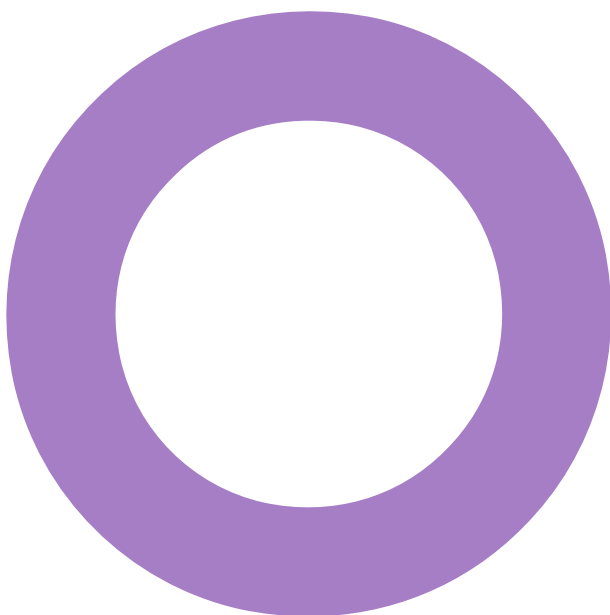


**Proposed Retail Food Store.
Buckingham Road, Aylesbury.
Lidl Great Britain Ltd.**

ACOUSTICS
NOISE IMPACT ASSESSMENT.

REVISION 5 - 26 JUNE 2023



Audit sheet.

Rev.	Date	Description of change / purpose of issue	Prepared	Reviewed	Authorised
0	08/06/2022	Draft Report	AM		
1	06/07/2022	Issued report	AM	DM	DM
2	30/11/2022	Updated for Buckinghamshire Council comments	AM	DM	DM
3	15/06/2023	Updated for plant compound details	AM	DM	DM
4	21/06/2023	Corrected for DAC noise data	AM	DM	DM
5	26/06/2023	Updated for design team comments	AM	DM	DM

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1. Introduction.

Hoare Lea Acoustics has been instructed by Lidl to carry out a noise impact assessment for a proposed retail food store at land located off Buckingham Road, Aylesbury.

The report details the results of site survey work and assesses the potential noise impact of the proposed Lidl store upon the existing dwellings nearest to the site.

This current report includes additional commentary following the Planning Consultation responses issued by Buckinghamshire Council Strategic Environmental Health Team dated 18 October 2022 and 7 June 2023.

2. Site description.

The development site is located off Buckingham Road approximately one mile to the north of Aylesbury town centre near the junction with the A4157 Weedon Road. The site is currently occupied by disused commercial buildings.

The A413 Buckingham Road forms the western site boundary and provides a principal traffic route into the town centre from the north. Traffic flows are high throughout the day and into the evening. Across Buckingham Road to the west are existing residential properties.

Beyond the north west corner of the site, is the signal-controlled junction between Buckingham Road and Weedon Road. Weedon Road forms a northern orbital route around the town centre and carries high traffic flows throughout the day.

The northern site boundary adjoins St Claire's RC Church and a single dwelling to the rear of the church is formed by Sears Drive which provides access to residential properties to the west and south of the site.

To the east, the site adjoins existing dwellings off Megdale Place.

To the south, the site adjoins retained commercial premises including a vehicle repair garage and a warehouse for outdoor garden equipment

An aerial view of the development site and surroundings is shown below and indicates the approximate position of the proposed store building (yellow).



3. Development proposals.

The new store building will occupy the eastern section of the site and aligned along the southern boundary. The remainder of the site to the west of the building will be given over to customer car parking. A small number of parking spaces will be located along the northern side of the building whilst staff parking will be located to the east of the building adjacent to the loading bay.

Customer vehicle and delivery vehicle access to the site will be from the approximate mid-point of the Buckingham Road boundary.

The delivery point and loading bay for the Lidl store will be on the eastern side of the building. The loading bay will comprise a single enclosed dock leveller and all unloading activities will, therefore, occur within the vehicle or within the building – there will be no external unloading activity. The vehicle bay will ramp down such that the trailer floor is at floor level of the store. The lowest point of the ramp will be approximately 1.5m below the surrounding store ground level.

Deliveries will be by means of HGV with a normal schedule of up to two deliveries per day but increasing to two to three deliveries per day for peak shopping periods such as Christmas and Easter.

External plant items will be located within a ground level compound on the eastern side of the building adjacent to the loading bay. The new plant will comprise 3no condensing units, 2no dry air coolers and 2no heat pumps. The heat pumps operate in a reduced mode when the store is closed. The plant compound will be provided with a solid barrier fence to 2.5m along the northern and eastern periphery.

It is expected that the new store will open between 08.00 to 22.00hrs Monday to Saturday including Bank Holidays and between 10.00 and 17.00hrs on Sunday. Deliveries may, however, need to occur outside of these times.

The proposed development will include installation of a solid barrier fence of height 2m along the site boundaries to the residential properties and the church.

The proposed site layout plan is given at Appendix 1.

4. Assessment criteria.

4.1 National Planning Policy framework.

The National Planning Policy Framework (NPPF): July 2021 sets out the Government's planning policies for England and how these are expected to be applied. The document seeks to encourage sustainable development subject to all relevant factors.

Section 15: 'Conserving and enhancing the natural environment', paragraph 174, states the following:

'Planning policies and decisions should contribute to and enhance the natural and local environment by:

- *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.'*

Furthermore, paragraph 183 states that:

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

- *mitigate and reduce to a minimum potential adverse impacts resulting from noise from new development – and avoid noise giving rise to significant adverse impacts on health and the quality of life;*
- *identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason'*

Paragraph 188, additionally, states *'The focus of planning policies and decisions should be on whether proposed development is acceptable use of land rather than control of processes or emissions (where these are subject to separate pollution control regimes).'*

NPPF also makes reference to the DEFRA Noise Policy Statement for England (NPSfE) 2010. This latter document is intended to apply to all forms of noise other than that which occurs in the workplace. It includes environmental noise and neighbourhood noise in all forms.

NPSfE advises that the impact of noise should be assessed on the basis of adverse and significant adverse effect but does not provide any specific guidance on assessment methods or limit sound levels. Moreover, the document advises that it is not possible to have *'a single objective noise-based measure...that is applicable to all sources of noise in all situations'*. It further advises that the sound level at which an adverse effect occurs is *'likely to be different for different noise sources, for different receptors and at different times'*.

In the absence of specific guidance for assessment of environmental noise within NPPF and NPSfE, it will be necessary to base the assessment on current British Standards and relevant local or national guidance.

It is noted that NPSfE also advises that the general principle that increases in ambient noise should be 'minimised', needs to be considered in context for each site and, in this regard, states:

'Of course, taken in isolation and to a literal extreme, noise minimisation would mean no noise at all. In reality, although it has not always been stated, the aim has tended to be to minimise noise as far as is reasonably practical... the application of the NPSfE should enable noise to be considered alongside other relevant issues and not to be considered in isolation. In the past, the wider benefits of a particular...development or other activity may not have been given adequate weight when assessing the noise implications'

4.2 BS 8233:2014.

BS 8233 'Guidance on sound insulation and noise reduction for buildings' is the current British Standard providing guidance for acoustic requirements in and around new buildings, including dwellings. It is expected that the proposed development would be required to achieve BS 8233 criteria at dwellings adjacent to the site.

The BS8233 internal design criteria for dwellings are as follows:

Activity	Location	07:00 to 23:00	23:00 to 07:00
Resting	Living rooms	35 dB L _{Aeq,16hour}	-
Dining	Dining Room / Area	40 dB L _{Aeq,16hour}	-
Sleeping (daytime resting)	Bedroom	35 dB L _{Aeq,16hour}	30 dB L _{Aeq,8hour}

BS 8233 Section G1 advises that sound reduction across an open window is limited to 15dB. Section 9.5 of the Standard does, however, acknowledge that additional sound reduction will result from room furnishings and states 'The reduction in noise within a room where the source is outside the room is limited to approximately 3 dB for each doubling of total sound absorption within the room'. Available test data indicates that, for mid-frequencies, the overall sound reduction from outside to inside is approximately 20dB for a window open by approximately 100mm onto a furnished room.

4.3 BS 4142:2014.

BS4142:2014 'Methods for rating and assessing industrial and commercial sound' is the current British Standard providing guidance for assessment of noise impact from industrial and commercial sites. In general, the likelihood of adverse impact for a particular noise source is dependent upon factors including the margin by which it exceeds the background noise level, the character of the noise and its occurrence. The Standard recommends the determination of the Rating Level of the specific source and advises a correction factor if the sound has a tonal quality, is intermittent or impulsive or has any other distinct characteristics which would make it more noticeable. The Standard advises that where a correction is applied, this should be on the basis of the sound as perceived at the receptor and not as perceived near to the source.

The degree of impact is assessed by comparing the measured background level with the Rating Level. Where the Rating Level exceeds the background, the level of impact increases as shown below:

Comparison with background	Assessment
+0 dB or below measured background	Low impact
+ 5 dB	Adverse impact
+ 10 dB or more above measured background	Significant adverse impact

It should be noted that the assessment method applies to free field external sound levels and in this respect, BS 4142 para 1.2 states that the 'standard is applicable to the determination of...levels at outdoor locations' and 'The standard is not intended to be applied to the derivation of indoor sound levels arising from sound levels outside, or the assessment of indoor sound levels'.

It would be expected that any noise impact during night time would occur within a dwelling albeit with open windows.

5. Measurements.

Measurements have been made to determine the existing diurnal noise climate for the nearest dwellings to the east of the development site off Megdale Place. Measurements were made over the period Friday 23rd to Monday 27th June 2022 at a position near to the mid-point of the eastern boundary adjacent to the dwellings. Lowest background sound levels are expected to occur over the weekend.

The measurement position is shown on the image below.



Levels were recorded continuously in 15-minute samples to determine the equivalent continuous sound level, L_{Aeq} , the short duration maximum sound level, L_{Amax} and the background sound level, L_{A90} .

All measurements were made with a calibrated precision grade sound level meter in accordance with BS EN 60651 and BS 7445. The meter was calibrated before and after use.

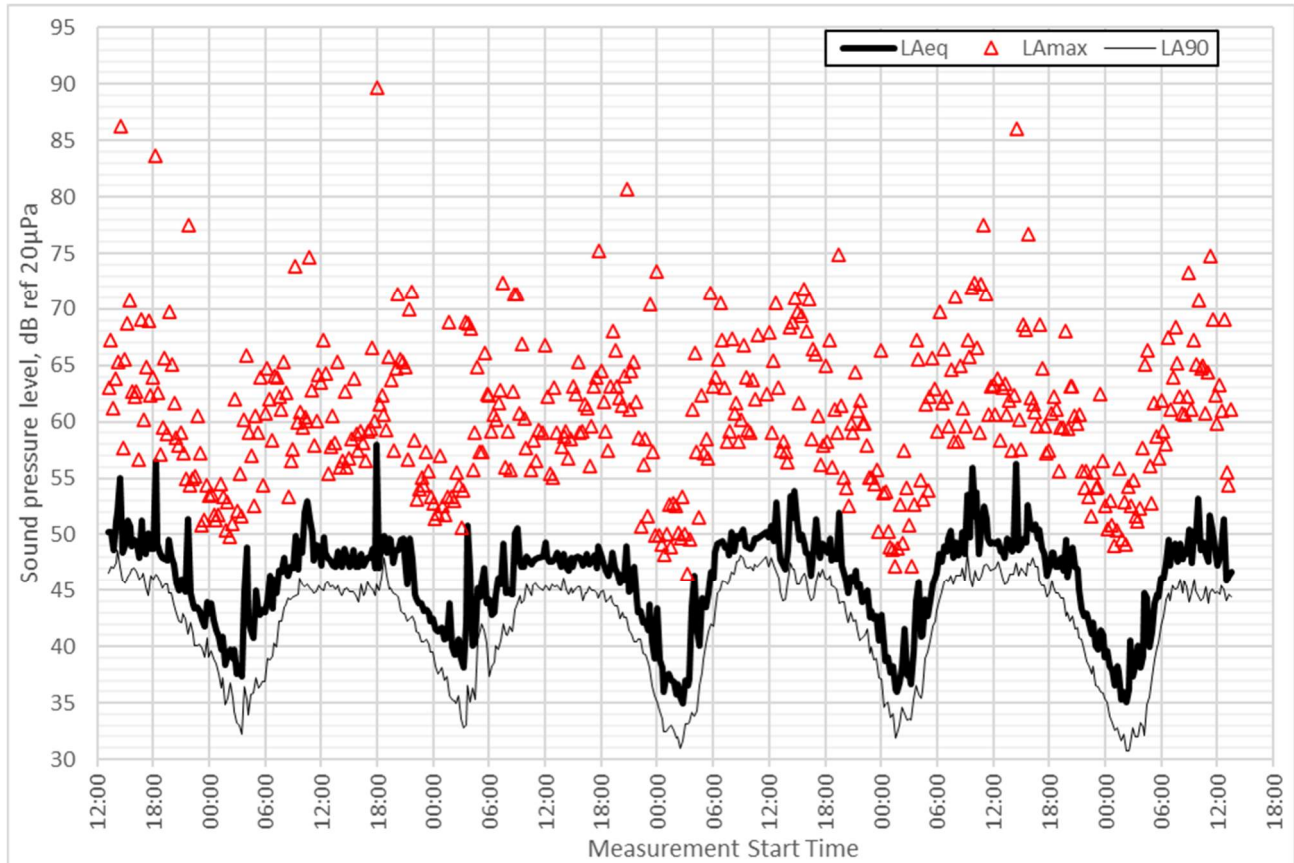
Weather conditions over the survey period were mostly fine and dry and suitable for environmental noise measurement.

Site observations indicated that the general noise climate was attributable to traffic noise.

6. Results.

The results of all site measurements are tabulated at Appendix 2. Levels are given as hourly values derived from the measured 15-minute samples.

The variation in sound levels at the residential boundary over the survey period is shown in the following graph:



The graph shows a reasonably consistent variation in sound levels over the survey period.

The following table summarises the overall levels at the monitoring position over the survey period:

Period	L _{Aeq} dB	L _{Amax} dB	L _{A10} dB	L _{A90} dB
Friday (14:00 – 23:00)	49.6	57 – 80	50.5	45.3
Friday night	42.8	53 – 62	45.3	37.4
Saturday	48.8	56 – 69	50.5	44.6
Saturday night	43.6	54 – 66	46.1	38.4
Sunday	47.3	57 – 75	49.1	44.1
Sunday night	43.2	51 – 67	45.5	38.3
Monday (07:00 – 11:00)	49.3	58 – 68	51.1	47.0

The typical lowest night time background sound level was L_{A90} 34dB during the weekend whilst the typical lowest daytime background level for the daytime period (07.00-23.00hrs) was L_{A90,1hour} 41dB for the late evening period on Friday and Saturday and the early morning period on Sunday.

7. Noise impact.

7.1 Mechanical services plant.

External plant serving the store will be located within a dedicated compound at ground level to the rear of the loading bay on the eastern side of the building. Plant will comprise 2no dry air coolers operating on a 24hr basis and 2no heat pumps which operate, primarily, during store opening hours. When the store is closed, the heat pumps operate only occasionally and at reduced duty with lower noise emissions – the sound reduction for night mode operation is specified at -4dB by the manufacturer.

The nearest residential receptors are located to the east at approximately 34 metres from the DAC and pumps and 32m from the VRF units.

The proposed solid barrier fence around the plant compound will prevent a line of sight from 1st floor windows and gardens at the adjacent dwellings. Manufacturer's data indicates that the fan centre of the VRF units is 2000mm above ground level, the fan centre of the dry coolers is 1720mm above ground level whilst the fan centre for the heat pumps is 1560mm above ground level. and the calculated path difference from the plant to 1st floor windows would give an excess attenuation of between 7.6dB and 8.7dB. For ground floor windows and garden areas, the calculated excess attenuation is marginally higher due to additional screening from the new solid fence that will be installed adjacent to the existing fence along the residential boundary.

The following table shows the manufacturer's data for the plant sound levels over a reflecting plane and the derivation of the screened sound level at the nearest dwellings to the south.

Plant	Sound level	Distance	Nº units	Screening	spl at dwelling
Heat pumps - day	43dB(A) at 1m	34m	2	8.7	6.7dB(A)
Heat pumps - night	39dB(A) at 1m	34m	2	8.7	2.7dB(A)
Dry coolers	44dB(A) at 5m	34m	2	8.2	22.2dB(A)
VRF condenser	62dB(A) at 1m	32m	3	7.6	29.3dB(A)
All plant - day	-	-	-	-	30.1dB(A)
All plant - night	-	-	-	-	30.1dB(A)

The calculated values indicate that the heat pumps do not provide any significant contribution to the overall plant noise level which is determined by the dry air coolers and VRF units.

After correction for screening, the derived, total immission level just achieves L_{Aeq} 30dB(A) for both daytime and night time at the 1st floor windows. Levels will be slightly lower for the ground floor windows and gardens.

The derived cumulative plant noise level during night time at 1st floor windows can be assessed in accordance with BS4142 using the site measured background sound levels as follows:

Parameter	Day (all plant)	Night (all plant)
Cumulative plant noise level (screened)	30dB(A)	30dB(A)
Character correction (BS4142 Example A1)	+3	+3
Plant noise Rating Level	33	33
Typical lowest measured L_{A90} level	41	34
Difference	-8	-1
BS 4142 assessment	'low impact'	'low impact'

The plant noise rating levels at ground floor areas will be lower than those at 1st floor given in the table above.

The table above shows that the BS 4142 assessment at 1st floor windows of the nearest dwellings with all plant operating would fall into the category of 'low impact' during the day and night with the proposed barrier fencing along the periphery of the plant compound.

It is noted that the calculated plant noise immission levels are significantly lower than typical existing ambient sound levels which are at least 5dB higher than background. This would indicate that plant noise may be masked by this general noise.

Noise impact during the night at the nearest 1st floor dwellings will only occur within the dwelling. BS 4142 states that the standard should not be used to derive indoor sound levels from levels outside. In the case of indoor levels, it advises that other Standards will be more appropriate.

It is considered that BS 8233 represents an appropriate alternative standard albeit with allowance for the character correction factors advised by BS 4142. On this basis, corrected the corrected BS 8233 internal criterion would be L_{Aeq} 27dB for night time sleeping.

BS 8233 advises that the sound reduction across an open window is limited to 15dB and, from the table above, the derived 1st floor internal plant noise Rating Level with open windows is L_{Aeq} 15dB. It is noted that this break-in sound level is approximately thirty times lower than the BS 8233 guidance value for good sleeping conditions. It should also be noted that, where windows are open, existing traffic noise levels would also break in to habitable rooms and this would be expected to exceed the sound levels for plant noise break-in.

7.2 Noise break-out from store building.

Activities within the sales area of the store do not generate any significant level of noise and the sales area does not adjoin the external façade on the northern and eastern sides of the building.

Slightly higher sound levels would be expected to occur within the warehouse area from movement of good with pallet trucks and unpacking of goods. A recent measurement exercise was carried out within an existing warehouse facility indicated that, over a one hour period in an active section of the warehouse, typical sound levels were in the range $L_{Aeq,5-min}$ 50-64dB with an overall mean level of $L_{Aeq, 1-hour}$ 59dB. Short duration maximum levels were in the range L_{Amax} 80-82dB.

The warehouse area has a single external door on each of the northern and eastern elevations and greatest noise break-out would be expected to occur when the door is open. From Standard theory, it would be reasonable to assume a sound level just outside the open door that is 10dB lower than the internal level which would give levels of L_{Aeq} 49dB and L_{Amax} 70-72dB.

The proposed site layout indicates the door on the northern elevation would be approximately 25m from the Presbytery whilst the door on the eastern elevation would be approximately 33m from the dwellings on Megdale Place. After correction for distance the calculated immission levels for open propagation are given in the following table.

Receptor	L_{Aeq}	L_{Amax}
Presbytery	21dB	42-44dB
Megdale Place	19dB	40-42dB

The estimated temporal values are of the order of five hundred times lower than existing daytime ambient noise levels whilst maximum levels are more than two hundred times lower than existing typical daytime maxima.

On the basis of the above findings, it is extremely unlikely that noise break-out from the warehouse via open doors would result in any perceptible noise at any dwelling at any time of the day or night.

7.3 Deliveries.

The delivery bay will be located on the eastern side of the building with the centre of the bay at approximately 28m from the nearest dwellings to the east.

The standard delivery schedule for this size of store requires up to two deliveries per day. Delivery vehicle movements occur for less than a minute during arrival and departure and, consequently, there is no noise impact from this source for the majority of the day. Where two deliveries occur, these will be at different times of the day.

Noise impact from deliveries will comprise arrival and departure of the vehicle each of which would last less than a half minute. The vehicle movement will be at low speed and, typically, of the order of 5mph. Given the low speed of movement, the vehicle will operate at low revs at all times. Once parked for unloading, the engine is switched off and there is then no noise attributable to the vehicle until completion of unloading when it leaves the site.

Assessment of noise levels generated by delivery activities has recently been carried out at an existing Lidl store at Eastern Avenue, Gloucester and this data will be representative of sound levels that will be generated by deliveries to the proposed store at this site.

A total of five deliveries occurred during the survey period at the Gloucester site as follows:

- Friday 17.00-18.00hrs
- Saturday 17.00-18.00hrs
- Sunday 09.00-10.00hrs and 13.00-14.00hrs
- Monday 07.00-08.00hrs

From examination of the survey data during these periods, the delivery events lasted between 35 and 45 minutes with the most common delivery period being 40-45 minutes. During the delivery event, highest sound levels occurred during vehicle arrival departure with a longer period between these events where noise was attributable to breakout from the trailer body due to movement of goods within the trailer.

The measured levels for delivery events were in the range $L_{Aeq,1hr}$ 61-67dB and gave a mean delivery noise level of $L_{Aeq,1hr}$ 64dB. This level includes all noise from the delivery event including vehicle movement, alarms during reversing, brakes, door closure and any noise break-out from the trailer body whilst moving goods into the building.

The measurements were made at the approximate mid-point of the bay and approximately 3m from the centre line of the loading bay and, for this site where the nearest dwelling is at a distance of 28m from the vehicle reversing area, the corrected sound level would be a mean level of $L_{Aeq,1hr}$ 45dB assuming open propagation.

The following table shows the BS 4142 assessment for the calculated immission level for open propagation compared to the lowest measured daytime background sound level:

Parameter	dB
Delivery noise at dwelling - L_{Aeq}	45
Noise character correction	+5
Rating Level at residential facade	50
Lowest background level L_{A90}	41
Difference	+9
BS4142 Assessment	'adverse impact'

Lower noise impact would occur during the main daytime period when background sound levels are higher than those during the late evening.

The assessment indicates that there would be adverse impact upon the nearest dwellings to the east where there is open propagation to windows.

It is noted that delivery vehicle activity will be screened from ground floor windows and gardens by the proposed new fence adjacent to the site boundary and it is calculated that the screening effect would be

approximately 9dB for a 2m fence. This screening effect would enable a BS 4142 condition of 'low impact' for the gardens and ground floor windows.

In the case of 1st floor windows, screening can be achieved by provision of low level solid fencing along the eastern parapet wall of the loading bay adjacent to the staff parking spaces. For an overall barrier height of 1.5m above yard level, the calculated screening effect for 1st floor windows is 10dB. This degree of screening would achieve a BS 4142 condition of 'low impact' at the nearest 1st floor windows.

The assessment above is based upon the lowest background sound levels during the late evening period and, for all other daytime periods, background levels are higher and the potential noise impact will be lower than indicated in the table above. It is noted that, on weekdays, the background sound levels for the period 06.00-07.00hrs is higher than that for the late evening due to the general increase in traffic noise. Given this increase in background sound levels delivery noise impact would be lower during this early morning period compared to the late evening period.

As noted in 7.1 above, noise impact at 1st floor rooms can only occur within the dwelling and, in this situation, BS 4142 advises the use of alternative guidance for assessment of internal noise impact.

It is considered that BS 8233 represents an appropriate alternative standard albeit with allowance for the character correction factors advised by BS 4142. On this basis, corrected the corrected BS 8233 internal criterion would be L_{Aeq} 30dB for daytime resting (sleeping).

For a sound reduction of 15dB across an open window, the screened break-in Rating Level would be L_{Aeq} 25dB (ignoring room effects) which achieves the corrected BS 8233 requirement for 'daytime resting'. This level would also achieve the night time sleeping requirement within bedrooms for the early morning period 06.00-07.00hrs.

Notwithstanding the findings above, it is noted that delivery activity noise occurs for a very short period, primarily during vehicle arrival and departure which would be expected to last less than one minute in total (there is little noise generation once the vehicle is parked). On this basis there would be no delivery vehicle noise impact for the majority of the day.

7.4 Customer car park.

A section of the customer car park lies to the north of the store building and adjacent to the site boundary with the church and Presbytery to the north. The boundary at this location will be provided with solid fencing.

The proposed site layout indicates 10no parking spaces within 25m of the Presbytery and adjacent to this boundary. If it is assumed that each parking bay experiences two vehicle arrivals and departures within in any one-hour period, this equates to 20 complete vehicle movements per hour. It would be reasonable to assume arrival duration of 5 seconds and departure duration of 10 seconds (total 15 seconds for each vehicle movement) which would give a total on-time of 300 seconds per hour.

Archive measurement data obtained for vehicle drive-by on a public car park indicates a mean drive-by sound level of 62.7dB(A) at 2m for a range of common passenger cars. The nominal centre of the parking bays is approximately 17m from the residential facade and, consequently, the corrected mean vehicle noise level is 44.1dB(A). Correcting this level for on-time gives a temporal sound level at the dwelling of $L_{Aeq(1hr)}$ 33.3dB for open propagation. Allowance for screening by the new boundary fence would reduce this level by at least 10dB to give a sound level at the nearest ground floor windows and garden of less than $L_{Aeq(1hr)}$ 23dB.

The calculated sound level at the residential facade is significantly below the lowest late evening background noise level and is more than 20dB below existing late evening ambient sound levels. On this basis, it would be expected that any noise generated by vehicle movement on the customer car park would be masked by general ambient noise and not noticeable at the church or Presbytery.

It is noted that the predicted noise level for the car park is also significantly below BS 8233 preferred criterion of L_{Aeq} 50dB for gardens.

In the case of noise from conversations on the car park, standard theory indicates that the typical sound level for raised male voice is 70dB(A) which, for the nearest point on the car park, would give a sound level of approximately 54dB(A) for a position 3m into the garden without any form of screening. The estimated screening effect from the new boundary fence for two standing individuals (1.8m) is 6.5dB to give a screened raised speech level of 48dB(A). It is noted that this level is similar to the existing daytime ambient sound level before any allowance is made for on-time. For a worst case assumption of two individuals talking continuously in raised voices for 15 minutes, the calculated sound level in the garden would be $L_{Aeq,1hr}$ 42dB. This level is comparable the lowest late evening background sound level and significantly below the BS 8233 desirable sound level for gardens.

In the case of noise from car doors, archive data indicates that a typical car door slam generates a sound level of L_{Amax} 65dB at 5m which, for the nearest parking spaces translates to approximately L_{Amax} 63dB at a position 3m into the garden with open propagation. After allowance for the screening effect of the fence, the corrected level is approximately L_{Amax} 54dB. If it is assumed that there are 20 vehicle movements per hour in the spaces adjacent to the garden and, as a worst case, it is assumed that every vehicle has two occupants such that there are four door closures and one hatch/boot closure per car, this would give a total of 100 closures per hour.

Assuming 0.5sec per closure the total on-time would be 50 seconds per hour to give an overall temporal level within the garden of $L_{Aeq,1hr}$ 35.4dB. This level is approximately 6dB below the lowest late evening background sound level and more than 15dB below the BS 8233 desirable sound level for gardens.

In the case of noise from car radios and sound systems, it can be assumed that a loud vehicle internal sound level of L_{Aeq} 85dB would result in an external sound level of L_{Aeq} 75dB with an upper level of L_{Amax} 80-85dB adjacent to an open window. The estimated sound level, after screening, at a point 3m into the garden from the nearest parking space is L_{Aeq} 50dB and L_{Amax} 55-60dB. The temporal level is comparable to the daytime ambient sound level. However, it is unlikely that this level of noise would occur continuously and correction for on-time would give a temporal sound level that is significantly below existing ambient and background sound levels.

Examination of the survey data for the quieter late evening periods on each day indicates that event sound levels regularly exceed L_{Amax} 65dB. It is noted that all of the potential car park noise sources reviewed above generate maximum levels that are significantly lower than the existing range of maximum sound levels that currently occur at the site.

Notwithstanding the assessments above, it is noted that car park use will be highest during busier times of the day when ambient and background sound levels are higher. There will be a much lower level of car park activity during quieter times in the early morning and evening with lower probable use of the parking spaces adjacent to the residential boundary.

8. Discussion.

8.1 Existing noise climate.

The existing noise climate at the site and at the nearest dwellings to the proposed store is, primarily, determined by traffic noise from Elmhurst Road and Buckingham Road.

The majority of noise from the roads is attributable to tyre 'roar' which has a characteristic mid-frequency tonal peak.

8.2 BS8233 Assessment.

Section 7 above determines the predicted immission levels at the nearest dwellings for the plant installations and delivery operations associated with the proposed new store.

The calculated immission level for plant noise with the proposed screening is L_{Aeq} 30dB for both daytime and night time at the nearest residential façades.

It is noted that BS 8233 internal requirements for 'daytime resting' and 'night time sleeping' would require external levels no higher than L_{Aeq} 50dB and L_{Aeq} 45dB respectively with open windows. The calculated immission level for plant noise readily achieves these external levels.

It is also noted that the calculated immission levels readily achieve BS 8233 requirements for gardens and external amenity areas.

In the case of noise associated with deliveries, section 7 indicates that immission levels at the nearest dwellings for a complete delivery event would be L_{Aeq} 40-41dB which easily satisfies the BS 8233 requirement for internal daytime resting after allowance for the sound reduction from outside to inside. It is noted that noise from delivery operations occurs only for short periods and that, for the majority of the day, there is no noise generation from this activity.

For the customer car park, the nearest parking spaces to the Presbytery would be expected to generate sound levels below L_{Aeq} 50dB in the garden area near to the boundary.

Notwithstanding the comments above, it is further noted that noise generated by the proposed new store will be within existing levels of ambient noise generated by adjacent roads and, consequently, is unlikely to be particularly noticeable at the nearest dwellings.

8.3 BS4142 Assessment.

Section 7 above provides a BS 4142 assessment for plant noise. The assessment indicates a BS 4142 condition of 'low impact' can be achieved at the nearest residential properties to the south for both daytime and night time with the provision of the proposed solid fencing along the periphery of the plant compound.

Section 7 also indicates that predicted immission levels at the nearest dwellings from delivery activities would achieve a BS 4142 condition of 'low impact' for the quietest daytime period of the week with provision of low level screening along the eastern edge of the vehicle delivery bay.

It is noted from the survey data that typical background sound levels over the majority of the survey period were significantly higher than the lowest background sound levels during the quietest periods of the day and night which are used in the assessments at section 7 of this report. This would indicate that noise impact from the proposed store will, for the majority of time, be significantly lower than indicated by the assessments given in Section 7.

9. Recommendations.

It is recommended that a solid barrier fence of minimum height 2.5m be installed along the northern and eastern periphery of the plant compound.

It is recommended that a low level barrier of overall height 1.5m above yard level be installed along the eastern edge of the delivery vehicle ramp.

Barriers should have a minimum mass of 10kgm^{-2} and extend for the length of the plant compound and delivery bay and be continuous to ground level. In practice, these requirements can be achieved with close-boarded timber panels.

10. Conclusions.

The survey work carried out at this site has determined the current general ambient noise climate and the lowest daytime and night time background sound levels which occur at dwellings nearest to the site. The noise climate is determined by traffic flows on the A4157 Elmhurst Road and Buckingham Road.

Calculated immission levels at the nearest dwellings for fixed plant and delivery operations, when appropriately screened, are below the lowest background and ambient sound levels that already occur at the dwellings and, consequently, would be unlikely to be noticeable within habitable rooms nearest to the site. Gardens and ground floor rooms will benefit from the screening provided by the proposed new fencing adjacent to the northern and eastern site boundaries.

Assessment in accordance with BS 4142 for the periods of lowest background sound level indicates that noise rating levels at the nearest dwellings for plant noise and for delivery activities from the proposed store will fall into the category of 'low impact' with the screening measures recommended in this report.

The calculated immission levels for plant noise and delivery noise at the nearest dwellings would enable BS 8233 internal criteria for bedrooms and living rooms to be readily achieved when windows are open. In the case of deliveries background sound levels for the period 06.00-07.00hrs on weekdays, higher background sound levels would enable deliveries from 06.00hrs whilst achieving a BS 4142 assessment of low impact and the corrected BS 8233 internal criteria.

Assessment for noise break-out from the warehouse area indicates that there would be no perceptible noise impact at the dwellings at any time of the day or night when warehouse doors are open. On this basis, there is no requirement to restrict use of these doors.

Assessment for the noise impact of the customer car park indicates that immission levels at dwellings would be below BS 8233 guidance values for gardens and open windows to habitable rooms. The predicted levels are below existing levels of ambient noise that occur at the dwellings.

The findings of this report indicate that operation of the store will not have any significant impact upon nearby dwellings on any day of the week and that delivery operations can occur throughout the day up to 23.00hrs.

Appendix 2 - Measured Sound Pressure Levels.

Date	Day	From:	To:	L _{Aeq}	L _{Amax}	L _{A10}	L _{A90}
24/06/2022	Friday	14:00	14:59	52.3	80.3	53.2	47.4
		15:00	15:59	50.1	67.9	52.7	46.4
		16:00	16:59	49.7	64.8	51.1	46.5
		17:00	17:59	49.0	65.4	50.3	45.8
		18:00	18:59	52.3	77.8	50.7	46.2
		19:00	19:59	48.3	65.7	50.1	45.3
		20:00	20:59	46.7	61.8	48.7	43.5
		21:00	21:59	47.9	71.6	47.5	42.2
		22:00	22:59	43.9	57.1	46.1	40.9
		23:00	23:59	42.9	54.2	45.0	40.0
25/06/2022	Saturday	00:00	00:59	42.7	52.7	45.1	39.1
		01:00	01:59	40.1	52.8	42.7	36.6
		02:00	02:59	39.4	57.0	41.7	35.6
		03:00	03:59	40.9	56.3	44.2	34.1
		04:00	04:59	44.8	61.3	48.2	35.3
		05:00	05:59	43.6	60.7	45.5	36.7
		06:00	06:59	44.4	62.1	46.7	38.6
		07:00	07:59	46.1	63.0	47.5	41.4
		08:00	08:59	47.1	61.7	49.0	43.9
		09:00	09:59	48.5	68.4	49.8	45.0
		10:00	10:59	51.5	69.1	54.2	45.4
		11:00	11:59	49.1	61.9	51.7	45.0
		12:00	12:59	48.5	64.2	50.2	45.4
		13:00	13:59	47.7	61.6	49.5	45.3
		14:00	14:59	47.8	58.9	50.0	45.0
		15:00	15:59	47.6	60.4	49.4	44.8
		16:00	16:59	47.6	57.9	49.6	44.7
		17:00	17:59	47.9	62.6	49.6	45.2
		18:00	18:59	53.4	61.6	51.5	46.4
		19:00	19:59	48.9	62.8	50.7	45.4
		20:00	20:59	49.1	67.7	51.9	43.8
		21:00	21:59	48.0	68.5	50.8	42.6
		22:00	22:59	44.2	55.7	46.3	41.3
		23:00	23:59	42.9	55.4	44.9	40.2
26/06/2022	Sunday	00:00	00:59	41.8	53.9	44.1	38.4
		01:00	01:59	41.9	63.1	43.1	37.2
		02:00	02:59	39.9	54.2	42.7	35.3
		03:00	03:59	45.8	65.9	49.2	34.3

		04:00	04:59	44.1	64.4	47.0	37.5
		05:00	05:59	45.4	62.4	47.4	41.3
		06:00	06:59	43.7	60.8	46.4	38.7
		07:00	07:59	46.8	67.2	49.4	40.9
		08:00	08:59	46.8	66.2	47.9	41.9
		09:00	09:59	48.4	67.1	49.8	44.1
		10:00	10:59	47.7	57.3	49.4	45.0
		11:00	11:59	47.9	58.2	49.8	45.5
		12:00	12:59	48.2	62.5	49.9	45.3
		13:00	13:59	47.8	61.5	49.9	45.4
		14:00	14:59	47.6	58.4	49.4	45.3
		15:00	15:59	47.8	63.1	49.6	45.1
		16:00	16:59	47.7	60.0	49.5	44.8
		17:00	17:59	48.0	69.8	49.2	44.8
		18:00	18:59	47.3	61.6	49.0	44.6
		19:00	19:59	47.4	65.7	49.4	43.9
		20:00	20:59	47.0	74.9	48.0	42.7
		21:00	21:59	45.5	63.5	47.7	40.9
		22:00	22:59	42.7	56.9	44.7	40.1
		23:00	23:59	41.5	64.7	43.1	37.4
27/06/2022	Monday	00:00	00:59	40.0	67.4	41.3	34.0
		01:00	01:59	37.2	51.4	40.2	32.7
		02:00	02:59	35.8	51.7	38.5	31.7
		03:00	03:59	39.7	55.8	43.6	33.5
		04:00	04:59	43.7	62.1	47.0	35.9
		05:00	05:59	44.9	66.0	46.6	40.7
		06:00	06:59	48.4	66.9	50.4	43.8
		07:00	07:59	48.8	63.4	50.8	45.8
		08:00	08:59	49.6	63.4	51.7	47.2
		09:00	09:59	49.6	63.6	51.4	47.6
		10:00	10:59	49.3	64.2	50.6	47.2

Appendix 3 - Glossary of Terms.

Decibel (dB)

The decibel is the unit used to quantify sound pressure levels. The human ear has an approximately logarithmic response to acoustic pressure over a very large dynamic range (typically 20 micro-Pascals to 100 Pascals). Therefore, a logarithmic scale is used to describe sound pressure levels and also sound intensity and power levels. The logarithm is taken to base 10, hence, an increase of 10 dB in sound pressure level is equivalent to an increase by a factor of 10 in the sound pressure level (measured in Pascals). Subjectively, this increase would correspond to a doubling of the perceived loudness of sound.

A-Weighting

The 'A' weighting is a correction term applied to the frequency range in order to approximate to the sensitivity of the human ear to noise. It is generally used to obtain an overall noise level from octave or third octave band frequencies. An 'A' weighted sound level is written as dB(A).

$L_{Aeq,T}$

The A-weighted equivalent continuous sound level – the level of a notionally steady sound having the same energy as the true fluctuating sound over a specified measurement period (T). $L_{Aeq,T}$ is used to describe many types of noise and can be measured directly with an integrating sound level meter. It is the preferred descriptor for environmental noise in accordance with BS 7445:1993.

$L_{A90,T}$

The A-weighted noise level exceeded for 90% of the specified measurement period (T). This is generally taken to indicate the prevailing background noise level.

L_{Amax}

The highest short duration A-weighted sound level recorded during a noise event.



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