Appendix B

Includes:

- Acoustic Report

Camden

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10-11 Kings Mews, London

Construction Noise, Vibration and Dust Management Plan

12764-CNMP-01

7 September 2017

Issued For:

Drop Box Basements
56 Great Western Studios
65 Alfred Road
London
W2 5EU

committed to CSCS Platinum award

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12764-SP1	Indicative Site Plan
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Appendix A	Glossary of Acoustic Terminology

1.0 INTRODUCTION

Clement Acoustics Ltd has been instructed by Drop Box Basements to produce a construction impact assessment for the proposed development of the residential dwelling at 10-11 Kings Mews, London. The property falls within the London Borough of Camden.

The works site is relatively small and includes construction works to form a residential dwelling with a basement. This document aims to assess the impacts arising from the proposed works at nearby sensitive receivers and provides an action and management plan to mitigate any identified impact.

2.0 SITE LOCATION

The site address is a currently a plot of land that will form a terrace mews property. It is bound by residential properties on John Street to the West, and residential properties on Kings Mews to the North, East and South.

The most affected noise and vibration sensitive premises have been identified in the attached indicative site plan, 12764-SP1.

3.0 ENVIRONMENTAL NOISE AND VIBRATION SURVEY

3.1 Procedure

Measurements were undertaken as shown on indicative site drawing 12764-SP1. An automated unmanned survey was undertaken at a nearby property on Kings Mews. This survey location obtained noise and vibration levels from the King's Mews Road. Manual measurements were also taken at rear of the site.

Weather conditions were generally dry with periods of light winds for both the automated and manned survey, therefore suitable for the measurement of environmental noise.

The measurement procedure generally complied with BS7445:1991. *Description and measurement of environmental noise, Part 2- Acquisition of data pertinent to land use.*

3.2 Automated Unmanned Environmental Noise Survey

The microphone was installed on the front façade of 26 Kings Mews approximately 3m above ground level and approximately 1 m from the façade. A façade correction was applied. An Accelerometer was also installed to a party wall at 26 Kings mews via adhesive. This was at ground floor level.

Continuous automated monitoring was undertaken for the duration of the survey between 12 January 2017 and 17 January 2017.

Background noise levels at the monitoring positions consisted of road traffic noise as well as construction noise during installation and collection of equipment.

3.3 Manual Measurements

Manual measurements were undertaken at 10-11 Kings Mews in the location shown on indicative site plan 12764-SP1 in order verify the existing survey.

Measurements were taken in a free field position with the closest façade being greater than 3.5 m away. The sound level meter was mounted on a tri-pod approximately 1.5 m above ground level.

The noise levels were mostly dominated by construction noise during the course of the survey.

3.4 Equipment

The equipment calibration was verified before and after use and no abnormalities were observed.

The equipment used was as follows.

- 1 No. 01dB Solo Class 1 Sound Level Meter
- 1 No. Svantek Type 958 Class 1 Sound Level Meter
- Norsonic Type 1251 Class 1 Calibrator
- Cirrus CRL 511E Class 1 Calibrator

4.0 EXISTING AMBIENT NOISE AND VIBRATION LEVELS

The measured noise levels are shown as a time history in time history 12764-TH1-3, with ambient and background noise levels summarised in Table 3.1.

	Average ambient noise level $L_{Aeq,T}$ dB(A)	Minimum background noise level
	Unmanned Measurement (Position 1)	
Daytime (07:00 - 23:00)	64dB(A)	44dB(A)
Night-time (23:00 - 07:00)	53dB(A)	41dB(A)
Operating Hours (08:00 – 18:00)	66dB(A)	46dB(A)
	Manual Measurement	
Measurement Period (16:00 – 16:15)	58dB(A)	47dB(A)

Table 4.1: Baseline Ambient Noise Levels

The measured vibration levels are shown in vibration time history 12764-VIB1. The measured vibration was typically below 0.5mm/s PPV during the course of the survey.

5.0 ACTIVITIES ASSESSED

It is understood that the following activities and equipment, in Table 5.1, will need to be assessed with regards to noise impact to nearby sensitive premises.

Activity	Works	Period	
		From	Till
Front Works			
Site Prepatation and enabling works	Makita Combi Drill	04/09/2017	15/09/2017
Underpinning/bulk excavation	1 5T Excavator	18/09/2017	02/02/2018
Slab breakout cose to perimeter walls	Heavy duty breaker	19/09/2017	28/09/2017
Rubbish Collection	Grab Lorry 17T	27/09/2017	29/09//2017
Underpinning	Medium Breaker	29/09/2017	02/02/2018
Underpinning	9" angle grinder	18/09/2017	02/02/2018
Underpinning	Conveyor drive unit	18/09/2017	02/02/2018
Underpinning	Makita Combi Drill	18/09/2017	09/03/2018
Structural concrete pours	Concrete mixer with pump	19/02/2018	09/03/2018
Bulk Excavation	Grab Lorry 17T	02/10/2017	02/02/2018
Steel installation	9" angle grinder	26/02/2018	09/03/2018
Rear Works			
Site Preparation and Enabling Works	Makita Combi Drill	04/09/2017	15/09/2017
Slab breakout close to perimeter walls	Heavy duty breaker	19/09/2017	28/09/2017
Underpinning/Bulk excavation	1,5T Excavator	18/09/2017	02/02/2018
Underpinning	Conveyor drive unit	18/09/2017	02/02/2018
Underpinning	Medium duty beaker	29/09/2017	02/02/2018
Underpinning	9" angle grinder	18/09/2017	02/02/2018
Underpinning	Makita Combi Drill	18/09/2017	09/03/2018
Steel installation	9" Grinder	26/02/2018	09/03/2018

Table 5.1 Period of Site Activities and equipment

6.0 HOURS OF WORK

Normal permitted hours for noisy work in the Borough are Monday to Friday 08:00 to 18:00. Noisy works are not permitted on Sundays or Public Holidays or outside the periods above if they will be audible at the site boundary.

The duration of works is from March 2017 to June 2017 as indicated in Table 5.1.

7.0 NOISE ASSESSMENT CRITERIA

It is proposed that the limiting levels should be set as follows:

BS 5228: 2009 Code of Practice for noise and vibration on Construction and Open Sites – Part 1: Noise references the Department of Environment (DoE) Advisory Leaflet (AL) 72 (1976) 'Noise Control on Building Sites', gives advice on the maximum levels of construction site noise at residential locations during daytime hours based on levels associated with speech interference. This publication states that during daytime hours (08:00 hours to 18:00 hours) the L_{Aeq} noise level at the building façade should not exceed:

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

Given the location of the site, within a busy part of London in close proximity to Theobalds Road and Grays Inn Road, we suggest a value of 75dB $L_{Aeq\ (10hour)}$ be adopted as an appropriate assessment criterion. It should be noted that this criterion is not proposed as an absolute limit for construction noise; rather, it should be considered as a level against which to assess the significance of noise impacts associated with demolition and construction activities.

Draft 'Guidelines for Noise Impact Assessments', published by the Institute of Acoustics and Institute of Environmental Management and Assessment (IEMA), gives guidance on describing the impact of noise based on the change in noise level as follows:

- Negligible: Assessment criterion is exceeded by 0 to 3 dBA;
- Minor adverse: Assessment criterion is exceeded by 3 to 5 dBA;
- Moderate adverse: Assessment criterion is exceeded by 5 to 10 dBA; and
- Substantial adverse: Assessment criterion is exceeded by over 10 dBA.

8.0 NOISE IMPACT ASSESSMENT

Although this development is not a major project in its footprint and duration, it is located in close proximity to residential receptors.

8.1 Source Noise Levels

Source noise levels for the various items of machinery involved in the demolition and construction processes have been derived from historic data and levels stated in BS 5228-Part1: 2009 *Code of practice for noise and vibration on construction and open sites: Noise*. Where possible manufacturer measured noise levels have been used.

Assumed levels and percentage on-time are indicated in attached Construction Noise Schedule 12764-CNS1.

Worst case noise levels have been predicted at the nearest noise sensitive premises. 7-8 Kings Mews, London has been assessed due to excavation and construction works at the front of 10-11 Kings Mews, London. In addition to this 25 Kings Mews has also been assessed as a noise sensitive receiver. The residential dwellings at John Street, London have been assessed due to excavation and construction works at the rear of 10-11 Kings Mews London.

Due to the numerous locations of work activities, the 'average' distance from the centre of the front or rear site has been used in our calculations. This will likely provide representative $L_{Aeq\ (10\ hour)}$ noise levels.

Further screening has been assumed for certain items of plant. Details of screening attenuation assumed in our calculations is indicated in our attached Construction Noise Schedule 12764-CNS1.

8.2 7-8 Kings Mew, London - Receiver Noise Levels

Predicted construction noise levels have been calculated in full accordance with BS5228:2009 and are presented in Appendix B.

Worst case predicted noise levels at the nearest noise sensitive receptors are indicated in Table 8.1 below. Screening has been taken in to account as there is no line of sight from the building site to the residential receiver. The Receiver was noted to be a distance of 8 m away to the centre of the site.

Activity	Period		Predicted Noise Level LAeq:10hours
Front Facade			
Site Preparation and Enabling Works	04/09/2017	15/09/2017	75 dB
Underpinning/ Bulk Excavation / Slab Breakout	18/09/2017	28/09/2017	75 dB
Underpinning / Bulk Excavation / Rubbish Collection	27/09/2017	29/09/2017	74 dB
Underpinning / bulk excavation	30/09/2017	02/02/2018	72 dB
Underpinning	02/02/2018	19/02/2018	62 dB
Underpinning/ Structural concrete pours/ steel installation	19/02/2018	09/03/2018	71 dB
Rear Façade			
Site Preparation and Enabling Works	04/09/2017	15/09/2017	75 dB
Underpinning/ Bulk Excavation / Slab Breakout	18/09/2017	28/09/2017	75 dB
Underpinning / Bulk Excavation / Rubbish Collection	27/09/2017	29/09/2017	74 dB
Underpinning / bulk excavation	30/09/2017	02/02/2018	71 dB
Underpinning	02/02/2018	19/02/2018	64 dB
Underpinning/ Structural concrete pours/ steel installation	19/02/2018	09/03/2018	70 dB

Table 8.1: 7-8 Kings Mews, London - Worst Case Receiver Noise Levels

8.3 26 Kings Mew, London - Receiver Noise Levels

Predicted construction noise levels have been calculated in full accordance with BS5228:2009.

Worst case predicted noise levels at the nearest noise sensitive receptors are indicated in Table 8.2 below. The Receiver was noted to be a distance of 14 m to the centre of the site.

Activity	Period		Predicted Noise Level LAeq:10hours
Front Facade			
Site Preparation and Enabling Works	04/09/2017	15/09/2017	75 dB
Underpinning/ Bulk Excavation / Slab Breakout	18/09/2017	28/09/2017	72 dB
Underpinning / Bulk Excavation / Rubbish Collection	27/09/2017	29/09/2017	75dB
Underpinning / bulk excavation	30/09/2017	02/02/2018	72dB
Underpinning	02/02/2018	19/02/2018	62 dB
Underpinning/ Structural concrete pours/ steel installation	19/02/2018	09/03/2018	74dB

Table 8.2: 26 Kings Mews, London - Worst Case Receiver Noise Levels

8.4 John Street, London - Receiver Noise Levels

Predicted construction noise levels have been calculated in full accordance with BS 5228: 2009.

Predicted noise levels at the noise sensitive receptors to the rear of the development are indicated in Table 8.3 below. The Receiver was noted to be a distance of 20 m to the centre of the site.

Activity	Period		Predicted Noise Level LAeq:10hours
Rear Facade			
Site Preparation and Enabling Works	04/09/2017	15/09/2017	72 dB
Underpinning/ Bulk Excavation / Slab Breakout	18/09/2017	28/09/2017	70 dB
Underpinning / Bulk Excavation / Rubbish Collection	27/09/2017	29/09/2017	71 dB
Underpinning / bulk excavation	30/09/2017	02/02/2018	68 dB
Underpinning	02/02/2018	19/02/2018	61 dB
Underpinning/ Structural concrete pours/ steel installation	19/02/2018	09/03/2018	67 dB

Table 8.3: John Street, London - Worst Case Receiver Noise Levels

9.0 VIBRATION LEVELS

Vibration levels will significantly diminish with distance and geographical attenuation. It is recommended that vibration levels are monitored during excavation/construction.

BS 5228-Part2: 2009 *Code of practice for noise and vibration on construction and open sites: Vibration* provides criteria for cosmetic damage, as reproduced in Table 8.3 below.

Line (see Figure B.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	50 mm/s at 4 Hz and above
2	Unreinforced or light framed structures Residential or light commercial 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.

NOTE 2 For line 2, at frequencies below 4 Hz, a maximum displacement of 0.6 mm (zero to peak) is not to be exceeded.

Table 8.3: BS 5228-9: 2009 Cosmetic Damage Limits for Vibration

BS 5228-Part2: 2009 also explains: 'The guide values [in the above table] relate predominately 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 [in the above table] might need to be reduced by up to 50%.

10.0 MANAGEMENT PLAN

This section aims to highlights the appropriate mitigation measures that will be undertaken to minimise noise impacts.

This will be presented in accordance with best practice documents in order to ensure that any potential adverse noise impacts relating to demolition and construction activities are minimised.

10.1 Control of Noise at Source

Controlling noise at source is by far the most effective means of minimising any impact on nearby noise sensitive receivers.

Plant and machinery to be used on site must be selected carefully in order to minimise noise emission levels. Where there are multiple options for the same operations, the quieter unit shall be selected.

Any manufacturer recommended noise and vibration attenuation measures should also be used due to the nature of the site location relative to nearby noise sensitive receivers.

Finally, noise and vibration generating equipment should only be operational when necessary and switched off when not in use so as to minimise the accumulation of various noise sources on site.

10.2 Control of Noise Spread

British Standard 5228: 2009 provides detailed advice on methods for minimising nuisance from construction noise. This can take the form of a reduction in the source noise level and the control of noise spread and. In order to comply with specified noise criteria, the constrictors should comply with the recommendations in BS 5228: 2009.

10.3 Construction Traffic

The arrival of delivery vehicles must be properly co-ordinated so only one vehicle is present at a time with a maximum 30 minute stay, and there will be no holding areas permitted.

Vehicles should not be idling unnecessarily and adequate signage must be in place to remind drivers of their responsibility to minimise noise levels as far as practicable.

10.4 Site Hoarding

It is recommended that site hoarding is used at the front of the development in order to screen the nearby receivers. Although such a barrier will provide some level of noise attenuation for ground floor receivers, it is unlikely to have a major beneficial effect to receivers above first floor level due to the proximity of nearby noise sensitive receivers to the site.

10.5 Localised Screening

Additional localised screening should be provided when necessary in order to provide line-of-site screening from the following items of plant:

- Heavy Duty Breaker
- 9" Angle Grinder

10.6 Proposed Steps to Minimise Noise and Vibration

General

- Best practice, as defined in Section 72 of the Control of Pollution Act 1974, in relation to noise and vibration mitigation shall be used at all times during construction.
- Equipment is to be hired from reputable companies who can supply new well maintained plant.
- Unnecessary revving of engines and motor driven tools is to be avoided.
- Vehicles and plant are to be switched off when not in use.
- Rubber lined chutes and dumpers will be used wherever practicable.
- Drop heights are to be minimised.
- Site vehicles are to be fitted with broadband white noise reversing alarms wherever practicable.
- All movement of plant and vehicles onto and around the site is to take place within permitted working hours.
- Erect solid screens or barriers around the site boundary and use acoustic fencing panels wherever noisy work is taking place.

Plant machinery and equipment.

- The quietest available equipment and methods will be used in conjunction with noise barriers and all practicable mitigation measures.
- The use of percussive breaking equipment will be avoided wherever practicable.
- Noise generating fixed plant shall be located as far from sensitive premises as possible.
- Mechanical generators shall be avoided wherever practicable.
- Electricity driven plant and equipment will be used in favour of diesel or petrol driven plant and equipment wherever practicable.
- Care is to be taken to always select the quietest available equipment, wherever practicable, and to keep that equipment well maintained in accordance with manufacturer's instructions.
- All equipment covered by European Directive 2000/14/EC on the noise emission in the environment by equipment for outdoors is to bear the CE marking and the indication of the guaranteed sound power level (and to be accompanied by an EC declaration of conformity).

- Any equipment not covered by the EU Directive should comply with the generic plant noise emissions in Annex C of BS 5228 and should be properly silenced and maintained in accordance with manufacturers' instructions.
- Plant and equipment in frequent use should be replaced every three years to ensure that noise levels are minimised by using the most efficient and well maintained machinery.

Key construction processes and equipment

- Wherever practicable non-percussive techniques are to be used. Equipment that demolishes structures by crushing, bending, shearing, cutting or hydraulic splitting are to be used wherever practicable. Wherever practicable building elements are to be detached from a structure and lowered to the ground.
- Wherever practicable floor slabs will be broken up using non-percussive techniques and wherever practicable slabs are to be levered from their position and removed from site for breaking up/crushing elsewhere. Where this is not possible slabs are to be cut and separated around their perimeter to isolate the slab from the rest of the structure before breaking up.
- Where percussive breakers are to be used, multiple breakers are to be employed where practicable to minimise the time taken to break up concrete and floor slabs.
- The contractor is to communicate with neighbours to ensure that they are well informed about timing and to minimise disturbance as far as practicable.
- Wherever practicable non-percussive pile reduction techniques are to be utilised.
- Excavation plant will be switched off when not in use and will be subject to regular maintenance and checks and servicing.
- Spoil conveyors will be electrically powered with drive motors located as far from neighbouring properties as practicable and sound insulated. All conveyors must have a service contract to ensure regular maintenance and replacement of worn parts.
- Concrete pours are to take place only within permitted hours. Careful planning will be necessary by the contractor and design team to ensure that the volume of pours make this possible and that sufficient contingency is allowed for potential delays on any given day.
- Steelwork fabrication and cutting is to take place off site wherever practicable. Where this is not practicable cutting and fabricating is to take place within a mobile acoustic enclosure.

- Electrical generators and air compressors are not to be used during construction unless unavoidable. Where unavoidable these are to be located within the site itself and acoustically screened from neighbouring properties.
- A temporary builder's power supply is to be used from the outset to avoid the need for generators.
- Where generators or compressors must be used the contractor will demonstrate that they are the quietest available super or ultra-silent units incorporating sound attenuating acoustic enclosures or other sound reduction techniques.
- Generators and compressors must be switched off when there is no demand on site.
- Where appropriate generators and compressors must be isolated from adjacent structures to avoid transfer of noise and vibration to adjoining properties.

10.7 Proposed Steps to Minimise Dust

Site Management

- Record all dust and air quality complaints, identify cause(s), take appropriate measures to reduce emissions in a timely manner and record the measures taken. Make the complaints log available to the local authority when asked.
- Record any exceptional incidents that cause dust and/or air emissions, either on or off site and the action taken to resolve the situation in the log book.
- Hold regular liaison meetings with other high-risk construction sites within 500 m of the site boundary, to ensure plans are co-ordinated and dust and particulate matter emissions are minimised.

Preparing and maintaining the site

- Plan site layout so that machinery and dust causing activities are located away from receptors as far as is possible. Use intelligent screening where possible
- Erect solid screens or barriers around the site boundary.
- Avoid site runoff of water or mud.
- Keep site fencing, barriers clean.
- Remove materials that have a potential to produce dust from site as soon as possible, unless being re-used on site. If they are being re-used on site then re-cover.
- Depending on the duration that stockpiles will be present and their size, cover, fence or water to prevent wind whipping.

Operating vehicle/machinery and sustainable travel

- Ensure all on-road vehicles comply with the requirements of the London Low Emission Zone, where applicable.
- Ensure all vehicles switch off engines when stationary.
- Avoid the use of diesel or petrol powered generators and use mains electricity or battery powered equipment where practicable.
- Produce a Construction Logistics Plan to manage the sustainable delivery of goods and materials.
- Implement a Travel Plan that supports and encourages sustainable staff travel (public transport, cycling, walking and car-sharing).

Operations

- Use only cutting, grinding or sawing equipment fitted or in conjunction with suitable dust suppression techniques such as water sprays or local extraction, e.g. Suitable local exhaust ventilation systems.
- Ensure an adequate water supply on the site for effective dust/particulate matter suppression/mitigation, using non-potable water where possible.
- Use enclosed chutes, conveyors and covered skips where practicable.
- Minimise drop heights from conveyors, loading shovels, hoppers and other loading or handling equipment and use fine water sprays on such equipment wherever appropriate.
- Ensure equipment is readily available on site to clean any dry spillages, and clean up spillages as soon as reasonably practicable after the event using wet cleaning methods.

Waste management

- Use only registered waste carriers to take waste off site.
- Avoid bonfires and burning of waste materials.

Measures specific to demolition

- Soft strip inside buildings before demolition (retaining walls and windows in the rest of the building where possible, to provide a screen against dust).
- Ensure effective water suppression is used during demolition operations. Hand held sprays are more effective than hoses attached to equipment as the water can be directed to where it is needed. In addition, high volume water suppression systems, manually controlled, can produce fine water droplets that effectively bring the dust particles to the ground.
- Avoid explosive blasting, using appropriate manual or mechanical alternatives.
- Bag and remove any biological debris or damp down such material before demolition.

Measures specific to construction

- Ensure bulk cement and other fine powder materials are delivered in enclosed tankers and stored in silos with suitable emission control systems to prevent escape of material and overfilling during delivery.
- For smaller supplies of fine powder materials ensure bags are sealed after use and stored appropriately to prevent dust.

10.8 Publicity and Communication

Good public relations and extensive consultations with local authorities are of paramount importance to minimise the impact of construction work. In particular, local residents will need to be advised that any higher levels of noise will only be for a short period of time and that publicised works schedules will be adhered to.

Careful consideration should be given to occupiers of adjoining properties.

10.9 Noise Monitoring

In order to meet appropriate noise levels, it is recommended that noise monitoring is carried out for the duration of noisy works with Class 1 integrating logging sound level monitors. The monitors will be installed and calibration verified (before and after) with a Class 1 acoustic calibrator. The instrumentation will have been fully calibrated by the manufacturer, or other approved body, as required by the relevant British Standard, with current calibration certificates available. The meters will be set to measure and store samples of various acoustic

parameters such as L_{Aeq}, L_{A90}, L_{A10} and L_{Amax}. Data would be downloaded remotely on a regular basis.

It is proposed that the meters are configured to log continuous 1-hour samples of noise throughout the working day, which will be used to calculate a 10-hour (daily) L_{Aeq}. Monitoring Locations, daily limits and hourly action levels will be agreed with the Council prior to the works.

10.10 Vibration Monitoring

It is recommended that vibration monitoring is undertaken for the duration of the works, measuring the peak particle velocity [ppv]. The instrumentation will have been fully calibrated by the manufacturer, or other approved body with current calibration certificates available. Data would be downloaded remotely on a regular basis.

It is proposed that the meters are configured to log continuous 5 minute samples of maximum PPV levels throughout the working day. Monitoring Locations, daily limits and hourly action levels will be agreed with the Council prior to the works.

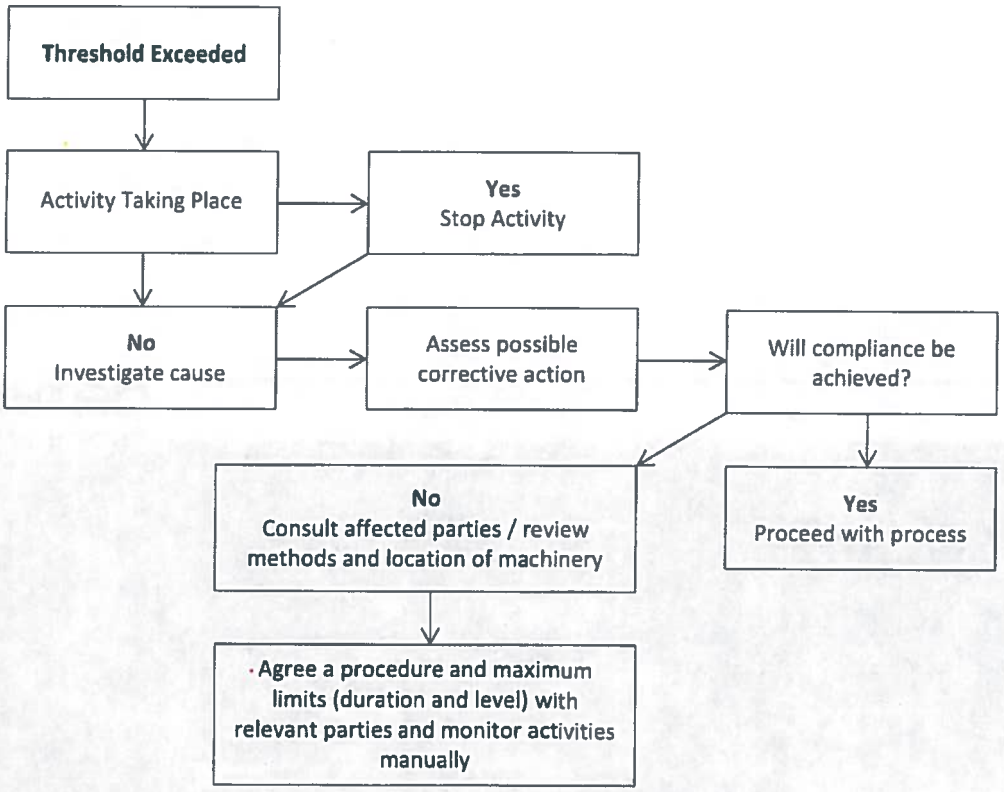
10.11 Noise and Vibration Monitoring Alert Systems

In order to ensure that the site manager and relevant parties are made aware of noise limits being exceeded at a specific monitoring location at any time during the works, we recommend that the following alert systems are implemented:

- SMS alert sent to a mobile telephone number (site manager) as soon as the threshold is exceeded. The text message would contain information on the noise level which triggered the alert.
- Email alert sent to an email address as soon as the threshold is exceeded. The email would contain information on the noise level which triggered the alert.

10.12 Incident Procedure

Should the noise criteria agreed with the Local Authority be exceeded during the demolition and construction programme, the following procedure should be followed:



Any exceedances caused and the subsequent action taken should be recorded in a table as follows:

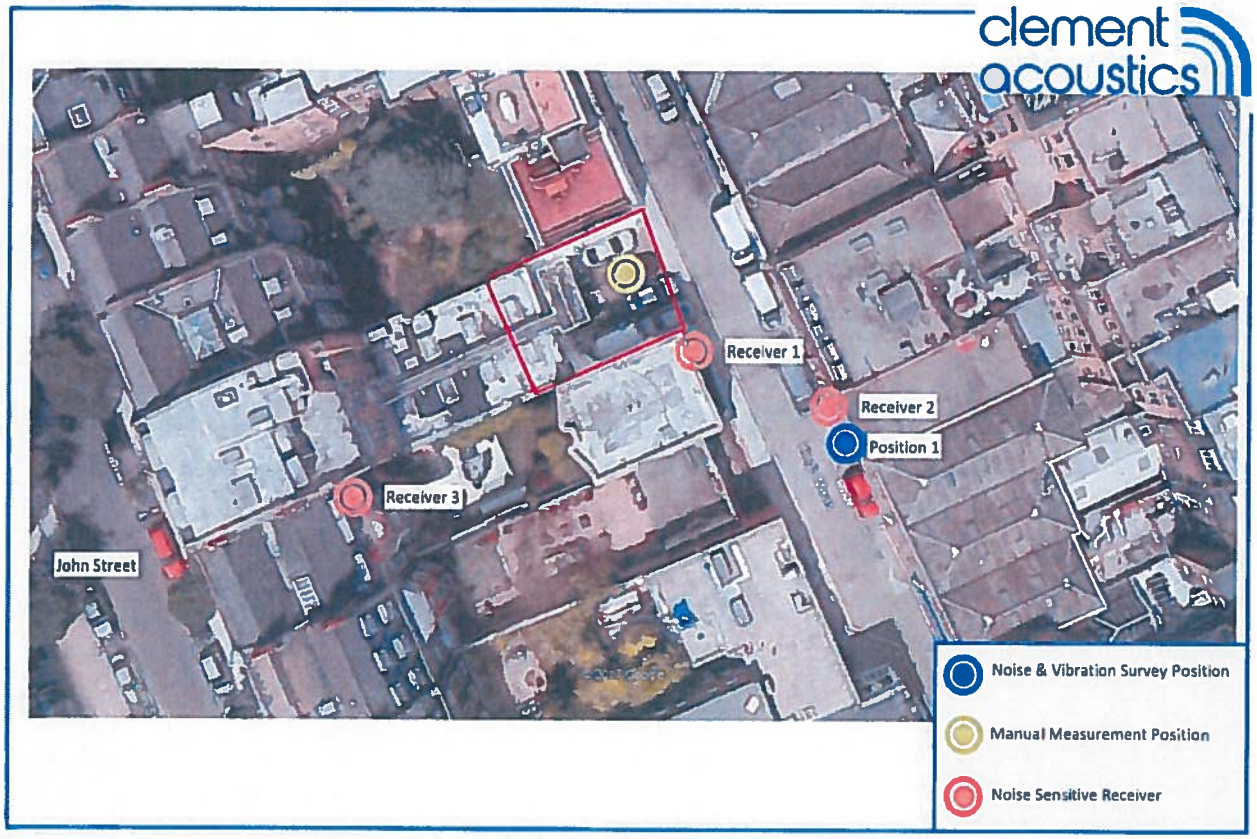
Date	Time	Findings of Investigation and Action Taken

10.13 Complaints Procedure

All Complaints to be investigated immediately by site manager for investigation and follow up.

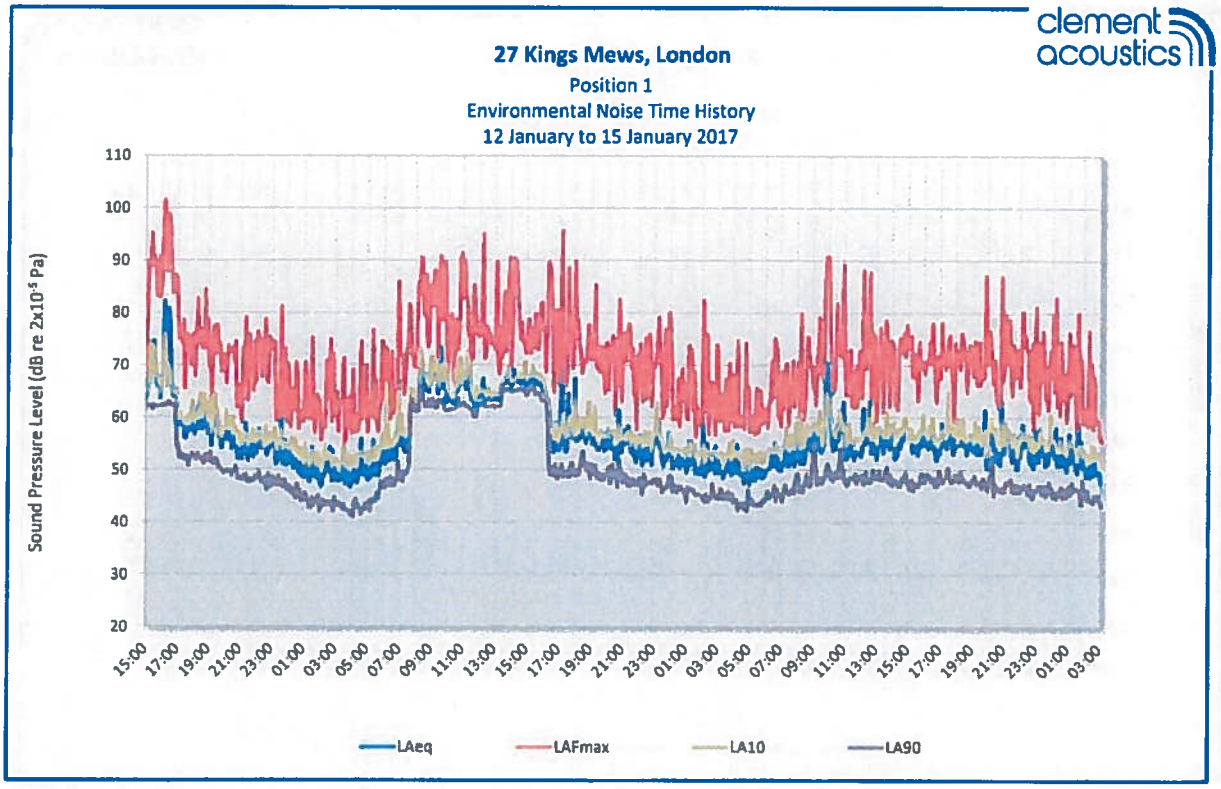
Any complaints should be logged as follows:

Date of receipt	Time of receipt	Contact details of complainant	Description of complaint	Date of investigation	Findings of investigation and actions taken



12764-SP1 Indicative site plan indicating noise and vibration monitoring positions and nearest noise sensitive receivers

Date: 07 September 2017


27 Kings Mews, London
Position 1
Environmental Noise Time History
12 January to 15 January 2017
clement acoustics
Sound Pressure Level (dB re 2x10⁻⁵ Pa)
110
100
90
80
70
60
50
40
30
20
15:00
17:00
19:00
21:00
23:00
01:00
03:00
05:00
07:00
09:00
11:00
13:00
15:00
17:00
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05:00
07:00
09:00
11:00
13:00
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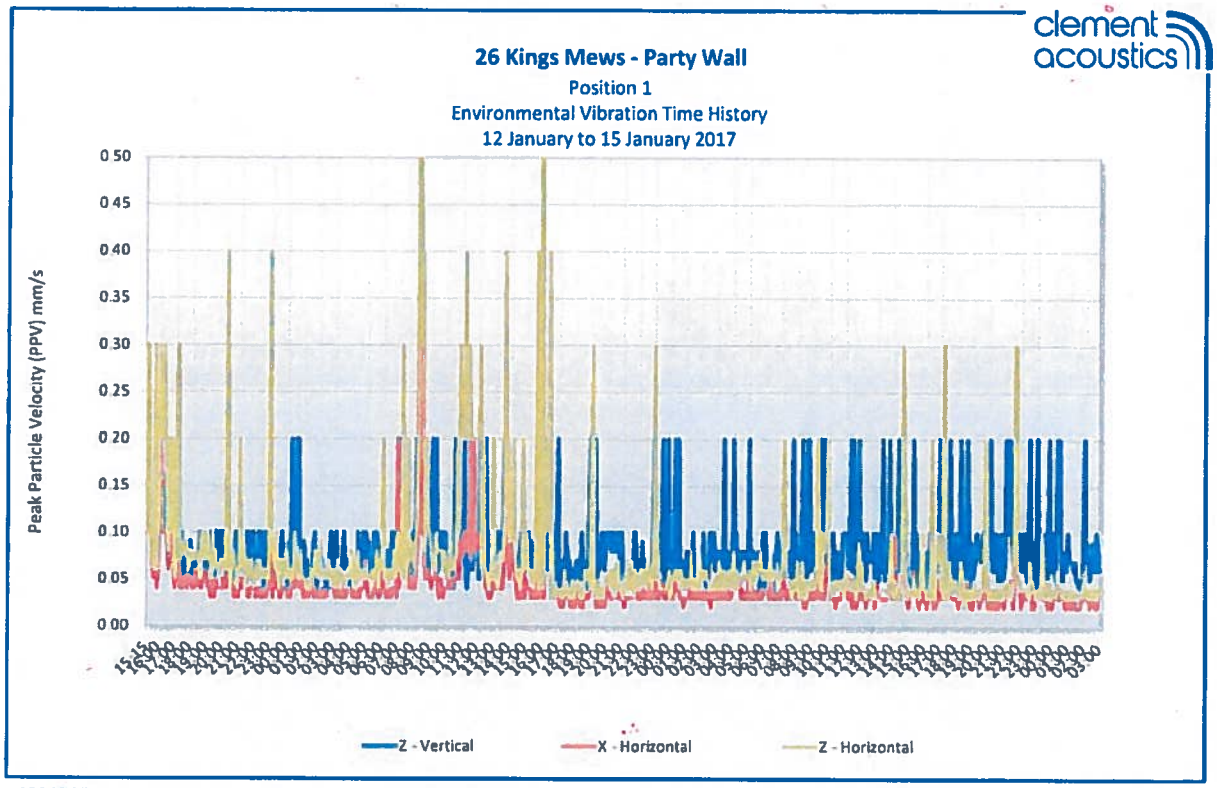
21:00
23:00
01:00
03:00
LAeq
LAFmax
LA10
LA90

12764-TH1


clement acoustics
26 Kings Mews - Party Wall
Position 1
Environmental Vibration Time History
12 January to 15 January 2017
Peak Particle Velocity (PPV) mm/s
0.50
0.45
0.40
0.35
0.30
0.25
0.20
0.15
0.10
0.05
0.00
Z - Vertical
X - Horizontal
Z - Horizontal

12048-VIB1

Construction Noise Schedue For Front of Site

12764

10-11 Kings Mews, London

Activity	Plant/Equipment	No	% on time	Start Date	Finish Date
Site Prepatation and enabling works	Makita Combi Drill	2	50	04/09/2017	15/09/2017
Underpinning/bulk excavation	1.5T Excavator	1	80	18/09/2017	02/02/2018
Slab breakout cose to perimeter walls	Heavy duty breaker	2	15	19/09/2017	28/09/2017
Rubbish Collection	Grab Lorry 17T	1	10	27/09/2017	29/09//2017
Underpinning	Medium Breaker	2	20	29/09/2017	02/02/2018
Underpinning	9" angle grinder	1	15	18/09/2017	02/02/2018
Underpinning	Conveyor drive unit	1	20	18/09/2017	02/02/2018
Underpinning	Makita Combi Drill	2	10	18/09/2017	09/03/2018
Structural concrete pours	Concrete mixer with pump	1	15	19/02/2018	09/03/2018
Bulk Excavation	Grab Lorry 17T	1	20	02/10/2017	02/02/2018
Steel installation	9" angle grinder	1	10	26/02/2018	09/03/2018

Construction Noise Schedue For Rear of Site

Activity	Plant/Equipment	No(1)	% on time	Start Date	Finish Date
Site Preparation and Enabling Works	Makita Combi Drill	2	50	04/09/2017	15/09/2017
Slab breakout close to perimeter walls	Heavy duty breaker	2	20	19/09/2017	28/09/2017
Underpinning/Bulk excavation	1,5T Excavator	1	80	18/09/2017	02/02/2018
Underpinning	Conveyor drive unit	1	40	18/09/2017	02/02/2018
Underpinning	Medium duty beaker	2	30	29/09/2017	02/02/2018
Underpinning	9" angle grinder	1	15	18/09/2017	02/02/2018
Underpinning	Makita Combi Drill	2	15	18/09/2017	09/03/2018
Steel installation	9" Grinder	1	15	26/02/2018	09/03/2018

APPENDIX A

GLOSSARY OF ACOUSTIC TERMINOLOGY

dB(A)

The human ear is less sensitive to low (below 125Hz) and high (above 16kHz) frequency sounds. A sound level meter duplicates the ear's variable sensitivity to sound of different frequencies. This is achieved by building a filter into the instrument with a similar frequency response to that of the ear. This is called an A-weighting filter. Measurements of sound made with this filter are called A-weighted sound level measurements and the unit is dB(A).

L_{eq}

The sound from noise sources often fluctuates widely during a given period of time. An average value can be measured, the equivalent sound pressure level L_{eq}. The L_{eq} is the equivalent sound level which would deliver the same sound energy as the actual fluctuating sound measured in the same time period.

L_{10}

This is the level exceeded for not more than 10% of the time. This parameter is often used as a "not to exceed" criterion for noise

L_{90}

This is the level exceeded for not more than 90% of the time. This parameter is often used as a descriptor of "background noise" for environmental impact studies.

L_{max}

This is the maximum sound pressure level that has been measured over a period.

Octave Bands

In order to completely determine the composition of a sound it is necessary to determine the sound level at each frequency individually. Usually, values are stated in octave bands. The audible frequency region is divided into 10 such octave bands whose centre frequencies are defined in accordance with international standards.

Addition of noise from several sources

Noise from different sound sources combines to produce a sound level higher than that from any individual source. Two equally intense sound sources operating together produce a sound level which is 3dB higher than one alone and 10 sources produce a 10dB higher sound level.

Attenuation by distance

Sound which propagates from a point source in free air attenuates by 6dB for each doubling of distance from the noise source. Sound energy from line sources (e.g. stream of cars) drops off by 3dB for each doubling of distance.

Subjective impression of noise

Sound intensity is not perceived directly at the ear; rather it is transferred by the complex hearing mechanism to the brain where acoustic sensations can be interpreted as loudness. This makes hearing perception highly individualised. Sensitivity to noise also depends on frequency content, time of occurrence, duration of sound and psychological factors such as emotion and expectations. The following table is a reasonable guide to help explain increases or decreases in sound levels for many acoustic scenarios.

Change in sound level (dB)	Change in perceived loudness
1	Imperceptible
3	Just barely perceptible
6	Clearly noticeable
10	About twice as loud
20	About 4 times as loud

Barriers

Outdoor barriers can be used to reduce environmental noises, such as traffic noise. The effectiveness of barriers is dependent on factors such as its distance from the noise source and the receiver, its height and its construction.

Reverberation control

When sound falls on the surfaces of a room, part of its energy is absorbed and part is reflected back into the room. The amount of reflected sound defines the reverberation of a room, a characteristic that is critical for spaces of different uses as it can affect the quality of audio signals such as speech or music. Excess reverberation in a room can be controlled by the effective use of sound-absorbing treatment on the surfaces, such as fibrous ceiling boards, curtains and carpets.