

5.4 Noise and Vibration

- 5.4.1 Chapter 9 of the 2013 ES reported the outcome of the assessment of likely significant effects of the Proposed Development on the Site and the surrounding area in terms of noise and vibration matters.
- 5.4.2 This Section has been prepared in order to outline the key changes in relation to the Consented Scheme and to identify changes to the findings and conclusions associated with the 2013 ES.

5.5 Legislation, Planning Policy and Guidance

- 5.5.1 A review of UK legislation, planning policy and guidance relevant to the proposals has been previously undertaken as part of the 2013 ES , however much of this has been updated in the interim. Whilst some legislation and planning policy remain valid, there have been updates to the following documents which should be considered.

National

National Planning Policy Framework (2023)

- 5.5.2 The updated “National Planning Policy Framework” (NPPF) sets out the Government’s requirements for the planning system. Paragraph 193 advises:

“Planning policies and decisions should contribute to and enhance the natural and local environment by; preventing new and existing development from contributing to, being put at unacceptable risk from, or being adversely affected by, unacceptable levels of... noise pollution... Development should, wherever possible, help to improve local environmental conditions...”

- 5.5.3 With specific regard to noise, paragraph 191 states that:

“Planning policies and decisions should aim to...mitigate and reduce to a minimum potential adverse impact resulting from noise from new development – and avoid noise giving rise to significant adverse impacts on health and the quality of life;

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

Planning Practice Guidance on Noise (2019)

- 5.5.4 The “Planning Practice Guidance on Noise” (PPG-N) advises on how planning can manage potential noise impacts in new development.
- 5.5.5 The Observable Adverse Effect Level terms presented in the Noise Policy Statement for England (2010) are adopted in the Government’s PPG-N which presents a table of example outcomes to help characterise the level of effect as show in Figure 5.4.1.
- 5.5.6 The PPG-N gives advice on the ‘Agent of Change’ principal and states:

“Development proposed in the vicinity of existing businesses, community facilities or other activities may need to put suitable mitigation measures in place to avoid those activities having a significant adverse effect on residents or users of the proposed scheme.

In these circumstances the applicant (or ‘agent of change’) will need to clearly identify the effects of existing businesses that may cause a nuisance (including noise, but also dust, odours, vibration and other sources of pollution) and the likelihood that they could have a significant adverse effect on new residents/users. In doing so, the agent of change will need to take into account not only the current activities that may cause a nuisance, but also those activities that businesses or other facilities are permitted to carry out, even if they are not occurring at the time of the application being made.

The agent of change will also need to define clearly the mitigation being proposed to address any potential significant adverse effects that are identified. Adopting this approach may not prevent all complaints from the new residents/users about noise or other effects, but can help to achieve a satisfactory living or working environment, and help to mitigate the risk of a statutory nuisance being found if the new development is used as designed (for example, keeping windows closed and using alternative ventilation systems when the noise or other effects are occurring).

It can be helpful for developers to provide information to prospective purchasers or occupants about mitigation measures that have been put in place, to raise awareness and reduce the risk of post-purchase/occupancy complaints.”

- 5.5.7 And provides advice on mitigating significant adverse impacts where the ‘Agent of Change’ needs to put mitigation in places stating:

“For noise sensitive developments, mitigation measures can include avoiding noisy locations in the first place; designing the development to reduce the impact of noise from adjoining activities or the local environment; incorporating noise barriers; and optimising the sound insulation provided by the building envelope. It may also be possible to work with the owners/operators of existing businesses or other activities in the vicinity, to explore whether potential adverse effects could be mitigated at source. Where this is the case, it may be necessary to ensure that these source-control measures are in place prior to the occupation / operation of the new development. Where multiple development sites would benefit from such source control measures, developers are encouraged to work collaboratively to spread this cost. Examples of source control measures could include increased sound proofing on a building (e.g. a music venue) or enclosing an outdoor activity (e.g. waste sorting) within a building to contain emissions.”

Figure 5.4.1: PPG-N Noise Exposure Hierarchy table

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

Regional

London Plan (2021)

5.5.8 The London Plan is the spatial development strategy for Greater London and sets out the framework for future development in London. The current London Plan states the following regarding noise from the development:

“Policy D14 Noise:

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

- B. *Boroughs, and others with relevant responsibilities, should identify and nominate new Quiet Areas and protect existing Quiet Areas in line with the procedure in Defra’s Noise Action Plan for Agglomerations.”*

Local

Royal Borough of Greenwich Local Plan: Core Strategy with Detailed Policies (2014)

- 5.5.9 The Royal Borough of Greenwich (RBG) Local Plan describes RBG’s planning policies for the borough. It states the following with regards to noise and vibration from development:

Section 4.1.28

“New housing developments and conversions should incorporate in the design and layout, protection against noise, air quality, lighting and/or vibration to preserve the amenity of future residents. Locations close to busy transportation links and those that are adjacent to safeguarded wharves are particularly vulnerable. The design and layout of all housing developments should also show a consideration of the privacy of adjacent residents.”

Policy H5 Housing Design (Point 3.)

- 5.5.10 The housing density, character of the area and site location – and their relationship - are considered by RBG for:

“New residential development, redevelopment, refurbishment or conversions”

- 5.5.11 RBG would expect the following:

“An acceptable level of noise insulation being achieved by means of sensitive design, layout and in developments vulnerable to transportation noise and vibration.”

Royal Borough of Greenwich – Construction Sites Noise Code (2014) & Noise from Major Sites

- 5.5.12 RBG’s Code of Construction (Ref 6.8) sets out their requirements and control methods for noise from major construction site, and, regarding major sites, states the following:

“Much of the noise generated [from major construction sites] is unavoidable and noise control methods are a balancing act between the needs of the developer to carry out the works and the rights of neighbours to quiet enjoyment of their properties. The legislation governing noise from construction sites strives to achieve this balance. The Council aims to minimise the impact of noise from such works on local residents.

The main control that the Council can impose on construction sites is to limit the times during which they are permitted to make noise that their neighbours can hear.

For general construction works the Council usually imposes (when necessary) the following limits on noisy works:

- *Monday to Friday - 8am to 6pm*
- *Saturdays - 8am to 1pm*
- *Sundays and Bank Holidays - No noisy activities allowed*

Some particularly noisy activities, such as pile driving, may be subject to stricter time controls to allow neighbours some relief from excessive noise. On the other hand, some activities may be allowed outside of normal working hours when there is a good reason for

this to happen... The council usually only imposes time limits on construction sites when they are causing problems for residents. If the work is not disturbing anyone, then the Council does not need to impose restrictions on that work. This means that quiet work could go on at almost any time of the day.

The council can also set maximum noise levels at particular locations... The developer is required to take noise measurements at our chosen locations (usually twice daily), the results of which are forwarded to the council on a weekly basis. In the event of the maximum level being exceeded, the developer is required to take action to lower the noise level. All such actions must be recorded and the details immediately forwarded to the council.

The other method we use to control noise from construction sites is to require that all contractors use the "best practical means" to minimise noise from their activities. This is a very broad area and can include matters ranging from the prohibition of the use of radios on site to the proper maintenance of plant and equipment. It can also include matters such as the choice of appropriate plant for a particular task or putting up noise barriers or screens..."

Regulations

Approved Document O (2021)

5.5.13 Approved Document O (ADO) aims to protect the health and welfare of occupants of buildings by reducing the occurrence of high indoor temperatures. In practice, the requirements of ADO are met by limiting solar gains and providing adequate means of removing excess heat from dwellings.

5.5.14 Section 3 of ADO states that it should be ensured that the overheating mitigation strategy is useable and thus if the overheating strategy is to rely on open windows, suitable noise conditions within bedrooms at night should be achieved under such conditions:

Guidance

5.5.15 Reference is also made to the following guidance document which have been updated since the 2013 ES:

- British Standard BS4142: 2014+A1:2019. Methods for Rating and Assessing Industrial and Commercial Sound;
- British Standard BS5228:2009+A1:2014. Code of Practice for Noise and Vibration Control on Construction and Open Sites. Part 1 Noise and Part 2 Vibration;
- British Standard BS8233: 2014. Guidance on Sound Insulation and Noise Reduction for Buildings;
- Design Manual for Roads and Bridges, LA111, Noise and Vibration. Highways England, Transport Scotland, Welsh Government and Department for Infrastructure, 2019;

Scheme Changes

5.5.16 The 2013 ES considered Plots A, B, D and K of the Royal Arsenal Riverside Masterplan. Much of these proposals remain unchanged and a number of these blocks have been constructed or are under construction. This addendum ES assesses the changes to Plots D and K, specifically.

5.5.17 The scheme changes since the 2013 ES that are relevant to the noise and vibration assessment are:

- reduction in the number of parking spaces in the outline planning consent to 144 for the proposed development, and therefore a reduction in development generated traffic levels.
- change in baseline and projected opening year of the proposed development.

5.5.18 It is noted that the changes in parking spaces results in a reduction in traffic levels.

5.5.19 Since the 2013 ES, the baseline year for the assessment has moved to 2024 (the latest year for which monitoring data is available to validate the model with).

5.6 Assessment Methodology and Significance Criteria

5.6.1 The following section outlines the methodologies applied to identify and assess the potential impacts and likely effects to result from the Proposed Development and highlight any changes from the 2013 ES.

Extent of The Study Area

5.6.2 With regards to the assessment of the impacts of the Proposed development, the spatial extent of the study area is the same as in the 2013 ES. In terms of determining how noise and vibration affect the Proposed Development, this ES addendum only assesses Plot D and Plot K.

Method of Baseline Collection

5.6.3 Supplementary baseline noise data was collected to assess whether there has been any significant change in baseline since the 2013 ES. Unattended baseline noise monitoring was undertaken at two locations on the Site, over suitable durations.

5.6.4 The 2013 ES scoped out the impact of vibration from the subterranean TfL Elizabeth Line that bisects the site based on the design stage performance assurances of Crossrail. As the line is now operational, supplementary baseline vibration data was collected to assess the potential impact from tactile vibration and re-radiated groundborne noise.

5.6.5 All monitoring has been undertaken in accordance with relevant British Standards relating to environmental noise measurement and by suitably qualified and experienced acousticians.

5.6.6 Details of the noise monitoring results, and methodology are detailed in **Appendix 5.4.1**.

Method of Assessment

5.6.7 The assessment has been undertaken using the same general assessment methodology as the 2013 ES. This section highlights any relevant changes to assessment methodology, and changes to Standards and calculation methodologies.

Demolition & Construction Phase

Noise

5.6.8 BS 5228-1:2009+A1:2014 provides guidance on the measurement, prediction and control of noise from construction sites. It summarises the typical sources of construction noise and vibration and provides a calculation methodology for predicting construction noise propagation based on various site-specific factors.

5.6.9 It does not provide normative criteria for assessing the potential impact construction noise, however it does provide informative methods and criteria for assessing potential adverse impact. These methods consider either absolute noise levels, or the change in noise level compared to the existing ambient noise.

5.6.10 In terms of absolute levels, the standard refers to Advisory Leaflet 72, as follows:

“noise from construction and demolition sites should not exceed the level at which conversation in the nearest building would be difficult with the windows shut. the noise can be measured with a simple sound level meter, as we hear it, in a-weighted decibels (dB(a))– see note below. noise levels, between say 07.00 and 19.00 hours, outside the nearest window of the occupied room closest to the site boundary should not exceed:

- 70 decibels (dBA) in rural, suburban and urban areas away from main road traffic and industrial noise;
- 75 decibels (dBA) in urban areas near main roads in heavy industrial areas.

5.6.11 These limits are for daytime working outside living rooms and offices.”

5.6.12 The 2013 ES noted that the scheme would be constructed in phases, however, as Plot D and Plot K are the final phases to be constructed, the other plots will be occupied during the construction period and therefore would be sensitive receptors.

5.6.13 From the 2013 ES report, potential negative effects have been identified at several receptors, where noise levels exceed 75dB L_{Aeq} , as per the informative guidance within BS 5228.

Vibration

5.6.14 BS 5228:2014 Part 2 - provides guidance on the measurement, prediction and control of vibration from construction sites. It summarises the typical sources of construction vibration (e.g. piling), and provides a methodology for predicting construction vibration propagation based on empirical data.

5.6.15 The standard does not provide normative criteria for assessing the potential impact of construction vibration, however it does provide an indication of when construction vibration may become problematic, in terms of Peak Particle Velocity levels, summarised in the following Table.

Table 5.4.1: Peak Particle Velocity Vibration Levels and Potential Effects during the Construction Period

Vibration Level (PPV mm/s)	Effect
0.14	Vibration might be just perceptible in the most sensitive situations or most vibration frequencies associated with construction. at lower frequencies, people are less sensitive to vibration.
0.30	Vibration might be just perceptible in residential environments.
1.00	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.
10.00	Vibration is likely to be intolerable for any more than a very brief exposure to this level.

5.6.16 An indicative construction vibration assessment has been undertaken for the 2013 ES in accordance with the guidance provided in BS 5228.

5.6.17 At that stage, limited details of the required vibration-inducing construction activities were available, therefore a worst-case assumption has been made, resulting in predicted vibration levels which have been calculated using the empirical formula provided within BS 5228. Further details of the construction activities are limited and therefore no changes to the method are required.

5.6.18 Worst case distances have been assessed i.e. the shortest potential distances between the pilling rig and the sensitive receptors.

5.6.19 Predicted vibration levels have been assessed in accordance with the informative construction vibration criteria provided in BS 5228 (in terms of Peak Particle Velocity).

5.6.20 Overall, the classification of construction noise and vibration effects is assessed as negligible and therefore not significant.

Noise from Off-site Construction Traffic

5.6.21 The 2013 ES concluded that as proposed construction traffic was similar to the 2008 ES assessment undertaken for the Royal Arsenal Riverside Masterplan the impact due to changes in traffic flow on the surrounding road network would be negligible and therefore scoped out of the 2013 ES assessment.

Operational Phase

Noise from off-site Operational Traffic

5.6.22 The 2013 ES concluded that proposed development generated traffic would be similar to the 2008 ES assessment undertaken for the Royal Arsenal Riverside Masterplan. Therefore, the impact due to changes in traffic flow on the surrounding road network would be negligible and noise from the operation of development generated traffic was scoped out of the 2013 ES assessment.

Noise from Fixed Plant and Equipment

5.6.23 The 2013 ES adopted an earlier version of the British Standard (BS 4142:1997) to assess potential effects of plant noise. The following amendments to the document are included, although they are not noted to have an impact on the assessment undertaken as part of the previous ES chapter:

- clarifications to the application of the standard,
- introduction of uncertainty and means of reducing uncertainty,
- and places greater importance on the context of the sound.

5.6.24 The current standard BS 4142:2014+A1:2019: 'Method for rating and assessing industrial and commercial sound' is intended to be used to assess noise of a commercial nature such as that arising from commercial premises.

5.6.25 The procedure contained in BS 4142:2014+A1:2019 for assessing environmental noise impact is to compare the measured or predicted noise level from the source in question, the “Specific Sound Level” immediately outside the noise sensitive premises, with the corresponding representative “Background Sound Level”. Where the noise contains attention attracting characteristics such as tonal, impulsive and/or intermittent elements, it may be appropriate to apply a correction to the Specific Sound Level to obtain the “Rating Level”.

5.6.26 BS 4142:2014+A1:2019 states that the significance of sound arising from an industrial and/or commercial nature depends upon both the margin by which the Rating Level of the specific sound source exceeds the Background Sound Level, and also the context in which the sound occurs:

- Typically, the greater this difference, the greater the magnitude of the impact.
- A difference of around +10dB or more is likely to be an indication of a significant adverse impact, depending on the context.
- A difference of around +5dB is likely to be an indication of an adverse impact, depending on the context.
- 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.

5.6.27 For the daytime, the assessment is carried out over a one-hour period, and over a 15-minute period at night. The daytime and night time periods are defined as occurring between 07:00 hours to 23:00 hours, and 23:00 hours to 07:00 hours, respectively.

5.6.28 The 2013 ES outlined that the noise data for fixed plant is not currently available as the type and configuration of the plant items is yet to be finalised. Therefore, an assessment would not be appropriate at this stage and any impact can be controlled by way of suitable planning condition.

5.6.29 Given the above, a cumulative plant noise emission limit has been set, based on the guidance detailed in BS 4142 and the requirements of RBG, which requires the noise rating level from any fixed plant to be 10dB below the existing background noise level, which will need to be achieved when all proposed plant items are operating simultaneously.

Site Suitability

5.6.30 The 2013 ES assessed the suitability of the development with regards to ambient noise. It also sets out indicative façade sound insulation requirements to achieve suitable internal noise levels, as defined by BS 8233:1999. Indicative glazing and ventilation requirements were provided to demonstrate that the internal ambient noise criteria are achievable across the development.

- 5.6.31 Considering the proposed changes to the development, the changes in building massing will have a small/ negligible effect on the sound insulation requirements of the façade, however, changes to the baseline noise levels may impact the sound insulation requirements.
- 5.6.32 The exact glazing requirements for the development would be subject to detailed design, which is beyond the scope of the work required for planning purposes.
- 5.6.33 The current version of the British Standard, BS 8233:2014, provides suggested internal ambient noise levels within dwellings, based on World Health Organisation guidelines, reproduced in Table 5.4.2.

Table 5.4.2: BS 8233:2014 Indoor Ambient Noise Level Design Guidance

Activity	Location	Daytime 07:00 - 23:00 hours	Night time 23:00 – 07:00 hours
Resting	Living room	35dB $L_{Aeq,16hour}$	-
Dining	Dining room	40dB $L_{Aeq,16hour}$	-
Sleeping (daytime resting)	Bedroom	35dB $L_{Aeq,16hour}$	30dB $L_{Aeq,8hour}$

Overheating

5.6.34 The 2013 ES did not assess the site against the requirements of ADO, as the regulation was not a statutory requirement at the time of submission.

5.6.35 Section 3 of ADO states that it should be ensured that the overheating mitigation strategy is useable and thus if the overheating strategy is to rely on open windows, suitable noise conditions within bedrooms at night should be achieved under such conditions:

“...the overheating mitigation strategy should take account of the likelihood that windows will be closed during sleeping hours (11pm to 7am).

Windows are likely to be closed during sleeping hours if noise within bedrooms exceeds the following limits:

a. 40dB $L_{Aeq,T}$, averaged over 8 hours (between 11pm and 7am).

b. 55dB L_{AFmax} , more than 10 times a night (between 11pm and 7am).”

Vibration

5.6.36 British Standard 6472:2008 provides guidance on the likely human response to vibration within buildings. This standard assesses the likely adverse impacts of vibration, and can be used to assess the suitability of proposed residential buildings in locations with existing vibration.

5.6.37 The standard sets out suggested vibration criteria to assess potential adverse comment in residential buildings, as replicated in Table 5.4.3.

Table 5.4.3: BS 6472:2008 Vibration Dose Values and Possibility of Adverse Comment in Residential Buildings

Time	Low Possibility of Adverse Comment ($ms^{-1.75}$)	Adverse Comment Possible ($ms^{-1.75}$)	Adverse Comment Probable ($ms^{-1.75}$)
16 hour day	0.2 – 0.4	0.4 – 0.8	0.8 – 1.6
8 hour night	0.1 – 0.2	0.2 – 0.4	0.4 – 0.8

- 5.6.38 There are currently no criteria set within UK guidance that define a level at which groundborne noise from railway systems becomes a significant adverse impact for residential receptors. Therefore, guidance needs to be drawn from previous experience, national infrastructure projects, and other international authoritative guidance.
- 5.6.39 Guidance from ISO 14837-1:2005 advocates the use of $L_{Amax,slow}$ when assessing groundborne noise.
- 5.6.40 Considering the guidance presented by the Federal Transit Authority (FTA), as referenced by the Association of Noise Consultants (ANC) publication “Measurement and Assessment of Groundborne Noise and Vibration”, it is considered that an internal groundborne noise design criterion of 35dB $L_{Amax,slow}$ represents the LOAEL, with an upper maximum design limit of 40dB $L_{Amax,slow}$ within any residential room which represents the SOAEL.

5.7 Significance Criteria

- 5.7.1 As detailed in the 2013 ES, the assessment of the potential impacts and likely effects as a result of the Proposed Development has taken into account the demolition and construction phases and operational phase.
- 5.7.2 The significance level attributed to each effect has been assessed based on the magnitude of change due to the Proposed Development and the sensitivity of the affected receptor/receiving environmental to change, as well as a number of other factors that are outlined in more detail in Chapter 2 of the 2013 ES.
- 5.7.3 Magnitude of change and the sensitivity of the affected receptor/receiving environmental are both assessed on a scale of high, medium, low and negligible (as shown in Chapter 2 of the 2013 ES).
- 5.7.4 The following terms have been used in the 2013 ES to define the significance of effects identified and remain unchanged:
- **Major positive or negative effect** – where the Proposed Development would cause a large improvement (or deterioration) to the existing environment;
 - **Moderate positive or negative effect** – where the Proposed Development would cause a noticeable improvement (or deterioration) to the existing environment;
 - **Minor positive or negative effect** – where the Proposed Development would cause a small improvement (or deterioration) to the existing environment; and
 - **Negligible** – no discernible improvement or deterioration to the existing environment as a result of the development will occur.

5.8 Consultation

- 5.8.1 No consultation has been undertaken with RBG.

5.9 Assessment of Effects, Mitigation and Residual Effects

Demolition & Construction Phase

5.9.1 This section identifies and assesses the scale and nature of the main effects arising from the Proposed Development during the construction phase.

Construction Noise from On-Site Activities

5.9.2 The construction programme length and activities are to remain the same the construction scheme assessed for the 2013 ES, although the start date will be revised, therefore the significant noise effects, mitigation and residual effects remain unchanged.

5.9.3 As described in the 2013 ES, without mitigation in place, the majority of existing and proposed dwellings would experience minor or negligible effects. Certain receptors would experience noise levels above 75dB L_{Aeq} for short durations during the construction period, and, without mitigation, would experience moderate and major negative effects.

Mitigation

5.9.4 By employing appropriate site management practices, the potential for negative noise effects from construction vehicles and plant during the works can be minimised. A range of measures are suggested in the 2013 ES, which would form part of a site specific Construction Environmental Management Plan (CEMP).

Residual Effect

5.9.1 As per the 2013 ES, with the implementation of appropriate mitigation, the negative effects relating to construction noise will be minimised, and the majority of effects would be negligible and minor, although occasional effects of moderate negative significance could still be experienced when works are being undertaken close to receptors.

Construction Vibration from On-Site Activities

5.9.2 The construction programme and activities will be similar to the construction scheme assessed for the 2013 ES, and therefore the significant vibration effects, mitigation and residual effects remain unchanged.

5.9.3 As described in the 2013 ES, all receptors would experience a negligible effect due to vibration from Site works.

Mitigation

5.9.4 As no significant negative effects are predicted, no noise mitigation is proposed.

Residual Effect

5.9.5 No residual effects are predicted.

Construction Noise from Off-Site Construction Traffic

5.9.6 No significant changes in construction traffic flows have been identified as a result of the Proposed Development and therefore the significant effects, mitigation and residual effects remain unchanged.

Mitigation

5.9.7 As no significant negative effects are predicted, no noise mitigation is proposed.

Residual Effect

5.9.8 No residual effects are predicted.

Operational Phase

5.9.9 This section identifies and assesses the scale and nature of the main effects arising from the Proposed Development during the operational phase.

Off-site Operational Traffic

5.9.10 A reduction in operational traffic flows has been identified as a result of the Proposed Development and therefore there will be no significant effect over the consented scheme.

5.9.11 As per the 2013 ES, noise effects from operational traffic are considered negligible and have been excluded from the scope of the assessment.

Mitigation

5.9.12 As no significant negative effects are predicted, no noise mitigation is proposed.

Residual Effect

5.9.13 No residual effects are predicted.

Noise from Fixed Plant

5.9.14 As outlined in the 2013 ES, there is limited information available for the type and configuration of the fixed plant items and as such a plant noise emission assessment cannot be undertaken.

5.9.15 As such a plant noise emission limit is set for all fixed plant items associated with the development, operating simultaneously. The noise limit has been based on guidance provided in BS 4142:2014+A1:2019 and the requirements of RBG to be 10dB below the existing background noise level.

5.9.16 As the background noise level used to determine the plant noise emission limit detailed in the 2013 ES chapter was measured some time ago, it is likely that the noise level is no longer representative of the typical background noise level. Based on the noise survey undertaken in October 2022, the representative existing background noise level is 50dB L_{A90} during the daytime and 43dB L_{A90} during the night time. The resultant plant noise emission limits are presented in the following Table:

Table 5.4.4: Maximum permissible noise level limits for all M&E plant

Cumulative Plant Noise Limit at any Façade	
dB $L_{A,T,r}$ (free field)	
Daytime 07:00 – 23:00	Night time 23:00 – 07:00
40	33

Mitigation

5.9.17 The principal means of mitigation is to design the fixed plant to achieve the proposed noise emission limits which may include change in location, reselection of plant or provision of attenuation measures such as enclosures, plant screens or in-duct silencers.

Residual Effect

5.9.18 With the implementation of the correct mitigation, negligible noise effects are predicted in relation to fixed plant.

Building Envelope Specification

5.9.19 The noise levels incident on the development and proposed layouts have been used to demonstrate that the building envelope can provide a suitable level of protection against external noise intrusion. The windows typically provide the lowest sound insulation performance of the façade elements, as such it is typical to first consider the sound insulation of the glazed elements.

5.9.20 In order to accurately predict the noise levels incident on the façade if the development, a 3D acoustic model has been developed using industry standard acoustic modelling software, CadnaA. The model has been calibrated using the noise survey data outlined in Appendix 5.4.1.

Mitigation

5.9.21 The sound insulation performance requirements of the glazing have been determined in order to achieve the internal ambient noise level targets set out in BS 8233, as presented in Table 6.2.

5.9.22 In order to meet the BS 8233 noise levels, the glazing unit (including framing and seals) is required to provide a sound insulation performance of up to 42dB $R_w + C_{tr}$ depending on room type and location as detailed in Appendix 5.4.1.

Residual Effect

5.9.23 With the implementation of the above glazing requirements, the internal ambient noise levels are considered to be suitable.

Overheating

- 5.9.24 The noise levels incident on the development, as predicted using the previously mentioned CadnaA model, have been used to assess the acoustic suitability of natural means (e.g. openable windows) of mitigating overheating within dwellings against the requirements of Approved Document O (ADO).
- 5.9.25 The assessment shows that there a number of locations, principally overlooking the surrounding road network, where use of natural ventilation would result in an exceedance of the internal noise level criteria given in ADO and therefore is not suitable.

Mitigation

- 5.9.26 In locations where the ADO noise criteria are exceeded during periods of overheating, mechanical means of overheating mitigation must be provided. A suitable overheating mitigation strategy will be developed during the detailed design stage of the project.

Residual Effect

- 5.9.27 With the implementation of the above mitigation, the internal ambient noise levels during periods of overheating are considered to be suitable.

Vibration

- 5.9.28 The 2013 ES chapter previously excluded the effects of tactile vibration and groundborne noise from the assessment scope based on assurances provided by Crossrail at the design stage.
- 5.9.29 A baseline vibration survey has been undertaken now that the Elizabeth Line is fully operational, and the assessment confirms that tactile vibration and reradiated groundborne noise will not have any significant negative effect on the residential units of the Proposed Development as presented in Appendix 5.4.1.

Mitigation

- 5.9.30 As no significant negative effects are predicted, no noise mitigation is proposed.

Residual Effect

- 5.9.31 No residual effects are predicted.

5.10 Cumulative Effects

- 5.10.1 This section considers the likely cumulative effects that could arise from the Proposed Development when considered alongside other committed development schemes proximate to the Site. It identifies whether effects from several developments which individually may be insignificant could, when considered together, cause significant cumulative effects requiring mitigation.
- 5.10.2 A number of committed developments have been identified as being relevant to this assessment. These were identified through a review of RBG's planning portal and have been agreed with RBG.

5.10.3 The assessment is based on the best available information and draws on the assessments included in the ES and Application Reports that accompany the development applications, where available.

5.10.4 The cumulative effects remain largely unchanged from the 2013 ES as the impact of noise and vibration from the construction phase and operational phase will be limited by the assessment to the closest sensitive receptors which are unlikely to be cumulatively impacted by other consented scheme due to location.

5.10.5 Given the proximity to the site of other consented developments, it is anticipated that the construction and operational noise from the development will have a negligible impact.

5.11 Limitation and Assumptions

5.11.1 The following limitations and assumptions are relevant to the noise and vibration assessment.

Construction Noise

5.11.2 The noise assessment is based on the high level information available at this time, which is limited. The exact type and number of plant is to be determined as the design progresses.

Construction Vibration

5.11.3 The vibration assessment is based on the reasonable assumption that rotary pilling (e.g. CFA) will be used.

Fixed Plant Noise

5.11.4 The details of the fixed plant associated with the Proposed Development have not been fully developed, therefore predictions to determine the significance of the likely noise effect would not be meaningful at this stage. Consequently, a plant noise emission limit has been set to which all fixed plant associated with the Proposed Development should adhere.

5.12 Summary & Conclusions

5.12.1 This chapter provides a review of the updated legislation, planning policy and guidance issued since the previous 2013 ES chapter for the development was undertaken, as well as a review of the noise and vibration assessment where the proposed refinements have had an impact on the assessment.

5.12.2 The significant effects, mitigation proposals and residual effects associated with the development remain unchanged when compared to the 2013 ES. Where new legislation is in place or amendments to scheme impact the effects, the required mitigation and residual effects have been provided.

5.12.3 The site remains suitable for the Proposed Development when the identified mitigation is implemented.

6.0 References

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