



## **25-26 Redington Gardens LLP**

### **25-26 Redington Gardens**

#### **Noise Assessment**

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## Executive Summary

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A noise survey and assessment has been undertaken for the proposed development at 25-26 Redington Gardens in West Hampstead, London. Existing noise levels at the site have been measured and compared to national and local noise policy in addition to relevant standards and guidance.

The results of the noise survey have indicated that the site is suitable for residential development. An assessment of likely internal ambient noise levels has been undertaken and recommendations relating to glazing performance have been made based on meeting the guideline noise criteria contained in BS 8233: 2014.

Limiting noise levels for externally mounted services plant have been suggested, based on the requirements of Camden Council and the guidance in BS 4142:2014. The following table summarises the proposed plant noise limits at the nearest noise sensitive receptors:

Period	Limiting Level in dB, $L_{AeqT}$ (Non-Tonal / Non-Impulsive Noise)	Limiting Level in dB, $L_{AeqT}$ (Tonal / Impulsive Noise)
Day (07:00 - 23:00)	31	30
Night (23:00 – 7:00)	30	30

*Table 1 - Limiting noise levels for services plant*

Vibration and ground-borne noise has not been assessed as there were judged to be no vibration sources close enough to the site to result in adverse impacts at sensitive receptors.

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## 1. Introduction

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Cundall have been instructed by 25-26 Redington Gardens LLP to carry out a noise survey and assessment for the proposed development at 25-26 Redington Gardens in West Hampstead, London. The proposed scheme comprises demolishing two existing residential properties and constructing 2 new semi-detached properties.

The primary purpose of this report is to document existing ambient and background noise levels around the site and to assess any potential impact of noise generated by the development on nearby noise-sensitive receptors. In addition, suitable internal noise criteria have been suggested in line with relevant guidance and appropriate glazing and ventilator specifications provided.

## 2. Site Description

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The site is located in the Redington Frogna Conservation Area in the West Hampstead area of Camden.

The red outline in Figure 1 below highlights the approximate extent of the proposed development site boundary.



*Figure 1 - Site location plan*

The land use in the immediate surrounding area is residential. The main sources of noise affecting the site during the day were considered to be road traffic on surrounding streets and aircraft. Birdsong, trees rustling in the wind and domestic sounds were also audible.

Several properties in the area were having refurbishment, maintenance or extension work carried out which was also a significant feature of the noise climate. However, for the purposes of establishing a background noise level,  $L_{A90}$  values are considered to be representative of the typical noise level in the area due to the intermittent nature of these noise sources.

## 3. Assessment Criteria

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This section of the report outlines the key legislation and guidance relevant to the assessment of noise for a development of this type.

### 3.1 National Policy

#### 3.1.1 Noise Policy Statement for England

The Noise Policy Statement for England (NPSE) was published by Defra in March 2010. This NPSE sets out the long term vision of Government noise policy:

“Promote good health and a good quality of life through the effective management of noise within the context of Government policy on sustainable development.”

The NPSE long term vision is supported by the following aims:

“Through the effective management and control of environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development:

- avoid significant adverse impacts on health and quality of life;
- mitigate and minimise adverse impacts on health and quality of life; and
- where possible, contribute to the improvement of health and quality of life.”

#### 3.1.2 National Planning Policy Framework

The National Planning Policy Framework (NPPF) was published in March 2012. The NPPF is part of government reform to make the planning system less complex and more accessible, and to promote sustainable growth. It replaces existing national planning policies such as Planning Policy Guidance PPG24: Planning and Noise.

The NPPF states:

“Planning policies and decisions should aim to:

- avoid noise from giving rise to significant adverse impacts on health and quality of life as a result of new development;
- mitigate and reduce to a minimum other adverse impacts on health and quality of life arising from noise from new development, including through the use of conditions;
- recognise that development will often create some noise and existing businesses wanting to develop in continuance of their business should not have unreasonable restrictions put on them because of changes in nearby land uses since they were established; and
- identify and protect areas of tranquillity which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason.”

## 3.1.3 Planning Practice Guidance

In March 2014 Planning Practice Guidance for noise was published. This online document advises on how planning can manage potential noise impacts in new development.

## 3.2 Local Policy

Within the Camden Development Policies 2010-2025 document, Camden Council have a specific Development Policy relating to noise called DP28 – Noise and Vibration. DP28 sets out the following noise limits which are relevant to this development:

**Table A: Noise levels on residential sites adjoining railways and roads at which planning permission will not be granted**

Noise description and location of measurement	Period	Time	Sites adjoining railways	Sites adjoining roads
Noise at 1 metre external to a sensitive façade	Day	0700-1900	74 dB $L_{Aeq}^{12h}$	72 dB $L_{Aeq}^{12h}$
Noise at 1 metre external to a sensitive façade	Evening	1900-2300	74 dB $L_{Aeq}^{4h}$	72 dB $L_{Aeq}^{4h}$
Noise at 1 metre external to a sensitive façade	Night	2300-0700	66 dB $L_{Aeq}^{8h}$	66 dB $L_{Aeq}^{8h}$

**Table B: Noise levels on residential streets adjoining railways and roads at and above which attenuation measures will be required**

Noise description and location of measurement	Period	Time	Sites adjoining railways	Sites adjoining roads
Noise at 1 metre external to a sensitive façade	Day	0700-1900	65 dB $L_{Aeq}^{12h}$	62 dB $L_{Aeq}^{12h}$
Noise at 1 metre external to a sensitive façade	Evening	1900-2300	60 dB $L_{Aeq}^{4h}$	57 dB $L_{Aeq}^{4h}$
Noise at 1 metre external to a sensitive façade	Night	2300-0700	55 dB $L_{Aeq}^{1h}$	52 dB $L_{Aeq}^{1h}$
Individual noise events several times an hour	Night	2300-0700	>82 dB $L_{Amax}$ (S time weighting)	>82 dB $L_{Amax}$ (S time weighting)



**Table E: Noise levels from plant and machinery at which planning permission will not be granted**

Noise description and location of measurement	Period	Time	Noise level
Noise at 1 metre external to a sensitive façade	Day, evening and night	0000-2400	5dB(A) <LA90
Noise that has a distinguishable discrete continuous note (whine, hiss, screech, hum) at 1 metre external to a sensitive façade.	Day, evening and night	0000-2400	10dB(A) <LA90
Noise that has distinct impulses (bangs, clicks, clatters, thumps) at 1 metre external to a sensitive façade.	Day, evening and night	0000-2400	10dB(A) <LA90
Noise at 1 metre external to sensitive façade where LA90>60dB	Day, evening and night	0000-2400	55dBL <sub>Aeq</sub>

### 3.3 British Standards

A number of British Standards have been used and referred to in this assessment. The following summarises the key documents relevant to this assessment.

- BS 4142:2014 “Methods for rating and assessing industrial and commercial sound”
- BS 8233:2014 “Guidance on sound insulation and noise reduction for buildings”

#### 3.3.1 BS 8233 ‘Guidance on Sound Insulation and noise reduction for buildings’, 2014

BS 8233:2014 contains a large amount of information relating to the acoustic design of buildings, particularly relevant to this project are the guidance internal noise levels for dwellings that are reproduced in Table 2 below:

Activity	Location	07:00 to 23:00	23:00 to 07:00
Resting	Living room	35 dB LAeq,16hour	-
Dining	Dining room/area	40 dB LAeq,16hour	-
Sleeping	Bedroom	35 dB LAeq,16hour	30 dB LAeq,8hour

*Table 2 - BS 8233:2014 Indoor ambient noise levels for dwellings*

#### 3.3.2 BS 4142 ‘Method for rating and assessing industrial and commercial sound’, 2014

This British Standard provides a methodology for assessing the impact of commercial and industrial sound.

The standard describes a method for comparing the 'rating level' (this is the sound of the industrial / commercial source of interest plus a number of potential character corrections) to the existing 'background sound level'.

Based on the difference between the two levels, the standard provides an initial indication of the likely impact of the industrial / commercial sound on nearby noise sensitive receptors. The relevant guidance from the standard is reproduced below:

- a) *“Typically, the greater this difference, the greater the magnitude of the impact.*
- b) *A difference of around +10 dB or more is likely to be an indication of a significant adverse impact, depending on the context.*
- c) *A difference of around +5 dB is likely to be an indication of an adverse impact, depending on the context.*
- d) *The lower the rating level is relative to the measured background sound level, the less likely it is that the specific sound source will have an adverse impact or a significant adverse impact. Where the rating level does not exceed the background sound level, this is an indication of the specific sound source having a low impact, depending on the context.”*

It is made clear in the standard that this is an initial assessment of impact and that this should be considered based on the context in which the sound occurs.

## 4. Environmental Noise Survey

This section of the report describes the environmental noise survey undertaken at 26 Redington Gardens. The survey comprised external measurements completed between the 8 and 12<sup>th</sup> May 2015.

### 4.1 Measurement Locations and Times

Unattended noise monitoring was undertaken at two locations (shown in Figure 2 below) considered representative of the local noise climate at the proposed site and nearby noise-sensitive receptors.

At the unattended location (number 1) the microphone was located at the end of the garden approximately 18m from the north west façade of the existing building. At location 2, attended monitoring was carried out on the pavement at a distance of approximately 2.5m from the roadside edge.

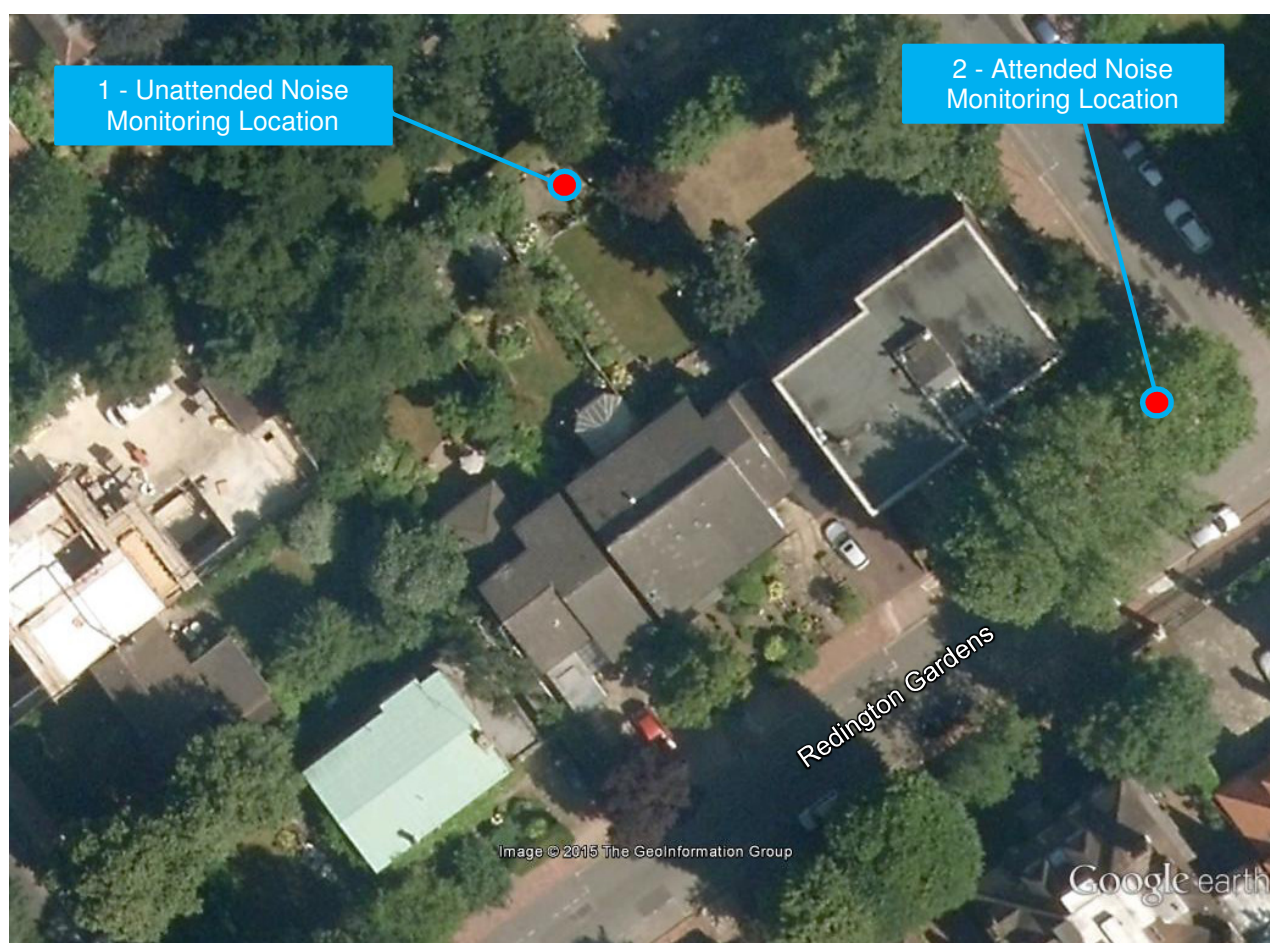


Figure 2 - Approximate noise monitoring locations

## 4.2 Measurement Equipment

Noise measurements were carried out with Class 1 CEL 633 sound level meters. The meters were field calibrated prior to and immediately after the monitoring with no significant drift noted. Copies of calibration certificates are available upon request.

Measurements were made of various noise descriptors but the key indices used in this assessment are as follows:

- $L_{Aeq,T}$  ( the average A-weighted noise level exposure over a given time period,  $T$ )
- $L_{AFmax}$  (the maximum A-weighted noise level measured)
- $L_{A90,T}$  (the noise level exceeded for 90% of the measurement period  $T$ , referred to as the 'background' noise level).

The time period,  $T$ , was set to 15 minutes and the profile function was set to 5 minutes.

## 4.1 Weather Conditions

After analysing weather data it was confirmed that conditions remained dry and overcast throughout the survey with low wind speeds and no significant precipitation recorded.

## 4.2 Survey Results

The results of the survey are shown in Table 3 below, all values are measured free-field levels in A-weighted decibels, more detailed results are available upon request.

$L_{Aeq,15min}$  values were log-averaged over each time period for each day and then the highest daily value reported. This is considered to represent a worst-case scenario when judging the potential suitability of the site for residential development.

The mode of the  $L_{A90,15min}$  values was calculated for each time period (day, evening, night) for each separate day. The lowest of these values has been reported below. These values were then judged against a plot of all measured  $L_{A90,15min}$  values and are considered to represent the typical background noise levels on the site (and at the surrounding receptors) on a quiet day. This value is therefore considered to be an appropriate value for use in setting plant noise limits at the facades of the nearest noise-sensitive receptors to the site.

Typical  $L_{AFmax}$  values were derived by analysing the measured 5 min values in each assessment period (day, evening and night). For each period the average value plus 1 and 2 standard deviations was calculated, in addition to the 90<sup>th</sup> percentile value was also calculated. The calculated values were then assessed against a graph of all measured  $L_{A90,5min}$  data and a representative 'typical' value was identified;

i.e. an  $L_{AFmax}$  value which is not regularly exceeded in a given time period. These values are reported in the table below.

Location	Period	Max. Ave. $L_{Aeq,T}$ in dB	Typical $L_{A90,T}$ in dB	Typical $L_{AFmax}$ in dB
1	Day (07:00 - 19:00)	57	39	77
	Evening (19:00 - 23:00)	45	36	64
	Night (23:00 – 07:00)	50	31	64
2	Day (07:00-19:00)	54	46	72

*Table 3 - Measurement results*

It is important to note that the measured  $L_{Aeq,T}$  noise levels at Locations 1 and 2 are very similar. This is due to there being very little traffic on Redington gardens and the dominant noise source being more distant road traffic and aircraft affecting the whole site. It is therefore judged that measurements at Location 2 are representative of noise levels incident upon all facades of the proposed dwellings.

## 5. Site Suitability

### 5.1 Camden Council's Requirements

Camden Council's Development Policy 28 sets out the noise conditions under which development may be granted planning permission. DP28 also specifies noise levels above which attenuation measures will be required.

Below is a table comparing the requirements of Camden Council, for sites adjoining roads, against the levels measured on site.

Location	Period (T)	Planning Not Granted $L_{Aeq,T}$ in dB	Attenuation required $L_{Aeq,T}$ in dB	Measured $L_{Aeq,T}$ in dB
1	Day (07:00 - 19:00)	$\geq 72$	$\geq 62$	57
	Evening (19:00 - 23:00)	$\geq 72$	$\geq 57$	45
	Night (23:00 – 07:00)	$\geq 66$	$\geq 52$	50
2	Day (07:00-19:00)	$\geq 72$	$\geq 62$	54

It can be seen from the table above, that the levels measured at the site are below those at which planning permission would be refused or attenuation measures required. Therefore according to the requirements of Camden Council, this would suggest that the site is suitable for residential development.

Although it is unlikely that any specific noise mitigation measures will be required to achieve appropriate noise levels in the proposed development, the following section will identify performance criteria for façade and glazing elements based on the guidance for internal ambient noise levels in BS 8233.

### 5.2 Glazing and Ventilation Recommendations

At the time of writing no information was available with regards to Camden Council's required internal ambient noise conditions for residential developments. Therefore, the guidance in BS 8233:2014 has been used to determine a glazing performance specification which should achieve suitable internal noise levels.

BS 8233: 2014 contains guideline values for desirable noise levels in residential dwellings for steady external sources of noise and this has been summarised in Section 3 of this report.

Noise levels measured on site are considered representative of those which will be experienced at the proposed development. From the measured free-field levels it is possible to determine the façade level of

sound incident upon the building with the addition of 3 dB to the measured level, based on this information the level of attenuation required by each of the facades can then be calculated.

As noise levels do not appear to vary significantly across the site, glazing and ventilation specifications will be based on the noisiest façade. Therefore, the glazing performance recommendations below are judged to be valid for all facades of the building.

The descriptor  $R_w + C_{tr}$  is considered appropriate when specifying glazing; the  $C_{tr}$  weighting is useful when considering low-mid frequency noise such as that produced by road traffic.

Table 4 summarises the attenuation requirements based on the façade noise levels set out in the previous section<sup>1</sup>. Table 5 details the suggested glazing performance in bedrooms at night based on the maximum noise levels<sup>2</sup>. During the night-time this will result in two attenuation values [calculation for both average and maximum noise impact], the highest should be selected to meet the most stringent design criteria.

Period	Facade Noise Level in dB $L_{Aeq,T}$	Internal Design Target in dB $L_{Aeq,T}$	Glazing attenuation in dB $R_w + C_{tr}$
Day	60	35	25
Night	53	30	23

Table 4 - Glazing and ventilator performance –  $L_{Aeq,T}$  levels

Period	Typical Maximum Façade Noise Level in dB $L_{AFmax}$	Design Target in dB $L_{AFmax}$	Glazing attenuation in dB $R_w + C_{tr}$
Night	67	45	22

Table 5 - Glazing and ventilator performance -  $L_{AFmax}$  levels

## 5.2.1 Glazing Suggestions

It is expected that all glazing requirements of the development can be met with standard thermal double glazing providing a minimum of 25 dB  $R_w + C_{tr}$  sound insulation. This is likely to be met by most double glazed systems and a potentially suitable glazing configuration is suggested below:

- 4 mm pane /  $\geq$  16mm cavity / 4mm pane <sup>3</sup>

<sup>1</sup> An internal noise level can be approximated by subtracting the  $R_w + C_{tr}$  value of the glazing from the façade level.

<sup>2</sup> BS 8233: 2014 does not include specific criteria for maximum noise levels at night, however, the 45 dB  $L_{AF,max}$  internal ambient noise criteria (that should not be regularly exceeded) of the 1999 version of the standard has been used in this assessment.

<sup>3</sup> Glazing performance values assumed in this report are based on information provided by Pilkingtons website (Pilkington Optiphon™ brochure and datasheet, accessed 15/04/2015). Alternative glazing products may be suitable but should provide equal or greater sound insulation performance.



## 5.2.2 Ventilation Strategy

It is understood that the building is to be mechanically ventilated and therefore it will not be necessary to open windows under normal ventilation conditions. However, windows may be opened occasionally for purge ventilation, in which case the desirable internal noise levels in BS 8233 may be exceeded.

However, it is normally acceptable for internal noise levels to rise in such circumstances as these short-term, temporary increases in noise level are likely to be tolerated by the occupants. This is common-place in residential design.

## 5.2.3 Assumptions

All suggested glazing configurations take account of acoustic requirements only. The performance of glazing with respect to thermal or other requirements should be confirmed by an appropriately qualified engineer / consultant.

Noise measurements have been undertaken over a period judged to represent the typical noise climate at the site. However, it is important to note that the noise climate in a location can vary depending on a range of factors and therefore there is an element of uncertainty in all noise measurements and assessments.

Notwithstanding the above, it is assumed that the measurements and assessment described in this report are adequate for the purposes of providing design advice relating to internal ambient noise levels.

Vibration (or ground-borne noise) was not assessed as there were judged to be no vibration sources close enough to create adverse impacts at the site.

Standard building constructions (wall, roof, etc.) will typically have an attenuation performance significantly higher than the glazing elements and therefore internal noise levels are generally dependent on glazing and ventilator specification. As a result, the sound insulation performance of these elements has not been considered in this section of the report.



## 6. Limiting Plant Noise Levels

At this stage the details of any noise generating plant and equipment that will form part of the development are not available. Therefore, to minimise the potential for any adverse impacts at nearby sensitive receptors, noise emission limits will be set for any noise generating plant and equipment associated with the proposed scheme.

### 6.1 Receptors

The proposed development is located in a residential area and is surrounded by noise-sensitive receptors on all sides. The nearest sensitive receptor to any plant and equipment associated with the development is the adjacent property to the north east; if suitable noise levels are achieved at this property the Local Authority's noise criteria are likely to also be met at more distant receptors.

### 6.2 Background noise levels

In order to specify limiting plant noise levels it is necessary to establish background noise levels, Table 6 below contains the background noise levels for use in the assessment.

Period	Typical $L_{A90,T}$ in dB
Day (07:00 - 23:00)	36
Night (23:00 – 7:00)	31

Table 6 - Background noise levels

### 6.3 Limiting plant noise criteria

Based on the information in the preceding sections of the report and the criteria set by Camden Council, limiting plant noise levels have been determined.

Table 7 below shows the proposed limiting noise levels for services plant and equipment associated with the proposed development. These levels should not be exceeded by all new items of plant running at maximum design duty, when assessed at the facade of the nearest affected noise-sensitive premises. All values below are in dB  $L_{Aeq,T}$ :

Period	Limiting Level in dB, $L_{Aeq,T}$ (Non-Tonal / Non-Impulsive Noise)	Limiting Level in dB, $L_{Aeq,T}$ (Tonal / Impulsive Noise)
Day (07:00 - 23:00)	31	26
Night (23:00 – 7:00)	26	21

Table 7 - Limiting noise levels for services plant and equipment

As can be seen above, the potential minimum night-time limiting plant noise level is 21 dB  $L_{Aeq,T}$ , which is considered to be very low. Guidance in BS 4142 states:

“Where background sound levels and rating levels are low, absolute levels might be as, or more, relevant than the margin by which the rating level exceeds the background. This is especially true at night.”

Taking into account the guidance in BS 4142, it is not usually considered necessary to control external noise from plant and equipment to below 30 dB as internal noise levels, even with windows open, will be approaching a level at which they are unlikely to result in significant impacts. Therefore, it is advised that the minimum limiting plant noise level during the night-time period is set at 30 dB  $L_{Aeq,T}$ . However, it will need to be confirmed that this is acceptable with Camden Council and that it does not conflict with any of their noise policy goals.

## 7. Conclusions

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A noise survey and assessment has been undertaken for the proposed development at 25-26 Redington Gardens in West Hampstead, London. Existing noise levels at the site have been measured and compared to national and local noise policy in addition to relevant standards and guidance.

The results of the survey suggest that the site is suitable for residential development. An assessment of likely internal ambient noise levels has been undertaken and recommendations relating to glazing performance have been made based on meeting the guideline noise criteria contained in BS 8233: 2014.

Limiting noise levels for externally mounted services plant have been suggested, based on the requirements of Camden Council and the guidance in BS 4142:2014.

Vibration and ground-borne noise has not been assessed as there were judged to be no vibration sources close enough to the site to result in adverse impacts at sensitive receptors.