



**ENVIRONMENTAL STATEMENT**

**VOLUME 2**

**APPENDIX 9.4 – NOISE FROM PROPOSED  
COMMERCIAL INDUSTRIAL NOISE ONTO  
EXISTING AND PROPOSED**

**Appendix 9.4: Noise from Proposed Commercial/Industrial Noise onto Existing and Proposed  
Receptors**

---

---

## **BS4142:2014+A1:2019 Methods for Rating and Assessing Industrial and Commercial Sound**

The BS 4142 Standard describes methods for rating and assessing the following:

- Sound from industrial and manufacturing processes;
- Sound from fixed installations which comprise mechanical and electrical plant and equipment;
- Sound from the loading and unloading of goods and materials at industrial and/or commercial premises; and
- Sound from mobile plant and vehicles that is an intrinsic part of the overall sound emanating from premises or processes, such as that from forklift trucks, or that from train movements on or around an industrial and/or commercial site.

The methods use outdoor sound levels to assess the likely effects of sound on people who might be inside or outside a dwelling or premises used for residential purposes upon which sound is incident. The Standard advises the purpose of the methodology includes the assessment of sound from any plant and activities associated with existing industrial and/or commercial uses at proposed residential dwellings.

If appropriate, the specific sound level of the source ( $L_{Aeq,T}$ ) is corrected, by the application of one or more corrections for acoustic features such as tonal qualities and/or distinct impulses, to give a 'rating' level ( $L_{Ar,T}$ ). The Standard effectively compares and rates the difference between the rating level of the specific sound and the typical background sound level ( $L_{A90,T}$ ) in the absence of the specific sound.

The Standard advises that the time interval ('T') of the background sound measurement should be sufficient to obtain a representative or typical value of the background sound level at the time(s) the source in question operates or is proposed to operate in the future.

Comparing the rating level with the background sound level, BS 4142 states:

"Typically, the greater this difference, the greater the magnitude of 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."

### **Noise from Employment Generated Road Traffic**

An indicative masterplan for the development shows that the main site's access for the proposed employment area will be off Stakehill Lane, close to existing residential receptors.

---

Therefore, there is the potential for these receptors to be affected by noise generated from additional road traffic movements along this road.

The results of the traffic assessment have been used as the basis for determining the future road traffic noise levels that would result from development generated traffic.

Due to the size of the development, the predicted future traffic flows are low and therefore fall outside the scope of the Calculation of Road Traffic Noise. The Noise Advisory Council document "A Guide to Measurement and Prediction of Equivalent Continuous Sound Level  $L_{eq}$ " published in 1978 provides a method for estimating sound exposure levels (SELs) from vehicle passbys. The predicted SEL level at 10 m from the nearside kerb edge, for vehicles with an unladen weight below 1,525 kg, is stated to be derived from the following equation:

$$SEL = 37.8 + 20\log(V)$$

Where V = speed in km/h

To predict the  $L_{eq}$  level from the calculated SEL, the following equation is used:

$$L_{eq} = L_{AX} + 10\log(n) - 10\log(T)$$

$$L_{AX} = SEL$$

n = number of events

T = time in seconds

The  $L_{eq}$  for the access road serving the proposed employment area has been calculated using traffic data from the project team, set out in Table 7.4.1. Please note that data is available only between 0700-1900hrs, which would generally include the vast majority of the trips generated.

**Table 7.4.1: Available trip generation along new access route to employment area**

| Activity   | Daily trip generation (07:00 – 19:00) |            |         |
|------------|---------------------------------------|------------|---------|
|            | Arrivals                              | Departures | Two-way |
| Industrial | 388                                   | 391        | 779     |
| %HGVs      | 6.0%                                  | 6.1%       | 6.1%    |

Assuming a speed of 30 km/h (20 mph), 779 vehicle movements in a 12-hour period and adopting the above calculation methodology, the resultant  $L_{Aeq,12h}$  would be 50 dB at 10 metres from LGVs.

To calculate the noise from the HGV movements, the mobile plant calculation set out in BS5228:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites – Part 1: Noise can be used as follows:

$$L_{Aeq,T} = L_{WA} - 33 + 10\log Q - 10\log V - 10\log d$$

Where

$L_{WA}$  is the sound power of the plant (dB);

Q is the number of vehicles in the defined period (12 hours in this case);

V is the average vehicle speed (km/h);

D is the distance of the receiving position from the centre of the haul road (m)

Adopting an  $L_{WA}$  of around 108<sup>5</sup> dB, and assuming 4 HGV movements (in an hour), this would result in an  $L_{Aeq,1h}$  of 56 dB at 10 metres. Combining this with the noise from LGVs/cars, it would result in 57 dB  $L_{Aeq,12h}$  at 10 metres. Assuming a line source distance attenuation (i.e. 3 dB per doubling of distance), and given the nearest dwellings are around 30 metres from the proposed access road, and their gardens are as close as 20 metres from the proposed road, the resultant noise levels during the daytime could be in the region of 51 dB  $L_{Aeq, 16 \text{ hours}}$  at the nearest dwelling and 53 dB  $L_{Aeq, 16 \text{ hours}}$  in gardens.

DMRB suggests that the LOAEL in relation to road traffic noise is 55 dB  $L_{A10,18hr}$  (façade) which would equate to approximately 54 dB  $L_{Aeq, 16 \text{ hours, day}}$ <sup>6</sup>.

The most affected areas of the existing residential receptors in relation to traffic associated with the employment uses would be the rear facades and the rear gardens, which are partially screened from noise associated with road traffic along Stakehill Lane. Based on the results of the noise monitoring at positions ML1 and ML3 and considering screening and distance losses, it is predicted that existing ambient noise levels at the most affected facades and gardens are in the region of 50 dB  $L_{Aeq, 16 \text{ hours}}$ . As such the combined ambient noise level of existing ambient noise and noise associated with vehicle movements along the proposed access road, would be below the LOAEL and as such the impact would not be significant, with no further mitigation measures proposed.

There is currently limited information regarding night-time vehicle movements, however vehicle movements will be predominantly during the day. Where night-time vehicle movements are required, they will be controlled such that noise levels are below the LOAEL set out in DMRB of 40 dB  $L_{night}$ .

It should be noted that perhaps the  $L_{Amax}$  noise parameter may be more dominant during the night-time period, Indeed based on meeting guideline values for  $L_{night}$  of 30 dB, and the 10th highest  $L_{AF,max}$  of 45 dB, in the majority of cases the 10th highest  $L_{AF,max}$  is likely to be the most significant design constraint<sup>7</sup>, as on average it is 18.5 dB higher than the  $L_{night}$ . However, for such an assessment to be undertaken, detailed information in relation to night-time movements of vehicles is necessary, since based on current daytime proposed movements, and typical relationships, night-time movements of more than 10 vehicles may not even occur.

---

<sup>5</sup> At 30 km/h, most HGV noise comes from the engine and exhaust systems rather than aerodynamic or tire noise, supporting higher  $L_{WA}$  values –  $L_{WA}$  level taken from Table D.3 Historic sound level data on site preparation from BS5228-1:2019+A1:2014.

<sup>6</sup> Using the method 3 calculation as per Collins, D., & Pritchard, J. (2015). An Investigation of Road Noise Mapping in the UK to Comply with the EU Environmental Noise Directive. *Proceedings of the Institute of Acoustics*, Vol. 37, Pt. 2.

<sup>7</sup> See Conlan, N., Wei, W., & Harvie-Clark, J. (2021). Empirical relationship between  $L_{night}$  and  $L_{AFmax}$ . *Proceedings of the Institute of Acoustics*, 43(1).

## Noise from loading/unloading of HGVs and LGVs at the proposed employment uses

This section provides an assessment of the potential loading and unloading operations for heavy goods vehicles (HGVs) at the proposed employment sites, focusing on the potential noise impacts to nearby residential receptors.

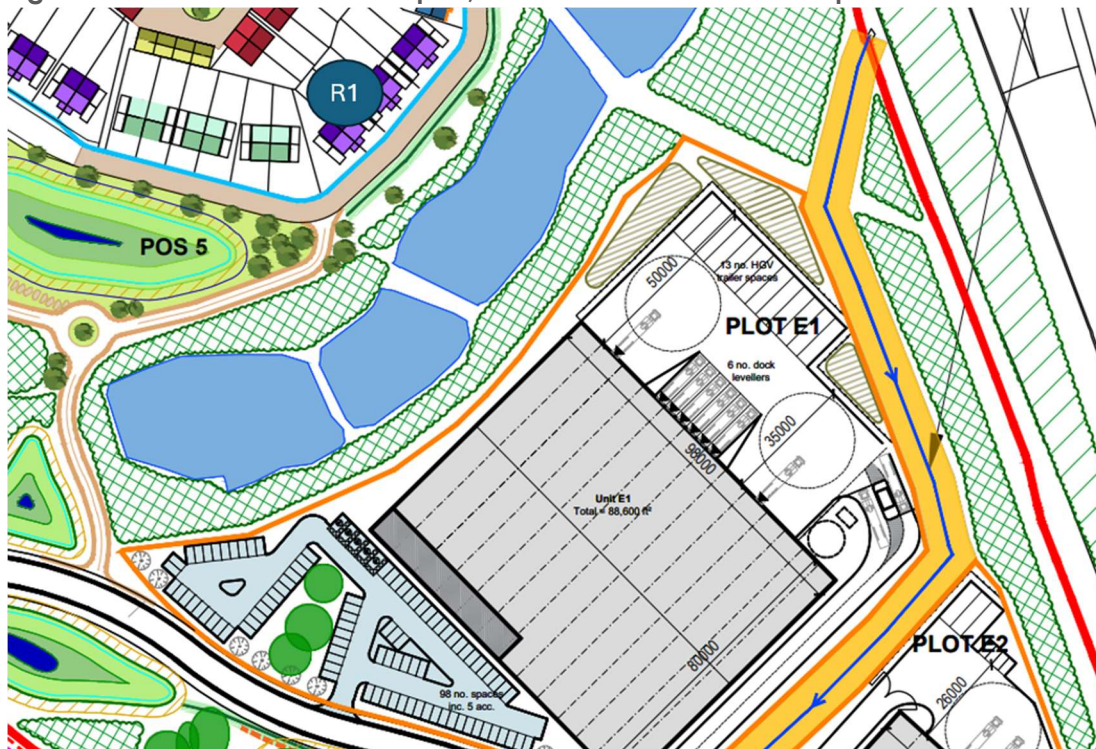
The site (based on the indicative masterplan) includes four proposed units (E1, E2, E3A, and E3B) designated for employment uses, with HGV docking facilities located within proximity to existing residential areas. Key features include:

- **Units E1 and E2:** Loading bays are shielded by the building structure with screening provided to existing receptors. However, there is currently a direct line of sight to the proposed residential receptors on the other side of the existing water feature.
- **Units E3A and E3B:** Loading bays are unscreened and directly face residential premises to the south.

The nearest sensitive receptors are:

- **R1:** Proposed residential dwellings on the other side of the existing water feature, separating the employment uses from the residential site (see Figure 7.4.1).
- **R2(NSR 8):** Existing residential receptors along Stakehill Lane, with rear facades and gardens having a line of sight to the proposed new units.

**Figure 7.4.1: Location of R1 receptor, based on indicative masterplan**



### Analysis of Loading Operations

Traffic flow information in relation to the employment uses have been provided by the project team. These were provided in relation to traffic associated with all units. Information in the preliminary masterplan, in relation to the number of units and their ground floor area,

has informed the assumptions in relation to likely traffic flows per unit, based on a proportional basis. The assumed HGV traffic movements per employment use unit are shown in Table 7.4.2.

**Table 7.4.2: HGV Loading Facilities**

| Unit | Ground Floor GIA      | Docks | Parking Spaces    | Daytime HGV Movements |
|------|-----------------------|-------|-------------------|-----------------------|
| E1   | 88600 ft <sup>2</sup> | 8     | 98 (5 accessible) | 32                    |
| E2   | 22000 ft <sup>2</sup> | 2     | 35 (2 accessible) | 8                     |
| E3A  | 13600 ft <sup>2</sup> | 2     | 18 (1 accessible) | 5                     |
| E3B  | 10600 ft <sup>2</sup> | 2     | 15 (1 accessible) | 4                     |

Noise levels associated with HGV loading/unloading movements are shown in Table 7.4.3. These values were established via previous noise measurements for a similar project.

**Table 7.4.3: HGV activities related noise levels**

| Activity                    | SEL (dB) at 10m |
|-----------------------------|-----------------|
| HGV arrival                 | 69              |
| Reversing and manoeuvring   | 65              |
| Door opening/closing        | 60              |
| Cage and pallet movement    | 51              |
| Engine starts and departure | 74              |

### Predicted Noise Levels at Receptors

**Table 7.4.4: Predicted Daytime Noise from Development at Receptor R1**

| Activity                           | Measured Noise Levels SEL@10m (dB) | Correction for No. of Occurrences | Distance (m) | Distance Correction (dB) | Screening Correction (dB) | Resultant SEL at Receptor (dB) |
|------------------------------------|------------------------------------|-----------------------------------|--------------|--------------------------|---------------------------|--------------------------------|
| HGV arrives and turns all forwards | 69                                 | 3                                 | 100          | -20                      | 0                         | 52                             |
| HGV reverses and manoeuvres        | 65                                 | 3                                 | 100          | -20                      | 0                         | 48                             |
| Door open/close                    | 60                                 | 6                                 | 100          | -20                      | 0                         | 46                             |
| Cage/pallet movement               | 51                                 | 13                                | 100          | -20                      | 0                         | 44                             |
| Engine starts and departs          | 74                                 | 3                                 | 100          | -20                      | 0                         | 57                             |
| <b>Cumulative SEL</b>              |                                    |                                   |              |                          |                           | <b>59</b>                      |
| <b>L<sub>Aeq</sub>, 1 hour</b>     |                                    |                                   |              |                          |                           | <b>23</b>                      |

**Table 7.4.5: Predicted Daytime Noise from Development at Receptor R2**

| Activity                           | Measured Noise Levels SEL@10m (dB) | Correction for No. of Occurrences | Distance (m) | Distance Correction (dB) | Screening Correction (dB) | Resultant SEL at Receptor (dB) |
|------------------------------------|------------------------------------|-----------------------------------|--------------|--------------------------|---------------------------|--------------------------------|
| HGV arrives and turns all forwards | 69                                 | 0                                 | 45           | -13                      | 0                         | 56                             |
| HGV reverses and manoeuvres        | 65                                 | 0                                 | 45           | -13                      | 0                         | 52                             |
| Door open/close                    | 60                                 | 3                                 | 45           | -13                      | 0                         | 50                             |
| Cage/pallet movement               | 51                                 | 10                                | 45           | -13                      | 0                         | 48                             |
| Engine starts and departs          | 74                                 | 0                                 | 45           | -13                      | 0                         | 61                             |
| <b>Cumulative SEL</b>              |                                    |                                   |              |                          |                           | <b>63</b>                      |
| <b>L<sub>Aeq</sub>, 1 hour</b>     |                                    |                                   |              |                          |                           | <b>27</b>                      |

**Table 7.4.6: Background sound levels (analysis)**

| Monitoring Location | Daytime Mean L <sub>A90</sub> (dB)    | Daytime Median L <sub>A90</sub> (dB)    | Daytime Std Dev (dB)    | Daytime Min L <sub>A90</sub> (dB)    | Daytime Max L <sub>A90</sub> (dB)    |
|---------------------|---------------------------------------|-----------------------------------------|-------------------------|--------------------------------------|--------------------------------------|
| NML1                | 45                                    | 45                                      | 2                       | 41                                   | 51                                   |
| NML3                | 53                                    | 54                                      | 3                       | 47                                   | 58                                   |
| NML4                | 38                                    | 36                                      | 5                       | 30                                   | 48                                   |
| Monitoring Location | Night-time Mean L <sub>A90</sub> (dB) | Night-time Median L <sub>A90</sub> (dB) | Night-time Std Dev (dB) | Night-time Min L <sub>A90</sub> (dB) | Night-time Max L <sub>A90</sub> (dB) |
| NML1                | 43                                    | 42                                      | 3                       | 36                                   | 52                                   |
| NML3                | 48                                    | 47                                      | 4                       | 40                                   | 55                                   |
| NML4                | 37                                    | 38                                      | 4                       | 29                                   | 47                                   |

The representative background sound levels (L<sub>A90</sub>) from monitoring location **NML1** are deemed to be the most appropriate in relation to the impacts associated with HGVs loading and unloading, as it provides the most relevant baseline for nearby receptors. Based on professional judgment and statistical analysis of the measured background sound level 45 dB has been chosen as representative of the daytime at **NML1**.

#### Noise Impact Assessment

**Table 7.4.7: BS4142 assessment at Receptor R1**

| Results                | Value                   | Relevant Clauses of BS4142:2014 | Commentary                              |
|------------------------|-------------------------|---------------------------------|-----------------------------------------|
| Background Sound Level | L <sub>A90</sub> =45 dB | 8.1, 8.2                        | Representative typical background sound |

| Results                                | Value                                 | Relevant Clauses of BS4142:2014 | Commentary                                                                                                                                                                          |
|----------------------------------------|---------------------------------------|---------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                        |                                       |                                 | level from measurements                                                                                                                                                             |
| Specific Sound Level                   | $L_{Aeq, T}=23$ dB                    | 7.3.6                           |                                                                                                                                                                                     |
| Acoustic Feature Correction            | 0 dB                                  | 9                               | Due to the predicted difference between the background sound level and the specific level, it may be challenging to identify any acoustic characteristics at the receptor locations |
| Rating Level                           | $(23+0)=23$ dB                        |                                 |                                                                                                                                                                                     |
| Excess of Rating Level over Background | $(23-45)=-22$ dB                      |                                 |                                                                                                                                                                                     |
| Assessment of Impact                   | Negligible (depending on the context) | 11                              |                                                                                                                                                                                     |

**Table 7.4.8: BS4142 assessment at Receptor R2**

| Results                                | Value                                 | Relevant Clauses of BS4142:2014 | Commentary                                                                                                                                                                          |
|----------------------------------------|---------------------------------------|---------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Background Sound Level                 | $L_{A90}=45$ dB                       | 8.1, 8.2                        | Representative typical background sound level from measurements                                                                                                                     |
| Specific Sound Level                   | $L_{Aeq, T}=27$ dB                    | 7.3.6                           |                                                                                                                                                                                     |
| Acoustic Feature Correction            | 0 dB                                  | 9                               | Due to the predicted difference between the background sound level and the specific level, it may be challenging to identify any acoustic characteristics at the receptor locations |
| Rating Level                           | $(27)=27$ dB                          |                                 |                                                                                                                                                                                     |
| Excess of Rating Level over Background | $(27-45)=-18$ dB                      |                                 |                                                                                                                                                                                     |
| Assessment of Impact                   | Negligible (depending on the context) | 11                              |                                                                                                                                                                                     |

## Context and Uncertainties

The BS4142:2014 assessments for Receptors R1 and R2 indicate negligible impacts under the current proposed indicative masterplan. However, the following contextual factors and uncertainties should be considered:

1. **Indicative Masterplan Assumptions:** The assessment assumes the loading bays are positioned as per the indicative masterplan. If the final design places loading bays closer to the receptors, the impacts could be higher.
2. **Distance Adjustments:** For example, if the loading bays were moved 50% closer to the receptors, the resultant sound levels would increase by approximately 6 dB.
3. **Uncertainty in Screening:** The existing screening for Units E1 and E2 is assumed effective only for existing receptors.

It is recommended that when plans reach a more detailed stage, the assessment should be revisited to determine whether any mitigation is required.

## Assessment of Fixed Plant Noise Impacts

### Noise Limit from Fixed Plant and Equipment at NSRs

Apart from the HGV movements, it is anticipated that there may be fixed plant associated with the proposed employment uses that has the potential to generate noise. However, at this stage, details of the proposed type, number and precise location of any such plant or the nature of its operation are not available. In the absence of detailed information, it is appropriate to specify suitable noise control limits to which any plant (and noise associated with HGV movements) should conform. This is the standard approach where fixed plant details are not available and is considered embedded mitigation. These limits should include any appropriate corrections for acoustic characteristics, in accordance with BS 4142.

To ensure noise from fixed plant and equipment does not cause an adverse impact at relevant NSRs, the rating level of fixed plant noise sources (and HGV activities) should be designed to be at least 5 dB below the representative background sound level when measured at the nearest NSRs. The cumulative effect of all relevant industrial noise sources should be specified so that the rating level is less (by 5 dB) than the prevailing background sound level.

Noise from external plant and operations at the employment uses should achieve the following noise level limits, shown in Table 7.4.9.

**Table 7.4.9: Noise Limits from Industrial Sources (Plant, equipment, Noise break out etc.)**

| NSR                 | Rating Level Limit to be Achieved (dB $L_{A,T,r}$ ) |                        |
|---------------------|-----------------------------------------------------|------------------------|
|                     | Daytime (0700-2300)                                 | Night-time (2300-0700) |
| R1 and NSR4 to NSR8 | 40                                                  | 38                     |

It should be noted that the above rating limits are based on the proposed location of the Employment uses based on the indicative masterplan, and the numbers are based on the representative background sound levels in ML1.

The above rating level limits apply at least 3.5 metres from the façade of any residential property i.e. in free-field conditions.

In accordance with BS 4142, the assessment of plant noise emissions (and HGV activities) should include appropriate rating corrections for tonal, irregular or intermittent characteristics<sup>8</sup> where applicable, before comparison with the above limits.

Once the detailed nature of such future uses is confirmed, noise from any fixed plant, equipment and break-out noise can be considered to ensure that the above limits can be met.

It should be noted that the derived rating level limits would be applicable to the total noise from the simultaneous operation of all external plant, equipment (including HGV movements) and break-out noise serving the Proposed Development. As such, noise emissions from individual sources will need to be lower than the given limit, although the exact limit for each individual source will be dependent upon its type, noise characteristics, location etc. This issue is best addressed during the detailed design stage.

Should the limits set out in Table 7.4.9 be met, it is likely that any effect would be limited to a permanent, minor adverse (Not Significant) effect at worst.

---

<sup>8</sup> At the receptor locations.

---