6.0 NOISE AND VIBRATION

INTRODUCTION

6.1 This Chapter of the ES assesses the likely environmental effects of the proposed development, with respect to noise and vibration. The existing and proposed road traffic noise levels are considered in order to demonstrate site suitability and to allow consideration of potential effects at existing noise sensitive receptors in the surrounding area.

6.2 In the context of this assessment, noise is defined as unwanted or undesirable sound derived from sources such as road traffic, or construction works that interfere with normal activities, including conversation, sleep or recreation. Vibration is defined as the transmission of energy through the medium of ground or air resulting in small movements of the transmitting medium, such as a building, which can cause discomfort or even damage to structures if the movements are large enough.

6.3 Described within this Chapter is the relevant legislative and policy framework; the assessment methodology; the baseline conditions at the proposed development site and surroundings; the likely significant environmental effects; the mitigation measures required to prevent, reduce or offset any significant adverse effects; and the likely residual effects after these measures have been employed.

LEGISLATION AND PLANNING POLICY CONTEXT

National

National Planning Policy Framework, 2021

6.4 The National Planning Policy Framework (NPPF) (July 2021) sets out the Government's economic, environmental and social planning policies for England.

6.5 Under Section 15; Conserving and enhancing the natural environment, the following is stated in paragraph 174:

"Planning policies and decisions should contribute to and enhance the natural and local environment by: …

preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of soil, air, water or noise pollution or land instability…"

6.6 The NPPF goes on to state in paragraph 185 that:

"Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as potential sensitivity of

the site or the wider area to impacts that could arise from the development. In doing so they should:

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

b) identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason"

Noise Policy Statement for England (NPSE), 2010

6.7 The NPSE seeks to clarify the underlying principles and aims in existing policy documents, legislation and guidance that relate to noise. It also sets out the long-term vision of Government noise policy:

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

6.8 The NPSE clarifies that noise should not be considered in isolation of the wider benefits of a scheme or development, and that the intention is to minimise noise and noise effects as far as is reasonably practicable having regard to the underlying principles of sustainable development.

6.9 The first two aims of the NPSE follow established concepts from toxicology that are applied to noise impacts, for example, by the World Health Organisation. They are:

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

6.10 The NPSE extends these to the concept of a significant observed adverse effect level.

- SOAEL – Significant Observed Adverse Effect Level - The level above which significant adverse effects on health and quality of life occur.

6.11 The NPSE notes:

"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"

Planning Practice Guidance (PPG) – Noise, 2019

6.12 The PPG relates the three concepts of NOEL, LOAEL and SOAEL to perceptions of noise, and gives guidance on how these different levels should be treated.

6.13 The three levels are summarised as follows, in terms of perceptions and the recommended action:

- NOEL: Noise can be heard, but does not cause any change in behaviour or attitude. Can slightly affect the acoustic character of the area but not such that there is a perceived change in the quality of life.

  Action: No specific measures required;

- LOAEL: Noise can be heard and causes small changes in behaviour and/or attitude, e.g. turning up volume of television; speaking more loudly; where there is no alternative ventilation, having to close windows for some of the time because of the noise. Potential for some reported sleep disturbance. Affects the acoustic character of the area such that there is a perceived change in the quality of life.

  Action: Mitigate and reduce to a minimum.

- SOAEL: The noise causes a material change in behaviour and/or attitude, e.g. avoiding certain activities during periods of intrusion; where there is no alternative ventilation, having to keep windows closed most of the time because of the noise. Potential for sleep disturbance resulting in difficulty in getting to sleep, premature awakening and difficulty in getting back to sleep. Quality of life diminished due to change in acoustic character of the area.

  Action: Avoid

6.14 PPG also introduces a final level, Unacceptable Adverse Effect. Based on the nature of the proposed development, the three earlier discussed levels have been considered within this assessment to address anticipated noise effects.

The London Plan, 2021

6.15 The most relevant guidance within the London Plan in terms of the impact and assessment of noise is found within Policy D14: Noise, which states:

'*…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…'

6.16 Policy D14: Noise refers to Policy D13: Agent of Change, which states:

'…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 Developments 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 ongoing and future management of mitigation measures secured through planning obligations

3 separating new noise-sensitive development where possible from existing noise-generating business 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…'

Richmond Local Plan, 2018

6.17 Policy LP10 Local Environmental Impacts, Pollution and Land Contamination states that:

"The Council will seek to ensure that local environmental impacts of all development proposals do not lead to detrimental effects on the health, safety and the amenity of existing and new users or occupiers of the development site, or the surrounding land. These potential impacts can include, but are not limited to, air pollution, noise and vibration, light pollution, odours and fumes, solar glare and solar dazzle as well as land contamination.

Developers should follow any guidance provided by the Council on local environmental impacts and pollution as well as on noise generating and noise sensitive development. Where necessary, the Council will set planning conditions to reduce local environmental impacts on adjacent land uses to acceptable levels."

6.18 Regarding Noise and Vibration, the Policy goes on to state:

"The Council encourages good acoustic design to ensure occupiers of new and existing noise sensitive buildings are protected. The following will be required, where necessary:

1. noise assessment of any new plant and equipment and its impact upon both receptors and the general background noise levels;

2. mitigation measures where noise needs to be controlled and managed;

3. time limits and restrictions for activities where noise cannot be sufficiently mitigated;

4. promotion of good acoustic design and use of new technologies;

5. measures to protect the occupiers of new developments from existing sources."

Supplementary Planning Document - Development Control for Noise Generating and Noise Sensitive Development. 2018

6.19 LB Richmond adopted the SPD in September 2018 to address noise issues affecting the Borough and assist in providing a consistent approach to development where noise is an issue.

6.20 The SPD identifies that:

"Noise can have a significant effect on the environment, and on the health and quality of life enjoyed by individuals and communities. Consequently, noise needs to be considered

when new developments may create noise and when new developments would be sensitive to the existing noise conditions".

6.21 The document forms part of the Local Plan for Richmond and was produced to "assist developers, decision makers, agents, residents and others to identify issues to be addressed in any application for development in which noise and/or vibration will be an important consideration when assessing that application and details the requirements of the Local Planning Authority".

ASSESSMENT METHODOLOGY

During Construction

6.22 The impact of noise and vibration during construction of the proposed development requires prediction and assessment in accordance with the guidance presented in British Standard 5228 1:2009+A1:2014 'Code of practice for noise and vibration control on construction and open sites. Noise'[1].

6.23 The following elements are considered to have the potential to give rise to significant effects during the demolition and construction stage of the proposed development and have, therefore, been considered within this ES chapter:

- Noise from on-site demolition and construction activities affecting nearby existing sensitive receptors; and
- Vibration from on-site demolition and construction activities affecting nearby existing sensitive receptors.

During Operation

6.24 Computer noise modelling has been used to calculate road traffic noise across the proposed development in accordance with the methodology contained within the Calculation of Road Traffic Noise[2] (CRTN). The future 'with development' scenario has been considered against the future 'without development' scenario based on the traffic flow data for the opening year 2030, as provided by Velocity Transport Planning Ltd, in order to identify the impact of the introduction of the proposed development.

6.25 The ambient noise at residential dwellings is assessed against the guidance provided by BS 8233:2014[3] for both the day and night-time period. Night time maximum noise levels are assessed against the guideline noise level for the onset of sleep disturbance provided by the WHO Guidelines for Community Noise[4]. The ambient noise levels for the year 2027 have been calculated to ensure future noise levels are appropriately considered.

Changes in Road Traffic Flows

6.26 The impact at existing residential receptors due to changes in noise level resulting from changes in traffic flow and composition on existing roads as a result of the operational

development has been assessed in accordance with the guidance presented in the Design Manual for Roads and Bridges[5] (DMRB).

Building Services Plant

6.27 Information pertaining to operational plant is not yet available and details of any likely building services plant are not known. Consequently, limits relating to the introduction of any commercial sources are derived based on the guidance presented by BS 4142:2014+A1:2019[6]. These limits will ensure that plant items can be appropriately selected to minimise the risk of adverse effects.

Play Areas and Makers Labs/Community Centre

6.28 The assessment focusses on those areas with potential for significant effects. Play areas/ breakout from Makers Labs/Community Centre has not been considered detail however, discussion is provided in the Residual Impacts section.

Methodology for Defining Effects

Sensitivity

6.29 The criteria set out in Table 6.1 below have been applied to identify noise/vibration sensitive receptors either on or adjacent to the site.

Table 6.1 Table 6.1 Noise and Vibration Receptors

Sensitivity	Description	Receptor
High	Receptors that are especially susceptible to noise/vibration	Residential dwellings, Schools, Hospitals, Care Homes
Moderate	Receptors where a reasonable degree of noise disturbance is acceptable	Offices
Low	Receptors where noise is tolerable	Retail shops, restaurants
Negligible	Receptors where noise is not likely to be a factor	Sports Grounds, commercial and industrial environments

Demolition and Construction Noise

6.30 Noise levels generated by construction activities have the potential to impact upon nearby noise-sensitive receptors. However, the magnitude of the potential impact will depend upon a number of variables, such as:

- the noise generated by plant or equipment used on site;
- the period of time that construction plant is operational;
- the distance between the noise source and the receptor; and

- the level of likely attenuation due to ground absorption and barrier effects.

6.31 BS 5228 gives several examples of acceptable limits for construction or demolition noise. The most simplistic being based upon the exceedance of fixed noise limits and states in paragraph E.2:

"Noise from construction and demolition sites should not exceed the level at which conversation in the nearest building would be difficult with the windows shut.".

"Noise levels, between say 07.00 and 19.00 hours, outside the nearest window of the occupied room closest to the site boundary should not exceed: 70 decibels (dBA) in rural, suburban areas away from main road traffic and industrial noise or 75 decibels (dBA) in urban areas near main roads in heavy industrial areas. These limits are for daytime working outside living rooms and offices."

6.32 The construction noise impact considers the noise magnitude and adverse effect levels as provided in the Noise Policy Statement for England[7] (NPSE) and the Planning Practice Guidance[8] (PPG) provided by the Department for Communities & Local Government in its on-line planning guidance to assist with interpretation of the NPPF[9] as shown in Table 6.2.

Table 6.2 Construction Noise Magnitude

Day	Time (hours)	Averaging Period T	LOAEL $L_{Aeq,T}$ (dB)	SOAEL $L_{Aeq,T}$ (dB)*
Mondays to Fridays	0700 – 0800	1 hour	60	70
	0800 – 1800	10 hours	65	75
	1800 – 1900	1 hour	60	70
	1900 – 2200	1 hour	55	65
Saturdays	0700 – 0800	1 hour	60	70
	0800 - 1300	5 hours	65	75
	1300 - 1400	1 hour	60	70
	1400 - 2200	1 hour	55	65
Sundays & Public Holidays	0700 - 2200	1 hour	55	65
Any night	2200 - 0700	1 hour	45	55
Table Notes * The measured levels should be monitored in order to ensure that the levels presented in the table are not exceeded for a period of 10 or more days of working in any 15 consecutive days or for a total number of days exceeding 40 in any 6 consecutive months.				

6.33 Threshold values for the onset construction impacts are required to allow quantitative assessment of construction noise levels. The adopted values used to define the magnitude of change for construction noise impacts are based on the values presented in Table 6.3.

Table 6.3 Weekday Threshold Ranges for Construction Levels

Impact	Negligible	Low	Medium	High
Construction Noise Level, $L_{Aeq,T}$ dB	< 65	65 – 70	70 - 75	> 75

6.34 It is worth noting that the purpose of the target construction noise criteria is to control the impact of construction noise insofar as is reasonably practicable, whilst recognising that it is unrealistic for developments of this nature to be constructed without causing some degree of disturbance in the locality. Hence, even if the criteria adopted for this assessment is achieved, noise from construction activities is likely to be readily noticeable. It is further noted that the local authority may restrict the hours of construction and construction related traffic on the site.

Demolition and Construction Vibration

6.35 Vibration may be impulsive, such as that due to hammer-driven piling; transient, such as that due to vehicle movements along a railway; or continuous, such as that due to vibratory driven piling. The primary cause of community concern generally relates to building damage from both construction and operational sources of vibration, although, the human body can perceive vibration at levels which are substantially lower than those required to cause building damage.

6.36 Damage to buildings associated solely with ground-borne vibration is not common and although vibration may be noticeable, there is little evidence to suggest that they produce cosmetic damage such as a crack in plaster unless the magnitude of the vibration is excessively high. The most likely impact, where elevated levels of vibration do occur during the construction phase, is associated with perceptibility.

6.37 BS 5228 indicates that the threshold of human perception to vibration is around 0.15mm/s, although it is generally accepted that for the majority of people vibration levels in excess of between 0.15 and 0.3 mm/s peak particle velocity (PPV) are just perceptible.

6.38 Accordingly, 1 mm/s ppv has been selected as the target criteria to control the impact of construction vibration, with the criteria for assessing the magnitude of vibration impacts according to the margin by which this target criterion is achieved or exceeded presented in Table 6.4 below.

6.39 This target criterion is based on the guidance contained within BS 5228, experience from previous sites and accepted vibration policy criteria across a range of enforcing authorities elsewhere in the UK. The limits are presented in terms of peak particle velocity (PPV) as it is the simplest indicator for both perceptibility and building damage.

Table 6.4 Ground-vibration impact levels for permanent residential buildings

Vibration		
Lowest Observed Adverse Effect Level	PPV mm/s	1
Significant Observed Adverse Effect Level	PPV mm/s	10

6.40 Again, it is worth noting that the purpose of the target construction vibration criteria is to control the impact of construction vibration insofar as is reasonably practicable and is entirely based on the likelihood of the vibration being perceptible, rather than causing damage to property. Hence, although vibration levels in excess of 1 mm/s ppv would be considered a Major Adverse impact in respect of the likelihood of perceptibility, they would not be considered significant in terms of the potential for building damage, which would require levels of at least 15 mm/s ppv to result in minor cosmetic damage in light / unreinforced buildings.

6.41 There are currently no British Standards that provide a methodology to predict levels of vibration from construction activities, other than that contained within BS 5228 which relates to percussive or vibratory piling only. Therefore, it is not possible to accurately predict levels of vibration during the site preparation and construction phases of the proposed development.

6.42 Notwithstanding the above, the empirical predictors for groundborne vibration arising from mechanized construction works provided within BS 5228 have been adapted to provide an indication of the distances where impacts may begin to occur. The adopted calculation is based on vibratory piling and is considered to constitute a cautious consideration when applied to all construction activity.

6.43 The resultant thresholds for identification of vibration impacts at residential dwellings, and calculated distances for the likely onset of these values, are presented in Table 6.5.

Table 6.5 Thresholds for ground-vibration effects at permanent residential buildings

Effect Significance	PPV Threshold	Indicative Distance, m
Negligible	< 1	> 73.3
Minor	1 – 5	21.3 – 73.3
Moderate	5 – 10	12.5 – 21.3
Major	> 10	< 12.5

Effect Magnitude: Completed Development

6.44 The aim of noise policy within the UK is to protect individuals from excessive noise levels both in the workplace and within their homes. It has been recognised that severe annoyance to individuals due to noise can lead to sleep disturbance and adverse health effects.

6.45 The NPPF does not give a set of criteria for external noise assessment and therefore guidance within contemporary British Standards and other internationally published documents has been considered.

6.46 For the purposes of this assessment, external noise levels for residential use have been applied to the residential accommodation and derived on the basis of internal noise criteria outlined in British Standard 8233 and World Health Organisation (WHO) guidance.

6.47 BS 8233 makes recommendations for the control of noise in and around buildings. It suggests appropriate criteria for different situations, and is primarily intended to guide the design of new or refurbished buildings undergoing a change of use rather than to assess the effect of changes in the external noise climate. The guidance provides desirable indoor ambient noise levels for dwellings which are summarised in Table 6.6 below.

Table 6.6 Noise Criteria for Residential Use Buildings

Activity	Location	0700 to 2300	2300 to 0700
Resting	Living room	35 dB $L_{Aeq,16hr}$	-
Dining	Dining room/area	40 dB $L_{Aeq,16hr}$	-
Sleeping (daytime resting)	Bedroom	35 dB $L_{Aeq,16hr}$	35 dB $L_{Aeq,8hr}$

6.48 To allow a quantitative assessment of significant effects, impacts have been assigned based on the excess of the BS 8233 criteria and the typical façade reductions, as provided within BS 8233. Reductions of 15 dB and 33 dB are typically afforded for partially open and closed windows, respectively.

6.49 Accordingly, where a reduction of 15 dB is required to achieve the BS 8233 criteria this is an indication that no mitigation is required. The effect is therefore considered as Negligible.

6.50 A 3 dB increase in noise level is considered to constitute a perceptible change, with a 10 dB increase resulting in a perceived doubling in sound level. A Minor effect is considered to be present in instances up to 9 dB above the Negligible criteria, where a sound may be perceived as no more than twice as loud as noise levels at the Negligible threshold value. Where the criteria is exceeded by more than 15 dB and up to 24 dB a Minor significance of effect is identified.

6.51 Based on the 33 dB reduction provided within BS 8233 for closed windows, noise levels up to 33 dB above the BS 8233 criteria are controllable with typical insulated double glazing and adequate ventilation. An identified required façade reduction between 25 and 33 dB is therefore considered a Moderate Adverse effect.

6.52 Where the required façade reduction exceeds 33 dB, a Major Adverse effect is identified. Sufficient glazing and ventilation would be likely for habitable rooms that are subject to these effects in order to suitably reduce internal noise levels.

Table 6.7 Thresholds for Internal Noise at Residential Dwellings

Impact	Negligible	Low	Medium	High
Reduction Required to Achieve BS 8233 Criteria	< 15	15 - 24	25 – 33	> 33

6.53 For all identified effects, the significance could be considered as Negligible with the installation of typical glazing and ventilation options. Where suitable glazing and ventilation options are required, windows may remain openable to allow for purge ventilation or to be used at the occupants' discretion.

6.54 BS8233:2014 states that for traditional external areas that are used for amenity space, such as gardens and patios, it is desirable that the external noise level does not exceed 50 dB $L_{Aeq,T}$, with an upper guideline value of 55 dB $L_{Aeq,T}$ which would be acceptable in noisier environments. However, it is also recognized that these guideline values are not achievable in all circumstances where development might be desirable.

6.55 In higher noise areas, such as city centres or urban areas adjoining the strategic transport network, a compromise between elevated noise levels and other factors, such as the convenience of living in these locations or making efficient use of land resources to ensure development needs can be met, might be warranted. In such a situation, development should be designed to achieve the lowest practicable levels in these external amenity spaces, but should not be prohibited.

6.56 The internal noise levels recommended in BS 8233 are almost identical to those presented in WHO guidelines for community noise (internal to buildings). Internally, the WHO guidance is that in order to avoid sleep disturbance the period noise level ($L_{Aeq,T}$) should not exceed 30 dB and individual noise events should not exceed 45 dB L_{Amax}. Section 3.4 of the WHO Guidelines states that for good sleep, indoor noise levels should not exceed approximately 45 dB L_{Amax} more than 10-15 times a night. On the basis of the WHO's 15 dB façade insulation for windows partly open; this equates to external L_{Amax} of 60 dB that should not be exceeded more than 10-15 times per night.

Fixed Plant

6.57 British Standard BS 4142:2014+A1:2019 Methods for Rating and Assessing Industrial and Commercial Sound is intended to be used for the assessment of whether sound of industrial and/or commercial nature is likely to give rise to complaints from people residing in nearby dwellings. The Standard, which was updated in 2014, states that such sound can include:

- sound from industrial and manufacturing processes;
- sound from fixed installations which comprise mechanical and electrical plant and equipment;
- sound from the loading and unloading of goods and materials at industrial and/or commercial premises; and,
- sound from mobile plant and vehicles that is an intrinsic part of the overall sound emanating from premises or processes, such as that from forklift trucks, or that from train or ship movements on or around an industrial and/or commercial site.

6.58 The procedure contained in BS 4142 for assessing the likelihood of complaints is to compare the measured or predicted sound level from the source in question, the 'specific sound level', at the assessment position with the background sound level. Where sound contains acoustic features, such as tonality, impulsivity or other noticeable characteristics then a correction is added to the specific sound to obtain the 'rating level' that reflects the contextual setting of the site.

6.59 To assess the likelihood of complaints, the measured background sound level is subtracted from the rating level. BS 4142 states:

'Typically, the greater this difference, the greater the magnitude of the impact;

- A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context;
- A difference of around +5 dB is likely to be an indication of an adverse impact, depending on the context; and,
- The lower the rating level is relative to the measured background sound level, the less likely it is that the specific sound source will have an adverse impact or a significant adverse impact. Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending on the context.'

6.60 BS 4142 also states that "where a new noise-sensitive receptor is introduced and there is extant industrial and/or commercial sound, it ought to be recognized that the industrial and/or commercial sound forms a component of the acoustic environment. In such circumstances other guidance and criteria in addition to or alternative to this standard can

also inform the appropriateness of both introducing a new noise-sensitive receptor and the extent of required noise mitigation."

Road Traffic Noise

6.61 The impact of any changes in road traffic noise levels has been considered against the principles and guidance presented within the Design Manual for Roads and Bridges (DMRB) Part 7 HD213/11 Noise and Vibration, 2011. DMRB presents an impact significance matrix for assessing the magnitude of changes in noise level for the short and long term and can be used as criteria for assessing the impact of any changes in road traffic noise levels, as shown in Tables 6.8 and 6.9.

6.62 The DMRB states that:

'The impact of a Proposed Development at any location can be reported in terms of changes in absolute noise level. In the UK the standard index used for traffic noise is the LA10,18hr level, which is quoted in decibels'

6.63 In order to determine whether changes in traffic noise levels are likely to occur as a result of the proposed development, noise levels have been predicted in accordance with the methodology contained within CRTN, based on traffic flow data for the local road network with and without the proposed development.

Table 6.8 Semantic Descriptors for Traffic Noise in the Short Term

Change in Noise Level $L_{A10,18hr}$ dB	Magnitude of Impact
0	No Change
0.1 to 0.9	Negligible
1 to 2.9	Minor
3 to 4.9	Moderate
5+	Major

Table 6.9 Semantic Descriptors for Traffic Noise in the Long Term

Change in Noise Level $L_{A10,18hr}$ dB	Magnitude of Impact
0	No Change
0.1 to 2.9	Negligible
3 to 4.9	Minor
5 to 9.9	Moderate
10+	Major

Effect Significance Matrix

6.64 The significance matrix has been adopted to guide the quantitative identification of significant effects. The sensitivity of the receptor is used in conjunction with the calculated magnitude of impact to identify a likely significant effect. The matrix presented in Table 6.10 does not allow for consideration of additional context and is therefore used as a guide. Professional judgement will be applied where deemed necessary due to additional factors.

Table 6.10 Quantitative Derivation of Effect Significance

Sensitivity	Magnitude of Impact			
	Negligible	Minor	Moderate	Major
High	Negligible	Minor	Moderate	Major
Moderate	Negligible	Negligible	Minor	Moderate
Low	Negligible	Negligible	Negligible	Minor
Negligible	Negligible	Negligible	Negligible	Negligible

6.65 Effects that are identified as being 'Moderate' or 'Major' Adverse / Beneficial are classified as significant effects.

ASSUMPTIONS AND LIMITATIONS

6.66 The adopted construction noise levels are representative of continuous activity and therefore are likely to provide a conservative assessment of the likely impacts. The calculated noise levels are therefore likely to be higher than those observed in practice. Construction noise levels have been calculated based on typical noise levels for construction activities. Construction activities have been assumed to take place within a 10-hour period out of any 16-hour day.

6.67 The road noise levels were calculated with use of the traffic data provided by Velocity Transport Planning Ltd on the proposed development and the data obtained during the unattended survey. The noise model was verified using the obtained data to ensure similar results. The calculations used within this ES are considered representative of the ambient environment at the proposed development.

6.68 The assessment of the change in noise levels across existing road links is based on the provided traffic flow data. The data includes future committed development within the surrounding area. Any changes to the calculated traffic flows may provide a material change to this assessment. Any decrease in flows related to the proposed development may change the calculated effect significance due to road traffic flows.

BASELINE CONDITIONS

6.69 The baseline conditions across the site have been determined by environmental noise measurements and subjective observations at the site. The survey of baseline noise conditions at the site was carried out between 3rd and 7th December 2021.

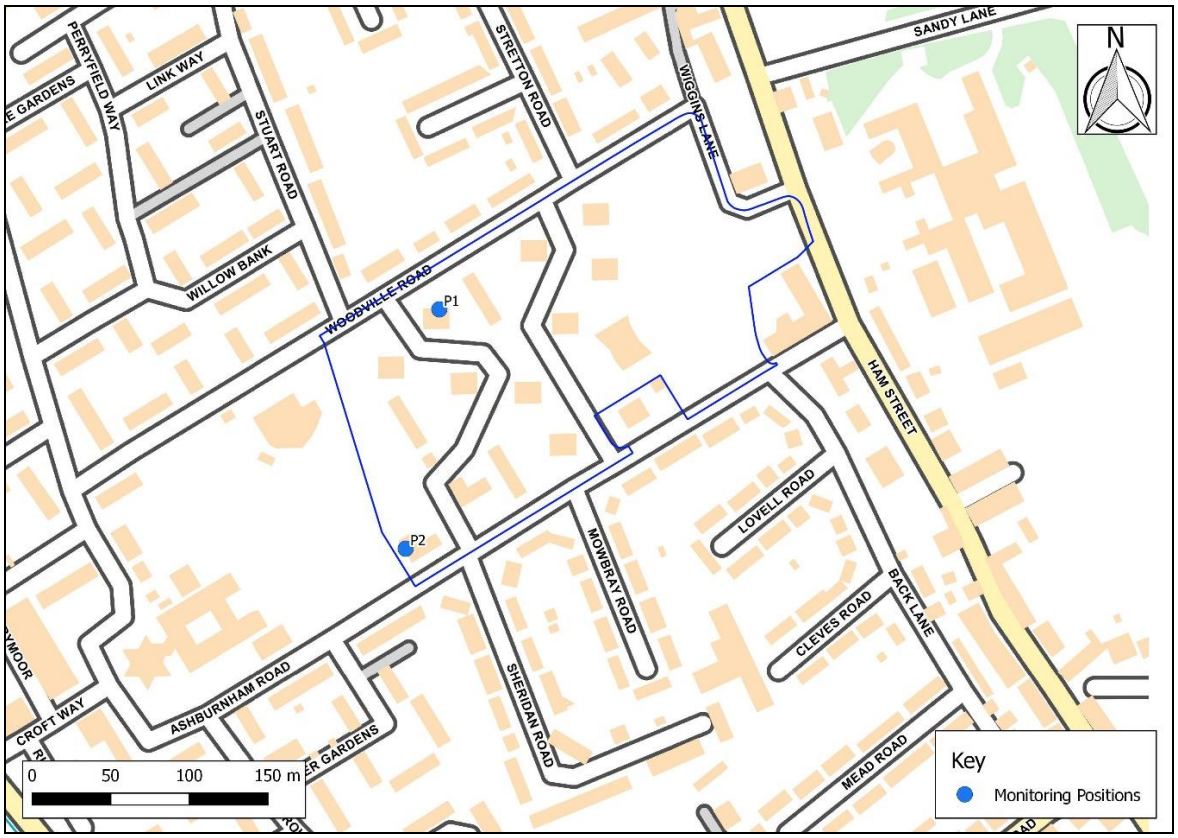
6.70 The primary purpose of the noise survey was to gather acoustic information on the baseline noise levels at the site during daytime and night-time periods. The ambient noise data is used to validate the computer model of noise levels and to identify any façade mitigation requirements for the proposed development. The measured background sound levels are used for consideration of fixed plant noise levels.

6.71 Observations on-site indicate that the ambient environment is dominated by local road traffic. Other sources include overhead aircraft and birdsong. The computer noise model was validated against the baseline survey to ensure calculated noise levels were representative of the extant environment.

6.72 The monitors were situated at positions across the site in order to allow consideration of local traffic on Woodville Road and Ashburnham Road and to provide data for validation of the noise model. P1 was situated overlooking Woodville Road, approximately 1.5m above roof level. P2 was situated on Ashburnham Road at approximately 1.5m above roof level.

6.73 The microphones were fitted with protective windshields for the measurements. All measurement equipment used during the noise surveys conformed to relevant Type 1 specifications. Weather conditions during the survey period were stable and are not considered to have significantly affected the survey data. The noise measurement locations are shown in Figure 6.1.

Figure 6.1 Unattended Survey Locations



6.74 A summary of the unattended noise measurements is presented in Table 6.11. The full set of graphical results is shown in Appendix 6.2 and Appendix 6.3.

Table 6.11 Summary of Unattended Noise Levels

Monitoring Position	Measured Sound Pressure Level, dB re. $2x10^{-5}$ Pa.					
	Day Time (07:00 - 23:00)			Night-time (23:00 - 07:00)		
	$L_{Amax,F}$	$L_{Aeq,T}$	$L_{A90,T}$	$L_{Amax,F}$	$L_{Aeq,T}$	$L_{A90,T}$
P1	87.5	52.2	44.4	67.8	44.3	37.3
P2	88.8	51.0	43.5	70.9	44.7	36.7

6.75 Background sound levels have been obtained using statistical analysis of the unattended sound levels to identify the most frequently occurring $L_{A90,15min}$ values. The adopted background sound levels are presented in Table 6.12, statistical analysis of measurements is presented in Appendix 6.4 and Appendix 6.5.

Table 6.12 Adopted Background Sound Levels

Monitoring Position	Period	Background Sound Level, $L_{A90,T}$ dB
P1	Daytime	45
	Night-Time	38
P2	Daytime	45
	Night-Time	37

6.76 All noise measurements were undertaken by consultants competent in environmental noise monitoring, and, in accordance with the principles of BS 7445:2003[10]. The broadband noise parameters of $L_{Aeq,T}$, $L_{A10,T}$, $L_{A90,T}$, and $L_{Amax,F}$ were recorded at each location.

6.77 Consideration of weather conditions and stability of the unattended data indicates that the weather conditions during the survey did not significantly affect the survey.

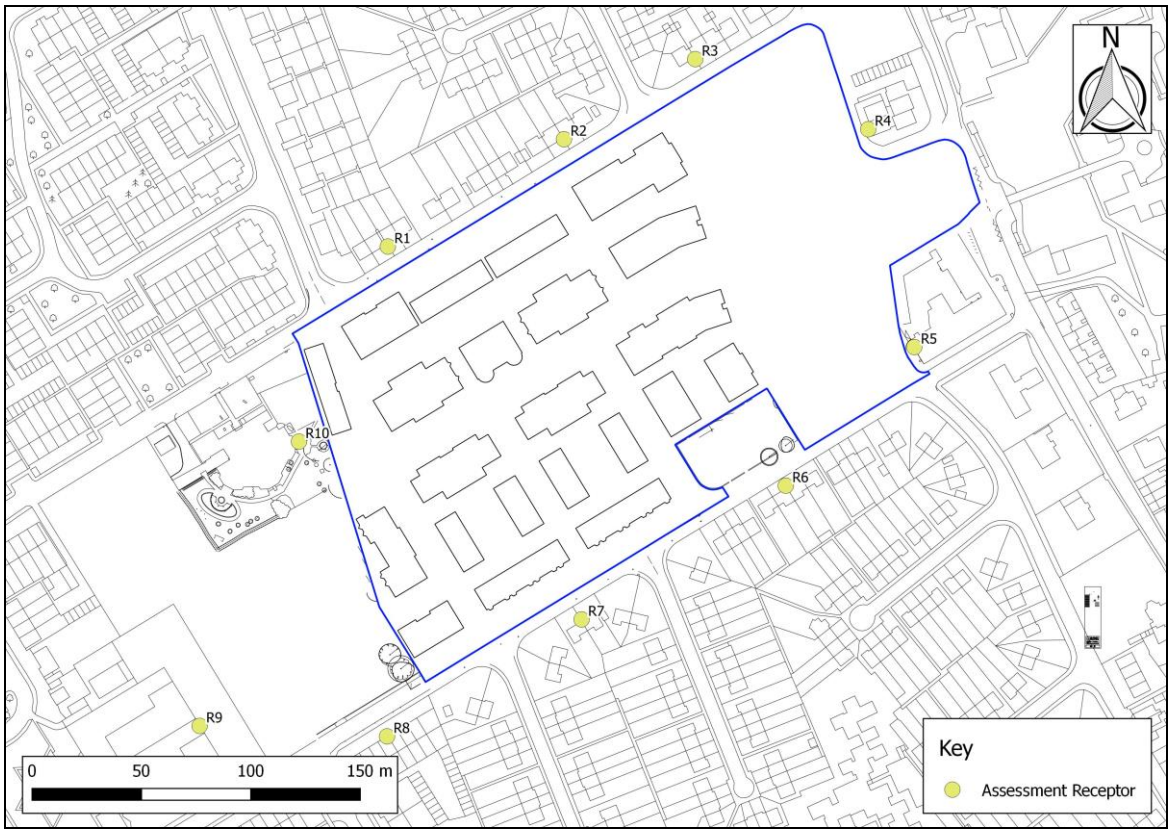
6.78 On-site vibration levels due to road traffic were qualitatively assessed during the noise survey and no vibration was observed to be perceptible. It is therefore considered that a vibration survey was not required for the purpose of this assessment.

Receptors and Receptor Sensitivity

Existing

6.79 Receptors identified for the assessment of construction activities are presented in Figure 6.2.

Figure 6.2 Construction Assessment Receptor Locations



6.80 The change in road traffic flows due to the proposed development is considered for the residential dwellings on the surrounding road links. The residential receptors on surrounding road links are high sensitivity.

Introduced

6.81 The completed development assessment is undertaken to confirm the site suitability and identify the mitigation requirements for the proposed residential dwellings. The residential dwellings in the proposed development are high sensitivity.

POTENTIAL IMPACTS

During Construction

Noise

6.82 The operation of equipment associated with site preparation and construction of the proposed development has the potential to result in noise effects at existing noise sensitive receptors in the vicinity.

6.83 The construction noise calculations have been undertaken for the noisiest construction phases to provide assessment levels at the nearest high sensitivity receptors. The highest

noise levels are from plant usually associated with earthworks, piling, concreting, road pavement and general construction site activities. Typical facade noise levels have been adopted based on measurements of similar activities and are presented below. These are representative of continuous activity and are considered a worse-case consideration.

- Demolition works - 85 dB(A) at 10m
- Enabling works - 84 dB(A) at 10m
- CFA piling - 85 dB(A) at 10m
- Sub structure construction - 80 dB(A) at 10m
- Road pavement works - 81 dB(A) at 10m
- Super structure construction - 85 dB(A) at 10m

6.84 With regard to barrier attenuation effects, acoustic screening would be provided by permanent structures on the intervening land between the proposed construction areas and receptor locations, in addition to the natural screening that may be afforded by the topography of the area. To provide a robust assessment however, the construction noise predictions assume no attenuation from site hoardings at receptor locations.

6.85 Construction noise levels have been predicted at the closest existing representative noise sensitive receptor locations. The calculations have been undertaken for both minimum and typical distances between the construction locations and the identified receptors. The construction noise levels are therefore calculated to provide both a worse case and indicative typical assessment.

6.86 Indicative noise levels have been calculated using the closest separation distances between the proposed development site and receptors, as well as a typical distance to a more central position in order to identify the likely worse case temporary effects as well as the likely typical effects. These worse case and typical noise levels have been calculated at the closest façade of each receptor position during each phase of the works. The adopted distances are presented in Table 6.13.

6.87 The initial phases of the proposed development may be occupied during construction of subsequent phases and receptors will therefore be introduced at the boundary of construction activities. The closest receptor (R10) is considered representative of effects at these newly introduced receptors.

Table 6.13 Separation Distances Between Construction Activities and Receptors, m

Receptor	Separation Distance	
	Closest Activity (Demolition)	Typical Distance
R1	20 (30)	95
R2	20 (30)	110
R3	35 (40)	160
R4	85 (80)	185
R5	75 (70)	165
R6	45 (60)	115
R7	25 (30)	105
R8	40 (45)	175
R9	100 (105)	220
R10	15 (40)	115

6.88 The calculated noise levels are shown in Table 6.14.

Table 6.14 Calculated Façade Construction Noise Levels $L_{Aeq,T}$ dB

Rec. No.	Façade Noise Level at Nearest Receptors During Likely Phases of Construction, dB(A), $L_{Aeq,16hr}$					
	Demolition	Enabling Works	Piling	Sub-structure	Roads	Super-structure
	Closest Activity					
R1	74	>75	>75	73	74	>75
R2	74	>75	>75	73	74	>75
R3	72	72	73	68	69	73
R4	66	<65	65	<65	<65	65
R5	67	66	67	<65	<65	67
R6	68	70	71	66	67	71
R7	74	75	>75	71	72	>75
R8	71	71	72	67	68	72
R9	<65	<65	<65	<65	<65	<65
R10	72	>75	>75	>75	>75	>75
	Typical Distance					
R1	<65	<65	<65	<65	<65	<65
R2	<65	<65	<65	<65	<65	<65
R3	<65	<65	<65	<65	<65	<65
R4	<65	<65	<65	<65	<65	<65
R5	<65	<65	<65	<65	<65	<65
R6	<65	<65	<65	<65	<65	<65
R7	<65	<65	<65	<65	<65	<65
R8	<65	<65	<65	<65	<65	<65
R9	<65	<65	<65	<65	<65	<65
R10	<65	<65	<65	<65	<65	<65

6.89 The resultant noise impacts are shown in Table 6.15.

Table 6.15 Calculated Construction Noise Impacts

Rec. No.	Calculated Construction Noise Impacts During Likely Phases of Construction					
	Demolition	Enabling Works	Piling	Sub-structure	Roads	Super-structure
	Closest Activity					
R1	Medium	High	High	Medium	Medium	High
R2	Medium	High	High	Medium	Medium	High
R3	Medium	Medium	Medium	Low	Low	Medium
R4	Low	Negligible	Low	Negligible	Negligible	Low
R5	Low	Low	Low	Negligible	Negligible	Low
R6	Low	Medium	Medium	Low	Low	Medium
R7	Medium	Medium	High	Medium	Medium	High
R8	Medium	Medium	Medium	Low	Low	Medium
R9	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible
R10	Medium	High	High	High	High	High
	Typical Distance					
R1	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible
R2	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible
R3	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible
R4	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible
R5	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible
R6	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible
R7	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible
R8	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible
R9	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible
R10	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible

6.90 Construction activities are calculated to exceed SOAEL during localised works. However, it should be noted that construction activities do not occur simultaneously nor would activities be operated at the closest distance to the residential areas for long periods of time, as assumed for the purposes of a worse-case scenario assessment. During the majority of construction activities, the separating distances are substantially increased and calculated noise levels fall below LOAEL.

6.91 The calculated effect significance, with consideration to the sensitivity of the nearby receptors, is presented in Table 6.16.

Table 6.16 Calculated Construction Noise Effects

Rec. No.	Calculated Construction Noise Impacts During Likely Phases of Construction					
	Demolition	Enabling Works	Piling	Sub-structure	Roads	Super-structure
	Closest Activity					
R1	Moderate	Major	Major	Moderate	Moderate	Major
R2	Moderate	Major	Major	Moderate	Moderate	Major
R3	Moderate	Moderate	Moderate	Minor	Minor	Moderate
R4	Minor	Negligible	Minor	Negligible	Negligible	Minor
R5	Minor	Minor	Minor	Negligible	Negligible	Minor
R6	Minor	Moderate	Moderate	Minor	Minor	Moderate
R7	Moderate	Moderate	Major	Moderate	Moderate	Major
R8	Moderate	Moderate	Moderate	Minor	Minor	Moderate
R9	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible
R10	Moderate	Major	Major	Major	Major	Major
	Typical Distance					
R1	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible
R2	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible
R3	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible
R4	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible
R5	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible
R6	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible
R7	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible
R8	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible
R9	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible
R10	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible

6.92 The effect significance is classed as **temporary Major Adverse (significant) to Negligible (not significant)**. Mitigation measures which further minimise the likelihood of adverse impacts are discussed later in this Chapter.

6.93 The phased nature of the proposed development will introduce properties at the boundary of ongoing construction activities that may be occupied during subsequent phases. Given the close proximity of these properties, a short-term **Major Adverse (significant)** effect is to be expected during the initial stages of the adjacent phase for some properties. As works migrate further across the remainder of the site, and the proximity is reduced, the effects should be considered to become **Negligible (not significant)**.

Vibration

6.94 The likely worse case vibration effects at the identified separation distances have been calculated based on the methodology provided within BS 5228-2. The calculated effects are presented in Table 6.17.

6.95 Considering the separation distances, nearby residential properties are likely to be affected during close proximity works. The majority of activities will be unlikely to affect the nearby residential properties, although Moderate effects may be likely during close proximity works. The likely vibration effects from construction activities are therefore considered to be **temporary Moderate Adverse (significant) to Negligible (not significant)**.

Table 6.17 Calculated Construction Vibration Effects

Rec. No.	Calculated Construction Noise Impacts During Likely Phases of Construction					
	Demolition	Enabling Works	Piling	Sub-structure	Roads	Super-structure
	Closest Activity					
R1	Minor	Moderate	Moderate	Moderate	Moderate	Moderate
R2	Minor	Moderate	Moderate	Moderate	Moderate	Moderate
R3	Minor	Minor	Minor	Minor	Minor	Minor
R4	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible
R5	Minor	Negligible	Negligible	Negligible	Negligible	Negligible
R6	Minor	Minor	Minor	Minor	Minor	Minor
R7	Minor	Minor	Minor	Minor	Minor	Minor
R8	Minor	Minor	Minor	Minor	Minor	Minor
R9	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible
R10	Minor	Moderate	Moderate	Moderate	Moderate	Moderate
	Typical Distance					
R1	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible
R2	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible
R3	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible
R4	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible
R5	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible
R6	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible
R7	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible
R8	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible
R9	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible
R10	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible

During Operation

Ambient Noise Levels

6.96 The identification of requirements for residential accommodation has been confirmed by considering the calculated noise contours and the guidance adopted for this Chapter.

6.97 Calculated daytime and night-time noise contours are presented in Appendix 6.6 and Appendix 6.7, respectively. The calculated facade reductions required at façade locations across the proposed development are presented in Figure 6.3.

Figure 6.3 Glazing and Ventilation Requirements

6.98 The required façade reductions are presented for all façades that are calculated to exceed the BS 8233 criterion noise levels within habitable rooms, with windows partially open, when adopting the typical reduction due to partially open windows as presented within BS 8233.

6.99 Roof and façade constructions typically achieve an attenuation of at least 55 dB R_w, with the windows and trickle ventilators being the weakest part of any facade. Suitable glazing and ventilation options at these properties will be incorporated at these façades to allow windows to remain closed.

6.100 Glazing and ventilation options will be specified to ensure the calculated reductions are achieved as a minimum.

6.101 To ensure the R_W values take account of possible low frequency noise, the sound reduction index of each element will include a correction for the C_{tr} urban traffic noise spectrum. The ventilation will achieve this value when open, to allow ventilation to the dwelling. Additionally, the glazing and ventilation installation must maintain the integrity of the façade with regard to noise insulation.

6.102 All external areas within the development fall below 55 dB. The calculated daytime noise contour, presented in Appendix 6.6, indicates that noise levels in the proposed garden areas are calculated to fall below the desirable level of 50 dB.

6.103 The WHO Guidelines states that indoor noise levels should not exceed approximately 45 dB L_{Amax} more than 10-15 times a night to ensure there are no negative health effects related to sleep disturbance.

6.104 Considering the façade sound reduction identified in the BS 8233 assessment, maximum night time noise levels with windows closed would not exceed the WHO criteria of 45 dB. Windows need to remain closed at facades overlooking the adjacent roads. Maximum $L_{Amax,F}$ noise levels are considered likely to achieve the criteria set out in the WHO Guidelines, provided suitable glazing and ventilation options are employed.

6.105 With incorporation of suitable glazing and ventilation choices, the internal noise levels would fall below LOAEL and the effect would be **Negligible (not significant)**.

Building Services Plant

6.106 Any proposed plant will be specified to ensure compliance with the relevant design standards contained within BS 4142.

6.107 No proposed plant has been specified and detailed data for any proposed fixed plant is not yet available. Limits have therefore been identified in order to inform the design of the proposed plant items during the detailed design stage.

6.108 Building services plant will be specified and sufficiently mitigated as required, such that suitable conditions are maintained at the nearby residential dwellings. In accordance with BS 4142, the rating level of any plant (inclusive of penalties accounting for acoustic features) should remain below the background sound level during all periods of operation.

6.109 BS 4142 provides assessment periods of:

- Daytime, 07:00 – 23:00; and
- Night-time, 23:00 – 07:00.

6.110 The observed background sound levels are presented in Table 6.12. Fixed plant would be specified such that the calculated combined Rating level at the nearest residential receptors does not exceed the background sound levels, with specific levels remaining below the identified limits.

6.111 The resultant effects would be **Negligible (not significant)**.

Changes in Road Traffic Noise – Existing Residential Receptors

6.112 The traffic flow data provided within the Transport Assessment (Appendix 6.8) has been used as the basis for the road traffic noise assessment. The 18-hour Annual Average Weekday Total (AAWT) flows were provided for the year 2030 both with and without the proposed development.

6.113 Traffic noise predictions have been made using the CRTN prediction methodology. The methodology has been used to predict the magnitude of any change in noise level resulting from the proposed development at the roadside of the local network.

6.114 The calculated indicative changes in noise level on existing road links, identified with respect to the road traffic noise impact assessment criteria, are presented in Table 6.18.

Table 6.18 Change in Noise Level on Local Road Network in, 2030

Road Link	Indicative Change in AAWT Traffic Flow Between Baseline and With Development Scenarios, 2030	
	Increase	dB change
Woodville Road (east of Stuart Road)	267	0.9
Asburnham Road (east of Sheridan Road)	213	0.4
Woodville Road (west of Stuart Road)	213	0.8
Ashburnham Road (west of Sheridan Road)	212	0.4
Wiggins Lane	267	0.8
Ashburnham Road (east of Ham Close)	267	0.5
Ham Street (north of Ashburnham Road)	277	0.4
Ham Street (south of Ashburnham Road)	112	0.3
Ham Street (north of Wiggins Lane)	422	0.5
Sandy Lane	422	0.4
A307 (north of Sandy Lane)	347	0.1
A307 (south of Sandy Lane)	75	0.0

6.115 Table 6.18 identifies that existing noise-sensitive receptors adjacent to the road network are calculated to result in Negligible (not significant) impacts due to the changes in road traffic levels.

MITIGATION

During Construction

6.116 To control the impact of noise during construction of the proposed development, contractors will ensure that works are carried out in accordance with best practicable means (BPM) as described in BS 5228 comprising of the following:

- Where possible, 'silenced' plant and equipment will be used;
- Where vehicles are standing for a significant period of time, engines will be switched off;
- Acoustic enclosures will be fitted where possible to suppress noisy equipment;
- Plant will operate at low speeds, where possible, and incorporate automatic low speed idling;
- Where possible, electrically driven equipment will be selected in preference to internal combustion powered, hydraulic power in preference to pneumatic and wheeled in lieu of tracked plant;
- All plant will be properly maintained (greased, blown silencers replaced, saws kept sharpened. Teeth set and blades flat, worn bearings replaced etc);
- Consideration will be given to temporary screening or enclosures for static noisy plant to reduce noise emissions and plant should be certified to meet any relevant EC Directives;
- All contractors will be made familiar with the guidance in BS 5228 (Parts 1 & 2) which will form a pre-requisite of their appointment; and
- Early and good public relations with the adjacent tenants and occupants of buildings will also reduce the likelihood of complaints.

6.117 These general measures to control construction have been incorporated into the CEMP and will be included in the detailed CEMP secured by planning condition. By adopting the recommended best practicable means, construction noise levels can typically be reduced by 10 dB(A).

6.118 Moderate construction related vibration impacts are likely at the closest residential receptors (R1, R2 and R10) in the short term. BPM should be employed to minimise vibration at the source.

6.119 Construction activities should be programmed to ensure that noise levels do not exceed 75 dB for periods of 10 or more days of working in any 15 consecutive days or for a total number of days exceeding 40 in any 6 consecutive months.

During Operation

Residential Dwellings

6.120 The calculated façade reductions required across the development are presented in Figure 6.3. Typical insulated double glazing and attenuated trickle ventilation is likely to suitably reduce noise levels. Suitable glazing and ventilation options will be adopted in conjunction with typical façade in order to achieve the BS 8233 and WHO criteria.

6.121 Any ventilation will allow for sufficient airflow whilst maintaining the integrity of the façade with regard to noise insulation. The glazing and ventilation elements will be selected with consideration to the façade reductions identified within Figure 6.3.

6.122 To ensure the R_W values take account of possible low frequency noise, the sound reduction index of each element will include a correction for the C_{tr} urban traffic noise spectrum. The ventilation must achieve this value when open/operational, to allow ventilation to the dwelling.

6.123 For non-habitable rooms, such as kitchens, bathrooms, stairways, halls, landings etc, lower acoustic performance glazing configurations may be considered permissible.

Building Services Plant

6.124 Sound from fixed plant will be specified such that sound levels remain below the limits specified in this Chapter.

6.125 Mitigation options will be specified during the detailed design stage, as appropriate. Effects from building services would be **Negligible (not significant)** following specification.

RESIDUAL IMPACTS

During Construction

6.126 Construction noise levels are calculated to remain below the 75 dB $L_{Aeq,T}$ criterion noise level for the majority of the construction and would typically fall below LOAEL. Close proximity activities may exceed the criterion noise levels in the short term.

6.127 Construction noise and vibration effects are likely to be **Moderate Adverse (significant)** in the short term with the majority of activities being **Negligible (not significant)**.

During Operation

Residential Dwellings

6.128 The residential area is calculated to fall below the BS 8233 criteria with typical insulated double glazing and attenuated trickle ventilation. Maximum levels remain below the WHO criteria for sleep disturbance during the night-time with the incorporation of sufficient mitigation measures.

6.129 The residual noise effect is considered to be **Negligible (not significant)** following incorporation of suitable mitigation.

Building Services Plant

6.130 Fixed plant will be specified during the detailed design stage. All plant will be specified such that rating levels at the nearest residential receptors fall below the identified background sound levels.

6.131 Whilst the effect cannot be quantitively assessed, any proposed plant will be specified such that the resulting effect is **Negligible (not significant)**.

Road Traffic Noise

6.132 The provided data indicates a minimal change on the local road network. The assessment of the change in traffic flows indicates that the proposed development will have a **Negligible effect (not significant)** on surrounding road links.

Table 6.19 Summary

Description of Impact/Receptor	Nature of Effect (Permanent or Temporary)	Potential Impact	Mitigation Measure	Residual Impact
Demolition and Construction				
Noise at surrounding residential and commercial receptors	Direct, Temporary Short-Term Local	Negligible to Major Adverse	Implementation of Best Practicable Means to control noise emissions	Negligible to Major short term Adverse
Vibration at surrounding residential and commercial receptors	Direct, Temporary Short-Term Local	Negligible to Moderate Adverse	Implementation of Best Practicable Means to control vibration	Negligible to Moderate short term Adverse
Completed Development				
Noise at proposed residential receptors	Direct, Permanent Long-Term Local	Negligible to Moderate Adverse	Appropriate sound insulation and installation of mechanical ventilation	Negligible Adverse
Noise from building services at proposed and existing residential receptors	Direct, Permanent Long-Term Local	Negligible Adverse	Appropriate mitigation, to be determined during detailed design	Negligible Adverse
Noise from changes in road traffic noise at existing residential receptors	Direct, Permanent Long-Term Local	Negligible Adverse	None	Negligible Adverse

Play Areas and Makers Labs/Community Centre

6.133 There are no concerns relating to noise from existing sources (including existing playgrounds). The noise levels obtained during the survey were sufficiently low and ambient noise levels are not considered to give rise to significant effects. Noise from playgrounds is not likely to significantly increase the daytime levels over the residential criteria. The mitigation identified within the chapter is considered appropriate to control ambient noise levels.

6.134 Any noise breakout at the Makers Lab or Community Centre is covered under fixed plant items consideration of effects above. The assessment identifies that plant would be specified during detailed design (as is standard practice) and that plant items will not exceed the background sound level at residential dwellings.

CUMULATIVE EFFECTS

6.135 Nearby developments that may potentially give rise to cumulative effects are identified in Chapter 11.0. The noise and vibration assessment has considered the combined road traffic movements from these future committed developments as part of the predicted future baseline conditions. However, in order to provide consistency with the EIA Regulations, the potential cumulative effects are presented below.

During Construction (including Demolition)

6.136 Construction activity at the future committed development sites has the potential to cause localised noise disturbance around each development site. However, cumulative effects are unlikely due to the intervening distances between the proposed development and other committed sites. Cumulative construction effects are considered to be **Negligible (not significant)**.

During Operation

6.137 The assessment of the proposed residential dwellings has considered the additional traffic movements from the proposed development and committed developments and determined that the significance of effects will be **Negligible (not significant)** with the incorporation of appropriate glazing and ventilation.

6.138 The committed developments would lead to additional traffic movements on local roads. An increase in traffic noise levels of 3 dB would be required for the long-term noise change to be considered a Minor Adverse effect. The proposed development is calculated to result in an increase of up to 0.7 dB and will have a Negligible (not significant) effect. This effect is unlikely to combine committed developments in a way that may result in cumulative effects. Cumulative effects due to variations in road traffic are considered to be **Negligible (not significant)**.

6.139 There are no expected significant cumulative effects due to the intervening distance between the site and the other development sites.

6.140 With consideration to the above, the potential cumulative effects from the proposed development and identified nearby developments are unlikely to affect those effects identified within this chapter.

SUMMARY AND CONCLUSION

6.141 This chapter has considered the likely effects of the proposed development with respect to noise and vibration. These include the effects of existing conditions on the proposed development and the effects of noise and vibration generated from demolition and construction activities pertaining to the proposed development on surrounding properties. Limits have been specified for the operational phases. The detailed design of the proposed development will ensure that operational noise emissions from the site would remain below the specified background sound levels.

6.142 The impact of noise and vibration during construction of the proposed development has been predicted and assessed in accordance with BS 5228. Generic mitigation measures have been recommended, which when implemented are capable of ensuring that the impact of noise and vibration during the construction of the proposed development is adequately controlled.

6.143 Construction noise and vibration effects are likely to be **Moderate Adverse (significant)** in the short term with the majority of activities being **Negligible (not significant)**.

6.144 An assessment has been carried out in accordance with the adopted criteria to determine the suitability of the site for residential accommodation. The assessment has been based on a computer noise model, informed and validated using environmental noise measurements and traffic data provided for the adjacent road links.

6.145 Noise levels at the residential dwellings associated with the proposed development are likely to be sufficiently mitigated with the implementation of typical insulated double glazing and attenuated ventilation. The residual noise effect is considered to be **Negligible (not significant)** with the incorporation of typical insulated double glazing and attenuated trickle ventilation.

6.146 The impact of the increase in road traffic associated with the proposed development has been calculated as **Negligible (not significant)**.

REFERENCES

1 British Standard 5228-1:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites. Noise

2 The Department for Transport, 1988, 'Calculation of Road Traffic Noise (CRTN)', The Stationary Office

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

4 World Health Organisation (WHO): 1999, 'Guidelines for Community Noise', WHO, Geneva

5 Design Manual for Roads and Bridges (DMRB) Volume 11, Section 3 Part 7 – HD 213/11 Noise and Vibration, 2011

6 BS 4142:2014+A1:2019 Methods for Rating and Assessing Industrial and Commercial Sound

7 Noise Policy Statement for England, 2010 (NPSE)

8 Planning Practice Guidance 'Noise', The Stationary Office, 2019

9 The National Planning Policy Framework, July 2021, The Stationary Office, 2021

10 British Standard 7445: 2003: Description and measurement of environmental noise. BSI, 2003