

Our ref: NIA/10036/21/10200/v1/Lidl Hoyland **DRAFT**



1<sup>st</sup> December 2021

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Dear Sirs

**NOISE IMPACT ASSESSMENT FOR PROPOSED FOOD STORE  
LAND AT CROSS KEYS LANE, HOYLAND, BARNSELY**

**1.00 INTRODUCTION**

- 1.01 Environmental Noise Solutions Ltd (ENS) has been commissioned by Lidl GB Ltd undertake a noise impact assessment for a proposed food store at land at Cross Keys Lane, Hoyland, Barnsley (hereafter referred to as the application site).
- 1.02 The objectives of the noise impact assessment were to:
- Measure the baseline noise levels at the application site and its surrounding environs during representative periods of the daytime and night time
  - Assess the potential impact of the proposed food store with reference to pertinent guidelines
  - Provide recommendations for structural and management controls, as necessary, to protect the noise amenity of the nearest residential dwellings
- 1.03 This report details the methodology and results of the assessment. It has been prepared to accompany a planning application to be submitted to Barnsley Metropolitan Borough Council.
- 1.04 This report has been prepared for Lidl GB Ltd for the sole purpose described above and no extended duty of care to any third party is implied or offered. Third parties making reference to the report should consult Lidl GB Ltd and ENS as to the extent to which the findings may be appropriate for their use.
- 1.05 A glossary of acoustic terms used in the main body of the text is contained in Appendix 1.

## **2.00 PROPOSED FOODSTORE DEVELOPMENT AND APPLICATION SITE SETTING**

- 2.01 The proposed development consists of a food store (circa 1,900 m<sup>2</sup> gross internal area) with associated service yard, plant compound and 107 car parking spaces. The proposed layout plan is contained in Appendix 2 for reference.
- 2.02 The application site is located in a mixed-use area on the outskirts of Hoyland, near Barnsley, and currently comprises open greenfield land. Irregular in shape, the application site is bound by (see Appendix 3 for site location plan):
- Cross Keys Lane to the east
  - Sheffield Road to the south
  - The A6135 Sheffield Road to the west
  - No. 3 Cross Keys Lane and existing fields to the north
- 2.03 The nearest noise sensitive receptors (NSRs) to the application site are considered to be:
- No. 3 Cross Keys Lane to the north (NSR1)
  - Existing residential dwellings on Regent Court to the east (NSR2)
- 2.04 The proposed opening hours are understood to be 0800 to 2200 hours Monday to Sundays, subject to restrictions imposed by Sunday trading laws which currently limit trading to any 6 consecutive hours between 1000 and 1800 hours on a Sunday.
- 2.05 If feasible from a noise perspective, unrestricted delivery hours are required to maximise flexibility to allow for factors such as: replenishment of stock during non-trading periods (i.e. when the food store is closed), regional logistical constraints, traffic delays etc. The noise impact assessment has therefore been undertaken on the basis of 24/7 deliveries.
- 2.06 Based on the likely refrigeration and comfort cooling requirements of the food store, it is understood that the following items of plant are required (a site plan illustrating the location of the plant compound is contained in Appendix 2 for reference):
- 2 no. dry coolers (42 dB(A) at 5 metres per unit)
  - 2 no. heat pumps (43 dB(A) at 1 metre per unit)
  - 3 no. condensing units (62 dB(A) at 1 metre per unit)
- 2.07 It is understood that the condensing units will operate between 0700 hours and 2130 hours, whilst the dry coolers/heat pumps will operate 24/7.
- 2.08 The cumulative noise levels associated with the refrigeration and air conditioning units are therefore:
- 53 dB(A) at 5 metres between 0700 and 2130 hours
  - 45 dB(A) at 5 metres between 2130 and 0700 hours

### 3.00 BASELINE NOISE SURVEY

- 3.01 In order to determine the baseline noise levels in the vicinity of the application site, a baseline noise survey was undertaken on Tuesday 9<sup>th</sup> November through to Wednesday 10<sup>th</sup> November 2021.
- 3.02 For the purpose of the assessment, the following noise monitoring positions were adopted (see Appendix 3 for approximate monitoring positions):
- MP1 was located at the southern boundary of the application site (representative of NSR1)
  - MP2 was located at the eastern boundary of the application site (representative of NSR2)
- 3.03 Noise measurements were undertaken using Bruel & Kjaer 2250 Type 1 integrating sound level meters. Measurements consisted of A-weighted broadband parameters, together with linear octave band  $L_{eq}$  levels. All measurements were made in a free field environment at a height of approximately 1.5 metres above ground level.
- 3.04 The measurement system calibration was verified immediately before the commencement of the measurement sessions and again at the end, using a Bruel & Kjaer Type 4231 calibrator. No drift in calibration level was noted. Weather conditions throughout the surveys were appropriate for monitoring, with dry conditions and wind speeds of < 5 m/s.
- 3.05 The following table contains a summary of the measurement data for each monitoring session, at each monitoring position, rounded to the nearest decibel (see Appendix 4 for the full baseline data at MP1).

**Table 3.1 – Baseline Noise Measurement Data Summary**

| Position | Date     | Time      | $L_{Aeq,T}$ (dB) | $L_{A90}$ (15 min) (dB) |         |
|----------|----------|-----------|------------------|-------------------------|---------|
|          |          |           |                  | Range                   | Typical |
| MP1      | 09/11/21 | 1821–1921 | 59               | 41–57                   | 51      |
|          |          | 1921–2021 | 56               |                         |         |
|          |          | 2051–2151 | 52               |                         |         |
|          |          | 2151–2252 | 49               |                         |         |
|          | 10/11/21 | 0017–0119 | 43               | 34–50                   | 41      |
|          |          | 0143–0243 | 47               |                         |         |
|          |          | 0243–0343 | 45               |                         |         |
|          |          | 0413–0513 | 47               |                         |         |
|          |          | 0513–0615 | 51               |                         |         |
|          |          | 0643–0700 | 50               |                         |         |
| MP2      | 09/11/21 | 2025–2040 | 53               | 50                      | 50      |
|          | 10/11/21 | 0123–0139 | 47               | 43                      | 43      |
|          | 10/11/21 | 0350–0405 | 48               | 44                      | 44      |
|          | 10/11/21 | 0622–0637 | 54               | 52                      | 52      |

- 3.06 The ambient noise climate in the vicinity of the application site is due to road traffic on the surrounding road network, primarily the M1 and the A6195.
- 3.07 Typical<sup>1</sup> background noise levels at MP1 were measured at circa **51 dB  $L_{A90}$  (15 min)** during the daytime (late evening) and circa **41 dB  $L_{A90}$  (15 min)** during the night time. Noise levels at MP2 were comparable.

<sup>1</sup> 'Typical' values are considered to be either the modal average (i.e. most occurring) or the mean average, whichever is the lower of the two data sets.

#### 4.00 NOISE IMPACT ASSESSMENT CRITERIA

##### National Planning Policy Framework

- 4.01 The National Planning Policy Framework (NPPF) was updated in July 2021 and sets out the Government's planning policies for England and how these are expected to be applied.
- 4.02 Where issues of noise impact are concerned the NPPF provides brief guidance in paragraph 174 where it states that 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.....noise pollution'.*

- 4.03 Paragraph 185 advises 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'.*

- 4.04 The NPPF also refers to the 2010 DEFRA publication, the Noise Policy Statement for England (NPSE) which reinforces and supplements the NPPF

##### Noise Policy Statement for England

- 4.05 The Noise Policy Statement for England (NPSE) sets out the long-term vision of promoting good health and a good quality of life through the effective management of noise within the context of Government policy on sustainable development. This long-term vision is supported by the following aims:

- Avoid significant adverse impacts on health and quality of life.
- Mitigate and minimise adverse impacts on health and quality of life.
- Where possible, contribute to the improvement of health and quality of life.

- 4.06 NPSE describes the following levels at which noise impacts may be identified:

- 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.

##### Planning Practice Guidance – Noise

- 4.07 Planning Practice Guidance on Noise (PPG) is an online resource (as updated October 2019) which provides additional guidance and elaboration on the NPPF. It advises that the Local Planning Authority should consider the acoustic environment in relation to:

- Whether or not a significant adverse effect is occurring or likely to occur.
- Whether or not an adverse effect is occurring or likely to occur.
- Whether or not a good standard of amenity can be achieved.

- 4.08 In line with the Explanatory Note of the NPSE, the PPG references the LOAEL and SOAEL in relation to noise impact. It also presents a table of noise exposure hierarchy, which relates the NOAEL, LOAEL and SOAEL levels to the subjective perception of noise and examples of outcomes (reproduced in Table 4.1 below).

**Table 4.1: Summary of noise exposure hierarchy (from NPPG, Noise)**

| 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    |
| <b>Lowest Observed Adverse Effect Level</b>      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                     |                                  |
| 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 |
| <b>Significant Observed Adverse Effect Level</b> |                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                     |                                  |
| 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                          |

- 4.09 However, in line with the NPSE, no objective noise levels are provided for LOAEL or SOAEL although the PPG acknowledges that:

*‘...the subjective nature of noise means that there is not a simple relationship between noise levels and the impact on those affected. This will depend on how various factors combine in any particular situation’.*

BS 4142:2014+A1-2019 'Methods for Rating and Assessing Industrial and Commercial Sound'

- 4.10 British Standard BS 4142:2014+A1-2019 'Methods for Rating and Assessing Industrial and Commercial Sound' (BS 4142) describes methods for determining, at the outside of a building, noise levels from factories or industrial premises and a method for assessing whether the noise is likely to give rise to adverse impacts, and states:

*The significance of sound of an industrial and/or commercial nature depends upon both the margin by which the rating level of the specific sound source exceeds the background sound level and the context in which the sound occurs. Typically, the greater this difference, the greater the magnitude of the impact. For example:*

- *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*

*Adverse impacts include, but are not limited to, annoyance and sleep disturbance. Not all adverse impacts will lead to complaints and not every complaint is proof of an adverse impact.*

*Where the initial estimate of the impact needs to be modified due to the context, take all pertinent factors into consideration, including the absolute level of sound.*

- 4.11 The rating level is described as the specific sound level (the equivalent continuous A-weighted sound pressure level at the assessment position (NSR) produced by the specific sound source over the given reference time interval) plus any adjustment for the characteristic features of the sound. The character correction relates to whether and to what degree the specific sound is assessed to have an element of tonality, impulsivity and/or characteristics that are readily distinctive against the residual acoustic environment.
- 4.12 The background noise level is the A-weighted sound pressure level of the residual noise at the assessment position that is exceeded for 90 percent of a given time interval, T, measured using time weighting 'F' and quoted to the nearest whole number of decibels.

## 5.00 NOISE IMPACT OF THE PROPOSED FOOD STORE

5.01 The principal noise sources potentially associated with the proposed Lidl food store are considered to be:

- Noise associated with servicing arrangements (deliveries)
- Noise associated with fixed external plant

5.02 The following sections of the noise impact assessment discuss the potential noise impacts of the above activities on the amenity of the nearest NSRs.

### Noise Associated with Servicing Arrangements (Deliveries)

5.03 The delivery process involves an HGV reversing into the delivery bay, where a delivery plate is lowered into the rear of the HGV. The unloading of the HGV then takes place without the need for ramps or lifts, due to the rear of the trailer being level with the delivery area.

5.04 During unloading, the principal noise source associated with deliveries is that of palletised goods being moved over the delivery plate. The delivery bay is to be located on the northern façade of the proposed Lidl food store.

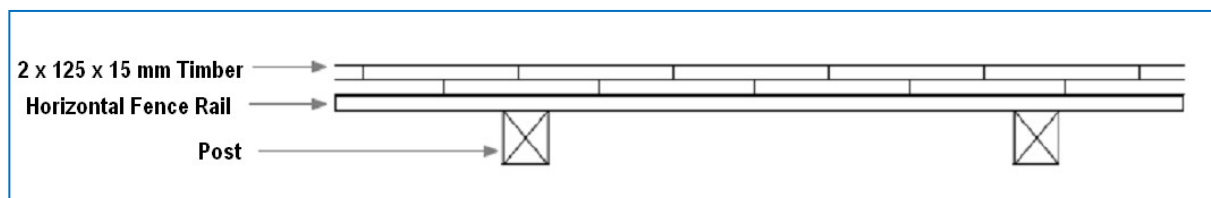
5.05 Measurements have previously been undertaken by ENS at numerous Lidl food stores. The delivery process consists of an HGV arrival, unloading activities, and an HGV departure. There is at least 5 minutes of relative inactivity either side of unloading operations for administration. Typical specific noise levels associated with the delivery are as follows:

**Table 5.1 – Typical Delivery Noise Levels at Source**

| Activity      | Duration   | Measured Noise Level at 10 m |
|---------------|------------|------------------------------|
| HGV Arrival   | 2 minutes  | 60 dB $L_{Aeq, T}$           |
| Unloading     | 45 minutes | 58 dB $L_{Aeq, T}$           |
| HGV Departure | 1 minutes  | 63 dB $L_{Aeq, T}$           |

5.06 In order to screen NSR1 from the loading bay, it is recommended that a circa 2.4- metre-high solid timber fence is installed along the northern boundary of the application site (see Appendix 2 for location of fence). The base of the fence should be level with the top of the proposed retaining wall.

5.07 The timber barrier should be built in double-thickness solid timber construction as illustrated below. The barrier should have no gaps or holes (cover strips should also be used to prevent gaps forming over time) and should be fully sealed at the ground (i.e. include a gravel board).



- 5.08 The resultant noise levels at NSR1 are calculated by correcting the source levels above for distance attenuation and screening attenuation.
- 5.09 Screening attenuation for unloading activities is calculated using the Maekawa barrier calculation in conjunction with Lidl delivery noise octave data and the path difference between the direct sound path and the screened sound path due to the proposed 2.4-metre-high timber fence. For reference, ground level at NSR1 is circa 1 metre below the ground level of the proposed store and fence, and therefore a receiver height of 3 metres above ground level has been adopted for upper floors at the dwelling (see Appendix 5 for barrier calculations).
- 5.10 Processing the above, the resultant delivery noise levels at NSR1 are set out in Table 5.2.

**Table 5.2 – Resultant Delivery Noise Levels at NSR1**

| Activity      | Noise Level at Source            | Distance Attenuation                    | Screening Attenuation | Noise Level at NSR              |
|---------------|----------------------------------|-----------------------------------------|-----------------------|---------------------------------|
| HGV Arrival   | 60 dB L <sub>Aeq</sub> (2 mins)  | –13 decibels ( $20 \cdot \log(10/45)$ ) | –10 dB                | 37 dB L <sub>Aeq</sub> (2 min)  |
| Unloading     | 58 dB L <sub>Aeq</sub> (45 mins) | –11 decibels ( $20 \cdot \log(10/35)$ ) | –13 dB                | 34 dB L <sub>Aeq</sub> (45 min) |
| HGV Departure | 63 dB L <sub>Aeq</sub> (1 min)   | –13 decibels ( $20 \cdot \log(10/45)$ ) | –10 dB                | 40 dB L <sub>Aeq</sub> (1 min)  |

- 5.11 NSR2 is significantly further from the proposed service yard and will be fully screened by the store itself. NSR1 therefore represents the worst-case receptor.
- 5.12 BS 4142 requires that an adjustment can be made for the characteristic features of the sound. Unloading noise may contain subjectively impulsive characteristics. Whilst the absolute unloading noise levels are relatively low (and significantly below existing background levels) at NSR1, a **+3 dB penalty** is robustly applied for impulsivity.
- 5.13 For the assessment of daytime (evening) noise impact, BS 4142 requires that the assessment period is 1 hour. Based on experience of deliveries at similar stores, it is assumed that a complete delivery could occur within that time frame.
- 5.14 For the assessment of night-time noise impact, BS 4142 requires that the assessment period is 15 minutes. Two night-time scenarios are presented, as follows:
- 15 minutes of unloading operations only
  - 15 minutes comprising an HGV departure, with the remaining time consisting of driver administration and unloading activity
- 5.15 On the basis of the above, daytime and night time BS 4142 delivery noise assessments at the nearest NSRs are set out in Tables 5.3–5.5 overleaf.

**Table 5.3 – Daytime BS 4142 Delivery Noise Assessment at NSR1**

| Results                                      | HGV Arrival              | Unloading                | HGV Departure            | Comment                                               |
|----------------------------------------------|--------------------------|--------------------------|--------------------------|-------------------------------------------------------|
| Resultant sound level                        | 37 dB $L_{Aeq}$ (2 min)  | 34 dB $L_{Aeq}$ (45 min) | 40 dB $L_{Aeq}$ (1 min)  | Calculated level at NSR1                              |
| Specific sound level                         | 22 dB $L_{Aeq}$ (1 hour) | 33 dB $L_{Aeq}$ (1 hour) | 22 dB $L_{Aeq}$ (1 hour) | Reference time interval is 1 hour                     |
| Acoustic feature correction                  | 0 dB                     | +3 dB                    | 0 dB                     | Unloading noise may contain impulsive characteristics |
| Rating level                                 | 22 dB $L_{Ar}$ (1 hour)  | 36 dB $L_{Ar}$ (1 hour)  | 22 dB $L_{Ar}$ (1 hour)  | Rating level at NSR1                                  |
| Cumulative rating level                      | 36 dB $L_{Ar}$ (1 hour)  |                          |                          | -                                                     |
| Background sound level                       | 51 dB $L_{A90, T}$       |                          |                          | Evening background level at MP1                       |
| Excess of rating over background sound level | -15 dB                   |                          |                          | Indication of a low impact, subject to context        |

**Table 5.4 – Night Time BS 4142 Delivery Noise Assessment at NSR1 (unloading only)**

| Results                                      | Unloading                | Comment                                               |
|----------------------------------------------|--------------------------|-------------------------------------------------------|
| Resultant sound level                        | 34 dB $L_{Aeq}$ (15 min) | Calculated level at NSR1                              |
| Specific sound level                         | 34 dB $L_{Aeq}$ (15 min) | Reference time interval is 15 minutes                 |
| Acoustic feature correction                  | +3 dB                    | Unloading noise may contain impulsive characteristics |
| Rating level                                 | 37 dB $L_{Ar}$ (15 min)  | Rating level at NSR1                                  |
| Background sound level                       | 41 dB $L_{A90, T}$       | Night time background sound level at MP1              |
| Excess of rating over background sound level | -4 dB                    | Indication of a low impact, subject to context        |

**Table 5.5 – Night Time BS 4142 Delivery Noise Assessment at NSR1 (unloading + HGV)**

| Results                                      | Unloading                | HGV Departure            | Comment                                               |
|----------------------------------------------|--------------------------|--------------------------|-------------------------------------------------------|
| Resultant sound level                        | 34 dB $L_{Aeq}$ (10 min) | 40 dB $L_{Aeq}$ (1 min)  | Calculated level at NSR1                              |
| Specific sound level                         | 32 dB $L_{Aeq}$ (15 min) | 28 dB $L_{Aeq}$ (15 min) | Reference time interval is 15 minutes                 |
| Acoustic feature correction                  | +3 dB                    | 0 dB                     | Unloading noise may contain impulsive characteristics |
| Rating level                                 | 35 dB $L_{Ar}$ (15 min)  | 28 dB $L_{Ar}$ (15 min)  | Rating level at NSR1                                  |
| Cumulative rating level                      | 36 dB $L_{Ar}$ (15 min)  |                          | -                                                     |
| Background sound level                       | 41 dB $L_{A90, T}$       |                          | Night time background sound level at MP1              |
| Excess of rating over background sound level | -5 dB                    |                          | Indication of a low impact, subject to context        |

5.16 The delivery rating levels are at least 4 dB below the existing background noise levels at NSR1. In accordance with BS 4142, this is an indication of a low impact, subject to context.

5.17 In relation to context it should be noted that the delivery noise rating levels of  $\leq 37$  dB  $L_{Ar}$  (1 hour) are relatively low in absolute terms. For reference, the World Health Organisation's Night Noise Guidelines for Europe considers that below 40 dB  $L_{Aeq}$  (2300–0700) outside represents the Lowest Observed Adverse Effect Level.

- 5.18 It is therefore considered that noise associated with deliveries is at the No Observed Adverse Effect Level as: it may be heard, but does not cause any change in behaviour or attitude; and it can slightly affect the acoustic character of the area, but not such that there is a perceived change in the quality of life.
- 5.19 In accordance with standard industry practice for 'out-of-hours' deliveries, it is recommended that a Delivery Management Plan (as set out in Appendix 7) is also to be implemented for deliveries between 2300 and 0700 hours. The most important elements of the plan are that reverse alarms are not used during the night time and that engine revs are kept to a minimum.

Noise associated with fixed external plant

- 5.20 The cumulative noise levels associated with the external fixed plant units are taken as:
- 53 dB(A) at 5 metres between 0700 and 2130 hours
  - 45 dB(A) at 5 metres between 2130 and 0700 hours
- 5.21 The resultant plant noise levels at the nearest NSRs are set out in Table 5.6 (note: no screening attenuation is taken).

**Table 5.6 – Resultant Plant Noise Levels at NSRs**

| Period | Receptor   | Noise Level at Source | Distance Attenuation                   | Noise Level at NSR |
|--------|------------|-----------------------|----------------------------------------|--------------------|
| NSR1   | Daytime    | 53 dB(A) at 5 metres  | -17 decibels ( $20 \cdot \log(5/35)$ ) | 36 dB(A)           |
|        | Night Time | 45 dB(A) at 5 metres  |                                        | 28 dB(A)           |
| NSR2   | Daytime    | 53 dB(A) at 5 metres  | -21 decibels ( $20 \cdot \log(5/55)$ ) | 32 dB(A)           |
|        | Night Time | 45 dB(A) at 5 metres  |                                        | 24 dB(A)           |

- 5.22 Based on ENS previous experience of plant compounds at existing Lidl stores, noise associated with the plant is typically broadband (i.e. not tonal) and is not impulsive. In order to corroborate this, a site visit was undertaken to a recent Lidl store (Bawtry Road, Selby). Measurements were made at 1 metre from existing plant units using a calibrated B&K 2250 Type 1 sound level meter, during the evening on Tuesday 20<sup>th</sup> April 2021.
- 5.23 As demonstrated in Appendix 6, the measured one-third octave frequency spectrum data indicates that the plant is not objectively tonal when assessed in accordance with Annex C of BS 4142. On the basis of the above, no tonal character penalty is warranted. However, the plant could be intermittent in nature (i.e. switching on/off as when required to maintain store temperatures) and therefore a + 3 dB correction for intermittent operation is robustly applied.

5.24 On the basis of the above, daytime and night time BS 4142 plant noise assessments are set out in Table 5.7 and 5.8 below.

**Table 5.7 – BS 4142 Plant Noise Assessment at NSR1**

| Results                                      | Evening                  | Night Time               | Comment                                                |
|----------------------------------------------|--------------------------|--------------------------|--------------------------------------------------------|
| Resultant sound level                        | 36 dB $L_{Aeq, T}$       | 28 dB $L_{Aeq, T}$       | Calculated level at NSR1                               |
| Specific sound level                         | 36 dB $L_{Aeq}$ (1 hour) | 28 dB $L_{Aeq}$ (15 min) | Plant assumed to operate for 100% of assessment period |
| Acoustic feature correction                  | +3 dB                    | +3 dB                    | Plant may contain intermittent characteristics         |
| Rating level                                 | 39 dB $L_{Ar}$ (1 hour)  | 31 dB $L_{Ar}$ (15 min)  | Rating level at NSR1                                   |
| Background sound level                       | 51 dB $L_{A90, T}$       | 41 dB $L_{A90, T}$       | Background sound levels at NSR                         |
| Excess of rating over background sound level | -12 dB                   | -10 dB                   | Indication of a low impact, subject to context         |

**Table 5.8 – BS 4142 Plant Noise Assessment at NSR2**

| Results                                      | Evening                  | Night Time               | Comment                                                |
|----------------------------------------------|--------------------------|--------------------------|--------------------------------------------------------|
| Resultant sound level                        | 32 dB $L_{Aeq, T}$       | 24 dB $L_{Aeq, T}$       | Calculated level at NSR2                               |
| Specific sound level                         | 32 dB $L_{Aeq}$ (1 hour) | 24 dB $L_{Aeq}$ (15 min) | Plant assumed to operate for 100% of assessment period |
| Acoustic feature correction                  | +3 dB                    | +3 dB                    | Plant may contain intermittent characteristics         |
| Rating level                                 | 35 dB $L_{Ar}$ (1 hour)  | 27 dB $L_{Ar}$ (15 min)  | Rating level at NSR2                                   |
| Background sound level                       | 51 dB $L_{A90, T}$       | 41 dB $L_{A90, T}$       | Background sound levels at NSR                         |
| Excess of rating over background sound level | -16 dB                   | -14 dB                   | Indication of a low impact, subject to context         |

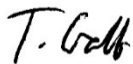
- 5.25 Plant rating levels are significantly below the existing background noise levels at the nearest NSRs. In accordance with BS 4142, this is an indication of a low impact, subject to context.
- 5.26 In relation to context it should be noted that night time plant noise rating levels are very low in absolute terms. For reference, the worst case night time rating level of **≤ 31 dB  $L_{Ar}$  (15 min)** is 9 dB below the LOAEL as defined in the World Health Organisation's Night Noise Guidelines for Europe.
- 5.27 It is therefore considered that noise associated with fixed external plant is at the No Observed Adverse Effect Level as: it may be heard, but does not cause any change in behaviour or attitude; and it can slightly affect the acoustic character of the area, but not such that there is a perceived change in the quality of life.

## **6.00 CONCLUSIONS**

- 6.01 A noise impact assessment has been undertaken for a proposed food store at land at Cross Keys Lane, Hoyland, Barnsley
- 6.02 The ambient noise climate in the vicinity of the application site is due to road traffic on the surrounding road network, primarily the M1 and the A6195.
- 6.03 An assessment of the noise impact of the proposed Lidl food store has been undertaken, in line with the National Planning Policy Framework Planning Practice Guidelines on Noise. Mitigation measures have been recommended, as appropriate.
- 6.04 Provided the recommendations contained within this noise impact assessment are implemented, noise is not considered to represent a constraint to the proposed Lidl food store.

I trust the foregoing is sufficient for your needs. Should you have any queries regarding the above, please do not hesitate to contact me.

Yours sincerely



Thomas Crabb  
MIOA, Diploma in Acoustics and Noise Control  
Environmental Noise Solutions Limited

## **Appendix 1**

### **Glossary of Acoustic Terms**

#### **Sound Pressure Level ( $L_p$ )**

The basic unit of sound measurement is the sound pressure level. As the pressures to which the human ear responds can range from 20  $\mu\text{Pa}$  to 200 Pa, a linear measurement of sound levels would involve many orders of magnitude. Consequently, the pressures are converted to a logarithmic scale and expressed in decibels (dB) as follows:

$$L_p = 20 \log_{10}(p/p_0)$$

Where  $L_p$  = sound pressure level in dB;  $p$  = rms sound pressure in Pa; and  $p_0$  = reference sound pressure (20  $\mu\text{Pa}$ ).

#### **A-weighting Network**

A frequency filtering system in a sound level meter, which approximates under defined conditions the frequency response of the human ear. The A-weighted sound pressure level, expressed in dB(A), has been shown to correlate well with subjective response to noise.

#### **Equivalent continuous A-weighted sound pressure level, $L_{Aeq, T}$**

The value of the A-weighted sound pressure level in decibels of continuous steady sound that within a specified time interval,  $T$ , has the same mean-square sound pressure as a sound that varies with time.  $L_{Aeq, 16h}$  (07:00 to 23:00 hours) and  $L_{Aeq, 8h}$  (23:00 to 07:00 hours) are used to qualify daytime and night time noise levels.

#### **$L_{A10, T}$**

The A-weighted sound pressure level in decibels exceeded for 10% of the measurement period,  $T$ .  $L_{A10, 18h}$  is the arithmetic mean of the 18 hourly values from 06:00 to 24:00 hours.

#### **$L_{A90, T}$**

The A-weighted sound pressure level of the residual noise in decibels exceeded 90% of a given time interval,  $T$ .  $L_{A90}$  is typically taken as representative of background noise.

#### **$L_{AF \text{ max}}$**

The maximum A-weighted noise level recorded during the measurement period. The subscript 'F' denotes fast time weighting, slow time weighting 'S' is also used.

#### **Sound Exposure Level (SEL or $L_{AE}$ )**

The energy produced by a discrete noise event averaged over one second, no matter how long the event actually took. This allows for comparison between different noise events which occur over different lengths of time.

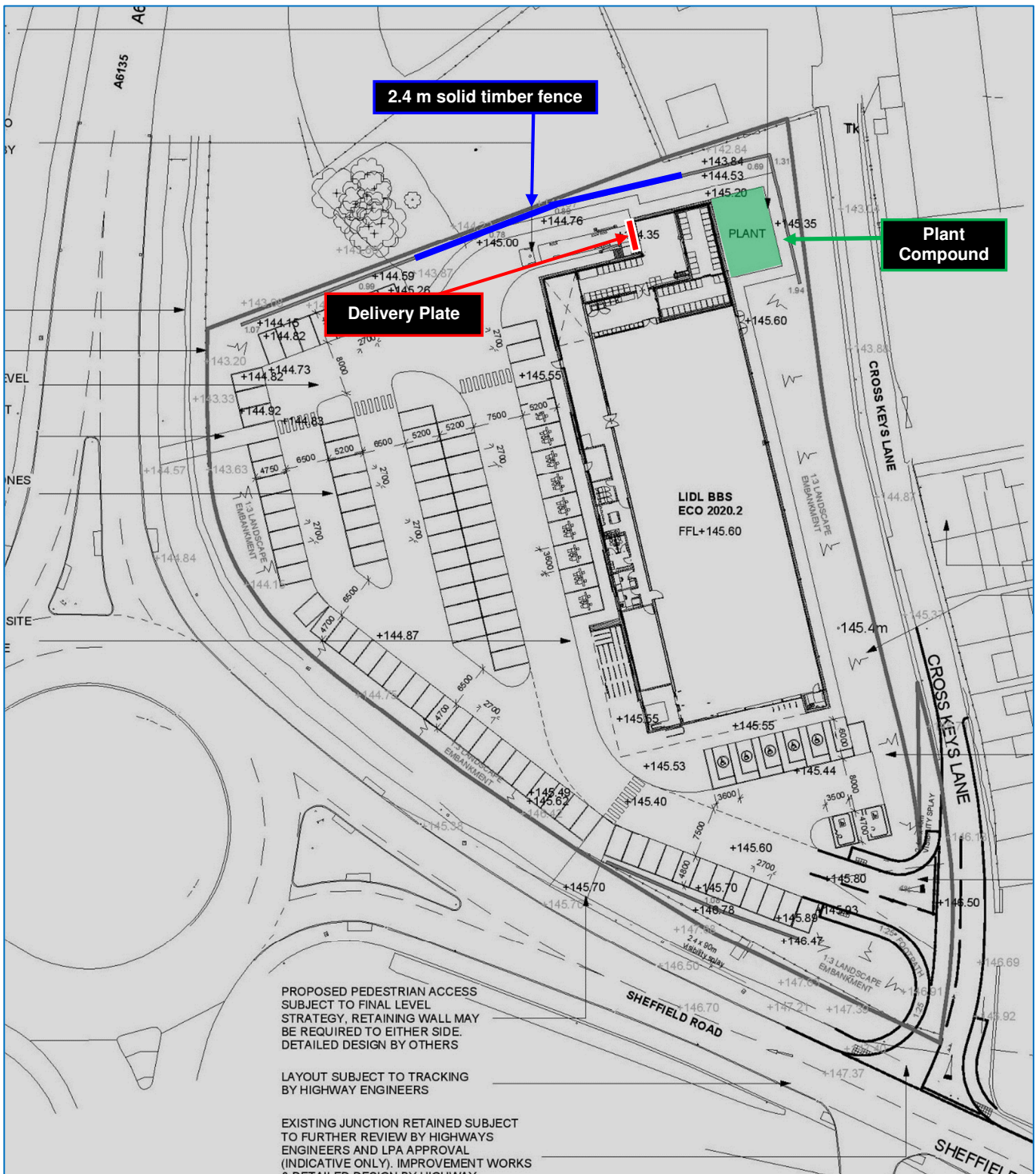
#### **Weighted Sound Reduction Index ( $R_w$ )**

Single number quantity which characterises the airborne sound insulation properties of a material or building element over a defined range of frequencies ( $R_w$  is used to characterise the insulation of a material or product that has been measured in a laboratory).

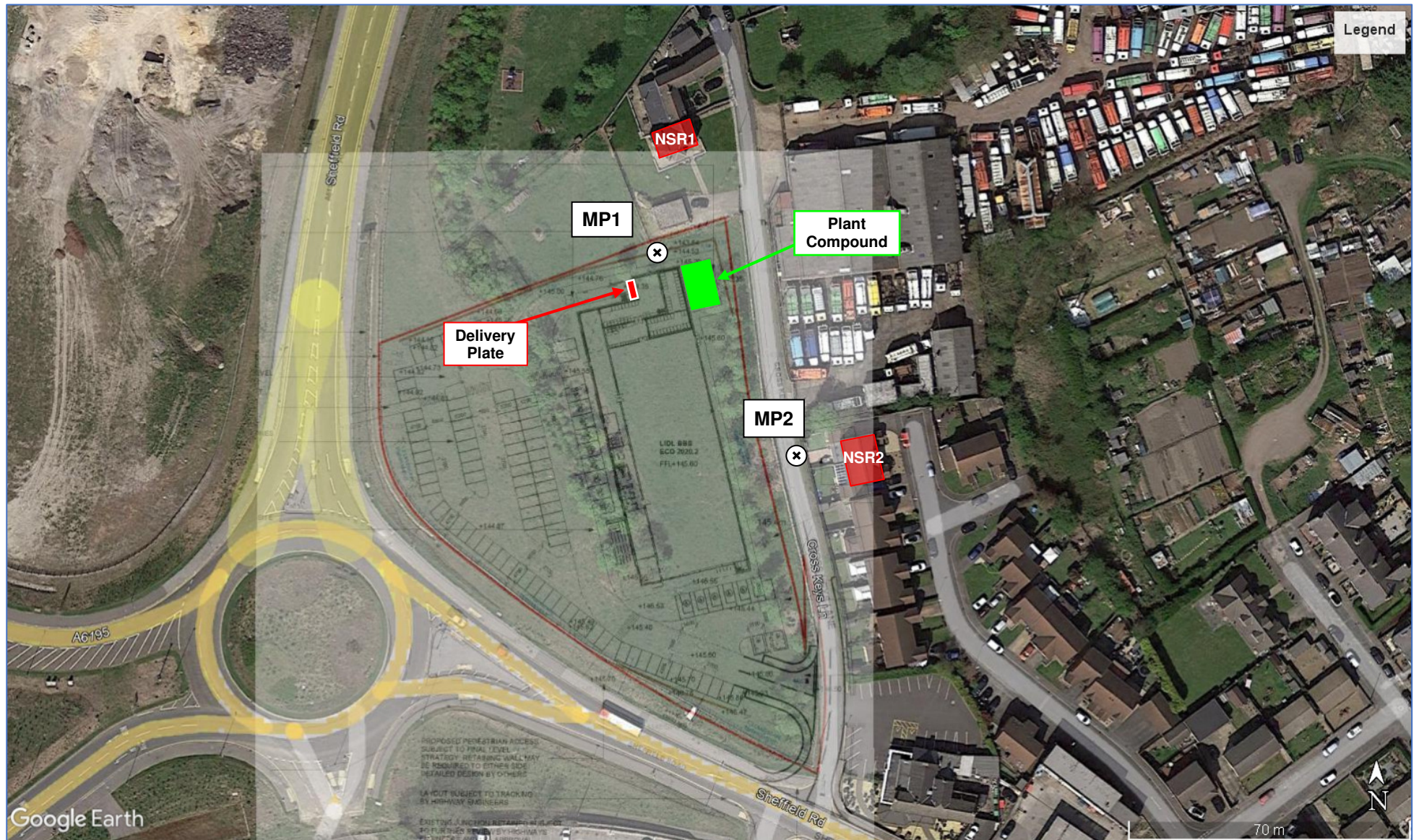
#### **Weighted Airborne Sound Insulation ( $D_{nT,w}$ )**

Single number quantity which characterises the airborne sound insulation between rooms.

## Appendix 2 Proposed Layout Plan



### Appendix 3 Annotated Site Plan and Noise Monitoring Locations



**Appendix 4**  
**MP1 Baseline Noise Measurement Data**

| Date     | Time      | L <sub>Aeq</sub> (dB) | L <sub>A90</sub> (dB) |
|----------|-----------|-----------------------|-----------------------|
| 09/11/21 | 1821–1836 | 59                    | 57                    |
|          | 1836–1851 | 58                    | 56                    |
|          | 1851–1906 | 62                    | 56                    |
|          | 1906–1921 | 57                    | 56                    |
|          | 1921–1936 | 56                    | 55                    |
|          | 1936–1951 | 54                    | 52                    |
|          | 1951–2006 | 54                    | 53                    |
|          | 2006–2021 | 57                    | 52                    |
|          | 2051–2106 | 53                    | 51                    |
|          | 2106–2121 | 52                    | 50                    |
|          | 2121–2136 | 51                    | 49                    |
|          | 2136–2151 | 51                    | 48                    |
|          | 2151–2206 | 51                    | 49                    |
|          | 2206–2221 | 50                    | 47                    |
|          | 2221–2236 | 46                    | 41                    |
|          | 2236–2252 | 44                    | 41                    |
| 10/11/21 | 0017–0032 | 40                    | 34                    |
|          | 0032–0047 | 42                    | 34                    |
|          | 0047–0102 | 42                    | 36                    |
|          | 0102–0119 | 46                    | 41                    |
|          | 0143–0158 | 46                    | 42                    |
|          | 0158–0213 | 48                    | 44                    |
|          | 0213–0228 | 47                    | 42                    |
|          | 0228–0243 | 48                    | 44                    |
|          | 0243–0258 | 45                    | 41                    |
|          | 0258–0313 | 46                    | 43                    |
|          | 0313–0328 | 45                    | 41                    |
|          | 0328–0343 | 44                    | 41                    |
|          | 0414–0429 | 48                    | 44                    |
|          | 0429–0444 | 48                    | 45                    |
|          | 0444–0459 | 47                    | 44                    |
|          | 0459–0514 | 46                    | 43                    |
|          | 0514–0529 | 48                    | 45                    |
|          | 0529–0544 | 52                    | 50                    |
|          | 0544–0559 | 51                    | 49                    |
|          | 0559–0615 | 52                    | 50                    |
|          | 0643–0700 | 50                    | 48                    |

## Appendix 5 Maekawa Barrier Calculations

### Loading Operations

| Calculation of Approximate Attenuation of a Thin Rigid Barrier |       |       |       |      |       |       |       |        |        |      |  |
|----------------------------------------------------------------|-------|-------|-------|------|-------|-------|-------|--------|--------|------|--|
| Octave band centre frequencies (Hz)                            | 31.5  | 63    | 125   | 250  | 500   | 1000  | 2000  | 4000   | 8000   | LAeq |  |
| Source octave analysis (dB Leq)                                | 70.3  | 64.4  | 61.0  | 56.5 | 54.2  | 52.3  | 50.9  | 47.2   | 40.2   | 58.0 |  |
| A-weighting (dB)                                               | -39.4 | -26.2 | -16.1 | -8.6 | -3.2  | 0.0   | 1.2   | 1.0    | -1.1   |      |  |
| Level at source position (dB LAeq)                             | 30.9  | 38.2  | 44.9  | 47.9 | 51.0  | 52.3  | 52.1  | 48.2   | 39.1   |      |  |
| Wavelength (m)                                                 | 10.8  | 5.4   | 2.7   | 1.4  | 0.7   | 0.3   | 0.2   | 0.1    | 0.0    |      |  |
| Path difference (m)                                            | 0.27  | 0.27  | 0.27  | 0.27 | 0.27  | 0.27  | 0.27  | 0.27   | 0.27   |      |  |
| Fresnel No. (40.δ/λ)                                           | 1.02  | 2.04  | 4.04  | 8.08 | 16.15 | 32.30 | 64.60 | 129.21 | 258.42 |      |  |
| Attenuation (dB) (Maekawa*)                                    | 6.0   | 7.0   | 8.5   | 10.4 | 12.8  | 15.5  | 18.3  | 21.2   | 24.2   | 13.9 |  |
| Level at receptor position (dB Leq)                            | 64.3  | 57.4  | 52.5  | 46.1 | 41.4  | 36.8  | 32.6  | 26.0   | 16.0   | 44.1 |  |
| A-weighting (dB)                                               | -39.4 | -26.2 | -16.1 | -8.6 | -3.2  | 0.0   | 1.2   | 1.0    | -1.1   |      |  |
| Level at receptor position (dB LAeq)                           | 24.9  | 31.2  | 36.4  | 37.5 | 38.2  | 36.8  | 33.8  | 27.0   | 14.9   |      |  |

|                     |       |
|---------------------|-------|
| Receiver Height=    | 3.00  |
| Barrier Height=     | 2.40  |
| Source Height=      | 0.00  |
| Source to Barrier=  | 7.00  |
| Source to Receiver= | 34.00 |

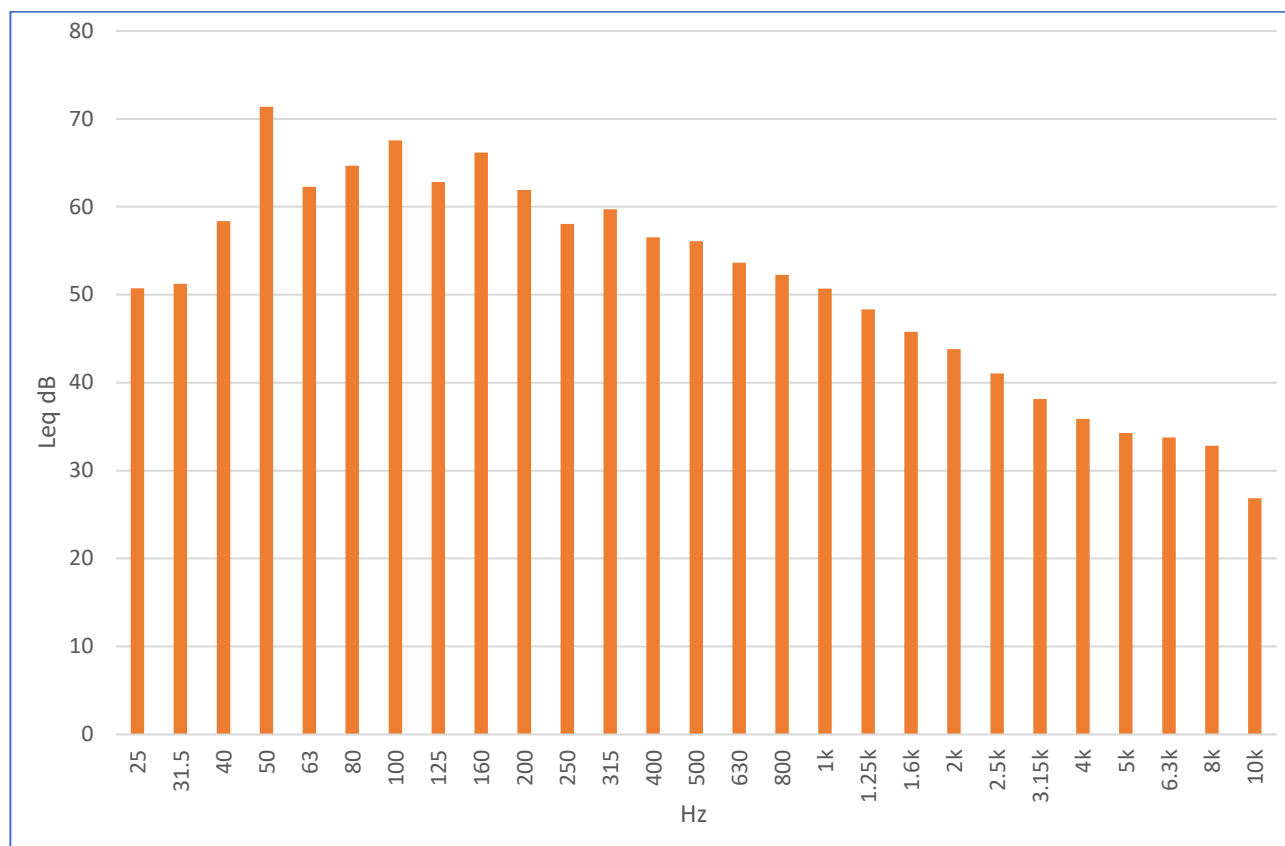
### HGV Movements

| Calculation of Approximate Attenuation of a Thin Rigid Barrier |       |       |       |      |      |      |      |       |       |      |  |
|----------------------------------------------------------------|-------|-------|-------|------|------|------|------|-------|-------|------|--|
| Octave band centre frequencies (Hz)                            | 31.5  | 63    | 125   | 250  | 500  | 1000 | 2000 | 4000  | 8000  | LAeq |  |
| Source octave analysis (dB Leq)                                | 78.0  | 64.0  | 61.0  | 59.0 | 55.0 | 56.0 | 58.0 | 54.0  | 45.0  | 63.0 |  |
| A-weighting (dB)                                               | -39.4 | -26.2 | -16.1 | -8.6 | -3.2 | 0.0  | 1.2  | 1.0   | -1.1  |      |  |
| Level at source position (dB LAeq)                             | 38.6  | 37.8  | 44.9  | 50.4 | 51.8 | 56.0 | 59.2 | 55.0  | 43.9  |      |  |
| Wavelength (m)                                                 | 10.8  | 5.4   | 2.7   | 1.4  | 0.7  | 0.3  | 0.2  | 0.1   | 0.0   |      |  |
| Path difference (m)                                            | 0.04  | 0.04  | 0.04  | 0.04 | 0.04 | 0.04 | 0.04 | 0.04  | 0.04  |      |  |
| Fresnel No. (40.δ/λ)                                           | 0.16  | 0.31  | 0.62  | 1.25 | 2.50 | 4.99 | 9.98 | 19.96 | 39.93 |      |  |
| Attenuation (dB) (Maekawa*)                                    | 5.0   | 5.2   | 5.6   | 6.3  | 7.4  | 9.0  | 11.1 | 13.6  | 16.3  | 10.1 |  |
| Level at receptor position (dB Leq)                            | 73.0  | 58.8  | 55.4  | 52.7 | 47.6 | 47.0 | 46.9 | 40.4  | 28.7  | 52.9 |  |
| A-weighting (dB)                                               | -39.4 | -26.2 | -16.1 | -8.6 | -3.2 | 0.0  | 1.2  | 1.0   | -1.1  |      |  |
| Level at receptor position (dB LAeq)                           | 33.6  | 32.6  | 39.3  | 44.1 | 44.4 | 47.0 | 48.1 | 41.4  | 27.6  |      |  |

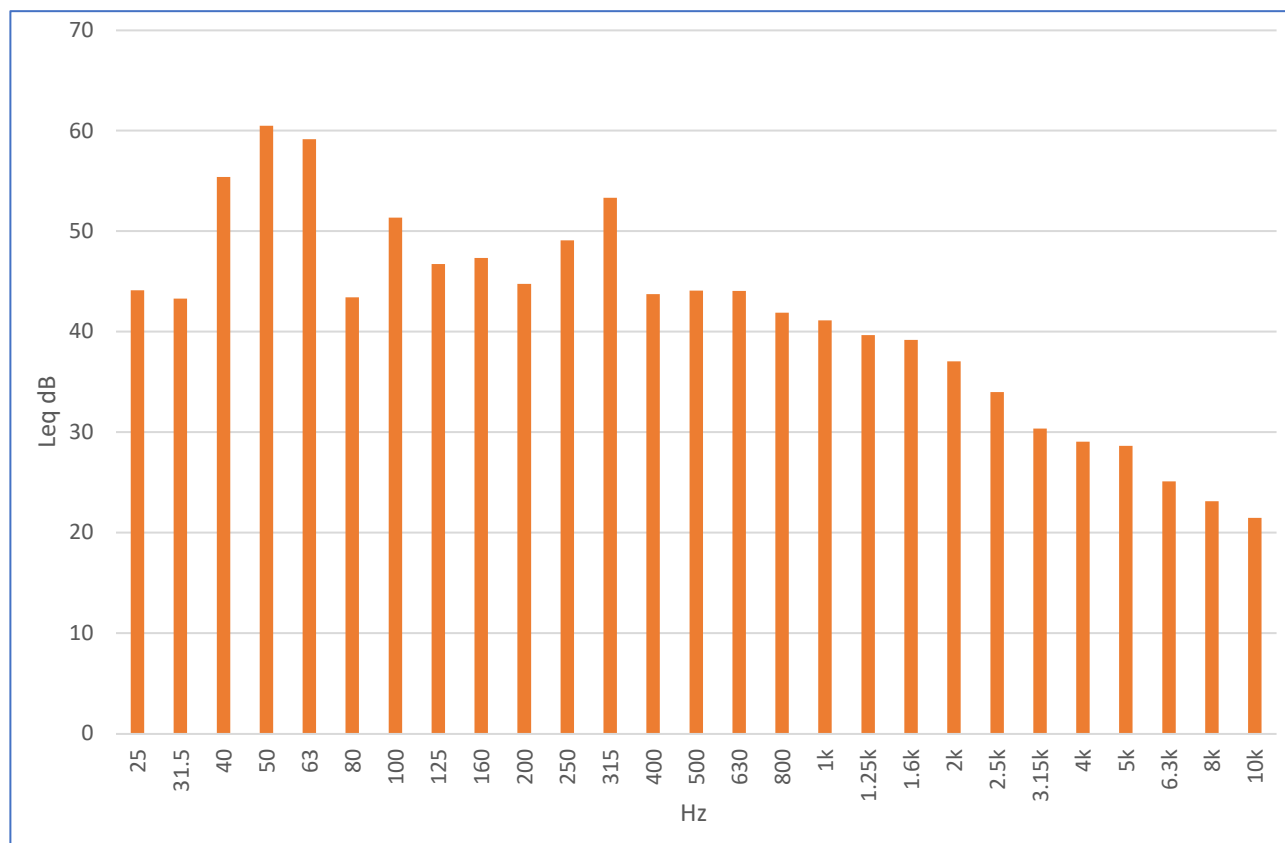
|                     |       |
|---------------------|-------|
| Receiver Height=    | 3.00  |
| Barrier Height=     | 2.40  |
| Source Height=      | 1.00  |
| Source to Barrier=  | 12.00 |
| Source to Receiver= | 45.00 |

## Appendix 6 Plant One-Third Octave Frequency Spectrum Summary

### Condensing Units at 1 metre



### Dry Coolers at 1 metre



## **Appendix 7**

### **Delivery Management Plan for Night Time Deliveries**

#### **The Journey**

- During the final approach to the store, refrigeration units within vehicles will be switched off and remain switched off during unloading (note: refrigeration units not required with insulated boxes)
- When within the service yard, vehicles will switch off their engines
- Access into the service yard should be unrestricted. However, if entry is restricted, vehicles should stop; switch off engines, radios and headlights, and contact store staff

#### **Within the Delivery Yard**

- Vehicle radios will be switched off
- Vehicle headlights will be switched off when stationary and vehicle lights will be used for vehicle manoeuvring only, to aid safe movement
- The use of external alarms or speakers will be prohibited within the delivery yard
- The internal alarm will be muffled to reduce potential for disturbance
- Noise generation from vehicle manoeuvring into loadings to be kept to a minimum
- Vehicle reversing 'audible warning' to be switched off during night time periods
- At all times drivers will be advised to: engage gears within minimal noise; keep engine revs to a minimum; apply brakes gently; and close doors with minimal noise

#### **Unloading/Re-loading**

- Ensure delivery bay doors and loading plates are well maintained to minimise noise when opening and closing
- Ensure the delivery point and surrounding areas are clear of obstructions so vehicles can manoeuvre easily
- Avoid using external bells at delivery points
- Make sure the driver knows the precise location of your delivery point and is aware of any local access issues
- Drivers should ensure that engine and refrigeration units are switched off once vehicle the vehicle is stationary and in the unloading position
- Drivers should seek to: lower loading plates into the correct position with minimal noise; avoid making contact with trailer walls, lift guardrails and other obstructions; and maintain conversation to a minimum.

#### **The Return Journey**

- All vehicle doors will be closed with minimal noise
- Drivers should refrain from starting up vehicle refrigeration units (if required) until the vehicle is a reasonable distance from the store and neighbouring dwellings
- Drivers should seek to: engage gears within minimal noise; keep engine revs to a minimum; apply brakes gently; and accelerate gently until the vehicle is a reasonable distance from the store