9.0 NOISE AND VIBRATION

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9.1 INTRODUCTION

9.1.1 This chapter reports on the effects of the Development on noise and vibration and has been completed by Brookbanks Consulting Ltd.

9.1.2 Environmental noise rarely reaches the sound pressure levels associated with hearing impairment. However, noise can cause annoyance. It is commonly blamed for sleep disturbance and has been linked by researchers to less obvious effects, such as cardiovascular and mental health problems and reduced performance at work or school.

9.1.3 The following sections of this chapter describe the baseline conditions and the assessment methodology and assess the likely effects of the project in accordance with local and national guidance.

9.2 METHODOLOGY

Noise Terminology

9.2.1 The scale used to identify noise sources is the decibel (dB) scale which extends from 0 to 140 decibels corresponding to the intensity of the sound pressure level. The ear recognises sound based on pitch and frequencies. Microphones cannot record noise in the same way. To counter this, the noise-measuring instrument applies a correction to correspond more closely to the frequency response of the ear. The correction factor is called 'A Weighting' and the resulting measurements are written as dB(A). Typical dB(A) noise levels for familiar noises are indicated below.

Table 9.1: Familiar Noise Levels

Approximate Noise Level	Noise Example
10 dB	Normal breathing
20 dB	Rustling leaves, mosquito
30 dB	Whisper
40 dB	Stream, refrigerator humming
50 dB	Quiet office
60 dB	Normal conversation
70 dB	In car noise without radio
80 dB	Vacuum cleaner / washing machine
90 dB	Lawnmower
100 dB	Train
110 dB	Pneumatic Drill
120 dB	Thunder
130 dB	Plane taking off
140 dB	Threshold of pain

9.2.2 The noise levels indicated above are sound pressure levels (SPL) and describe the noise level at a single point in space. Noise levels at a receptor vary over time depending on the occurring noise generating activities. The following indices are used to take into account noise level variation over time:

- LAeq T is the equivalent continuous sound level and is the sound level over the time period (T). It is possible to consider this level as the ambient noise encompassing all noise at a given time. LAeq T is considered the best general purpose index for environmental noise;

- LA90 T represents the noise level exceeded for 90% of the measurement period and is used to indicate quieter times during the measurement period. It is usually referred to as the background noise level;
- LA10 T refers to the level exceeded for 10% of the measurement period. LA10 T is widely used as a descriptor of traffic noise; and
- LAmax is maximum recorded noise level during the measurement period.

9.2.3 Human subjects, under laboratory conditions, are generally only capable of noticing changes in steady levels of no less than 3 dB(A).

Relevant Guidance

The Control of Pollution Act 1974

9.2.4 The Control of Pollution Act 1974 section 62 and 63 contains powers for local authorities to deal with noise and vibration from construction and demolition sites.

The Planning and Compulsory Purchase Act 2004

9.2.5 The Planning and Compulsory Purchase Act 2004 requires local authorities to draw up local Development plans. setting the broad framework for acceptable Development in their area and reconciling the conflicts inherent in Development.

9.2.6 Under the Town and Country Planning Act 1990, local planning authorities may include planning conditions to Planning Applications which could include controls on the emission of noise. Advice on the use of these powers is given to English authorities in the tight of the Government's Noise Policy Statement for England in the National Planning Policy Framework.

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9.2.7 9.2.16 Policy BSC 8: Securing Health and Well-Being: Planning decisions can have an effect on travel to work, schools, noise and air quality, access to services, climate change and social networks which can all contribute to health and well-being. The local environment has a fundamental impact on the health and well-being of local people. By providing facilities such as local open space this allows for activities such as walking and cycling, promoting healthy lifestyles. The Council will work with the local community to provide safe and accessible environments and to identify the need for and provide local facilities.

Noise Policy Statement for England

9.2.8 The Noise Policy Statement for England of March 2010 (Defra 2010) provides a more overarching policy statement on the approach to noise in England.

9.2.9 This Noise Policy Statement for England (NPSE) sets out the long term vision of Government noise policy, to:

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

National Planning Practice Guidance (NPPG, 2014)

9.2.10 In February 2014 National Planning Practice Guidance (NPPG) was published. The main objective is to:

"identify whether the overall effect of noise exposure is, or would be, above or below the significant observed adverse effect level and the lowest observed adverse effect level for the given situation."

9.2.11 A summary of the effects of noise exposure associated with both noise generating developments and noise sensitive developments is presented within the NPPG as indicated below.

Table 9.2: Noise Exposure Hierarchy

Perception	**Examples of Outcomes**	**Increasing Effect Level**	**Action**
Not noticeable	No Effect	No Observed Effect	No specific measures required
Noticeable and not intrusive	Noise can be heard, but does not cause any change in behaviour or attitude. Can slightly affect the acoustic character of the area but not such that there is a perceived change in the quality of life.	No Observed Adverse Effect	No specific measures required
Lowest Observed Adverse Effect Level			

Noticeable and intrusive	Noise can be heard and causes small changes in behaviour and/or attitude, e.g. turning up volume of television; speaking more loudly; where there is no alternative ventilation, having to close windows for some of the time because of the noise. Potential for some reported sleep disturbance. Affects the acoustic character of the area such that there is a perceived change in the quality of life.	Observed Adverse Effect	Mitigate and reduce to a minimum
Significant Observed Adverse Effect Level			
Noticeable and disruptive	The noise causes a material change in behaviour and/or attitude, e.g. avoiding certain activities during periods of intrusion; where there is no alternative ventilation, having to keep windows closed most of the time because of the noise. Potential for sleep disturbance resulting in difficulty in getting to sleep, premature awakening and difficulty in getting back to sleep. Quality of life diminished due to change in acoustic character of the area.	Significant Observed Adverse Effect	Avoid
Noticeable and very disruptive	Extensive and regular changes in behaviour and/or an inability to mitigate effect of noise leading to psychological stress or physiological effects, e.g. regular sleep deprivation/awakening; loss of appetite,	Unacceptable Adverse Effect	Prevent

	significant, medically definable harm, e.g. auditory and non-auditory		

9.2.12 The guidance identifies that the subjective nature of noise means that there is not a simple relationship between noise levels and the impact on those affected. This will depend on how various factors combine in any particular situation. These factors include:

- the source and absolute level of the noise together with the time of day it occurs.
- for non-continuous sources of noise, the number of noise events, and the frequency and pattern of occurrence of the noise;
- the spectral content of the noise (ie whether or not the noise contains particular high or low frequency content) and the general character of the noise

9.2.13 More specific factors to consider when relevant:

- where applicable, the cumulative impacts of more than one source should be taken into account,
- consideration should also be given to whether adverse internal effects can be completely removed by closing windows ,
- if external amenity spaces are an intrinsic part of the overall design, the acoustic environment of those spaces should be considered so that they can be enjoyed.

9.2.14 In relation to how noise can be mitigated, this is dependent on the type of development being considered and the character of the proposed location. In general, for noise making developments, there are four broad types of mitigation:

- engineering: reducing the noise generated at source and/or containing the noise generated;
- layout: where possible, optimising the distance between the source and noise-sensitive receptors and/or incorporating good design to minimise noise transmission through the use of screening by natural or purpose built barriers, or other buildings;
- using planning conditions/obligations to restrict activities allowed on the site at certain times and/or specifying permissible noise levels differentiating as appropriate between different times of day, such as evenings and late at night, and;
- mitigating the impact on areas likely to be affected by noise including through noise insulation when the impact is on a building.

9.2.15 There are further considerations relating to mitigation of noise on residential developments. The noise impact may be partially off-set if the residents of those dwellings have access to:

- a relatively quiet facade (containing windows to habitable rooms) as part of their dwelling, and/or;
- a relatively quiet external amenity space for their sole use or a relatively quiet, protected, nearby external amenity space for sole use by a limited group of residents as part of the amenity of their dwellings
- a relatively quiet, protected, external publically accessible amenity space (e.g. a public park or a local green space designated because of its tranquillity) that is nearby (e.g. within a 5 minutes walking distance).

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9.2.16 Policy BSC 8: Securing Health and Well-Being: Planning decisions can have an effect on travel to work, schools, noise and air quality, access to services, climate change and social networks which can all contribute to health and well-being. The local environment has a fundamental impact on the health and well-being of local people. By providing facilities such as local open space this allows for activities such as walking and cycling, promoting healthy lifestyles. The Council will work with the local community to provide safe and accessible environments and to identify the need for and provide local facilities.

British Standard 8233:2014 Sound Insulation and Noise Reduction for Buildings

9.2.17 BS8233:2014 (British Standards Institution 2014) gives recommendations for the control of noise in and around buildings and suggests appropriate criteria and internal noise limits for habitable rooms of residential dwellings. In accordance with the requirements of BS8233, the following internal and daytime noise limits will need to be met within sensitive rooms of the residential dwellings:

- 35dB LAeq (16 hour) during the daytime in living rooms;
- 30dB LAeq (8 hour) during the night time in bedroom areas; and
- 55 dB LAeq,T for noise in external amenity areas.

Calculation of Road Traffic Noise (Department for Transport 1988)

9.2.18 The Calculation of Road Traffic Noise (CRTN) is the standard UK procedure for defining measurement and calculation methods for assessing road traffic noise. The procedures assume typical traffic and noise propagation conditions, which are consistent with moderately adverse wind speeds and direction during the specified periods.

9.2.19 All predicted noise levels are expressed in terms of LA10 (1-hour) or LA10 (18-hour) between 06.00 and 24.00. The LA10 (18-hour) is the arithmetic average of the values of LA10 hourly data for each of the eighteen 1-hour periods between 06.00 and 24.00.

British Standard 5228: Code of Practice for Noise and Vibration Control on Construction and Open Sites

9.2.20 BS5228: 'Code of Practice for Noise and Vibration Control on Construction and Open Sites' (British Standards Institution 2009, as amended) sets out the methodology to predict construction noise and the control of noise and vibration. It provides guidance on methods of predicting and measuring noise and assessing its impact on those exposed to it, and also recommendations for basic methods of vibration control.

9.2.21 The standard provides guidance for identifying the significance of noise and vibration levels from surface construction activity. Significance can be considered in relation to fixed limits for noise and vibration, or alternatively in considering the potential change in the ambient noise level with the addition of construction noise.

9.2.22 There are no national noise criteria for limiting noise from construction sites. BS 5228 Annex E gives guidance on the significance of noise effects from construction and recommends the ABC method to establish construction noise limits.

9.2.23 The ABC method involves rounding the existing ambient noise levels to the nearest 5 dB for the appropriate time period and then comparing these levels to the total noise level, including construction noise. If the total noise level exceeds the existing rounded value, then a significant effect is deemed to have occurred.

Table 9.3: Thresholds of Construction Noise

Assessment Period	**Category A Threshold**	**Category B Threshold**	**Category C Threshold**
Night-time (23:00 to 07:00)	45	50	55
Evenings and Weekends	55	60	65
Daytime (07:00 to 19:00) and Saturdays (07:00 to 13:00)	65	70	75

9.2.24 If the existing ambient noise levels exceed the threshold values presented above then a significant effect is deemed to have occurred. The ABC method should only apply to residential receptors.

IEMA/IOA Guidelines for Noise Impact Assessment

9.2.25 The IEMA Guidelines for noise impact assessments document was prepared by a joint working party of the Institute of Environmental Management and Assessment and the Institute of Acoustics. It represents the most relevant 'best practice' guidance for undertaking noise studies for EIA purposes. It includes an example of a table of scales of significance of noise change although it is stated that it is necessary for the individual assessor to adapt the table for the particular type of noise being evaluated.

9.2.26 Based on these guidelines, criteria for assessment of the significance of impact relating to increased road traffic noise from existing roads, attributable to the Proposed Development, are set out below.

Table 9.4: Impact Significance Criteria for Increased Road Traffic Noise

Noise Level Increase (dB)	**Subjective Response**	**Significance**
0.0 – 0.9	No perceptible increase	Negligible
1.0 – 2.9	Very low but potentially perceptible increase	Minor
3.0 – 4.9	Noticeable increase	Moderate
5.0 – 5.9	Up to a doubling in loudness	Major

9.3 BASELINE CONDITIONS

9.3.1 In order to establish a baseline noise environment, noise measurements have been assessed on the adjacent roads forming the site boundary.

9.3.2 Daytime and night time noise levels have been assessed over a 24 hour period, to ensure that any noise sources from nearby roads were identified.

9.3.3 Two locations were assessed, with the results presented overleaf.

Table 9.5: Noise Monitoring Results

Location	Daytime noise level dB(A)	Night-time Noise level dB(A)
A4260 Oxford Road	55.6	50.5
Near to M40 Motorway	52.6	47.3

9.4 IMPACTS

9.4.1 For construction noise effects, the ABC method set out in BS 5228 has been used. The approach is based on the following table from BS 5228, which identifies the thresholds for significant effects for residential properties.

Table 9.6: Construction Noise Threshold of Significant Effect

Assessment Category and Threshold Value Period dB LAeq	**A**	**B**	**C**
Night-time (23:00 to 07:00)	45	50	55
Evenings and Weekends	55	60	65
Daytime (07:00 to 19:00) and Saturdays (07:00 to 13:00)	65	70	75
*19:00-23:00 weekdays, 13:00-23:00 Saturdays and 07:00-23:00 Sundays			
Category A: threshold values to use when ambient noise levels (when rounded to the nearest 5 dB) are less than these values. Category B: threshold values to use when ambient noise levels (when rounded to the nearest 5 dB) are the same as category A values. Category C: threshold values to use when ambient noise levels (when rounded to the nearest 5 dB) are higher than category A values.			

Note 1: A significant effect has been deemed to occur if the LAeq noise level for the period during construction exceeds the threshold level for the Category appropriate to the ambient noise level.

Note 2: If the ambient noise level exceeds the threshold values given in the table, then a significant effect has been deemed to occur if the LAeq noise levels for the period increase by more than 3 dB due to construction noise.

Note 3: For receptors that are not dwellings, the effects have been assessed using criteria appropriate to the circumstances, such as the duration that people are expected to be at the receptor and the activities that are undertaken there.

9.4.2 For operational effects, the sensitivity of the receptor and the magnitude of the impact have been combined using the matrix below to determine the significance of the effect. Where the matrix offers more than one significance option, professional judgement has been used to decide which option is most appropriate.

Table 9.7: Assessment Matrix

	Magnitude of Impact			
Sensitivity	**Negligible**	**Low**	**Medium**	**High**
Negligible	Negligible	Negligible or Minor	Negligible or Minor	Minor
Low	Negligible or Minor	Negligible or Minor	Minor	Minor or Moderate
Medium	Negligible or Minor	Minor	Moderate	Moderate or Major
High	Minor	Minor or Moderate	Moderate or Major	Major or Substantial
Very High	Minor	Moderate or Major	Major or Substantial	Substantial

9.4.3 The terms in the Table have the following definitions:

- Substantial: Only adverse effects are normally assigned this level of significance. They represent key factors in the decision-making process. These effects are generally, but not exclusively, associated with sites or features of international, national or regional importance that are likely to suffer a most damaging impact and loss of resource integrity. However, a major change in a site or feature of local importance may also enter this category.

- Major: These beneficial or adverse effects are considered to be very important considerations and are likely to be material in the decision-making process.

- Moderate: These beneficial or adverse effects may be important, but are not likely to be key decision-making factors. The cumulative effects of such factors may influence decision-making if they lead to an increase in the overall adverse effect on a particular resource or receptor.

- Minor: These beneficial or adverse effects may be raised as local factors. They are unlikely to be critical in the decision-making process, but are important in enhancing the subsequent design of the project.

- Negligible: No effects or those that are beneath levels of perception, within normal bounds of variation or within the margin of forecasting error.

9.4.4 Effects of moderate, major or substantial significance represent effects considered to be significant in terms of the EIA guidance.

9.5 MITIGATION AND MONITORING

Direct and Indirect Noise and Vibration from Construction

9.5.1 To minimise the impact on receptors during the construction process, the following noise and vibration mitigation measures would be implemented as appropriate for all works and would be incorporated into the Construction Environmental Management Plan (CEMP):

- Particularly noisy construction activities would be confined to times of the day when they are least likely to be disturbing;
- Careful selection of plant, construction methods and programming. Only plant conforming with relevant national or international standards, directives and recommendations on noise and vibration emissions would be used;
- Construction plant would be located, as far as is reasonably practicable, away from adjacent occupied buildings or as close as possible to noise barriers or site hoardings where these are located between the plant and the buildings;
- Static and semi-static plant/equipment (e.g. compressors and generators) would be fitted with suitable enclosures where practicable;
- Personnel would be instructed on best practice to reduce noise and vibration as part of their induction training and as required prior to specific work activities;
- When plant is not being used, it would be shut down and not left to idle;
- Methods of work and vehicular routes would be selected with regard to minimising noise and vibration impact; and

- Given the phasing of construction, certain areas of the project would be occupied while construction is still underway in adjacent areas. Where possible, the occupancy of completed phases of construction would be planned in such a way that there is a buffer between occupied areas and areas where construction is being carried out.

Direct Façade Noise Levels on the Proposed Dwellings

9.5.2 Traffic can increase noise levels at sensitive receptors. However, those levels can be kept within acceptable limits through the following mitigation measures:

- Passive ventilation systems and double glazing for only those residential properties falling within NEC C and fronting onto the highways bordering the site;
- Internal layout of properties to consider the location of lounge and bedroom areas for those properties fronting onto the highways boarding the site; and
- Site layout to consider the orientation of residential buildings to reduce sight lines onto the highways bordering the site.

Assessment of Construction Effects

9.5.3 During the construction stage, it is envisaged that limited demolition, earthworks, installation of necessary services and building construction would form the main noise impacts upon existing residential properties in the environs of the site.

9.5.4 At the time of writing, it is considered that the impact of construction traffic would be negligible. The temporary increase in traffic due to construction is likely to be undiscernible from daily variations in traffic flow.

9.5.5 Although the final details of the construction activities cannot be finalised until construction contractors have been confirmed, construction noise levels have been predicted using the sound pressure levels for typical construction plant as described in BS 5228: 2009 Part 1. The sound pressure levels in BS 5228 have been presented as a LAeq at a distance of 10 m. A high percentage for the 'on-time' (the length of time that the equipment remains active on site) has been assumed so as to present a reasonable worst case.

Table 9.8: List of Construction Plant and Associated Sound Levels

Plant Description	**BS5228 Reference**	**Sound level at 10m**	**On time %**
Angle Grinder	Table C4 No. 93	80	40
Asphalt Paver	Table C5 No. 33	75	60
Circular Saw	Table C4 No. 72	79	40
Compressor	Table C5 No. 5	75	80
Concrete Pump & Concrete mixer truck discharging	Table C4 No. 28	79	80
Concrete Saw	Table C4 No. 71	85	10
Delivery Lorry	Table C2 No. 35	80	70

Diesel Generator	Table C4 No. 84	74	100
Dozer	Table C5 No. 12	77	60
Dumpers	Table C4 No. 9	77	60
Excavator	Table C5 No. 34	82	75
Percussion Drill	Table C4 No. 69	85	40
Pneumatic Breaker	Table D2 No.2	81	40
Poker Vibrator	Table C4 No. 33	78	80
Road Planer	Table C5 No. 7	82	70
Roller Compactor	Table C5 No. 29	76	60
Telescopic Handler	Table C4 No. 54	79	75
Tower Crane	Table C4 No. 49	77	60
Tracked Excavator	Table C5 No. 18	80	70
Tracked Excavator fitted with Breaker	Table D2 No. 5	91	70
Tracked Mobile Crane	Table C4 No. 52	75	60
Vibratory Roller (22t)	Table C5 No. 28	77	60
Water Pump	Table C2 No. 45	65	75
Welder	Table C3 No. 31	73	40
Wheeled Loader	Table C2 No. 26	79	75

9.5.6 The on-time correction factor has been extracted from Figure F5 within BS5288

9.5.7 The construction noise impacts have been calculated using the following formula as described in BS5228:

$$k_h = 20 \times LOG \frac{R}{r}$$

Where:

Kh = the correction for propagation across hard ground

R = the distance to the receptor location

r = the distance of 10 m at which the SPL has been measured

9.5.8 Where more than one piece of the same equipment is used in a construction activity, the following equation has been used to determine the total noise level generated:

Combined noise level = x + 10*log10(N)

Where:

x = noise level from a single piece

N = the number of items of equipment used

9.5.9 To calculate the combined noise level for a construction process the following equation has been used to combine the noise levels from the individual construction plant:

Combined event = 10*log10(10 L1/10 + 10 L2/10 + 10 L3/10 + …..10 Ln/10)

Where: L1 = individual noise event

9.5.10 A reasonable worst case scenario has been presented by considering propagation across hard ground and by not considering screening provided by topographical features, buildings or other structures.

9.5.11 The potential noise impacts during the construction stage are presented below;

Table 9.9: Site Mobilisation Noise Levels

Plant	**Number**	**Noise level at 10m**	**Noise level at 20m**	**Noise level at 50m**	**Noise level at 100m**	**Noise level at 200m**
Delivery Lorry	1	78.5	72.5	64.5	58.5	52.5
Tracked Mobile Crane	1	73.0	67.0	59.0	53.0	47.0
Telescopic Handler	1	78.0	72.0	64.0	58.0	52.0
Wheeled loader	1	77.5	71.5	63.5	57.5	51.5
Dozer	1	75.0	69.0	61.0	55.0	49.0
Dumpers	2	78.0	72.0	63.0	58.0	52.0
Diesel generator	1	74.0	68.0	60.0	54.0	48.0
Total		85.2	79.2	71.0	65.2	59.2

Table 9.10: Levels Road Construction Noise levels

Plant	Number	Noise level at 10m	Noise level at 20m	Noise level at 50m	Noise level at 100m	Noise level at 200m
Road Planer	1	80.5	74.5	66.5	60.5	54.5
Tracked Excavator	1	78.5	72.5	64.5	58.5	52.5
Dozer (Spreading fill)	1	75.0	69.0	61.0	55.0	49.0
Dumpers	2	78.0	72.0	63.0	58.0	52.0
Vibratory Roller (22t)	1	75.0	69.0	61.0	55.0	49.0
Asphalt Paver	1	73.0	67.0	59.0	53.0	47.0
Diesel Generator	1	74.0	68.0	60.0	54.0	48.0
Total		85.5	79.5	71.3	65.5	59.5

Table 9.11: Site Clearance Noise Levels

Plant	Number	Noise level at 10m	Noise level at 20m	Noise level at 50m	Noise level at 100m	Noise level at 200m

Dumpers	2	78.0	72.0	63.0	58.0	52.0
Tracked Excavator	1	78.5	72.5	64.5	58.5	52.5
Lorry	1	78.5	72.5	64.5	58.5	52.5
Dozer	1	75.0	69.0	61.0	55.0	49.0
Compressor	2	77.0	71.0	63.0	57.0	51.0
Diesel Generator	1	74.0	68.0	60.0	54.0	48.0
Total		84.9	78.9	70.8	64.9	58.9

Table 9.12: Building Construction Noise Levels

Plant	**Number**	**Noise level at 10m**	**Noise level at 20m**	**Noise level at 50m**	**Noise level at 100m**	**Noise level at 200m**
Tracked Excavator	1	78.5	72.5	64.5	58.5	52.5
Diesel Generator	1	74.0	68.0	60.0	54.0	48.0
Dumpers	1	75.0	69.0	61.0	55.0	49.0
Telescopic Handler	1	78.0	72.0	64.0	58.0	52.0

Concrete Pump & Concrete mixer truck discharging	1	78.0	72.0	64.0	58.0	52.0
Poker Vibrator	2	80.0	74.0	66.0	60.0	54.0
Compressor	2	77.0	71.0	63.0	57.0	51.0
Total		86.1	80.1	72.1	66.1	60.1

9.5.12 Construction activities can produce high noise levels, particularly close to source. Construction noise tends to fluctuate and is usually of fairly short duration related to particular activities. The construction noise impacts would depend on the proximity of construction activities to nearby receptor locations.

9.5.13 The demolition and construction noise impacts predicted above indicate that the impacts could be observed by sensitive receptors within 200 m of the site. The predicted noise levels are based on a possible worst case scenario. Propagation across hard ground has been assumed and no screening from topographical features or other structures has been assumed.

9.5.14 The majority of existing residential dwellings that are located over 200 m from the centre of the site, meaning the highest value identified for noise levels at 200 m (maximum) would be 64.3 dB, which is below the Category A threshold (ABC method) of 65 dB.

9.5.15 As set out in the Measures Adopted as Part of the Project section above, where necessary, for the small number of dwellings affected, construction plant would be located, as far as is reasonably practicable, away from adjacent occupied buildings or as close as possible to noise barriers or site hoardings located between the plant and the buildings. Such measures to control construction noise would be implemented through the Code of Construction Practice, which would also minimise operations during sensitive time periods.

9.5.16 Therefore, given the nature of the construction activities, it is not anticipated that the significance thresholds would be exceeded for long periods of time. Overall, it is considered that the magnitude of the noise impact in relation to the closest receptors would be low and at most would have a minor adverse effect.

Assessment of Operational Effects

Local Network Traffic Noise Effects

9.5.17 Traffic noise predictions have been made using the CRTN prediction methodology. The methodology has been used to predict the magnitude of any change in noise level resulting from the project at the roadside of the local network. The traffic flows used in the assessment were provided by the Transport Consultant. Full details of which are provided in the Transport Chapter.

9.5.18 The predicted changes in noise level, identified with respect to the road traffic noise impact assessment criteria, are presented below showing the future with and without the completed project impact respectively.

Table 9.13: Predicted Long Term Noise Levels Within Local Road Network

Link	2031 Basic Noise (dB) without Development	2031 Basic Noise (dB) with Development	Noise Impact (dB)	Long Term Effect
Horse Fair (north of High Street)	72.8	72.8	0.0	Negligible
High Street	69.4	69.2	-0.2	Negligible
West Bar Street	68.4	68.4	0.0	Negligible
South Bar Street (south of High St)	71.6	71.8	0.2	Negligible
South Bar Street (north of Bloxham Rd)	72.2	72.3	0.1	Negligible
Bloxham Road (east of Oxford Road)	70.6	70.6	0.0	Negligible
Queensway	70.8	70.8	0.0	Negligible
Springfield Avenue	67.7	67.9	0.2	Negligible
Oxford Road (south of Bloxham Road)	72.1	72.1	0.0	Negligible
Oxford Road (north of Upper Windsor St)	72.2	72.2	0.0	Negligible
Upper Windsor St (east of Oxford Rd)	70.1	70.0	-0.1	Negligible
Oxford Rd (south of Upper Windsor St)	72.7	72.8	0.1	Negligible
Cherwell St (south of Bridge St)	73.5	73.5	0.0	Negligible

Link	2031 Basic Noise (dB) without Development	2031 Basic Noise (dB) with Development	Noise Impact (dB)	Long Term Effect
Bridge St (west of Cherwell St)	66.9	66.9	0.0	Negligible
Cherwell St (north of Bridge St)	72.4	72.4	0.0	Negligible
Bridge St (east of Cherwell St)	70.8	70.8	0.0	Negligible
Oxford Road (north of Horton View)	72.7	72.8	0.1	Negligible
Horton View	66.6	66.8	0.2	Negligible
Hightown Road	67.1	67.1	0.0	Negligible
Oxford Road (south of Highton Rd)	72.7	72.7	0.0	Negligible
Oxford Road (north of Farmfield Rd)	72.7	72.7	0.0	Negligible
Farmfield Rd	62.7	62.9	0.2	Negligible
Oxford Road (south of Farmfield Rd)	72.5	72.6	0.1	Negligible
Oxford Road (north of Bankside)	72.4	72.4	0.0	Negligible
Oxford Road (south of Bankside)	72.9	72.4	-0.5	Negligible
Bankside (west of site access)	67.3	68.2	0.9	Negligible
Bankside (east of site access)	69.0	69.4	0.4	Negligible
Oxford Road (north of Weeping Cross)	72.8	72.8	0.0	Negligible
Weeping Cross	59.5	59.2	-0.3	Negligible
Oxford Road (south of Weeping	72.9	73.0	0.1	Negligible

Link	2031 Basic Noise (dB) without Development	2031 Basic Noise (dB) with Development	Noise Impact (dB)	Long Term Effect
Oxford Road (north of Twyford Rd)	72.9	72.9	0.0	Negligible
Twyford Road	63.2	63.7	0.5	Negligible
Oxford Road (south of Twyford Rd)	72.4	72.4	0.0	Negligible
Oxford Road (north of Aynho Road)	72.1	72.2	0.1	Negligible
Aynho Road	67.0	66.8	-0.2	Negligible
Oxford Road (south of Aynho Road)	72.0	72.0	0.0	Negligible
Concord Avenue	72.4	72.4	0.0	Negligible
Bridge Street East	70.8	70.8	0.0	Negligible
Cherwell Street (north of Swan Close)	73.5	73.5	0.0	Negligible
Bridge Street West	66.9	66.9	0.0	Negligible
Hightown Rd North	69.4	69.6	0.2	Negligible
Bankside	67.9	68.3	0.4	Negligible
Hightown Rd South	65.9	65.9	0.0	Negligible
Lambs Crescent	45.8	46.7	0.9	Negligible
Cherwell Street (south of Swan Close)	70.1	70.0	-0.1	Negligible

Link	2031 Basic Noise (dB) without Development	2031 Basic Noise (dB) with Development	Noise Impact (dB)	Long Term Effect
Swan Close Rd	70.2	70.3	0.1	Negligible
Upper Windsor St	72.0	71.9	-0.1	Negligible

9.5.19 This demonstrates that the predicted magnitude of impact on noise levels from any changes on the wider road network would be negligible. In the short term, some of the impacts may be of low magnitude. The significance of effect for high sensitive receptors (residents) would be negligible to minor adverse. This would not be significant in EIA terms.

BS:8233: Assessment of Exterior Noise Levels

9.5.20 BS8233 indicates that for traditional external areas that are used for amenity space, such as gardens and patios, an upper guideline value of 55 dB LAeq,T is acceptable. However, BS8233 also recognises that the guideline values are not achievable in all circumstances, such as city centres or urban areas adjoining the strategic transport network.

9.5.21 BS8233 identifies that in such a situation, development should be designed to achieve the lowest practicable levels in these external amenity spaces, but external noise should not be prohibitive on development delivery.

9.5.22 A review of the noise environment across the site has indicated that the external noise without mitigation exceeds 55 dB along the site boundary. However, there are no properties that lie within the 55dB area. There some properties to the north that lie on the 55dB, but the dwellings will provide natural noise screening, such that the back gardens will not experience unacceptable noise levels.

BS:8233 Assessment of Day Time Noise Levels in Living Rooms

9.5.23 BS8233 indicates that a daytime noise level of 35 dB LAeq represents the desired standard. The calculated noise levels have been used to determine likely noise levels and the extent of attenuation required.

9.5.24 The actual location of housing within the project would be determined at detailed design stage. Therefore potential housing locations have been selected. The results of the assessment are presented below.

Table 9.14: Predicted Noise Levels Within Living Rooms

Link Fronting Property	**Internal noise without window screening**	**Internal noise with window screening**
A4260 Oxford Road	57.3	24.3
Eastern Edge of Site closest to M40 Motorway	54.9	21.9

9.5.25 This indicates that appropriate attenuation can be achievable for all of the properties through the use of thermal double glazing, with facades of properties further into the site being protected and screened by other buildings. Orientating properties and considering the internal layout to avoid direct sight lines onto the main roads would further mitigate and reduce internal noise sources. Therefore, there would be no significant effects.

BS:8233 Assessment of Night Time Noise Levels in Bedrooms

9.5.26 BS8233 indicates that a night time noise level of 30 dB LAeq represents the desirable standard in bedrooms. The calculated noise levels have been used to determine likely noise levels and the extent of attenuation required.

Table 9.15: Predicted Noise Levels Within Bedrooms

Link Fronting Property	**Internal noise without window screening**	**Internal noise with window screening**
A4260 Oxford Road	50.9	17.9
Eastern Edge of Site closest to M40 Motorway	48.2	15.2

9.5.27 This indicates that appropriate noise attenuation will be achievable, with facades of properties further into the site being protected and screened by other buildings. Therefore, there would be no significant effects.

9.6 CUMULATIVE IMPACTS

9.6.1 The noise assessment has been based on the traffic figures produced as part of the assessment of transport effects. These traffic figures were provided following the agreed methodology which included committed developments as follows:

- 05/01337/OUT (Bankside Phase 1) – Land North East of Oxford Road, West of Oxford Canal and East of Bankside
- 13/00158/OUT (Banbury 2) – Land adjoining Foxhill and West of Southam Road Banbury
- 13/00159/OUT (Banbury 2) – Hardwick Farm East of Southam Road Banbury
- 12/01789/OUT (Banbury 5) – Land off Warwick Road North of Hanwell Fields Banbury
- 13/01528/OUT – OS Parcel 0063 North East of Crouch Hill Farm adjoining Broughton Road
- 13/00444/OUT (Banbury 3) – Land North of Withycombe Farm west of Edinburgh Way Banbury
- 14/00066/OUT (Banbury 6) – Land off Dukes Meadow Drive, Hanwell Fields Banbury
- 14/01188/OUT – OS Parcels 1200 1300 2000 1981 South of Salt Way Bloxham Road Banbury
- 14/02156/OUT – Land south of Cotefield Business Park Oxford Road Bodicote
- 14/01932/OUT – OS Parcel 7400 adjoining and South of Salt Way Banbury
- 15/01326/OUT – OS Parcels 6741 and 5426 West of Cricket Field North of Wykham Lane Bodicote
- Planning Ref. 16/00472/OUT S Grundon Services Ltd Merton Street.

- Planning Ref. 18/00293/OUT Caravan Park Station Approach, Banbury.

9.6.2 The potential for cumulative construction effects to arise has been considered. There is some potential for temporary cumulative noise effects arising if the construction phase for the adjacent Phase 1 of the site remains ongoing when the Phase 2 construction phase commences. However, it is noted that given the location, there is a very limited number of receptors that could be affected by both developments. Construction of Phase 1 adjacent to the A4260 Oxford Road has already completed and the built out has now moved north, towards Bankside. Therefore, cumulative effects on existing receptors due to construction noise would appear unlikely. Nevertheless, any such effects could be controlled through the Code of Construction Practice. Potential effects of Phase 2 construction noise on future residents of Phase 1 have been considered together with other receptors in the construction assessment within this chapter.

9.7 RESIDUAL IMPACTS

During Construction

9.7.1 With appropriate mitigation and regulation through a Construction Environmental Management Plan, no residual impacts are anticipated at the construction stage.

Post Construction

9.7.2 The measures implemented will ensure that following construction, the baseline site situation is not detrimentally altered and as such, no residual impacts are expected.

9.8 CONCLUSIONS

9.8.1 The noise environment across the site has been assessed. Temporary construction effects have been considered. There are very few existing receptors in the vicinity of the proposed works. Given the distance to receptors, the presence of existing roads and the proposed adoption of a Code of Construction Practice, effects are not considered likely to be greater than minor adverse.

9.8.2 The assessment demonstrates that, in terms of the existing noise environment at the site, the site is suitable for development. However, the assessment and review of British Standards indicates that an appropriate noise environment can be achieved with suitable measures in place.

9.8.3 The assessments completed above have considered the effect of the project on existing dwellings. Existing dwellings nearby would experience a negligible increase in noise levels in the long term as a result of increased traffic. This would result in a negligible effect.

9.8.4 As a whole, the assessments do not identify any significant adverse effects. The effects identified are summarised in Table 9.16P as follows;

Table 9.16: Summary of Likely Environmental Effects on Noise

Activity	Sensitivity of receptor	Likely impact	Short / medium / long term	Magnitude of impact	Significance of effect	Significant / Not significant	Indirect / direct	Notes
Noise								
Construction phase – Construction Activities	High	Construction/ Demolition Noise and Vibration	Short term continuous	Low	Minor Adverse	Not significant	direct	
Operational phase – Increased Road Traffic	High	Noise levels across the site	Long term continuous	N/A	Site suitability test passed – not significant	Not significant	direct	
Operational phase – Increased Road Traffic	High	Increased noise levels at existing receptors	Long term continuous	Negligible to low	Negligible to minor adverse	Not significant	direct	