

B&Q Cricklewood ES Volume I

Chapter 13: Noise and Vibration

Montreaux Cricklewood Developments Ltd

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13. Noise and Vibration

13.1 Introduction

- 13.1.1 This chapter reports the findings of an assessment of the likely significant effects on noise and vibration as a result of the Proposed Development.
- 13.1.2 Existing baseline conditions of the site and surrounding area are established and the assessment of demolition and construction activities as well as the completed phase of the Proposed Development are presented.
- 13.1.3 The assessment considers relevant existing and newly introduced sensitive receptors and the potential impacts and resultant effects the Proposed Development are likely to result in. The nature, scale and significance of any resultant effects are discussed.
- 13.1.4 If required, mitigation measures are identified and any residual effects (of moderate or major scale), after mitigation measures have been adopted, are referred to as likely significant noise and vibration effects.
- 13.1.5 The following potential effects on nearby sensitive receptors have been assessed:
- Noise and vibration generated from onsite demolition and construction activities;
 - Changes in road traffic noise as a result of demolition and construction vehicles and the completed and operational Proposed Development; and
 - Noise from fixed plant associated with the operation of the Proposed Development.
- 13.1.6 The potential for effect interactions on a single receptor (Type 1 effects) are discussed in *Chapter 17: Effect Interactions*. Combined cumulative noise and vibration effects (Type 2 effects) of the Proposed Development with other development schemes are discussed at the end of this chapter.
- 13.1.7 This chapter also assesses the suitability of the Proposed Development for its intended use and outline recommendations have been provided in order to achieve relevant indoor ambient noise and vibration levels for residential amenity.
- 13.1.8 This assessment and ES chapter has been produced by AECOM.
- 13.1.9 A glossary of noise and vibration terminology used in this chapter is presented in *ES Volume III Appendix 13.1*.

13.2 Legislation and Planning Policy Context

National Legislation

Control of Pollution Act (1974)¹

- 13.2.1 The Control of Pollution Act 1974 (CoPA) requires that Best Practicable Means (BPM), as defined in section 72 of the CoPA, are adopted to control construction noise on any given site. Sections 60 and 61 of the CoPA provide the main legislation regarding enabling works and construction site noise and vibration. If noise complaints are received, a Section 60 notice may be issued by the Local Authority with instructions to cease work until specific conditions to reduce noise have been adopted.
- 13.2.2 Section 61 of the CoPA provides a means to apply for prior consent to carry out noise generating activities during construction. Once prior consent has been agreed under Section 61, a Section 60 notice cannot be served provided the agreed conditions are maintained on-site.
- 13.2.3 The Environmental Protection Act 1990 (EPA) prescribes noise (and vibration) emitted from premises (including land) so as to be prejudicial to health or a nuisance as a statutory nuisance.

¹ Her Majesty's Stationery Office (1974); Control of Pollution Act

Environmental Protection Act (1990)²

- 13.2.4 Local Authorities are required to investigate any public complaints of noise and if they are satisfied that a statutory nuisance exists, or is likely to occur or recur, they must serve a noise abatement notice. A notice is served on the person responsible for the nuisance. It requires either simply the abatement of the nuisance or works to abate the nuisance to be carried out, or it prohibits or restricts the activity. Contravention of a notice without reasonable excuse is an offence. Right of appeal to the Magistrates Court exists within 21 days of a noise abatement notice having been served.
- 13.2.5 In determining if a noise complaint amounts to a statutory nuisance the Local Authority can take account of various guidance documents and existing case law as no statutory noise limits exist. Demonstrating the use of BPM for construction activities to minimise noise levels is an accepted defence against a noise abatement notice.

National Planning Policy

National Planning Policy Framework (2019)³

- 13.2.6 The aim of the NPPF in terms of noise and vibration is to prevent both “*new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by unacceptable levels of..... noise pollution...*” (paragraph 170).
- 13.2.7 Section 15 of the NPPF is concerned with protecting the natural environment, including the matters that should be considered for planning decisions in relation to ground conditions and pollution. This includes ensuring “*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 other adverse impacts resulting from noise from new development and avoid noise giving rise to significant adverse impacts on health and 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.*” (Paragraph 180).
- 13.2.8 These policies must be applied in the context of Government policy on sustainable development.

Noise Policy Statement for England (2010)⁴

- 13.2.9 The Noise Policy Statement for England (NPSE) seeks to clarify the underlying principles and aims in existing policy documents, legislation and guidance that relate to noise. The statement applies to all forms of noise, including environmental noise, neighbour noise and neighbourhood noise.
- 13.2.10 The NPSE sets out the long-term vision of the government’s noise policy, which is to “promote good health and a good quality of life through the effective management of noise within the context of policy on sustainable development”.
- 13.2.11 This long-term vision is supported by three aims:
- *“Avoid significant adverse impacts on health and quality of life;*
 - *Mitigate and minimise adverse impacts on health and quality of life; and*
 - *Where possible, contribute to the improvements of health and quality of life.”*
- 13.2.12 The ‘Explanatory Note’ within the NPSE provides further guidance on defining ‘significant adverse effects’ and ‘adverse effects’ using the concepts:

² Her Majesty’s Stationery Office, 1995; Environmental Protection Act

³ Department for Communities and Local Government, 2019; National Planning Policy Framework

⁴ Department for Environment Food and Rural Affairs, 2010; Noise Policy Statement for England

- *No Observed Effect Level (NOEL) - the level below which no effect can be detected. Below this level no detectable effect on health and quality of life due to noise can be established;*
- *Lowest Observable Adverse Effect Level (LOAEL) - the level above which adverse effects on health and quality of life can be detected; and*
- *Significant Observed Adverse Effect Level (SOAEL) - the level above which significant adverse effects on health and quality of life occur.*

13.2.13 With reference to the SOAEL, the NPSE states:

- *“It is recognised that 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, the SOAEL is likely to be different for different noise sources, for different receptors and at different times. It is acknowledged that further research is required to increase our understanding of what may constitute a significant adverse impact on health and quality of life from noise. However, not having specific SOAEL values in the NPSE provides the necessary policy flexibility until further evidence and suitable guidance is available.”*

13.2.14 For situations where noise levels are between the LOAEL and SOAEL, all reasonable steps should be taken to mitigate and minimise the effects. However, this does not mean that such adverse effects cannot occur.

National Planning Practice Guidance: Noise (2017) ⁵

13.2.15 The Planning Practice Guidance for Noise (PPGN) “*advises on how planning can manage potential noise impacts in new development*” and provides guidelines that are designed to assist with the implementation of the NPPF.

13.2.16 The PPGN states that local planning authorities should take account of the acoustic environment and in doing so consider:

- *“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.”*

13.2.17 Factors to be considered in determining whether noise is a concern are identified including the absolute noise level of the source, the existing ambient noise climate, time of day, frequency of occurrence, duration, character of the noise and cumulative effects.

13.2.18 PPGN introduces the additional concepts of NOAEL (No Observed Adverse Effect Level), and UAEL (Unacceptable Adverse Effect Level). Further details are provided in Table 13-1 below.

⁵ Department for Communities and Local Government, 2017; National Planning Practice Guidance

Table 13-1: Planning Practice Guidance for Noise

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

Green Future: Our 25 Year Plan to Improve the Environment ⁶

- 13.2.19 The 25 Year Environment Plan, published in January 2018, sets out the actions the UK Government will take to help the natural world regain and retain good health.
- 13.2.20 The Plan states that “*over the next 25 years, we must significantly cut all forms of pollution and ease the pressure on the environment. We must ensure that noise and light pollution are managed effectively.*”

⁶ Department for Environment, Food and Rural Affairs, 2018. 25 Year Environment Plan

Regional Planning Policy

The London Plan – Spatial Development Strategy for Greater London (2016)⁷

13.2.21 The London Plan March 2016 is an update of the 2011 London Plan to ensure it is relevant to government guidance and national legislation enacted since 2011. The London Plan 2016 sets a framework for the development of London over the next 20 years. With regards to noise, the following policies set out a number of methods for the management of noise in new developments.

- Policy 3.2: *“Addressing health and health inequalities – which requires working to address significant health issues (i.e. those created / 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 design principles for minimising noise pollution”;*
- 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 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 developments”.*

The New London Plan – ‘Intend to Publish London Plan – Spatial Development Strategy for Greater London’ (2019)⁸

13.2.22 The New London Plan was published in December 2019. An outline of the key policies relating to noise and vibration has been provided for information. The updated document contains the following policies:

- Policy D13 Agent of Change
 - *“A The Agent of Change principle places the responsibility for mitigating impacts from existing noise and other nuisance-generating activities or uses on the proposed new noise-sensitive development. Boroughs should ensure that Development Plans and planning decisions reflect the Agent of Change principle and take account of existing noise and other nuisance-generating uses in a sensitive manner when new development is proposed nearby.*
 - *B Development should be designed to ensure that established noise and other nuisance-generating uses remain viable and can continue or grow without unreasonable restrictions being placed on them.*
 - *C New noise and other nuisance-generating development proposed close to residential and other noise-sensitive uses should put in place measures to mitigate and manage any noise impacts for neighbouring residents and businesses.*
 - *D Development proposals should manage noise and other potential nuisances by: 1) ensuring good design mitigates and minimises existing and potential nuisances generated by existing uses and activities located in the area 2) exploring mitigation measures early in the design stage, with necessary and appropriate provisions including*

⁷ Greater London Authority, 2016; The London Plan – The Spatial Development Strategy for London Consolidated with Alterations Since 2011

⁸ Greater London Authority, 2019; The New London Plan – ‘Intend to Publish London Plan – Spatial Development Strategy for Greater London’. December 2019

ongoing and future management of mitigation measures secured through planning obligations 3) separating new noise-sensitive development where possible from existing noise-generating businesses and uses through distance, screening, internal layout, sound-proofing, insulation and other acoustic design measures.

- *E Boroughs should not normally permit development proposals that have not clearly demonstrated how noise and other nuisances will be mitigated and managed.”*
- Policy D14 Noise
 - *“A In order to reduce, manage and mitigate noise to improve health and quality of life, residential and other non-aviation development proposals should manage noise by:*
 - *1) avoiding significant adverse noise impacts on health and quality of life*
 - *2) reflecting the Agent of Change principle as set out in Policy D13 Agent of Change*
 - *3) mitigating and minimising the existing and potential adverse impacts of noise on, from, within, as a result of, or in the vicinity of new development without placing unreasonable restrictions on existing noise-generating uses*
 - *4) improving and enhancing the acoustic environment and promoting appropriate soundscapes (including Quiet Areas and spaces of relative tranquillity)*
 - *5) separating new noise-sensitive development from major noise sources (such as road, rail, air transport and some types of industrial use) through the use of distance, screening, layout, orientation, uses and materials – in preference to sole reliance on sound insulation*
 - *6) where it is not possible to achieve separation of noise-sensitive development and noise sources without undue impact on other sustainable development objectives, then any potential adverse effects should be controlled and mitigated through applying good acoustic design principles 7) promoting new technologies and improved practices to reduce noise at source, and on the transmission path from source to receiver.*
 - *B Boroughs, and others with relevant responsibilities, should identify and nominate new Quiet Areas and protect existing Quiet Areas in line with the procedure in Defra’s Noise Action Plan for Agglomerations.”⁹*

City Soundings: The Mayor of London’s Ambient Noise Strategy (2004)¹⁰

13.2.23 The London Ambient Noise Strategy aims to minimise the adverse effects of noise on people living, working in and visiting London, by using the best available practices and technologies within a sustainable development framework. The Strategy aims to work towards more compact city development while minimising noise. This requires careful consideration of the adverse effect of noise on, from, within, or in proximity to a development.

Sustainable Design and Construction Supplementary Planning Guidance (2014)¹¹

13.2.24 The Sustainable Design and Construction Supplementary Planning Guidance (SPG) provides 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*”.

⁹ Department for Environment Food and Rural Affairs, 2019; Noise Action Plan: Agglomerations (Urban Areas) Environmental Noise (England) Regulations 2006, as amended.

¹⁰ Greater London Authority, 2004; City Soundings: The Mayor’s London Ambient Noise Strategy.

¹¹ Greater London Authority, 2014; The London Plan Supplementary Planning Guidance – Sustainable Design and Construction.

Mayor's London Environment Strategy (2018)¹²

- 13.2.25 The Mayor's London Environment Strategy was published in May 2018 and sets out the Mayor's vision for London's environment to 2050. The strategy aims to improve Londoners' quality of life by "...*reducing the number of people adversely affected by noise and promoting more quiet and tranquil spaces*".
- 13.2.26 It also states that "*reducing the noise impacts of motor traffic will directly benefit health, improve the ambience of street environments and encourage active travel and human interaction*" and that "*development should seek to protect and improve the acoustic environment by introducing a soundscape that is relevant to the local environment*".

Local Planning Policy

London Borough of Barnet Draft Local Plan (Reg 18) Preferred Approach Consultation (2020)¹³

- 13.2.27 The London Borough of Barnet (LBB) are currently in the process of reviewing and updating the borough's adopted Local Plan documents, and recently published its Draft Local Plan (Regulation 18 document) for public consultation. The consultation period took place between 27 January – 16 March 2020, with the Regulation 19 (i.e. Publication of Local Plan for making representations on soundness issues (NPPF para 35) document scheduled for publication in Winter 2021. Adoption of the revised Draft/New Local Plan is not expected until Spring 2022.
- 13.2.28 With reference to noise, the LBB Draft Local Plan (Reg 18) Preferred Approach Consultation contains the following policy:
- Policy ECC02: Environmental Considerations – "*To avoid generation of unacceptable noise levels close to noise sensitive uses. Proposals to locate noise sensitive development in areas with existing high levels of noise will not be permitted without satisfactory measures to mitigate noise impacts through design, layout, and insulation as set out in the Sustainable Design and Construction SPD. The Council will apply the Agent of Change principle in accordance with Draft London Plan Policy D12.*"
- 13.2.29 By virtue of being at an early stage in the adoption process, the Draft Local Plan is considered to be of limited weight and is not a material consideration within this EIA.

Local Plan Core Strategy Development Plan Document (2012)¹⁴

- 13.2.30 With reference to noise, the LBB Local Plan Core Strategy contains the following policy:
- Policy CS13: Ensuring the efficient use of natural resources – "*We will seek to minimise Barnet's contribution to climate change and ensure that through the efficient use of natural resources the borough develops in a way which respects environmental limits and improves quality of life. We will improve air and noise quality by requiring Air Quality Assessments and Noise Impact Assessments from development in line with Barnet's SPD on Sustainable Design and Construction.*"

London Borough of Barnet Local Plan Development Management Policies (2012)¹⁵

- 13.2.31 With reference to noise, the LBB Local Plan Development Management Policies contains the following policy:
- Policy DM04: Environmental considerations for development – "*Proposals to locate development that is likely to generate unacceptable noise levels close to noise sensitive uses will not normally*

¹² Mayor of London, 2018; London Environment Strategy

¹³ London Borough of Barnet, 2020; Draft Local Plan for Public Consultation – Regulation 18 Document

¹⁴ London Borough of Barnet, 2012; Local Plan (Core Strategy)

¹⁵ London Borough of Barnet, 2012; Development Management Policies DPD

be permitted. Proposals to locate noise sensitive development in areas with existing high levels of noise will not normally be permitted. Mitigation of noise impacts through design, layout, and insulation will be expected where appropriate. ”

Supplementary Planning Document: Sustainable Design and Construction (2013) ¹⁶

13.2.32 Guidance contained within LBB’s Sustainable Design and Construction Supplementary Planning Document (SPD) reflects the NEC procedure which forms part of PPG24, which has since been withdrawn.

13.2.33 In addition, the SPD provides the following Noise Design Principals which should be considered in the design of a new development:

- *“A. Ensure that development reduces the effect of noise on occupants and existing properties – Proposed developments subject to high levels of noise will require very high design criteria to ensure acceptable levels of internal noise and vibration are achieved. Buildings can be used to screen outdoor amenity areas from sources of noise.*
- *B. Mixing of land uses and Internal layout – Consideration should be given to the use of a proposed building and how proposed noise generating units (e.g. leisure, retail, industrial etc.) may affect neighbouring sensitive units. Building design should try to limit transmission of noise through internal noise and external breakout of noise. It is recommended that this may be achieved through the following measures:*
 - *Locate rooms that are sensitive to loud noise (i.e. bedrooms/living rooms) away from areas of the site that are most prone to loud or continuous noise.*
 - *Stacking rooms with similar uses on top of each other (i.e. living rooms, kitchens) to avoid unnecessary noise disturbance.*
 - *Non-residential uses should be placed closer to noise sources than residential accommodation.*
- *C. Provide appropriate noise insulation given the external and internal noise environment – Appropriate mitigation (glazing and ventilation) should be provided to achieve suitable internal noise levels in new developments. Building services should be suitably located and mitigated.*
- *D. Establish the impact of new development on the noise environment – building systems should be suitably mitigated that they do not contribute to increasing background noise levels.”*

13.2.34 The SPD also makes reference to fixed plant noise levels which should achieve a level of 5dB(A) below the background noise level.

Supplementary Planning Document: Residential Design Guidance (2013) ¹⁷

13.2.35 Contained in the LBB SPD: Residential Design Guidance principles is reference to noise which states that new development must:

- *“Ensure the design and layout of developments (including balconies, stacking of rooms, windows) minimise the potential for noise transfer between new homes”*

13.2.36 The document makes reference to Sustainable Design and Construction SPD for guidance and requirements on how to reduce disturbance from noise.

¹⁶ London Borough of Barnet, 2013; Supplementary Planning Document: Sustainable Design and Construction

¹⁷ London Borough of Barnet, (2013); Supplementary Planning Document: Residential Design Guidance

Other Relevant Policy, Standards and guidance

Additional Policy/Standards/Guidance

13.2.37 Guidance documents of relevant to the noise and vibration assessments include, but are not limited to, the following:

- BS 4142:2014+A1:2019 Methods for rating and assessing industrial and commercial sound¹⁸;
- BS 5228:2009+A1:2014 Noise and vibration control on construction and open sites¹⁹;
- BS 6472-1:2008 Guide to evaluation of human exposure to vibration in buildings. Part 1: Vibration sources other than blasting²⁰;
- BS 7385:1993 Evaluation and measurement for vibration in buildings. Part 2: Guide to damage levels from groundborne vibration²¹;
- BS 7445:1991 and 2003 Description and measurement of environmental noise Parts 1 and 2²²²³;
- BS 8233:2014 Guidance on sound insulation and noise reduction for buildings²⁴;
- Calculation of Road Traffic Noise (CRTN) (1988)²⁵;
- Design Manual for Road and Bridges (DMRB) Volume 11 Section 3 LA 111 Revision 1 Sustainability and Environment. Appraisal. Noise and vibration (2020)²⁶;
- Institute of Environmental Management and Assessment (IEMA) Guidelines for Environmental Noise Impact Assessment (2014)²⁷;
- World Health Organisation (WHO) Guidelines for Community Noise (1999)²⁸;
- WHO Night Noise Guidelines for Europe (2009)²⁹;
- WHO Environmental Noise Guidelines for the European Region (2018)³⁰;
- Professional Practice Guidance (ProPG) on Planning & Noise (2017)³¹; and
- Transport Research Laboratory (TRL) report 429 Groundborne Vibration Caused by Mechanised Construction Works (2000)³².

¹⁸ British Standards Institute (2019); BS 4142+A1:2019 – Methods for rating and assessing industrial and commercial sound, BSi, London.

¹⁹ British Standards Institute (2014) BS 5228:2009+A1:2014 – Code of practice for noise and vibration control on construction and open sites. Noise, BSi, London.

²⁰ British Standards Institute (2008); BS 6472 – Guide to evaluation of human exposure to vibration in buildings. Part 1: Vibration sources other than blasting, BSi, London.

²¹ British Standards Institute (1999); BS 7385 – Evaluation and measurement for vibration in buildings. Part 2: Guide to damage levels from groundborne vibration, BSi, London.

²² British Standards Institute (2003); BS 7445 – Description and measurement of environmental noise. Part 1: Description and measurement of environmental noise. Guide to quantities and procedures, BSi, London.

²³ British Standards Institute (1991); BS 7445 – Description and measurement of environmental noise. Part 2: Guide to the acquisition of data pertinent to land use, BSi, London.

²⁴ British Standards Institute, (2014); BS 8233 – Guidance on sound insulation and noise reduction for buildings, BSi, London.

²⁵ Department of Transport/Welsh Office (1988); Calculation of Road Traffic Noise.

²⁶ Highways England (2020); Design Manual for Road and Bridges Volume 11 Section 3 LA 111 Revision 1 Sustainability and Environment. Appraisal. Noise and vibration.

²⁷ Institute of Environmental Management and Assessment (2014); Guidelines for environmental noise impact assessment.

²⁸ World Health Organisation (1999); Guidelines for Community Noise.

²⁹ World Health Organisation (2009); Night Noise Guidelines for Europe.

³⁰ World Health Organisation (2018); Environmental Noise Guidelines for the European Region.

³¹ Association of Noise Consultants, Institute of Acoustics, and Chartered Institute of Environmental Health, (2017); Professional Practice Guidance (ProPG) on Planning & Noise.

³² Hiller, D. M., and G. I. Crabb, (2000); Groundborne Vibration Caused By Mechanised Construction Works. TRL Report 429.

13.3 Assessment Methodology

13.3.1 This section of this ES chapter presents the following:

- Information sources that have been consulted throughout the preparation of this chapter;
- Details of consultation undertaken with respect to noise and vibration;
- The methodology behind the assessment of noise and vibration effects, including the criteria for the determination of sensitivity of receptor and magnitude of change from the existing or 'baseline' condition;
- An explanation as to how the identification and assessment of potential noise and vibration effects has been reached; and
- The significance criteria and terminology for the assessment of noise and vibration residual effects.

13.3.2 The following sources of information that define the Proposed Development have been reviewed and form the basis of the assessment of likely significant effects of noise and vibration:

- Illustrative Masterplan drawings;;
- Baseline, development, and demolition and construction traffic flow data prepared as part of the Transport Assessment and identified in *Chapter 15: Traffic and Transport*; and
- Indicative demolition and construction programme and plant and equipment schedule (as presented in Table 63 of *Chapter 6: Demolition and Construction*) and the indicative construction programme (as presented in Figure 62 of *Chapter 6: Demolition and Construction*).

Methodology for Determining Baseline Conditions and Sensitive Receptors

13.3.3 The study area for demolition and construction and operational noise effects has considered noise-sensitive receptors within 100 metres (m) of the Site boundary; based on existing ambient noise levels and physical screening by intervening building massing (both existing and future), it is considered that noise impacts at greater distances would be limited to a negligible effects. Similarly, at greater distances any demolition and construction vibration impacts will be limited to a negligible effect.

13.3.4 The study area for road traffic noise effects due to the temporary changes to the highway network during demolition and construction phases has been limited to receptors located along the main vehicle access routes i.e. Cricklewood Lane and Cricklewood Broadway.

13.3.5 Potentially sensitive receptors, such as occupants within buildings which may be disturbed by adverse noise and vibration levels, and structures that are sensitive to vibration, have been considered when assessing the effects associated with noise and vibration levels resulting from the demolition and construction phase, and once the Proposed Development is complete and operational.

13.3.6 The receptors selected in this assessment are those considered to be representative of the nearest receptors to the Site, i.e. the receptors that will likely experience the highest levels of noise and vibration and have been identified based on their relative distance from the Site boundary and confirmed during site attendance.

13.3.7 Sensitive receptors have been classified depending on their use and subsequent sensitivity to noise and vibration. The sensitivity of receptors to noise and vibration has been defined in Table 13-2.

Table 13-2: Criteria Used to Define Sensitivity of Noise and Vibration Receptors

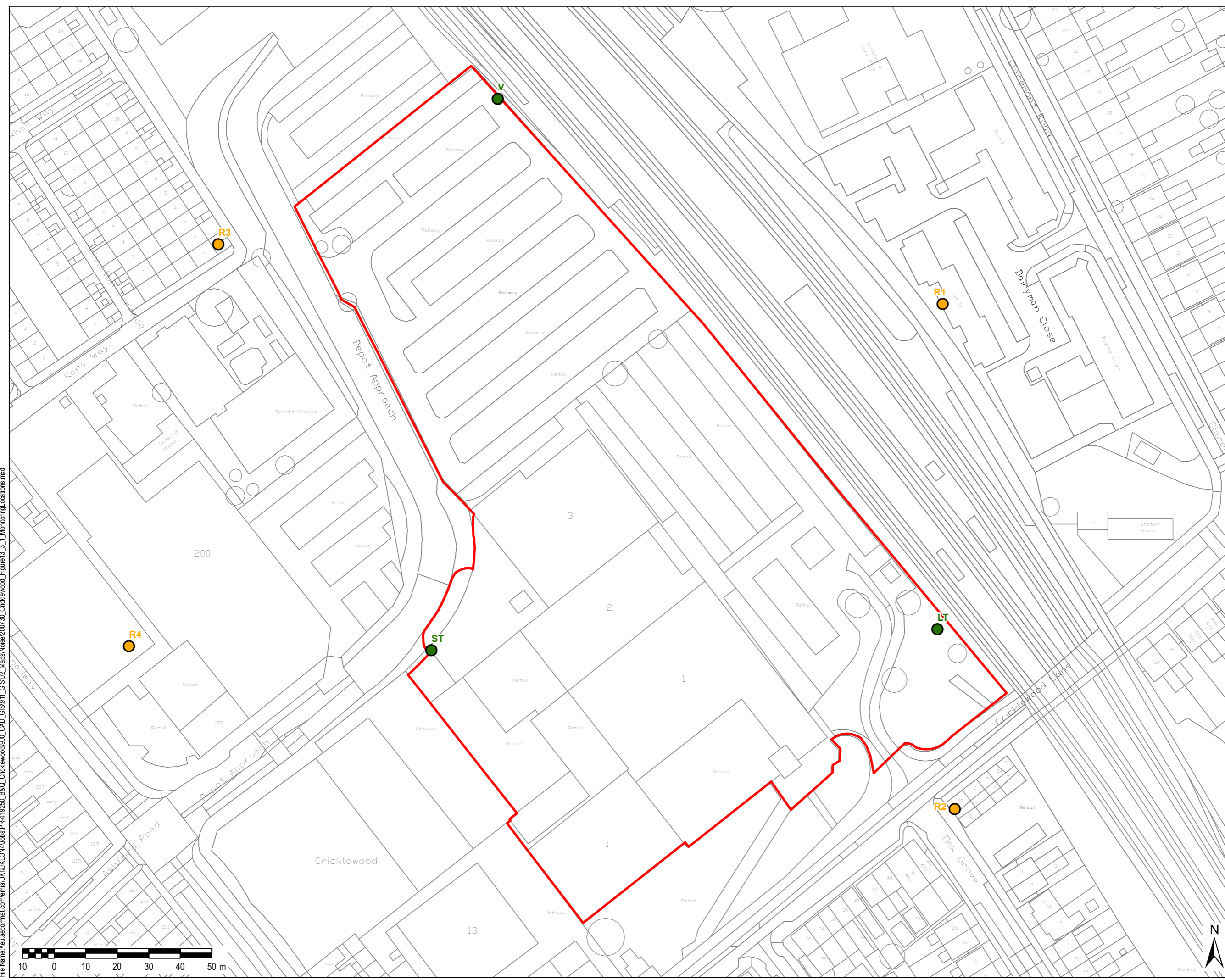
Sensitivity	Description	Examples of receptor usage
Very High	Receptors where noise will significantly affect the function of a receptor	<ul style="list-style-type: none"> • Auditoria/studios; • Specialist medical/teaching centres; and • Libraries.
High	Receptors where people or operations are particularly susceptible to noise	<ul style="list-style-type: none"> • Residential and student accommodation; • Hotels; • Places of worship; • Conference facilities; • Schools in daytime; and • Hospitals/residential care homes.
Medium	Receptors of low sensitivity to noise, where it may cause some distraction or disturbance	<ul style="list-style-type: none"> • Offices/retail units; • Cafes, bars, public houses and restaurants; • External amenity spaces; and • Sports grounds when spectator or noise is not a normal part of the event and where quiet conditions are necessary (e.g. tennis, golf).
Low	Receptors where distraction or disturbance from noise is minimal	<ul style="list-style-type: none"> • Residences and other buildings not occupied during relevant hours; • Factories and working environments with existing high noise levels; and • Sports grounds when spectator or noise is a normal part of the event.

13.3.8 Figure 13-1 illustrates the Site redline boundary and surrounding, noise and vibration monitoring positions, and locations of sensitive receptors.

THIS DRAWING IS TO BE USED ONLY FOR THE PURPOSE OF ISSUE THAT IT WAS ISSUED FOR AND IS SUBJECT TO AMENDMENT

LEGEND

- Application Boundary
- Monitoring Location
- Sensitive Receptor



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Client
MONTREAUX CRICKLEWOOD DEVELOPMENTS LTD

Project Title
B&Q CRICKLEWOOD

Drawing Title
SITE BOUNDARY, RECEPTORS AND NOISE/VIBRATION MONITORING LOCATIONS

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Drawing Number
FIGURE 13-1

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- 13.3.9 The nearest identified noise and vibration sensitive receptors to the Site are:
- R1: Residential properties located at: Dairyman Close on the opposite side of the rail lines to the east (approximately 60m from the Site boundary), high sensitivity;
 - R2: Residential properties on Cricklewood Lane to the south (approximately 20m from the Site boundary), high sensitivity;
 - R3: Residential properties on Kara Way to the north and west (approximately 30m from the Site boundary), high sensitivity; and
 - R4: Travelodge hotel to the west (approximately 100m from the Site boundary), high sensitivity.
- 13.3.10 Noise and vibration monitoring surveys were carried out in January and February 2020 to collect data representative of the baseline noise and vibration environment around the Site and at nearby sensitive receptors.
- 13.3.11 Monitoring was carried out at the following locations:
- LT: Long-term unattended noise monitoring along the eastern Site boundary from 4th to 11th February 2020, representative of rail noise affecting this boundary and considered representative of receptors R1 and R2;
 - ST: Short-term attended noise monitoring along the western Site boundary from 23rd to 24th January 2020, representative of road traffic noise affecting this boundary and considered representative of receptors R3 and R4; and
 - V: Short-term attended vibration monitoring along the eastern Site boundary on 23rd January 2020, representative of rail vibration affecting this boundary.
- 13.3.12 Noise monitoring was undertaken following guidance from BS 7445-1 and included the following sound level indicators: L_{Aeq} , L_{A90} , and L_{Amax} . Vibration monitoring was undertaken following guidance from BS6472-1 and measured the vibration dose value (VDV) indicator.
- 13.3.13 Monitoring was completed prior to the start of lockdown measures for the coronavirus outbreak. During lockdown measures noise and vibration levels have been reduced by travel restrictions, social distancing and changes in operating patterns at surrounding premises. The results of the January/February 2020 surveys are considered to be representative of the baseline once temporary lockdown effects come to an end.
- 13.3.14 Previous versions of DMRB LA111 (i.e. HD 213/11) state that, *“a change in noise level of 1 dB $L_{A10,18h}$ is equivalent to a 25% increase or a 20% decrease in traffic flow, assuming other factors remain unchanged and a change in noise level of 3 dB $L_{A10,18h}$ is equivalent to a 100% increase or a 50% decrease in traffic flow.”* DMRB HD 213/11 also advised that a change in road traffic noise of 1 dB is the smallest that is considered perceptible.
- 13.3.15 Based on information from the Transport Assessment it is not envisaged that there will be future increases (due to natural and cumulative growth) in road traffic of greater than 25%. Similarly, train movements on the adjacent rail line are not envisaged to increase by 25% in the near future. As such any future increases in road/rail traffic noise will be below 1dB and therefore the measured January/February 2020 noise and vibration levels are considered representative of the future baseline scenario.

Methodology for Determining Demolition and Construction Effects

Demolition and Construction Noise

- 13.3.16 The potential impacts throughout the demolition and construction stage are likely to include the noise and vibration due to demolition and construction works activities; and noise from Heavy and Light Goods Vehicles (HGV, LGV) movements along the local road network.

- 13.3.17 Construction noise predictions were undertaken using typical items of plant that are used in such developments, which are presented in *Chapter 6: Demolition and Construction*. These items of plant were taken to be representative of the plant that will be used during the construction process of the Proposed Development. Noise predictions were carried out to represent a conservative scenario where all construction plant is operational. Consequently, noise predictions may overestimate construction noise levels and can therefore be considered as worst case.
- 13.3.18 Construction noise levels were predicted following guidance from Annex F of BS 5228-1 and were based on the following assumptions:
- Work would only take place during LBB's standard permitted hours for noisy work on construction sites of Monday-Friday (08:00-18:00) and Saturdays (08:00-13:00). No evening or night-time works were assessed;
 - Due to variability in works locations across the Site, construction plant was modelled as located at a single position towards the centre of Site;
 - Due to variability in operational times for plant activities over the course of a working day, plant was modelled as operational for 50% of the working day (e.g. each plant item in operation for five hours over a typical ten-hour working day); and
 - Basic mitigation measures providing physical screening of noise is employed (e.g. site hoarding and/or equipment enclosures) and physical screening by intervening buildings provides a total noise attenuation of 10 dB.
- 13.3.19 Assessment criteria for demolition and construction noise are presented in Table 13-3. For assessment purposes and per NPSE guidance, the Lowest Observed Adverse Effect Level (LOAEL) was set as 65 dB $L_{Aeq,T}$ and the Significant Observed Adverse Effect Level (SOAEL) as 75 dB $L_{Aeq,T}$.

Table 13-3 Magnitude of Construction Noise Impacts

Magnitude of Impact	Construction noise level at façade of receptor, $L_{Aeq,T}$ Daytime (07.00–19.00) and Saturdays (07.00–13.00)
Low	≤ 65 dB
Medium	≥ 65 dB and < 70 dB
High	≥ 70 dB and < 75 dB
Very high	≥ 75 dB

Demolition and Construction Vibration

- 13.3.20 Vibration levels from demolition and construction activities have been assessed based example measurement data for the types of plant used and their proximity to sensitive receptors, using guidance in BS 5228 Part 2: Vibration.
- 13.3.21 Table 13-4 details vibration peak particle velocity (PPV) levels and their potential impact on humans to be used in the assessment, as per BS 5228 Part 2: Vibration, which provides a simple method of determining annoyance associated with vibration. For residential receptors and other high sensitivity receptors, the LOAEL was defined as a vibration PPV value of 0.3 mm/s during the daytime. The SOAEL was defined as a vibration PPV value of 1.0 mm/s during the daytime.

Table 13-4 Criteria for Magnitude of Demolition and Construction Vibration Impacts (Human Response)

Magnitude of Impact	Peak particle velocity (PPV) level	Description
Low	0.14 to < 0.3 mm/s	<i>"Vibration might be just perceptible in the most sensitive situations for most vibration frequencies associated with construction. At lower frequencies, people are less sensitive to vibration."</i>
Medium	0.3 to < 1.0 mm/s	<i>"Vibration might be just perceptible in residential environments."</i>
High	1.0 to < 10.0 mm/s	<i>"It is likely that vibration of this level in residential environments will cause complaint, but can be tolerated if prior warning and explanation has been given to residents."</i>
Very high	≥ 10.0 mm/s	<i>"Vibration is likely to be intolerable for any more than a very brief exposure to this level."</i>

13.3.22 In terms of demolition and construction vibration, the recommended PPV vibration limits for transient vibration, above which cosmetic damage could occur for different types of buildings are provided in BS 5228-2 and presented in Table 13-5. For these limits, 'minor damage' is possible at vibration magnitudes which are greater than twice those given in Table 13-5, and 'major damage' can occur at values greater than four times the tabulated values.

13.3.23 Given that these criteria relate to the risk of cosmetic damage dependent on the type of building and its physical sensitivity to vibration, rather than impacts on human occupants with varying sensitivities (as shown in Table 13-2), a semantic scale for determining the significance of effect has been provided. Note that the criteria presented relate to the potential for cosmetic damage, not structural damage; cosmetic damage would precede the onset of any structural damage.

Table 13-5 Criteria for Significance of Demolition and Construction Vibration Impacts (Building Response)

Significance of Effect	Multiple of vibration threshold values	Type of building	Peak component particle velocity in frequency range of predominant pulse, at which cosmetic damage could occur
Negligible	Up to x1	Reinforced or framed structures,	50 mm/s at 4 Hz and above
Minor	Up to x2	Industrial and heavy commercial buildings	
Moderate	Up to x4	Unreinforced or light framed structures,	15 mm/s at 4 Hz increasing to 20 mm/s at 15 Hz, and increasing to 50 mm/s at 40 Hz and above
Major	Greater than x4	Residential or light commercial buildings	

Demolition and Construction Traffic

13.3.24 The temporary changes in road traffic noise levels along the local road network have been calculated based on guidance from CRTN and assessed based on IEMA guidance. The predictions are based on baseline traffic data (2024 scenario with existing Site-related traffic removed, in the form of 18-hour Average Annual Weekday Traffic (AAWT) flows) prepared as part of the Transport Assessment and peak construction traffic as identified in *Chapter 6: Demolition and Construction*.

13.3.25 *Chapter 6: Demolition and Construction* estimates that the average number of vehicles in a peak month will be approximately 40 HGV (two way) vehicles per day and approximately 30 LGV (two way) vehicles, with proposed access and departures via Cricklewood Lane and Cricklewood Broadway.

- 13.3.26 Assessment criteria are presented in Table 13-6. The LOAEL was defined as a change of 1 dB and the SOAEL as a change of 5 dB.

Table 13-6 Road Traffic Noise Impacts (Temporary Changes)

Magnitude of Impact	Noise Change Band, $L_{A10,18h}$
Low	≥ 0 dB and < 1 dB
Medium	≥ 1 dB and < 3 dB
High	≥ 3 dB and < 5 dB
Very high	≥ 5 dB

Methodology for Determining Complete and Operational Effects

Operational Traffic

- 13.3.27 As discussed in the Scoping Report, there will be a net reduction in trips generated by the Proposed Development when compared to the baseline. Further review of traffic data provided as part of the Transport Assessment identifies that the net reduction will be less than the DMRB guidance threshold of a 20% decrease where perceptible changes may occur. Therefore, no significant effects (beneficial or adverse) associated with development traffic noise are expected.

Fixed Plant and Building Services

- 13.3.28 As a finalised schedule of plant or details of operational activities is not yet available, suitable criteria for operational noise limits have been recommended based on BS 4142 guidance. No quantitative assessment of noise from fixed plant and building services has been undertaken.
- 13.3.29 A key aspect of the BS 4142 assessment method is a comparison between the background noise level in the vicinity of receptor locations and the rating level of the noise source under consideration. The relevant sound level parameters in this instance are as follows:
- Background sound level – $L_{A90,T}$ – defined in the Standard as the ‘A’ weighted sound pressure level that is exceeded by the residual sound at the assessment location for 90% of a given time interval, T, measured using time weighting F and quoted to the nearest whole number of decibels;
 - Specific sound level – $L_{Aeq,Tr}$ – the equivalent continuous ‘A’ weighted sound pressure level produced by the specific sound source at the assessment location over a given reference time interval, Tr; and
 - Rating level – $L_{Ar,Tr}$ – the specific sound level plus any adjustment made for the characteristic features of the noise.
- 13.3.30 Once any adjustments have been made, the background level and the rating levels are compared. BS4142 advises the following:
- *“Typically, the greater the difference, the greater the magnitude of impact.*
 - *A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending upon the context.*
 - *A difference of around +5 dB is likely to be an indication of an adverse impact, depending upon the context.*

- *The lower the rating level is to the measured background sound level, the less likely it is that the specific sound 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 upon the context.”*

13.3.31 Based on the above guidance, the LOAEL was defined as a rating level equal to the background level, and the SOAEL as a rating level 10 dB above the background level.

13.3.32 Noise limits for fixed plant and building services have been set to a rating level 5 dB below the background level in line with the LBB SPD guidance and as to not introduce new noise into the area (i.e. 'background creep') which is equivalent to NOEL.

Suitability of Site for Residential Development

13.3.33 Noise and vibration assessments have been undertaken to determine the site's suitability for the Proposed Development based on the results of the noise and vibration surveys. Noise has been assessed against guidance on internal amenity noise levels given in BS 8233 and ProPG guidelines, which are aligned with internal guidance levels from the WHO Guidelines for Community Noise. Vibration has been assessed guidance from BS 6472-1.

13.3.34 At this stage, only the more sensitive areas (residential areas) in the Proposed Development were assessed as it would follow that where noise and vibration threshold criteria can be achieved in these areas, criteria in other less-sensitive areas (e.g. commercial units) can also be readily achieved.

13.3.35 The suitability assessment is not intended to form part of the impact assessment, but rather to determine any outline requirements as to achieve suitable amenity noise and vibration levels for the intended use of the Proposed Development.

13.3.36 The relevant criteria applicable to internal noise within residential uses is presented in Table 13-7.

Table 13-7 Criteria for Indoor Ambient Noise Levels for Dwellings when they are Unoccupied

Activity	Location	16 h day (07:00-23:00)	8 h night (23:00-07:00)
Resting	Living Room	35 dB $L_{Aeq,16hr}$	-
Dining	Dining Room/Area	40 dB $L_{Aeq,16hr}$	-
Sleeping (daytime resting)	Bedroom	35 dB $L_{Aeq,16hr}$	30 dB $L_{Aeq,8hr}$ 45 dB L_{Amax} (10-15 events)

13.3.37 Some flexibility to the internal $L_{Aeq,T}$ noise criteria is provided by BS 8233 which 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."*

13.3.38 ProPG expands on this by defining exceedances of greater than 5 dB as 'unreasonable'. These exceedances may be allowable in developments if applicants can provide detailed information on how the number of rooms affected has been kept to a minimum. Once internal noise levels exceed BS 8233 criteria by 10 dB, ProPG defines the internal noise conditions as 'unacceptable'.

13.3.39 Based on the above guidance, the LOAEL was defined as internal noise levels up to 5 dB above the guidance levels, and the SOAEL as internal noise levels 5 dB or greater above the guidance levels.

13.3.40 The relevant criteria applicable to vibration levels in residential spaces is presented in Table 13-8. The LOAEL was defined as vibration levels equivalent to 'low probability of adverse comment', and the SOAEL as vibration levels equivalent to 'adverse comment probable'.

Table 13-8 Vibration Dose Value Ranges which Might Result in Various Probabilities of Adverse Comment within Residential Buildings

Place and time	Low probability of adverse comment $m\cdot s^{-1.75}$	Adverse comment possible $m\cdot s^{-1.75}$	Adverse comment probable $m\cdot s^{-1.75}$
Residential buildings 16 h day (07:00-23:00)	0.2 to 0.4	0.4 to 0.8	0.8 to 1.6
Residential buildings 8 h night (23:00-07:00)	0.1 to 0.2	0.2 to 0.4	0.4 to 0.8

Significance Criteria

- 13.3.41 The following terminology was used to define noise and vibration effects:
- Adverse - detrimental or negative effects to an environmental resource or receptor;
 - Negligible - imperceptible effects to an environmental resource or receptor; or
 - Beneficial - advantageous or positive effects to an environmental resource or receptor.
- 13.3.42 Where adverse or beneficial noise and vibration effects were identified, these are described using the following scale:
- Minor - slight, very short or highly localised effect;
 - Moderate - limited effect (by extent, duration or magnitude), which may be important at a local scale; or
 - Major - considerable effect (by extent, duration or magnitude) of more than local significance or in breach of recognised acceptability, legislation, policy or standards.
- 13.3.43 The duration of noise and vibration effects is defined as follows:
- Short term - up to 24 months duration;
 - Medium term - up to 48 months duration; or
 - Long term – associated with the completed and occupied Proposed Development.
- 13.3.44 Table 13-9 provides a matrix showing the significance of effects depending on the sensitivity of receptors and magnitude of impact.

Table 13-9: Classification of Effects

Magnitude of Potential Change/Impact	Importance of the Resource/Sensitivity of the Receptor			
	Very High	High	Medium	Low
Very High	Major	Major	Moderate	Minor
High	Major	Moderate	Minor	Negligible
Medium	Moderate	Minor	Negligible	Negligible
Low	Minor	Negligible	Negligible	Negligible

Consultation

- 13.3.45 Consultation was undertaken with respect of the EIA scoping process. The approach to the assessment of noise and vibration effects was set out in the AECOM EIA Scoping Report submitted to LBB in December 2019. LBB issued their EIA Scoping Opinion in February 2020. Table 13-10 summarises key comments raised by consultees of relevance to this assessment and how the assessment has responded to them.

Table 13-10 Comments raised in the LBB EIA Scoping Opinion

Comments Raised	Response Provided in the ES/Planning Application
<i>"The SR [Scoping Report] sets out that the assessment of the noise and vibration impacts during the demolition and construction phase, and once the Proposed Development is complete and operational would be SCOPED IN to the EIA. However, no major vibration sources or increases in traffic flows are envisaged to be introduced as part of the Proposed Development, and therefore operational vibration and operational traffic noise will have no impact and is SCOPED OUT from the EIA. This conclusion and the assessment methodology has been reviewed the Council's Environmental Health officer who concurs with the conclusions and is satisfied with the methodology."</i>	No response; assessment to follow scope set out in the Scoping Report.

Limitations and Assumptions

- 13.3.46 To assess the potential noise and vibration effect of the Proposed Development, it was necessary to determine the baseline conditions. Due to site access restrictions and safety of operators, noise surveys comprised of long-term noise and vibration monitoring on the eastern boundary, and a single set of short-term attended daytime and night-time noise measurements on the western boundary. The survey was carried out prior to any restrictions on travel or public activity associated with the coronavirus outbreak. It is considered that the noise and vibration measurements, which were undertaken at the Site in January/February 2020, are representative of the baseline noise and vibration environment once temporary lockdown effects come to an end.
- 13.3.47 For the purposes of the assessment, it has been assumed the facades of buildings will be at the extent of the building plots. This is an outline application so the actual extent of building facades will be subject to revision. Noise measurements at location LT and vibration measurements at location V are considered representative of the highest noise and vibration levels that may be experienced at buildings within the Proposed Development.
- 13.3.48 The measured L_{A90} background noise level was used to define design criteria for fixed plant associated with the Proposed Development. Ambient noise levels may change in the period between the survey and the future assessment years; however, as the L_{A90} 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 2020 baseline survey and the Proposed Development opening year due to the development of areas surrounding the Site.

13.4 Baseline Conditions

Existing Baseline

- 13.4.1 The dominant noise sources in the vicinity of the Site are train movements arriving and departing from Cricklewood Railway Station and road traffic along A5 Cricklewood Lane. Additional minor noise sources were observed to be vehicle movements within the existing B&Q retail unit car park (located within the Site boundary) and along local roads, as well as announcements from the nearby Beacon Bingo hall (located approximately 25m to the west of the Site boundary). There are no designated 'Quiet Areas' in the locality of the Site.

- 13.4.2 Vibration during train movements was perceived by the attending site engineer along the eastern Site boundary. At locations away from the eastern boundary, train vibration was not perceived.
- 13.4.3 Summaries of noise and vibration measurements are presented in Table 13-11 (long-term noise monitoring at the LT position on Figure 13.3.1), Table 13-12 (short-term noise monitoring at the ST position on Figure 13.3.1) and Table 13-13 (short-term vibration monitoring at the V position on Figure 13.3.1). Further details of the methodology and results of the baseline surveys are summarised in Appendix 13.2.

Table 13-11 Summary of Long-Term Noise Monitoring (Location LT)

Dates/time of measurement	Time period (T)	L _{Aeq,T} dB	L _{A90,15min} dB	L _{Amax,15min} dB
Start: 04/02/2020 12:30	Daytime 07:00-23:00	62	53	94
End: 11/02/2020 10:15	Night-time 23:00-07:00	57	43	79

Table 13-12 Summary of Short-Term Noise Monitoring (Location ST)

Dates/time of measurement	Time period (T)	L _{Aeq,T} dB	L _{A90,T} dB	L _{Amax,T} dB
23/01/2020 13:15	2 hours	60	51	82
24/01/2020 00:00	1 hour	52	47	80

Table 13-13 Summary of Short-Term Vibration Monitoring (Location V)

Dates/time of measurement	Time period (T)	Measured 2-hour VDV _{2hr} (ms ^{-1.75})	Estimated* daytime (07:00-23:00) VDV _{16hr} (ms ^{-1.75})	Estimated* night-time (23:00-07:00) VDV _{8hr} (ms ^{-1.75})
23/01/2020 15:45	2 hours	0.055	0.093	0.078

* Note to table: 16-hour daytime and 8-hour V DVs have been estimated based on guidance from BS 6472-1 section 3.5 'Vibration dose summation' assuming the measured 2-hour V DV value is representative of the typical vibration profile throughout the day and night. This is considered a worst-case scenario as there would be fewer trains during the night.

Future Baseline

- 13.4.4 As discussed above, emerging developments within the vicinity of the Site are not expected to notably increase the local noise environment; as such the 2020 baseline noise and vibration environment is considered representative of the future baseline during the opening year (2026) of the Proposed Development.

13.5 Environmental Design and Management

- 13.5.1 Potential environmental effects that have been or will be avoided, prevented, reduced or off-set through the design and / or management of the Proposed Development are outlined below for the construction and operational phases. These measures are considered as part of the assessment of the likely significant effects. Proposed environmental enhancements are also described where relevant.

Demolition and Construction

- 13.5.2 As with any large-scale construction programme in an urban context, there will be temporary impacts on local receptors. However, construction noise and vibration, mitigated through 'Best Practicable Means' (BPM) as defined by Section 72 of the Control of Pollution Act 1974 and careful management which will be documented in a Construction Environmental Management Plan (CEMP). The CEMP will be prepared prior to the commencement of works which will describe the mitigation measures that will be applied for construction activities which is expected to be secured by an appropriately worded planning condition.
- 13.5.3 Measures to control noise as defined in Annex B of BS 5228-1 and measures to control vibration as defined in Section 8 of BS 5228-2 will be adopted where reasonably practicable. General measures will include the following as appropriate:
- Vehicles and mechanical plant used for the purpose of the works will be fitted with effective exhaust silencers, maintained in good and efficient working order, and operated in such a manner as to minimise noise emissions. The contractor will ensure that all plant complies with the relevant statutory requirements;
 - Machines in intermittent use will be shut down or throttled down to a minimum when not in use;
 - Compressors will be fitted with properly lined and sealed acoustic covers which will be kept closed whenever in use. Pneumatic percussive tools will be fitted with mufflers or silencers of the type recommended by the manufacturers;
 - Equipment which breaks concrete, brickwork or masonry by bending, bursting or "nibbling" will be used in preference to percussive tools. Where possible, the use of impact tools will be avoided where the Site is close to occupied premises;
 - Rotary drills and bursters activated by hydraulic, chemical, or electrical power will be used for excavating hard or extrusive material;
 - Wherever possible, equipment powered by mains electricity will be used in preference to equipment powered by internal combustion engine or locally generated electricity;
 - No part of the works nor any maintenance of plant will be carried out in such a manner as to cause unnecessary noise except in the case of an emergency when the work is necessary for the saving of life or property or the safety of the works;
 - Plant will be maintained in good working order so that extraneous noise from mechanical vibration, creaking and squeaking is kept to a minimum; and
 - Noise emitting machinery which is required to run continuously will be housed in a suitable acoustically lined enclosure.
- 13.5.4 These are generic good industry practice environmental design and management recommendations and are typically applicable to most construction sites and will be contained within the CEMP that will be prepared for the Proposed Development after receipt of planning permission.
- 13.5.5 Consideration will also be given to traffic routing, timing and access points to the site to minimise noise impacts at existing receptors following contractor appointment, and as construction working methods are developed. However, increases in road traffic noise levels during construction works will be temporary, relatively short term, and although the effect will be dependent on the actual number of HGV deliveries, it is considered that significant noise and vibration effects can be managed and avoided. Contractors will issue a project route map and delivery schedule to control construction traffic. Traffic management will be employed to guide and control both public and construction traffic during deliveries and will be documented in a Construction Traffic Management Plan (CTMP).

- 13.5.6 The effectiveness of the application of mitigation measures is dependent on the construction methodology and the appointed construction contractor. Consequently, the potential reduction in noise as a result of the mitigation measures cannot be accurately quantified so unmitigated noise predictions have been undertaken and unmitigated noise effects have been identified. The potential reduction in noise as a result of mitigation measures has been estimated based on professional experience and is identified in the *Residual Effects* section.

Operational Development

Ambient Noise within the Proposed Development

- 13.5.7 To achieve the internal noise levels detailed in Table 13-7, external noise ingress must be controlled by the building envelope and suitable systems are selected. The final façade details will be finalised during the detailed acoustic design of the Proposed Development at the Reserved Matters Application stage.
- 13.5.8 Based on the noise survey results, facades of the Proposed Development along the eastern Site boundary which front onto the rail line will be the worst-affected by noise. Facades on the western Site boundary or facing internal within the Site will experience lower levels of noise in comparison.
- 13.5.9 A summary of the long-term measured noise levels, which are considered to be representative of noise levels incident on the worst-affected facades of the Proposed Development (i.e. those on the eastern boundary facing the rail lines) is provided in Table 13-14. Note that due to setback distances of the building plots, actual incident noise levels will be lower. The estimated overall sound reduction of the façade in order to achieve the internal ambient noise criteria for habitable rooms (as set out in Table 13-7) has been provided.

Table 13-14 Sound Reduction of Worst-Affected Facades of Proposed Development

Location	External (free-field) noise levels, dB			Estimated weighted sound reduction performance of façade, R_w+C_{tr} dB
	Daytime $L_{Aeq,16hr}$	Night-time $L_{Aeq,8hr}$	Night-time L_{Amax}	
Eastern boundary facades fronting onto rail line	62	57	79	34

- 13.5.10 Example glazing configurations may comprise enhanced double glazing e.g. 6mm glass/6-16mm air gap/6mm laminated, with a weighted sound reduction performance of R_w+C_{tr} 38 dB. These have been developed on the assumption that a uniform façade system will be adopted for all building envelopes (rather than providing different glazing build-ups to different storeys on various facades) at this stage.
- 13.5.11 A partially opened window typically provides 10-15 dB of noise reduction; when windows are opened (e.g. for purge ventilation / temperature control) then internal ambient noise criteria may be exceeded however this will be at the discretion of the room occupant. Windows would be required to be closed to achieve internal noise criteria and as such alternative forms of ventilation will be required. Alternative ventilation could be provided by acoustically attenuated trickle ventilation (such as the type of acoustic ventilator specified in the Noise Insulation Regulations). However, the attenuation performance of any alternative ventilation system must be specified to achieve a value of no less than that provided by the glazed element of the façade.
- 13.5.12 ProPG notes that internal noise level guidelines are generally not applicable to purge ventilation conditions (provided by opening windows) as this would only occur occasionally. When windows of residential units are opened to maintain comfort during warm periods, internal noise are expected to exceed the BS 8233 guidance levels, although it is considered that such occurrences are likely to be limited.
- 13.5.13 It is considered that with design measures such as appropriate glazing and ventilation specifications and façade insulation design, the impact from both transport noise sources as well as surrounding existing commercial activities affecting future occupants can be mitigated and the internal ambient noise criteria can be achieved. As such, the Site is considered suitable for its intended use. This will be finalised during future Reserved Matters Applications (RMA).

Ambient Vibration within the Proposed Development

- 13.5.14 For the eastern Site boundary which is closest to the rail line, estimated daytime and night-time vibration levels presented in Table 13-13 are below $0.1 \text{ m}\cdot\text{s}^{-1.75}$ VDV. Vibration levels within the Site will be lower at greater distances from the rail line.
- 13.5.15 Based on the criteria in Table 13-8 this indicates vibration levels are below the guidance levels for a 'Low probability of adverse comment'.
- 13.5.16 No mitigation measures to address ambient vibration are considered necessary, and the Site is considered suitable for its intended use.

Fixed Plant and Building Services Noise

- 13.5.17 Building services plant will be designed to achieve operational limits consistent with the requirements of BS 4142 which may require mitigation to be incorporated into the fixed plant design. The specification of plant machinery with low noise emission and properly attenuated supply and extract terminations will help to mitigate noise emissions. The use of enclosures, local screening, mufflers and silencers will also be used as appropriate. Where the noise exhibits any such acoustic features then the relevant penalty/correction will be applied in accordance with BS 4142 so that the resultant rating level falls within any applicable limit levels.
- 13.5.18 Table 13-15 presents proposed operational noise limits for building services and fixed plant associated with the Proposed Development at nearby sensitive receptors, as not to exceed 5 dB below the background noise levels (represented by the long-term monitoring, Table 13-11).

Table 13-15 Proposed Building Services Design Criteria

Location	Rating level of operational noise $L_{A,r,Tr}$ dB	
	Day 07:00 – 23:00	Night 23:00 – 07:00
Existing residential properties	48	38

- 13.5.19 The above limits address the issue of disturbance to existing noise sensitive properties due to noise emission from building services plant. Noise to future sensitive areas of the Proposed Development such as the residential uses and non-residential (employment, health centre, and offices) uses is not included in this. To provide confidence that plant noise emission to areas within the Proposed Development is suitable, the noise limits in Table 13-16 are proposed; these will be finalised during future RMA's.

Table 13-16 Proposed Plant Noise Limits within the Proposed Development

Location	Maximum plant noise level
	Daytime and Night-time ($L_{Aeq,15min}$ dB)
Residential facades	45
Non-residential facades	50

13.6 Assessment of Effects and Significance

Effects during Demolition and Construction

Noise

- 13.6.1 The assessment of potential noise levels at surrounding receptors from demolition and construction plant during various stages of the works is summarised in Table 13-17. The location of receptors assessed as shown on Figure 13.3.1. Details of the calculations are provided in Appendix 13.3.

Table 13-17 Demolition and Construction Noise Assessment

Receptor	Sensitivity	Predicted L _{Aeq,T} dB noise level						Magnitude of impact	Significance of effect
		Enabling Works	Demolition and Site Clearance	Earth works and Substructure	Super Structure	Roofing and Cladding	Fit-out & Lift Install		
R1	High	62	65	66	64	58	58	Low to Medium	Negligible to Minor (Adverse)
R2	High	68	71	71	69	63	63	Low to High	Negligible to Moderate (Adverse)
R3	High	66	69	69	67	61	61	Low to Medium	Negligible to Minor (Adverse)
R4	High	59	62	63	61	55	54	Low	Negligible

13.6.2 Based on the criteria in Table 13-3 demolition and construction noise levels at R2 are predicted to have a low to high magnitude of impact, which for high sensitivity receptors is equivalent to a negligible to moderate adverse effect. Significant adverse effects are predicted to occur during demolition, site clearance, earthworks and substructure activities at building plot A which is nearest to R2.

13.6.3 Based on the indicative construction programme (presented in *Chapter 6: Demolition and Construction*) early stages of works likely to cause significant effects at R2 are likely to be 33 months in duration (i.e. 38 weeks demolition and site clearance, 39 weeks Parcel A foundations then 64 weeks Parcel A superstructure). As such any the duration of significant adverse effects at R1 would be in the 'medium term'.

13.6.4 At R1 and R3, demolition and construction noise levels are predicted to have a low to medium magnitude of impact, which for high sensitivity receptors is equivalent to a negligible to minor adverse effect which is not significant.

13.6.5 The nature of demolition and construction work means that plant working at the closest approach may exist for only a matter of days or even hours and there would be regular periods, even during the course of a single day, when the assumed noisy plant will not be in operation during breaks or changes of working routine. As such any the duration of adverse effects at R1 and R3 is limited to the 'short term'.

13.6.6 At R4, demolition and construction noise levels are predicted to have a low magnitude of impact, which for high sensitivity receptors is equivalent to a negligible effect which is not significant. .

13.6.7 The programme for works (presented in *Chapter 6: Demolition and Construction*) indicates that the Proposed Development will be constructed in phases, with Parcel B being completed first followed by Parcel A, Parcel C, then Parcel D. The Proposed Development will be mostly built out before any of the Parcels are occupied such that future occupants would not be subject to noisy works (e.g. demolition, earthworks, substructure activities) and any works on adjacent Parcels would only be for later stages (e.g. cladding, fit-out, landscaping) which are relatively quiet in comparison. The introduction of the buildings themselves will also physically screen any construction works noise from other parts of the Site. It is expected that construction works noise will be suitably managed such that effects on any future occupants of the Proposed Development will be limited to short-term duration minor adverse effects which is not significant.

13.6.8 Construction noise is not predicted to exceed the SOAEL at any of the identified receptors.

Vibration

13.6.9 BS 5228-2 makes reference to TRL report 429; Figure 50 of the TRL report indicates that ground vibration from miscellaneous vehicle operations on demolition and construction sites (including scrapers,

rollers, dumpers, breakers, bulldozers and HGVs) are in the region of 1 mm/s PPV at approximately 10 m, decreasing to the region of 0.1 mm/s PPV at approximately 50m. However, actual vibration levels from construction works are dependent on several factors including ground conditions, plant or vehicle size, the nature of the works (in particular piling methods), the speed of HGV movements and the quality of surface of haul or other temporary roads.

- 13.6.10 *Chapter 6: Demolition and Construction* advises that during piling and substructure works, bearing piles for the Proposed Development will be installed using Continuous Flight Auger (CFA) piling rig, or equipment of a similar scale. Historic measurement data provided in BS 5228-2 indicates that CFA piling activities generally only generate vibration impacts (i.e. vibration levels greater than 1 mm/s PPV) when they are located less than 20m from sensitive locations. However, the impact depends on the type of piling, ground conditions, and receptor distance.
- 13.6.11 At these distances, it is expected that vibration levels at surrounding receptors would be limited to a low to medium magnitude of impact (based on the criteria in Table 13-4). For high sensitivity receptors this is equivalent to a negligible to minor adverse short-term effect which is not significant. Construction vibration is not predicted to exceed the SOAEL at any of the identified receptors.
- 13.6.12 Vibration effects on structures (based on the criteria in Table 13-5) would be limited to a negligible effect which is not significant.

Traffic Noise

- 13.6.13 The changes in road traffic noise levels due to demolition and construction traffic are presented in Table 13-18 and assessed per the criteria in Table 13-6.

Table 13-18 Demolition and Construction Traffic Noise Assessment

Road link	2024 Baseline (without existing Site traffic)		2024 Baseline (without existing Site traffic) + construction		Change in road traffic noise level	Magnitude of impact
	Total traffic flow	Total HGV (%)	Total traffic flow	Total HGV (%)		
Cricklewood Lane westbound	11656	2015 (17%)	11691	2035 (17%)	0.0 dB(A)	Low
Cricklewood Lane eastbound	11656	2015 (17%)	11691	2035 (17%)	0.0 dB(A)	Low
Cricklewood Broadway northbound	9104	4296 (47%)	9139	4316 (47%)	0.0 dB(A)	Low
Cricklewood Broadway southbound	17835	2019 (11%)	17870	2039 (11%)	0.0 dB(A)	Low

- 13.6.14 There are no predicted changes to road traffic noise levels due to demolition and construction routes along Cricklewood Lane and Cricklewood Broadway, which is equivalent to NOEL. The magnitude of impact will be low, and for high sensitivity receptors in the area this equivalent to a negligible effect which is not significant. Given that this assessment is based on peak construction traffic any adverse effects will be limited to the short term.

Effects once Complete and Operational

Ambient Noise within the Proposed Development

- 13.6.15 The design of the Proposed Development will include a mitigation strategy such that suitable façade configurations (following any design requirements as set out by the Applicant) are selected so that desirable internal noise conditions are achieved. The final façade design (including glazing and ventilation configurations) will be finalised during the detailed acoustic design, at Reserved Matters Application stage of the Proposed Development.

Fixed Plant and Building Services Noise

- 13.6.16 Operational noise from fixed plant and building services will be designed to achieve suitable operational noise limits at surrounding receptors; as such these would have a negligible effect which is not significant.

13.7 Additional Mitigation and Monitoring Measures

Mitigation during Demolition and Construction

- 13.7.1 Likely significant adverse effects due to demolition and construction works noise at the nearest receptors have been identified. At this stage no additional mitigation or monitoring measures are proposed; further assessment will be undertaken by the appointed contractor prior to works commencing and once exact working methods are confirmed, as to identify and confirm any specific mitigation measures that may be required beyond the embedded measures.
- 13.7.2 No significant adverse effects due to vibration or traffic noise have been identified and no additional mitigation or monitoring measures are proposed. However as stated above these will be finalised by the appointed contractor prior to works commencing and once exact working methods are confirmed.
- 13.7.3 It is not considered that monitoring of demolition and construction noise and vibration levels would be required, although this may be undertaken as part of any consent agreements between the appointed contractor and LBB.

Mitigation Once the Proposed Development is Operational

- 13.7.4 No significant adverse effects due to operational activities have been identified; no mitigation measures beyond the embedded measures identified are required.
- 13.7.5 The use of mitigation measures will be finalised during future RMA's such that desirable internal noise and vibration conditions are achieved for residential use within the Proposed Development.
- 13.7.6 It is expected that during future RMA's, information for glazing/ventilation configurations and for building services and fixed plant would be provided as a planning condition to any subsequent planning permissions.
- 13.7.7 It is not considered that monitoring of operational noise levels would be required, although this may be undertaken as part of any plant commissioning testing as part of any reserved matters applications.

13.8 Residual Effects and Conclusions

- 13.8.1 Residual effects of construction noise are predicted to be medium term moderate adverse (which is significant) at receptor R2 during demolition, site clearance, earthworks and substructure activities. For later phases of works, residual effects are predicted to be negligible to minor adverse which is not significant.
- 13.8.2 At receptors R1, R3 and R4 as well as future occupants of the Proposed Development, residual effects during all phases of demolition and construction works are predicted to be negligible to minor adverse which is not significant.
- 13.8.3 Residual effects of demolition and construction vibration are negligible to minor adverse (not significant) for occupants of nearby buildings, and negligible (not significant) to nearby buildings and structures.
- 13.8.4 Residential effects of demolition and construction traffic noise are negligible (not significant).
- 13.8.5 The duration of adverse effects due to demolition and construction is considered to be short-term and temporary with no permanent residual effects once works are completed.
- 13.8.6 Operational noise from fixed plant and building services will be designed to achieve suitable operational noise limits. A mitigation strategy will be implemented to achieve desirable internal noise and vibration conditions for residential use within the Proposed Development.
- 13.8.7 Residual effects of operational noise are predicted to be negligible and long-term.

Table 13-19: Noise and Vibration Summary of Potential Effects

Description of Effect	Sensitivity of Receptor	Nature of effect/Geographic Scale	Magnitude of Impact	Initial Classification of Effect (with embedded mitigation)	Additional Mitigation	Residual Effect Significance
Demolition and Construction						
Construction noise affecting receptors at Cricklewood Lane (R2)	High	Temporary (Medium Term) and Local	Low to High	Negligible to Moderate Adverse		Negligible to Moderate Adverse
Construction noise affecting receptors at Dairyman Close (R1) and Kara Way (R3), and future occupants of the Proposed Development	High	Temporary (Short Term) and Local	Low to Medium	Negligible to Minor Adverse		Negligible to Minor Adverse
Construction noise affecting receptors at Travelodge (R2)	High	Temporary (Short Term) and Local	Low	Negligible	Specific measures to be finalised by contractor prior to works commencing and once working methods confirmed	Negligible
Construction vibration affecting identified receptors R1 to R4 and future occupants of the Proposed Development	High	Temporary (Short Term) and Local	Low to Medium	Negligible to Minor Adverse		Negligible to Minor Adverse
Vibration effects and the risk of cosmetic damage to structures	n/a	Temporary (Short Term) and Local	n/a	Negligible		Negligible
Demolition and construction traffic noise along the local road network	High	Temporary (Short Term) and Local	Low	Negligible		Negligible

Complete and Occupied

Fixed plant and building services noise	High	Permanent (Long Term) and Local	Low	Negligible	None	Negligible
Ambient noise and vibration within the Proposed Development	Medium	Permanent (Long Term) and Local	n/a	n/a	To be finalised as part of acoustic design strategy	N/A

13.9 Statement of Effect Significance

- 13.9.1 During early stages of demolition and construction works (e.g. enabling works, demolition and site clearance, earthworks and substructure) residual effects of **moderate** significance are predicted at the nearest receptors to the Site boundary (i.e. residential properties approximately 20m to the south along Cricklewood Lane).
- 13.9.2 No other significant effects are identified.

13.10 Cumulative Effects Assessment

Demolition and Construction

Assessment of Effects

- 13.10.1 It is considered that any overlapping of demolition and construction phases between the Proposed Development and the other nearby development schemes (e.g. 18/6353/FUL - "Co-op Site" 1-13 Cricklewood Lane London NW2 1ET and 17/0233/FUL - 194-196 Cricklewood Broadway London as identified in *Chapter 7: EIA Methodology*) will have the greatest potential to contribute to in-combination cumulative effects. During the demolition and construction phases, potential cumulative effects exist for common receptors within the immediate local surroundings.
- 13.10.2 Common receptors to the Proposed Development and the 1-13 Cricklewood Lane and 194-196 Cricklewood Broadway schemes include R2 (residential properties on Cricklewood Lane), R3 (residential properties on Kara Way), and R4 (Travelodge).
- 13.10.3 For the Proposed Development, the introduction of site hoardings, use of BPM for construction activities, adherence to pre-determined HGV traffic routes, and compliance with the mitigation measures detailed within this chapter will reduce these interactions as far as possible. It is expected that each individual scheme will also be subject to minimising any significant adverse effects on surrounding noise-sensitive receptors, however where a noise-sensitive receptor is subject to noise from multiple schemes there is the potential that they would experience increased noise levels and/or prolonged duration of adverse effects.
- 13.10.4 Should high-noise stages of works (e.g. demolition, earthworks) take place at the Proposed Development and the 1-13 Cricklewood Lane and 194-196 Cricklewood Broadway schemes at the same time, it is considered likely that receptors R2 and R3 will experience temporary short-term moderate to major adverse (significant) effects. During less noisy stages of works the potential for significant effects will be decreased.

Additional Mitigation and Monitoring Measures

- 13.10.5 It is recommended that the LBB liaise with the Contractors of neighbouring schemes, in order to establish working guidelines to reduce the effects of cumulative demolition and construction works noise. Where necessary, the LBB and Contractors shall seek to undertake regular liaison meetings and reviews with neighbouring demolition and construction sites to plan works so that they do not cause unnecessary disruption.

Residual Effects

- 13.10.6 Residual effects of cumulative construction noise as estimated to be, as a worst-case, temporary short-term moderate to major adverse which is significant; however, this would only occur in the event that high noise stages of works take place on all sites at the same time. During other scenarios the potential for significant effects will be decreased.

Complete and Operational

Assessment of Effects

- 13.10.7 It is expected that building services noise from nearby developments will be designed to achieve appropriate operational noise limits to not contribute additional noise to the area, i.e. 'background creep', which would avoid any adverse effects to noise-sensitive receptors in the area.

Additional Mitigation and Monitoring Measures

- 13.10.8 Control and mitigation of noise effects from surrounding developments will be the responsibility of the individual operator. Provided services plant from nearby developments are designed to achieve appropriate operational noise limits, it is considered that there will be no significant effects due to cumulative building services noise.

Residual Effects

- 13.10.9 Residual effects of cumulative operational noise are estimated to be negligible and not significant.