



ACOUSTIC CONSULTANTS LTD

Proposed Lidl Food Store
South Road, Twickenham

Noise Impact Assessment

Reference: 7334/SL/BL

September 2018



Proposed Lidl Food Store
South Road, Twickenham

Noise Impact Assessment

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1. Introduction

Lidl appointed Acoustic Consultants Limited to undertake a noise survey and an environmental noise assessment for the proposed Lidl food store and retail unit at the site of the existing Wickes store at South Road, Twickenham, TW2 5NT.

This report provides a noise impact assessment in accordance with “British Standard 4142:2014” of plant and deliveries associated with the Lidl food store on the nearby sensitive receivers. Since the occupier of the smaller retail unit is unknown at this stage, it is not possible consider the noise impact of the smaller unit. The impact of this smaller unit could be mitigated via a suitably worded planning condition.

The site location is as follows:

Figure 1: Site Location



2. The Site and Proposals

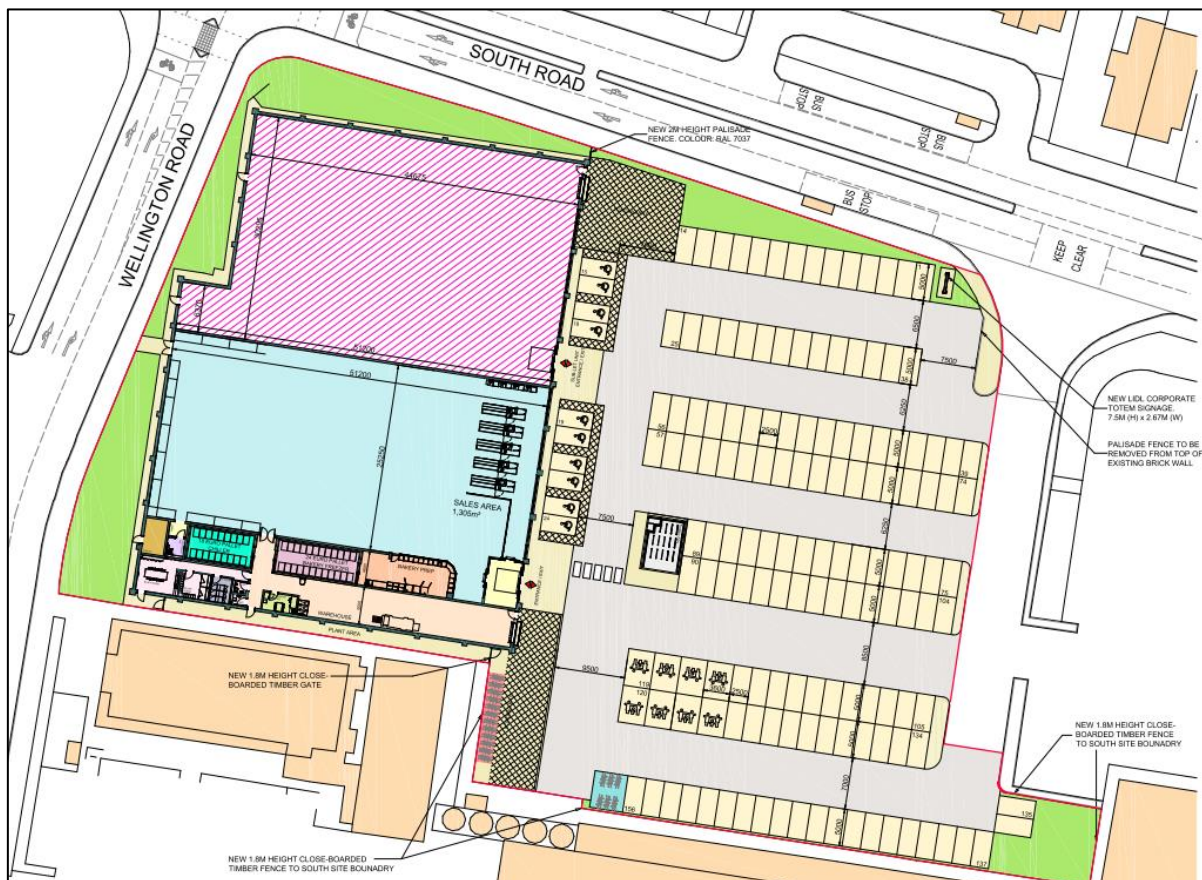
The proposal is for a Lidl food store at the existing Wickes store at South Road, Twickenham. Half of the building is proposed to be sublet, and the southern half to house the Lidl food store, with the associated plant and delivery bay to the south of the site.

The site lies in a mixed-use area with commercial receivers in all directions, comprising a bus depot, car dealership, public house and garden centre. There are residential properties to the north on South Road, approximately 100 metres from the delivery bay and plant area, and further residential properties to the south.

The existing Wickes store has permission for deliveries between the hours of 8am-8pm Monday to Saturday. It is proposed to extend delivery hours for the Lidl store to encompass night-time hours as well.

Figure 2 below provides the Lidl site layout.

Figure 2: Site Layout





3. National Planning Policy

3.1. National Planning Policy Framework

The National Planning Policy Framework (NPPF) was published in March 2012 and revised in July 2018. Section 15 entitled 'Conserving and enhancing the natural environment' addresses noise as a requirement of planning. Paragraph 170 states:

"170. Planning policies and decisions should contribute to and enhance the natural and local environment by:

- e) preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability. Development should, wherever possible, help to improve local environmental conditions such as air and water quality, taking into account relevant information such as river basin management plans; and f) remediating and mitigating despoiled, degraded, derelict, contaminated and unstable land, where appropriate."*

Paragraph 180 states:

"180. Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development. In doing so they should:

- a) mitigate and reduce to a minimum potential adverse impacts resulting from noise from new development – and avoid noise giving rise to significant adverse impacts on health and the quality of life⁶⁰*
- b) identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason; and*
- c) limit the impact of light pollution from artificial light on local amenity, intrinsically dark landscapes and nature conservation.*

60 See Explanatory Note to the Noise Policy Statement for England (Department for Environment, Food & Rural Affairs, 2010).

The document does not prescribe any assessment methodology or criteria to assess the adverse effect of noise.



3.2. Noise Policy Statement for England

The NPPF refers to the Noise Policy Statement for England (NPSE). This was published in March 2010 and aims to provide clarity regarding current policies and practices to enable noise management decisions to be made within the wider context, at the most appropriate level, in a cost-effective manner and in a timely fashion and applies to all forms of noise including environmental noise, neighbour noise and neighbourhood noise.

The NPSE sets out the long term vision of Government noise policy. This long term vision is supported by three noise policy aims as follows:

“Through the effective management and control of environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development:

*avoid significant adverse impacts on health and quality of life;
mitigate and minimise adverse impacts on health and quality of life; and
where possible, contribute to the improvement of health and quality of life.”*

The NPSE introduces the concept of “Significant adverse” and “Adverse” impacts of noise which relate to the noise policy aims. These are applied as follows:

NOEL – No Observed Effect Level

This is the level below which no effect can be detected. In simple terms, below this level, there is no detectable effect on health and quality of life due to the noise.

LOAEL – Lowest Observed Adverse Effect Level

This is the level above which adverse effects on health and quality of life can be detected.

SOAEL – Significant Observed Adverse Effect Level

This is the level above which significant adverse effects on health and quality of life occur.

The Noise Policy Statement for England (NPSE) states that noise levels above the Lowest Observed Adverse Effect Level are acceptable in planning where reduced to a minimum.



With regard to where there is potential for noise impact it states the following in relation to the second noise policy aim:

“The second aim of the NPSE refers to the situation where the impact lies somewhere between LOAEL and SOAEL. It requires that all reasonable steps should be taken to mitigate and minimise adverse effects on health and quality of life while also taking into account the guiding principles of sustainable development (paragraph 1.8). This does not mean that such adverse effects cannot occur.”

The NPSE does not provide any assessment criteria for the noted effect levels and each case must be considered on its merits. The NPSE does, however, emphasise that in dealing with noise, Local Planning Authorities are required to take a balanced approach in considering the benefits of development against any adverse effects which arise. Paragraph 2.18 of the NPSE is particularly relevant in this respect and states:

“There is a need to integrate consideration of the economic and social benefits of the activity or policy under examination with proper consideration of the adverse environmental effects, including the impact of noise on health and quality of life. This should avoid noise being treated in isolation in any particular situation, i.e. not focusing solely on the noise impact without taking into account other related factors.”

The planning need is outside the scope of noise and acoustics and will need to be addressed by others.

3.3. National Planning Practice Guidance, Noise (NPPG)

The National Planning Practice Guidance (NPPG) on noise referred to here is based on the current version (January 2015) as provided on the Planning Guidance Website.

It states that *“Noise needs to be considered when new developments may create additional noise and when new developments would be sensitive to the prevailing acoustic environment.”*

It provides generic guidance on how to determine the noise impact and what factors could be a concern.

It includes the option types to mitigate any adverse effects of noise stating that there are four broad types of mitigation. These are engineering, layout, using planning conditions or obligations and noise insulation.



Paragraph 5 of the NPPG provides a table identifying the effect level and examples of effect relating to the impact effect levels provided in the NPSE. The table is duplicated below:

Table 1: NPPG Noise – Perception of Effect Levels

Perception	Examples of Outcomes	Increasing Effect Level	Action
Not noticeable	No Effect	No Observed Effect	No specific measures required
Noticeable and not intrusive	Noise can be heard, but does not cause any change in behaviour or attitude. Can slightly affect the acoustic character of the area but not such that there is a perceived change in the quality of life.	No Observed Adverse Effect	No specific measures required
		Lowest Observed Adverse Effect Level	
Noticeable and intrusive	Noise can be heard and causes small changes in behaviour and/or attitude, e.g. turning up volume of television; speaking more loudly; where there is no alternative ventilation, having to close windows for some of the time because of the noise. Potential for some reported sleep disturbance. Affects the acoustic character of the area such that there is a perceived change in the quality of life.	Observed Adverse Effect	Mitigate and reduce to a minimum
		Significant Observed Adverse Effect Level	
Noticeable and disruptive	The noise causes a material change in behaviour and/or attitude, e.g. avoiding certain activities during periods of intrusion; where there is no alternative ventilation, having to keep windows closed most of the time because of the noise. Potential for sleep disturbance resulting in difficulty in getting to sleep, premature awakening and difficulty in getting back to sleep. Quality of life diminished due to change in acoustic character of the area.	Significant Observed Adverse Effect	Avoid
Noticeable and very disruptive	Extensive and regular changes in behaviour and/or an inability to mitigate effect of noise leading to psychological stress or physiological effects, e.g. regular sleep deprivation/awakening; loss of appetite, significant, medically definable harm, e.g. auditory and non-auditory	Unacceptable Adverse Effect	Prevent

The table does not provide any objective assessment which equates to the noted effect levels, however, the NPPG identifies that where noise is audible, it is not necessarily intrusive. The effect and impact on people is based primarily on the level of noise.



4. Assessment Methodology

The following section identifies the guidance which is considered to provide noise criteria equivalent to effect levels within NPPG and NPSE. We would consider BS 4142:2014 to be the most appropriate guidance for assessing the impact of a commercial use on dwellings in the vicinity.

British Standard 4142:2014 entitled 'Method for rating and assessing industrial and commercial sound' uses outdoor sound levels to assess the likely effects of sound upon people who might be inside or outside a dwelling or other premises used for residential purposes. The principle is that of establishing the 'difference' between the 'rating level' and the 'background sound level'.

The 'rating level' is the 'specific sound level' of the source over a period of one hour during the day (07:00 to 23:00 hours) and over a period of 15 minutes during the night (23:00 to 07:00 hours). Section 9 entitled 'Rating Level' states: *"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. Where such features are present at the assessment location, add a character correction to the specific sound level to obtain the rating level."*

An acoustic character correction should be added to the 'specific sound level' if it exhibits any tonality, impulsivity, other sound characteristics and/or intermittency at the assessment location. The value of the character correction varies, dependent on the prominence of the character of the sound source at the assessment location. In Section 11 of the Standard, entitled 'Assessment of the Impacts', it states:

"Obtain an initial estimate of the impact of the specific sound by subtracting the measured background sound level (see Clause 8) from the rating level (see Clause 9), and consider the following.

- *Typically, the greater this difference, the greater the magnitude of the impact.*
- *A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context.*
- *A difference of around +5 dB is likely to be an indication of an adverse impact, depending on the context.*
- *The lower the rating level is relative to the measured background 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."*



Industrial and commercial noise would normally be considered acceptable where the rating sound level does not exceed the background sound level, a 0 dB difference, however context should be considered. In terms of context British Standard 4142:2014 states:

“Where the initial estimate of the impact needs to be modified due to the context, take all pertinent factors into consideration, including the following.

- 1) *Where background sound levels and rating levels are low, absolute levels might be as, or more, relevant than the margin by which the rating level exceeds the background. This is especially true at night. Where residual sound levels are very high, the residual sound might itself result in adverse impacts or significant adverse impacts, and the margin by which the rating level exceeds the background might simply be an indication of the extent to which the specific sound source is likely to make those impacts worse.*
- 2) *The character and level of the residual sound compared to the character and level of the specific sound. Consider whether it would be beneficial to compare the frequency spectrum and temporal variation of the specific sound with that of the ambient or residual sound, to assess the degree to which the specific sound source is likely to be distinguishable and will represent an incongruous sound by comparison to the acoustic environment that would occur in the absence of the specific sound. Any sound parameters, sampling periods and averaging time periods used to undertake character comparisons should reflect the way in which sound of an industrial and/or commercial nature is likely to be perceived and how people react to it.*

NOTE 3 Consideration ought to be given to evidence on human response to sound and, in particular, industrial and/or commercial sound where it is available. A number of studies are listed in the “Effects on humans of industrial and commercial sound” portion of the “Further reading” list in the Bibliography.

- 3) *The sensitivity of the receptor and whether dwellings or other premises used for residential purposes will already incorporate design measures that secure good internal and/or outdoor acoustic conditions, such as:
 - i) *façade insulation treatment;*
 - ii) *ventilation and/or cooling that will reduce the need to have windows open so as to provide rapid or purge ventilation; and*
 - iii) *acoustic screening.”**



5. Baseline Noise Measurements

A long term noise monitoring exercise was carried out to determine the baseline noise conditions around the site.

5.1. Monitoring Equipment

Sound Pressure Levels were measured using a Class 1 Sound Level Meter with a half-inch condenser microphone using the "fast" setting. The equipment is checked annually using a Quality System meeting the requirements of British Standard EN ISO/IEC 17025:2005 and in accordance with British Standard EN 10012:2003 and traceable to the National Standards. This equipment was checked and calibrated as noted below and the certificates are available for inspection.

Table 2: Monitoring Equipment

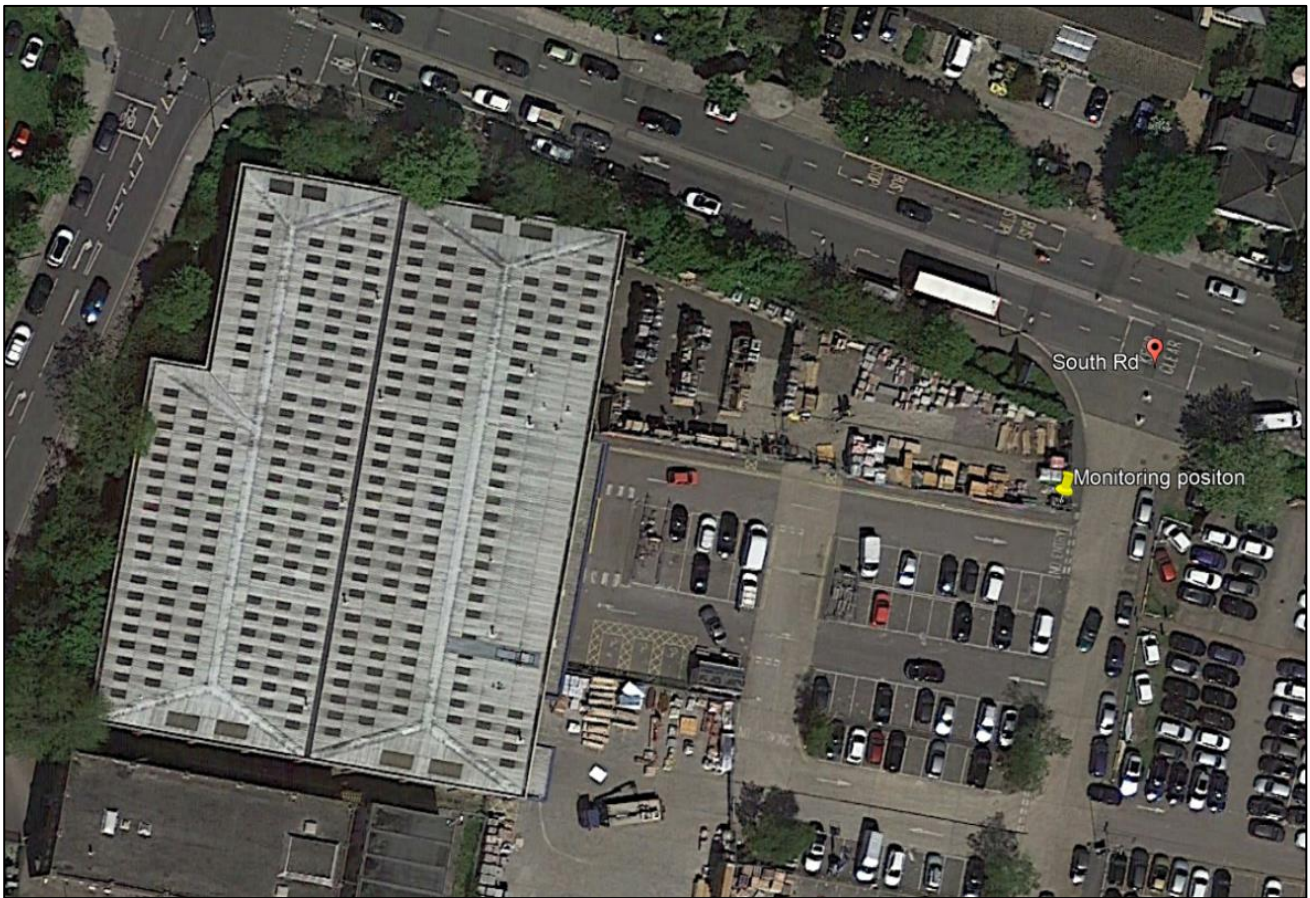
Equipment Description / Manufacturer / Type	Serial number	Date of calibration	Calibration Certification Number
NTI XL2 Sound Level Meter	A2A-09705-E0	04/09/2017	15284
NTI MA220 Pre-Amp	5332	04/09/2017	15284
NTI Microphone Capsule MC230A	A14374	04/09/2017	15284
Calibrator, CEL, Type 284/2	3/02716829	04/09/2017	15283

The measuring systems were checked for calibration before and after the tests which gave a drift of 0.1 dB. This drift is insignificant.

5.2. Monitoring Procedure

Noise monitoring was undertaken between 14:00 hours on 31st July 2018 and 09:15 on 1st August 2018. Noise monitoring was undertaken in accordance with British Standard 4142:2014. The monitoring location is shown as "A" on Figure 3 below.

Figure 3: Monitoring Location



The monitoring location is considered representative of the baseline noise level at noise sensitive receivers around the site. The microphone was on a tripod 1.5 metres above the ground and in a free-field position.

The main noise source affecting the monitoring location is road traffic from South Road.

5.3. Meteorological Conditions

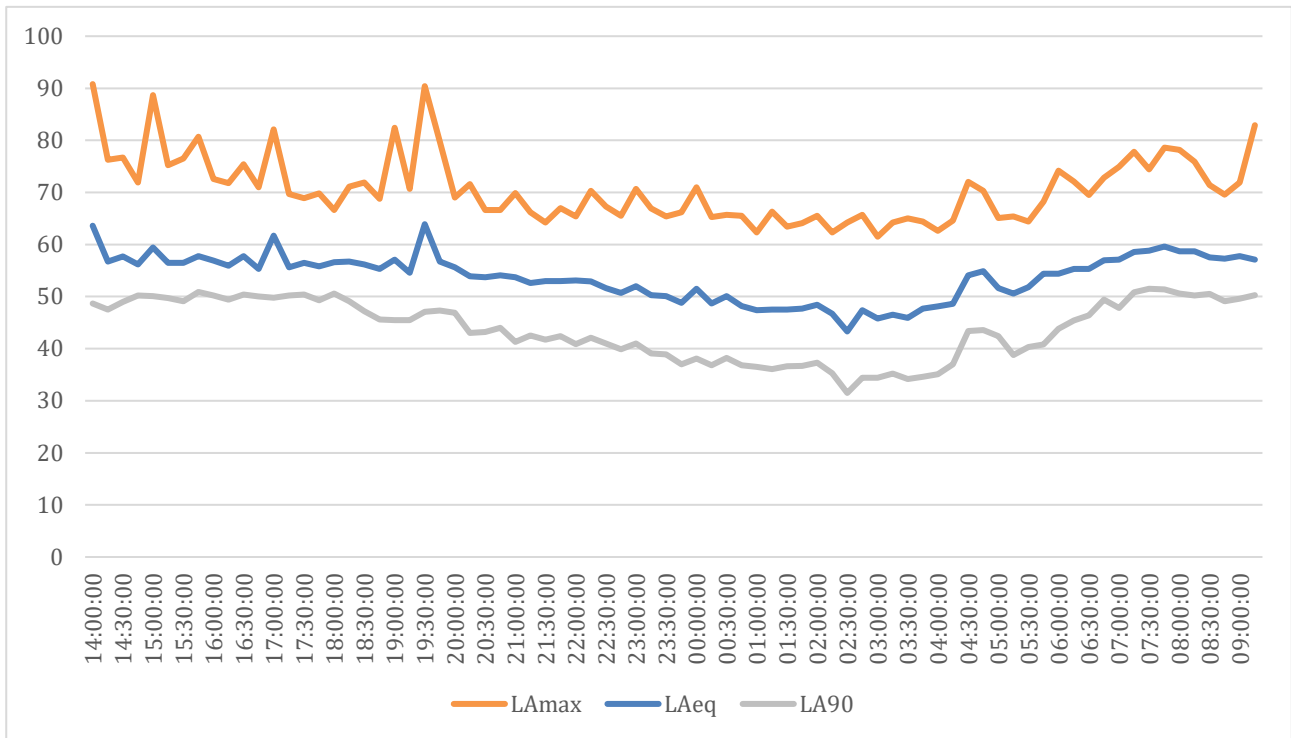
During the monitoring, conditions were dry with wind speeds of up to 3 metres per second. The average air temperature during the survey was 17 degrees centigrade. These conditions are not expected to have any adverse effect on the measured levels.

5.4. Measured Data

The measured data consists of the Maximum Noise Level ($L_{AFmax,15min}$), Equivalent Noise Level ($L_{Aeq,15min}$), and Background Noise Level ($L_{A90,15min}$) in dB(A). The graphical results of the monitored period are provided below.



Chart 1: Variation in Measured Noise Levels



As per the methodology of British Standard 4142:2014, we have determined the following daytime (07:00 to 23:00 hours) and night-time (23:00-07:00 hours) background sound levels via a statistical modal analysis of the measured $LA_{90,15\text{min}}$ data. These are free-field levels.

Parameter	Period	Average	Min	Max
LA90	Day	50	40	52
	Night	37	32	44
LAeq	Day	57	64	51
	Night	51	57	43



6. Lidl Plant Noise Assessment

6.1. Proposed Plant

The proposed plant for the food store will be located at ground level within the alleyway on the southern façade of the Lidl store, adjacent to the delivery bay.

We have been advised that the proposed plant is as follows. It should be noted that any changes to the following schedule, or changes to the location or layout of the plant units will affect the predicted levels at the receiver points around the site and as such, will need reassessing.

There will be four inverter heat pumps (Mitsubishi FDC250VSA), one welfare VRF (Mitsubishi FDC280KXZRE1), one cash room DX heat pump (Mitsubishi SRC20ZS-S), two 4 fan Dry Coolers (VT03061U.1/S3G800-CD57-39)

The following table provides the supplied octave band noise data of the plant as supplied by Lidl.

Table 3: Noise data of Plant

Plant	Quantity	Parameter	Frequency (Hz)						
			125	250	500	1k	2k	4k	8k
Dry Coolers	8 fans	L_{wA} (dB) (per fan)	49	54	61	63	62	57	51
Mitsubishi FDC250VSA	4	L_p (dB) at 1m	65	60	57	59	54	49	45
Mitsubishi (SRC20ZS-S)	1	L_p (dB) at 1m	44	43	40	43	34	28	23
Mitsubishi FDC280KXZRE1	1	L_p (dB) at 1m	61	52	53	54	48	43	40

6.2. Predicted Specific Sound Level

The plant noise emission has been modelled in the noise modelling software Cadna:A by DataKustik. The modelling software calculates sound levels based on the inputted sound emission values, source and receiver locations, and primarily distance, barrier and ground attenuation. Calculations are undertaken using the General Method of Calculation from ISO 9613.

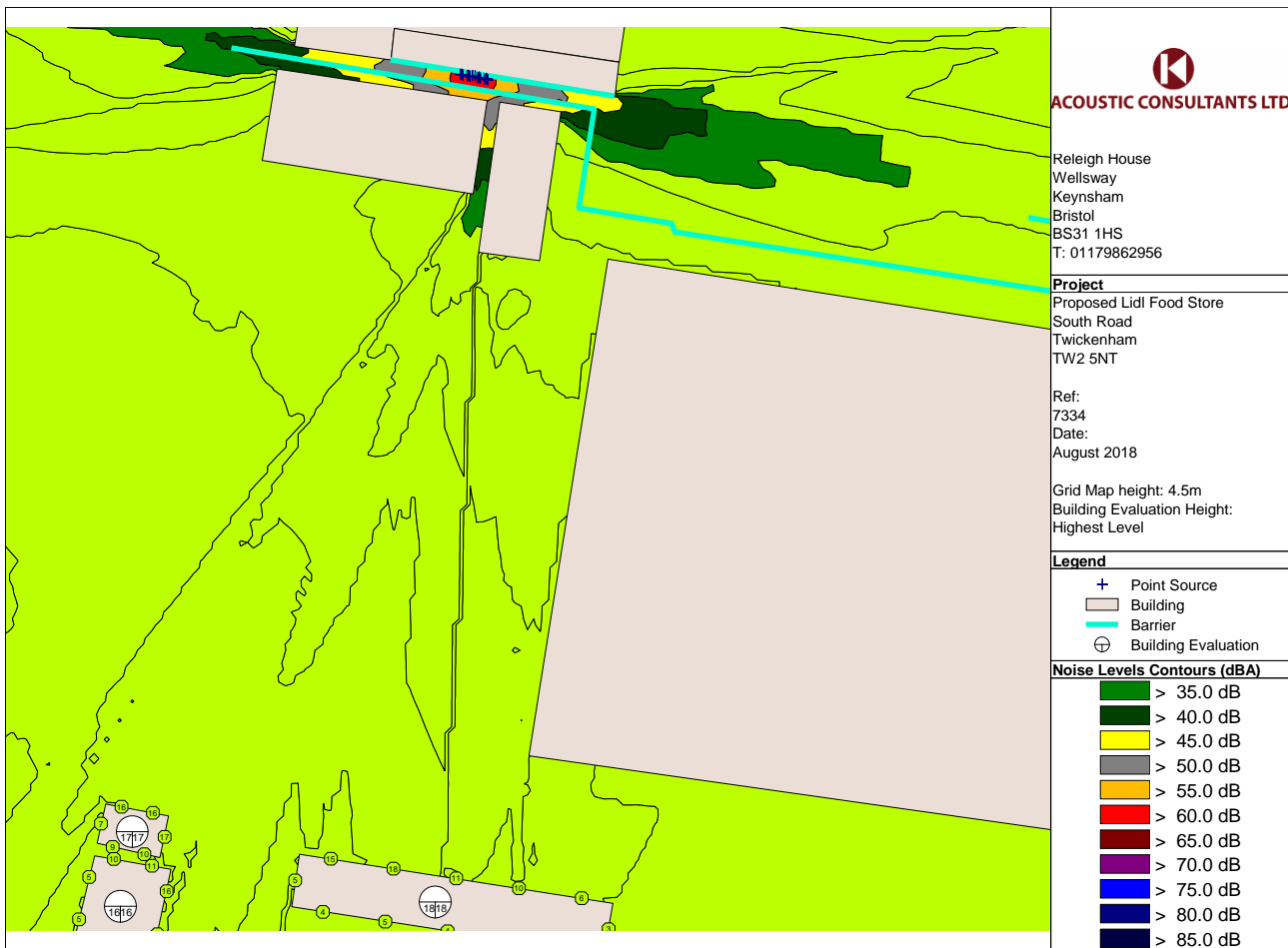


The parameters within the Cadna:A model are as follows and are considered reasonable assumptions:

- The store height is based on the known height of the supplied elevation drawings, the existing residential buildings have been assumed to be 5-8 metres tall based on online and site observations.
- The order of reflections is 3, and all buildings are reflective.
- The ground across the site and surrounding area is considered hard and reflective.
- The topography of the site is assumed to be flat.
- The predictions are based on the supplied plant noise levels and mitigation measures noted above.
- The predictions are based on all plant operating continuously.
- A 1.8-metre-high barrier is provided to the southern site boundary as specified in the site plans.
- The predicted building noise map level at each receiver is the highest predicted level on each façade. The noise map is at a height of 4.5 metres.

A noise map of the plant specific sound levels is provided below for the daytime and night-time plant operation.

Figure 4: Predicted Specific Sound Level of Plant $L_{Aeq}(15min)$



The most sensitive receivers to plant noise are the residential houses located to the south. From the noise mapping, the predicted free-field specific sound level of plant at the worst-case noise sensitive receiver is 18 dB $L_{Aeq}(15 \text{ minutes})$.

6.1. Initial Estimate of Impact

A British Standard 4142:2014 initial estimate of the impact has been undertaken at the sensitive receivers around the site and is as follows:

Background Sound Level

From the measured data we have determined a typical worst-case, free-field design background sound level to 37 dB $L_{A90}(15 \text{ min})$ during the night and 50 dB $L_{A90}(1 \text{ hour})$ during the day at a location representative of the noise sensitive receivers.



Specific Sound Level

The cumulative specific sound level at the worst-case receiver is 18 dB $L_{Aeq(15minutes)}$ (free-field level). This is the level determined at the noise sensitive receivers without any character corrections applied.

Character Corrections

Character corrections should be added to the “specific sound level” if the “specific sound level” exhibits any *tonality, impulsivity, other specific characteristics and/or intermittency* at the assessment location. Based on our site visit, the character corrections to be applied are as follows:

Tonality– From our experience of other Lidl sites their plant is not normally tonal however the supplier and installer should ensure any tonality is not distinguishable at the noise-sensitive receivers in the area.

Impulsivity– Plant noise is not normally impulsive.

Intermittency– We do not expect that the intermittency of the plant will be distinguishable at the sensitive receiver over the residual noise climate and we have not applied correction for intermittency. We have also assumed all plant is running continuously within our noise model.

Other Sound Characteristics – We do not believe a character correction is necessary for other sound characteristics.

Therefore the British Standard 4142:2014 initial estimate at the most sensitive location is as follows:

Table 4: British Standard 4142:2014 Initial Estimate

Parameter	Daytime	Night-time
Background Level, $L_{A90(T)}$	50 dB	37 dB
Specific Sound Level, $L_{Aeq(T)}$	18 dB	18 dB
Acoustic Character Correction	+0 dB	+0 dB
Rating Level	18 dB	18 dB
Excess of rating over background level	-32 dB	-19 dB

This means that the plant rating noise level will result in a British Standard 4142:2014 **assessment ‘difference’** -19 dB at the nearest noise-sensitive receiver during the night-time and -32 dB during the daytime period.



As such, it is an indication that the plant rating noise level will be inaudible at the most exposed residential receiver and will result in a low impact on the noise-sensitive receivers in the area. It should be noted that in all instances the context needs to be considered when determining the overall impact.

6.2. Uncertainty

With the proposed plant acoustics, the difference between the rating level and the background sound level is 18 dB at worst and as such, the uncertainty in the measurements and assessment will not have a significant impact on the outcome of the assessment.

6.3. Context

British Standard 4142:2014 states:

“Where the initial estimate of the impact needs to be modified due to the context, take all pertinent factors into consideration, including the following.

Absolute Levels

With regard to ‘absolute levels’, the most relevant guidance is British Standard 8233:2014.

Internally to a dwelling during the day the internal ambient noise levels should not exceed 35 dB $L_{Aeq(16hr)}$ and 30 dB $L_{Aeq(8hr)}$ during the night.

The internal level is approximately 15 dB(A) quieter than the external free-field level (as stated by the WHO) allowing for the attenuation of a partially open window. Therefore, based on the predicted rating levels noted above, the internal absolute levels are as follows.

Table 5: Comparison with Criteria at worst-case receiver

Parameter	Predicted External Level / dB	Open Window Correction / dB(A)	Predicted Internal Level / dB(A)	Within Criteria
$L_{Ar(T)}$	18	-15	3	YES

As can be seen from the table above, the plant rating sound level is at least 27 dB lower than the criteria for night-time rooms and 32 dB lower than the criteria for daytime rooms.



Therefore, we would consider plant noise to be suitably controlled to the dwellings in the vicinity when absolute levels are considered.

Residual Noise Climate

We should also consider the residual noise climate. We have compared the residual noise climate, i.e. *the ambient sound at the assessment location when the specific sound source (plant) is suppressed to such a degree that it does not contribute to the ambient sound*, to the specific sound level (plant) and rating level (plant noise level with character correction applied).

This is summarised below:

Table 6: Comparing the residual noise climate to the specific sound level and rating level

	Daytime	Night-time
Residual Sound Level	57 dB $L_{Aeq}(60 \text{ min})$	51 dB $L_{Aeq}(15 \text{ min})$
Specific Sound Level	18 dB $L_{Aeq}(60 \text{ min})$	18 dB $L_{Aeq}(15 \text{ min})$
Rating Sound Level	18 dB $L_{Ar}(60 \text{ min})$	18 dB $L_{Ar}(15 \text{ min})$

As can be seen, the plant rating sound level (with character) is 39 dB below the residual level during the daytime and 33 dB below the residual level during the night-time at the worst-case receiver. We would consider the noise source to be inaudible when compared to the residual noise climate and as such, that plant noise would be suitably controlled to the dwellings in the vicinity when residual levels are considered.

Summary of British Standard 4142:2014 Assessment

As can be seen above, once context is considered and the noise impact of the plant is compared to the existing noise climate, plus internal noise levels compared to the relevant adopted guidance, then it is clear that plant noise will be acceptable when assessed to British Standard 4142:2014 and of a low impact.



7. Lidl Delivery Noise Assessment

7.1. Summary of Delivery Operation

The delivery bay will be located to the south of the store. The vehicle will access and exit the site via South Road. The unloading, arrival and departure of the delivery vehicle has the potential to affect the receivers around the site.

We understand that the deliveries are contained to only one or two articulated vehicles per day.

The vehicles have a refrigerated section with condensing unit which is turned off during the delivery operation.

The vehicle arrives on site and reverses up to the delivery yard. Reverse alarms are turned on during the manoeuvres.

The engine is then turned off and the goods are moved from the trailer by tail-lift at the rear of the vehicle.

The goods are mostly on pallets and an electric pallet truck is used. The operation takes place externally and the vehicle departs after 1 or 2 hours.

The most sensitive receivers to delivery noise are the residential houses located to the north of the site. All other residential dwellings are further away from the delivery activities and shielded from the noise by the bus station to the south.

7.2. Delivery Operation Noise Levels

Noise from another Lidl site using a tail-lift in the delivery operation. The unloading operation was measured at a distance of 15 metres from the delivery bay, with noise emitting in a 50% sphere partition. The measured level was 59 dB(A) at 15 metres, which equates to a sound power level of 90.5 dB(A).



7.3. Delivery Operation Noise Predictions

Noise emission prediction calculations have been carried out for the potentially most sensitive locations to delivery noise (as stated above).

The delivery operation has also been modelled in the noise modelling software Cadna:A by DataKustik. The parameters within the Cadna:A model are as follows and are considered reasonable assumptions:

- The store height is based on the supplied elevations of the proposed store, the existing residential and commercial buildings have been assumed to be 5-8 metres tall based on online and site observations.
- The order of reflections is 3, and all buildings are reflective.
- The ground across the site and surrounding area is considered hard and reflective.
- The topography of the site is assumed to be flat.
- The predictions are based on all plant operating continuously.
- A 1.8-metre-high barrier is provided to the southern site boundary as specified in the site plans.
- The predicted building noise map level at each receiver is the highest predicted level on each façade. The noise map is at a height of 1.5 metres for the daytime calculations and 4.5 metres at night.
- The predictions are based on the measured delivery noise emission levels noted above.
- For the assessment we have predicted the equivalent noise levels over a 1-hour period for the daytime assessment and a 15-minute period to be representative of the night-time assessment period. The predictions include the delivery arrival and unloading in one model.
- The delivery assessment considers the unloading process only. The vehicle movements occur for a very short period during each delivery. These movements are similar in character to the residual noise climate and of a lower level. Therefore, the movements would not result in an adverse impact.

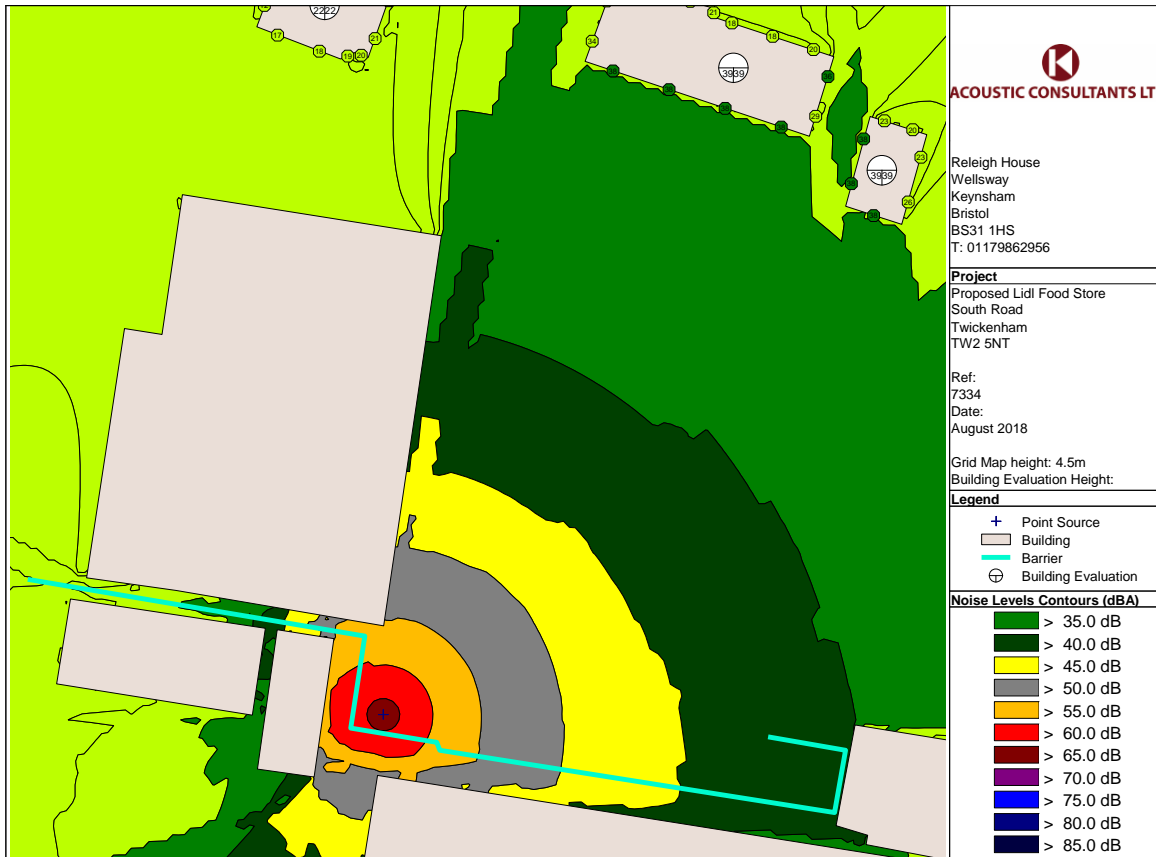
Daytime and night-time noise maps of the delivery specific sound levels are provided below:



Figure 5: Predicted Daytime Specific Sound Level of Lidl Deliveries $L_{Aeq(60min)}$ (Ground Floor Height)



Figure 6: Predicted Night-time Specific Sound Level of Lidl Deliveries $L_{Aeq(15min)}$ (1st Floor Height)



The most sensitive receivers to delivery noise are the residential houses located to the north. From the noise mapping, the predicted free-field specific sound level of plant at the worst-case noise sensitive receiver is 31 dB $L_{Aeq(1\text{ hour})}$ during the day (ground floor height) and 35 dB $L_{Aeq(15\text{ minutes})}$ during the night (first floor height).

7.4. Initial Estimate of Impact

Specific Sound Level

From the measured data we have determined a typical worst-case, free-field design background sound level to 37 dB $L_{A90(15\text{ min})}$ during the night and 50 dB $L_{A90(1\text{ hour})}$ during the day at a location representative of the noise sensitive receivers.



Specific Sound Level

The cumulative specific sound level at the worst-case receiver is 39 dB $L_{Aeq(1 \text{ hour})}$ during the day and 38 dB $L_{Aeq(15 \text{ minutes})}$ during the night (free-field level). This is the level determined at the noise sensitive receivers without any character corrections applied.

Character Corrections

Character corrections should be added to the “specific sound level” if the “specific sound level” exhibits any *tonality, impulsivity, other specific characteristics and/or intermittency* at the assessment location. Based on our surveys at Lidl sites, the character corrections to be applied are as follows:

Tonality– Delivery noise is not tonal.

Impulsivity –Delivery noise is normally impulsive. Impulsivity has been calculated based on our measurements of delivery noise on Lidl sites, the residual level at the noise-sensitive receiver and the methodology of Annex E of British Standard 4142:2014. Following this methodology, the impulsivity correction at the noise sensitive receiver is 0 dB as the residual noise climate exceeds the predicted impulse level at the worst-case façade at day and night.

Intermittency – The delivery operation will have intermittent characteristics; however, we do not believe this will be distinguishable over the residual climate so no correction is applied.

Other Sound Characteristics – We do not believe a character correction is necessary for other sound characteristics.

Therefore the British Standard 4142:2014 initial estimate at the worst-case time is as follows:

Table 7: British Standard 4142:2014 Initial Estimate

Parameter	Day	Night
Background Sound Level, $L_{A90(1 \text{ hour}/15 \text{ minutes})}$	50 dB	37 dB
Specific Sound Level, $L_{Aeq(1 \text{ hour})}$	39 dB	38 dB
Character Correction	0 dB	0 dB
Rating Sound Level $L_{Ar(1 \text{ hour})}$	39 dB	38 dB
Difference between rating and background level	-11 dB	+1 dB

This means that the delivery rating noise level will result in a British Standard 4142:2014 **assessment ‘difference’ of -11 dB during the day and +1 dB at night** at the most sensitive receivers and as such, is estimated to be of a low impact during the day and of minor to adverse



impact during the night; however, the context of the site and the receivers needs to be considered.

7.5. Context of Site

British Standard 4142:2014 states:

“Where the initial estimate of the impact needs to be modified due to the context, take all pertinent factors into consideration, including the following.

Absolute Levels

With regard to ‘absolute levels’, the most relevant guidance is British Standard 8233:2014.

Internally to a dwelling during the day the internal ambient noise levels should not exceed 35 dB $L_{Aeq(16hr)}$ and 30 dB $L_{Aeq(8hr)}$ during the night.

As the delivery noise has character, the level with a character correction (rating level) should be considered to allow for the fact it is not anonymous noise.

The internal level is approximately 15 dB(A) quieter than the external free-field level (as stated by the WHO) allowing for the attenuation of a partially open window. Therefore, based on the predicted rating levels noted above, the internal absolute levels are as follows.

Table 8: Comparison with Criteria at worst-case receiver

Period	Predicted External Level / dB	Open Window Correction / dB(A)	Predicted Internal Level / dB(A)	Within Criteria
Day	39	-15	24	YES
Night	38		23	YES

As can be seen from the table above, the delivery rating sound level is at least 7 dB lower than the criteria for night-time rooms and 11 dB lower than the criteria for daytime rooms.

Therefore, we would consider delivery noise to be suitably controlled to the dwellings in the vicinity when absolute levels are considered.





Residual Noise Climate

We should also consider the residual noise climate. We have compared the residual noise climate, i.e. *the ambient sound at the assessment location when the specific sound source (deliveries) is suppressed to such a degree that it does not contribute to the ambient sound*, to the specific sound level (deliveries) and rating level (delivery noise level with character correction applied).

This is summarised below:

Table 9: Comparing the residual noise climate to the specific sound level and rating level

	Daytime	Night-time
Residual Sound Level	57 dB $L_{Aeq}(60 \text{ min})$	51 dB $L_{Aeq}(15 \text{ min})$
Specific Sound Level	39 dB $L_{Aeq}(60 \text{ min})$	38 dB $L_{Aeq}(15 \text{ min})$
Rating Sound Level	39 dB $L_{Ar}(60 \text{ min})$	38 dB $L_{Ar}(15 \text{ min})$

As can be seen, the delivery rating sound level (with character) is 18 dB below the residual level during the daytime and 13 dB below the residual level during the night-time at the worst-case receiver. We would consider the noise source to be inaudible when compared to the residual noise climate and as such that delivery noise would be suitably controlled to the dwellings in the vicinity when residual levels are considered.

7.6. Summary of British Standard 4142:2014 Assessment

As can be seen above, once context is considered and the noise impact of the delivery operation is compared to the existing noise climate, plus internal noise levels compared to the relevant adopted guidance, then it is clear deliveries will be acceptable when assessed to British Standard 4142:2014 and of a low impact.



8. Northern Unit Noise Assessment

This section provides an outline noise impact assessment of the proposed northern retail unit. As the operators are not known at this stage it is not feasible to provide a full detailed assessment of this use. However the assessment below can be written into any outline planning consent to ensure the nearby sensitive receivers are not adversely affected by way of noise.

8.1. Noise Limits

The following are proposed as noise limiting criteria for use of all the industrial/commercial during the daytime and night-time hours only. The noise limits are free-field levels 3.5 metres from the façade of the nearest sensitive receivers, such as dwellings, in the vicinity.

The criteria relates to commercial activities within the units, plant noise and delivery processes. This would not include car parking noise or noise from pedestrians associated with the site. We have provided operational noise limits over the 24 hour period based on the monitoring data.

Where assessments differences between the Rating Level and Background Sound Level are of 0 dB or less the impact is likely to be low depending on the context. This has been used as the criteria of this assessment.

Based on the above criteria and the assessment time periods stated, the maximum Rating Noise limits of operational noise from the development are as follows:

Table 10: Operational Noise Rating Level Limits

Time Period	Rating Level $L_{Ar(T)}$ dB
Day (07:00 – 23:00)	50 $L_{Ar(1 \text{ hour})}$ dB
Night (23:00 – 07:00)	37 $L_{Ar(15 \text{ min})}$ dB

The Rating Level of noise from the site should include an acoustic feature correction as applicable in accordance with Section 9 of BS4142:2014 for any tonality, impulsivity, intermittency or other sound characteristics.



8.2. Outline Noise Control Measures

The current proposals are not known but are likely to include external compressors, condensers and extract fans to the buildings of the employment use.

All of these items of plant can either be specified to be 'low noise' or enclosed and as such it is considered that with suitable engineering noise control measures the above noise limits can be achieved.

The control of noise from the internal operations can be addressed with a suitably designed building façade. Once the site layout and building construction is known a detailed assessment can be undertaken to determine the impact based on typical noise at work limits.

The control of noise from vehicle movements can be achieved with a well designed site layout, i.e. orientating the delivery yards/car parks away from the sensitive receivers and/or the use of barriers/buildings to reduce the noise at the dwellings.

All of the above can be addressed at the detailed design stage with the noise limits proposed in Section 8.1 can be written into a suitably worded planning condition.



9. Limitations

The report limits itself to addressing solely on the noise control and acoustic aspects as included in this report. We provide advice only in relation to noise and acoustics.

The report has been prepared in good faith, with all reasonable skill and care, based on information provided or available at the time of its preparation and within the scope of work agreement with the Client. We disclaim any responsibility to the Client and others in respect of any matters outside the scope of the above.

The report is provided for the sole use of the named Client and is confidential to them and their professional advisors. No responsibility is accepted to other parties.

It should be noted that noise predictions are based on the current information as we understand it and on the performances noted in this report. Any modification to these parameters can alter the predicted level. All predictions are in any event subject to a degree of tolerance of normally plus or minus three decibels. If this tolerance is not acceptable, then it would be necessary to consider further measures.



10. Summary & Conclusions

Lidl appointed Acoustic Consultants Limited to undertake a noise survey and an environmental noise assessment for the proposed Lidl food store at the site of the existing Wickes store at South Road, Twickenham, TW2 5NT.

This report provides a noise impact assessment in accordance with “British Standard 4142:2014” of plant and deliveries associated with the Lidl food store on the nearby sensitive receivers.

Plant and delivery noise levels at the nearest noise-sensitive residential properties have been predicted and a British Standard 4142:2014 assessment undertaken.

We consider that once all pertinent factors (i.e. context) are taken into account, it is an indication that plant noise will be of a low impact when assessed to British Standard 4142:2014.

We also consider once context is considered and the noise impact of the delivery operation is compared to the existing noise climate, plus internal noise levels compared to the relevant adopted guidance, then it is clear deliveries will be acceptable when assessed to British Standard 4142:2014 and of a low impact.

Since the occupier of the smaller retail unit is unknown at this stage, it is not possible consider the noise impact of the smaller unit. The impact of this smaller unit could be mitigated via a suitably worded planning condition. We have provided noise limits in this report for this smaller unit. The noise limits proposed in Section 8.1 can be written into a suitably worded planning condition.

In environmental noise terms (affecting the residential premises in the vicinity) the proposals are considered acceptable in terms of plant and delivery noise emission to the dwellings in the vicinity.



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