Chapter 10: Noise and Vibration

Noise and Vibration	
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SUPPORTING APPENDIX	**ES Volume 3: Appendix: Noise and Vibration:** Annex 1: Introduction to noise Annex 2: Glossary of Terms Annex 3: Legislation, Policy and Guidance Annex 4: Unattended Survey Results – P1 Annex 5: Unattended Survey Results – P2 Annex 6: Unattended Survey Results – P3 Annex 7: Unattended Survey Results – P4 Annex 8: Statistical Analysis of Background Sound Levels – P1 Annex 9: Statistical Analysis of Background Sound Levels – P2 Annex 10: Statistical Analysis of Background Sound Levels – P3 Annex 11: Statistical Analysis of Background Sound Levels – P4 Annex 12: Daytime Noise Contour, 1.5m Annex 13: Night-time Noise Contour, 1.5m Annex 14: ANC Acoustics Ventilation and Overheating Risk Categories Annex 15: Traffic Data
KEY CONSIDERATIONS	This ES Chapter addresses the likely environmental significant effects of the Proposed Development with respect to noise and vibration. In summary, the ES Chapter addresses: • The suitability of the Site for the type of development proposed based on the potential constraints from existing sources of noise on the internal noise environments at the Proposed Development and where necessary, the types of measures that might be adopted to overcome these constraints; • The impact of noise and vibration on existing sensitive receptors during the demolition and construction phase; • The target criteria for commercial plant and activities that may occur at the completed development; and • The potential effect of road traffic noise from the Proposed Development on surrounding sensitive receptors following completion and habitation of the Proposed Development.
CONSULTATION	This ES Chapter has been undertaken with consideration to the London Borough of Tower Hamlets Scoping Opinion, received 8th September 2021, as presented in **ES Volume 2 Appendix: EIA Methodology – Annex 2**.

ASSESSMENT METHODOLOGY

Defining the Baseline

10.1 The baseline noise levels have been obtained by unattended noise surveys. The future noise levels are calculated by way of computer noise modelling, which is informed by the existing baseline conditions in conjunction with future traffic noise levels for the year 2031. The justification for the use of 2031 for the future year assessment for the traffic data is set out in **ES Volume 1, Chapter 7: Traffic and Transport**.

10.2 On site observations indicate that vibration levels from existing sources are likely to be imperceptible. Therefore, a vibration survey is not required.

Evolution of the Baseline

10.3 The projected completion year for the Proposed Development is 2033. It is therefore appropriate to consider how noise levels may change in the period prior to completion. The existing noise climate on the Site is dominated by road noise from the A12 to the west. With regards to operational road traffic noise, there is the potential for cumulative schemes in the area to change the flows on the local road network. The calculated future noise levels include flows for both the completed development and other committed development. Accordingly, the assessment of noise levels at proposed dwellings is undertaken against the future baseline including the natural and planned evolution of the surrounding area.

Impact Assessment Methodology

Demolition and Construction

10.4 The impact of noise and vibration during the demolition and construction of the Proposed Development requires prediction and assessment in accordance with the guidance presented in BS 5228 1:2009+A1:2014 'Code of practice for noise and vibration control on construction and open sites. Noise'[1,2]. Consideration has also been given to pertinent guidance in the London Borough of Tower Hamlets (LBTH) Code of Construction Practice[3] (CoCP) document.

Demolition and Construction Noise

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

10.6 The worst-case scenario is based on peak Heavy Goods Vehicle (HGV) construction flows as discussed in **ES Volume 1, Chapter 5: Demolition and Construction**. Peak HGV construction occurs at a point where Phase B is under construction and the Detailed Proposals (Phase A) are occupied and represents a worst case for construction traffic on Site. The assessment of Demolition and Construction Nosie therefore applies to other phases of the Proposed Development and therefore the mitigation identified within this ES Chapter would apply to other phases of the Proposed Development.

10.7 BS 5228 sets out a methodology for predicting, assessing and controlling noise levels arising from a wide variety of construction and related activities. As such, it can be used to predict noise levels arising from the operations at proposed construction sites. BS 5228 also sets out tables of sound power levels generated by a wide variety of construction plant to facilitate such predictions. These are then compared against the baseline noise levels which are determined using the noise measurements on the Site (see the Baseline section).

10.8 The prediction procedure involves taking the source noise level of each item of plant and correcting it for (i) distance effects between source and receiver (ii) percentage operating time of the plant; (iii) barrier attenuation effects; (iv) ground absorption; and (v) facade corrections. The latter correction involves a 3dB noise increase due to the reflection effects for a receiving point location 1m in front of a building facade.

10.9 The assessment has been undertaken on the basis of a 'worse-case' scenario to ensure likely impacts are sufficiently considered. Calculations representing a worst-case scenario over a one-hour period with plant operating at the closest point to the nearest noise sensitive receptors and in the absence of mitigation are presented. In practice, noise levels would tend to be lower owing to greater separation distances and screening effects.

Demolition and Construction Vibration

10.10 To control the impact of vibration during the Site preparation and construction of the Proposed Development, limits relating to the perceptibility of vibration have been set 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.

Construction Traffic Noise

10.11 Changes in road traffic flows on the surrounding road network during the 2026 interim scenario (see below) which includes peak construction HGV flows have been considered against the CRTN short term criteria for impacts at high sensitivity receptors.

[1] *The British Standards Institution (2014), BS 5228-1:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites. Part 1: Noise*

[2] *The British Standards Institution (2014), BS 5228-2:2009+A1:2014 Code of practice for noise and vibration control on construction and open sites. Part 2: Vibration*

[3] *LBTH (published year unknown), Code of Construction Practice*

Phasing

10.12 As set out above in **paragraph 10.6**, the future residents of the Detailed Proposals (Phase A) are considered as receptors in relation to potential construction and vibration effects during the subsequent construction phases. This is considered a worst-case scenario for construction traffic on site as it represents a period with peak HGV traffic occurs (i.e. Phase B is under construction and the Detailed Proposals (Phase A) are occupied)

10.13 Consideration has also been given to phasing of the Proposed Development through assessment of an interim traffic data scenario for the year 2026, which includes the peak construction flows.

Completed Development

Development Generated Road Traffic Noise and Site Suitability

10.14 The impact of changes in noise level resulting from changes in traffic flow and composition on existing roads as a result of the operational development requires assessment in accordance with the guidance presented in the Design Manual for Roads and Bridges (DMRB) Volume 11, Section 3 Part 7 – HD 213/11 Noise and Vibration, 2011[4]. Computer noise modelling has been used to calculate the road traffic noise in accordance with the methodology contained within the Calculation of Road Traffic Noise (CRTN). The future with development scenario for the year 2031 has been considered against the future without development scenario for the year 2031 in order to identify the impact of the introduction of the Proposed Development.

10.15 The ambient noise at proposed residential dwellings within the Proposed Development is assessed against the guidance provided by BS 8233:2014 'Sound Insulation and Noise Reduction for Buildings'[5] for both the day and night-time periods. Night time maximum noise levels are considered against the guideline noise level for the onset of sleep disturbance provided by the WHO Guidelines for Community Noise. The ambient noise levels for the year 2031 have been calculated to ensure future noise levels are appropriately considered.

10.16 Noise emission levels affecting the Proposed Development have been calculated using predictive computer noise modelling. The noise modelling software (Cadna-A) uses algorithms based on ISO 9613 'Attenuation of sound during outdoor propagation'[6] to predict noise levels generated at receiver locations by noise sources.

10.17 The noise levels have been predicted across the Site. Noise levels have been calculated at individual residential buildings. The propagation of noise across the Site is presented as noise contours which have been calculated at 1.5 m above ground level.

10.18 The primary noise sources affecting the Proposed Development are identified as road traffic on the A12 and on the surrounding road network.

10.19 Following verification of the existing scenario, the proposed road traffic flows for the year 2031 have been modelled, including the likely increased traffic due to the Proposed Development.

10.20 The future noise levels at the Proposed Development Site have been assessed by considering the results of the calculations against the guidance provided in BS 8233 and the WHO Guidelines.

External Building Services Plant Noise

10.21 Information pertaining to operational plant is not yet available and future occupiers of proposed commercial uses are not yet known. Accordingly, limits will be identified in accordance with the requirements set out in Appendix G of the LBTH Local Plan 2031: Managing Growth and Sharing the Benefits (adopted in 2020)[7]. These limits will ensure that plant items can be appropriately selected to minimise the risk of adverse effects.

10.22 In their EIA Scoping Opinion, the LBTH requested that overheating risk categories are identified in line with the Acoustics Ventilation and Overheating Residential Design Guide. Whilst these calculations do not form part of the impact assessment within this ES Chapter, they have been calculated for the reference of the energy consultant and to inform the overheating assessment.

Assumptions and Limitations

10.23 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.

10.24 The road noise levels were calculated with use of the traffic data provided within this ES **(refer to ES Volume 3, Appendix Noise and Vibration – Annex 15** and **ES Volume 1, Chapter 7: Traffic and Transport**) 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 Chapter are considered representative of the ambient environment at the Site.

10.25 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.

10.26 The road network is understood to be at capacity and therefore provided traffic data for the interim year adopts the same baseline traffic flow as the 2031 scenario. Due to the low percentage increase in road traffic flows any variation in the baseline is unlikely to affect the assessment.

Methodology for Defining Effects

Receptors and Receptor Sensitivity

10.27 The criteria set out in **Table 10.1** below have been applied to identify noise/vibration sensitive receptors either on or adjacent to the Site.

Table 10.1 Noise aand 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

Magnitude of Impact

Demolition and Construction Noise

10.28 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.

10.29 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 will 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 will 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."

[4] Design Manual for Roads and Bridges Volume 11, Section 3 Part 7 – HD 213/11 Noise and Vibration, 2011, accessed via: DMRB VOLUME 11 SECTION 3 PART 7 - HD 213/11 - NOISE AND VIBRATION (sthelens.gov.uk)

[5] The British Standards Institution (2014), BS 8233:2014, Guidance on Sound Insultation and Noise Reduction for Buildings

[6] International Organisation of Standardisation, ISO 9613-2:11996, Acoustics – Attenuation of Sound During Propagation Outdoors – Part 2: General Method of Calculation

[7] *LBTH Local Plan 2031: Managing Growth and Sharing the Benefits (adopted in 2020)*

10.30 The construction noise impact considers the noise magnitude and adverse effect levels as provided in the Noise Policy Statement for England (NPSE) (2010)[8] and the Planning Policy Guidance (PPG) provided by the Department for Communities & Local Government in its on-line planning guidance to assist with interpretation of the National Planning Policy Framework (NPPF) as shown in **Table 10.2**.

Table 10.2 Construction Noise Magnitude

Day	Time (hours)	Averaging Period T	LOAEL[1] $Lp_{Aeq,T}$ (dB)	SOAEL[2] $Lp_{Aeq,T}$ (dB)[3]
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

1 Lowest Observed Adverse Effect Level - This is the level above which adverse effects on health and quality of life can be detected.

2 Significant Observed Adverse Effect Level - This is the level above which significant adverse effects on health and quality of life occur.

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.

10.31 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 10.3**.

Table 10.3 Weekday Threshold Ranges, Db, For Construction Levels

Negligible	Low	Medium	High
< 65	65 – 70	70 - 75	> 75

10.32 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

10.33 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.

10.34 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.

10.35 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.

10.36 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 10.4** below. 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 10.4 Ground- Vibration Effect Levels for Permanent Residential Buildings

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

10.37 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.

10.38 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.

10.39 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.

10.40 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 10.5**.

Table 10.5 Threshold Values for Ground-Vibration Impacts 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

Site Suitability

10.41 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.

10.42 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.

10.43 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.

10.44 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 10.6** below.

[8] *Department for Environment, Food and Rural Affairs (2010), Noise Policy Statement for England*

Table 10.6 Noise Criteria for Residential Use Buildings

Activity	Location	0700 to 2300	2300 to 0700
Resting	Living room	35 dB $L_{Aeq,16\ hour}$	-
Dining	Dining room/area	40 dB $L_{Aeq,16\ hour}$	-
Sleeping (daytime resting)	Bedroom	35 dB $L_{Aeq,16\ hour}$	35 dB $L_{Aeq,8\ hour}$
Note 4 Regular individual noise events (for example, scheduled aircraft or passing trains) can cause sleep disturbance. A guideline value may be set in terms of SEL or $L_{Amax,F}$ depending on the character and number of events per night. Sporadic noise events could require separate values.			

10.45 BS 8233:2014 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 recognised that these guideline values are not achievable in all circumstances where development might be desirable. 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 might be warranted. In such a situation, development will be designed to achieve the lowest practicable levels in these external amenity spaces, but will not be prohibited.

10.46 The internal noise levels recommended in BS 8233 are almost identical to those presented in World Health Organisation (WHO) guidelines for community noise (internal to buildings). Internally, the WHO guidance is that in order to avoid sleep disturbance the period noise level ($L_{Aeq,T}$) will not exceed 30 dB and individual noise events will not exceed 45 dB L_{Amax}. Section 3.4 of the WHO Guidelines states that for good sleep, indoor noise levels will 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 will not be exceeded more than 10-15 times per night.

Lowest Observed Adverse Effect Level (LOAEL) and Significant Observed Adverse Effect Level (SOAEL) for Transportation Airborne Noise Affecting Indoor Residential Levels

10.47 Incident façade levels will not be considered in isolation of the sound reduction provided by the external building fabric. The guidance within Planning Policy Guidance states that "*consideration should also be given to whether adverse internal effects can be completely removed by closing windows and, in the case of new residential development, if the proposed mitigation relies on windows being kept closed most of the time. In both cases a suitable alternative means of ventilation is likely to be necessary. Further information on ventilation can be found in the Building Regulations*."

10.48 Based on the advice within BS 8233:2014 an indoor noise level of 35 dB $L_{Aeq,16hr}$ during the daytime and 30 dB $L_{Aeq,8hr}$ during the night-time may be considered as the LOAEL for transportation noise.

10.49 Similarly, an indoor noise level 50 dB $L_{Aeq,16hr}$ and 45 dB $L_{Aeq,8hr}$ during the night-time may be considered as the SOAEL for transportation noise.

10.50 The WHO Guidelines for Community Noise also identify 60 dB $L_{Amax,F}$ outside as the guideline value for sleep disturbance with windows open. For this reason, a sound level of 60 dB $L_{Amax,F}$ at the façade is considered the LOAEL.

10.51 **Table 10.7** summarises LOAEL and SOAEL inside the different areas of permanent residential buildings.

Table 10.7 Internal And External Noise Criteria for Habitable Spaces

Level	Proposed LOAEL and SOAEL levels for transportation noise affecting new residential premises	
	Daytime (07:00 hours to 23:00 hours)	Night-time (23:00 hours to 07:00 hours)
Internal Noise Levels		
LOAEL	35 $L_{Aeq,16h}$ (dB)	30 $L_{Aeq,8h}$ (dB)
SOAEL	50 $L_{Aeq,16h}$ (dB)	45 $L_{Aeq,8h}$ (dB)
LOAEL	Not applicable	45 dB $L_{Amax,F}$ if more than 15 events
	Not applicable	50 dB $L_{Amax,F}$ if less than 15 events
SOAEL	Not applicable	65 dB $L_{Amax,F}$ if more than 15 events
	Not applicable	70 dB $L_{Amax,F}$ if less than 15 events
External Amenity Areas (free field levels)		
LOAEL	50 $L_{Aeq,16hr}$ (dB)	40 $L_{Aeq,8hr}$ (dB)
SOAEL	65 $L_{Aeq,16hr}$ (dB)	55 $L_{Aeq,8hr}$ (dB)

Fixed Plant

10.52 British Standard BS 4142:2014+A1:2019 Methods for Rating and Assessing Industrial and Commercial Sound [9] 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 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.

10.53 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.

10.54 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,

10.55 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.

10.56 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."

10.57 In accordance with the LBTH Local Plan, Rating levels from fixed plant will be specified to target a rating level of -10 dB below the background sound level at any nearby residential receptor.

Road Traffic Noise – Existing Receptors

10.58 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

[9] The British Standards Institution, 2014, BS:4142:2014 +A1:2019, Methods for Rating and Assessing Industrial and Commercial Sound

noise level in the long term and can be used as criteria for assessing the impact of changes in road traffic noise levels due to the introduction of the Proposed Development, as shown in **Table 10.8** and **10.9**.

10.59 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'

10.60 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 the Calculation of Road Traffic Noise (CRTN), based on traffic flow data for the local road network with and without the Proposed Development.

Table 10.8 Semantic Descriptors for Traffic Noise In The Short Term (Construction)

Change in Noise Level $L_{A10,18\ hr}$ 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

Table 10.9 Semantic Descriptors for Traffic Noise Impacts (Completed Development)

Change in Noise Level $L_{A10,18\ hr}$ 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

Defining the Effect

Geographic Extent and Duration

10.61 All effects in this ES Chapter are local effects (i.e. effects within the Site and/or neighbouring area) due to the dissipation of noise impacts over distance.

Permanent and Temporary

10.62 Effects that are generated as a result of the demolition and construction works (i.e. those that last for this set period of time) are classed as 'temporary' and 'short term' or 'medium term'. Effects that result from the completed and operational phase of the Proposed Development are classed as 'permanent' or 'long-term' effects.

Nature

10.63 Most noise and vibration effects are considered adverse or no change. An 'adverse effect' is considered anything that can cause a change in behaviour or attitude or changes the character of a place in a negative manner.

10.64 An improvement from the Baseline environment would result in a beneficial effect.

Scale of Effect

10.65 The significance matrix has been adopted to guide the quantitative identification of significant effects for both the demolition and construction, and completed development phases. 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 10.10** 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 10.10 Quantitative Derivation of Effect Significance

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

Categorising Likely Significant Effects

10.66 Effects that are identified as being 'moderate' or 'major' adverse / beneficial are classified as significant effects.

BASELINE CONDITIONS

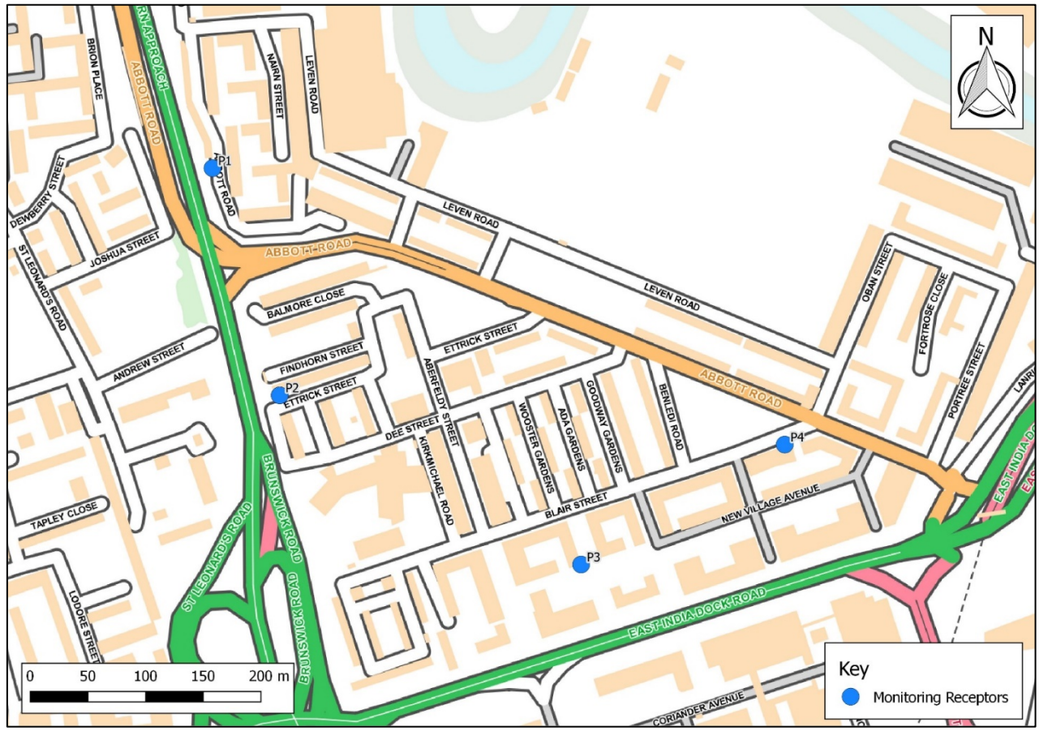
10.67 The current baseline conditions across the Site have been determined by environmental noise measurements undertaken in September 2021.

10.68 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 inform the computer model of noise levels in 2031 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.

10.69 The monitors were situated at locations across the Site in order to allow consideration of traffic from the A12 and to provide additional data for validation of the noise model. P1 was situated at Poplar Works, approximately 1.8m above local ground level and overlooking the A12. P2 was situated on a balcony at Kilbrennan House, overlooking the A12 and at approximately 7.5m above local ground level, P3 was situated on the roof of the Barrel Makers, approximately 1.8m above roof level. P4 was situated at Blairgowrie Court, approximately 6.5m above ground level.

10.70 Data was obtained over a week at positions P1 to P3 and three days at P4. 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 10.1**.

Figure 10.1 Unattended Survey Locations



10.71 A summary of the unattended noise measurements is presented in **Table 10.11**. The full set of graphical results is shown in **ES Volume 3, Appendix Noise and Vibration – Annex 5 to Annex 8**.

Table 10.11 Summary Of Measured Noise Levels

Monitoring Location	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	96.4	65.8	57.8	93.6	64.5	53.2
P2	97.7	67.7	62.4	95.3	65.7	57.5
P3	92.5	60.3	54.9	87.2	58.1	50.6
P4	95.8	60.2	49.8	85.8	55.2	42.0

10.72 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 10.12**, statistical analysis of measurements at P1 to P4 is presented in **ES Volume 3, Appendix Noise and Vibration – Annex 9 to Annex 12**.

Table 10.12 Adopted Background Sound Levels

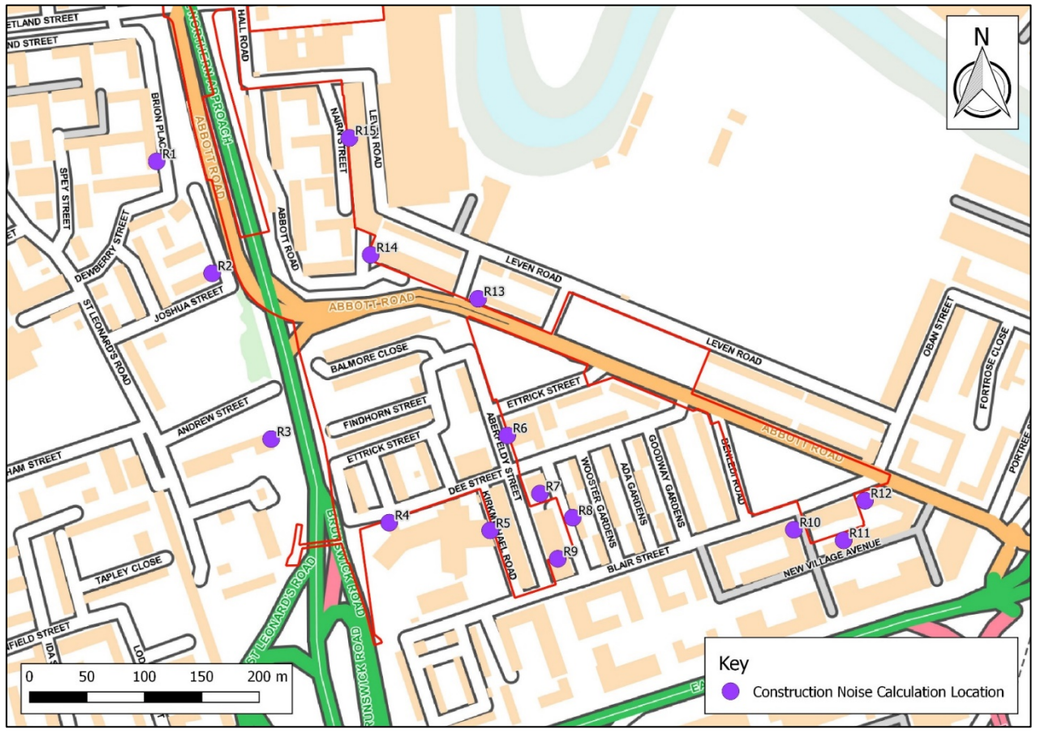
Monitoring Position	Period	Background Sound Level, $L_{A90,T}$ (dB)	Noise Limit for Fixed Installations of Mechanical Plant, $L_{Ar,Tr}$ (dB)
P1	Daytime	58	48
	Night-Time	56	46
P2	Daytime	62	52
	Night-Time	55	45
P3	Daytime	55	45
	Night-Time	49	39
P4	Daytime	52	42
	Night-Time	38	28

RECEPTORS AND RECEPTOR SENSITIVITY

Existing

10.73 Receptors identified for the assessment of construction activities (see **Figure 10.2**) are residential and therefore of a high sensitivity. In addition, the disused Bromley Hall School is represented by receptor R1 and the vibration effects reported for R1 are also representative of those at the Bromley Hall School. Culloden Primary School is represented by R4 and R5, the noise and vibration effects at these receptors are representative of those at Culloden Primary School

Figure 10.2 Construction Assessment Receptor Locations



10.74 The change in road traffic flows due to the Proposed Development is considered for the residential dwellings on the surrounding road links. The receptors on surrounding road links are taken to be residential and therefore high sensitivity.

Introduced

10.75 The 'During Operation' assessment is undertaken to identify the Site suitability and mitigation requirements for the proposed residential dwellings. The residential dwellings in the Proposed Development are high sensitivity.

POTENTIAL EFFECTS

Demolition and Construction

Demolition and Construction Noise

10.76 The operation of equipment and works associated with the Site preparation, demolition and construction phase of the Proposed Development has the potential to result in noise effects at existing noise sensitive receptors in the vicinity (see **Figure 10.2**).

10.77 The construction noise calculations have been undertaken for the noisiest construction phases to provide assessment levels at the nearest noise sensitive 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 80 dB(A) at 10m
- Road pavement 81 dB(A) at 10m
- Super Structure 85 dB(A) at 10m

10.78 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. Hoarding of at least 2.4m will be incorporated at the Site, in accordance with the LBTH CoCP. Notwithstanding this, to provide a robust assessment the construction noise predictions assume no attenuation between the Site and calculation receptor locations. Further consideration of construction noise, including phasing and incorporated mitigation, will be undertaken as part of the Construction Environmental Management Plan (CEMP).

10.79 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.

10.80 The interim scenario year 2026, has been selected as it represents peak HGV flows as the Detailed Proposals (Phase A) will be occupied whilst construction activities continue on the Outline Proposals (and therefore represents a worst case). Due to the separating distances between the completed aspects and ongoing construction, the highest calculated noise levels can be considered to be applicable to these dwellings. These noise levels can also be considered applicable for future phases that will be built out and constructed whilst the later phases are still under construction.

10.81 The calculated levels assume the construction activities occur for 10 hours within any 16-hour daytime period.

10.82 Indicative noise levels have been calculated using the closest separation distances between the Site and receptors, as well as a typical distance to a more central position in to identify the likely worse case temporary effects as well as the likely typical effect. These worse case and typical noise levels have been calculated at the closest façade of each construction assessment position during each phase and sub-phase of the works. The adopted distances are presented in **Table 10.13**.

Table 10.13 Separation Distances Between Construction Activities and Receptors, M

Receptor	Façade Noise Level at Nearest Residential Receptor During Likely Phases of Construction, dB(A), $L_{Aeq,16hr}$					
	Demolition	Enabling Works	Piling	Sub-structure	Roads	Super-structure
Closest Activity						
R1	100	100	100	100	100	100
R2	65	65	65	65	65	65
R3	45	45	45	45	45	45
R4	25	25	25	25	25	25
R5	10	10	10	10	10	10
R6	20	20	20	20	20	20
R7	10	10	10	10	10	10
R8	15	15	15	15	15	15
R9	Adjacent	Adjacent	Adjacent	Adjacent	Adjacent	Adjacent
R10	15	15	15	15	15	15
R11	20	20	20	20	20	20
R12	15	15	15	15	15	15
R13	35	35	35	35	35	35
R14	20	20	20	20	20	20
R15	15	15	15	15	15	15
Typical Distance						
R1	120	120	120	120	120	120
R2	120	120	120	120	120	120
R3	100	100	100	100	100	100
R4	115	115	115	115	115	115
R5	135	135	135	135	135	135
R6	100	100	100	100	100	100
R7	145	145	145	145	145	145
R8	170	170	170	170	170	170
R9	195	195	195	195	195	195
R10	355	355	355	355	355	355
R11	385	385	385	385	385	385
R12	390	390	390	390	390	390
R13	100	100	100	100	100	100
R14	120	120	120	120	120	120
R15	150	150	150	150	150	150

10.83 The calculated noise levels are shown in **Table 10.14**.

Table 10.14 Calculated Façade Construction Noise Levels $L_{aeq,T}$ Db

Receptor	Façade Noise Level at Nearest Residential Receptor During Likely Phases of Construction, dB(A), $L_{Aeq,16hr}$					
	Demolition	Enabling Works	Piling	Sub-structure	Roads	Super-structure
Closest Activity						
R1	<65	<65	<65	<65	<65	<65
R2	68	67	68	<65	<65	68
R3	71	70	71	66	67	71
R4	>75	75	>75	71	72	>75
R5	>75	>75	>75	>75	>75	>75
R6	>75	>75	>75	73	74	>75
R7	>75	>75	>75	>75	>75	>75
R8	>75	>75	>75	>75	>75	>75
R9	>75	>75	>75	>75	>75	>75
R10	>75	>75	>75	>75	>75	>75
R11	>75	>75	>75	73	74	>75
R12	>75	>75	>75	>75	>75	>75
R13	73	72	73	68	69	73
R14	>75	>75	>75	73	74	>75
R15	>75	>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
R11	<65	<65	<65	<65	<65	<65
R12	<65	<65	<65	<65	<65	<65
R13	<65	<65	<65	<65	<65	<65
R14	<65	<65	<65	<65	<65	<65
R15	<65	<65	<65	<65	<65	<65

10.84 The resultant noise impacts are presented in **Table 10.15**.

Table 10.15 Calculated Construction Noise Impacts

Receptor	Façade Noise Level at Nearest Residential Receptor During Likely Phases of Construction, dB(A), $L_{Aeq,16hr}$					
	Demolition	Enabling Works	Piling	Sub-structure	Roads	Super-structure
Closest Activity						
R1	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible
R2	Low	Low	Low	Negligible	Negligible	Low
R3	Medium	Medium	Medium	Low	Low	Medium
R4	High	Medium	High	Medium	Medium	High
R5	High	High	High	High	High	High
R6	High	High	High	Medium	Medium	High
R7	High	High	High	High	High	High
R8	High	High	High	High	High	High
R9	High	High	High	High	High	High
R10	High	High	High	High	High	High
R11	High	High	High	Medium	Medium	High
R12	High	High	High	High	High	High
R13	Medium	Medium	Medium	Low	Low	Medium
R14	High	High	High	Medium	Medium	High
R15	High	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
R11	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible
R12	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible
R13	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible
R14	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible
R15	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible

10.85 Construction activities are calculated to exceed SOAEL during close proximity works. However, it will 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.

10.86 The calculated effect significance, with consideration to the high sensitivity of the nearby receptors, is presented in **Table 10.16**.

Table 10.16 Calculated Construction Noise Effects

Receptor	Façade Noise Level at Nearest Residential Receptor During Likely Phases of Construction, dB(A), $L_{Aeq,16hr}$					
	Demolition	Enabling Works	Piling	Sub-structure	Roads	Super-structure
Closest Activity						
R1	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible
R2	Minor	Minor	Minor	Negligible	Negligible	Minor
R3	Moderate	Moderate	Moderate	Minor	Minor	Moderate
R4	Major	Moderate	Major	Moderate	Moderate	Major
R5	Major	Major	Major	Major	Major	Major
R6	Major	Major	Major	Moderate	Moderate	Major
R7	Major	Major	Major	Major	Major	Major
R8	Major	Major	Major	Major	Major	Major
R9	Major	Major	Major	Major	Major	Major
R10	Major	Major	Major	Major	Major	Major
R11	Major	Major	Major	Moderate	Moderate	Major
R12	Major	Major	Major	Major	Major	Major
R13	Moderate	Moderate	Moderate	Minor	Minor	Moderate
R14	Major	Major	Major	Moderate	Moderate	Major
R15	Major	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
R11	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible
R12	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible
R13	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible
R14	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible
R15	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible

10.87 The effect significance is classed as Major temporary to Minor. Mitigation measures which further minimise the likelihood of adverse impacts are discussed later in this ES Chapter.

Construction Vibration

10.88 Considering the separation distances, nearby residential properties are likely to be affected during close proximity works. The majority of works will be unlikely to affect the nearby residential properties, although Major effects will be likely during close proximity works. The likely impact from construction activities is therefore considered to be temporary major adverse (significant) to negligible (not significant).

10.89 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 10.17**.

Table 10.17 Calculated Construction Vibration Effects

Receptor	Façade Noise Level at Nearest Residential Receptor During Likely Phases of Construction, dB(A), $L_{Aeq,16hr}$					
	Demolition	Enabling Works	Piling	Sub-structure	Roads	Super-structure
Closest Activity						
R1	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible
R2	Minor	Minor	Minor	Minor	Minor	Minor
R3	Minor	Minor	Minor	Minor	Minor	Minor
R4	Minor	Minor	Minor	Minor	Minor	Minor
R5	Major	Major	Major	Major	Major	Major
R6	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate
R7	Major	Major	Major	Major	Major	Major
R8	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate
R9	Major	Major	Major	Major	Major	Major
R10	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate
R11	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate
R12	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate
R13	Minor	Minor	Minor	Minor	Minor	Minor
R14	Moderate	Moderate	Moderate	Moderate	Moderate	Moderate
R15	Moderate	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
R11	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible
R12	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible
R13	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible
R14	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible
R15	Negligible	Negligible	Negligible	Negligible	Negligible	Negligible

Phasing

10.90 Changes in traffic flows due to construction activities have been considered based on the interim year traffic flow data, which includes peak construction HGV traffic. The 18-hour Annual Average Daily Total (AAWT) flows were provided for the local road network surrounding the Proposed Development for the year 2026 both with and without construction traffic.

10.91 The predicted changes in noise level at the roadside on existing road links on the local network, identified with respect to the road traffic noise impact assessment criteria, are presented in **Table 10.18**.

Table 10.18 Change In Noise Level On Local Road Network, Interim Year

Road Link	Change in Flow	Noise Change, dB
Abbott Road (East of Underpass)	0	0.0
Abbott Road (East of Oban Street)	0	0.0
Leven Road	0	0.0
Oban Street	0	0.0
Bromley Hall Road	154	0.6
Lochnagar Street	154	0.3
Zetland Street	0	0.0
Abbott Road Underpass (One-Way)	0	0.0
A1206 Preston's Road	0	0.0
A12 (Between Lochnagar Street and A13)	100	0.0
A12 (North of Lochnagar Street)	54	0.0
A12 On-slip from A13 (St. Leonards Road)	54	0.0
Trafalgar Way	0	0.0
Upper Bank Street	0	0.0
Poplar High Street	0	0.0
Saltwell Street	0	0.0
A1206 Cotton Street	0	0.0
A1261 Aspen Way (West of A12)	0	0.0
Blackwall Tunnell	23	0.0
Upper North Street (A13 to Cordelia Street)	0	0.0
Upper North Street (Cordelia Street to B140 St. Paul's Way)	0	0.0
B140-St. Paul's Way	0	0.0
Cordelia Street	0	0.0
Devons Road	0	0.0
Devas Street W of Purdy Street	0	0.0
Chrisp Street (South of Burcham Street)	0	0.0
Chrisp Street (North of Burcham Street)	0	0.0
Campbell Road	0	0.0
Devas Street (West of A12 junction)	0	0.0
Burcham Street/St Leonard Road	0	0.0
A13 (From A12/A13 interchange to Abbott Road)	77	0.0
A13 (West of A12/A13 interchange)	0	0.0
A1020 Leamouth Road	23	0.0
A13 (East of Leamouth Road)	100	0.0
A13 Newham Way (East of Abbott Road)	100	0.0
A1011 Silvertown Way (South of A13)	12	0.0
A12 Off-slip (St. Leonard Road from Blackwall Tunnel)	0	0.0
A102 On-slip (to Blackwall Tunnel)	23	0.0
A102 Off-slip (to A13 east and west)	39	0.0
A102 off-slip (to A13 west)	0	0.0
A102 on-slip (from A13 east)	0	0.0

10.92 **Table 10.18** identifies that existing noise-sensitive receptors adjacent to the road network would experience increases in noise level of no more than 1 dB and therefore changes in noise levels on the surrounding road network are likely to result in Negligible effects in the short term.

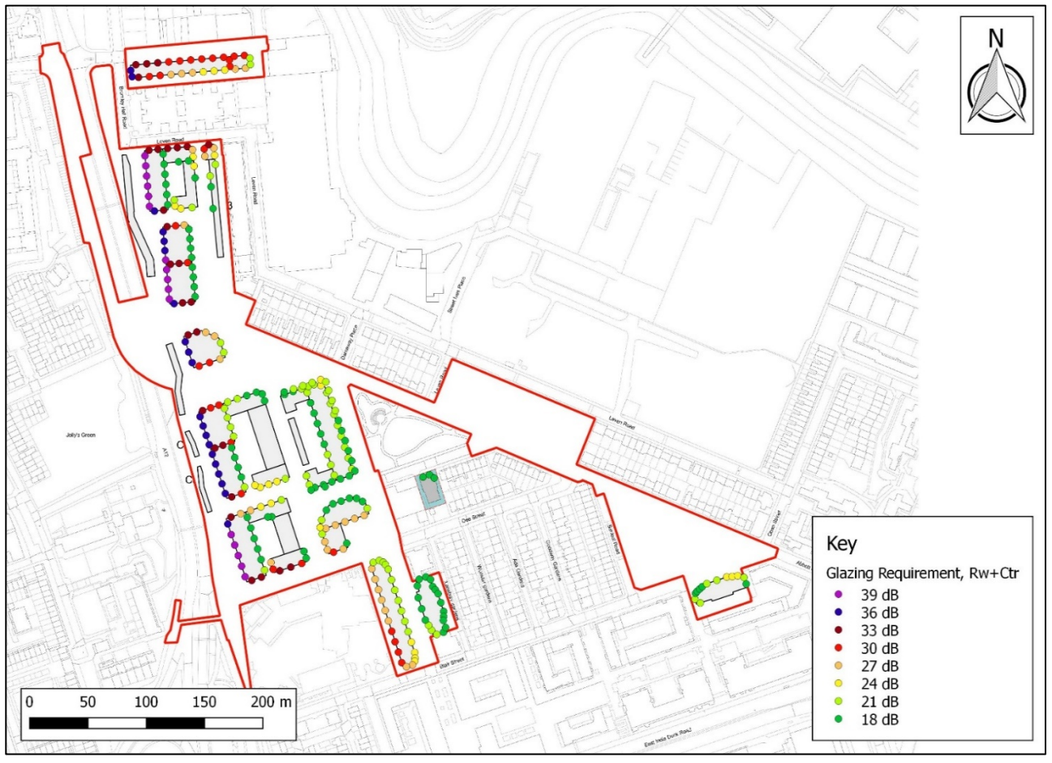
Completed Development

Ambient Noise levels

10.93 The future suitability of the Site for residential accommodation has been confirmed by considering the calculated noise contours and the guidance adopted for this ES Chapter.

10.94 Calculated daytime and night-time noise contours are presented in **ES Volume 3, Appendix Noise and Vibration – Annex 14 and 15**, respectively. The calculated facade reductions required at façade locations across the Proposed Development are presented in **Figure 10.3**.

Figure 10.3 Glazing And Ventilation Requirements



10.95 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.

10.96 Roof and façade constructions typically achieve an attenuation of at least 55 dB Rw, 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.

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

10.98 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 Ctr 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.

10.99 BS 8233 recognises that external ambient noise levels are not achievable in urban areas adjoining the strategic noise network. An excess of the upper guideline noise level will not prohibit development provided the Proposed Development is designed to achieve the lowest practicable levels. Accordingly, an effect significance for external amenity noise levels has not been identified.

10.100 The positioning of buildings and balcony areas have been considered within the design of the development and dwellings directly overlooking the A12 are proposed to comprise winter gardens in order to mitigate noise levels at the most affected facades.

10.101 Where facades do not directly overlook the A12 the balconies benefit from partial or complete screening by the proposed building structures and therefore the noise levels will not be as high. Protruding balconies could incorporate measures such as imperforate parapets and absorptive linings in order to reduce noise levels further.

10.102 The Proposed Development design incorporates 'courtyard' areas where noise levels will fall below the upper guideline noise levels. Additionally, the proposed tower blocks will screen the eastern side of the Proposed Development and form a 'quiet side' area with noise levels at ground floor level lower than those currently observed.

10.103 Based on the above, the Proposed Development is considered to mitigate noise at amenity areas as far as practicable. The noise levels at these areas will not prohibit development.

10.104 The WHO Guidelines states that indoor noise levels will 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.

10.105 Considering the façade sound reduction identified in the BS 8233 assessment, maximum night time noise levels with windows closed achieve the WHO criteria of 45 dB. Windows need to remain closed at facades overlooking the railway line. Maximum $L_{Amax,F}$ noise levels are considered to achieve the criteria set out in the WHO Guidelines, provided the glazing and ventilation options previously identified are employed.

10.106 With incorporation of suitable glazing and ventilation choices the internal noise levels would fall below LOAEL and would therefore render the Site to be suitable for the proposed uses.

ANC Acoustics Ventilation and Overheating Risk

10.107 The overheating risk categories have been calculated at the facades of the proposed dwellings for the consideration of the energy consultant and incorporation into the overheating assessment.

10.108 The risk categories have been identified based on the calculated noise levels across the Proposed Development and have been adopted across all floors in order to provide a cautious consideration of the risk.

10.109 The calculated risk categories across the Proposed Development are presented in **ES Volume 3, Appendix Noise and Vibration – Annex 17.**

Proposed Fixed Plant & Commercial Activity

10.110 Any proposed plant and activities pertaining to business use will be specified by the future occupants prior to fit-out. Plant will be specified by the occupants to ensure compliance with the fixed limits identified in **Table 10.12**, in accordance with the LBTH Local Plan.

10.111 The future occupiers are not currently known and detailed data is not yet available. The identified limits will inform the design of the proposed plant items/activities during the detailed design stage.

10.112 The proposed 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) will remain 10 dB below the background sound level during all periods of operation.

10.113 BS 4142 provides assessment periods of:

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

10.114 The observed background sound levels and resultant fixed plant noise limits are presented in **Table 10.12**. Commercial plant and activity would be specified such that the calculated combined Rating level at the nearest residential receptors does not exceed these limits.

10.115 Sufficiently mitigated plant items would result in a Negligible effect significance.

Increases in Road Traffic Noise – Existing Residential Receptors

10.116 The traffic flow data has been used as the basis for the road traffic noise assessment. The 18-hour Annual Average Daily Total (AAWT) flows were provided for the local road network surrounding the Proposed Development for the year 2031 both with and without development.

10.117 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.

10.118 The predicted changes in noise level on existing road links, identified with respect to the road traffic noise impact assessment criteria, are presented in **Table 10.19**.

Table 10.19 Change in Noise Level on Local Road Network, 2031

Road Link	Change in Flow	Noise Change, dB
Abbott Road (East of Underpass)	-6,144	-11.9
Abbott Road (East of Oban Street)	-2,005	-1.3
Leven Road	562	0.6
Oban Street	1,063	1.2
Bromley Hall Road	905	2.6
Lochnagar Street	553	0.9
Zetland Street	-341	-0.8
Abbott Road Underpass (One-Way)	-4,800	-46.6
A1206 Preston's Road	204	0.0
A12 (Between Lochnagar Street and A13)	1,558	0.1
A12 (North of Lochnagar Street)	1,658	0.1
A12 On-slip from A13 (St. Leonards Road)	43	0.0
Trafalgar Way	-75	-0.2
Upper Bank Street	-19	0.0
Poplar High Street	26	0.0
Saltwell Street	25	0.0
A1206 Cotton Street	-917	-0.2
A1261 Aspen Way (West of A12)	-377	0.0
Blackwall Tunnell	617	0.0
Upper North Street (A13 to Cordelia Street)	113	0.1
Upper North Street (Cordelia Street to B140 St. Paul's Way)	-21	0.0
B140-St. Paul's Way	212	0.1
Cordelia Street	-81	-0.2

Road Link	Change in Flow	Noise Change, dB
Devons Road	-1,512	-0.9
Devas Street W of Purdy Street	20	0.0
Chrisp Street (South of Burcham Street)	733	0.3
Chrisp Street (North of Burcham Street)	338	0.1
Campbell Road	-459	-0.2
Devas Street (West of A12 junction)	1,643	1.4
Burcham Street/St Leonard Road	780	0.8
A13 (From A12/A13 interchange to Abbott Road)	478	0.0
A13 (West of A12/A13 interchange)	163	0.0
A1020 Leamouth Road	1,279	0.3
A13 (East of Leamouth Road)	7	0.0
A13 Newham Way (East of Abbott Road)	-295	0.0
A1011 Silvertown Way (South of A13)	127	0.0
A12 Off-slip (St. Leonard Road from Blackwall Tunnel)	-617	-0.3
A102 On-slip (to Blackwall Tunnel)	-412	-0.3
A102 Off-slip (to A13 east and west)	539	0.2
A102 off-slip (to A13 west)	-824	-0.4
A102 on-slip (from A13 east)	347	0.1

10.119 **Table 10.19** identifies that existing noise-sensitive receptors adjacent to the road network would experience increases in noise level of no more than 3 dB and therefore changes in road traffic flows are likely to result in Negligible effects in the long term.

10.120 There is a substantial decrease in traffic at two locations on Abbott Road, resulting in a **Major Beneficial** (**Significant**) effect at these locations.

MITIGATION AND RESIDUAL EFFECTS

Demolition and Construction Mitigation

10.121 To control the impact of noise during all phases of the construction of the Proposed Development, contractors will ensure that construction works are carried out in accordance with best practicable means (BPM) as described in BS 5228 and 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 will 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.

10.122 By adopting the recommended best practicable means, construction noise levels can typically be reduced by 10 dB(A).

10.123 Procedures will be implemented to control the potential impact of noise at any proposed residential units that are occupied prior to the completion of the construction activities at the Site. Essentially, where construction activities associated with any phase are identified to be within the critical distances, consideration will be given to the use of quieter techniques or targeted and specific noise mitigation measures (such as reduced duration of operation, enclosure of equipment etc.) to ensure continued compliance with the criterion limit.

10.124 Construction related vibration impacts are likely in the short term. Should any activities take place within the critical distances identified in **Table 10.13** prior notification will be given to residents of affected properties. A programme of vibration monitoring will be implemented to manage any impacts. Best Practicable Means will be employed to reduce vibration at the source.

10.125 Construction activities will 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.

Completed Development Mitigation

Ambient Noise Levels

10.126 The calculated façade reductions required across the development are presented in **Figure 10.3**. Suitable glazing and ventilation options will be adopted in conjunction with typical façade in order to achieve the BS 8233 and WHO criteria.

10.127 Mechanical ventilation is proposed across the Proposed Development. Any installed mechanical ventilation system 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 required façade reduction.

10.128 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 Ctr urban traffic noise spectrum. The ventilation will achieve this value when open/operational, to allow ventilation to the dwelling.

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

10.130 Winter gardens are incorporated at dwellings directly overlooking the A12. The remainder comprises protruding balconies and external amenity areas at ground level which are screened by the layout of the Proposed Development. Balconies would benefit from measures such as imperforate parapets and absorptive linings.

Commercial Activities

10.131 The sound from commercial plant and activities will be specified such that sound levels remain below the limits specified in this ES Chapter.

10.132 Mitigation options will be specified during the detailed design stage, as appropriate. Effects from commercial activities would be Negligible following specification and assessment of proposed commercial activity.

Residual Effects

Demolition and Construction

10.133 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 will exceed the criterion noise levels in the short term.

10.134 Construction noise and vibration effects are likely to be **Major Adverse (Significant)** in the short term with the majority of activities being **Minor Adverse (not significant) (Figure 10.20)**.

Operation

10.135 Noise levels at all proposed dwellings are calculated to fall below the BS 8233 criteria with the incorporation of suitable glazing and ventilation units. This provides a **Minor Adverse** effect significance due to the

sensitivity of the residential dwellings. The residual noise effect is considered to be **Negligible** with the adoption of suitable mitigation **(Figure 10.20)**.

10.136 Long Term effects due to changes in road traffic flows are considered to be **Negligible**.

10.137 All commercial plant will be specified by the future occupants such that rating levels at the nearest residential receptors fall below the specified background sound levels. Whilst the effect cannot be quantitively assessed, any proposed plant will be specified such that the resulting effect is **Negligible**.

Table 10.20 Residual Effects

Receptor	Description of the Residual Effect	Scale and Nature	Significant / Not Significant	Geo	D I	P T	St Mt Lt
Demolition and Construction							
Residential Receptors Immediately Adjacent to Activities	Demolition and Construction Noise and Vibration (short term)	Negligible to Major Adverse	Not Significant to **Significant**	L	D	T	St
Residential Receptors	Demolition and Construction Noise and Vibration (medium term)	Minor Adverse	Not Significant	L	D	T	Mt
Residential Receptors	Demolition and Construction traffic	Negligible	Not Significant	L	D	T	Mt
Completed Development							
Residential Receptors	Internal Ambient Noise Levels	Negligible	Not Significant	L	D	P	Lt
Nearby Residential Receptors	Building Services and Plant Noise	Negligible	Not Significant	L	D	P	Lt
Residential Receptors on Road Network	Changes in Road Traffic Flows	Negligible	Not Significant	L	D	P	Lt
Residential Dwellings on Abbot Road	Changes in Road Traffic Flows	Major Beneficial	Not Significant	L	D	P	Lt

Notes:
Residual Effect
- Scale = Negligible / Minor / Moderate / Major
- Nature = Beneficial or Adverse

Geo (Geographic Extent) = Local (L), Borough (B), Regional (R), National (N)
D = Direct / I = Indirect
P = Permanent / T = Temporary
St = Short Term / Mt = Medium Term / Lt = Long Term
N/A = not applicable / not assessed

ASSESSMENT OF THE FUTURE ENVIRONMENT

Evolution of the Baseline Scenario

10.138 The opening of the Silvertown Tunnel may give rise to changes in vehicle movements over the current baseline scenario. Committed development may also increase road traffic flows on the road network. However, the road network in the surrounding area is understood to be near or at capacity and therefore the ambient environment is not likely to significantly increase over existing conditions.

Cumulative Effects Assessment

10.139 Nearby developments that may potentially give rise to cumulative effects are identified in **ES Volume 1, Chapter 2: EIA Methodology.** 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[10], the potential cumulative effects are presented below.

[10] Town and Country Planning (Environmental Impact Assessment) Regulations, 2017, as amended 2018 and 2020

Demolition and Construction

10.140 The surrounding area is subject to a large amount of redevelopment and construction activity at nearby developments, namely Ailsa Wharf, the Leven Road Gasworks, Former Poplar Bus Depot, Islay Wharf, and Aberfeldy Estate has the potential to cause localised noise disturbance around each development site. However, the activities have commenced on-site at the majority of these developments and it is not known whether the construction activities from each development will be completed or will occur at the same time as those on the Proposed Development Site.

10.141 The developments at Islay Wharf and the Former Poplar Bus Depot are understood to have not yet commenced and therefore there is an increased chance that demolition and construction activities happen concurrently to those on the Proposed Development.

10.142 Such activities at these sites may give rise to cumulative effects in instances where construction activity at both sites takes place in close proximity to an identified receptor. The sensitivity of the nearby receptors is identified as high and impacts low to medium, resulting in minor to moderate adverse effects at local receptors during the majority of the demolition and construction phases. However, should activities occur concurrently the cumulative effects would be short term major adverse.

Completed Development

10.143 The assessment at proposed residential dwellings has considered the additional traffic movements from the Proposed Development and committed developments and determined that the significance of effects at internal habitable rooms will be Negligible with the incorporation of appropriate glazing and ventilation.

10.144 Regarding fixed plant, the neighbouring developments will be subject to the same mitigation requirements as the proposed Development and plant items will be required to result in Negligible impacts. There are therefore no expected significant cumulative effects due to the fixed plant items.

10.145 With consideration to the above, the potential cumulative effects from the Completed Development and identified nearby developments are unlikely to affect those identified within this ES Chapter.

LIKELY SIGNIFICANT EFFECTS

10.146 Demolition and construction activities may give rise to major adverse (significant) short-term effects on levels of noise and vibration at nearby sensitive receptors should instances arise where activity occurs in close proximity to sensitive receptors. The majority of demolition and construction activities would give rise to minor to moderate adverse effects depending on the intervening distances between activities.

10.147 With appropriate mitigation choices there are no likely cumulative effects identified from the Completed Development.