



**ENVIRONMENTAL STATEMENT**

**VOLUME 2**

**APPENDIX 9.2 – CONSTRUCTION NOISE AND  
VIBRATION IMPACT ASSESSMENT**

## **Appendix 9.2: Construction Noise and Vibration Impact Assessment**

## **Construction Noise and Vibration Assessment**

This Appendix discusses the potential noise and vibration effects on sensitive receptors arising during the construction phase of the Proposed Development.

Noise and vibration levels experienced by local receptors during such works depend upon a number of variables, the most significant of which are:

- The noise generated by plant or equipment used on site, generally expressed as sound power levels ( $L_w$ ) or the vibration generated by the plant;
- The periods of use of the plant on site, known as on-time;
- The distance between the noise/vibration source and the receptor;
- The noise attenuation due to ground absorption, air absorption and barrier effects;
- In some instances, the reflection of noise due to the presence of hard surfaces such as the sides of buildings; and
- The nature of the ground with respect to vibration transmission.

Key construction related activities associated with the Proposed Development are likely to include, but are not limited to:

- Excavation and substructure works;
- Drainage works;
- Superstructure and building envelopes;
- Fitting out; and
- Hard landscaping/highways infrastructure.

## **Construction Noise Criteria**

As a construction contractor has not yet been appointed, specific details on the construction activities, programme and number or type of construction plant are not yet available. Therefore, detailed construction noise predictions at specific NSRs have not been undertaken. Nevertheless, indicative construction noise predictions have been undertaken using the calculation methods set out in BS 5228:2009+A1:2014. In the absence of specific construction details for the project the predictions have been based on details of similar previous projects. For each stage of construction, the noisiest activities have been assumed to occur simultaneously at the point on the site closest to the NSR. In practice these activities will not occur simultaneously and will be distributed across the Site, hence the approach taken represents a worst case.

The calculation method provided in BS 5228 takes account of factors including the number and types of equipment operating, their associated Sound Power Levels (SWLs), their modes of operation (% on-times within the working period), the distance to NSRs, and the effects of any intervening ground cover or barrier/ topographical screening. This allows prediction of the magnitude of impact.

The subsequent assessment of construction noise 'effects' at residential NSRs considers the guidance in 'example method 1 – the ABC method' as defined in BS 5228- 1:2009+A1:2014.

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Table 7.2.1 (reproduced from BS 5228) provides guidance in terms of appropriate threshold values for residential NSRs, based upon existing ambient noise levels.

**Table 7.2.1: Construction Noise Thresholds at Residential Dwellings**

| Assessment Category and Threshold Value Period        | Threshold Value $L_{Aeq,T}$ dB(A) – Free-field |                           |                           |
|-------------------------------------------------------|------------------------------------------------|---------------------------|---------------------------|
|                                                       | Category A <sup>(a)</sup>                      | Category B <sup>(b)</sup> | Category C <sup>(c)</sup> |
| Night-time (23:00 – 07:00)                            | 45                                             | 50                        | 55                        |
| Evenings and weekends                                 | 55                                             | 60                        | 65                        |
| Daytime (07:00 – 19:00) and Saturdays (07:00 – 13:00) | 65                                             | 70                        | 75                        |

NOTE 1: A potential significant effect is indicated if the  $L_{Aeq,T}$  noise level arising from the site exceeds the threshold level for the category appropriate to the ambient noise level.

NOTE 2: If the ambient noise level exceeds the Category C threshold values given in the table (i.e. the ambient noise level is higher than the above values), then a potential significant effect is indicated if the total  $L_{Aeq,T}$  noise level for the period increases by more than 3 dB due to site noise.

NOTE 3:

Applies to residential receptors only.

(a) Category A: Threshold values to use when ambient noise levels (when rounded to the nearest 5 dB) are less than these values.

(b) Category B: Threshold values to use when ambient noise levels (when rounded to the nearest 5 dB) are the same as Category A values.

(c) Category C: Threshold values to use when ambient noise levels (when rounded to the nearest 5 dB) are higher than Category A values.

(d) 19:00 – 23:00 weekdays, 13:00 – 23:00 Saturdays, 07:00 – 23:00 Sundays.

For the appropriate period (day, evening, night, weekend etc.), the ambient noise level is determined and rounded to the nearest 5 dB and the appropriate Threshold Value is then derived. The predicted construction noise level is then compared with this Threshold Value. Based upon this BS 5228 ABC method, the criterion adopted in this assessment for the determination of potentially significant effects is the exceedance of the  $L_{Aeq,T}$  threshold level for the category appropriate to the ambient noise level at each NSR.

This is considered to be potentially equivalent to the Significant Observed Adverse Effect Level (SOAEL), although as stated in BS 5228, other project-specific factors, such as the number of NSRs affected and the duration and character of the impact should also be considered by the assessor when determining if there is a potentially significant effect. Similarly, the criterion for the LOAEL for this assessment is a predicted construction noise level equal to the existing ambient noise level at each NSR, i.e. resulting in a 3 dB increase in noise level when combined with the ambient noise level. Note that these criteria relate to residential NSRs only, in line with the ABC method.

In accordance with the NPPF and NPSE, it is important to identify NSRs that exceed the LOAEL and ensure adverse effects are mitigated and minimised. The assessment focuses on the impact at existing residential NSRs.

Based upon the above, the magnitude of the impact of construction noise is classified in accordance with the descriptors in Table 7.2.2.

**Table 7.2.2: Magnitude of Construction Noise Impacts**

| Criteria                                                | Magnitude of Impact |
|---------------------------------------------------------|---------------------|
| Exceedance of ABC Threshold Value by more than 5 dB     | High                |
| Exceedance of ABC Threshold Value up to 5 dB            | Medium              |
| Equal to or below the ABC Threshold Value by up to 5 dB | Low                 |
| Below the ABC Threshold Value by more than 5 dB         | Very Low            |

## Construction Vibration Criteria

### Effects on Humans

Construction vibration has the potential to impact upon occupants of buildings within the vicinity of the works. BS 5228-2:2009+A1:2014 provides guidance on the perception of vibration within occupied buildings and provides a simple method of determining annoyance alongside evaluation of cosmetic damage associated with vibration.

The potential impact depends on the type of piling, ground conditions, and distance to NSRs. As part of the Proposed Development, it is anticipated that piled foundations will only be necessary in some localised areas, and this will be determined at the detailed design stage.

The following criteria set out in Table 7.2.3 has been adopted and is based upon the guidance on effects of vibration levels applicable to human perception as presented within BS5228-2. The corresponding vibration ranges and associated magnitude of effect ratings adopted for the purpose of this assessment have also been included within Table 7.2.3.

**Table 7.2.3: Magnitude of Effect Applicable to Construction Vibration – Applicable to Human Perception**

| Vibration Level | Effect                                                                                      | Magnitude of Impact |
|-----------------|---------------------------------------------------------------------------------------------|---------------------|
| >10.0 mm/s      | Vibration is likely to be intolerable for any more than a very brief exposure to this level | High                |
| 1.0 > 10.0 mm/s | Onset of complaints in residential environments                                             | Medium              |
| 0.3 > 1.0 mm/s  | Onset of perceptibility in residential environments                                         | Low                 |
| < 0.3 mm/s      | Unlikely to be perceptible in residential environments                                      | Very Low            |

For residential receptors and other high sensitivity receptors, the LOAEL is defined as a PPV of 0.3 mm/s (millimetres per second), this being the point at which construction vibration is likely

to become perceptible. The SOAEL is defined as a PPV of 1.0 mm/s, this being the level at which construction vibration can be tolerated with prior warning.

At receptors above the SOAEL, further consideration of whether an effect is significant is undertaken using professional judgement, taking account of the duration and frequency of the effect, as well as the time of evening/ night that the effect would be experienced.

## Effects on Buildings

In addition to human annoyance, building structures may be damaged by high levels of vibration. The levels of vibration that may cause building damage are far in excess of those that may cause annoyance. Consequently, if vibration levels are controlled by reference to those relating to annoyance (i.e. 1.0 mm/s), then it is highly unlikely that buildings will be structurally damaged by demolition and construction vibration levels.

The criteria used in this assessment relate to the potential for cosmetic damage, not structural damage as these are lower and hence the assessment is more onerous. The principal concern is generally transient vibration, for example due to piling.

BS 7385-2: 1993<sup>1</sup> provides guidance on vibration levels likely to result in cosmetic damage and is referenced in BS 5228-2: 2009+A1:2014. Guide values for transient vibration, above which cosmetic damage could occur, are given in Table 7.2.4.

**Table 7.2.4: Transient Vibration Guide Values for Cosmetic Damage**

| Type of Building                                                                     | Peak Component Particle Velocity in Frequency Range of Predominant Pulse |                                                                 |
|--------------------------------------------------------------------------------------|--------------------------------------------------------------------------|-----------------------------------------------------------------|
|                                                                                      | 4 Hz to 15 Hz                                                            | 15 Hz and above                                                 |
| Reinforced or framed structures<br>Industrial and heavy commercial buildings         | 50 mm/s at 4 Hz and above                                                |                                                                 |
| Unreinforced or light framed structures<br>Residential or light commercial buildings | 15 mm/s at 4 Hz<br>increasing to 20 mm/s<br>at 15 Hz                     | 20 mm/s at 15 Hz<br>increasing to 50 mm/s<br>at 40 Hz and above |

NOTE 1: Values referred to are at the base of the building.

NOTE 2: For un-reinforced or light framed structures and residential or light commercial buildings, a maximum displacement of 0.6 mm (zero to peak) is not to be exceeded.

BS 7385-2:1993 states that the probability of building damage tends to zero for transient vibration levels less than 12.5 mm/s PPV. For continuous vibration, such as from vibratory rollers, the threshold is around half this value.

It is also noted that these values refer to the likelihood of cosmetic damage. ISO 4866:2010<sup>2</sup> defines three different categories of building damage:

<sup>1</sup> British Standards Document BS 7385-2

Evaluation and measurement for vibration in buildings. Guide to damage levels from groundborne vibration.

<sup>2</sup> ISO 4866:2010 Mechanical vibration and shock — Vibration of fixed structures — Guidelines for the measurement of vibrations and evaluation of their effects on structures.

- Cosmetic: Formation of hairline cracks in plaster or drywall surfaces and in mortar joints of brick/concrete block constructions;
- Minor: Formation of large cracks or loosening and falling of plaster or drywall surfaces or cracks through brick/block; and
- Major: Damage to structural elements, cracks in support columns, loosening of joints, splaying of masonry cracks.

BS 7385-2:1993 defines that minor damage occurs at a vibration level twice that of cosmetic damage and major damage occurs at a vibration twice that of minor damage. Therefore, this guidance can be used to define the magnitude of impact identified in Table 7.2.5 below.

**Table 7.2.5: Magnitude of Impact – Construction Vibration Building Damage**

| Magnitude of impact | Damage Risk | Continuous vibration level PPV mm/s |
|---------------------|-------------|-------------------------------------|
| High                | Major       | 30                                  |
| Medium              | Minor       | 15                                  |
| Low                 | Cosmetic    | 6                                   |
| Very low            | Negligible  | <6                                  |

## Noise Sensitive Receptors (NSRs)

The following receptors were identified as the most affected during construction, located at approximately 15 metres from construction activities:

- NSR1: Dwellings on Stakehill Lane (north of the site, adjacent to the A627(M)).
- NSR2: Dwellings on the North Side of Bentley Avenue (west of the site).
- NSR3-8: Dwellings overlooking Stakehill Lane (south to southwest of the site)

However, it should be noted that based on the indicative masterplan, dwellings are proposed to be located at distances further than 15 m from the nearest existing residential receptors, and therefore an assessment of impacts at 15 m may be considered as a worst case scenario.

As per Figure 7.2.1, a number of existing residential receptors are located in very close proximity to the red line boundary of the site.

Figure 7.2.1: Location of noise sensitive receptors



- Indicative red line boundary
- Nearest existing commercial/industrial noise sources
- Nearest road traffic noise sources
- Nearest existing noise sensitive receptors

## Construction Noise Assessment

The assessment of construction noise has been undertaken in accordance with the ABC method detailed in BS 5228-1:2009+A1:2014. The assessment has been undertaken at the NSRs, and the determined daytime noise limits at each receptor re detailed below in Table 7.2.6.

Table 7.2.6: Determination of construction stage noise limits, dB(A)

| NSR | Measured Noise Level (dB(A)) | Ambient Noise Levels Rounded to the Nearest 5dB (A) | Category Value in Accordance with BS5228-1 | Noise Level at which Noise from Construction Stage may cause a Significant Impact |
|-----|------------------------------|-----------------------------------------------------|--------------------------------------------|-----------------------------------------------------------------------------------|
| 1   | 64 at ML2                    | 65                                                  | B                                          | 70                                                                                |
| 2   | 52 at ML4                    | 50                                                  | A                                          | 65                                                                                |
| 3-8 | 47 at ML1                    | 50                                                  | A                                          | 65                                                                                |

For the purposes of this assessment, it has been assumed that operational hours for the construction works will be between 8am – 6pm only. For works outside the daytime hours of 8am – 6pm as considered in BS 5228-1, additional limit values should be agreed with the Local Planning Authority.

Specific details of activities and associated plant are not available at this stage. In terms of the potential noise effects, excavation/earthworks/regrading using heavy plant is likely to be the source of the main impacts at nearby NSRs. The construction and fitting out of the new buildings are likely to result in lower noise levels.

Notwithstanding this, Table 7.2.7 sets out the key construction activities which have been assumed including the plant type, number and assumed utilisation (percentage 'on-time') used in the prediction of noise levels. These were taken from BS 5228 Annex C which details current sound level data on site equipment and site activities.

**Table 7.2.7: Construction Noise Source Levels**

| Stage                  | Sub-Task                 | Machinery                    | BS 5228-1 Reference | Measured $L_{Aeq}$ at 10m (dB) | % On-Time | Number Operating on Site |
|------------------------|--------------------------|------------------------------|---------------------|--------------------------------|-----------|--------------------------|
| Stage 1 - Earthworks   | Clearing Site            | Dozer                        | C.2.12              | 75                             | 50%       | 1                        |
|                        |                          | Tracked Excavator            | C.2.23              | 77                             | 50%       | 2                        |
|                        | Ground Excavation        | Tracked Excavator            | C.2.26              | 79                             | 50%       | 2                        |
|                        | Loading Lorries          | Tracked Excavator            | C.2.26              | 79                             | 50%       | 1                        |
|                        |                          | Wheeled Loader               | C.2.12              | 79                             | 50%       | 1                        |
|                        | Distribution of Material | Dump Truck - Tipping         | C.2.30              | 79                             | 50%       | 2                        |
|                        |                          | Lorry                        | C.2.34              | 80                             | 50%       | 2                        |
|                        | Road Construction        | Road Roller                  | C.5.19              | 80                             | 50%       | 1                        |
|                        |                          | Asphalt Paver                | C.2.31              | 77                             | 50%       | 1                        |
| Stage 2 - Construction | Mixing Concrete          | Cement Mixer Truck - Idling  | C.4.19              | 71                             | 50%       | 1                        |
|                        |                          | Cement Mixer - Discharging   | C.4.18              | 75                             | 50%       | 2                        |
|                        | Pumping Concrete         | Concrete Pump + Cement Mixer | C.4.29              | 67                             | 50%       | 1                        |
|                        | Lifting Ops              | Mobile Telescopic Crane      | C.4.39              | 77                             | 50%       | 2                        |

| Stage | Sub-Task               | Machinery                                | BS 5228-1 Reference | Measured LAeq at 10m (dB) | % On-Time | Number Operating on Site |
|-------|------------------------|------------------------------------------|---------------------|---------------------------|-----------|--------------------------|
|       |                        | Telescopic Handler                       | C.4.54              | 79                        | 50%       | 1                        |
|       | Compaction of Concrete | Diesel Generator                         | D.8.41              | 94                        | 50%       | 1                        |
|       |                        | Poker Vibrator                           | D.8.42              | 94                        | 50%       | 1                        |
|       |                        | Compressor                               | D.8.43              | 77                        | 50%       | 1                        |
|       | Cutting Concrete       | Circular Saw                             | C.4.71              | 85                        | 50%       | 1                        |
|       | Power for Site Cabins  | Diesel Generator                         | C.4.76              | 61                        | 50%       | 1                        |
|       | Moving Equipment       | Tracked Excavator                        | D.3.14              | 88                        | 50%       | 2                        |
|       |                        | Forklift Trucks                          | D.7.94              | 88                        | 50%       | 2                        |
|       |                        | Wheeled Excavator with Hydraulic Breaker | C.2.42              | 78                        | 50%       | 2                        |

The predictions have followed the methodology contained within BS 5228-1 and are in terms of the  $L_{Aeq,T}$  over the core working day, which is assumed to be 0800-1800 Monday to Friday. The predictions assume all plant will be located at the approximate centre of the site to represent a typical scenario ("average case") and at the closest point to a given boundary of the site to represent a worst-case scenario ("worst-case"). It is key to note that the worst-case scenario is likely to occur for a very short duration, if at all.

Predictions have been carried out to determine noise levels likely to be generated during the construction stage. For the purpose of these predictions, it was assumed that the intervening ground between the construction noise sources, and the receivers will be acoustically hard such that there will be no additional attenuation of sound due to ground absorption and that no acoustic barriers such as local buildings will be present, thus informing a worst-case assessment.

Noise predictions have been undertaken for NSR 2 only as this may represent not only a worst-case scenario, but the likely construction noise impact at all receptors. Table 7.2.8 sets out the average and worst case predicted unmitigated earthworks and construction noise levels for the construction stage whilst Table 7.2.9 presents the resultant magnitude of impact.

**Table 7.2.8: Predicted Unmitigated Average and Worst-case Construction Noise Levels,  $L_{AeqT}$**

| Receptor | Distance to Proposed Development (m) |            | Earthworks Noise Levels, $dB L_{AeqT}$ |            | Construction Noise Levels, $dB L_{AeqT}$ |            |
|----------|--------------------------------------|------------|----------------------------------------|------------|------------------------------------------|------------|
|          | Average                              | Worst-case | Average                                | Worst-case | Average                                  | Worst-case |
| NSR 2    | 150                                  | 15         | 63                                     | 83         | 73                                       | 93         |

**Table 7.2.9: Predicted Unmitigated Average and Worst-case Construction Noise Magnitude of Impact**

| Receptor | Distance to Proposed Development (m) |            | Earthworks Noise Levels, $dB L_{AeqT}$ |            |
|----------|--------------------------------------|------------|----------------------------------------|------------|
|          | Average                              | Worst-case | Average                                | Worst-case |
| NSR 2    | Low                                  | High       | High                                   | High       |

During average-case construction works, the magnitude of impact is predicted to be low during earthworks and high at worst during the construction stage for NSR 2. During worst-case construction works, the magnitude of impact is predicted to be high during the earthworks stage and high at worst during the construction stage.

As such, there is predicted to be a temporary, short-term major adverse effect (significant) during construction works.

Based on the above, recommendations for appropriate mitigation are presented in the mitigation measures section below.

## Construction Vibration

As with construction noise, it is anticipated that there may be some disturbance in terms of vibration caused at the very nearest sensitive receptors during the works. However, any disturbance would be localised, and the works would be short term.

In accordance with the methodologies and criteria detailed in BS 5228-2, vibration levels likely during vibratory compaction activity (i.e. the forming of land) have been predicted. The predictions have been based on the methodology in BS 5228-2 for vibratory compaction. This activity is considered reasonably representative of worst-case activities anticipated during the works, in terms of levels of vibration likely to be generated.

The predicted<sup>3</sup> construction vibration levels during compaction at the average-case and worst-case distances, as detailed in Table 7.2.9, are presented in Table 7.2.10. The resulting magnitude of impact at each NSR is presented in Table 7.2.11.

**Table 7.2.10: Predicted Unmitigated Average and Worst-case Construction Vibration Levels (PPV mm/s)**

| Receptor | Peak Particle Velocity (PPV) mm/s (steady-state operation) |            |
|----------|------------------------------------------------------------|------------|
|          | Average                                                    | Worst-case |
| NSR 2    | 0.03                                                       | 0.78       |

<sup>3</sup> Assuming a Bomag BW135AD twin smooth drum roller is used. This is a "small" ride on roller.

**Table 7.2.11: Predicted Unmitigated Average and Worst-case Construction Vibration Magnitude of Impact**

| Receptor | Magnitude of Impact |            |
|----------|---------------------|------------|
|          | Average             | Worst-case |
| NSR 2    | Very Low            | Low        |

It can be seen from Table 7.2.11 that the predicted magnitude of impact from construction vibration at the representative typical case NSR is very low for the average case and low for the worst-case distances. Based on this magnitude of impact there is predicted to be a temporary minor adverse effect. This is considered not significant.

However, under the worst case scenario, the predicted vibration level exceeds the LOAEL and therefore specific mitigation measures have been considered for construction vibration.

### Mitigation Measures

To effectively manage and mitigate potential construction noise impacts, the following measures will be implemented.

### Construction Environmental Management Plan (CEMP)

A detailed **Construction Environmental Management Plan (CEMP)** will be adopted and implemented. The CEMP provides a structured approach to managing construction activities, and in relation to noise and vibration impacts it ought to include the following:

### Noise Control Measures

#### 1. Use of Low-Noise Equipment:

- All construction plant and equipment, such as tracked excavators, dozers, dump trucks, and road rollers, will comply with modern noise emission standards and undergo regular maintenance to reduce noise levels.

#### 2. Acoustic Screening:

- Temporary acoustic barriers, such as solid hoardings or noise screens, will be installed along site boundaries closest to sensitive receptors (e.g., Stakehill Lane and Bentley Avenue).
- These barriers will be designed to provide a noise reduction of at least 10 dB at nearby sensitive locations.

#### 3. Optimised Scheduling:

- Noisy activities, including material handling and concrete cutting, will be limited to standard working hours:
  - 08:00–18:00 on weekdays and 08:00–13:00 on Saturdays.
- Any work outside these hours will only be conducted with prior approval from the Local Planning Authority and residents will be informed in advance.

#### 4. Vehicle Noise Management:

- A no-idling policy will be enforced for all vehicles and equipment when not in active use.
- Designated haul routes will be used to minimise noise impacts on nearby sensitive receptors.

5. **Monitoring and Adaptive Management:**

- Regular noise monitoring will be carried out at key sensitive receptors to ensure compliance with noise thresholds.
- If noise thresholds are exceeded, corrective actions, such as rescheduling activities or deploying additional mitigation measures, will be taken immediately.

## Vibration Control Measures

Specific vibration mitigation measures in order to reduce impacts to a minimum (in line with policy at LOAEL) include the following best practices:

1. **Use of Low-Vibration Equipment:**

- Wherever possible, equipment designed to minimise vibration impacts will be used, such as modern tracked excavators and road rollers.

2. **Buffer Zones:**

- High-vibration activities will be carried out at the maximum possible distance from sensitive receptors.

3. **Community Communication:**

- Residents will be informed of any activities with potential for vibration impacts to ensure transparency and minimise concerns.

## Residual Effects

With the CEMP and these mitigation measures in place:

- **Noise Impacts:**
    - Reduced to **Minor Adverse** during high-intensity activities (e.g., earthworks and concrete works) at close proximity to existing receptors.
    - Reduced to **Negligible** during lower-intensity activities (e.g., landscaping and internal fitting out).
  - **Vibration Impacts:**
    - Predicted to reduce to **Negligible** across all receptors, with no significant effects anticipated.
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### **Appendix 7.3: Operational Road Traffic Noise Impact Assessment**

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## Introduction

This Appendix evaluates the potential noise impacts associated with the operation of the proposed development. The assessment is conducted in accordance with the methodology detailed in *DMRB LA111 Noise and Vibration (Revision 2)*. It focuses on comparing the 2040 "Do Minimum" and "Do Something" scenarios to quantify changes in noise levels, thereby illustrating the effects of increased road traffic anticipated to support the development.

## Methodology

The Calculation of Road Traffic Noise (CRTN) methodology was employed to calculate the Basic Noise Levels (BNLs,  $LA_{10,18h}$  at 10m from the effective source, at a height of 1.5m above local ground level) for each road link under assessment. A notional receptor location was chosen as it provides a consistent basis for assessing changes in road traffic noise levels along each road link.

BNLs were calculated for the following scenarios:

- 2025 Base Year: Baseline traffic conditions.
- 2040 Do-Minimum: Includes traffic growth and committed developments without the proposed development.
- 2040 Do-Something: Includes traffic growth, committed developments, and additional traffic generated by the proposed development.

Traffic volumes, speeds, and vehicle compositions were supplied by WSP (see Table 7.3.1), the transport consultant for this study.

**Table 7.3.1: Traffic Flows**

| Road Name                  | Ref No | Average speed (kph) | 2025 Base Year |      | 2040 Do Minimum |      | 2040 Do Something |      |
|----------------------------|--------|---------------------|----------------|------|-----------------|------|-------------------|------|
|                            |        |                     | AAWT 18hr      | %HGV | AAWT 18hr       | %HGV | AAWT 18hr         | %HGV |
| A627 (M) NB                | 5      | 113                 | 40831          | 5%   | 64778           | 5%   | 64844             | 5%   |
| A627 (M)SB                 | 6      | 113                 | 39907          | 5%   | 54468           | 5%   | 54540             | 5%   |
| A627 (M) Slattocks Link EB | 9      | 113                 | 13599          | 5%   | 26643           | 5%   | 26798             | 5%   |
| A627 (M) Slattocks Link WB | 10     | 113                 | 17782          | 5%   | 27736           | 5%   | 27900             | 5%   |
| Bentley Avenue             | 11     | 48                  | 379            | 4%   | 10815           | 4%   | 11614             | 5%   |
| Whitbrook Way NB           | 12     | 48                  | 7595           | 7%   | 11238           | 7%   | 11386             | 7%   |
| Whitbrook Way SB           | 13     | 48                  | 8236           | 7%   | 9346            | 7%   | 9553              | 7%   |

|                    |    |     | 2025 Base Year |      | 2040 Do Minimum |      | 2040 Do Something |      |
|--------------------|----|-----|----------------|------|-----------------|------|-------------------|------|
| A664 Rochdale Road | 14 | 48  | 31829          | 2%   | 38029           | 2%   | 38687             | 5%   |
| A664 Rochdale Road | 15 | 48  | 17500          | 3%   | 29738           | 3%   | 29913             | 5%   |
| A627 (M)           | 24 | 113 | 28821          | 3.5% | 33331           | 3.5% | 33374             | 5.0% |
| A627 (M)           | 25 | 113 | 25433          | 4.2% | 30044           | 4.2% | 30079             | 5.0% |

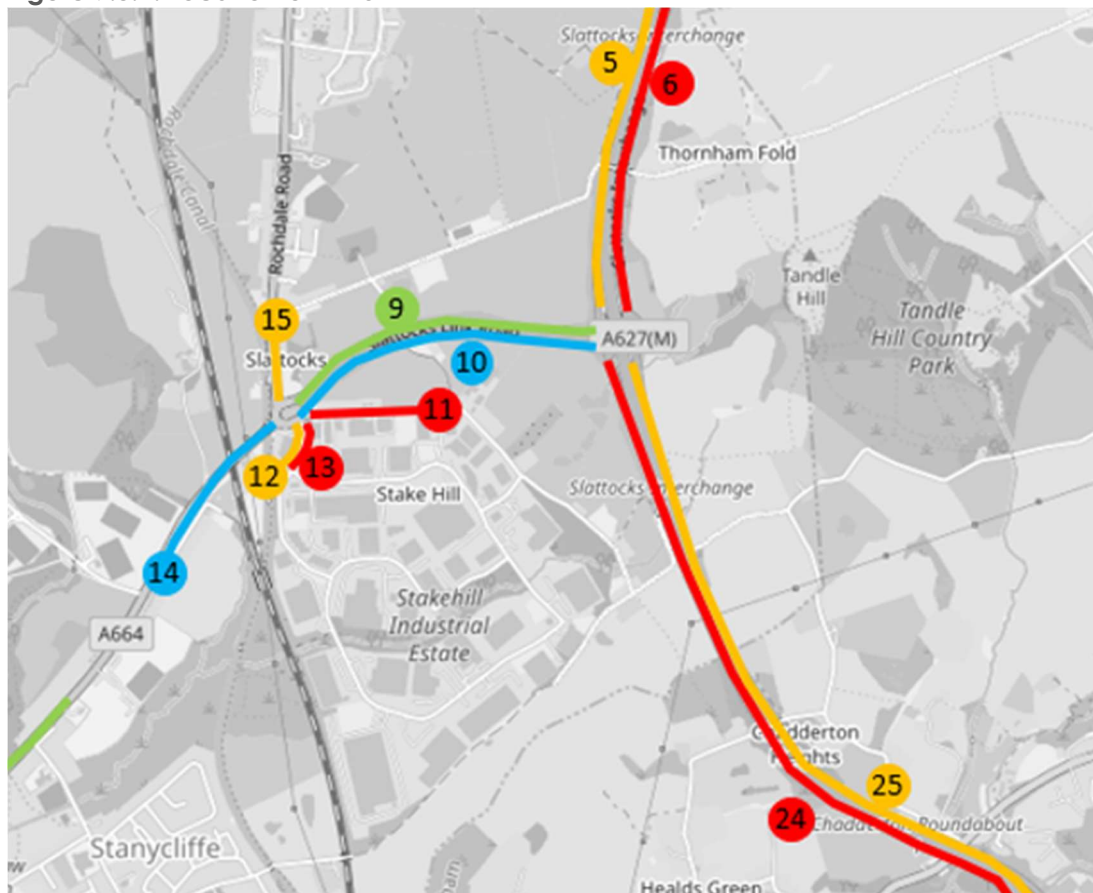
Table 7.3.2 includes a description of where these traffic flows are in relation to the from and to points.

**Table 7.3.2: Traffic flow links from/to**

| Road Name               | Ref. No | From                          | To                            | Road Class | Direction/2 way |
|-------------------------|---------|-------------------------------|-------------------------------|------------|-----------------|
| A627 (M)                | 5       | A627(M) Slattocks Interchange | M62 J20                       | Motorway   | NB              |
| A627 (M)                | 6       | M62 J20                       | A627(M) Slattocks Interchange | Motorway   | SB              |
| A627 (M) Slattocks Link | 9       | Slattocks Roundabout          | A627(M) Slattocks Interchange | Motorway   | EB              |
| A627 (M) Slattocks Link | 10      | A627(M) Slattocks Interchange | Slattocks Roundabout          | Motorway   | WB              |
| Bentley Avenue          | 11      | Bentley Avenue                | Bentley Avenue                | Local Road | 2-way           |
| Whitbrook Way           | 12      | Whitbrook Way                 | Slattocks Roundabout          | Local Road | NB              |
| Whitbrook Way           | 13      | Slattocks Roundabout          | Whitbrook Way                 | Local Road | SB              |
| A664 Rochdale Road      | 14      | A664 Rochdale Road            | A664 Rochdale Road            | A Road     | 2-way           |
| A664 Rochdale Road      | 15      | A664 Rochdale Road            | A664 Rochdale Road            | A Road     | 2-way           |
| A627 (M)                | 24      | Chadderton Roundabout         | A627(M) Slattocks Interchange | Motorway   | NB              |
| A627 (M)                | 25      | A627(M) Slattocks Interchange | Chadderton Roundabout         | Motorway   | SB              |

Figure 7.3.1 Shows the location of the traffic flow links used in the assessment.

**Figure 7.3.1: Location of links**



The analysis incorporated the guidance within DMRB LA111 Noise and Vibration (Revision 2) guidance to classify as far as possible the noise impacts based on the magnitude of change:

**Table 7.3.3: Classification of Magnitude of Noise Impacts in the Short Term and Long Term**

| Short Term Noise Change (dB $L_{A10,18h}$ ) | Magnitude of Impact | Long Term Noise Change (dB $L_{A10,18h}$ ) | Magnitude of Impact |
|---------------------------------------------|---------------------|--------------------------------------------|---------------------|
| 0                                           | Very Low            | <3                                         | Very Low            |
| 0.1 to 0.9                                  | Low                 | 3.0 to 4.9                                 | Low                 |
| 1.0 to 2.9                                  | Medium              | 5.0 to 9.9                                 | Medium              |
| 3.0 to 4.9                                  | High                | 10+                                        | High                |

Table 7.3.4 below, reproduced from Table 3.58 of DMRB LA111, outlines the initial assessment of likely significant effects on noise-sensitive buildings:

**Table 7.3.4: Likely significant effects**

| Significance    | Short-Term Magnitude of Change |
|-----------------|--------------------------------|
| Significant     | Major                          |
| Significant     | Moderate                       |
| Not Significant | Minor                          |

| Significance    | Short-Term Magnitude of Change |
|-----------------|--------------------------------|
| Not Significant | Negligible                     |

DMRB LA111 states that the Lowest Observed Adverse Effect Level (LOAEL) and Significant Observed Adverse Effect Levels (SOAEL) shall be set for all noise-sensitive receptors within the Study Area, for time periods when they are in use. LOAEL and SOAEL considered in this assessment are defined in Table 7.3.5 below, reproduced from Table 3.49.1 of DMRB LA111:

**Table 7.3.5: LOAEL and SOAEL Levels**

| Time Period         | LOAEL                                    | SOAEL                                    |
|---------------------|------------------------------------------|------------------------------------------|
| Day (06:00 – 24:00) | 55 dB $L_{A10,18hr}$ (façade)            | 68 dB $L_{A10,18hr}$ (façade)            |
| Night (23:00-07:00) | 40 dB $L_{night}$ , outside (free-field) | 55 dB $L_{night}$ , outside (free-field) |

## Significance Thresholds

It is considered that a potentially significant noise change occurs when:

- A 1 dB change in noise level in either the short-term or long-term when the resulting noise level exceeds the SOAEL. In the long-term, the noise level must also change by at least 1 dB when comparing the Do-Minimum and Do-Something scenarios to ensure the change is as a result of the proposed scheme as opposed to a change that would happen even if the proposed scheme did not go ahead.
- A 3 dB change in the short-term or 5 dB change in the long-term (i.e., “moderate” change from DMRB LA111) where the resulting noise level is between the LOAEL and SOAEL.
- Where noise levels are below the LOAEL, significant effects are not expected.

## Baseline Conditions

BNLs in the 2025 Base Year range from 32 dB to 79 dB, however most relevant to existing and proposed residential receptors are the levels of 44.9 dB at Bentley Avenue to 74.1/75.3 dB at A627 (M) Slattocks Link.

According to CRTN, the methodology is not considered reliable for roads with flows below 1,000 vehicles per 18-hour period (06:00–24:00). This is due to the increased influence of individual vehicle noise events and the reduced averaging effect of continuous traffic, leading to less consistent and less representative noise predictions. For such low-flow scenarios, the model's assumptions and equations may fail to account for the variability in noise emissions caused by sporadic vehicle movements.

For Bentley Avenue, where the predicted traffic flows fall below this threshold during the baseline scenario (341 vehicles over 18 hours), the use of CRTN is inherently less reliable. The methodology itself recommends caution in interpreting the results for such road links. CRTN advises that for roads with very low traffic volumes, alternative methods, such as on-site noise monitoring, should be considered to verify and complement the predicted noise levels.

Given these limitations, the predicted baseline noise level of 44.9 dB  $L_{A10,18h}$  for Bentley Avenue should be treated with caution. This value may not fully reflect the true acoustic conditions, particularly if intermittent noise events or background contributions from

surrounding areas play a significant role. During the baseline survey, monitoring position ML4 was overlooking Bentley Avenue and therefore can be a good resource to use for comparison purposes. Unfortunately, during this survey the  $L_{A10}$  levels were not measured. However, the measured  $L_{Aeq, 24 \text{ hours}}$  was 47.6 dB and based on the relationship proposed by Huybregts and Samuels<sup>4</sup>, the corresponding  $L_{A10, 18 \text{ hour}}$  would be 50.8 dB. As such, it is proposed that this number is used to assess the baseline of road traffic noise along Bentley Avenue rather than the CRTN calculated level of 44.9 dB.

## Noise Level Predictions

**Table 7.3.6: Summary of Predicted Noise Levels and Changes, dB**

| Road Name                  | Ref No | 2025 Base Year | Road Name | Ref No | 2025 Base Year | Road Name |
|----------------------------|--------|----------------|-----------|--------|----------------|-----------|
| A627 (M) NB                | 5      | 78.9           | 80.9      | 80.9   | +2.0           | 0         |
| A627 (M)SB                 | 6      | 78.8           | 80.1      | 80.1   | +1.4           | 0         |
| A627 (M) Slattocks Link EB | 9      | 74.1           | 77.0      | 77.1   | +2.9           | 0         |
| A627 (M) Slattocks Link WB | 10     | 75.3           | 77.2      | 77.2   | +2.0           | 0         |
| Bentley Avenue             | 11     | 50.8           | 65.5      | 65.8   | +15            | +0.3      |
| Whitbrook Way NB           | 12     | 63.9           | 65.6      | 65.7   | +1.8           | +0.1      |
| Whitbrook Way SB           | 13     | 64.3           | 64.8      | 64.9   | +0.6           | +0.1      |
| A664 Rochdale Road         | 14     | 70.1           | 70.9      | 71.0   | +0.9           | +0.1      |
| A664 Rochdale Road         | 15     | 67.5           | 69.8      | 69.9   | +2.3           | 0         |
| A627 (M)                   | 24     | 77.8           | 78.5      | 78.5   | +0.7           | 0         |

## Significance of Impacts

The transport consultants (WSP) have not explicitly stated whether 2040 is the opening year or the future year (i.e. opening year + 15 years). WSP has confirmed that the 2040 Do minimum scenario represents the 2025 baseline traffic flows plus the anticipated traffic growth including committed developments (including all Pfe Sites). They have advised that the 2040 Do Something scenario is the traffic flows in 2040 Do Minimum plus the proposed development trip generation.

<sup>4</sup> Huybregts and Samuels (1998). New relationships between  $L_{10}$  and  $L_{eq}$  for road traffic noise. Proceedings of Internoise 1998. November 16 -18th, Christchurch, New Zealand.

The assessment focuses on the differences between the 2040 Do-Minimum and 2040 Do-Something scenarios to determine significance, as these isolate the development's specific contribution to noise impacts. Based on this review the highest predicted increase in noise levels associated with road traffic from the proposed development is +0.3 dB and such an increase is considered negligible (either as a short term or a long term impact) and not significant in EIA terms. No mitigation measures are required for these existing premises as the predicted development's contribution to noise is minimal.

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**Appendix 7.4: Noise from Proposed Commercial/Industrial Noise onto Existing and Proposed  
Receptors**

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## **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 ( $L_{Ar,T_r}$ ). 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.

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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.

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<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.

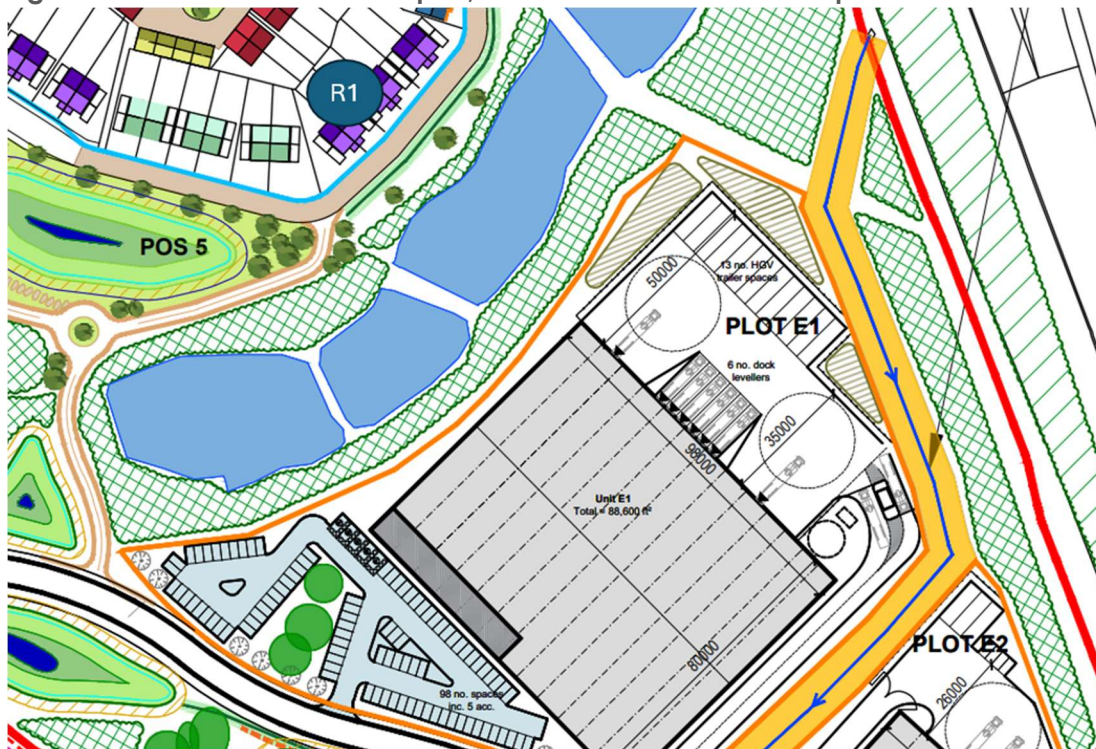
The site (based on the indicative masterplan) includes four proposed units (E1, E2, E3A, and E3B) designated for employment uses, with HGV docking facilities located within proximity to existing residential areas. Key features include:

- **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.

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

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## **Appendix 7.5: Noise from Road Traffic Affecting Proposed Receptors**

## Introduction

This appendix assesses the potential noise impact from road traffic on the proposed residential dwellings at the Stakehill development. The assessment utilises baseline noise monitoring data, previous road traffic noise assessments, and Defra noise mapping information. It evaluates compliance with relevant standards, including **BS8233:2014**, and proposes suitable mitigation measures to ensure acceptable noise levels in both outdoor and indoor environments.

## Residential internal and external noise criteria

BS 8233:2014 Guidance on sound insulation and noise reduction for buildings (BS 8233) and the World Health Organisation (WHO) Guidelines for Community Noise both provide quantitative guidance for internal noise levels in and around buildings.

BS 8233 provides appropriate criteria and limits for different situations, including the design of new buildings. The relevant noise level criteria recommended in BS 8233 for residential spaces are summarised in Table 7.5.1

**Table 7.5.1: Indoor Ambient Noise Levels for Dwellings, BS 8233**

| Activity                   | Location    | Daytime<br>(07:00 – 23:00) | Night-time<br>(23:00 – 07:00) |
|----------------------------|-------------|----------------------------|-------------------------------|
| Resting                    | Living room | 35 dB LAeq,16h             | -                             |
| Sleeping (daytime resting) | Bedroom     | 35 dB LAeq,16h             | 30 dB LAeq,8h                 |

It should also be noted that BS 8233 states that “regular individual noise events (for example, scheduled aircraft or passing trains) can cause sleep disturbance. A guideline value may be set in terms of SEL or LA<sub>Fmax</sub> depending on the character and number of events per night.” However, no numerical values for internal LA<sub>Fmax</sub> levels in dwellings are stated within BS 8233. The *ProPG: Planning and Noise – New Residential Development (ProPG)* attempts to address this by adding the following guidance:

“In most circumstances in noise-sensitive rooms at night (e.g. bedrooms) good acoustic design can be used so that individual noise events do not normally exceed 45 dB LA<sub>Fmax</sub> more than 10 times a night. However, *where it is not reasonably practicable to achieve this guideline then the judgement of acceptability will depend not only on the maximum noise levels but also on factors such as the source, number, distribution, predictability and regularity of noise events.*”

The WHO guidelines consolidate scientific knowledge on the health effects of community noise and provides guidance to environmental health authorities and professionals trying to protect people from the harmful effects of noise in non-industrial environments. The main sources of community noise are identified as road, rail and air traffic, industries, construction and public work and neighbours.

The effects of noise in dwellings are, typically, sleep disturbance, speech interference and annoyance. Relevant guideline values and the time base over which the individual guideline values apply are summarised in Table 7.5.2.

**Table 7.5.2: WHO Guideline Values for Community Noise in Specific Environments**

| Specific environment                                                                                          | Critical health effects                                            | $L_{Aeq,T}$ | Time base (hours)* | $L_{AFmax}$ |
|---------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------|-------------|--------------------|-------------|
| Outdoor living area                                                                                           | Serious annoyance, daytime and evening                             | 55 dB       | 16                 | -           |
| Sleeping (daytime resting)                                                                                    | Moderate annoyance, daytime and evening                            | 50 dB       | 16                 | -           |
| Inside dwellings, habitable rooms                                                                             | Speech intelligibility and moderate annoyance, daytime and evening | 35 dB       | 16                 | -           |
| Inside bedrooms                                                                                               | Sleep disturbance, night-time                                      | 30 dB       | 8                  | 45 dB       |
| Outside bedrooms                                                                                              | Sleep disturbance, window open (outdoor values)                    | 45 dB       | 8                  | 60 dB       |
| Note:<br>* These periods are usually taken to be 07:00 – 23:00 (16-hour day) and 23:00 – 07:00 (8-hour night) |                                                                    |             |                    |             |

It can be seen from Tables 7.5.1 and 7.5.2 that the internal  $L_{Aeq,T}$  criteria for day and night-time periods in BS 8233 and the WHO Guidelines are the same, and these values have been used in this assessment.

Whilst BS 8233 does not provide a quantitative guideline value for night-time noise events, the WHO guideline value inside bedrooms is 45 dB  $L_{AFmax}$ , and the ProPG suggests that this value should not be exceeded more than 10 times a night. Therefore, this criterion has been used to ensure an adequate internal night-time noise environment.

With regards to any external amenity areas, the WHO and BS 8233 recommended guideline value of 55 dB  $L_{Aeq,16h}$  has been adopted during the daytime and evening.

In summary, the adopted internal and external noise criteria are as presented in Table 7.5.3 below.

**Table 7.5.3 : Adopted Internal and External Target Noise Criteria**

|                                              | Daytime (07:00 – 23:00) | Night-time (23:00 – 07:00) |                     |
|----------------------------------------------|-------------------------|----------------------------|---------------------|
|                                              | $L_{Aeq,16h}$           | $L_{Aeq,8h}$               | Typical $L_{AFmax}$ |
| Internal noise levels within habitable rooms | 35 dB $L_{Aeq,16h}$     | 30 dB $L_{Aeq,8h}$         | 45 dB $L_{AFmax}$   |

|                                                                 | Daytime<br>(07:00 – 23:00) | Night-time<br>(23:00 – 07:00) |
|-----------------------------------------------------------------|----------------------------|-------------------------------|
| External noise levels within gardens and external amenity areas | 55 dB $L_{Aeq,16h}$        | -                             |

## Baseline Noise Monitoring Results

Baseline noise monitoring conducted at the site identified road traffic from the A627(M) and surrounding local roads as the dominant noise source. The following results were obtained from the monitoring:

- Daytime  $L_{Aeq,16h}$ : ranges from 47 to 64 dB across the site, with most measurements falling between 50 and 60 dB.
- Night-time  $L_{Aeq,8h}$ : ranges from 40 to 56 dB across the site.

## Assessment Findings

### Outdoor Amenity Areas

Noise levels in outdoor amenity areas across much of the site are expected to exceed 55 dB. The northern and eastern portions of the site, closest to the A627(M), are subject to the highest noise levels.

### Indoor Living Spaces

Noise levels near the A627(M) and other major roads exceed the 50-56 dB daytime and 45-51 dB night-time external thresholds for achieving acceptable indoor noise levels (based on 15 dB attenuation through an open window in line with BS8233:2014 or achieving around 21 dB based on typical glazing and hit and miss trickle ventilators based on relevant guidance by the Association of Noise Consultants<sup>9</sup>). These areas will require enhanced mitigation measures to ensure compliance with BS8233:2014 and WHO Guidelines.

### Screening Effect of Proposed Buildings

Once buildings are introduced on-site, they will provide significant screening for dwellings located further from the northern and eastern boundaries. This screening effect will reduce the noise levels for internal receptors.

## Mitigation Measures

### Outdoor Amenity Areas

- **Acoustic Barriers:**
  - For gardens exposed to 55-65 dB  $L_{Aeq,16h}$ , install **acoustic barriers** with a minimum height of 2.5 m to reduce noise by at least 10 dB.

- **Building Layout:**

- Position buildings to act as acoustic screens for gardens.
- Orient gardens away from primary noise sources.

### Indoor Living Spaces<sup>10</sup>

- **Glazing and Ventilation<sup>11</sup>:**

- For external noise levels of up to 60 dB, standard double glazing ( $R_w + C_{tr}$  31 dB) and trickle ventilators ( $D_{n,e,w}$  29 dB) will suffice.
- For highest external daytime noise levels of 64 dB, standard double glazing ( $R_w + C_{tr}$  29 dB) and mechanical ventilation, or standard double glazing ( $R_w + C_{tr}$  31 dB) and acoustic ventilators ( $D_{n,e,w}$  39 dB).

- **Alternative Ventilation:**

- For areas where closed windows are required to meet internal noise standards, provide **mechanical ventilation systems** or **passive cooling** to mitigate overheating.

- **Perimeter Mitigation:**

- Install an acoustic barrier along the northern and eastern site boundaries to provide site-wide attenuation. This will reduce the reliance on higher-performing glazing for properties further from the noise source.

## **Summary and Recommendations**

### **1. Outdoor Amenity Areas:**

- Areas exposed to more than 55 dB will require mitigation through acoustic barriers or strategic building placement.
- For gardens closer to the A627(M), consider bund and barrier combinations.

### **2. Indoor Living Spaces:**

- Enhanced glazing and ventilation systems will be required for properties closest to the A627(M).
- Noise-sensitive rooms should be located on the screened side of buildings wherever possible.

### **Perimeter Mitigation:**

- An acoustic barrier along the northern and eastern boundaries will provide substantial noise reduction for the entire development.

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<sup>10</sup>

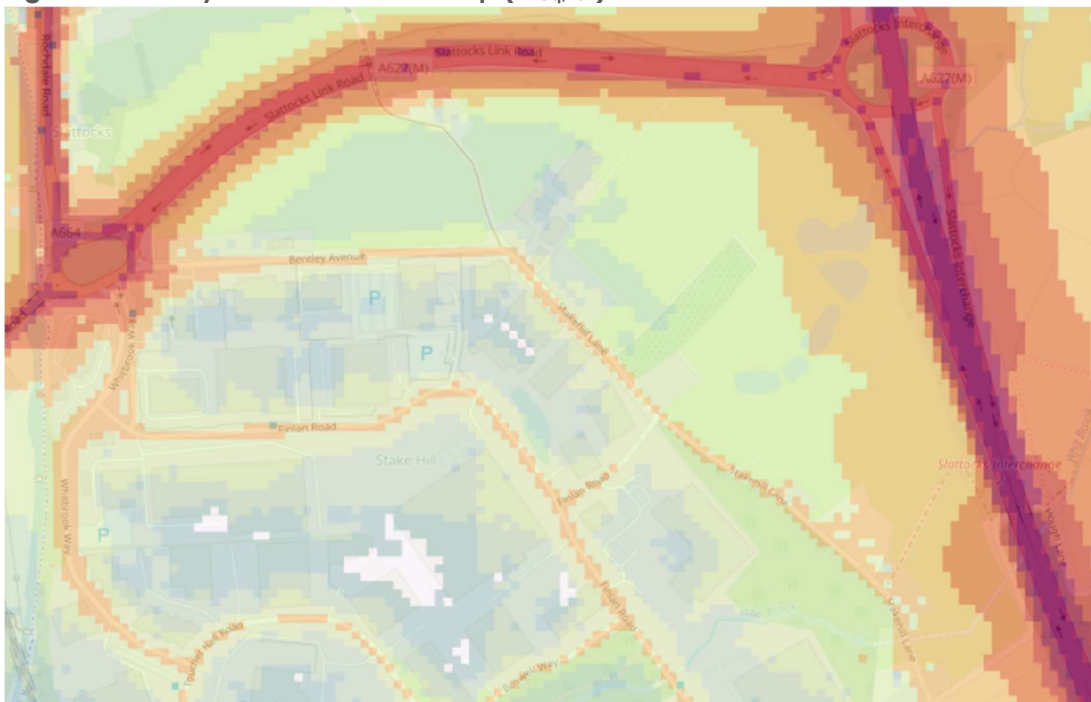
<sup>11</sup>

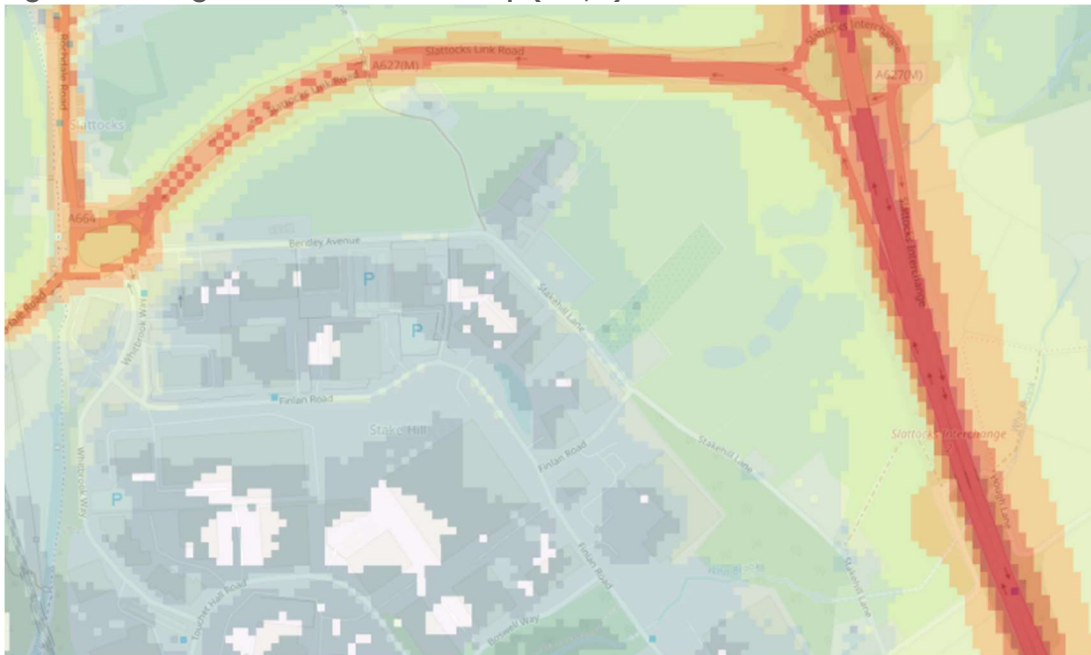
**Reassessment:**

- As the development design evolves, revisit the assessment to optimise mitigation strategies and confirm compliance with **BS8233:2014** standards.

**Assumptions:**

- Baseline noise levels from 2022 Defra noise mapping and site-specific monitoring are representative of current conditions.
- Noise reduction assumptions for barriers and building layouts are based on industry standards and typical performance data.
- Traffic growth and distribution align with traffic data provided for the operational noise assessment.
- Noise levels at receptors account for direct line-of-sight exposure, with no additional shielding beyond proposed mitigation measures.

**Figures****Figure 7.5.1: Daytime Defra Noise Map ( $L_{Aeq,16h}$ )**



## **Appendix 7.6: Noise from Existing Businesses Affecting Proposed Receptors**



**Figure 7.6.2: Main noise producing businesses adjacent to the site as noted during the daytime site visit**



While other businesses do have the potential to generate noise, no other business was deemed on the short site visit to present any additional noise concern that would need to be accounted for. In both instances, there are already existing noise sensitive receptors in close proximity to these businesses so it is unlikely that residential development on the site would further constrain the existing businesses.

It can be considered that where BS 8233 or WHO Guidelines are exceeded this is the equivalent of a significant effect.

The measurement location closest to RDM Engineering was ML1. During the noise survey it was considered that road traffic noise from Stakehill Lane was dominant at this location with minimal contribution from commercial noise. It is therefore considered that noise from RDM Engineering will not affect proposed residential development.

The measurement location closest to JLG industries was ML4. Observations at this location suggest that during times when the roller shutter door is open noise from JLG industries is dominant. Measured daytime noise levels at this location were 47-56 dB  $L_{Aeq,16h}$ . There is therefore potential to be exceeded BS 8233 or WHO Guidelines to be exceeded which is equivalent to a significant effect.

At this stage, it is recommended that, where possible, gardens are placed away from site boundaries bordering existing businesses, and that internal roads are used as a buffer zone between noise generative and noise sensitive uses.