended delivery periods could be considered to have the potential to lead to significant adverse impact. When considered in the context of the site, which is under the Heathrow flight path, and exposed to regular and established ambient noise and events considerably higher than that associated with HGV delivery processes, the actual noise impact would be considered to be lower. Assessments were carried out demonstrating the typical noise levels from a single Waitrose HGV delivery would satisfy guidance for sleeping and resting as defined under BS 8233/WHO based on the glazing that would be required to achieve the same criteria from noise from the aircraft.

8.05 The change in ambient noise level when the aircraft are flying over and a delivery is occurring at the Waitrose store will be only 1dB and assessed as a negligible long term change. Even if the delivery process was to occur at a period when the flights are not occurring the change in ambient level would still only be assessed as minor but as discussed the residents are expected to have suitable noise mitigation already in place to protect themselves against the noisier period when aircraft are overflying that their exposure to noise from the delivery process will be significantly below guideline values for acceptable conditions for resting and sleeping as specified in BS8233.

8.06 On the basis of these additional assessments adding context to the noise impact and considering that the noise source and character is established and familiar, the proposed extension to the delivery window should not be considered to have any significant adverse impact on the surrounding properties. The overall number of deliveries to the store is not expected to change with the proposed extension and will alleviate existing local and wider road traffic burdens shifting certain deliveries out of rush hours.

8.07 On the basis of this noise impact assessment it is considered that the results of this assessment would support a limited extension to the current permitted delivery times to the hours of 0600-2200hrs seven days a week without any actual significant adverse impact.

APPENDIX A

GLOSSARY OF TECHNICAL TERMS

ACOUSTIC TERMINOLOGY

Absorption Classes	The sound absorption of a material is rated from Class A to Class E, where Class A materials provide the highest level of sound absorption.
Ambient Noise Levels	Noise levels measured in the absence of noise requiring control, frequently measured to determine the situation prior to the additional of a new noise source.
dB	Decibel. The logarithmic unit of sound level.
dB(A)	A-weighted decibel. The A-weighting approximates the response of the human ear.
$D_{nT,w}$	Weighted standardized level difference. A single number quantity of the sound level difference between two rooms. $D_{nT,w}$ is typically used to measure the on-site sound insulation performance of a building element such as a wall, floor or ceiling. Measured in accordance with BS EN ISO 16283-1 and weighted in accordance with BS EN ISO 717-1.
$D_{n,e,w}$	The weighted element-normalized level difference. A single number rating of the sound reduction provided by a sound passing through an individual element. $D_{n,e,w}$ is typically used to define the sound insulation provided by ventilators. Measured in accordance with BS EN ISO 10140-2:2010 and rated in accordance with BS EN ISO 717-1.
Flanking	Transmission of sound energy through paths adjacent to the building element being considered. For example, sound may be transmitted around a wall by travelling up into the ceiling space and then down into the adjacent room.
Frequency	Sound can occur over a range of frequencies extending from the very low, such as the rumble of thunder, up to the very high such as the crash of cymbals. Sound is generally described over the frequency range from 63Hz to 4kHz, roughly equal to the range of frequencies on a piano.
Impact Sound	Sound produced by an object impacting directly on a building structure, such as footfall noise or chairs scrapping on a floor.
$L_{Aeq,t}$	The equivalent continuous sound level measured in dBA. This is commonly referred to as the average noise level. 't' is the interval time for the measurement. Typically 't' of 16hrs and 8hrs is used for day and night time ambient noise respectively or 't' is defined by the period of interest in BS4142 assessments.
$L_{A90,t}$	The noise level exceeded for 90% of the measurement period, measured in dBA. This is commonly referred to as the background noise level.
$L'_{nT,w}$	Weighted, standardized impact sound pressure level. A single number rating of the impact sound insulation of a floor/ceiling when impacted on by a standard "tapper" machine. The lower the $L'_{nT,w}$, the better the acoustic performance. Measured in accordance with BBS EN ISO 140-7 and rated in accordance with BS EN ISO 717-2.
NR	Noise Rating. A single number rating which is based on the sound level in the octave bands 31.5Hz – 8kHz inclusive, generally used to assess noise from mechanical services in buildings.
Octave Band	Frequencies are often grouped together into octaves for analysis. Octave bands are labelled by their centre frequency which are: 63Hz, 125Hz, 250Hz, 500Hz, 1kHz, 2kHz and 4kHz.
Reverberation Time (T_{mf})	Reverberation time is used for assessing the acoustic qualities of a space. It is defined as the time it takes for an impulse to decay by 60dB. T_{mf} is the arithmetic average of the reverberation time in the mid frequency bands (500Hz, 1kHz and 2kHz).
R_w	Weighted sound reduction index. A single number rating of the sound insulation performance of a specific building element. R_w is measured in a laboratory. R_w is commonly used by manufacturers to describe the sound insulation performance of building elements such as plasterboard and concrete. Measured in accordance with BS EN ISO 10140-2:2010 and rated in accordance with BS EN ISO 717-1.
Sound Absorption	When sound hits a surface, some of the sound energy is absorbed by the surface material. Sound absorption refers to the ability of a material to absorb sound, rated from 0, complete reflection, to 1, complete absorption.
Sound Insulation	When sound hits a surface, some of the sound energy travels through the material. 'Sound insulation' refers to the ability of a material to prevent the travel of sound.
Structure-borne transmission	Transmission of sound energy as vibrations via the structure of a building.

APPENDIX B

PLANNING POLICY AND GUIDANCE

PLANNING POLICY AND GUIDANCE

The Department for Communities and Local Government published the National Planning Policy Framework (NPPF) on 27th March 2012 (as amended on 20th December 2023) and upon its publication, the majority of planning policy statements and guidance notes were withdrawn, including Planning Policy Guidance 24 Planning and Noise, which previously presented the government's overarching planning policy on noise.

Paragraph 180 in Section 15 of the NPPF , entitled Conserving and enhancing the natural environment, states that:

> *"Planning policies and decisions should contribute to and enhance the natural and local environment by:*
>
> *e) preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability…"*

Paragraph 191 in Section 15 also states that:

> "*Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development. In doing so they should:*
>
> *a) mitigate and reduce to a minimum potential adverse impacts resulting from noise from new development – and avoid noise giving rise to significant adverse impacts on health and the quality of life;*
>
> *b) identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason…"*

The Department for Environment Food and Rural Affairs published the Noise Policy Statement for England (NPSE) in March 2010. The explanatory note of NPSE defines the following terms used in the NPPF:

> *"NOEL – No Observed Effect Level*
>
> *This is the level below which no effect can be detected. In simple terms, below this level, there is no detectable effect on health and quality of life due to the noise.*
>
> *LOAEL – Lowest Observed Adverse Effect Level*
>
> *This is the level above which adverse effects on health and quality of life can be detected.*
>
> *2.21 Extending these concepts for the purpose of this NPSE leads to the concept of a significant observed adverse effect level.*
>
> *SOAEL – Significant Observed Adverse Effect Level*
>
> *This is the level above which significant adverse effects on health and quality of life occur."*

The NPSE does not define any of the above effect levels numerically.

The NPSE presents the Noise Policy Aims as:

> *"Through the effective management and control of environmental, neighbour and neighbourhood noise within the context of Government policy and sustainable development:*
>
> *avoid significant adverse impacts on health and quality of life;*
>
> *mitigate and minimise adverse impacts on health and quality of life; and*
>
> *where possible, contribute to the improvement of health and quality of life."*

It can be seen that the first two bullet points are similar to Section 11 of the NPPF, with a third aim that seeks to improve health and quality of life. The NPSE later expands on the Noise Policy Aims, stating:

> *2.23 The first aim of the NPSE states that significant adverse effects on health and quality of life should be avoided while also taking into account the guiding principles of sustainable development (paragraph 1.8).*
>
> *2.24 The second aim of the NPSE refers to the situation where the impact lies somewhere between LOAEL and SOAEL. It requires that all reasonable steps should be taken to mitigate and minimise adverse effects on health and quality of life while also taking into account the guiding principles of sustainable development (paragraph 1.8). This does not mean that such adverse effects cannot occur.*
>
> *2.25 This aim* (the third aim)*, seeks where possible, positively to improve health and quality of life through the pro-active management of noise while also taking into account the guiding principles of sustainable development (paragraph 1.8), recognising that there will be opportunities for such measures to be taken and that they will deliver potential benefits to society. The protection of quiet places and quiet times as well as the enhancement of the acoustic environment will assist with delivering this aim."*

It is clear that noise described in the NPSE as SOAEL that would lead to significant adverse effects should be avoided, although there is no definition as to what constitutes a significant adverse effect. Similarly, noise should be mitigated where it is high enough to lead to adverse effects, termed the LOAEL, but not so high that it leads to significant adverse effects.

British Standard 4142

To assess the acceptability of the resultant noise levels we have consulted the relevant standards. BS 4142:2014 'Methods for rating and assessing industrial and commercial sound' has been used to assess the likelihood any adverse impacts based on the resultant noise level from the new plant item, including any corrections for the character of the noise against the existing background noise level.

BS4142 gives guidance on assessing the likelihood of adverse impacts by calculating a 'rating level' of the new noise source and comparing its magnitude at noise sensitive locations to the existing or underlying background noise level. The background noise level is subtracted from the 'rating level' to assess the likelihood of complaints:

- The greater the difference the greater the likelihood of complaints.
- A difference of around +10dB or more is an indication of a significant adverse impact, depending on the context.
- A difference of +5dB 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 noise level, the less likely it is that the specific sound source will have an adverse impact or 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 sound impact, depending on the context.

This assessment is carried out over a one hour period for the daytime and a fifteen minute period for the night-time. For the purposes of the standard it states that daytime and night-time are typically 07:00 to 23:00 hours and 23:00 to 07:00 hours respectively.

The 'rating level' of the noise source is obtained taking the following factors into consideration:

- The new plant noise (the specific noise) is measured or predicted in terms of L_{Aeq}.
- An additional correction shall be included if the noise contains a distinguishable, discrete continuous note, if the noise contains distinct impulses or if the noise is irregular enough to attract attention. The value for any tonal noise can be an addition of up to 6dB and for impulsive noise of up to 9dB.

BS 4142 goes onto state that:

> *'The significance of sound of an industrial and/or commercial nature depends upon both the margin by which the rating level of the specific sound source exceeds the background sound level and the context in which the sound occurs. 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.'*

BS4142 has been referenced in setting noise limits for any fixed plant proposed as part of the proposed development.

APPENDIX C

SURVEY RESULTS
(TABULAR)

EC 20746 - Waitrose Richmond Service Yard

Waitrose Ltd

MP1 Tabulated Noise data

Time	L_{Aeq}	L_{AMax}	L_{A90}
12:45	60.2	83.6	53.7
13:00	54.7	69.0	53.1
13:15	56.3	68.4	53.7
13:30	67.0	75.4	53.5
13:45	68.1	82.5	64.3
14:00	68.7	88.0	53.3
14:15	62.1	80.2	53.3
14:30	59.1	75.2	52.8
14:45	55.6	65.7	53.9
15:00	62.6	81.1	53.9
15:15	62.2	76.9	53.4
15:30	61.5	76.6	53.6
15:45	61.5	75.2	53.5
16:00	61.0	77.5	52.9
16:15	60.9	74.9	53.0
16:30	63.5	78.5	53.2
16:45	59.5	75.3	52.2
17:00	60.2	74.3	53.0
17:15	59.7	77.0	53.9
17:30	62.0	74.9	53.8
17:45	60.2	87.0	53.5
18:00	59.9	72.4	53.6
18:15	61.5	75.9	53.7
18:30	63.3	79.3	53.4
18:45	62.5	79.8	54.3
19:00	61.9	77.4	53.9
19:15	63.2	77.5	53.4
19:30	61.2	76.5	53.6
19:45	61.6	77.4	53.1
20:00	62.7	78.8	53.8
20:15	64.8	77.3	54.4
20:30	63.2	79.3	53.1
20:45	63.4	78.4	52.8
21:00	60.8	78.1	51.2
21:15	59.4	74.5	51.0
21:30	61.0	78.1	51.7
21:45	58.9	73.0	50.5
22:00	58.7	71.2	51.0
22:15	57.3	75.0	50.6
22:30	57.0	73.0	50.7
22:45	59.3	73.7	50.6
23:00	59.1	76.5	49.6
23:15	55.4	74.4	49.8
23:30	51.2	56.1	50.2
23:45	50.9	56.9	49.9
00:00	50.8	59.9	49.7
00:15	50.7	62.8	49.8
00:30	50.6	53.8	49.6

Time	L_{Aeq}	L_{AMax}	L_{A90}
00:45	50.9	57.0	49.8
01:00	50.6	65.1	49.5
01:15	50.0	63.9	48.8
01:30	49.8	55.7	49.0
01:45	51.6	65.6	49.3
02:00	50.2	54.8	49.3
02:15	49.1	54.9	48.2
02:30	49.6	64.5	48.7
02:45	49.8	54.8	49.1
03:00	50.1	61.5	49.3
03:15	50.9	67.7	49.4
03:30	50.4	55.5	49.5
03:45	50.2	61.5	48.7
04:00	49.7	62.3	48.7
04:15	49.5	58.6	48.8
04:30	49.4	59.0	48.5
04:45	50.0	68.7	48.4
05:00	51.5	64.0	49.7
05:15	51.3	66.0	49.7
05:30	50.8	65.3	49.7
05:45	50.8	63.4	49.7
06:00	61.5	78.2	50.6
06:15	61.8	75.7	50.7
06:30	62.2	75.8	50.8
06:45	60.7	75.8	50.6
07:00	55.2	65.8	53.6
07:15	59.1	79.2	52.7
07:30	65.6	78.0	53.1
07:45	63.0	80.7	52.5
08:00	63.2	75.0	52.9
08:15	60.8	77.9	54.7
08:30	61.7	79.2	55.5
08:45	61.2	81.0	55.0
09:00	57.4	67.0	54.3
09:15	59.0	79.0	55.5
09:30	58.1	73.3	55.5
09:45	57.6	71.8	55.5
10:00	57.2	67.7	55.7
10:15	57.7	66.2	56.0
10:30	58.7	70.7	56.1
10:45	58.4	77.8	55.4
11:00	58.8	70.1	55.9
11:15	57.5	69.4	55.5
11:30	59.2	75.4	55.9
11:45	58.1	79.4	56.3
12:00	58.9	74.9	56.7
12:15	58.1	74.6	56.7
12:30	57.7	68.4	56.7

EC 20746 - Waitrose Richmond Service Yard

Waitrose Ltd

MP1 Tabulated Noise data

Time	L_{Aeq}	L_{AMax}	L_{A90}
12:45	59.4	79.2	56.5
13:00	57.1	79.2	55.5
13:15	60.9	86.2	56.3
13:30	57.5	67.5	56.3
13:45	61.8	93.0	54.0
14:00	64.0	91.9	53.7
14:15	60.2	76.8	54.1
14:30	57.4	68.9	56.2
14:45	58.6	72.4	56.2
15:00	62.5	78.6	55.4
15:15	62.3	77.8	55.0
15:30	62.7	78.1	54.9
15:45	62.5	76.1	54.8
16:00	63.0	81.1	55.0
16:15	62.7	77.0	53.1
16:30	62.0	76.7	52.9
16:45	60.8	76.0	54.3
17:00	61.9	76.9	54.3
17:15	59.0	76.4	53.9
17:30	60.9	77.0	54.0
17:45	60.5	75.1	53.8
18:00	61.2	77.6	53.5
18:15	61.2	76.8	53.6
18:30	63.2	79.0	54.1
18:45	60.6	74.5	54.0
19:00	62.2	76.3	54.3
19:15	62.4	78.1	54.3
19:30	62.7	79.3	54.2
19:45	62.3	76.3	54.5
20:00	60.9	75.9	54.6
20:15	60.8	74.1	54.7
20:30	59.0	70.9	54.9
20:45	60.7	76.7	55.1
21:00	58.9	72.6	49.7
21:15	60.1	73.8	50.1
21:30	56.7	71.0	49.8
21:45	57.7	78.9	49.9
22:00	56.6	71.6	49.3
22:15	58.9	74.6	49.6
22:30	56.7	69.1	48.8
22:45	57.2	71.2	48.9
23:00	52.6	69.1	48.9
23:15	53.1	68.7	48.9
23:30	49.4	54.0	48.5
23:45	53.7	72.2	48.6
00:00	50.2	63.8	48.9
00:15	49.3	58.0	48.5
00:30	50.1	60.5	48.9

Time	L_{Aeq}	L_{AMax}	L_{A90}
00:45	49.5	56.6	48.3
01:00	49.5	59.2	48.2
01:15	49.1	59.3	48.2
01:30	48.9	58.2	48.2
01:45	49.5	69.2	47.9
02:00	49.3	53.5	48.5
02:15	48.6	58.6	47.8
02:30	48.5	55.7	47.8
02:45	49.6	60.3	48.3
03:00	48.7	63.3	47.6
03:15	48.7	58.8	47.7
03:30	48.4	57.4	47.6
03:45	48.7	58.8	47.9
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05:30	49.4	65.8	48.2
05:45	51.5	65.1	48.0
06:00	62.8	78.5	50.0
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08:15	51.0	66.4	49.1
08:30	52.3	69.2	49.4
08:45	54.6	78.8	49.8
09:00	62.1	80.1	54.7
09:15	59.2	74.0	52.9
09:30	57.4	77.5	52.9
09:45	57.5	73.2	52.5
10:00	59.5	80.9	52.5
10:15	56.3	71.1	54.2
10:30	55.2	66.5	53.8
10:45	55.1	64.6	53.6
11:00	54.7	66.7	53.4
11:15	55.2	70.3	53.3
11:30	54.8	64.9	53.2
11:45	55.3	66.9	53.4
12:00	55.8	69.5	53.3
12:15	60.6	84.9	52.7
12:30	58.0	77.6	52.5

EC 20746 - Waitrose Richmond Service Yard

Waitrose Ltd

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14:45	55.6	71.9	52.5
15:00	61.9	76.7	52.5
15:15	60.0	75.0	52.3
15:30	62.8	75.5	52.8
15:45	61.3	78.1	52.9
16:00	60.5	82.5	53.2
16:15	62.9	77.7	53.2
16:30	60.8	76.8	53.0
16:45	61.5	75.5	53.0
17:00	61.9	78.1	51.2
17:15	60.6	73.1	51.0
17:30	58.4	72.9	50.8
17:45	61.4	85.5	51.1
18:00	61.3	76.1	51.0
18:15	60.9	76.8	50.9
18:30	60.1	72.6	50.9
18:45	62.5	76.8	50.8
19:00	60.1	74.1	50.8
19:15	60.5	77.3	50.5
19:30	60.0	74.5	50.6
19:45	59.1	73.2	50.6
20:00	62.9	75.7	51.0
20:15	60.2	75.1	50.6
20:30	59.2	71.5	50.7
20:45	58.2	72.4	50.5
21:00	59.7	74.8	50.8
21:15	59.9	78.4	50.1
21:30	59.0	72.0	50.3
21:45	57.8	71.7	50.4
22:00	57.1	70.5	49.9
22:15	55.5	70.1	49.5
22:30	57.3	70.6	49.7
22:45	52.5	67.9	49.4
23:00	51.3	63.9	49.7
23:15	51.2	57.9	49.7
23:30	50.3	57.4	49.3
23:45	51.6	68.0	49.1
00:00	50.2	57.0	49.1
00:15	50.1	56.6	49.3
00:30	49.9	55.7	49.1

Time	L_{Aeq}	L_{AMax}	L_{A90}
00:45	49.9	57.2	49.1
01:00	49.7	56.6	48.8
01:15	49.5	53.9	48.8
01:30	49.0	55.2	48.3
01:45	49.6	58.0	48.5
02:00	49.4	55.0	48.6
02:15	49.4	61.5	48.5
02:30	49.4	52.1	48.7
02:45	49.4	59.7	48.7
03:00	49.4	53.2	48.6
03:15	52.3	79.9	48.4
03:30	48.9	60.3	48.1
03:45	49.6	60.0	48.8
04:00	50.3	54.0	49.3
04:15	50.6	71.8	49.1
04:30	50.4	57.5	49.6
04:45	51.0	65.0	49.5
05:00	51.5	68.1	49.7
05:15	51.7	64.6	50.1
05:30	52.0	73.6	50.2
05:45	51.8	65.2	50.8
06:00	63.1	76.7	52.0
06:15	62.4	74.9	50.7
06:30	61.8	74.8	51.2
06:45	63.6	77.1	51.3
07:00	65.3	80.2	54.7
07:15	67.6	78.2	55.0
07:30	68.3	74.8	64.2
07:45	66.4	75.0	58.8
08:00	66.4	80.7	55.9
08:15	63.5	80.9	55.2
08:30	62.9	76.1	54.7
08:45	65.9	90.4	55.1
09:00	64.6	81.4	53.8
09:15	64.0	77.0	58.6
09:30	66.4	79.6	59.6
09:45	65.3	82.7	59.5
10:00	69.5	99.8	54.4
10:15	64.1	77.1	53.5
10:30	63.1	75.2	53.4
10:45	62.6	75.2	54.4
11:00	63.1	77.9	58.4
11:15	62.0	77.7	53.1
11:30	63.2	77.3	59.1
11:45	62.8	76.9	53.8
12:00	63.8	76.5	54.0
12:15	63.5	77.6	53.5
12:30	62.6	76.6	53.9

EC 20746 - Waitrose Richmond Service Yard

Waitrose Ltd

MP1 Tabulated Noise data

Time	L_{Aeq}	L_{AMax}	L_{A90}
12:45	*63.8*	*75.4*	*59.4*
13:00	*60.8*	*77.1*	*53.1*
13:15	*62.4*	*84.6*	*53.4*
13:30	*64.6*	*85.9*	*56.2*
13:45	*62.4*	*78.4*	*53.5*
14:00	*63.3*	*81.0*	*53.9*

Time	L_{Aeq}	L_{AMax}	L_{A90}

EC 20746 - Waitrose Richmond Rooftop Noise Measurement

Waitrsoe Ltd

MP2 - Tabulated Noise data

Time	L_{Aeq}	L_{AMax}	L_{A90}
13:00	52.7	65.3	50.6
13:15	53.6	68.2	50.5
13:30	56.3	64.5	51.0
13:45	57.2	69.0	54.0
14:00	56.7	72.0	51.8
14:15	54.1	65.9	50.8
14:30	53.7	67.4	51.5
14:45	53.1	62.2	51.2
15:00	64.1	78.9	51.3
15:15	63.9	78.4	50.6
15:30	63.3	78.1	51.2
15:45	63.3	79.0	51.6
16:00	62.7	78.7	51.0
16:15	63.1	79.3	51.3
16:30	64.9	80.7	51.3
16:45	61.0	77.7	51.4
17:00	61.4	76.8	51.8
17:15	60.1	78.4	51.2
17:30	63.7	78.0	51.4
17:45	60.2	77.3	51.3
18:00	61.0	75.1	51.3
18:15	63.1	80.1	51.3
18:30	65.0	80.1	51.3
18:45	64.1	82.9	51.6
19:00	63.7	79.5	51.6
19:15	65.1	79.0	51.3
19:30	63.1	80.0	51.6
19:45	63.4	79.6	50.9
20:00	64.3	79.9	51.1
20:15	64.4	81.3	52.0
20:30	64.8	79.7	51.1
20:45	61.3	75.8	50.9
21:00	62.3	78.3	51.0
21:15	60.6	75.8	50.2
21:30	62.8	79.7	51.5
21:45	60.8	77.3	50.9
22:00	60.5	75.8	50.3
22:15	58.7	76.3	49.6
22:30	58.7	75.5	50.4
22:45	61.7	76.9	49.9
23:00	61.3	79.3	49.7
23:15	56.9	73.4	49.5
23:30	50.5	57.6	49.6
23:45	50.7	70.8	49.5
00:00	51.0	62.6	49.7
00:15	49.7	62.1	48.4
00:30	49.4	60.7	47.4
00:45	50.1	59.6	49.1

Time	L_{Aeq}	L_{AMax}	L_{A90}
01:00	50.5	56.8	49.1
01:15	48.6	55.8	46.9
01:30	48.5	55.7	47.0
01:45	50.8	61.7	48.7
02:00	49.8	59.0	48.0
02:15	47.0	50.8	45.5
02:30	48.6	56.3	47.0
02:45	48.9	55.7	48.1
03:00	49.6	64.3	47.9
03:15	49.4	71.0	47.4
03:30	48.4	62.7	47.6
03:45	49.4	66.8	47.9
04:00	49.4	63.4	47.8
04:15	48.3	57.3	47.3
04:30	48.1	56.5	47.1
04:45	48.7	66.0	47.1
05:00	50.9	61.9	48.6
05:15	49.5	58.9	48.3
05:30	50.1	63.7	48.4
05:45	50.3	64.5	48.8
06:00	63.7	78.9	50.2
06:15	63.9	77.3	49.6
06:30	64.3	77.6	49.7
06:45	63.0	80.5	49.8
07:00	52.9	64.9	51.4
07:15	54.2	66.0	52.0
07:30	55.0	63.7	52.3
07:45	54.0	67.1	52.1
08:00	54.5	63.6	52.2
08:15	54.4	64.4	52.3
08:30	54.8	66.0	52.2
08:45	55.5	68.7	52.0
09:00	53.8	63.4	51.8
09:15	54.6	65.6	51.7
09:30	54.5	63.2	51.9
09:45	53.9	70.1	51.1
10:00	53.5	64.3	51.0
10:15	53.7	64.6	50.8
10:30	53.3	64.9	51.0
10:45	55.6	79.4	51.3
11:00	53.7	74.9	51.6
11:15	54.5	65.5	51.2
11:30	53.9	67.3	51.1
11:45	53.8	63.9	51.1
12:00	55.8	70.5	51.2
12:15	53.7	66.4	51.1
12:30	53.2	68.4	51.1
12:45	54.4	66.7	51.3

EC 20746 - Waitrose Richmond Rooftop Noise Measurement

Waitrsoe Ltd

MP2 - Tabulated Noise data

Time	L_{Aeq}	L_{AMax}	L_{A90}
13:00	53.1	64.7	51.1
13:15	53.3	68.8	51.1
13:30	53.6	64.3	51.3
13:45	54.3	75.1	51.4
14:00	56.0	77.4	51.4
14:15	54.4	66.6	51.4
14:30	53.3	63.2	51.4
14:45	56.7	74.9	51.4
15:00	63.3	79.4	51.5
15:15	64.0	80.1	51.3
15:30	64.7	80.0	51.7
15:45	64.2	78.7	51.9
16:00	64.2	80.0	51.8
16:15	64.3	80.4	51.4
16:30	63.8	79.8	51.8
16:45	62.3	79.3	51.9
17:00	63.7	79.3	51.7
17:15	59.3	75.6	50.7
17:30	62.5	79.9	51.1
17:45	62.6	80.4	51.1
18:00	62.8	80.0	50.7
18:15	62.9	78.8	51.4
18:30	64.7	81.7	51.3
18:45	62.1	75.8	51.1
19:00	64.2	80.0	51.0
19:15	64.6	81.6	51.1
19:30	64.3	80.6	51.3
19:45	64.1	78.6	51.3
20:00	62.4	78.8	51.1
20:15	62.3	75.7	51.2
20:30	60.0	74.0	50.9
20:45	62.1	78.9	51.0
21:00	61.1	77.4	48.8
21:15	62.4	76.8	48.2
21:30	58.1	74.9	47.5
21:45	59.7	83.9	47.9
22:00	58.8	76.5	47.8
22:15	61.1	76.9	47.8
22:30	58.7	71.1	46.3
22:45	59.1	74.7	46.4
23:00	53.6	71.4	47.7
23:15	54.5	70.8	48.5
23:30	49.1	55.9	47.9
23:45	55.0	75.4	47.3
00:00	49.5	64.2	48.1
00:15	48.0	51.0	47.3
00:30	48.3	57.4	46.4
00:45	48.0	53.8	47.2

Time	L_{Aeq}	L_{AMax}	L_{A90}
01:00	48.1	56.1	46.9
01:15	46.1	54.8	44.7
01:30	46.4	54.1	45.2
01:45	48.5	65.2	45.6
02:00	49.1	52.9	47.7
02:15	48.3	53.9	47.6
02:30	48.6	53.7	47.8
02:45	49.7	62.5	48.3
03:00	49.6	61.5	47.8
03:15	48.0	59.7	45.9
03:30	46.3	63.7	45.2
03:45	47.9	57.6	46.1
04:00	48.4	56.7	47.6
04:15	47.2	64.2	45.3
04:30	47.9	61.2	44.9
04:45	50.2	64.0	45.2
05:00	50.2	62.9	46.4
05:15	47.8	61.6	45.3
05:30	47.9	67.0	45.7
05:45	50.7	65.0	45.5
06:00	65.2	78.1	48.7
06:15	63.1	76.4	46.5
06:30	64.1	79.1	47.4
06:45	52.9	75.9	47.7
07:00	53.9	66.9	48.6
07:15	52.5	64.7	48.1
07:30	53.1	66.3	48.4
07:45	52.9	66.0	49.6
08:00	52.8	63.0	50.5
08:15	52.4	63.6	50.2
08:30	53.6	68.5	50.7
08:45	52.5	63.4	50.6
09:00	62.4	79.0	51.5
09:15	56.7	77.8	52.3
09:30	54.3	68.0	51.5
09:45	54.2	66.7	50.4
10:00	53.9	65.2	50.9
10:15	53.2	67.9	50.9
10:30	53.3	66.2	50.6
10:45	53.7	67.7	51.0
11:00	53.0	71.7	50.8
11:15	53.2	64.1	50.7
11:30	52.9	67.8	50.8
11:45	53.9	69.0	51.3
12:00	53.8	66.1	51.1
12:15	53.2	68.5	50.7
12:30	53.8	66.9	51.2
12:45	53.4	64.9	50.7

EC 20746 - Waitrose Richmond Rooftop Noise Measurement

Waitrsoe Ltd

MP2 - Tabulated Noise data

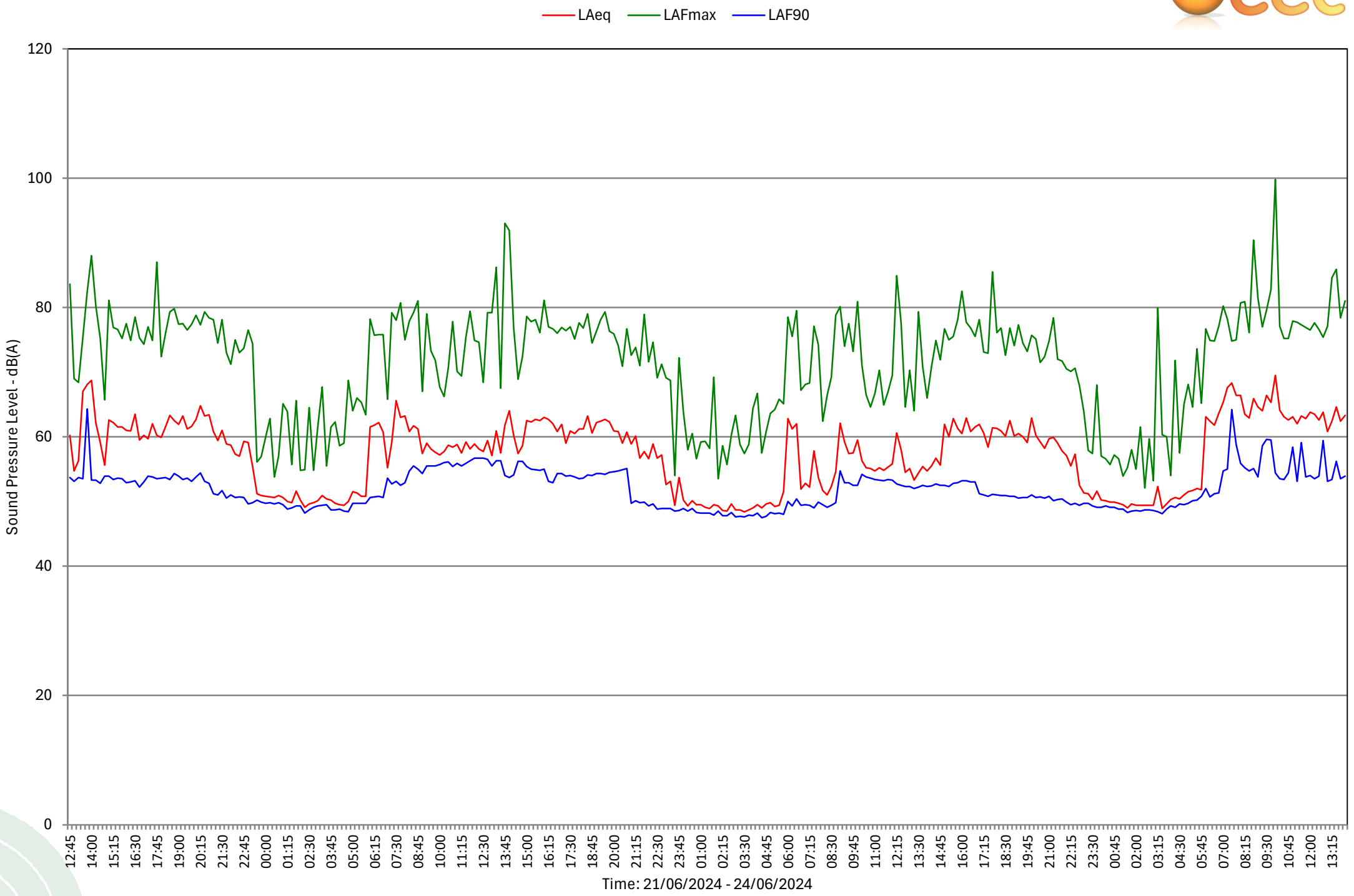
Time	L_{Aeq}	L_{AMax}	L_{A90}
13:00	52.5	64.7	50.4
13:15	52.3	63.0	50.1
13:30	52.8	63.8	50.6
13:45	54.0	69.4	50.5
14:00	52.7	63.4	50.6
14:15	52.4	64.9	50.5
14:30	53.2	63.0	51.2
14:45	53.1	69.2	51.1
15:00	63.8	78.0	50.7
15:15	61.7	77.5	50.8
15:30	64.9	77.4	51.2
15:45	63.3	79.6	51.0
16:00	62.2	76.8	50.8
16:15	65.0	79.8	51.1
16:30	62.4	79.1	51.3
16:45	63.5	79.4	50.7
17:00	64.5	81.2	49.3
17:15	62.8	76.6	49.4
17:30	59.9	75.3	49.2
17:45	58.4	74.1	49.6
18:00	63.5	78.4	48.6
18:15	63.0	78.0	48.9
18:30	62.2	76.9	48.9
18:45	65.0	79.2	48.5
19:00	62.2	76.5	48.6
19:15	63.0	79.7	48.2
19:30	62.3	76.5	48.4
19:45	61.1	76.9	48.4
20:00	65.3	78.5	48.7
20:15	62.5	77.9	47.8
20:30	61.7	75.1	49.2
20:45	60.1	73.4	48.2
21:00	61.8	77.2	47.9
21:15	62.7	82.9	47.3
21:30	61.2	73.3	47.9
21:45	59.6	73.0	47.8
22:00	58.8	74.9	47.8
22:15	57.1	71.4	46.8
22:30	59.2	73.7	47.5
22:45	53.0	71.4	46.7
23:00	48.9	60.1	47.1
23:15	48.7	53.3	47.2
23:30	48.1	52.8	46.6
23:45	50.0	64.2	46.5
00:00	48.5	57.5	46.8
00:15	48.7	56.7	47.4
00:30	47.9	52.2	46.3
00:45	47.3	55.3	46.0

Time	L_{Aeq}	L_{AMax}	L_{A90}
01:00	47.1	52.1	46.0
01:15	47.2	51.7	45.9
01:30	47.6	49.8	46.3
01:45	47.7	58.8	45.9
02:00	47.7	54.7	46.3
02:15	47.7	51.9	46.1
02:30	47.9	52.9	46.6
02:45	47.3	52.4	46.1
03:00	48.4	55.9	46.3
03:15	48.8	63.4	46.0
03:30	48.2	58.8	46.6
03:45	49.1	61.5	47.1
04:00	50.2	55.4	48.7
04:15	50.1	65.6	48.8
04:30	50.5	61.0	49.2
04:45	51.7	62.2	49.6
05:00	52.4	64.6	50.2
05:15	52.2	70.9	50.0
05:30	51.7	61.9	50.0
05:45	52.3	65.3	50.8
06:00	65.6	79.2	51.9
06:15	64.9	77.6	50.0
06:30	64.4	78.6	50.9
06:45	65.3	78.4	50.4
07:00	65.5	78.8	52.6
07:15	62.9	77.5	53.2
07:30	63.9	76.9	55.9
07:45	64.0	78.1	54.5
08:00	64.2	77.9	51.6
08:15	63.8	78.5	51.4
08:30	64.4	81.0	51.8
08:45	64.0	77.5	52.0
09:00	62.2	73.9	51.6
09:15	64.3	80.6	51.1
09:30	65.1	77.9	52.0
09:45	65.3	86.7	51.8
10:00	64.2	81.0	51.9
10:15	65.0	78.2	51.3
10:30	64.0	79.1	51.3
10:45	62.9	76.2	51.9
11:00	62.5	77.3	51.5
11:15	63.6	80.1	51.4
11:30	63.4	80.8	51.3
11:45	63.5	82.3	51.5
12:00	64.0	77.9	51.9
12:15	64.6	78.0	51.8
12:30	62.5	76.7	51.5
12:45	63.9	77.9	51.5

APPENDIX D

SURVEY RESULTS
(GRAPHICAL)

MP1 - Noise Level Time History at Waitrose Richmond Service Yard



MP2 - Noise Level Time History at Waitrose Richmond Rooftop Noise Measurement