CALDECOTE FARM

NEWPORT PAGNELL · MILTON KEYNES

CHAPTER 9

ENVIRONMENTAL STATEMENT

NOISE & VIBRATION

JULY 2021

newlands developments

9.0 ECOLOGY AND NATURE CONSERVATION

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CHAPTER 9

ENVIRONMENTAL STATEMENT

NOISE & VIBRATION

9.1 INTRODUCTION

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9.1 INTRODUCTION

9.1.1 This chapter considers the potential noise and vibration impacts and effects that may arise at relevant sensitive receptors from the construction and operation of the Proposed Development at Caldecote Farm, Newport Pagnell. A detailed description of the Proposed Development can be found in Chapter 2.

9.1.2 This chapter describes the assessment methodology, the existing baseline conditions, the potential impacts and effects of the development arising from noise and vibration and any mitigation measures required to manage the impacts as required by Government policy. The residual effects that may exist, after these measures have been applied, are also identified.

9.1.3 The Proposed Development has the potential to generate noise from the following sources:

- The construction of the Proposed Development;
- The change in road traffic flows on the road network surrounding the Proposed Development;
- Noise emission from operational activities within the site, including vehicles travelling on the internal access roads, HGV manoeuvres and loading/unloading in the service yards; and
- Mechanical services plant associated with the proposed warehousing.

9.1.4 Concerning vibration during the construction phase, it is understood that no piling is required to construct the Proposed Development. The other construction activities will not give rise to vibration which is likely to cause adverse effects at nearby receptors. Therefore, no assessment of construction vibration has been undertaken.

9.1.5 No assessment of operational vibration effects has been undertaken as the operation of the Proposed Development should not give rise to any new sources of vibration.

9.1.6 To assist with the understanding of this chapter, a glossary of acoustic terms is provided in Appendix 9.1.

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9.2 PLANNING POLICY CONTEXT

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9.2 PLANNING POLICY CONTEXT

National Planning Policy

National Planning Policy Framework 2019

9.2.1 The National Planning Policy Framework (NPPF), last amended in June 2019, sets out the government planning policy for England. At its heart is an intention to promote more sustainable development.

9.2.2 The relevant paragraphs concerning noise in the NPPF are:

- Paragraph 170e: Specifies that new and existing development should be prevented from contributing to, being put at unacceptable risk from, or being adversely affected by unacceptable levels of noise pollution and, wherever possible, should help to improve local environmental conditions.
- Paragraph 180: "Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development. In doing so they should:

a) mitigate and reduce to a minimum potential adverse impacts resulting from noise from new development – and avoid noise giving rise to significant adverse impacts on health and the quality of life;"

9.2.3 The NPPF makes direct reference to the Noise Policy Statement for England for advice on the achievement of these policy aims.

Noise Policy Statement for England 2010

9.2.4 The Noise Policy Statement for England (NPSE) sets out the government's overall policy on noise management. It aims to promote good health and a good quality of life through the effective management of noise in the context of government policy on sustainable development.

9.2.5 It uses the previously established concepts of No Observed Effect Level (NOEL) and Lowest Observed Adverse Effect Level (LOAEL), and extends these concepts by introducing Significant Observed Adverse Effect Level (SOAEL). This is the level above which significant adverse effects on health and quality of life are likely to occur. However, the explanatory note to the NPSE states that it is not possible to identify a single objective value to define SOAEL that is applicable to all sources of noise in all situations. It is likely to be different for different noise sources, for different receptors and at different times.

9.2.6 The NPSE sets out the following long-term vision of noise policy and supporting aims in paragraphs 1.6 and 1.7:

"Noise Policy Vision

Promote good health and a good quality of life through the effective management of noise within the context of Government policy on sustainable development.

Noise Policy Aims

Through the effective management and control of environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development:
Avoid significant adverse impacts on health and quality of life;
Mitigate and minimise adverse impacts on health and quality of life; and
Where possible, contribute to the improvement of health and quality of life."

9.2.7 The second aim of the NPSE refers to noise impacts that lie somewhere between LOAEL and SOAEL; while these may be considered as adverse effects, they are not considered as significant.

9.2.8 The NPSE asserts that, while all reasonable steps should be taken to mitigate and minimise adverse effects, this does not mean that such adverse effects cannot occur.

Planning Practice Guidance: Noise (2019)

9.2.9 Further government guidance on the consideration of noise for planning has been published as the Planning Practice Guidance for Noise (PPG:N), last revised in July 2019. The PPG:N supports the NPPF by providing a range of advice and includes a noise exposure hierarchy table, and again makes reference to the NPSE.

9.2.10 The hierarchy table (replicated in Table 9.1 below), provides descriptive (i.e. non-numerical) guidance on the potential effects of noise exposure at levels corresponding to the NOEL, LOAEL and SOAEL as described in the NPSE, and confirms that adverse effects (between LOAEL and SOAEL) should be mitigated and reduced to a minimum, and significant adverse effects (above SOAEL) should be avoided, taking account of the economic and social benefit of the activity causing or affected by the noise.

Table 9.1 PPG:N Noise Exposure Hierarchy

Response	Examples of outcomes	Increasing effect level	Action
	No Observed Effect Level		
Present and not intrusive	Noise can be heard, but does not cause any change in behaviour, attitude or other physiological response. Can slightly affect the acoustic character of the area but not such that there is a change in the quality of life	No Observed Effect	No specific measures required
	No Observed Adverse Effect Level		
Present and intrusive	Noise can be heard and causes small changes in behaviour, attitude or other physiological response, e.g. turning up volume of television; speaking more loudly; where there is no alternative ventilation, having to close windows for some of the time because of the noise. Potential for some reported sleep disturbance. Affects the acoustic character of the area such that there is a small actual or perceived change in the quality of life.	No Observed Adverse Effect	No specific measures required
	Lowest Observed Adverse Effect Level		
Present and disruptive	The noise causes a material change in behaviour, attitude or other physiological response, e.g. avoiding certain activities during periods of intrusion; where there is no alternative ventilation, having to keep windows closed most of the time because of the noise. Potential for sleep disturbance resulting in difficulty in getting to sleep, premature awakening and difficulty in getting back to sleep. Quality of life diminished due to change in acoustic character of the area.	Observed Adverse Effect	Mitigate and reduce to a minimum
	Significant Observed Adverse Effect level		
Present and disruptive	The noise causes a material change in behaviour, attitude or other physiological response, e.g. avoiding certain activities during periods of intrusion; where there is no alternative ventilation, having to keep windows closed most of the time because of the noise. Potential for sleep disturbance resulting in difficulty in getting to sleep, premature awakening and difficulty in getting back to sleep. Quality of life diminished due to change in acoustic character of the area.	Significant Observed Adverse Effect	Avoid
Present and very disruptive	Extensive and regular changes in behaviour, attitude or other physiological response and/or an inability to mitigate effect of noise leading to psychological stress, e.g. regular sleep deprivation/awakening; loss of appetite, significant, medically definable harm, e.g. auditory and non-auditory.	Unacceptable Adverse Effect	Prevent

Local Planning Policy

Milton Keynes Council Local Plan 2016-2031

9.2.11 The current Milton Keynes Council Local Plan, adopted in Spring 2019 and referred to as Plan:MK 2016-2031, states the following within Policy NE6 Environmental Pollution:

C. Noise and Vibration

1. A Noise and Vibration Impact Assessment will be required for proposals with the potential to cause disturbance to people or the natural environment due to noise and/or vibration and for proposals that are considered to be sensitive to noise and/or vibration. Proposals that would result in or be subject to noise pollution and/or vibration that is:

a. Very disruptive and would have an unacceptable adverse effect on human health or the natural environment or the tranquillity and enjoyment of the countryside will not be permitted.

b. Disruptive and would have a significant adverse effect on human health or the natural environment or the tranquillity and enjoyment of the countryside will be refused unless the need for, and benefits of, the development significantly outweigh the harm and all feasible solutions to avoid and mitigate that harm have been fully implemented.

c. Intrusive and would have an adverse effect on human health or the natural environment or the tranquillity enjoyment of the countryside will be resisted unless the need for, and benefits of, the development outweigh the harm and all feasible solutions to avoid and mitigate that harm have been fully implemented.

Other Relevant Policy Standards and Guidance

IEMA Guidelines for Environmental Noise Impact Assessment (2014)

9.2.12 Provides information on current good practice standards for the scope, content and methodology of noise impact assessments.

BS 5228-1:2009+A1:2014 Code of Practice for noise and vibration control on construction and open sites, Part 1 Noise and Part 2 Vibration

9.2.13 Gives recommendations for basic methods of noise and vibration control relating to construction sites where work activities/operations are expected to generate noise and vibration that could affect those living or working nearby.

LA111 Noise and Vibration (June 2020) Highways England

9.2.14 Provides guidance on the assessment of the impacts that road projects on the Strategic Road Network may have on levels of noise and vibration.

BS 4142:2014+A1:2019 Methods for rating and assessing industrial and commercial sound.

9.2.15 Describes methods for rating and assessing sound of an industrial and/or commercial nature (including sound from loading and unloading of goods and materials at industrial or commercial premises, mobile plant and fixed mechanical plant installations).

BS 8233:2014 Guidance on sound insulation and noise reduction for buildings

9.2.16 Provides information on the design of buildings so that the internal acoustic environments are appropriate to their functions.

WHO Guidelines for Community Noise 2000

9.2.17 Provides guidelines on the potential effects of community (environmental) noise.

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9.3 ASSESSMENT METHODOLOGY

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9.3 ASSESSMENT METHODOLOGY

Scope

9.3.1 Regarding the likely noise and vibration effects arising from the Proposed Development, the extent of the study area includes the site and the surrounding sensitive receptors that might be adversely affected.

9.3.2 Generally, for construction and operational sound, consideration is given to the nearest receptors to the site boundary, on the assumption that these represent the worst affected receptors. The impact at all other receptor locations will be no greater and most likely less than at those receptors included in the assessment.

9.3.3 For road traffic noise, the extent of the study area is dependent upon the impact of the Proposed Development on the surrounding traffic flows and the availability of traffic data for the network.

Approach to Assessment & Significance Criteria

9.3.4 In general, the assessment methodology used for each type of source is different in terms of how the potential noise impact is predicted and how the effect is assessed. The degree of impact and significance of effect is dependent upon several factors including the noise level from the activity, the existing sound environment, and the duration, timing, and character of the different noise sources.

9.3.5 The assessment methodologies that have been used for each element of the assessment are described below.

Baseline Conditions

9.3.6 To characterise and quantify the existing noise environment, a predominantly unattended baseline noise survey was undertaken in November 2017 at locations considered to represent some of the closest noise sensitive receptors to the site.

Construction Noise

9.3.7 It is anticipated that construction works would commence in 2021 with all construction works for the development anticipated to take up to 15 months to complete. The first operational year would be 2023.

Construction Traffic

9.3.8 The traffic consultant has provided 18 hour Annual Average Weekday Traffic Flows for construction traffic, these have been added to the baseline 2020 flows to determine the likely impact. The volume of construction traffic is based on weeks 1 to 26 of the construction programme, when the highest volume of construction traffic is forecast and is therefore a worst case. Based on these flows, the basic noise levels arising from the road traffic corrected for speed and percentage HGVs have been predicted for the 2020 baseline and then with the construction traffic added onto the baseline flows. This calculation has been undertaken the methodology set out in Chart 3 and 4 of the Calculation of Road Traffic Noise,1988 (CRTN[1]).

9.3.9 The significance of construction traffic noise effects has been determined using the thresholds set out in Table 9.2. These values are based on the guidance in Table 3.17 of LA111.

1 CRTN, Calculation of Road Traffic Noise, Department of Transport 1988

Table 9.2 Magnitude of impacts of construction traffic noise at sensitive receptors

Magnitude of Impact	Increase in BNL[2] of closest public road used for construction traffic (dB)
Major	Greater than or equal to 5.0
Moderate	Greater than or equal to 3.0 and less than 5.0
Minor	Greater than or equal to 1.0 and less than 3.0
Negligible	Less than 1.0

Note: Construction traffic noise shall constitute a significant effect where it is determined that a major or moderate magnitude of impact will occur for a duration exceeding;
a) 10 or more days or nights in any 15 consecutive days or nights
b) A total number of days exceeding 40 in any 6 consecutive months.

Construction Plant & Machinery

9.3.10 Prior to the appointment of a contractor, detailed information regarding the construction traffic movements and the type, numbers and size of construction equipment that will be employed for each activity is not available. However, in order to determine whether there are likely to be any significant effects arising from the works a number of assumptions have been made with regard to the construction traffic, the construction methods and equipment that are likely to be employed. Further details are provided in Chapter 2 Proposed Development.

9.3.11 It is anticipated that the construction working hours will be as follows:
- 07:00 – 18:00 hours Monday to Friday
- 07:00 – 16:00 hours on Saturdays
- No working on Sundays and Bank Holidays

9.3.12 It is expected that all construction related deliveries would also take place during these hours, except for large items of plant which usually have to be transported on the road network at other times when there is minimal traffic. Site personnel would typically be permitted to access the site shortly before and after these hours.

9.3.13 On occasion, out of hours works may be required where it is not practicable to complete them within the hours stated above. Such activities may include long concrete pours which cannot be interrupted once started. Any such works would be appropriately managed and mitigated to minimise any potential adverse noise effects as far as practicable. Permission would be sought from MKC and occupiers of nearby properties would be informed by the contractor in advance of the works and their likely duration.

9.3.14 For the main construction works, an indication of the potential noise effects of construction activities has been determined at the relevant noise sensitive receptors based on estimates of the type and numbers of plant and equipment likely to be used together with their estimated usage, or on-time, for a typical working day. These estimates are summarised in Appendix 9.2. As can be seen from that Appendix, the works have been split into the following indicative activity scenarios:

- Earthworks
- Concreting
- Main Build

9.3.15 For each activity scenario, the noise contribution for each item of plant was calculated at two different distances from each receptor to give an indication of the likely noise levels at each receptor when:

- the plant is operating at the centre of the site, providing a consideration of all activities spread over the application site.
- the closest distance from the boundary of the particular phase of construction to the receptor, providing an indication of the worst-case noise levels.

2 BNL – Basic Noise Level – part of the CRTN method

9.3.16 The construction noise predictions have been based on the principles of the methodology contained within Annex F of BS 5228-1:2009+A1:2014[3]. This standard has been formally adopted by Government as the Code of Practice for use in this situation[4]. No allowance has been made for any screening attenuation in the predictions.

9.3.17 With reference to the average construction noise levels at the receptors, the significance of potential adverse noise effects has been determined using the thresholds set out in Table 9.3. The values are based on the guidance within Annex E of BS 5228-1:2009+A1:2014 and the effects that construction noise can have on those exposed to it. The thresholds are expressed in terms of current Government Policy.

Table 9.3 Threshold of potential effects of construction noise at receptors

Effect	Time Period	Threshold Value ($L_{Aeq,T}$)[a]
Lowest Observed Effect Level (LOAEL)	Day (07:00 – 19:00)	65
	Evening (19.00 –23.00)	55
	Night (23.00 – 07.00)	45
Significant Adverse Effect Level (SOAEL)	Day (07:00 – 19:00)	75
	Evening (19.00 –23.00)	65
	Night (23.00 – 07.00)	55

[a] *These effects are expected to occur if the programme of works indicates that the relevant threshold values are likely to be exceeded over a period of at least one month*

9.3.18 With regard to the likely worst-case construction noise levels, these are only likely to occur on a small number of days and would not be expected to last for one month. Therefore it is not appropriate to assess the worst-case results using the thresholds in Table 9.3.

9.3.19 All construction noise effects would be temporary in nature.

Construction Vibration

9.3.20 Of the potential construction activities that could be undertaken, only piling would have the potential to generate levels of vibration that could adversely affect nearby receptors. It is understood that there will be no piling works associated with the Proposed Development and consequently no assessment of the effect construction vibration has been undertaken.

Operational Road Traffic Noise

9.3.21 The potential change in road traffic noise has been predicted using the environmental noise modelling software IMMI which incorporates the methodology set out in CRTN. This methodology assumes that the receptor location is downwind of the source.

9.3.22 The project transport consultant, ADC, has provided road traffic data in the form of 18 hour AAWT flows for each scenario. There is forecast to be an increase in HGV traffic due to the Proposed Development. On this basis, detailed modelling of road traffic noise was considered necessary for the immediate surrounding area.

9.3.23 The road traffic noise levels have been predicted for the following scenarios:

- 2020 Baseline
- 2023 DM and DS representative of the opening year of the Proposed Development when the site would be fully operational.

Note: DM means 'Do Minimum' i.e. Without the Proposed Development. DS means 'Do Something' i.e. With the Proposed Development.

3 BS 5228-1:2009+A1:2014 – Code of Practice for noise and vibration control on construction and open sites, Part 1: Noise
4 Statutory Instrument 2015/227 – The Control of Noise (Code of Practice for Construction and Open Sites) (England) Order 2015

9.3.24 As well as the predicted noise level arising from road traffic at the receptor locations, the change in road traffic noise between the DM and DS scenarios has also been determined.

9.3.25 It is understood that traffic flows used for the Do Minimum and Do Something opening year and future year scenarios include the cumulative effect of all committed development schemes.

9.3.26 The significance of potentially adverse road traffic noise effects has been based on a combination of the change in noise exposure between the DM and DS scenarios, and the resulting noise exposure. The noise exposure thresholds are set out in Table 9.4. These have been derived from the effects that road traffic noise can have on those affected[5] and are expressed in terms of Government policy.

Table 9.4 Threshold of potential effects of road traffic noise (residential receptors)

Time period	Effect	Threshold Value
Day (06:00-00:00)	LOAEL	50 dB LAeq 16 hour free-field[a,b]
	SOAEL	63 dB LAeq 16 hour free-field[a,c]
Night (23.00-07.00)	LOAEL	40 dB Lnight (free-field)
	SOAEL	55 dB Lnight (free-field)

Notes:
[a] This is the average daily value (07:00 – 23:00 hours) at a position one metre from a residential building façade containing a window, ignoring the effect of an acoustic reflection from that façade.
[b] equivalent to 55 dB LA10,18hr façade
[c] equivalent 68 dB LA10,18hr façade

9.3.27 If the daytime LOAEL threshold is exceeded, the data in Table 9.5 sets out how the magnitude of the impact is described taking account of the change in daytime noise exposure and the resulting exposure.

Table 9.5 Descriptors of impact magnitude of daytime road traffic noise change

Magnitude of Impact	Between LOAEL and SOAEL	SOAEL or greater
No Change	0	0
Negligible	Up to 2.9 dB(A)	Up to 0.9 dB(A)
Minor	3.0 – 4.9 dB(A)	**1.0 – 2.9 dB(A)**
Moderate	5.0 – 9.9 dB(A)	**3.0 – 4.9 dB(A)**
Major	10.0 dB(A) and over	**5.0 dB(A) and over**

9.3.28 Whether or not a significant adverse effect is expected to occur is determined by comparing the predicted noise level (with the Proposed Development) with the LOAEL and SOAEL values shown in Table 9.4, and also considering the increase in noise due to the Proposed Development. If the result for any property falls in the categories shown by the shaded boxes with text in bold in Table 9.5 that indicates that the property is regarded as experiencing a significant adverse effect with respect to Government policy due to an increase in road traffic noise during the daytime period.

9.3.29 If the night-time LOAEL threshold is exceeded, the data in Table 9.6 sets out how the magnitude of the impact is described taking account of the change in night-time noise exposure and the resulting exposure.

5 The evidence for using some these values can be found in guidance from the World Health Organisation. Similar values have been used for the assessment of other schemes such as A14 DCO and Northampton Gateway DCO.

Table 9.6 Descriptors of impact magnitude of night-time road traffic noise change

Magnitude of Impact	Between LOAEL and SOAEL	SOAEL or greater
No Change	0	0
Negligible	Up to 0.9 dB(A)	Up to 0.9 dB(A)
Minor	1 – 2.9 dB(A)	**1.0 – 2.9 dB(A)**
Moderate	3.0 – 4.9 dB(A)	**3.0 – 4.9 dB(A)**
Major	5.0 dB(A) and over	**5.0 dB(A) and over**

9.3.30 Whether or not a significant adverse effect is expected to occur is determined by comparing the predicted noise level (with the Proposed Development) with the LOAEL and SOAEL values shown in Table 9.4, and also considering the increase in noise due to the Proposed Development. If the result for any property falls in the categories shown by the shaded boxes with text in bold in Table 9.6 that indicates that the property is regarded as experiencing a significant adverse effect with respect to Government policy due to an increase in road traffic noise during the night-time period.

9.3.31 CRTN calculates road traffic noise levels in terms of the LA10,18h or LA10,1h. To compare the results to the LAeq noise exposure thresholds shown in Table 9.4, the predicted LA10,18hr free-field values can be converted to LAeq16h values by decreasing the result by 2 dB. Lnight values have been calculated from LA10,1hr values using method 1 of the Defra commissioned report by TRL/Casella Stanger[6].

9.3.32 All road traffic noise effects are expected to be permanent.

Operational Sound from the Development Site - Fixed Plant

9.3.33 Sound emission from mechanical plant associated with the Proposed Development, such as that used for ventilation and cooling of the warehouses and associated office space, is considered a component of operational sound.

9.3.34 Prior to the occupants of the warehouses being known, no information regarding the type or number of these units is available. Prior to installation, it is proposed that details of the mechanical plant will be submitted to and approved by the relevant planning authority.

9.3.35 As part of this process, sound from the proposed plant installations will be assessed and if required, mitigated, to demonstrate compliance with Government and Local policy. The assessment will use the methodology in BS 4142:2014+A1:2019[7] and the background sound levels presented in this chapter. Items of plant will be selected and located to minimise operational sound at nearby receptors as far as reasonably practicable, with further options being available for standard mitigation including local screening, enclosures and in-duct attenuators.

Operational Sound from the Development Site - HGVs

9.3.36 The primary sources of operational sound at the Proposed Development have been identified as HGV manoeuvres (reversing, start up and pull away), HGV loading/unloading in the service yard areas and HGVs travelling along the access roads within the development to and from the units and into the service yards.

9.3.37 At the time of assessment, it is understood that as the application is for outline consent the site layout is not fixed. Therefore, the sizes and positions of the warehousing, service yards and loading bays etc are subject to change, although the proposed maximum floorspace is fixed. It is also understood that the Proposed Development will operate 24 hours a day, every day of the week.

6 Method for Converting the UK Road Traffic Noise Index LA10,18h to the EU Noise Indices for Road Noise Mapping, TRL/Casella Stanger for Defra (2006)

7 BS 4142:2014+A1:2019: Method for rating and assessing industrial and commercial sound, BSI (2019)

9.3.38 To predict the potential impacts and effects at the receptors, it is necessary to make some indicative assumptions regarding the site layout, the potential distribution of noise sources across the site and likely operations. For this assessment the layout has been assumed to be as set out in the illustrative masterplan. This is considered to be indicative of a reasonable worst-case scenario in terms of the likely impacts at the receptors in closest proximity to the site as it assumes loading bays are facing the closest noise sensitive receptors. The assessment is based on all warehouses having dock levellers for loading/unloading and no refrigerated goods being part of the loads.

9.3.39 Regarding the prediction of sound from these sources, a 3D model of the surrounding area including topography, has been constructed using the software package IMMI. Predictions of sound arising from HGV activities in service yards have been modelled within IMMI as point sources, using the propagation methodology described in ISO 9613-2:1996[8]. Predictions of the noise levels from HGVs travelling along the access roads within the red line boundary have been modelled in IMMI using the haul road method from BS 5228-1:2009+A1 2014.

9.3.40 Octave frequency band source levels for the HGV activities have been taken from Vanguardia's measurement library and are presented in Table 9.7 below.

Table 9.7 HGV Source Terms

HGV Activity	Sound Power Level (Lw dB in each Octave Band)								LwA (dB)
	63Hz	125Hz	250Hz	500Hz	1KHz	2KHz	4KHz	8KHz	
HGV Reverse	101	94	94	91	94	95	84	79	99
HGV Start-up & Pull away	107	101	98	97	97	94	87	78	101
HGV Load	90	89	90	89	86	83	79	73	91
Cab picking up trailer (Lmax)	113	106	107	108	108	107	102	92	113

9.3.41 The relevant standard for the assessment of operational sound from the Proposed Development is BS 4142:2014+A1:2019, which indicates that the operational sound at the receptor locations should be evaluated over reference interval of 1 hour during the day (07:00 – 23:00 hours) and 15 minutes during the night (23:00 – 07:00 hours). Therefore, the model considers the likely number of manoeuvres (i.e. a HGV reversing into the loading or parking bay and pulling away) and loading/unloading activities taking place over these periods. The number of manoeuvres has been based on the hourly HGV profile for the warehousing provided by the project transport consultant, which is based on the proposed maximum floor area of the development.

9.3.42 Where the activity takes place for less than the duration of the assessment period, the levels have been corrected to take account of their duration or on time. For the 1-hour daytime assessment period, it has generally been assumed that manoeuvres (reversing and pull away) take 1 minute to complete and loading/unloading takes 30 minutes. For the 15 minute night-time assessment period, the same assumptions apply to manoeuvres, but no on-time correction is applied to loading/unloading as this may occur throughout the assessment period. These assumptions are based on Vanguardia's experience of undertaking these assessments for a range of occupiers and the duration of the measurements in our library measurement data. The number of activities that have been assumed for each assessment period and the corresponding source level are summarised in Table 9.8.

8 ISO 9613-2: Acoustics – Attenuation of sound during propagation outdoors – Part 2: General Method of calculation, ISO (1996)

Table 9.8 Details of HGV service yard activities during peak hour of the day and peak 15 minutes at night

		Daytime 1 hour Assessment Period			Night-time 15 minute Assessment Period		
Unit	HGV Activity	No. during hour	On-time correction (dB)	Corrected Sound power level (dBA)	No. during 15 minutes	On-time correction (dB)	Corrected Sound power level (dBA)
1	Reverse	11	-18	81	2	- 12	87
	Pull-away	11	-18	83	2	-12	89
	Loading	11	-3	88	4	0	91
2	Reverse	8	-18	81	2	-12	87
	Pull-away	8	-18	83	1	-12	89
	Loading	8	-3	88	3	0	91

9.3.43 The assessment of the potential impacts arising from operational sound associated with the Proposed Development is based on the principles of BS 4142:2014+A1:2019. This methodology provides an initial estimate of impact based on the difference between the sound from the source being assessed (the specific level) and the existing background sound level at the measurement location.

9.3.44 Regarding the background sound level, the standard states that the value used should be representative of what occurs at the receptor locations during the assessment periods and that the objective is not simply to identify the lowest level. Typical background sound levels are usually identified using statistical analysis; see the Baseline Conditions section below for further information.

9.3.45 The standard also states that certain characteristics, if perceptible at the receptor location, can increase the extent of the impact over that expected from a simple difference in noise levels. These characteristics include tonality, impulsivity and intermittency as well as "other sound characteristics" which is used when the sound might be readily distinctive against the residual acoustic environment but is not considered to have any of the other three features. The standard describes various options for taking any such features into account and for determining what is described in the standard as a 'rating level'.

9.3.46 The standard states that the extent of the impact can be determined by subtracting the typical background sound level from the rating level. The greater the difference the greater the magnitude of the initial impact estimate. The standard states that:

'Typically, the greater this difference, the greater the magnitude of the 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.'*

9.3.47 The standard states that while the difference between the rating level and the background sound level provides an initial estimate of impact, other factors should be considered in terms of context, such as the absolute noise levels and how the character and level of the source relates to the existing sound environment. Regarding the absolute noise levels, relevant guideline values are presented in Table 9.9 below.

Table 9.9 Summary of Guideline Values from BS 8233:2014

Location (activity)	Time period	Desirable Sound Level not to be exceeded
	Day (07:00-23:00)	35 - 40 dB LAeq,T
Inside bedrooms (sleeping)	Night (23:00-07:00)	30 - 35 dB LAeq,T
Inside Dining Room/area (dining)	Day (07:00 – 23:00)	**40 - 45 dB LAeq,T**
External Amenity Space	Day (07:00-23:00)*	**50-55 dB LAeq,T**
*Time period not defined but assumed to be day.		

9.3.48 The lower values presented in the table are generally regarded as the LOAEL for steady external sound, i.e. no adverse effect due to the impact of the sound would be expected. If the sound has certain characteristics at the receptor location, it could be appropriate to consider a lower value as the LOAEL.

9.3.49 The World Health Organisation's Guidelines for Community Noise has been used to consider the potential impact from any maximum short-term noise levels from operational sound during the night-time period. The guidelines state that, for good sleep, indoor sound pressure levels should not exceed around 45 dB LAFmax more than 10–15 times per night. This is equated to a level at the outside façade of 60 dB LAFmax with a partially open window. It is generally accepted that this criterion is a LOAEL[9].

9.3.50 The Institute of Environmental Management and Assessment (IEMA) published their Guidelines for Environmental Noise Impact Assessment in 2014[10]. The document describes a process for undertaking such assessments. It notes that the extent of the effects of noise impact can rarely be determined solely by the difference between current and future noise levels, and that there are other factors to consider when determining potential effects. This principle has been followed in the assessment.

Consultation

9.3.51 Consultation was undertaken with the Environmental Health Officer (EHO) for Milton Keynes Council (MKC) in October 2017 to agree the baseline monitoring strategy and survey locations.

9.3.52 The EHO was contacted in February 2021 regarding the overall assessment methodology, which was not previously agreed. The response received indicated their agreement with our proposed approach to the assessment for the ES and the use of the 2017 baseline noise survey data.

LIMITATIONS TO ASSESSMENT

Construction

9.3.53 Prior to the appointment of a contractor, detailed information is not yet available regarding the construction traffic movements and the type, numbers and size of construction equipment that will be employed from each activity. The assessment has been based on assumptions of the likely plant and equipment and their expected typical use over a working day.

Operational Sound

9.3.54 As mentioned above, only the total proposed floorspace for the development is fixed. The assessment therefore has been based on approximate sizes of units, general locations and anticipated amount of activity based on the total proposed floorspace. This approach means that a reasonable worst case has been assumed. Therefore, the assessment identifies the magnitude of the likely impacts and effects and the mitigation measures likely to be needed to manage the operational sound impacts.

9 There is no equivalent research regarding the probability of a noise-induced awakening from sources such as those which would occur at the proposed development site. Hence the approach to maximum noise levels is based on WHO guidance.

10 Guidelines for Environmental Noise Impact Assessment, IEMA (2014)

9.3.55 Regarding mechanical services noise, prior to the occupants of the warehouses being known, no information regarding the type or number of these units is available. Prior to installation, it is proposed that details of the mechanical plant will be submitted to and approved by the relevant planning authority and assessed as detailed in 9.58.

RECEPTORS

9.3.56 Sensitive receptors are identified as locations where a human or ecological habitat could be exposed to increased levels of noise and vibration due to the Proposed Development.

9.3.57 The noise sensitive receptors used in this assessment are presented in Table 9.10 and presented in Figure 9.1 below. All receptors are residential with the exception of the Holiday Inn Hotel. Two locations within the proposed Bloor Homes residential development off Willen Road have also been considered as receptors.

Table 9.10 Noise sensitive receptors

Receptor Location		Assessment Height (m)	Road Traffic Noise Receptor	Operational Noise Receptor	Construction Noise Receptor
R1	Tabard Gardens	1.5, 4.5	Yes	Yes	Yes
R2	Caldecote Farm	1.5, 4.5	Yes	No	No
R3	Pyms Stables	1.5, 4.5	Yes	No	No
R4	27-29 London Road	1.5, 4.5	Yes	No	No
R5	Holiday Inn	1.5, 4.5	Yes	No	No
R6	Dolben Court	1.5, 4.5	Yes	Yes	Yes
R7	Traveller Site	1.5	Yes	Yes	Yes
R8	Glenfield (Location 1)	1.5, 4.5	Yes	Yes	Yes
R9	Glenfield (Location 2)	1.5, 4.5	Yes	Yes	No
R10	Proposed Residential 1	1.5, 4.5	Yes	Yes	No
R11	Proposed Residential 2	1.5, 4.5	Yes	Yes	No
Notes: Assessment height 1.5m = ground floor (GF), 4.5m = first floor (FF)					

Figure 9.1 Noise sensitive receptors

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NOISE & VIBRATION

9.4 BASELINE CONDITIONS

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9.4 BASELINE CONDITIONS

Noise Survey

9.4.1 To characterise and quantify the existing sound environment around the Proposed Development site a baseline noise survey was undertaken from Wednesday 1st November to Friday 10th November 2017.

9.4.2 The survey comprised 3 static monitoring locations left unattended for the duration of the monitoring and one short-term measurement position to determine whether there was any correlation between this short-term position and the longer-term positions. The locations were selected to be representative of the existing noise sensitive receivers around the Proposed Development.

9.4.3 Table 9.11 below presents a description of the monitoring locations and details of the sensitive receptor they represent. Figure 9.2 below presents the measurement locations used in the baseline noise survey.

Figure 9.2 Baseline survey monitoring locations

Table 9.11 Baseline survey monitoring locations

Monitoring location	Location detail
LT1	To the north of the Proposed Development, near the dwellings on Tabard Gardens.
LT2	To the east of the proposed site boundary, representative of the residential dwellings at Glenfield.
LT3	Also to the east of the proposed site boundary but closer to Willen Road and the M1. Representative of the Traveller Site.
ST1	To the south proposed site boundary, representative of residential properties on Dolben Court. These measurements were taken to determine correlation with long term monitoring location LT3.

9.4.4 Measurements were undertaken using Class 1 monitoring equipment at a height of 1.5 m above local ground level under free field conditions. The sound level meters were field calibrated prior to and following the measurements using a Class 1 acoustic calibrator. A drift of no more than 0.1dB was found, with the exception of one location (LT1).

9.4.5 At LT1 there was a significant drift in calibration and therefore a repeat survey was undertaken at this location between Wednesday 15th November 2017 and Thursday 23rd November 2017. The calibration drift for this repeated survey was not more than 0.1 dB.

9.4.6 The weather conditions throughout both survey periods were changeable with some rain and variable wind speeds. Any data identified as being contaminated by poor weather conditions was removed from the data set and is excluded from the assessment.

9.4.7 Appendix 9.3 presents information on the survey equipment used and the weather data.

9.4.8 The noise level at each monitoring location was dominated by road traffic noise from the M1 which runs along the western boundary of the Proposed Development site.

Characterisation of Measured Sound Levels Used for the Assessment

9.4.9 The methodology for the assessment of operational sound from the Proposed Development (BS 4142:2014+A1:2019) requires that a typical background sound level be selected for each receptor.

9.4.10 After filtering out any data affected by adverse weather conditions, the data gathered during the baseline noise survey has been analysed to determine the modal background sound level measured during survey. The relevant values have been identified for the day and night-time periods using statistical analysis. These are considered to be a good indicator of the typical background sound level within these periods.

9.4.11 However, in some situations the background sound level is not evenly spread about the modal value and there can be quite a few occasions when a lower value occurs. To assess the distribution of the measured background sound levels, the lower quartile value (25th percentile) was calculated and compared to the modal value for both the day and night-time periods. The lower quartile is the value which is exceeded 75% of the time. When the lower quartile was at least 3 dB(A) below the modal value, this was considered to indicate an unevenness in the distribution of the background sound level. In those cases, the lower quartile value was used as a sensitivity test in the operational sound assessment, in addition to the modal value. This means that a robust approach to the consideration of the typical background sound levels in the assessment has been followed.

Table 8.12 Typical residual and background noise levels

Monitoring location	Period	Modal Background Sound Level ($L_{A90,15mins}$ dB)	Sensitivity Test* Background Sound Level ($L_{A90,15mins}$ dB)	Difference	Sensitivity Test Required?
LT1	Day (07:00-23:00)	64	56	-8	Yes
	Night (23:00 – 07:00)	53	53	0	No
LT2	Day (07:00-23:00)	58	56	-2	No
	Night (23:00 – 07:00)	54	50	-4	Yes
LT3	Day (07:00-23:00)	62	61	-1	No
	Night (23:00 – 07:00)	55	53	-2	No

Note: Sensitivity test value is the 25th percentile of the background sound levels for that period.

9.4.12 In addition to the data presented above, an additional short-term measurement was undertaken to determine the difference in noise level between ST1 and LT3. The attended measurement was undertaken on the 10th of November 2017 between 10:25 and 11:05. A comparison between the measured data from both monitoring locations is presented in the Table 8.13 below.

Table 8.13 Level difference at ST1 compared to the measured noise level at LT3

Time	ST1 L_{Aeq} (dB)	ST3 L_{Aeq} (dB)	Difference (dB)	ST1 L_{A90} (dB)	ST3 L_{A90} (dB)	Difference dB
10:25	62	73	-11	60	63	-3
10:30	62	73	-11	60	63	-3
10:35	62	73	-11	60	64	-4
10:40	62	72	-10	60	64	-4
10:45	62	73	-11	61	64	-3
10:50	63	72	-9	61	64	-3
10:55	63	73	-10	60	64	-4
11:00	63	73	-10	61	62	-1
11:05	63	72	-9	61	63	-2
Average Difference			**-10**	**Average Difference**		**-3**

9.4.13 Table 8.13 indicates that during the daytime period, the background sound level (LA90) at ST1 was generally 3 dB lower than that measured at LT3 over the same period, during the day. No short-term measurements were undertaken during the night-time period at ST1 to enable a direct comparison with the measurements at LT3. However, given that the dominant noise source at both locations is continuous road traffic noise from the M1 it was considered reasonable to apply the same correction to the night-time noise levels from LT3 to derive a background sound level at ST1 for the night-time period.

9.4.14 Based on Tables 8.12 and 8.13, the background sound levels for the operational noise receptors are presented in Table 8.14 below.

Table 8.14 Background sound levels used for assessment

Receptor Location	Monitoring Position	Period	Modal Background Sound Level (LA90,15mins dB)	Sensitivity Test Background Sound Level (LA90,15mins dB)
R1	LT1	Day (07:00-23:00)	64	56
		Night (23:00 – 07:00)	53	Not required
R8, R9, R10, R11	LT2	Day (07:00-23:00)	58	Not required
		Night (23:00 – 07:00)	54	50
R7	LT3	Day (07:00-23:00)	62	Not required
		Night (23:00 – 07:00)	55	Not required
R6	ST1*	Day (07:00-23:00)	59	Not required
		Night (23:00 – 07:00)	52	Not required

Notes: ST1 Background Sound Levels derived by subtracting 3 dB from the LT3 values based on the correlation in Table 8.13

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9.5 POTENTIAL IMPACTS

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9.5 POTENTIAL IMPACTS

Construction Traffic

9.5.1 The predicted basic noise level (BNL) for the 2020 baseline and 2020 with construction traffic scenarios, corrected for speed and percentage HGVs are presented in Table 8.15 along with the difference in noise levels and the predicted magnitude of impact, determined in accordance with the criteria in Table 8.2.

Table 8.15 Construction traffic noise predictions

Road	Predicted BNL (LA10, 18 hour)		Change In Noise Level	Magnitude
	2020 Baseline	2020 with Construction Traffic		
Willen Road North	73.8	74.0	+0.2	Negligible
Willen Road South	73.8	74.0	+0.2	Negligible
Tongwell Street	73.5	73.7	+0.2	Negligible
Marsh End Road	74.2	74.2	0.0	No change
A422 east of Marsh End roundabout	76.7	76.8	+0.1	Negligible
A509 London Road	75.7	75.8	+0.1	Negligible
H3 Monks Way West of Marsh End	76.7	76.8	+0.1	Negligible

9.5.2 It can be seen from Table 8.15 that the construction traffic noise associated with the scheme results in a negligible impact at most receptors and therefore would not result in any adverse or significant adverse effects.

Construction Noise

9.5.3 Regarding the potential temporary noise effects at nearby receptors arising from construction of the Proposed Development, the predicted noise levels for the construction activities considered are presented in Table 8.16 and Table 8.17.

9.5.4 The values represent the LAeq,11hr noise levels to be expected on a typical working day at ground floor level (Table 8.16) and the levels when construction plant is concentrated at the nearest boundary of the site to that receptor (Table 8.17). The tables also indicate how the predicted noise levels correspond to the thresholds of potential effect stated in Table 8.3 above, although, in Table 8.17, this comparison does not consider the duration of the activity in that location.

9.5.5 The construction noise levels will vary considerably throughout the works programme depending on the different activities being undertaken during each phase and how the works are distributed across the site. While it is possible that more than one activity may take place concurrently, the predicted noise levels shown in Table 8.18 are based on the activities being in relatively close proximity to the receptors. Therefore, it is unlikely that any other activities taking place at the same time would be close enough to a particular receptor to cause a material increase in construction noise levels over those shown.

Table 8.16 Construction noise predictions – Centre of site $L_{Aeq,11hr}$ dB (Façade levels)

Receptor Location	Predicted Construction Noise Level $L_{Aeq,11hr}$ dB(A)		
	Earthworks	Concreting	Main Build
R1 Tabard Gardens	66 Between LOAEL & SOAEL	57 Below LOAEL	60 Below LOAEL
R6 Dolben Court	61 Below LOAEL	52 Below LOAEL	55 Below LOAEL
R7 Traveller Site	67 Between LOAEL & SOAEL	58 Below LOAEL	61 Below LOAEL
R8 Glenfield 1	69 Between LOAEL & SOAEL	60 Below LOAEL	64 Below LOAEL

Table 8.17 Construction noise predictions – Nearest Boundary $L_{Aeq,11hr}$ dB (Façade levels)

Receptor Location	Predicted Construction Noise Level $L_{Aeq,11hr}$ dB(A)		
	Earthworks	Concreting	Main Build
R1 Tabard Gardens	73 Between LOAEL & SOAEL	63 Below LOAEL	64 Below LOAEL
R6 Dolben Court	68 Between LOAEL & SOAEL	58 Below LOAEL	59 Below LOAEL
R7 Traveller Site	83 Above SOAEL*	74 Between LOAEL & SOAEL	71 Between LOAEL & SOAEL
R8 Glenfield 1	76 Above SOAEL*	65 Between LOAEL & SOAEL	66 Between LOAEL & SOAEL
Note: * would not be expected occur for more than one month in proximity to this receptor			

9.5.6 The results in Table 8.16 indicate that when works are in the centre of the site the predicted noise levels for the concreting and main build scenarios are below the LOAEL. Therefore, there would be no adverse impact and no significant adverse effect. For the Earthworks, at most receptors the predicted levels are between the LOAEL and the SOAEL, indicating a potentially adverse but not significantly adverse effect.

9.5.7 The results in Table 8.17 indicate when earthworks activities occur close to the site boundary (i.e. the worst case) they would exceed the threshold for SOAEL[1] at R7 and R8. The predictions assume all the plant for that activity is concentrated in close proximity to the receptor and it is all operating simultaneously on this smaller section of the site (whereas in practice the construction equipment would likely be spread over a wider area). Therefore, while this level may be experienced on some days, it is considered unlikely that the construction noise would remain at this level for a month and therefore no significant adverse effect would be expected at these receptors. However, there would be an adverse effect at R7 and R8 during this phase of work.

9.5.8 For all other phases of work the predicted noise levels at R7 and R8 are between LOAEL and SOAEL, indicating a potentially adverse but not significantly adverse effect. This is also the case at R1 and R6 during the earthworks phase.

9.5.9 The predicted impact at these receptors and for these phases of works require that reasonable steps are taken to mitigate the impact and reduce it to a minimum. Therefore, where possible mitigation will be implemented to reduce the potential impact from construction noise at these receptors.

9.5.10 Table 8.17 also indicates that when the concreting and main build occur close to the site boundary with R1 and R6, the predicted construction noise levels do not exceed the LOAEL. Therefore, there would be no adverse impact and no significant adverse effect.

1 As set out in Table 8.3.

Operational Road Traffic Noise

9.5.11 The predicted noise levels for the road traffic scenarios modelled are presented in Appendix 9.4 The change in noise level have been determined for the following:

- Difference between 2023 "Do Something" (DM) and "Do Minimum" (DM) scenarios
- Difference between 2020 Baseline and DS scenarios

9.5.12 The change in road traffic noise as a result of the Proposed Development for the daytime is shown in Table 1 of Appendix 9.4 and the change in night-time traffic noise is shown in Table 2 of that Appendix. For the daytime assessment, the levels presented are generally those predicted at ground floor level unless the receptor is a hotel in which case both ground and first floor levels are presented. For the night-time assessment, levels are generally those at first floor level representative of bedrooms where people would be sleeping, with the exception of the hotel, and the traveller site (which comprises single storey dwellings only).

Daytime Road Traffic Noise

9.5.13 On comparing the 2023 Do Minimum and Do Something scenarios, Table 1 of Appendix 9.4 indicates that during the daytime period, there would be a negligible impact from the change in road traffic noise at receptors R1 to R5 and no change at R6. Therefore, these receptors are not expected to experience any adverse or significant adverse effects as a result of the Proposed Development.

9.5.14 At receptors R7 to R11, Table 1 of Appendix 9.4 indicates that these properties would experience a decrease in road traffic noise during the daytime as a result of the Proposed Development. This generally results in a minor beneficial impact and is a consequence of the proposed warehouse buildings providing some screening from the motorway to the west and dual carriageway to the north and also the decrease in the speed limit along Willen Road from 60 mph to 40 mph.

9.5.15 Furthermore, at R7 and R10, the 2023 Do Something effect level is above the SOAEL therefore the minor beneficial reductions would result in a significant beneficial effect at these receptors.

Night-time Road Traffic Noise

9.5.16 On comparing the 2023 Do Minimum and Do Something scenarios, Table 2 of Appendix 9.4 indicates that during the night-time period at receptors R2 to R6, a small increase in road traffic noise is predicted, however the magnitude of this impact is negligible. Therefore, these receptors are not expected to experience any adverse or significant adverse effects as a result of the Proposed Development.

9.5.17 At all other receptors the predicted night-time road traffic noise levels with the Proposed Development decrease as a result of screening of motorway or dual carriageway noise by the development buildings and as a result of the reduction in the speed limit on Willen Road. At receptors R1, R7 and R11 a minor beneficial impact is predicted, but because the '2023 do something effect level' is above the SOAEL, this would result in a significant beneficial effect at these receptors. A minor beneficial impact is also predicted at R8 (Glenfield 1), but as the '2023 do something effect level' is between the LOAEL and the SOAEL it is not a significant beneficial effect. At R9 (Glenfield 2) a moderate beneficial impact is expected, this would be a significant beneficial effect. At R10 (Proposed Residential 1) the decrease in noise level is considered to be negligible.

9.5.18 Overall, for operational road traffic noise, it can be seen that the assessment indicates that there are no adverse or significant adverse effects that require any mitigation. Furthermore, at several locations there are beneficial impacts and some significant beneficial effects as a result of screening provided by the proposed warehouse buildings and the decrease in the speed limit on Willen road.

Operational Sound from the Development Site - HGVs

9.5.19 The assessment of the potential adverse impacts from operational sound from HGV activities at the Proposed Development has been based on the principles of BS 4142:2014+A1:2019.

9.5.20 To make an initial estimate of the impact of the source being assessed, two values are required. The first is the rating level of the source to be assessed; this is the specific sound level which if appropriate has been corrected to account for certain acoustic features. The second is the typical background sound level at the receptor identified in Table 8.14.

9.5.21 The standard states that, where certain characteristics are likely to be perceptible at the receptor location, a correction should be applied to the operational sound level (the specific level) as these characteristics can increase the extent of the impact. In this case, as can be seen in Table 1 of Appendix 9.5 the specific operational noise levels are so low in comparison to the background sound levels, it is highly unlikely than any character would be perceptible at the receptor location to a degree that it would influence the impact of the noise and therefore no correction has been applied to these levels.

9.5.22 A similar situation exists during the night-time period (Table 2) for all receptors except R11. Hence, at most receptors it is unlikely than any character would be perceptible at the receptor location to a degree that it would influence the impact of the noise and therefore no correction has been applied to these levels. At R11, the specific operational noise level is within 3 dBA of the sensitivity test background sound level and hence as a cautious approach 3 dBA correction has been added for 'other acoustic features'.

9.5.23 The predicted rating levels are presented in Appendix 9.5, with Table 1 of that Appendix presenting the comparison of the predicted levels with the typical background sound levels for the daytime period and Table 2 showing the comparison for the night-time period.

9.5.24 During the daytime assessment period it can be seen from the main assessment in Table 1 of Appendix 9.5, that at all receptors the rating levels are below the typical background level. As a result, no significant adverse impacts or effects are expected due to operational sound at these receptors. It can also be seen that for R1 (Tabard Gardens), the only location where a sensitivity test was required during the daytime, the rating level is considerably below the sensitivity test background sound level. According to the standard this is below a low impact and therefore no significant adverse effects are expected from operational noise during the daytime period.

9.5.25 For the night-time assessment (Table 2, Appendix 9.5) it can be seen from the main assessment that, at all receptors, the predicted rating level is below the typical background sound level. Again, this would be below a low impact and therefore no significant adverse impacts or effects are expected. This is also the case for the sensitivity test assessment for receptors R8, R9 and R10. At R11 (Proposed Residential 2), the rating level exceeds the sensitivity test background sound level by 1 dBA. According to the standard this is below an adverse impact and just above a low impact depending on the context. Therefore, no adverse or significant adverse impacts or effects are identified.

9.5.26 As there are not anticipated to be any adverse or significant adverse impacts, there is no requirement for specific additional mitigation as a result of the operational HGV noise levels arising from the Proposed Development.

Maximum Noise Levels at Night

9.5.27 The impact of maximum noise levels that may occur during operational activities at night has been considered at each receptor. The maximum source level, taken from the Vanguardia database, has been assumed to be 85 dB LAFmax at 10 metres, and this would occur during a reversing manoeuvre of an HGV when the cab couples with the trailer. The predicted maximum noise levels at each receptor location are presented in Table 3 of Appendix 9.5.

9.5.28 It can be seen from the table that the maximum noise level at the façades of the receptors does not exceed 60 dB. Assuming a partially open window provides 15 dB attenuation on the façade level, the predicted maximum levels inside bedrooms is below 45 dB at all receptor locations for both scenarios and therefore does not exceed the threshold for an adverse impact or effect as specified in paragraph 9.72. Therefore, no additional specific mitigation is required to reduce the maximum noise levels at night.

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9.6 MITIGATION MEASURES

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9.6 MITIGATION MEASURES

9.6.1 The identification of the potential impacts and effects from the Proposed Development, has indicated that mitigation measures are only required to minimise construction noise. No mitigation measures are required with regard to construction traffic, operational road traffic noise or operational sound from the development site (HGVs).

Construction Noise

9.6.2 In general, construction noise and vibration will be managed by the use of best practicable means (BPM), i.e. the use of all reasonably practicable measures to minimise construction noise and vibration. This will follow the principles of the guidance within BS 5228:2009+A1:2014 parts 1 and 2[1] and may include the following where appropriate:

- Selection of appropriate equipment and construction methods;
- Plant to be located as far away as is reasonably practicable from noise-sensitive receptors;
- Static plant/equipment fitted with suitable enclosures or screening where practicable;
- Temporary hoardings/screens around the site boundary or specific activities as appropriate
- Site personnel instructed on BPM to reduce noise and vibration as part of their induction training and as required prior to specific work activities;
- Appropriate management of working hours for noisier tasks; and
- Liaison with residents in advance of works commencing to provide information regarding the programme.

9.6.3 It is expected that, by use of BPM, the noise from these activities would be managed as far as is practicable.

9.6.4 To mitigate the potential adverse effects at R7 and R8, site hoarding should be constructed along the Willen Road site boundary to minimise the impact from the construction activities. In accordance with BS5228-1:2009+A1:2014, a reduction of 10 dB can be assumed when the noise source completely hides the source from the receiver (i.e. for works close to the site boundary). The standard also indicates that an approximate attenuation of 5 dB can be assumed when the top of the plant is just visible to the receiver over the barrier.

9.6.5 The hoarding should be 2.4m high and made of a material with a mass per unit surface area of 10kg/m2, be solid in construction with no gaps or holes, particularly between the bottom of the barrier and the ground.

1 BS 5228-1:2009+A1:2014 – Code of Practice for noise and vibration control on construction and open sites, Part 1: Noise; BS 5228-2:2009+A1:2014 – Code of Practice for noise and vibration control on construction and open sites, Part 2: Vibration

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9.7 RESIDUAL IMPACT ASSESSMENT

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9.7 RESIDUAL IMPACT ASSESSMENT

Construction Traffic

9.7.1 As indicated in Table 9.15 construction traffic associated with the proposed development generally results in a negligible change in road traffic noise. Therefore, no adverse or significant adverse effects are likely.

Construction Noise

9.7.2 The proposed site hoarding along the boundary with Willen Road is anticipated to provide attenuation of 10 dB when plant is in close proximity to barrier and 5 dB when it is further away. As can be seen in Table 9.18 and 9.19. This would reduce the predicted noise levels at R7 and R8 when works are near the site boundary to below the SOAEL threshold value of 75 dB LAeq during all phases of construction.

Table 9.18 Construction noise predictions with mitigation – Centre of site LAeq,11hr dB (Façade levels)

Receptor Location	Predicted Construction Noise Level $L_{Aeq,11\ hr}$ dB(A)		
	Earthworks	Concreting	Main Build
R7 Traveller Site	62 < LOAEL	53 < LOAEL	56 < LOAEL
R8 Glenfield 1	64 < LOAEL	55 < LOAEL	59 < LOAEL

Table 9.18 Construction noise predictions with mitigation – Centre of site LAeq,11hr dB (Façade levels)

Receptor Location	Predicted Construction Noise Level $L_{Aeq,11hr}$ dB(A)		
	Earthworks	Concreting	Main Build
R7 Traveller Site	73 Between LOAEL & SOAEL	64 < LOAEL	61 < LOAEL
R8 Glenfield 1	66 Between LOAEL & SOAEL	55 < LOAEL	56 < LOAEL
Note: * would not be expected occur for more than one month in proximity to this receptor			

9.7.3 With the proposed mitigation, the predicted construction noise levels at all receptor location for all phases would be below the LOAEL when works are occurring in the centre of the site (Table 9.18). When works are occurring at the nearest boundary to the receptor Table 9.19 indicates that the proposed mitigation reduces the noise levels during the earthworks phase to below the SOAEL threshold to one where there would be an adverse effect. For the other phases of works (concreting and main build) the predicted levels are below the LOAEL and therefore there would be no adverse effect.

9.7.4 Overall, with the proposed mitigation no significant adverse effects are anticipated from construction noise.

Operational Road Traffic Noise

9.7.5 No mitigation is required or proposed. The results of the operational traffic noise assessment remain as previously identified. No significant adverse effects have been identified and receptors located in proximity to Willen Road would generally experience a minor beneficial decrease in noise levels as a consequence of the screening of the M1 by the Proposed Development and the speed reduction on Willen Road.

Operational Sound from the Proposed Development Site – HGVs

9.7.6 With regard to the daytime and night-time assessment of noise from HGVs manoeuvring and loading/unloading within the boundary of the development site, no adverse or significant adverse impacts or effects are identified. Consequently, there is no requirement for specific additional mitigation as a result of the operational HGV noise levels arising from the Proposed Development.

9.7.7 At all receptors, the maximum noise levels at night do not exceed the recommended guideline value. Therefore, no additional specific mitigation is required to reduce the maximum noise levels at night.

9.7.8 The residual effects of the Proposed Development are summarised in Table 9.20 below.

Table 9.20 Residual Effects Summary

Description of Effect	Receptor	Potential Effect including significance	Specific Mitigation Required?	Residual Effect including significance
Construction Traffic	N/A - All Roads	Negligible Not Significant	None	Negligible Not significant
Construction Noise works in centre of site – Earthworks	R6	Below adverse effect level. Not significant	None^.	Below adverse effect level. Not significant
	R1, R7, R8	Above adverse effect level, but below a significant adverse effect. Not significant.	Best practicable means.	Above adverse effect level, but below a significant adverse effect. Not significant
Construction Noise works in centre of site – Concreting and Main Build	All (R1, R6, R7, R8)	Below adverse effect level. Not significant.	None^.	Below adverse effect level. Not significant
Construction Noise works at nearest boundary – Earthworks	R1, R6	Above adverse effect, but below a significant adverse effect. Not significant.	Best practicable means.	Above adverse effect, but below a significant adverse effect. Not significant.
	R7, R8	Above adverse effect, but below a significant adverse effect. Not significant.	2.4m high hoarding along boundary with Willen Road. Best practicable means	Above adverse effect, but below a significant adverse effect. Not significant
Construction Noise works at nearest boundary – Concreting and main build	R1, R6	Below adverse effect level. Not significant.	None^.	Below adverse effect level. Not significant
	R7, R8	Above adverse effect, but below a significant adverse effect. Not significant.	Best practicable means. Will benefit from the 2.4m hoarding.	Below adverse effect level. Not significant.
Operational Road Traffic – Day	R6	No change. Not significant.	None.	No change. Not significant.
	R1, R2, R3, R4, R5, R8	Negligible Not significant.	None.	Negligible. Not significant.
	R9, R11	Minor beneficial. Not significant.	None.	Minor beneficial. Not significant.
	R7, R10	Minor beneficial Significant.	None.	Minor beneficial. Significant

Description of Effect	Receptor	Potential Effect including significance	Specific Mitigation Required?	Residual Effect including significance
Operational Road Traffic - Night	R2, R3, R4, R5, R6, R10	Negligible. Not significant.	None.	Negligible. Not significant.
	R8	Minor beneficial. Not significant.	None.	Minor beneficial. Not significant
	R1, R7, R9, R11	Minor beneficial. Significant.	None.	Minor beneficial. Significant.
Operational Noise HGVs – Day (Main Assessment & Sensitivity Test)	All	Below a low impact. Not significant.	None.	Below a low impact. Not significant.
Operational Sound – HGVs Night (Main Assessment)	All	Below a low impact. Not significant.	None.	Below a low impact. Not significant.
Operational Sound – HGVs Night (Sensitivity Assessment)	R1, R6, R7, R8, R9, R10	Below a low impact. Not significant.	None.	Below a low impact. Not significant.
	R11	Around a low impact. Not significant.	None.	Around a low impact. Not significant.
Operational Sound – Maximum noise levels from HGVs	All	Below threshold. Not significant.	None.	Below threshold. Not significant.
Notes: ^ however, best practicable means would be applied.				

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9.8 CUMULATIVE IMPACT ASSESSMENT

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9.8 CUMULATIVE IMPACT ASSESSMENT

9.8.1 The main potential for cumulative impacts to arise is in relation to the proposed application for residential development on the east of Willen Road. These proposed dwellings have been considered as a potential receptor in the operational and road traffic noise assessments. If both these developments were consented, and the proposed residential development was constructed and occupied prior to construction commencing on the Proposed Development site, the construction noise levels at these new dwellings would be similar to those predicted at R8.

9.8.2 The extent to which there is a cumulative construction noise impact with other developments will depend on the timings of when the cumulative schemes (identified in the Transport Assessment) are built.

9.8.3 The receptors at Glenfield (R8 and R9) and the Traveller Site (R7) are the most likely to experience a cumulative construction impact if the proposed adjacent residential development is granted consent. The assumptions used in the construction noise assessment mean that even if other schemes were being built at the same time, specific mitigation measures and the use of best practicable means have been identified to mitigate and minimise the construction noise at these receptors. No information is available in the public domain to determine the cumulative construction noise level at these receptors.

9.8.4 The future traffic data used in the operational road traffic noise assessment takes account of all cumulative schemes in the vicinity of the Proposed Development. Therefore, the cumulative effects are already assessed as part of this assessment and no significant effects are expected.

9.8.5 None of the cumulative schemes would add to the impact from operational sound from the Proposed Development at the identified receptors. Therefore, the cumulative effects are already assessed, and no significant impacts are identified.

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9.9 CONCLUSIONS

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9.9 CONCLUSIONS

9.9.1 The potential noise and vibration impacts and effects that may arise as a result of the construction and operation of the Proposed Development at Caldecote Farm have been considered and assessed in accordance with relevant Government and Local Policy.

9.9.2 With regard to vibration during the construction phase, no activities are proposed which are likely to cause adverse effects at nearby receptors, therefore no assessment of construction vibration has been undertaken. In addition, no assessment of operational vibration effects has been undertaken as the operation of the Proposed Development should not give rise to any new sources of vibration.

9.9.3 The assessment of construction traffic noise indicates there would be a negligible impact and no adverse or significant adverse effects.

9.9.4 The assessment of construction noise has shown that there would be no significant adverse effects but there will be some adverse effects particularly during the earthworks. BPM measures would be implemented to mitigate and minimise as far as reasonably practicable the temporary adverse effects.

9.9.5 When construction works are taking place close to the Willen Road site boundary, the predicted noise levels at the closest receptors on Willen Road, exceed the threshold level for a significant adverse effect. These levels, however, would only prevail for a short duration, therefore they would not result in a significant adverse effect but there would be an adverse effect. Specific mitigation in the form of a 2.4m hoarding along the site boundary has been proposed to mitigate and minimise this adverse effect.

9.9.6 Regarding the change in road traffic noise associated with the Proposed Development, no significant adverse effects have been identified. Receptors located in proximity to Willen Road, generally experience a minor beneficial decrease in noise levels as a consequence of screening arising from screening of the Proposed Development and the decrease in the speed limit on this road. In some cases, the decrease is considered to be a significant beneficial effect.

9.9.7 With regard to noise from fixed plant prior to installation, it is proposed that details of the mechanical plant will be submitted to and approved by the relevant planning authority. As part of this process, sound from the proposed plant installations will be assessed and, if required, mitigated to demonstrate compliance with national and local noise policy. Such mitigation is typically of a standard type that can be relied upon to achieve the required level of noise attenuation.

9.9.8 The daytime and night-time impact of noise from HGVs manoeuvring and loading/unloading within the boundary of the development site has been assessed. No adverse or significant adverse impacts or effects are identified. Consequently, there is no requirement for specific additional mitigation as a result of the operational HGV noise levels.

9.9.9 Furthermore, at all receptors, the maximum noise levels at night do not exceed the recommended guideline value. Therefore, no additional specific mitigation is required to reduce the maximum noise levels at night.

9.9.10 Overall, the assessment of noise and vibration associated with the Proposed Development has not identified any significant adverse effects.

9.9.11 The cumulative impacts of the Proposed Development in combination with other proposed or consented schemes have been considered. The main potential for cumulative impacts to arise is with regard to the proposed application for residential development to the east of Willen Road. This has been considered as a receptor in the assessment. With regard to other cumulative developments, the worst-case impacts and effects are considered to have already been identified and assessed.