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Dear Dan

AS11545 28-34 FORTESS GROVE, LONDON

Construction Noise & Vibration Trial Works

Further to our recent discussions, we have conducted trial works on nearby noise and vibration sensitive receptors of the proposed demolition and construction works at Fortess Grove.

Description of site and proposals

The site is situated in a mixed residential and commercial part of Kentish Town, London. The nearest residential receptors are to the north-east on Railey Mews and to the west on Fortess Grove itself, to which the noise and vibration levels will be calculated in the analysis.

The proposed works involve the renovation / construction of new office accommodation, with the removal and replacement of existing roof coverings, walls and steel frames, the installation of a new mezzanine level and flooring, and the excavations and installation of new foundations. It is noted the development shares one party wall (abutting independent flank walls) with Nos. 1, 3, 4 and 5 Railey Mews and No. 19 Fortess Grove, and two party walls (abutting independent flank walls) with No. 2, Railey Mews.

Internal Construction Noise and Vibration Trial Measurements

A survey of in-situ noise and vibration levels was conducted on 15th September 2020 for the worst affected rooms of the adjacent receptors, during operation of a number of 'high risk' plant items expected to generate the highest noise and vibration levels. Measurements were made of a 'whacker' plate, a petrol concrete saw, breaker (Kango), a drill operating on the floor slab, and a drill operating into the wall. To provide a more robust assessment, each plant item was operating adjacent to the abutting independent flank wall in 28-34 Fortress Grove, with the exception of the drill operating directly into the abutting independent flank wall, therefore providing worst-case scenario for the noise and vibration levels received in each receptor.

Measurements were then taken inside the worst affected space within each receptor. These are as follows:

- No. 1 Railey Mews – Ground floor level living area; and
- No. 2 Railey Mews – Ground floor level bedroom-adjacent closet.

Construction Noise and Vibration Thresholds

Construction vibration target thresholds have been derived in accordance with thresholds set in Table B.1 and Table B.2 in BS5228-2:2009+A1:2014. These thresholds are general guidance values to minimise the risk to personal comfort and structural damage.

These are not strict requirements but provide an early indication of potential significant exceedances via prediction which allow contractors to anticipate potential effects of demolition and construction and can assist in managing noise and vibration impacts on sensitive receptors. A table of these guideline values is presented below.

VIBRATION LEVEL	POTENTIAL EFFECT
0.14 mm/s	Vibration might be just perceptible in the most sensitive situations for most vibration frequencies associated with construction. At lower frequencies, people are less sensitive to vibration
0.3 mm/s	Vibration might be just perceptible in residential environments
1.0 mm/s	It is likely that vibration of this level in residential environments will cause complaint, but can be tolerated if prior warning and explanation has been given to residents
10 mm/s	Vibration is likely to be intolerable for any more than a very brief exposure to this level in most building environments
15 mm/s at 4Hz increasing to 20 mm/s at 15Hz	Cosmetic damage is possible to residential or light commercial buildings
>30 mm/s at 4Hz increasing to >40 mm/s at 15Hz	Minor damage is possible to residential or light commercial buildings
>60 mm/s at 4Hz increasing to >80 mm/s at 15Hz	Major damage is possible to residential or light commercial buildings

Vibration levels and their potential effects PPV [mm/s]
Excerpt from BS5228:2-2009 +A.1:2014

Construction Noise and Vibration Impact Measurements

Measurements have been undertaken using items of plant most likely to produce the highest noise and vibration levels to determine the magnitude of impacts at the adjacent receptors. The highest peak particle velocity [ppv] measured for each item of plant is presented below along with the one-third octave frequency band of the peak value for the vibratory impact.

PLANT ITEM	VIBRATION LEVEL		
	EAST TO WEST [X], FREQUENCY	NORTH TO SOUTH [Y], FREQUENCY	VERTICAL [Z], FREQUENCY
No. 2, West Wall			
Whacker plate	7.4 mm/s, 0.8Hz	2.0 mm/s, 100Hz	5.1 mm/s, 100Hz
Concrete saw	1.0 mm/s 0.8Hz	0.6 mm/s, 0.8Hz	0.7 mm/s, 1.25Hz
Breaker	1.9 mm/s 100Hz	1.6 mm/s, 80Hz	4.9 mm/s, 80Hz
Drill operating into ground	3.0 mm/s, 1.25Hz	0.5 mm/s, 1.25Hz	0.5 mm/s, 1.25 Hz
Drill operating into wall	3.6 mm/s, 0.8Hz	0.5 mm/s, 1Hz	2.5 mm/s, 1Hz
No. 2, South Wall			
Whacker plate	2.4 mm/s, 0.8Hz	1.7 mm/s, 80Hz	5.0 mm/s, 63Hz
Concrete saw	1.0 mm/s, 0.8Hz	0.5 mm/s, 1.25Hz	0.4 mm/s, 1.25Hz
Breaker	5.0 mm/s, 0.8Hz	2.2 mm/s, 0.8Hz	3.1 mm/s, 100Hz
Drill operating into ground	0.4 mm/s, 1.25Hz	0.4 mm/s, 1.25Hz	0.4 mm/s, 1.25Hz
Drill operating into wall	1.9 mm/s, 0.8Hz	0.5 mm/s, 1.25Hz	0.7 mm/s, 1.25Hz
No. 1, West Wall			
Whacker plate	Not measurable above background	0.6 mm/s, 50Hz	6.4 mm/s, 1.25Hz
Concrete saw	0.5 mm/s, 1Hz	0.4 mm/s, 0.8Hz	0.5 mm/s, 1.25Hz
Breaker	1.1 mm/s, 1Hz	Not measurable above background	Not measurable above background
Drill operating into ground	0.5 mm/s, 1.25Hz	0.4mm/s, 1.25Hz	0.4mm/s, 1.25Hz
Drill operating into wall	0.4 mm/s, 0.8Hz	0.4mm/s, 1.25Hz	0.9mm/s, 1.25Hz

Measured vibration levels PPV [mm/s]

It should be noted that the vibration measurements conducted in No.2 were made with the transducer mounted on the timber floor finish. As a result, the magnitude of the vibration is amplified due to the natural frequency of the wood and actual levels of structure-borne vibration are considerably lower.

The average (L_{Aeq}) measured noise level of each operation is presented below.

PLANT ITEM	NOISE LEVEL [dB L_{Aeq}]
Unit 2, West Wall	
Whacker plate	62 dB(A)
Concrete saw	44 dB(A)
Breaker	62 dB(A)
Drill operating into ground	43 dB(A)
Drill operating into wall	56 dB(A)
Unit 2, South Wall	
Whacker plate	58 dB(A)
Concrete saw	37 dB(A)
Breaker	77 dB(A)
Drill operating into ground	57 dB(A)
Drill operating into wall	66 dB(A)
Unit 1, West Wall	
Whacker plate	34 dB(A)
Concrete saw	23 dB(A)
Breaker	72 dB(A)
Drill operating into ground	53 dB(A)
Drill operating into wall	60 dB(A)

Measured noise levels [dB ref. 20µP]

Construction Noise Impact Assessment

A construction schedule has been provided and demonstrates the different phases of construction anticipated.

Calculations have been undertaken on the noise levels within each receptor, to account for likely 'on-times' of each plant item per construction phase. The resultant levels are presented below.

PLANT ITEM	NOISE LEVELS AT NO. 1, RAILEY MEWS [$L_{Aeq, 1hour}$]	NOISE LEVELS AT NO. 2, RAILEY MEWS [$L_{Aeq, 1hour}$]
Soft strip and enabling works	68 dB(A)	74 dB(A)
Foundations / structural concrete pours	63 dB(A)	69 dB(A)
Steelwork installation	53 dB(A)	59 dB(A)
Structural works / façade	63 dB(A)	69 dB(A)
Internal fit out/ fix	53 dB(A)	59 dB(A)

Measured noise levels [dB ref. 20μP]

The calculations predict worst-case noise levels as could be experienced if the above plant items operate directly adjacent to the abutting independent flank walls. It is noted that this scenario is may occur within a 1-hour period, although this is likely to be sporadic and should be communicated to residents.

Certain processes are likely to cause perceptible vibrations within each receptor when operating directly by the abutting independent flank walls. These include the whacker plate, breaker, and drill when operating directly into the wall. Vibration levels are unlikely to give rise to structural or cosmetic damage to the neighbouring properties, however.

Use of these tools, or similar, should consequently be subject to best practice controls in order to manage effects on neighbouring properties.

Construction Noise and Vibration Mitigation and Management

It is essential to cultivate an appropriate environment in which this exposure can be best tolerated from the outset, minimising adverse community reaction.

Restrictions on the hours of operations for works deemed to be of 'high impact' in terms of the level of disturbance caused to neighbouring residents are suggested. This is to ensure that nearby occupiers have sufficient breaks from activities that can be extremely disruptive. 'High impact' works for the purpose of this letter include activities including the whacker plate, breaker, and drilling onto walls, near to the party walls. Permitted hours for 'high impact works' will be limited to 14:00 – 16:00 hours, Monday to Friday.

These hours should be rigorously observed for any operations which are likely to generate noise levels noticeable by neighbouring residents. In addition, it may be necessary to undertake noisy works on an 'on/off' basis, thereby providing neighbouring residents with some respite. Any exceptions deemed essential to the works would need to be authorised by the Local Authority and must also be communicated with the residents.

Communications and public relations are dealt with in detail below but it is important to establish that communication of information regarding the overall project duration is significant in controlling adverse community reaction.

In conjunction with effective communication of site activities and scheduling, liaison with local neighbours is essential in cultivating a positive attitude. A dedicated telephone number and designated staff contact should be made available to respond to any complaints or queries, with a messaging service for 'out of hours' enquiries. Information on current and forthcoming activities should be made as freely available as possible.

Some noisy activities are particularly intrusive due to tonal or impulsive characteristics which tend to draw more attention to their operation. Awareness of these issues is important in liaison with local residents. Local temporary acoustic screening to these activities, where practicable, will also significantly reduce the impact at the closest residential properties.

Noise and Vibration Monitoring

Where appropriate, it may be considered necessary to monitor external noise levels and, in particular, internal vibration levels to demonstrate that operational hours limits are being observed.

The following is a simple proposal for this exercise should this be required.

Noise monitoring

Class 1 integration logging sound level meters e.g. a Rion NL-52 or similar, will be installed, external to the residential receptor, and will be calibrated (before and after) with a Class 1 acoustic calibrator. The instrumentation will be fully calibrated by the manufacturer, or other approved body, as required by the British Standard, with current calibration certificates. The meter will be set to measure and store samples of various acoustic parameters such as L_{Amax}, L_{A10}, L_{Aeq} and L_{A90}. It is proposed that the meters are configured to store and log continuous 30-minute samples of noise throughout the working day for the duration of relevant site works. Alert threshold response will be available by SMS and/or e-mail facility which will notify the Contractor when a recorded 30-minute L_{Aeq} result suggests that the agreed criterion is likely to be exceeded.

Vibration monitoring

Vibration monitoring will be undertaken with the use of a Profound Vibra+ seismograph or similar measuring the peak particle velocity [ppv] in three axes continuously over defined periods. Alert threshold response will be available by SMS text facility to notify the Contractor and other interested parties when agreed criteria are exceeded.

In accordance with best practice for vibration monitoring, the vibration transducer should be attached at the base of a wall (or other structure whose foundation can be confirmed to be in good adhesion with the underlying geology) of the affected building. Where no such installation is possible, a concrete block should be sunk, by others, to a depth beneath the topsoil layers such that it achieves the necessary geological attachment.

Assessment and reporting

Monitoring data will be downloaded from meters, and normal operation of the meters will be verified, on a weekly basis via a remote modem link.

Weekly, fortnightly or monthly summary reports will be issued to relevant parties by email in pdf format detailing the relevant period's measurements, together with comments on whether the specified criteria have been exceeded. Monitoring data can be provided in spreadsheet format to accompany the report, if required.

Conclusions

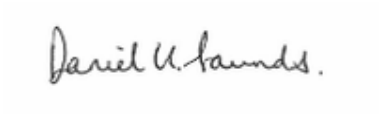
The trial works exercise and subsequent calculations indicate that the worst-case construction structureborne noise levels associated with the redevelopment of Fortess Grove would be noticeable, however unlikely to occur at the levels stated above for prolonged periods.

Measurements of construction vibration associated with the redevelopment of Fortess Grove would be below the identified construction vibration thresholds identified in BS 5228-2:2009+A1:2014 as resulting in structural or cosmetic damage to the adjacent receptors There is potential for complaint, however, if these works are not anticipated by residents.

Although noise levels are expected to be audible, and vibratory levels may be perceptible, limiting the hours of operation of specific plant items and the location of the works within the redevelopment Fortess Grove, and clear communication with the neighbours is expected to limit the likelihood of adverse comment.

Notwithstanding these predictions, a construction noise and vibration monitoring plan should be put in place, that shall be used to provide advance warning of potential exceedances of the thresholds such that steps can be taken to swiftly react to any problems that may arise on site.

Yours sincerely
for CLARKE SAUNDERS ACOUSTICS



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