Chapter 9: Noise and Vibration

NOISE AND VIBRATION	
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COMPARISON OF EFFECTS	The assessment presented within this ES Chapter is based on the revised proposals (referred to as the 'Proposed Development'), as described in ES Volume 1, Chapter 0 'Preface' and ES Volume 1, Chapter 4 'The Proposed Development'. A comparison of the findings and conclusions of this assessment against those of the December 2018 ES in relation to noise and vibration is provided in the section of this ES Chapter titled '*Comparison of Effects*'.
SUPPORTING APPENDIX	***ES Volume 3: Appendix - Noise and Vibration*** Annex 1: Legislation, Planning Policy and Other Relevant Standard and Guidance Annex 2: Glossary Annex 3: Environmental Noise and Vibration Survey Report Annex 4: Construction Plant Assumptions
KEY CONSIDERATIONS	The following are the key acoustic issues which have been assessed: • Construction noise and vibration impacts on the nearby noise sensitive receptors. • The control of noise egress from building services plant on nearby sensitive receptors; • The control of noise egress from operations of the building (i.e. road traffic) on nearby sensitive receptors.
CONSULTATION	Prior to the undertaking of the baseline noise and vibration survey in 2018, contact was made with an Environment Health Officer (EHO) at the LBS to understand the requirements. The conversation determined the length of survey and when it could take place. An EIA Scoping Report was prepared and submitted to the LBS for discussion on the 24th September 2018 in relation to the 2018 Environmental Statement (ES) (see ***ES Chapter 2 – EIA Methodology (Volume 1)***). Informal feedback on the Scoping Report was received from the LBS on the 29th November 2018 in the form of a high-level review (the 'LBS Review') with recommendations for consideration within the ES. The LBS Review comments were incorporated where appropriate within the 2018 ES that was submitted in support of the 2018 planning application to the LBS. A summary of the key points raised in the LBS Review in terms of the approach and methodology is presented within Annex A of this ES Chapter. In addition to the Scoping Process, the 2018 ES was reviewed by an independent third party (Land Use Consultants (LUC)) on behalf of the LBS. The feedback received from LUC on the 2018 ES was responded to at the time and has been, as relevant been incorporated into this 2021 ES, thus ensuring that the 2021 ES for the revised scheme is comprehensive in terms of scope and addressed requested clarifications and points raised previously by LUC on behalf of the LBS pursuant to Regulation 25 of the EIA Regulations. The 2018 scoping process was undertaken in detail and has provided the Applicant, Trium and Sandy Brown with sufficient knowledge of the site and the surrounding area to be able to determine the scope of the EIA for the 2021 revised scheme. In October 2020, an EIA scoping note was issued to the GLA (see ***ES Chapter 2 – EIA Methodology (Volume 1)***). The note confirms that in determining the scope of the EIA for the amended scheme, reference has been made to the September 2018 Scoping Report, the November 2018 LBS Review, the 2018 ES and the LUC Review. A further scoping meeting (virtual) was held with the GLA on 8th September 2021 to review and confirm the approach to the EIA.

ASSESSMENT METHODOLOGY

Defining the Baseline

Baseline Conditions

9.1 The baseline conditions have been established through review of existing noise data at surrounding sites and additional noise surveys carried out around the perimeter of the existing building. Details of the noise survey methodology are discussed below.

9.2 A vibration survey has also been undertaken to assess the vibration impact on the Proposed Development (references to the Proposed Development throughout this ES Chapter unless specified otherwise refers to the 'revised' October 2021 scheme) from train movements in and out of London Bridge Train Station. Details of the vibration survey methodology are discussed below.

Survey methodologies

9.3 Noise surveys have been undertaken in line with the guidance contained in British Standard (BS) 7445:2003[1] and BS 4142:2014[2].

9.4 A vibration survey has also been undertaken with regard to the guidance in BS 6472-1:2008[3] and HTM 08-01[4] to assess the impact of perceptible vibration on the development. The potential for re-radiated noise resulting from train movements has also been assessed. The re-radiated noise assessment has been based on the Association of Noise Consultants (ANC) guidelines[5] (2012).

9.5 Environmental noise surveys were conducted in November 2018 to establish the baseline noise climate around the site and at key receptor locations where there is potential for noise sensitivity. The surveys have been used as a basis for setting limiting noise emission criteria for sources associated with the Proposed Development, primarily for new building services plant and systems. As there have been no significant changes around the site that would have affected the noise levels (e.g. new or changes to the road network or railway lines) the results obtained during 2018 are representative of those that are likely to be present. Consequentially a new survey has not been undertaken.

Unattended Noise Survey

9.6 Unattended noise monitoring was undertaken at the site over 5 days to determine the existing background sound levels in the vicinity of nearby noise sensitive premises. Two monitoring position were adopted, the first position overlooking St Thomas street (Position A) and the second position overlooking Melior Street (Position B). The microphone positions for the noise survey are indicated on **Figure 9.1**.

9.7 The microphone at position A was mounted about 5 meters above the ground, and at least 3.5 metres from any vertical reflective surface. The microphone at position B was mounted about 4 metres from the ground and approximately 1 m from a vertical reflective surface. The positions were chosen to be reasonably representative of the nearest noise sensitive premises.

9.8 The unattended measurements were carried out using a Rion NL-52 Class 1 sound level meter, measuring octave band sound pressure levels over 5-minute periods between 10:47 on 1 November 2018 and 11:47 on 6 November 2018.

9.9 The sound level meter and microphone were calibrated at the beginning and end of the measurements using an externally calibrated sound level calibrator.

9.10 The dominant noise sources noted along Melior Street consisted of traffic, pedestrians and plant noise. The dominant noise sources noted along St Thomas Street consisted of pedestrians, traffic (i.e. delivery trucks), and audio announcements from London Bridge station.

9.11 Full details of the methodology of the environmental noise surveys are presented in ***Volume 3: Appendix - Noise and Vibration (Annex 3)***.

Attended Noise Survey

9.12 Attended sample noise measurements were also carried out on 6th November 2018 to supplement the long-term monitoring survey and to assess the baseline noise at receptors where leaving secure monitoring equipment was not possible.

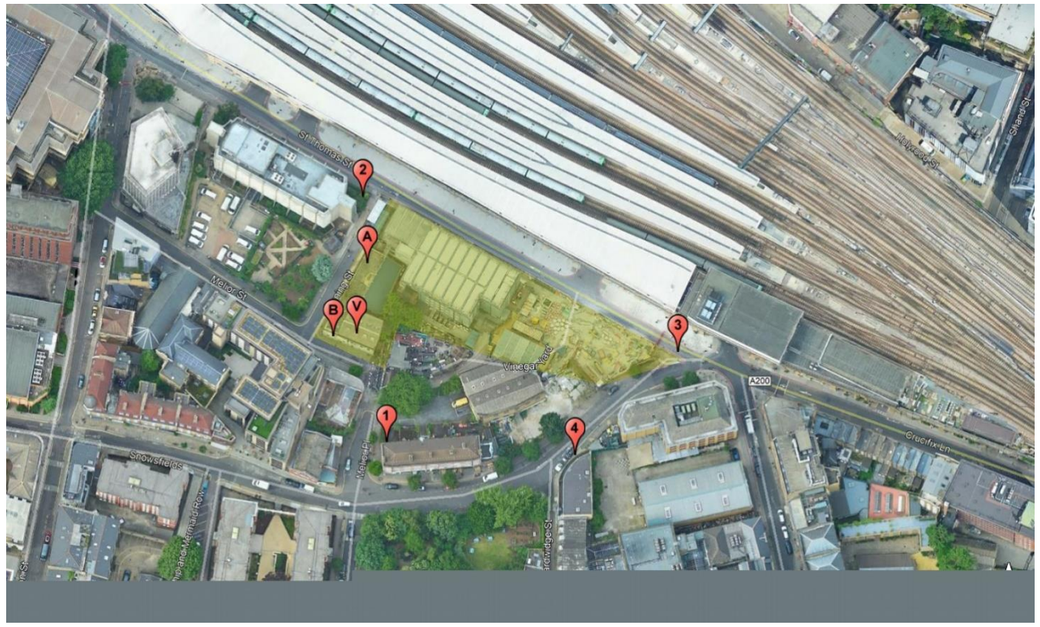
9.13 The measurement locations are shown in **Figure 9.1**, indicated as '1'. Sample noise measurement details are provided in **Table 9.12**.

9.14 Measurements were made using a hand-held Rion NL-52 Class 1 sound level meter, measuring octave band sound pressure levels over 5-minute periods.

9.15 The sound level meter and microphone were calibrated at the beginning and end of the measurements using an externally calibrated sound level calibrator. No significant deviation in calibration was observed.

[1] 'British Standards (BS) 7445-1:2003 – 'Description and measurement of environmental noise', December 2003
[2] 'British Standards (BS) 4142:2014+A1:2019 Method for rating and assessing industrial and commercial sound, October 2014
[3] British Standards (BS) 6472-1:2008 Guide to Evaluation of Human Exposure to Vibration in Buildings. Part 1: Vibration Sources other than Blasting, June 2008
[4] Department of Health, Health Technical Memorandum 08-01 (HTM 08-01): Acoustics, March 2013
[5] Association of Noise Consultants (ANC) guidelines (2012) 'Measurement and assessment of ground-borne noise and vibration', 2nd edition

Figure 9.1 Noise Monitoring Positions and Sensitive Receptors



Note: Image courtesy of Google Earth Pro

Baseline Vibration Survey

9.16 Trains running into London Bridge train station are within close proximity of the site and are a potential vibration source to future occupants of the site. Measurements were made within a ground floor of the existing warehouse building on site (1-7 Fenning Street), shown with a 'V' on **Figure 9.1**. The measurements were taken on 1st November 2018 to assess the existing levels of vibration in the area. Details of the measurements, including methodology and results are provided in ***Volume 3: Appendix - Noise and Vibration (Annex 3)***.

Likely Evolution of the Baseline

9.17 The evolution of the baseline condition has been determined through review of road traffic forecasts for future baseline assessment years (i.e. cumulative assessment scenario) and professional experience and judgement. The outline of the evolution of the future baseline is described qualitatively.

9.18 Potential changes in road traffic flows are considered to have the biggest potential to affect the future baseline at the site. Potential increases in road traffic can be derived from either natural population growth and / or new developments and infrastructure within the local and wider area of the borough and London region.

9.19 The future baseline conditions are expected to remain as per those surveyed as part of the current baseline conditions on the following assumptions:

- No significant changes envisaged to the surrounding road network; and
- No changes to the nearby Underground and National Rail train lines.

Impact Assessment Methodology

9.20 This section presents the methodology used to assess each type of noise and vibration impact, through the application of relevant standards and guidance, along with the types of data and analyses carried out.

9.21 The impact assessment includes the full assessment of two different floorspace options, in the event that either option could come forward. These are:

- Option 1: Where levels 1 - 10 of the Main Building are provided as D1 Use Class (medical use); and
- Option 2: Whereby levels 1 - 10 of the Main Building are provided as B1b Use Class (research and development use).

9.22 In both options the remaining levels of the Main Building and Warehouse are provided as B1(a) Office, affordable workspace (B1 / D1), D1 (community) and A1-A4 (retail).

9.23 For each of the floorspace options, an assessment of the significance of effects on each of the receptors described in **Table 9.13** has been undertaken and the effects stated for Option 1 and Option 2 where relevant.

9.24 The assessment considers the following types of noise and vibration:

- Construction
  - Construction noise - airborne noise from machinery and the works themselves;
  - Construction vibration - ground-borne vibration from machinery and the works themselves;
  - Construction traffic - noise from construction vehicles;
- Completed Proposed Development
  - Road traffic noise;
  - Rail vibration; and
  - Building services noise.

Demolition and Construction Activities

9.25 The demolition and construction programme is anticipated to be undertaken over the course of approximately 36 months. Full details can be found in ***ES Chapter 5 - Demolition and Construction (Volume 1)***.

9.26 Indicative details of plant and equipment associated with the demolition and construction stages are provided in ***ES Chapter 5 - Demolition and Construction (Volume 1)*** and ***ES Volume 3 – Appendix: Noise and Vibration***. This information has been used for the construction stage noise assessment.

9.27 Assessments have been undertaken for the following construction stages of work: demolition, excavation, piling and superstructure. Noise egress has been calculated based on the methodology outlined in BS 5228-1:2009[6]. Where specific sound power levels have not been provided as part of ***ES Chapter 5 - Demolition and Construction (Volume 1)***, reference has been made to the noise levels from various items of plant that will be in operation that are included within this standard. The operation of the plant noise levels have been used to determine a representative equivalent continuous sound level (L_{Aeq}) associated with each stage of the construction programme.

9.28 A 3D noise model (CadnaA) has been created to determine the predicted operational plant noise level associated with demolition and construction works, at the surrounding noise sensitive receptors.

9.29 The CadnaA model includes the sources of environment sound (e.g. roads, railway lines, building services plant, construction plant etc), ground terrain heights and buildings/structures amongst other objects that may absorb, reflect or screen noise. The model uses standardised methods of calculating the sound pressure level at the receptors from multiple sources considering screening and reflections from buildings or other objects. The model facilitates the calculation of sound pressure levels from numerous sources across many points across the façade simultaneously. This approach allows complicated calculations to be completed that would otherwise not be viable with a simple non-modelled approach.

9.30 Noise levels generated during the period of the demolition and construction works have been predicted at each of the noise sensitive locations and these levels have been compared with the guidelines highlighted in BS 5228, to determine the magnitude of impact. This has been referenced against the sensitivity of each receptor to determine the scale of effect.

Demolition and Construction Traffic Noise

9.31 The assessment of traffic noise effects is based on the Department for Transport Welsh Office Calculation of Road Traffic Noise 1988 (CRTN) [7] and Volume 11 of the Design Manual for Roads and Bridges (DMRB)[8] using traffic data predicted in ***ES Chapter 5 - Demolition and Construction (Volume 1)***.

[6] British Standards (BS) 5228-2:2009 Code of Practice for Noise and Vibration Control on Construction and Open Sites - Noise, December 2008
[7] Department for Transport Welsh Office (1988) Calculation of Road Traffic Noise (CRTN)
[8] Department for Transport Highways Agency Design Manual for Roads and Bridges: LA 111 – Noise and vibration, May 2020

9.32 Changes in road traffic noise levels associated with the demolition and construction works have been calculated following the principles detailed within the CRTN, which provide guidance and procedures for how to calculate noise from road traffic.

9.33 The results from the model have been used to assess the likely change in ambient noise levels (from the Baseline condition) at receptors in the area surrounding the site during the demolition and construction period.

Demolition and Construction Vibration

9.34 The assessment of demolition and construction vibration effects considers absolute levels (i.e. the actual levels) experienced within adjacent buildings in general accordance with BS 5228-2[9].

9.35 Vibration levels have been predicted at receptors in the area surrounding the site using historical data and the methodology provided in BS 5228-2.

9.36 Predictions of vibration levels at the receptor locations have been made in terms of the Peak Particle Velocity (PPV) experienced within the working day during key stages for works likely to cause vibration impacts (i.e. piling works).

Assumptions and Limitations

9.37 It is assumed that trade contractors will comply with all relevant legislation for the control of noise and vibration from construction works, including:

- The Control of Pollution Act (COPA) 1974[10] with particular reference to part III;
- The Environmental Protection Act 1990[11];
- The Control of Noise at Work Regulations 2005[12]; and
- The Health and Safety at Work Act 1974[13].

9.38 The predictions of potential demolition and construction noise and vibration effects have assumed the following for the purpose of the assessment:

- The adoption of a minimum 2.4m high perimeter site hoarding around the site;
- Construction plant that is compliant with the sound and vibration levels published within BS 5288;
- Stationary construction plant such as concrete crushers, will be positioned behind screens and positioned away from nearby sensitive receptors;
- The use of hand-held tools when used for a prolonged period will be adequately screened;
- The two piling rigs will be positioned at opposing sides of the site when used; and
- Mobile plant will move across the site equally across the construction period.

9.39 The selected plant and equipment, and the adopted demolition and construction methodology when works commence on site would be dependent on the appointed Principal Construction Contractor and trade contractors selected for the work. Therefore, in the absence of final details, conservative worst-case assumptions have therefore been made with regards to operations and activities, and the associated plant and equipment to be used, as outlined within ***ES Chapter 5 - Demolition and Construction (Volume 1)*** and ***ES Volume 3 – Appendix: Noise and Vibration***. As such, the predicted demolition and construction noise and vibration levels represent an upper estimate or worst-case scenario of emissions from the site during the works.

9.40 The equipment and operating hours assumed for the assessments contained herein are provided in ***ES Volume 3 – Appendix: Noise and Vibration.***

9.41 The emphasis of the construction assessment focuses on the noisiest phases of work, which are likely to arise from the use of plant such as excavators, crushers and piling rigs.

9.42 For the purposes of this assessment, predictions have been generally made for the construction plant located at ground level to represent the worst-case scenario. Construction works beneath ground level will benefit from greater separating distance to receptors and potentially greater amount of screening.

9.43 The month with the highest number of construction traffic (taken from ***ES Chapter 5 - Demolition and Construction (Volume 1))*** has been adopted in the assessment of potential increases in traffic noise to represent the worst-case scenario.

Completed Development

Building Services (Plant) Noise

9.44 Limiting noise levels for the new and replacement plant associated with the Proposed Development have been set based on the standard requirements of the LBS 'Technical Guidance for Noise' (the 'LBS Noise Guide')[14] and the guidance and assessment methodology outlined in BS 4142:2014.

Operational Traffic Noise

9.45 The potential operational traffic noise effects have been determined by comparing the 'Future Cumulative Baseline (Do Nothing) Opening Year (2025)' flows with the 'Future Baseline (Development) Opening Year (2025)' flows for Option 1 and Option 2.

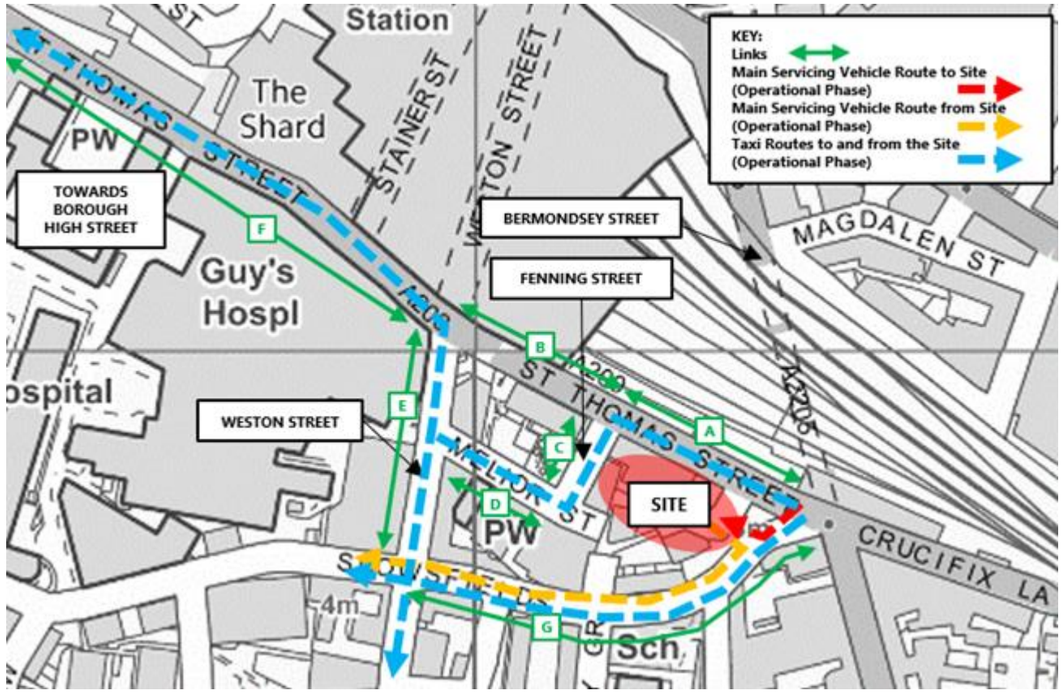
9.46 Option 1 of the Proposed Development is expected to introduce no more than 59 single vehicles per day on any road link, with Option 2 expected to introduce no more than 31 single vehicles per day on any road link. The routes for both options are expected to predominately follow the routes indicated in **Figure 9.2**. These vehicles will include refuse collections, taxi journeys and other servicing vehicles.

9.47 The CRTN algorithms are not applicable for roads that have less than 1,000 vehicles travelling on them each day. The surveys documented in ***ES Volume 4 – Appendix: Transport Assessment*** of the surrounding roads show very low Average Annual Daily Traffic flow that are under the 1,000 per day threshold.

9.48 The assessment is therefore based on the assumption that a 3 dB increase in traffic noise level requires the existing traffic volume to double.

[9] British Standards (BS) 5228-2:2009 Code of Practice for Noise and Vibration Control on Construction and Open Sites - Vibration, December 2008
[10] Control of Pollution Act 1974 (COPA)
[11] Environmental Protection Act 1990
[12] The Control of Noise at Work Regulations 2005
[13] The Health and Safety at Work Act 1974
[14] London Borough of Southwark (2019): Technical Guidance for Noise, November 2019

Figure 9.2 Delivery and Service Vehicle Routeing Plan



Groundborne Vibration

9.49 The potential for vibration impacts experienced by occupants within the Proposed Development from the operation of the nearby train lines (i.e. London Bridge) has been assessed.

9.50 Acceleration levels were measured within the existing building as part of the baseline assessment. Acceleration is the rate of change of velocity per unit of time, which can be converted using standard approaches to standard descriptors of vibration, i.e. Vibration Does Values (VDV).

9.51 The VDV, as described in BS 6472-1, is used to assess the likelihood of vibration levels resulting in 'adverse comment' by occupants of different building types. **Table 9.1** outlines the VDV criteria for office buildings from BS 6472-1 and different types of health care accommodation from HTM 08-01. There is no criteria available for retail or community spaces, though achieving below 0.2 m/sec$^{1.75}$ would be indicative of low probability of adverse comment.

Table 9.1 Vibration Dose Value Criteria

Accommodation type (use class)	Time Period	Low probability of adverse comment (m/sec$^{1.75}$)	Adverse comment possible (m/sec$^{1.75}$)	Adverse comment probable (m/sec$^{1.75}$)
Office (B1a) and Consulting rooms (D1)	07:00-23:00 16 hours day	0.4-0.8	0.8-1.6	1.6-3.2
General laboratories (B1b), treatment areas (D1)	07:00-23:00 16 hours day	0.2-0.4	0.4-0.8	0.8-1.6

Methodology for Defining Effects

Receptor Sensitivity

9.52 Receptors have been identified using council tax records and visual inspection of buildings during site visits.

9.53 **Table 9.2** describes the category of sensitivity corresponding with the type of receptor, which is based on a mixture of professional experience, industry standard, and information within the LBS Noise Guide.

Table 9.2 Receptor Sensitivity

Sensitivity of Receptor	Receptor Type
High	Hospitals (with wards), schools and residential
Medium	Health care, places of worship and educational building
Low	External amenity, commercial and retail buildings

9.54 Within an urban environment, although there are other noise sensitive receptors beyond those presented in the assessment, it is assumed that controlling noise egress at the closest properties would also result in acceptable noise levels at other noise sensitive properties located further away.

9.55 Where the noise impact cannot be mitigated to an acceptable level at the nearest noise sensitive receptors, consideration will be given to the potential impact on receptors at greater separation distances.

Magnitude of Impact

Demolition and Construction Noise

9.56 Guidance on the management of construction noise is provided within LBS Noise Guide. The guidance provides "Trigger" levels which gives advanced warning of a potential problem, whilst "Action" levels indicate a need to reduce noise or stop works. The "Trigger" level for the day is $L_{Aeq,10hr}$ 70 dB, whilst the "Action" level is $L_{Aeq,10hr}$ 75 dB.

9.57 In addition to the above, BS 5228 provides practical information on construction noise and vibration reduction measures and promotes a 'Best Practicable Means' (BPM) approach to control noise and vibration. The calculation method provided in BS 5228 is based on the number and types of equipment operating, their associated Sound Power Level (SWL), and the distance to receptors, together with the effects of any screening.

9.58 Magnitude of impact for assessing the effect of demolition and construction plant noise are based on the guidance set out in BS5228-1 and are presented in **Table 9.3**. These levels are external noise levels measured at the facade of the building.

Table 9.3 Magnitude of Noise Impact – Demolition and Construction Activities

Magnitude of impact	Daytime noise level dB L_{Aeq}
Very low	Lower than ambient L_{Aeq},or greater than the ambient L_{Aeq} but less or equal to L_{Aeq} 65 dB
Low	Greater than ambient L_{Aeq} and between L_{Aeq} 66-70 dB
Medium	Higher than ambient and between L_{Aeq} 71-75 dB
High	Higher than ambient and greater than L_{Aeq} 75 dB

Demolition and Construction Vibration

9.59 BS 5228-2 provides guidance on the perception of vibration within occupied buildings from construction activities.

9.60 **Table 9.4** details Peak Particle Velocity (PPV) levels and their potential effect on humans, and provides a semantic scale for description of construction vibration impacts on human receptors.

Table 9.4 Guidance on Human Effects of Peak Particle Velocity (PPV) Levels

Magnitude of Impact Category	Peak Particle Velocity Level	Impact Description
Very Low	<0.3 mm/s	Vibration might be just perceptible in the most sensitive situations for most vibration frequencies associated with construction. At lower frequencies, people are less sensitive to vibration.

Magnitude of Impact Category	Peak Particle Velocity Level	Impact Description
Low	0.3 – 1.0 mm/s	Vibration might be just perceptible in residential environments.
Medium	1.0 – 3.0 mm/s	It is likely that vibration of this level in residential environments will cause complaint, but can be tolerated if prior warning and explanation has been given to residents.
High	>3.0 mm/s	Vibration is likely to be intolerable for any more than a very brief exposure to this level.

9.61 In addition to the human effects, BS 5228- 2 also provides vibration thresholds for cosmetic damage within buildings with reference to BS 7385- 2[15].

9.62 Levels of vibration required for cosmetic damage are far higher than those that would result in an unacceptable impact in terms of 'annoyance'.

Construction Road Traffic Noise

9.63 The potential impact of road traffic can be categorised as noise associated with changes in road traffic movements on the roads around the site.

9.64 Criteria for assessing the traffic effects associated with the Proposed Development are presented in **Table 9.5**. The criteria are based on the IOA / IEMA 'Guidelines for Noise Impact Assessment.'

Table 9.5 Magnitude of Impact Rating for Assessing the Effect of Increases in Road Traffic Noise

Magnitude of Impact	Increase in Noise Level (dBA)	Description
Very low	<1.0	Noise increase is unlikely to be discernible
Low	1.0-2.9	A slight increase in noise levels may be perceived in affected buildings and outdoor recreational areas
Medium	3.0-4.9	Increase in noise levels is likely to be noticeable in affected buildings and outdoor recreational areas
High	>5.0	Increase in noise levels is likely to be clearly perceptible and could have a significant effect on the continued use of a building

9.65 The above criteria also applies to the assessment of road traffic noise generated when the Proposed Development is complete and occupied (the Completed Development).

Completed Development

Building Services Plant Noise

9.66 Noise from the building services plant associated with the Proposed Development would need to be controlled to ensure that it would not have an effect on nearby noise sensitive receptors relative to the background sound level.

9.67 Criteria for the assessment are set in accordance with LBS guidance, BS 4142 and the Institute of Acoustics (IOA) / Institute of Environmental Management and Assessment (IEMA) 'Guidelines for Noise Impact Assessment'[16], as identified in **Table 9.6**.

Table 9.6 Magnitude of Impact Rating for Assessing the Effect of Building Services Plant Noise

Magnitude of Impact	Increase in Noise Level (dBA)	Description
Very low	<1.0	Noise increase is unlikely to be discernible
Low	1.0-2.9	A slight increase in noise levels may be perceived in affected buildings and outdoor recreational areas
Medium	3.0-4.9	Increase in noise levels is likely to be noticeable in affected buildings and outdoor recreational areas
High	>5.0	Increase in noise levels is likely to be clearly perceptible and could have a significant effect on the continued use of a building

Vibration levels

9.68 The level of vibration present at a site can determine whether it is suitable for development.

9.69 The magnitude of impact categories for assessing vibration have been developed using the guidance in BS 6472-1, as presented in **Table 9.7**.

Table 9.7 Magnitude of Vibration Impacts for Assessing Site Suitability

Magnitude of Impact	Vibration Dose Value ($m/sec^{1.75}$)	Description (reference to BS 6472)
Very low	≤0.4 (16 hour day)	Below the 'low probability of adverse comment' range
Low	≤0.8 (16 hour day)	Below the 'adverse comment possible' range
Medium	≤1.6 (16 hour day)	Below the 'adverse comment probable' range
High	>1.6 (16 hour day)	Above the 'adverse comment probably' range

Scale and Nature of Effect

9.70 **Table 9.8** relates the scale of effects to the sensitivity of the receptor and the magnitude of the impact, based on the IOA / IEMA 'Guidelines'.

Table 9.8 Scale of Effect Matrix

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

9.71 **Table 9.9** puts the scale of effect in context to the effects experienced by the receptors. This is based on the IEMA Guidelines for Environmental Noise Impact Assessment and the Planning Practice Guidelines (PPG)[17].

9.72 **Table 9.9** also relates the scale of effect with the LOAEL (Lowest Observed Adverse Effect Level) and SOAEL (Significant Observed Adverse Effect Level) rating. The NOEL (No Observed Adverse Effect Level) referenced in the Scoping Report is equivalent to a Negligible effect rating.

[15] British Standards (BS) 7385-2:1193 Evaluation and measurement for vibration in buildings. Part 2: Guide to damage levels from groundborne vibration, November 1993

[16] Institute of Environmental Management and Assessment (IEMA) and Institute of Acoustics (IOA) Guidelines for Noise Impact Assessment, October 2014

[17] Department of Communities and Local Government (2014) Planning Practice Guidance (March 2014)

Table 9.9 Classification of Noise Effects

Scale of Effect	Description of Effect	Exceeds SOAEL?	Exceeds LOAEL?	Acceptance
Major	Disruptive, causes a material change in behaviour and/or attitude. Potential for sleep disturbance. Quality of life diminished due to change in character of the area.	Yes	Yes	No
Moderate	Intrusive, noise can be heard and causes small changes in behaviour and/or attitude. Potential for non-awakening sleep disturbance. Affects the character of an area such that there is a perceived change in the quality of life.	Yes	Yes	
Minor	Non-intrusive, can be heard but does not cause any change in behaviour or attitude. Can slightly affect the character of an area but not such that there is a perceived change in the quality of life.	No	No	Yes
Negligible	No discernible effect on the receptor	No	No	

Effect Nature

9.73 All noise and vibration effects are considered either Adverse or Neutral.

9.74 An Adverse effect is anything that can cause a change in behaviour, attitude or changes the character of a place. A Neutral effect is used to describe the effect when the scale of the effect is Negligible, as there is no discernible effect on the receptors.

9.75 Whilst Beneficial noise effects can occur, this assumes an improvement from the Baseline environment and in reality is highly unlikely when new development is being introduced to the local environment.

Geographic Extent of Effect

9.76 The geographic extent of the effects is identified. At a spatial level, **'site' or 'local'** effects are those affecting the site and neighbouring receptors, while effects upon receptors in the London Borough of Southwark (LBS) /surrounding boroughs or the LBS beyond the vicinity of the site and its neighbours are at a **'district / borough'** level. Effects affecting Greater London are at a **'regional'** level, whilst those which affect different parts of the country, or England, are considered being at a **'national'** level.

Effect Duration

9.77 For the purposes of the ES, 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'; these may be further classified as either 'short term' or 'medium-term' effects depending on the duration of the enabling and construction works that generate the effect in question.

9.78 Effects that result from the completed and operational Proposed Development are classed as 'permanent' or 'long-term' effects.

BASELINE CONDITIONS

Baseline Conditions

Unattended Monitoring

9.79 The minimum background sound levels measured at Positions A (St Thomas Street) and Position B (Melior Street) during the unattended survey are given in **Table 9.10** and **Table 9.11** respectively.

Table 9.10 Lowest measured background noise levels (Position A)

Date	Daytime (07:00 – 19:00) $L_{A90,5min}$ (dB)	Evening (19:00 – 23:00) $L_{A90,5min}$ (dB)	Night time (23:00 – 07:00) $L_{A90,5min}$ (dB)
1 November 2018	51*	51	47
2 November 2018	50	54	46
3 November 2018	49	50	45
4 November 2018	45	47	45
5 November 2018	49	50	46
6 November 2018	49*	-	-

*Measurements not made over full duration as a result of survey start and end time

Table 9.11 Lowest measured background noise levels (Position B)

Date	Daytime (07:00 – 19:00) $L_{A90,5min}$ (dB)	Evening (19:00 – 23:00) $L_{A90,5min}$ (dB)	Night time (23:00 – 07:00) $L_{A90,5min}$ (dB)
1 November 2018	54 *	55	53
2 November 2018	54	60	44
3 November 2018	47	49	44
4 November 2018	44	45	44
5 November 2018	48	54	53
6 November 2018	54 *	-	-

*Measurements not made over full duration as a result of survey start and end time

9.80 The lowest background sound levels measured during the survey were $L_{A90,5min}$ 44 dB during the daytime, $L_{A90,5min}$ 45 dB during the evening and $L_{A90,5min}$ 44 dB at night.

9.81 Daytime, evening and night time statistical analysis of representative values for both Positions A and B at the site are given in Annex B (at the end of this ES Chapter). From the analysis, the representative background sound levels measured during the survey at Position A (on St Thomas Street) were $L_{A90,5min}$ 53 dB during the daytime, $L_{A90,5min}$ 54 dB during the evening and $L_{A90,5min}$ 47 dB at night.

9.82 The statistical data at Position B (on Melior Street) is erratic and does not follow a common pattern. Investigations indicate that the background noise levels are determined by nearby building services plant associated with a restaurant and patrons outside the Horseshoe Inn Public House. Nevertheless, the representative background noise level has been assessed to be $L_{A90,5min}$ 46 dB for during the day, evening and night.

Attended monitoring

9.83 The results of the sample noise measurements (over 5-minute periods) are summarised in **Table 9.12**.

Table 9.12 Summary of Sample Measurement Results

Start Time (hh:mm)	Measured Noise Level (dB)		
	$L_{Aeq,T}$ (dB)	L_{AFmax} (dB)	$L_{AF90,T}$ (dB)
10:17	64	89	53
10:22	60	83	54
10:27	60	76	55
11:11	58	73	54

Baseline Vibration Levels

9.84 The results from the survey indicate VDVs up to 0.003 m/s$^{1.75}$ within the existing warehouse building. Details of the measurements and the assessments completed are provided within ***ES Volume 3 – Appendix: Noise and Vibration, Annex 3***.

9.85 The results indicates that barely measurable levels of vibration are present, which would not usually be perceptible or result in adverse comment being made.

9.86 The vibration levels measured were significantly below the threshold of the low probability of 'adverse comment' range. The magnitude of impact will be Very Low and the effect will be **Negligible** (not significant) on the uses within the Proposed Development. Vibration effects during the operation of the Proposed Development have not been considered further in the ES Chapter.

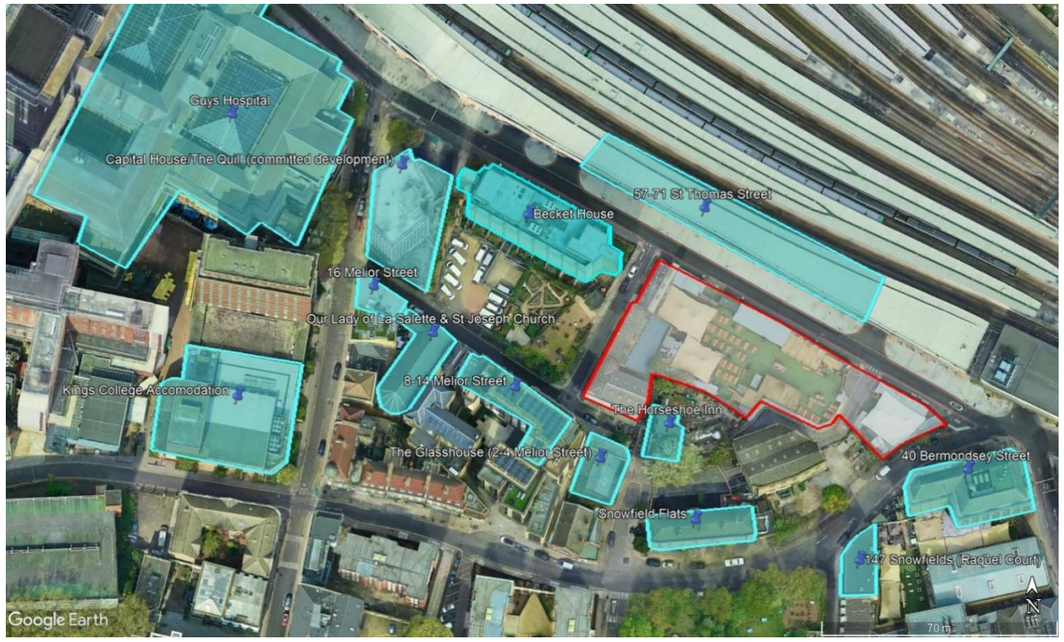
RECEPTORS AND RECEPTOR SENSITIVITY

9.87 The receptors assumed for the assessment have been identified in **Figure 9.3** and listed with their sensitivity in **Table 9.13**.

Table 9.13 Summary of Receptors

Receptor	Category	Receptor Sensitivity
The Glasshouse (2-4 Melior Street)	Residential (existing and consented)	High
8 – 14 Melior Street	Residential	High
16 Melior Street	Residential	High
Capital house	Commercial (consented)	Low
Our Lady of La Salette & St Joseph Church	Place of Worship	Medium
Snowfield flats	Residential	High
40 Bermondsey Street	Commercial	Low
147 Snowfields	Residential	High
Becket House	Commercial	Low
Guys Hospital	Hospital (with ward)	High
Kings College accommodation, Wolfson House	Residential	High
The Horseshoe Inn	Residential; Public House	High
57-71 St Thomas Street	Commercial (restaurant and retail)	Low

Figure 9.3 Existing Nearby Receptors



Note: Image courtesy of Google Earth Pro

POTENTIAL EFFECTS

9.88 This section discusses noise and vibration effects to sensitive receptors arising from the Proposed Development during the demolition and construction phase and during the operational phase.

9.89 The effects for both Option 1 and Option 2 have been stated.

9.90 Where significant adverse effects are predicted to occur, mitigation measures have been identified in order to reduce the magnitude of these effects to an acceptable level.

Demolition and Construction

9.91 The highest unmitigated construction noise levels and magnitude of impact for each stage of demolition and construction (up to substructure stage) at each noise sensitive receptor are highlighted in **Table 9.14**. These levels are based upon localised grouping of construction activities around the site, and therefore these levels can be considered to be the reasonable worst case scenario.

Table 9.14 Predicted Construction Noise Levels and Magnitude of Impact

Receptor	Predicted noise level – $L_{Aeq,10hour}$ (dB)				
	Receptor Sensitivity	Demolition	Excavation	Piling	Superstructure
The Glasshouse (2-4 Melior Street)	High	73 Medium	73 Medium	71 Medium	62 Very Low
8 – 14 Melior Street	High	75 Medium	76 High	70 Low	65 Very Low
16 Melior Street	High	70 Low	76 High	70 Low	64 Very Low
Capital house	Low	75 Medium	79 High	70 Low	63 Very Low
Our Lady of La Salette & St Joseph Church	Medium	73 Medium	75 Medium	69 Low	65 Very Low
Snowfield Flats	High	70 Low	79 High	71 Medium	66 Low
40 Bermondsey Street	Low	74 Medium	78 High	68 Low	68 Low
147 Snowfields	High	66 Low	71 Medium	68 Low	64 Very Low
Becket House	Low	85 High	83 High	80 High	76 High
Guys Hospital	High	66 Low	70 Low	65 Very Low	58 Very Low
Kings College accommodation, Wolfson House	High	63 Very Low	65 Very Low	61 Very Low	53 Very Low
The Horseshoe Inn	High	86 High	88 High	77 High	74 Medium
57-71 St Thomas Street	Low	77 High	80 High	69 Low	70 Low

9.92 The impact of demolition and construction noise activity has been determined based on the magnitude of impact classifications provided in **Table 9.3**, Sensitivity of the Receptors provided in **Table 9.13** and detailed further in **Table 9.14**.

9.93 Based on the magnitude of impacts and sensitivity of receptors presented in **Table 9.14**, the scale of effect on each receptor has been identified within **Table 9.15** (the likely effects considered significant are shaded grey).

Table 9.15 Predicted Demolition and Construction Noise Scale of Effects

Noise Sensitive Receptor	Scale of Effects			
	Demolition	Excavation	Piling	Superstructure
The Glasshouse (2-4 Melior Street)	Moderate Adverse	Moderate Adverse	Moderate Adverse	Negligible
8 – 14 Melior Street	Moderate Adverse	Major Adverse	Minor Adverse	Negligible
16 Melior Street	Minor Adverse	Major Adverse	Minor Adverse	Negligible
Capital house	Negligible	Minor Adverse	Negligible	Negligible
Our Lady of La Salette & St Joseph Church	Minor Adverse	Minor Adverse	Negligible	Negligible
Snowfield Flats	Minor Adverse	Major Adverse	Moderate Adverse	Minor Adverse
40 Bermondsey Street	Negligible	Minor Adverse	Negligible	Negligible
147 Snowfields	Minor Adverse	Moderate Adverse	Minor Adverse	Negligible
Becket House	Minor Adverse	Minor Adverse	Minor Adverse	Negligible
Guys Hospital	Minor Adverse	Minor Adverse	Negligible	Negligible
Kings College accommodation, Wolfson House	Negligible	Negligible	Negligible	Negligible
The Horseshoe Inn	Major Adverse	Major Adverse	Major Adverse	Moderate Adverse
57-71 St Thomas Street	Minor Adverse	Minor Adverse	Negligible	Negligible

9.94 The following main activities during the period of works have been identified to result in **Major** and **Moderate Adverse effects** (significant):

- Demolition;
- Excavation; and
- Piling.

9.95 The exception is for works associated with the superstructure stage on the Horseshoe Inn where a **Moderate Adverse** (significant) effect has also been assessed.

9.96 The predictions presented are based on reasonable worst-case assumptions and it is considered that there will be opportunities for the contractor to reduce the magnitude of impact experienced at the nearest noise sensitive properties through the implementation of BPM and associated mitigation measures detailed in **Paragraphs 9.115 - 9.120**. An outline of the noise mitigation that could be applied, to reduce the magnitude of impact and so resultant scale of effects experienced, is provided within ***ES Chapter 15 – Mitigation and Monitoring (Volume 1)***.

9.97 The moderate and major adverse effects shown above are the same for both Option 1 and Option 2.

Construction Traffic

9.98 The demolition construction traffic programme shows a peak of approximately 36 vehicle movements per day (25 HDV) entering and leaving the Site (one way route) along St Thomas Street for either Option 1 or Option 2 of the Proposed Development. The 2018 baseline daytime AADT vehicle flow along St Thomas Street is 316. Based on the worst-case construction traffic information the overall effect on changes to A-weighted 16 hour noise levels would be less than 1.0 dB.

9.99 On this basis the potential magnitude of impact would be Very Low and the likely effect to all receptors (including those located along the road network) is assessed to be **Negligible** (not significant).

9.100 The negligible (not significant) effects are applicable to both Option 1 and Option 2.

Construction Vibration

9.101 BS 5228 indicates that construction activities (particularly piling) generally only generate vibration impacts when they are located less than 20 m from sensitive locations. The magnitude of impact depends on the type of piling, ground conditions, and receptor distance.

9.102 It is not possible to estimate the levels of vibration with any certainty. Instead, it is proposed that limits are placed on the vibration at sensitive buildings (receptors) and therefore vibration levels will need to be monitored during construction. BS 5228-2 states that vibration PPV levels are tolerable within residential properties when they do not exceed 1.0 mm/s and prior warning is given.

9.103 Annex C and D of BS 5228-2 provide summaries of case histories of vibration measured during piling operations. Data from works carried out in East London indicate that peak particle velocities of between 0.05 to 0.23 mm/s at 20 m from a site have been recorded during auger boring of 1.05 m diameter piles, with soil conditions described as 'fill / dense ballast / clay'. During the removal of pile casings PPV's (at 25 Hz) of between 0.8 to 1.5 mm/s at 30 m and 25 m from piling locations have been recorded in the same general area. These historical data suggest that vibration levels are unlikely to affect any buildings outside of the site, and that at reasonable distances from the Proposed Development the vibration levels would be expected to be substantially lower than the vibration levels stated above.

9.104 It is likely that piling work close to the boundaries will result in vibration levels in the region of 1 mm/s – 3 mm/s within Becket House, 57-71 St Thomas Street, The Horseshoe Inn, The Glasshouse (2-4 Melior Street) and 8-14 Melior Street.

9.105 The resultant effect in The Horseshoe Inn, The Glasshouse (2-4 Melior Street) and 8-14 Melior Street has been assessed as being **Moderate Adverse** (significant). The resultant effect in Becket House and 57-71 St Thomas Street has been assessed as being **Minor Adverse** (not significant).

9.106 The magnitude of impact is also expected to be very low at all the other receptors and the assessed effect is **Negligible** (not significant) due to their increased distance away from the site and/or lower sensitivity**.**

9.107 These negligible to moderate adverse effects are applicable to both Option 1 and Option 2.

Completed Development

Building Services Plant Noise

9.108 On the basis of the baseline background noise levels, the total noise from building services plant are proposed to be limited in line with the noise levels detailed in **Table 9.16** at a position 1m from the existing facades. The building services plant strategy would need to be developed to ensure that the limits detailed in **Table 9.16** are achieved. These limits would apply to both Option 1 and Option 2 of the Proposed Development as they are set such that noise emissions from any building services plant do not result in significant adverse effects at existing receptors. The limits are determined independently and irrespective of the different Use Classes proposed in Option 1 and Option 2.

9.109 Limits have only been determined for the closest receptors on the basis that the control of noise emissions from building services plant at these receptors will inherently result in lower noise levels at receptors further away (i.e. attenuation of noise as distance increases).

Table 9.16 Building Services Plant Noise Limits

Receptor	Building Services Noise Limits (dB)		Representative Background Noise Level (dB)		Increase in Background Noise Level	Receptor Sensitivity	Magnitude of Impact	Scale of Effects
	Daytime	Night time	Daytime	Night time				
The Glasshouse (2-4 Melior Street)	43	37	53	47	<0	High	Very Low	**Negligible**
8 – 14 Melior Street	36	36	46	46	<0	High	Very Low	**Negligible**
16 Melior Street	36	36	46	46	<0	High	Very Low	**Negligible**
Capital house	43	37	53	47	<0	Low	Very Low	**Negligible**
Our Lady of La Salette & St Joseph Church	36	36	46	46	<0	Medium	Very Low	**Negligible**
Snowfield Flats	36	36	46	46	<0	High	Very Low	**Negligible**
40 Bermondsey Street	43	37	53	47	<0	Low	Very Low	**Negligible**
147 Snowfields	43	37	53	47	<0	High	Very Low	**Negligible**
Becket House	43	37	53	47	<0	Low	Very Low	**Negligible**
Guys Hospital	43	37	53	47	<0	Medium	Very Low	**Negligible**
Kings College accommodation, Wolfson House	43	37	53	47	<0	High	Very Low	**Negligible**
The Horseshoe Inn	36	36	46	46	<0	High	Very Low	**Negligible**
57-71 St Thomas Street	43	37	53	47	<0	Low	Very Low	**Negligible**

9.110 On this basis, the magnitude of impact will be Very Low and the effect will be **Negligible** (not significant).

9.111 This negligible (not significant) effect applies to both Option 1 and Option 2.

Road Traffic Noise

9.112 The traffic generated by the Proposed Development will generally be limited to taxis and service vehicles (including deliveries and refuse vehicles). The vehicles will follow the route shown in **Figure 9.2**.

9.113 **Table 9.17** and **Table 9.18** shows the change in vehicle numbers per day and the likely change in noise level expected for Option 1 and Option 2 respectively.

Table 9.17 Traffic Flow Predictions (Option 1)

Road	AADT Traffic Flow (Do Nothing 2025)	AADT Traffic Flow (Future Baseline 2025)	Increase in Traffic	Expected Increase in Noise Level ($L_{Aeq,T}$ dB)
St Thomas St (Bermondsey St to Fenning St)	402 (189 HGVs)	460 (189 HGVs)	58 (0)	0.6
St Thomas St (Fenning St to Weston St)	383 (168 HGVs)	397 (168 HGVs)	14 (0)	0.2
Fenning St	123 (55 HGVs)	165 (55 HGVs)	42 (0)	1.3
Melior St (Fenning St to Weston St)	132 (58 HGVs)	174 (58 HGVs)	42 (0)	1.2
Weston St (St Thomas St to Snowsfields)	117 (43 HGVs)	142 (43 HGVs)	25 (0)	0.8
St Thomas St (west of Weston St)	416 (184 HGVs)	441 (184 HGVs)	25 (0)	0.2

Road	AADT Traffic Flow (Do Nothing 2025)	AADT Traffic Flow (Future Baseline 2025)	Increase in Traffic	Expected Increase in Noise Level ($L_{Aeq,T}$ dB)
Snowsfields (Bermondsey St to Weston St)	1,687 (212 HGVs)	1,735 (231 HGVs)	48 (19)	0.1

Table 9.18 Traffic Flow Predictions (Option 2)

Road	AADT Traffic Flow (Do Nothing 2024)	AADT Traffic Flow (Future Baseline 2024)	Increase in Traffic	Expected Increase in Noise Level ($L_{Aeq,T}$ dB)
St Thomas St (Bermondsey St to Fenning St)	402 (189 HGVs)	408 (189 HGVs)	6 (0)	0.1
St Thomas St (Fenning St to Weston St)	383 (168 HGVs)	384 (168 HGVs)	1 (0)	0.0
Fenning St	123 (55 HGVs)	129 (55 HGVs)	7 (0)	0.2
Melior St (Fenning St to Weston St)	132 (58 HGVs)	138 (58 HGVs)	4 (0)	0.2
Weston St (St Thomas St to Snowsfields)	117 (43 HGVs)	121 (43 HGVs)	4 (0)	0.1
St Thomas St (west of Weston St)	416 (184 HGVs)	420 (184 HGVs)	4 (0)	0.0
Snowsfields (Bermondsey St to Weston St)	1,687 (212 HGVs)	1,718 (227 HGVs)	31 (15)	0.1

9.114 **Table 9.17** (Option 1) indicates that the existing ambient noise levels are not expected to increase by more than 1.2 dB along any road and therefore a Low magnitude of impact has been assigned. The effect has been assessed to be **Minor Adverse** (not significant) at the High Sensitivity receptors along Melior Street, i.e. The Glasshouse (2-4 Melior Street), 8-14 Melior Street, 16 Melior Street and The Horseshoe Inn. A Very Low magnitude of impact has been assigned at all other receptors, which results in a **Negligible** (not significant) effect as a result of operational traffic. **Table 9.18** (Option 2) indicates that the existing ambient noise levels are not expected to increase by more than 0.1 dB along any road and therefore a Very Low magnitude of impact has been assigned. The effect has been assessed to be **Negligible** (not significant) at all receptors as a result of operation traffic.

MITIGATION AND MONITORING MEASURES

Demolition and Construction

Noise Associated with Construction Works

9.115 The predicted noise levels are based on reasonable worst-case assumptions and it is expected that there will be additional mitigation options available to the contractor to reduce noise during the demolition, excavation and piling phases and throughout construction.

9.116 A full set of mitigation measures that the contractor/s will be required implement include those presented in ***ES Chapter 15 – Mitigation and Monitoring (Volume 1)*** and are summarised below. These apply to both Option 1 and Option 2 of the Proposed Development.

- The production of a construction noise and vibration report that evaluates the construction activities and provides specific Best Practicable Means (BPM) to reduce noise and vibration;
- Limiting high impact activities (including piling) to specific times during the day, e.g. 1 hour on – 1 hour off, or 09:00-12:00 and 14:00-17:00;
- Plant is to be properly maintained and operated in accordance with manufacturer's recommendations. Electrically powered plant is preferred, where practicable, to mechanically powered alternatives;
- When appropriate all mechanically powered plant will be fitted with suitable silencers. Items of plant on site operating intermittently are to be shut down in the intervening periods between use;
- Where feasible, all stationary plant would be located so that the noise effect at all occupied residential and commercial properties is minimised and, if practicable, every item of static plant when in operation is to be sound attenuated using methods based on the guidance and advice given in BS 5228;
- Trade contractors would at all times apply the principle of Best Practicable Means as defined in Section 72 of the COPA and carry out all work in such a manner as to reduce any disturbance from noise and vibration to a minimum; and
- The timing of building operations will be critical in avoiding noise and vibration nuisance to surrounding areas and premises. The contractor would identify particularly sensitive periods in the works so that the potential problems can be minimised and that early and good public relations with the adjacent tenants and occupants of buildings are maintained.

9.117 The assessment of potential construction noise and vibration effects does not include prescriptive measures, as these are not appropriate for this stage of the development. A Construction Method Statement (CMS) (see ***ES Chapter 5 – Demolition and Construction (Volume 1)***) would be employed to mitigate the potential noise and vibration effects on nearby noise sensitive premises, with the primary method for the control of noise and vibration being a Section 61 agreement under the Control of Pollution Act 1974 (COPA) with LBS being established.

9.118 A Section 61 agreement under the COPA will contain appropriate noise and vibration limits at the nearby properties depending on their use and ownership. These limits are recommended to be monitored and reported. The reports and monitoring will highlight when it is likely that the construction limits will be exceeded, so that construction activities can be effectively altered.

9.119 In addition, a Section 61 agreement also sets out a dispensation and variation procedure under which consent can be applied for to carry out works which would potentially exceed the agreed noise and vibration limits or must occur at times when such work is otherwise not approved. Such dispensation/variations would be applied for where there are good engineering, safety or practical reasons for undertaking the works at these times. The selected contractor should adopt measures, including site supervision arrangements, to reduce noise and vibration to a minimum in accordance with Best Practicable Means (BPM), as defined in Section 72 of the COPA.

9.120 With the implementation of the measures outlined, the likely residual effects from demolition and construction activities are expected to reduce to be less than those presented, though this is not easily quantifiable. However, some construction activities may result in a similar outcome with the implementation of mitigation measures. In these temporary instances (e.g. demolition and excavation activities that take place at the site perimeter and is closest to the receptors), the effects at The Horseshoe Inn, 8 – 14 Melior Street, 16 Melior Street and Snowfield Flats will remain as **Major Adverse** (significant) as a worst-case.

9.121 Notwithstanding the above, it would be expected that with mitigation measures adopted the residual effects would reduce by a single category, e.g. from **Major Adverse** to **Moderate Adverse**, **Moderate Adverse** to **Minor Adverse** etc. This relationship would be expected for receptors further away from the site, as the position of the construction activity on the site (i.e. centre or perimeter) has less influence on the predicted noise level.

Construction Traffic Noise

9.122 No mitigation is required for either Option 1 or Option 2 of the Proposed Development.

Construction Vibration

9.123 The effects of construction generated vibration on nearby sensitive receptors pre-mitigation is **Moderate Adverse** (significant) at the High sensitivity receptors closest to the site (i.e. The Horseshoe Inn, The Glasshouse (2-4 Melior Street) and 8-14 Melior Street). The effect level is described due mainly to the proximity of the receptors to the site, and opportunities to reduce vibration may therefore be limited or not quantifiable.

9.124 All other receptors have construction vibration effects that have been assessed to be **Minor to Negligible** (not significant) **(**pre-mitigation).

9.125 Vibration limits would-be set-in accordance with BS5228-2 to minimise the risk of complaints or building damage. These limits would be controlled through the implementation of the CMS as set out above, in addition to vibration monitoring.

9.126 The likely residual vibration effects from construction activities is expected to remain as either **Moderate Adverse** (significant) or **Minor Adverse / Negligible** (not significant) and apply to both Option 1 and Option 2 of the Proposed Development.

Completed Development

Road Traffic Noise

9.127 The analysis completed indicate no further mitigation is required.

Building Services Noise

9.128 Noise emissions from building services plant will be controlled by the selection of suitable items of plant and the provision of suitable attenuation packages, as required. The building services plant will be designed to ensure that the noise limits outlined in **Table 9.16** are not exceeded.

RESIDUAL EFFECTS

9.129 The residual effects resulting from the Proposed Development are summarised in **Table 9.19**. Unless stated otherwise, the residual effects are the same for both Option 1 and Option 2.

Table 9.19 Summary of Residual Effects – 2021 Proposed Development

Receptor	Receptor Sensitivity	Residual Effect (Nature and Scale)	Effect Significance	Geo	D I	P T	St Mt Lt
Demolition and Construction							
Demolition and Construction Activities Noise							
The Horseshoe Inn	High	Major Adverse to Moderate Adverse	Significant	L	D	T	St
Snowfield Flats	High	Major Adverse to Minor Adverse	Significant	L	D	T	St
8-14 Melior Street, 16 Melior Street	High	Major Adverse to Negligible	Significant	L	D	T	St
The Glasshouse (2-4 Melior Street), 147 Snowsfields	High	Moderate Adverse to Negligible	Significant	L	D	T	St
Our Lady of La Salette and St Joseph Church	Medium	Minor Adverse to Negligible	Not Significant	L	D	T	St
Becket House, Capital House and 57-71 St Thomas Street	Low	Minor Adverse to Negligible	Not Significant	L	D	T	St
Guys Hospital	High	Minor Adverse to Negligible	Not Significant	L	D	T	St
Kings College accommodation / Wolfson House	High	Negligible	Not Significant	L	D	T	St
Construction Vibration							
The Glasshouse (2-4 Melior Street), 8-14 Melior Street, The Horseshoe Inn	High	Moderate Adverse	Significant	L	D	T	St
Becket House, 57-71 St Thomas Street	Low	Minor Adverse	Not Significant	L	D	T	St
All other receptors	Low to High	Negligible	Not Significant	L	D	T	St
Construction Traffic							
All receptors	Low to High	Negligible	Not Significant	L	D	T	St
Completed Development							
Road Traffic (Option 1)							
The Horseshoe Inn, 8-14 Melior Street, 16 Melior Street and The Glasshouse (2-4 Melior Street)							
All other receptors	Low to High	Negligible	Not Significant	L	D	P	Lt
Road Traffic (Option 2)							
All receptors	Low to High	Negligible	Not Significant	L	D	P	Lt
Building Services Noise							
All receptors	Low to High	Negligible	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

LIKELY SIGNIFICANT EFFECTS

9.130 The Proposed Development will result in temporary residual noise effects that are major or moderate adverse (significant) at the closest receptors during the period of demolition and construction works. The periods that these effects are expected are limited to the demolition, excavation and piling related activities, as well as during the superstructure works at The Horseshoe Inn.

9.131 The Proposed Development will result in temporary residual vibration effects that are moderate adverse (significant) at the closest receptors during the period of demolition and construction works. The period that these effects are expected are limited to the piling works on site.

CLIMATE CHANGE

9.132 Climate change has the potential to intensify heat in the summer and cold in the winter, therefore as a result there is the potential for an increase in the use of heating and cooling functions of air handling type plant and a potential for receptors to open windows for longer durations.

9.133 Increased heat is likely to result in residents in the vicinity of the development to open windows for longer and reduce the level of attenuation their facades would typically provide and an increase in the use of air handling plant within the development may result in higher noise levels at those receptors. Alternatively, additional air handling plant may be installed.

ASSESSMENT OF FUTURE ENVIRONMENT

Evolution of the Baseline Scenario

9.134 Regarding any likely future change in road traffic noise in the absence of the Proposed Development, for example as a result of cumulative schemes in the area or forecasts of general changes in road use, this is reflected in the predicted road traffic noise levels for the Future Baseline (Do Nothing) Opening Year scenario, against which the impact of the Proposed Development is assessed.

9.135 Regarding any likely future change in railway noise, the current frequency of use of the rail lines in connection with London Bridge Station by both passenger and freight services indicates that there is unlikely to be any significant increase or decrease in rail traffic would cause a material change in railway noise.

9.136 There will be no change to the vibration levels measured on site as the operation of the nearby railway is not expected to change and there are no new railway lines beneath the site planned.

Cumulative Effects Assessment

9.137 This section identifies the effects of the Proposed Development in combination with the effects of other cumulative schemes within the surrounding area (identified in ***ES Chapter 2 - EIA Methodology (Volume 1)***). The assessment of cumulative effects are the same for both Option 1 and Option 2 of the Proposed Development.

9.138 Due to their proximity to the site, the following developments have been considered with respect to their potential to generate cumulative noise and vibration effects:

- 2-4 Melior Place (known as The Glasshouse);
- Capital House, 40 – 46 Weston Street;
- Guinness Court, Snowsfields Street;
- Edge;
- Sellar; and
- New City Court.

Demolition and Construction

9.139 The other cumulative schemes are expected to be subject to the same conditions as those suitably worded conditions to be imposed on the Proposed Development (if granted) that would control noise and vibration at the high sensitivity receptors closest to them. The highest sensitivity receptors to 2-4 Melior Place are the Horseshoe Inn (south façade) and 8-12 Melior Street, which is approximately 2-5 m from their site boundary. The highest sensitivity receptor to the Capital House scheme is St Guys Hospital, which is approximately 15 m from their site boundary. The highest sensitivity receptors closest to Guinness Court includes: Snowfields Primary School, residential properties along Snowsfields Street and along Ship and Mermaid Row, ranging from around 5-20 m from the Guinness Court location.

9.140 Given the proximity to each other, the Proposed Development and the other developments have the potential for construction noise and vibration levels to increase at the shared receptors.

9.141 Detailed demolition and construction noise assessments are not included for the 2-4 Melior Place or Guinness Court planning documents, though have been included in the Capital House planning application documents.

Capital House

9.142 The Capital House application indicates that there are shared receptors with the Proposed Development, namely Guy's Hospital, 16 Melior Street, 8-14 Melior Street, Our Land of La Salette Church, Beckett House and Kings College accommodation / Wolfson House. The assessed effects from demolition works are described as **Substantial (significant),** with up to **Moderate (significant)** during the construction phases. It is expected that if demolition or construction works coincide that the effects described in the Capital House application would exist, as mostly the effects described for the Proposed Development at the common receptors are **Minor Adverse or Negligible (not significant),** i.e. the demolition and construction activities from Capital House will be the dominant noise source.

2-4 Melior Place

9.143 The design proposals for 2-4 Melior Place indicate that the existing building will be demolished, a basement will be excavated and bored piles to the perimeter. While not of the same scale as the Proposed Development, it is envisaged that potentially similar activities to those assessed could be adopted, albeit for much shorter durations.

9.144 The development at 2-4 Melior Place has the potential to result in **Major Adverse (significant)** effects for sections of the demolition and construction programme at 8-14 Melior Place and the Horseshoe Inn.

9.145 With respect to the Horseshoe Inn, the highest noise levels from the development at 2-4 Melior Place will be on the south façade, whereas the highest noise levels from the Proposed Development are described at the north façade. On this basis it is likely that the assessed effects from the Proposed Development will remain unchanged from those described.

Guinness Court

9.146 The designs for Guinness Court indicate that extensions to the existing buildings are proposed. The works do not appear to include demolition, excavation, piling or otherwise particularly noisy activities. On this basis, and that there are limited shared receptors, the cumulative effects are expected to be the same as those described with the Proposed Development.

Edge, 60 St Thomas Street

9.147 The Edge development (60 St Thomas Street (20/AP/0944)) shares many receptors with the Proposed Development (all apart from 147 Snowfields). The residual demolition and construction effects at all High sensitivity receptors have been described in the Edge application (20/AP/0944, ES Volume 1) as being either **Moderate** or **Major Adverse (significant)** during the demolition, excavation and piling stages.

9.148 The available information indicates mostly higher levels of demolition and construction noise than those at the common receptors listed in **Table 9.14**. The Edge predictions in most instances are sufficiently above those for the Proposed Development that if coincident activities occur it is likely that the effects described in the Edge application will prevail without variation i.e., the cumulative effects will be either **Moderate** or **Major Adverse (significant)** during demolition, excavation and piling at the High sensitivity receptors.

Sellar, 40-44 Bermondsey Street, Vinegar Yard Warehouse, 9-17 Vinegar Yard and Land

9.149 The Sellar development (19/AP/0404) shares many receptors with the Proposed Development. The residual effects due to demolition and construction activities associated with the Sellar development are described (19/AP/0404, ES Volume 1), as being significant adverse at the shared receptors of Snowfield Flats, 2-4 Melior Place, The Horseshoe Inn and 147 Snowfield.

9.150 The Sellar application states that cumulative construction noise effects would not be materially different to that resulting from the most dominant source. Nevertheless, in some situations it is possible for the cumulative effect to result in changes in the predictions provided herein so that previously assessed **Negligible** and **Minor Adverse** effects (not significant) would be **Moderate** or **Major Adverse (significant)** effects at the shared receptors.

New City Court

9.151 The New City Court scheme is greater than 100 m from the site and therefore is not expected to share common receptors with those surrounding the Proposed Development. Therefore, it is considered that the New City Court is of a sufficient distance so that it is not expected to influence the potential impacts accounted for in the cumulative assessment.

Completed Development

9.152 The cumulative schemes considered are inherently included within the road traffic volumes and therefore have been accounted for within the assessment of the Proposed Development.

9.153 The building services noise associated with the cumulative schemes will be controlled to meet the same conditions as imposed on the Proposed Development and receptors closest to them. As a result, the cumulative effects of building services noise is likely to remain **Negligible** (not significant).

COMPARISON OF EFFECTS

9.154 **Table 9.20** below presents the residual effects of the 2018 Proposed Development to allow for a comparison with the residual effects of the 2021 Proposed Development (**Table 9.19**).

9.155 Since the 2018 Proposed Development, the units located in 57-74 St Thomas Street have been occupied, which the 2021 Proposed Development takes into consideration. With this exception, all other receptors remain the same.

9.156 The comparison of effects demonstrates that, in terms of noise and vibration effects throughout the demolition and construction period:

- The effects relating to demolition and construction works noise are broadly consistent. The effects to receptors over the duration of the works programme range from major adverse (significant) to negligible (not significant); while this is consistent in that the assessment of the 2018 Proposed Development also identified effects from demolition and construction works noise ranging from major adverse to negligible, there are some variations in the effects seen at individual receptors. For example, the assessment of the 2021 Proposed Development identifies that for the Horseshoe Inn, the noise effects throughout the construction works range from major adverse (significant) to moderate adverse (significant), whereas in the 2018 ES, the effects ranged from major adverse (significant), moderate adverse (significant) and minor adverse (not significant). For other receptors, the scale of effects has reduced by one category,

for example for The Glasshouse where in the 2018 ES effects were major adverse (significant) to minor adverse (not significant) whereas for the 2021 Proposed development the effects are defined as being moderate adverse (significant) to minor adverse (not significant). Generally, the demolition and construction works noise effects range from major adverse (significant) to negligible (not significant) for both the 2018 Proposed development and the 2021 Proposed Development.

- The effects relating to vibration are consistent for both the 2018 Proposed development and the 2021 Proposed Development; the effects range from moderate adverse (significant) to negligible (not significant); and
- The effects relating to construction road traffic are consistent for both the 2018 Proposed development and the 2021 Proposed Development; the effects are negligible at all receptors and not significant.

9.157 The comparison of effects demonstrates that, in terms of noise effects on completion and occupation of the Proposed Development:

- In relation to the noise effects from operational road traffic, the Option 2 assessment of the 2021 Proposed Development demonstrates that the effects are negligible (not significant) at all receptors whereas for the 2018 Proposed Development, the road traffic effects were minor adverse (not significant) at 8-14 Melior Street, 2 Melior Place, 16 Melior Street and The Horseshoe Inn. The Option 1 assessment of the 2021 Proposed Development demonstrates that the road traffic effects are the same as the 2018 Proposed Development;
- The effects relating to building services noise remain consistent; the effects are negligible (not significant); and
- There are no noise effects associated with entertainment noise due to the removal of this use (music venue) from the Proposed Development.

9.158 In conclusion, while some different and additional likely effects have been identified as a result of the 2021 Proposed Development, there are no different or additional likely significant noise or vibration effects from the 2021 Proposed Development when compared with the 2018 Proposed Development.

9.159 With regards to the cumulative assessment, the 2018 ES assessed the cumulative effects of the 2018 Proposed Development in combination with the consented Capital House, 40 – 46 Weston Street 'The Quill' development and Guinness Court, Snowsfields Street.

9.160 The cumulative assessment of the 2021 Proposed Development accounts for a number of other / additional cumulative schemes. Therefore, the results are not comparable. In conclusion, the assessment of the 2021 Proposed Development in the cumulative scenario identifies additional and different effects including likely significant effects in relation to noise. This is due, in part, to the proposals of the 2021 Proposed Development but mainly due to the number of existing and approved redevelopment schemes coming forward in the surrounding development context.

Table 9.20 Summary of Residual Effects - 2018 Proposed Development

Receptor	Receptor Sensitivity	Residual Effect (Nature and Scale)	Effect Significance	Geo	D I	P T	St Mt Lt
Demolition and Construction							
Demolition and Construction Activities							
The Glasshouse, 8-14 Melior Street, 2 Melior Place, The Horseshoe Inn	High	Major Adverse to Minor Adverse	Significant	L	D	T	St
16 Melior Street, 147 Snowfields Street, Guys Hospital	High	Moderate Adverse to Negligible	Significant	L	D	T	St
Our Lady of La Salette and St Joseph Church	Medium	Minor Adverse to Negligible	Not Significant	L	D	T	St
Becket House	Low	Minor Adverse to Negligible	Not Significant	L	D	T	St
Wolfson House	High	Negligible	Not Significant	L	D	T	St
Capital House	Low	Negligible	Not Significant	L	D	T	St
Construction Vibration							
The Glasshouse, 8-14 Melior Street, The Horseshoe Inn	High	Moderate Adverse	Significant	L	D	T	St
Becket House	Low	Minor Adverse	Not Significant	L	D	T	St
All other receptors	Low to High	Negligible	Not Significant	L	D	T	St
Construction Traffic							
All receptors	Low to High	Negligible	Significant	L	D	T	St
Completed Development							
Road Traffic							
8-14 Melior Street, 2 Melior Place, 16 Melior Street, The Horseshoe Inn	High	Minor Adverse	Not Significant	L	D	P	Lt
All other receptors	Low to High	Negligible	Not Significant	L	D	P	Lt
Building Services Noise							
All receptors	Low to High	Negligible	Not Significant	L	D	P	Lt
Entertainment Noise							
Guys Hospital	High	Major Adverse	Significant	L	D	P	Lt
Becket House	Low	Minor Adverse	Not Significant	L	D	P	Lt
All existing residential receptors	High	Negligible	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

ANNEX A

LBS Review

LBS Review - Summary of Comments	Reference in the ES Chapter / Application Documentation
Paragraph 1.54 A baseline long and short term noise measurement survey has been proposed to be carried out representing the different noise conditions at the site boundaries and at nearby sensitive receptor locations. The scope and measurement procedures appear to be adequate although it is not clear whether the methodology has been agreed in consultation with LBS EHO. Confirmation that the methodology and scope of the noise and vibration assessment and monitoring locations have been agreed with LBS is required.	The precise locations of the monitoring were not discussed with the EHO, however, the duration and timing of the measurements were. As a result, the measurements were conducted over a period longer than 24 hours.
Paragraph 1.55 Receptor locations have been adequately described and, although not mentioned, it is assumed that the assessment will include amenity areas as receptors.	Amenity spaces have not been considered as these are not clearly definable (location or sensitivity). Nevertheless, the effects described at the residential properties close to the site represent the worst-case and effects in amenity spaces would be the same or less.
Paragraph 1.56 Appropriate methods for calculating levels of construction noise and vibration at sensitive receptors have been described and the assessment will take account of existing ambient conditions at receptors.	The principles of BS 5228-1 and the local authority have been applied.
Paragraph 1.57 Appropriate impact descriptors have been assigned for construction and operational noise assessment in terms of 'negligible' to 'major' and separate descriptors are proposed for traffic noise assessment during construction and operation.	Noted
Paragraph 1.58 Relevant criteria for the assessment of vibration impacts have been included for both construction and operational phases and the assessment of noise from building services plant has been adequately described.	Noted, though criteria for operation considers only existing vibration levels not those from proposed building services. The building services plant will be vibration isolated as part of the final detailed design, though these measures are not definable currently pre-submission of the planning application.
Paragraph 1.59 Although criteria for assessment of significant effects have been identified there is no mention of mitigation methods or when such measures might be needed. Details on mitigation measures are to be clearly identified within the ES	Consideration of mitigation measures have been taken into account, along with their expected outcome.
Paragraph 1.60 The assessment of residual impacts and noise in amenity areas has not been included. A summary of residual effects following mitigation and consideration of the potential cumulative noise effects from other nearby developments is to be provided within the ES.	Residual and cumulative effects have been considered in the chapter. As per previous comment the effects in amenity spaces would be the same or less than those described for the residential receptors.

ANNEX B

Position A

Figure 9B.1 Statistical analysis of background sound level during the day at Position A

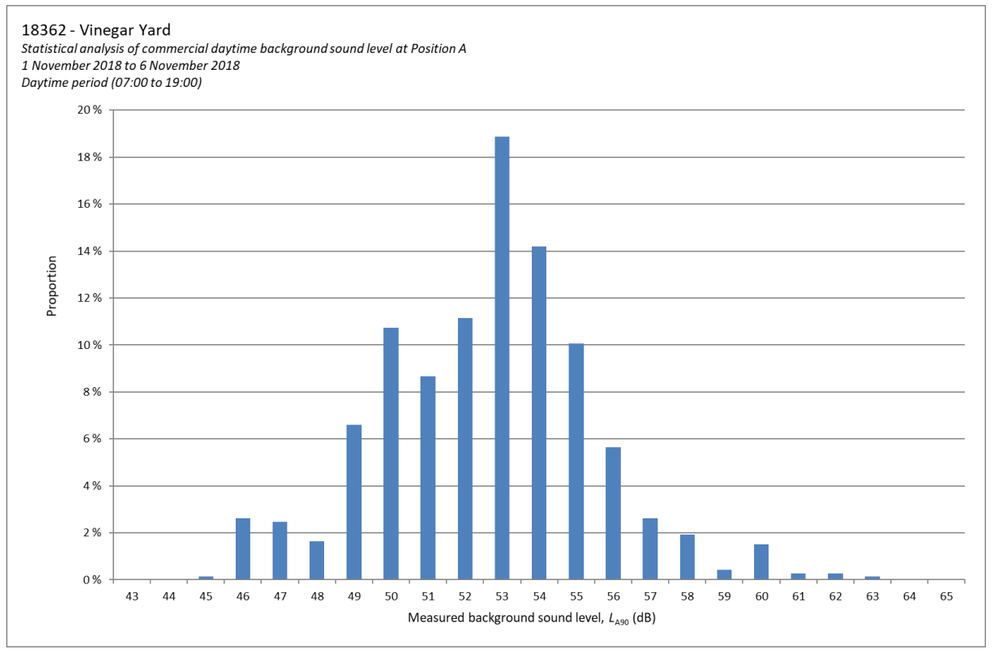


Figure 9B.2 Statistical analysis of background sound level during the evening at Position A

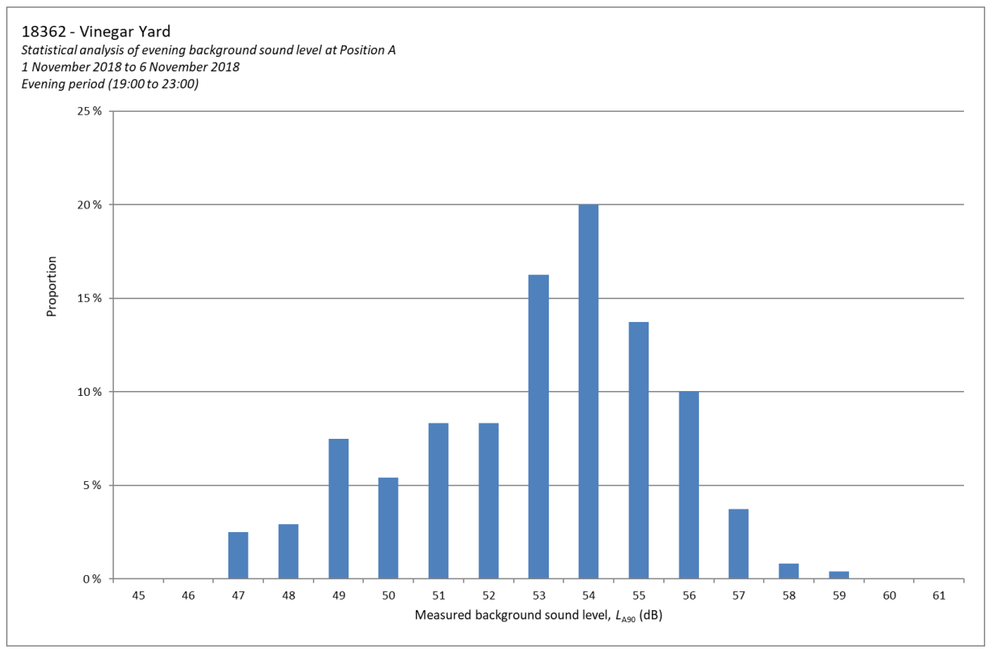
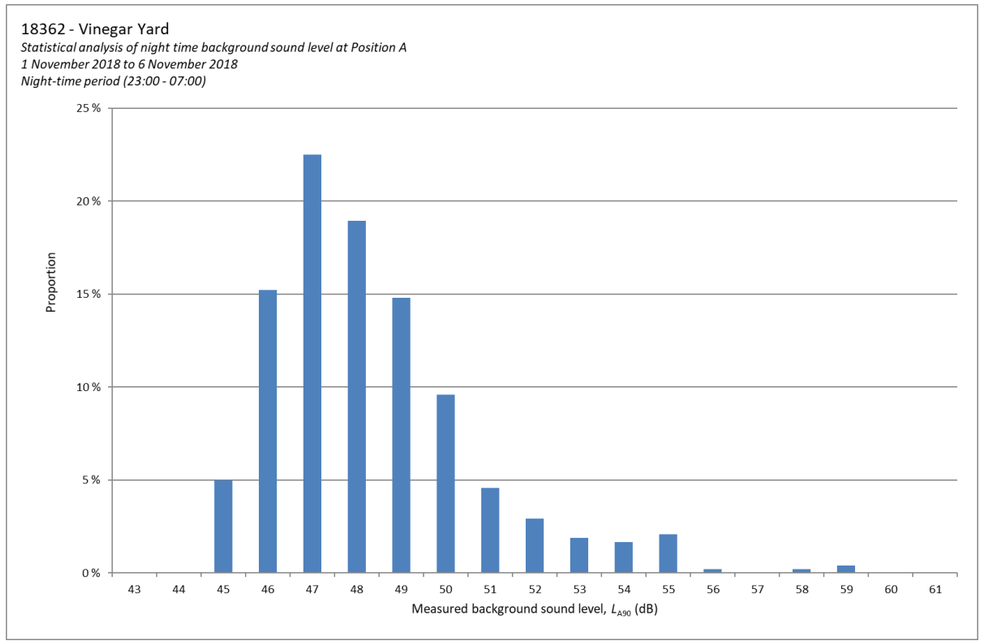


Figure 9B.3 Statistical analysis of background sound level during the night at Position A



Position B

Figure 9B.4 Statistical analysis of background sound level during the day at Position B

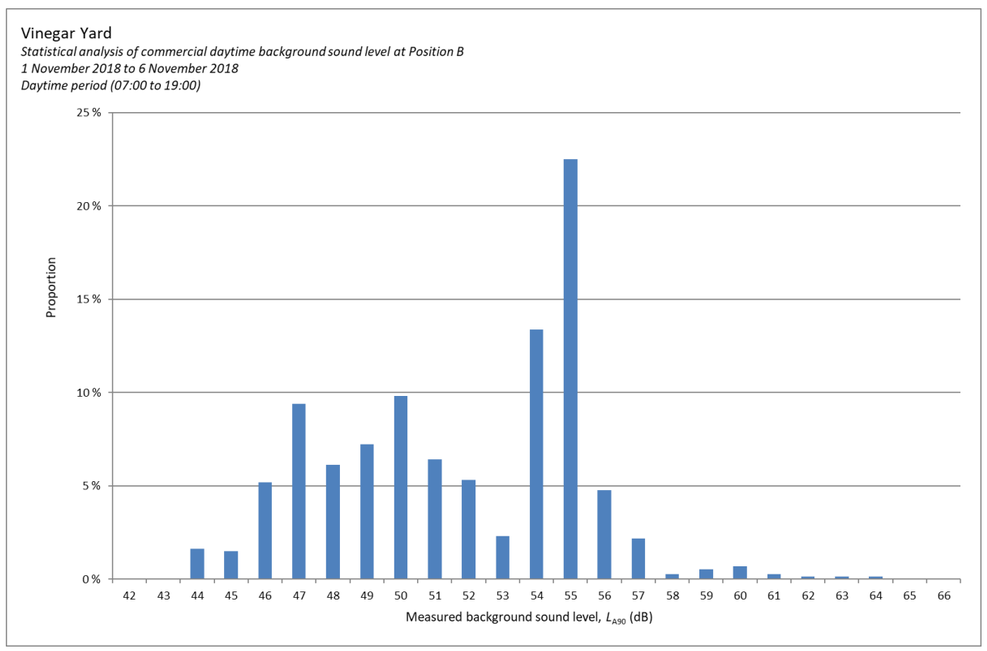


Figure 9B.5 Statistical analysis of background sound level during the evening at Position B

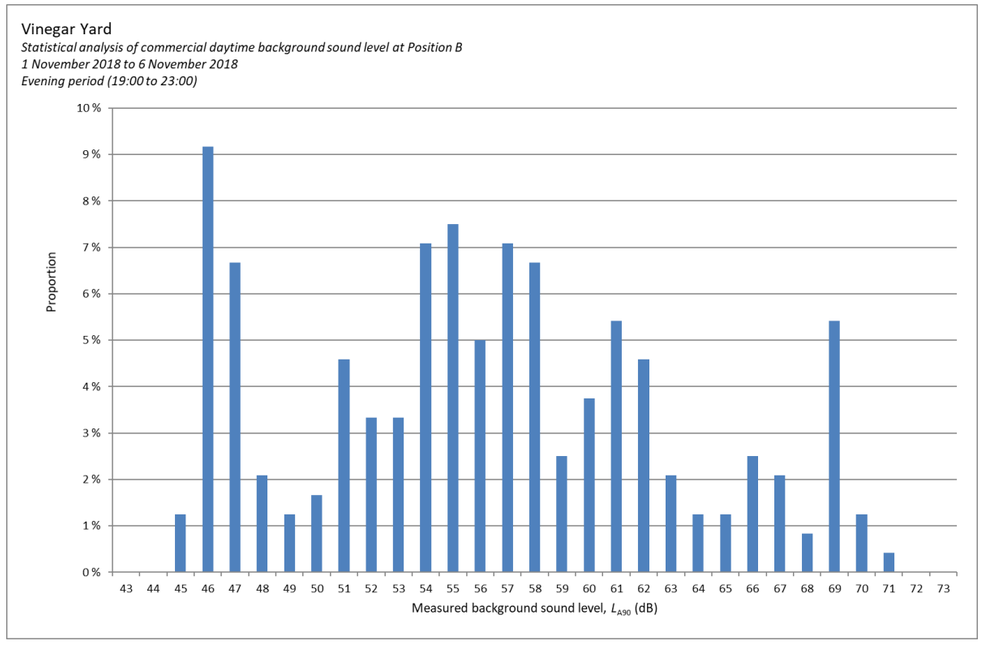


Figure 9B.6 Statistical analysis of background sound level during the night at Position B