

Date: 1 April 2020  
Ref: 20035/003D/pm

Confidential

**LANTANA HEIGHTS  
GROUND BORNE RAIL NOISE**

Client: Stratford City Business District (SCBD)



Report Author

MloA CEng CPhys

© Applied Acoustic Design 2020



Expert Witness<sup>™</sup>  
Established 1996

This document has been prepared by AAD Ltd for the sole use of our client and in accordance with generally accepted consultancy principles, the budget for fees and the terms of reference agreed between AAD and the Client. Unless otherwise expressly stated in this document, any information provided by third parties and referred to herein has not been checked or verified by AAD. No third party may rely on this document without the prior and express written agreement of AAD.

THE GREEN BUSINESS CENTRE  
THE CAUSEWAY  
STAINES  
MIDDLESEX  
TW18 3AL

TELEPHONE: 01784 464404  
FACSIMILE: 01784 465447  
E MAIL: mail@aad.co.uk

## Executive Summary

Acoustic commissioning tests have been completed in a ground floor flat in Lantana Heights, Stratford, London. The planning permission pertaining to the development imposes 3 conditions concerning internal noise levels.

Condition O10 concerns internal noise levels which include ingress of noise from all external sources, using the standards recommended by BS 8233, and has been shown to be met.

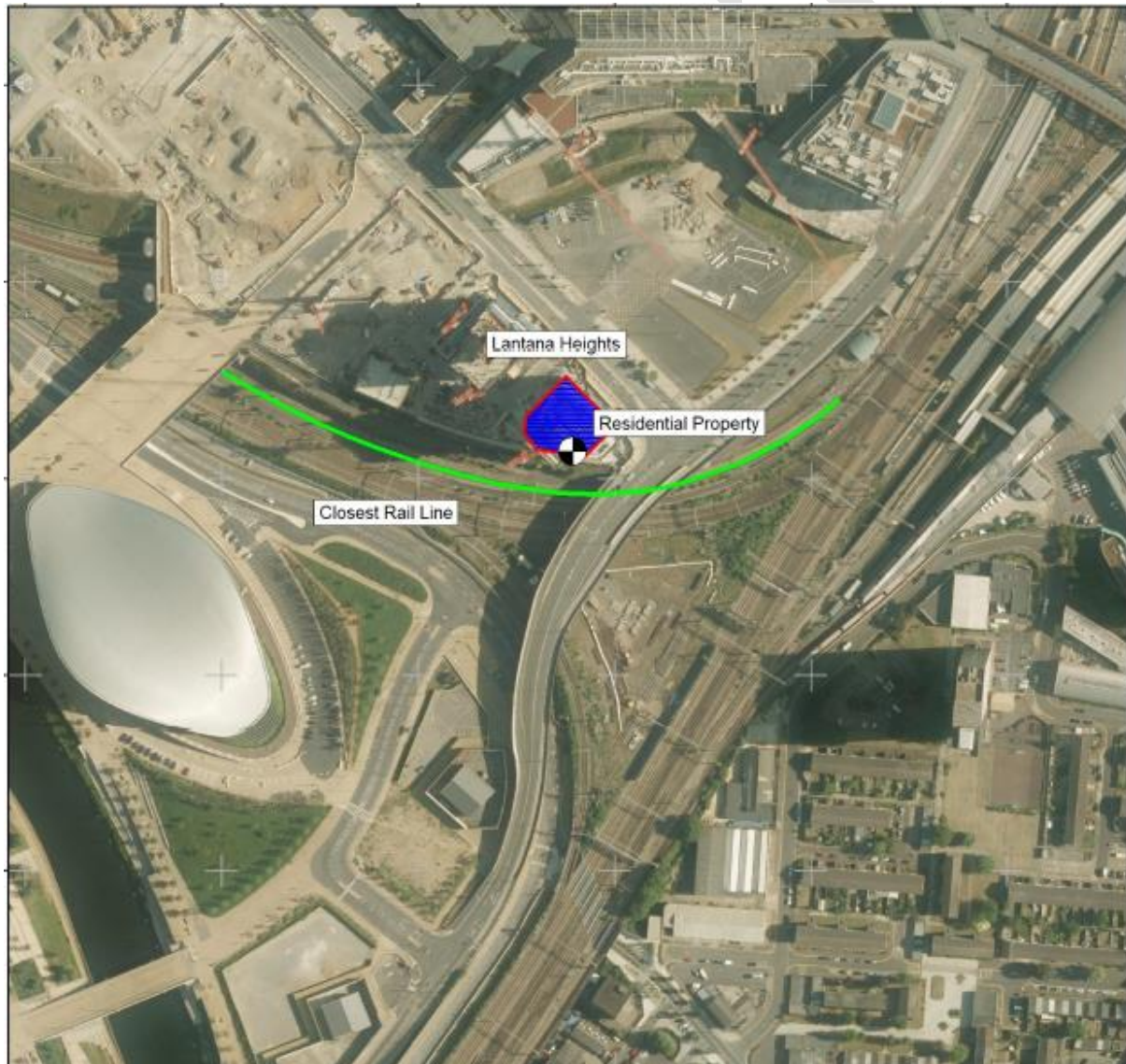
Condition O8 concerns ground-borne noise from railway tracks and states that noise levels should not exceed 35 dB  $L_{ASmax}$  inside the property. The usual method of demonstrating compliance with this type of condition is by pre-development acoustic modelling. Ground-borne noise cannot be measured directly in a completed development and requires calculations to predict the contribution of ground-borne noise to a measurement of total noise, it also requires that all other background sources of noise have negligible influence during the measurements such as clicks and creaks from building fabric thermal movement and building services. The measurements of total noise indicate minor exceedances of the 35 dB  $L_{ASmax}$  criterion; however, at this point a conclusion as to the proportions of this measured noise that are ground-borne and airborne is practically impossible. As a result of this it is not possible to determine whether condition O8 is being exceeded.

Condition O9 is directly linked to condition O8 and acknowledges, in some circumstances, that meeting condition O8 may be difficult. In these situations, the local authority may consider factors including availability of space for development and the predicted ground-borne noise at the site and relax condition O8. This relaxation would come with stipulations that ground-borne noise is mitigated within practical means to a level that reduces the exposure of occupants. Other developments in the area have invoked Condition O9 following pre-development assessment of ground-borne noise predicting exceedance with the criterion required by Condition O8.

## 1.0 Introduction

- 1.1 This report presents a summary of the planning history of various sites within the locality of Glasshouse Gardens (the Site) at International Quarter London (IQL) in Stratford City in the context of noise level measurements undertaken in a ground floor apartment at Lantana Heights. The aim of this report is to present the findings of site noise measurements, case history of other developments in the area in the context of ground borne railway noise and validate the criteria required by condition regarding ground borne railway noise.
- 1.2 The façade of the property is located approximately 22 metres from the closest railway track. This section of line has five separate tracks at increasing distances. The ground floor apartment has no direct line of sight to the railway tracks due to the lower elevation of the tracks relative to ground level of the apartment building. A site location plan is shown below.

### Site Location Plan



## 2.0 Planning Conditions

2.1 Planning conditions imposed on the Lantana Heights development in relation to noise are as follows:

### Condition O8:

*“Subject to Condition O9, ground borne noise from any railway tracks to residential units provided pursuant to the development shall not exceed 35 dBL<sub>Amax(s)</sub>. Reason: To protect the amenity of future occupants and/or neighbours”*

### Condition O9:

*“In some circumstances, the Local Planning Authority may allow the building of residential properties in areas that do not meet the criteria set out in Condition O8. In considering such applications, the Local Planning Authority will have regard to the availability of alternative sites, the nature of the building and the degree to which the noise standard is exceeded. Any application to the Local Planning Authority pursuant to this condition shall include details of mitigation measures to be employed using best practicable means to reduce noise exposure to the lowest practicable level (which shall include, without limitation, where appropriate, design of foundations, building structure, set backs of buildings and internal layout). Where the Local Planning Authority permits the building of residential properties which do not meet the criteria set out in Condition O8, the approved mitigation measures shall be carried out prior to occupation of the residential properties in question. Reason: in the interests of amenity”*

### Condition O10:

*“Internal noise levels within residential units provided pursuant to the development shall meet the ‘good’ standard of BS8233 Table 5 or any equivalent contemporaneous standard Reason: In the interests of amenity.”*

2.2 The standard imposed in condition O8 does not reference time of day and implies that this standard is to be achieved at any time of day. It should be noted that the standard required in Condition O8 is 5dB more onerous than the Crossrail *Undertakings and Assurances given during the Parliamentary passage of the Crossrail Bill through Parliament*, which states that:

*“...the requirement is that the nominated undertaker will be required to design the permanent track support system so that the level of groundborne noise near the centre of any noise-sensitive room is predicted in all reasonably foreseeable circumstances not to exceed the levels in Table 1 (page 10).*

For residential properties this level is given as 40dB L<sub>Amax,S</sub>

2.3 It should be noted that CTRL, HS1, Thameslink 2000 and the Jubilee Line Extension (JLE), all similarly have limits of 40dB L<sub>Amax,S</sub>.

2.4 This undertaking by Crossrail is in relation to a new noise/vibration source affecting existing properties, which may be viewed as a different scenario to new residential development being built close to existing noise sources, for which the guidelines referenced in condition O10 given in BS 8233 would normally apply. Notwithstanding this, the inference provided in the Crossrail undertaking is that such criteria can only be determined by prediction prior to development.

- 2.5 Pre-development assessment of ground borne railway noise predictions for Lantana Heights completed by NHBC concluded that:

*“...we would consider  $L_{A\text{Max}}$  levels due to ground borne vibration from the railway in excess of 35dB  $L_{A\text{Max}}$  to be unlikely”*

- 2.6 The version of BS 8233 referred to in condition O10 includes a maximum noise criterion of 45dB  $L_{A\text{max},F}$  that applies in bedrooms at night only. BS 8233 criteria have been derived from WHO research and guidelines. Based on this research and guidance, the purpose of setting a maximum noise criterion is in relation to sleep disturbance and therefore only applies in bedrooms at night.

*BS 8233: “For a reasonable standard in bedrooms at night, individual noise events (measured with F time-weighting) should not normally exceed 45 dB  $L_{A\text{max}}$ ”*

- 2.7 This is further endorsed by the ProPG document: *Planning & Noise Professional Practice Guidance on Planning & Noise New Residential Development* which states at Note 4 to Figure 2:

*Note 4: Regular individual noise events (for example, scheduled aircraft or passing trains) can cause sleep disturbance. A guideline value may be set in terms of SEL or  $L_{AF\text{max},F}$ , depending on the character and number of events per night. Sporadic noise events could require separate values. In most circumstances in noise sensitive rooms at night (e.g. bedrooms) good acoustic design can be used so that individual noise events do not normally exceed 45dB  $L_{AF\text{max},F}$  more than 10 times a night. However, where it is not reasonably practicable to achieve this guideline then the judgement of acceptability will depend not only on the maximum noise levels but also on factors such as the source, number, distribution, predictability and regularity of noise events.*

- 2.8 Condition O8 does not make any distinction with respect to time of day. It would be reasonable to conclude that achieving the “good” standard of BS 8233 for average daytime noise would indicate that frequent instantaneous noise events such as those caused by train pass-bys are sufficiently controlled.

- 2.9 This raises the question as to why Condition O8 requires a maximum noise level at all times of day that is approximately 10dB more onerous than that required by Condition O10 at night only.

- 2.10 Whilst there are methods for *predicting* groundborne noise in a room this is very different from *measuring* groundborne noise in a completed development. There is no direct method of measuring groundborne noise alone and disseminating it from airborne (or total) noise. Sound pressure level measurements, as would be made using a sound level meter, can only measure *total* noise from all propagation routes and cannot distinguish between groundborne and airborne. This makes the verification of the requirements of Condition O8 practically impossible. It shall be seen from the literature research that all the nearby developments similarly affected by ground borne railway noise have had their planning decisions determined through predictive assessments and in nearly all cases a relaxation of the criterion of Condition O8 was approved when the assessments revealed a predicted excess of the criterion. This procedure is as allowed by condition O9.

2.11 The National Planning Policy Framework (NPPF) states the following:

*Planning conditions should be kept to a minimum and only imposed where they are necessary, relevant to planning and to the development to be permitted, enforceable, precise and reasonable in all other respects. Agreeing conditions early is beneficial to all parties involved in the process and can speed up decision making. Conditions that are required to be discharged before development commences should be avoided, unless there is a clear justification*

2.12 Prevailing guidance at the time of the Stratford City outline planning permission was PPG 24 which had similar provisions as follows:

*The appropriate use of planning conditions can enable many development proposals to proceed where it would otherwise be necessary to refuse permission. General advice on the use of conditions is contained in DOE/WO Circular 1/85. Conditions should only be imposed where they are:*

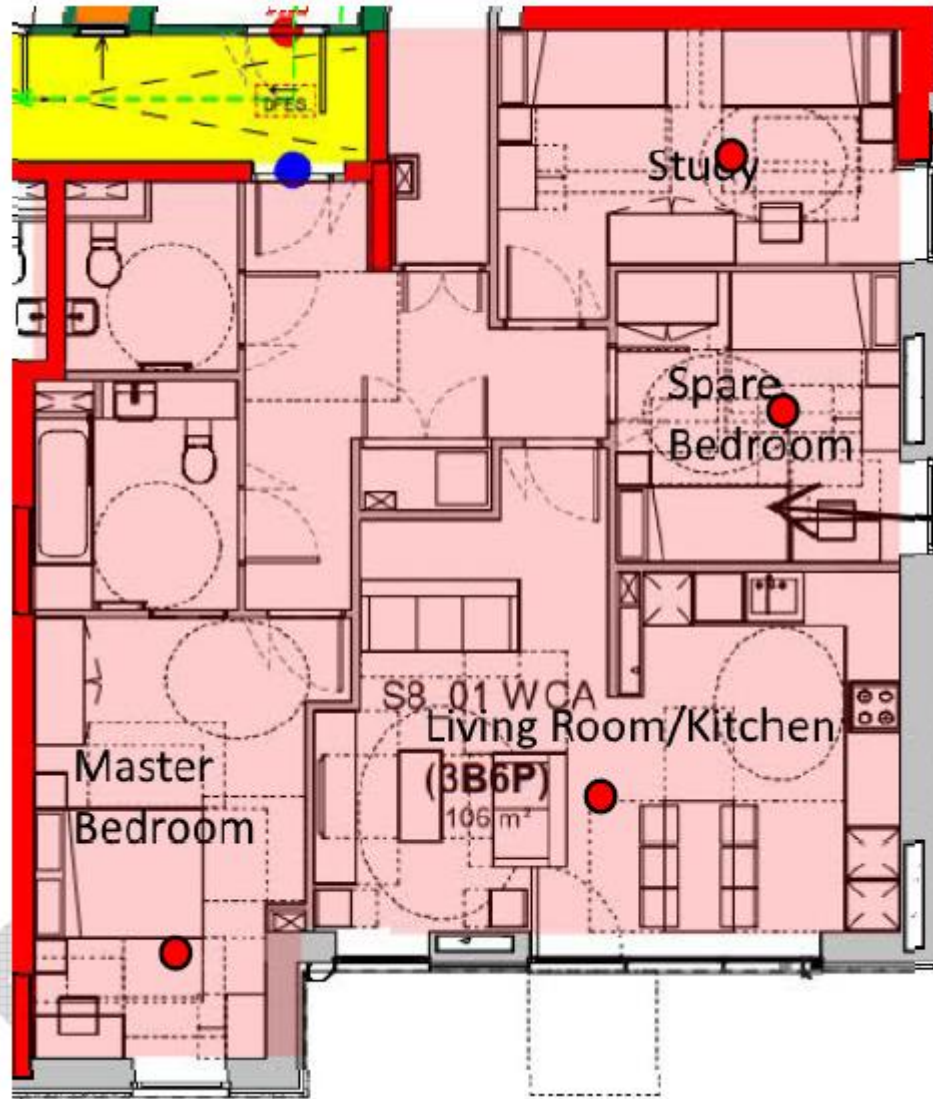
- *necessary*
- *relevant to planning*
- *relevant to the development to be permitted*
- *enforceable*
- *precise*
- *reasonable in all other respects.*

Condition O8 provided no informative as to how the criterion required is to be demonstrated.

### 3.0 Site Measurements

3.1 Site measurements have been conducted in a ground floor apartment within the development, the results are presented below. These data have been taken from survey measurements specifically commissioned to examine, in more detail, the condition O8 criterion following initial acoustic testing which demonstrated compliance with Condition O10 criteria. The apartment layout plan below shows the location of each measurement. A typical  $L_{Amax,S}$  spectrum is also presented for each room.

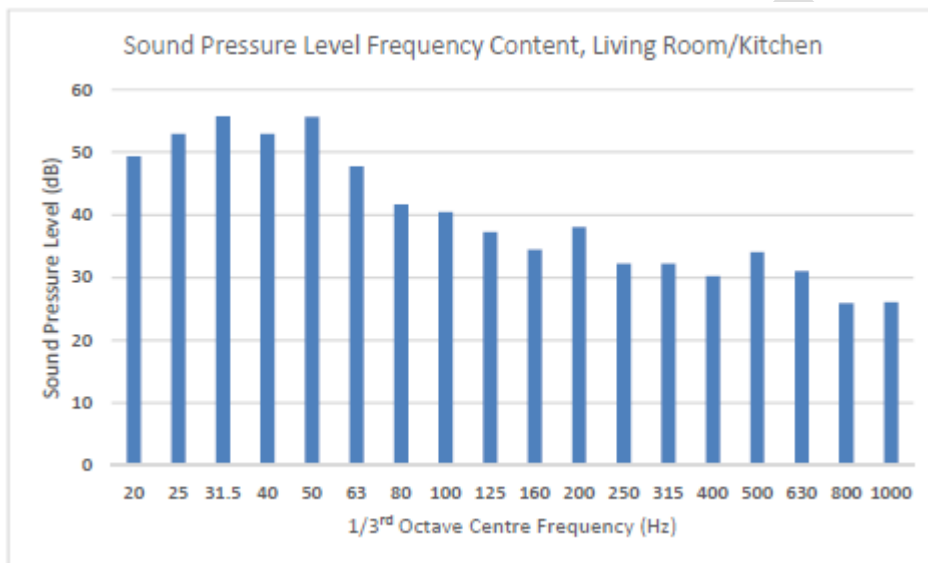
Apartment Layout Plan



Measurement Location: - ●

**Table 5.1 Summary of  $L_{A_{Smax}}$  Measurements in Living Room/Kitchen**

Measurement ID	Date & Time	$L_{A_{Smax}}$ (dB)
STR114	23/07/2019 11:24:24	32.3
STR115	23/07/2019 11:30:26	39.1
STR116	23/07/2019 11:32:48	35.4
STR117	23/07/2019 11:35:46	38.6
STR118	23/07/2019 11:40:07	34.6
STR119	23/07/2019 11:46:43	39.5



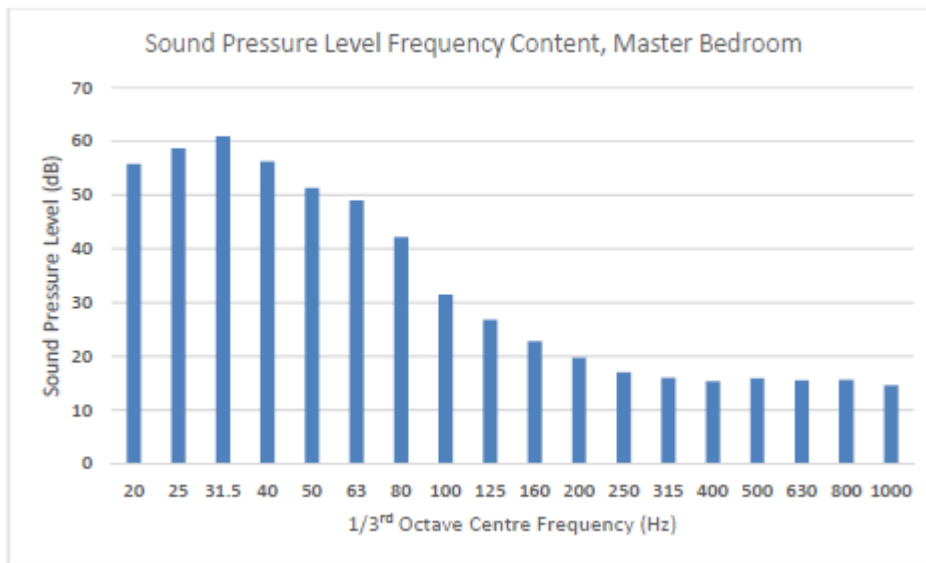
**Table 5.2 Summary of  $L_{A_{Smax}}$  Measurements in Master Bedroom**

Measurement ID	Date & Time	$L_{A_{Smax}}$ (dB)
STR125	23/07/19 12:45:53	27.4
STR126	23/07/19 12:49:58	37.9
STR127	23/07/19 12:54:21	36.5
STR128	23/07/19 12:55:26	34.0
STR129	23/07/19 13:01:56	30.4
STR130	23/07/19 13:03:44	36.3
STR131	23/07/19 13:07:23	34.1
STR132	23/07/19 13:08:44	30.4
STR133	23/07/19 13:09:12	31.9
STR134	23/07/19 13:13:07	35.1
STR135	23/07/19 13:15:48	30.3
STR136	23/07/19 13:17:53	34.0
STR137	23/07/19 13:24:36	31.5
STR139	23/07/19 13:31:22	32.1
STR140	23/07/19 13:40:38	32.3



**Master Bed Contd**

Measurement ID	Date & Time	L <sub>ASmax</sub> (dB)
STR141	23/07/19 13:42:02	34.7
STR144	23/07/19 14:00:31	33.3
STR145	23/07/19 14:02:03	35.1
STR146	23/07/19 14:08:41	32.1
STR147	23/07/19 14:10:47	35.0
STR148	23/07/19 14:16:08	28.5
STR149	23/07/19 14:17:48	34.5
STR150	23/07/19 14:24:43	29.4



**Table 5.3 Summary of L<sub>ASmax</sub> Measurements in the Spare Bedroom**

Measurement ID	Date & Time	L <sub>ASmax</sub> (dB)
STR101	23/07/19 10:39:56	31.2
STR102	23/07/19 10:41:55	39.3
STR103	23/07/19 10:46:42	30.1
STR104	23/07/19 10:48:59	36.1
STR105	23/07/19 10:54:59	32.9
STR106	23/07/19 10:56:05	38.9
STR107	23/07/19 11:02:39	29.8
STR108	23/07/19 11:03:38	38.8
STR109	23/07/19 11:09:33	33.0
STR111	23/07/19 11:10:42	37.9
STR112	23/07/19 11:16:50	25.3

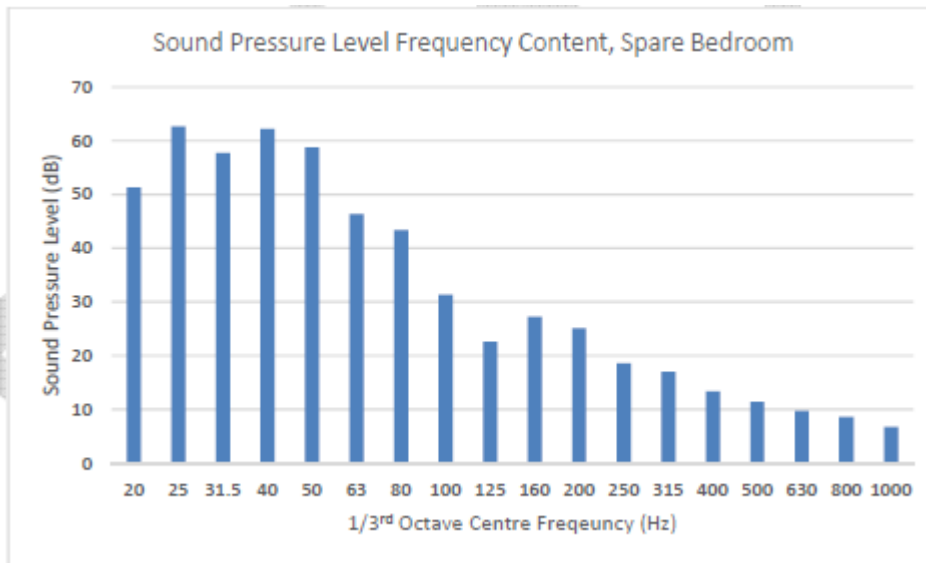
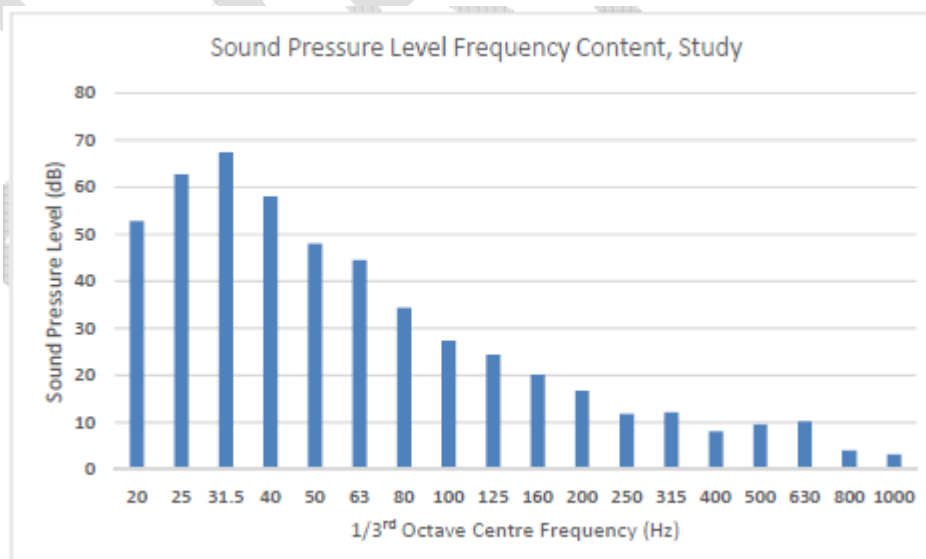


Table 5.4 Summary of  $L_{A8max}$  Measurements in the Study

Measurement ID	Date & Time	$L_{A8max}$ (dB)
STR101	23/07/19 10:39:56	30.8
STR102	23/07/19 10:41:55	32.5
STR103	23/07/19 10:46:42	29.0
STR104	23/07/19 10:48:59	38.6
STR105	23/07/19 10:54:59	32.1
STR106	23/07/19 10:56:05	34.2
STR107	23/07/19 11:02:39	28.8
STR108	23/07/19 11:03:38	34.3
STR109	23/07/19 11:09:33	31.3
STR111	23/07/19 11:10:42	34.5
STR112	23/07/19 11:16:50	29.7



- 3.2 It can be seen from the above results that the measured **total** noise level (both ground borne and airborne) of train pass-by events exceeds 35dB  $L_{AmaxS}$  by varying degrees and frequency of occurrence in each room. No value greater than 40dB  $L_{AmaxS}$  has been recorded however.
- 3.3 It should be noted that the measurement of maximum noise events is very volatile and subject to contamination by the slightest of extraneous noise other than the source under study, such as creaks and clicks caused by thermal movement of building fabric, building services etc. It can be seen for example that the same train events were measured in the Study and in the Spare Bedroom and yet there is no consistent difference between the measurements in the two rooms. Some events displayed higher levels in the Study than in the Spare Bedroom and for others the reverse is the case, indicating there may be some other influences on the measurements and endorsing the fact that attempting to determine a maximum noise level criterion of such low magnitude by measurement is unreasonable and practically impossible.
- 3.4 To put the above maximum noise measurements into context with total ambient noise in the apartment, typical daytime and night time  $L_{Aeq,T}$  values recorded in the apartment were 28dB  $L_{Aeq, 16hr}$  and 23dB  $L_{Aeq, 8hr}$  respectively.
- 3.5 Set out below are sample time histories for  $L_{AmaxS}$  and vibration acceleration taken concurrently to examine any correlation of noise and vibration. It can be seen that although noise events and vibration events coincide for some events, the magnitude of the vibration events vary significantly for similar levels of maximum noise, indicating that it is likely that some airborne noise contribution is present.

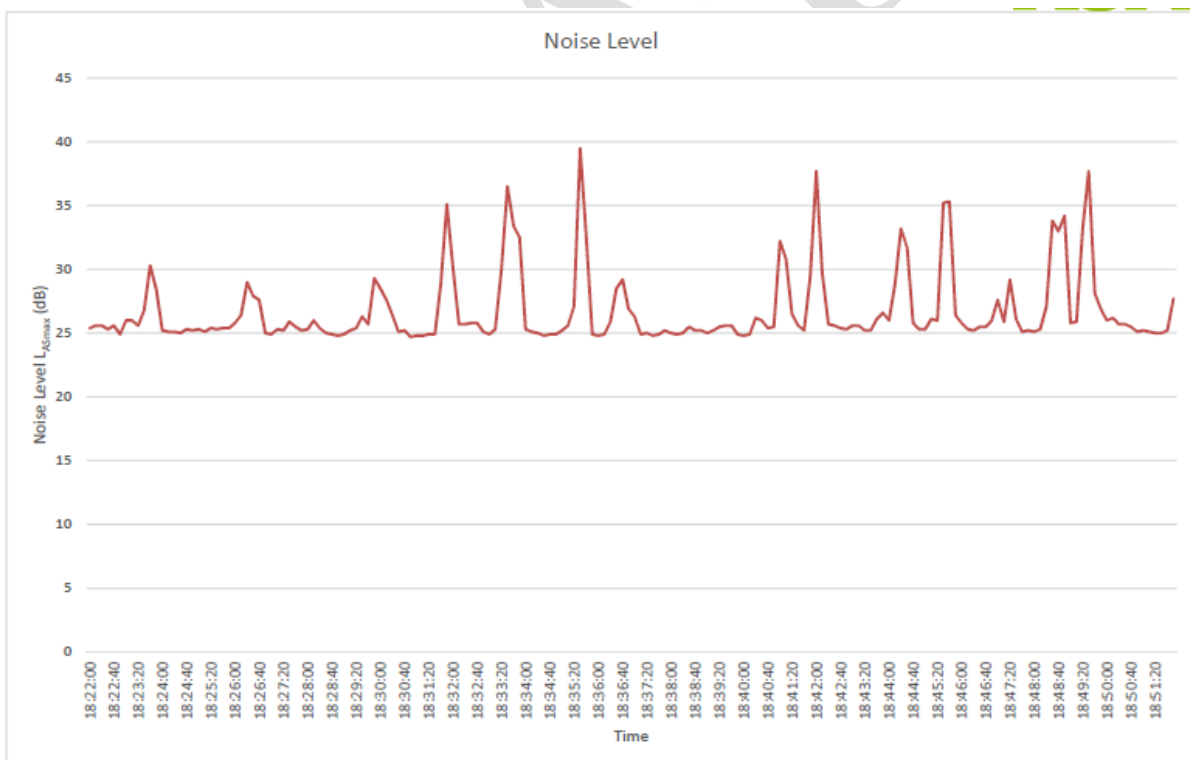


Figure 5.1 Example of  $L_{Amax}$  Time History

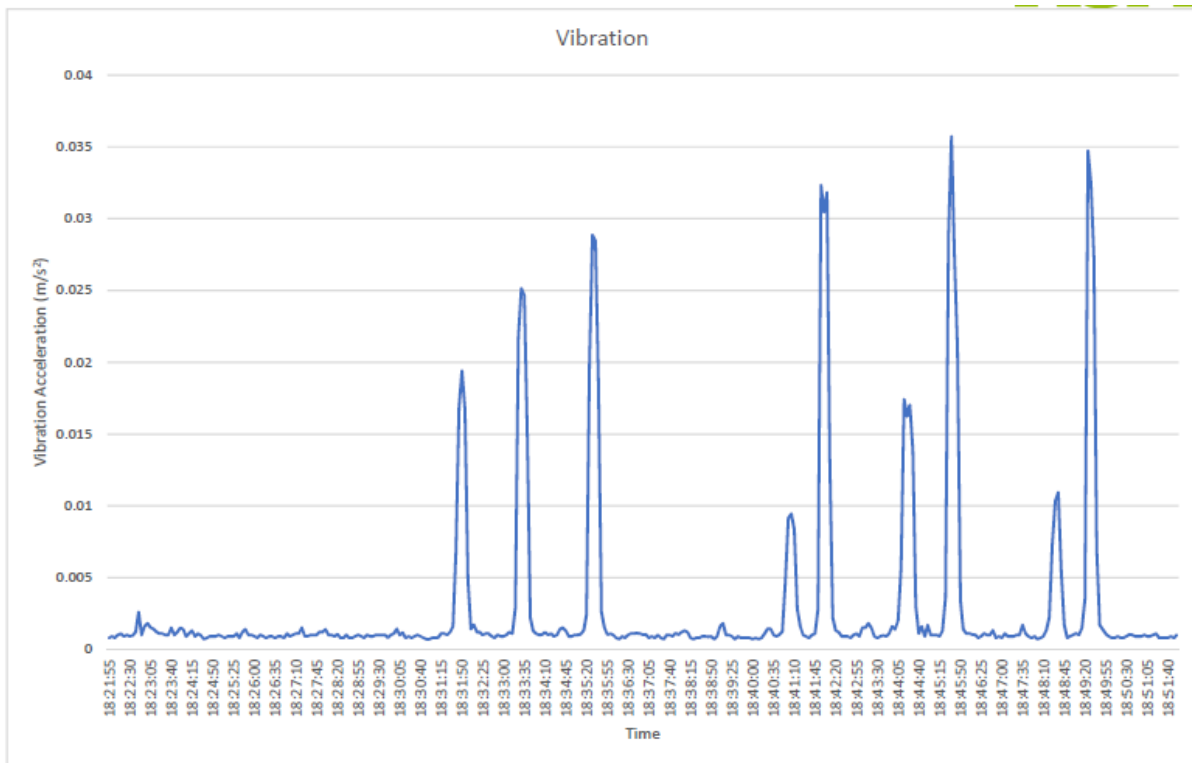


Figure 5.2 Example of Vibration Time History

3.6 It must be emphasised again that the above noise measurement results are of **total** noise and cannot disseminate ground borne from airborne noise and should not, therefore, form the basis of assessing compliance with Condition O8.

#### 4.0 Pre-Development Noise Survey Data

4.1 Set out below are extracts from the pre-development noise survey conducted at the site along with the sound insulation performance for the installed glazing.

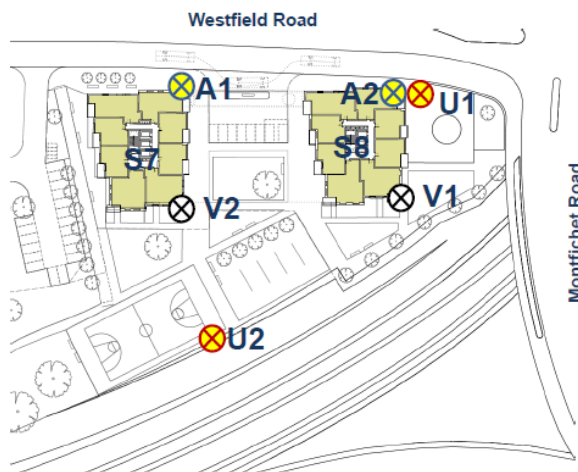
##### Extracts from NHBC Survey Report

Two unattended sound level meters (U1 & U2) were positioned at a height of 1.5m above local ground level. One facing Westfield Road (U1); the other overlooking the railway (U2). These were used to obtain representative average daytime (07h00-23h00) and night time (23h00-07h00) noise levels. Measurement were taken over continuous 10 minute periods

Meter U2 was located adjacent to the southern boundary fence to ensure it had full sight of passing trains and railway tracks. Meter 1 facing Westfield Road was located 3m from the northern boundary fence near the east boundary in order to obtain worst case noise levels from both Westfield Road and Montfichet Road.

A 3-hour attended daytime noise survey (A1 & A2) was also carried out at the location of the two apartment blocks during which traffic flows along Montfichet Road and Westfield Road were assessed.

Two vibration meters were also placed in locations representative of the nearest corners of the two proposed buildings to the railway. Measurements were carried out in accordance with BS6472:2008



Lantana Heights Ground-Borne Rail Noise

Noise used for our assessment (prior to adjustments for distance, screening etc) is summarised in the following tables.

Position U1	A	63	125	250	500	1000	2000	4000	8000
$L_{eq}$ (dB)	60	69	64	60	57	55	51	46	39
$L_{Max}$ (dB)	74	87	82	73	70	68	66	60	53

Position U2	A	63	125	250	500	1000	2000	4000	8000
$L_{eq}$ (dB)	61	67	63	58	57	55	53	54	48
$L_{Max}$ (dB)	82	79	69	66	69	69	77	77	61

Extract from Glazing Technical Submission

Object:

Project:	International Quarter Stratford
Certificat-No.:	Saint Gobain Test Data
Glass build-up :	8.8/16/8.8
Acoustic insulation $R_w$ :	39 [dB]
Spectral adaption value C:	-2 [dB]
Spectral adaption value Ctr:	-6 [dB]
Contact:	Vincent Smith
Date:	20/12/2013
Glass type :	Option B

Results:

Frequency	Third values	Octave values
100	0.0	
125	0.0	22.0
160	0.0	
200	0.0	
250	0.0	27.0
315	0.0	
400	0.0	
500	0.0	36.0
630	0.0	
800	0.0	
1000	0.0	42.0
1250	0.0	
1600	0.0	
2000	0.0	42.0
2500	0.0	
3150	0.0	
4000	0.0	57.0
5000	0.0	

Octave frequency acc. EN20140-3:1995 Formula (10)

4.2 Due to the construction build-up, the sound insulation of the solid areas of façade would far exceed that of the glazed areas and consequently it is the windows that will dominate airborne noise ingress. Using the above data and accounting for the greater distance of the development from the railway tracks with respect to measurement position U2 and also accounting for a fairly significant estimated screening attenuation due the lower elevation of the railway tracks with respect to the ground floor apartment, summary calculations show that the predicted airborne external noise break-in level could be in the order of 32-35dB  $L_{Amax,S}$  depending on the actual degree of screening from the railway tracks. Based on the measured levels of total noise reported above, this is a positive indication that some airborne noise contribution is highly likely.

## 5.0 Other Developments in the Area

5.1 Set out below is a summary of the noise assessments and arguments presented with applications made for a number of other developments in the area similarly affected by ground borne railway noise and the decision outcomes that ensued.

### 5.2 East Bank Planning permission ref: 18/00470/OUT

5.2.1 An assessment of ground-borne noise arising from the adjacent London Overground and Network Rail lines is included within the Environmental Statement (ES) accompanying the application. Paragraph 11.3.36 of the noise assessment states that:

*“Due to a lack of relevant national or international standards, reference is made to available guidance used in High Speed 2 (HS2) (Ref. 11.29) in order to set design criteria for groundborne noise within buildings. HS2 adopted a criterion for ground-borne noise inside residential properties of 35 dB  $L_{ASmax}$ . Therefore, a design target of 35 dB  $L_{ASmax}$  for residential should be achieved in the Proposed Development to avoid significant levels of ground-borne noise due to train movements”.*

5.2.2 The Noise Assessment confirms that ground-borne noise levels exceed the stated guideline in one of the tested locations by 4dB.

5.2.3 The LLDC’s Committee Report provides an appraisal of the proposed residential development for the site. The report does not, however, raise any concerns regarding the impact of ground-borne noise, stating (para 10.440) that:

*“Operational noise and vibration predictions for the proposed development were carried out by the applicant and reported in the ES. The applicant shall undertake an assessment of ground borne noise once foundation and superstructure constructions are available and provide a further submission. This would be secured by condition”.*

5.2.4 Accordingly, Condition O40 of the East Bank planning permission was imposed on the decision notice which included the clause:

*“Groundborne noise within residential uses from rail traffic movements shall not exceed 35dB  $L_{ASmax}$  at any time”*

5.2.5 The restriction on ground-borne noise arising from the railway tracks in the residential units is therefore the same as that set out within condition O8 of the Lantana Heights permission. There was no condition similar to Condition O9 of the Lantana Heights permission, however and permission was granted notwithstanding the predicted exceedance of the subsequently imposed condition O40 reported in the ES.

### 5.3 Manhattan Loft Gardens (Plot N24) Planning permission ref: 10/90285/FUMODA

5.3.1 This application was accompanied by a noise report that explains that the 35dB  $L_{AmaxS}$  ground-borne noise limit set out within condition O8 of the SC OPP is onerous when compared to the commitments required of Crossrail, CTRL, Thameslink 2000 and the Jubilee Line Extension (JLE), which all have limits of 40dB  $L_{AmaxS}$ . It goes on to explain that this is particularly the case of Crossrail and the JLE, which also refer to lower levels where reasonable and practicable for particularly sensitive buildings.

5.3.2 Citing the 'Crossrail Information Paper (D10 – Groundborne Noise and Vibration, Version 4, 3 April 2008)', which states that the limit of 40dB  $L_{AmaxS}$  applies to Residential Buildings, the report suggests that:

*"To be compatible with the current standards being met adjacent to other rail lines it is suggested that the planning condition could be revised to a limit of 40dB  $L_{AmaxS}$ ".*

5.3.3 The LLDC's planning committee report appraising the application acknowledges the applicant's suggestion and the findings of the noise report, which predicted ground-borne noise to be 29dB  $L_{AmaxS}$  at the lowest residential level (7th floor) and the level to reduce higher up the building.

5.3.4 The LLDC subsequently instructed an external consultant (Hyder Consulting) to consider the higher ground borne noise limit proposed. Whilst Hyder agreed with the rationale for adopting the upper limit of 40dB  $L_{AmaxS}$ , the London Borough of Newham (Environmental Health) requested a condition requiring the 35dB  $L_{AmaxS}$  limit to be met.

5.3.5 The LLDC Planning Report acknowledges that plot N24 is the closest plot in Stratford City to the High Speed line and therefore achieving the 35dB  $L_{AmaxS}$  limit is more challenging. However, the report goes on to state that:

*"given the initial predicted noise levels of 39 for the level 1 hotel rooms and 29 for the level 7 residential, it is considered appropriate to allow for an upper limit for the hotel development of 40dB  $L_{AmaxS}$  but that the residential should achieve 35dB  $L_{AmaxS}$ ".*

5.3.6 Accordingly, two conditions were attached to the MLG planning permission relating to ground-borne noise to reflect the position that was taken for the hotel and the residential respectively.

### 5.4 Stratford International Planning Permission ref: 19/00391/FUL

5.4.1 The application is currently awaiting determination. The application was supported by a Noise Report. The Noise Report explains that a guidance limit of 40 dB  $L_{AmaxS}$  is considered appropriate for the assessment of ground-borne noise from the adjacent rail lines as there are no British or international standards which provide guidance on assessing the potential effects of structure-borne noise from railways on the occupants of a building.

5.4.2 The report states that the predicted structure borne noise levels for the site do not exceed the 40 dB  $L_{AmaxS}$  limit and explains that, although the assessment prediction was based on vibration levels from the worst-case instance of a train passing, in reality the levels of ground-borne vibration would be lower and would likely be attenuated further by the structural foundation of the building. As such, it is considered that the effects of structure borne noise would be insignificant, and no mitigation would be required.

5.4.3 No consultation comments relating to the noise assessment have been published to date. It is noted that LB Newham Environmental Health officers were also formally consulted on the application.

#### 5.5 Relevant Reserved Matters Applications (RMA's)

5.5.1 Two reserved matters applications (RMAs) submitted pursuant to the SC OPP where residential developments did not meet the requirements of Condition O8 have been identified. In such instances, the RMAs themselves sought approval pursuant to Condition O9 i.e. agreement with the LLDC to allow the building of residential properties in areas that do not meet the criteria set out in Condition O8. Namely, these relate to:

Plot N09 (RMA ref: 08/90361/REMODA dated 3 June 2009); and

Plot N26 (RMA ref: 09/90065/REMODA dated 6 August 2009).

5.5.2 Noise assessments were submitted in support of those applications because it was predicted that ground-borne noise would be exceeded by these plots given their proximity to railway infrastructure. The reports were reviewed by the Local Planning Authority's (LPA's) environmental consultants and LB Newham's Environmental Health Officers (EHO).

5.5.3 For Plot N09, the Noise Reports concludes that:

*"On the basis of the survey results and predictions performed, the groundborne noise limit of  $L_{ASmax}$  35 dB set out in planning condition O8 is expected to be exceeded by up to around 3 dB, very few times per day, and only on the two lowest residential floors. In the context of environmental noise impact assessments, an increase of 3 dB would typically be considered minor.*

*The predicted groundborne noise levels do not exceed the design limit of  $L_{ASmax}$  40 dB adopted for a number of recent rail developments in the UK in any Plot N09 residential units.*

*Given the relatively minor degree to which the requirements of condition O8 are exceeded, it is the applicant's belief that residential development is justified in the context of planning condition O9. Due consideration has been given to all relevant factors".*

5.5.4 In setting out consideration of this issue, the LPA's planning committee report (see Appendix 13 to this note) (paras 7.9.2 - 7.9.8) states that:

*"The submitted acoustic report describes the methodology undertaken to survey current vibration levels within the extent of Plot N09 which were measured on the heads of two test piles driven at different distance from the HML. Only freight train movements were recorded, but it is noted that laden freight trains typically result in higher levels of groundborne noise than passenger trains. The report predicts that that the worst-case groundborne noise level is  $L_{ASmax}$  38dB and that for the majority of freight train passes the predicted level is below or very close to the  $L_{ASmax}$  35dB set out under Condition O8. It is noted that the predicted groundborne noise levels would not exceed the design limit of 40 dB  $L_{AmaxS}$  which has been adopted for Crossrail, Thameslink, CTRL and the JLE.*



*The report concludes that groundborne noise levels are likely to be lower on the upper floors of the building with the worst affected on the first floor and the limits being met from the third floor upwards. The frequency of such occurrences is considered to be low, comprising approximately 4 daytime (07:00 - 23:00) train movements and 2 night time (23:00 - 07:00) train movements.*

*Condition O9 requires that any application to the Local Planning Authority pursuant to this condition shall include details of mitigation measures to be employed using best practical means to reduce noise exposure to the lowest practicable level (which shall include, without limitation, where appropriate, design of foundations, buildings structure, set backs of buildings and internal layout).*

*The report has considered the availability of alternative sites and the nature of the building and concluded that it is not practicable to avoid residential development in relatively close proximity to the railway lines that surround and pass through the Stratford City site.*

*The submitted acoustic report has been considered by the Environmental Health Officer of LB Newham who has accepted that the applicant has satisfactorily addressed requests for a quantitative appraisal of the vibration and following consideration of the report they are satisfied that the requirements of condition O9 are met.*

*The Environment Review Panel also accept the findings of the report that specific attenuation measures are not required. It is recommended therefore that approval can be given to the request to allow residential development to be undertaken that will experience groundborne noise in excess of 35dB. No further mitigation measures are considered to be required.*

*Planning Officers of LB Newham have suggested that the applicant should employ appropriate measures to mitigate the noise impact wherever possible to ensure the noise limits specified in Condition O8 are met. However, given the specialist response from ERP and LB Newham EHO it is considered that no further mitigation measures are considered to be required”.*

5.5.5 For Plot N26, the Noise Report concludes, at Chapter 13, that:

*“Based on the survey results and the proposed structure types, analysis has been undertaken to predict likely levels of train induced re-radiated ground-borne noise at the N26 residential buildings.*

*The nearest facades of the proposed residential N26 buildings are to be in the region of 5m away from the CTRL Chord and 20m away from the LVL railway tracks. At these distances we have predicted worst-case re-radiated noise levels to be around 44dB<sub>L<sub>Asmax</sub></sub>.*

*The current groundborne noise planning condition limit of 35dB(A) L<sub>smax</sub> is expected to be exceeded relatively few times per day and only in up to around 13% of the residential dwellings on plot N26.*

*The installation of building isolation has been considered using anti-vibration mounts which we believe is not necessary in noise mitigation terms as detailed in Section 12.0. Also this is a complex, significantly complicated and therefore costly process which could delay the delivery of the Athletes Village for 2012. A relatively infrequent exceedance of the planning condition is not likely to justify the level of expenditure and time the isolation of a building would generate.*

*Given the relatively infrequent nature of which the requirements of Condition O8 are exceeded, we believe that residential development is justified in the context of planning Condition O9. Due consideration has been given to all relevant factors”.*

- 5.5.6 The LPA’s planning committee report considers noise and vibration where it states as follows:

*“Initial surveys carried out in October and December 2008 established that the permitted noise level would be exceeded by approximately 9dB due to movement of trains along both tracks. This would affect 13% of dwellings within the development, being 19 townhouses on the eastern side of the plot and apartments at the eastern end of Block A.*

*On the basis of these findings the GLA and the LB Newham Environmental Health Officer both recommended that the request to relax the standard for ground borne noise pursuant to Condition O.9 should be refused.*

*In response the applicants have recently undertaken further testing on the site, following completion of the 8m high retaining wall between the site boundary and the Lea Valley railway line. The results of this testing now show that noise levels would be exceeded by up to 4dB and the 35dB limit set out in condition O8 would be exceeded approximately once per hour between 04:00 and 00:00 hours. This information has been reviewed by the Environmental Health Officer who is now satisfied with the findings and recommends that the development can be undertaken pursuant to condition O9, without complying with condition O8”.*

## 6.0 Conclusions

- 6.1 Pre-development assessment of ground borne noise predicted that a level exceeding 35dB  $L_{AmaxS}$  was unlikely. Other developments in the area have been granted permission where levels of ground borne noise were predicted to be in excess of 35dB  $L_{AmaxS}$  by up to 4dB. It is not known whether any of these sites have been subject to post construction testing. None of the developments' planning conditions have required substantiation of the criterion by measurement, demonstration of compliance for discharge is by prediction calculations.
- 6.2 It should be noted that the measurement of maximum noise events is very volatile and subject to contamination by the slightest of extraneous noise other than the source under study, such as creaks and clicks caused by thermal movement of building fabric, building services etc.
- 6.3 Any direct measurement of maximum noise events in a completed development are necessarily of total noise and cannot disseminate ground borne from airborne noise and should not, therefore, form the basis of assessing Condition O8.
- 6.4 Notwithstanding the above, there is evidence from site measurements of *total* maximum noise in all rooms of a ground floor apartment to support that some airborne noise contribution is present and that maximum train noise events give rise to *total* noise levels which are below 40dB  $L_{AmaxS}$ . This is consistent with the precedent set for other consented developments in the area. It is concluded, therefore, that no further action is required.