10. NOISE & VIBRATION

Introduction

10.1 This chapter of the ES assesses the likely significant effects of the Development on the environment in respect of Noise & Vibration. A description of the site and the scheme is provided in the introduction to this ES document and this chapter refers to the scheme under consideration.

10.2 The chapter describes the methods used to assess the likely significant effects; the baseline conditions currently existing at the Site and surrounding area; the mitigation measures required to prevent, reduce or offset any significant adverse effects; and the likely residual effects after these measures have been adopted.

10.3 The following appendices support the Chapter:

Appendix 10.1 Glossary;
Appendix 10.2 Legislation and Planning Policy;
Appendix 10.3 Environmental Noise Survey (BuroHappold, 2019);
Appendix 10.4 Baseline and Future Traffic Flows; and
Appendix 10.5 Construction Noise Calculations.

10.4 The following Figures support the Chapter:

Figure 10.1 Noise Exposure Hierarchy;
Figure 10.2 Hounslow Noise Assessment Process;
Figure 10.3 Site Location Plan/Study Area;
Figure 10.4 Predicted Noise Conditions around the Site – Daytime View 1;
Figure 10.5 Predicted Noise Conditions around the Site – Daytime View 2;
Figure 10.6 Predicted Noise Conditions around the Site – Daytime View 3;
Figure 10.7 Predicted Noise Conditions around the Site – Night Time View 1;
Figure 10.8 Predicted Noise Conditions around the Site – Night Time View 2;
Figure 10.9 Predicted Noise Conditions around the Site – Night Time View 3;
Figure 10.10 Podium Amenity, No Barrier;
Figure 10.11 Podium Amenity, 1.5m Barrier; and
Figure 10.12 Façade References.

Policy Context

National Planning Policy Framework[i]

10.5 Published in February 2019, the National Planning Policy Framework (NPPF) sets out the Government's planning policies for England and how these are expected to be applied. Reference to noise is made in Section 16: Conserving and enhancing the natural environment, paragraph 170 of the NPPF, which states that:

> *"Planning policies and decisions should contribute to and enhance the natural and local environment by:*
> *[…]*
> *(e) preventing new and existing development form contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instablility. Development should, wherever possible, help to improve local environmental conditions such as air and water quality, taking into account relevant information such as river basing management plans."*

10.6 Noise is also referenced within the Ground conditions and pollution sub-section within Section 15: Conserving and enhancing the natural environment:

> *"180. Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development. In doing so they should:*
>
> *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;*
>
> *Identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason."*

10.7 The NPPF introduces the concept of 'agent of change', the principle of which in terms of noise and vibration is that where a development introduces new sources of noise and vibration, or new noise and vibration sensitive receptors, the developer is responsible for managing that change.

Noise Policy Statement for England[ii]

10.8 Reference is made in the NPPF to the Department for Environment, Food and Rural Affairs (Defra) 2010 Noise Policy Statement for England (NPSfE).

10.9 The NPSfE is intended to apply to all forms of noise other than that which occurs in the workplace, and includes environmental noise and neighbourhood noise in all forms.

10.10 The NPSfE advises that the effect of noise should be assessed on the basis of negative and significant negative effect, but does not provide any specific guidance on assessment methods or limit sound levels.

10.11 This lack of numeric limit sound levels is a direct consequence of the advice also contained in the NPSfE which is that it is not possible to have "a single objective noise-based measure that is applicable to all sources of noise in all situations".

10.12 It further advises that the sound level at which a negative effect occurs is "likely to be different for different noise sources, for different receptors and at different times". In the absence of specific guidance within the NPPF and NPSfE for the assessment of environmental noise, it is considered appropriate to base assessment on LPA requirements, current British Standards and national and international guidance (as described later in this Chapter). However, one noteworthy advisory point in the NPSfE is the need to place into context any general requirements that increases in ambient noise should be 'minimised'. In this regard the NPSfE states:

> *"Of course, taken in isolation and to a literal extreme, noise minimisation would mean no noise at all. In reality, although it has not always been stated, the aim has tended to be to minimise noise as far as is reasonably practical... the application of the NPSE should enable noise to be considered alongside other relevant issues and not to be considered in isolation. In the past, the wider benefits of a particular policy, development or other activity may not have been given adequate weight when assessing the noise implications".*

Planning Practice Guidance[iii]

10.13 The national Planning Practice Guidance (PPG) provides advice on how 'planning can manage potential noise impacts in new development', providing guidelines that are in line with those provided in the NPPF.

10.14 The PPG states that planning authorities should take account of the local environment with regards to acoustics and in doing so make the following considerations:

- 'whether or not a significant adverse effect is occurring or likely to occur;
- Whether or not an adverse effect is occurring or likely to occur; and
- Whether or not a good standard of amenity can be achieved.'

10.15 Several factors should be considered in determining whether the noise is a concern. These include:

- The absolute noise level of the source;
- The existing ambient noise climate;
- The time of day;
- Frequency of occurrence;
- Duration of the noise;
- Character of the noise; and
- Cumulative effects of the noise.

10.16 The PPG provides guidance on mitigation of noise effects in residential development, highlighting that effects may be reduced where residents have access to a relatively quiet façade as part of their dwelling, or a relatively quiet amenity space (be it private, shared or public).

10.17 The guidance also introduced the concepts of No Observed Adverse Effect Level (NOAEL), and Significant Observed Adverse Effect Level (SOAEL). Figure 10.1 provides some context for these terms.

- Significant observed adverse effect level: This is the level of noise exposure above which significant adverse effects on health and quality of life occur.
- Lowest observed adverse effect level: this is the level of noise exposure above which adverse effects on health and quality of life can be detected.
- No observed effect level: this is the level of noise exposure below which no effect at all on health or quality of life can be detected.

10.18 Although the word 'level' is used here, this does not mean that the effects can only be defined in terms of a single value of noise exposure. In some circumstances adverse effects are defined in terms of a combination of more than one factor such as noise exposure, the number of occurrences of the noise in a given time period, the duration of the noise and the time of day the noise occurs.

Regional Planning Policy

The London Plan[iv]

10.19 The London Plan has been updated since 2011 to ensure its continuing relevance to government guidance and national legislation that has been published since its first edition. The current version is dated 2016. The Plan sets a framework for future development of London, with several policies related to the management of noise in new developments.

- Policy 3.2: Addressing health and health inequalities – which require working to address significant health issues such as those created by or affected by noise levels in an area, and monitor policies/interventions for their impact on health;
- Policy 5.3: Sustainable design and construction – which requires that developments implement the minimising of noise pollution into design principles;
- Policy 7.6: Architecture – that states that architecture should make a positive contribution to an area, and consequently new developments should be of the highest architectural quality, including methods and materials to minimise noise levels;
- Policy 7.15: Reducing and managing noise, improving and enhancing the acoustic environment and promoting appropriate soundscapes – which requires noise to be managed in order to encourage the right acoustic environment and to promote good health and a good quality of life within the wider context of achieving sustainable development; and
- Policy 7.17: Metropolitan Open Land – which requires the overall accessibility and quality of open land to be improved which includes maintaining appropriate noise levels when considering new development.

The Intend to Publish London Plan[v]

10.20 The Examination in Public (EiP) on the Draft New London Plan was held between 15th January and 22nd May 2019. Since this time, a Panel of Inspectors, appointed by the Secretary of State, issued their report and recommendations to the London Mayor on 8th October 2019.

10.21 The London Mayor has since considered these recommendations and, on the 9th December 2019, issued to the Secretary of State his intention to publish the London Plan as well as publishing the Intend to Publish Version of the London Plan. The Secretary of State wrote to the Mayor to request that changes were made to the Intend to Publish London Plan in March 2020. At present, the text of the Draft New London Plan is being informally agreed with MHCLG and Secretary of State, with a view of adoption in Summer 2020.

10.22 As such, the Intend to Publish London Plan has significant weight given its stage of preparation. Generally, the policies referenced in this Statement are not affected by the Secretary of State's comments and therefore can be given full weight. For those that are under discussion with the Secretary of State, this is identified and accounted for. The relevant policies that apply to the development include:

- Policy D13: Agent of Change – this places the responsibility for mitigating impacts from existing noise and other nuisance generating activities on the proposed noise-sensitive development.

- Policy D14: Noise – repeats the aims of the original London Plan but adds the promotion of new technologies and improved practices to reduce noise at source, and requires Boroughs to identify Quiet Areas.

Sustainable Design and Construction Supplementary Guidance(2014)[vi]

10.23 The Sustainable Design and Construction Supplementary Planning Guidance is a Mayoral SPG providing guidance on key noise related areas and makes reference to the following London Plan policies:

- London Plan Policies 3.2, 7.15; 'Areas identified as having positive sound features or as being tranquil should be protected from noise'; and
- London Plan Policies 3.2, 5.3, 7.6, 7.15: 'Noise should be reduced at source, then designed out of a scheme to reduce the need for mitigation measures.'

Sounder City: The Mayor's Ambient Noise Strategy (2004)[vii]

10.24 The London Ambient Noise Strategy aims to minimise the adverse effects of noise on people living in, working in and visiting London by using the best available practices and technologies within a sustainable development framework.

10.25 The Strategy aims to work towards a more compact city development while minimising noise. This requires careful consideration of the adverse effects of noise on, from, within or in proximity to a development.

Local Planning Policy

London Borough of Hounslow Local Plan[viii]

10.26 Noise is discussed within the Local Plan, policy EQ5. This policy seeks to reduce the impact of noise from aviation, transport and noise generating uses, and requires the location and design of new development to have considered the impact of noise, and mitigation of these impacts, on new users and surrounding uses according to their sensitivity.

10.27 In summary, Hounslow expects development proposals to;

- Comply with BS8233:2014;
- Demonstrate that new plant and machinery generate a noise level at least 10dB below background noise levels; and
- Be located outside the 69dB$L_{Aeq,16h}$ noise contour of Heathrow Airport.

10.28 This Site is located outside of the 69dB$L_{Aeq,16h}$ contour (it is within the 65dB$L_{Aeq,16h}$ noise contour).

London Boroughs of Hillingdon, Hounslow and Richmond Upon Thames – Development Control for Noise Generating and Noise Sensitive Development[ix]

10.29 The broad principles and requirements for consideration in the planning process are detailed within this policy document. They include;

- Avoiding significant adverse effects of noise on people living and working in the Boroughs;
- Encourage good acoustic design;
- Preventing development which is unacceptable in terms of noise; and
- Improving and enhancing the acoustic environment.

10.30 The document sets out a staged assessment for noise sensitive development proposals that must be taken into account. This is reproduced as Figure 10.2.

10.31 The document also references national guidance including the NPPF and NPSE.

Draft Great West Corridor Local Plan Review[x]

10.32 The draft Great West Corridor Local Plan Review notes that noise pollution arising from the A4 is 'another significant issue that development in the area must address'.

10.33 The Review identifies a strategic objective 'To mitigate the impact of noise and air pollution through the design and positioning of buildings and greening of the area'.

10.34 The presence of large quality parks and relatively tranquil areas such as Osterley Park and Syon Park is noted.

Great West Corridor Masterplan and Capacity Study (2019)[xi]

10.35 This is a supporting study to the Great West Corridor Local Plan Review.

10.36 Section 2.8.2 of this document reiterates the Hounslow Local Plan requirement that noise sensitive development should be located outside the 69dBL_{Aeq} noise contour and further notes that 'family housing' should be outside the 63dBL_{Aeq} contour. These contours are shown in Figure 2.28 of the Masterplan.

10.37 The housing within the Development consists of residential apartments and is generally within the 55-59.9dBL_{Aeq} noise contour shown in Figure 2.28 of the Masterplan. Areas immediately adjacent to the road may be subject to higher noise levels. The resolution of the figure does not allow for a more detailed assessment

10.38 The document follows the line of discussion within the GWC local plan and generally considers that noise pollution along the A4/M4 corridor is a development concern which must be addressed.

10.39 Section 7.2.1 on Land Use Strategy states that;

> *"Normally a non-residential buffer development should be provided between the A4/M4 corridor and residential use to provide shelter from noise and pollution. The case for residential uses in the upper floors of taller buildings on the corridor could be explored if suitable mitigation measures are applied and meet the relevant legislative requirements in respect of air and noise pollution for residential accommodation and internal and external amenity spaces."*

10.40 The next sections set out the case for residential uses above a podium retail store, exploring suitable mitigation to address the issues of noise.

Legislative Context

10.41 The relevant legislation and planning policy applicable to the noise and vibration impact assessment is listed below. Further details are provided within Appendix 10.2 to this report.

- Control of Pollution Act 1974[xii];
- Environmental Protection Act 1990[xiii];

- National Planning Policy Framework (NPPF), 2019;
- Noise Policy Statement for England (NPSE), 2010; and
- National Planning Practice Guidance (NPPG), 2012 revised July 2018.

Relevant Guidance

10.42 The relevant best practice guidance, including international standards, applicable to the noise and vibration impact assessment is listed below. Further detail is included in Appendix 10.2. Where an assessment has been informed by one of the following standards, the methodology has followed the suggested method given by the standard in question.

- World Health Organisation 'Environmental Noise Guidelines for the European Region' (2018)[xiv];
- BS 8233:2014 'Guidance on sound insulation and noise reduction for buildings' (BS8233)[xv];
- *BS 4142:*2014+A1:2019 'Methods for Rating and Assessing Industrial and Commercial Sound' (BS4142)[xvi];
- BS 5228-1:2009 'Code of practice for noise and vibration control on construction and open sites, Part 1, Noise' (BS5228-1)[xvii];
- BS 5228, 2009: 'Code of practice for noise and vibration control on construction and open sites. Part 2: Vibration' (BS5228-2)[xviii];
- BS 6472:2008 – 'Guide to evaluation of human exposure to vibration in buildings'[xix];
- ISO 9613-2:1996 Acoustics – 'Attenuation of sound during propagation outdoors - Part 2: General method of calculation'[xx];
- Calculation of Road Traffic Noise (CRTN), Department of Transport (Welsh Office), 1988[xxi];
- Calculation of Railway Noise (CRN), Department of Transport (Welsh Office), 1988[xxii];
- Design Manual for Roads and Bridges Volume 11, Part 3, Section 7, HMSO, 1994 (DMRB 11:3:7), 2011[xxiii];
- Acoustics, Ventilation and Overheating Residential Design Guide (AVO) – V1.1, Association of Noise Consultants, 2020[xxiv]; and
- Professional Practice Guidance on Planning and Noise (ProPG), Association of Noise Consultants, 2017[xxv].

Assessment Methodology

Overview

10.43 Noise and vibration surveys have been undertaken to establish the baseline ambient conditions at the Site and nearby noise sensitive receptors.

10.44 Effects have been considered during the construction and operational phases of the Development.

10.45 Effects from building services and fixed plant noise associated with the Development have been determined on the basis that plant noise will not be permitted to exceed LBH limits. Noise emission limits have been set in accordance with LBH guidance and the plant will be designed to ensure a BS4142 rating level of at least 10dB below the background sound level at the nearest noise sensitive receptors.

10.46 Effects from changes in noise as a result of Development related traffic on the local road network have been assessed.

10.47 An assessment of the suitability of the Site for the Development has been undertaken to enable the identification of appropriate design and mitigation measures of the building necessary to comply with the relevant noise and vibration criteria. This assessment, including noise modelling, has been based on the currently available design information and is considered to represent a worst-case assessment of site suitability. More details are included in the following sections of this Chapter.

Baseline Methodology

Noise

10.48 In order to determine the existing noise climate, noise surveys were carried out on Tuesday 3rd September 2019 (daytime), Monday/Tuesday 2nd-3rd and Tuesday/Wednesday 3rd-4th September 2019 (night-time). Noise surveys were undertaken before the COVID-19 pandemic reduced traffic levels and associated decrease in noise levels, and are therefore considered to be representative of more normal conditions.

10.49 Full details of the survey methodology and measured levels are provided in Appendix 10.3 and are summarised here. The measurement locations are shown in Figure 10.3.

10.50 In summary, noise levels around the Site are relatively high, and are dominated by road traffic noise (predominantly from the A4 Great West Road, and Syon Lane) and air traffic noise associated with the nearby Heathrow Airport.

Vibration

10.51 LBH typically requires a vibration assessment where railways are within 30m of a proposed development site. The vibration dose value (VDV) after any required mitigation should not exceed the values shown in Table 1 of BS6472-1:2008[xix].

10.52 An assessment has therefore been undertaken, with a series of vibration measurements made at Location E (shown in Figure 10.3) adjacent to the railway line.

Rail Noise

10.53 Rail noise has been scoped out of this assessment on the basis that there will be no change to rail movements or noise levels arising from rail movements as a result of the Development.

Consultation

10.54 No consultation specific to noise and vibration has been undertaken as part of this assessment. All information regarding LBH requirements for assessment were available in the public domain and have been referenced in writing this chapter.

10.55 The scoping opinion received from LBH (Appendix 2.4) notes that *"the proposed methodology for assessing noise and vibration is generally in line with standard industry practice, and that scoping is generally agreed"*.

10.56 The specific points relating to noise raised within the Scoping Opinion (Appendix 2.4) have been responded to as follows:

Table 10.1: Scoping responses Relevant to this Chapter

Scoping Reference (Appendix 2.4)	Issue Raised	How Addressed
3.27	Noise emissions from fixed plant and servicing areas.	Fixed plant noise emissions are limited to 10dB below background sound levels. Servicing areas are located internally to minimise impact on residential receptors.
3.28	Noise transfer from proposed ground floor to upper residential areas.	Buffer zones are included within the design of the Development to separate residential and commercial areas. Separating floor to Level 4 will be designed to control noise transfer such that limits set in BS8233:2014 will not be exceeded in residential properties.
3.29	Cumulative effects of Tesco redevelopment	Will not affect this assessment due to distance and existing transportation noise levels.
3.30	Mitigation should give consideration to overheating under TM59 guidelines	Assessment of overheating to be carried out by M&E consultant. Reference made within this chapter (operational effects) to acoustics and overheating guidance.
3.31	Aircraft noise from the north runway at Heathrow should be taken into account.	The noise survey includes aircraft noise. Aircraft noise is also included in the noise model based on Heathrow Airport noise contours.

Study Area

10.57 The study area is shown in Figure 10.3. Major local noise sources have been identified as:

- Great West Road (A40) to the north of the Site;
- Syon Lane to the west of the Site;
- The railway to the south of the Site; and
- Aircraft overhead associated with Heathrow Airport.

Identified Receptors

10.58 Potential sensitive receptors (i.e. buildings whose occupants may be disturbed by adverse noise and vibration levels and structures that are sensitive to vibration) have been taken into account when assessing the potential impacts associated with noise and vibration levels from the construction and operational phases of the Development.

10.59 The nearest noise and vibration sensitive receptors (NVSRs) to the Site are the houses to the east of the Site located on Cherry Crescent and Brambles Lane, the nearest of which is located approximately 35m from the Site boundary; and the houses on Syon Lane to the south of the Site, the nearest of which is located approximately 40m from the Site boundary. These locations are identified in Figure 10.3.

10.60 Commercial receptors are considered less noise sensitive than residential receptors. Most commercial receptors are at a similar or greater distance from the Site than the residential receptors. There is a car dealership immediately to the east of the Site. This will be subject to noise during construction but it is not anticipated that there would be any significant operational noise impact at this location as a result of the Development. This is due to operational noise sources (cars, plant) being located away from the car dealership, and the high noise levels to which the car dealership is already subjected to from road and air traffic.

10.61 Residents occupying the first phases of the Development while other parts are still being constructed, as well as the adjacent car dealership, are also considered to be NSVRs during the construction phase.

Assessment Criteria

10.62 This section describes the assessment criteria used when considering noise and vibration arising during construction and operation of the Development.

10.63 The magnitude of impacts from noise and vibration will be determined based on the criteria provided in Table 10.2, below. These are derived from the IEMA Noise Guidelines.[xxvi]

Table 10.2: Methodology for Assessing Magnitude

Magnitude of Impact	Criteria for assessing impact
Major	Total loss or major/substantial alteration to key elements/features of the baseline (pre-Development) conditions such that the post Development character/composition/attributes will be fundamentally changed.
Moderate	Loss or alteration to one or more key elements/features of the baseline conditions such that the post Development character/composition/attributes will be materially changed.
Minor	A minor shift away from baseline conditions. Change arising from the loss/alteration will be discernible/detectable but not material. The underlying character/composition/attributes of the baseline condition will be similar to the pre-development circumstances/situation.
Negligible	Very little change from baseline conditions. Change barely distinguishable, approximating to a 'no change' situation.

Magnitude of Impact - Construction

Construction Phase Noise

10.64 Construction activities are a potential, albeit temporary, source of noise and vibration. British Standard BS5228 "Code of practice for noise and vibration control on construction and demolition sites"[xvii] provides methodologies for the assessment and control of noise and vibration from construction operations. The Standard contains detailed information on noise reduction measures and promotes the 'Best Practicable Means' (BPM) approach to control noise and vibration and minimise the impact on local residents and construction workers.

10.65 The magnitude and significance of effects from construction noise is determined quantitatively, and is based on "Example Method 2 '5dB change'" as described in BS5228-1. This method states that noise levels generated by construction activities are deemed to be significant if the 'total noise' (pre-construction ambient plus construction noise) exceeds the pre-construction ambient noise by 5dB or more, subject to lower cut-off values of 65 dB, 55 dB and 45 dB L_{Aeq},period, from construction noise alone, for the daytime (07:00-19:00), evening (19:00-23:00) and night-time (23:00-07:00) periods, respectively.

10.66 There is no recognised guidance to determine if any predicted significant adverse effects of construction noise are of 'minor', 'moderate' or 'major' significance, consistent with the EIA terminology adopted in the ES (refer to ES Chapter 2), however professional judgement and experience of similar schemes indicates that the following approach could be considered appropriate based on the "ABC" methodology set out within Annex E of BS5228-1 as described above:

Table 10.3 Construction Noise Magnitude of Impact

Total Noise Arising from Construction	Magnitude
<65	Negligible
65-70 dBA	Minor
70-75 dBA	Moderate
>75 dBA	Major

10.67 Best practice approaches consider whether the effect is for a short or long duration, and adjust the reported effects accordingly (meaning they can move to adjacent magnitude bands). For example, piling noise may be >75dB, but may only occur over a 1-week duration and therefore would be considered to be of 'moderate' magnitude.

Construction Phase Traffic

10.68 DMRB Volume 11 'Environmental Assessment' Section 3 'Environmental Assessment Techniques' Part 7 HD 213/11 – Revision 11 'Noise and Vibration'[xxiii] states that:

> *'Table 3.1 should be used in the assessment of noise impact associated with construction traffic on the local road network and from temporary diversion routes resulting from construction of the road project'* (Para 3.40).

10.69 For off-site construction traffic, which mostly relates to changes in road traffic on the public highway, the change in noise level has been deemed greater than negligible if the change exceeds 1dB. The magnitude of impact has been determined taking into account the guidance in the DMRB. The criteria used within the assessment are presented below.

Table 10.4 Construction Traffic Magnitude of Impact

Magnitude	Typical Descriptors
Major	Change in road traffic sound emission $L_{A10,T}$ of more than +5dB.
Moderate	Change in road traffic sound emission $L_{A10,T}$ of +3 to +5 dB.
Minor	Change in road traffic sound emission $L_{A10,T}$ of +1 to +3 dB.
Negligible	Change in road traffic sound emission $L_{A10,T}$ of less than +1 dB.

Construction Phase Vibration

10.70 Construction vibration levels are discussed in BS 5228 Part 2. The document provides basic methods of vibration control relating to construction sites where work activities/operations generate significant vibration levels, describes the legislative background to vibration control and provides recommendations given regarding procedures for the establishment of effective liaison between developers, site operators and local authorities.

10.71 Vibration during construction work may arise from activities such as piling (e.g. for building foundations), ground improvement and road construction. Selection of plant and methods will need to consider the possible effects of vibration on nearby buildings and their occupants.

10.72 Ground-borne vibration from construction work has broadly two potential impacts; cosmetic/structural damage and human sensitivity.

10.73 For building damage criteria, Table 1 of BS 7385: Part 2:1993: "Evaluation and Measurement for Vibration in Buildings - guide to damage levels from ground-borne vibration"[xxvii], sets out limits for primarily transient vibration above which cosmetic damage could occur. This is reproduced in Table 10.5.

10.74 Structural damage to buildings by vibration is extremely rare and, if at all, only occurs when receiving buildings or structures are located very close (e.g. at least within around 10m) to very intensive vibration generating activities and/or are vulnerable due to their structural condition.

10.75 The threshold of perception of vibration depends on the frequency. The human body is most sensitive to vibration in the frequency range 1-80 Hz. The threshold of perception is typically taken to be 0.15 mms-1 and 0.3 mms-1 peak particle velocity (PPV) at frequencies between 8 Hz and 80 Hz.

10.76 Experience shows that disturbance or annoyance from vibration in residential situations is likely to arise when the magnitude of vibration is only slightly in excess of the threshold of perception.

Table 10.5: Construction Vibration Magnitude of Impact

Magnitude	Construction vibration – humans	Construction vibration - buildings
Negligible	0.14 mm/s PPV	15 mm/s at 4Hz increasing to 20 mm/s at 15Hz and 50mm/s at 40Hz and above
Minor	0.30 mm/s PPV	15 mm/s at 4Hz increasing to 20 mm/s at 15Hz and 50mm/s at 40Hz and above
Moderate	1 mm/s PPV	30 mm/s at 4Hz increasing to 40 mm/s at 15Hz and 100mm/s at 40Hz and above
Major	10 mm/s PPV	60 mm/s at 4Hz increasing to 80 mm/s at 15Hz and 200mm/s at 40Hz and above

Magnitude of Impact - Operational

Community Noise

10.77 The World Health Organisation[xiv] sets out to define 'recommended exposure levels for environmental noise in order to protect population health'. The guidance document relates specifically to external noise levels and recommends that 'all CNG (WHO Community Noise Guidelines, 1999) indoor guideline values and any values not covered by the current guidelines (such as industrial noise and shopping areas) should remain valid'. Reference has been made to the WHO Community Noise Guidelines for recommendation on internal noise levels.

10.78 The WHO document "Guidelines for Community Noise"[xxviii] describes guideline levels that are 'essentially values for the onset of health effects from noise exposure". The guideline values were adopted in the 2014 revision of BS8233[xv].

Noise Break-In (Impact On the Development)

10.79 The assessment criteria for environmental noise intrusion into residential apartments and commercial units are aligned with the requirements of BS8233 and the London Borough of Hounslow (LBH) as shown in Table 10.6.

Table 10.6: Noise Intrusion Limits

Room Type	Daytime Limit, dB $L_{Aeq,16hour}$	Night-time Limit, dB $L_{Aeq,8hour}$	Night-time Limit, dB $L_{Amax,F}$
Living Rooms	35	-	-
Bedrooms	35	30	45
Open Plan Office	45-50	45-50	-
Retail	50-55	50-55	-

10.80 BS8233 also states that "Where development is considered necessary or desirable, despite external noise levels above WHO guidelines, the internal target levels may be relaxed by up to 5 dB and reasonable internal conditions still achieved."

10.81 In line with WHO guidance, the London Borough of Hounslow SPG requires that at night (23:00-07:00), the maximum noise level in bedrooms should not exceed 45dBL_{Amax} more than 10 times per night.

10.82 Based on the guidance within BS8233:2014, Table 10.7 presents indicative criteria against which the magnitude of impact of internal ambient noise level can be assessed, however the primary design aim should be to achieve the levels presented in Table 10.6 above.

Table 10.7: Internal Ambient Noise Level Magnitude of Impact

Magnitude	Typical Descriptors and Significance
Major	Noise levels in Table 10.6 are exceeded by <10dB (Major Adverse).
	Noise levels are lower than those in Table 10.2 by <10dB (Major Beneficial).
Moderate	Noise levels in Table 10.6 are exceeded by <6dB (Moderate Adverse).
	Noise levels are lower than those in Table 10.2 by <6dB (Moderate Beneficial).
Minor	Noise levels in Table 10.6 are exceeded by <3dB (Minor Adverse).
	Noise levels are lower than those in Table 10.2 by <3dB (Minor Beneficial).
Negligible	Noise levels in Table 10.6 are exceeded by <1dB (Negligible Adverse).
	Noise levels are lower than those in Table 10.2 by <1dB (Negligible Beneficial).
No change	Noise levels in Table 10.2 are met

Noise Emissions (Development Operational)

10.83 The only operations which could impact on the nearest noise sensitive receptors relate to noise from activities associated with the retail units, and from any building services plant connected to the Development.

10.84 The assessment of noise from these sources is presented in BS4142, which compares the 'rating' noise level ($dBL_{Ar,Tr}$) from a noise source with the background noise level ($dBL_{A90,T}$) without the noise source operating.

10.85 A 'rating' noise level is derived from the character correction applied to the 'specific' noise level (dB $L_{Aeq,T}$) of the source if the noise has a defined acoustic character such as being tonal, impulsive, distinctive or intermittent in nature.

10.86 The impact of the noise source is calculated by subtracting the background noise level from the rating level, the resulting difference is then used to determine the likelihood of impact, as presented in Table 10.8 below. BS 4142:2014 states that "Typically, the greater this difference, the greater the magnitude of impact".

Table 10.8: BS4142:2014 Magnitude of Impact

Difference between rating and background noise level	Magnitude of Impact
≥+10dB	Major
+5dB – +9.9dB	Moderate
-4.9dB - +4.9dB	Minor
≤-5dB	Negligible

10.87 LBH requires that 'new plant and machinery…generate noise that is at least 10dB below the background noise levels'. This is assumed to refer to the BS4142 rating level when assessed at the nearest noise sensitive receptors, although this is not explicitly stated. This therefore relates to 'negligible' significance and would not lead to any increase in noise levels in the surrounding area.

Operational Traffic

10.88 DMRB Volume 11 'Environmental Assessment' Section 3 'Environmental Assessment Techniques' Part 7 HD 213/11 – Revision 11 'Noise and Vibration'[xxiii] states that:

> *'A change in road traffic noise of less than 1dB $L_{A10,18h}$ in the short term (i.e. when a project is opened) is the smallest that is considered perceptible. In the long term (typically 15 years after project opening), a 3dB $L_{A10,18h}$ change is considered perceptible.'* (Para 3.37).

10.89 This has been taken into account within this assessment. For off-site operational traffic, which mostly relates to changes in road traffic on the public highway, the change in noise level has been deemed greater than negligible if the change exceeds 1dBA. The magnitude of impact has been determined based on the criteria provided below;

Table 10.9: Definitions of Magnitude – Operational Traffic

Magnitude	Typical Descriptors
Major	Change in road traffic sound emission $L_{A10,T}$ of more than +5dB
Moderate	Change in road traffic sound emission $L_{A10,T}$ of +3dB to +5dB
Minor	Change in road traffic sound emission $L_{A10,T}$ of +1dB to +5dB
Negligible	Change in road traffic sound emission $L_{A10,T}$ of less than +1dB

10.90 As decibels add logarithmically, a mathematical assessment of any noise impact can be calculated by comparing the predicted change in vehicle movements to and from the Site with the existing situation, using the formula 10 x log (new movements/existing movements). A doubling of movements would, for example, potentially result in a 3 dB increase in noise levels.

Receptor Sensitivity/Value

10.91 There is no national government guidance on how the sensitivity of an NSVR should be determined for the assessment of noise and vibration effects. The sensitivity of a receptor considers the susceptibility of people or operations to be disturbed by noise and vibration based on the use of the receptor.

10.92 The semantic scale for determining the sensitivity of NSVRs in this chapter has been based on professional judgement and IEMA guidance and is summarised below.

Table 10.10: Methodology for Determining Impact Sensitivity

Sentitivity	Criteria for assessing sensitivity
High	Receptors where people, activities or operations are highly susceptible to noise and vibration. For example, hospital operating theatres and highly sensitive processes such as electron microscopes and some micro-electronic manufacturing equipment.
Medium	Receptors where people, activities or operations are moderately susceptible to noise and vibration. Examples include; residential including private gardens where appropriate; quiet outdoor areas used for stationary recreation; conference facilities; theatres/auditoria/studios; schools during the daytime; hospitals/residential care homes, and places of worship.
Low	Receptors where people, activities or operations are slightly sensitive to noise and vibration, where it may cause some distraction or disturbance. Examples include; offices, sports grounds without spectator noise and where concentration is needed (e.g. tennis, golf, bowls).
Negligible	Receptors with minimal or no sensitivity to disturbance from noise and vibration. Examples include; bars/cafes/restaurants; sports grounds her spectator noise in a normal part of the event, buildings not occupied during working hours, factories and working environments with existing high noise levels, and night clubs.

10.93 Based on the above, the receptors have therefore been assigned the sensitivities detailed in Table 10.11 below:

Table 10.11: Receptor Sensitivity Definition

Sensitivity	Typical Descriptors
High	Hospitals, Laboratories
Medium	Residential Properties
Low	Commercial/Industrial Properties
Negligible	Train Station, Car Parking areas

Effect Significance

10.94 The significance of an environmental effect is determined by the interaction of the magnitude and sensitivity. The Effect Significance Matrix is set out in Table 10.12. Please note that effects can be adverse or beneficial.

Table 10.12: Effect Significance Matrix

Sensitivity	Magnitude of Impact			
	Negligible	**Minor**	**Moderate**	**Major**
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

10.95 With reference to the NPPF[i], NPSE[ii], and NPPG[iii] the following apply within this assessment:

- Effects of major significance are considered to be significant in terms of the EIA Regulations. Such effects are commensurate with the Unacceptable Adverse Effect Level (UAEL) set out by IEMA[xxvi] and should be prevented and require mitigation;
- Effects of moderate significance are considered to be significant in terms of the EIA Regulations. Such effects are commensurate with the Significant Observed Adverse Effect Level (SOAEL) set out in the NPPG and should be avoided and require mitigation (effects can be beneficial or adverse);
- Effects of minor significance are not considered to be significant in terms of the EIA Regulations. Such effects are commensurate with the Lowest Observed Adverse Effect Level (LOAEL) set out in the NPPG and should be mitigated and reduced to a minimum as far as reasonably practicable (effects can be beneficial or adverse); and
- Effects of negligible significance are not considered to be significant in terms of the EIA Regulations. Such effects are commensurate with the No Observed Effect Level (NOEL) set out in the NPPG, with no specific requirements for mitigation.
- In EIA terms for construction noise, only moderate and major effects would be considered significant.

Calculation of Construction Impacts

10.96 In the absence of specific information regarding the proposed construction activities and plant/equipment, which will be determined by the contractor, assumptions have been made in this assessment based on the indicative information included in Chapter 5 Construction Methodology & Phasing (refer to the Limitations and Assumptions section below).

10.97 Vibration levels of typical construction plant and equipment have been extrapolated from the BS5228-2 and CALTRAN Standard Plans 2004. Using empirical prediction formulas contained in BS5228-2, the vibration level can be predicted at the nearest affected vibration-sensitive receptor.

Calculation of Operational Impacts

10.98 A noise model of the Site has been created using the SoundPlan 8.1 software package. The model has been calibrated against the baseline noise survey data and then updated for predicted traffic flows on the surrounding road network for the 2026 baseline (Completed Development Scenario 2 as set out within paragraph 9.30 of Chapter 9: Transport and Access) and Do Something scenarios, including Development and cumulative traffic flows (Completed Development Scenario 4 as set out within paragraph 9.30 of Chapter 9: Transport and Access).

10.99 Traffic flows have also been provided for an additional scenario which considers the Development's impact in the absence of any of the cumulative schemes (Completed Development Scenario 3 as set out within paragraph 9.30 of Chapter 9: Transport and Access). This means that the Tesco Osterley will operate as it is currently with a new Tesco store also operating as part of the Development. Although this is not considered to be a realistic scenario, the impacts and effects for Noise and Vibration have been modelled and are considered further in Appendix 10.4. This will mean that the worst-case noise effects are assessed in the unlikely event that the Osterley scheme is not delivered.

10.100 Traffic flow information in relation to the noise assessment is presented in Appendix 10.4, and further detail is also provided within the Transport chapter of the ES.

Limitations and Assumptions

10.101 Supermarket usage is confirmed as the primary retail offer, with the store itself located at Ground Floor Level with plant located on the south eastern façade. The type and final location of any building services plant will be subject to detailed design.

10.102 Noise level limits have been provided, based on the baseline noise levels measured on the Site, which will form the basis for any planning conditions relating to noise from the Development. Confirmation can be provided at a later design stage (when plant selections are made) that the limits set within the planning conditions should be achieved. This is considered an appropriate approach in EIA terms as noise from building services can be controlled using conventional mitigation measures, including location/selection of plant, screening and/or plant attenuation.

10.103 Planning for demolition and construction is necessarily broad at this stage and may be subject to modification (refer to Chapter 5 Construction Methodology and Phasing). The construction noise and vibration calculations are based on reasonable assumptions and experience and allows assessment of the realistic "worst case" demolition and construction phase effects.

10.104 For construction noise and vibration calculations, assumptions have been made as to the type and quantity of plant on site. Further information on construction methodology and phasing is provided in Chapter 5 and the information presented within that chapter has been reflected in the calculations provided here.

10.105 For calculations of noise break-in, room sizes have been assumed and an allowance has been made for up to 50% glazing. This is considered representative based on the detailed drawings submitted as part of the planning application (Appendix 3.1).

10.106 Prediction and modelling of sound levels will always have an associated degree of uncertainty. Whilst best endeavours have been made to minimise that uncertainty in this work, it is unavoidable that some remains.

10.107 In addition, any measurement of existing ambient or background baseline sound levels will be subject to a degree of uncertainty. Environmental sound levels vary between days, weeks and throughout the year due to variations in source levels and conditions, meteorological effects on sound propagation and other factors. Hence, any measurement survey can only provide a sample of the ambient levels. Every effort is made to ensure that measurements are undertaken in such a way as to provide a representative sample of conditions, such as avoiding periods of adverse weather, rail strikes and school holiday periods. However, a small degree of uncertainty will always remain in the values taken from such a measurement survey.

10.108 The measured $L_{A90,T}$ background noise level is used to define design criteria for fixed plant associated with the Development. Background noise levels may change in the period between the survey and the opening year; however, as the $L_{A90,T}$ background noise level is a statistical value based on a range of measured noise data, it is not possible to predict future background noise levels with any degree of accuracy. It is considered that background noise levels are unlikely to reduce in the intervening period between the baseline survey and projected opening year. Consequently, it is considered that the derived design criteria provide suitable noise thresholds for future scenarios.

10.109 Vibration measurements made during the daytime are thought to have been affected by localised vehicle movements on Syon Gate Way and have therefore been discounted from the assessment as they would not be representative of vibration levels affecting the development.

Baseline Conditions

Current Baseline (2019)

Noise

10.110 The full survey measurement procedure and results are provided in Appendix 10.3. However, a summary of the typical noise levels affecting the Site is shown in Table 10.13, below.

Table 10.13: Noise Survey Summary

Measurement Location	Day, dBLAeq,16h	Night, dBLAeq,8hr	Night, dBLAmax,F
A – Syon Lane	69	47	79
B – Corner of Syon Lane / Great West Road	68	49	82
C – Great West Road	71	51	75
D – Cherry Crescent	65	41	68
E – Gate Centre Access Road	64	51	80

Vibration

10.111 A series of vibration measurements were made at Location E (see Figure 10.3), adjacent to the railway line as the primary vibration source in the area, during the noise survey. The methodology is provided in Appendix 10.3. At night the measured PPV was 0.625mm/s. The VDV was below 0.1m/s$^{-1.75}$ at night.

Future Baseline (2019 Baseline + Future Committed Development Traffic Flow)

10.112 These sections assess the current baseline conditions plus the impact of traffic flow from the already-committed development in the area, i.e. what the impact in the area would be if the proposed development would not go ahead.

Noise

10.113 The predicted increase in road traffic movements as a result of committed developments has been provided by the Traffic Consultants, and the data used to predict the future baseline conditions, as shown in Appendix 10.4. The data provided includes an assessment of 11 locations on the surrounding road network and presents baseline traffic levels, predicted movements due to committed developments, and those arising from construction traffic and traffic associated with the Development.

10.114 Based on the simple relationship between the percentage change in movements, the worst case predicted increase in noise levels is less than 1dB, which with reference to Table 10.9 is considered to be negligible.

10.115 On this basis, the noise levels derived for the current baseline have been used in the assessment.

10.116 As discussed above, traffic flows have also been provided for an additional scenario which considers the Development's impact in the absence of any of the cumulative schemes identified in ES Chapter 2, including the proposed Tesco Osterley development. This means that the Tesco Osterley will operate as it is currently, with a new Tesco store also operating as part of the Development. Although this is not considered to be a realistic scenario, the impacts and effects for Noise and Vibration have been modelled and are considered further in Appendix 10.4. This will mean that the worst-case noise effects are assessed in the unlikely event that the Osterley scheme is not delivered. In this scenario, a 1dB change in traffic noise levels occurs on Syon Lane north of the A4 which would be considered minor adverse with reference to Table 10.9.

Vibration

10.117 There is no evidence to suggest that vibration levels will change as a result of committed developments in the area. We are not aware of any significant changes to rail movements proposed on the existing route to the south of the Site.

Likely Significant Effects

10.118 The following sections provide assessment of the noise and vibration impacts associated with the construction and operation of the scheme.

Construction Phase

10.119 Based on the information provided within Chapter 5, indicative noise levels have been calculated at the closest noise sensitive receivers for expected construction plant and processes. These calculations have been undertaken on the following basis:

- Site clearance and earthworks will be undertaken;
- Piling undertaken (assumed Continuous Flight Auger piling);
- Demolition and Construction will be in 7 separate phases; and
- The distance calculations have been based on the distance from the centre of the Site to the residential receptors. This represents a typical noise and vibration impact throughout the construction phase. Impacts may be greater when works are close to residents, and lower when works are further away. Properties at a greater distance than those assessed should be subject to similar or lower noise and vibration levels.

Construction Noise

10.120 In summary, typical noise levels anticipated at the nearest noise sensitive locations are detailed in Table 10.14 below. Full calculations are provided in Appendix 10.5.

Table 10.14: Predicted Construction Stage Noise Levels and Significance

Phase	Receptor	Typical daytime noise level, dB $L_{Aeq,T}$	Magnitude	Significance	Calculation Reference
1 Vacant possession / demolition of Homebase	Syon Lane	69	Low	Minor Adverse	1
	Cherry Crescent	74	Medium	Moderate Adverse	2
	Car Dealership	93	High	Major Adverse	2a
2 Construction of Tesco - Piling	Syon Lane	53	Negligible	Negligible	3
	Cherry Crescent	59	Negligible	Negligible	4
	Car Dealership	77	High	Moderate Adverse	4a
2 Construction of Tesco – Concreting	Syon Lane	69	Low	Minor Adverse	5
	Cherry Crescent	74	Medium	Moderate Adverse	6
	Car Dealership	93	High	Major Adverse	6a
3 Block C	Syon Lane	76	High	Major Adverse	7
	Cherry Crescent	76	High	Major Adverse	8
	Car Dealership	77	High	Moderate Adverse	8a
4 Block D	Syon Lane	76	High	Major Adverse	9
	Cherry Crescent	66	Low	Minor Adverse	10
	Block C	83	High	Major Adverse	11
	Car Dealership	77	High	Moderate Adverse	11a
5 Block B	Syon Lane	72	Medium	Moderate Adverse	12
	Cherry Crescent	71	Medium	Moderate Adverse	13
	Block C	77	High	Moderate Adverse	14
	Block D	83	High	Major Adverse	15
	Car Dealership	93	High	Major Adverse	15a
6 Block E	Syon Lane	76	High	Major Adverse	16
	Cherry Crescent	60	Negligible	Negligible	17
	Block C	65	Low	Minor Adverse	18
	Block D	84	High	Major Adverse	19
	Block B	79	High	Major Adverse	20
7 Block A	Syon Lane	75	Medium	Moderate Adverse	21
	Cherry Crescent	58	Negligible	Negligible	22
	Block C	72	Medium	Moderate Adverse	23
	Block D	84	High	Major Adverse	24
	Block B	82	High	Major Adverse	25
	Block E	81	High	Major Adverse	26

10.121 With reference to Table 10.14, construction activities would result in temporary effects of major and moderate adverse significance at some noise sensitive locations, particularly at those locations which will be completed in the initial phases of the Development, as later phases are being constructed. This is largely due to their close proximity.

10.122 The only major adverse effects predicted at the off-site residential receptors identified in Figure 10.3 occur during construction of Block C at Syon Lane and Cherry Crescent, and during construction of Block D at Syon Lane. This is again due to close proximity of the Development to the off-site receptors.

10.123 The car dealership adjacent to the eastern boundary of the Site will be subject to major adverse effects from construction noise during the demolition of Homebase and the early concreting phase on site. This is due to the close proximity of the dealership to the works.

Construction Traffic

10.124 The predicted increase in road traffic movements as a result of construction traffic has been provided by the project transport consultants (RHDHV).

10.125 The impacts of construction traffic on noise are summarised below with full calculations presented in Appendix 10.4.

10.126 The EIA traffic data indicates a maximum of 144 two-way construction traffic movements per 12-hour day during the peak construction period, of which 106 will be routed along the A4 Great West Road, to the north of the Site. This is based on information provided by the transport consultants. Compared to the existing traffic on the surrounding road network, construction traffic would have no impact on noise levels (less than 1dB change), and therefore the impact is considered to be negligible.

Construction Vibration

10.127 Ground-borne vibration from construction activities is assessed for potential effects on humans and on nearby buildings.

10.128 Table 10.15 identifies the reference PPV for each type of construction equipment that produces ground-borne vibration that is of significance along with the predicted PPV level at Syon Lane which is the closest receptor to the centre of the Site. The resultant magnitude of impact and significance are also identified.

Table 10.15: Reference and estimated PPV at NSRs – Magnitude and Significance of effect from construction vibration exposure at nearest NSR (Syon Lane)

Construction Activity	Equipment	Reference PPV at 7.6 m-mm/s	Estimated PPV at NSR	Magnitude of impact for exposure to humans	Magnitude of impact on buildings	Significance
Demolition	Vibratory roller	5.33	0.43	Low	Negligible	Minor Adverse
	Large bulldozer	2.26	0.18	Negligible	Negligible	Negligible
	Hydraulic breakers	6.10	0.49	Low	Negligible	Minor Adverse
	Jackhammer	0.89	0.07	Negligible	Negligible	Negligible
Piling	Rotary bored piling	-	<0.02	Negligible	Negligible	Negligible

10.129 As presented in Table 10.15, the magnitude of impact for exposure to humans from construction vibration range from negligible to low. Given the moderate sensitivity of the residential receptors this would be considered a temporary minor adverse significance of effect at the receptors on Syon Lane. These effects would be temporary.

Operational Phase

Operational Noise

10.130 The likely significant noise effects during the operational phase of the Development are noise ingress to the residential properties, noise affecting residential balconies and the communal external area on top of the podium, and noise emissions from building services plant associated both with the proposed residential and commercial uses of the Development.

10.131 It is considered that, if noise levels are suitably controlled at the key receptors identified, then noise levels will correspondingly be suitably controlled at all sensitive receptors (including residential and commercial receptors) within the area surrounding the Site.

Operational Noise – Internal Noise Levels

10.132 Noise breaking in to the residential properties should not exceed the limits set within BS8233. This will be controlled by noise break in via the glazing, and hence the sound insulation performance of the glazing required to achieve the limits has been calculated (See Table 10.16). This specification is therefore designed-in mitigation and the operational effects will be negligible.

10.133 There is no difference in glazing requirements between living rooms and bedrooms at the Site given the high external noise levels.

10.134 Figure 10.12 identifies the façade references set out in Table 10.16 below.

Table 10.16: Indicative Sound Insulation Performance of Glazing

Façade Reference	125Hz	250Hz	500Hz	1kHz	2kHz	4kHz	$R_w(+C_{tr})$
Type A	35	45	49	50	54	65	51(-4)
Type B	28	36	45	53	56	64	48(-7)
Type C	29	29	38	43	49	56	42(-7)
Type D	26	27	34	40	38	46	38(-6)

10.135 Given the acoustic requirements for glazing, it is anticipated that whole-dwelling ventilation will be provided. Where higher rates of ventilation are required in relation to the overheating condition, it is considered appropriate to allow higher levels of internal ambient noise from transport sources[xxiv].

10.136 The basis for this is that the overheating condition occurs for only part of the time. During this period, occupants may accept a trade-off between acoustic and thermal conditions, given that they have some control over their environment.

Operational Noise – External Amenity Areas

10.137 The external amenity area (on top of the Podium) will have a 1.5m solid barrier to its full perimeter.

10.138 The effect of this barrier on noise levels can be shown by comparing the model results in Figure 10.10 and 10.11.

10.139 It can be seen that the barrier means that noise levels in this area during the daytime will typically be in the range 55-60dB $L_{Aeq,16hour}$.

10.140 Based on the results of the noise model, residential balconies will also typically be in the range 55-60dB $L_{Aeq,16hour}$. Balconies directly overlooking the A4 Great West Road would exceed this level, but have been designed as inset balconies to provide additional screening.

Operational Noise – Plant Noise Emissions

10.141 Rating noise limits for plant noise emissions have been set in line with LBH Local Plan EQ5 requirement identified above, which limits plant noise emissions to a level that is 10dB below the representative background noise level ($L_{A90,T}$ dB). A summary of rating limits is shown in

Table 10.17 below.

10.142 Compliance with these limits would ensure that the proposed fixed plant would have a negligible effect.

Table 10.17: Plant Noise Emission Limits

Receptor	Period	Maximum rating noise level from external plant, 1m from noise sensitive receptor, $L_{Ar,Tr}$ (dB)
Syon Lane	Daytime (07:00-23:00)	59
	Night time (23:00-07:00)	37
Cherry Crescent	Daytime (07:00-23:00)	55
	Night time (23:00-07:00)	31

Operational Vibration

10.143 Operational vibration effects associated with the Development are considered negligible, as the change in traffic flows as a result of the Development would be minimal. Please refer to the transport assessment in Chapter 9, and Appendix 10.4, for more detail.

10.144 At night the measured PPV from rail movements was 0.625mm/s. The VDV was below $0.1m/s^{-1.75}$ at night.

10.145 With reference to Table 1 of BS6472-1:2008 (as required by LBH), this suggests that there is a low probability of adverse comment from residents and as such operational vibration effects are considered negligible.

Operational Traffic

10.146 Operational noise and vibration effects associated with traffic from the Development are considered negligible as the change in traffic flows associated with the Development would be minimal in relation to the existing and future traffic flows. In order to cause a 3dB change in noise levels, which would be barely perceptible to the human ear, traffic flows would need to double (or halve). Calculations are presented in Appendix 10.4.

10.147 Additional calculations, based on traffic data for the unrealistic scenario that the Tesco Osterley site will operate under the existing conditions with a new Tesco store also operating as part of the Development is included in Appendix 10.4, for completeness.

Mitigation Measures

Construction Phase

Noise

10.148 Table 10.14 above identifies that there is a potential for temporary, major adverse impacts on the nearest noise sensitive receptors (housing on Syon Lane and Cherry Crescent/Brambles Close) during the construction phase of the Development.

10.149 It should be noted that the noise data provided in BS5228 is representative of older construction machinery without the use of any mitigation measures; the current version of the Standard was issued in 2009 and contains noise data which was previously presented in the 1997 version of the document.

10.150 An Outline Design & Construction Method Statement and CEMP is submitted with the planning application (see Appendix 5.1). A detailed CEMP would be secured by planning condition. Best Practicable Means will be implemented through the CEMP, which would reduce the predicted noise levels significantly.

10.151 All properties outside of the Site will benefit from acoustic screening which will be provided through site hoardings (assuming a solid construction with a minimum mass per unit area of 10-15kg/m^2, that is well sealed to the ground and between abutting panels) during periods when construction takes place at ground level e.g. piling, earthworks etc. This will reduce noise levels at the housing on Syon Lane and Cherry Crescent by 5-10dB.

10.152 Working hours on the Site will be agreed with LBH through the CEMP. However, it is likely that the standard hours of work will be adhered to. These are:

- Monday to Friday, 8am to 6pm;
- Saturday, 8am to 1pm; and
- Sunday and Bank Holidays, no works on-site.

10.153 All work outside these hours will be subject to prior agreement of, and/or reasonable notice to LBH as appropriate.

10.154 Night-time working will be restricted to exceptional circumstances and work internally with buildings. By arrangement, there may be some out of hours construction deliveries made to the Site.

10.155 In general, the use of Best Practicable Means (BPM) to control noise emissions from the Site, in conjunction with ongoing community communication e.g. (informing residents of likely noisy periods of works and providing a site contact in the event of any issues), would be sufficient to mitigate the temporary noise impact arising from the construction works.

10.156 Examples of mitigation measures that can be used to control construction noise are found in Section 8 of BS 5228-1:2009+A1:2014. These will be adopted in the construction of the scheme and include:

- Selecting quieter construction plant and equipment;
- Turning equipment off when not in use;
- Providing enclosures around fixed plant like power generators or using mains power;
- Ensuring that all plant and equipment is well maintained;
- Keep internal haul routes well maintained and avoid steep gradients;
- Use rubber linings in chutes and dumpers to reduce impact noise;
- Minimise drop heights of materials;
- Start plant up sequentially rather than simultaneously;
- Move fixed plant away from identified noise sensitive receptors;
- Modify existing plant with noise attenuation packages such as acoustic enclosures and attenuators;
- Avoid using diesel power generators and use local electricity grid wherever possible;
- For impact driven piling, a non-metallic dolly between the hammer and the driving helmet should be used;
- Introducing an acoustic shroud for impact driven piles;
- Choose a quieter piling method; and
- Avoiding unnecessary revving of engines.

10.157 These measures will be implemented during the construction phase of the Development.

Vibration

10.158 Examples of mitigation measures that can be used to control construction vibration are found in Section 8 of BS 5228-2-2009, These will be adopted in the construction of the scheme and include:

- Substitute plant and/or methods with less obtrusive plant and/or methods;
- Where reasonably practical, move vibrating equipment away from identified NSRs;
- Vibration isolation of stationary plant;
- Selecting less intrusive methods of piling;
- Employ cut-off trenches which are analogous to noise barriers; and
- Pre-auguring before installing the piles.

10.159 These measures will be implemented during construction.

Operational Phase

Noise

10.160 The mitigation of noise issues during the operational phase is inherent, in compliance with the requirements of LBH. Mitigation will form part of the design of the buildings in the acoustic specification of facades and glazing as well as the ventilation strategy. Further details are also provided in the Energy and Sustainability Statement for the Development, included as Appendix 3.2 of the ES.

10.161 The façade and ventilation design of the building will ensure that the internal ambient noise levels required by BS8233:2014 to provide appropriate acoustic conditions for residential amenity during the day and night time periods will be met.

10.162 Plant noise emissions will be controlled in line with the requirements of LBH by a combination of selection of quieter equipment and additional mitigation such as silencers and enclosures as required in order to ensure that plant noise emissions are at least 10dB below the background noise level at the nearest noise sensitive receptors.

10.163 The noise levels in the external amenity area are predicted to be in the range 55-60 dB $L_{Aeq,16hr}$. This is due to aircraft noise overhead and as such no further mitigation measures are possible.

10.164 All residential units within the Development are separated from the Tesco Extra supermarket operation by acoustic buffer zones, including circulation, cycle stores and back of house areas. The separating floor between the car park and Level 4 residential units will be designed such that the noise limits set within BS8233:2014 and as required by LBH will not be exceeded within residential areas.

10.165 The Development incorporates suitable mitigation measures, including setting back the noise sensitive residential uses back from the Site boundary and by further separating it with the clean air route. to ensure that existing businesses will not be subject to unreasonable restrictions, in accordance with the principle of Agent of Change.

Vibration

10.166 No operational vibration effects are anticipated.

Residual Effects

Construction Phase

10.167 No significant residual effects due to construction vibration are expected during the construction of the buildings given that it is assumed that vibration caused by construction activities would be controlled through the CEMP.

10.168 Adverse noise effects will be mitigated as far as possible by the use of Best Practicable Means in line with the recommendations set out in Section 8 of BS5228-1. The residual effects of construction noise at the nearest noise sensitive receptors (with the proposed mitigation adopted) are considered to be a temporary moderate adverse effect on residents at Syon Lane and Cherry Crescent / Brambles Close during the main build.

Operational Phase

10.169 The residual effects of operational noise and vibration at the nearest noise sensitive receptors are considered to be negligible, assuming implementation of designed in mitigation as discussed above.

Cumulative Effects

10.170 All permitted developments are further from the Site than the nearest existing noise sensitive receptors and hence construction and operational noise and vibration effects from the Site will be lower than that predicted at these receptors when assessed at other locations.

10.171 Appendix 10.4 shows the predicted noise impact for all traffic scenarios. The cumulative noise impact of construction and operational traffic flows from the Development and from committed developments is less than 1dB at all receptors and is therefore considered to be negligible.

Summary

10.172 The noise climate at the Site is dominated by road traffic noise on the surrounding roads, and regular aircraft overflights associated with nearby Heathrow Airport. There are occasional train movements on the line immediately to the south-east of the Site.

10.173 The nearest noise sensitive receptors are at Cherry Crescent, located approximately 35m to the south-east of the Site boundary, and at Syon Lane, located approximately 40m to the south-west of the Site boundary. There is a car dealership immediately to the east of the Site. These receptors are currently exposed to relatively high levels of aircraft and road traffic noise.

10.174 Noise and vibration levels at the Site as existing have been quantified through baseline surveys.

10.175 A computer model has been created, calibrated against the noise survey data, to assess noise impact affecting the Development.

10.176 Construction noise and vibration have been assessed during all stages, including site clearance and demolition as well as phased construction. The effects of vibration are considered to be minor adverse. Construction noise has a potentially major adverse effect throughout this period both at the existing residential and commercial receptors and at the occupied phases of the Development as later phases are constructed, however the mitigation measures to be adopted are considered to reduce these to be a temporary moderate adverse effect on residents at Syon Lane and Cherry Crescent / Brambles Close during the main build.

10.177 Best Practicable Means of noise and vibration control will be used throughout the construction period. These are detailed in paragraphs 10.154 and 10.156 above.

10.178 Noise egress from the Site during operation will have a negligible effect on either existing or new sensitive receptors.

10.179 The acoustic requirements for building facades have been outlined such that the internal ambient noise levels are compliant with the guidance given in BS8233:2014 and the requirements of LBH.

10.180 Noise emission limits for building services plant have been set in accordance with the requirements of LBH. This ensures a negligible impact arising from building services plant during operation.

10.181 Noise emissions from operational traffic are considered to be negligible.

10.182 Construction residual effects would predominantly be negligible or minor adverse, with a potential for a moderate adverse but temporary impact on residents at Syon Lane and Cherry Crescent.

10.183 Operational residual effects are considered to be negligible.

10.184 Cumulative residual effects are considered to be negligible.

10.185 Table 10.18 contains a summary of the likely significant effects of the Development.

Table 10.18: Table of Significance – Noise & Vibration

Potential Effect	Nature of Effect (Permanent/Temporary)	Significance (Major/Moderate/Minor) (Beneficial/Adverse/Negligible)	Mitigation / Enhancement Measures	Geographical Importance*							Residual Effects (Major/Moderate/Minor) (Beneficial/Adverse/Negligible)
				I	UK	E	R	C	B	L	
Construction											
Construction Noise	Temporary	Major adverse	Best Practicable Means including selection of quietest equipment and methodologies, incorporated in the CEMP (see 10.148)							X	Moderate Adverse
Construction Vibration	Temporary	Minor adverse	Best Practicable Means including selection of low-vibration plant and methodologies (see 10.156)							X	Negligible
Completed Development											
Traffic and aircraft noise affecting the Development	Permanent	Negligible	Designed-in mitigation via glazing and façade specification and ventilation							X	Negligible
Plant noise emissions	Permanent	Negligible	None required							X	Negligible
Traffic generated by the Development	Permanent	Negligible	None required							X	Negligible
Cumulative Effects											
Construction											
Noise and vibration	Temporary	Major adverse	Best Practicable Means – committed development unlikely to affect construction impacts.							X	Moderate Adverse
Operation											
Noise emissions	Permanent	Negligible	None required							X	Negligible
Traffic volumes	Permanent	Negligible	None required							X	Negligible
Traffic and aircraft noise affecting development	Permanent	Negligible	None required							X	Negligible

*** Geographical Level of Importance**
I = International; UK = United Kingdom; E = England; R = Regional; C = County; B = Borough; L = Local

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