

NoiseAssess

Acoustics, Noise and Vibration Consultants

**Proposed new Lidl Food Store
Salop Road, Wrexham**

Noise Impact Assessment

Our Reference: 11395.01.v1
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On Behalf of: Lidl UK GmbH

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1.0 INTRODUCTION

- 1.1 This noise assessment has been commissioned by Lidl UK GmbH in support of a planning application for the replacement of the Wrexham food store with a larger store. The site address is 50-52, Salop Road, Wrexham LL13 7AF
- 1.2 The store site is on the west side of Salop Road. The site has residential properties to the east, south and west and commercial premises to the north. The location of the site is shown in Figure 1.
- 1.3 The ground level of residential properties to the west is approximately 6 above the ground level of the store. The ground level of residential properties to the southeast of the site, on the junction of Salop Road and Bennion Road is approximately 5m above the site. To the east of the site the ground level of Salop Road falls by around 3m from the south to the north.
- 1.4 The existing site has the food store building to the southwest with car parking to the east and north of the site. Deliveries and collections to the store use a docking bay to the south of the store. The existing store's external plant is on the west elevation of the store, some at the north end of the building and some at the south end.
- 1.5 The proposed new store will be slightly larger than the existing store and will extend approximately 7m further east than the existing store. The car park layout will be redesigned. Deliveries will be via a loading dock to the south of the store building. External plant will be on a plinth at the south end of the west elevation of the store and behind south facing louvres on the east side of the store building. The proposed site layout is shown in Figure 2.
- 1.6 The proposed trading hours are:
- i) 08:00 to 21:00 hours Monday to Saturday
 - ii) 10:00 to 16:00 hours Sundays & Bank Holidays
- 1.7 The client has asked that consideration be given to extending the trading times to 07:00-22:00 hrs, Monday to Saturday with no change to the proposed trading times on Sundays and Bank Holidays.

- 1.8 Deliveries to the site are currently restricted by a planning condition to the following permitted periods:
- i) Monday to Saturdays 07:00-10:00 hrs & 19:00-21:00 hrs
 - ii) No deliveries permitted on Sundays and Banks Holidays
- 1.9 The client has asked that consideration be given to extending the delivery hours to 07:00-22:00 hrs seven days a week.
- 1.10 This report relates to the potential impact of the operational noise arising from mechanical services plant; deliveries using the loading dock in the service bay and vehicle movements in the car park.

2.0 NOISE SURVEY

2.1 An unattended survey of the noise levels representative of the closest residential properties was carried out from 12:00 hrs Friday 26 June 2015 to 12:00 hrs Monday 29 June 2015.

2.2 The Noise levels were measured at the following locations:

Location A: On the east boundary of the site's car park approximately 13m north of the southern boundary of the car park. The microphone was mounted at a height of approximately 4m above ground level. The microphone was approximately the same distance from the centre of Salop Road as the houses along the east side of Salop Road. The noise monitoring location is also considered to be representative of the north facing elevation of the flats to the southeast of the site.

Location B: At the top of the bank to the south of the delivery bay. The survey location is considered to be representative of the residential properties to the west of the site.

The survey locations are marked on Figure 1.

2.3 Noise measurements were carried out using two Rion NL-31 Type 1 auto-logging sound level meters fitted with double skin environmental windshields. Rion NL-31 s/n 00583265 was installed at location A and Rion NL-31 s/n 00583265 was installed at location B. The microphones were in freefield conditions at both survey locations.

2.4 The sound level meters were calibrated using a portable Norsonic 1251 calibrator (s/n 32860) at the start and finish of the survey period with no variation in the calibration level. Noise levels were measured using 5 minute sample periods.

2.5 When the site was visited to install and retrieve the sound level meter the weather conditions were dry with low wind speeds (<5m/s). From the weather forecast it is understood that the weather conditions were similar throughout most of the survey.

2.6 The results of the noise survey are presented in full in Appendix A2 and summarised in Tables 1 and 2. The $dB_{Aeq,5min}$ ambient noise levels have been logarithmically averaged and the $dB_{LA90,5min}$ values have been arithmetically averaged to derive the 1 hour daytime noise levels and night-time 15 minute noise levels. Values have been provided for the following periods:

Friday, Saturday & Monday daytimes

- 07:00-10:00 hrs: permitted morning deliveries Mon-Sat
- 19:00-21:00 hrs: permitted evening deliveries Mon-Sat
- 07:00-22:00 hrs: desired deliveries Mon-Sat
- 07:00-08:00 hrs: first hour of potential Mon-Sat extended trading times
- 08:00-21:00 hrs: existing and proposed trading hours
- 21:00-22:00 hrs: final hour of potential Mon-Sat extended trading times

Sunday daytime

- 10:00-16:00 hrs: permitted trading hours
- 07:00-22:00 hrs: desired Sunday deliveries

Night-times

- 23:00-02:00 hrs: quiet period when most people trying to get to sleep.
- The tables present data from all of the noise measurements falling into the time periods detailed above.

Table 1. Location A: Summary of free field noise levels

Day	Time period	dBL _{Aeq} [†]		dBL _{A90} [†]	
		Average	Range	Average	Lowest
Fri, Sat & Mon	07:00-10:00 hrs	60	57-61	49	44-52
	19:00-21:00 hrs	61	60-62	49	47-51
	07:00-22:00 hrs	60	57-62	51	43-55
	07:00-08:00 hrs	59	57-60	46	44-48
	08:00-21:00 hrs	61	59-62	51	47-55
	21:00-22:00 hrs	58	57-58	45	43-47
Sun	10:00-16:00 hrs	62	59-65	53	51-54
	07:00-22:00 hrs	60	57-65	49	41-54
All	23:00-02:00 hrs	55	48-58	39	32-45

† 1 hour reference period for daytime values and 15 minute reference period for night-time values

Table 2. Location B: Summary of free field noise levels

Day	Time period	dBL _{Aeq} [†]		dBL _{A90} [†]	
		Average	Range	Average	Range
Fri, Sat & Mon	07:00-10:00 hrs	53	49-57	43	40-45
	19:00-21:00 hrs	58	50-60	44	42-45
	07:00-22:00 hrs	53	47-60	44	40-47
	07:00-08:00 hrs	50	49-50	42	40-43
	08:00-21:00 hrs	53	48-60	44	42-47
	21:00-22:00 hrs	48	47-49	41	40-42
Sun	10:00-16:00 hrs	51	49-52	45	44-47
	07:00-22:00 hrs	50	46-52	43	38-47
All	23:00-02:00 hrs	44	38-47	36	29-43

† 1 hour reference period for daytime values and 15 minute reference period for night-time values

3.0 PROPOSED PLANT AND NOISE CONTROL

Proposed plant

- 3.1 The proposed plant is to be located in a compound to the southwest of the store building next to the delivery bay as shown on Figure 2.
- 3.2 The manufacturer's noise data for the proposed plant is detailed in Table 3.

Table 3. Manufacturer's noise data: External air handling and condenser plant

Item	No. Units.	Noise level
GFV 080.3A/3-L(S)-F6/4P	1	42 dB(A) at 5m
FDC 200VS	4	57 dB(A) at 1m
FDC 112 KXEN6	1	54 dB(A) at 1m
RIVACOLD RV4B0905	1	43 dB(A) at 10m*

* This is the manufacturer's level when the unit is installed externally. The unit will be installed in a plant room which provides 10dB of attenuation resulting in a noise level of 33 dB(A) at 10m. This has been confirmed with measurements at another Lidl store where this unit is located in a plant room.

- 3.3 The approximate proposed plant locations are shown on Figure 2. The GFV 080.3A/3-L(S)-F6/4P and RIVACOLD RV4B0905 will run intermittently 24 hours a day, 7 days a week. The FDC 200VS and FDC 112 KXEN6 air conditioning units will only operate during store opening hours.

4.0 NOISE IMPACT ASSESSMENT

Assessment Methodology

- 4.1 The potential noise impact of new external plant has been assessed in accordance with BS4142¹ and considered in context by comparison with the existing ambient noise levels and the acoustic design criteria of BS8233² and WHO³.
- 4.2 The potential impact of noise from deliveries has been considered by comparison with the existing ambient noise levels and the acoustic design criteria of BS8233 and WHO.
- 4.3 The potential impact of noise from the movement of customer vehicles in the car park has been considered by comparison with the existing ambient noise levels and the acoustic design criteria of BS8233 and WHO.
- 4.4 For the purposes of this assessment any increase in the ambient noise level greater than 2.5 dB(A) has been considered significant.

Noise from external plant

- 4.5 Noise from the proposed external mechanical services plant has been assessed for the closest residential properties. These properties are summarised below and marked on Figure 1.

R1: Houses on the east side of Salop Road

R2: Flats to the northwest of the junction of Salop Road and Bennion Road

R3: Houses on Salisbury Close to the west of the south end of the store

Calculation of plant noise at closest residential properties

- 4.6 Noise from the external mechanical services has been calculated at the closest properties using the manufacturer's noise data detailed in Table 3. The calculations include corrections for the number of plant items, distance and acoustic screening provided by the store building. A maximum value of 15 dB(A) has been used for acoustic screening, usually for situations where a plant item is screened by a relatively very tall obstacle (e.g. the façade of the store building) in close proximity. Elsewhere the acoustic screening value has been calculated for ground floor level during the daytime and first floor level during the night-time.
- 4.7 The calculations for store opening hours are detailed in Tables 4-6.

Table 4. Plant noise at R1: Salop Road, store opening hours

	Plant items			
	GFV 080.3A/3-L(S)-F6/4P	FDC 200VS	FDC 112 KXE	RIVACOLD RV4B0905
Source noise level, dB(A)	42	57	54	33
Source noise measurement distance, m	5	1	1	10
Number of units	1	4	1	1
Correction for number of units, dB(A)	0	6	0	0
Distance, m	90	90	90	65
Distance correction, dB(A)	-25	-39	-39	-16
Acoustic screening, dB(A)	-15	-15	-15	0
Noise level at house, $dB_{Aeq,1hr}$	2	9	0	17
Total noise level at house, $dB_{Aeq,1hr}$	18			

Table 5. Plant noise at R2: Salop Rd / Bennion Rd flats, store opening hours

	Plant items			
	GFV 080.3A/3-L(S)-F6/4P	FDC 200VS	FDC 112 KXE	RIVACOLD RV4B0905
Source noise level, dB(A)	42	57	54	33
Source noise measurement distance, m	5	1	1	10
Number of units	1	4	1	1
Correction for number of units, dB(A)	0	6	0	0
Distance, m	75	75	75	68
Distance correction, dB(A)	-24	-38	-38	-17
Acoustic screening, dB(A)	-15	-15	-15	0
Noise level at house, $dB_{Aeq,1hr}$	3	10	1	16
Total noise level at house, $dB_{Aeq,1hr}$	17			

Table 6. Plant noise at R3: Salisbury Close, store opening hours

	Plant items			
	GFV 080.3A/3-L(S)-F6/4P	FDC 200VS	FDC 112 KXE	RIVACOLD RV4B0905
Source noise level, dB(A)	42	57	54	33
Source noise measurement distance, m	5	1	1	10
Number of units	1	4	1	1
Correction for number of units, dB(A)	0	6	0	0
Distance, m	25	25	25	63
Distance correction, dB(A)	-14	-28	-28	-16
Acoustic screening, dB(A)	-5	-5	-5	-15
Noise level at house, $dB_{Aeq,1hr}$	23	30	21	2
Total noise level at house, $dB_{Aeq,1hr}$	31			

4.8 The calculations for night-time periods are given in Tables 7-9.

Table 7. Plant noise at R1: Salop Road, night time

	Plant items	
	GFV 080.3A/3-L(S)- F6/4P	RIVACOLD RV4B0905
Source noise level, dB(A)	42	33
Source noise measurement distance, m	5	10
Number of units	1	1
Correction for number of units, dB(A)	0	0
Distance, m	90	65
Distance correction, dB(A)	-25	-16
Acoustic screening, dB(A)	-15	0
Noise level at house, dBL_{Aeq,5min}	2	17
Total noise level at house, dBL_{Aeq,5min}	17	

Table 8. Plant noise at R2: Salop Rd / Bennion Rd flats, night time

	Plant items	
	GFV 080.3A/3-L(S)- F6/4P	RIVACOLD RV4B0905
Source noise level, dB(A)	42	33
Source noise measurement distance, m	5	10
Number of units	1	1
Correction for number of units, dB(A)	0	0
Distance, m	75	68
Distance correction, dB(A)	-24	-17
Acoustic screening, dB(A)	-15	0
Noise level at house, dBL_{Aeq,5min}	3	16
Total noise level at house, dBL_{Aeq,5min}	16	

Table 9. Plant noise at R3: Salisbury Close, night time

	Plant items	
	GFV 080.3A/3-L(S)- F6/4P	RIVACOLD RV4B0905
Source noise level, dB(A)	42	33
Source noise measurement distance, m	5	10
Number of units	1	1
Correction for number of units, dB(A)	0	0
Distance, m	25	63
Distance correction, dB(A)	-14	-16
Acoustic screening, dB(A)	-5	-5
Noise level at house, dBL_{Aeq,5min}	23	12
Total noise level at house, dBL_{Aeq,5min}	23	

BS4142 Assessment

4.9 The impact of new mechanical services noise sources is normally assessed in accordance with BS4142¹. The standard was revised in 2014 and the latest version has been used.

4.10 The scope of BS4142 is given in the extract below.

"1.1 This standard describes methods for rating and assessing sound of an industrial and/or commercial nature, which includes:

- a) Sound from industrial and manufacturing processes;
- b) Sound from fixed installations which comprise mechanical and electrical plant and equipment;
- c) Sound from the loading and unloading of goods and materials at industrial and / or commercial premises; and
- d) Sound from mobile plant and vehicles that is an intrinsic part of the overall sound emanating from premises or processes, such as that from forklift trucks, or that from train or ship movements on or around an industrial and / or commercial site.

The methods described in this British Standard use outdoor sound levels to assess the likely effects of sound on people who might be inside or outside a dwelling or premises used for residential purposes upon which sound is incident."

4.11 The standard compares sound from industrial / commercial sources with the background sound level. The standard states in Clause 9.1 that "Certain acoustic features can increase the significance of impact over that expected from a basic comparison between the specific sound level and the background sound level". Such features are taken into account by adding a correction to the specific sound level depending on the extent to which the distinguishing acoustic characteristics will attract attention. The standard states the following in Clause 9.2:

- "Tonality: For sound ranging from not tonal to prominently tonal the Joint Nordic Method gives a correction of between 0 dB and +6dB for tonality. Subjectively, this can be converted to a penalty of 2 dB for a tone that is just perceptible at the noise receptor, 4 dB where it is clearly perceptible and 6 dB where it is highly perceptible".
- "Impulsivity: A correction of up to 9 dB can be applied for sound that is highly impulsive, considering both the rapidity of the change in sound level and the overall change in sound level. Subjectively, this can be converted to a penalty of 3dB for impulsivity which is just perceptible at the noise receptor, 6 dB where it is clearly perceptible, and 9 dB where it is highly perceptible."
- "Other sound characteristics: Where the specific sound features characteristics that are neither tonal nor impulsive, though otherwise are readily distinctive against the residual acoustic environment, a penalty of 3dB can be applied."
- "Where tonal and impulsive characteristics are present in the specific sound within the same reference period then these two corrections can both be taken into account. If one feature is dominant then it may be appropriate to apply a single correction. Where both features are likely to affect perception of response, the correction ought normally to be applied in a linear fashion."
- "Intermittency: When the specific sound has identifiable on/off conditions, the specific sound level ought to be representative of the time period of length equal to the reference time interval which contains the greatest total amount of on time. This can necessitate measuring the specific sound over a number of shorter sampling periods that are in combination less than the reference time interval in total, and then calculating the specific sound level for the reference time interval allowing for time when the specific sound is not present. If the intermittency is readily distinctive against the residual acoustic environment, a penalty of 3 dB can be applied".

Note: Although not clear in the standard it appears from the examples given that the intermittency penalty is for use when the specific sound source is intermittent but not particularly impulsive. Therefore it has been assumed that impulsive and intermittency penalties would not generally be both applied in a linear fashion.

4.12 BS4142 provides guidance on the assessment of impacts in Clause 11.

"11 Assessment of the impacts

COMMENTARY ON CLAUSE 11.

The significance of sound of an industrial / commercial nature depends upon both the margin by which the rating 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.

Obtain an initial estimate of the impact of the specific sound by subtracting the measured background sound level from the rating level, and consider the following:

- a) Typically, the greater this difference, the greater the magnitude of the impact.
- b) A difference of around +10dB or more is likely to be an indication of a significant adverse impact, depending on the context.
- c) A difference of around +5dB is likely to be an indication of an adverse impact, depending on the context.
- d) The lower the rating level is relative to the measured background sound level, the less likely it is that the specific sound source will have an adverse impact or a significant adverse impact. Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending on the context".

4.13 The BS4142¹ assessments of plant noise at the nearest residential receivers are shown in Tables 10-12.

- A 2dB tonal penalty and a 3dB impulsive/intermittency penalty have been added as a precaution.
- The daytime assessments have used the lowest 1 hour background noise level, $dB_{LA90,1hr}$, measured during the proposed Monday-Saturday store opening times of 08:00-21:00 hrs (and 10:00-16:00hrs on Sunday) and the lowest background noise level, $dB_{LA90,1hr}$, measured during the potential Monday-Saturday store opening times of 07:00-22:00 hrs.
- The night-time assessments have used the lowest 15 minute background noise level $dB_{LA90,15min}$, measured during the period 23:00-02:00hrs, the critical period when most people are falling asleep.

Table 10. BS4142 assessment – proposed store opening hours, 08:00-21:00hrs.

Receiver	R1	R2	R3
Specific noise level, dB_{LAeq}	18	17	31
Tonal Penalty, dB	2	2	2
Impulsive/Intermittency penalty, dB	3	3	3
Rating, dB	23	22	36
Background noise level, dB_{LA90}	47	47	42
Rating - background, dB	-24	-25	-6

Table 11. BS4142 assessment – potential store opening hours, 07:00-22:00hrs.

Receiver	R1	R2	R3
Specific noise level, dB_{LAeq}	18	17	31
Tonal Penalty, dB	2	2	2
Impulsive/Intermittency penalty, dB	3	3	3
Rating, dB	23	22	36
Background noise level, dB_{LA90}	43	43	40
Rating - background, dB	-20	-21	-4

Table 12. BS4142 assessment - night time

Receiver	R1	R2	R3
Specific noise level, dB_{LAeq}	17	16	23
Tonal Penalty, dB	2	2	2
Impulsive/Intermittency penalty, dB	3	3	3
Rating, dB	22	21	28
Background noise level, dB_{LA90}	32	32	29
Rating - background, dB	-10	-11	-1

4.14 Tables 10 and 11 show that the worst case BS4142 assessment results for the proposed and potential store opening times will be:

- i) A rating level 6 dB below the lowest measured background noise level, $dB_{LA90,1hr}$, for the proposed store opening times of 08:00-21:00 hrs.
- ii) A rating level 4 dB below the lowest measured background noise level, $dB_{LA90,1hr}$, for the potential extended store opening times of 07:00-22:00 hrs

These rating levels for both the proposed and potential store opening times indicate a low impact depending on the context.

4.15 Table 12 shows that the worst case BS4142 assessment result for the night-time period will be rating 1 dB below the lowest background noise level, $dB_{LA90,15min}$, measured during the critical period 23:00-02:00 hrs. This normally indicates low impact depending on the context.

Consideration of plant noise in 'context'

4.16 BS4142 recommends that the noise also be judged in context. Noise from the external mechanical services plant has been compared against the lowest measured daytime ambient noise levels, $dB_{LAeq,1hr}$ and the lowest measured night-time ambient noise levels, $dB_{LAeq,15min}$ for the period 23:00-02:00 hrs. The comparison is shown in Tables 13-15.

Table 13. Comparison of plant noise during proposed store opening times 08:00-21:00 hrs with lowest ambient noise levels.

	R1	R2	R3
Plant noise, $dB_{LAeq,1hr}$	18	17	31
Existing ambient $dB_{LAeq,1hr}$	59	59	48
Difference between plant noise and ambient, dB(A)	-41	-42	-17
Existing ambient + plant noise, $dB_{LAeq,1hr}$	59	59	48
Increase, dB(A)	0	0	0

Table 14. Comparison of plant noise during potential store opening times 07:00-22:00 hrs with lowest ambient noise levels.

	R1	R2	R3
Plant noise, $dB_{L_{Aeq,1hr}}$	18	17	31
Existing ambient $dB_{L_{Aeq,1hr}}$	57	57	47
Difference between plant noise and ambient, dB(A)	-39	-40	-16
Existing ambient + plant noise, $dB_{L_{Aeq,1hr}}$	57	57	47
Increase, dB(A)	0	0	0

Table 15. Comparison of plant noise during night-time with lowest ambient noise levels during period 23:00-02:00 hrs.

	R1	R2	R3
Plant noise, $dB_{L_{Aeq,1hr}}$	17	16	23
Existing ambient $dB_{L_{Aeq,1hr}}$	48	48	38
Difference between plant noise and ambient, dB(A)	-31	-32	-15
Existing ambient + plant noise, $dB_{L_{Aeq,15min}}$	48	48	38
Increase, dB(A)	0	0	0

4.17 Tables 13-15 shows that noise from the external mechanical services plant will be:

- i) 17-42 dB(A) below the lowest ambient noise levels measured during the proposed store opening times 08:00-21:00 hrs and will result in no increase in ambient noise levels.
- ii) 16-40 dB(A) below the lowest ambient noise levels measured during the potential store opening times 07:00-22:00 hrs and will result in no increase in ambient noise levels.
- iii) 15-32 dB(A) below the lowest ambient noise levels measured during the night-time period 23:00-02:00 hrs and will result in no increase in ambient noise levels.
- iv) Comparison of plant noise with the existing ambient noise levels indicates a very low noise impact.

- 4.18 The noise levels can also be compared with absolute criteria given in BS8233² or World Health Organisation Guidelines³. The calculated plant noise levels at the closest residential properties are 17-31 dBL_{Aeq} during store opening times and 16-23 dBL_{Aeq} at night.
- i) The noise levels during store opening hours are well below the lowest guideline level of 50 dBL_{Aeq} for outdoor amenity areas.
 - ii) The internal noise level produced by the plant within residential properties if their windows are open can be estimated using an attenuation of 10-15 dB(A) for an open window. This would be less than or equal to 21 dB(A) in the day and less than or equal to 13 dB(A) at night. These are very low levels when compared with the recommended internal noise levels of 35 dBL_{Aeq} in the day and 30 dBL_{Aeq} at night.
- 4.19 Therefore in the light of the context of the BS4142 assessment it is considered that the results will be acceptable.

Delivery noise

- 4.20 The noise from the delivery movements has been calculated from SEL values using the following formula:

$$L_{Aeq(T)} = SEL + 10 \log N - 10 \log T$$

where $L_{Aeq(T)}$ = Equivalent continuous sound pressure level over time period T
SEL = 'Single Event Level', i.e. the 1 second L_{Aeq} which has the same total A-weighted energy as the entire event
N = Number of events in time period T
T = Time period in seconds

- 4.21 Calculations have been carried out of the noise from the arrival and reverse of the vehicle, the unloading and the subsequent departure.
- 4.22 The assessment has been based on there being no more than 1 delivery within a 1 hour period.
- 4.23 Noise has been assessed for the daytime period only.
- 4.24 A higher SEL has been used for the reverse to cover the noise from typical reversing alarms.
- 4.25 The delivery noise calculations are given in the Tables 16-18 for the 3 closest residential properties, R1, R2 and R3 detailed in the plant noise section above.

Table 16. Delivery noise at R1, Salop Road

Movement	1	2	3	4	5
SEL at 10m, dB(A)	79	86	68	79	79
No. of operations	1	1	28	1	1
Correction for no. of operations, dB(A)	0.0	0.0	14.5	0.0	0.0
Reference period, minutes	60	60	60	60	60
Correction for reference period, dB(A)	-35.6	-35.6	-35.6	-35.6	-35.6
Distance, m	32	39	73	56	53
Distance correction, dB(A)	-10.1	-11.8	-17.3	-15	-14.5
Barrier correction, dB(A)	0	0	0	0	0
Each item: noise at house dB L _{Aeq}	33.3	38.6	29.6	28.4	28.9
Total noise at house dB LAeq	40.7				

1. Forward arrival; 2. Reverse, stop to open doors & reverse; 3. Unloading;

4. Move forward after delivery & stop to close doors; 5. Depart

Table 17. Delivery noise at R2: Salop Rd / Bennion Rd flats

Movement	1	2	3	4	5
SEL at 10m, dB(A)	79	86	68	79	79
No. of operations	1	1	28	1	1
Correction for no. of operations, dB(A)	0.0	0.0	14.5	0.0	0.0
Reference period, minutes	60	60	60	60	60
Correction for reference period, dB(A)	-35.6	-35.6	-35.6	-35.6	-35.6
Distance, m	30	30	45	40	45
Distance correction, dB(A)	-9.5	-9.5	-13.1	-12	-13.1
Barrier correction, dB(A)	0	0	0	0	0
Each item: noise at house dB L _{Aeq}	33.9	40.9	33.8	31.4	30.3
Total noise at house dB LAeq	42.9				

1. Forward arrival; 2. Reverse, stop to open doors & reverse; 3. Unloading;

4. Move forward after delivery & stop to close doors; 5. Depart

Table 18. Delivery noise at R3: Salisbury Close

Movement	1	2	3	4	5
SEL at 10m, dB(A)	79	86	68	79	79
No. of operations	1	1	28	1	1
Correction for no. of operations, dB(A)	0.0	0.0	14.5	0.0	0.0
Reference period, minutes	60	60	60	60	60
Correction for reference period, dB(A)	-35.6	-35.6	-35.6	-35.6	-35.6
Distance, m	55	55	42	55	55
Distance correction, dB(A)	-14.8	-14.8	-12.5	-14.8	-14.8
Barrier correction, dB(A)	-5	-5	-5	-5	-5
Each item: noise at house dB L _{Aeq}	23.6	30.6	29.4	23.6	23.6
Total noise at house dB LAeq	34.3				

1. Forward arrival; 2. Reverse, stop to open doors & reverse; 3. Unloading;

4. Move forward after delivery & stop to close doors; 5. Depart

4.26 Deliveries to the site are currently restricted by planning conditions to the following permitted periods:

- i) Monday to Saturdays 07:00-10:00 hrs & 19:00-21:00 hrs
- ii) No deliveries permitted on Sundays and Banks Holidays

4.27 The store operators want to extend the permitted times for deliveries to the following periods:

- i) Monday to Saturdays 07:00-22:00 hrs
- ii) 07:00-22:00 hrs Sundays and Banks Holidays

4.28 Noise from deliveries has been compared with the existing lowest ambient, $dB L_{Aeq,1hr}$ noise levels measured during the survey for the currently permitted delivery times and then against the lowest measured ambient, $dB L_{Aeq,1hr}$ noise levels for the desired delivery periods. The comparisons are shown in Tables 19-22.

Table 19: Comparison of delivery noise with lowest ambient noise levels during permitted delivery period 07:00-10:00 hrs, Mon-Sat.

	R1	R2	R3
Delivery noise, $dB_{Leq,1hr}$	41	43	34
Existing ambient $dB_{Leq,1hr}$	57	57	47
Difference between delivery noise and ambient, dB(A)	-16	-14	-13
Existing ambient + delivery noise, $dB_{Leq,15min}$	57	57	47
Increase, dB(A)	0	0	0

Table 20: Comparison of delivery noise with lowest ambient noise levels during permitted delivery period 19:00-21:00 hrs, Mon-Sat.

	R1	R2	R3
Delivery noise, $dB_{Leq,1hr}$	41	43	34
Existing ambient $dB_{Leq,1hr}$	60	60	50
Difference between delivery noise and ambient, dB(A)	-19	-17	-16
Existing ambient + delivery noise, $dB_{Leq,15min}$	60	60	50
Increase, dB(A)	0	0	0

Table 21: Comparison of delivery noise with lowest ambient noise levels during desired delivery period 07:00-22:00 hrs, Mon-Sat.

	R1	R2	R3
Delivery noise, $dB_{Leq,1hr}$	41	43	34
Existing ambient $dB_{Leq,1hr}$	57	57	47
Difference between delivery noise and ambient, dB(A)	-16	-14	-13
Existing ambient + delivery noise, $dB_{Leq,15min}$	57	57	47
Increase, dB(A)	0	0	0

Table 22: Comparison of delivery noise with lowest ambient noise levels during desired delivery period 07:00-22:00 hrs, Sunday.

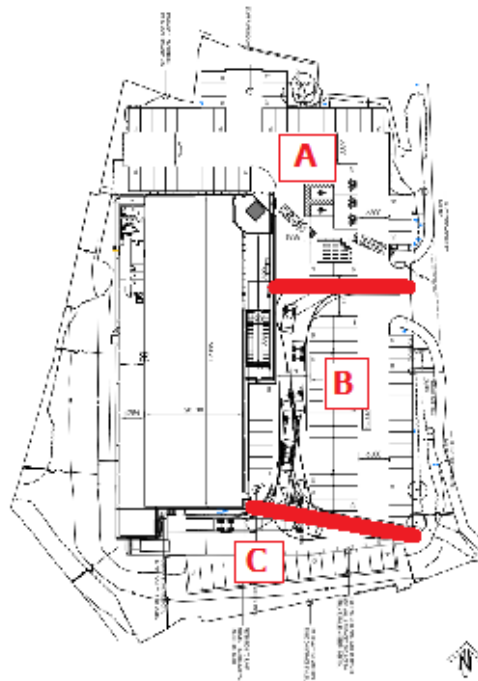
	R1	R2	R3
Delivery noise, $dB_{Leq,1hr}$	41	43	34
Existing ambient $dB_{Leq,1hr}$	57	57	46
Difference between delivery noise and ambient, dB(A)	-16	-14	-12
Existing ambient + delivery noise, $dB_{Leq,15min}$	57	57	46
Increase, dB(A)	0	0	0

- 4.29 Noise from deliveries are between 13 and 19 dB(A) below the existing ambient, $dB_{L_{Aeq,1hr}}$ noise levels at the closest residential properties during the permitted delivery times of 07:00-10:00 hrs and 19:00-21:00 hrs Monday to Saturday. These values mean that noise from deliveries does not result in any increase in existing ambient noise levels.
- 4.30 The comparison of delivery noise with the ambient noise levels shows that the currently permitted delivery times (07:00-10:00 hrs & 19:00-21:00 hrs) occur during the most sensitive times of the day. The daytime periods between the currently permitted periods have higher ambient noise levels than during the currently permitted delivery periods. It is therefore recommended that there are no reasons not to permit deliveries during the full period of 07:00-21:00hrs Monday to Saturday.
- 4.31 If deliveries were permitted during the period 07:00-22:00hrs, 7 days a week the resultant noise levels at the closest residential properties would be between 12 and 16 dB(A) below the existing ambient noise levels. The values also show that noise from deliveries during the desired extended period of 07:00-22:00hrs, 7 days a week would not result in any increase in existing ambient noise levels at the closest residential properties. It is therefore recommended that there are no reasons not to permit deliveries during the period of 07:00-22:00hrs, 7 days a week
- 4.32 The noise levels can also be compared with absolute criteria given in BS8233 or World Health Organisation Guidelines. The calculated noise levels due to deliveries at the closest residential properties are 34-43 $dB_{L_{Aeq}}$.
- i) The noise levels well below the lowest guideline level of 50 $dB_{L_{Aeq}}$ for outdoor amenity areas.
 - ii) The internal noise level produced by the plant within residential properties if their windows are open can be estimated using an attenuation of 10-15 dB(A) for an open window. This would be 19-33 dB(A) in the day which is below the recommended daytime internal noise level of 35 $dB_{L_{Aeq}}$.
- 4.33 The assessment shows that the impact of delivery noise on the closest residential properties is currently very low to low and there will no additional impact on the closest residential properties if the permitted time for deliveries is extended to 07:00-22:00 hrs, 7 days a week

Noise from movement of customer vehicles in car park

- 4.34 The proposed site plan states that the car park will have 118 customer parking bays.
- 4.35 Data provided for another Lidl store indicates that the peak hour there may be 2.85 vehicle movements per parking bay (source data for Lidl, Wallasey).
- 4.36 The calculated impact of noise from the use of the car park is based on the equal use of each parking space in the car park. For the purposes of the assessment the car park has been split into three areas: A, B & C (see below).

Car park areas used for calculations:



- 4.37 The ambient noise level due to the use of the car park has been calculated for each of the three receptors detailed in the plant and delivery sections above. Noise levels have been calculated for a height 1.5m above ground level at the receptors. The calculations allow for the partial barrier attenuation provided by the store building for R3, Salisbury Close. The calculations are shown in Tables 23-25.

Table 23: Peak hour car park noise at R1: Salop Road

	Car park areas		
	A	B	C
Movement SEL at 10m, dB(A)	68	68	68
No. of operations	128	185	23
Correction for no. of operations, dB(A)	21.1	22.7	13.6
Reference period, minutes	60	60	60
Correction for reference period, dB(A)	-35.6	-35.6	-35.6
Distance, m	77	45	58
Distance correction, dB(A)	-17.7	-13.1	-15.3
Barrier correction	0	0	0
Movement noise at houses dB L_{Aeq}	35.8	42.0	30.7
Total movement noise at houses dB L_{Aeq}	43.2		

Table 24: Peak hour car park noise at R2: R2: Salop Rd / Bennion Rd flats

	Car park areas		
	A	B	C
Movement SEL at 10m, dB(A)	68	68	68
No. of operations	128	185	23
Correction for no. of operations, dB(A)	21.1	22.7	13.6
Reference period, minutes	60	60	60
Correction for reference period, dB(A)	-35.6	-35.6	-35.6
Distance, m	100	50	33
Distance correction, dB(A)	-20	-14	-10.4
Barrier correction	0	0	0
Movement noise at houses dB L_{Aeq}	33.5	41.1	35.6
Total movement noise at houses dB L_{Aeq}	42.7		

Table 25: Peak hour car park noise at R3: Salisbury Close

	Car park areas		
	A	B	C
Movement SEL at 10m, dB(A)	68	68	68
No. of operations	128	185	23
Correction for no. of operations, dB(A)	21.1	22.7	13.6
Reference period, minutes	60	60	60
Correction for reference period, dB(A)	-35.6	-35.6	-35.6
Distance, m	95	69	61
Distance correction, dB(A)	-19.6	-16.8	-15.7
Barrier correction	-15	-15	0
Movement noise at houses dB L_{Aeq}	18.9	23.3	30.3
Total movement noise at houses dB L_{Aeq}	31.3		

- 4.38 The noise levels due to the peak hour of movements in the car park will be 43 $\text{dBL}_{\text{Aeq,1hr}}$ at R1 and R2 and 31 $\text{dBL}_{\text{Aeq,1hr}}$ at R3.
- 4.39 Noise from vehicle movements in the car park has been compared against the lowest ambient noise levels measured during the potential trading hours of 07:00-22:00 hrs Monday to Saturday and 10:00-16:00 hrs Sundays and Bank Holidays. The comparisons are shown in Tables 26 and 27.

Table 26: Comparison of delivery noise with lowest ambient noise levels during potential opening hours 07:00-22:00 hrs, Mon-Sat.

	R1	R2	R3
Car park noise, $\text{dBL}_{\text{Aeq,1hr}}$	43	43	31
Existing ambient $\text{dBL}_{\text{Aeq,1hr}}$	57	57	47
Difference between car park noise and ambient, dB(A)	-14	-14	-16
Existing ambient + car park noise, $\text{dBL}_{\text{Aeq,15min}}$	57	57	47
Increase, dB(A)	0	0	0

Table 27: Comparison of delivery noise with lowest ambient noise levels during opening hours 10:00-16:00 hrs, Sunday.

	R1	R2	R3
Car park noise, $\text{dBL}_{\text{Aeq,1hr}}$	43	43	31
Existing ambient $\text{dBL}_{\text{Aeq,1hr}}$	59	59	49
Difference between car park noise and ambient, dB(A)	-16	-16	-18
Existing ambient + car park noise, $\text{dBL}_{\text{Aeq,15min}}$	59	59	49
Increase, dB(A)	0	0	0

- 4.40 Noise from the movement of customers vehicles in the car park are:
- i) Between 14 and 16 dB(A) below the lowest existing ambient, $\text{dBL}_{\text{Aeq,1hr}}$, noise levels at the closest residential properties during the potential opening hours of 07:00-10:00 hrs
 - ii) Between 16 and 18 dB(A) below the existing ambient, $\text{dBL}_{\text{Aeq,1hr}}$, noise levels at the closest residential properties during opening hours of 10:00-16:00 hrs on Sundays and Bank Holidays.
 - iii) These values mean that noise from customer vehicle movements in the car park will not result in any increase in existing ambient noise levels at the closest residential properties

- 4.41 The noise levels can also be compared with absolute criteria given in BS8233 or World Health Organisation Guidelines. The calculated noise levels due to customer vehicles in the car park at the closest residential properties are 31-43 dBL_{Aeq}.
- i) The noise levels well below the lowest guideline level of 50 dBL_{Aeq} for outdoor amenity areas.
 - ii) The internal noise level produced by the plant within residential properties if their windows are open can be estimated using an attenuation of 10-15 dB(A) for an open window. This would be less than or equal to 21-33 dB(A) in the day which is below the recommended daytime internal noise level of 35 dBL_{Aeq}.
- 4.42 The assessment demonstrates that the impact of noise from the movement of customer vehicles in the car park on the closest residential properties will be very low to low.
- 4.43 It should be noted that the assessment is conservative because the noise from vehicle movements is compared with the lowest measured ambient noise levels during the proposed trading hours. It is highly unlikely that the period of peak vehicle movements will coincide with the period of lowest ambient noise levels.

5.0 CONCLUSIONS

- 5.1 A noise assessment has been carried out to assist with the planning application for the replacement of an existing food store with a larger store in the same location at 50-52 Salop Road, Wrexham LL13 7AF.
- 5.2 A noise survey has been carried out of the existing noise levels representative of the closest residential properties to the proposed food store. The survey used two unattended sound level meters to measure noise levels continuously from midday on Friday 26 June to midday on Monday 29 June 2015.
- 5.3 The opening hours of the existing store are: 08:00 to 21:00 Monday to Saturday and 10:00 to 16:00 hrs on Sundays and Bank Holidays. The assessment has been carried out for the potential extended opening hours of 07:00-22:00 hrs, Monday to Saturday and the proposed hours of 10:00-16:00hrs on Sunday.
- 5.4 Deliveries to the store are currently restricted by planning conditions to the permitted periods of Mondays to Saturdays 07:00-10:00 hrs and 19:00-21:00hrs with no deliveries permitted on Sundays and Bank Holidays. The operators wish to extend the delivery times to 07:00-22:00 hrs, seven days a week.
- 5.5 The assessment shows that noise from external plant at the proposed store will have a very low to low noise impact on the closest residential properties. The assessment shows that the potential extension of store opening hours to 07:00-22:00 hrs would not affect the impact of plant noise.

- 5.6 The assessment shows that noise impact of from deliveries on the closest residential properties during the currently permitted periods of 07:00-10:00 hrs and 19:00-21:00 hrs is very low to low.
- i) The assessment compares delivery noise with the ambient noise levels and shows that the currently permitted delivery times (07:00-10:00 hrs & 19:00-21:00 hrs) occur during the most sensitive times of the day. The daytime periods between the currently permitted periods have higher ambient noise levels than during the currently permitted delivery periods. It is therefore recommended that there are no reasons not to permit deliveries during the full period of 07:00-21:00hrs Monday to Saturday.
 - ii) The assessment also shows that if deliveries were permitted during the period 07:00-22:00hrs, 7 days a week the resultant noise levels at the closest residential properties would be between 12 and 16 dB(A) below the existing ambient noise levels. The values also show that noise from deliveries during the desired extended period of 07:00-22:00hs, 7 days a week would not result in any increase in existing ambient noise levels at the closest residential properties. It is therefore recommended that there are no reasons not to permit deliveries during the period of 07:00-22:00hrs, 7 days a week.
- 5.7 The assessment shows that noise from the movement of customer vehicles in the car park will be very low to low.
- 5.8 The noise assessment shows that the noise impact of the proposed food store will be very low to low and that:
- i) The permitted opening hours may be 07:00-22:00hrs Monday to Saturday with no detrimental noise impact on the closest noise sensitive properties.
 - ii) The permitted delivery times may be extended to 07:00-22:00 hrs 7 days a week with no detrimental noise impact on the closest noise sensitive properties.

6.0 REFERENCES

1. BS4142: British Standard 4142:2014, Methods for rating and assessing industrial and commercial sound.
2. BS8233: British Standard 8233, Guidance on sound insulation and noise reduction for buildings, BSI 2014.
3. Guidelines for Community Noise, World Health Organisation, Geneva: 1999.

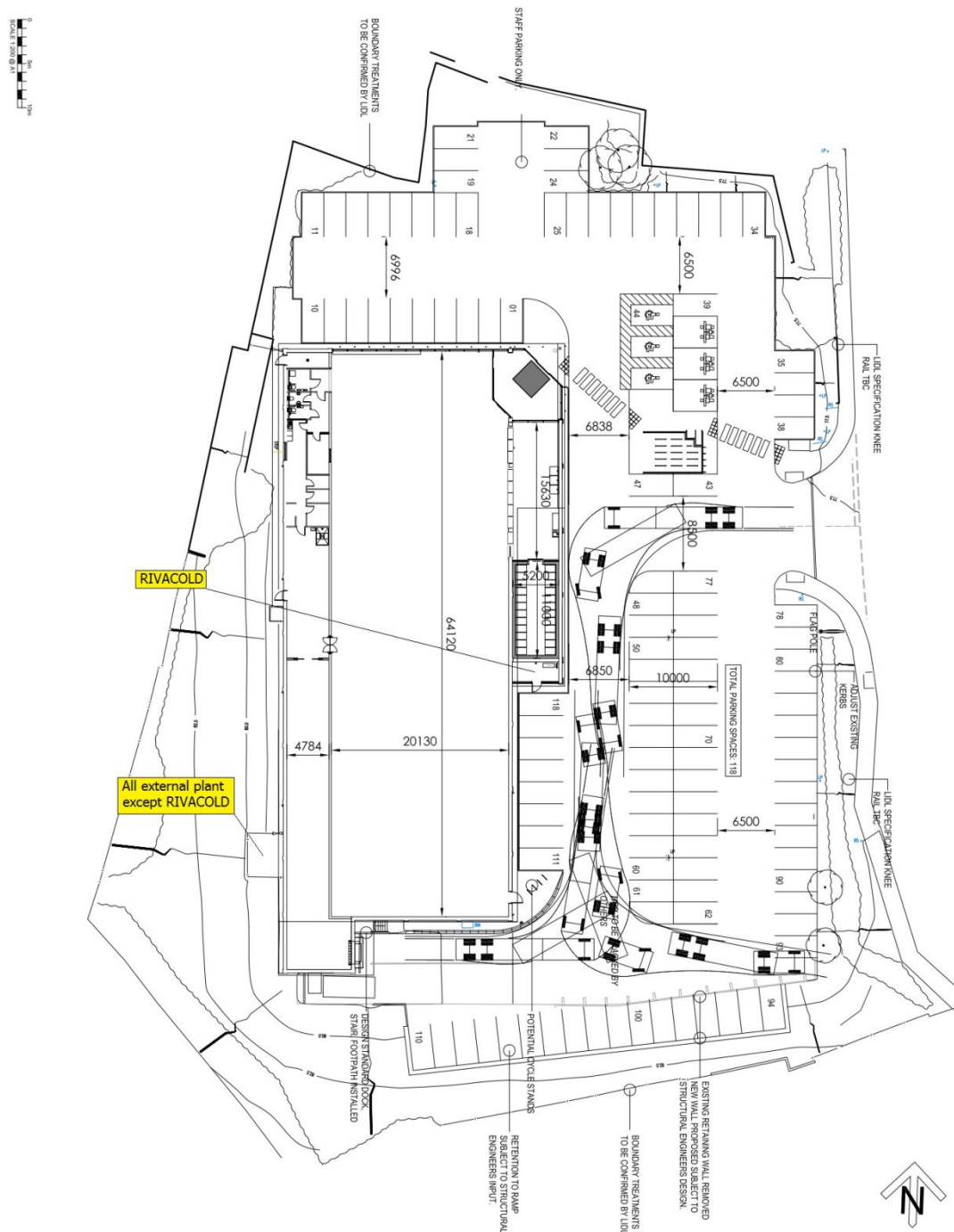
FIGURE 1. SITE AND NOISE MONITORING LOCATIONS

Shows location of site, survey locations & receptor positions



FIGURE 2. PROPOSED SITE LAYOUT

Shows: Proposed store layout and location of external plant



APPENDIX A1: ACOUSTIC TERMINOLOGY

Ambient noise	The sound pressure level at a given location (i.e. sound from all sources) usually measured using the L_{Aeq} parameter.
A-weighting	A weighting applied to the frequencies which make up a sound pressure level to mimic the response of the human ear which is less responsive to low frequency sounds as it is to high frequency sounds. The resultant level after application of the weighting is called the 'A-weighted sound pressure level' and is denoted by dB(A) or by using a subscript A (e.g. $dB_{L_{Aeq}}$).
Background noise	The noise measured in the absence of the noise under investigation usually using the statistical parameter L_{90} which represents the quietest parts of the measurement period.
Broadband sound	Sound which contains all the frequencies.
Decibel (dB)	A logarithmic measurement scale used for sound pressure levels. This scale is used because the simple use of sound pressures would be unwieldy as the range of pressures to which the human ear responds is very large. The normal threshold of hearing at 1kHz is 0dB. A level of $120dB_{L_{Aeq}}$ is very loud (L signifies level and the A and eq are explained under A-weighting and L_{eq}). Some night club dance floors can have sound levels of around $110 dB_{L_{Aeq}}$. In the workplace the wearing of hearing protection is compulsory for staff who experience a noise level of over $85dB_{L_{Aeq}}$ averaged over an 8-hour day and is normally used when the levels are over $80dB_{L_{Aeq}}$ averaged over the 8-hour day. Noise intrusion levels into bedrooms (e.g. from traffic noise) are often controlled to below $30dB_{L_{Aeq}}$ in the design of new properties (standards sometimes vary between authorities). Noise levels of below $20dB_{L_{Aeq}}$ are very quiet and would normally only be achieved in a well designed recording studio. Although noise calculations are normally carried out using figures to 1 decimal place the results are often presented to the nearest dB as changes of a fraction of a dB are not normally perceptible even in controlled conditions.
Facade noise level	Noise level including a contribution from the reflection from a building facade, usually measured at 1m from the facade.
Free field	Noise levels with no contribution from reflections from nearby structures.
Hertz	The units used for frequency denoted by Hz, i.e. the number of cycles of pressure fluctuation per second. K used in front of Hz represents 1000 (1kHz = 1000Hz). High frequency sounds (e.g. 8kHz) are high pitched and low frequency sounds (e.g. 63Hz) are the bass notes.

L_{eq}	A parameter used to denote the 'equivalent continuous sound pressure level'. This is the sound pressure level of a continuous sound that would contain the same energy as the varying sound being measured or investigated. L_{Aeq} is the parameter used to denote the 'A-weighted equivalent continuous sound pressure level' (see A-weighting).
L_{10}	A statistical parameter often used for the measurement of road traffic noise. It is the level exceeded for 10% of the time period being considered. If A-weighted a subscript A is included and the time period can also be included in subscript, e.g. $L_{A10, 1\text{hour}}$.
L_{90}	A statistical parameter often used for the measurement of background noise levels. It is the level exceeded for 90% of the time period being considered. If A-weighted a subscript A is included and the time period can also be included in subscript, e.g. $L_{A90, 5\text{min}}$.
L_{max}	The maximum noise level which occurred during the monitoring period. $L_{Amax,f}$ denotes the maximum A-weighted sound pressure level using the fast time constant of 125ms.
Loudness	Although a 3dB increase is equivalent to a doubling of the sound power level of a sound source this increase is the minimum perceptible under normal conditions. It takes a 10dB change in noise level for it to sound roughly twice (or half) as loud subjectively.
Rating Level	A term used in BS4142. The 'Specific Noise Level' plus a 5dB weighting if the noise has certain characteristic features which may make it more disturbing.
Residual noise	The ambient noise remaining when the specific noise source being investigating is not contributing to the noise level at that location (normally measured using the L_{Aeq} parameter).
Specific Noise Level	A term used in BS4142. The L_{Aeq} noise level produced at the assessment position by the noise source being investigated over the reference time period (1-hour in the day and 5-mins at night).
SEL	Single Event Level. The total sound energy of a noise event (e.g. a train pass-by) compressed into 1 second. i.e. the 1 second L_{Aeq} which has the same total A-weighted energy as the entire event.

APPENDIX A2: EXISTING NOISE LEVELS – SURVEY RESULTS

Lidl UK GmbH

NoiseAssess Ltd

Salop Road, Wrexham

Daytime Noise Measurements

Location A**Table A1: Daytime Noise Survey Data**
Friday 26 Jun 2015

Date	Start (h:m:s)	Period (h:m:s)	Free field noise levels (dB)		
			L _{Aeq}	L _{Amax(f)}	L _{A90}
26/06/2015	12:00:02	01:00:00	59.7	75.6	51.8
26/06/2015	13:00:02	01:00:00	60.9	84.1	51.3
26/06/2015	14:00:02	01:00:00	60.1	84.9	52.1
26/06/2015	15:00:02	01:00:00	60.4	81.0	53.4
26/06/2015	16:00:02	01:00:00	61.4	84.0	54.5
26/06/2015	17:00:02	01:00:00	61.1	83.5	54.1
26/06/2015	18:00:02	01:00:00	60.1	77.0	52.7
26/06/2015	19:00:02	01:00:00	60.3	80.4	50.7
26/06/2015	20:00:02	01:00:00	61.5	86.6	50.3
26/06/2015	21:00:02	01:00:00	58.0	76.4	47.2
26/06/2015	22:00:02	01:00:00	57.5	77.9	45.9
AVERAGE			60.3	-	51.3
HIGHEST			61.5	86.6	54.5
LOWEST			57.5	75.6	45.9

Table A2: Daytime Noise Survey Data
Saturday 27 Jun 2015

Date	Start (h:m:s)	Period (h:m:s)	Free field noise levels (dB)		
			L _{Aeq}	L _{Amax(f)}	L _{A90}
27/06/2015	07:00:02	01:00:00	56.6	73.2	43.5
27/06/2015	08:00:02	01:00:00	60.1	79.0	49.2
27/06/2015	09:00:02	01:00:00	59.3	79.4	51.6
27/06/2015	10:00:02	01:00:00	61.5	84.0	53.7
27/06/2015	11:00:02	01:00:00	59.5	78.6	52.3
27/06/2015	12:00:02	01:00:00	58.6	74.9	52.2
27/06/2015	13:00:02	01:00:00	59.7	83.0	52.2
27/06/2015	14:00:02	01:00:00	60.4	80.8	51.3
27/06/2015	15:00:02	01:00:00	60.2	83.5	50.9
27/06/2015	16:00:02	01:00:00	60.3	81.2	50.9
27/06/2015	17:00:02	01:00:00	61.6	84.6	50.4
27/06/2015	18:00:02	01:00:00	61.6	90.7	49.8
27/06/2015	19:00:02	01:00:00	60.9	84.3	48.6
27/06/2015	20:00:02	01:00:00	59.7	85.7	46.6
27/06/2015	21:00:02	01:00:00	57.3	74.3	43.3
27/06/2015	22:00:02	01:00:00	57.7	83.1	43.1
AVERAGE			59.9	-	49.4
HIGHEST			61.6	90.7	53.7
LOWEST			56.6	73.2	43.1

Table A3: Daytime Noise Survey Data
Sunday 28 Jun 2015

Date	Start (h:m:s)	Period (h:m:s)	Free field noise levels (dB)		
			L _{Aeq}	L _{Amax(f)}	L _{A90}
28/06/2015	07:00:02	01:00:00	57.6	79.1	40.9
28/06/2015	08:00:02	01:00:00	57.2	77.6	43.1
28/06/2015	09:00:02	01:00:00	59.2	74.8	46.4
28/06/2015	10:00:02	01:00:00	62.9	89.2	52.1
28/06/2015	11:00:02	01:00:00	59.3	78.4	51.1
28/06/2015	12:00:02	01:00:00	61.0	79.5	53.5
28/06/2015	13:00:02	01:00:00	65.1	96.7	52.7
28/06/2015	14:00:02	01:00:00	60.6	81.4	53.2
28/06/2015	15:00:02	01:00:00	59.5	77.5	53.2
28/06/2015	16:00:02	01:00:00	59.3	76.8	50.2
28/06/2015	17:00:02	01:00:00	59.6	86.9	48.4
28/06/2015	18:00:02	01:00:00	58.8	76.6	47.7
28/06/2015	19:00:02	01:00:00	58.6	86.0	47.0
28/06/2015	20:00:02	01:00:00	58.3	84.5	45.6
28/06/2015	21:00:02	01:00:00	57.5	80.2	45.3
28/06/2015	22:00:02	01:00:00	55.8	73.9	43.5
AVERAGE			60.0	-	48.4
HIGHEST			65.1	96.7	53.5
LOWEST			55.8	73.9	40.9

Table A4: Daytime Noise Survey Data
Monday 29 Jun 2015

Date	Start (h:m:s)	Period (h:m:s)	Free field noise levels (dB)		
			L _{Aeq}	L _{Amax(f)}	L _{A90}
29/06/2015	07:00:02	01:00:00	60.1	77.0	47.9
29/06/2015	08:00:02	01:00:00	61.3	81.9	51.9
29/06/2015	09:00:02	01:00:00	61.1	77.1	52.4
29/06/2015	10:00:02	01:00:00	60.3	76.6	50.9
29/06/2015	11:00:02	01:00:00	60.2	81.0	51.5
AVERAGE			60.6	-	50.9
HIGHEST			61.3	81.9	52.4
LOWEST			60.1	76.6	47.9

Location B**Table A5: Daytime Noise Survey Data**
Friday 26 Jun 2015

Date	Start (h:m:s)	Period (h:m:s)	Free field noise levels (dB)		
			L_{Aeq}	$L_{Amax(f)}$	L_{A90}
26/06/2015	12:00:02	01:00:00	48.9	67.7	44.3
26/06/2015	13:00:02	01:00:00	51.5	74.9	44.4
26/06/2015	14:00:02	01:00:00	47.7	67.1	44.2
26/06/2015	15:00:02	01:00:00	49.1	70.8	44.3
26/06/2015	16:00:02	01:00:00	50.4	68.0	46.0
26/06/2015	17:00:02	01:00:00	51.5	74.7	46.8
26/06/2015	18:00:02	01:00:00	50.3	66.7	46.3
26/06/2015	19:00:02	01:00:00	50.3	68.0	45.3
26/06/2015	20:00:02	01:00:00	60.1	92.9	44.6
26/06/2015	21:00:02	01:00:00	46.6	71.7	41.8
26/06/2015	22:00:02	01:00:00	45.9	65.9	41.5
AVERAGE			52.4	-	44.5
HIGHEST			60.1	92.9	46.8
LOWEST			45.9	65.9	41.5

Table A6: Daytime Noise Survey Data
Saturday 27 Jun 2015

Date	Start (h:m:s)	Period (h:m:s)	Free field noise levels (dB)		
			L _{Aeq}	L _{Amax(f)}	L _{A90}
27/06/2015	07:00:02	01:00:00	50.2	89.1	39.7
27/06/2015	08:00:02	01:00:00	48.9	69.8	42.8
27/06/2015	09:00:02	01:00:00	50.0	70.7	44.0
27/06/2015	10:00:02	01:00:00	52.5	72.6	46.2
27/06/2015	11:00:02	01:00:00	50.4	67.4	44.4
27/06/2015	12:00:02	01:00:00	50.9	74.4	44.8
27/06/2015	13:00:02	01:00:00	49.6	68.9	44.6
27/06/2015	14:00:02	01:00:00	52.2	75.3	44.4
27/06/2015	15:00:02	01:00:00	47.9	64.8	43.4
27/06/2015	16:00:02	01:00:00	50.6	72.4	44.1
27/06/2015	17:00:02	01:00:00	51.3	71.0	43.9
27/06/2015	18:00:02	01:00:00	51.3	76.8	43.7
27/06/2015	19:00:02	01:00:00	55.6	80.3	42.9
27/06/2015	20:00:02	01:00:00	59.3	81.9	41.8
27/06/2015	21:00:02	01:00:00	48.7	72.9	40.1
27/06/2015	22:00:02	01:00:00	44.6	61.4	38.0
AVERAGE			52.3	-	43.1
HIGHEST			59.3	89.1	46.2
LOWEST			44.6	61.4	38.0

Table A7: Daytime Noise Survey Data
Sunday 28 Jun 2015

Date	Start (h:m:s)	Period (h:m:s)	Free field noise levels (dB)		
			L _{Aeq}	L _{Amax(f)}	L _{A90}
28/06/2015	07:00:02	01:00:00	46.2	64.2	38.4
28/06/2015	08:00:02	01:00:00	48.3	78.7	40.1
28/06/2015	09:00:02	01:00:00	50.5	69.9	42.3
28/06/2015	10:00:02	01:00:00	50.9	75.1	44.9
28/06/2015	11:00:02	01:00:00	49.0	66.3	44.0
28/06/2015	12:00:02	01:00:00	50.1	66.6	45.7
28/06/2015	13:00:02	01:00:00	51.7	81.1	45.6
28/06/2015	14:00:02	01:00:00	50.4	65.8	45.4
28/06/2015	15:00:02	01:00:00	50.2	64.8	46.5
28/06/2015	16:00:02	01:00:00	50.6	76.7	44.5
28/06/2015	17:00:02	01:00:00	51.7	76.6	44.4
28/06/2015	18:00:02	01:00:00	47.4	66.9	42.5
28/06/2015	19:00:02	01:00:00	46.8	74.3	42.3
28/06/2015	20:00:02	01:00:00	48.7	79.7	41.2
28/06/2015	21:00:02	01:00:00	46.3	66.5	40.8
28/06/2015	22:00:02	01:00:00	44.2	60.0	38.7
AVERAGE			49.4	-	43.0
HIGHEST			51.7	81.1	46.5
LOWEST			44.2	60.0	38.4

Table A8: Daytime Noise Survey Data
Monday 29 Jun 2015

Date	Start (h:m:s)	Period (h:m:s)	Free field noise levels (dB)		
			L _{Aeq}	L _{Amax(f)}	L _{A90}
29/06/2015	07:00:02	01:00:00	49.3	63.0	43.3
29/06/2015	08:00:02	01:00:00	54.6	84.6	45.2
29/06/2015	09:00:02	01:00:00	57.2	86.4	45.1
29/06/2015	10:00:02	01:00:00	50.1	69.3	43.8
29/06/2015	11:00:02	01:00:00	50.3	75.1	43.8
AVERAGE			53.5	-	44.2
HIGHEST			57.2	86.4	45.2
LOWEST			49.3	63.0	43.3

Lidl UK GmbH

NoiseAssess Ltd

Salop Road, Wrexham

Night-time measurements

Location A**Table A9: Night time Noise Survey Data****Friday 26 Jun 2015 to Saturday 27 Jun 2015**

Date	Start (h:m:s)	Period (h:m:s)	Free field noise levels (dB)		
			L _{Aeq}	L _{Amax(f)}	L _{A90}
26/06/2015	23:00:02	00:15:00	56.7	74.1	45.4
26/06/2015	23:15:02	00:15:00	56.2	73.4	43.6
26/06/2015	23:30:02	00:15:00	56.9	75.9	43.5
26/06/2015	23:45:02	00:15:00	55.1	72.0	42.1
27/06/2015	00:00:02	00:15:00	55.4	75.0	43.8
27/06/2015	00:15:02	00:15:00	54.7	68.1	41.6
27/06/2015	00:30:02	00:15:00	55.0	70.2	39.3
27/06/2015	00:45:02	00:15:00	54.0	69.4	37.5
27/06/2015	01:00:02	00:15:00	54.8	74.6	39.4
27/06/2015	01:15:02	00:15:00	54.3	67.4	37.4
27/06/2015	01:30:02	00:15:00	54.2	71.7	35.5
27/06/2015	01:45:02	00:15:00	53.8	71.6	35.9
27/06/2015	02:00:02	00:15:00	51.8	69.7	38.1
27/06/2015	02:15:02	00:15:00	51.5	66.4	39.2
27/06/2015	02:30:02	00:15:00	50.4	64.6	38.8
27/06/2015	02:45:02	00:15:00	50.7	66.9	38.3
27/06/2015	03:00:02	00:15:00	52.1	66.1	40.0
27/06/2015	03:15:02	00:15:00	50.3	67.5	37.4
27/06/2015	03:30:02	00:15:00	51.3	69.5	37.3
27/06/2015	03:45:02	00:15:00	51.1	67.9	37.6
27/06/2015	04:00:02	00:15:00	52.8	70.7	38.1
27/06/2015	04:15:02	00:15:00	53.4	70.0	38.7
27/06/2015	04:30:02	00:15:00	52.3	66.1	39.2
27/06/2015	04:45:02	00:15:00	51.5	70.9	39.1
27/06/2015	05:00:02	00:15:00	50.0	66.3	38.5
27/06/2015	05:15:02	00:15:00	54.9	71.7	40.3
27/06/2015	05:30:02	00:15:00	57.4	79.1	42.6
27/06/2015	05:45:02	00:15:00	53.5	68.9	39.8
27/06/2015	06:00:02	00:15:00	55.9	71.0	41.5
27/06/2015	06:15:02	00:15:00	54.1	70.6	42.6
27/06/2015	06:30:02	00:15:00	55.8	70.6	44.2
27/06/2015	06:45:02	00:15:00	56.8	70.5	42.9
AVERAGE			54.2	-	40.0
HIGHEST			57.4	79.1	45.4
LOWEST			50.0	64.6	35.5

Table A10: Night time Noise Survey Data**Saturday 27 Jun 2015 to Sunday 28 Jun 2015**

Date	Start (h:m:s)	Period (h:m:s)	Free field noise levels (dB)		
			L _{Aeq}	L _{Amax(f)}	L _{A90}
27/06/2015	23:00:02	00:15:00	56.7	73.6	41.1
27/06/2015	23:15:02	00:15:00	56.1	75.2	41.2
27/06/2015	23:30:02	00:15:00	55.7	66.5	41.2
27/06/2015	23:45:02	00:15:00	55.7	69.9	39.4
28/06/2015	00:00:02	00:15:00	54.7	69.7	38.3
28/06/2015	00:15:02	00:15:00	54.6	68.7	39.6
28/06/2015	00:30:02	00:15:00	57.7	80.8	39.4
28/06/2015	00:45:02	00:15:00	54.3	68.1	36.2
28/06/2015	01:00:02	00:15:00	54.3	74.0	36.4
28/06/2015	01:15:02	00:15:00	53.6	69.0	39.8
28/06/2015	01:30:02	00:15:00	56.5	71.6	42.4
28/06/2015	01:45:02	00:15:00	57.7	77.9	42.8
28/06/2015	02:00:02	00:15:00	58.8	72.1	40.8
28/06/2015	02:15:02	00:15:00	59.9	73.2	44.8
28/06/2015	02:30:02	00:15:00	58.1	74.1	43.9
28/06/2015	02:45:02	00:15:00	58.3	74.3	42.5
28/06/2015	03:00:02	00:15:00	58.9	74.9	42.9
28/06/2015	03:15:02	00:15:00	58.5	74.3	44.2
28/06/2015	03:30:02	00:15:00	58.2	74.7	38.4
28/06/2015	03:45:02	00:15:00	56.2	71.7	37.6
28/06/2015	04:00:02	00:15:00	56.2	71.5	36.2
28/06/2015	04:15:02	00:15:00	55.4	70.0	37.0
28/06/2015	04:30:02	00:15:00	56.6	78.4	38.1
28/06/2015	04:45:02	00:15:00	56.0	72.0	43.7
28/06/2015	05:00:02	00:15:00	58.5	74.8	45.9
28/06/2015	05:15:02	00:15:00	57.9	74.6	40.5
28/06/2015	05:30:02	00:15:00	55.8	71.9	40.3
28/06/2015	05:45:02	00:15:00	55.8	72.2	39.2
28/06/2015	06:00:02	00:15:00	58.7	75.0	43.7
28/06/2015	06:15:02	00:15:00	57.3	72.4	40.8
28/06/2015	06:30:02	00:15:00	56.8	72.7	40.1
28/06/2015	06:45:02	00:15:00	56.6	69.3	40.7
AVERAGE			57.0	-	40.6
HIGHEST			59.9	80.8	45.9
LOWEST			53.6	66.5	36.2

Table A11: Night time Noise Survey Data**Sunday 28 Jun 2015 to Monday 29 Jun 2015**

Date	Start (h:m:s)	Period (h:m:s)	Free field noise levels (dB)		
			L _{Aeq}	L _{Amax(f)}	L _{A90}
28/06/2015	23:00:02	00:15:00	56.3	77.7	40.9
28/06/2015	23:15:02	00:15:00	53.6	67.5	39.0
28/06/2015	23:30:02	00:15:00	52.4	69.2	39.1
28/06/2015	23:45:02	00:15:00	52.9	70.6	37.1
29/06/2015	00:00:02	00:15:00	55.5	72.7	39.5
29/06/2015	00:15:02	00:15:00	54.9	76.8	37.7
29/06/2015	00:30:02	00:15:00	52.5	69.8	37.2
29/06/2015	00:45:02	00:15:00	52.7	72.2	34.0
29/06/2015	01:00:02	00:15:00	50.9	67.7	33.2
29/06/2015	01:15:02	00:15:00	50.7	69.6	32.5
29/06/2015	01:30:02	00:15:00	51.9	71.3	33.6
29/06/2015	01:45:02	00:15:00	47.8	64.8	32.4
29/06/2015	02:00:02	00:15:00	48.4	69.4	31.0
29/06/2015	02:15:02	00:15:00	47.7	66.0	29.9
29/06/2015	02:30:02	00:15:00	51.2	72.3	28.8
29/06/2015	02:45:02	00:15:00	50.8	68.3	30.7
29/06/2015	03:00:02	00:15:00	48.7	68.0	29.4
29/06/2015	03:15:02	00:15:00	47.3	64.3	33.1
29/06/2015	03:30:02	00:15:00	48.7	69.2	32.3
29/06/2015	03:45:02	00:15:00	49.0	66.4	35.0
29/06/2015	04:00:02	00:15:00	45.9	70.1	34.2
29/06/2015	04:15:02	00:15:00	51.2	70.8	35.9
29/06/2015	04:30:02	00:15:00	54.6	77.4	36.1
29/06/2015	04:45:02	00:15:00	51.5	68.0	38.8
29/06/2015	05:00:02	00:15:00	53.6	68.8	39.1
29/06/2015	05:15:02	00:15:00	56.9	73.0	41.9
29/06/2015	05:30:02	00:15:00	57.6	75.6	44.1
29/06/2015	05:45:02	00:15:00	56.6	73.9	41.2
29/06/2015	06:00:02	00:15:00	56.8	71.0	42.9
29/06/2015	06:15:02	00:15:00	55.9	69.5	41.6
29/06/2015	06:30:02	00:15:00	59.1	72.7	44.7
29/06/2015	06:45:02	00:15:00	59.3	74.5	45.8
AVERAGE			54.0	-	36.6
HIGHEST			59.3	77.7	45.8
LOWEST			45.9	64.3	28.8

Location B**Table A12: Night time Noise Survey Data****Friday 26 Jun 2015 to Saturday 27 Jun 2015**

Date	Start (h:m:s)	Period (h:m:s)	Free field noise levels (dB)		
			L _{Aeq}	L _{Amax(f)}	L _{A90}
26/06/2015	23:00:02	00:15:00	45.2	58.7	40.6
26/06/2015	23:15:02	00:15:00	45.2	66.2	39.1
26/06/2015	23:30:02	00:15:00	44.9	60.7	39.1
26/06/2015	23:45:02	00:15:00	43.4	57.0	38.0
27/06/2015	00:00:02	00:15:00	44.1	55.9	38.6
27/06/2015	00:15:02	00:15:00	43.3	56.7	38.0
27/06/2015	00:30:02	00:15:00	43.4	57.3	36.7
27/06/2015	00:45:02	00:15:00	42.4	55.7	34.5
27/06/2015	01:00:02	00:15:00	43.9	67.5	36.6
27/06/2015	01:15:02	00:15:00	42.4	54.2	34.3
27/06/2015	01:30:02	00:15:00	41.8	60.1	32.5
27/06/2015	01:45:02	00:15:00	42.4	60.5	32.3
27/06/2015	02:00:02	00:15:00	40.6	52.9	35.0
27/06/2015	02:15:02	00:15:00	41.3	51.9	37.0
27/06/2015	02:30:02	00:15:00	41.1	51.4	36.3
27/06/2015	02:45:02	00:15:00	40.8	52.8	36.1
27/06/2015	03:00:02	00:15:00	41.1	53.1	36.7
27/06/2015	03:15:02	00:15:00	40.4	53.4	35.1
27/06/2015	03:30:02	00:15:00	40.1	52.3	34.5
27/06/2015	03:45:02	00:15:00	42.0	58.9	35.0
27/06/2015	04:00:02	00:15:00	48.4	64.1	35.4
27/06/2015	04:15:02	00:15:00	51.0	65.4	36.8
27/06/2015	04:30:02	00:15:00	48.3	71.8	36.8
27/06/2015	04:45:02	00:15:00	42.9	57.0	37.1
27/06/2015	05:00:02	00:15:00	42.1	66.7	35.9
27/06/2015	05:15:02	00:15:00	43.9	55.2	37.5
27/06/2015	05:30:02	00:15:00	45.6	58.4	39.1
27/06/2015	05:45:02	00:15:00	42.9	52.5	37.2
27/06/2015	06:00:02	00:15:00	51.9	62.2	39.5
27/06/2015	06:15:02	00:15:00	47.8	67.0	38.6
27/06/2015	06:30:02	00:15:00	52.6	77.5	40.7
27/06/2015	06:45:02	00:15:00	49.9	64.1	39.6
AVERAGE			45.9	-	36.9
HIGHEST			52.6	77.5	40.7
LOWEST			40.1	51.4	32.3

Table A13: Night time Noise Survey Data**Saturday 27 Jun 2015 to Sunday 28 Jun 2015**

Date	Start (h:m:s)	Period (h:m:s)	Free field noise levels (dB)		
			L _{Aeq}	L _{Amax(f)}	L _{A90}
27/06/2015	23:00:02	00:15:00	46.3	65.9	37.2
27/06/2015	23:15:02	00:15:00	43.7	56.3	36.8
27/06/2015	23:30:02	00:15:00	43.5	54.8	36.5
27/06/2015	23:45:02	00:15:00	43.7	58.6	35.7
28/06/2015	00:00:02	00:15:00	42.6	54.5	34.5
28/06/2015	00:15:02	00:15:00	42.4	55.6	35.8
28/06/2015	00:30:02	00:15:00	46.8	69.6	35.4
28/06/2015	00:45:02	00:15:00	42.4	54.3	34.2
28/06/2015	01:00:02	00:15:00	42.8	66.9	33.6
28/06/2015	01:15:02	00:15:00	43.3	57.8	36.0
28/06/2015	01:30:02	00:15:00	46.3	55.1	43.4
28/06/2015	01:45:02	00:15:00	46.9	65.0	42.8
28/06/2015	02:00:02	00:15:00	45.6	57.2	39.6
28/06/2015	02:15:02	00:15:00	48.3	59.5	44.0
28/06/2015	02:30:02	00:15:00	46.9	61.5	41.8
28/06/2015	02:45:02	00:15:00	47.7	62.5	44.0
28/06/2015	03:00:02	00:15:00	47.6	56.9	44.4
28/06/2015	03:15:02	00:15:00	48.9	58.8	44.0
28/06/2015	03:30:02	00:15:00	45.8	57.1	38.7
28/06/2015	03:45:02	00:15:00	46.2	61.1	36.0
28/06/2015	04:00:02	00:15:00	46.7	63.8	34.7
28/06/2015	04:15:02	00:15:00	51.4	66.7	36.3
28/06/2015	04:30:02	00:15:00	50.9	66.3	37.1
28/06/2015	04:45:02	00:15:00	46.9	59.8	42.1
28/06/2015	05:00:02	00:15:00	50.2	57.5	47.5
28/06/2015	05:15:02	00:15:00	47.6	64.9	42.0
28/06/2015	05:30:02	00:15:00	48.5	60.2	40.7
28/06/2015	05:45:02	00:15:00	45.1	57.2	38.2
28/06/2015	06:00:02	00:15:00	48.6	58.9	44.6
28/06/2015	06:15:02	00:15:00	46.7	57.2	40.4
28/06/2015	06:30:02	00:15:00	45.6	59.6	39.3
28/06/2015	06:45:02	00:15:00	45.4	58.3	38.5
AVERAGE			46.9	-	39.2
HIGHEST			51.4	69.6	47.5
LOWEST			42.4	54.3	33.6

Table A14: Night time Noise Survey Data**Sunday 28 Jun 2015 to Monday 29 Jun 2015**

Date	Start (h:m:s)	Period (h:m:s)	Free field noise levels (dB)		
			L _{Aeq}	L _{Amax(f)}	L _{A90}
28/06/2015	23:00:02	00:15:00	45.6	68.1	38.4
28/06/2015	23:15:02	00:15:00	41.6	54.8	36.1
28/06/2015	23:30:02	00:15:00	41.7	52.6	35.4
28/06/2015	23:45:02	00:15:00	41.2	56.8	33.8
29/06/2015	00:00:02	00:15:00	43.4	56.8	35.3
29/06/2015	00:15:02	00:15:00	44.0	67.4	34.2
29/06/2015	00:30:02	00:15:00	41.7	53.8	35.1
29/06/2015	00:45:02	00:15:00	41.5	60.6	32.4
29/06/2015	01:00:02	00:15:00	40.5	57.8	31.8
29/06/2015	01:15:02	00:15:00	37.8	54.8	29.1
29/06/2015	01:30:02	00:15:00	39.8	56.1	31.1
29/06/2015	01:45:02	00:15:00	38.0	50.9	30.2
29/06/2015	02:00:02	00:15:00	37.1	54.7	28.1
29/06/2015	02:15:02	00:15:00	36.6	49.7	27.6
29/06/2015	02:30:02	00:15:00	38.0	56.4	26.7
29/06/2015	02:45:02	00:15:00	38.6	54.3	27.9
29/06/2015	03:00:02	00:15:00	38.4	52.9	27.3
29/06/2015	03:15:02	00:15:00	36.5	57.1	29.6
29/06/2015	03:30:02	00:15:00	38.8	52.9	29.7
29/06/2015	03:45:02	00:15:00	43.4	63.2	30.6
29/06/2015	04:00:02	00:15:00	47.8	66.5	32.0
29/06/2015	04:15:02	00:15:00	41.8	53.7	32.9
29/06/2015	04:30:02	00:15:00	42.9	59.2	32.8
29/06/2015	04:45:02	00:15:00	46.1	61.7	36.3
29/06/2015	05:00:02	00:15:00	49.1	65.6	36.4
29/06/2015	05:15:02	00:15:00	45.4	58.8	37.9
29/06/2015	05:30:02	00:15:00	49.6	77.0	39.6
29/06/2015	05:45:02	00:15:00	45.5	61.7	38.2
29/06/2015	06:00:02	00:15:00	49.9	69.2	38.6
29/06/2015	06:15:02	00:15:00	45.2	56.1	38.8
29/06/2015	06:30:02	00:15:00	47.5	71.8	40.1
29/06/2015	06:45:02	00:15:00	50.5	63.9	41.5
AVERAGE			44.6	-	33.6
HIGHEST			50.5	77.0	41.5
LOWEST			36.5	49.7	26.7