

## 11.0 NOISE AND VIBRATION

### Introduction

- 11.1 This ES Chapter has been prepared by Mott MacDonald on behalf of OUFC in relation to a new stadium development at the Site.
- 11.2 The key objectives of the noise and vibration assessment are to:
- identify the appropriate standards, guidance and planning policy;
  - summarise the existing baseline conditions in the local area of the Proposed Development and determine baseline levels suitable for the assessment;
  - identify the appropriate criteria for the assessment of construction noise and vibration and operational noise levels associated with the Proposed Development;
  - assess both qualitatively and quantitatively the temporary and operational noise levels generated by the Proposed Development, following the description provided in Chapter 3;
  - determine the significance of effects on Noise and vibration Sensitive Receptors (NSRs), arising from the temporary and operational noise and vibration levels associated with the Proposed Development.
  - identify the most appropriate and effective mitigation measures and ensure they are considered to limit adverse effects of the Proposed Development as far as is reasonably practicable.
- 11.3 This Chapter is supported by the following technical appendices: **Appendix 11.1 Noise Technical Appendix.**

### Legislation and Policy

#### **National Legislation**

##### **Section 60 and Section 61 of the Control of Pollution Act 1974 (CoPA, 1974)<sup>i</sup>**

- 11.4 This Act gives local authorities powers to control noise from construction sites and other similar worksites either before works starts, or after they have commenced. Section 61 of the CoPA provides provisions for contractors or persons arranging for works to be carried out to take a proactive approach to communicate with the local authority beforehand and applying for prior consent to the works. Section 60 of the Act provides local authorities with powers to impose controls on construction noise emanating from the Site, before or after the works have started.
- 11.5 British Standard (BS) 5228-1:2009+A1:2014 *Code of practice for noise and vibration control on construction and open sites*, has been approved as a Code of Practice by the Secretary of State under Section 71 of CoPA.

11.6 This legislation will be used to inform embedded noise measures to reduce construction impacts.

### **Environmental Protection Act (EPA) 1990 (EPA, 1990)<sup>ii</sup>**

11.7 The EPA describes the responsibility of the local authority to take steps to reduce any noise effect, including that from a construction sites, deemed to be causing a statutory nuisance.

### **National Policy**

#### **National Planning Policy Framework (NPPF, 2023)<sup>iii</sup>**

11.8 The NPPF advises that ‘significant’ adverse impacts on health and the quality of life as a result of noise from new developments should be avoided. It also advises that other adverse impacts on health and quality of life arising from noise from new developments should be reduced to a minimum.

11.9 Paragraph 180 of the NPPF states that *“Planning policies and decisions should contribute to and enhance the natural and local environment by, (amongst other considerations): Preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability.”*.

11.10 In addition to this, the NPPF states in paragraph 191 that *“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:*

- *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; and;*
- *identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason.”*

#### **Noise Policy Statement for England<sup>iv</sup>**

11.11 The NPPF document does not refer to any policy documents specifically regarding noise beyond the NPSE.

11.12 The NPSE introduces concepts from toxicology that are currently being applied to noise impacts, for example, by the World Health Organization (WHO). They are:

- *“No Observed Effect Level (NOEL) – this is the level below which no effect can be detected. In simple terms, below this level, there is no detectable effect on health and quality of life due to noise”; and*
- *“Lowest Observed Adverse Effect Level (LOAEL) – This is the level above which adverse effects on health and quality of life can be detected”.*

11.13 Extending these concepts for the purpose of the NPSE leads to the concept of a significant observed adverse effect level:

- *“Significant Observed Adverse Effect Level (SOAEL) – This is the level above which significant adverse effects on health and quality of life occur”.*

11.14 It is not possible to have a single objective noise-based measure that defines SOAEL that is applicable to all sources of noise in all situations. Consequently, SOAEL is likely to be different for different noise sources, for different receptors and at different times.

11.15 The aims of the NPSE are stated, *“within the context of Government policy on sustainable development”* as:

- *“Avoid significant adverse impacts on health and quality of life from environmental... Noise”;*
- *“Mitigate and minimise adverse impacts on health and quality of life from environmental ... noise”*
- *“Where possible, contribute to the improvement of health and quality of life through the effective management and control of environmental... noise”*

## Planning Policy Guidance <sup>v</sup>

11.16 The Department for Levelling up, Housing and Communities has published web-based Planning Practice Guidance including a summary of noise exposure hierarchy.

**Table 11.1: Noise exposure hierarchy based on likely average response (based on PPG)**

	Response	Examples of outcomes	Increasing effect level	Action
→ Increasing Noise Level →	<b>No Observed Effect Level</b>			
	Not present	No effect	No Observed Effect	No specific measures required
	<b>No Observed Adverse Effect Level</b>			
	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 Adverse Effect	No specific measures required
<b>Lowest Observed Adverse Effect Level</b>				

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 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 quality of life.	Observed Adverse Effect	Mitigate and reduce to a minimum
<b>Significant Observed Adverse Effect Level</b>			
<b>Present and disruptive</b>	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
<b>Present and very disruptive</b>	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 Policy**

**Cherwell District Council Noise Policy<sup>vi</sup>**

11.17 Cherwell District Council (CDC) is the planning authority for the Proposed Development Site. The CDC Noise Policy summarises the approach to managing noise to ensure the best quality of life for residents and others.

11.18 In regards to planning, the CDC noise policy states that the council will:

- *“Work to prevent noise wherever possible through advice, planning, licensing and other routes. We will work to minimise the impact of noise in our districts by:*
- *Responding to and where applicable providing advice through planning and licensing consultations*
- *Providing advice to our communities on our website and through newsletters and other media*
- *Provide advice to our customers including residents and businesses”*

**Oxford Local Plan 2036. Adopted 8<sup>th</sup> of June 2020<sup>vii</sup>**

11.19 The following policies are set out in the Oxford Local Plan 2036, which has relevance to the Proposed Development and this chapter:

11.20 Policy RE8: Noise and Vibration:

- *“Planning permission will only be granted for development proposals which manage noise to safeguard or improve amenity, health, and quality of life.*
- *Planning permission will not be granted for development that will generate unacceptable noise and vibration impacts.*
- *Planning permission will not be granted for development sensitive to noise in locations which experience high levels of noise, unless it can be demonstrated, through a noise assessment, that appropriate attenuation measures will be provided to ensure an acceptable level of amenity for end users and to prevent harm to the continued operation of existing uses.*
- *Conditions will be used to secure such mitigation measures and operational commitments.*
- *Measures to mitigate the impacts of noise and vibration associated with demolition and construction will be secured by legal agreement through Construction Management Plans (Refer to Policy M2).”*

11.21 Policy M2: Assessing and Managing Development:

*“A Construction Management Plan must be provided for developments of:*

- *20 dwellings or more;*
- *500m<sup>2</sup> or more of non-residential floorspace; or*
- *any size in a location where construction activities are likely to have a significant impact on the adjacent or surrounding road network.*

11.22 *A Construction Management Plan should set out how the construction phase of the development will be managed and in particular:*

- *Time of operations;*
- *Noise operations;*
- *Abatement noise techniques;*
- *Monitoring noise levels;*
- *Vibration levels...”*

### **Technical guidance**

#### **British Standard 5228 ‘Code of practice for noise and vibration control on construction and open sites – Part 1: Noise (BS 5228-1/2:2009+A1:2014)<sup>viii</sup>**

11.23 British Standard 5228-1:2009+A1:2014 ‘Code of practice for noise and vibration control on construction and open sites – Part 1: Noise’ provides a methodology for predicting noise levels generated by plant and equipment associated with construction operations.

11.24 The level of noise experienced by sensitive receptors would vary according to the following factors:

- sound power levels of the plant;

- number of plant items used at the same time;
- distances from source to receiver;
- phasing of construction works;
- presence of screening by barriers (in the mitigation stage); and
- topographical features, such as ground type or intervening land-forms between source and receptor.

11.25 The standard also provides a digest of construction noise levels for a variety of construction plant, obtained from previous measurements.

### **IEMA Guidelines for Environmental Noise Impact Assessment (IEMA 2014)<sup>ix</sup>**

11.26 The IEMA guidelines provide advice on how to assess the potential noise and vibration impacts on new developments considering people, property and the environment. Additional advice from the guidelines which is relevant to this chapter include:

- Assessment should consider the type, level, and duration of the noise, as well as the sensitivity of the receptors (i.e., the people or things that are affected by the noise).
- Assessments should also consider the potential for noise to impact on sleep, health, property values, and the enjoyment of the environment.

### **British Standard 8233 'Guidance on sound insulation and noise reduction for buildings (BS 8233:2014)<sup>x</sup>**

11.27 The BS 8233:2014 provides design criteria for external noise, with the target levels applicable to amenity spaces associated with the residential properties (such as gardens, balconies and patios). In these areas it is desirable that the external noise level does not exceed 50 dB  $L_{Aeq,T}$ , though a higher threshold level of 55 dB  $L_{Aeq,T}$  is acceptable in noisier environments.

### **BS4142:2014+A1:2019 entitled 'Methods for rating and assessing industrial and commercial sound'<sup>xi</sup>**

11.28 BS4142:2014+A1:2019 entitled '*Methods for rating and assessing industrial and commercial sound*' provides guidance for assessing a new industrial sound source in mixed residential and industrial areas. The methods described in this standard assess the likely effects of the new sound source on premises used for residential purposes upon which sound is incident.

11.29 The level of sound from proposed new plant, the 'rating level', is predicted in terms of the A-weighted equivalent continuous sound level dB  $L_{Aeq}$ , and compared to the existing background sound level, in terms of  $L_{A90}$ . The  $L_{A90}$  is to be representative of the period being assessed. If the new sound source is impulsive, intermittent, or tonal in nature, then the 'rating level' includes a penalty to account for the character of the noise.

- 11.30 The outcome of the assessment is defined in BS4142 with the following points that relate to the difference between the background sound level and the 'rating level':
- a) Typically, the greater this difference, the greater the magnitude of the impact.
  - b) A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context.
  - c) A difference of around +5 dB is likely to be an indication of an adverse impact, depending on the context.
- 11.31 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.

#### **Design Manual for Roads and Bridges: LA111 2020 (LA111, 2020)<sup>xii</sup>**

- 11.32 Provides guidance on the assessment of impacts from noise and vibration that may result from road projects. The guidance is used in the assessment to determine a methodology for assessing road traffic noise from the construction of the Proposed Development.

#### **Calculation of Road Traffic Noise (CRTN, 1988)<sup>xiii</sup>**

- 11.33 CRTN, 1988 provides a methodology for predicting noise levels due to road traffic.

#### **World Health Organization 'Night noise guidelines for Europe' (WHO, 2009)<sup>xiv</sup>**

- 11.34 WHO's guidelines for night noise provide guidance on desirable (and also interim) noise limits for night-time. They will be used as reference for assessment of absolute noise levels at night.

## Assessment Methodology and Significance Criteria

### **Consultation**

- 11.35 A scoping request has been submitted and a response received. This response provided high level comment on aspects of noise and vibration to be included in the assessment and these are reflected in this chapter.
- 11.36 In relation to the baseline noise survey an email was sent to CDC on 29 September 2023 outlining the proposed survey methodology and survey locations. No response has yet been received.

## **Scope of the Assessment**

- 11.37 The following aspects are scoped into the noise and vibration assessment based on the scoping response:
- Temporary noise and vibration impacts due to construction activities which are assessed qualitatively;
  - Changes in road traffic noise due to temporary additional traffic movements associated with construction, temporary diversions of road traffic during some stages of construction;
  - Permanent noise impacts generated by spectators, car park and the stadium Public Address and Voice Alarm (PAVA) for football and non-football events;
  - Permanent changes in road traffic due to the attendance of patrons and staff to Proposed Development which are assessed quantitatively.
- 11.38 The following aspects are scoped out of the noise and vibration assessment:
- Quantitative assessment of temporary noise and vibration impacts due to the construction of the Proposed Development – this is not possible at this stage due to limited information about construction methodologies and schedule. This assessment has been made qualitatively.
  - Operational vibration impacts – on the basis of the distance to the nearest existing receptors and appropriate design for the hotel if contained within stadium building;
  - Permanent noise impacts from music concerts as these do not form part of the proposals and would be subject to separate planning/licensing applications;
  - Noise and vibration impacts of traffic changes where flows do not vary by more than 10%; and
  - Noise and vibration impacts on sensitive parts within the Proposed Development e.g. the impact of spectator noise during football matches and the nearby aggregates depot on the proposed Hotel – as any effects will be mitigated by the design within the Proposed Development under the “agent of change” principle.
- 11.39 Noise criteria have been set for potential permanent noise impacts due to fixed plant installations (such as air handling plant) in the confidence that these items can be designed to have no significant effect at noise sensitive receptors.

## **Study Area**

- 11.40 For the aspects of the assessment which are scoped in and where a quantitative assessment will be undertaken, the following study areas have been defined:
- For the evaluation of temporary traffic noise changes due to the Proposed Development, the study area encompasses locations where there are front line residences or other noise sensitive receptors which may be subject to a 1 dB or greater increase in noise level expressed as  $L_{A10,18\text{hours}}$ , as a result of construction traffic.

- For operational traffic noise changes due to the Proposed Development, DMRB LA111 methodology recommends that calculations are undertaken for receptors within 600 metres of new road links or roads physically changed or bypassed by the Proposed Development and 50 metres of roads which are likely to experience a change of 1 dB  $L_{A10,18hr}$ , upon Proposed Development opening.
- For operational noise from the stadium a study area of 600 metres has also been used.

## Assessment Locations

- 11.41 The closest existing residential area is located north of the Proposed Development, in south Kidlington. Additional residential areas have been identified in north Summertown. Representative groups of receptors have been identified for assessment of noise and vibration and are described below and assessment locations are illustrated in Figure A.1, **Appendix 11.1**:
- Existing residential receptors located West of Oxford Road and on South Avenue (located approx. 265 m north of the Proposed Development);
  - Existing Stratfield Farm House south west of South Avenue approx. 370 m north west of the Proposed Development; and.
  - Existing residential receptors located on Croxford Gardens (located approx. 510 m northwest of the Proposed Development).
- 11.42 There is an existing residential property on the A4165 Banbury Road, south of the southern spur of the Site but this is further from the proposed stadium than South Kidlington and the southern spur of the site will contain no significant new sources of noise.
- 11.43 Additional future receptors include proposed residential areas which may have been granted planning permission by the time of submission of this document. These are in a 120 house site allocation south of South Avenue above, (PR7B- Stratfield Farm 374 Oxford Road Kidlington OX5 1DL). These residences will be approx. 210 m north of the Proposed Development boundary and separated from the Development by the A4260.
- 11.44 A further allocated site of 430 houses (Land North Of 66 And Adjacent Water Eaton Lane Gosford) is proposed east of Bicester Road/Oxford Road. The southern part of this site is proposed to be playing fields which would be on the eastern side of Oxford Road adjacent to the Proposed Development. The nearest residences within this development would be approx. 290 m northwest of the proposed site boundary and separated from it by Oxford Road.
- 11.45 In summary the nearest potentially affected residences will be the proposed new development at Stratfield Farm, 210 m north of the Proposed Development boundary and separated by the A4260.

11.46 Other non-residential receptors including Stratfield Brake Sports Ground are considered Low sensitivity due to the masking effect of the roads.

**Environmental effects and Significance Criteria**

11.47 The assessment of likely significant environmental effects as a result of the Proposed Development has taken into account the construction and operational phases.

**Determining Significance of Effect**

*Receptor Sensitivity and Magnitude of Effect*

11.48 Noise and vibration affect people in a number of different ways. These may include factors such as anxiety, annoyance and sleep disturbance, enjoyment of quiet spaces, ability to communicate with others, ability to concentrate at home or at work, and participation in social and community activities.

11.49 This noise and vibration assessment is focused on residential receptors which are regarded as having high sensitivity to noise and vibration. There are no non-residential receptors with a high sensitivity to noise and vibration, closer to the development site than the identified residential receptors.

11.50 Generally, the variation in the noise sensitivity of receptors is taken into account by applying different scales to classify magnitude of impact (e.g. by using different scales for daytime and night-time) rather than by varying the assignment of sensitivity to specific types of receptors.

11.51 **Table 11.2** below sets out criteria for assessing sensitivity and **Table 11.3** below sets out criteria for assessing magnitude of impact.

**Table 11.2: Criteria for assessing sensitivity of the receptor.**

Sensitivity	Description	Examples of receptors
<b>High</b>	Receptors where occupants or activities are particularly susceptible to noise	Residential occupied during match/working periods Quiet outdoor areas used for recreation during match/working periods Conference facilities Auditoria/studios Schools in daytime Hospitals/residential care homes Religious institutions e.g. churches or mosques
<b>Medium</b>	Receptors moderately sensitive to noise, where it may cause some distraction or disturbance	Offices Restaurants Sports grounds where spectator noise is not a normal part of the event and where quiet conditions are necessary (e.g. golf or tennis)

<b>Low</b>	Receptors where distraction or disturbance from noise is minimal	Residences and other buildings not occupied during match/working hours Factories and working environments with existing high noise levels Sports grounds where spectator noise is a normal part of the event
<b>Negligible</b>	No discernible effect on the receptor	N/A

Source: Adopted from IEMA Guidelines for Environmental Noise Impact Assessment (IEMA, 2014) and the Planning Practice Guidance (PPG, 2019)

**Table 11.3: Criteria for assessing magnitude of impact**

<b>Magnitude of Impact</b>	<b>Criteria for assessing the impact</b>
<b>High</b>	Increase in noise levels is likely to be clearly perceptible and could have a significant effect on the continued use of a building and other premises. Disruptive, causes a material change in behaviour and/or attitude. Potential for sleep disturbance. Quality of life diminished due to change in character of the area.
<b>Medium</b>	Increase in noise levels is likely to be noticeable in affected buildings and outdoor recreational areas. Intrusive, noise can be heard and causes small changes in behaviour and/or attitude. Potential for non-awakening sleep disturbance. Affects the character of an area such that there is a perceived change in the quality of life.
<b>Low</b>	A slight increase in noise levels may be perceived in affected buildings and outdoor recreational areas. Can slightly affect the character of an area but not such that there is a perceived change in the quality of life. Non-intrusive noise can be heard but does not cause any change in behaviour or attitude.
<b>Negligible</b>	Noise increase is unlikely to be discernible, very little change to noise from the baseline conditions.

Source: Adopted from IEMA Guidelines for Environmental Noise Impact Assessment (IEMA, 2014).

Significance of effect

11.52 The significance of the effect of any noise and vibration impact is determined as a function of the sensitivity of the receptor and the magnitude of the impact that it is exposed to. Using the definition of receptor sensitivity and the magnitudes of impact (defined above), the significance of any effects is identified using the matrix presented in **Table 11.4**.

**Table 11.4: Matrix for determining the significance of the effect**

	<b>Sensitivity</b>			
<b>Magnitude</b>	<b>High</b>	<b>Medium</b>	<b>Low</b>	<b>Negligible</b>
<b>High</b>	Major	Major/Moderate	Moderate/Minor	Negligible
<b>Medium</b>	Major/Moderate	Moderate	Minor	Negligible
<b>Low</b>	Moderate/Minor	Minor	Minor/Negligible	Negligible
<b>Negligible</b>	Negligible	Negligible	Negligible	Negligible

Source: Chapter 2 Assessment Methodology

11.53 The terms outlined in the above table have been defined as follows:

- Major (adverse or beneficial) – where the development would cause significant deterioration (or improvement) of the existing environment;

- Moderate (adverse or beneficial) – where the development would cause noticeable deterioration (or improvement) to the existing environment;
- Minor (adverse or beneficial) – where the development would cause perceptible deterioration (or improvement) to the existing environment;
- Negligible – no discernible improvement or deterioration to the existing environment.

## **Assessment Methodology**

### **Construction Noise and Vibration**

- 11.54 Due to limited information about construction methodologies and schedule, quantitative predictions of construction noise and vibration impacts are not possible at this stage. However, the separation distance between the construction works and the closest noise sensitive receptors is large enough that noise and vibration impacts are likely to be below the threshold of potential significance defined in BS 5228-1. Therefore, a quantitative assessment is not considered necessary.
- 11.55 In line with the scoping request and response, a qualitative assessment of potential impacts and mitigation measures has been conducted for completeness.

### **Construction Traffic Noise**

- 11.56 Assessment of noise from construction traffic using the wider road network follows guidance of DMRB LA111, which compares Basic Noise Levels (BNL) between existing baseline and construction phases. Noise levels from construction traffic using the existing road network are determined in accordance with Calculation of Road Traffic Noise (CRTN) calculation methodology. This comparative assessment indicates the relative changes in noise level due to changes in traffic flow during construction at nearby noise sensitive receptors.
- 11.57 LA111 Guidance indicates an increase in noise level due to construction traffic of 1 dB or more has the potential to result in Minor magnitude of impact and 3 dB or more has the potential to result in Moderate magnitude at noise sensitive receptors (see **Table 11.5** below). The assessment is only relevant if the road traffic noise source subject to increase is the dominant ambient noise source at the identified receptors. The duration of increases in traffic flow due to construction traffic also contributes to the extent of any adverse impacts.
- 11.58 In accordance with the DMRB LA111 a significant effect due to noise from construction traffic is likely only when a Moderate or Major magnitude of change is identified.
- 11.59 In order to align with terminology used throughout this EIA, an LA111 of Minor magnitude will be considered a Low magnitude and an LA111 of Moderate magnitude will be considered Medium magnitude.

11.60 Baseline data has been assessed upon 2018 and 2023 traffic counts, this is discussed further in Potential Effects section.

## **Operational Noise and Vibration**

### Operational Road Traffic Noise

11.61 DMRB LA111 provides a methodology for assessment of traffic noise associated with alterations to the existing road network and for changes in traffic flow or composition on the wider network. DMRB LA111 provides guidance for comparisons that should be made to assess the impact of changes in road traffic noise. The traffic noise change is based on noise levels associated with Do Minimum (that is, without the Proposed Development) and Do-something (that is, with the Proposed Development) and for the opening year and a design year that is usually 15 years later but can be a shorter interval where appropriate. The comparisons include:

- Do Minimum scenario in the opening year against Do Something in the opening year (short-term change with the Proposed Development)
- Do Minimum scenario in the opening year against Do Something in the future year (long-term change with the Proposed Development)
- Do Minimum scenario in the opening year against Do Minimum in the future year (long-term change without the Proposed Development)

11.62 The assessment for this Proposed Development will only compare the noise levels in the opening year under the Do Minimum scenario to the noise levels in the opening year under the Do Something scenario, as it is not expected that there will be any additional changes in road traffic due to the Proposed Development in the future year.

11.63 DMRB LA111 provides guidance for assessment of impact magnitudes due to the difference in road traffic noise levels between scenarios. These impact magnitudes are described as Negligible, Minor, Moderate or Major, subject to the scale of the noise level difference and can be positive or negative reflecting beneficial and adverse impacts (Error! Reference source not found.5). The assignment of these descriptors to an associated noise level change are different for short term construction noise impacts and long term operational noise impacts.

11.64 This assessment only considers the short-term noise changes, as it is not expected that the Proposed Development will result in any additional traffic growth in the long term. The total number of noise sensitive receptors within the study area falling into each category is reported for the short term.

**Table 11.5: Magnitude of road traffic noise change in the short-term**

<b>Magnitude</b>	<b>Short term noise change (dB L<sub>A10,18hr</sub> or L<sub>night</sub>)</b>
Major	Greater than or equal to 5.0
Moderate	3.0 to 4.9
Minor	1.0 to 2.9
Negligible	Less than 1.0

Source: DRMB LA111 Table 3.54a

- 11.65 In accordance with the DMRB LA111 a significant effect due to noise from operation traffic is likely only when a Moderate or Major magnitude of change is identified.
- 11.66 The operational road traffic noise assessment has used traffic data based on 2023 baseline traffic data. 2023 traffic data has been made available for a recent update of assessment, following additional surveys carried out in September 2023. Further details of this recent update are provided in the Transport and Access Chapter.
- 11.67 In order to align with terminology used throughout this EIA, an LA111 of Minor magnitude will be considered a Low magnitude and an LA111 of Moderate magnitude will be considered Medium magnitude.

#### Noise from Fixed Plant Installations

- 11.68 Due to the lack of information about the type, number, locations, and noise output of the new fixed building services plant associated with the Proposed Development at this stage, it has not been possible to predict the resultant rating noise levels at sensitive receptors using the methodology described in BS 4142.
- 11.69 Noise criteria for the design and selection of fixed mechanical plant associated with the Proposed Development have been set, using BS4142, in order that these noise sources will have no significant effect on sensitive receptors, in the confidence that these criteria can be met by careful design of the mechanical plant using tried, tested, and well understood means of mitigation.
- 11.70 For evaluation of fixed plant, the criteria given by BS 4142 for assessing significance are based on the difference between background noise and the rating level. The differences correspond with a likelihood of complaint i.e. where:
- 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.

11.71 These criteria have been adapted, as presented in **Table 11.6**, in order to describe the significance of effects in a way that is consistent with the approach of the EIA. The effect of impact is on residential receptors only, which are High sensitivity.

**Table 11.6: Criteria for determining the significance of effect of noise impacts from fixed plant.**

Difference between rating noise level $L_{Aeq}$ dB and typical background noise level $L_{A90}$ dB	Magnitude of impact	Significance of effect
<-10 dB	None	Neutral
$\geq$ -10 and <0	Negligible	Negligible
$\geq$ 0 and <5 dB	Low	Moderate/Minor
$\geq$ 5 and <10	Medium	Major/Moderate
$\geq$ 10 dB	High	Major

Source: Adopted from BS4142 Method for Rating Industrial Sound Affecting Mixed Residential and Industrial Areas (BSI 2014+A1 2019).

### Car Park Noise

11.72 Activities within the proposed car parking area will include transient noise sources (e.g. cars manoeuvring, closing car doors or boots, etc.) and matchday coach drop off.

11.73 There is no specific guidance for the assessment of noise impacts from car parking activities. Car park noise has been assessed using the same methodology as described for the Matchday noise created by the stadium.

### Matchday Noise Generated by the Stadium

11.74 There is no accepted methodology for evaluation of noise generated by stadium patrons due to its variable nature, the limited duration of the sporting fixture, and the crowd noise peaking at dramatic moments during a game. Note also that noise from stadium patrons is not directly controllable.

11.75 The context of activity at a football stadium should be borne in mind when considering noise generated by patrons. The assessment has considered that games happen on a limited number of Saturday afternoons and weekday evenings during the football season. As part of the Proposed Development, the current plans are to close part of Oxford Road (south of the A34) on match days which would reduce road traffic noise. This means that the overall noise levels on Oxford Road could be lower during the match, although this in itself could make noise generated by patrons more noticeable.

11.76 In the absence of a specific methodology for setting LOAEL and SOEAL for crowd noise, the following methodology is proposed based on consideration of various pieces of guidance given for noise of a temporary, intermittent and limited duration.

- 11.77 LOAEL is set at the background  $L_{A90,1hr}$  level at the receptor.
- 11.78 The threshold for potential significant adverse effect is set at an  $L_{Aeq,1hr}$  10 dB above the background  $L_{A90,1hr}$  level for the period of the match.
- 11.79 The threshold for potential significant adverse effect has been set in sight of the following guidance which, although none is specific to the assessment of noise from football matches, provides some context in relation to noise of an intermittent nature.
- 11.80 The Code of Practice on Environmental Noise Control at Concerts, Noise Council 1995<sup>xv</sup>, provides guidance on assessing noise from concerts. In some ways noise from football matches is similar in nature to a concert in that they are discrete events separated from each other by significant periods of time. The code provides guidance on acceptable levels of noise from concerts dependent on the number of concerts per year. This guidance suggests that for events which occur 4 to 12 times per year the MNL (music noise level) should not exceed the existing background noise level ( $L_{A90}$ ) by more than 15 dB over a 15 minute period.
- 11.81 The character of crowd noise is however less tonal, and less rhythmic and therefore potentially less intrusive in nature than music. However, as the match-day events will exceed the 12 times per year criterion, it is appropriate for the level of exceedance of  $L_{A90}$  to be lower than 15 dB for a likely significant adverse effect to arise. Other guidance that makes reference to noise levels exceeding background noise, while not directly applicable to the assessment of matchday noise, includes BS4142 on rating of noise from industrial and commercial sources and government minerals (Minerals - GOV.UK (www.gov.uk)) guidance. In both cases this other guidance refers to criteria involving the new noise source exceeding the background noise by 10 dB. On this basis, the criterion used for a significant adverse effect to arise from matchday noise is for the  $L_{Aeq}$  from the noise to exceed the existing baseline noise by 10 dB or more.
- 11.82 These criteria have been adapted, as presented in **Table 11.7**, in order to describe the significance of effects in a way that is consistent with the approach of the EIA. The effect of impact is on residential receptors only, which are High sensitivity.

**Table 11.7: Criteria for determining the significance of effect and magnitude of impact of noise impacts of matchday noise from the stadium.**

Difference between rating noise level $L_{Aeq}$ dB and typical background noise level $L_{A90}$ dB	Magnitude of impact	Significance of effect
<0	None	Neutral
≥0 and <5 dB	Negligible	Negligible
≥5 and <10 dB	Low	Minor
≥10 and <15 dB	Medium	Moderate
≥15 dB	High	Major

Source: Adapted from Code of Practice on Environmental Noise Control at Concerts, Noise Council 1995, Minerals - GOV.UK ([www.gov.uk](http://www.gov.uk)), BS4142 Method for Rating Industrial Sound Affecting Mixed Residential and Industrial Areas (BSI 2014+A1 2019).

#### Non-football Event Noise Generated by the Stadium

11.83 Non-football events will vary from small meetings (10 people) and activities to a small number of larger events (650-700 people). All these events will be internal so event noise will be managed within the building except for arrivals and departures. Non-football event activity sound and incidental music will be managed to avoid significant impacts by a noise management plan for larger events.

#### Public Address and Voice Alarm Systems

11.84 Noise levels from the PAVA system have been assessed as part of the matchday noise generated by the stadium.

11.85 Proposals to include a PAVA system to provide coverage of the new stadium are being developed. The PAVA systems will be designed to ensure that public address announcements, including pre- and post match announcements and entertainment, do not exceed the existing background sound level at the closest noise sensitive receptors.

11.86 Provided this design objective for the PAVA design is implemented, the effects would be considered to be not significant in terms of EIA.

#### **Summary of Criteria for Significance of Effect**

11.87 Criteria for an observable effect and criteria for potential significance on a high sensitivity receptor, for each parameter have been summarised in **Table 11.8**, for noise sources subject to quantitative assessment in the scope of this report.

**Table 11.8: Summary of Criteria for significance for quantitative assessment**

Time period	Criteria for an observable effect	Criteria for potential significant effect	Criteria/ Guidance
Operational road traffic noise including construction traffic			
Daytime	A noise level change of 1 dB L <sub>A10,18hr</sub> (façade)	A noise level change of 3 dB L <sub>A10,18 hr</sub> (façade)	DMRB LA111
Night-time	A noise level change of 1 dB L <sub>Night,r</sub> (free-field)	A noise level change of 3 dB L <sub>Night,r</sub> (free-field)	DMRB LA111
Car park noise			
Daytime	As below for matchday Noise	As below for matchday Noise	As below for matchday Noise
Matchday Noise			

Daytime	An event noise level ( $L_{Aeq,1hr}$ ) equal to the background level $L_{A90,1hr}$ dB	An event noise level ( $L_{Aeq,1hr}$ ) 10 dB above background level ( $L_{A90,1hr} + 10$ dB)	Developed in sight of: Code of Practice on Environmental Noise Control at Concerts, Noise Council 1995, Minerals policy, and; BS 4142:2014+A1:2019; Methods for rating and assessing industrial and commercial sound.
Mechanical Plant associated with the Stadium			
Daytime and Night-time.	A rating level ( $L_{Ar,Tr}$ ) not exceeding background less 10 dB ( $L_{A90,T} - 10$ dB)	A rating level ( $L_{Ar,Tr}$ ) not exceeding 10dB above background ( $L_{A90,T} + 10$ dB)	BS 4142:2014+A1:2019; Methods for rating and assessing industrial and commercial sound.

11.88 Exceedance of significance criteria does not in itself constitute a significant adverse effect. The assessment of likely significant effects at sensitive receptors considers the sensitivity of the receptor and the duration and frequency of change.

### **Assumptions and limitations**

11.89 All traffic noise calculations have been based on traffic counts and predictions provided by Ridge Transportation Engineers.

11.90 There is no specific guidance in relation to assessing the noise impact of football matches or car parks. Predictions of noise levels from both football matches and car parks presented here are based on measurements previously conducted.

11.91 Noise level criteria are in some instances based on the results of ambient/background noise surveys. These surveys are of necessity a snapshot of the noise environment in the area of the Proposed Development and may vary with time.

## Baseline Conditions

### **Baseline information**

11.92 A noise survey was conducted by Mott MacDonald to establish ambient and background sound levels during periods when the proposed stadium will be used for football matches (weekend afternoons and weekday evenings).

11.93 The methodology and results of the survey are set out in **Appendix 11.1** and summarised below.

11.94 The noise survey was undertaken from 30th September to 4th October 2023. The survey comprised both unattended, continuous long-term (LT) measurement and attended, short-term measurements (ST).

11.95 Measurement positions were selected to be representative of the baseline noise levels at the nearest sensitive receptors potentially subject to temporary construction noise and operational noise as a result of the Proposed Development.

11.96 Measurement locations and details are provided in **Figure 11.1**.

### Long Term Measurements

11.97 Position LT1 was located on the subject site. This location was considered representative of background noise levels in the area and has been used to set limits for mechanical plant based on the measured  $L_{A90,T}$  values.

11.98 The levels relevant to the operational assessments are summarised in **Table 11.9** below.

**Table 11.9: LT1 Measurement Results (free field measurement)**

Date	Average $L_{Aeq, T}$ dB			$L_{A90, T}$ dB	
	Day (07:00-19:00)	Evening (19:00-23:00)	Night (23:00-07:00)	Day (07:00-23:00)	Night (23:00-07:00)
Saturday, 30th September 2023	60	57	52	51	39
Sunday, 1st October 2023	59	56	52	49	36
Monday, 2nd October 2023	59	57	53	49	39
Tuesday, 3rd October 2023	59	57	54	52	43
Wednesday, 4th October 2023	60*	-	-	55*	-
<b>Baseline level for Mechanical Plant noise criteria</b>				49	39

### Short Term measurements

11.99 The noise climate of the short term measurement locations was dominated by road traffic noise (RTN) on the Kidlington Roundabout and distant consistent A34 RTN. Short term noise measurements were completed at two locations on Saturday 30th September 2023 between 15:15 and 20:00 and on Wednesday 4th October 2023 between 19:00 and 22:30. The supplementary short term noise levels and main noise source and comments are summarised in **Table 11.10** for ST1 and **Table 11.11** for ST2.

**Table 11.10: Summary of ST1 Measurements on a weekend (15 minutes for each measurement)**

ST1	Date	Survey Period	Typical $L_{A90, T}$	Main noise source and comments
weekend	30 Sep 23	15:15 - 20:00	53	Major noise source: RTN from Kidlington Roundabout Other: vegetation noise, distant and consistent A34 RTN, aeroplane and helicopter noise, noise from sports games until around 5pm, occasional emergency vehicles, occasional bird noise, people walking past and talking.
weekday	04 Oct 23	19:00 - 22:15	49	Major noise source: RTN from Kidlington Roundabout Other: vegetation noise, distant and consistent A34 RTN, aeroplane and helicopter noise, occasional emergency vehicles, occasional bird noise, people walking past and talking.

**Table 11.11: Summary of ST2 Measurements on a weekend (15 minutes for each measurement)**

ST2	Date	Start time	$L_{A90, T}$	Main noise source and comments
weekend	30 Sep 23	15:30 - 19:45	58	Major noise source: RTN from Kidlington Roundabout Other: vegetation noise, Lorry unloading, refrigerator unit noise, distant and consistent A34 RTN, aeroplane and helicopter noise, occasional emergency vehicles, occasional bird noise.
weekday	04 Oct 23	20:00- 22:55	52	Major noise source: RTN from Kidlington Roundabout Other: vegetation noise, Lorry unloading, refrigerator unit noise, distant and consistent A34 RTN, aeroplane and helicopter noise, occasional emergency vehicles, occasional bird noise.

## Potential Effects

### Temporary Impacts

#### Construction Noise and Vibration

11.100 Potential temporary noise and vibration impacts arising from the construction works include:

- Impacts arising from on-site construction activities from stationary and moving noise sources; and
- Activities within the contractors' compounds.

11.101 Noise and vibration from construction activities can be tolerated by residents, provided that prior notice is given, the effects are restricted to reasonable times and they are kept to a minimum. Limits for working hours and levels of noise at nearby properties will be agreed in advance with CDC and incorporated into the specification for the Proposed Development. Alternatively, the contractor may seek a Section 61 approval under the COPA (1974).

- 11.102 Best Practicable Means for noise control (BPM) will be applied at all times. BPM will be based upon guidance provided within BS5228 and should include the selection of the most appropriate method and plant for the job, adequate maintenance of plant, optimum siting of stationary plant, local screening and the education of the workforce. Restrictions may also be placed on early/late delivery times. Potentially affected residents will be kept informed in advance of the works and contacts details be provided to request further information or to report disturbance.
- 11.103 Control measures related to construction noise and vibration will be set out within the Construction Environmental Management Plan (CEMP). This will identify the series of measures to reduce the environmental effects, including noise and vibration, during the construction period and covers environmental and safety aspects affecting the interests of residents, businesses, road users and the general public in the vicinity of the works.
- 11.104 For further consideration of the management of construction related deliveries including the likely routing of construction related journeys, reference should be made to Chapter 10 and its Technical Appendices.
- 11.105 By implementation of the recommendations above, the requirements of the NPPF and NPSE, which states that a new development should avoid noise which will give rise to a significant effect will be satisfied. It is therefore considered that the significance of effect of construction noise and vibration will be **Negligible**, which is **not significant**.

### **Construction Traffic Noise**

- 11.106 Calculations of the change in Basic Noise Level during construction have been conducted using the CRTN for each road link listed below using predicted construction traffic flows and existing baseline flows provided by RIDGE transportation engineers. This traffic data is shown in **Appendix 11.1**. These calculations take into account the overall change in flow and the change in percentage of heavy vehicles:
- A4260 Oxford Road (North)
  - Bicester Road (North)
  - Frieze Way (North)
  - A4165 Oxford Road (South)
  - A4165 Banbury Road (North)
  - Elsfield Way
  - A4165 Banbury Road (South)
  - A40 North Way
  - A44 Woodstock Road (Central)
  - A44 Woodstock Road (South)

- A40 Northern Bypass Road
- A44 Woodstock Road (North)
- A44 (Central)
- A34 (South)
- A34 (North)

11.107 There were no changes in predicted  $L_{A10,18hr}$  on any road links except for Frieze Way where a change of less than 1 dB was predicted. Reference to **Table 11.5** shows this level of noise level change is **Negligible**, which is **not significant**.

11.108 The construction traffic noise assessment has used 2018 baseline traffic data. It is noted that 2023 traffic data has been made available for a recent update of the assessment, following additional surveys carried out in September 2023. It is noted that the 2023 data shows lower baseline traffic flows than the 2018 data and therefore looking at the noise level change associated with construction traffic, the 2023 baseline provides a marginally higher noise impact. All predicted noise impacts due to construction traffic, using the baseline from 2018 or 2023, remain less than 1 dBA and are therefore considered **Negligible** and **not significant**.

## **Permanent Effects**

### **Fixed Plant Associated with the Proposed Development**

11.109 Based on the measured background noise levels in the area, the following rating level criteria have been set according to BS4142:

- Daytime (07:00-23:00) of 49 dB
- Nighttime (23:00-07:00) of 39 dB

11.110 Noise control measures for building services plant will be incorporated into the design to ensure compliance with these noise criteria. These control measures are widely used and well understood and may consist of; optimum location of plant to minimise noise emission, selection of quiet equipment options, use of attenuators, acoustic louvres and acoustically lined plena, vibration isolation, managing the hours of operation of plant, deployment of screening measures or other measures appropriate to the equipment specified.

11.111 These criteria will be readily achievable with the noise measures listed above and the distance between plant and the nearest residential receptors. The significance of effect of fixed plant will therefore be **Negligible**, which is **not significant**.

## Road Traffic Noise

11.112 Calculations of the change in Basic Noise Level, during operation of the proposed site have been conducted using the CRTN for each road link listed below using predicted operational traffic flows and existing baseline flows provided by Ridge and Partners LLP Transportation team. This traffic data is shown in **Appendix 11.1**. These calculations take into account the overall change in flow and the change in percentage heavy vehicles:

- A4260 Oxford Road (North)\*
- Bicester Road (North)\*
- Frieze Way (North)\*
- A4165 Oxford Road (South)\*
- A4165 Banbury Road (North)\*
- Elsfield Way
- A4165 Banbury Road (South)
- A40 North Way
- A44 Woodstock Road (Central)
- A44 Woodstock Road (South)
- A40 Northern Bypass Road
- A44 Woodstock Road (North)\*
- A44 (Central)\*
- A34 (South)
- A34 (North)

11.113 There were predicted changes, of less than 1dB in  $L_{A10,18hr}$  on road links marked with an asterisk (\*) above. Reference to **Table 11.5** shows these noise level changes are **Negligible**, which is **not significant**.

11.114 As traffic flows during matchdays will be concentrated at specific times during the day noise level changes have also been calculated on hour by hour basis for all of the road links listed using hourly flow predictions. These changes have been calculated for both weekends and weekdays. For weekends all hourly noise level changes are predicted to be less than 3 dB. This noise level change would however only occur for these hours on average once every two weeks during the football season. The significance of effect is therefore of **Negligible**, which is **not significant**.

11.115 For weekdays these predictions show that changes in  $L_{A10,1hr}$  would be less than 3 dB, and therefore Low magnitude of impact, on all links except on the A4165 Banbury Road north during the Hour 18:00 to 19:00 on a weekday where a noise level change of 4 dB is predicted and 21:00-22:00 on weekday when a noise level change of 6 dB is predicted. This noise level change would however only occur for these hours on average once every two weeks during the football season. The significance of effect is therefore also considered **Negligible**, which is **not significant**.

## Matchday Noise Generated by Patrons of the Stadium

11.116 For receptors potentially subject to matchday noise from the stadium, the threshold for potential significance has been set at the Background  $L_{A90,1hr} + 10$  dB. The measured background  $L_{A90,1hr}$  noise levels at South Avenue/Oxford Road/Stratfield Farm were:

- Sat afternoon 56 dB  $L_{A90,1hr}$
- Weekday evening 49 dB  $L_{A90,1hr}$

11.117 Therefore, the threshold for potential significance west of South Avenue/Oxford Road/Stratfield Farm is set at:

- Sat afternoon 66 dB  $L_{Aeq,1hr}$
- Weekday evening 59 dB  $L_{Aeq,1hr}$

11.118 For proposed residences east of Bicester Road the measured background  $L_{A90,1hr}$  noise levels were:

- Sat afternoon 58 dB  $L_{A90,1hr}$
- Weekday evening 52 dB  $L_{A90,1hr}$

11.119 Therefore the threshold for potential significance east of Oxford Road/Bicester Road is set at:

- Sat afternoon 68 dB  $L_{Aeq,1hr}$
- Weekday evening 62 dB  $L_{Aeq,1hr}$

11.120 The new stadium will be of a modern “wrap around” configuration and will in-fill areas at the corners of the ground, ensuring that there is no “line of sight” to the closest noise sensitive receptors and hence, limit crowd noise egress. This measure is considered by designers to provide the optimum amount of noise screening. The aspiration is to design the stands such that crowd noise is directed towards the pitch and other stands, enhancing the atmosphere within the stadium.

11.121 Based on the stadium design and measurements conducted at other stadia it is possible to provide indicative predictions of noise levels expected at the nearest noise sensitive receptors. The predictions have been based on measurements at other stadia conducted during:

- Coventry City v Norwich, Coca-Cola League Championship, Ricoh Arena, Coventry on 9th September 2006 (stadium capacity 32,000, attendance 22,006); and
- Swansea City v Huddersfield Town, Coca-Cola League One, Liberty Stadium, Swansea on 23rd September 2006 (Stadium Capacity 22,080-attendance 12,202).

11.122 Crowd Noise from these stadia indicate a noise level of 88dB  $L_{Aeq,1hr}$  at the touch line before the match and 91 dB  $L_{Aeq,1hr}$  during the match, based on the noise levels measured at the two matches above.

- 11.123 Preliminary modelling using DataKustik CadnaA modelling software taking into account the attenuation provided by the stadium structure and distance attenuation shows that the expected noise level at the nearest potentially affected residence would be around 57 dB  $L_{Aeq,1hr}$  during a match and 54 dB  $L_{Aeq,1hr}$  immediately before and after the match.
- 11.124 This level of noise is a Minor effect below the threshold for potential significance for residences on South Avenue/Croxford Gardens and Oxford Road and also for future residences at Stratfield Farm. This noise level change would however only occur during weekday evenings and Saturday afternoons on average once every two weeks during the football season. The significance of effect is therefore also considered **Negligible**, which is **not significant**.
- 11.125 For future residences east of Oxford Road/Bicester Road (Land North Of 66 And Adjacent Water Eaton Lane Gosford) the predicted levels of matchday noise will be 55 dB  $L_{Aeq,1hr}$  during a game and 52 dB  $L_{Aeq,1hr}$  immediately before and after the game. This noise change would only occur on average once every two weeks during the football season. This will not exceed the threshold for potential significance. The significance of effect is therefore also considered **Negligible**, which is **not significant**.
- 11.126 It is reasonable to assume however that the main pedestrian routes to and around the stadium, including footpaths and public rights of way, will experience noise level increases due to patrons walking to and from the stadium, which would likely occur over a period before and after a given match.
- 11.127 For the above reasons, it is considered that the noise impact associated with football matches at the closest noise sensitive receptors would result in an intermittent impact. As this impact only occurs, on average, every two weeks, the significance of effect is therefore considered **Negligible**, which is **not significant**.

### **Non-football match day event noise**

- 11.128 Non-football match events would be indoor. The noise generated by patrons will be managed by an event noise management plan and therefore the impact is considered not to be significant in terms of EIA.

### **Vehicle noise in car park**

- 11.129 The proposed car park is located west of the proposed stadium and therefore the stadium itself will provide significant acoustic screening from proposed residences on the east side of Oxford Road and Bicester Road. The nearest current sensitive receptors, Oxford Road/South Ave are located approximately 345 m to the north with the nearest future sensitive receptors, at the Stratfield Farm development, being approximately 310 m to the north. Previous measurements conducted by Mott

MacDonald show a Sound Power level of 72 dBA to represent the noise level produced by four parking spaces for an hour if each space was emptied or filled during the one hour period. Based on this sound power level, and utilisation of all of the 175 parking spaces in one hour, which is a very conservative assumption, a noise level of lower than 30dB<sub>L<sub>Aeq,1hr</sub></sub> would result at the nearest residential receptor.

11.130 This level of noise would be significantly below the threshold for potential significance for all potentially affected noise sensitive receptors and would not contribute to overall noise level during matchdays. The significance of effect is therefore considered **Negligible**, which is **not significant**.

11.131 Other receptors will be subject to even lower levels of car park noise.

### **Public Address and Voice Alarm Systems**

11.132 The measured noise levels used to predict matchday noise levels from the stadium above included noise from PAVA systems and is therefore assessed above.

11.133 Notwithstanding this, proposals for the PAVA system to provide coverage of the new stadium are being developed and the PAVA systems will be designed to ensure that public address announcements are not to exceed the background sound level at the closest noise sensitive receptors. Provided this approach to the PAVA design is implemented, no significant adverse effects on nearby residential noise sensitive receptors are anticipated.

11.134 For these reasons, it is considered that the significance of effect of the public address and voice alarm system will be **Negligible**, which is **not significant**.

## Mitigation Measures and Residual Effects

### **Mitigation Measures**

#### **Good Practice Mitigation**

##### *Temporary effects*

11.135 The impact of noise and vibration on nearby sensitive receptors within the vicinity of the Proposed Development will be controlled by implementation of the principal of Best Practicable Means (BPM). This can be achieved by undertaking construction activities in accordance with good practice set out in BS 5228-1/2:2009+A1:2014.

11.136 Incorporated mitigation related to construction noise will be set out within the CEMP. This will identify the series of measures to reduce the environmental effects during the construction period

and cover environmental and safety aspects affecting the interests of residents and the general public. Typical means by which noise and vibration may be minimised include the following:

- selecting quiet equipment;
- ensure equipment is maintained, in good working order, and is used in accordance with the manufacturer's instructions;
- members of the construction team should be trained and advised during tool box briefings on quiet working methods;
- equipment shall not be left running unnecessarily;
- equipment shall be fitted with silencers or mufflers;
- use plant enclosures whenever feasible;
- careful orientation of plant with directional features;
- materials shall be lowered instead of dropped from height;
- inform nearby sensitive receptors in advance of construction activities and keep them up to date with progress and changes;
- give nearby sensitive receptors a site contact telephone number; the contact should liaise with residents and maintain good support;
- manage deliveries to prevent queuing of site traffic at access points; and,
- use of adjustable or directional audible vehicle-reversing alarms or use of alternative warning systems (for example white noise alarms).

11.137 Construction vibration mitigation will also be set out in the CEMP.

11.138 The preferred approach for controlling construction noise and vibration is to reduce source levels where possible but with due regard to practicality. Sometimes a greater noise level may be acceptable if the overall construction time (and therefore length of disruption) is reduced.

11.139 Temporary barriers that remove "line of sight" (from the receptor to the construction works) would be likely to reduce the resultant noise levels from construction works by 10dB. However, it is likely that these will only be installed where necessary to avoid significant adverse effects, and practicable given site constraints. The noise estimates set out above assume that temporary barriers have not been installed.

## **Additional Mitigation**

### Temporary Effects

11.140 Due to the distance between the between the nearest existing and future residential receptors at Stratfield Farm immediately to the south of South Avenue/Croxford Gardens and Oxford Road, being over 200m from the nearest part of the proposed stadium and around 440m from the farthest part of the Site, no additional mitigation is proposed for construction activities.

### Permanent Effects

- 11.141 The stadium is being designed as a wraparound bowl and will therefore, to some extent, contain noise within it. The architectural design of the stadium will be developed to maximise this containment effect and minimise noise spillage outside of the stadium.
- 11.142 The PAVA system will be designed to minimise noise spillage outside of the stadium, for example by utilising a larger number of low powered speakers directed at the crowd rather than a small number of high powered speakers.
- 11.143 No mitigation for car park noise is proposed.
- 11.144 Noise control measures for building services plant will be incorporated into the design to ensure compliance with noise criteria. These control measures are widely used and well understood and may consist of; optimum location of plant to minimise noise emission, selection of quiet equipment options, use of attenuators, acoustic louvres and acoustically lined plena, vibration isolation, management of the hours of operation of plant, deployment of screening measures or other measures appropriate to the equipment specified.

### **Residual effects**

#### **Temporary residual effects**

##### Construction noise and vibration

- 11.145 A qualitative assessment of the construction noise and vibration has been conducted. Provided that the recommendations of the BPM are implemented to reduce the impact of construction noise and vibration no significant effects have been identified. The significance of effect is therefore considered **Negligible**, which is **not significant**.

##### Construction Traffic noise

- 11.146 There will be no residual effects due to construction traffic.

#### **Permanent residual effects**

##### Road Traffic Noise

- 11.147 Although there will be short term noticeable noise level increases due to matchday traffic on Banbury Road North these noise level increases will only be short term and relatively infrequent, being approximately once every two weeks. There are therefore considered to be **no residual effects**.

### Noise from Fixed Plant Installations

11.148 Fixed plant installations will be mitigated by design to ensure noise levels at the closest noise sensitive receptors do not exceed the background sound levels. On this basis, the impact has been determined to be not significant, in terms of EIA and **no residual effect** will occur.

### Vehicle noise from car park

11.149 Due to the parking area being approximately 310m from existing noise sensitive receptors and 260m from future receptors noise levels from the parking area will have **no residual effect**.

### Matchday and Non-football Event Noise Generated by the Stadium

11.150 The impact of event noise from the stadium has been determined to be **not significant** in terms of environmental impact assessment (EIA). This is because the noise is occasional, with an average of once every two weeks.

### Public Address and Voice Alarm Systems

11.151 Careful design of the PA system will ensure there are **no residual effects** at the nearest existing of future noise sensitive receptors.

## Cumulative Effects

11.152 There are a number of residential committed developments, allocated sites and other reasonably foreseeable developments in the general area of the Proposed Development. These potentially cumulative schemes are listed in **Table 2.6**, Chapter 2. These planned developments have been considered in the assessment above and in relation to cumulative effects.

11.153 These planned developments are sufficiently far from existing noise sensitive receptors and from the Proposed Development that the significance of effect is determined to be **Negligible and not significant**.

11.154 Similarly, during the operation of the Proposed Development all of the planned developments are sufficiently distant that the that the significance of effect is determined to be **Negligible and not significant**. No noise sensitive receptors will be subject to significant cumulative noise effect from the completed developments.

11.155 It is possible that construction periods for these sites may overlap with the construction of the Proposed Development. Even so the distances between existing noise sensitive receptors and the

Proposed Development are significantly greater than the distance between existing noise sensitive receptors and the proposed new residential sites, such that noise levels at existing receptors will be dominated by construction of the new residential developments rather than the Proposed Development during these periods.

## Conclusions

- 11.156 A noise and vibration assessment has been undertaken to assess the potential impacts associated with the construction and operation of the Proposed Development. The assessment has been undertaken with reference to relevant national, regional and local policy and guidance with respect to noise.
- 11.157 For construction noise and vibration, a qualitative assessment has been undertaken which provides recommendations for minimising impacts at the closest noise sensitive receptors. It is determined that the overall impact is **not significant** during the construction phase.
- 11.158 The potential noise effects of construction traffic are considered **Negligible**.
- 11.159 Fixed plant associated with the Proposed Development will be designed such that no noise effects are experienced at the nearest existing or future noise sensitive receptors.
- 11.160 Road traffic noise during operation has been assessed to have **no significant effect** at any noise sensitive receptors although noticeable noise level increases may occur on Banbury Road for an hour before and after weekday matches. This will however be relatively infrequent being once every two weeks on average.
- 11.161 A high-level assessment of the noise generated by patrons of the stadium has been conducted. The level of noise will be below the threshold of significant impact, and occasional, expected to occur once every two weeks on average, which has led to the conclusion that the impact would **not be significant**.
- 11.162 The stadium PAVA system will be designed such that it has no noise effect at the nearest noise sensitive receptors.

**Table 11.12: Summary of Residual Effects Table**

Effect	Receptor (Sensitivity)	Magnitude	Nature/Level of Effect	Mitigation	Residual Effect
<b>Temporary Phase</b>					
Construction Noise and vibration.	Residential receptors at South Avenue/Croxford Gardens and Oxford Road.	Negligible	Short-term/ temporary, direct, indirect	Implementation of Best Practicable Means with a CEMP framework	Negligible, not significant

	Future residential receptor at Stratfield Farm and east of Bicester Road.				
Construction traffic noise.	Residential receptors at South Avenue/Croxford Gardens and Oxford Road. Future residential receptor at Stratfield Farm and east of Bicester Road.	Negligible	Short-term/ temporary, direct, indirect	Implementation of Best Practicable Means with a CEMP framework	Negligible, not significant
<b>Operational Phase</b>					
Noise generated by patrons of the stadium	Residential receptors at South Avenue/Croxford Gardens and Oxford Road. Future residential receptor at Stratfield Farm and east of Bicester Road.	Low	Intermittent and Infrequent (approximately once per fortnight).		Negligible, not significant
Operational Traffic Noise		Low	Generally intermittent and Infrequent (approximately once per fortnight).		Negligible, not significant
PAVA system Noise		Negligible	Intermittent and Infrequent (approximately once per fortnight).	Careful design using commonly applied and well understood methods for the PAVA system will result in noise levels at nearest sensitive receptors having negligible effect.	Negligible, not significant
Mechanical Fixed Plant Noise		Negligible	Potentially continuous for some plant items (refrigeration plant). Intermittent and infrequent for other noise sources.	Careful design using commonly applied and well understood methods for the mechanical plant will result in noise levels at nearest sensitive receptors	Negligible, not significant

				having negligible effect.	
<b>Cumulative Effects</b>					
Construction phase Cumulative noise	As above	Low	Temporary	As above	Negligible, not significant
Operational phase Cumulative noise	As above	Low	Intermittent and Infrequent (approximately once per fortnight).	As above	Negligible, not significant

## References

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