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Noise/Vibration/Dust Management Plan

Project Ref.: 20638
NVDMP report

Site Address:

12 Pilgrims Lane, Camden NW3 1SN

For:

Sterling N3 Constructors Ltd

55 The Fairway,

Northolt UB5 4SL

Environmental Sensors Ltd.
262 Cavendish Rd, SW12 0BT

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Introduction

Sterling N3 Constructors Ltd, 55 The Fairway, Northolt UB5 4SL appointed ES Monitoring Ltd. to prepare an environmental noise/vibration/dust management plan for the project at 12 Pilgrims Lane, Camden NW3 1SN.

The following report presents information gathered from relevant documentation in establishing noise and dust risk assessment, criteria, controls and working methods. The following documents and guidance have been taken into account while preparing this report:

- British Standard BS7385: Part 2: 1993 'Evaluation and measurement for vibration in buildings Part 2. Guide to damage levels from groundborne vibration'
- British Standard 5228:2009+A1:2014 'Code of practice for noise and vibration control on construction and open sites'
- 'London Good Practice Guide: Noise & Vibration Control for Demolition and Construction' published by The London Authorities Noise Action Forum.
- The Greater London Authority (GLA) Supplementary Planning Guidance (SPG) on the Control of Dust and Emissions During Construction and Demolition (2014)
- The Institute of Air Quality Management (IAQM) Guidance on the assessment of dust from demolition and construction
- The Institute of Air Quality Management (IAQM) Guidance on Monitoring in the Vicinity of Demolition and Construction Sites

Site description

The site location of 12 Pilgrims Lane, Camden NW3 1SN has been presented below in Figure 1.

Figure 1 Indicative Site Plan with proposed monitoring locations (ref. Google Maps).

The site is end of the terrace house located within residential area separated from other properties to the west by Pilgrim Lane. To the east it is separated mostly by gardens and adjoining the property of 10 Pilgrim Lane.

WORK PROGRAMME

Scheduled Phase includes the following:

- Lower ground floor demolition and breakout
- Ground floor demolition
- 1st floor demolition
- Roof level demolition

- Lower ground floor structural works/piling
- Ground and 1st floor internal and structural works

Theory on noise

The effect of noise on individuals in surrounding premisses is complicated to predict and may vary significantly. In extreme cases they would be likely to include a sensation of loudness, potential interference with speech communication, disturbance of work or leisure, and disturbance of sleep. A complicating factor is that, in any neighbourhood, some individuals will be more sensitive to noise than others.

In order to assess instantaneous noise levels at any time, the instantaneous A-weighted sound pressure level, L_{pA} can be used. This will give an indication of the loudness and degree of speech interference from noise.

The most commonly used descriptor however, is the equivalent continuous A-weighted sound pressure level, $L_{Aeq,T}$. The time period involved should always be stated as the figure is a mathematical average of the all individual contributions of various sources during the reference period T. When assessing noise from individual events that may not always be present during a longer period L_{Aeq}, it can be useful to use a short reference period (e.g. 5min).

Criteria for noise

A number of factors are likely to affect the acceptability of noise from construction site. In order to assess the likelihood of disturbance, and minimise impact on local residents, as per BS 5228-1:2009 the following factors need to be considered:

Site Location

The location of a site in relation to noise sensitive receivers will be a foremost factor. The less distance to the sensitive receiver's premises, the higher levels of noise emanating from the site will be measured at the receivers.

Existing Ambient Noise Levels

It is experienced that the likelihood of complains increases with the increase of difference between background noise and new one. It is also assumed that when it is known that the operations are limited in time or short they might be tolerated.

Duration of Site Operations

In general, the longer the duration of on-site activities, the more likely it is that noise from the site will become an issue. Good public relations are very important to mitigate these issues. Local residents may be willing to accept an increased level of noise if they know the duration of all operations is for a short defined time. It is then important that site managers handle on-site activities within the provided schedule.

Hours of Work

For any noise sensitive premises some periods of the day will be more sensitive than others. For example, levels of noise that would be a source of disturbance during the working may not be an issue for the same property during the night. For dwellings, on-site operation undertaken outside of normal weekday working hours or Saturday morning will need special consideration. Noise control targets for the evening period in such cases will need to be stricter than those for the daytime and, when noise limits are set, the evening limit may have to be as low as 10 dB(A) below the daytime limit. Very strict noise control targets might be applied to any site which is to operate at night.

Attitude of the Site Operator

It is well established that people's attitudes to noise are always influenced by their attitudes to the noise source itself. Noise from a site will tend to be accepted more willingly by local residents if they consider that the site contractor is adopting best practicable means to avoid unnecessary noise.

Noise Characteristics

In some cases, a particular characteristic of noise may impact people’s perception and reduce tolerance of specific noise. For example, the presence of an impulsive or tonal noise, can make it less acceptable than it

may seem based on the level of noise measured in terms of $L_{Aeq, T}$. Examples may include: noise from driven piling, rattling noise from vibratory rollers, machine reversing alarms, etc.

With regards to noise levels, BS5228: 2009 "Code of Practice for noise and vibration control on construction and open sites" dictates the following:

"Noise from construction and demolition sites should not exceed the level at which conversation in the nearest building would be difficult with the windows shut. The noise can be measured with a simple sound level meter, as we hear it, in A-weighted decibels (dB(A))- see note below. Noise levels, between say 7.00 and 19.00 hours, outside the nearest window of the occupied room closest to the site boundary should not exceed:

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

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

The results from the baseline survey undertaken in December 2023 prior to any on site works have been presented in the Table 1 below.

	Location 1 $L_{Aeq,T}$	Location 1 $L_{Aeq,T}$
Daytime (Mon-Fri) (07:00 – 23:00)	55	51
Weekend (Sat-Sun) (07:00 – 23:00)	53	48
Weekday (08:00 – 18:00)	56	52
Weekend 08:00 – 13:00	50	47

Table 1 Measured averaged ambient noise levels.

Noise Monitoring and Threshold Criteria

During demolition/construction an automated noise monitoring will be undertaken in 4 locations around the site perimeter to ensure the noise generated is controlled and managed as per BPM.

The locations have been initially identified as per Figure 2, although a final location will need to be agreed with local authorities.

Figure 2 Indicative Site Plan monitoring locations (ref. Google Maps).

Noise Monitoring Equipment:

- Automated noise monitoring system with Class 1 in accordance with (IEC 61672-1:2013) Noise Data Logger with automated alerts and web-based interface.

The final locations will be agreed and should reflect the most impact of noise from the construction/demolition activities on the potential closest sensitive receiver.

Noise Monitoring System

An automated noise monitoring system with mobile connectivity allowing data to be uploaded to a web based system and high frequency providing near-live data presentation.

A two-tier alert system with a frequent amber threshold based on 1 hour averages and second daily noise exposure level. The first tier (amber) threshold allows site/project manager to be pro-active and monitor the daily exposure during on site operations.

Additional notification system verifies a saturation of daily exposure level through the day and generates information for designated people should there be a possibility of exceedance of daily (RED) threshold level.

Threshold Levels

The proposed noise threshold levels have been based on BS5228:2009 and they have been provided as per table below.

BS5228:2009 suggest a 75dB(A) $L_{Aeq,\ 10\ hour}$ threshold level measured 1m away from the façade of the closest sensitive receiver. All monitoring locations are set within the site perimeter and the distance to façade of the closest sensitive receiver varies between 3m at the back to approx. 17m at front toward Broadway.

The noise levels from the point source reduce by 6dB by doubling the distance as per equation below.

$$Lp_{R2} = Lp_{R1} - 20 \cdot \mathrm{Log10}\left(\frac{\mathrm{R2}}{\mathrm{R1}}\right)$$

Table 2 compares the attenuation of noise due to distance from the noise source to monitoring station vs the distance from the monitoring location to sensitive receiver. The highlighted columns represent the approx. distance between the monitoring locations and closest receivers.

Distance source to microphone	Distance in meters between monitoring location and receiver													
	2	5	6	7	8	9	10	12	14	16	18	20	25	30
	Attenuation of sound due to distance													
5m	3	6	6.8	7.6	8.3	8.9	9.5	10.6	11.6	12.5	13.3	14	15.6	16.9
10m	2.5	3.5	4.1	4.6	5.1	5.6	6	6.8	7.6	8.3	8.9	9.5	10.9	12
15m	1.1	2.5	2.9	3.3	3.7	4.1	4.4	5.1	5.7	6.3	6.8	7.4	8.5	9.5

Table 2 The relation of sound reduction to distance of the source and receiver towards monitoring position

It is expected that noise attenuation due to distance in the worst-case scenario will vary between -1 to -3 at the back of the site toward 10 Pilgrim Lane, and -6 to -12dB towards residential area opposite Pilgrim Lane. It will however depend on the location of the noise source on site.

The noise predictions calculations suggest that typically daily noise levels $L_{Aeq,\ 10\ hours}$ remains below 75dBA with some individual periods during demolition of 1st Floor when the highest predicted noise level reached 80dB.

The proposed trigger and action levels at the monitoring locations around the site perimeter were presented below.

Period	Trigger Level (Amber Alert) dB $L_{Aeq,\ 1hour}$	Action Level (Red Alert) dB $L_{Aeq,\ 1hour}$	Action Level (Red Alert) dB $L_{Aeq,\ 10hour}$
Monday – Friday 08:00 – 18:00	75	78	75
Saturday 08:00 – 13:00	75	78	75 $L_{Aeq,\ 5\ hours}$

Remedial Action on exceedance

It is possible that during the site operation some exceedances may occur due to on-site operations or the external factors (for example: fire alarm going off in the neighbouring property, road works not related to the site in a close proximity, other high level noises generated by off-site activities.)

The exceedance of AMBER threshold level is an indication of possible exceedance of daily threshold level. Although it does not require immediate action, it is advisable to verify what could cause the exceedance and log the action causing excessive noise.

The exceedance of RED threshold level needs to be investigated and should the value be above 1dB over the threshold works should stop, the cause of exceedance identified, and the methodology should be revised, and where alternative methodology is possible that could reduce the noise levels – it should be considered.

Any additional actions required by local authorities should be undertaken in addition to the above action plan.

Noise Risk Assessment

The London Good Practice Guide: Noise & Vibration Control for Demolition and Construction outlines a two-part Risk Assessment, included below:

Phase: Demolition and Substructure

Risk Assessment A – Locality / Site information

		Low	Medium	High
Locality / Site Information	**Programme Duration**			
	<6 months	X		
	6 months to 12 months			
	>12 months			
	Proximity of Receptors			
	>50m from the site boundary			
	Between 25m and 50m			
	<25m			X
	Daytime Ambient Noise Level			
	High ambient noise level			
	Medium ambient noise level		X	
	Low ambient noise level			
	Working Hours			
	Normal working hours only	X		
	Some extended evening or weekend working			
	Some night-time working			
	SUBTOTAL A - Add up the number of ticks in each column	**2**	**1**	**1**

Risk Assessment B – Works Information

		Low	Medium	High
Works Information	**Location of Works**			
	Majority within existing complete building envelope			
	Majority of works external			X
	External demolition			
	Limited to 2 weeks			
	External demolition between 2 weeks and 3 months		X	

	External demolition greater than 3 months			
	Ground works			
	Limited to non-percussive methods (i.e. hand tools / small excavator / small backhoe)			
	Percussive methods less than 3 months		X	
	Percussive methods greater than 3 months			
	Piling			
	Limited to 1 week	X		
	Bored piling only. No impact or vibratory piling			
	Impact or vibratory piling			
	Vibration generating activities			
	Limited to less than 1 week			
	Between 1 week and 1 month		X	
	Greater than 1 month			
	Street management			
	Required for less than 1 week / or not at all	X		
	Required for less than 1 month			
	Required for greater than 1 month			
	SUBTOTAL B - Add up the number of ticks in each column	**2**	**3**	**1**

	Low	**Medium**	**High**
Risk Assessment A – Locality / Site Information Carry over SUBTOTAL A	2	3	1
Risk Assessment B - Works information For the highest number of ticks in SUBTOTAL B add 1 tick to the equivalent risk column	X	-	-
TOTAL	**3**	**3**	**1**

Based on the above, during that phase the site is assessed as a **Medium risk** site overall.

Phase: Superstructure

Risk Assessment A – Locality / Site information

		Low	**Medium**	**High**
Locality / Site Information	**Programme Duration**			
	<6 months	X		
	6 months to 12 months			
	>12 months			
	Proximity of Receptors			
	>50m from the site boundary			
	Between 25m and 50m			
	<25m			X
	Daytime Ambient Noise Level			
	High ambient noise level			
	Medium ambient noise level		X	
	Low ambient noise level			
	Working Hours			
	Normal working hours only	X		
	Some extended evening or weekend working			
	Some night-time working			
	SUBTOTAL A - Add up the number of ticks in each column	**2**	**1**	**1**

Risk Assessment B – Works Information

		Low	Medium	High
Works Information	**Location of Works**			
	Majority within existing complete building envelope			
	Majority of works external			X
	External demolition			
	Limited to 2 weeks	X		
	External demolition between 2 weeks and 3 months			
	External demolition greater than 3 months			
	Ground works			
	Limited to non-percussive methods (i.e. hand tools / small excavator / small backhoe)	X		
	Percussive methods 13 less than 3 months			
	Percussive methods greater than 3 months			
	Piling			
	Limited to 1 week	X		
	Bored piling only. No impact or vibratory piling			
	Impact or vibratory piling			
	Vibration generating activities			
	Limited to less than 1 week	X		
	Between 1 week and 1 month			
	Greater than 1 month			
	Street management			
	Required for less than 1 week / or not at all	X		
	Required for less than 1 month			
	Required for greater than 1 month			
	SUBTOTAL B - Add up the number of ticks in each column	**5**	**0**	**1**

	Low	Medium	High
Risk Assessment A – Locality / Site Information Carry over SUBTOTAL A	2	1	1
Risk Assessment B - Works information For the highest number of ticks in SUBTOTAL B add 1 tick to the equivalent risk column	X	-	-
TOTAL	**3**	**1**	**1**

Based on the above, during Substructure phase the site is assessed as a **Low risk** site overall.

A summary of the risk assessment has been presented below:

Activity	Overall Risk level
Demolition	**MEDIUM RISK**
Superstructure	**LOW RISK**

Noise & Vibration Management Plan and Mitigation Measures

During works on site all operatives will be trained to ensure that best practicable means (BPM) are implemented at all times. BPM are defined in Section 72 of the Control of Pollution Act 1974 and Section 79 of the Environmental Protection Act 1990 as those measures which are:

"reasonably practicable having regard among other things to local conditions and circumstances, to the current state of technical knowledge and to financial implications".

Where practicable the control measures set out in BS5228-1:2009+A1:2014, Section 8 will also be implemented. Employees must also show consideration to the sensitive receptors, including residential neighbours, and must not generate unnecessary noise when walking to and from the site, or when leaving and arriving at work.

Recommended control measures include:

- Screening: for example local screening of equipment or perimeter hoarding;
- Choice of methodology/technique for operations (including site layout) will be considered in order to eliminate or reduce emissions at sensitive locations
- Fixed items of construction plant will be electrically powered in preference to diesel or petrol driven.
- If any specialise fabrication is required, this will be undertaken off-site if possible.
- Noisy plant will be kept as far away as possible from sensitive areas.
- Each item of plant used will comply with the noise limits quoted in the relevant European Commission Directive 2000/14/EC/United Kingdom Statutory Instrument (SI) 2001/1701 [3] where reasonably available.
- Equipment will be well-maintained and will be used in the mode of operation that minimises noise and shut down when not in use.
- Vehicles shall not wait or queue on the public highway with engines running (unless the engine is required to power the operation of the vehicle e.g. concrete wagon).
- Where possible deliveries will be arranged on a just-in-time basis in order to prevent vehicles queuing outside site.
- All materials will be handled in a manner that minimises noise.
- Automated noise monitoring around the perimeter of the site.
- Piling will be carried out with the method that minimises both noise and the transmission of vibration to sensitive receptors;

Vibration Guidelines

The term vibration describes repetitive motion that can be measured and observed in a structure. Unwanted vibration can cause fatigue or degrade the performance of the structure. Therefore it is desirable to eliminate or reduce the effects of vibration. Although vibration of low magnitude can be perceived by people and can

affect vibration sensitive equipment such as medical and laboratory one, they usually will not cause damage to the structure of the building.

In current scenario, the main concern is the risk of damage of the building, for that purpose, it is common to measure peak value attained during the period. The typical monitored parameter would be than peak particle velocity (P.P.V.)

The damage to the building can occur due to different factors both dynamic and quasi-static such as exposure to high dynamic impacts, accelerated ageing, ground movements due to removal of demolished structure, or soil compaction.

Following the best practice means, without prejudice, the following British Standards has been considered as an advice on vibrations in structures and acceptable levels:

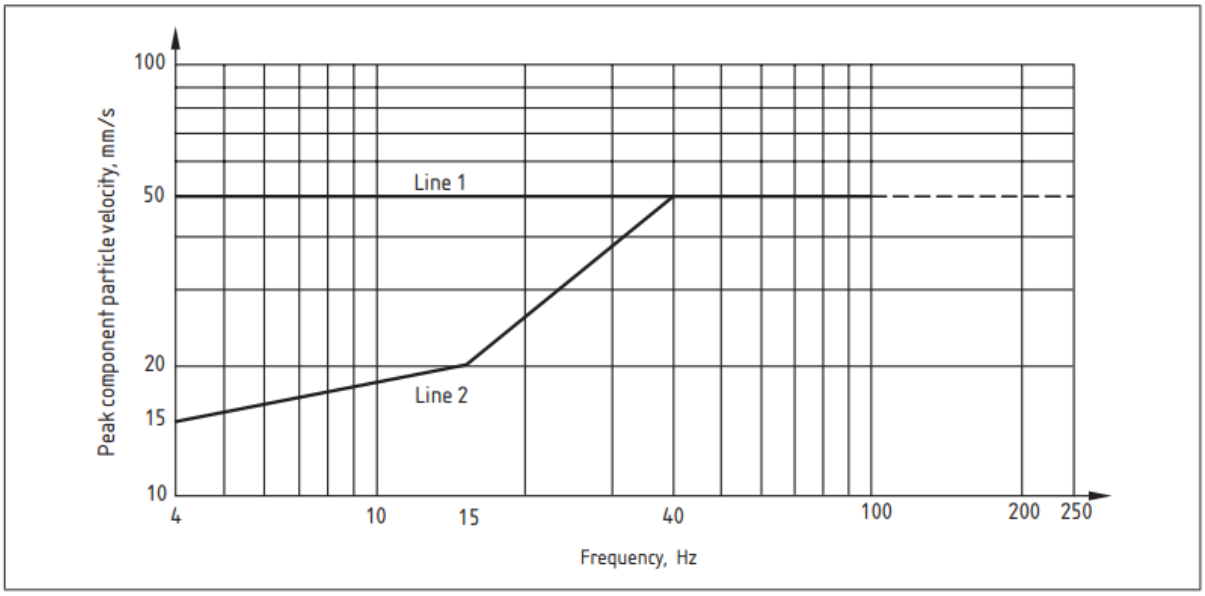
- British Standard BS7385: Part 2: 1993 'Evaluation and measurement for vibration in buildings Part 2. Guide to damage levels from groundborne vibration'
- British Standard 5228:2009+A1:2014 'Code of practice for noise and vibration control on construction and open sites'

For the purposes of BS 7385 damage is classified as cosmetic (formation of hairline cracks), minor (formation of large cracks) or major (damage to structural elements). Guide values given in the Standard are associated with the threshold of cosmetic damage only, usually in wall and/or ceiling lining materials. Since case-history data, taken alone, has so far not provided an adequate basis for identifying thresholds for vibration-induced damage, data using controlled vibration sources within buildings has been established to enable definition of vibration thresholds judged to give a minimal risk of vibration-induced damage.

Limits for primarily transient vibration above which cosmetic damage could occur are reported in tabular form and graphical form in the Standard and reproduced exactly below:

Line (see Figure 1)	Type of building	Peak component particle velocity in frequency range of predominant pulse	
		4 Hz to 15 Hz	15 Hz and above
1	Reinforced or framed structures Industrial and heavy commercial buildings	50 mm/s at 4 Hz and above	
2	Unreinforced or light framed structures Residential or light commercial type buildings	15 mm/s at 4 Hz increasing to 20 mm/s at 15 Hz	20 mm/s at 15 Hz increasing to 50 mm/s at 40 Hz and above
NOTE 1 Values referred to are at the base of the building (see 6.3). NOTE 2 For line 2, at frequencies below 4 Hz, a maximum displacement of 0.6 mm (zero to peak) should not be exceeded.			

Transient Vibration Guide Values for Cosmetic Damage (from BS 7385: Part 2:1993)



Summary of Damage Thresholds for Transient Vibration on Domestic Structures

The Standard indicates, for example, that for a residential building (line 2) a PPV of greater than 15mms-1 at 4Hz or greater than 50 mms-1 at 40 Hz or above, measured at the base of the building, may be expected to result in cosmetic damage. Guidance on acceptable vibration levels in structures is also provided in BS 5228:

"It is recommended that, for soundly constructed residential property and similar structures which are in generally good repair, a conservative threshold for minor or cosmetic (i.e. non-structural) damage should be taken as a peak particle velocity (P.P.V.) of 10 mm/s for intermittent vibration and 5 mm/s for continuous vibrations. Below these vibration magnitudes, minor damage is unlikely to occur. Current experience suggests that these values may be reduced by up to 50% where the preliminary survey reveals existing significant defects (such as a result of settlement) of a structural nature."

"Buildings constructed for industrial and commercial use exhibit greater resistance to damage from vibrations than normal dwellings, and it is recommended that light and flexible structures …… should be assigned thresholds of 20 mm/s for intermittent vibrations and 10 mm/s for continuous vibrations, whereas heavy and stiff buildings should have higher thresholds of 30 mm/s for intermittent vibrations and 15 mm/s for continuous vibrations."

BS 5228:2009 also assesses the human perception of vibration inside the building, using the same parameters as for cosmetic damage, making it easier to monitor.

In the Table B.1 of the standard, it states that vibration higher than 1 mm/s PPV can cause complains but can be tolerated, while levels of 10mm/s PPV are intolerable, except for brief exposure.

Table B.1 **Guidance on effects of vibration levels**

Vibration level	Effect
0.14 mm·s^{-1}	Vibration might be just perceptible in the most sensitive situations for most vibration frequences associated with construction. At lower frequencies, people are less sensitive to vibration.
0.3 mm·s^{-1}	Vibration might be just perceptible in residential environments.
1.0 mm·s^{-1}	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^{-1}	Vibration is likely to be intolerable for any more than a very brief exposure to this level.

The standard also points out that *that human response to vibration varies quantitatively according to the direction in which it is* perceived*. Thus, generally, vertical vibrations are more perceptible than horizontal vibrations*.

In addition to it a kindred problem is that vibrations can cause structure-borne noise which can be an additional irritant to occupants of buildings. Loose fittings are prone to rattle and movement.

Noise and Vibration Control for Demolition and Construction states that *building occupants can be disturbed by vibration at levels appreciably less than that which would result in building damage. Therefore, in the absence of any other restrictions, to minimise disruption to building occupants, the following upper vibration guidance levels, as measured at the worst-affected floor of the relevant property, are recommended to provide an initial indication of the risk of disturbance:*

- *1 mm/s Peak Particle Velocity (PPV) for occupied residential and educational buildings*
- *3 mm/s PPV for occupied commercial premises where the activities are not of an especially vibration sensitive nature or for potentially vulnerable unoccupied buildings*
- *5 mm/s PPV for other unoccupied buildings*

This can be often perceived by occupants of the properties as an indication of possibility of cosmetic or structural damage. Based on the information above the levels at which vibration can be a source of minor damage are much higher and it is unlikely that vibration below 5mm/s P.P.V. would be a source of minor or cosmetic damage. Even with reduced threshold by 50% the levels for continuous vibration would be in the range of 2.5 mm/s P.P.V.

Vibration Measurement Procedure & Threshold Criteria

Criteria for the assessment of vibration effects on buildings are given in BS 7385-2:1993 Evaluation and measurement for vibration in buildings – Part 2: Guide to damage levels from groundborne vibration.

BS 7385-2 provides guide values of vibration above which cosmetic damage (such as surface cracks in plaster or brickwork) to buildings could occur. The levels are specified in terms of a Peak Particle Velocity (PPV) in the frequency range 4-250 Hz. These apply to measurement at the base of the building in any of the orthogonal axes. The guide values are summarised below (this table is the same as that shown in below, which is reproduced from BS 7385 -2: 1993).

Type of building	Peak component particle velocity in frequency range of predominant pulse	
	4 Hz to 15 Hz	15 Hz and above
Reinforced or framed structures Industrial and heavy commercial buildings	50 mm/s at 4 Hz and above	
Unreinforced or light framed structures Residential or light commercial type buildings	15 mm/s at 4 Hz increasing to 20 mm/s at 15 Hz	20 mm/s at 15 Hz increasing to 50 mm/s at 40 Hz and above

Vibration Levels above which Cosmetic Damage to Buildings Could Occur

Minor damage is possible at vibration magnitudes which are greater than twice those given in *'Vibration Levels above which Cosmetic Damage to Buildings Could Occur'*, and major damage to a building structure can occur at values greater than four times the tabulated values.

The guide values relate predominantly to transient vibration which does not give rise to resonant responses in structures, and to low-rise buildings. Where the dynamic loading caused by continuous vibration is such as to give rise to dynamic magnification due to resonance, especially at the lower frequencies where lower guide values apply, then the guide values might need to be reduced by up to 50%

BS 5228 provides also guidance on effects of vibration levels.

Vibration level [A), B), C)]	Effect
0.14 mm·s^{-1}	Vibration might be just perceptible in the most sensitive situations for most vibration frequences associated with construction. At lower frequencies, people are less sensitive to vibration.
0.3 mm·s^{-1}	Vibration might be just perceptible in residential environments.
1.0 mm·s^{-1}	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^{-1}	Vibration is likely to be intolerable for any more than a very brief exposure to this level in most building environments.

A) The magnitudes of the values presented apply to a measurement position that is representative of the point of entry into the recipient.

B) A transfer function (which relates an external level to an internal level) needs to be applied if only external measurements are available.

C) Single or infrequent occurrences of these levels do not necessarily correspond to the stated effect in every case. The values are provided to give an initial indication of potential effects, and where these values are routinely measured or expected then an assessment in accordance with BS 6472-1 or -2, and/or other available guidance, might be appropriate to determine whether the time varying exposure is likely to give rise to any degree of adverse comment

The vibration sensors similarly to noise monitors have be placed within the site. The levels recorded at source will be higher than actual vibration levels at the receiver.

'London Good Practice Guide: Noise & Vibration Control for Demolition and Construction' recommends criteria for vibration **within the affected property** should not exceed:

- 1mm/s PPV for residential,

The closest sensitive receptors are residential ones at the adjoining property of the terrace house.

It is proposed that the vibration monitor to be located at the party wall of the adjoining property to allow measurements of exposure of the neighbouring property to vibration.

Based on the above it is proposed to set the following criteria for vibration monitoring around site perimeter:

	Threshold level
AMBER	1 mm/s PPV
RED	1.5 mm/s PPV

Remedial Action on exceedance

It is possible that during the site operation some exceedances may occur due to on-site operations or the external factors (for example disturbance to the sensors by people in the close proximity.)

The exceedance of AMBER threshold level is an indication of possible nuisance due to vibration. Although a single exceedance is unlikely to cause a complain, it is advisable to verify what could cause the exceedance and log the action causing it, and proceed with caution, as number of consecutive amber readings can cause complains.

The exceedance of RED threshold level needs to be investigated and works should stop, the cause of exceedance identified, and the methodology should be revised, and where alternative methodology is possible that could reduce the vibration levels – it should be considered.

Should the level measured be above 10mm/s PPV it would be advisable to undertake the survey and verify if no damage has occurred. Further actions may be required should such high levels be recorded.

Any additional actions required by local authorities should be undertaken in addition to the above action plan.

Air Quality Criteria

Following the Air Quality risk assessment the site is considered a low risk and no PM10 automated monitoring is required.

Air Quality and Dust Management Plan and Mitigation Measures

Dust from construction and demolition sites can have a negative effect on the amenity of neighbouring residents. Dust and other pollutants can have a range of effects, the severity of which can vary depending upon the on the recipient as referenced in the IAQM 'Guidance on the assessment of dust from demolition and construction'.

As such, it is important that a number of mitigation measures are applied in order to minimise dust emissions from the site, in accordance with the Mayor's SPG for Control of Dust and Emissions during Construction and Demolition.

General advice for all construction and demolition sites, include the following:

- Dust generated by the construction process will be suppressed via a fine directional spray jet of water aimed at the source, and any material to be transported to be wetted down prior to transit.
- Skips and powder containers to be covered when not in use

- Wherever possible fabrication / dismantling is undertaken off site
- Cutting equipment to be used with water suppressant and/or suitable extract system
- Vehicles transporting materials capable of generating dust to and from site will be suitably sheeted on each journey to prevent release of materials and particulate matter. The sheeting material will be maintained in good order, free from excessive rips and tears;
- Plant is well maintained (with efficient dust suppression systems) and switched off when not in use;
- No burning of waste wood or other materials on site
- The stockpiling of dust generating materials on site will be minimised
- Wet brushing techniques will be used for cleaning
- Regular checks for visual observation of dust and soiling within 50m of site
- Avoid the use of diesel or petrol powered generators and use mains electricity or battery powered equipment
- Ensure all on-road vehicles comply with the requirements of the London Low Emission Zone, where applicable
- All employees are provided with an appropriate induction and on-going briefings regarding dust mitigation measures required from the works they are carrying out
- Only use registered waste carriers to take waste off-site
- Any other mitigation measures as per IAQM Guidance on the assessment of dust from demolition and construction (p.24-27)

Furthermore, according to IAQM guidelines, it would be necessary to inspect the area in the local vicinity of the construction works to ensure that surfaces are not soiled by dust emissions from the site, with suitable cleaning offered if necessary. In order to minimise this, it would be recommended that screens are erected around the site boundaries as appropriate.

The following mitigation measures will be implemented when construction methods are being considered, to reduce emissions in relation to construction plant:

- Vehicle engines and equipment will be switched off when not in use and not left running unnecessarily
- Vehicles and Equipment will be maintained in accordance with the manufacturer's recommendations
- Where practicable kept operating equipment away from potentially sensitive receptors
- Mains or battery powered equipment will be used where practically possible and available
- All qualifying plant procured or hired will be registered on the NRMM register ensuring that it conforms to EU standard IIIA for GLA.

Monitoring Alerts Information

All alerts should be issued to designated people on-site. The list should include, but not limited to:

- Project manager
- Other designated people who can act immediately on receipt of the alert (i.e. Site manager)

All alerts should be issued in electronic form instead of audio/visual indication to minimise unnecessary noise/light pollution. An email will be generated to designated people, and where it is not practical an additional text message will be generated.

Conclusions

ES Monitoring Ltd. have reviewed the relevant documentation and prepared the Noise/Vibration/Dust Management Plan. The report outline noise mitigation and control measures during on-site activities at 12 Pilgrims Lane, Camden NW3 1SN.

An additional documents with noise predictions and air quality risk assessment have been prepared and the calculations were not a part of this report. It had been identified that the noise monitoring locations are around the site perimeter, and the site boundaries are approx. 3m – 17m from the closest sensitive receiver façade depending on the site. The threshold levels outlined in BS5229:2009 and proposed adjusted threshold levels based on the attenuation of noise due to additional distance have been proposed.

The noise risk assessment has been undertaken as per LANAF London Good Practice Guide: Noise & Vibration Control for Demolition and Construction and the summary is presented below:

Activity	**Overall Risk level**
Demolition	**MEDIUM RISK**
Superstructure	**LOW RISK**

The threshold levels outlined in guidelines and standards without any adjusted threshold levels based on the attenuation of noise due to additional distance have been proposed.

Period	**Trigger Level (Amber Alert) dB $L_{Aeq, 1hour}$**	**Action Level (Red Alert) dB $L_{Aeq, 1hour}$**	**Action Level (Red Alert) dB $L_{Aeq, 10hour}$**
Monday – Friday 08:00 – 18:00	**75**	**78**	**75**
Saturday 08:00 – 13:00	**75**	**78**	**75 $L_{Aeq, 5 hours}$**

Vibration Thresholds have been proposed based on location of the vibration monitor on a party wall.

	Threshold level
AMBER	1 mm/s PPV
RED	1.5 mm/s PPV

All alerts will be issued in electronic form (emails) and sent to Project Manager and any additional designated people.

Where Site action levels have been exceeded these should be reported along with the suspected cause of exceedances, and details of measures taken as per agreement with Camden Council.

Monthly report with all data collected during the monitoring period will be issued to the client in the agreed format.

Krzysztof Mrozek

ES Monitoring Ltd.