



Land North of Camer Road, Meopham Environmental Statement

Chapter 7: Noise and Vibration

Entran Ltd on behalf of The
McManus Family

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7. NOISE AND VIBRATION

Introduction

- 7.1 This chapter of the ES has been prepared by Entran Ltd and presents an assessment of the likely significant effects of the Proposed Development with respect to noise and vibration. Mitigation measures are identified, where appropriate, to avoid, reduce or offset any significant adverse effects identified and/or enhance likely beneficial effects. Taking into account the mitigation measures, the nature and significance of the likely residual effects are reported.
- 7.2 This chapter is supported by the following technical appendices:
- **Appendix 7.1: Glossary of Terms;**
 - **Appendix 7.2: Legislation, Policy and Guidance;**
 - **Appendix 7.3: Traffic Data;**
 - **Appendix 7.4: Daytime Noise Contour;**
 - **Appendix 7.5: Night-time Noise Contour; and**
 - **Appendix 7.6: Indicative Residential Effects.**

Legislation and Policy Context

National Planning Policy

- 7.3 The following national planning policy is relevant to the Proposed Development:
- National Planning Policy Framework (2025); and
 - Noise Policy Statement for England.

Local Planning Policy

- 7.4 The following local planning policies are relevant to the Proposed Development:
- Gravesham Local Plan Core Strategy.

Guidance

- 7.5 The following guidance is relevant to the Proposed Development:
- Planning Practice Guidance (PPG) – Noise;
 - BS 5228:2009+A1:2014 (BS 5228);
 - Design Manual for Roads and Bridges (DMRB) Document LA111;
 - Calculation of Road Traffic Noise (CRTN);
 - BS 4142:2014+A1:2019 (BS 4142);
 - BS 8233:2014 (BS 8233); and
 - World Health Organisation (WHO) Guidelines for Community Noise.

Assessment Methodology and Significance Criteria

- 7.6 This section presents the methodology used to assess the potential effects of the Proposed Development in relation to noise and vibration.

Consultation

- 7.7 **Table 7.1** presents a summary of the comments raised in the Council's EIA Scoping Opinion and other discussions with relevant consultees with respect to noise and vibration.

Table 7.1 Summary of Comments

Consultee	Comment	Response
Gravesham Borough Council - Environmental Protection Team	The proposed methodology for the noise chapter is acceptable. It will be expected that internal noise levels as well as noise levels in external amenity areas will comply with the levels in BS8233/WHO guidance. Overheating should be considered if noise levels can't be achieved with openable windows.	Noise effects have been considered within this chapter. The application is outline and specific mitigation will be considered during detailed design.

Scope

- 7.8 The following aspects will be considered in the ES as a significant effect is considered likely:
- Construction;
 - Operation (proposed residential properties); and
 - Operation (existing residential receptors).

Assessment Methodology

Impact Areas

Construction Phase Methodology

- 7.9 The impact of noise and vibration during construction of the Proposed Development requires calculation and assessment in accordance with the guidance presented in BS 5228 1:2009+A1:2014 'Code of practice for noise and vibration control on construction and open sites. Noise'¹.
- 7.10 The following elements are considered to have the potential to give rise to significant effects during the construction stage of the Proposed Development and have, therefore, been considered within this ES chapter:
- Noise from the Proposed Development related to construction activities affecting nearby existing sensitive receptors; and
 - Vibration from on-Site construction activities affecting nearby existing sensitive receptors.

Changes in Road Traffic Flows

- 7.11 The impact at existing residential receptors due to changes in noise level resulting from changes in traffic flow as a result of the operational Proposed Development has been assessed in accordance with the guidance presented in the DMRB².
- 7.12 The future 'with development' scenario has been considered against the future 'without development' scenario based on the traffic flow data for the year 2042, as provided by the transport consultants, in order to identify the impact of the introduction of the Proposed Development.

Noise at Proposed Residential Properties

- 7.13 Computer noise modelling has been used to calculate the ambient noise levels across the Site. The ambient noise at residential dwellings is assessed against the guidance provided by BS 8233:2014³ for both the day and night-time period. Night-time maximum noise levels are assessed against the guideline noise level for the onset of sleep disturbance provided by the WHO Guidelines for Community Noise⁴.
- 7.14 The ambient noise levels for the year 2042 have been calculated to ensure future noise levels arising from increases in road traffic are appropriately considered.

Significance Criteria

- 7.15 The scale attributed to each effect has been determined based on the sensitivity of the receptor and magnitude of impact arising as a result of the Proposed Development. Professional judgement and experience have been drawn upon to assess the scale and significance.

Receptors and Receptor Sensitivity

- 7.16 The sensitivity of each receptor was evaluated as being high, medium, low or negligible based on a review of the baseline position of each receptor and its performance against benchmark areas. The receptors and the definition of sensitivity of a receptor (high, medium, low) is based on a scale set out in **Table 7.1**.

Table 7.1 Receptor Sensitivity Description

Value (Sensitivity)	Description	Receptor Type
High	Receptors that are especially susceptible to noise/vibration	Residential dwellings, Schools, Hospitals, Care Homes
Medium	Receptors where a reasonable degree of noise disturbance is acceptable	Offices
Low	Receptors where noise is tolerable	Retail shops, restaurants
Very Low	Receptors where noise is not likely to be a factor	Sports Grounds, commercial and industrial environments

Construction Noise

7.17 Noise levels generated by construction activities have the potential to impact upon nearby noise-sensitive receptors. However, the magnitude of the potential impact will depend upon a number of variables, such as:

- the noise generated by plant or equipment used on-Site;
- the period of time that construction plant is operational;
- the distance between the noise source and the receptor; and
- the level of likely attenuation due to ground absorption and barrier effects.

7.18 The construction noise impact considers the noise magnitude and adverse effect levels as provided in the Noise Policy Statement for England (NPSE)⁵ and the Planning Policy Guidance (PPG)⁶ provided by the Department for Communities & Local Government in its on-line planning guidance to assist with interpretation of the NPPF⁷ as shown in **Table 7.2**.

Table 7.2 Construction Noise Magnitude

Day	Time (hours)	Averaging Period T	Lowest Observed Adverse Effect Level (LOAEL) LAeq,T (dB)	Significant Observed Adverse Effect Level (SOAEL) LAeq,T (dB)*
Mondays to Fridays	0700 - 0800	1 hour	60	70
	0800 - 1800	10 hours	65	75
	1800 - 1900	1 hour	60	70
	1900 - 2200	1 hour	55	65
Saturdays	0700 - 0800	1 hour	60	70
	0800 - 1300	5 hours	65	75
	1300 - 1400	1 hour	60	70
	1400 - 2200	1 hour	55	65
Sundays & Public Holidays	0700 - 2200	1 hour	55	65
Any night	2200 - 0700	1 hour	45	55

* The measured levels should be monitored in order to ensure that the levels presented in the table are not exceeded for a period of 10 or more days of working in any 15 consecutive days or for a total number of days exceeding 40 in any 6 consecutive months.

- 7.19 Threshold values for the onset construction impacts are required to allow quantitative assessment of construction noise levels and the above table has been used to inform derivation of threshold criteria. The adopted values used to define the magnitude of change for construction noise impacts are based on the values presented in **Table 7.3**.

Table 7.3 Weekday Threshold Ranges for Construction Levels

Impact	Negligible	Low	Medium	High
Construction Noise Level, LAeq,T dB	< 65	65 – 70	70 - 75	> 75

- 7.20 It is worth noting that the purpose of the target construction noise criteria is to control the impact of construction noise insofar as is reasonably practicable, whilst recognising that it is unrealistic for developments of this nature to be constructed without causing some degree of disturbance in the locality. Hence, even if the criteria adopted for this assessment is achieved, noise from construction activities is likely to be readily noticeable. It is further noted that the local authority may restrict the hours of construction and construction related traffic on the Site.

Construction Vibration

- 7.21 Vibration may be impulsive, such as that due to hammer-driven piling; transient, such as that due to vehicle movements along a railway; or continuous, such as that due to vibratory driven piling. The primary cause of community concern generally relates to building damage from both construction

and operational sources of vibration, although, the human body can perceive vibration at levels which are substantially lower than those required to cause building damage.

- 7.22 Damage to buildings associated solely with ground-borne vibration is not common and although vibration may be noticeable, there is little evidence to suggest that they produce cosmetic damage such as a crack in plaster unless the magnitude of the vibration is excessively high. The most likely impact, where elevated levels of vibration do occur during the construction phase, is associated with perceptibility.
- 7.23 BS 5228 indicates that the threshold of human perception to vibration is around 0.15mm/s, although it is generally accepted that for the majority of people vibration levels in excess of between 0.15 and 0.3 mm/s peak particle velocity (PPV) are just perceptible. A PPV of above 1.0 mm/s is identified as likely to cause complaint, but can be tolerated if early warning and explanation is given to residents.
- 7.24 Accordingly, 1 mm/s ppv has been selected as the target criteria to control the impact of construction vibration, with the criteria for assessing the magnitude of vibration impacts according to the margin by which this target criterion is achieved or exceeded presented in **Table 7.4**.
- 7.25 This target criterion is based on the guidance contained within BS 5228, experience from previous sites and accepted vibration policy criteria across a range of enforcing authorities elsewhere in the UK. The limits are presented in terms of peak particle velocity (PPV) as it is the simplest indicator for both perceptibility and building damage.

Table 7.4 Ground-Vibration Impact Levels for Permanent Residential Buildings

Vibration		
Lowest Observed Adverse Effect Level	PPV mm/s	1
Significant Observed Adverse Effect Level	PPV mm/s	10

- 7.26 Again, it is worth noting that the purpose of the target construction vibration criteria is to control the impact of construction vibration insofar as is reasonably practicable and is entirely based on the likelihood of the vibration being perceptible, rather than causing damage to property. Hence, although vibration levels in excess of 1 mm/s ppv would be considered a Moderate Adverse impact in respect of the likelihood of perceptibility, they would not be considered significant in terms of the potential for building damage, which would require levels of at least 15 mm/s ppv to result in minor cosmetic damage in light / unreinforced buildings.
- 7.27 There are currently no British Standards that provide a methodology to predict levels of vibration from construction activities, other than that contained within BS 5228 which relates to percussive or vibratory piling only. Therefore, it is not possible to accurately calculate levels of vibration during the site preparation and construction phases of the Proposed Development.
- 7.28 Notwithstanding the above, the empirical predictors for groundborne vibration arising from mechanized construction works provided within BS 85228 have been adapted to provide an indication of the distances where impacts may begin to occur. The adopted calculation is based on

vibratory piling and is considered to constitute a cautious consideration when applied to all construction activity.

- 7.29 The resultant thresholds for identification of vibration impacts at residential dwellings, and calculated distances for the likely onset of these values, are presented in **Table 7.5**.

Table 7.5 Thresholds for Ground-Vibration Effects at Permanent Residential Buildings

Effect Significance	PPV Threshold	Indicative Distance, m
Negligible	< 0.3	> 185.1
Minor	0.3 - 1	73.3 - 185.1
Moderate	1 – 10	12.5 – 73.3
Major	> 10	< 12.5

Effect Magnitude: Completed Development

- 7.30 The aim of noise policy within the UK is to protect individuals from excessive noise levels both in the workplace and within their homes. It has been recognised that severe annoyance to individuals due to noise can lead to sleep disturbance and adverse health effects.
- 7.31 The NPPF does not give a set of criteria for external noise assessment and therefore guidance within contemporary British Standards and other internationally published documents has been considered.
- 7.32 For the purposes of this assessment, external noise levels for residential use have been applied to the residential accommodation and derived on the basis of internal noise criteria outlined in British Standard 8233 and WHO guidance.
- 7.33 BS 8233 makes recommendations for the control of noise in and around buildings. It suggests appropriate criteria for different situations, and is primarily intended to guide the design of new or refurbished buildings undergoing a change of use rather than to assess the effect of changes in the external noise climate. The guidance provides desirable indoor ambient noise levels for dwellings which are summarised in **Table 7.6** below.

Table 7.6 Noise Criteria for Residential Use Buildings

Activity	Location	0700 to 2300	2300 to 0700
Resting	Living room	35 dB LAeq,16 hour	-
Dining	Dining room/area	40 dB LAeq,16 hour	-
Sleeping (daytime resting)	Bedroom	35 dB LAeq,16 hour	30 dB LAeq,8 hour

- 7.34 To allow a quantitative assessment of significant effects, impacts have been assigned based on the excess of the BS 8233 criteria and the typical façade reductions, as provided within BS 8233. Reductions of 15 dB and 33 dB are typically afforded for partially open and closed windows, respectively.
- 7.35 Accordingly, where a reduction of 15 dB is required to achieve the BS 8223 criteria this is an indication that no mitigation is required. The effect is therefore considered as Negligible.
- 7.36 A 3 dB increase in noise level is considered to constitute a perceptible change, with a 10 dB increase resulting in a perceived doubling in sound level. A Minor effect is considered to be present in instances up to 9 dB above the Negligible criteria, where a sound may be perceived as no more than twice as loud as noise levels at the Negligible threshold value. This results in a Minor effect significance where the criteria is exceeded by more than 15 dB and up to 24 dB.
- 7.37 Based on the 33 dB reduction provided within BS 8233 for closed windows, noise levels up to 33 dB above the BS 8233 criteria are controllable with typical insulated double glazing and adequate ventilation. A required façade reduction between 25 and 33 dB is therefore considered a Moderate Adverse effect.
- 7.38 Where the required façade reduction exceeds 33 dB, a Major Adverse effect is identified. Sufficient glazing and ventilation would be likely for habitable rooms that are subject to these effects in order to suitably reduce internal noise levels.

Table 7.7 Thresholds for Noise Within Residential Dwellings

Impact	Negligible	Low	Medium	High
Reduction Required to Achieve BS 8233 Criteria	< 15	15 - 24	25 – 33	> 33

- 7.39 For all identified effects, the significance could be considered as Negligible with the installation of typical glazing and ventilation options. Where suitable glazing and ventilation options are required, windows may remain openable to allow for purge ventilation or to be used at the occupants' discretion.
- 7.40 BS8233:2014 states that for traditional external areas that are used for amenity space, such as gardens and patios, it is desirable that the external noise level does not exceed 50 dB LAeq,T, with an

upper guideline value of 55 dB $L_{Aeq,T}$ which would be acceptable in noisier environments. However, it is also recognised that these guideline values are not achievable in all circumstances where the Proposed Development might be desirable.

- 7.41 In higher noise areas, such as city centres or urban areas adjoining the strategic transport network, a compromise between elevated noise levels and other factors, such as the convenience of living in these locations or making efficient use of land resources to ensure the Proposed Development needs can be met, might be warranted. In such a situation, the Proposed Development should be designed to achieve the lowest practicable levels in these external amenity spaces, but should not be prohibited.
- 7.42 The internal noise levels recommended in BS 8233 are almost identical to those presented in WHO guidelines for community noise (internal to buildings). Internally, the WHO guidance is that in order to avoid sleep disturbance the period noise level ($L_{Aeq,T}$) should not exceed 30 dB and individual noise events should not exceed 45 dB L_{Amax} . Section 3.4 of the WHO Guidelines states that for good sleep, indoor noise levels should not exceed approximately 45 dB L_{Amax} more than 10-15 times a night. On the basis of the WHO's 15 dB façade insulation for windows partly open; this equates to external L_{Amax} of 60 dB that should not be exceeded more than 10-15 times per night.
- 7.43 It is also noted that typically, where a new commercial source is introduced, an assessment would be required in accordance with the methodology as provided within BS 4142. Conversely however, BS 4142 states that *“where a new noise-sensitive receptor is introduced and there is extant industrial and/or commercial sound, it ought to be recognized that the industrial and/or commercial sound forms a component of the acoustic environment. In such circumstances other guidance and criteria in addition to or alternative to this standard can also inform the appropriateness of both introducing a new noise-sensitive receptor and the extent of required noise mitigation.”*
- 7.44 Further to the above, extant commercial activity would be suitably covered within the assessment of the completed Proposed Development. Accordingly, internal ambient noise levels at residential properties, inclusive of any extant commercial activity, should remain below the threshold criteria provided in BS 8233.

Changes in Road Traffic Noise Due to the Introduction of the Proposed Development

- 7.45 The impact of any changes in road traffic noise levels has been considered against the principles for assessment of Basic Noise Levels (BNL) as presented within the DMRB Document LA111 Noise and Vibration, Rev 2 2020. DMRB presents an impact significance matrix for assessing the magnitude of changes in noise level for the short and long term and can be used as criteria for assessing the impact of any changes in road traffic noise levels, as shown in **Tables 7.8** and **7.9**.
- 7.46 In order to determine whether changes in traffic noise levels are likely to occur as a result of the Proposed Development noise levels have been calculated in accordance with the methodology contained within the Calculation of Road Traffic Noise (CRTN)⁸. Calculations are based on traffic flow data for the local road network both with and without the Proposed Development.

Table 7.8 Semantic Descriptors for Traffic Noise in the Short Term

Change in Noise Level $L_{A10,18hr}$ dB	Magnitude of Impact
0	No Change
0.1 to 0.9	Negligible
1 to 2.9	Minor
3 to 4.9	Moderate
5+	Major

Table 7.9 Semantic Descriptors for Traffic Noise in the Long Term

Change in Noise Level $L_{A10,18hr}$ dB	Magnitude of Impact
0	No Change
0.1 to 2.9	Negligible
3 to 4.9	Minor
5 to 9.9	Moderate
10+	Major

Assessing Significance

- 7.47 **0** provide a matrix for determining the significance of an effect based on the sensitivity of the receptor and the magnitude of impact.

Table 7.10 Significance of Effect Matrix

Receptor Sensitivity	Magnitude of Impact			
	High	Medium	Low	Very Low
High	Major Beneficial / Adverse	Moderate Beneficial / Adverse	Minor Beneficial / Adverse	Negligible Beneficial / Adverse
Medium	Moderate Beneficial / Adverse	Minor Beneficial / Adverse	Negligible	Negligible
Low	Minor Beneficial / Adverse	Negligible	Negligible	Negligible
Very Low	Negligible	Negligible	Negligible	Negligible

- 7.48 Effects classified as major or moderate are considered 'significant'. Effects classified as minor or negligible in scale are considered 'not significant'.

Limitations and Assumptions

- 7.49 The adopted construction noise levels are representative of continuous activity and therefore are likely to provide a cautious assessment of the likely impacts. The calculated noise levels are therefore likely to be higher than those observed in practice. Construction noise levels have been calculated based on typical noise levels for construction activities.
- 7.50 Road noise levels have been calculated using traffic data provided within this ES and measurements obtained during an environmental noise survey. Noise associated with rail movements has been calculated based on measured noise data, following calculation of road traffic noise. The calculations used within this chapter are considered to be suitably representative of the ambient environment at the Proposed Development.
- 7.51 The assessment of the change in noise levels across existing road links is based on the provided traffic flow data. The data includes future committed development within the surrounding area. Any changes to the calculated traffic flows may provide a material change to this assessment. Any decrease in flows related to the Proposed Development may change the calculated effect significance due to road traffic flows.

Baseline Conditions

Establishing Baseline Conditions

- 7.52 The baseline conditions across the Site have been determined by environmental noise measurements and subjective observations. The survey of baseline noise conditions at the Site was carried out between 4th and 8th December 2025.

7.53 The primary purpose of the noise survey was to gather acoustic information on the sound levels at the Site during daytime and night-time periods. The ambient noise data is used to validate the computer model of noise levels for calculation of ambient noise levels.

Baseline Conditions

7.54 Monitoring equipment was situated at the Site boundaries overlooking potential noise sources. Details of the monitoring positions are listed below:

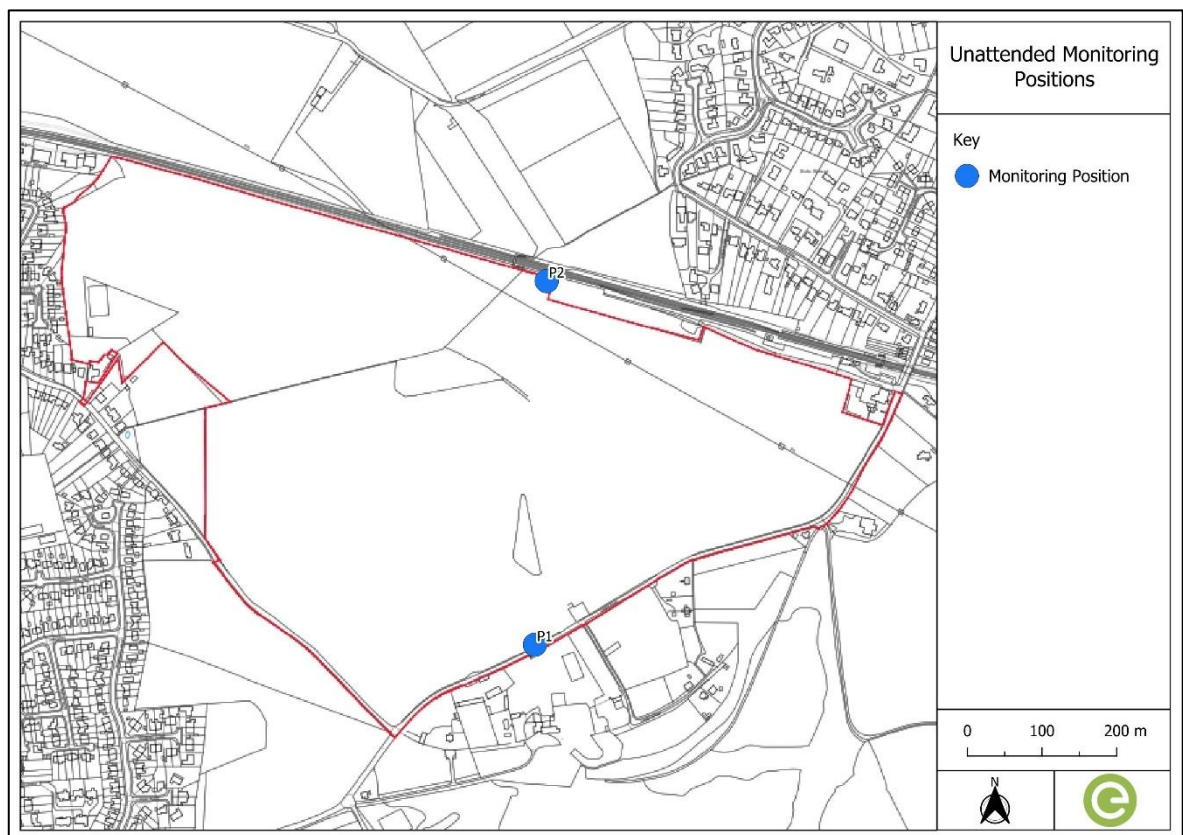
- P1 – East (Camer Road); and
- P2 – North (Chatham Main Line).

7.55 The monitors at P1 and P2 were situated approximately 1.8m above local ground. Microphones were fitted with a protective windshield and all measurement equipment used during the noise surveys conformed to relevant Type 1 specifications.

7.56 The primary noise source affecting the Proposed Development is identified as road and rail traffic on the surrounding network.

7.57 The noise measurement locations are shown in **Figure 7.1**.

Figure 7.1 Survey Positions



7.58 A summary of the unattended noise measurements is presented in **Table 7.11**.

Table 7.11 Summary of Unattended Noise Levels

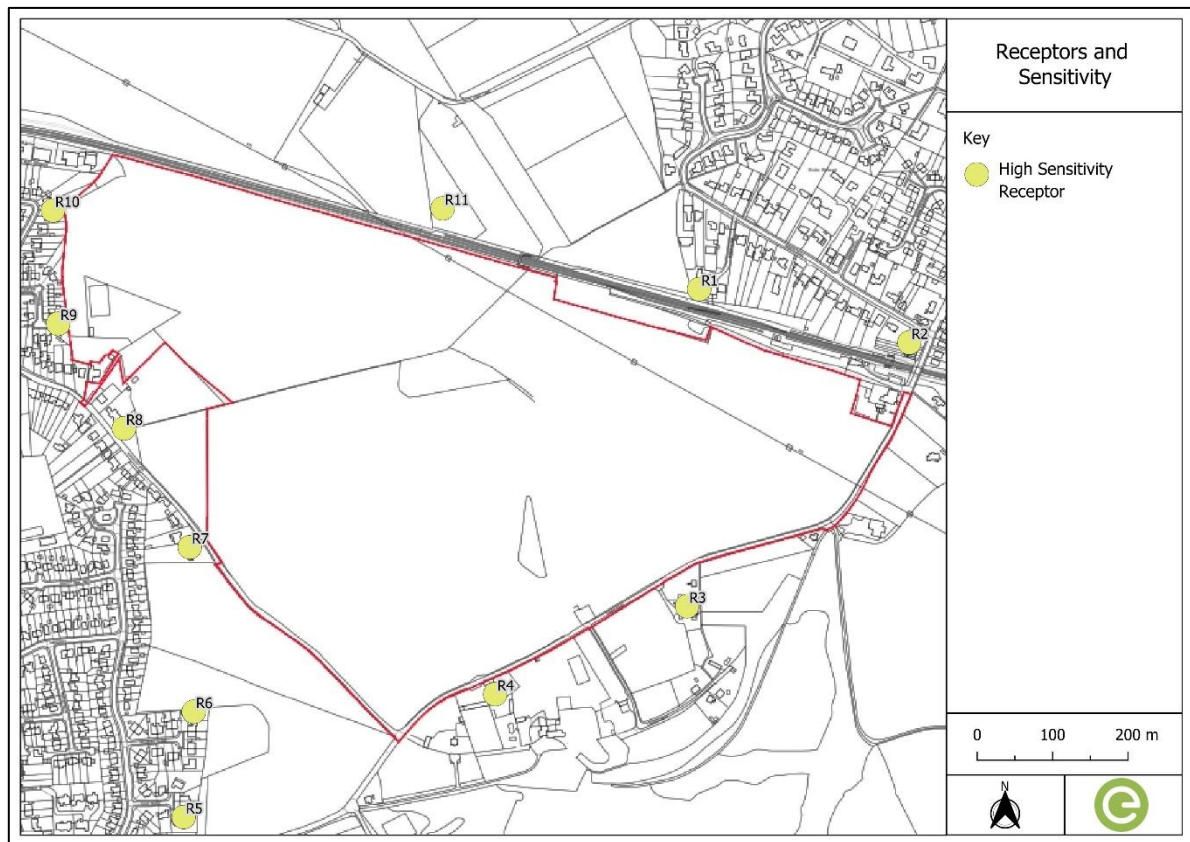
Monitoring Position	Measured Sound Pressure Level, dB re. 2×10^{-5} Pa.					
	Day Time (07:00 - 23:00)			Night-time (23:00 - 07:00)		
	L _{Amax,F}	L _{Aeq,T}	L _{A90,T}	L _{Amax,F}	L _{Aeq,T}	L _{A90,T}
P1	78.1	63.5	39.2	80.0	55.4	28.5
P2	88.8	58.0	42.2	92.1	52.4	35.1

- 7.59 All noise measurements were undertaken by consultants competent in environmental noise monitoring, and, in accordance with the principles of BS 7445:2003⁹. The broadband noise parameters of L_{Aeq,T}, L_{A10,T}, L_{A90,T}, and L_{Amax,F} were recorded at each location.
- 7.60 The values presented in **Table 7.11** have been used to validate the noise model, which was completed using 18-hour Annual Average Weekday Total (AAWT) values.
- 7.61 Measurements at P2 were used to calibrate rail noise levels such that calculated levels agree with the measured levels at monitoring position P2.
- 7.62 On-site vibration levels were qualitatively assessed during the noise survey and no vibration was observed to be perceptible. It is therefore considered that a vibration survey was not required for the purpose of this assessment.

Receptors

- 7.63 Existing receptors identified for the assessment of construction activities and their respective sensitivities are presented in **Figure 7.2**. The proposed residential receptors are high sensitivity.

Figure 7.2 Construction Assessment Receptor Locations



- 7.64 The change in road traffic flows due to the Proposed Development is considered for the residential receptors on surrounding road links, which are high sensitivity.

Future Baseline

- 7.65 The future baseline within the vicinity of the Site would be largely similar to the extant baseline environment. Increases in road traffic movements over time may increase the ambient environment. However, based on provided traffic data these increases are unlikely to significantly affect the ambient environment.

Assessment of Effects (Construction and Operational)

Effects During Construction

Construction Noise

- 7.66 The operation of equipment associated with Site preparation and construction of the Proposed Development has the potential to result in noise effects at existing noise sensitive receptors in the vicinity.
- 7.67 Construction noise calculations have been undertaken to provide assessment levels at the nearest high sensitivity receptors. The highest noise levels are from plant usually associated with earthworks, piling, concreting, road pavement and general construction site activities. Typical facade noise levels have been adopted based on measurements of similar activities and are presented

below. These are representative of continuous activity and are considered a worse-case consideration.

- Enabling works - 84 dB(A) at 10m
- CFA Piling - 85 dB(A) at 10m
- Sub Structure - 80 dB(A) at 10m
- Road pavement - 81 dB(A) at 10m
- Super Structure - 85 dB(A) at 10m

7.68 With regard to barrier attenuation effects, acoustic screening may be provided by any pre-existing permanent structures on the intervening land between the proposed construction areas and receptor locations, in addition to the natural screening that may be afforded by the topography of the area. To provide a robust assessment however, the construction noise calculations assume no attenuation from pre-existing structures or site hoardings.

7.69 Construction noise levels have been calculated for the closest existing representative noise sensitive receptors. The calculations have been undertaken for both minimum and typical distances between the construction locations and the identified receptors. The construction noise levels therefore provide both a worse case consideration of temporary effects and indicative typical effects.

7.70 The identified separation distances are presented in **Table 7.12**.

Table 7.12 Separation Distances Between Construction Activities and Receptors, m

Receptor	Separation Distance, m	
	Closest Activity	Typical Distance
R1	250	500
R2	420	730
R3	60	450
R4	40	330
R5	280	500
R6	165	380
R7	30	250
R8	110	330
R9	120	460
R10	110	550
R11	80	370

7.71 The calculated noise levels are shown in **Table 7.13**.

Table 7.13 Calculated Façade Construction Noise Levels

Receptor	Façade Noise Level at Nearest Receptors During Likely Phases of Construction, dB(A), L _{Aeq,16hr}				
	Enabling Works	Piling	Sub-structure	Roads	Super-structure
Closest Activity					
R1	55	56	51	52	56
R2	51	52	47	48	52
R3	67	68	63	64	68
R4	71	72	67	68	72
R5	54	55	50	51	55
R6	59	60	55	56	60
R7	73	74	69	70	74
R8	62	63	58	59	63
R9	61	62	57	58	62
R10	62	63	58	59	63
R11	65	66	61	62	66
Typical Distance					
R1	49	50	45	46	50
R2	46	47	42	43	47
R3	50	51	46	47	51
R4	53	54	49	50	54
R5	49	50	45	46	50
R6	51	52	47	48	52
R7	55	56	51	52	56
R8	53	54	49	50	54
R9	50	51	46	47	51
R10	48	49	44	45	49
R11	52	53	48	49	53

7.72 The resultant noise impacts are shown in **Table 7.14**.

Table 7.14 Calculated Construction Noise Impacts

Receptor	Calculated Noise Impacts During Likely Phases of Construction				
	Enabling Works	Piling	Sub-structure	Roads	Super-structure
Closest Activity					
R1	Negligible	Negligible	Negligible	Negligible	Negligible
R2	Negligible	Negligible	Negligible	Negligible	Negligible
R3	Low	Low	Negligible	Negligible	Low
R4	Medium	Medium	Low	Low	Medium
R5	Negligible	Negligible	Negligible	Negligible	Negligible
R6	Negligible	Negligible	Negligible	Negligible	Negligible
R7	Medium	Medium	Low	Medium	Medium
R8	Negligible	Negligible	Negligible	Negligible	Negligible
R9	Negligible	Negligible	Negligible	Negligible	Negligible
R10	Negligible	Negligible	Negligible	Negligible	Negligible
R11	Low	Low	Negligible	Negligible	Low
Typical Distance					
R1	Negligible	Negligible	Negligible	Negligible	Negligible
R2	Negligible	Negligible	Negligible	Negligible	Negligible
R3	Negligible	Negligible	Negligible	Negligible	Negligible
R4	Negligible	Negligible	Negligible	Negligible	Negligible
R5	Negligible	Negligible	Negligible	Negligible	Negligible
R6	Negligible	Negligible	Negligible	Negligible	Negligible
R7	Negligible	Negligible	Negligible	Negligible	Negligible
R8	Negligible	Negligible	Negligible	Negligible	Negligible
R9	Negligible	Negligible	Negligible	Negligible	Negligible
R10	Negligible	Negligible	Negligible	Negligible	Negligible
R11	Negligible	Negligible	Negligible	Negligible	Negligible

7.73 The resultant effect significance, with consideration to the sensitivity of the nearby receptors, is presented in **Table 7.15**.

Table 7.15 Calculated Construction Noise Effects

Receptor	Calculated Noise Effects During Likely Phases of Construction				
	Enabling Works	Piling	Sub-structure	Roads	Super-structure
Closest Activity					
R1	Negligible	Negligible	Negligible	Negligible	Negligible
R2	Negligible	Negligible	Negligible	Negligible	Negligible
R3	Minor	Minor	Negligible	Negligible	Minor
R4	Moderate	Moderate	Minor	Minor	Moderate
R5	Negligible	Negligible	Negligible	Negligible	Negligible
R6	Negligible	Negligible	Negligible	Negligible	Negligible
R7	Moderate	Moderate	Minor	Moderate	Moderate
R8	Negligible	Negligible	Negligible	Negligible	Negligible
R9	Negligible	Negligible	Negligible	Negligible	Negligible
R10	Negligible	Negligible	Negligible	Negligible	Negligible
R11	Minor	Minor	Negligible	Negligible	Minor
Typical Distance					
R1	Negligible	Negligible	Negligible	Negligible	Negligible
R2	Negligible	Negligible	Negligible	Negligible	Negligible
R3	Negligible	Negligible	Negligible	Negligible	Negligible
R4	Negligible	Negligible	Negligible	Negligible	Negligible
R5	Negligible	Negligible	Negligible	Negligible	Negligible
R6	Negligible	Negligible	Negligible	Negligible	Negligible
R7	Negligible	Negligible	Negligible	Negligible	Negligible
R8	Negligible	Negligible	Negligible	Negligible	Negligible
R9	Negligible	Negligible	Negligible	Negligible	Negligible
R10	Negligible	Negligible	Negligible	Negligible	Negligible
R11	Negligible	Negligible	Negligible	Negligible	Negligible

7.75 Close proximity works are calculated to result in short-term effects up to Moderate significance at receptors R4 and R7. However, it should be noted that construction activities do not occur simultaneously, nor would activities take place at the closest distance to the residential areas for long periods of time; as assumed for the purposes of a worse-case scenario assessment.

7.76 During the majority of construction activities, the separating distances are substantially increased and calculated noise levels for typical distances are not calculated to give rise to significant adverse effects. Mitigation measures to further minimise the likelihood of adverse impact are discussed later in this chapter.

Construction Vibration

7.77 The likely worse case vibration impacts at the identified separation distances have been calculated based on the methodology provided within BS 5228-2. The calculated impacts are presented in **Table 7.16**.

Table 7.16 Calculated Construction Vibration Impacts

Receptor	Calculated Vibration Impacts During Likely Phases of Construction				
	Enabling Works	Piling	Sub-structure	Roads	Super-structure
Closest Activity					
R1	Negligible	Negligible	Negligible	Negligible	Negligible
R2	Negligible	Negligible	Negligible	Negligible	Negligible
R3	Medium	Medium	Medium	Medium	Medium
R4	Medium	Medium	Medium	Medium	Medium
R5	Negligible	Negligible	Negligible	Negligible	Negligible
R6	Low	Low	Low	Low	Low
R7	Medium	Medium	Medium	Medium	Medium
R8	Low	Low	Low	Low	Low
R9	Low	Low	Low	Low	Low
R10	Low	Low	Low	Low	Low
R11	Low	Low	Low	Low	Low
Typical Distance					
R1	Negligible	Negligible	Negligible	Negligible	Negligible
R2	Negligible	Negligible	Negligible	Negligible	Negligible
R3	Negligible	Negligible	Negligible	Negligible	Negligible
R4	Negligible	Negligible	Negligible	Negligible	Negligible
R5	Negligible	Negligible	Negligible	Negligible	Negligible
R6	Negligible	Negligible	Negligible	Negligible	Negligible
R7	Negligible	Negligible	Negligible	Negligible	Negligible
R8	Negligible	Negligible	Negligible	Negligible	Negligible
R9	Negligible	Negligible	Negligible	Negligible	Negligible
R10	Negligible	Negligible	Negligible	Negligible	Negligible
R11	Negligible	Negligible	Negligible	Negligible	Negligible

7.78 The resultant effect significance, with consideration to the sensitivity of the nearby receptors, is presented in **Table 7.17**.

Table 7.17 Calculated Construction Vibration Effects

Receptor	Calculated Vibration Effects During Likely Phases of Construction				
	Enabling Works	Piling	Sub-structure	Roads	Super-structure
Closest Activity					
R1	Negligible	Negligible	Negligible	Negligible	Negligible
R2	Negligible	Negligible	Negligible	Negligible	Negligible
R3	Moderate	Moderate	Moderate	Moderate	Moderate
R4	Moderate	Moderate	Moderate	Moderate	Moderate
R5	Negligible	Negligible	Negligible	Negligible	Negligible
R6	Minor	Minor	Minor	Minor	Minor
R7	Moderate	Moderate	Moderate	Moderate	Moderate
R8	Minor	Minor	Minor	Minor	Minor
R9	Minor	Minor	Minor	Minor	Minor
R10	Minor	Minor	Minor	Minor	Minor
R11	Minor	Minor	Minor	Minor	Minor
Typical Distance					
R1	Negligible	Negligible	Negligible	Negligible	Negligible
R2	Negligible	Negligible	Negligible	Negligible	Negligible
R3	Negligible	Negligible	Negligible	Negligible	Negligible
R4	Negligible	Negligible	Negligible	Negligible	Negligible
R5	Negligible	Negligible	Negligible	Negligible	Negligible
R6	Negligible	Negligible	Negligible	Negligible	Negligible
R7	Negligible	Negligible	Negligible	Negligible	Negligible
R8	Negligible	Negligible	Negligible	Negligible	Negligible
R9	Negligible	Negligible	Negligible	Negligible	Negligible
R10	Negligible	Negligible	Negligible	Negligible	Negligible
R11	Negligible	Negligible	Negligible	Negligible	Negligible

- 7.79 The effect significance is classed as up to Moderate significance at receptors R3, R4, and R7 in the short term. Such effects may be perceived when activities take place within close proximity to a given receptor. However, such effects would be short term and effects during activities at typical distances are calculated as not significant at all receptor locations. Mitigation measures to further minimise the likelihood of adverse impact are discussed later in this chapter.

Effects Once the Proposed Development is Operational

Ambient Noise Climate

- 7.80 The future suitability of the Site for residential accommodation has been confirmed by considering the calculated noise contours and the guidance adopted for this chapter.
- 7.81 Noise emission levels affecting the Proposed Development have been calculated using predictive computer noise modelling. Ambient noise levels have been calculated across the Site for both the day and night-time periods.
- 7.82 The results of the ambient noise survey have been used to validate the noise emissions from the nearby roads using the provided traffic data. Following verification of the existing scenario, the proposed road traffic flows for the year 2042 have been modelled. The 'with development' scenario

includes the likely increased traffic due to the Proposed Development. Traffic flows adopted for completion of the computer noise model are presented in **Appendix 7.3**.

- 7.83 Resultant noise contours have been calculated at 1.5m above ground level for day and night-time periods. Calculated daytime and night-time noise contours are presented in **Appendix 7.4** and **7.5**.
- 7.84 The highest calculated residential effects, based on the calculated noise contours, and with reference to the threshold values presented within **Table 7.7**, are presented in **Appendix 7.6**.
- 7.85 The calculated noise contours indicate that residential effects would be mostly Minor (not significant) at proposed housing parcels, with potential Moderate (significant) effects at facades overlooking Camer Road.
- 7.86 The layout of the Proposed Development will provide screening to properties beyond the perimeter of the Site and therefore the calculated effects are presented in advance of mitigation inherent within the Proposed Development layout. Noise levels within the Proposed Development and remaining effects are calculated to be not significant before consideration of mitigation.
- 7.87 Where significant effects are calculated, suitable glazing and ventilation should be selected to attain the BS 8233 and WHO criteria for suitable habitable noise levels. Where Minor effects are identified, no further consideration of mitigation options is considered as necessary.
- 7.88 Effects are up to Moderate significance at the boundary of proposed residential areas. All effects are considered Negligible with the incorporation of typical insulated glazing and attenuated ventilation, provided it does not compromise the façade with regards to noise reduction.
- 7.89 With incorporation of suitable mitigation choices, residential effects due to internal ambient noise levels would be Negligible (not significant).
- 7.90 The daytime ambient noise contour shows that calculated ambient noise levels would fall below the BS 8233 upper guideline noise level of 55 dB LAeq,T at positions over approximately 30m from the adjacent road and up to approximately 80m from the railway. The introduction of the Proposed Development would provide inherent screening to attenuate noise from road sources and external noise levels are likely to be sufficiently reduced as to meet the BS 8233 criteria.
- 7.91 Notwithstanding this, BS 8233 recognises that *“these guideline values are not achievable in all circumstances where development might be desirable. In areas such as ... urban areas adjoining the strategic transport network, a compromise between elevated noise levels and other factors, such as the convenience of living in these locations or making efficient use of land resources to ensure development needs can be met, might be warranted. In such a situation, development should be designed to achieve the lowest practicable levels in these external amenity spaces, but should not be prohibited”*.
- 7.92 Accordingly, proposed buildings should be sited to screen gardens from the adjacent sources and gardens should not overlook the road, as far as practicable. Suitable fencing should be employed where necessary, following consideration of the design. The location and effect of any screening can be considered during the progression of detailed design.

- 7.93 Where screening is required, it should be adequately specified to ensure ambient noise is mitigated as far as practicable. For example, a suitable wooden fence should comprise suitably dense close-boarded solid timber fencing, which should have a mass per unit of surface area in excess of 12 Kg/m² and be of a continuous/close-boarded construction with a minimum thickness of 15 mm. Fences should be suitably treated to prevent warping and rot due to weathering.

Changes in Road Traffic Noise – Existing Residential Receptors

- 7.94 Traffic flow data provided by the transport consultants has been used as the basis for the road traffic noise assessment. The 18-hour AAWT flows were provided for the year 2042 both with and without the Proposed Development.
- 7.95 Traffic noise has been calculated using the CRTN methodology. The DMRB LA111 assessment criteria has been used to quantify the magnitude of any change in noise level resulting from the Proposed Development at the roadside of the existing road network.
- 7.96 The calculated changes in noise level on existing road links, identified with respect to the road traffic noise impact assessment criteria, are presented in **Table 7.18**.

Table 7.18 Change in Noise Level on Local Road Network, 2042

Road Link	BNL		Change, dB
	Baseline	With Development	
Camer Road (north of access)	69.8	66.0	-3.8
Sole Street	66.1	66.6	0.5
Jeskyns Road	68.7	69.6	0.9
Henhurst Road	68.8	69.7	0.9
The Street	61.5	61.8	0.3
Halfpence Lane	66.9	67.2	0.3
Camer Road (south of access)	69.8	65.8	-4.0
Green Lane	64.5	65.2	0.7
Wrotham Road (north of Longfield Road)	68.5	68.3	-0.2
Longfield Road	61.5	62.3	0.8
Wrotham Road (south of Longfield Road)	69.1	69.1	0.0
Wrotham Road (north of Green Lane)	66.9	67.2	0.3
Norwood Lane (southern section)	58.3	-	-
Norwood Lane (northern section)	59.2	59.9	0.7
Wrotham Road (south of Norwood Lane)	67.2	67.5	0.3
Wrotham Road (north of Norwood Lane)	67.3	67.6	0.3
Wrotham Road (south of Lewis Road)	70.9	71.2	0.3
Wrotham Road (Istead Rise to Lewis Road)	69.6	69.9	0.3
Wrotham Road (north of Istead Rise)	72.0	72.3	0.3
A2 (east of Halfpence Lane)	85.9	85.9	0.0
A2 (east of Henhurst Road)	86.0	86.0	0.0
A2 (east of Wrotham Road)	84.0	84.0	0.0
A2 (west of Wrotham Road)	84.3	84.3	0.0

- 7.97 Calculated effects due to changes in road traffic noise levels are Negligible in the short and long-term.
- 7.98 Minor beneficial long-term effects are calculated on Camer Road, due to the reduction in speed limit following the introduction of the Proposed Development.

Mitigation Measures

Mitigation During Construction

- 7.99 To control the impact of noise during construction of the Proposed Development, contractors will ensure that works are carried out in accordance with best practicable means (BPM) as described in BS 5228 comprising of the following:
- Where possible, 'silenced' plant and equipment will be used;

- Where vehicles are standing for a significant period of time, engines will be switched off;
- Acoustic enclosures will be fitted where possible to suppress noisy equipment;
- Plant will operate at low speeds, where possible, and incorporate automatic low speed idling;
- Where possible, electrically driven equipment will be selected in preference to internal combustion powered, hydraulic power in preference to pneumatic and wheeled in lieu of tracked plant;
- All plant will be properly maintained (greased, blown silencers replaced, saws kept sharpened. Teeth set and blades flat, worn bearings replaced etc);
- Consideration will be given to temporary screening or enclosures for static noisy plant to reduce noise emissions and plant should be certified to meet any relevant EC Directives;
- All contractors will be made familiar with the guidance in BS 5228 (Parts 1 & 2) which will form a pre-requisite of their appointment; and
- Early and good public relations with the adjacent tenants and occupants of buildings will also reduce the likelihood of complaints.

7.100 These general measures to control construction noise should be incorporated within the Construction Environmental Management Plan (CEMP) and/or detailed in construction method statements. By adopting the recommended best practicable means, construction noise levels can typically be reduced by 10 dB(A).

Mitigation Once the Proposed Development is Operational

7.101 Suitable glazing and ventilation options should be adopted at dwellings overlooking the railway and roads in order to achieve the BS 8233 and WHO criteria.

7.102 Typical insulated double glazing and attenuated ventilation is likely to suitably reduce noise levels where dwellings are screened by the proposed layout. Any ventilation should allow for sufficient airflow whilst maintaining the integrity of the façade with regard to noise insulation. Exact requirements can be identified through the progression of the detailed development layout.

7.103 Examples of façade mitigation include acoustic air bricks, trickle ventilation and mechanical ventilation. Passive or mechanical systems allow for sufficient airflow whilst maintaining the integrity of the façade with regard to noise insulation.

7.104 Screening may be required to garden areas. The requirement for this would be determined during detailed design. However, it should be noted that BS 8233 indicates that the guidelines are not always achievable and that, provided the Proposed Development is designed to mitigate external noise levels as far as practicable, development should not be prohibited.

Residual Effects and Monitoring

7.105 The residual effects arising from the Proposed Development are summarised in **Table 7.19** below.

Table 7.19 Summary of Residual Effects

Effect	Receptor (Sensitivity)	Nature of Effect and Geographic Scale	Magnitude of Impact*	Classification of Effect	Mitigation and Monitoring	Residual Effect
Construction Effects						
Construction Noise	Surrounding residential receptors (high)	Short-term, local	Negligible (short term Medium impacts)	Negligible (Moderate to Negligible Temporary)	Implementation of Best Practicable Means to control noise emissions	Negligible (Moderate to Negligible Temporary)
Construction Vibration	Surrounding residential receptors (high)	Short-term, local	Negligible (short term Medium impacts)	Negligible (Moderate to Negligible Temporary)	Implementation of Best Practicable Means to control vibration	Negligible (Moderate to Negligible Temporary)
Operational Effects						
Ambient Noise	Proposed residential dwellings (high)	Long-term, local	Medium to Negligible	Moderate to Negligible	Incorporation of suitable glazing and attenuated ventilation	Negligible
Noise from changes in road traffic noise at existing residential receptors	surrounding residential receptors (high)	Long-term, local	Negligible to Low Beneficial	Negligible to Minor Beneficial	None	Negligible to Minor Beneficial

Notes: * incorporating environmental design and management, ** incorporating mitigation and monitoring measures

Likely Significant Environmental Effects

Construction Phase

- 7.106 Typical construction noise levels are calculated to fall below the 75 dB LAeq,T criterion noise level and identified effects are not significant. Close proximity activities may exceed the criterion noise levels in the short term.
- 7.107 Construction noise and vibration effects are likely to be Negligible during the majority of activities. Moderate short term effects are likely during close proximity works and BPM measures should be adopted to ensure the likelihood of effects is reduced as far as practicable.

Operational Phase – Ambient Noise Levels

- 7.108 Noise levels within the residential area would fall below the BS 8233 criteria with the incorporation of typical insulated glazing and attenuated ventilation. The residual noise effect is considered to be Negligible (not significant).

Operational Phase - Road Traffic Noise

- 7.109 The provided data and calculated noise changes indicate that effects would be Negligible at all road links.

Summary and Conclusions

- 7.110 This chapter has considered the likely significant environmental effects of the Proposed Development with respect to noise and vibration. These include the effects of existing conditions on the Proposed Development and the effects of noise and vibration generated by the Proposed Development on surrounding properties, during both construction and operational phases.
- 7.111 The assessment has been based on a computer noise model, informed and validated using environmental noise measurements and traffic data provided for the surrounding road links.
- 7.112 The impact of noise and vibration during construction of the Proposed Development has been calculated and assessed in accordance with BS 5228. Generic mitigation measures have been recommended, which when implemented are capable of ensuring that the impact of noise and vibration during the construction of the Proposed Development is adequately controlled.
- 7.113 An assessment has been carried out in accordance with the adopted criteria to determine the likely residential effects at proposed dwellings. Effects are Moderate prior to consideration of mitigation. Specific values can be determined during detailed design.
- 7.114 The impact of the increase in road traffic associated with the Proposed Development has been assessed. Effects due to any increase in road traffic are identified as not significant at calculated road links.

References

- ¹ British Standard 5228:-1:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites. Noise
- ² Design Manual for Roads and Bridges (DMRB) Document LA111 Noise and Vibration, 2020
- ³ British Standard 8233: 2014 Sound Insulation and Noise Reduction for Buildings
- ⁴ World Health Organisation (WHO): 1999, 'Guidelines for Community Noise', WHO, Geneva
- ⁵ Noise Policy Statement for England, 2010 (NPSE)
- ⁶ Planning Policy Guidance PPG24 'Planning and Noise'. 1994 The Stationary Office, 1994
- ⁷ The National Planning Policy Framework, December 2024, Ministry of Housing, Communities & Local Government
- ⁸ The Department for Transport, 1988, 'Calculation of Road Traffic Noise (CRTN)', The Stationary Office
- ⁹ British Standard 7445: 2003: Description and measurement of environmental noise. BSI, 2003