NoiseAssess

Acoustics, Noise and Vibration Consultants

Project:	**Proposed Lidl Food Store** **Church Road North, Liverpool L15 6TE**
Scope of Report	**Assessment of noise from proposed mechanical services, deliveries and car parking**
Client:	Lidl Great Britain Limited
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1.0 INTRODUCTION

1.1 This noise assessment has been commissioned by Lidl Great Britain Limited in support of a planning application for the proposed development of a new food store. The proposed location of the new food store is on the former Co-op Food site on Church Road North, south of Childwall Road (B5178). The site location is shown on Figure 1.

1.2 The proposed site layout is shown on Figure 2. There will be a loading dock at the south end of the store building, to the north of Wavertree Green. Mechanical services plant will be sited on a plant deck at roof level on the western side of the new store building.

1.3 This report relates to the potential impact of the operational noise arising from mechanical services plant, deliveries and car parking. The proposed store is on the site of an existing food store which has recently closed and therefore the nearest residential properties have been subject to noise from plant, deliveries and car parking related to the previous use. However, no allowance has been made for the previous use in this assessment making it conservative.

1.4 There are residential properties to the south of the site on Wavertree Green and Church Road North, marked R1 and R2 on Figure 1. There are also residential properties on Church Road North opposite the site to the west, the closest is marked R3 on Figure 1. R1 and R2 share the southern site boundary, and R3 is approximately 45m from the western elevation of the proposed store building. Another property, located on Childwall Road to the north-east of the proposed site has not been considered for this assessment as it will be screened from the plant and deliveries by the store building itself and will have no more exposure to car parking noise than it did during the previous use.

1.5 Dr Ian Rushforth, Senior Enforcement Officer in the Environmental Protection Unit of Liverpool City Council has been consulted by email about the methodology for this assessment. The assessment has been carried out during the Covid-19 restrictions which have resulted in atypically low environmental noise levels due to low road traffic flows and flight numbers and the closure of businesses. Therefore, agreement has been made with Dr Rushforth that the baseline noise levels used for this site can be derived from the results of baseline noise surveys carried out at other sites. The Association of Noise Consultants (ANC) and The Institute of Acoustics (IOA) have issued joint guidance on the impact of

Covid-19 on noise assessment work. Version 3 of the guidance issued on 16 April 2020 is shown in Appendix A3.

1.6 For the purposes of this assessment consideration has been given to the store being open any period between 07:00 and 23:00 hours on any day. The proposed delivery hours have not yet been decided and are to be informed by the outcome of this noise assessment.

2.0 CRITERIA

BS4142

2.1 The noise impact of commercial/industrial noise sources on existing residential properties is normally assessed in accordance with BS4142[1].

2.2 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."

2.3 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.

2.4 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".

2.5 BS4142 recommends that the specific sound level during daytime periods 07:00 - 23:00 hrs should be determined over a reference time interval of 1 hour and during night-time periods 23:00 - 07:00 hrs over a reference time interval of 15 minutes.

Assessment in Context

2.6 BS4142 recommends that the industrial sound should also be assessed in context. Therefore, the sound levels have been assessed in the context of the character of the area; the derived ambient noise levels and the criteria given in BS8233[2].

2.7 The BS8233 recommendations for indoor ambient noise levels are given below.

Table 1: BS8233 recommendations for indoor ambient noise levels

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

2.8 Paragraph 7.7.3.2 of BS8233 recommends that for traditional external amenity areas such as gardens and patios, it is desirable that during the daytime the external noise level does not exceed 50 $dBL_{Aeq,T}$ with an upper guideline value of 55 $dBL_{Aeq,T}$ which would be acceptable in noisier environments. The time period is not stated but is assumed to be 16 hours (07:00 hours to 23:00 hrs) as in the previous version of BS8233.

3.0 NOISE SURVEY RESULTS FROM OTHER SITES

3.1 As explained in Section 1 above, a noise survey could not be carried out at the Church Road North site due to the Covid-19 restrictions. Baseline noise levels have therefore been derived from the noise surveys carried out on behalf of Lidl at three other sites as follows:

- Arrow Park Road, Upton – at the location marked M on Figure 3
- Park Hill Road, Toxteth – at the locations marked A and B on Figure 4
- Longmoor Lane, Fazakerley – at the location marked M on Figure 5

Upton noise survey

3.2 The survey at Upton was carried out from 15:00 hours on Thursday 09/01/2020 to 12:00 hours on Monday 13/01/2020. The noise survey was carried out using an unattended auto-logging Rion NL-52 sound level meter (serial number 976253). The sound level meter was calibrated using a portable Norsonic 1251 calibrator (s/n 32860) at the start and finish of the survey with no variation in the calibration level. The measurements were taken with the microphone at a height of approximately 4.8m above ground level in free-field conditions. The main noise source during the periods of attendance on site was road traffic. The weather conditions during the periods of attendance on site were dry with light winds (<5m/s). Weather reports indicate that the wind speeds remained <5m/s throughout most of the survey but there were some periods with higher wind speeds during Saturday 11/01/2020 and periods with light showers / drizzle at the weekend.

3.3 The monitoring location was in a mixed residential/commercial area. The monitoring was carried out at a position which is likely to have been subject to slightly lower road traffic noise than the nearest residential properties to the Church Road North site.

3.4 The results of the noise survey are summarised below and are presented in full in Appendix A2. The L_{Aeq} values given are log averages of the 5-minute values and the L_{A90} values have been arithmetically averaged.

Table 2. Summary of Upton daytime noise levels, 09/01/2020-13/01/2020

Day	Survey Period	dBL_{Aeq}	dBL_{A90}	
		Average	Average	Mode
Thursday	15:00-23:00 hrs	55	52	54
Friday	07:00-23:00 hrs	56	53	53
Saturday	07:00-23:00 hrs	58	54	56
Sunday	07:00-23:00 hrs	56	52	52
Monday	07:00-12:00 hrs	57	55	55

Table 3. Summary of Upton night-time noise levels, 09/01/2020-13/01/2020

Day	Survey Period	dBL_{Aeq}	dBL_{A90}	
		Average	Average	Mode
Thursday-Friday	23:00-07:00 hrs	48	41	36
Friday-Saturday	23:00-07:00 hrs	59	47	53
Saturday-Sunday	23:00-07:00 hrs	51	40	36
Sunday-Monday	23:00-07:00 hrs	48	40	36

Toxteth noise survey

3.5 The noise survey at Toxteth was been carried out over sample periods between 21:58 hours on Wednesday 17/04/2019 and 07:37 hours on Thursday 18/04/2019. The noise survey was carried out using an attended Norsonic Nor-140 Type 1 noise analyser (s/n 1404289). The meter was calibrated using a portable Norsonic 1251 calibrator (s/n 32860) at the start and finish of the survey with no variation in the calibration level. The measurements were taken with the microphone at a height of approximately 2.5m above ground level in freefield conditions. This meant that the microphone was above the height of the wall between Baysdale Close and the site. On Kelbey Close the monitoring position was slightly screened from Park Road by a van in the parking area. The weather conditions during the survey were dry with light winds (<5m/s). The main noise source was road traffic.

3.6 The monitoring locations were in a residential area on cul-de-sacs 40-80m from Park Road (A651) not near motorways. The monitoring was carried out at positions which are likely to have been subject to slightly lower road traffic noise than the nearest residential properties to the Church Road North site.

3.7 The results of the noise survey are summarised below and are presented in full in Appendix A2. The L_{Aeq} values given are log averages of the 5-minute values and the L_{A90} values have been arithmetically averaged.

Table 4. Summary of Toxteth noise survey results

Time & Position	dBL_{Aeq}	dBL_{A90}
21:58-22:53 hrs, Location A	49.0	43.6
22:54-22:59 hrs, Location B	53.8	46.7
23:02-23:32 hrs, Location B	54.1	43.9
00:04-01:12 hrs, Location B	52.0	40.4
06:25-07:00 hrs, Location B	56.0	44.3
07:37-07:37 hrs, Location B	57.2	47.6

Fazakerley noise survey

3.8 The noise survey at Fazakerley was been carried out from 14:03 hours on Friday 20/01/2017 to 11:03 hours on Monday 23/01/2017. The noise survey was carried out using a Rion NL-52 Class 1 sound level meter (s/n 732142). The sound level meter was calibrated using a portable Norsonic 1251 calibrator (s/n 32860) at the start and finish of the survey with no variation in the calibration level. The measurements included frequency analysis. The measurements were taken with the microphone at a height of approximately 3m above ground level in freefield conditions. The main noise source during the periods of attendance on site was road traffic. The weather conditions during the periods of attendance on site were dry with light winds (<5m/s). Weather forecasts / reports indicated that the weather conditions were similar for most of the unattended noise survey period.

3.9 The monitoring location was in a mainly residential area about 100m from the A506 and 1.8km from the nearest motorway. The monitoring was carried out at a position which is likely to have been

subject to slightly lower road traffic noise than the nearest residential properties to the Church Road North site.

3.10 The results of the noise survey are summarised below and are presented in full in Appendix A2. The L_{Aeq} values given are log averages of the 5-minute values and the L_{A90} values have been arithmetically averaged.

Table 5. Summary of Fazakerley daytime noise levels, 20-23/01/2017

Day	Period	Average dBL_{Aeq}	Average dBL_{A90}	Modal dBL_{A90}
Friday	14:03-23:03 hrs	52	46	46
Saturday	07:03-23:03 hrs	52	45	47
Sunday	07:03-23:03 hrs	53	44	46
Monday	07:03-11:03 hrs	53	47	47

Table 6. Summary of Fazakerley night-time noise levels, 20-23/01/2017

Days	Period	Average dBL_{Aeq}	Average dBL_{A90}	Modal dBL_{A90}
Friday-Saturday	23:03-07:03 hrs	51	42	41
Saturday-Sunday	23:03-07:03 hrs	49	39	39
Sunday-Monday	23:03-07:03 hrs	51	39	37

Derivation of baseline noise levels for the Church Road North site

3.11 The background noise levels used for this assessment have been derived from the lowest of the average or modal dBL_{A90} results from the three sites detailed above. The ambient noise levels have been derived from the lowest average dBL_{Aeq} results from the three sites. At Toxteth there were other daytime and night-time attended monitoring periods not reported below because they gave higher results. This derivation of the baseline noise levels is shown in the two tables below. The data used from two of the sites includes weekend periods and therefore the derived results have been applied to all days.

Table 7. Derivation of daytime baseline

Site	Dates	Times	Ave dBL_{Aeq}	Ave dBL_{A90}	Mode dBL_{A90}
Park Hill Rd/Park Rd, Toxteth	17-18/04/19	22:54-22:59	49	44	
Longmoor Lane, Fazakerley	20-23/01/17	Unattended continuous	52	44	46
Arrowe Park Road, Upton, Birkenhead	09-13/01/2020	Unattended continuous	56	52	52 (Sun)
Used for Church Road North			49	44	

Table 8. Derivation of night-time baseline

Site	Dates	Times	Ave dBL_{Aeq}	Ave dBL_{A90}	Mode dBL_{A90}
Park Hill Rd/Park Rd, Toxteth	17-18/04/19	00:04-01:12	52	40	
Longmoor Lane, Fazakerley	20-23/01/17	Unattended continuous	49	39	37
Arrowe Park Road, Upton, Birkenhead	09-13/01/2020	Unattended continuous	48	40	36
Used for Church Road North			48	36	

4.0 NOISE IMPACT ASSESSMENT AND RECOMMENDATIONS

Criteria and Methodology

4.1 The potential noise impact of new mechanical services plant and deliveries has been assessed in accordance with BS4142[1].

4.2 The noise from customer car movements in the car park has been assessed by comparing the noise generated with the current ambient noise levels. An increase in ambient noise of 3dB(A) or more is normally considered significant.

Closest noise sensitive properties

4.3 R1 is the closest existing residential property to the proposed delivery bay. R2 and R3 are the closest noise sensitive properties to the proposed plant deck.

4.4 Noise from the proposed external plant has been calculated and assessed to R2 and R3 on Figure 1. Receptor R1 shown on Figure 1 has not been used in the assessment of plant noise because it is screened from the plant deck by the proposed store building. Therefore, Receptor R1 will be used for the assessment delivery noise only. Receptor R3 is further away from the proposed plant location than R2 but has been included for completeness as it will be directly facing the proposed plant deck.

4.5 Noise from the car park has been calculated and assessed for receptors R2 and R3 shown on Figure 1. R1 has not been included because increased distance and screening at this position means that car park noise levels will be lower than at R2.

Mechanical Services Noise

Proposed external plant

4.6 The proposed external plant is to be on a plant deck at second-floor level on the western side of the new store building.

4.7 Calculations of mechanical services noise have been based on the manufacturer's noise data for the proposed plant as provided by the client and summarised below.

Table 9. Manufacturer's noise data for external plant

Item	No. Units.	Noise level
Dry coolers	2	42 dB(A) at 5m
Refrigeration pump stations	2	Understood to be negligible
Sales area VRF outdoor units	2	62 dB(A) at 1m
Welfare VRF outdoor unit	1	61 dB(A) at 1m

4.8 It is understood that:

- The dry coolers and pump stations will run intermittently 24 hours a day, 7 days a week.
- The VRF units will operate during store opening hours only.

Calculation of noise from external plant

4.9 The calculations have been carried out to receptors R2 and R3 shown on Figure 1. The calculated plant noise levels are given below. The calculations include corrections for the number of plant items and attenuation due to distance. No screening has been included in the calculation at this stage. However, it is normal practice for the plant deck to be screened from view. Any screening of this nature will further improve results making this assessment conservative.

Table 10. Daytime noise from external plant to R2 (07:00-23:00 hours)

Plant items	Dry coolers	Sales area VRFs	Welfare VRF
Source noise level, dB(A)	42	62	61
Source noise measurement distance, m	5	1	1
Number of units	2	2	1
Correction for number of units, dB(A)	3	3	0
Distance, m	45	45	45
Distance correction, dB(A)	-19	-33	-33
Acoustic screening, dB(A)	0	0	0
Noise level at house, $dBL_{Aeq,1hr}$	**26**	**32**	**28**
Total noise level at house, $dBL_{Aeq,1hr}$	**34**		

Table 11. Daytime noise from external plant to R3 (07:00-23:00 hours)

Plant items	Dry coolers	Sales area VRFs	Welfare VRF
Source noise level, dB(A)	42	62	61
Source noise measurement distance, m	5	1	1
Number of units	2	2	1
Correction for number of units, dB(A)	3	3	0
Distance, m	50	50	50
Distance correction, dB(A)	-20	-34	-34
Acoustic screening, dB(A)	0	0	0
Noise level at house, $dBL_{Aeq,1hr}$	**25**	**31**	**27**
Total noise level at house, $dBL_{Aeq,1hr}$	**33**		

Table 12. Night-time noise from external plant to R2 (23:00-07:00 hours)

Plant items	Dry coolers
Source noise level, dB(A)	42
Source noise measurement distance, m	5
Number of units	2
Correction for number of units, dB(A)	3
Distance, m	45
Distance correction, dB(A)	-19
Acoustic screening, dB(A)	0
Noise level at house, $dBL_{Aeq,15min}$	**26**

Table 13. Night-time noise from external plant to R3 (23:00-07:00 hours)

Plant items	Dry coolers
Source noise level, dB(A)	42
Source noise measurement distance, m	5
Number of units	2
Correction for number of units, dB(A)	3
Distance, m	50
Distance correction, dB(A)	-20
Acoustic screening, dB(A)	0
Noise level at house, $dBL_{Aeq,5min}$	**25**

BS4142 Assessment of plant noise

4.10 The BS4142 assessment of plant noise to the nearest residential receiver is shown below. A 2dB tonal penalty and a 3dB impulsive/intermittency penalty have been added as a precaution. The calculated plant noise levels have been compared with the derived baseline dBL_{A90} noise levels shown in Section 3 above.

Table 14. Daytime BS4142 assessment of plant noise.

Receptor	R2	R3
Specific noise level, dBL_{Aeq}	34	33
Tonal Penalty, dB	2	2
Impulsive/Intermittency penalty, dB	3	3
Rating, dB	39	38
Background noise level, dBL_{A90}	44	44
Rating - background, dB	**-5**	**-6**

Table 15. Night-time BS4142 assessment of plant noise.

Receptor	R2	R3
Specific noise level, dBL_{Aeq}	26	25
Tonal Penalty, dB	2	2
Impulsive/Intermittency penalty, dB	3	3
Rating, dB	31	30
Background noise level, dBL_{A90}	36	36
Rating - background, dB	**-5**	**-6**

4.11 The daytime and night-time results normally indicate a low noise impact depending on the context.

Plant noise considered in context

4.12 BS4142 recommends that the noise also be judged in context. The site is in a predominantly residential area but is adjacent to a well-trafficked road (B5178) and roundabout. The site has until recently been in use for a food store with mechanical services plant. To assist with the consideration of the noise in context the plant noise levels have been compared with the derived ambient noise levels shown in Section 3. In addition, the plant noise levels have been compared with the criteria given in BS8233. It is recognised that this standard is generally used for anonymous noise sources and it is used here only to provide additional information on the scale of the noise levels. The results of these comparisons are given below.

Table 16. Plant noise comparison with ambient noise levels and BS8233 criteria.

Receptor	**R2**		**R3**	
Time	**Day**	**Night**	**Daytime**	**Night-time**
Source noise level, dBL_{Aeq}	34	26	33	25
Comparison with ambient noise levels				
Ambient noise level, dBL_{Aeq}	49	48	49	48
Difference between ambient & source noise level, dB(A)	-15	-22	-16	-23
Ambient + source noise level, dBL_{Aeq}	49	48	49	48
Increase in ambient noise level, dBL_{Aeq}†	0	0	0	0
Comparison with BS8233 criteria for gardens				
BS8233 upper limit for private gardens	55	N/A	55	N/A
Difference between source noise & desired limit, dB(A)	-21	N/A	-22	N/A
Comparison with BS8233 internal noise limiting criteria				
Internal noise level due to source noise, dB(A)††	19-24	11-16	18-23	10-15
BS8233 recommended internal noise criteria dB(A)	≤ 35	≤ 30	≤ 35	≤ 30
Difference between BS8233 internal limit & internal source, dB(A)	-16 to -11	-19 to -14	-17 to -12	-20 to -15

†An increase in ambient noise level of up to 3dB(A) is not considered to be significant

††Attenuation due to partially open window taken as 10-15dB(A)

4.13 The consideration of the noise in context supports the conclusion of the BS4142 assessment that the plant will have a low noise impact. Therefore, it is considered that additional plant noise control measures will not be required.

Servicing Noise

Delivery operations data

4.14 Deliveries to the new store will be via the loading dock at southern end of the building as shown on Figure 2.

4.15 The assessment of noise due to delivery vehicle movements and unloading has been based on noise measurements taken during deliveries to another Lidl store as summarised below.

Table 17. Noise source levels for delivery vehicle movements and unloading

Operation	Freefield noise level at 10m dB, SEL
1. HGV drive into site	79
2. HGV reverse, stop to open doors and reverse into loading bay	86
3. Unloading: each trip into / out of trailer	68
4. Drive forward and close rear doors	79
5. Drive away	79

4.16 The higher SEL for the reverse includes noise from typical reversing alarms.

4.17 It is understood that there is normally no more than 1 delivery within a 1-hour period. The proposed delivery hours have not yet been decided and are to be informed by the outcome of this noise assessment.

Control of noise from deliveries

4.18 A 2.4m high acoustic barrier should be installed along the southern side of the delivery ramp extending along the southern site boundary on the line shown in blue on Figure 6.

4.19 The acoustic barrier should have a minimum mass of 10 kg/m^2 and may comprise 20mm thick weather-treated, close-boarded timber fencing with cover strips to seal the gaps between panels and gravel

boards to seal the gap at the base. A masonry wall with no gaps can also be used. Alternative constructions can be used if checked with an acoustic consultant.

4.20 To reduce the reflection of noise from hard finishes an absorbent lining should be used on southern face of the section of the store building facing the delivery ramp to a height of 1m above the top of the acoustic fence. The absorbent lining could be formed with mineral wool covered with perforated metal sheeting with a minimum 30% open area. Alternatively, proprietary panels could be used such as:

- 'Tilon' noise absorptive panels (https://tilontest.files.wordpress.com/2014/11/tenb45a2.pdf) or
- 'Prosonic' external acoustic panels (http://www.customaudiodesigns.co.uk/prosonic-external-acoustic-panels.htm).

4.21 It is the Client's responsibility to check with the manufacturer that products chosen are suitable for the proposed use in other respects. The sound insulation performance of the proposed construction will be dependent upon correct installation and workmanship.

4.22 The recommendations are given for acoustic reasons only and advice on other matters should be obtained from other specialists. The safety implications of the installation of the recommended products / material should be checked by the Client before use and appropriate systems of work put in place.

Calculation of noise from deliveries

4.23 The noise from the vehicle 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

4.24 Calculations have been carried out of the noise from the arrival and reverse of the vehicle, the unloading, and the subsequent departure.

4.25 The daytime calculation has been based on one complete delivery within a 1-hour period including 24 cages. For the assessment of night-time deliveries, it has been assumed that the vehicle would arrive, reverse to the bay, and partly unload within the 15-minute reference period.

4.26 The calculations have been carried out to the closest residential property marked R1 on Figure 1.

4.27 The delivery calculations are given below. The calculations include corrections for the number of operations and attenuation due to distance. The attenuation of the proposed 2.4m acoustic barrier detailed above has been included in the calculation. The calculations have been carried out to ground-floor level in the daytime and first-floor level at night.

Table 18: Daytime delivery noise to R1

Operation	**1**	**2**	**3**	**4**	**5**
SEL at 10m, dB(A)	79	86	68	79	79
No. of operations	1	1	24	1	1
Correction for no. of operations, dB(A)	0.0	0.0	13.8	0.0	0.0
Reference period, mins	60	60	60	60	60
Correction for reference period, dB(A)	-35.6	-35.6	-35.6	-35.6	-35.6
Distance, m	25	12	10	17	17
Distance correction, dB(A)	-8	-1.6	0	-4.6	-4.6
Barrier correction, dB(A)	-11.4	-11.4	-11.4	-11.4	-11.4
Total: each item noise at house dBL_{Aeq}	**24.0**	**37.4**	**34.8**	**27.4**	**27.4**
Total noise at house dBL_{Aeq}	**39.9**				

1. Forward arrival; 2. Reverse, stop to open doors and reverse; 3. Unloading;
4. Move forward after delivery and stop to close doors; 5. Depart

Table 19: Daytime delivery noise to R2

Operation	1	2	3	4	5
SEL at 10m, dB(A)	79	86	68	79	79
No. of operations	1	1	24	1	1
Correction for no. of operations, dB(A)	0.0	0.0	13.8	0.0	0.0
Reference period, mins	60	60	60	60	60
Correction for reference period, dB(A)	-35.6	-35.6	-35.6	-35.6	-35.6
Distance, m	18	18	36	18	18
Distance correction, dB(A)	-5.1	-5.1	-11.1	-5.1	-5.1
Barrier correction, dB(A)	-10.7	-10.7	-9.3	-10.7	-10.7
Total: each item noise at house dBL$_{Aeq}$	**27.6**	**34.6**	**25.8**	**27.6**	**27.6**
Total noise at house dBL$_{Aeq}$	**37.0**				

1. Forward arrival; 2. Reverse, stop to open doors and reverse; 3. Unloading;
4. Move forward after delivery and stop to close doors; 5. Depart

Table 20: Night-time delivery noise to R1

Operation	1	2	3
SEL at 10m, dB(A)	79	86	68
No. of operations	1	1	5
Correction for no. of operations, dB(A)	0.0	0.0	7.0
Reference period, mins	15	15	15
Correction for reference period, dB(A)	-29.5	-29.5	-29.5
Distance, m	25	12	10
Distance correction, dB(A)	-8	-1.6	0
Barrier correction, dB(A)	0	0	0
Total: each item noise at house dBL$_{Aeq}$	**41.5**	**54.9**	**45.5**
Total noise at house dBL$_{Aeq}$	**55.5**		

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

Table 21: Night-time delivery noise to R2

Operation	1	2	3
SEL at 10m, dB(A)	79	86	68
No. of operations	1	1	5
Correction for no. of operations, dB(A)	0.0	0.0	7.0
Reference period, mins	15	15	15
Correction for reference period, dB(A)	-29.5	-29.5	-29.5
Distance, m	18	18	36
Distance correction, dB(A)	-5.1	-5.1	-11.1
Barrier correction, dB(A)	0	0	0
Total: each item noise at house dBL$_{Aeq}$	**44.4**	**51.4**	**34.4**
Total noise at house dBL$_{Aeq}$	**52.3**		

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

BS4142 assessment of delivery noise

4.28 The BS4142 assessment of delivery noise to the nearest residential receivers is shown below. A 2 dB tonal penalty and a 3 dB impulsive/intermittency penalty have been added.

Table 22. BS4142 assessment of daytime delivery noise

Receptor	R1	R2
Specific noise level, dBL$_{Aeq}$	40	37
Tonal Penalty, dB	2	2
Impulsive/Intermittency penalty, dB	3	3
Rating, dB	45	42
Background noise level, dBL$_{A90}$	44	44
Rating - background, dB	**1**	**-2**

Table 23. BS4142 assessment of night-time delivery noise

Receptor	R1	R2
Specific noise level, dBL$_{Aeq}$	56	52
Tonal Penalty, dB	2	2
Impulsive/Intermittency penalty, dB	3	3
Rating, dB	61	57
Background noise level, dBL$_{A90}$	36	36
Rating - background, dB	**25**	**21**

4.29 The results indicate that daytime deliveries will have a low noise impact but that noise from deliveries at night would have a significant adverse noise impact. However, the noise should also be considered in context as detailed below.

Delivery noise considered in context

4.30 BS4142 recommends that the noise also be judged in context. The site is in a predominantly residential areas but is near to a relatively well-trafficked road (B5178) and a roundabout. The site has until recently been in use for a food store with deliveries. To assist with the consideration of the noise in context the delivery noise levels have been compared with the derived ambient noise levels shown in Section 3. In addition, the delivery noise levels have been compared with the criteria given in BS8233. It is recognised that this standard is generally used for anonymous noise sources and it is used here only to provide additional information on the scale of the noise levels. The results of these comparisons are given below.

Table 24. Delivery noise comparison with ambient noise levels and BS8233 criteria.

Receptor	**R1**		**R2**	
Time	**Day**	**Night**	**Day**	**Night**
Source noise level, dBL_{Aeq}	40	56	37	52
Comparison with ambient noise levels				
Ambient noise level, dBL_{Aeq}	49	48	49	48
Difference between ambient & source noise level, dB(A)	-9	8	-12	4
Ambient + source noise level, dBL_{Aeq}	50	57	49	53
Increase in ambient noise level, dBL_{Aeq}†	1	9	0	5
Comparison with BS8233 criteria for gardens				
BS8233 Upper limit for private gardens	55	N/A	55	N/A
Difference between source noise & desired limit, dB(A)	-15	N/A	-18	N/A
Comparison with BS8233 internal noise limiting criteria				
Internal noise level due to source noise, dB(A)††	25-30	41-46	22-27	37-42
BS8233 recommended internal noise criteria dB(A)	≤ 35	≤ 30	≤ 35	≤ 30
Difference between BS8233 internal limit & internal source, dB(A)	-10 to -5	11 to 16	-13 to -8	7 to 12

†An increase in ambient noise level of up to 3dB(A) is not considered to be significant

††Attenuation due to partially open window taken as 10-15dB(A)

4.31 The consideration of the noise in context supports the conclusion of the BS4142 assessment that the deliveries will have a low noise impact during the daytime but could have a significant adverse noise impact at night.

Summary of delivery noise assessment

4.32 The results of the delivery noise assessment and consideration in context indicate that deliveries should be allowed 07:00-23:00 hours on any day but not during the night-time (23:00-07:00 hours).

4.33 This assessment is based on an acoustic barrier being installed along the edge of the delivery bay at a height of 2.4m. Assessment indicates that it may be possible to mitigate the adverse noise impact at R1 and R2 by using such an acoustic barrier. However, it should be noted that to reduce the impact sufficiently the barrier would need to be installed as close to the vehicle movements and the service ramp as possible. This would mean leaving a small landscaped area outside the barrier. If the barrier could be sited close to the source, then it could be around 2.4m high. However, if it were sited on the site boundary it would need to be higher which may be unacceptable.

4.34 This assessment does not use the hour by hour data because it is derived from other sites and therefore such a detailed assessment using data not specific to this site may be unreliable. In view of the current restrictions it may be advisable to seek planning consent based on daytime only deliveries initially and to carry out a noise survey at a later date to check whether delivery hours could be extended.

Customer vehicle movements in the car park

Customer vehicle movement data

4.35 Noise from the car park has been based on an SEL of 68 dB(A) at a distance of 10m for a car movement. This figure is taken from measurements made by NoiseAssess Ltd at other locations.

4.36 Data provided for another Lidl store indicates that the peak hour there may be 2.85 vehicle movements per parking bay. 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.

Calculation of noise from customer vehicle movements in the car park

4.37 Noise from customer vehicle movements in the car park has been calculated for R2 and R3 because R1 is further away and calculations for R2 will be worst case for carpark noise at properties to the south of the site. The calculations have been based on 69 car parking bays.

4.38 The calculated noise level due to customer vehicle movements in the car park is given below. The calculations include corrections for the number of movements and attenuation due to distance. Attenuation from the acoustic barrier recommended in the assessment of delivery noise has also been included for Receptor R2, as results suggest an acoustic barrier is required to mitigate an adverse noise impact.

Table 25. Calculation of daytime 1-hour noise levels due to peak vehicle movements in the car park.

Receptor	**R2**	**R3**
Movement SEL at 10m, dB(A)	68	68
No. parking bays	69	69
No. movments per bay per hour	2.85	2.85
Total no. of movements per hour	197	197
Correction for no. of operations, dB(A)	22.9	22.9
Reference period, mins	60	60
Correction for reference period, dB(A)	-35.6	-35.6
Distance, m	35	35
Distance correction, dB(A)	-10.9	-10.9
Barrier correction	-10	0
Movement noise at dwelling dB $L_{aeq,1hr}$	**34.4**	**44.4**

4.39 The calculated car park noise is compared with the lowest average daytime ambient noise level below.

Table 26. Comparison of car park and ambient noise levels.

Receptor	**R2**	**R3**
Noise level from peak car park use, $dBL_{Aeq,1hr}$	34	44
Ambient noise level $L_{aeq,1hr}$	49	49
Log sum of customer car & ambient noise	49	50
Increase in noise level dB(A)	**0**	**1**

4.40 The above calculation shows that the car park noise will not increase the ambient noise level by more than 3dB(A). Therefore, it is expected that customer car movements in the car park will have a low noise impact. The above calculated increase in noise level of 1 dB(A) should be considered very much worst case as the ambient noise level of 49 $L_{aeq,1hr}$ used was taken from another site with a monitoring location further away from the closest main road than Receptors R2 and R3. Although a noise survey representative of unrestricted traffic is not currently possible at the current site, R2 and R3 are properties facing a two-lane, well-trafficked main road leading to a roundabout. Therefore, the ambient noise levels are likely to be considerably higher at the current site, and a higher ambient noise level would reduce the noise level increase shown above. It should also be noted that the car park is on the site of an existing car park which has until recently been used for a food store so this is unlikely to be perceived as a new noise source in the area.

5.0 CONCLUSIONS

5.1 The assessment indicates that the plant noise will have a low impact. Therefore, no additional noise control measures have been recommended for the mechanical services plant.

5.2 The assessment indicates that installing an acoustic barrier along the edge of the delivery bay and car parking bays closest to the southern boundary (see Figure 3) will result in a low noise impact in the daytime (07:00-23:00 hours). However, an adverse noise impact is likely if deliveries take place at night (23:00-07:00 hours). In view of this assessment it would be advisable to apply for only daytime deliveries (07:00-23:00 hours on any day) to be permitted at this time. If the client wishes to investigate the possibility of extending the delivery hours, then a noise survey would need to be carried out at a time when the current COVID-19 restrictions are no longer in place.

5.3 The assessment indicates that customer car movements in the car park will have a low noise impact.

5.4 Based on the above noise assessment, it is recommended that the application for the development should not be refused on noise grounds.

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.

FIGURE 1. SITE & RECEPTOR LOCATIONS

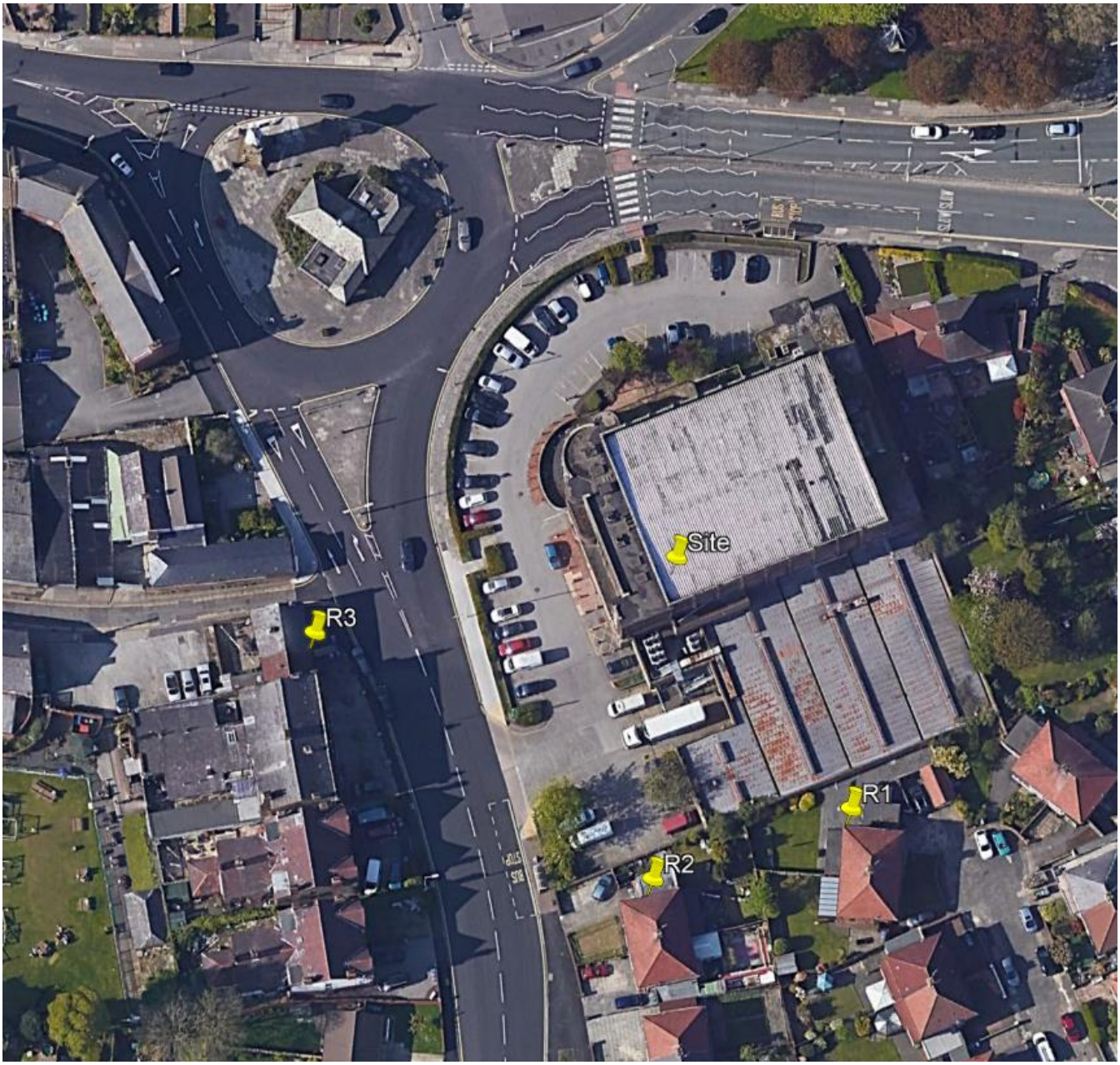

FIGURE 2. PROPOSED SITE LAYOUT

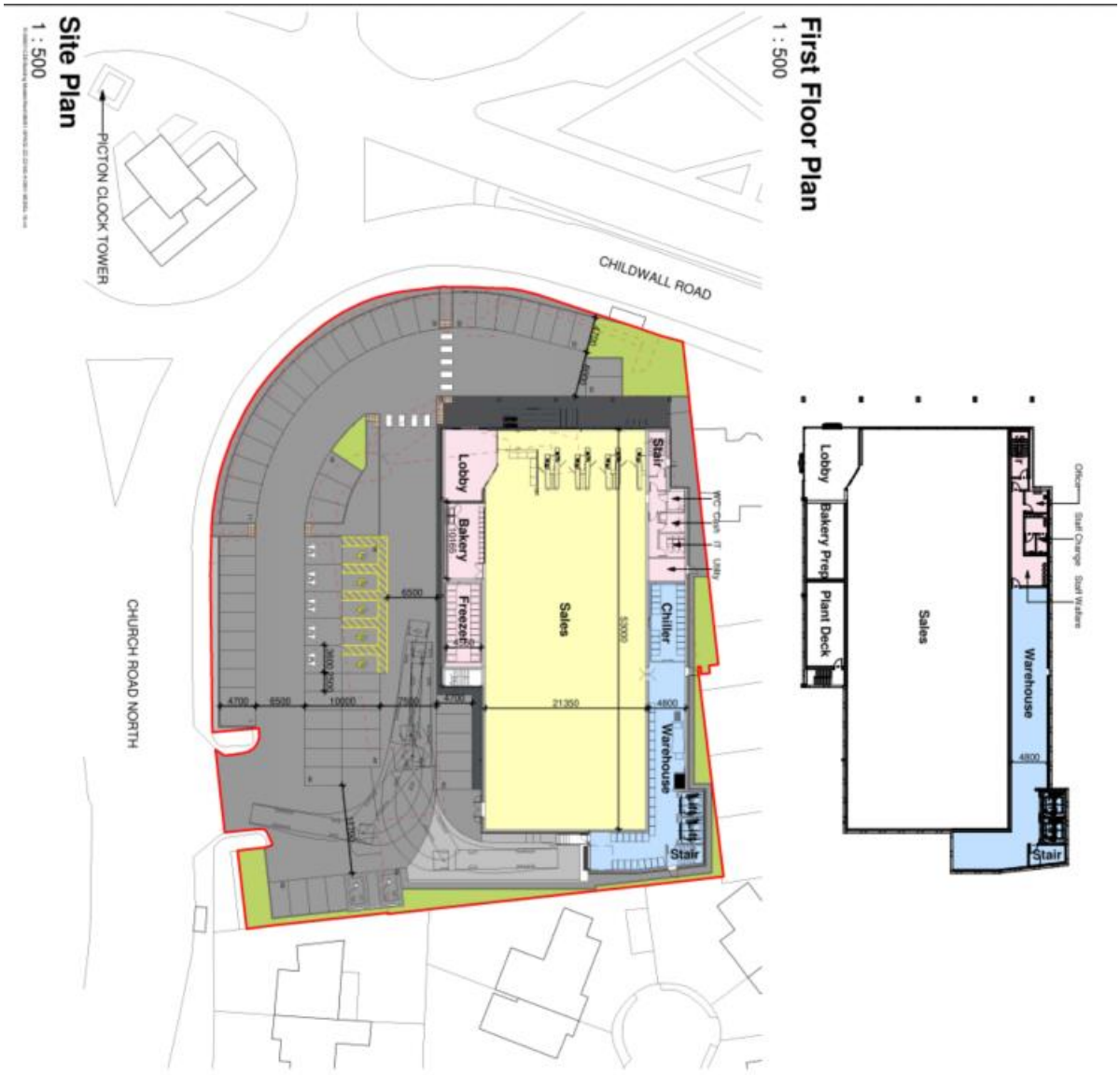

FIGURE 3. NOISE MONITORING LOCATION, UPTON

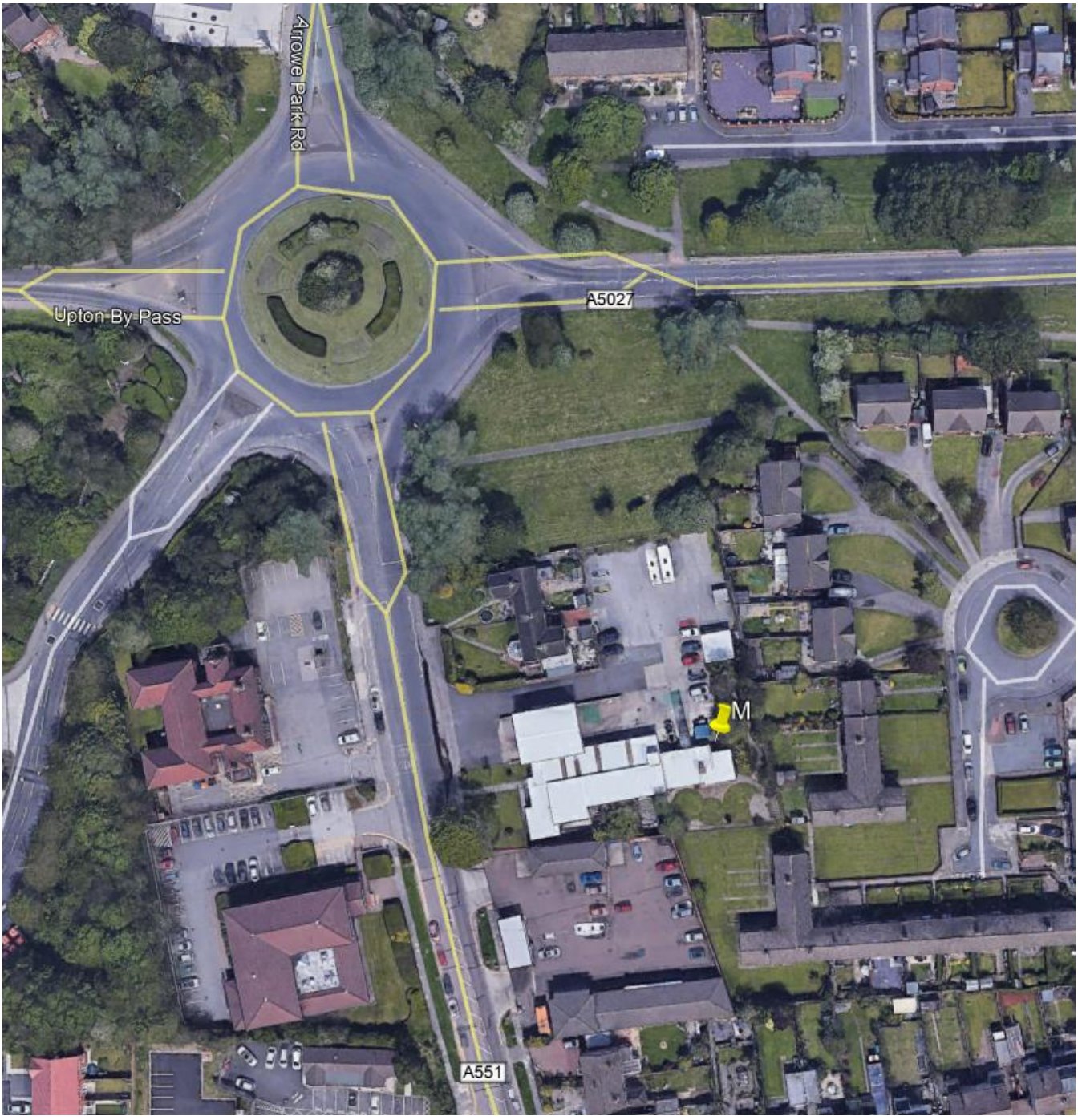

FIGURE 4. NOISE MONITORING LOCATION, TOXTETH

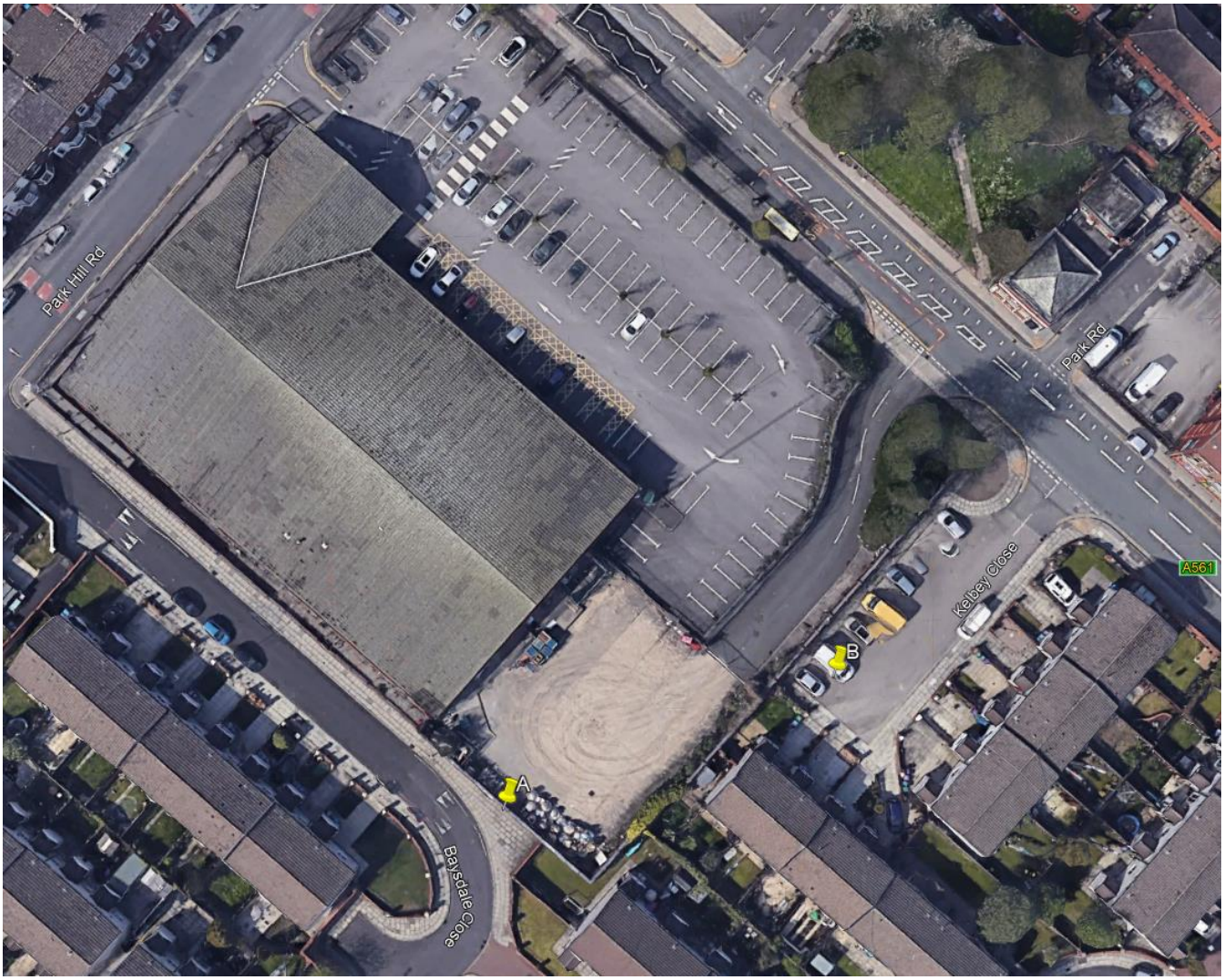

FIGURE 5. NOISE MONITORING LOCATION, FAZAKERLEY

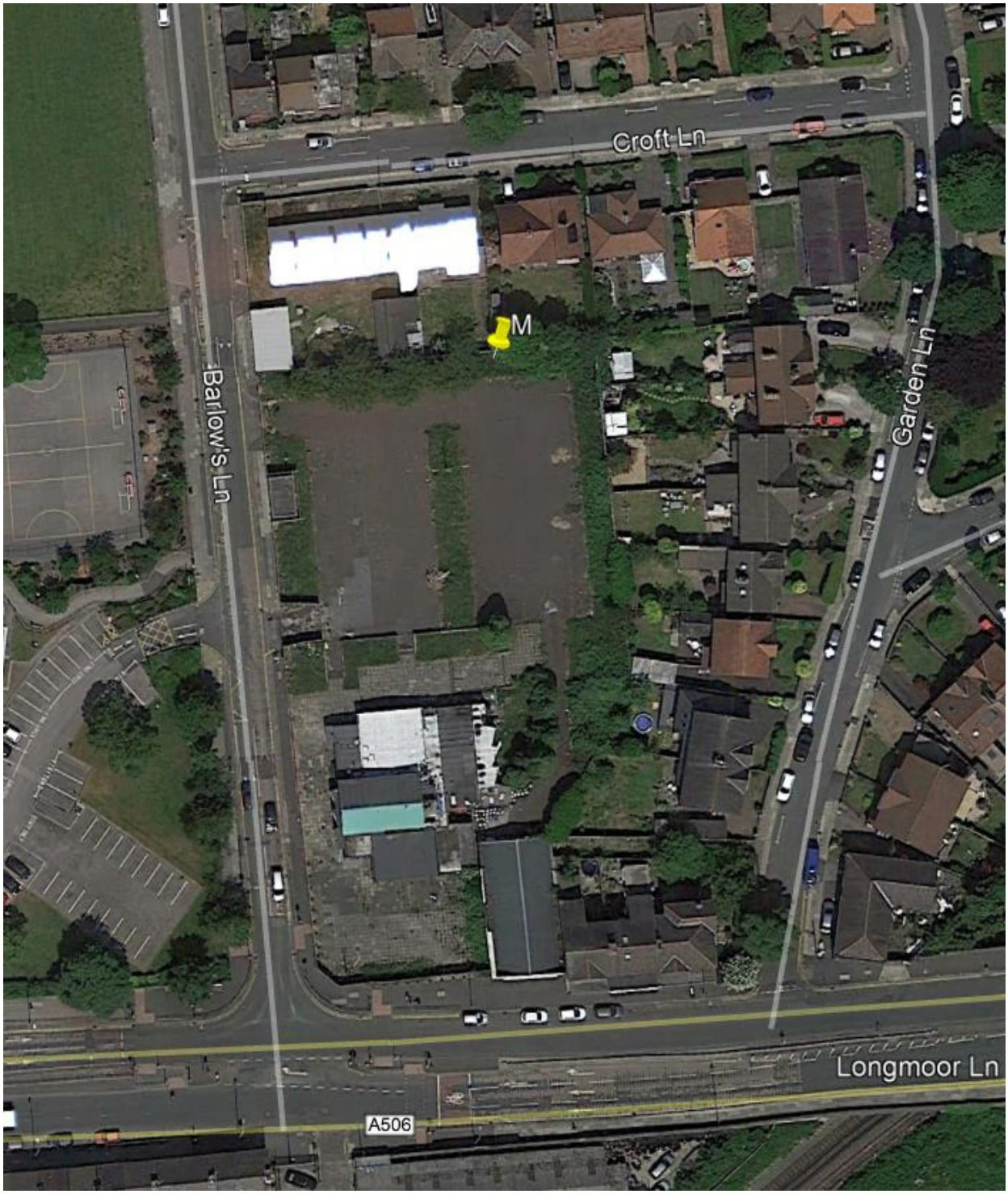

FIGURE 6. PROPOSED ACOUSTIC BARRIER

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. dBL_{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 $120dBL_{Aeq}$ 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 dBL_{Aeq}. In the workplace the wearing of hearing protection is compulsory for staff who experience a noise level of over $85dBL_{Aeq}$ averaged over an 8-hour day and is normally used when the levels are over $80dBL_{Aeq}$ averaged over the 8-hour day. Noise intrusion levels into bedrooms (e.g. from traffic noise) are often controlled to below $30dBL_{Aeq}$ in the design of new properties (standards sometimes vary between authorities). Noise levels of below $20dBL_{Aeq}$ 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. $L_{A10,\ 1hour}$.
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. $L_{A90,\ 5min}$.
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 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 15-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: SURVEY RESULTS FROM OTHER SITES

Noise Survey Results, Arrowe Park Road, Upton

Table A2.1: Daytime Noise Survey Data
Thursday 09 Jan 2020

Date	Start (h:m:s)	Period (h:m:s)	Free field noise levels (dB)		
			L_{Aeq}	$L_{Amax(f)}$	L_{A90}
09/01/2020	15:00:12	01:00:00	57.4	83.0	54.6
09/01/2020	16:00:12	01:00:00	55.7	69.4	53.9
09/01/2020	17:00:12	01:00:00	58.3	93.9	53.8
09/01/2020	18:00:12	01:00:00	54.9	66.9	52.6
09/01/2020	19:00:12	01:00:00	55.0	69.1	52.2
09/01/2020	20:00:12	01:00:00	54.0	67.9	50.8
09/01/2020	21:00:12	01:00:00	52.7	66.9	48.8
09/01/2020	22:00:12	01:00:00	51.5	68.7	46.7
AVERAGE			55.4	-	51.7
HIGHEST			58.3	93.9	54.6
LOWEST			51.5	66.9	46.7
MODE			-	-	54.0

Table A2.2: Daytime Noise Survey Data
Friday 10 Jan 2020

Date	Start (h:m:s)	Period (h:m:s)	Free field noise levels (dB)		
			L_{Aeq}	$L_{Amax(f)}$	L_{A90}
10/01/2020	07:00:12	01:00:00	56.4	72.5	53.6
10/01/2020	08:00:12	01:00:00	57.7	71.7	55.8
10/01/2020	09:00:12	01:00:00	56.4	67.7	54.3
10/01/2020	10:00:12	01:00:00	56.4	70.3	54.2
10/01/2020	11:00:12	01:00:00	55.9	80.8	53.4
10/01/2020	12:00:12	01:00:00	55.5	75.1	52.8
10/01/2020	13:00:12	01:00:00	55.5	78.5	52.7
10/01/2020	14:00:12	01:00:00	55.5	71.4	53.2
10/01/2020	15:00:12	01:00:00	55.9	74.1	53.6
10/01/2020	16:00:12	01:00:00	55.7	67.0	53.6
10/01/2020	17:00:12	01:00:00	56.7	77.1	53.0
10/01/2020	18:00:12	01:00:00	55.1	70.3	52.6
10/01/2020	19:00:12	01:00:00	55.2	70.8	51.9
10/01/2020	20:00:12	01:00:00	54.8	71.3	50.4
10/01/2020	21:00:12	01:00:00	55.3	80.7	49.6
10/01/2020	22:00:12	01:00:00	54.1	83.1	46.5
AVERAGE			55.8	-	52.6
HIGHEST			57.7	83.1	55.8
LOWEST			54.1	67.0	46.5
MODE			-	-	53.0

Table A2.3: Daytime Noise Survey Data
Saturday 11 Jan 2020

Date	Start (h:m:s)	Period (h:m:s)	Free field noise levels (dB)		
			L_{Aeq}	$L_{Amax(f)}$	L_{A90}
11/01/2020	07:00:12	01:00:00	57.8	72.7	53.1
11/01/2020	08:00:12	01:00:00	60.5	73.7	55.8
11/01/2020	09:00:12	01:00:00	57.0	77.2	53.7
11/01/2020	10:00:12	01:00:00	55.9	77.0	53.4
11/01/2020	11:00:12	01:00:00	57.0	71.5	54.4
11/01/2020	12:00:12	01:00:00	56.7	69.5	54.5
11/01/2020	13:00:12	01:00:00	58.9	70.0	55.9
11/01/2020	14:00:12	01:00:00	59.4	77.9	56.0
11/01/2020	15:00:12	01:00:00	62.0	79.2	57.5
11/01/2020	16:00:12	01:00:00	58.8	72.9	56.0
11/01/2020	17:00:12	01:00:00	58.9	77.2	56.3
11/01/2020	18:00:12	01:00:00	57.8	70.6	55.4
11/01/2020	19:00:12	01:00:00	57.0	66.5	54.3
11/01/2020	20:00:12	01:00:00	55.2	79.8	50.7
11/01/2020	21:00:12	01:00:00	54.2	81.0	48.6
11/01/2020	22:00:12	01:00:00	52.6	65.3	47.6
AVERAGE			58.1	-	54.0
HIGHEST			62.0	81.0	57.5
LOWEST			52.6	65.3	47.6
MODE			-	-	56.0

Table A2.4: Daytime Noise Survey Data
Sunday 12 Jan 2020

Date	Start (h:m:s)	Period (h:m:s)	Free field noise levels (dB)		
			L_{Aeq}	$L_{Amax(f)}$	L_{A90}
12/01/2020	07:00:12	01:00:00	56.0	66.4	51.5
12/01/2020	08:00:12	01:00:00	54.4	67.7	50.4
12/01/2020	09:00:12	01:00:00	56.7	68.2	53.7
12/01/2020	10:00:12	01:00:00	57.4	71.8	54.9
12/01/2020	11:00:12	01:00:00	59.0	79.7	56.0
12/01/2020	12:00:12	01:00:00	58.3	73.3	56.2
12/01/2020	13:00:12	01:00:00	58.2	77.0	55.1
12/01/2020	14:00:12	01:00:00	58.4	83.0	55.1
12/01/2020	15:00:12	01:00:00	56.6	68.1	54.4
12/01/2020	16:00:12	01:00:00	55.4	66.4	52.6
12/01/2020	17:00:12	01:00:00	55.9	75.7	51.9
12/01/2020	18:00:12	01:00:00	55.2	74.3	51.6
12/01/2020	19:00:12	01:00:00	54.4	64.4	50.8
12/01/2020	20:00:12	01:00:00	54.0	63.2	50.2
12/01/2020	21:00:12	01:00:00	52.1	69.9	47.4
12/01/2020	22:00:12	01:00:00	52.7	77.4	44.5
AVERAGE			56.4	-	52.3
HIGHEST			59.0	83.0	56.2
LOWEST			52.1	63.2	44.5
MODE			-	-	52.0

Table A2.5: Daytime Noise Survey Data
Monday 13 Jan 2020

Date	Start (h:m:s)	Period (h:m:s)	Free field noise levels (dB)		
			L_{Aeq}	$L_{Amax(f)}$	L_{A90}
13/01/2020	07:00:12	01:00:00	56.8	74.6	54.3
13/01/2020	08:00:12	01:00:00	57.9	75.6	56.1
13/01/2020	09:00:12	01:00:00	56.7	76.7	54.6
13/01/2020	10:00:12	01:00:00	56.8	70.3	54.6
13/01/2020	11:00:12	01:00:00	57.2	73.4	54.9
AVERAGE			57.1	-	54.9
HIGHEST			57.9	76.7	56.1
LOWEST			56.7	70.3	54.3
MODE			-	-	55.0

Table A2.6: Night time Noise Survey Data
Thursday 09 Jan 2020 to Friday 10 Jan 2020

Date	Start (h:m:s)	Period (h:m:s)	Free field noise levels (dB)		
			L_{Aeq}	$L_{Amax(f)}$	L_{A90}
09/01/2020	23:00:12	00:15:00	49.7	59.1	44.4
09/01/2020	23:15:12	00:15:00	49.3	64.8	43.3
09/01/2020	23:30:12	00:15:00	47.5	60.0	41.6
09/01/2020	23:45:12	00:15:00	48.6	62.9	41.0
10/01/2020	00:00:12	00:15:00	49.3	59.6	43.3
10/01/2020	00:15:12	00:15:00	47.7	61.2	41.7
10/01/2020	00:30:12	00:15:00	46.5	58.0	39.6
10/01/2020	00:45:12	00:15:00	45.9	58.5	38.8
10/01/2020	01:00:12	00:15:00	45.6	57.6	39.6
10/01/2020	01:15:12	00:15:00	45.7	59.7	38.7
10/01/2020	01:30:12	00:15:00	43.3	57.6	36.4
10/01/2020	01:45:12	00:15:00	43.3	57.7	35.9
10/01/2020	02:00:12	00:15:00	41.7	56.5	34.4
10/01/2020	02:15:12	00:15:00	40.4	55.8	34.9
10/01/2020	02:30:12	00:15:00	43.6	59.3	35.6
10/01/2020	02:45:12	00:15:00	41.7	57.4	35.6
10/01/2020	03:00:12	00:15:00	41.5	56.3	34.7
10/01/2020	03:15:12	00:15:00	42.2	56.0	34.2
10/01/2020	03:30:12	00:15:00	42.6	58.7	34.4
10/01/2020	03:45:12	00:15:00	43.2	58.3	35.0
10/01/2020	04:00:12	00:15:00	42.9	57.5	36.0
10/01/2020	04:15:12	00:15:00	45.9	62.0	38.8
10/01/2020	04:30:12	00:15:00	47.1	60.9	39.1
10/01/2020	04:45:12	00:15:00	47.8	61.0	41.5
10/01/2020	05:00:12	00:15:00	48.4	62.3	43.8
10/01/2020	05:15:12	00:15:00	48.9	60.2	43.9
10/01/2020	05:30:12	00:15:00	51.0	62.7	46.2
10/01/2020	05:45:12	00:15:00	51.1	61.0	47.3
10/01/2020	06:00:12	00:15:00	52.0	73.9	48.0
10/01/2020	06:15:12	00:15:00	52.4	64.6	48.5
10/01/2020	06:30:12	00:15:00	53.4	63.8	49.1
10/01/2020	06:45:12	00:15:00	54.2	63.4	50.3
AVERAGE			48.3	-	40.5
HIGHEST			54.2	73.9	50.3
LOWEST			40.4	55.8	34.2
MODE			-	-	36

Table A2.7: Night time Noise Survey Data
Friday 10 Jan 2020 to Saturday 11 Jan 2020

Date	Start (h:m:s)	Period (h:m:s)	Free field noise levels (dB)		
			L_{Aeq}	$L_{Amax(f)}$	L_{A90}
10/01/2020	23:00:12	00:15:00	53.0	68.8	47.4
10/01/2020	23:15:12	00:15:00	51.8	71.7	45.4
10/01/2020	23:30:12	00:15:00	51.2	61.5	45.8
10/01/2020	23:45:12	00:15:00	50.0	62.6	44.8
11/01/2020	00:00:12	00:15:00	49.5	60.8	44.5
11/01/2020	00:15:12	00:15:00	49.0	61.1	42.8
11/01/2020	00:30:12	00:15:00	45.6	58.5	38.6
11/01/2020	00:45:12	00:15:00	45.8	61.9	39.2
11/01/2020	01:00:12	00:15:00	47.2	61.5	39.6
11/01/2020	01:15:12	00:15:00	44.9	58.2	37.6
11/01/2020	01:30:12	00:15:00	43.9	60.1	37.1
11/01/2020	01:45:12	00:15:00	44.9	59.6	37.9
11/01/2020	02:00:12	00:15:00	44.1	61.8	36.5
11/01/2020	02:15:12	00:15:00	45.8	58.5	37.7
11/01/2020	02:30:12	00:15:00	47.7	61.2	38.6
11/01/2020	02:45:12	00:15:00	48.1	63.1	40.7
11/01/2020	03:00:12	00:15:00	50.7	64.7	40.6
11/01/2020	03:15:12	00:15:00	56.6	73.9	45.7
11/01/2020	03:30:12	00:15:00	58.5	71.2	48.6
11/01/2020	03:45:12	00:15:00	59.0	71.8	50.9
11/01/2020	04:00:12	00:15:00	61.5	72.0	53.9
11/01/2020	04:15:12	00:15:00	61.9	73.2	54.6
11/01/2020	04:30:12	00:15:00	59.7	71.6	53.2
11/01/2020	04:45:12	00:15:00	60.7	70.5	53.7
11/01/2020	05:00:12	00:15:00	58.7	71.9	52.7
11/01/2020	05:15:12	00:15:00	61.9	78.4	53.4
11/01/2020	05:30:12	00:15:00	65.2	76.8	58.1
11/01/2020	05:45:12	00:15:00	65.7	77.1	56.2
11/01/2020	06:00:12	00:15:00	64.9	76.9	57.2
11/01/2020	06:15:12	00:15:00	61.3	73.4	53.1
11/01/2020	06:30:12	00:15:00	57.3	69.0	51.4
11/01/2020	06:45:12	00:15:00	55.8	67.5	49.9
AVERAGE			58.6	-	46.5
HIGHEST			65.7	78.4	58.1
LOWEST			43.9	58.2	36.5
MODE			-	-	53

Table A2.8: Night time Noise Survey Data
Saturday 11 Jan 2020 to Sunday 12 Jan 2020

Date	Start (h:m:s)	Period (h:m:s)	Free field noise levels (dB)		
			L_{Aeq}	$L_{Amax(f)}$	L_{A90}
11/01/2020	23:00:12	00:15:00	51.3	61.4	45.7
11/01/2020	23:15:12	00:15:00	50.8	61.0	44.4
11/01/2020	23:30:12	00:15:00	51.1	69.8	44.6
11/01/2020	23:45:12	00:15:00	51.3	69.1	43.1
12/01/2020	00:00:12	00:15:00	50.5	60.9	43.2
12/01/2020	00:15:12	00:15:00	56.7	81.9	42.3
12/01/2020	00:30:12	00:15:00	48.7	60.3	41.1
12/01/2020	00:45:12	00:15:00	48.4	61.2	42.0
12/01/2020	01:00:12	00:15:00	49.2	65.5	41.4
12/01/2020	01:15:12	00:15:00	49.7	74.7	40.5
12/01/2020	01:30:12	00:15:00	47.4	63.6	38.9
12/01/2020	01:45:12	00:15:00	47.7	65.1	39.5
12/01/2020	02:00:12	00:15:00	46.8	60.6	38.3
12/01/2020	02:15:12	00:15:00	44.9	58.4	36.3
12/01/2020	02:30:12	00:15:00	44.4	60.9	36.2
12/01/2020	02:45:12	00:15:00	44.1	58.7	35.6
12/01/2020	03:00:12	00:15:00	45.8	60.5	36.8
12/01/2020	03:15:12	00:15:00	53.9	74.9	37.7
12/01/2020	03:30:12	00:15:00	44.6	58.9	36.7
12/01/2020	03:45:12	00:15:00	44.5	61.1	35.8
12/01/2020	04:00:12	00:15:00	44.1	59.3	35.5
12/01/2020	04:15:12	00:15:00	42.6	58.4	34.6
12/01/2020	04:30:12	00:15:00	43.2	57.9	35.9
12/01/2020	04:45:12	00:15:00	47.3	63.2	39.3
12/01/2020	05:00:12	00:15:00	46.0	59.5	38.4
12/01/2020	05:15:12	00:15:00	45.1	60.9	37.3
12/01/2020	05:30:12	00:15:00	45.3	60.1	37.9
12/01/2020	05:45:12	00:15:00	47.1	59.3	38.9
12/01/2020	06:00:12	00:15:00	47.8	65.4	42.4
12/01/2020	06:15:12	00:15:00	46.2	61.4	39.1
12/01/2020	06:30:12	00:15:00	53.8	63.1	46.8
12/01/2020	06:45:12	00:15:00	61.4	69.3	57.0
AVERAGE			51.0	-	40.1
HIGHEST			61.4	81.9	57.0
LOWEST			42.6	57.9	34.6
MODE			-	-	36

Table A2.9: Night time Noise Survey Data
Sunday 12 Jan 2020 to Monday 13 Jan 2020

Date	Start (h:m:s)	Period (h:m:s)	Free field noise levels (dB)		
			L_{Aeq}	$L_{Amax(f)}$	L_{A90}
12/01/2020	23:00:12	00:15:00	47.6	61.1	39.8
12/01/2020	23:15:12	00:15:00	48.1	61.9	42.1
12/01/2020	23:30:12	00:15:00	48.3	68.8	39.6
12/01/2020	23:45:12	00:15:00	47.6	59.5	41.5
13/01/2020	00:00:12	00:15:00	47.0	61.0	39.5
13/01/2020	00:15:12	00:15:00	47.5	59.6	40.3
13/01/2020	00:30:12	00:15:00	44.8	60.4	36.9
13/01/2020	00:45:12	00:15:00	45.8	63.2	37.3
13/01/2020	01:00:12	00:15:00	45.7	58.6	37.3
13/01/2020	01:15:12	00:15:00	42.5	61.3	36.4
13/01/2020	01:30:12	00:15:00	44.3	58.7	37.6
13/01/2020	01:45:12	00:15:00	45.4	60.4	36.2
13/01/2020	02:00:12	00:15:00	44.2	63.4	36.4
13/01/2020	02:15:12	00:15:00	44.7	61.8	35.9
13/01/2020	02:30:12	00:15:00	42.4	59.9	36.3
13/01/2020	02:45:12	00:15:00	42.6	58.2	34.8
13/01/2020	03:00:12	00:15:00	42.2	56.3	35.8
13/01/2020	03:15:12	00:15:00	43.6	59.6	37.6
13/01/2020	03:30:12	00:15:00	43.6	58.9	36.2
13/01/2020	03:45:12	00:15:00	44.1	60.0	36.3
13/01/2020	04:00:12	00:15:00	45.5	62.0	37.9
13/01/2020	04:15:12	00:15:00	45.6	59.4	37.5
13/01/2020	04:30:12	00:15:00	46.5	59.8	40.9
13/01/2020	04:45:12	00:15:00	45.6	61.5	40.6
13/01/2020	05:00:12	00:15:00	48.0	60.3	42.8
13/01/2020	05:15:12	00:15:00	48.7	60.4	44.3
13/01/2020	05:30:12	00:15:00	50.9	63.6	46.8
13/01/2020	05:45:12	00:15:00	51.8	60.9	47.9
13/01/2020	06:00:12	00:15:00	50.6	60.3	46.1
13/01/2020	06:15:12	00:15:00	52.4	61.5	49.5
13/01/2020	06:30:12	00:15:00	53.8	71.0	50.4
13/01/2020	06:45:12	00:15:00	54.1	63.7	51.0
AVERAGE			48.1	-	40.3
HIGHEST			54.1	71.0	51.0
LOWEST			42.2	56.3	34.8
MODE			-	-	36

Noise Survey Results, Park Hill Road/Park Road, Toxteth

Table A2.10: Late evening noise levels at Location A 17/04/2019

Start (h:m:s)	Period (h:m:s)	Free field noise levels (dB)			
		L_{Aeq}	$L_{Amax(f)}$	L_{A10}	L_{A90}
21:58:00	00:05:00	50.3	64.5	52.5	44.9
22:03:02	00:05:00	49.4	66.8	51.7	44.5
22:08:04	00:05:00	48.3	62.2	50.9	43.0
22:13:07	00:05:00	47.4	53.0	49.5	44.8
22:18:09	00:05:00	47.4	54.3	49.3	44.1
22:23:12	00:03:13	49.6	75.4	49.5	42.0
22:27:20	00:05:00	47.9	54.6	50.6	43.5
22:33:06	00:05:00	51.7	66.7	53.2	44.3
22:39:38	00:05:00	48.4	59.3	51.4	43.3
22:48:59	00:05:00	46.5	53.6	49.2	41.5
Average		49.0	-	50.8	43.6

Table A2.11: Late evening noise levels at Location B 17/04/2019

Start (h:m:s)	Period (h:m:s)	Free field noise levels (dB)			
		L_{Aeq}	$L_{Amax(f)}$	L_{A10}	L_{A90}
22:54:01	00:05:00	53.8	61.0	56.9	46.7

Table A2.12: Noise levels at Location B in first part of night 17/04/2019

Start (h:m:s)	Period (h:m:s)	Free field noise levels (dB)			
		L_{Aeq}	$L_{Amax(f)}$	L_{A10}	L_{A90}
23:02:20	00:05:00	54.1	62.2	58.0	43.2
23:07:22	00:05:00	53.3	64.2	57.1	44.6
23:12:25	00:05:00	52.9	59.8	56.6	44.2
23:17:27	00:05:00	55.2	70.7	58.3	44.2
23:22:30	00:05:00	54.8	62.2	58.7	43.7
23:27:54	00:05:00	54.0	63.0	58.2	43.6
Average		54.1	-	57.8	43.9

Table A2.13: Noise levels at Location B after midnight 18/04/2019

Start (h:m:s)	Period (h:m:s)	Free field noise levels (dB)			
		L_{Aeq}	$L_{Amax(f)}$	L_{A10}	L_{A90}
00:04:40	00:05:00	53.5	63.5	57.3	44.3
00:09:55	00:05:00	52.5	61.9	57.0	40.2
00:14:57	00:05:00	52.5	66.2	57.2	41.0
00:19:59	00:05:00	53.3	61.3	56.9	43.4
00:25:01	00:05:00	52.7	63.7	56.9	40.7
00:30:03	00:05:00	51.0	61.7	55.4	39.8
00:35:06	00:05:00	51.7	60.3	56.1	40.7
00:40:08	00:04:21	50.9	62.5	55.7	39.6
00:47:40	00:05:00	50.6	58.9	55.2	39.4
00:52:43	00:05:00	50.3	62.4	55.4	37.9
00:57:45	00:05:00	53.0	70.0	54.9	39.3
01:02:47	00:05:00	50.4	62.1	55.1	38.8
01:07:49	00:05:00	51.7	62.4	56.5	39.8
Average		52.0	-	56.1	40.4

Table A2.14: Noise levels at Location B night before 07:00 hrs 18/04/2019

Start (h:m:s)	Period (h:m:s)	Free field noise levels (dB)			
		L_{Aeq}	$L_{Amax(f)}$	L_{A10}	L_{A90}
06:25:30	00:05:00	55.8	68.7	59.6	43.9
06:30:33	00:05:00	54.2	67.3	58.5	41.3
06:35:35	00:05:00	55.0	68.2	59.2	40.8
06:40:38	00:05:00	58.3	73.9	60.4	48.6
06:45:40	00:05:00	57.0	66.4	59.9	49.9
06:50:42	00:05:00	54.7	65.1	59.0	43.6
06:55:45	00:05:00	55.7	65.9	60.0	42.0
Average		56.0	-	59.5	44.3

Table A2.15: Noise levels at Location B day after 07:00 hrs 18/04/2019

Start (h:m:s)	Period (h:m:s)	Free field noise levels (dB)			
		L_{Aeq}	$L_{Amax(f)}$	L_{A10}	L_{A90}
07:00:47	00:05:00	56.9	65.8	60.8	45.1
07:05:49	00:05:00	58.3	68.2	62.0	48.1
07:11:55	00:05:00	57.2	65.2	60.7	48.6
07:16:58	00:05:00	56.5	66.3	59.9	46.1
07:22:00	00:05:00	56.8	67.2	60.4	48.6
07:27:02	00:05:00	58.0	64.6	61.4	48.6
07:32:05	00:05:00	56.7	63.9	60.3	48.0
Average		57.2	-	60.8	47.6

Noise Survey Results, Longmoor Lane, Fazakerley

Table A2.16: Daytime Noise Survey Data
Friday 20 Jan 2017

Date	Start (h:m:s)	Period (h:m:s)	Free field noise levels (dB)		
			L_{Aeq}	$L_{Amax(f)}$	L_{A90}
20/01/2017	14:03:07	01:00:00	55.8	86.9	45.6
20/01/2017	15:03:07	01:00:00	51.7	81.1	45.3
20/01/2017	16:03:07	01:00:00	51.1	72.9	45.6
20/01/2017	17:03:07	01:00:00	51.6	79.2	45.2
20/01/2017	18:03:07	01:00:00	50.3	65.3	46.4
20/01/2017	19:03:07	01:00:00	51.4	62.8	47.6
20/01/2017	20:03:07	01:00:00	50.7	66.5	47.1
20/01/2017	21:03:07	01:00:00	49.7	61.6	45.1
20/01/2017	22:03:07	01:00:00	48.0	69.5	44.4
AVERAGE			51.7	-	45.8
HIGHEST			55.8	86.9	47.6
LOWEST			48.0	61.6	44.4
MODE			-	-	46.0

Table A2.17: Daytime Noise Survey Data
Saturday 21 Jan 2017

Date	Start (h:m:s)	Period (h:m:s)	Free field noise levels (dB)		
			L_{Aeq}	$L_{Amax(f)}$	L_{A90}
21/01/2017	07:03:07	01:00:00	54.3	82.6	47.1
21/01/2017	08:03:07	01:00:00	54.6	79.9	48.3
21/01/2017	09:03:07	01:00:00	56.0	81.2	48.4
21/01/2017	10:03:07	01:00:00	54.3	86.2	47.7
21/01/2017	11:03:07	01:00:00	51.2	75.9	46.5
21/01/2017	12:03:07	01:00:00	52.6	80.3	46.9
21/01/2017	13:03:07	01:00:00	54.3	80.3	45.9
21/01/2017	14:03:07	01:00:00	53.1	80.3	45.2
21/01/2017	15:03:07	01:00:00	48.6	62.4	44.9
21/01/2017	16:03:07	01:00:00	54.3	85.5	44.6
21/01/2017	17:03:07	01:00:00	48.0	57.4	43.8
21/01/2017	18:03:07	01:00:00	48.5	72.0	43.3
21/01/2017	19:03:07	01:00:00	48.5	70.0	44.0
21/01/2017	20:03:07	01:00:00	47.2	64.6	41.9
21/01/2017	21:03:07	01:00:00	45.6	62.7	41.7
21/01/2017	22:03:07	01:00:00	43.9	60.7	39.4
AVERAGE			52.2	-	45.0
HIGHEST			56.0	86.2	48.4
LOWEST			43.9	57.4	39.4
MODE			-	-	47.0

Table A2.18: Daytime Noise Survey Data
Sunday 22 Jan 2017

Date	Start (h:m:s)	Period (h:m:s)	Free field noise levels (dB)		
			L_{Aeq}	$L_{Amax(f)}$	L_{A90}
22/01/2017	07:03:07	01:00:00	52.5	81.4	43.5
22/01/2017	08:03:07	01:00:00	50.6	78.7	43.4
22/01/2017	09:03:07	01:00:00	51.8	82.2	44.8
22/01/2017	10:03:07	01:00:00	58.9	87.0	46.1
22/01/2017	11:03:07	01:00:00	50.5	72.5	45.8
22/01/2017	12:03:07	01:00:00	58.6	96.0	46.0
22/01/2017	13:03:07	01:00:00	51.5	83.5	45.5
22/01/2017	14:03:07	01:00:00	52.6	80.8	45.7
22/01/2017	15:03:07	01:00:00	49.8	64.3	44.7
22/01/2017	16:03:07	01:00:00	50.1	73.1	44.6
22/01/2017	17:03:07	01:00:00	52.3	85.6	43.7
22/01/2017	18:03:07	01:00:00	48.4	64.2	43.9
22/01/2017	19:03:07	01:00:00	49.0	70.2	44.1
22/01/2017	20:03:07	01:00:00	47.6	69.4	43.0
22/01/2017	21:03:07	01:00:00	45.3	59.7	40.6
22/01/2017	22:03:07	01:00:00	44.7	65.6	40.4
AVERAGE			52.8	-	44.1
HIGHEST			58.9	96.0	46.1
LOWEST			44.7	59.7	40.4
MODE			-	-	46.0

Table A2.19: Daytime Noise Survey Data
Monday 23 Jan 2017

Date	Start (h:m:s)	Period (h:m:s)	Free field noise levels (dB)		
			L_{Aeq}	$L_{Amax(f)}$	L_{A90}
23/01/2017	07:03:07	01:00:00	54.1	84.0	46.2
23/01/2017	08:03:07	01:00:00	51.6	72.4	47.0
23/01/2017	09:03:07	01:00:00	52.9	76.7	47.4
23/01/2017	10:03:07	01:00:00	52.1	76.4	48.5
AVERAGE			52.8	-	47.3
HIGHEST			54.1	84.0	48.5
LOWEST			51.6	72.4	46.2
MODE			-	-	47.0

Table A2.20: Night time Noise Survey Data
Friday 20 Jan 2017 to Saturday 21 Jan 2017

Date	Start (h:m:s)	Period (h:m:s)	Free field noise levels (dB)		
			L_{Aeq}	$L_{Amax(f)}$	L_{A90}
20/01/2017	23:03:07	00:15:00	47.6	53.1	45.3
20/01/2017	23:18:07	00:15:00	46.8	57.5	43.9
20/01/2017	23:33:07	00:15:00	47.1	60.8	43.0
20/01/2017	23:48:07	00:15:00	46.1	60.3	42.9
21/01/2017	00:03:07	00:15:00	45.8	53.8	42.5
21/01/2017	00:18:07	00:15:00	45.7	60.2	42.4
21/01/2017	00:33:07	00:15:00	44.4	52.9	41.1
21/01/2017	00:48:07	00:15:00	44.8	52.4	41.6
21/01/2017	01:03:07	00:15:00	45.2	57.4	42.6
21/01/2017	01:18:07	00:15:00	45.3	54.3	42.1
21/01/2017	01:33:07	00:15:00	44.1	53.1	40.9
21/01/2017	01:48:07	00:15:00	44.1	51.1	41.9
21/01/2017	02:03:07	00:15:00	43.8	58.2	40.5
21/01/2017	02:18:07	00:15:00	47.0	68.7	41.0
21/01/2017	02:33:07	00:15:00	44.2	52.0	41.1
21/01/2017	02:48:07	00:15:00	43.4	52.1	41.0
21/01/2017	03:03:07	00:15:00	43.9	53.1	41.1
21/01/2017	03:18:07	00:15:00	42.7	50.0	40.0
21/01/2017	03:33:07	00:15:00	42.7	53.2	39.8
21/01/2017	03:48:07	00:15:00	42.7	51.7	39.9
21/01/2017	04:03:07	00:15:00	41.1	50.5	38.9
21/01/2017	04:18:07	00:15:00	59.5	77.0	39.7
21/01/2017	04:33:07	00:15:00	58.0	74.8	39.9
21/01/2017	04:48:07	00:15:00	49.2	62.7	40.0
21/01/2017	05:03:07	00:15:00	50.1	62.5	41.7
21/01/2017	05:18:07	00:15:00	50.1	64.3	42.3
21/01/2017	05:33:07	00:15:00	50.5	65.1	43.8
21/01/2017	05:48:07	00:15:00	50.8	63.9	43.7
21/01/2017	06:03:07	00:15:00	50.7	72.3	43.9
21/01/2017	06:18:07	00:15:00	60.4	74.2	44.9
21/01/2017	06:33:07	00:15:00	53.9	67.6	45.7
21/01/2017	06:48:07	00:15:00	50.3	64.2	45.5
AVERAGE			51.3	-	42.0
HIGHEST			60.4	77.0	45.7
LOWEST			41.1	50.0	38.9
MODE			-	-	41.0

Table A2.21: Night time Noise Survey Data
Saturday 21 Jan 2017 to Sunday 22 Jan 2017

Date	Start (h:m:s)	Period (h:m:s)	Free field noise levels (dB)		
			L_{Aeq}	$L_{Amax(f)}$	L_{A90}
21/01/2017	23:03:07	00:15:00	43.4	58.6	38.8
21/01/2017	23:18:07	00:15:00	44.3	53.9	39.3
21/01/2017	23:33:07	00:15:00	44.9	58.6	39.4
21/01/2017	23:48:07	00:15:00	44.4	55.9	39.2
22/01/2017	00:03:07	00:15:00	43.4	52.6	38.2
22/01/2017	00:18:07	00:15:00	43.9	50.7	39.3
22/01/2017	00:33:07	00:15:00	45.0	53.5	39.9
22/01/2017	00:48:07	00:15:00	44.2	54.0	38.6
22/01/2017	01:03:07	00:15:00	43.9	51.9	38.5
22/01/2017	01:18:07	00:15:00	46.0	67.4	38.4
22/01/2017	01:33:07	00:15:00	44.0	53.4	37.8
22/01/2017	01:48:07	00:15:00	44.5	53.7	38.2
22/01/2017	02:03:07	00:15:00	42.4	52.2	37.3
22/01/2017	02:18:07	00:15:00	42.4	50.6	37.2
22/01/2017	02:33:07	00:15:00	42.9	51.6	38.6
22/01/2017	02:48:07	00:15:00	42.9	51.0	38.9
22/01/2017	03:03:07	00:15:00	42.8	51.2	38.8
22/01/2017	03:18:07	00:15:00	42.3	50.3	38.6
22/01/2017	03:33:07	00:15:00	41.6	50.3	37.9
22/01/2017	03:48:07	00:15:00	42.0	51.2	37.8
22/01/2017	04:03:07	00:15:00	41.9	51.8	37.2
22/01/2017	04:18:07	00:15:00	42.2	51.7	38.1
22/01/2017	04:33:07	00:15:00	42.4	53.2	37.8
22/01/2017	04:48:07	00:15:00	43.3	63.0	37.9
22/01/2017	05:03:07	00:15:00	49.2	62.8	40.4
22/01/2017	05:18:07	00:15:00	49.6	62.6	41.6
22/01/2017	05:33:07	00:15:00	48.8	61.3	40.6
22/01/2017	05:48:07	00:15:00	49.0	62.2	41.0
22/01/2017	06:03:07	00:15:00	49.4	62.4	41.9
22/01/2017	06:18:07	00:15:00	51.8	68.7	41.4
22/01/2017	06:33:07	00:15:00	56.0	73.6	41.7
22/01/2017	06:48:07	00:15:00	58.9	75.9	41.4
AVERAGE			48.5	-	39.1
HIGHEST			58.9	75.9	41.9
LOWEST			41.6	50.3	37.2
MODE			-	-	39.0

Table A2.22: Night time Noise Survey Data
Sunday 22 Jan 2017 to Monday 23 Jan 2017

Date	Start (h:m:s)	Period (h:m:s)	Free field noise levels (dB)		
			L_{Aeq}	$L_{Amax(f)}$	L_{A90}
22/01/2017	23:03:07	00:15:00	44.2	55.2	40.7
22/01/2017	23:18:07	00:15:00	44.5	52.9	41.2
22/01/2017	23:33:07	00:15:00	43.0	53.4	39.1
22/01/2017	23:48:07	00:15:00	43.5	50.4	40.2
23/01/2017	00:03:07	00:15:00	44.7	54.0	41.8
23/01/2017	00:18:07	00:15:00	42.4	50.1	39.1
23/01/2017	00:33:07	00:15:00	41.2	49.8	38.3
23/01/2017	00:48:07	00:15:00	41.9	52.0	37.3
23/01/2017	01:03:07	00:15:00	43.8	61.8	37.2
23/01/2017	01:18:07	00:15:00	40.1	51.0	35.6
23/01/2017	01:33:07	00:15:00	41.0	51.1	37.6
23/01/2017	01:48:07	00:15:00	41.5	51.7	37.1
23/01/2017	02:03:07	00:15:00	41.3	50.7	36.9
23/01/2017	02:18:07	00:15:00	41.5	53.1	37.6
23/01/2017	02:33:07	00:15:00	42.7	50.2	39.7
23/01/2017	02:48:07	00:15:00	41.2	48.9	38.2
23/01/2017	03:03:07	00:15:00	40.5	49.4	36.7
23/01/2017	03:18:07	00:15:00	40.5	50.9	36.2
23/01/2017	03:33:07	00:15:00	40.6	52.5	36.8
23/01/2017	03:48:07	00:15:00	42.7	53.9	39.6
23/01/2017	04:03:07	00:15:00	40.8	52.7	36.7
23/01/2017	04:18:07	00:15:00	43.0	51.6	39.8
23/01/2017	04:33:07	00:15:00	42.8	48.8	40.4
23/01/2017	04:48:07	00:15:00	54.8	74.3	40.7
23/01/2017	05:03:07	00:15:00	51.4	64.9	40.1
23/01/2017	05:18:07	00:15:00	50.6	63.2	40.8
23/01/2017	05:33:07	00:15:00	51.2	64.4	41.0
23/01/2017	05:48:07	00:15:00	54.8	71.9	40.8
23/01/2017	06:03:07	00:15:00	56.9	71.5	41.5
23/01/2017	06:18:07	00:15:00	51.3	66.5	42.3
23/01/2017	06:33:07	00:15:00	59.5	77.3	44.1
23/01/2017	06:48:07	00:15:00	61.3	76.3	46.2
AVERAGE			51.2	-	39.4
HIGHEST			61.3	77.3	46.2
LOWEST			40.1	48.8	35.6
MODE			-	-	37.0

APPENDIX A3: ANC/IOA JOINT GUIDANCE ON COVID-19

Joint Guidance on the Impact of COVID-19 on the Practicality and Reliability of Baseline Sound Level Surveying and the Provision of Sound & Noise Impact Assessments

By the Association of Noise Consultants [ANC] and the Institute of Acoustics [IOA]

Version 3

Containing latest Government Guidance and Links to Noise Mapping and other data sources

16th April 2020

Introduction

The level of concern across the United Kingdom in relation to the spread of the COVID-19 means that there is now forced home working, along with restricted travel arrangements being enforced by the Government.

With regard to the provision of Sound and Noise Impact Assessments, many Members of the ANC and IOA, are finding their normal work practices impacted, such that even where opportunities to work from home exist, it will not be 'business as usual'. Nevertheless, there will be a continuing requirement to maintain as far as possible the standard of our working practices, and also to maintain the flow of acoustic reporting which has an important role in the fabric and functioning of society. Acoustic reports are utilized for many purposes including to assist planning applications, the discharge of planning conditions and the implementation of Building Regulations. Continuing to provide high quality acoustic reporting in a timely manner for scrutiny by regulators and decision makers will allow the important aspects of planning to continue to move forward to support our society in the longer term beyond this national emergency.

As the responsible bodies, the ANC and IOA are keen to ensure that it is 'business as usual', as far as is practicably possible and responsible; not only to support continued on-going financial stability for our members, but also for the myriad strands of society that rely on our reports and input to projects. With the very tight limitations on travel for all, we recognize that there will have to be changes to the manner in which acoustic assessment and reporting is carried out. We have, therefore, recommended below some changes in working practices in the production of such reports. In so doing, it is still important to minimize uncertainties when determining baseline conditions, in a clear and transparent way. Furthermore, by good communication between those preparing the reports and those that will be reviewing them, the planning process (and other relevant processes) will be able to continue as smoothly as possible, without what could be a delay of many months.

We consider that by implementing these measures the provision of Sound and Noise Impact Assessments will be able to continue in a timely manner.

Competence

Site surveys should only take place if they can be carried out in complete accordance with current Government requirements. Instead, as set out below, alternative methods of characterising baseline conditions may be used. Acoustics professionals are skilled in understanding how best to use those techniques so that the outcome is representative and

the conclusions drawn are technically robust, so that clients and decision-makers can come to well-informed judgements.

Baseline Sound Level Characterisation

Before the most recent restrictions, the COVID-19 outbreak presented new challenges in obtaining representative baseline sound levels because typical road, air and rail transport usage have been reduced by travel restrictions and social distancing measures. Other sound sources may also have been affected – for example, due to changes in operating patterns at industrial and commercial premises. However, now that site visits cannot routinely occur, other approaches may have to be taken to establish an appropriate robust estimate of baseline conditions, such as using existing data (for example, from previous local surveys and noise maps) or undertaking baseline sound predictions. These approaches can be supplemented by additional limited on-site sound level measurements, where permitted. The most appropriate option to use must be determined on a case-by-case basis, assessing the level of uncertainty and including this information in the reporting. Most importantly at this time, before progressing with any methodology, there should be discussion of the intended approach with the relevant regulating authority.

Methodology

For some projects there will be similar challenges when determining the sound levels associated with the development. Where permitted, site visits to understand the sound environment will assist the professional in understanding the sources contributing to the sound environment, and where these may not be typical due to current circumstances. Any such site visits would need to comply with any restrictions on movement and ensure that social distancing is embedded within the site visit methodology.

For transport schemes, there will have to be a reliance on predicted sound levels to describe the baseline conditions, with a corresponding need to source flow/activity data. There are now many sources of transport data available and these should be used, where possible, along with previously made direct site measurements to describe baseline conditions. Links to data obtained from the most recent Noise Mapping carried out by the four devolved administrations and the Republic of Ireland are shown in the Appendix. Also shown are links to some road transport data sources.

Where sound from existing facilities is needed to inform future noise levels, or where it is the existing sound that is being assessed, enquiries will be needed to understand whether or not the facility is running as normal. Discussions with other operators may be needed to understand whether nearby facilities are operating normally, and whether any changes might affect sound emissions. Examples may include where the BS4142 methodology is being used to assess the impact from an industrial / commercial facility following complaints, or where existing machinery needs to be measured to use as a reference for predicted future levels.

The acoustics professional will need to consider whether alternative sources of information in respect of sound levels can reasonably be used. Where appropriate, a case should be made regarding why the proposed alternative methods are suitable for a robust assessment, and should clearly set out the estimated uncertainties in the assessment. In cases relating to the investigation of complaints it may not be possible to carry out any form of site measurement

at the moment, regardless of whether the conditions are representative of normal activities. Therefore, this type of assessment is likely to have to be postponed.

As with the determination of baseline conditions, discussions with the relevant regulators, who may be able to provide vital local knowledge, will be key.

Liaison with Regulators and Decision Makers

Liaison between acoustics professionals and relevant regulators is especially important during this period where characterising environmental sound climates cannot be undertaken in the conventional way. It is recognised that projects should be assessed on a case by case basis. A pragmatic approach may be needed with regard to the information required for planning applications and/or the discharge of planning conditions. Having said that, it will continue to be important that such assessments remain robust, and follow current good practice.

One outcome may be that supplementary information will be required at a later date or controlled by condition to allow planning authorities to maintain momentum in the planning system during this period.

Latest Government Guidance

The Chartered Institute of Ecology and Environmental Management received advice from the Government last week. Reference was made to the guidance set out here:

https://www.gov.uk/government/publications/guidance-to-employers-and-businesses-about-covid-19/guidance-for-employers-and-businesses-on-coronavirus-covid-19

The advice went on to state:

> *Ecologists and environmental professionals should therefore be able to continue with outdoor work, including ecological surveying and supervision, where they can continue to follow Public Health England guidelines.*
>
> *Detailed advice for outdoor work can be found at:*
>
> *https://www.gov.uk/guidance/social-distancing-in-the-workplace-during-coronavirus-covid-19-sector-guidance#outdoor-businesses*
>
> *Work that does not require travel, such as desk-based surveys and report writing, should be completed from home where possible.*
>
> *We recognise that the cessation of environmental survey works would risk causing later delays in the development sector.*

Clearly, therefore, there is an acknowledgement by Government that for businesses to continue, there is a need for outdoor monitoring work to occur **as long as it can be done safely.** However, as mentioned above, if the purpose of the monitoring is to determine typical conditions, it must be remembered that current conditions are far from typical.

Summary

In summary, we are experiencing extremely unusual conditions but yet, it is essential that we continue to exercise our professional skills diligently and cope with these changed circumstances. Some of the advice contained in this guidance is not new, and all professionals have probably had to cope previously with unusual circumstances from time to time in their day to day life. It is just that, at the moment, every day presents an unusual situation.

It is important that decision making and associated development continue, including the planning process and the discharge of planning conditions. But it is also important to avoid poor decisions being made because the highest standard of acoustic assessment was not maintained during these challenging times.

The Association of Noise Consultants

The Institute of Acoustics

APPENDIX
Noise Mapping Data

The strategic noise mapping covers the major sources of transportation noise within large urban agglomerations and along road and rail corridors between them and was designed to provide a global view of noise exposure in line with the requirements of the Environmental Noise Directive for reporting above 55 dB L_{den} and 50 dB L_{night}. It does not include all possible noise sources, or all urban areas in the UK and Ireland, however it may help to provide an initial screening for sites in the vicinity of the mapped sources.

Links have been included for downloading the results in GIS format, plus an online map viewer

England

Data https://www.gov.uk/government/publications/strategic-noise-mapping-2019

Maps: http://www.extrium.co.uk/noiseviewer.html

Northern Ireland

Data: https://www.opendatani.gov.uk/dataset/environmental-noise-directive-noise-mapping

Maps: https://appsd.daera-ni.gov.uk/noisemapviewer/index.html

Scotland

Data: http://map.sepa.org.uk/atom/Noise.atom
http://map.sepa.org.uk/atom/NOISE_ROUND3.atom

Maps: https://noise.environment.gov.scot/noisemap/

Wales

Data: https://lle.gov.wales/catalogue/item/EnvironmentalNoiseMapping2017/?lang=en

Maps: http://extrium.co.uk/walesnoiseviewer.html

Republic of Ireland

Data: http://gis.epa.ie/GetData/Download

Maps: https://gis.epa.ie/EPAMaps/

Acknowledgement: With thanks to Simon Shilton (Acustica) for supplying this information.

Transport Data Sources

Department for Transport

https://roadtraffic.dft.gov.uk/#6/55.254/-6.053/basemap-regions-countpoints

Highways England

http://webtris.highwaysengland.co.uk/