

Tavistock Works
Tavistock Road
Yiewsley
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Planning Noise Assessment

On behalf of

Linea Homes

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1.0 Introduction

- 1.1. Noise Solutions Ltd (NSL) has been commissioned to undertake a noise assessment in respect of the approved new residential development on the site of the former Tavistock Works on Tavistock Road, Yiewsley.
- 1.2. This report is submitted in support of a S.73 application, which seeks to amend condition 2 of application 35810/APP/2021/12324 and update the fenestration of the approved scheme.
- 1.3. To assist with the understanding of this report a brief glossary of acoustic terms can be found in **Appendix A**. A more in-depth glossary of acoustic terms can be assessed at the following web address <http://www.acoustic-glossary.co.uk/>.

2.0 Site layout and development proposals

- 2.1. The site is located at the junction of Tavistock Road and Garnet Place.
- 2.2. The approved development comprises demolition of an existing building and the redevelopment of the site to provide residential units with associated amenity and refuse space.
- 2.3. An image showing the site location, the surrounding area and the noise monitoring location used in this assessment is presented in **Appendix B**.
- 2.4. Typical floor plans of the development are shown in **Appendix C**.

3.0 Policy context

- 3.1. A great deal of change has occurred in recent years in the assessment of noise impacts and their relationship with planning decisions. The following sections introduce the applicable policies, either national or local, which ought to be considered to support the planning application.

Noise Policy Statement for England

- 3.2. The Noise Policy Statement for England (NPSE¹), published in March 2010, sets out the long-term vision of Government noise policy. The Noise Policy aims, as presented in this document, are: "*Through the effective management and control of environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development:*

- *avoid significant adverse effects on health and quality of life;*

¹ Noise Policy Statement for England, Defra, March 2010

- *mitigate and minimise adverse effects on health and quality of life; and*
 - *where possible, contribute to the improvement of health and quality of life.”*
- 3.3. The NPSE makes reference to the concepts of NOEL (No Observed Effect Level) and LOAEL (Lowest Observed Adverse Effect Level) as used in toxicology but applied to noise impacts. It also introduces the concept of SOAEL (Significant Observed Adverse Effect Level) which is described as the level above which significant adverse effects on health and quality of life occur.
- 3.4. The first aim of the NPSE is to avoid significant adverse effects, taking into account the guiding principles of sustainable development (as referenced in Section 1.8 of the NPSE). The second aim seeks to provide guidance on the situation that exists when the potential noise impact falls between the LOAEL and the SOAEL, in which case: *“...all reasonable steps should be taken to mitigate and minimise adverse effects on health and quality of life while also taking into account the guiding principles of sustainable development.”*
- 3.5. Importantly, the NPSE goes on to state that: *“This does not mean that such adverse effects cannot occur.”*
- 3.6. The NPSE does not provide a noise-based measure to define SOAEL, acknowledging that the SOAEL is likely to vary depending on the noise source, the receptor and the time in question. NPSE advises that: *“Not having specific SOAEL values in the NPSE provides the necessary policy flexibility until further evidence and suitable guidance is available.”*
- 3.7. It is therefore likely that other guidance will need to be referenced when applying objective standards for the assessment of noise, particularly in reference to the SOAEL, whilst also taking into account the specific circumstances of a proposed development.

National Planning Policy Framework

- 3.8. A new edition of NPPF was published in July 2021 and came into effect immediately. The original National Planning Policy Framework (NPPF²) was published in March 2012, with a revision in July 2018 and February 2019 - this document replaced the existing Planning Policy Guidance Note 24 (PPG 24) “Planning and Noise.” The 2021 revised edition contains no new directions or guidance with respect to noise, and hence, all previous references remain extant. The paragraph references quoted below relate to the July 2021 edition.

² National Planning Policy Framework, DCLG, March 2012

- 3.9. Paragraph 174 of the NPPF states that the planning system should contribute to and enhance the natural and local environment by, (amongst others) *“preventing both new and existing development from contributing to or being put at unacceptable risk from, or being adversely affected by unacceptable levels of soil, water or noise pollution or land stability.”*
- 3.10. The NPPF goes on to state in Paragraph 185:
- “planning policies and decisions should ...*
- (a) Mitigate and reduce to a minimum potential adverse impacts resulting from noise from new development, - and avoid noise giving rise to significant adverse impacts on health and quality of life;*
- (b) identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason ...*
- 3.11. The NPPF document does not refer to any other documents or British Standards regarding noise other than the NPSE.
- 3.12. Paragraph 2 of the NPPF states that “planning law requires that applications for planning permission must be determined in accordance with the development plan unless material considerations indicate otherwise.”
- 3.13. Paragraph 12 of the NPPF states that “The presumption in favour of sustainable development does not change the statutory status of the development plan as the starting point for decision making. Where a planning application conflicts with an up-to-date development plan (including any neighbourhood plans that form part of the development plan), permission should not usually be granted. Local planning authorities may take decisions that depart from an up-to-date development plan, but only if material considerations in a particular case indicate that the plan should not be followed.”
- 3.14. Paragraph 119 states that *“Planning policies and decisions should promote an effective use of land in meeting the need for homes and other uses, while safeguarding and improving the environment and ensuring safe and healthy living conditions. Strategic policies should set out a clear strategy for accommodating objectively assessed needs, in a way that makes as much use as possible of previously-developed or ‘brownfield’ land.”*

Planning Practice Guidance – Noise

- 3.15. An updated Planning Practice Guidance (PPG³) for noise was published on 22 July 2019 and provides additional guidance and elaboration on the NPPF. It advises that when plan-making and decision-taking, the Local Planning Authority should consider the acoustic environment in relation to:
- Whether or not a significant adverse effect is occurring or likely to occur;
 - Whether or not an adverse effect is occurring or likely to occur; and
 - Whether or not a good standard of amenity can be achieved.
- 3.16. This guidance introduced the concepts of NOAEL (No Observed Adverse Effect Level), and UAEL (Unacceptable Adverse Effect Level). NOAEL differs from NOEL in that it represents a situation where the acoustic character of an area can be slightly affected (but not such that there is a perceived change in the quality of life). UAEL represents a situation where noise is 'very disruptive' and should be 'prevented' (as opposed to SOAEL, which represents a situation where noise is 'disruptive', and should be 'avoided').
- 3.17. As exposure increases above the LOAEL, the noise begins to have an adverse effect and consideration needs to be given to mitigating and minimising those effects, taking account of the economic and social benefits being derived from the activity causing the noise. As the noise exposure increases, it will then at some point cross the SOAEL boundary.
- 3.18. The LOAEL is described in PPG⁴ as the level above which *"noise starts to cause small changes in behaviour and attitude, for example, having to turn up the volume on the television or needing to speak more loudly to be heard"*.
- 3.19. PPG identifies the SOAEL as the level above which *"noise causes a material change in behaviour such as keeping windows closed for most of the time or avoiding certain activities during periods when the noise is present."*

³ Planning Practice Guidance – Noise, <https://www.gov.uk/guidance/noise--2>, 22 July 2019

⁴ Paragraph: 005 Reference ID: 30-005-20190722

- 3.20. In line with the Explanatory Note of the NPSE, the PPG goes on to reference the LOAEL and SOAEL in relation to noise impact. It also provides examples of outcomes that could be expected for a given perception level of noise, plus actions that may be required to bring about a desired outcome. However, in line with the NPSE, no objective noise levels are provided for LOAEL or SOAEL although the PPG⁵ acknowledges that *“...the subjective nature of noise means that there is not a simple relationship between noise levels and the impact on those affected. This will depend on how various factors combine in any particular situation.”*
- 3.21. The relevant guidance in the PPG in relation to the adverse effect levels is summarized below:

Table 1 ProPG Effects 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 perceived 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

⁵ Paragraph: 006 Reference ID: 30-006-20190722

Response	Examples of Outcomes	Increasing Effect Level	Action
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

3.22. The Planning Practice Guidance⁶ states the following in relation to mitigation measures:

“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.”

3.23. In addition, the Guide notes that it may also be relevant to consider⁷:

“... whether any adverse internal effects can be completely removed by closing windows and, in the case of new residential development, if the proposed mitigation relies on windows being kept closed most of the time (and the effect this may have on living conditions). In both cases a suitable alternative means of ventilation is likely to be necessary. Further information on ventilation can be found in the Building Regulations”.

⁶ Paragraph: 010 Reference ID: 30-010-20190722

⁷ Paragraph: 006 Reference ID: 30-006-20190722

4.0 Acoustic Standards and Guidance – Site Suitability Assessment

Institute of Acoustics Professional Practice Guidance

- 4.1. The Institute of Acoustics published a guidance document for new residential development in May 2017, in conjunction with the ANC and the Chartered Institute of Environmental Health, "to provide practitioners with guidance on a recommended approach to the management of noise within the planning system in England".
- 4.2. The document advocates a two-stage process for consideration of noise affecting new residential developments. Stage 1 is an initial risk assessment of the proposed development site, based on the ambient noise levels in the area. Stage 2 recommends consideration of four main elements:
 - demonstration of a "good acoustic design process"
 - observation of internal noise guidelines
 - an assessment of noise affecting external amenity areas
 - consideration of other relevant issues
- 4.3. The initial risk assessment considers the indicative day-time and night-time equivalent continuous noise levels which indicates an "increasing risk of adverse effect" with increasing noise levels⁸.
- 4.4. For Stage 2, the ProPG document recommends that the guidance in BS 8233:2014 is followed.

BS 8233:2014 Guidance on Sound Insulation and Noise Reduction for Buildings.

- 4.5. This Standard provides recommended guideline values for internal noise levels within dwellings which are similar in scope to guideline values contained within the World Health Organisation (WHO) document, Guidelines for Community Noise (1999⁹). These guideline noise levels are shown in Table 2, below:

⁸ Figure 1, IoA ProPG for New Residential Development, May 2017

⁹ World Health Organisation Guidelines for Community Noise, 1999

Table 2 BS 8233:2014 Desirable Internal Ambient Noise Levels for Dwellings

Activity	Location	07:00 to 23:00 hours	23:00 to 07:00 hours
Resting	Living room	35dB $L_{Aeq,16h}$	-
Dining	Dining room/area	40dB $L_{Aeq,16h}$	-
Sleeping (daytime resting)	Bedroom	35dB $L_{Aeq,16h}$	30dB $L_{Aeq,8h}$

4.6. BS 8233:2014 advises that: *“regular individual noise events...can cause sleep disturbance. A guideline value may be set in terms of SEL or $L_{Amax,F}$ depending on the character and number of events per night. Sporadic noise events could require separate values.”* A typical requirement, derived from WHO guidance and previous editions of BS 8233, is that night-time internal L_{Amax} noise levels should not normally exceed 45dB.

4.7. The standard also provides advice in relation to design criteria for external noise. It states that:

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

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

...

In high-noise areas, consideration should be given to protecting these areas by screening or building design to achieve the lowest practicable levels. Achieving levels of 55dB $L_{Aeq,T}$ or less might not be possible at the outer edge of these areas, but should be achievable in some areas of the space.”

World Health Organisation, Guidelines for Community Noise, 1999 (WHO)

4.8. The World Health Organisation (WHO) Guidelines for Community Noise (1999) recommends suitable internal and external noise levels based on dose response research. The levels recommended in this guidance could be correlated to the LOAEL. Relevant guidance from this document is presented below.

- Sleep Disturbance (Night-time internal LOAEL): If negative effects on sleep are to be avoided, the equivalent sound pressure level should not exceed 30dBA indoors for continuous noise.
 - Interference with Communication (Daytime internal LOAEL): Noise tends to interfere with auditory communication, in which speech is a most important signal. However, it is also vital to be able to hear alarming and informative signals such as door bells, telephone signals, alarm clocks, fire alarms etc., as well as sounds and signals involved in occupational tasks. The effects of noise on speech discrimination have been studied extensively and deal with this problem in lexical terms (mostly words but also sentences). For communication distances beyond a few metres, speech interference starts at sound pressure levels below 50dB for octave bands centred on the main speech frequencies at 500, 1 000 and 2 000 Hz. It is usually possible to express the relationship between noise levels and speech intelligibility in a single diagram, based on the following assumptions and empirical observations, and for speaker-to-listener distance of about 1 metre:
 - a) Speech in relaxed conversation is 100% intelligible in background noise levels of about 35dBA and can be understood fairly well in background levels of 45dBA.
 - b) Speech with more vocal effort can be understood when the background sound pressure level is about 65dBA.
- 4.9. The WHO guidelines also propose that external sound levels for amenity use should not exceed 50-55dB $L_{Aeq,16hr}$ during daytime hours.

World Health Organisation (WHO) 2009

- 4.10. The introduction of the Directive on Environmental Noise obliges Member States to assess and manage noise levels. With the support of the European Commission, the WHO Regional Office for Europe has developed night noise guidelines for Europe to help Member States develop legislation to control noise exposure.
- 4.11. The guidelines are based on scientific evidence on the effects of noise and the thresholds above which these effects appear to harm human health.
- 4.12. There is limited evidence that night noise is related to hypertension, heart attacks, depression, changes in hormone levels, fatigue and accidents.
- 4.13. The WHO report summarises the threshold levels of night noise above which a negative effect starts to occur or above which the impact becomes dependent on the level of exposure. For example, the threshold level for waking in the night and/or too early in the morning was 42dB.
- 4.14. It also establishes that there are differences in the intensity and frequency of noise depending

on the source, which lead to different impacts. Road traffic is characterised by low levels of noise per event, but as there are a high number of events, on average it has a greater effect on awakenings than air traffic, which has high levels of noise per event but fewer events.

- 4.15. Integrating these findings, the report proposed a guideline target limit of outdoor night noise of 40dB (annual average defined as 'Lnight' in the Environmental Noise Directive). There is not sufficient evidence that the biological effects observed below this level are harmful to health but adverse effects are observed above 40dB.

Building Regulation parts L and F

- 4.16. Part L of the Building Regulations mandates that buildings become more airtight, and Part F stipulates ventilation requirements. Even though there appears to be a contradiction in this, Part L limits uncontrollable ventilation while Part F ensures that ventilation requirements are provided in a controlled manner.
- 4.17. The 2021 edition of Approved Document F came into effect on 15 June 2022. Volume 1 sets out the requirements for ventilation of dwellings.
- 4.18. Paragraph 1.9 describes a ventilation strategy comprising extract ventilation of bathrooms and kitchens, whole house ventilation to provide fresh air and "remove water vapour and pollutants not removed by extract ventilation" and purge ventilation used intermittently to "remove high concentrations of pollutants produced by occasional activities (e.g. fumes from painting)". The use of purge ventilation to control overheating is described in Part O, as noted below.
- 4.19. The assessment within the main part of this report deals with controlling intrusive noise in the "whole house ventilation" scenario.
- 4.20. While the use of open windows to remove intermittent fumes would inevitably result in increased intrusive sound levels compared to when windows are closed, this is considered not to be significant in acoustic terms because activities producing the fumes to be removed would tend to be short in duration and under the control of the occupants and therefore not likely to take place when occupants are trying to sleep.

Approved Document O1: overheating mitigation

- 4.21. Approved Document O1: *Overheating mitigation* of the Building Regulations 2010, came into force on 15 June 2022. Section 3 in the Approved Document includes the following:

Noise

3.2 In locations where external noise may be an issue (for example, where the local planning authority considered external noise to be an issue at the planning stage), the overheating

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

3.3 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_{Amax} more than 10 times a night (between 11pm and 7am).

3.4 Where in-situ noise measurements are used as evidence that these limits are not exceeded, measurements should be taken in accordance with the Association of Noise Consultants' Measurement of Sound Levels in Buildings with the overheating mitigation strategy in use.

NOTE: Guidance on reducing the passage of external noise into buildings can be found in the National Model Design Code: Part 2 – Guidance Notes (MHCLG, 2021) and the Association of Noise Consultants' Acoustics, Ventilation and Overheating: Residential Design Guide (2020)

5.0 Site suitability assessment methodology

Environmental Noise Survey

- 5.1. An unattended environmental sound pressure level survey was undertaken from Thursday 11th May to Friday 12th May 2023. Automatic measurement equipment was located at the junction of Tavistock Road and Garnet Place. The survey was undertaken in order to establish the typical incident environmental noise levels at the proposed residential development.
- 5.2. Full details of the survey are provided in [Appendix D](#) alongside a time history graph of the measurement results. The relevant results of the survey have been summarised in Table 3 and Table 4.

Table 3 Summary of survey results

Position	Measurement period	Range of recorded sound pressure levels (dB)			
		$L_{Aeq}(15mins)$	$L_{Amax}(15mins)$	$L_{A10}(15mins)$	$L_{A90}(15mins)$
L1 – Tavistock Road	Daytime (07.00 – 23.00 hours)	61-71	78-92	55-70	47-55
	Night-time (23.00 – 07.00 hours)	41-69	50-88	42-64	38-49

- 5.3. The incident environmental noise levels at the facades of the proposed apartments are summarised below.

Table 4 Summary of free field environmental noise levels

Period	Parameter	Sound pressure level, dB
		Tavistock Road
Thursday 11 th May daytime*	L _{Aeq,T}	66
11 th – 12 th May night-time	L _{Aeq,8hours}	61
Friday 12 th May daytime*	L _{Aeq,T}	64
Overall daytime	L_{Aeq, 16 hours}	66
Overall night-time	L_{Aeq, 8 hours}	61

*not complete 16 hour measurements

- 5.4. Measured octave band sound pressure levels corresponding to the overall values above are given in Table 5.

Table 5 Measured octave band sound pressure levels at the measurement locations

Position	Period	Incident sound pressure levels (dB) at Octave Band Centre Frequencies (Hz)								dBA
		63	125	250	500	1000	2000	4000	8000	
Tavistock Road	Daytime L _{eq, 16 hours}	65	62	60	61	62	59	53	46	66
	Night-time L _{eq, 8 hours}	59	55	53	55	58	55	47	37	61
	Night-time L _{Max,F}	81	79	74	77	82	77	68	55	84

- 5.5. The night-time L_{Max,F} data relate to the sound level of the tenth-highest event, in terms of L_{AFMax 10 sec}, measured at each position.
- 5.6. The measurement position corresponds to the approximate location of the nearest elevation to the railway, so no distance or other corrections have been applied to the monitoring data.
- 5.7. Furthermore, windows to all habitable rooms face onto either Tavistock Road or the junction with Garnet Place.
- 5.8. Incident sound levels used in the assessment are therefore as shown in Table 6.

Table 6 Incident octave band sound pressure levels at residential windows

Façade	Period	Incident sound pressure levels (dB) at Octave Band Centre Frequencies (Hz)								dBA
		63	125	250	500	1000	2000	4000	8000	
Tavistock Road	Daytime L _{eq, 16 hours}	65	62	60	61	62	59	53	46	66
	Night-time L _{eq, 8 hours}	59	55	53	55	58	55	47	37	61
	Night-time L _{Max,F}	81	79	74	77	82	77	68	55	84

Nature of source noise

- 5.9. During installation and removal of the sound measurement equipment positioned on site, the major noise source affecting the site was observed to be trains on the railway line to the south along with local road traffic.

6.0 Building fabric noise impact assessment

Initial risk assessment

- 6.1. Results for the highest existing ambient noise levels are shown below and compared with the risk guidance values shown in Figure 1 of ProPG.

Table 7 Comparison of external sound pressure levels with ProPG guidance

Period/ Parameter	External sound level, dB	ProPG Noise Risk Assessment category
Daytime L _{Aeq} 16hr	66	High
Night-time L _{Aeq} 8hr	61	High
Night-time L _{Amax,f}	84	non-negligible

- 6.2. The ProPG document notes that:

At low noise levels, the site is likely to be acceptable from a noise perspective provided that a good acoustic design process is followed and is demonstrated in an ADS¹⁰ which confirms how the adverse impacts of noise will be mitigated and minimised in the finished development.

As noise levels increase, the site is likely to be less suitable from a noise perspective and any subsequent application may be refused unless a good acoustic design process is followed and is demonstrated in an ADS which confirms how the adverse impacts of noise will be mitigated and minimised, and which clearly demonstrate that a significant adverse noise impact will be avoided in the finished development.

- 6.3. Even where noise levels are high “the risk may be reduced by following a good acoustic design process” which “confirms how the adverse impacts of noise will be mitigated and minimised.”
- 6.4. Note that this initial indication of risk “is not the basis for the eventual recommendation to the decision maker” but instead should inform the assessment and design process.

¹⁰ Acoustic Design Statement, i.e this report

Intrusive noise assessment and external building fabric specifications

- 6.5. In order to assess the suitability of the site for the proposed dwellings it is important to predict the internal noise levels within habitable rooms.
- 6.6. The composite acoustic performance required of any portion of the building envelope will depend on its location relative to the principal noise sources around the site and the nature of the spaces behind it (noise criteria, size, room finishes etc.). To control intrusive sound to acceptable levels the following glazing and ventilation specifications are required:

Table 8 Glazing and ventilator specifications

	Glazing Specification	Ventilator Specification
Tavistock Road – all floors		
Kitchen/Living Rooms	Type A	MVHR
Bedrooms	Type B	

Table 9 Proposed building envelope specifications

External building fabric element	Construction element	Sound reduction indices dB at Octave band Centre Frequencies (Hz)							
		63	125	250	500	1k	2k	4k	8k
Type A glazing	10mm glass/12mm cavity/6mm glass	21	27	24	31	32	32	36	38
Type B glazing	10mm glass/16mm cavity/6mm glass	19	24	24	31	39	39	43	43
Other building fabric elements		35	41	45	45	54	58	55	55

- 6.7. The detailed calculation methodology described in BS 8233:2014 has been used in the assessment.

Internal noise levels

- 6.8. With the proposed external building fabric elements shown in Table 8 and Table 9, the results of the calculations show the internal noise levels given in Table 10.
- 6.9. The floor plans and room details are presented in **Appendix C**. The assessment made is for the worst-case room; internal sound levels in all other rooms would be lower than shown.

Table 10 Predicted ambient noise levels in internal areas

Flat	Room	Reference*	Predicted noise levels, dB	Proposed LOAEL, dB	Difference, dB
All	Kitchen/Living	L _{Aeq} , daytime	31	35	-4
	Bedroom	L _{Aeq} , daytime	28	35	-7

Flat	Room	Reference*	Predicted noise levels, dB	Proposed LOAEL, dB	Difference, dB
		L _{Aeq} , night-time	22	30	-8
		L _{Amax} , night-time	45	45	0

*Daytime L_{Aeq,16hr}, night-time L_{Aeq,8hr}

- 6.10. The assessment has demonstrated that the typical requirements established in BS 8233:2014 will be met inside all habitable rooms when double glazing is installed with the acoustic specifications given in Table 8, Table 9 and **Appendix C**.
- 6.11. It is understood that the units are to be served by a mechanical ventilation and heat recovery (MVHR) system. This system must include suitable attenuation to control intrusive noise. The attenuation must control intrusive noise (entering through fresh air and exhaust ducts) and noise generated by the fan(s) to no higher than 25 dB L_{Aeq} and no higher than 40dB L_{Amax}.

External areas

- 6.12. There are residential balconies along the south facade of the development. The expected daytime noise levels at the ground floor balconies along the front facade are expected to be 66dB L_{Aeq, 16 hours}.
- 6.13. BS 8233:2014 provides guidance on external areas to not exceed a level of 50dB L_{Aeq,T} and 55dB L_{Aeq,T} for noisier environments. The standard also states in high noise areas if 55dB L_{Aeq,T} is not achievable at the outer edge, it should be met at some areas of the space.
- 6.14. However, the Standard also notes that:

“these guideline values are not achievable in all circumstances where development might be desirable.

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

Other locations, such as balconies, roof gardens and terraces, are also important in residential buildings where normal external amenity space might be limited or not available, i.e. in flats, apartment blocks, etc. In these locations, specification of noise limits is not necessarily appropriate.

Small balconies may be included for uses such as drying washing or growing pot plants, and noise limits should not be necessary for these uses. However, the general guidance on noise in amenity space is still appropriate for larger balconies, roof gardens and terraces, which might be intended to be used for relaxation.

In high-noise areas, consideration should be given to protecting these areas by screening or building design to achieve the lowest practicable levels. Achieving levels of 55 dB $L_{Aeq,T}$ or less might not be possible at the outer edge of these areas, but should be achievable in some areas of the space."

- 6.15. In addition to the balconies, there are rooftop terraces at sixth and seventh floor levels. An earlier assessment undertaken by ACA Acoustics ¹¹ demonstrated that daytime external noise levels on the rooftop terraces are 48dB L_{Aeq} and therefore within the BS 8233:2014 guidance. Suitable external amenity areas are therefore considered to be provided. It is worthy of note that the external noise levels measured during ACA's assessment are within 1dB of those measured during NSL's survey in May 2023, and as such the prediction of resultant rooftop levels remain valid.

Building Regulations Part O

- 6.16. *Approved Document O1: Overheating mitigation* of the Building Regulations 2010 notes that where internal sound levels within bedrooms are higher than 40dB $L_{Aeq, 8hr}$ at night, and/or where the internal $L_{AF,MAX}$ sound levels is over 55 dB more than ten times, opened windows should not be relied upon to mitigate the effects of overheating.
- 6.17. Guidance provided by the Association of Noise Consultants (ANC) and the Institute of Acoustics (IoA)¹² indicates that the sound reduction through a partially opened window is 13dBA. Predicted internal sound levels are therefore as shown in Table 11.

Table 11 Predicted internal noise levels in bedrooms (windows open)

Facade	Reference	External noise levels, dB	Predicted internal noise levels, dB	Part O criterion, dB	Difference, dB
Tavistock Road	$L_{Aeq, 8hr}$, night-time	61	48	40	+8
	L_{Amax} , night-time*	84	71	55	+16

**10th-highest noise event*

¹¹ Their report reference 210105-R001C dated 26th March 2021.

¹² Residential Design Guide on Acoustics Ventilation and Overheating (version 1.1), published January 2020

- 6.18. With windows open, the Part O noise criteria would be exceeded in bedrooms and an alternative method of providing ventilation to the mitigate against overheating will be required.
- 6.19. Possible overheating at night is mitigated by the proposed MVHR system and there is therefore no need for windows to remain open at night.

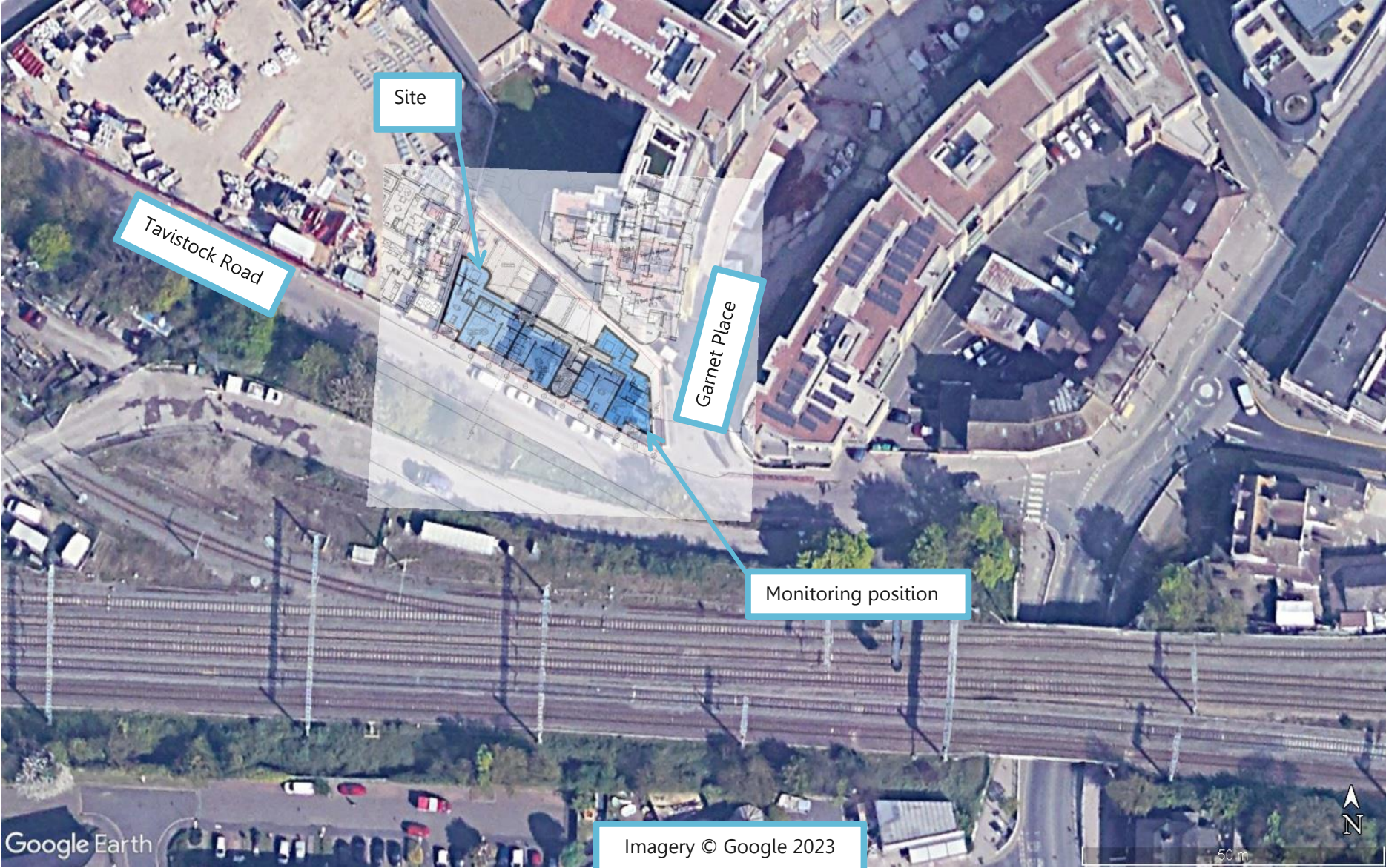
7.0 Summary

- 7.1. Noise Solutions Ltd (NSL) has been commissioned to undertake a noise assessment in respect of the approved new residential development on the site of the former Tavistock Works on Tavistock Road, Yiewsley. This report is submitted in support of a S.73 application, which seeks to amend condition 2 of application 35810/APP/2021/12324 and update the fenestration of the approved scheme.
- 7.2. In support of these assessment works, a baseline noise survey was undertaken to determine the prevailing environmental noise levels at the façades of the proposed building.
- 7.3. The results of the assessments were analysed and reviewed in line with the aims and advice contained within the National Policy Statement for England, the National Planning Policy Framework, Planning Practice Guidance and the Institute of Acoustics Professional Practice Guidance for new residential development.
- 7.4. The advice in the IoA ProPG document indicates that at the worst-affected façade noise levels are in the high risk range but that the risk may be reduced by following a “good acoustic design process”.
- 7.5. The assessment has demonstrated that the requirements established in BS 8233:2014 will be met inside all habitable rooms when fitted with suitable double-glazed windows and mechanical ventilation and heat recovery.
- 7.6. The site can, therefore, be considered suitable for the proposed residential development.

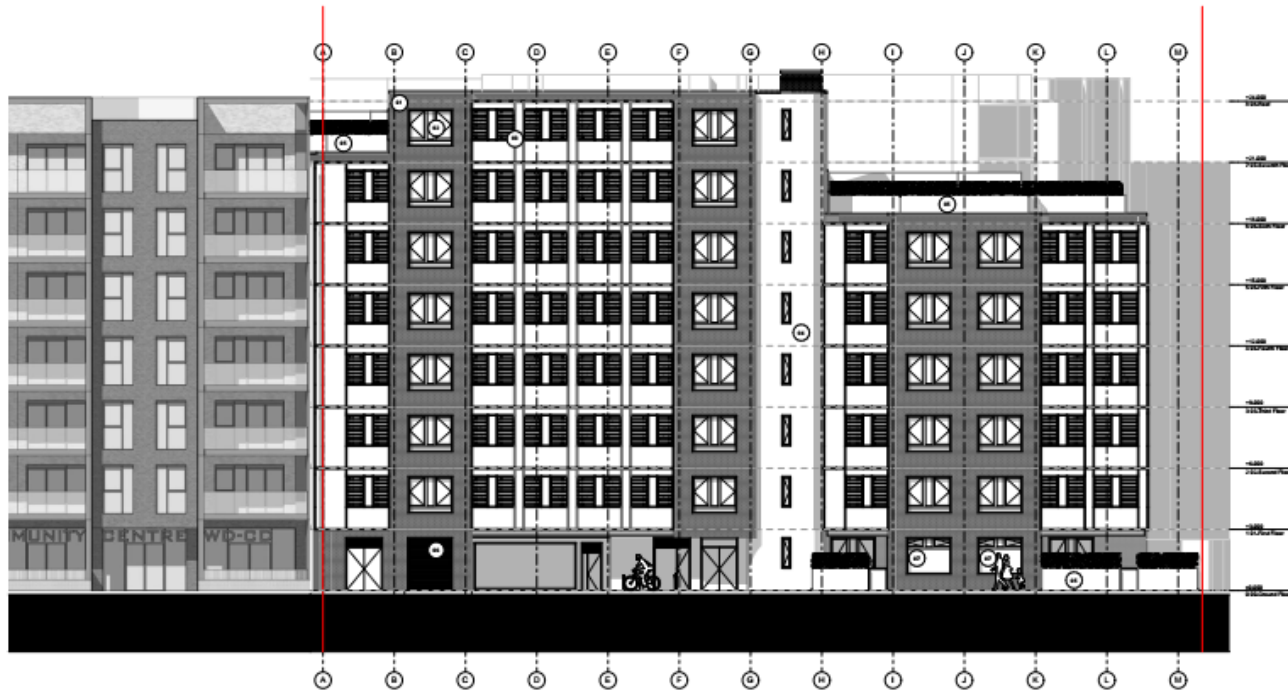
Appendix A Acoustic terminology

Parameter	Description
Ambient Noise Level	The totally encompassing sound in a given situation at a given time, usually composed of a sound from many sources both distant and near ($L_{Aeq,T}$).
Decibel (dB)	A scale for comparing the ratios of two quantities, including sound pressure and sound power. The difference in level between two sounds s_1 and s_2 is given by $20 \log_{10} (s_1/s_2)$. The decibel can also be used to measure absolute quantities by specifying a reference value that fixes one point on the scale. For sound pressure, the reference value is $20\mu\text{Pa}$. The threshold of normal hearing is in the region of 0dB and 140dB is the threshold of pain. A change of 1dB is only perceptible under controlled conditions.
dB(A), L_{Ax}	Decibels measured on a sound level meter incorporating a frequency weighting (A weighting) which differentiates between sounds of different frequency (pitch) in a similar way to the human ear. Measurements in dB(A) broadly agree with people's assessment of loudness. A change of 3dB(A) is the minimum perceptible under normal conditions, and a change of 10dB(A) corresponds roughly to halving or doubling the loudness of a sound. The background noise in a living room may be about 30dB(A); normal conversation about 60dB(A) at 1 metre; heavy road traffic about 80dB(A) at 10 metres; the level near a pneumatic drill about 100dB(A).
Fast Time Weighting	Setting on sound level meter, denoted by a subscript F, that determines the speed at which the instrument responds to changes in the amplitude of any measured signal. The fast time weighting can lead to higher values than the slow time weighting when rapidly changing signals are measured. The average time constant for the fast response setting is 0.125 (1/8) seconds.
Free-field	Sound pressure level measured outside, far away from reflecting surfaces (except the ground), usually taken to mean at least 3.5 metres
Façade	Sound pressure level measured at a distance of 1 metre in front of a large sound reflecting object such as a building façade.
$L_{Aeq,T}$	A noise level index called the equivalent continuous noise level over the time period T. This is the level of a notional steady sound that would contain the same amount of sound energy as the actual, possibly fluctuating, sound that was recorded.
$L_{max,T}$	A noise level index defined as the maximum noise level recorded during a noise event with a period T. L_{max} is sometimes used for the assessment of occasional loud noises, which may have little effect on the overall L_{eq} noise level but will still affect the noise environment. Unless described otherwise, it is measured using the 'fast' sound level meter response.
$L_{10,T}$	A noise level index. The noise level exceeded for 10% of the time over the period T. L_{10} can be considered to be the "average maximum" noise level. Generally used to describe road traffic noise. $L_{A10,18h}$ is the A-weighted arithmetic average of the 18 hourly $L_{A10,1h}$ values from 06:00-24:00.
$L_{90,T}$	A noise level index. The noise level that is exceeded for 90% of the measurement time interval, T. It gives an indication of the lower levels of fluctuating noise. It is often used to describe the background noise level and can be considered to be the "average minimum" noise level and is a term used to describe the level to which non-specific noise falls during quiet spells, when there is lull in passing traffic for example.

Appendix B **Photographs of site showing places of interest**



South elevation



Notes																							
1. This document and its design content is copyright ©. It shall be read in conjunction with all other associated project information including methods, specifications, schedules and related consultants documents. Do not scale from documents. All dimensions to be checked on site. Immediately report any discrepancies, errors or omissions on this document to the Originator. If in doubt ASK.																							
2. In addition to the hazard / risks normally associated with the types of work detailed on this drawing take note of the above. It is assumed that all works on this drawing will be carried out by a competent contractor working, where appropriate, to an appropriate method statement.																							
<p style="text-align: center;">— Site Boundary</p>																							
Materials																							
01 Aged Orange-Red Brick 02 Copper Aluminium Frame + Clear Glass 03 Copper Aluminium Frame + Clear Glass + Clear Glass Louvres 04 White Render 05 Copper Aluminium Planters 06 Copper Aluminium Louvres 07 Frosted Glazing 08 Copper Aluminium Frame + Frosted Glass 09 Copper Aluminium Checkered M&S Tiles																							
<table border="1"> <tr> <td>05</td> <td>GF-Windows</td> <td>06/06/01</td> <td>For Comments Only</td> </tr> <tr> <td>06</td> <td>GF-Store-Frontage</td> <td>06/07/01</td> <td>For Comments Only</td> </tr> <tr> <td>03</td> <td>RIBA-3</td> <td>22/05/01</td> <td>Final For Planning</td> </tr> <tr> <td>02</td> <td>RIBA-3-WIP</td> <td>22/04/01</td> <td>Final For Design Team</td> </tr> <tr> <td>01</td> <td>RIBA-3-WIP</td> <td>21/03/01</td> <td>Final For Review</td> </tr> </table>				05	GF-Windows	06/06/01	For Comments Only	06	GF-Store-Frontage	06/07/01	For Comments Only	03	RIBA-3	22/05/01	Final For Planning	02	RIBA-3-WIP	22/04/01	Final For Design Team	01	RIBA-3-WIP	21/03/01	Final For Review
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B - Approved with Comments																							
C - Do Not Use																							
Status	Purpose of Issue																						
S2	WIP																						
Originator	airc.design airc@airc.design																						
Project	Tavistock-Works Tavistock Works UB7 7QX																						
Layout Title	Proposed-South-Elevation																						
Client	Linea UB7 Ltd																						
Drawing Number																							
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Appendix D Environmental sound survey

Details of environmental sound survey

- D.1 Measurements of the existing background sound levels were undertaken between 11.15 hours on Thursday 11th May and 11.15 hours on Friday 12th May 2023.
- D.2 The sound level meter was programmed to record the A-weighted L_{eq} , L_{90} , L_{10} and L_{max} noise indices for consecutive 15-minute sample periods for the duration of the survey.

Measurement position

- D.3 The sound level meter was fixed to an extended vertical pole on the fire escape at the east of the existing building. The pole was of sufficient height that the microphone had an uninterrupted view of Tavistock Road and the railway to the south. The location is shown in [Appendix B](#). In accordance with BS 7445-2:1991 'Description and measurement of environmental noise – Part 2: Guide to the acquisition of data pertinent to land use', the measurements were undertaken under free-field conditions.











Equipment

- D.4 Details of the equipment used during the survey are provided in the table below. The sound level meter was calibrated before and after the survey; no significant change (± 0.2 dB) in the calibration level was noted.

Position	Description	Model / serial no.	Calibration date	Calibration certificate no.
Tavistock Road	Class 1 Sound level meter	Svantek 977/ 69747	01/08/2022	1503080-1
	Condenser microphone	ACO Pacific 7052E / 70829		
	Preamplifier	Svantek SV12L / 73687		
	Calibrator	Svantek SV30A / 10843	02/11/2022	1503080-2

Weather conditions

- D.5 Weather conditions were determined both at the start and on completion of the survey. It is considered that the meteorological conditions were appropriate for environmental noise measurements. The table below presents the weather conditions recorded on site at the beginning and end of the survey.

Weather Conditions				
Measurement Location	Date/Time	Description	Beginning of Survey	End of Survey
Tavistock Road	11.15 11 May - 11.15 12 May 2023	Temperature (°C)	15	13
<div style="border: 1px solid black; padding: 5px;"> <p style="text-align: center;">Cloud Cover</p> <p>Symbol Scale in oktas (eighths)</p> <p> 0 Sky completely clear</p> <p> 1</p> <p> 2</p> <p> 3</p> <p> 4 Sky half cloudy</p> <p> 5</p> <p> 6</p> <p> 7</p> <p> 8 Sky completely cloudy</p> <p> (9) Sky obstructed from view</p> </div>		Precipitation:	No	No
		Cloud cover (oktas - see guide)	6	7
		Presence of fog/snow/ice	No	No
		Presence of damp roads/wet ground	No	Damp
		Wind Speed (m/s)	<1	<1
		Wind Direction	-	-
		Conditions that may cause temperature inversion (i.e. calm nights with no cloud)	No	No

Results

- D.6 During installation and removal of the sound measurement equipment the major noise source affecting the site was observed to be due to trains and local road traffic.
- D.7 The results of the survey are presented in a time history graph overleaf.

Tavistock Works Thursday 11 - Friday 12 May 2023

