



LIDL STORE, CLITHEROE

NOISE ASSESSMENT

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1. INTRODUCTION

In November 2016, ESG was commissioned by LIDL UK GmbH to carry out a noise assessment at LIDL, Shawbridge Mill, Shawbridge Street, Clitheroe, Lancashire, BB7 1LZ. The noise assessment was required for an application to vary condition 5 of planning permission 3/2009/1071, dated 12 March 2010.

Planning condition 5 specified the store opening hours and a restriction on delivery hours as follows;

“The retailing use of the premises in accordance with this permission shall be restricted to the hours 0800 to 2000 hours Monday to Saturday, 1000 to 1600 hours on Sundays and 1100 to 1700 hours on Bank Holidays. Deliveries to the site should not take place within the hours of 2200 to 0700 hours.”

The current delivery restriction is affecting the store efficiency and management and is also causing logistical issues regarding to staffing and shelf replenishment. If the store was able to accept goods delivery at other times including night time, this would assist in addressing the current issues.

LIDL UK GmbH intends to apply for a variation of the existing planning permission to allow unrestricted goods delivery hours at the store.

This report presents the findings of a noise assessment of the potential noise impact at nearby residential properties if the restriction on goods delivery hours for the present delivery arrangement was to be amended as described above.

2. NOISE ASSESSMENT CRITERIA

BS 8233: 2014 Guidance on Sound Insulation and Noise Reduction for Buildings

BS 8233:2014 details guideline values for acceptable noise levels inside private dwellings, and is similar to criteria referenced in World Health Organisation (WHO) (1999) Guidelines for Community Noise. The referenced guideline values are provided in Table 1.

Table 1. Guideline ambient noise levels inside private dwellings

Activity	Location	07:00hrs to 23.00hrs	23.00hrs to 07.00hrs
Resting	Living room	35 dB LAeq, 16h	-
Dining	Dining room/area	40 dB LAeq, 16h	-
Sleeping	Bedroom	35 dB LAeq, 16h	30 dB LAeq, 8h

World Health Organisation (1999) Guidelines for Community Noise

As referenced above, the WHO 1999 Guidelines for Community Noise details acceptable ambient noise levels to be applied when considering noise impact inside private dwellings. Specifically, Table 4.1 in the guidelines advises the following;

- 35 dB LAeq, T for Living rooms (based on a 16hr day)
- 30 dB LAeq, T for bedrooms (based on an 8hr night)

The guidelines also state “*For a good sleep, it is believed that indoor sound pressure levels should not exceed approximately 45 dB LAFmax more than 10-15 times per night.*”

World Health Organisation (2009) Night Noise Guidelines for Europe

The EU Environmental Noise Directive 2002/49 placed an obligation on member states to implement measures to control noise from major infrastructure. The WHO, working with the European Commission, developed night time noise guidelines to assist member states in developing appropriate legislation for noise control.

The WHO 2009 guidelines identify a threshold above which it was considered that sleep disturbance would likely occur, dependent of course on the level of exposure. A threshold of 42dB was suggested, above which, occupants in private dwellings were likely to be awoken.

The guidelines also comment on the extent of noise impact associated with sound intensity and frequency.

BS4142:2014 Method for rating industrial and commercial sound

The guidance in British Standard (BS) 4142:2014 details the methodology for evaluating the likelihood of complaints at nearby external noise sensitive receptors from sound associated with industrial or commercial activity.

Assessment of the likelihood of complaint is made by direct comparison of the 'Rating Level' of the industrial or commercial sound source (the specific sound level, adjusted to account for particular characteristics including tonality and impulses) compared to the background sound level (LA90).

BS4142: 2014 states that a calculated rating level which exceeds background sound levels by 10 dB or more is considered indicative that noise complaints are likely and the impact is "significant adverse". A difference of up to 5db is said to be of marginal significance and the impact is "adverse". If the rating level is 10 dB below the background noise level then complaints are considered highly unlikely.

British Standard 5228:2009 Code of Practice for Noise and Vibration Control on Construction and Open Sites

The methodology as specified in BS5228:2009 was implemented during the night time baseline noise survey at the site. The standard defines the activity LAeq method for use with a stationary activity at a clearly defined source location.

The LAeq method as specified in BS5228: 2009 was used to determine the sound pressure level of the activity noise at the façade of the noise sensitive property.

Sound level calculations carried out for the noise assessment were in accordance with BS5228.

SoundPlan Essential 4.0

SoundPlan Essential software utilises accepted UK noise calculation methodology including standards BS5228-1:2009 and ISO9613-2:1996 and is considered an industry standard for noise propagation simulation. For this assessment, the software was used to determine the extent of noise propagation associated with HGV delivery and egress from the LIDL Clitheroe store.

A replication of the LIDL Clitheroe store was generated in SoundPlan using site layout data provided by the client, in addition to aerial photography (Google imagery). This created a scaled replication of the site in terms of landform, and elevations and buildings position and orientation.

Sound pressure level data was recorded during an actual HGV delivery at the LIDL Clitheroe store on 26 April 2016 (Appendix B) and used to calculate activity-specific Sound Power Levels (SWL) for the purpose of SoundPlan modelling.

Sound Power Levels were calculated and modelled in SoundPlan for the following activities;

- HGV arrival and manoeuvring to the goods delivery bay.
- HGV idling with engine on prior to egressing the store car park
- HGV egressing the store car park and onto Shawbridge Street.

Data output from SoundPlan modelling of the site was then used carry out BS4142 Rating Level Assessments.

3. NOISE SURVEY DETAILS

3.1 Instrumentation

The instrumentation used to carry out the baseline noise survey is detailed in Table 2.

Table 2. Sound Level Measurement Instrumentation

Manufacturer	Description	Type	Serial No.	Serviced and Calibrated
Cirrus	Integrating Averaging Sound Level Meter	CR:831B (Type 1)	C18929FF	17/10/16
Cirrus	Acoustic Calibrator	CR:511E	42342	10/10/16

The sound level meter was configured with the set up parameters detailed in Table 3 at the noise survey positions.

Table 3. Sound Level Meter Set-Up Parameters

Time Weighting	Fast
Frequency Weighting	A
Operational Mode	Broadband Mode
Measurement Period	Daytime (1hr) / Night time (15 mins)
Measurements (dB)	LAeq, L90, LAFmax

3.2 Calibration

The sound level meter was calibrated using an acoustic calibrator prior to commencement of the noise survey.

3.3 Surveys

A day time noise survey was carried out on the 1 November 2016 between 19.35hrs and 20.35hrs at a position at the corner of the LIDL store car park and the delivery ramp area at the store side as shown on Figure 1 (Appendix A). The noise survey was carried out during goods unloading activity including the movement of goods in cages from the trailer and the reloading of empty cages at the rear of the trailer. The survey position was set up at approximately 5m distance from the delivery HGV.

A night time noise survey to measure baseline noise levels was carried out between 00.49hrs and 01.04hrs on 2 November 2016 at approximately 4m from the façade of the nearest noise sensitive property (flats above commercial premises) on the corner of Shawbridge Street and Taylor Street, directly across from the LIDL store, with direct sightline to the delivery area. The noise sensitive property was approximately 62m from the LIDL store goods delivery area.

A separate baseline survey visit was carried out on 26th April 2016 between 07.28 hrs and 08.37hrs to measure the specific sound level associated with the HGV goods delivery arrival and egress from the LIDL Clitheroe store car park and the goods unloading bay. The survey position for this visit was the corner of the car park next to the goods unloading bay at the store as agreed with the Local Planning Authority Environmental Health Officer.

The noise survey utilised a Type 1 sound level meter equipped with windshield, and secured to a tri-pod 1.2m above ground.

The noise survey positions are identified on Figure 1 (Appendix A).

It was noted during the survey that a row of terraced properties located on Peel Street were at closest proximity to the LIDL store. However, the delivery area was located on the opposite side of the store with no direct line of site. It was considered that noise from the delivery area would be significantly attenuated by the barrier provided by the store structure itself. The focus of the assessment would therefore be from the flats as described on Shawbridge Street.

3.4 Meteorological Conditions

Climatic conditions observed at the monitoring locations during the noise survey periods were as follows;

- 01/12/2016 – 30% cloud cover, dry, wind speed <1m/s, temperature 6°C.
- 02/12/2016 – 20% cloud cover, dry, wind speed <1m/s, temperature 4°C.
- 26/04/2107 – 70% cloud cover, dry, wind speed <1m/s, temperature 2°C

4. SURVEY LOCATIONS

Store Delivery Area

The survey location comprised a hard surfaced area which extended from the car park to the HGV delivery position. There was no soft ground between the survey positions and the noise source location.

During the initial survey period (19.35hrs to 20.35hrs on 01/12/2016) at the delivery area, the store was trading and there were a number of vehicle movements (shoppers) accessing and egressing the store car park area. The vehicle movements were infrequent and the contribution to ambient noise levels during the survey was relatively limited.

During the survey period on 26 April 2017, the store was initially closed (at 07.28 hrs) and then opened by the time goods unloading from the HGV was completed. The HGV left the loading bay area at 08.35 hrs. The car park was in use by visiting LIDL customers when the HGV left the car park area.

The store is also located next to a heavily trafficked road (A671), the noise from which contributed significantly to the ambient sound levels (LAeq) measured during goods delivery. The traffic on the A671 did also include occasional passing HGV's.

Nearest Noise Sensitive Property

The survey location at the corner of Shawbridge Street and Taylor Street comprised a hard surfaced parking area. The noise sensitive property was located approximately 62m distance from the LIDL store delivery area (at closest proximity to HGV loading position).

The ground between the survey position and the store delivery area was hard surfaced on Shawbridge Street and the adjacent store car park.

During the night time baseline noise survey (00.49hrs to 01.04hrs) at the noise sensitive property, traffic noise from the nearby A671 was limited to the occasional passing vehicle, and was considered representative of the quiet night time period at the location. The ambient sound level was in fact so low that a stream which runs alongside the LIDL store was clearly audible during the survey period.

Noise measurement reports related to store delivery activity and also the baseline night time noise survey are provided in Appendix B.

HGV Movement

A specific sound level measurement was recorded on 26 April 2017 of a HGV arrival at the store and then it's manoeuvring into the loading bay area. A further sound level measurement was recorded of the HGV exit from the goods unloading bay and store car park.

The noise survey position was set up at the corner of the car park, next to the goods unloading area as shown on figure 1 (Appendix A).

There was no audible reversing alarm noted during the HGV reversing manoeuvre into the goods unloading bay. This replicates what would occur if night time goods deliveries were to be accepted at the store, and is consistent with Department for Transport document quiet deliveries good practice guidance (2014) for night time deliveries.

It was noted during the baseline noise survey that the LIDL store and also the potentially noise sensitive property at Shawbridge Street were located next to the A671 which was observed to be trafficked by HGVs. It is therefore considered usual for occasional HGVs to travel along the A671 during a typical night time period and was actually included in the specific sound level measurement during the goods unloading period.

For the purpose of the assessment, the HGV Sound Power Level (SWL) data was used to model the vehicle arrival and departure using SoundPlan acoustic modelling software. The SWL data (calculated from the activity specific SPL measurements) for the HGV truck and trailer was considered an accurate representation of the HGV delivery which would occur at the LIDL Clitheroe store during the proposed night time delivery.

For the purpose of adopting a conservative approach, the HGV arrival and turning manoeuvre into the store car park, which produced the highest specific sound level, and a calculated HGV Sound Power Level (SWL) of 101dB(A), would be used for the noise assessment.

SoundPlan modelling would therefore be based on a HGV SWL of 101dB(A) as a worst case Sound Power Level for HGV arrival and egress from the store car park.

5. SURVEY DATA

Noise survey data was downloaded from the sound level meter using deaf defier software. Tables 4a and 4b detail the sound level measurements at the LIDL store delivery area during goods unloading activity and also at the nearest potentially noise sensitive property (NSP) at Shawbridge Street.

Table 4a. Sound Level Measurements (LIDL Store Goods Unloading Activity).

Location	L _{Aeq} dB(A)				L _{A90} dB(A)			
	15 min	30 min	45 min	60 min	15 min	30 min	45 min	60 min
Store Goods Delivery Area	60	60.8	60.9	62.8	38.3	38.6	38.3	38.5

Table 4b. Sound Level Measurement (Baseline Night Time Survey at Shawbridge Street).

Location	L _{Aeq} dB(A)				L _{A90} dB(A)			
	15 min	30 min	45 min	60 min	15 min	30 min	45 min	60 min
Property at Shawbridge Street	51.5	-	-	-	34.5	-	-	-

Table 4c. Sound Level Measurement (HGV arrival, idling and egress).

Location	HGV Arrival*	HGV engine idling**	HGV Egress***
Corner of LIDL Store goods unloading bay	75 dB LAeq 1 min	66 dB LAeq 10 Seconds	72 dB LAeq 20 seconds

Note: * Peak sound level measurement at 8m distance from the manoeuvring HGV

** Peak sound level measurement at 5m distance from HGV parked in loading bay

***Peak sound level measurement at 2m distance from egressing HGV

6. NOISE CALCULATIONS

The approach adopted for assessing the noise impact from the proposed extension of operating hours was consistent with methodology detailed in BS4142 and BS5228.

Sound pressure level measurements of goods delivery at approximately 5m from the delivery HGV was carried out on 1 November 2016. The observed sound pressure level was considered representative of typical goods unloading, and therefore typical of that expected during proposed night time delivery if delivery hours restrictions were lifted.

The observed sound pressure levels at the LIDL store goods delivery area were considered appropriate for calculating distance attenuation and predicted noise impact at the nearest noise sensitive property on Shawbridge Street with direct line of sight to the delivery area.

The activity L_{Aeq} method referenced in BS5228 was considered appropriate for determining goods delivery activity noise levels at the Shawbridge Street noise sensitive property. The following method was used;

$$K_h = 20 \log_{10} \frac{R}{10}$$

Whereby, R = distance (in m) between point of interest and geometric centre of plant or activity, and 10 = reference distance (in m) between activity noise measurement position and centre of plant or activity.

6.1 Shawbridge Street (Predicted Specific Noise Level)

Measured sound pressure level of goods delivery activity = 62.8 dB (15min L_{Aeq})

Distance between noise source (delivery activity) and monitoring point = 5m

Distance between monitoring point and noise sensitive receptor (62m – 5m) = 57m

Therefore; R = 62m (5m + 57m), and the reference distance = 5m

Noise propagation can be calculated as follows;

$$K_h = 20 \text{ Log}_{10} \frac{R}{10}$$

$$K_h = 20 \text{ Log}_{10} \frac{62}{5}$$

$$K_h = 21.9 \text{ dB}$$

Predicted goods delivery sound pressure level at Shawbridge St = $62.8 - 21.9 = \mathbf{40.9 \text{ dB (A)}}$

7. SOUNDPLAN MODELLING

7.1 Modelling Parameterisation

SoundPlan modelling software was utilised to determine noise propagation associated with HGV arrival and egress at the Shawbridge Street LIDL store, Clitheroe. The model was parameterised based on noise measurement data for a HGV arriving at the car park and its manoeuvring into and out of the goods unloading bay on 26 April 2017.

The SoundPlan model included a three dimensional replication of the topographic and structural detail of the assessment area. The ground type and structural detail including reflective surfaces were replicated. Sound Power Levels (SWL) of noise associated with HGV arrival and egress were then assigned within the site model as linear noise sources.

Noise propagation simulations were then performed to determine the sound pressure levels (SPL) associated with HGV arrival and egress at the façade of the nearest NSPs.

Three SoundPlan models were utilised for the noise assessment. One model replicated the HGV arrival at the site. The second replicated the HGV engine idling prior to egress from the car park. The third SoundPlan model replicated the HGV egress from the loading bay area and the store car park and onto Shawbridge Street where the nearest noise sensitive receptor was located.

General parameters assigned to the SoundPlan models in the assessment were as follows;

- HGV arrival and egress from the car park – Assigned as a single line noise source at 2m height above ground (calculated Sound Power Level [SWL] based on actual sound pressure level [SPL] measurement at 8m distance). (*SPL of source passing at 8m distance of 75dB(A) = source SWL of 101 dB(A)*) – Worst case.
- HGV engine idling – Assigned as a single point noise source at 2m above ground (calculated Sound Power Level [SWL] based on recorded sound pressure level [SPL] at 5m) (*SPL at 5m from source of 66dB(A) = source SWL of 88dB(A)*)
- HGV egress from the car park - Assigned as a single line noise source at 2m height above ground (calculated Sound Power Level [SWL] based on actual sound pressure level [SPL] measurement at 2m distance). (*SPL of source passing at 2m distance of 72dB(A) = source SWL of 86 dB(A)*) – The HGV engine noise level peaked when reversing into the goods unloading bay, rather than when it egressed. For the purpose of adopting a worst case

approach, A SWL of 101 dB(A) was modelled in SoundPlan for the HGV egress assessment scenario.

- Noise sensitive properties – Assigned as single point receivers fixed at building façade at ground-floor and 1st floor height for bedroom (1st floor receiver at 2.8m height above ground).
- Buildings and structural dimensions replicated in SoundPlan models were based on Store Layout Plans provided by the client and were to scale.
- Ground absorption – Ground type assigned as “hard” with zero ground attenuation.
- Mitigation areas – No mitigation areas included in the model.

SoundPlan models were used to simulate the digital ground model (DGM), line and point noise sources, single point receivers and elevation points, to generate noise contour plans for each simulation scenario. Noise contour plans therefore accurately illustrate noise propagation for the study area (see Appendix D).

7.2 Modelling Results

SoundPlan modelling results for the LIDL goods delivery is presented in Table 5. The SoundPlan model results relate only to noise attributed to LIDL store HGV arrival and goods unloading, and exclude noise associated with other existing developments in the general surrounding area.

Table 5. SoundPlan model simulation results (without on-time correction)

Receiver Location	HGV arrival dB (A)*	HGV engine idling dB (A)*	HGV egress dB (A)*
Shawbridge St (1)	61.4	42.3	61.5
Shawbridge St (2)	58.8	42.2	57.4
Peel St	57.3	30.7	55.6

Note: *Activity sound level LAeq at property façade (1st floor bedroom height)

Noise contour plans were generated in SoundPlan which show the extent of noise propagation from the HGV movements (Appendix D). Noise levels are illustrated by coloured contours (Figures 3, 5 and 7). The noise contour plans clearly illustrate the extent of noise propagation associated with HGV arrival, and egress at the LIDL store. Noise levels at the façade of each NSP are detailed on Figures 2, 4 and 6 for ground and first floor elevations (Appendix D).

To fully consider the noise impact at nearby NSPs associated with night time goods delivery, it is necessary to compare the HGV movement and goods unloading activity related noise levels against measured background noise levels from the baseline noise survey, to provide a Rating Level assessment in accordance with BS4142: 2014.

8. BS4142:2014 RATING LEVEL ASSESSMENT

British Standard (BS) 4142:2014 describes the methodology for determining rating levels for noise generated from industrial and commercial activity, and assessing whether the noise is likely to give rise to complaints from occupiers of nearby noise sensitive property.

A rating level is said to be the specific noise level plus any adjustment for characteristic features of the noise source. BS4142 details a sliding scale of penalties to be applied to noise calculations where the source has identifiable tonal or impulse characteristics.

A description of the noise observed during goods unloading at the LIDL store would include occasional and intermittent impulses of bangs and clatters, and also occasional low rumbles of cage movements within the trailer (approx. 2-5 seconds duration). There was no continuous humming or drone noise type observed during goods unloading.

Impulse related noise characteristic penalties were therefore considered applicable for the Rating Level assessment. However, the extent to which they would be audible at 62m distance to noise sensitive property at Shawbridge Street was considered limited.

The proposed night time goods delivery scenario at the LIDL Clitheroe store was used to calculate a noise rating level for the noise sensitive property on Shawbridge Street. The results provide an indication of the likelihood of noise complaint.

BS4142:1997 states '*A difference of around +10 dB or more indicates that complaints are likely*'.

Table 6. BS4142:2014 Assessment of predicted noise levels associated with night time goods unloading

Results		Relevant clauses of BS4142:2014	Commentary
Background Sound Level	LA90 = 34.5 dB	8.1, 8.2	Measured background sound level at receptor
Reference interval (night time assessment)	15 mins	7.2	
Specific Sound Level	LAeq, T = 40.9 dB	7.3.6	Calculations in Section 6.1
Acoustic Feature Correction	3 dB	9.2	Impulsivity (just perceptible bangs and clatters at facade)
Rating Level	(40.9+3) dB = 43.9 dB		
Excess of Rating Level over background sound level	(43.9–34.5)dB = 9.4 dB		
Assessment of Impact	Ranging between adverse impact and significant adverse impact, depending on context	11	Further contextual information provided in sections 8, 9 and 10.

The Rating Level assessment indicates that the noise impact from night time goods unloading would be “adverse” to “significant adverse” at the adjacent Shawbridge Street noise sensitive property. However, BS4142:2014 also states that the estimated impact must also be considered within the context of the activity, site and location. In this regard, it is suggested that the following factors must also be taken into account;

- The Rating Level assessment was highly conservative as the measured Specific Sound Level of goods delivery also comprised significant contribution of noise from frequent traffic movements on the A671. It was not possible to separate the A671 traffic noise during the survey period.
- The number of deliveries is currently a single delivery each day (7pm daily). The potential for noise disturbance is therefore somewhat limited by the infrequency.
- BS4142:2014 relates to exposure of external noise only. If goods delivery hours were to be unrestricted, then the noise impact would mainly be associated with the likelihood of sleep disturbance occurring during night time, and the noise impact would be indoors. To assess

noise impact indoors, BS8233 and also WHO guidance should be considered as referenced in previous sections.

Table 7. BS4142:2014 Assessment of predicted noise levels associated with night time HGV arrival and reverse into store loading bay.

Results		Relevant clauses of BS4142:2014	Commentary
Background Sound Level	LA90 = 34.5 dB	8.1, 8.2	Measured background sound level at receptor
Reference interval (night time assessment)	15 mins	7.2	
Specific Sound Level (worst case at Shawbridge Street)	LAeq, T = 61.4 dB	7.3.6	Calculations in Section 7.2
On time correction	$10\lg(60 / 900) = -11.8$ dB	7.3.15	Total on time (HGV arrival) is 60 seconds of 15 min (900 seconds) night time reference period
Corrected Specific Sound level (after on time correction)	$61.4 - 11.8 \text{ dB} = 49.6$ dB	7.3.6 and 7.3.15	Adjustment calculation for short duration of HGV arrival (1 min) for comparability with reference time (15 min's) period
Rating Level	$(49.6+0) \text{ dB} = 49.5 \text{ dB}$		
Excess of Rating Level over background sound level	$(49.6-34.5) \text{ dB} = 15.1 \text{ dB}$		
Assessment of Impact	Significant adverse impact, depending on context	11	Further contextual information provided in sections 8, 9 and 10.

The Rating Level assessment indicates that the noise impact from the HGV arrival at the car park and then reversing into the goods delivery bay would be “significant adverse” at the façade of the adjacent Shawbridge Street NSP. However, BS4142:2014 is for the assessment of **external** noise impact, whereas noise associated with night time deliveries would mainly impact the occupants inside nearby dwellings. The following factors should therefore be taken into account;

-
- The number of HGV's arriving at the store is one per day. The potential for noise disturbance from a single HGV arrival (approx. 60 seconds duration) is therefore considered limited in the context of an 8 hour sleep pattern.
 - BS4142:2014 relates to exposure of external noise only. If goods delivery hours were to be unrestricted, then the noise impact would mainly be associated with the likelihood of sleep disturbance occurring during the night time, and the noise impact would be indoors. To assess noise impact indoors, BS8233 and also WHO guidance should be considered as referenced in the previous sections.

Table 8. BS4142:2014 Assessment of predicted night time noise associated with a HGV engine idling at the store loading bay.

Results		Relevant clauses of BS4142:2014	Commentary
Background Sound Level	LA90 = 34.5 dB	8.1, 8.2	Measured background sound level at receptor
Reference interval (night time assessment)	15 min's	7.2	
Specific Sound Level (worst case at Shawbridge Street)	LAeq, T = 42.3 dB	7.3.6	SoundPlan model calculations in Section 7.2
On time correction	$10\lg(300^* / 900) = -4.8 \text{ dB}$	7.3.15	Total on time (HGV idling) is 5 min (300 sec's) seconds of 15 min (900 sec's) night time reference period*
Corrected Specific Sound level (after on time correction)	$42.3 - 4.8 \text{ dB} = 37.5 \text{ dB}$	7.3.6 and 7.3.15	Adjustment calculation for short duration of HGV idling (5 min) for comparability with reference time (15 min's) period
Acoustic Feature Correction	2 dB	9.2	Tonality (just perceptible engine hum at NSP facade)
Rating Level	$(37.5+2) \text{ dB} = 39.5 \text{ dB}$		
Excess of Rating Level over background sound level	$(39.5-34.5) \text{ dB} = 5 \text{ dB}$		
Assessment of Impact	Adverse impact, depending on context	11	Further contextual information provided in sections 8, 9 and 10.

Note: The observed engine idling period after goods unloading was approximately 10 seconds on the 26 April 2017, prior to the HGV egress. No re-pressurisation of the air braking system was required on that occasion. To account for a possibility of future deliveries having to re-pressurise the air braking system prior to leaving, a conservative idling duration of 5 minutes was used for the noise assessment.

The Rating Level assessment indicates that the noise impact from the engine idling noise of a HGV would be “adverse” at the façade of the adjacent Shawbridge Street noise sensitive property. However, BS4142:2014 is for the assessment of **external** noise, whereas noise associated with

night time deliveries would mainly impact occupants inside nearby dwellings. The following factors should therefore be taken into account;

- The number of HGV's with engine idling at the store is one per day. The potential for noise disturbance from engine idling noise from one HGV (approx. 5 minutes duration) is therefore considered limited in the context of an 8 hour sleep pattern.
- BS4142:2014 relates to exposure of external noise only. If goods delivery hours were to be unrestricted, then the noise impact would mainly be associated with the likelihood of sleep disturbance occurring during the night time, and the noise impact would be indoors. To assess noise impact indoors, BS8233 and also WHO guidance should be considered as referenced in the previous sections.

Table 9. BS4142:2014 Assessment of predicted night time noise associated with HGV egress from the LIDL store car park.

Results		Relevant clauses of BS4142:2014	Commentary
Background Sound Level	LA90 = 34.5 dB	8.1, 8.2	Measured background sound level at receptor
Reference interval (night time assessment)	15 min's	7.2	
Specific Sound Level (worst case at Shawbridge Street)	L _{Aeq} , T = 61.5 dB	7.3.6	SoundPlan model calculations in Section 7.2
On time correction	$10\lg(20 / 900) = -16.5 \text{ dB}$	7.3.15	Total on time (HGV leaving) is 20 seconds of 15 min (900 sec's) night time reference period
Corrected Specific Sound level (after on time correction)	$61.5 - 16.5 \text{ dB} = 45 \text{ dB}$	7.3.6 and 7.3.15	Adjustment calculation for short duration of HGV idling (5 min) for comparability with reference time (15 min's) period
Rating Level	$(45+0) \text{ dB} = 45 \text{ dB}$		
Excess of Rating Level over background sound level	$(45-34.5) \text{ dB} = 10.5 \text{ dB}$		
Assessment of Impact	Ranging between adverse impact and significant adverse impact, depending on context	11	Further contextual information provided in sections 8, 9 and 10.

The Rating Level assessment indicates that the noise impact from a HGV egressing the store car park would be “significant adverse” at the façade of the adjacent Shawbridge Street noise sensitive property. However, BS4142:2014 is for the assessment of **external** noise, whereas noise associated with night time deliveries would mainly impact occupants inside the nearby dwellings. The following factors should therefore also be taken into account;

-
- The number of HGV's leaving at the store with a delivery is one per day. The potential for noise disturbance from one HGV per night (approx. 20 seconds duration) egressing the store car park is therefore considered limited in the context of an 8 hour sleep pattern.
 - BS4142:2014 relates to exposure of external noise only. If goods delivery hours were to be unrestricted, then the noise impact would mainly be associated with the likelihood of sleep disturbance occurring during the night time, and the noise impact would be indoors. To assess noise impact indoors, BS8233 and also WHO guidance should be considered as referenced in the previous sections.

9. BS8233: 2014 AND WHO ASSESSMENT

The main noise impact attributed to potential night time goods delivery at the LIDL store is not provided in a BS4142 Rating Level Assessment as it only addresses external noise to the building façade. To assess the noise impact on occupants inside a private dwelling, then attenuation associated with the building structure and materials must also be considered.

WHO guidelines suggest that with open windows (worst-case) for ventilation, a further noise attenuation of approximately 15dB LAeq would be expected for a typical domestic glazed window and usual bedroom furnishings. Table 9 details the predicted noise levels inside the nearest NSPs associated with a proposed night time delivery (one HGV per night) at the LIDL Clitheroe store.

Table 10. Predicted noise levels inside NSP's associated with night time goods delivery

Location	HGV Arrival dB(A)*		Goods Unloading dB(A)		HGV engine Idling dB(A)*		HGV egressing dB (A)*	
	Façade*	inside the NSP	Façade*	Inside the NSP	Façade*	Inside the NSP	Façade*	Inside the NSP
Shawbridge St (1)	49.6*	34.6	43.9	28.9	37.5*	22.5	45*	30
Shawbridge St (2)	47*	32	43.9	28.9	37.4*	22.4	40.9*	25.9
Peel St	45.5*	30.5	**see note	**see note	**see note	**see note	39.1*	24.1

Notes: *after on time correction applied in accordance with BS4142.

** No direct line of sight of goods available between unloading area and Peel St NSP due to the store orientation. Shawbridge St NSP therefore considered as worst case for the activity.

*** "Inside NSP" is predicted noise level inside the NSP during night time delivery activity based on WHO guidelines of 15 dB(A) reduction for open window.

HGV arrival and Reversing

The worst case predicted specific sound level (after on-time correction in accordance with section 7.3.15 of BS4142:2014) for noise associated with HGV arrival and reversing was 49.6 dB (A) at the façade of the Shawbridge Street property.

With an attenuation of 15 dB LAeq applied for an open window, the likely sound pressure level experienced by occupants inside the private dwelling during HGV arrival would be approximately 34.6 dB(A). This would be marginally above 30 dB (A) guideline threshold as referenced in BS8233:2014 for which sleep disturbance may occur. For added context, the sound level in a quiet library is around 40 dB (A).

It should also be noted that the recorded sound levels from passing vehicles on Shawbridge Street, during the night time baseline survey, were generally at around 65 dB LAeq (Appendix C). In the context of noise associated with HGV arrival at the store car park, the predicted noise level at the Shawbridge Street property façade of 49.6 dB(A), was well below the measured sound levels from existing traffic movements at the location.

If the windows of the Shawbridge Street property were closed, then noise mitigation of around 26-32 dB LAeq would be expected, which would further reduce the sound pressure level inside the private dwelling from the HGV arrival to between 17.6 and 23.6 dB LAeq. Noise disturbance at those levels was considered very unlikely.

HGV Engine Idling

The worst case predicted specific sound level (after on-time correction in accordance with section 7.3.15 of BS4142:2014) for noise associated with HGV engine idling was 37.5 dB (A) at the façade of the Shawbridge Street property.

With an attenuation of 15 dB LAeq applied for an open window, the likely sound pressure level experienced by occupants inside the private dwelling from HGV engine idling noise would be approximately 22.5 dB(A). This would be well below 30 dB (A) guideline threshold as referenced in BS8233:2014 for which sleep disturbance may occur.

HGV Egress

The worst case predicted specific sound level (after on-time correction in accordance with section 7.3.15 of BS4142:2014) for noise associated with HGV egress from the store car park was 45 dB (A) at the façade of the Shawbridge Street property.

With an attenuation of 15 dB LAeq applied for an open window, the likely sound pressure level experienced by occupants inside the private dwelling during HGV arrival would be approximately 30 dB(A). This would be at the 30 dB (A) guideline threshold as referenced in BS8233:2014 above which sleep disturbance may occur.

If the windows of the Shawbridge Street property were closed, then noise mitigation of around 26-32 dB LAeq would further reduce the sound pressure level inside the private dwelling from the HGV leaving the car park to between 13 and 19 dB LAeq. Noise disturbance at those levels was considered very unlikely.

Goods Unloading Activity

The calculated activity sound pressure level at façade from the goods unloading activity was 40.9 dB (A), and with an impulsivity penalty (3 dB) resulted in an equivalent activity sound pressure level of 43.9 dB (A). With an attenuation of 15 dB LAeq applied for an open window, the likely sound pressure level experienced by occupants inside the private dwelling during night time would be approximately 28.9 dB(A). This would be below the 30 dB guideline threshold as referenced in BS8233:2014.

With the windows closed, further noise mitigation of around 26-32 dB LAeq would be expected, which would reduce the sound pressure level inside the private dwelling from the goods delivery activity to between 17.9 to 23.9 dB LAeq.

It is clear from the BS8233:2014 assessment that the goods unloading related sound pressure level inside the nearby private dwelling at Shawbridge Street would be well below the level expected to cause sleep disturbance.

10. DISCUSSION OF ASSESSMENT RESULTS

The assessments indicate that residents in nearby private dwellings would not be adversely affected by noise from night time goods delivery at the LIDL Clitheroe store in terms of sleep disturbance or a reduction in the quality of life.

The noise assessment was considered highly conservative in approach, as the activity related specific sound measurement and included a significant contribution of traffic noise from the nearby A671. An accurate sound pressure level measurement of the goods delivery activity excluding traffic noise may have produced much lower results.

The Rating Level calculation accounted for an impulsivity correction of 3dB which was applied for the assessment, and the equivalent activity sound pressure level was determined to be 43.9dB LAeq.

Guidelines referenced in BS8233:2014 were then followed to determine the likely ambient noise levels inside the private dwelling based on the worst case scenario of an open window for ventilation (comparative to 15 dB sound attenuation). The determined internal ambient sound level for goods unloading activity, HGV engine idling noise, and also HGV egress from the store car park was below the BS8233: 2014 and WHO guideline threshold for sleep disturbance of 30dB LAeq

The BS8233 criteria for internal ambient noise levels were marginally exceeded for noise associated with a HGV arrival at the store car park and reversing into the loading bay. However, the noise level was well below the noise level of existing traffic movements, as evidenced in the night time baseline noise survey (Appendix C).

It should also be noted that a single goods delivery each day at the store comprising a very short duration for manoeuvring (less than 1 minute) into the delivery bay, and then approximately 15 to 20 seconds for exit, represents a very limited duration in the context of a typical 8hr sleep.

If the store delivery hours restriction was lifted, it would be good practice to implement a number of management practices to further ensure that the noise impact was minimised. The following noise management plan measures are recommended at the store.

- Deliveries to be scheduled at timings which are nearest to the store opening hours as possible.

-
- Delivery driver to contact the store to advise of the likely arrival time to allow the store to prepare for the delivery e.g. ready to open doors to prevent the driver having to attract the store occupants attention by shouting.
 - Service doors and shutters to be well maintained to reduce associated noise during delivery.
 - The lorry engine shall be turned off at the earliest opportunity when the vehicle is correctly positioned at the store delivery area.
 - The lorry driver shall not rev the lorry engine unnecessarily or use the horn.
 - The lorry and store FM radios or sound systems shall be turned off prior to and during the goods delivery.
 - All employees shall ensure voices are kept low, and that no shouting occurs during the delivery period.
 - Movement of cages within the goods delivery vehicle and goods reception area shall be in a controlled manner, so as to minimise any potential impulsive noises.
 - Upon receipt of any noise complaints related to goods delivery activity, LIDL shall ensure a thorough investigation is carried out into the cause of complaint. The investigation shall determine the likely noise source and also propose a suitable noise mitigation strategy, agreeable to both parties, and implemented during deliveries.
 - The delivery activities should follow the guidelines given in Department for Transport deliveries good practice guidance (2014).

11. CONCLUSION

A noise assessment was carried out to determine the potential noise impact associated with night time delivery of goods at the LIDL Clitheroe store. The assessment methodology as detailed in BS4142:2014, and also B5228: 2009 and 8233:2014 was followed. Guidelines provided in WHO guidelines of 1999 and 2009 were also considered.

The outcome of the noise assessment was that noise associated with goods delivery at the LIDL Clitheroe store during the night time period would have no significant adverse impact on residents in occupancy at nearby private dwellings. This would be further ensured by implementation of the noise control and mitigation measures referenced in this report, which could be suitably conditioned in the planning permission.

REFERENCES

British Standard (BS) 4142:2014 Methods for rating and assessing industrial noise, BSI standards limited.

British Standard (BS) 8233: 2014 Guidance on Sound Insulation and Noise Reduction for Buildings, BSI standards limited.

British Standard (BS) 5228: 2009 Code of Practice for Noise and Vibration Control on Construction and Open Sites. BSI standards limited.

Department for Transport (2014) Quiet Deliveries Good Practice Guidance – Key Principals and Processes for Freight Operators. DfT, London. Crown Copyright.

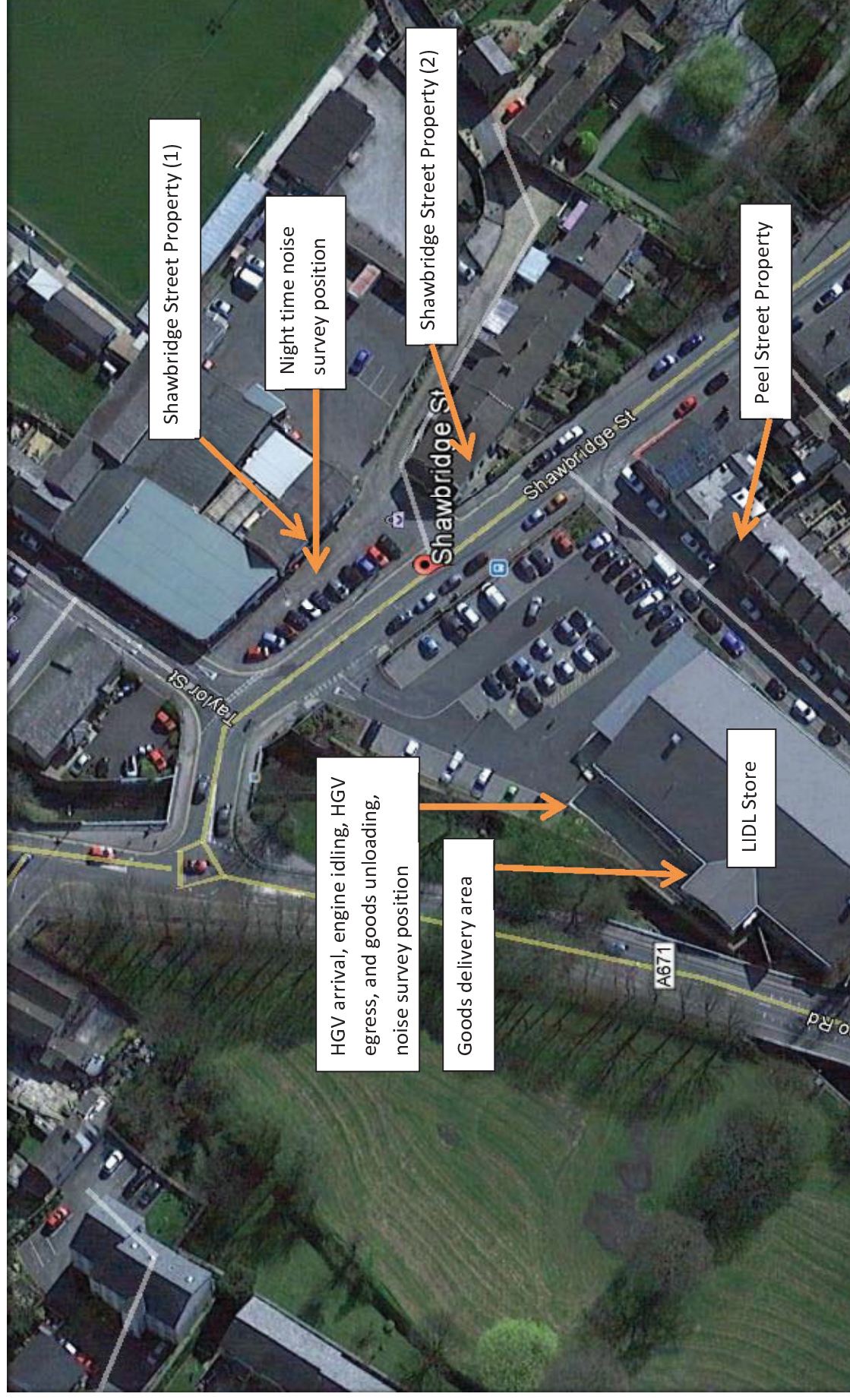
World Health Organisation (1999) Guidelines for Community Noise. Guideline document to the Department of the Protection of the Human Environment, Occupational and Environmental Health, World Health Organization, Geneva, Switzerland

World Health Organisation (2009) Night noise guidelines for Europe. Publications, WHO Regional Office for Europe, Denmark.

APPENDIX A

Noise Survey Location Plan

FIGURE 1. LIDL Store, Clitheroe – Noise Survey Locations and Noise Sensitive Properties (NSP's)



APPENDIX B

Noise Survey Data

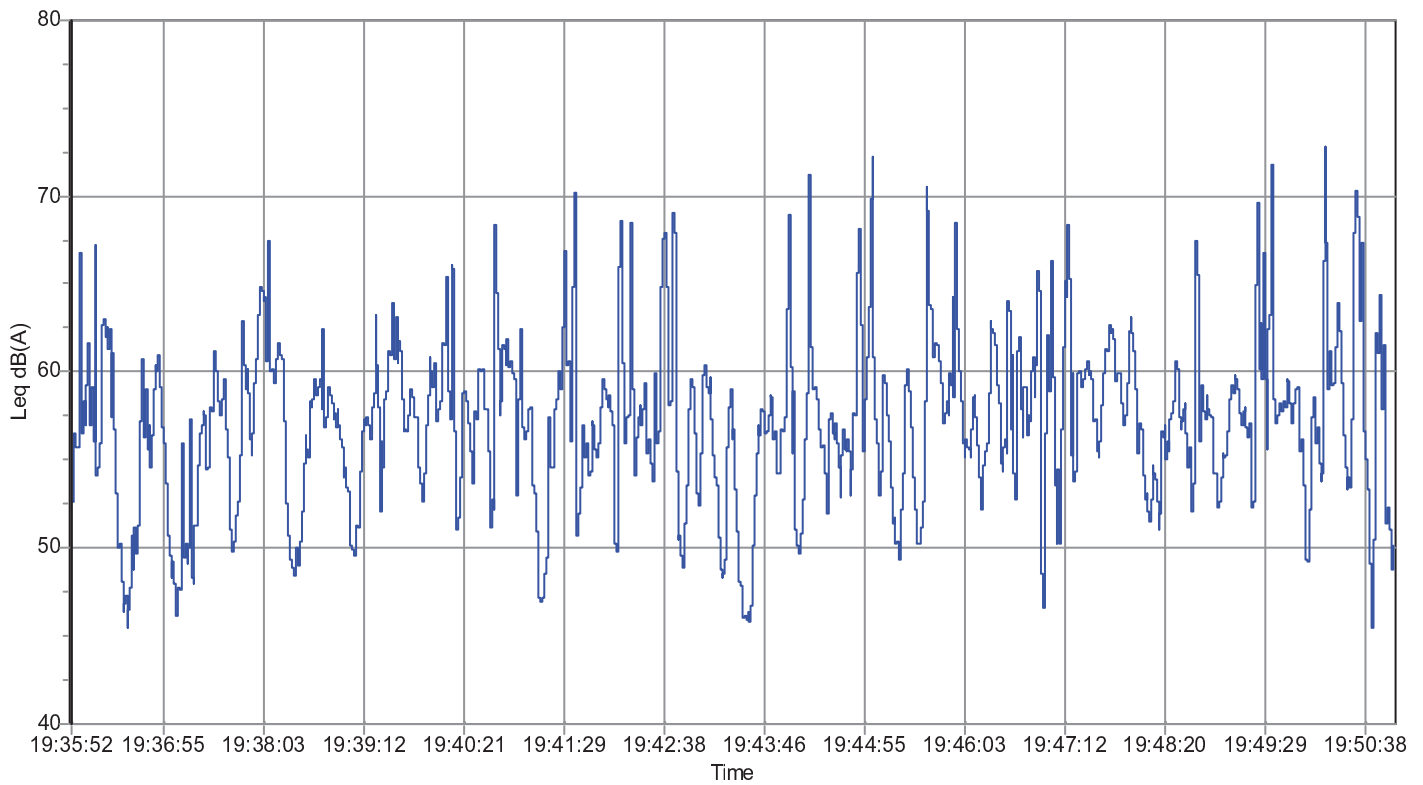
Measurement Report

Measurement Details

Date and Time: 01/12/2016 19:35
Sound Level Meter: Cirrus Research plc
Recalibration Due: 31/10/2017
Run Duration: 00:14:59 hh:mm:ss
Range: 40-110 dB
Overload: no
Location: LIDL Clitheroe
Notes:
During goods delivery

Data

Leq	60.0 dBA	L5.0	64.1 dBA
Lepd	44.9 dBA	L10.0	61.9 dBA
LAE	89.3 dBA	L50.0	56.7 dBA
LAFmax	78.6 dBA	L90.0	49.5 dBA
Peak	104.8 dBC	L95.0	47.8 dBA
		Lmin	43.1 dBA



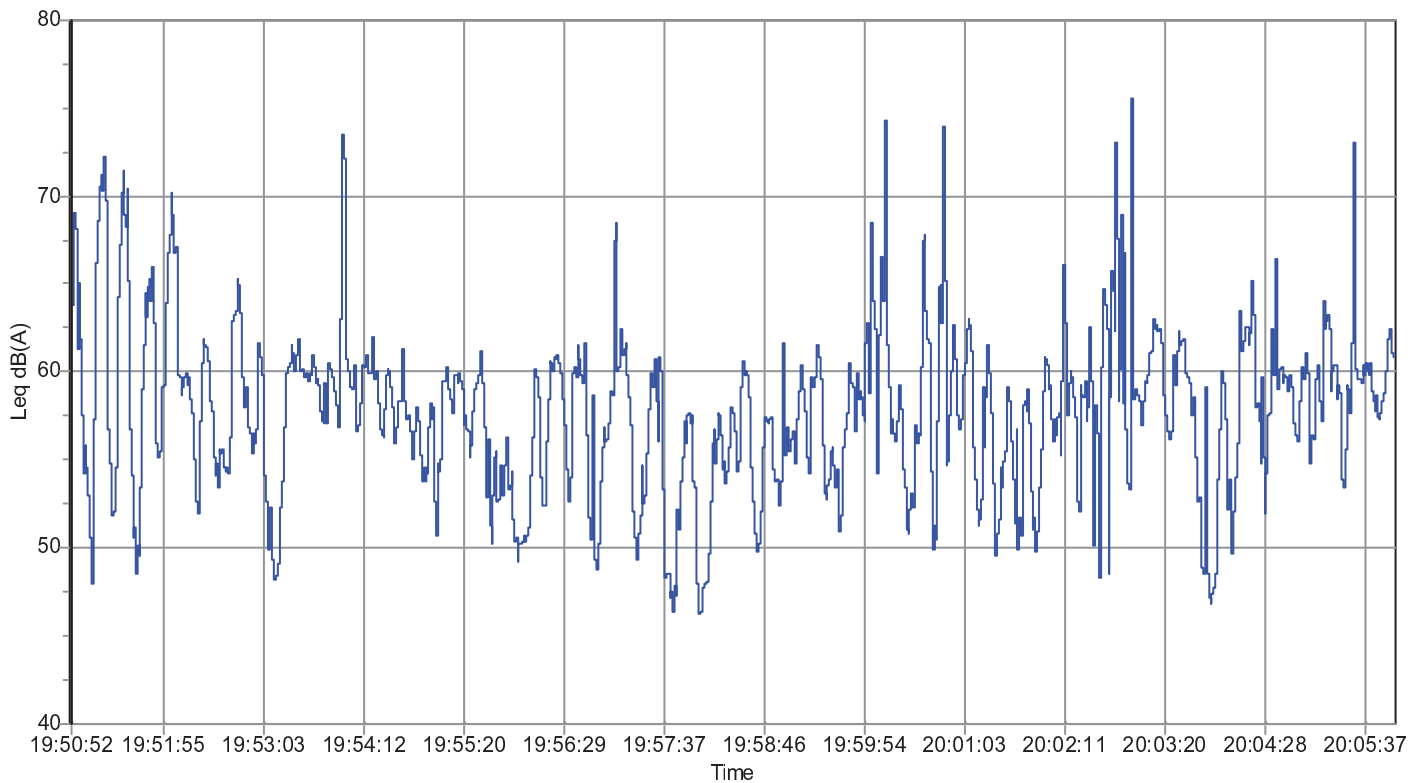
Measurement Report

Measurement Details

Date and Time: 01/12/2016 19:50
Sound Level Meter: Cirrus Research plc
Recalibration Due: 31/10/2017
Run Duration: 00:14:59 hh:mm:ss
Range: 40-110 dB
Overload: no
Location: LIDL Clitheroe
Notes:
During goods delivery

Data

Leq	60.8 dBA	L5.0	64.8 dBA
Lepd	45.7 dBA	L10.0	62.3 dBA
LAE	90.1 dBA	L50.0	57.4 dBA
LAFmax	83.8 dBA	L90.0	50.1 dBA
Peak	106.0 dBC	L95.0	48.5 dBA
		Lmin	43.9 dBA



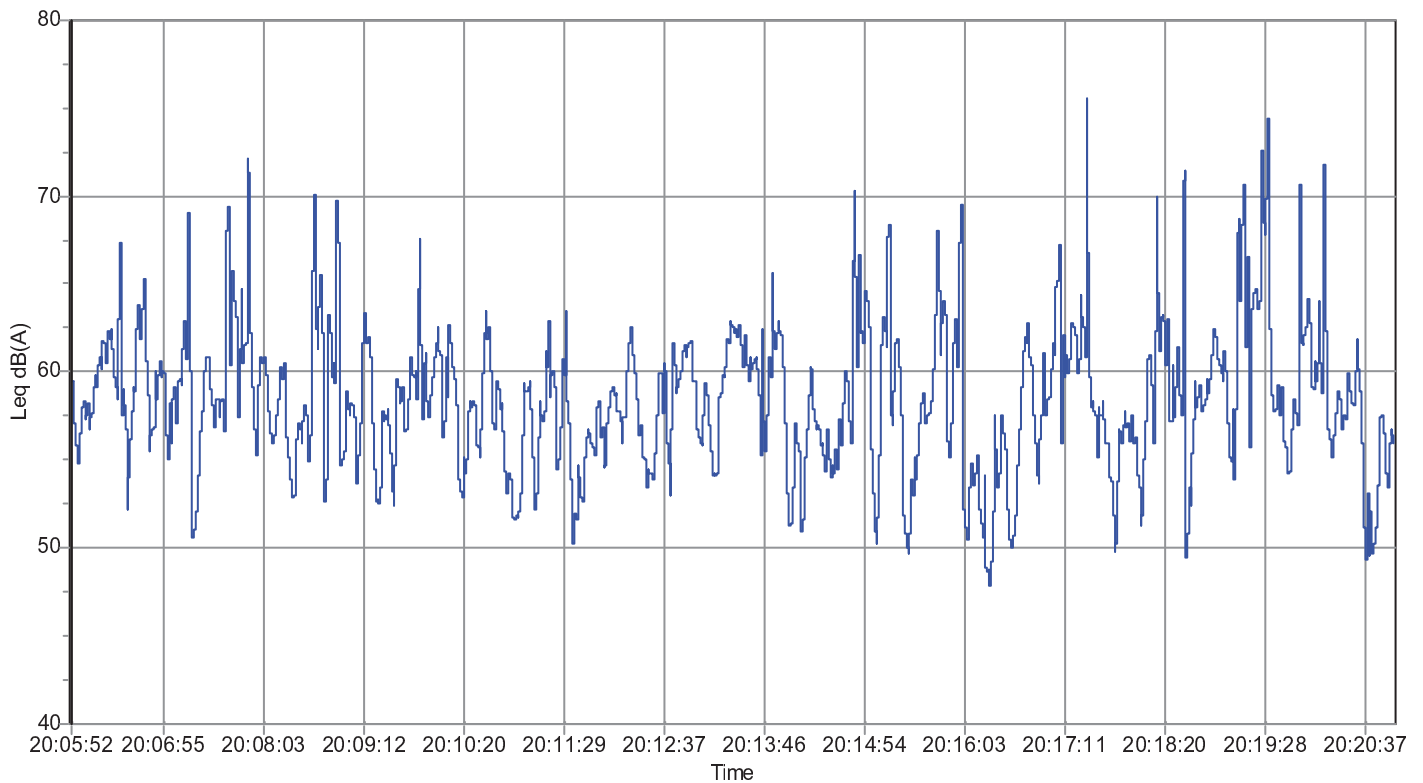
Measurement Report

Measurement Details

Date and Time: 01/12/2016 20:05
Sound Level Meter: Cirrus Research plc
Recalibration Due: 31/10/2017
Run Duration: 00:15:00 hh:mm:ss
Range: 40-110 dB
Overload: no
Location: LIDL Clitheroe
Notes:
During goods delivery

Data

Leq	60.9 dBA	L5.0	64.4 dBA
Lepd	45.8 dBA	L10.0	62.4 dBA
LAE	90.2 dBA	L50.0	57.6 dBA
LAFmax	81.1 dBA	L90.0	52.3 dBA
Peak	106.3 dBC	L95.0	50.6 dBA
		Lmin	45.8 dBA



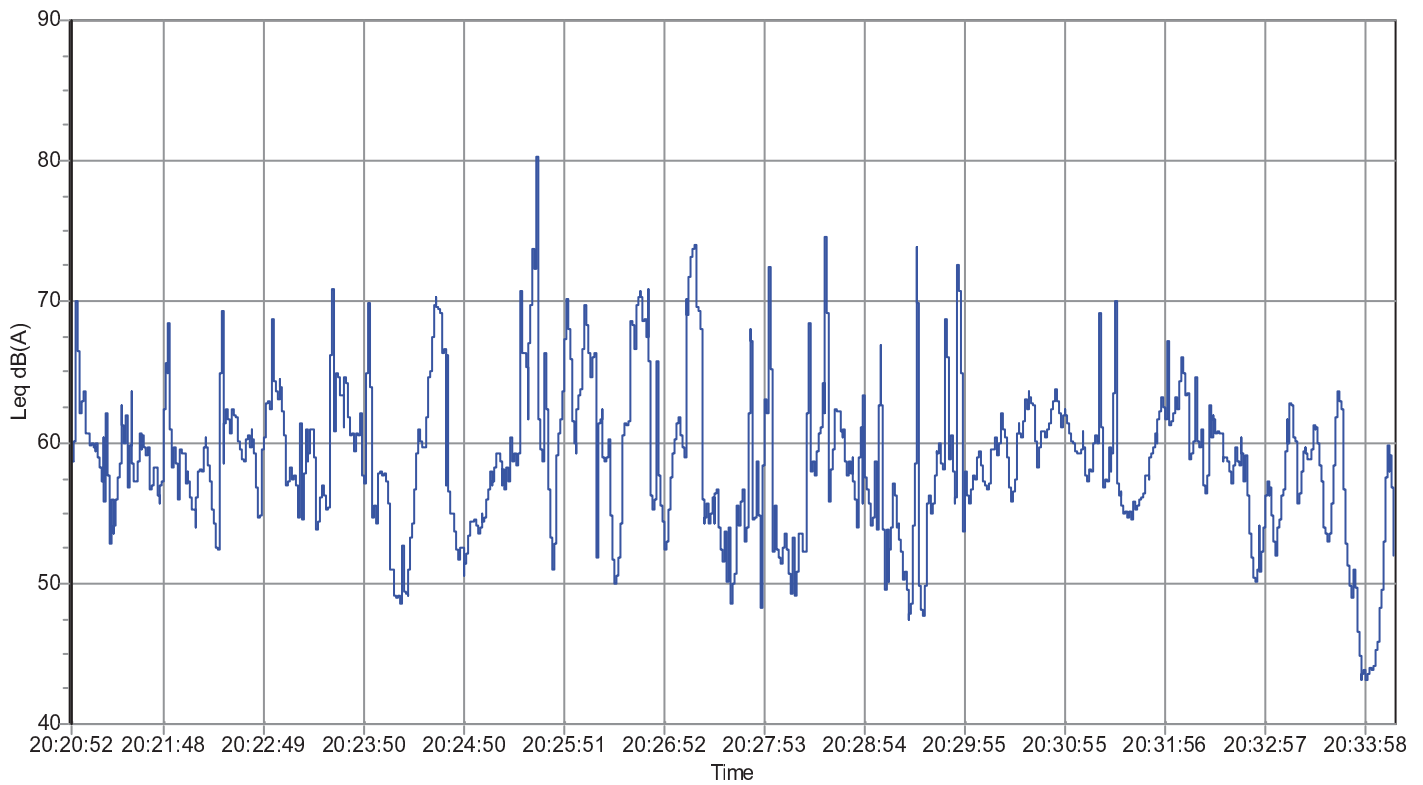
Measurement Report

Measurement Details

Date and Time: 01/12/2016 20:20
Sound Level Meter: Cirrus Research plc
Recalibration Due: 31/10/2017
Run Duration: 00:13:19 hh:mm:ss
Range: 40-110 dB
Overload: no
Location: LIDL Clitheroe
Notes:
During goods delivery

Data

Leq	62.8 dBA	L5.0	68.6 dBA
Lepd	47.2 dBA	L10.0	64.6 dBA
LAE	91.6 dBA	L50.0	58.0 dBA
LAFmax	82.0 dBA	L90.0	50.9 dBA
Peak	108.5 dBC	L95.0	48.3 dBA
		Lmin	40.5 dBA



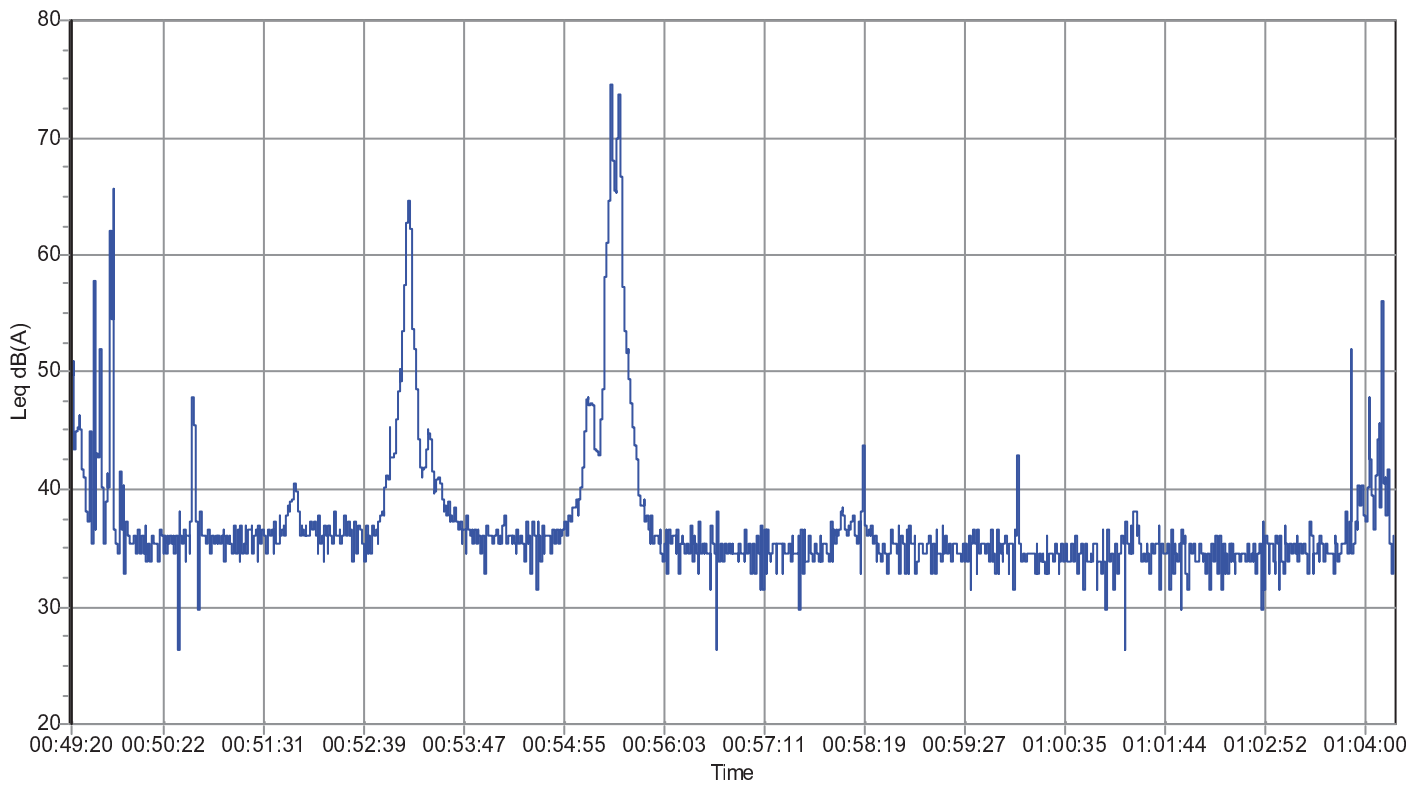
Measurement Report

Measurement Details

Date and Time: 02/12/2016 00:49
Sound Level Meter: Cirrus Research plc
Recalibration Due: 31/10/2017
Run Duration: 00:14:59 hh:mm:ss
Range: 40-110 dB
Overload: no
Location: LIDL Clitheroe
Notes:
Baseline night time

Data

Leq	51.5 dBA	L5.0	45.8 dBA
Lepd	36.5 dBA	L10.0	40.1 dBA
LAE	80.9 dBA	L50.0	35.6 dBA
LAFmax	76.3 dBA	L90.0	34.5 dBA
Peak	102.4 dBC	L95.0	34.4 dBA
		Lmin	34.0 dBA



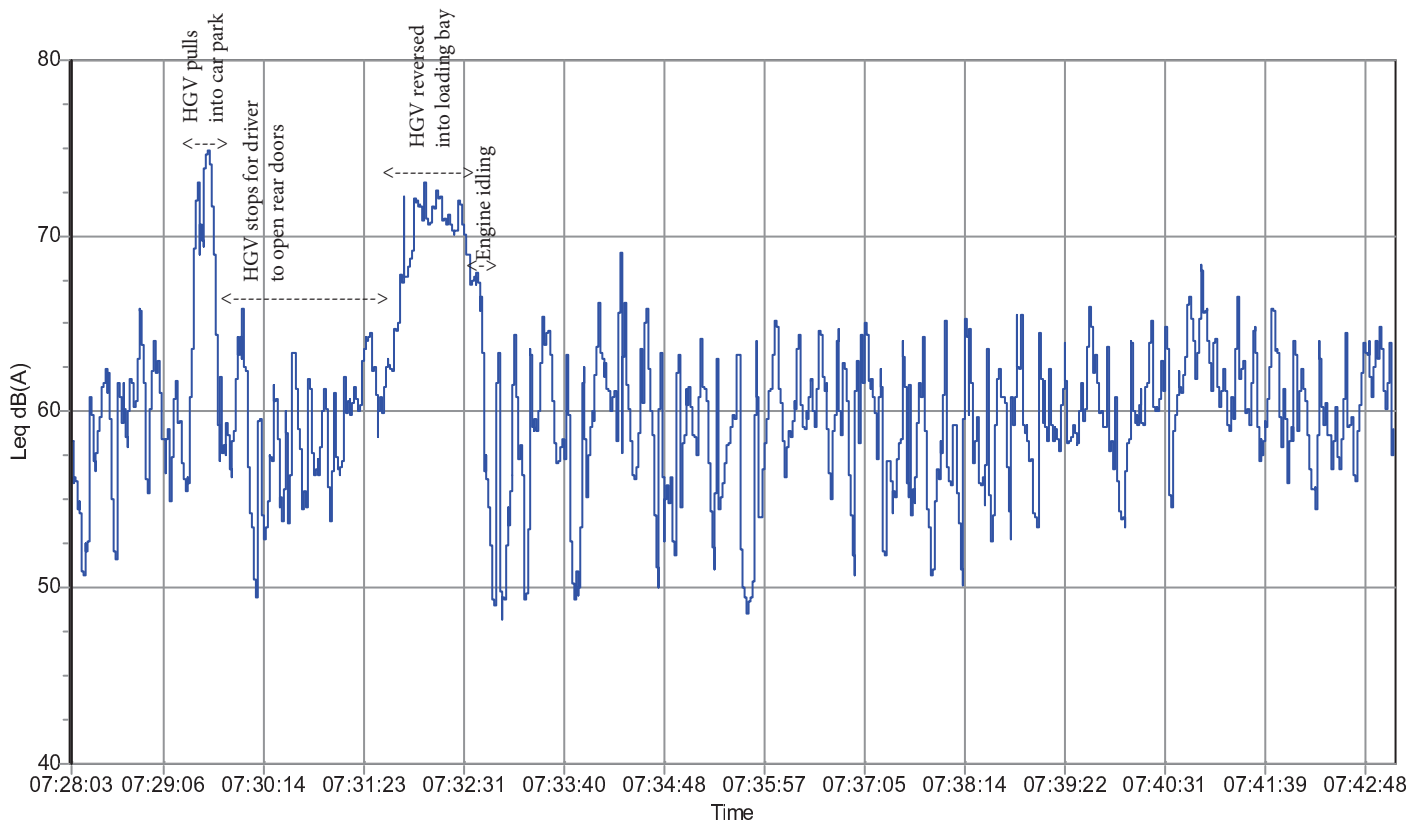
Measurement Report

Measurement Details

Date and Time: 26/04/2017 07:28
Sound Level Meter: Cirrus Research plc
Recalibration Due: 31/10/2017
Run Duration: 00:14:59 hh:mm:ss
Range: 40-110 dB
Overload: no

Data

Leq	63.2 dBA	L5.0	69.7 dBA
Lepd	48.1 dBA	L10.0	65.6 dBA
LAE	92.5 dBA	L50.0	59.5 dBA
LAFmax	76.8 dBA	L90.0	53.2 dBA
Peak	103.5 dBC	L95.0	50.7 dBA
		Lmin	45.9 dBA



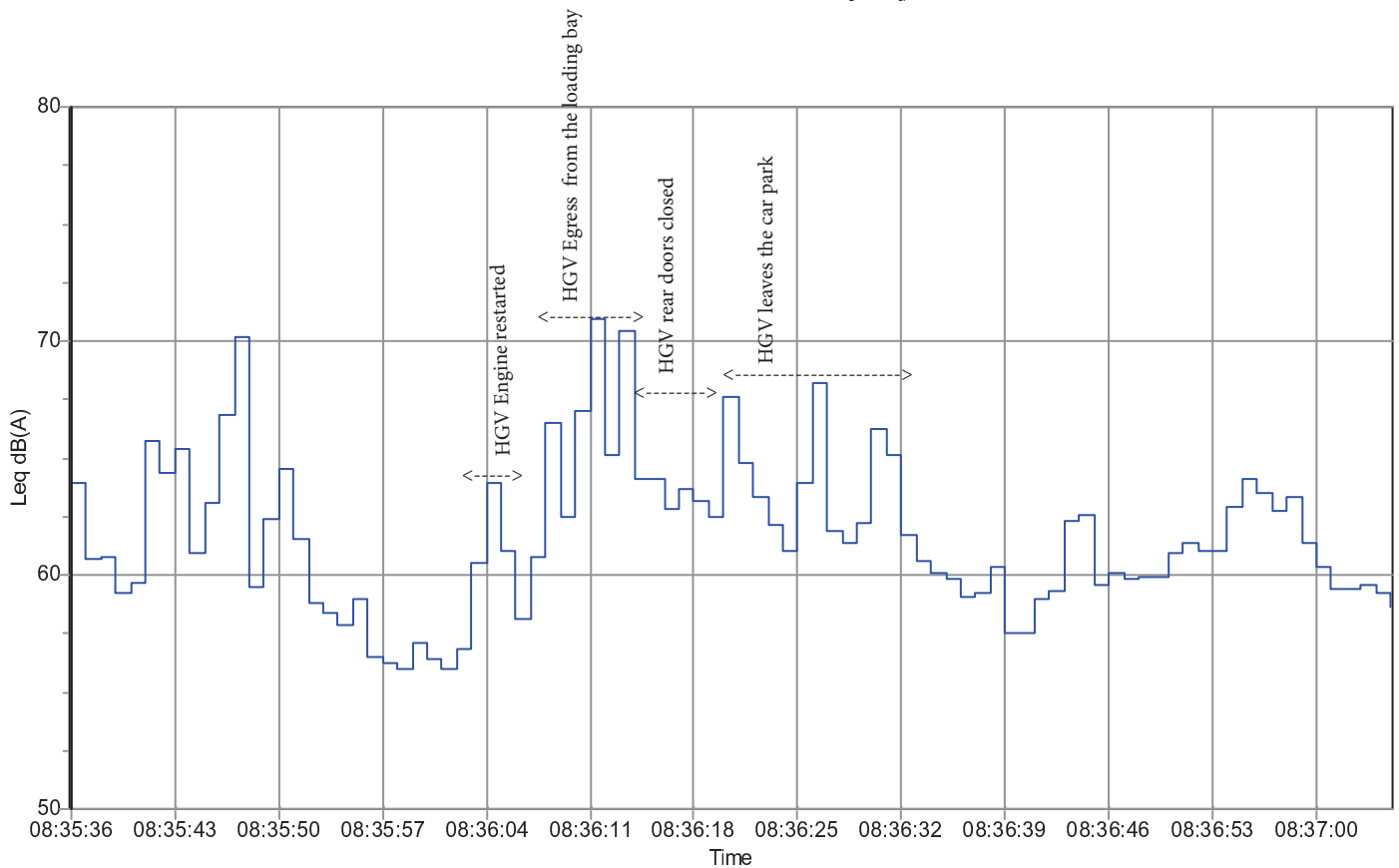
Measurement Report

Measurement Details

Date and Time: 26/04/2017 08:35
Sound Level Meter: Cirrus Research plc
Recalibration Due: 31/10/2017
Run Duration: 00:01:30 hh:mm:ss
Range: 40-110 dB
Overload: no

Data

Leq	63.1 dBA	L5.0	66.8 dBA
Lepd	38.1 dBA	L10.0	64.8 dBA
LAE	82.5 dBA	L50.0	60.8 dBA
LAFmax	76.4 dBA	L90.0	56.9 dBA
Peak	107.0 dBC	L95.0	56.1 dBA
		Lmin	54.2 dBA



APPENDIX C

Noise Survey Log

NOISE SURVEY RECORD SHEET

Survey Details

Job Title	LIDL Clitheroe Noise Survey
Location (name/grid ref)	Flat at Shawbridge St
Address (if applicable):	Shawbridge Street, Clitheroe, Lancashire, BB7 1LZ

Pre and Post Survey Calibration	Yes
Start Time (00:00 hrs)	00:49:00
Finish Time (00:00hrs)	01:05:00

Calibrator		
Model No.	Serial no.	Calibration date
CR511:E	42342	10/10/2016

Noise observations (source specific)	
Time	Description/details
0.52	Truck passing on nearby road
0.55	Moped passing on nearby road

Notes:



Technician (name)	M.Wilson
--------------------------	----------

Date	02/12/2016
Climatic conditions: 20% cloud cover, wind speed <1m/s, 4 Deg C, dry, no rainfall	

Background noise details
Occasional traffic on nearby A671. A Running stream nearby was audible.

Sound Level Meter		
Model No.	Serial no.	Calibration date
CR831B	C18929FF	17/10/2016

Wind speed (m/s)		
Time	Speed	Gusts
0 mins	<1m/s	
5 mins		
10 mins		
15 mins	<1m/s	
20 mins		
25 mins		
30 mins		
35 mins		
40 mins		
45 mins		
50 mins		
55 mins		
60 mins		

Survey Completed	
Name	Mark Wilson
Signed	<i>M. Wilson</i>

NOISE SURVEY RECORD SHEET

Survey Details



Job Title	LIDL Clitheroe Noise Survey
Location (name/grid ref)	LIDL store car park
Address (if applicable):	Shawbridge Mill, Shawbridge Street, Clitheroe, Lancashire, BB7 1LZ

Technician (name)	M.Wilson
--------------------------	----------

Date	01/12/2016
Climatic conditions: 30% cloud cover, wind speed <1m/s, 6 Deg C, dry, no rainfall	

Pre and Post Survey Calibration	Yes
Start Time (00:00 hrs)	19.35
Finish Time (00:00hrs)	20.35

Background noise details
Heavy traffic on nearby A671. Occasional vehicle entering/egressing store car park.

Calibrator		
Model No.	Serial no.	Calibration date
CR511:E	42342	10/10/2016

Sound Level Meter		
Model No.	Serial no.	Calibration date
CR831B	C18929FF	17/10/2016

Noise observations (source specific)	
Time	Description/details
20.19	Very noisy moped entering car park
20.25	Very noisy moped leaving car park
20.30	Taxi pulls into car park near survey position and leaves engine running

Wind speed (m/s)		
Time	Speed	Gusts
0 mins	<1m/s	
5 mins		
10 mins		
15 mins		
20 mins		
25 mins		
30 mins	<1m/s	
35 mins		
40 mins		
45 mins		
50 mins		
55 mins		
60 mins	<1m/s	

Notes:

Survey Completed
Name Mark Wilson
Signed <i>M. Wilson</i>

NOISE SURVEY RECORD SHEET

Survey Details

Job Title	LIDL Clitheroe Noise Survey
Location (name/grid ref)	LIDL store car park
Address (if applicable):	Shawbridge Mill, Shawbridge Street, Clitheroe, Lancashire, BB7 1LZ

Pre and Post Survey Calibration	Yes
Start/finish Time (00:00 hrs)	07.28hrs to 07.42hrs
Start/finish Time (00:00hrs)	08.35hrs to 08.37hrs

Calibrator		
Model No.	Serial no.	Calibration date
CR511:E	42342	10/10/2016

Noise observations (source specific)	
Time	Description/details
7.29	HGV pulls into the car park and manouvers into the loading bay
7.37	Aeroplane flying overhead
08:38	HGV engine restarted and then pulls out of the loading bay area and egresses the car park

Notes: Store was closed at the start of the survey. Around opening time of 8.00am the car park started being visited by customers.
--



Technician (name)	M.Wilson
--------------------------	----------

Date	26/04/2017
Climatic conditions: 70% Cloud cover, dry, light wind 1 Deg C	

Background noise details
Traffic noise on nearby roads, bird song nearby.

Sound Level Meter		
Model No.	Serial no.	Calibration date
CR831B	C18929FF	17/10/2016

Wind speed (m/s)		
Time	Speed	Gusts
0 mins	< 1m/s	
5 mins		
10 mins		
15 mins	<1m/s	
20 mins		
25 mins		
30 mins	<1m/s	
35 mins		
40 mins		
45 mins	<1m/s	
50 mins		
55 mins		
60 mins	<1m/s	

Survey Completed	
Name	Mark Wilson
Signed	M. Wilson

APPENDIX D

SoundPlan Data

HGV arrival and reversing into goods unloading bay

No.	Receiver name	Building side	Floor	Limit Leq1 dB(A)	Level Leq1 dB(A)	Conflict Leq1 dB(A)
1	Peel Street Dweelings 2	North west	GF 1.FI	- -	56.0 57.3	- -
2	Shawbridge Street Dwellings 1	South west	GF 1.FI	- -	60.7 61.4	- -
3	Shawbridge Street Dwellings 2	South west	GF 1.FI	- -	57.5 58.8	- -

Figure 2. HGV arrival and manoeuvring. Predicted noise levels at 1st and 2nd floor height at nearest noise sensitive properties (NSPs) (duration 1 minute)



Figure 3. HGV arrival and manoeuvring. Predicted noise levels contour plan (duration 1 minute)



HGV Engine Idling while positioned in loading bay

No.	Receiver name	Building side	Floor	Limit Leq1 dB(A)	Level Leq1 dB(A)	Conflict Leq1 dB(A)
1	Peel Street Dwellings 1	North west	GF 1.FI	- -	29.5 30.7	- -
2	Shawbridge Street Dwellings 1	South west	GF 1.FI	- -	41.5 42.3	- -
3	Shawbridge Street Dwellings 2	South west	GF 1.FI	- -	41.2 42.2	- -

Figure 4. HGV idling. Predicted noise levels at facade 1st and 2nd Floor height at nearest noise sensitive properties (NSPs)

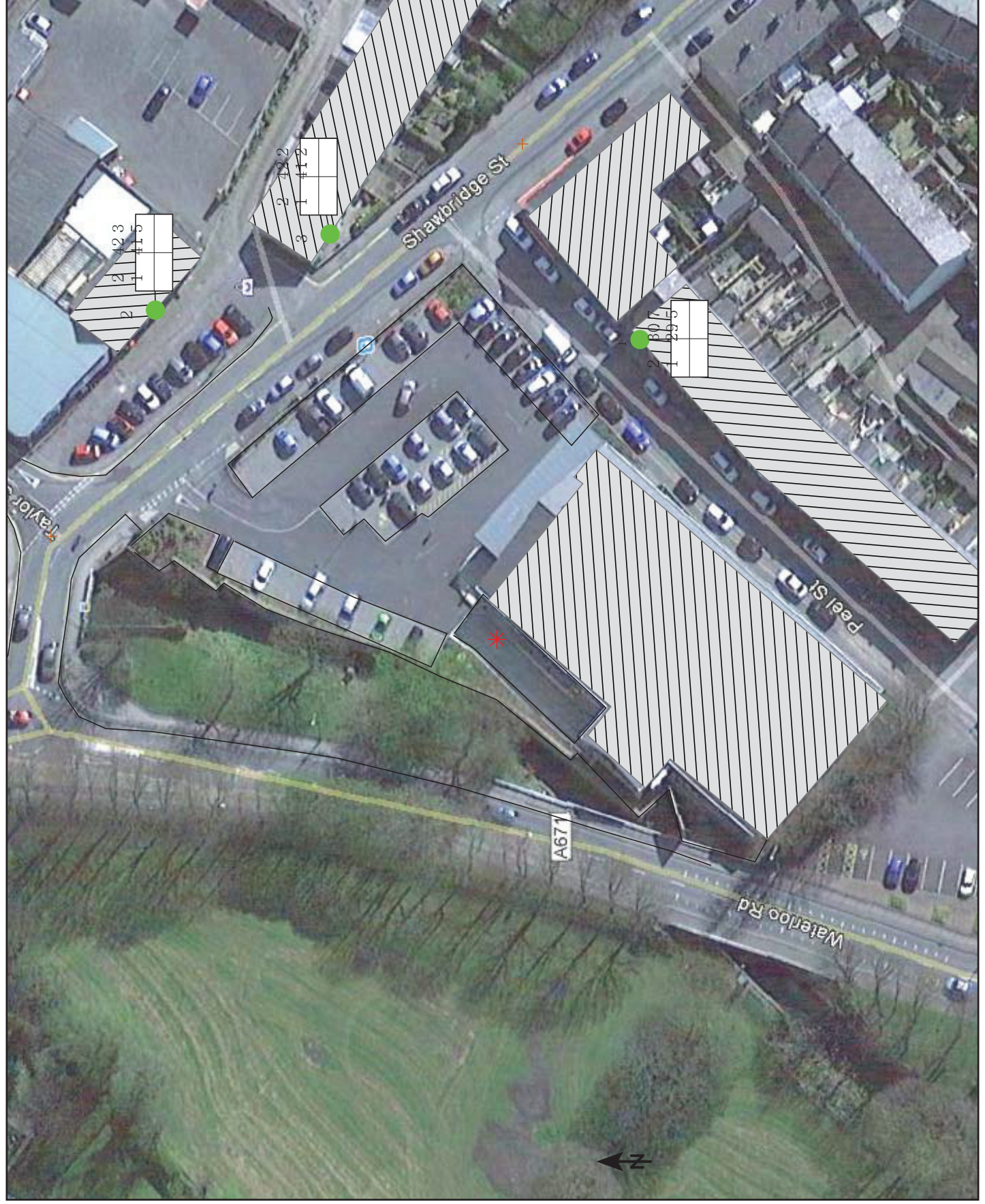
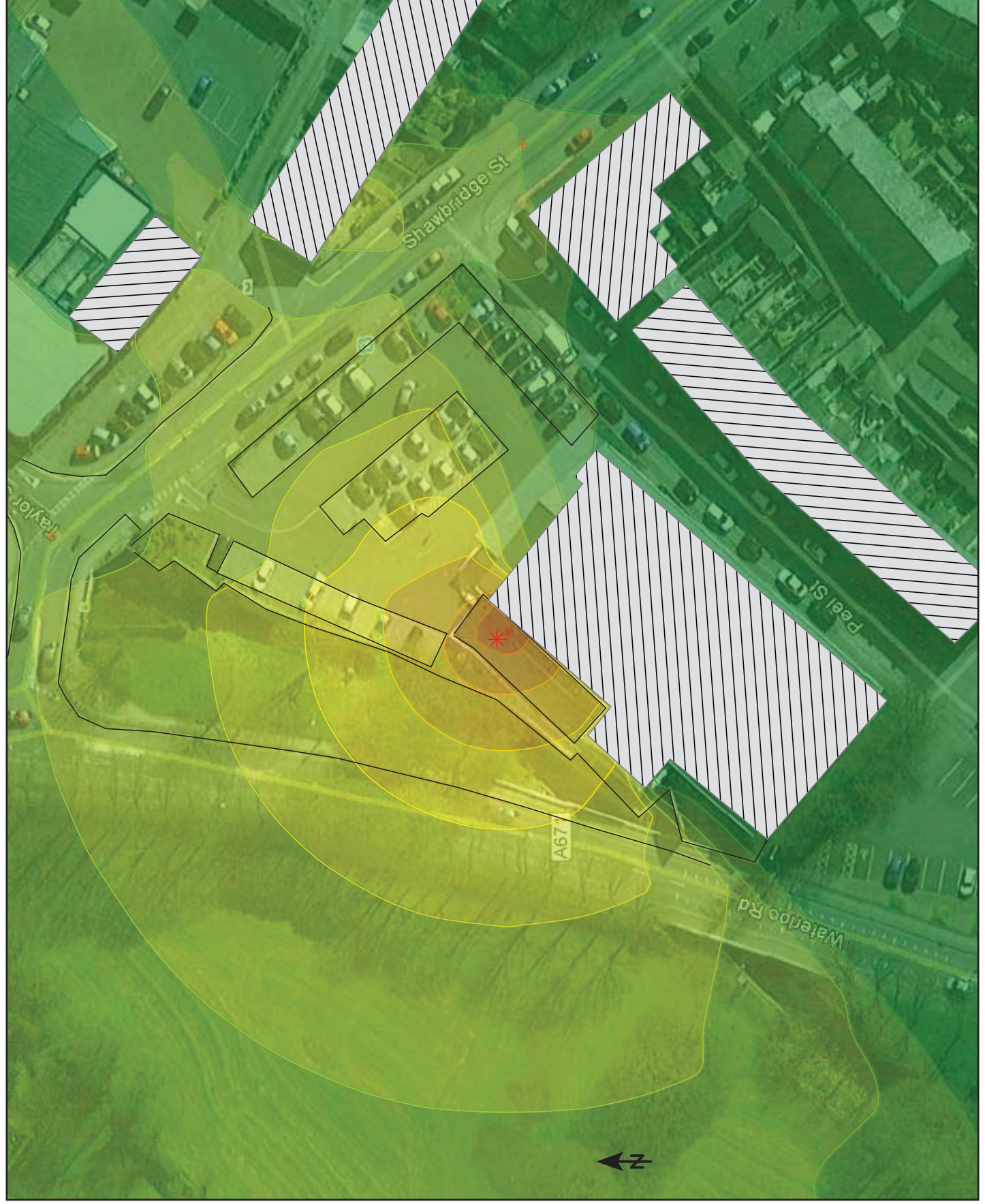


Figure 5. HGV idling. Predicted noise levels contour plan

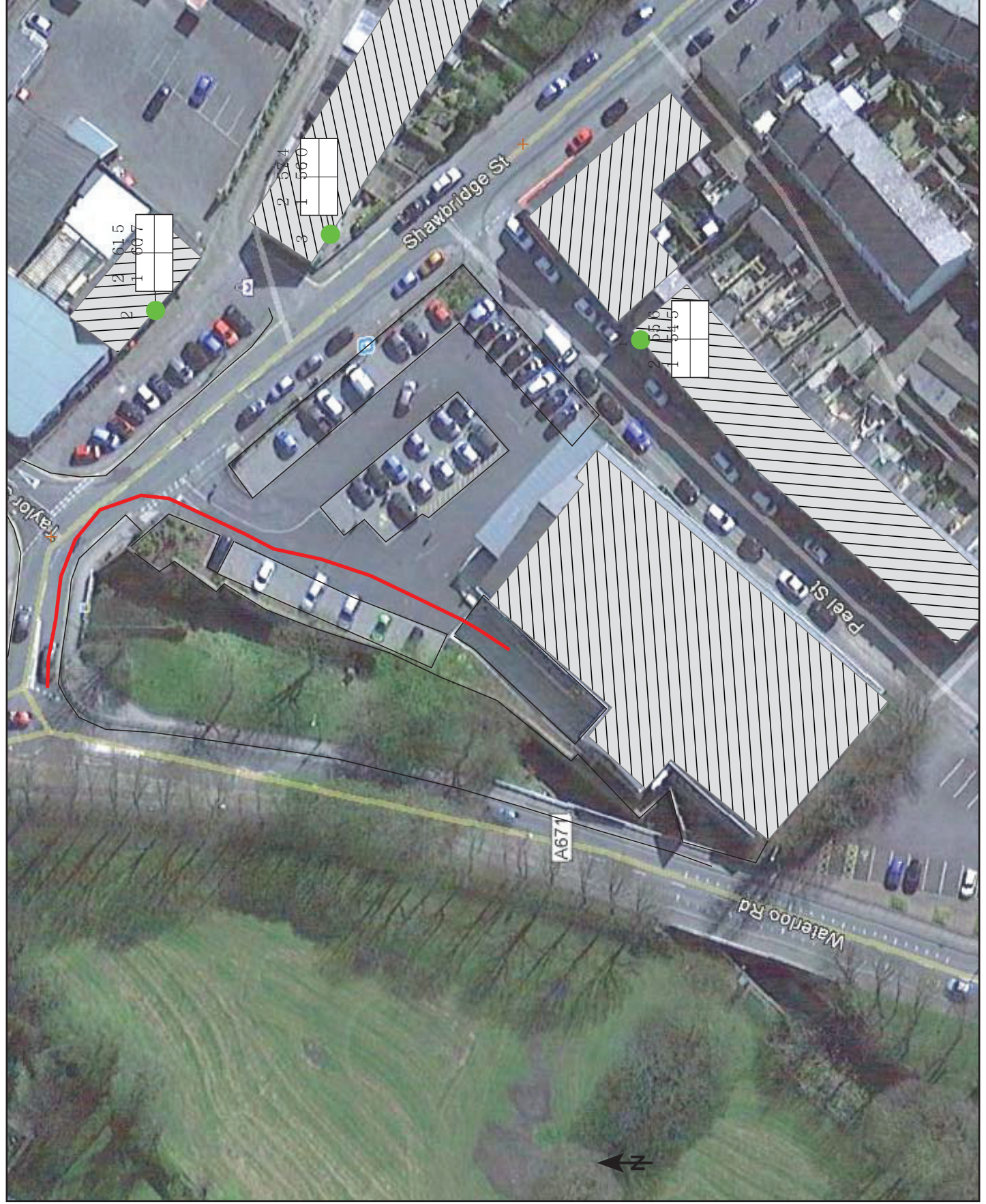


HGV Egress

No.	Receiver name	Building side	Floor	Limit Leq1 dB(A)	Level Leq1 dB(A)	Conflict Leq1 dB(A)
1	Peel Street Dweelings 1	North west	GF 1.FI	- -	54.5 55.6	- -
2	Shawbridge Street Dwellings 1	South west	GF 1.FI	- -	60.7 61.5	- -
3	Shawbridge Street Dwellings 2	South west	GF 1.FI	- -	56.0 57.4	- -

LIDL Clitheroe - Night Time Deliveries Noise Assessment

Figure 6. HGV egress. Predicted noise levels at facade 1st and 2nd Floor height at nearest noise sensitive properties (NSPs) (duration 15 to 20 seconds)



Signs and symbols

- Line
- Elevation point
- Receiver at building
- Line source
- Level tables

1 : 500

0 2.5 5 10 15 20 m

Figure 7. HGV egress. Predicted noise levels contour plan (duration 15 to 20 seconds)

