Construction Management Plan

pro forma v2.0

Camden

Contents

Camden

Review

For Internal use only

Please initial and date in the relevant section of the table.

The **highlighted areas** of the Draft table will be deleted by their respective teams during pre app review if these sections are no longer applicable.

Pre app

Community liaison	
CLOCS	
Transport	
Highways	
Parking	
Environmental health	
Sustainability	*(attach appendix if necessary)*
Sign off	

Draft

Community liaison	
CLOCS	
Transport	
Highways	
Parking	
Environmental health	
Sustainability	
Sign off	

- INDICATESINPUT REQUIREMENT FROM MULTIPLE TEAMS THROUGHOUT DOCUMENT

Introduction

The purpose of the **Construction Management Plan (CMP)** is to help developers to minimise construction impacts, and relates to both on site activity and the transport arrangements for vehicles servicing the site.

It is intended to be a live document whereby different stages will be completed and submitted for application as the development progresses.

The completed and signed CMP must address the way in which any impacts associated with the proposed works, and any **cumulative impacts of other nearby construction sites**, will be mitigated and managed. The level of detail required in a CMP will depend on the scale and kind of development. Further policy guidance is set out in Camden Planning Guidance **(CPG)** 6: Amenity and **(CPG)** 8: Planning Obligations.

This CMP follows the best practice guidelines as described in Transport for London's (TfL's Standard for Construction Logistics and Cyclist Safety (**CLOCS**) scheme) and Camden's Minimum Requirements for Building Construction**(CMRBC)**.

The approved contents of this CMP must be complied with unless otherwise agreed with the Council in writing. The project manager shall work with the Council to review this CMP if problems arise in relation to the construction of the development. Any future revised plan must also be approved by the Council and complied with thereafter.

It should be noted that any agreed CMP does not prejudice or override the need to obtain any separate consents or approvals such as for road closures or hoarding licences.

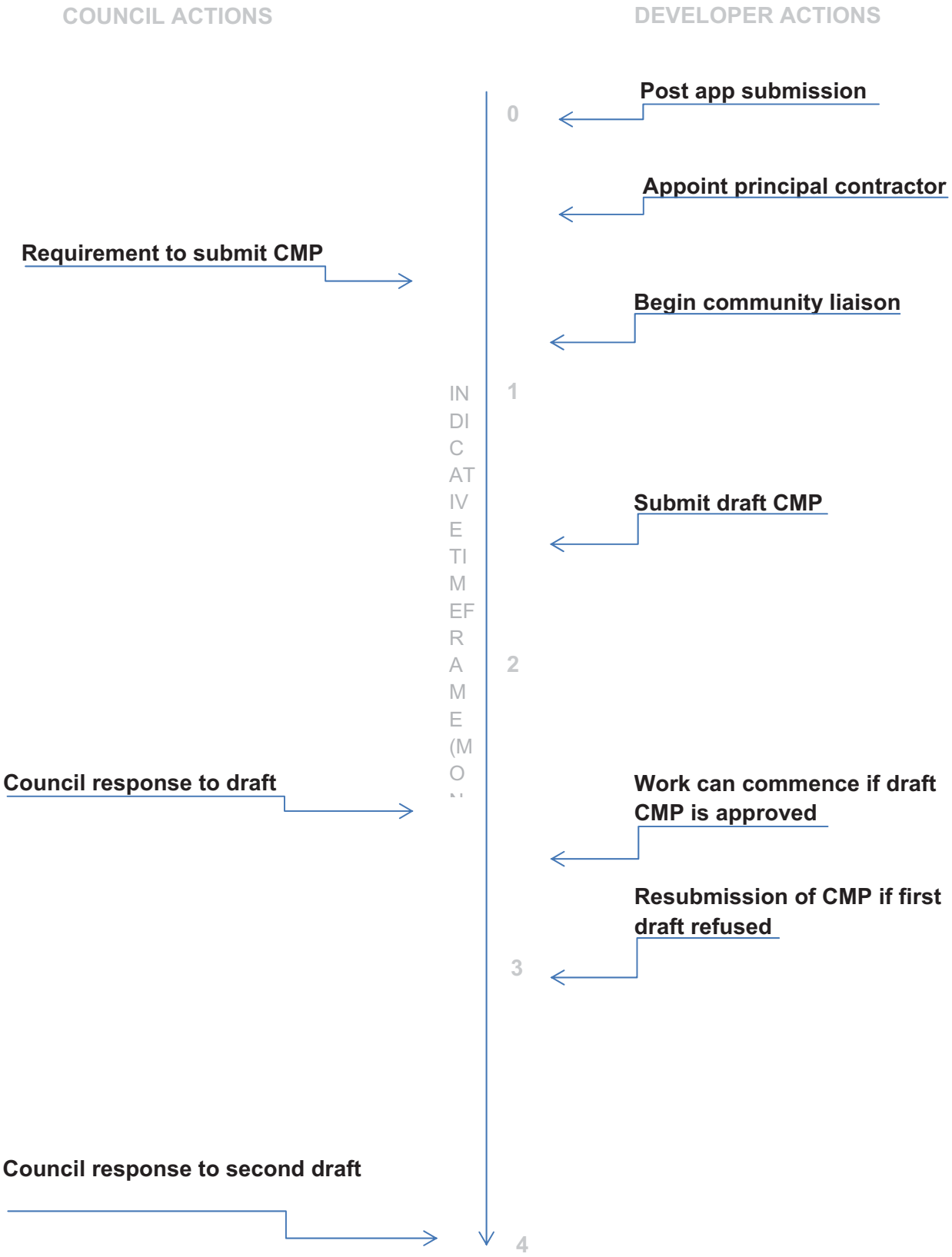
If your scheme involves any demolition, you need to make an application to the Council's Building Control Service. Please complete the "**Demolition Notice**"

Please complete the questions below with additional sheets, drawings and plans as required. The boxes will expand to accommodate the information provided, so please provide as much information as is necessary. It is preferable if this document is completed electronically and submitted as a Word file to allow comments to be easily documented.

(Note the term 'vehicles' used in this document refers to all vehicles associated with the implementation of the development, e.g. demolition, site clearance, delivery of plant & materials, construction, etc.)

Revisions to this document may take place periodically.

Timeframe


COUNCIL ACTIONS
DEVELOPER ACTIONS
Post app submission
0
Appoint principal contractor
Requirement to submit CMP
Begin community liaison
1
INDICATIVE TIMEFRAME (MON
Submit draft CMP
2
Council response to draft
Work can commence if draft CMP is approved
Resubmission of CMP if first draft refused
3
Council response to second draft
4

Contact

1. Please provide the full postal address of the site and the planning reference relating to the construction works.

Address:	3 Greenaway Gardens, London, NW3 7DJ
Planning ref:	2015/3373/P
Type of CMP - Section 106 planning obligation/~~Major sites framework~~:	

2. Please provide contact details for the person responsible for submitting the CMP.

Name:	Michael Brown
Address:	MY Construction Unit 5 Sayer House, Oxgate Lane, London NW2 7JN
Email:	michael@myconstruction.co.uk
Phone:	020 8450 5747

3. Please provide full contact details of the site project manager responsible for day-to-day management of the works and dealing with any complaints from local residents and businesses.

Name:	Graham Toole
Address:	MY Construction Unit 5 Sayer House, Oxgate Lane, London NW2 7JN
Email:	graham@myconstruction.co.uk
Phone:	07794676737

4. Please provide full contact details of the person responsible for community liaison and dealing with any complaints from local residents and businesses if different from question 3.

Name:	as above
Address:	
Email:	
Phone:	

5. Please provide full contact details of the person responsible for community liaison/dealing with any complaints from local residents and businesses if different from question 3. In the case of **Community Investment Programme (CIP)**, please provide contact details of the responsible Camden officer.

Name:	as above
Address:	
Email:	
Phone:	

6. Please provide full contact details including the address where the main contractor accepts receipt of legal documents for the person responsible for the implementation of the CMP.

Name:	MY Construction & Carpentry Ltd
Address:	103 High Street, Waltham Cross, Herts. EN8 7AN
Email:	info@myconstruction.co.uk
Phone:	0208450 5747

Site

1. Please provide a site location plan and a brief description of the site, surrounding area and development proposals for which the CMP applies.

The site forms part of an established residential road consisting of 2 and 3 storey houses, mostly detached. Some consist of or have been converted into flats.

It is situated to the north-east of the A41 Finchley Road, at a distance of some 250m.

2. Please provide a very brief description of the construction works including the size and nature of the development and details of the main issues and challenges (e.g. narrow streets, close proximity to residential dwellings).

Alterations to the existing building to form a single dwelling, including basement construction, replacement of existing side garage, erection of 3-storey rear extension and alterations to roof and windows etc.

In close proximity to adjacent dwellings nos. 2 and 4 Greenaway Gardens.

3. Please identify the nearest potential receptors (dwellings, business, etc.) likely to be affected by the activities on site (i.e. noise, vibration, dust, fumes, lighting, etc.).

nos. 2 and 4 Greenaway Gardens.

4. Please provide a scaled plan detailing the local highway network layout in the vicinity of the site. This should include details of on-street parking bay locations, cycle lanes, footway extents and proposed site access locations.

Attached

5. Please provide the proposed start and end dates for each phase of construction as well as an overall programme timescale. (A Gantt chart with key tasks, durations and milestones would be ideal).

This CMP relates to a 1st Phase Contract - Shell and Core construction:
Estimated contract period 52 weeks
Estimated Start Date 25 May 2016

An anticipated Programme for 1st Phase [Shell and Core] is attached, and this indicates the principal phases of construction:

Site set-up, demolitions etc	25 May - 8 June 2016
Piling, temporary supports	8 June-September 2016
Excavation	November-December 2016
Reinforced concrete work	December 2016-April 2017
Basement lining, upper floors	March 2017- September 2017
External walls and roof	July 2017- October 2017

6. Please confirm the standard working hours for this site, noting that the standard working hours for construction sites in Camden are as follows:

- 8.00am to 6pm on Monday to Friday
- 8.00am to 1.00pm on Saturdays
- No working on Sundays or Public Holidays

Confirmed standard working hours:
In exceptional circumstances, however, it may be necessary to work outside these hours - eg for tasks that are delayed, and cannot be interrupted after they have started, e.g. concrete pours. These will be notified to Environmental Health without delay (on the same day or next working day).
Deliveries of special and wide loads out of hours when required by Transport for London will be notified to Environmental Health in advance.

7. Please indicate if any changes to services are proposed to be carried out that would be linked to the site during the works (i.e. connections to public utilities and/or statutory undertakers' plant). Larger developments may require new utility services. If so, a strategy and programme for coordinating the connection of services will be required. If new utility services are required, please confirm which utility companies have been contacted (e.g. Thames Water, National Grid, EDF Energy, BT. etc.) You must explore options for the utility companies to share the same excavations and traffic management proposals. Please supply details of your discussions.

Entry ducts and chambers will be constructed within the site only at this stage.

It is envisaged that service connections in the highway will take place in a future phase, and will be coordinated with the relevant utilities.

Community Liaison

A neighbourhood consultation process must have been undertaken prior to submission of the CMP first draft.

Significant time savings can be made by running an effective neighbourhood consultation process. This must be undertaken in the spirit of cooperation rather than one that is dictatorial and unsympathetic to the wellbeing of local residents and businesses.

These are most effective when initiated as early as possible and conducted in a manner that involves the local community. Involving locals in the discussion and decision making process helps with their understanding of what is being proposed in terms of the development process. The consultation and discussion process should have already started, with the results incorporated into the CMP first draft submitted to the Council for discussion and sign off. This communication should then be ongoing during the works, with neighbours and any community liaison groups being regularly updated with programmed works and any changes that may occur due to unforeseen circumstances through newsletters, emails and meetings.

Please note that for larger sites, details of a construction working group may be required as a separate S106 obligation. If this is necessary, it will be set out in the S106 Agreement as a separate requirement on the developer.

Cumulative impact

Sites located within high concentrations of construction activity that will attract large numbers of vehicle movements should consider establishing contact with other sites in the vicinity in order to manage traffic routeing and volumes. Developers in the Tottenham Court Road area have done this to great effect.

The Council can advise on this if necessary.

1. Consultation

The Council expects meaningful consultation. For large sites, this may mean two or more meetings with local residents **prior to submission of the first draft CMP**.

Evidence of who was consulted, how the consultation was conducted and a summary of the comments received in response to the consultation. Details of meetings including minutes, lists of attendees etc. must be included.

In response to the comments received, the CMP should then be amended where appropriate and, where not appropriate, a reason should be given. The revised CMP should also include a list of all the comments received. Developers are advised to check proposed approaches to consultation with the Council before carrying them out. If your site is on the boundary between boroughs then we would recommend contacting the relevant neighbouring planning authority.

Please provide details of consultation of draft CMP with local residents, businesses, local groups (e.g. residents/tenants and business associations) and Ward Councillors.

We shall ensure good rapport with all neighbouring parties thus developing an effective system to manage activities in a proactive and consultative manner to avoid conflicts for the benefit of everyone involved.

MY Construction has prepared an introductory newsletter summarising the works to be undertaken and measures to be employed to mitigate the impacts. This newsletter is addressed to neighbouring properties based initially on the Planning consultation neighbours' list.

2. Construction Working Group

Please provide details of community liaison proposals including any Construction Working Group that will be set up, addressing the concerns of the community affected by the works, the way in which the contact details of the person responsible for community liaison will be advertised to the local community, and how the community will be updated on the upcoming works i.e. in the form of a newsletter/letter drop, or weekly drop in sessions for residents.

Within the site management team, a single point of contact will be made at a suitable level of seniority to liaise with the local neighbours. A Senior Project Manager will be the liaison contact point throughout the contract.
Prior to commencement the Senior Project Manager will have the ultimate responsibility on site and the necessary authority to direct operations.
Prior to commencement the senior project manager will notify the local residents association and arrange a pre-construction meeting. Information will be distributed to the neighbours on a regular basis to advise them of our planned operations and any impact they may have upon them.
An updated newsletter will be produced and distributed accordingly, keeping the local community informed of the progress and any changes to the project.
We will establish regular meetings for the community to discuss to ensure their opinions and requirements are aired and accounted for.
Members of the public will be able to communicate with us via a dedicated "24/7 hot line".
The number will be posted on our hoarding and distributed to the neighbours in all of our regular newsletters.
During the Construction period, a Complaints Register will be maintained, and resident notifications will be carried out in accordance with Camden's Minimum Requirements.

3. Schemes

Please provide details of any schemes such as the 'Considerate Constructors Scheme', such details should form part of the consultation and be notified to the Council. Contractors will also be required to follow the "Guide for Contractors Working in Camden" also referred to as "Camden's Considerate Contractors Manual".

The site is registered with the Considerate Constructors Scheme:
Site Registration no. 97111
We confirm also that we will follow the Guide for Contractors Working in Camden

4. Neighbouring sites

Please provide a plan of existing or anticipated construction sites in the local area and please state how your CMP takes into consideration and mitigates the cumulative impacts of construction in the vicinity of the site. The council can advise on this if necessary.

MY Construction is aware of consented developments at 4 Greenaway Gardens, 44 Frognal Lane, 41 Frognal, 59 Redington Road NW3.
MY Construction will continue to monitor the progress of planning applications in the area and will attempt to ensure that deliveries are coordinated with any consented schemes if appropriate.

Transport

This section must be completed in conjunction with your principal contractor. If one is not yet assigned, please leave the relevant sections blank until such time when one has been appointed.

Camden is a CLOCS Champion, and is committed to maximising road safety for Vulnerable Road Users (VRUs) as well as minimising negative environmental impacts created by motorised road traffic. As such, all vehicles and their drivers servicing construction sites within the borough are bound by the conditions laid out in the CLOCS Standard.

This section requires details of the way in which you intend to manage traffic servicing your site, including your road safety obligations with regard to VRU safety. It is your responsibility to ensure that your principal contractor is fully compliant with the terms laid out in the CLOCS Standard. It is your principal contractor's responsibility to ensure that all contractors and sub-contractors attending site are compliant with the terms laid out in the CLOCS Standard.

Checks of the proposed measures will be carried out by the council to ensure compliance. Please refer to the CLOCS Standard when completing this section. Guidance material which details CLOCS requirements can be accessed here, details of the monitoring process are available here.

Please contact CLOCS@camden.gov.ukfor further advice or guidance on any aspect of this section.

Please refer to the CLOCS Overview and Monitoring Overview documents which give a breakdown of requirements.

CLOCS Considerations

1. Name of Principal contractor:

MY Construction and Carpentry Ltd.

2. Please submit the proposed method for checking operational, vehicle and driver compliance with the CLOCS Standard throughout the duration of the contract (please refer to our CLOCS Overview document in the appendix and CLOCS Standard point 3.4.7).

The Client will ensure by random vehicle checks that the Contractor is maintaining a checking process to ensure compliance with CLOCS Standard point 3.4.7.
The Contractor will maintain a record of checks on vehicle and operator compliance with the following items:

Fleet operator quality certification;
Fleet operator collision reporting;
Driver adherence to traffic routing requirements;
Warning signage on all vehicles over 3.5 tGVW;
Side under-run guards fitted on all vehicles over 3.5 tGVW;
Blind spot aids as required to all vehicles over 3.5 tGVW and over 7.5 tGVW;
Vehicle audible warning for left turn etc to all vehicles over 3.5 tGVW;
Training of drivers for safety of vulnerable road users.

3. Please confirm that you as the client/developer and your principal contractor have read and understood the CLOCS Standard and included it in your contracts. Please sign-up to join the CLOCS Community to receive up to date information on the standard by expressing an interest online.

I confirm that I have included the requirement to abide by the CLOCS Standard in my contracts to my contractors and suppliers:

Confirmed:
MY Construction and Carpentry Ltd
On behalf of Mrs GK Burhan

Please contact CLOCS@camden.gov.uk for further advice or guidance on any aspect of this section.

Site Traffic

Sections below shown in blue directly reference the CLOCS Standard requirements. The CLOCS Standard should be read in conjunction with this section.

4. Traffic routing: *"Clients shall ensure that a suitable, risk assessed vehicle route to the site is specified and that the route is communicated to all contractors and drivers. Clients shall make contractors and any other service suppliers aware that they are to use these routes at all times unless unavoidable diversions occur."*(P19, 3.4.5)

Routes should be carefully considered and risk assessed, taking into account the need to avoid where possible any major cycle routes and trip generators such as schools, offices, public buildings, museums etc. Where appropriate, on routes that use high risk junctions (ie. those that attract high volumes of cycling traffic) installing Trixi mirrors to aid driver visibility should be considered.

Consideration should also be given to weight restrictions, low bridges and cumulative impacts of construction (including neighbouring construction sites) on the public highway network. The route(s) to and from the site should be suitable for the size of vehicles that are to be used.

a. Please indicate routes on a drawing or diagram showing the public highway network in the vicinity of the site including details of links to the Transport for London Road Network (TLRN).

Greenaway Gardens is a public road directly accessible from Frognal Lane and the A41 [Finchley Road], west of the site, and approachable from the south via Frognal Lane and the A41. The distance from the A41 to the site via Frognal Lane is approximately 300m; therefore this will be the preferred route for vehicular traffic.

Traffic exiting the site will do so either by turning around on Greenaway Gardens and using Frognal Lane to access the A41, or by continuing north into Oakhill Avenue and thence north into Bracknell Gardens, then Heath Road to access the A41.

b. Please confirm how contractors, delivery companies and visitors will be made aware of the route (to and from the site) and of any on-site restrictions, prior to undertaking journeys.

Contractors and delivery and waste hauliers will be sent a copy of the traffic route map with their order.
All vehicular movement both to and from site will be controlled by a full time security guard or traffic marshal. The traffic marshal will ensure all deliveries are removed from the public highway, and Greenaway Gardens, and onto site via a temporary hard standing area set back from Greenaway Gardens, as shown on the Logistics Plan. This will minimise the construction impact on the neighbouring environment. This unloading area will be sited at the front of the proposed dwelling, throughout the construction works.

5. Control of site traffic, particularly at peak hours: "*Clients shall consider other options to plan and control vehicles and reduce peak hour deliveries"*(P20, 3.4.6)

Construction vehicle movements are generally acceptable between 9.30am to 4.30pm on weekdays and between 8.00am and 1.00pm on Saturdays). If there is a school in the vicinity of the site or on the proposed access and/or egress routes, then deliveries must be restricted to between 9.30am and 3pm on weekdays during term time. (Refer to the *Guide for Contractors Working in Camden*).

A delivery plan should ensure that deliveries arrive at the correct part of site at the correct time. Instructions explaining such a plan should be sent to all suppliers and contractors**.** Consideration should be given to the location of any necessary holding areas for large sites with high volumes of traffic. Vehicles must not wait or circulate on the public highway. Whilst deliveries should be given set times to arrive, dwell and depart, no undue time pressures should be placed upon the driver at any time.

a. Please provide details of the typical sizes of all vehicles and the approximate frequency and times of day when they will need access to the site, for each phase of construction. You should estimate the average daily number of vehicles during each major phase of the work, including their dwell time at the site. High numbers of vehicles per day and/or long dwell times may require vehicle holding procedures.

Estimated/typical vehicle sizes/ frequency:
Where practicable between 9.30am to 4.30pm, 8.00am and 1.00pm on Saturdays:

3.5-7.5 tonne vans/ trucks:	2-3 no. per day throughout the contract;
8 yard skips:	1-2 no. per week throughout the contract;
16 tonne tipper lorries:	2-3 no. per day during demolition etc April-May 16
	8-9 per day during bulk excavation Oct-Dec. 16
6m3 Concrete truck mixer:	1-2 no. per day Jun-Sept 2016, Jan-July 2017

b. Please provide details of other developments in the local area or on the route.

MY Construction is aware of consented developments at 4 Greenaway Gardens, 44 Frognal Lane, 41 Frognal, 59 Redington Road NW3.
MY Construction will continue to monitor the progress of planning applications in the area and will attempt to ensure that deliveries are coordinated with any consented schemes if appropriate.

c. Please outline the system that is to be used to ensure that the correct vehicle attends the correct part of site at the correct time.

There is a single on-site loading bay. Drivers will be advised by mobile phone of approximately 1-hour delivery slots as far as practicable.

d. Please identify the locations of any off-site holding areas (an appropriate location outside the borough may need to be identified, particularly if a large number of delivery vehicles are expected) and any measures that will be taken to ensure the prompt admission of vehicles to site in light of time required for necessary compliance checks. Please refer to question 5 if any parking bay suspensions will be required for the holding area.

TBA if necessary

e. Please provide details of any other measures designed to reduce the impact of associated traffic (such as the use of construction material consolidation centres).

N/A

6. Site access and egress: *"Clients shall ensure that access to and egress from the site is appropriately managed, clearly marked, understood and clear of obstacles."* (P18, 3.4.3)

Vehicles entering and leaving the site should be carefully managed, using gates that are clearly marked and free from obstacles. Traffic Marshalls must ensure the safe passage of pedestrians, cyclists and other traffic when vehicles are entering and leaving site, particularly if reversing.

a. Please detail the proposed access and egress routes to and from the site

Gated access to Greenaway Gardens – see Site Layout Plan attached

b. Please describe how the access and egress arrangements for construction vehicles will be managed.

By Traffic Marshall, see 4[b] above

c. Please provide swept path drawings for any tight manoeuvres on vehicle routes to and from the site including proposed access and egress arrangements at the site boundary (if necessary).

Swept path diagrams attached in Appendix [Motion Consultants Ltd]

d. Provision of wheel washing facilities should be considered if necessary. If so, please provide details of how this will be managed and any run-off controlled.

Wheel-washing bay drained via settling tank

7. Vehicle loading and unloading: *"Clients shall ensure that vehicles are loaded and unloaded on-site as far as is practicable."* (P19, 3.4.4)

If this is not possible, Traffic Marshalls must ensure the safe passage of pedestrians, cyclists and motor traffic in the street when vehicles are being loaded or unloaded.

Please provide details of the parking and loading arrangements for construction vehicles with regard to servicing and deliveries associated with the site (e.g. delivery of materials and plant, removal of excavated material). This is required as a scaled site plan, showing all points of access and where materials, skips and plant will be stored, and how vehicles will access and egress the site. If loading is to take place off site, please identify where this is due to take place and outline the measures you will take to ensure that loading/unloading is carried out safely. Please outline in question 8if any parking bay suspensions will be required.

see Site Layout Plan attached

Highway interventions

- **8. Parking bay suspensions and temporary traffic management orders**

Please note that a parking bay suspension should only be requested where absolutely necessary. Parking bay suspensions are permitted for a maximum of 6 months, suspensions whose duration exceeds 6 months must apply for a Temporary Traffic Order (TTO). For parking bay suspensions of one year or longer, a Traffic Management Order (TMO) must be applied for.

Please provide details of any proposed parking bay suspensions and temporary traffic management orders which would be required to facilitate construction.

Information regarding parking suspensions can be found here.

A parking bay suspension will be applied for outside no. 3 Greenaway Gardens, adjacent to the site entrance

9. Scaled drawings of highway works

Please note that use of the public highway for storage, site accommodation or welfare facilities is at the discretion of the Council and is generally not permitted. If you propose such use you must supply full justification, setting out why it is impossible to allocate space on-site. You must submit a detailed (to-scale) plan showing the impact on the public highway that includes the extent of any hoarding, pedestrian routes, parking bay suspensions and remaining road width for vehicle movements. We prefer not to close footways but if this is unavoidable, you should submit a scaled plan of the proposed diversion route showing key dimensions.

- a. Please provide accurate scaled drawings of any highway works necessary to enable construction to take place (e.g. construction of temporary vehicular accesses).

Hoarding to be erected on the front boundary to no. 3 Greenaway Gardens – see attached Site Layout Plan.
A hoarding licence will be applied for if applicable.

b. Please provide details of all safety signage, barriers and accessibility measures such as ramps and lighting etc.

N/A

10. Diversions

Where applicable, please supply details of any diversion, disruption or other anticipated use of the public highway during the construction period (alternatively a plan may be submitted).

N/A

11. VRU and pedestrian diversions, scaffolding and hoarding

Pedestrians and/or cyclist safety must be maintained if diversions are put in place. Vulnerable footway users should also be considered, these include wheelchair users, the elderly, those with walking difficulties, young children, those with prams, the blind and partially sighted. Appropriate ramping must be used if cables, hoses, etc. are run across the footway.

Any work above ground floor level may require a covered walkway adjacent to the site. A licence must be obtained for scaffolding and gantries. The adjoining public highway must be kept clean and free from obstructions. Lighting and signage should be used on temporary structures/skips/ hoardings, etc.

A secure hoarding will generally be required to the site boundary with a lockable access

a. Please provide details describing how pedestrian and cyclist safety will be maintained, including any proposed alternative routes (if necessary), and any Traffic Marshall arrangements.

The site will be secured by a hoarding with a lockable gate. Vehicles will arrive at a pre-arranged time. They will reverse on to the site and leave in a forward direction.
There will be a full-time banksman/ traffic marshal stationed at the site entrance at all delivery times. Their duty will be to direct and guide vehicles entering or leaving the site entrance, and to warn pedestrians and cyclists verbally and by hand signals when a vehicle is commencing moving across

b. Please provide details of any temporary structures which would overhang the public highway (e.g. scaffolding, gantries, cranes etc.) and details of hoarding requirements or any other occupation of the public highway.

The site will be secured by 2.4m high painted plywood hoarding with lockable gates. The hoarding will be fixed on the site boundary at the back of the footpath, and will therefore not require a hoarding licence. It is not envisaged that any other type of structure will be required on or over the public highway.
It is not envisaged that any materials will be stored or carried routinely across the footpath.

In occasional circumstances craning may be required across the footpath, and should this be the case, this will be the subject of an application for partial road closure or other licence as required by the Highway Authority following standard procedures.

SYMBOL IS FOR INTERNAL USE

Environment

To answer these sections please refer to the relevant sections of **Camden's Minimum Requirements for Building Construction (CMRBC).**

1. Please list all noisy operations and the construction method used, and provide details of the times that each of these are to be carried out.

Noisy operations include the use of bored piling rigs, concrete breakers, compressors, generators and power tools.
These will be restricted to the Standard working hours, 8.00-18.00 M-F, 8.00-13.00 Saturday except in emergency situations.

2. Please confirm when the most recent noise survey was carried out (before any works were carried out) and provide a copy. If a noise survey has not taken place please indicate the date (before any works are being carried out) that the noise survey will be taking place, and agree to provide a copy.

Noise survey carried out on 11th-12th January 2016, copy attached [KP Acoustics]

3. Please provide predictions for noise and vibration levels throughout the proposed works.

Noise levels will be monitored in accordance with Camden's Minimum Requirements, and with reference to the attached Noise and Vibration Management Plan ref 13718.NVMP.01 Rev A [KP Acoustics]

4. Please provide details describing mitigation measures to be incorporated during the construction/demolition works to prevent noise and vibration disturbances from the activities on the site, including the actions to be taken in cases where these exceed the predicted levels.

Coordinated delivery times and efficient traffic management to prevent queues of traffic accessing the site.
Ensuring all plant has sound reduction measures (mufflers, baffles or silencers).
Utilising construction techniques that minimise the production of noise.
Utilisation, where possible of pre-fabricated components.
Utilisation of baffle system during the demolition process.
Strict adherence to the site working hours.

Devise and implement an action plan where noise levels exceed acceptable levels:
eg. Considering alternative demolition or construction methods.

5. Please provide evidence that staff have been trained on BS 5228:2009

Training programme in course of implementation.

6. Please provide details on how dust nuisance arising from dusty activities, on site, will be prevented.

We will establish air quality procedures to minimise dust generation and control plant and vehicle exhaust emissions.
We will undertake regular air quality sampling to ensure that we are not impacting on the existing air quality levels.
Ensure that all materials transported to and from site are in enclosed containers or fully sheeted.
Ensuring stock piles of topsoil etc. are kept below hoarding heights and kept damp in dry windy conditions. Once weeds and grass have grown again on the piles this will reduce the risk.
Loose materials will be stored in separated bays, and the division partitions will be lower than any adjacent boundary hoardings.
During dry periods the works will be dampened down to control the generation of dust.
Ensuring materials have a minimum of packaging.
Ensuring all polystyrene and similar lightweight materials are weighted down.
Making sure all dust generating materials are adequately packaged.
Ensuring all vehicles leaving the site have been through the wheel wash and that loads are covered where spoil or demolition material is being removed.
Provide regular road cleaning using road sweepers or brushes to control dust and mud.
Keeping the loading drop heights of spoil into lorries as low as possible.
Implementing an effective procedure to deal with complaints from third parties to ensure issues are dealt with efficiently and quickly, via an advised and dedicated telephone number.
All non-road mobile plant above 37 kW rated power, will comply with Euro IIIA emissions standard or better.

7. Please provide details describing how any significant amounts of dirt or dust that may be spread onto the public highway will be prevented and/or cleaned.

Ensuring all vehicles leaving the site have been through the wheel wash and that loads are covered where spoil or demolition material is being removed.
Provide regular road cleaning using road sweepers or brushes to control dust and mud.

8. Please provide details describing arrangements for monitoring of noise, vibration and dust levels.

Carry out daily noise surveys at perimeter of site and record findings. Implement an action plan where noise levels exceed acceptable levels. **Noise levels will be monitored in accordance with Camden's Minimum Requirements, with reference to Predicted Levels in BS 5228.2009 Part 1.**

Vibration levels will be monitored in accordance with Camden's Minimum Requirements, with reference to Predicted Levels in BS 5228.2009 Part 2.
Selection of Construction methods will be influenced where practicable by vibration control considerations, in particular the use of Bored piles in preference to Driven piles.

Dust pollution control will follow the three principles: 1-prevention; 2-suppression; 3-containment, in accordance with Camden's Minimum Requirements.[Copy attached in Appendix]

9. Please confirm that a Risk Assessment has been undertaken at planning application stage in line with the GLA's Control of Dust and Emissions Supplementary Planning Guidance (SPG), and the risk level that has been identified, with evidence. Please attach the risk assessment as an appendix if not completed at the planning application stage.

Low risk - see Dust Risk Assessment attached [Air Quality Assessments Ltd]

10. Please confirm that all of the GLA's 'highly recommended' measures from the SPG document relative to the level of risk identified in question 9 have been addressed by completing the GLA mitigation measures checklist. Please attach this as an appendix.

Refer to the attached Dust Risk Assessment

- 11. If the site is a High Risk Site, 4 real time dust monitors will be required, as detailed in the SPG. Please confirm the location, number and specification of the monitors in line with the SPG and confirm that these will be installed 3 months prior

to the commencement of works, and that real time data and quarterly reports will be provided to the Council detailing any exceedances of the threshold and measures that were implemented to address these.

N/A

12. Please provide details about how rodents, including rats, will be prevented from spreading out from the site. You are required to provide information about site inspections carried out and present copies of receipts (if work undertaken).

A site survey will be carried out by an approved Pest Control specialist before commencement of construction. A Method Statement for pest control will be prepared and implemented by the specialist, in accordance with Camden's Minimum Requirements.
Any redundant drains will be removed and any connections sealed with concrete.
Any existing drains required for connection will be sealed with proprietary rodent-proof caps pending re-connection.

13. Please confirm when an asbestos survey was carried out at the site and include the key findings.

TBA

14. Complaints often arise from the conduct of builders in an area. Please confirm steps being taken to minimise this e.g. provision of suitable smoking area, tackling bad language and unnecessary shouting.

Smoking is not permitted in working areas. If possible a compliant smoking area may be provided in a remote area of the site which does not cause nuisance to workers or neighbours.
Bad language will not be permitted, and unnecessary shouting will be monitored by advice from site supervisory staff

SYMBOL IS FOR INTERNAL USE

Agreement

The agreed contents of this Construction Management Plan must be complied with unless otherwise agreed in writing by the Council. This may require the CMP to be revised by the Developer and reapproved by the Council. The project manager shall work with the Council to review this Construction Management Plan if problems arise in relation to the construction of the development. Any future revised plan must be approved by the Council in writing and complied with thereafter.

It should be noted that any agreed Construction Management Plan does not prejudice further agreements that may be required such as road closures or hoarding licences.

Signed: ..... FOR AND ON BEHALF OF MY CONSTRUCTION

Date: ..... 8 June 2016 .....

Print Name: ..... MICHAEL BROWN .....

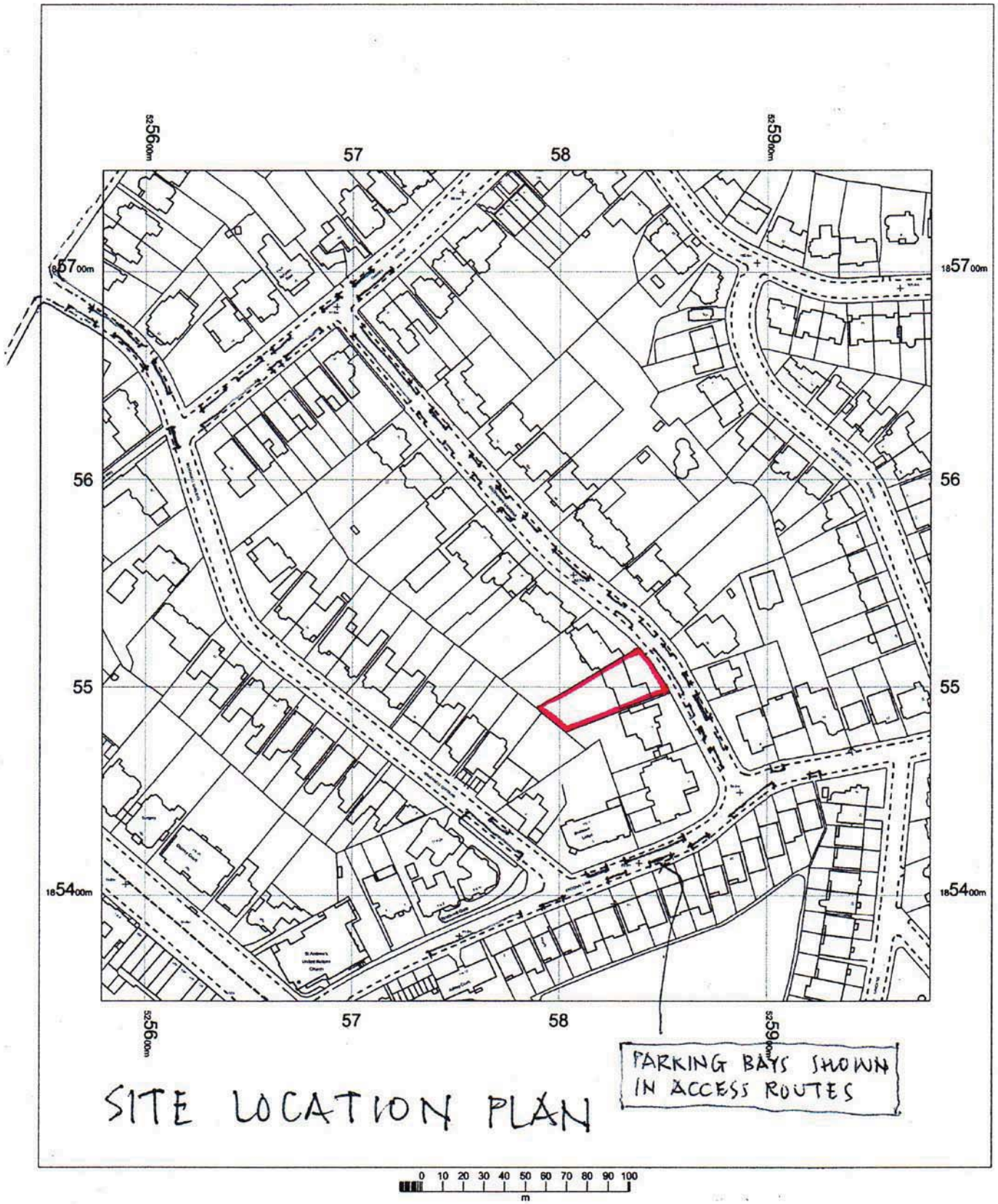
Position: ..... SURVEYOR .....

Please submit to: planningobligations@camden.gov.uk

End of form.

Camden

3 Greenaway Gardens



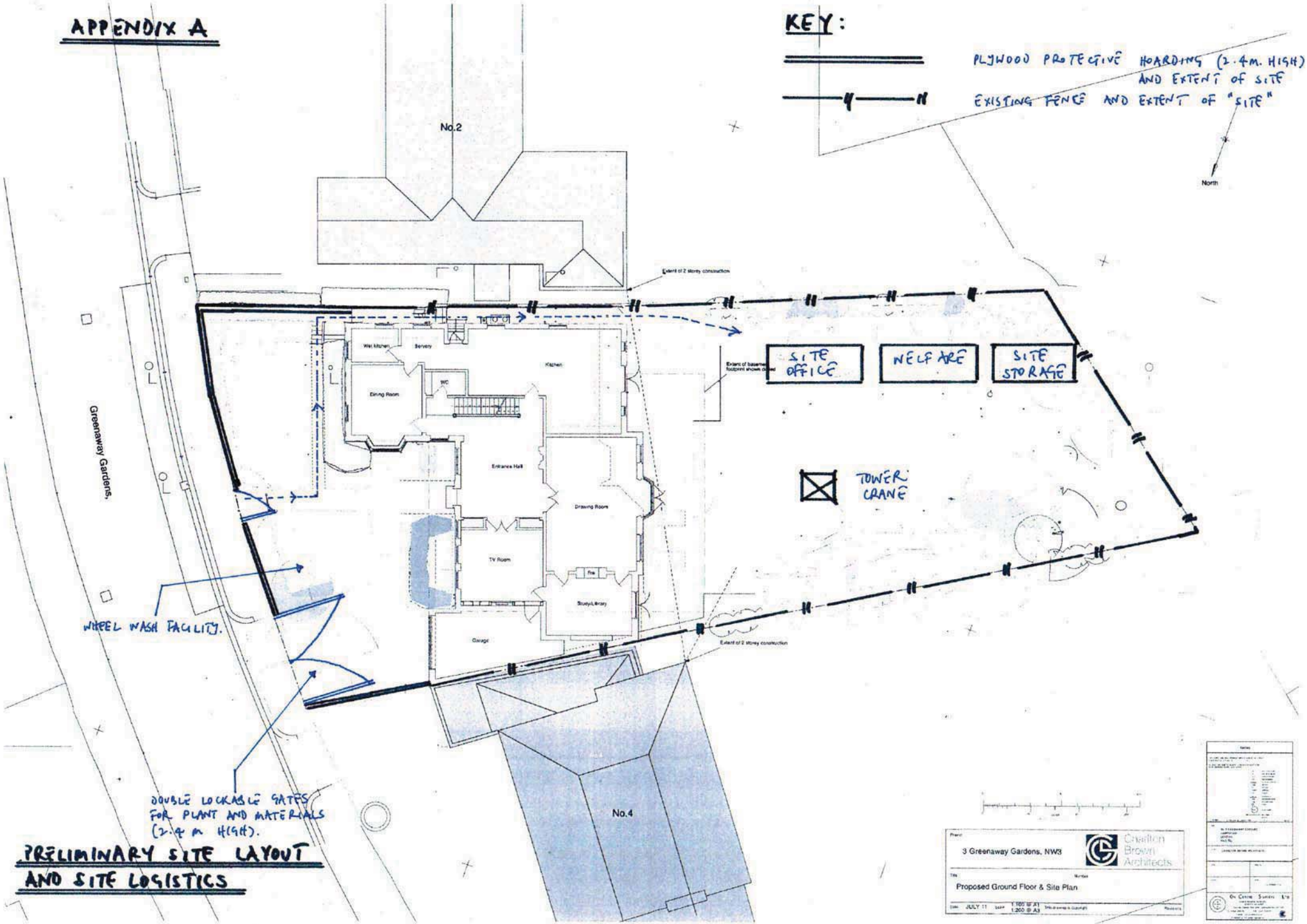
OS MasterMap 1250/2500/10000 scale
08 December 2015, ID: BLJT-00486256
www.planningapplicationmaps.co.uk

1:2500 scale print at A4, Centre: 525779 E, 185549 N

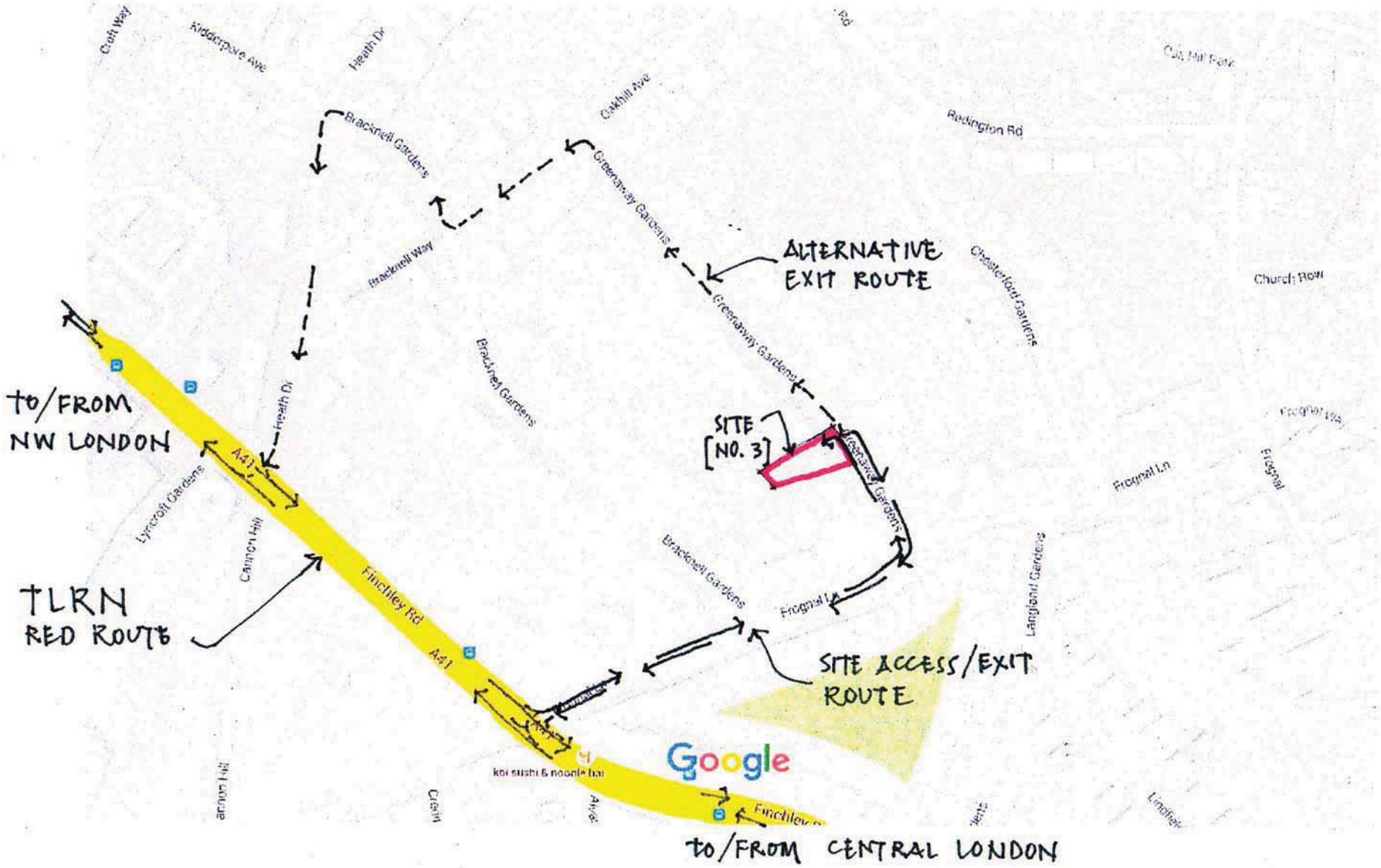
Mapping sourced from Ordnance Survey

bluejet mapping

APPENDIX A



PRELIMINARY SITE LAYOUT AND SITE LOGISTICS



ROUTE MAP DIAGRAM

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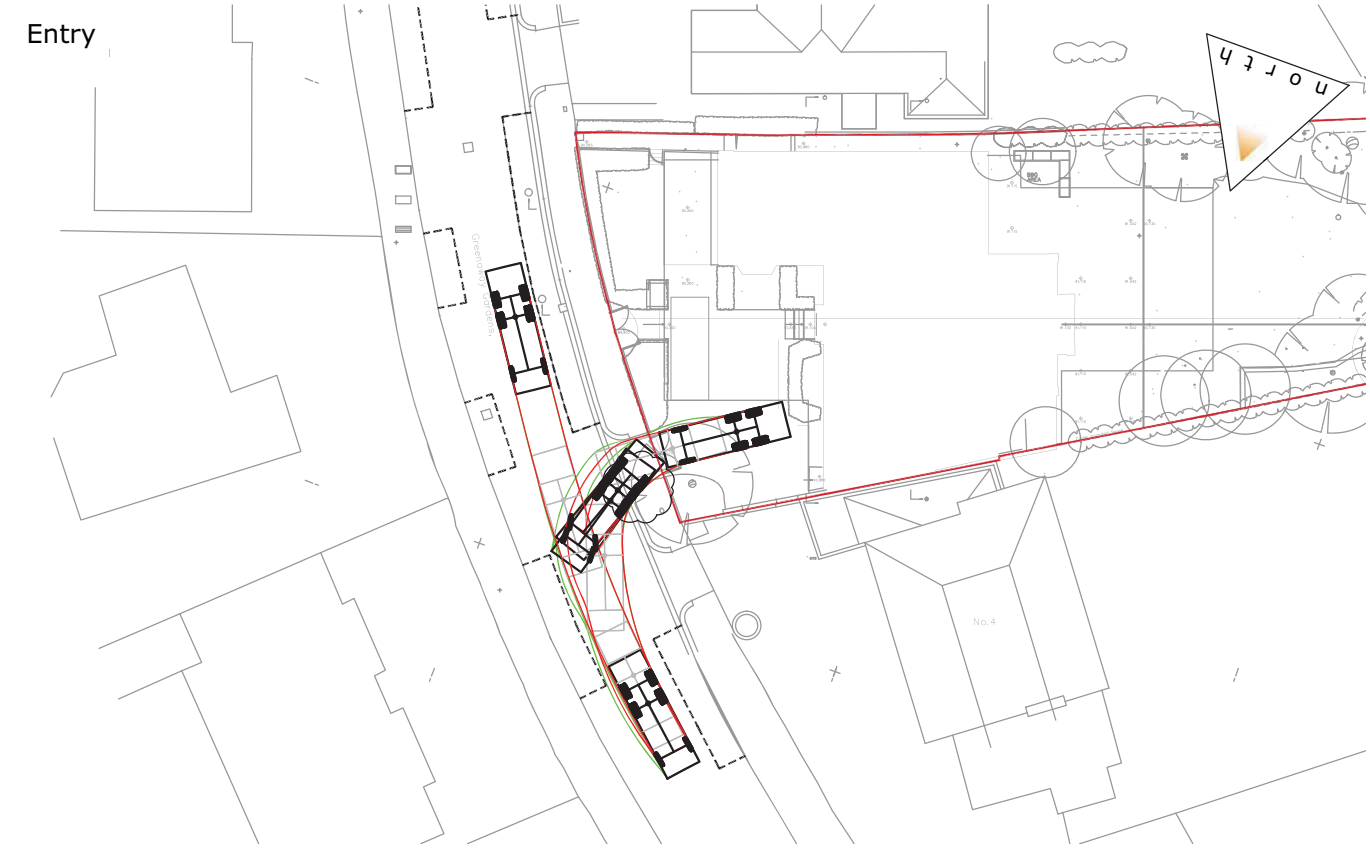

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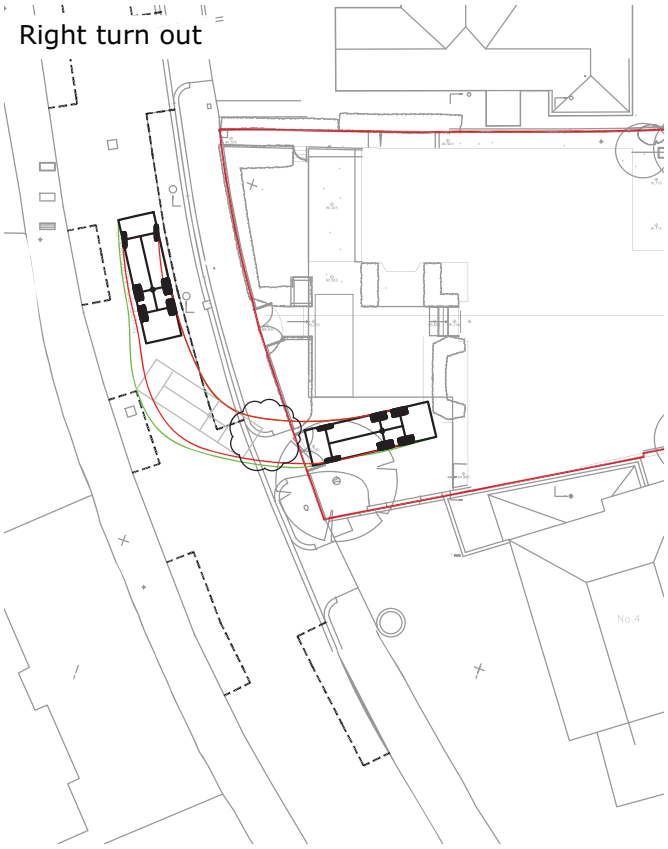

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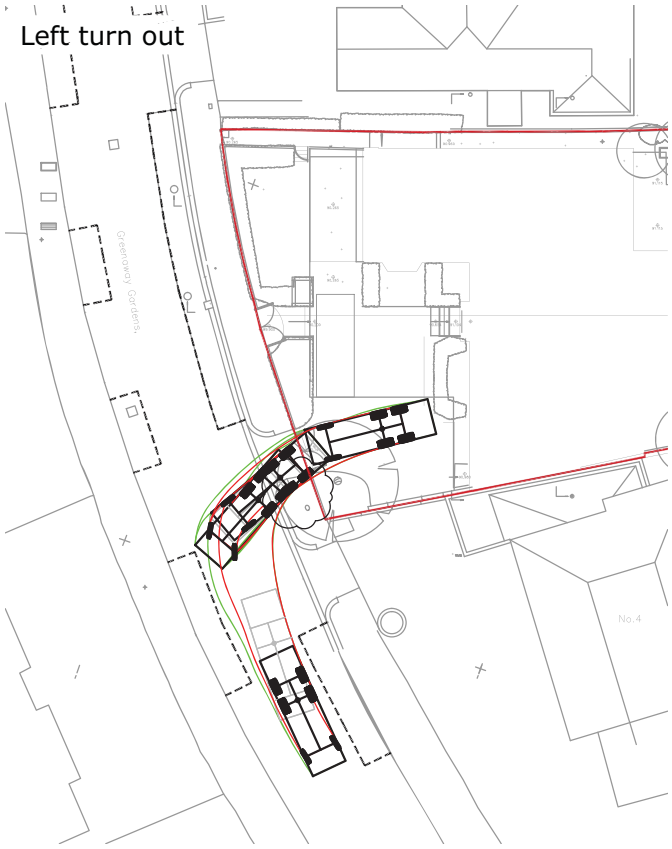

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Surrey
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8 Duncannon Street
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T: 020 7031 8141

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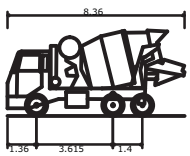

Concrete Mixer	
Overall Length	8.360m
Overall Width	2.390m
Overall Body Height	4.027m
Min Body Ground Clearance	0.358m
Max Track Width	2.413m
Lock to Lock Time	6.00s
Kerb to Kerb Turning Radius	8.210m

Project:
3 Greenaway Gardens

Title:
Swept Path Analysis

Scale: 1:500 (@ A4)

Drawing:
160106-TK01

Revision:
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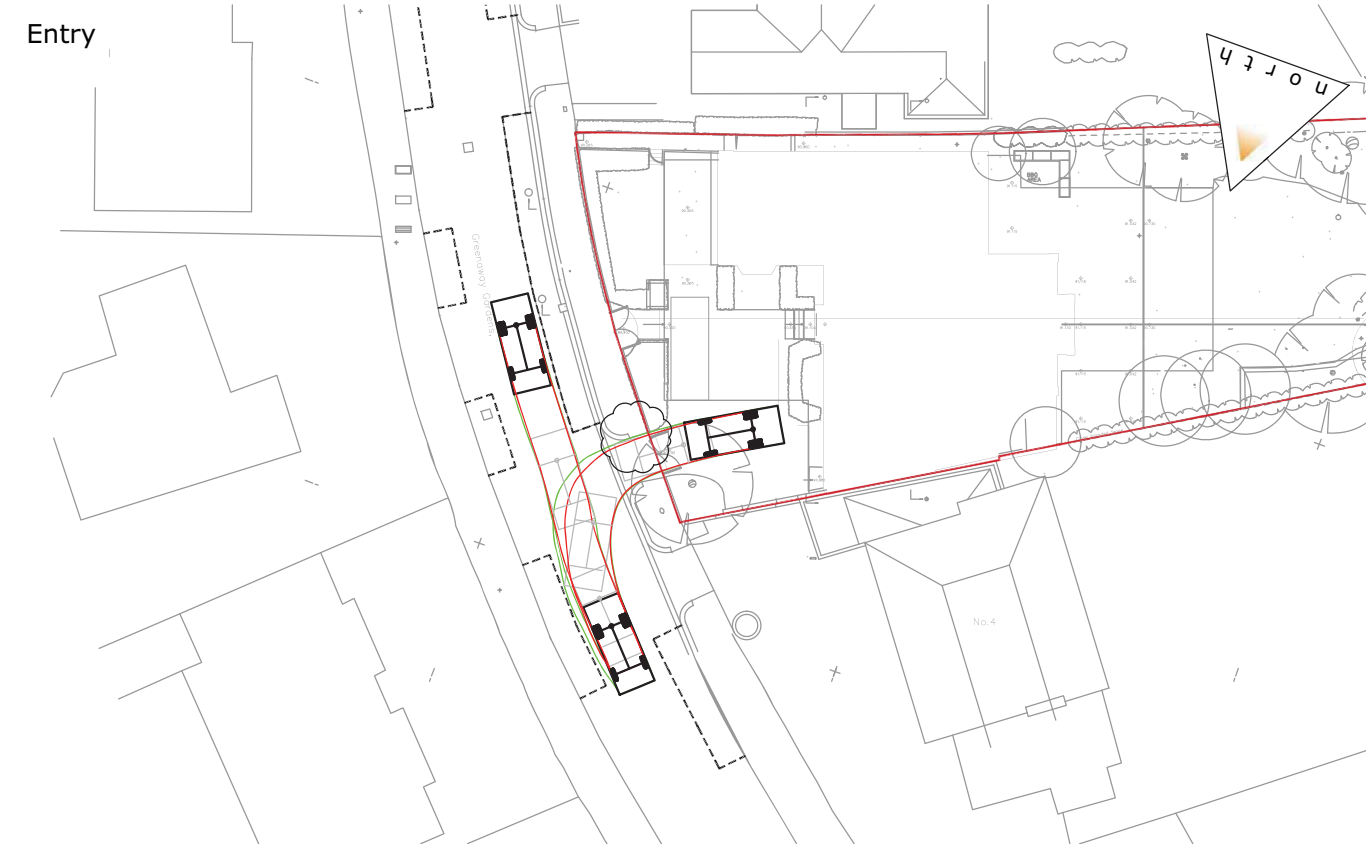

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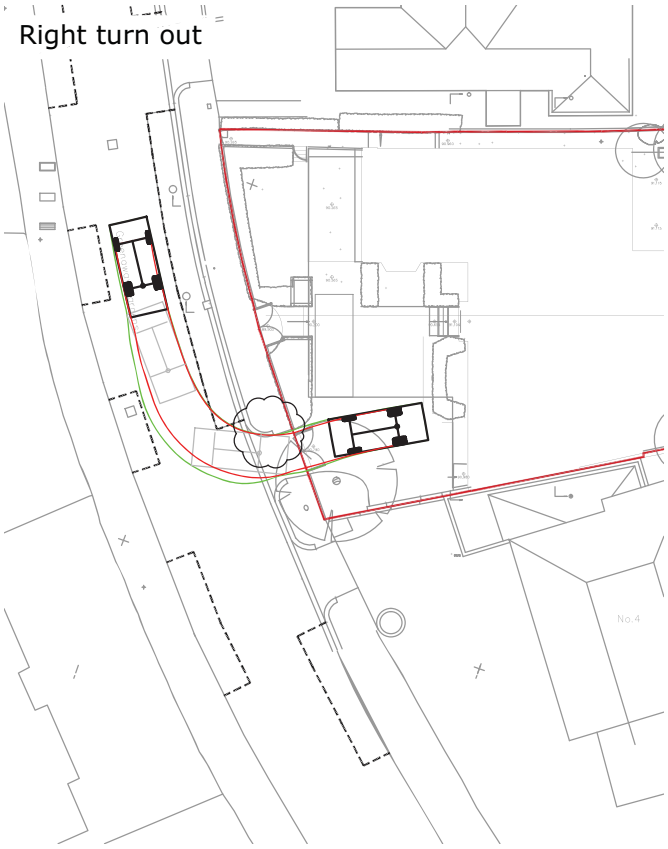

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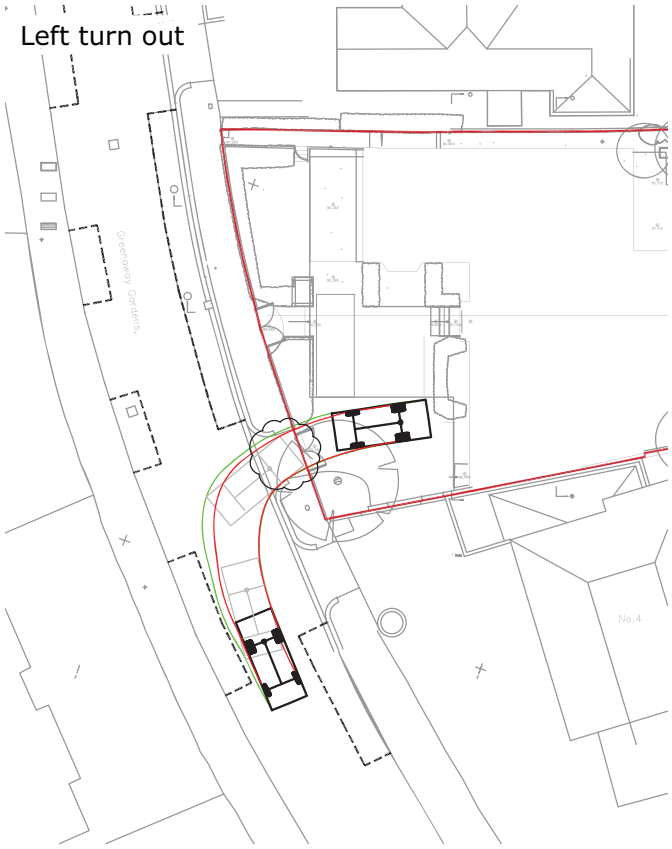

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GU1 3JF

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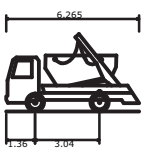

Small Skip Lorry	
Overall Length	6.265m
Overall Width	2.500m
Overall Body Height	3.650m
Min Body Ground Clearance	0.396m
Max Track Width	2.435m
Lock to Lock Time	6.00s
Kerb to Kerb Turning Radius	6.340m

Project:
3 Greenaway Gardens

Title:
Swept Path Analysis

Scale: 1:500 (@ A4)

Drawing:
160106-TK02

Revision:
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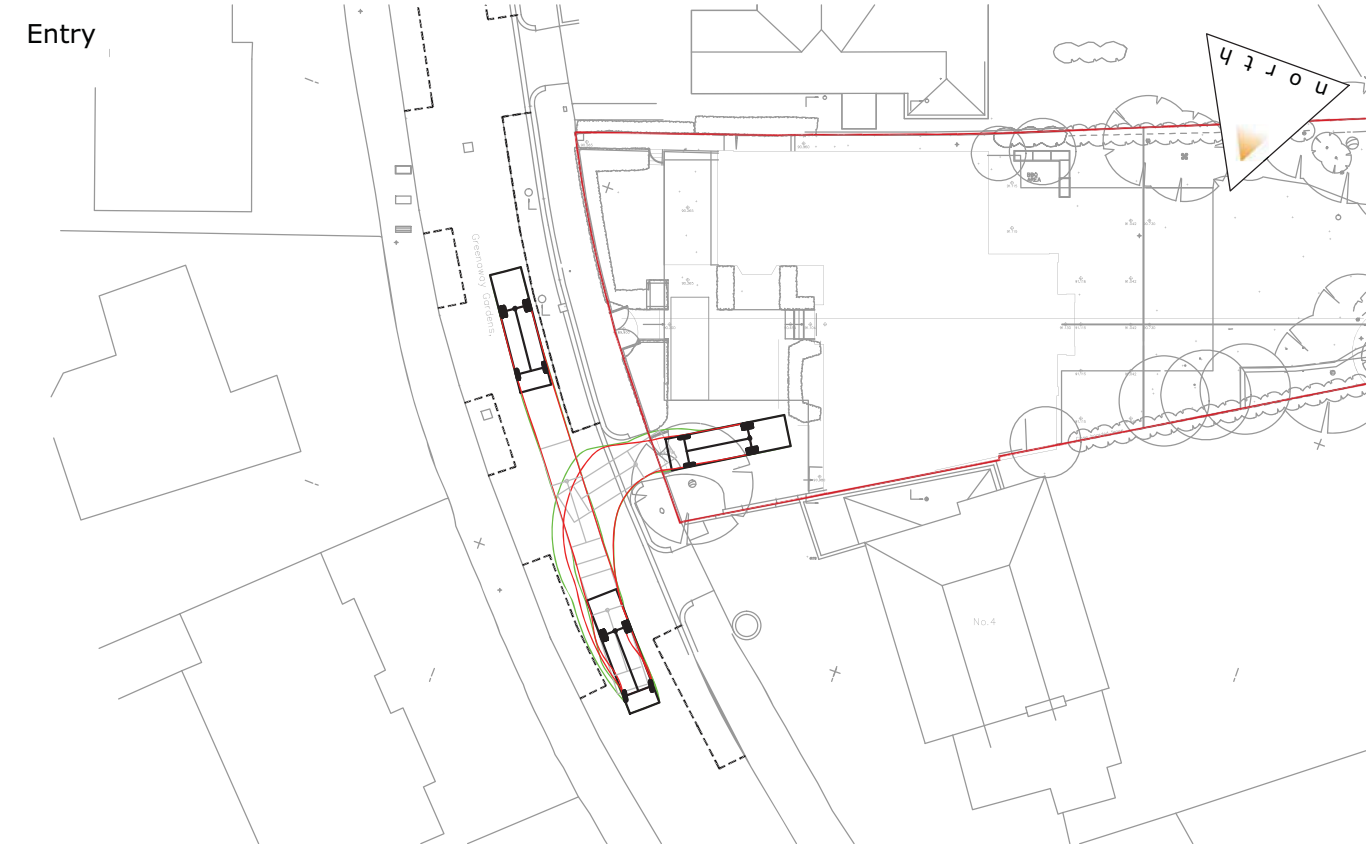

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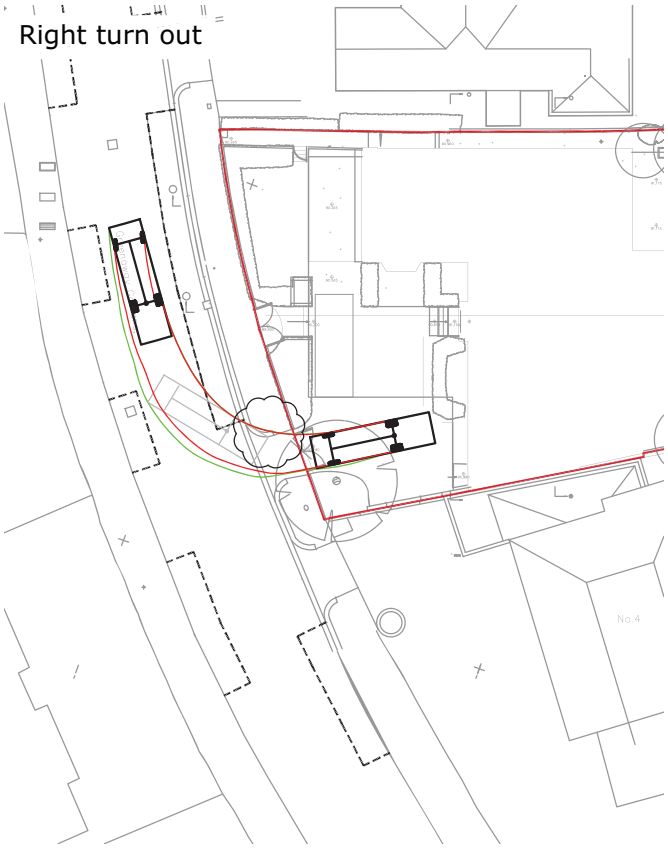

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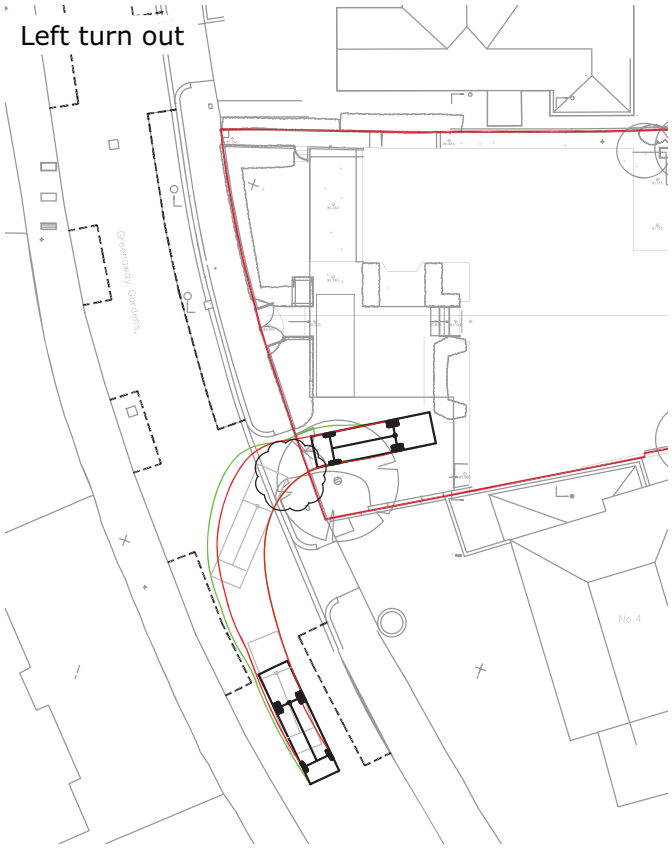

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Surrey
GU1 3JF

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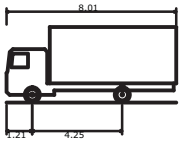

7.5t Box Van	
Overall Length	8.010m
Overall Width	2.100m
Overall Body Height	3.556m
Min Body Ground Clearance	0.351m
Track Width	2.064m
Lock to Lock Time	4.00s
Kerb to Kerb Turning Radius	7.400m

Project:
3 Greenaway Gardens

Title:
Swept Path Analysis

Scale: 1:500 (@ A4)

Drawing:
160106-TK03

Revision:
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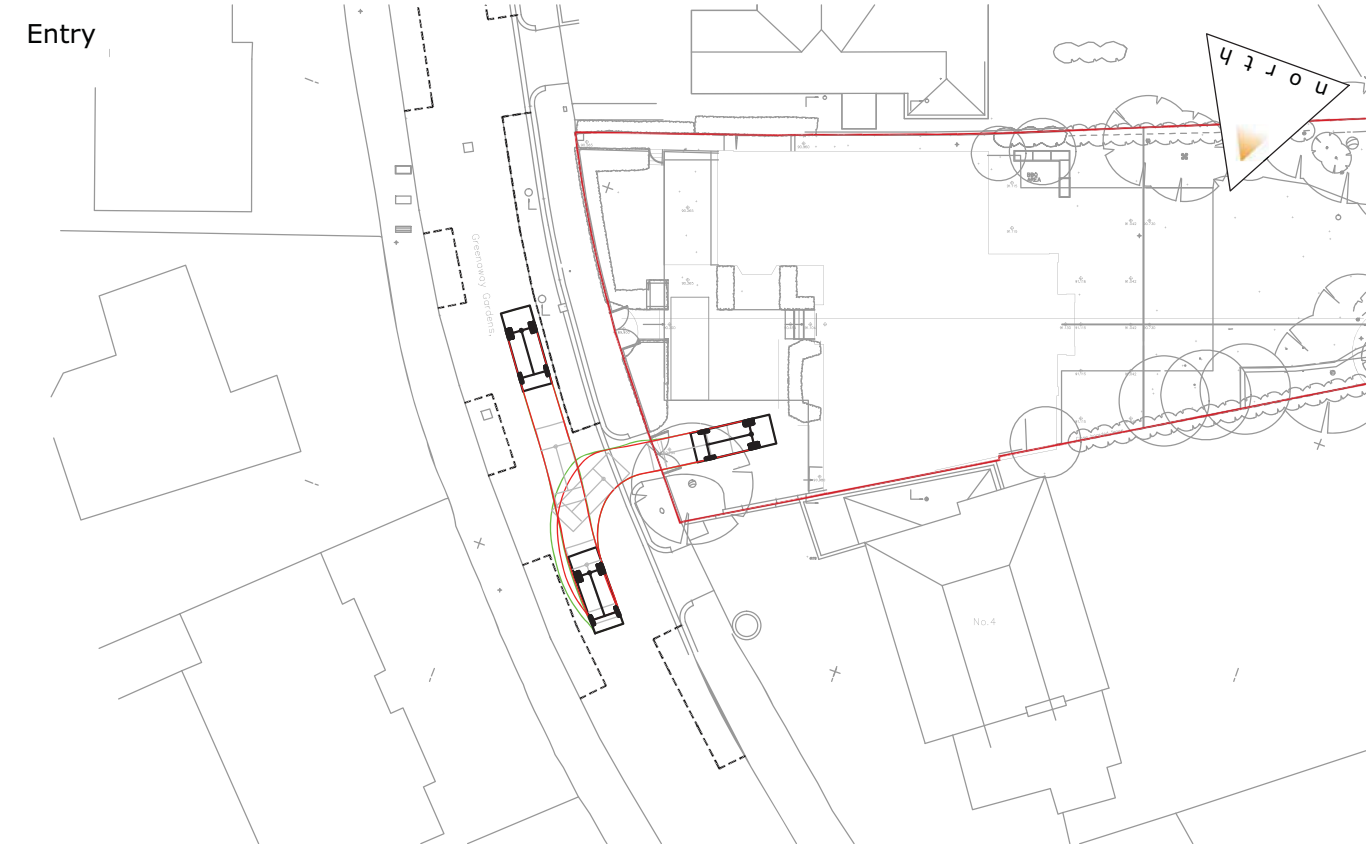

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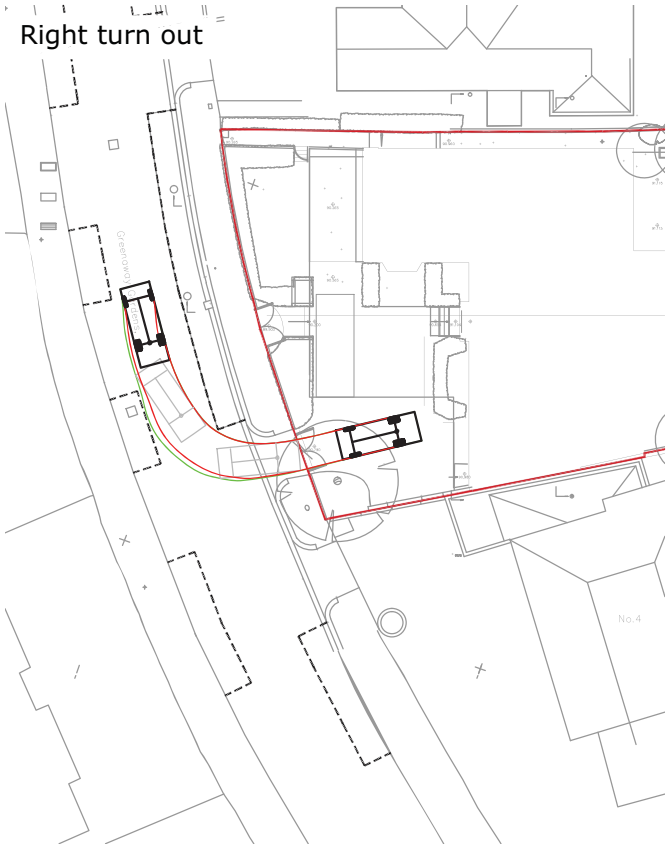

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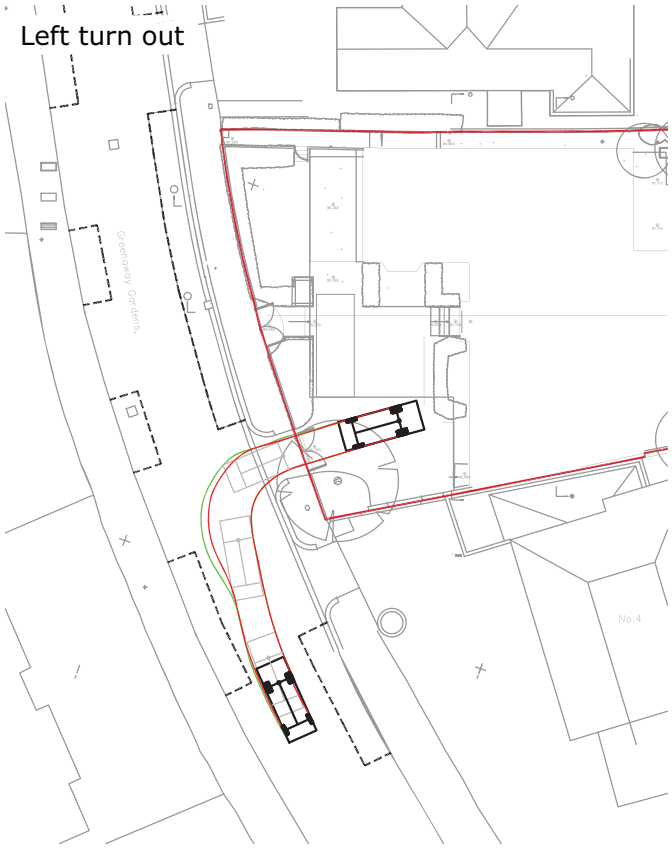

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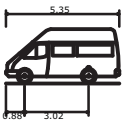

3.5t Panel Van	
Overall Length	5.350m
Overall Width	1.970m
Overall Body Height	2.562m
Min Body Ground Clearance	0.335m
Track Width	1.970m
Lock to Lock Time	4.00s
Kerb to Kerb Turning Radius	5.850m

Project:
3 Greenaway Gardens

Title:
Swept Path Analysis

Scale: 1:500 (@ A4)

Drawing:
160106-TK04

Revision:
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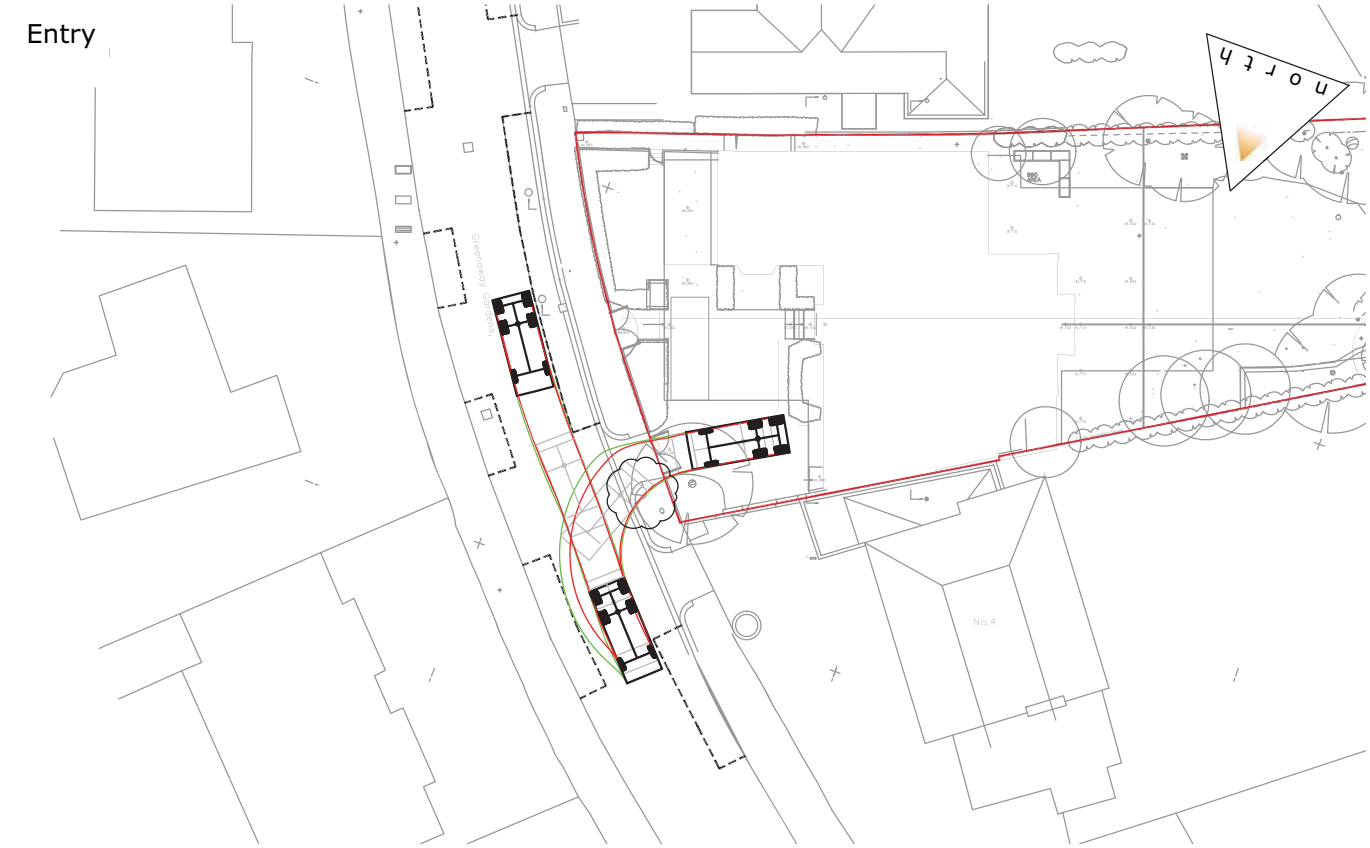

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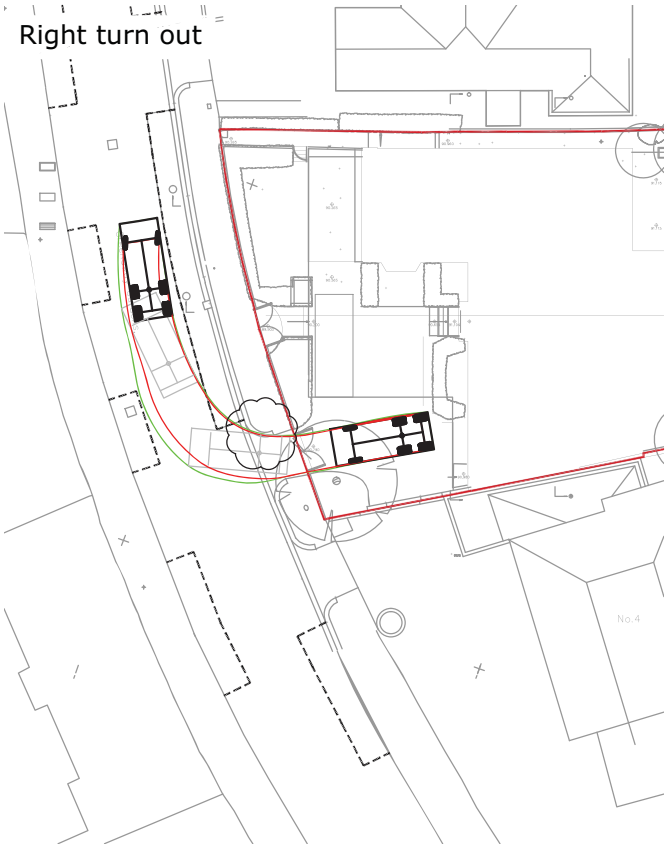

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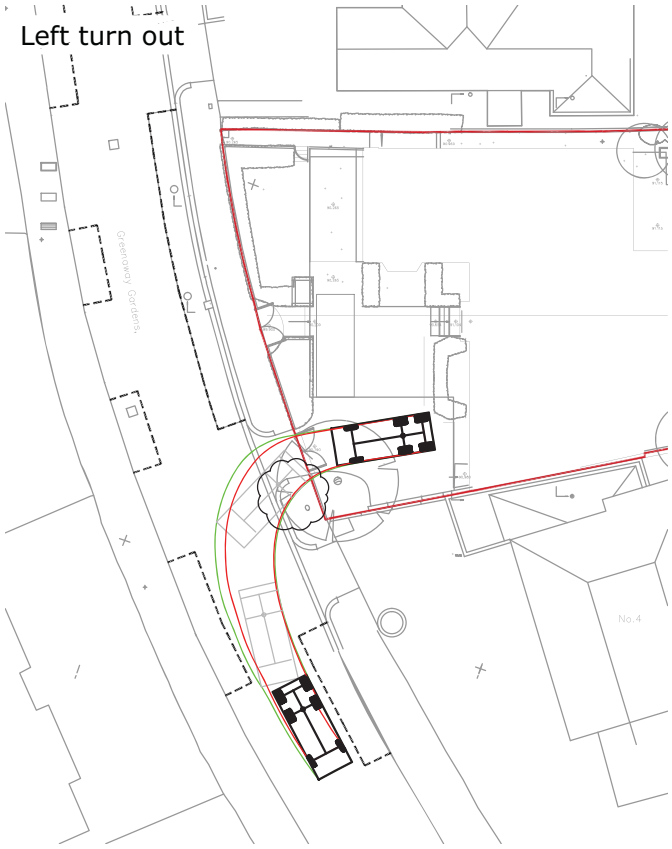

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WC2N 4JF

T: 020 7031 8141

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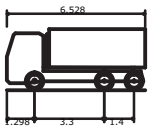

Small Tipper	
Overall Length	6.528m
Overall Width	2.495m
Overall Body Height	2.877m
Min Body Ground Clearance	0.327m
Track Width	2.393m
Lock to Lock Time	6.00s
Kerb to Kerb Turning Radius	7.850m

Project:
3 Greenaway Gardens

Title:
Swept Path Analysis

Scale: 1:500 (@ A4)

Drawing:
160106-TK05

Revision:
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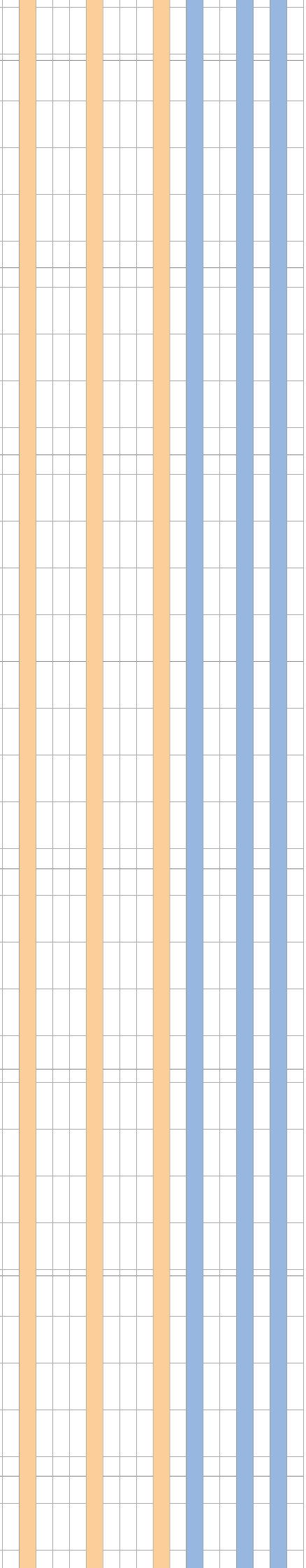


KP Acoustics Ltd
Britannia House
11 Glenthorne Road
London
W6 0LH

Tel: +44(0)208 222 8778
Fax: +44(0)208 222 8575
Email: info@kpacoustics.com
www.kpacoustics.com

3 GREENAWAY GARDENS, LONDON

Noise and Vibration Management Plan

Report 13718.NVMP.01

Prepared on 25 January 2016

For

Mr Yoav Tal
Unit 5, Sayer House
Oxgate Lane
London
NW2 7JN

Contents

1.0 INTRODUCTION

KP Acoustics has been commissioned by Mr Yoav Tal, Unit 5, Sayer House, Oxgate Lane, London, NW2 7JN, to compile a noise and vibration management plan for the project at 3 Greenaway Gardens, London following an environmental noise survey and background vibration measurements on site.

This report presents results from the environmental noise survey and vibration measurements with all information gathered from relevant documentation and the steps which should be adopted regarding noise and vibration in order to maintain the amenity of all sensitive receivers adjacent to the site.

2.0 ENVIRONMENTAL NOISE SURVEY

2.1 Procedure

A noise survey was undertaken at the position as shown in Figure 13718.SP1. This location was chosen in order to collect data representative of the worst-case levels expected at the nearest noise sensitive receiver, with additional manual measurements undertaken to assess noise level differences between front and rear facades of the property. Measurements of background vibration have also been undertaken to establish the existing vibration profile of the area. It is understood that the primary source of vibration on site will currently be local road traffic.

Continuous automated monitoring was undertaken for the duration of the survey between 11/01/16 and 12/01/16.

Weather conditions were generally dry with light winds and therefore suitable for the measurement of environmental noise. The measurement procedure complied with ISO 1996-2:2007 Acoustics “Description, measurement and assessment of environmental noise - Part 2: Determination of environmental noise levels”.

2.2 Equipment

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

- 1 No. Svantek Type 958A Class 1 Sound Level Meter
- 1 No. Svantek Type 958 Class 1 Sound Level Meter
- PCB 356B18 Tri-axial Accelerometer
- B&K Type 4231 Class 1 Calibrator

3.0 RESULTS

3.1 Noise Survey

The results from the continuous noise monitoring are shown as a time history of L_{Aeq}, L_{Amax}, L_{A10} and L_{A90} averaged over 5 minute sample periods in Figure 13718.TH1.

Existing background vibration levels are shown in Figures 13718.VS1-6, in terms of measured background RMS Acceleration in relation to the criteria curves of BS6472 in order to provide a representation of the typically low background vibration on site.

Average daytime and night time noise levels are shown in Table 4.1.

4.0 DISCUSSION

The site is bounded by Greenaway Gardens to the East, and residential buildings to all other façades. At the time of the survey, the background noise climate was dominated by road traffic noise from surrounding roads.

Measured noise levels are representative of noise exposure levels expected to be experienced by all façades of the proposed development.

	Level dB(A)
Position 1 - Rear	
Daytime $L_{Aeq,16hour}$	68
Night-time $L_{Aeq,8hour}$	49
Position 2 - Front	
Daytime $L_{Aeq,16hour}$	79
Night-time $L_{Aeq,8hour}$	60

Table 4.1 Site average noise levels for daytime and night time

5.0 NOISE & VIBRATION ELEMENTS

5.1 Noise

The effects of noise on all neighbouring premises can be varied and complicated. 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). As an alternative descriptor, the maximum sound pressure level, $L_{A(max)}$,or the one percentile level, L_{A01}, may be used.

With regards to noise levels, it is proposed that the absolute limit would be determined in accordance with BS5228-1:2009 and would be subject to an noise limit of 75dB $L_{Aeq:15min}$. As a result of the environmental noise survey, an overall daytime limit of 68dB(A) would be proposed, in order not to significantly exceed measured background noise levels over the daytime period.

5.2 Vibration

The assessment of sensitivity to vibration at different times of the day is far more complex than sensitivity to noise. The sensitivity of the human frame to vibration varies according to the axis of vibration relative to the human body (e.g. x, y or z axis) and to the frequency of vibration. In general, except at very low frequencies, sensitivity is greater in the z axis (i.e. head to foot). When setting vibration control targets it is reasonable to assume that people will normally be sitting or standing during the day and lying down during the night.

With an impulsive source of vibration, it is usual to measure the peak value attained from the beginning to the end of a drive. It is also usual to measure in terms of peak particle velocity (P.P.V) if the risk of damage to the building is the primary concern and there is also an interest in human reaction. If the concern is purely for human tolerance, then acceleration is the preferred parameter.

Vibrations, even of very low magnitude, may be perceptible to people and can interfere with the satisfactory conduct of certain delicate activities, e.g. operating theatres, use of very sensitive laboratory weighing equipment etc.

Nuisance from vibration is frequently associated with the assumption that, if vibrations can be felt, then damage is consequently inevitable; however, considerably greater levels of vibration are required to cause damage to buildings and structures than to be perceived by the human body.

Vibrations from site activities to the neighbourhood may therefore cause anxiety as well as annoyance and can disturb sleep, work or leisure activities. As with noise, in any neighbourhood, some individuals will be more sensitive to vibration than others.

6.0 CRITERIA FOR NOISE & VIBRATION

The following factors are typically used to assess the likelihood of disturbance caused by noise and vibration generating activities:

Site location

The relative location of a site in relation to noise or vibration sensitive receivers will be a determining factor. The closer a site is to sensitive premises, the higher the likelihood of complaints due to noise and vibration emanating from the site.

Ambient noise and vibration levels

As a result of the environmental noise survey, it is understood that the area is generally quiet with the main contribution to noise and vibration being road traffic from Finchley Road. This would indicate that there could be an increased likelihood of complaints due to the introduction of new noise sources, and the noise and vibration limits have been proposed accordingly.

However, the relationship between response and noise level difference may well be different. For example, a greater difference between the ambient noise level in the area and the new noise sources may be tolerated when it is known that the operations are of short duration. There is no known relationship between response and levels when comparing newly intruding and ambient vibrations.

Duration of site operations

In general, the longer the duration of all on-site operations, the more likely it is that noise or vibration from the site will potentially be an issue. In this respect, good public relations are very important. Local residents may be willing to accept a new status of noise and vibration if they know and understand the source and the duration of all operations. It is then important that site operations are carried out according to a stated 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 intruding within a dwelling during the day would not be an issue during the night. For dwellings, times of site operation outside normal weekday working hours 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 should be applied to any site which is to operate at night.

Attitude to the site operator

It is well established that “one’s music is somebody else’s noise” and vice-versa. People's attitudes to noise are always influenced by their attitudes to the noise source itself.

Noise and vibration generated from a site will tend to be accepted more willingly by local residents if they consider that the site operator is adopting best practicable means to avoid unnecessary noise.

Noise and vibration characteristics

In many cases the particular identity of noise and vibration will affect people’s judgement and appreciation of the signal itself. For example, the presence of a high-amplitude impulsive noise, accompanied by a vibration sensation would render the overall assessment slightly more onerous as “penalties” would need to be employed. These would comprise weightings to signals (e.g. 5dB(A) to a highly tonal or intermittent noise source).

7.0 NOISE AND VIBRATION MANAGEMENT PLAN

Deviation from approved method statements will be permitted only with prior approval from relevant parties. This will be facilitated by formal review before any deviation is undertaken.

Site Personnel

All operatives on site will be trained to ensure that noise minimisation and best practicable means (BPM) are implemented at all times. Works will be checked regularly by Site Engineers to ensure that BPM are being undertaken and where necessary corrective actions implemented.

Employees must 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.

General Noise and Vibration Control Measures

The Best Practicable Means (BPM) (as defined in Section 72 of the Control of Pollution Act 1974) will be used to reduce noise and vibration levels at all times. Where practicable the control measures set out in BS 5228:2009 + A1:2014 Part 1, Section 8 will also be implemented.

Recommended noise and vibration control measures include:

- 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

Recommended dust control measures include:

- 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
- Cutting equipment to be used with water suppressant and/or suitable extract system
- 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+

8.0 NOISE ASSESSMENT

Based on all sound pressure level figures provided in BS5228-1:2009 and in the absence of any manufacturer's noise emission levels, it is anticipated that site operations would generate levels within the range 90-95dB(A) in short term periods.

In this case, distance to the nearest noise sensitive receivers will be the main attenuating factor. It would be expected that with a distance of 5-10m from noise works to nearby bedroom windows, a reduction of 14dB to 20dB would be achievable. When taking into account the criteria of 75dB L_{Aeq} over a 15 minute period, it would be expected that this criteria would be met by site activities, provided that recommended noise control measures are implemented. Furthermore, the overall daytime criteria of 68dB(A) L_{Aeq}, would be expected to be met, due to an extended averaging period.

Please note that the above prediction is based solely on noise from typical site operations, unaffected from any other noise within the residential space (e.g. road traffic).

If noise disturbance is a persistent issue for neighbouring residences, under Example E4 BS 5228-1:2009+A1:2014 states:

"If the contractor has applied best practicable means to the provision of mitigation, i.e. all reasonable measures have been taken to reduce the noise levels, but levels are still such that widespread community disturbance or interference with activities or sleep is likely to occur, there are two further provisions that can be made if the construction activities are likely to continue for a significant period of time either continuously or sporadically. These are as follows:

a) Noise insulation (NI). This is the provision of secondary glazing to the windows of affected habitable rooms. Additional ventilation provision might also be necessary to allow the windows to be kept closed whilst maintaining the appropriate number of air changes in the room. Secondary glazing increases attenuation and this can provide a significant improvement to the internal noise environment

b) Temporary or permanent re-housing (TRH). Where construction noise levels are such that noise insulation will not provide sufficient attenuation to prevent disturbance or interference with activities or sleep, then the occupants can be temporarily re-housed away from the construction site. However, if the nature of the construction activities means that re-housing would be necessary for a significant extent of time, e.g. in excess of six months, then there might be advantages in offering

permanent re-housing, i.e. the property would be purchased by the developer and the occupants would purchase another property elsewhere. The property would then remain vacant or be used by site personnel for the duration of the works, after which it can be re-sold.

Where, in spite of the mitigation measures applied and any Section 61 consent under the Control of Pollution Act 1974, noise levels at some properties are expected to exceed trigger levels for the periods defined below, a scheme for the installation of noise insulation or the reasonable costs thereof, or a scheme to facilitate temporary rehousing of occupants, as appropriate, will be implemented by the developer or promoter. The scheme will include provision for the notification of affected parties."

Table E.2 of BS 5228-1:2009+A1:2014 provides example of time periods, averaging times and noise levels associated with the determination of eligibility for noise insulation and is represented below in Table 4.2 with the follow guidance for interpretation.

Examples of time periods, averaging times and noise levels associated with the determination of eligibility for noise insulation

Time	Relevant time period	Averaging time, *T*	Noise insulation trigger level dB $L_{Aeq,T}$ [A)]
Monday to Friday	07.00 – 08.00	1 h	70
	08.00 – 18.00	10 h	75
	18.00 – 19.00	1 h	70
	19.00 – 22.00	3 h	65
	22.00 – 07.00	1 h	55
Saturday	07.00 – 08.00	1 h	70
	08.00 – 13.00	5 h	75
	13.00 – 14.00	1 h	70
	14.00 – 22.00	3 h	65
	22.00 – 07.00	1 h	55
Sunday and Public Holidays	07.00 – 21.00	1 h	65
	21.00 – 07.00	1 h	55

A) All noise levels are predicted or measured at a point 1 m in front of the most exposed of any windows and doors in any façade of any eligible dwelling.

Noise insulation, or the reasonable costs thereof, will be offered by the developer or promoter to owners, where applied for by owners or occupiers, subject to meeting the other requirements of the proposed scheme, where the construction of the development causes, or is expected to cause, a measured or predicted airborne construction noise

level that exceeds either of the following at property lawfully occupied as a permanent dwelling:

- the noise insulation trigger levels presented in Table E.2 for the corresponding times of day;
- a noise level 5 dB or more above the existing pre-construction ambient noise level for the corresponding times of day; whichever is the higher; and for a period of 10 or more days of working in any 15 consecutive days or for a total number of days exceeding 40 in any 6 consecutive months."

9.0 VIBRATION ASSESSMENT

This section presents an assessment of the potential risk regarding vibration generated by the construction works detailed in this document, and the associated adverse effects on the surrounding area.

Guidance Vibration Limits

Estimated vibration levels have been evaluated against guidance presented in relevant British Standards in order to assess the likelihood of both structural damage to neighbouring buildings and the human response of the occupants.

Building Damage

According to BS 7385 Part 2 for residential or light commercial buildings, the threshold for the onset of potential cosmetic damage (i.e. formation of hairline cracks on drywall surfaces or the growth of existing cracks in plaster or drywall surfaces) to buildings varies with frequency. This ranges from a PPV of 15 mm/s at 4Hz, rising to 20mm/s at 15 Hz, and to 50 mm/s at and above 40Hz for transient vibration. BS 7385: Part 2 also states that the probability of building damage tends towards zero at 12.5 mm/s peak component particle velocity.

Line (see Figure 6.1)	Type of Building	Peak component particle velocity in frequency range of predominant pulse	
		4Hz to 15Hz	15Hz and above
1	Reinforced or framed structures. Industrial and heavy commercial buildings	50mm/s at 4Hz and above	
2	Unreinforced or light framed structures. Residential or light commercial type buildings	15mm/s at 4Hz increasing to 20mm/s at 15Hz	20mm/s at 15Hz increasing to 50mm/s at 40Hz and above

Note 1: Values referred to are at the base of the building
Note 2: For Line 2, at frequencies below 4Hz, a maximum displacement of 0.6mm (zero to peak) should not be exceeded

Table 6.1: Transient Vibration Guide Values for Cosmetic Damage (from BS 7385: Part 2:1993)

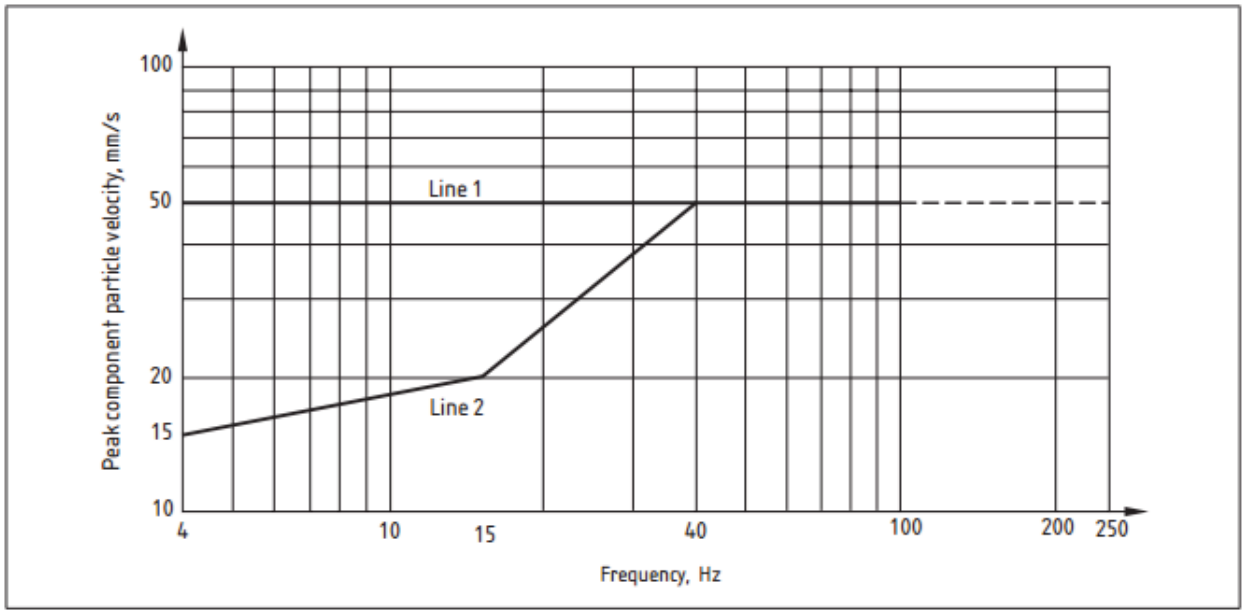


Figure 6.1: Summary of Damage Thresholds for Transient Vibration on Domestic Structures

Subjective Response

According to guidance provided in BS 5228 Part 2 , the threshold of vibration perceptible to humans lies around 0.14 to 0.3 mm/s. The Standard also indicates that a PPVs of around 1 mm/s in residential environments, as a first estimate, are likely to cause complaints, but can be tolerable provided prior warning and explanation of the works is given to residents; whilst, vibration magnitudes of around 10 mm/s are likely to be intolerable for more than a very brief exposure to this level.

As in the case above, the nature of all machinery due to be used is not known. This makes the prediction of vibration levels at adjacent dwellings very difficult.

On consideration of the above, a two-stage criterion is recommended:

- 5 mm/s p.p.v. 'soft' limit; when exceeded, the contractor should temporarily halt works. Works should only be resumed after consultation with the local residents, and with extreme caution
- 10 mm/s p.p.v. 'hard' limit; when exceeded, the contractor should stop work. Works should only continue after a thorough structural examination of the adjacent property, subsequent consultation with the local residents, and then with extreme

caution. Should significant damage be identified, alternative methods of land remediation operations should be adopted.

From previous experience on similar sites, it is unlikely that vibration would be an issue to local residents. A snapshot of vibration monitoring during continuous HGV movement at 5m from the road, is shown in Figure 6.2.

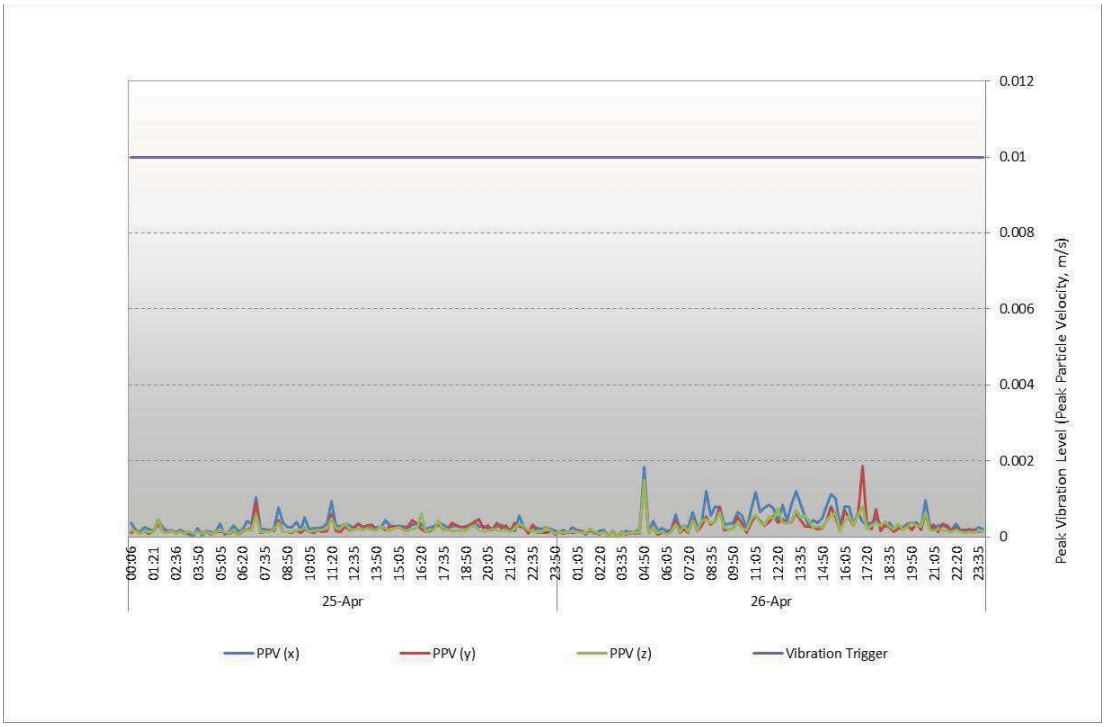


Figure 6.2: Results from vibration monitoring of HGV movements (similar scenario)

As can be seen from Figure 6.2, vibration levels are significantly lower than the limits set above, posing no threat to the local residents. Please note that this is for indicative purposes and would not reflect the predicted vibration levels in this project.

10.0 CONCLUSION

KP Acoustics has been commissioned to undertake a preliminary assessment of noise and vibration levels from all site operations at 3 Greenaway Gardens, London, in order to provide initial advice on the control of noise and vibration on site.

Information on good practice steps have been provided, while a realistic approach has been adopted regarding the maximum noise and vibration levels which should be met on site.

In order to predict specific noise levels to be experienced on site and at the nearest noise sensitive receivers, further information would be required, such as manufacturer noise emissions data for plant items operating on site. Initial predictions for noise and vibration

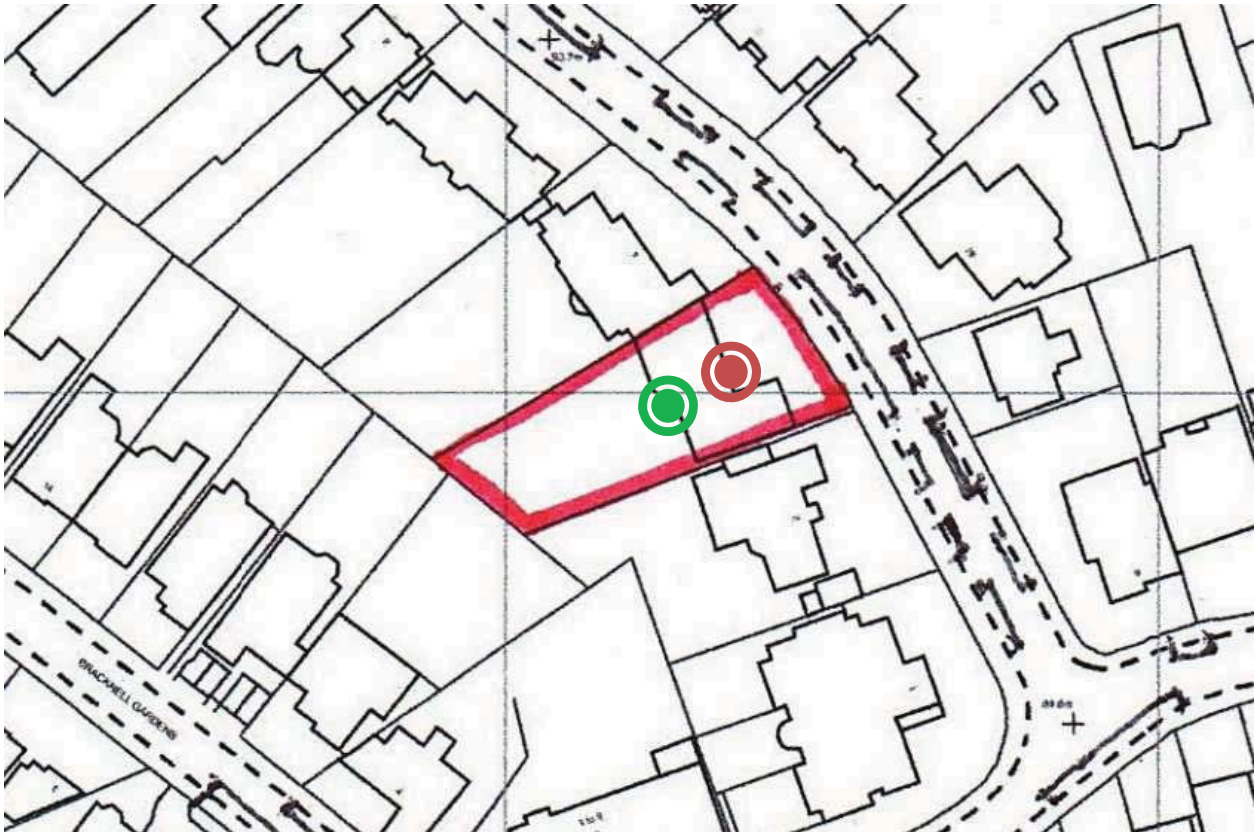
however indicate that provided that the guidelines provided within this report are followed, any disturbance caused by noise or vibration will be minimised.

Report by

Kenny Macleod AMIOA
KP Acoustics Ltd.

Checked by

Kyriakos Papanagiotou MIOA
KP Acoustics Ltd.



Title:
Indicative site plan showing noise and vibration monitoring positions

Date: 25 January 2016

FIGURE 13718.SP1

KP acoustics

3 Greenaway Gardens, London
Environmental Noise Time History
11th January to 12th January 2016

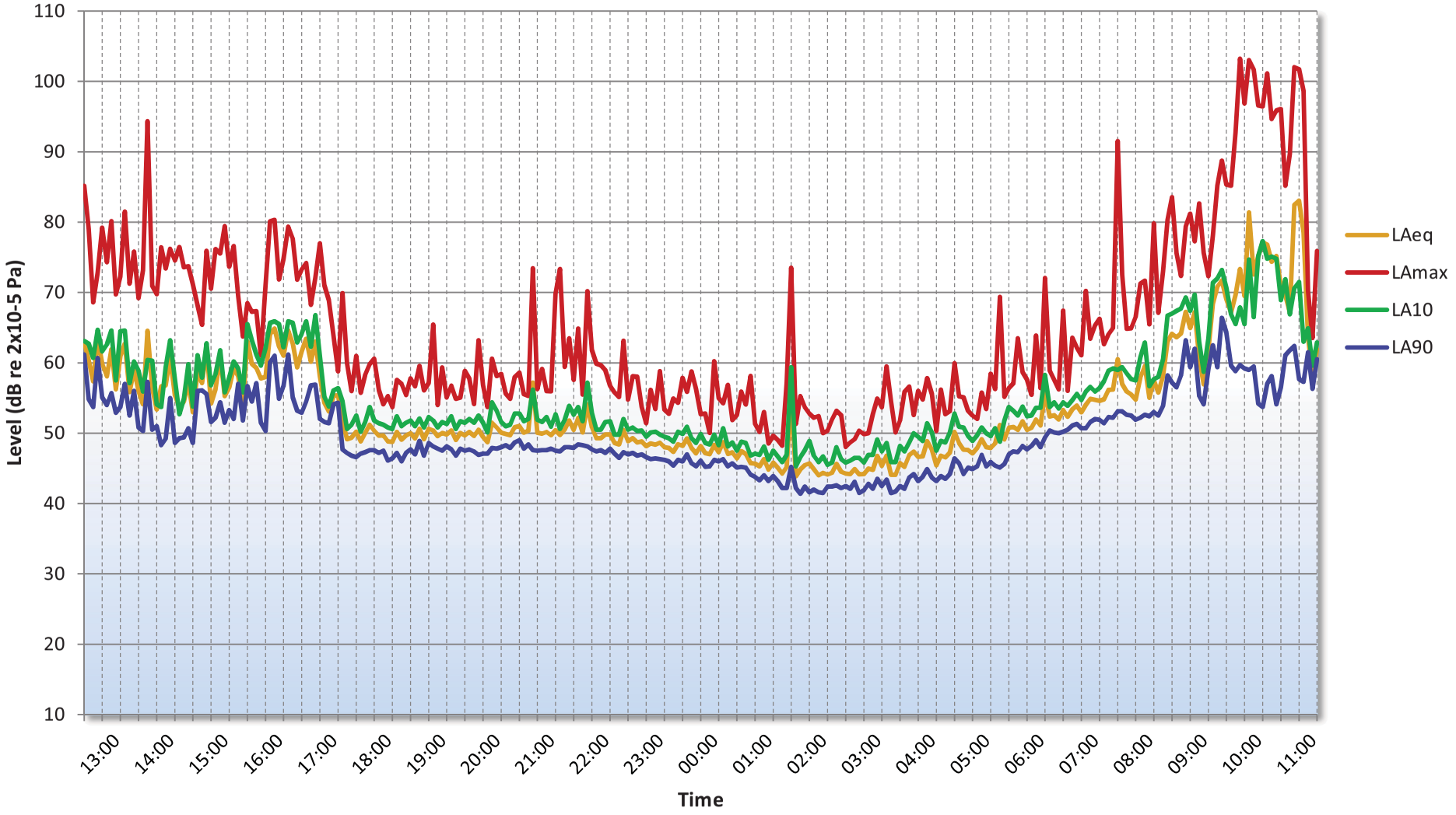


Figure 13718.TH1

3 Greenaway Gardens, London

MAXIMUM HORIZONTAL VIBRATION LEVELS

X-AXIS

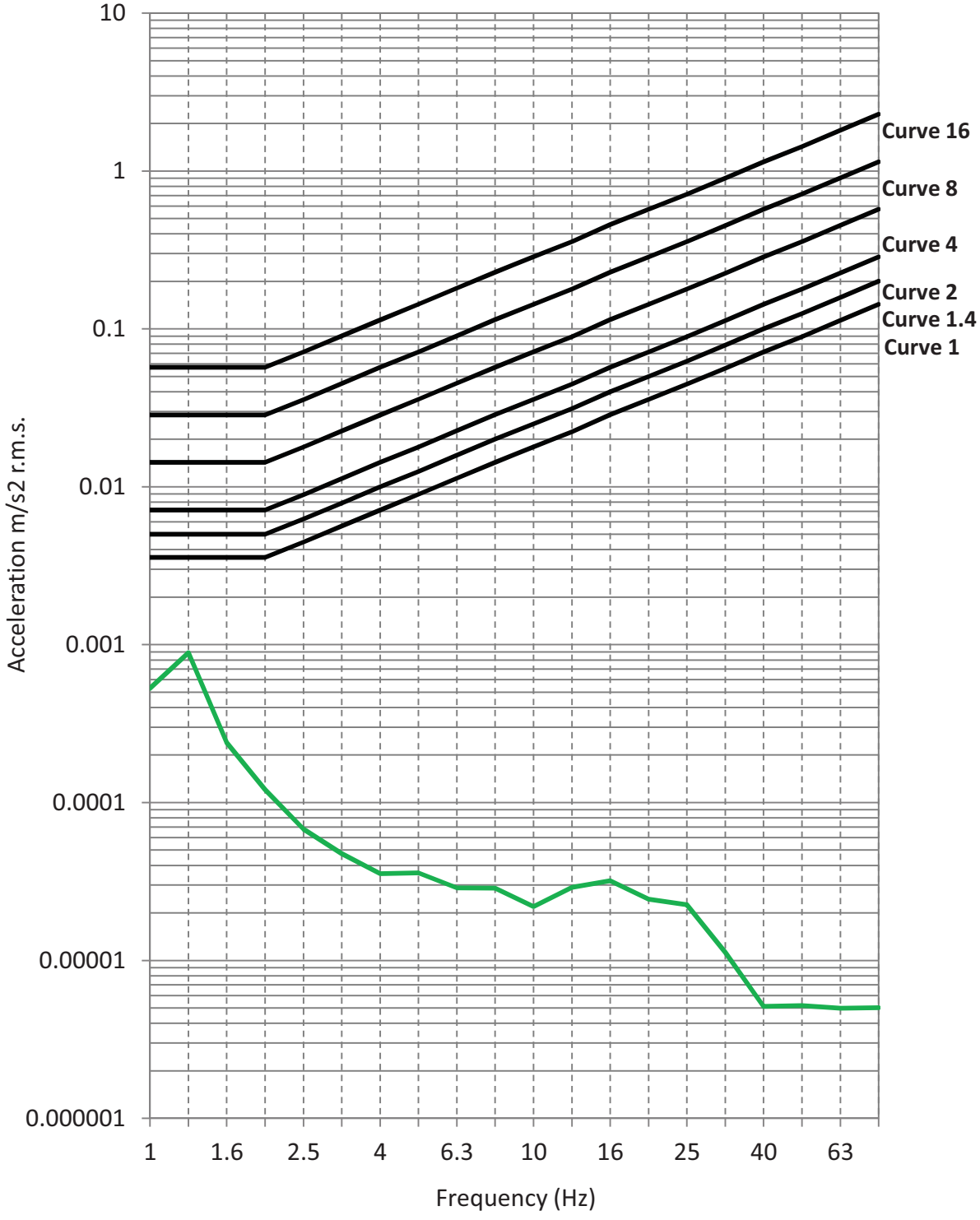


Figure 13718.VS1

3 Greenaway Gardens, London

MAXIMUM HORIZONTAL VIBRATION LEVELS

Y-AXIS

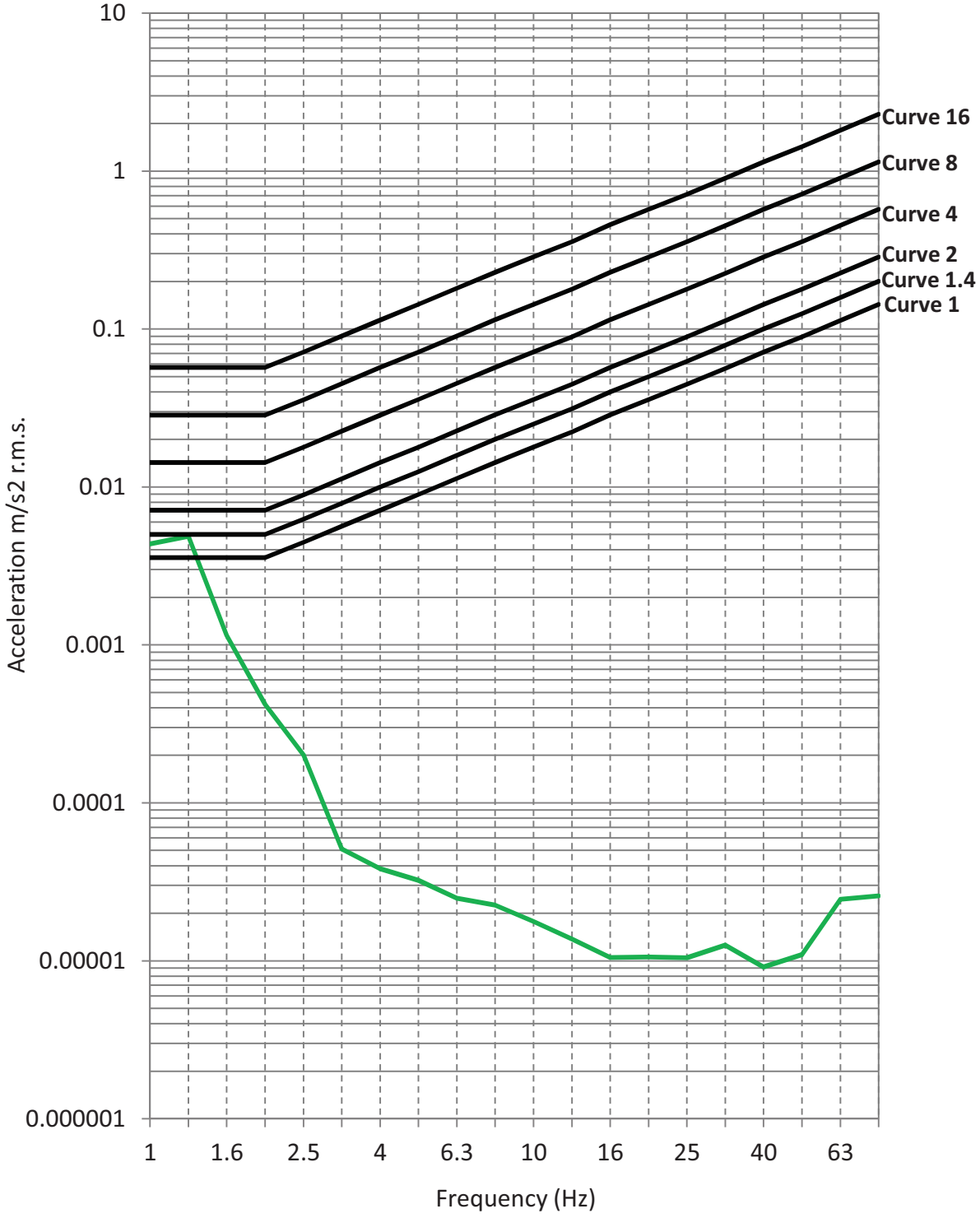


Figure 13718.VS2

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3 Greenaway Gardens, London

MAXIMUM VERTICAL VIBRATION LEVELS

Z-AXIS

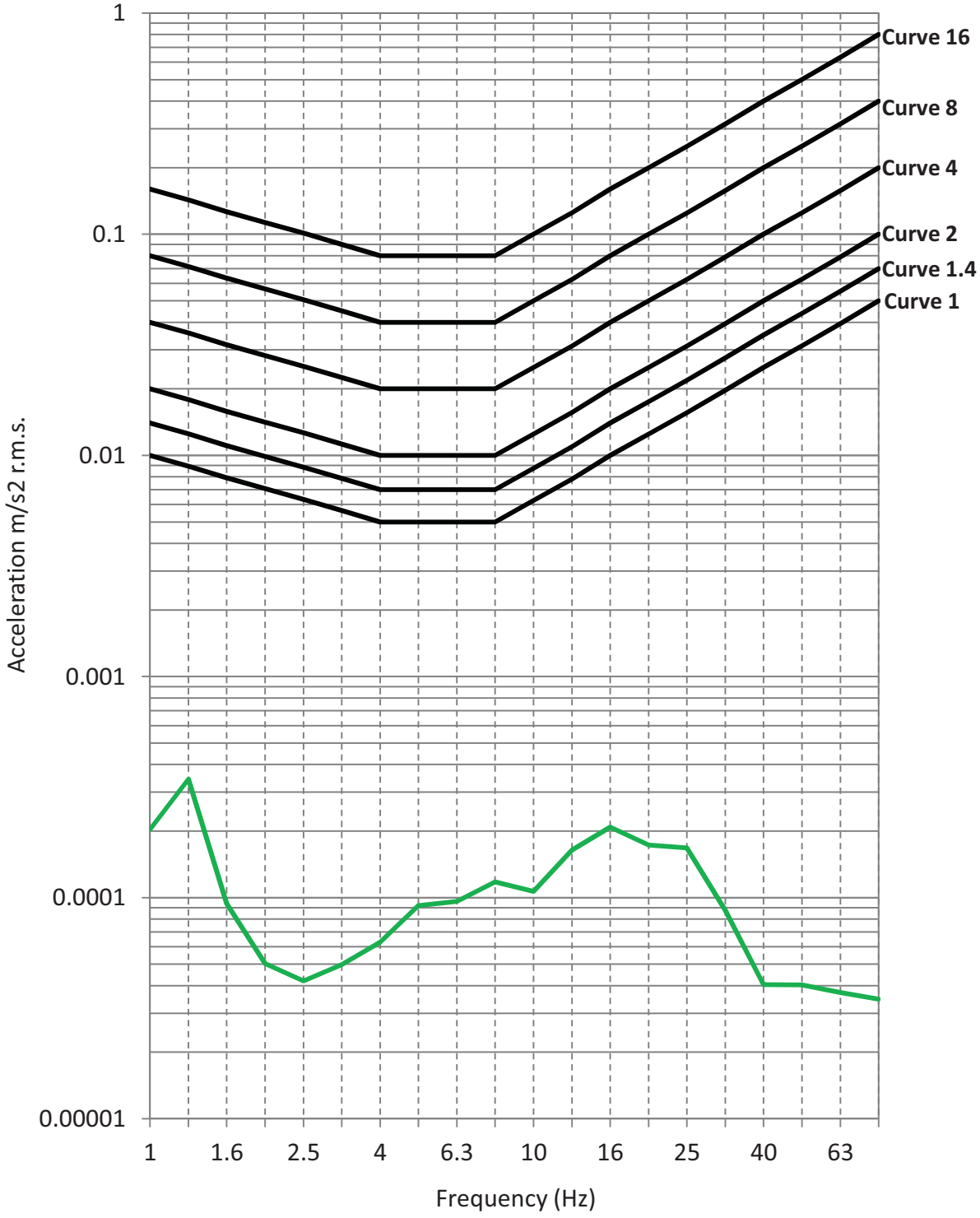


Figure 13718.VS3

3 Greenaway Gardens, London

MAXIMUM HORIZONTAL VIBRATION LEVELS

X-AXIS

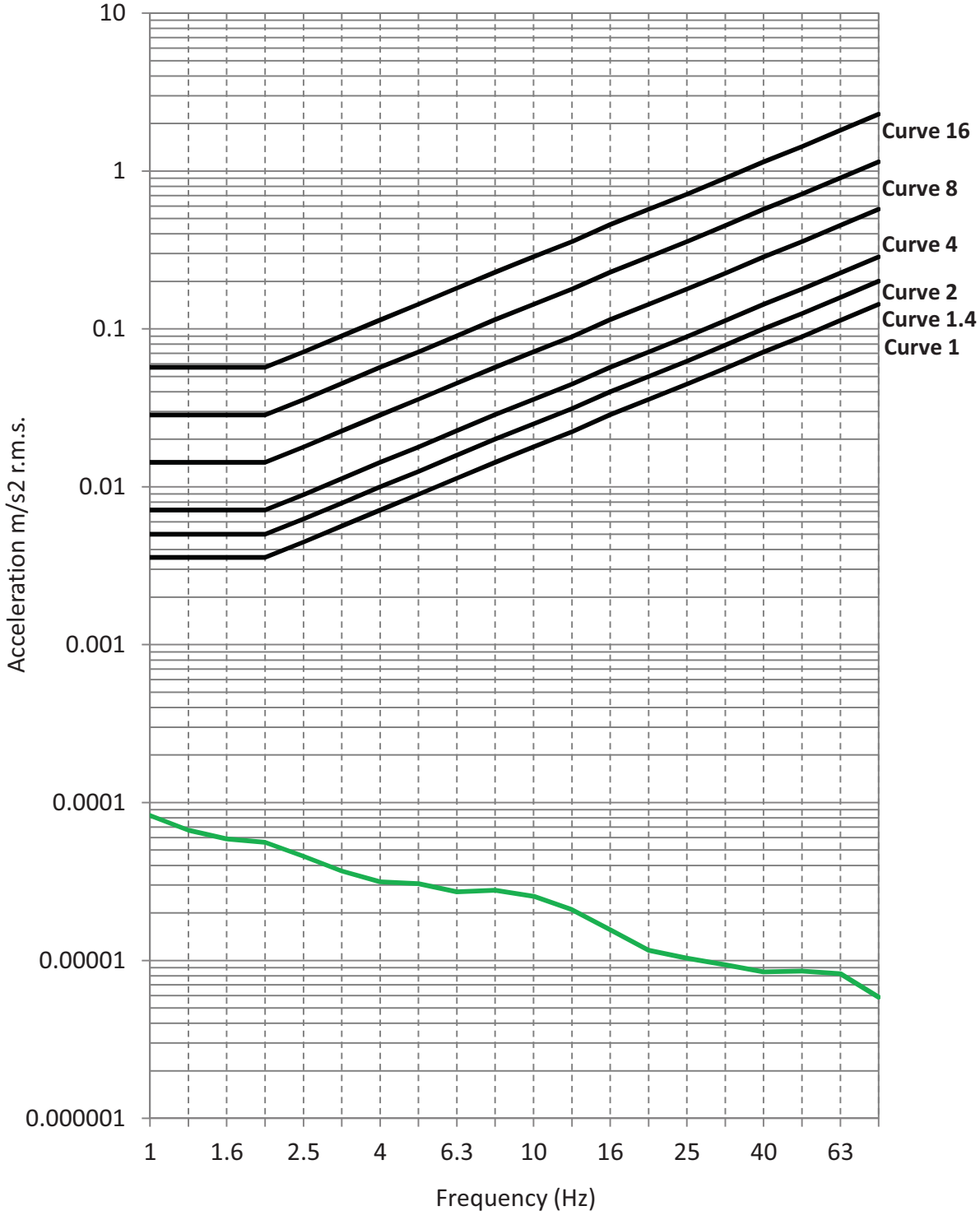


Figure 13718.VS4

3 Greenaway Gardens, London

MAXIMUM HORIZONTAL VIBRATION LEVELS

Y-AXIS

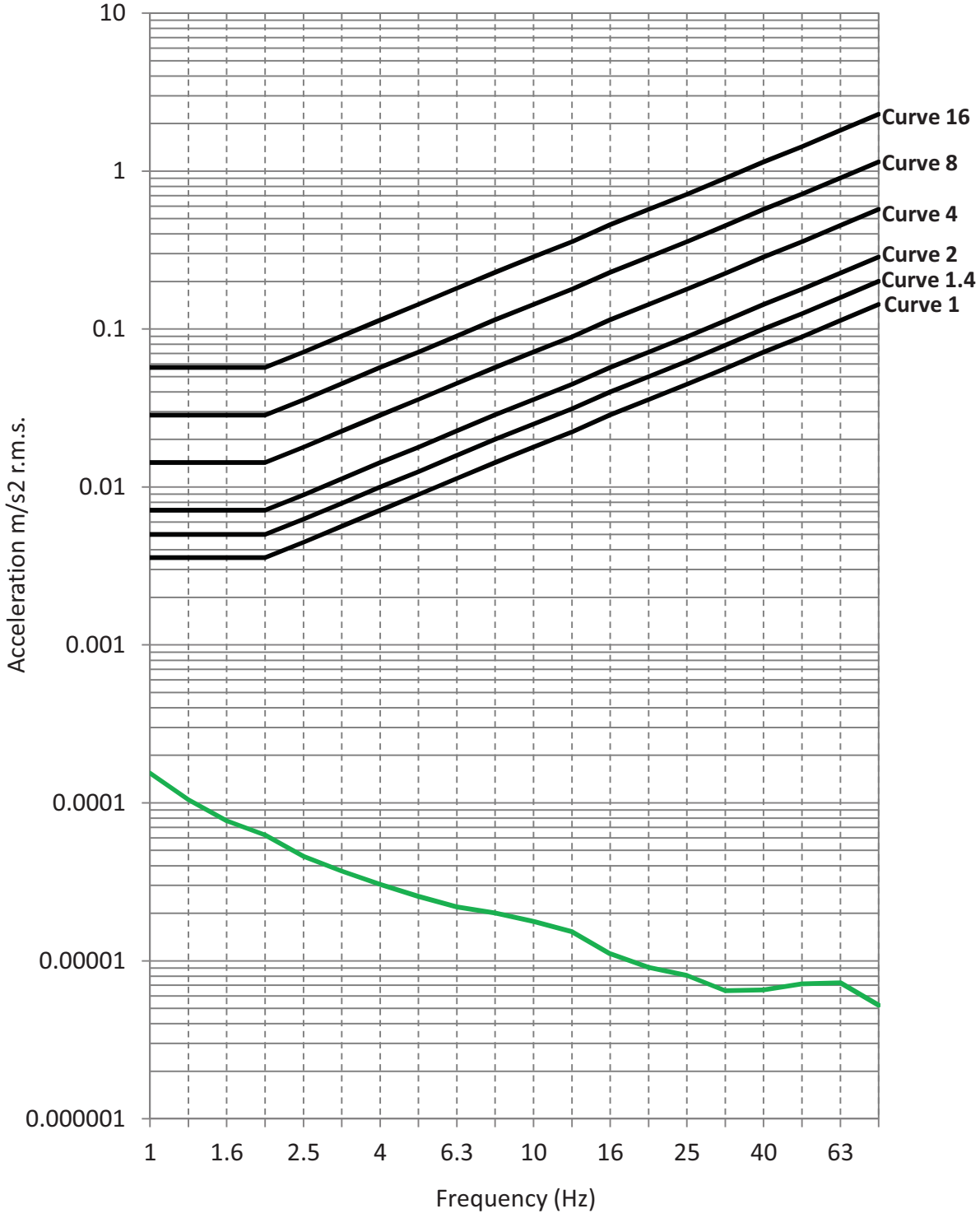


Figure 13718.VS5

3 Greenaway Gardens, London

MAXIMUM VERTICAL VIBRATION LEVELS

Z-AXIS

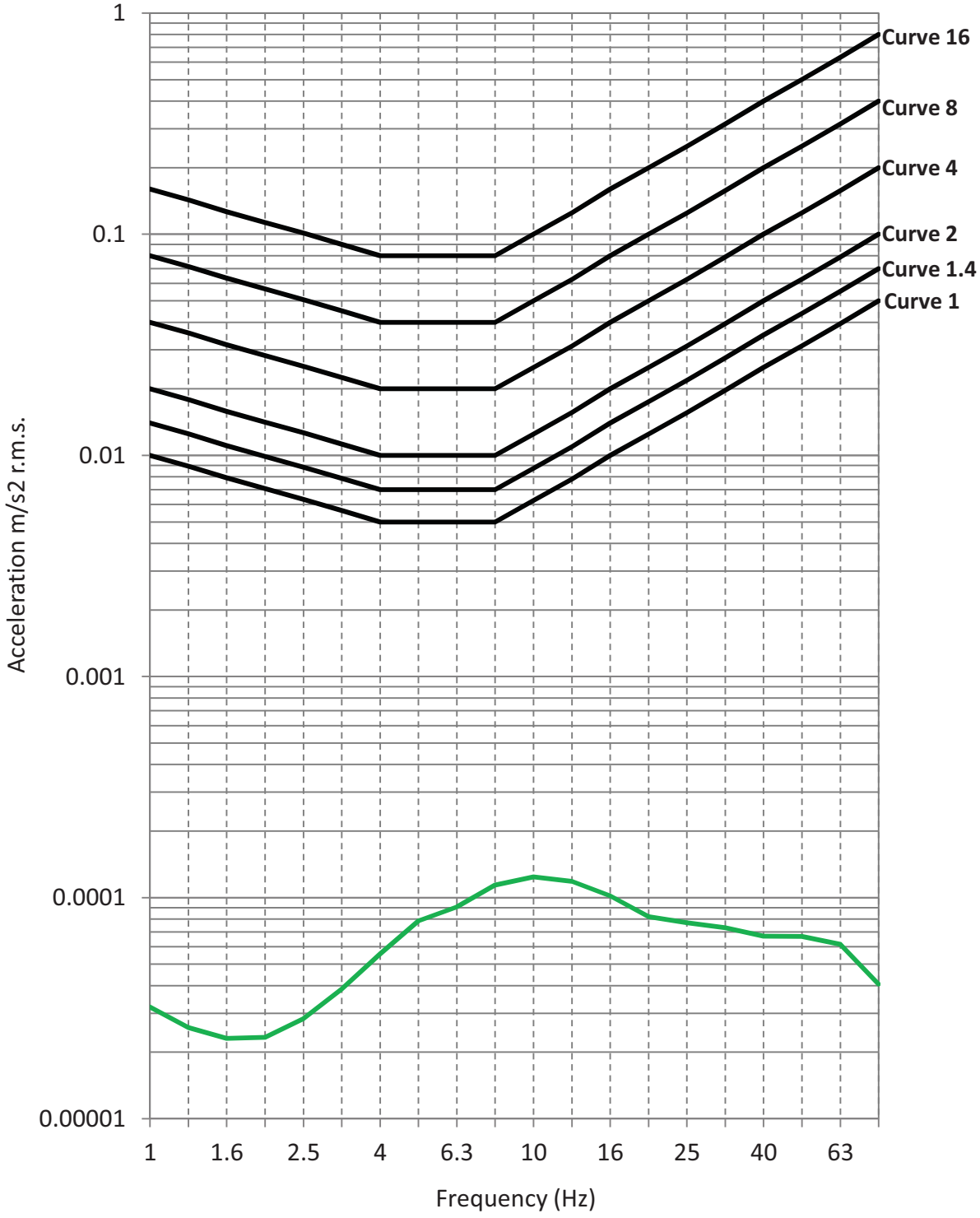


Figure 13718.VS6

KP Acoustics Ltd
Britannia House
11 Glenthorne Road
London
W6 0LH

Tel: +44(0)208 222 8778
Fax: +44(0)208 222 8575
Email: info@kpacoustics.com
www.kpacoustics.com

3 GREENAWAY GARDENS, LONDON

Noise and Vibration Management Plan

Report 13718.NVMP.01 Rev.A

Prepared on 26 May 2016

For

Mr Yoav Tal
Unit 5, Sayer House
Oxgate Lane
London
NW2 7JN

Contents

1.0 INTRODUCTION

KP Acoustics has been commissioned by Mr Yoav Tal, Unit 5, Sayer House, Oxgate Lane, London, NW2 7JN, to compile a noise and vibration management plan for the project at 3 Greenaway Gardens, London following an environmental noise survey and background vibration measurements on site.

This report presents results from the environmental noise survey and vibration measurements with all information gathered from relevant documentation and the steps which should be adopted regarding noise and vibration in order to maintain the amenity of all sensitive receivers adjacent to the site.

2.0 ENVIRONMENTAL NOISE SURVEY

2.1 Procedure

A noise survey was undertaken at the position as shown in Figure 13718.SP1. This location was chosen in order to collect data representative of the worst-case levels expected at the nearest noise sensitive receiver, with additional manual measurements undertaken to assess noise level differences between front and rear facades of the property. Measurements of background vibration have also been undertaken to establish the existing vibration profile of the area. It is understood that the primary source of vibration on site will currently be local road traffic.

Continuous automated monitoring was undertaken for the duration of the survey between 11/01/16 and 12/01/16.

Weather conditions were generally dry with light winds and therefore suitable for the measurement of environmental noise. The measurement procedure complied with ISO 1996-2:2007 Acoustics “Description, measurement and assessment of environmental noise - Part 2: Determination of environmental noise levels”.

2.2 Equipment

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

- 1 No. Svantek Type 958A Class 1 Sound Level Meter
- 1 No. Svantek Type 958 Class 1 Sound Level Meter
- PCB 356B18 Tri-axial Accelerometer
- B&K Type 4231 Class 1 Calibrator

3.0 RESULTS

3.1 Noise Survey

The results from the continuous noise monitoring are shown as a time history of L_{Aeq}, L_{Amax}, L_{A10} and L_{A90} averaged over 5 minute sample periods in Figure 13718.TH1.

Existing background vibration levels are shown in Figures 13718.VS1-6, in terms of measured background RMS Acceleration in relation to the criteria curves of BS6472 in order to provide a representation of the typically low background vibration on site.

Average daytime and night time noise levels are shown in Table 4.1.

4.0 DISCUSSION

The site is bounded by Greenaway Gardens to the East, and residential buildings to all other façades. At the time of the survey, the background noise climate was dominated by road traffic noise from surrounding roads.

Measured noise levels are representative of noise exposure levels expected to be experienced by all façades of the proposed development.

	Level dB(A)
Position 1 - Rear	
Daytime $L_{Aeq,16hour}$	68
Night-time $L_{Aeq,8hour}$	49
Position 2 - Front	
Daytime $L_{Aeq,16hour}$	79
Night-time $L_{Aeq,8hour}$	60

Table 4.1 Site average noise levels for daytime and night time

5.0 NOISE & VIBRATION ELEMENTS

5.1 Noise

The effects of noise on all neighbouring premises can be varied and complicated. 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). As an alternative descriptor, the maximum sound pressure level, $L_{A(max)}$,or the one percentile level, L_{A01}, may be used.

With regards to noise levels, it is proposed that the absolute limit would be determined in accordance with BS5228-1:2009 and would be subject to an noise limit of 75dB $L_{Aeq:15min}$. As a result of the environmental noise survey, an overall daytime limit of 68dB(A) would be proposed, in order not to significantly exceed measured background noise levels over the daytime period.

5.2 Vibration

The assessment of sensitivity to vibration at different times of the day is far more complex than sensitivity to noise. The sensitivity of the human frame to vibration varies according to the axis of vibration relative to the human body (e.g. x, y or z axis) and to the frequency of vibration. In general, except at very low frequencies, sensitivity is greater in the z axis (i.e. head to foot). When setting vibration control targets it is reasonable to assume that people will normally be sitting or standing during the day and lying down during the night.

With an impulsive source of vibration, it is usual to measure the peak value attained from the beginning to the end of a drive. It is also usual to measure in terms of peak particle velocity (P.P.V) if the risk of damage to the building is the primary concern and there is also an interest in human reaction. If the concern is purely for human tolerance, then acceleration is the preferred parameter.

Vibrations, even of very low magnitude, may be perceptible to people and can interfere with the satisfactory conduct of certain delicate activities, e.g. operating theatres, use of very sensitive laboratory weighing equipment etc.

Nuisance from vibration is frequently associated with the assumption that, if vibrations can be felt, then damage is consequently inevitable; however, considerably greater levels of vibration are required to cause damage to buildings and structures than to be perceived by the human body.

Vibrations from site activities to the neighbourhood may therefore cause anxiety as well as annoyance and can disturb sleep, work or leisure activities. As with noise, in any neighbourhood, some individuals will be more sensitive to vibration than others.

6.0 CRITERIA FOR NOISE & VIBRATION

The following factors are typically used to assess the likelihood of disturbance caused by noise and vibration generating activities:

Site location

The relative location of a site in relation to noise or vibration sensitive receivers will be a determining factor. The closer a site is to sensitive premises, the higher the likelihood of complaints due to noise and vibration emanating from the site.

Ambient noise and vibration levels

As a result of the environmental noise survey, it is understood that the area is generally quiet with the main contribution to noise and vibration being road traffic from Finchley Road. This would indicate that there could be an increased likelihood of complaints due to the introduction of new noise sources, and the noise and vibration limits have been proposed accordingly.

However, the relationship between response and noise level difference may well be different. For example, a greater difference between the ambient noise level in the area and the new noise sources may be tolerated when it is known that the operations are of short duration. There is no known relationship between response and levels when comparing newly intruding and ambient vibrations.

Duration of site operations

In general, the longer the duration of all on-site operations, the more likely it is that noise or vibration from the site will potentially be an issue. In this respect, good public relations are very important. Local residents may be willing to accept a new status of noise and vibration if they know and understand the source and the duration of all operations. It is then important that site operations are carried out according to a stated 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 intruding within a dwelling during the day would not be an issue during the night. For dwellings, times of site operation outside normal weekday working hours 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 should be applied to any site which is to operate at night.

Attitude to the site operator

It is well established that “one’s music is somebody else’s noise” and vice-versa. People's attitudes to noise are always influenced by their attitudes to the noise source itself.

Noise and vibration generated from a site will tend to be accepted more willingly by local residents if they consider that the site operator is adopting best practicable means to avoid unnecessary noise.

Noise and vibration characteristics

In many cases the particular identity of noise and vibration will affect people’s judgement and appreciation of the signal itself. For example, the presence of a high-amplitude impulsive noise, accompanied by a vibration sensation would render the overall assessment slightly more onerous as “penalties” would need to be employed. These would comprise weightings to signals (e.g. 5dB(A) to a highly tonal or intermittent noise source).

7.0 NOISE AND VIBRATION MANAGEMENT PLAN

Deviation from approved method statements will be permitted only with prior approval from relevant parties. This will be facilitated by formal review before any deviation is undertaken.

Site Personnel

All operatives on site will be trained to ensure that noise minimisation and best practicable means (BPM) are implemented at all times. Works will be checked regularly by Site Engineers to ensure that BPM are being undertaken and where necessary corrective actions implemented.

Employees must 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.

General Noise and Vibration Control Measures

The Best Practicable Means (BPM) (as defined in Section 72 of the Control of Pollution Act 1974) will be used to reduce noise and vibration levels at all times. Where practicable the control measures set out in BS 5228:2009 + A1:2014 Part 1, Section 8 will also be implemented.

Recommended noise and vibration control measures include:

- 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

Recommended dust control measures include:

- 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
- Cutting equipment to be used with water suppressant and/or suitable extract system
- 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+

8.0 NOISE ASSESSMENT

The client has confirmed that the operations on site will be as follows per project phase, with typical noise data from BS5228. Operating hours are proposed to be from 08:00 – 18:00, with a realistic 50% on-time applied.

Operation	Activity Equivalent Continuous Sound Pressure Level L_{eq} at 10m BS8228 Noise Emissions dB(A)
110v Heavy Breakers	92
110v Medium Duty Breakers	83
110v 9" Grinders	85
13 Tonne Excavator With Pecker/ Breaker	90
5 Tonne Dumper	78
Muck Away Lorry	79
Site Concrete Crusher	82
Diesel Compressor With 25kg Sullair Breakers	65

Table 8.1: BS5228:2009 Noise Emissions Data for Site Operations – Phase 1

Operation	Activity Equivalent Continuous Sound Pressure Level L_{eq} at 10m BS8228 Noise Emissions dB(A)
Cfa Piling Rig	79
13 Tonne Excavator	74
5 Tonne Dumper	78
Concrete Lorry	80
Static Concrete Pump	67

Table 8.2: BS5228:2009 Noise Emissions Data for Site Operations – Phase 2

Operation	Activity Equivalent Continuous Sound Pressure Level L_{eq} at 10m BS8228 Noise Emissions dB(A)
Petrol Grinders	91
110V Hammer Drills	77
Static Concrete Pump	67
Concrete Lorries	80
110V Concrete Vibrator/ Poker	78
Hand Tools/ Impact Battery Cordless	73

Table 8.3: BS5228:2009 Noise Emissions Data for Site Operations – Phase 3

Based on all sound pressure level figures provided in BS5228-1:2009, noise emissions from proposed operations on site have been predicted at the nearest noise sensitive receiver. These predictions take into account the daytime average LAeq, and time weighting applied to operations over the 10 hour working period. The results of these predictions are shown in Tables 8.4-8.6 below, with detailed calculations shown in 13718.Appendices B1-3.

Operation Required for Phase 1	Predicted Noise Level at Receiver $L_{Aeq,10hours}$	Criterion
110v Heavy Breakers	82.6 dB	75 dB(A)
110v Medium Duty Breakers	74.6 dB	
110v 9” Grinders	76.2 dB	
13 Tonne Excavator With Pecker/ Breaker	80.7 dB	
5 Tonne Dumper	71.3 dB	
Muck Away Lorry	70.5 dB	
Site Concrete Crusher	73.8 dB	
Diesel Compressor With 25kg Sullair Breakers	68.2 dB	

Table 8.4: Predicted noise level and criterion at nearest noise sensitive location – Phase 1

Operation Required for Phase 2	Predicted Noise Level at Receiver $L_{Aeq,10hours}$	Criterion
CFA Piling Rig	71.8	75 dB(A)
13 Tonne Excavator	69.6	
5 Tonne Dumper	71.3	
Concrete Lorry	71.0	
Static Concrete Pump	68.4	

Table 8.5: Predicted noise level and criterion at nearest noise sensitive location – Phase 2

Operation Required for Phase 3	Predicted Noise Level at Receiver $L_{Aeq,10hours}$	Criterion
Petrol Grinders	81.7	75 dB(A)
110V Hammer Drills	70.8	
Static Concrete Pump	68.4	
Concrete Lorries	71.0	
110V Concrete Vibrator/ Poker	71.3	
Hand Tools/ Impact Battery Cordless	69.3	

Table 8.6: Predicted noise level and criterion at nearest noise sensitive location – Phase 3

As shown in Appendix B1-3 and Tables 8.4-8.6, transmission of noise to the nearest residential windows due to the works without further noise control measures will generally fall within the noise emissions criterion. In some cases, noisy works may marginally exceed the noise emissions criterion depending upon their operating times. It would therefore be recommended that wherever possible, operational times for these operations are kept to an absolute minimum.

Should it be essential to utilise the heavy breakers, excavator with breaker attachment, or petrol grinders, for more than 2-3 hours per day, we would recommend the use of portable noise screens to obstruct line of sight between the noise sensitive receiver and the operation.

As a general step to reduce noise emissions from the site, all equipment should be fitted with silencers or mufflers where possible. At all times, site operations should be undertaken using the least noise generating methodology possible.

It would be recommended that at all times when working on site, noise monitoring is undertaken to alert site staff when noise emissions criteria are being approached in order to reduce operations accordingly.

If noise disturbance is a persistent issue for neighbouring residences, under Example E4 BS 5228-1:2009+A1:2014 states:

"If the contractor has applied best practicable means to the provision of mitigation, i.e. all reasonable measures have been taken to reduce the noise levels, but levels are still such that widespread community disturbance or interference with activities or sleep is likely to occur, there are two further provisions that can be made if the construction activities are likely to continue for a significant period of time either continuously or sporadically. These are as follows:

a) Noise insulation (NI). This is the provision of secondary glazing to the windows of affected habitable rooms. Additional ventilation provision might also be necessary to allow the windows to be kept closed whilst maintaining the appropriate number of air changes in the room. Secondary glazing increases attenuation and this can provide a significant improvement to the internal noise environment

b) Temporary or permanent re-housing (TRH). Where construction noise levels are such that noise insulation will not provide sufficient attenuation to prevent disturbance or interference with activities or sleep, then the occupants can be temporarily re-housed away from the construction site. However, if the nature of the construction activities means that re-housing would be necessary for a significant extent of time, e.g. in excess of six months, then there might be advantages in offering permanent re-housing, i.e. the property would be purchased by the developer and the occupants would purchase another property elsewhere. The property would then remain vacant or be used by site personnel for the duration of the works, after which it can be re-sold.

Where, in spite of the mitigation measures applied and any Section 61 consent under the Control of Pollution Act 1974, noise levels at some properties are expected to exceed trigger levels for the periods defined below, a scheme for the installation of noise insulation or the reasonable costs thereof, or a scheme to facilitate temporary rehousing of occupants, as appropriate, will be implemented by the developer or promoter. The scheme will include provision for the notification of affected parties."

Table E.2 of BS 5228-1:2009+A1:2014 provides example of time periods, averaging times and noise levels associated with the determination of eligibility for noise insulation and is represented below in Table 4.2 with the follow guidance for interpretation.

Examples of time periods, averaging times and noise levels associated with the determination of eligibility for noise insulation

Time	Relevant time period	Averaging time, *T*	Noise insulation trigger level dB $L_{Aeq,T}$ [A)]
Monday to Friday	07.00 – 08.00	1 h	70
	08.00 – 18.00	10 h	75
	18.00 – 19.00	1 h	70
	19.00 – 22.00	3 h	65
	22.00 – 07.00	1 h	55
Saturday	07.00 – 08.00	1 h	70
	08.00 – 13.00	5 h	75
	13.00 – 14.00	1 h	70
	14.00 – 22.00	3 h	65
	22.00 – 07.00	1 h	55
Sunday and Public Holidays	07.00 – 21.00	1 h	65
	21.00 – 07.00	1 h	55

A) All noise levels are predicted or measured at a point 1 m in front of the most exposed of any windows and doors in any façade of any eligible dwelling.

Noise insulation, or the reasonable costs thereof, will be offered by the developer or promoter to owners, where applied for by owners or occupiers, subject to meeting the other requirements of the proposed scheme, where the construction of the development causes, or is expected to cause, a measured or predicted airborne construction noise level that exceeds either of the following at property lawfully occupied as a permanent dwelling:

- the noise insulation trigger levels presented in Table E.2 for the corresponding times of day;
- a noise level 5 dB or more above the existing pre-construction ambient noise level for the corresponding times of day; whichever is the higher; and for a period of 10 or more days of working in any 15 consecutive days or for a total number of days exceeding 40 in any 6 consecutive months."

9.0 VIBRATION ASSESSMENT

This section presents an assessment of the potential risk regarding vibration generated by the construction works detailed in this document, and the associated adverse effects on the surrounding area.

Guidance Vibration Limits

Estimated vibration levels have been evaluated against guidance presented in relevant British Standards in order to assess the likelihood of both structural damage to neighbouring buildings and the human response of the occupants.

Building Damage

According to BS 7385 Part 2 for residential or light commercial buildings, the threshold for the onset of potential cosmetic damage (i.e. formation of hairline cracks on drywall surfaces or the growth of existing cracks in plaster or drywall surfaces) to buildings varies with frequency. This ranges from a PPV of 15 mm/s at 4Hz, rising to 20mm/s at 15 Hz, and to 50 mm/s at and above 40Hz for transient vibration. BS 7385: Part 2 also states that the probability of building damage tends towards zero at 12.5 mm/s peak component particle velocity.

Line (see Figure 6.1)	Type of Building	Peak component particle velocity in frequency range of predominant pulse	
		4Hz to 15Hz	15Hz and above
1	Reinforced or framed structures. Industrial and heavy commercial buildings	50mm/s at 4Hz and above	
2	Unreinforced or light framed structures. Residential or light commercial type buildings	15mm/s at 4Hz increasing to 20mm/s at 15Hz	20mm/s at 15Hz increasing to 50mm/s at 40Hz and above
Note 1: Values referred to are at the base of the building			
Note 2: For Line 2, at frequencies below 4Hz, a maximum displacement of 0.6mm (zero to peak) should not be exceeded			

Table 9.1: Transient Vibration Guide Values for Cosmetic Damage (from BS 7385: Part 2:1993)

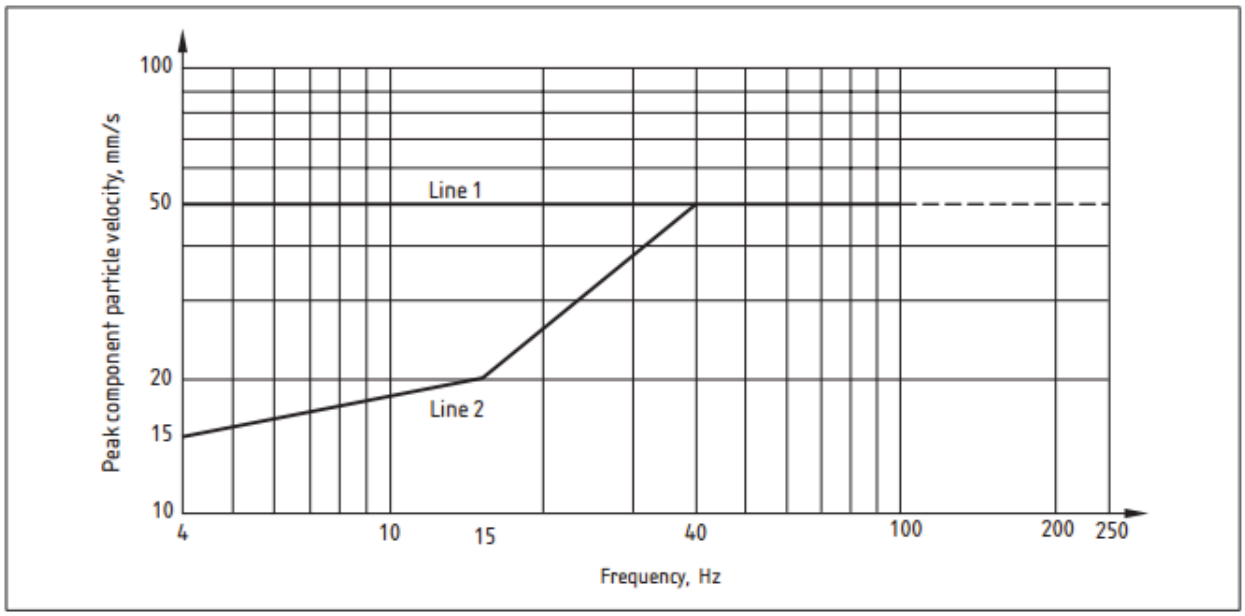


Figure 9.2: Summary of Damage Thresholds for Transient Vibration on Domestic Structures

Subjective Response

According to guidance provided in BS 5228 Part 2 , the threshold of vibration perceptible to humans lies around 0.14 to 0.3 mm/s. The Standard also indicates that a PPVs of around 1 mm/s in residential environments, as a first estimate, are likely to cause complaints, but can be tolerable provided prior warning and explanation of the works is given to residents; whilst, vibration magnitudes of around 10 mm/s are likely to be intolerable for more than a very brief exposure to this level.

As in the case above, the nature of all machinery due to be used is not known. This makes the prediction of vibration levels at adjacent dwellings very difficult.

On consideration of the above, a two-stage criterion is recommended:

- 5 mm/s p.p.v. 'soft' limit; when exceeded, the contractor should temporarily halt works. Works should only be resumed after consultation with the local residents, and with extreme caution
- 10 mm/s p.p.v. 'hard' limit; when exceeded, the contractor should stop work. Works should only continue after a thorough structural examination of the adjacent property, subsequent consultation with the local residents, and then with extreme caution. Should significant damage be identified, alternative methods of land remediation operations should be adopted.

From previous experience on similar sites, it is unlikely that vibration would be an issue to local residents. A snapshot of vibration monitoring during continuous HGV movement at 5m from the road, is shown in Figure 6.2.

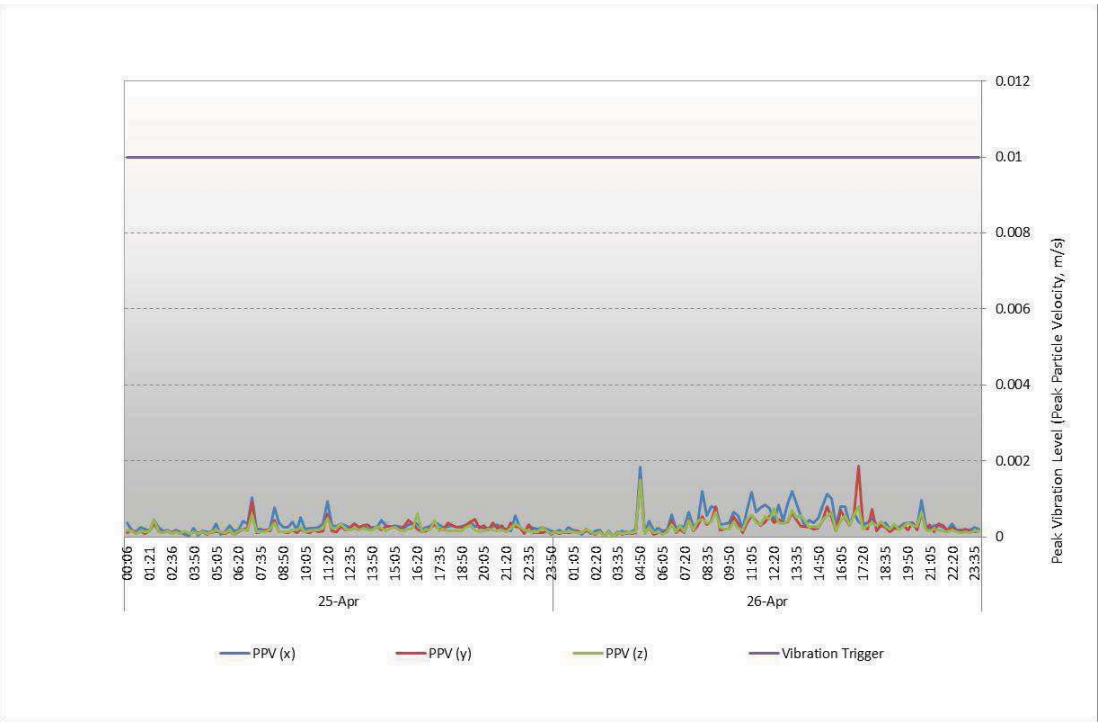


Figure 9.3 Results from vibration monitoring of HGV movements (similar scenario)

As can be seen from Figure 9.3, vibration levels are significantly lower than the limits set above, posing no threat to the local residents. Please note that this is for indicative purposes and would not reflect the predicted vibration levels in this project.

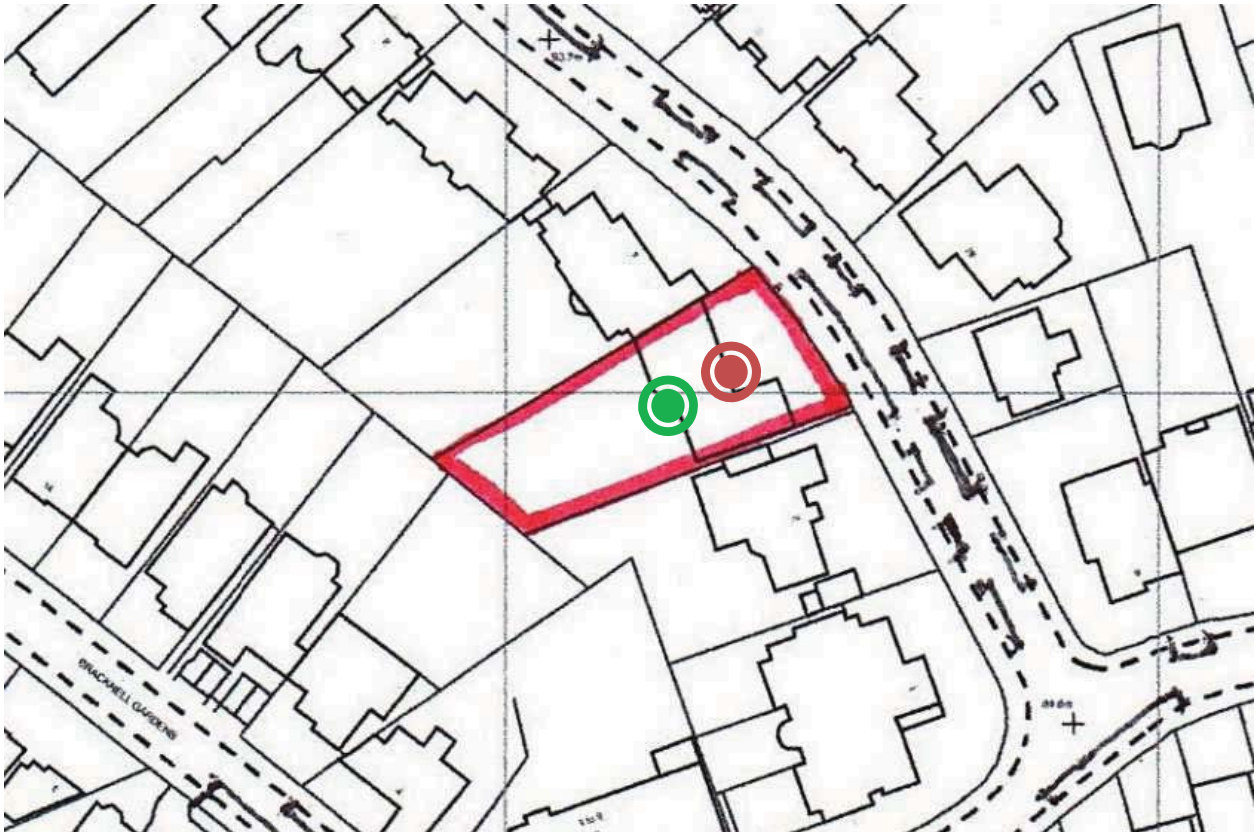
10.0 CONCLUSION

KP Acoustics has been commissioned to undertake a preliminary assessment of noise and vibration levels from all site operations at 3 Greenaway Gardens, London, in order to provide initial advice on the control of noise and vibration on site.

Information on good practice steps have been provided, while a realistic approach has been adopted regarding the maximum noise and vibration levels which should be met on site.

Noise emissions have been predicted to the most representative noise sensitive receivers for different project phases. It has been found that generally noise emissions will fall within the noise emissions criteria of BS5228:2009. Mitigation measures have been advised for general noise control on site, in addition to recommendations for noise monitoring throughout the project development. It would be expected that with mitigation measures as recommended in place, noise disturbance to the neighbouring noise sensitive receivers will be minimised.

Report by	**Checked by**
Duncan Arkley AMIOA	**Kyriakos Papanagiotou MIOA**
KP Acoustics Ltd.	**KP Acoustics Ltd.**



Title:
Indicative site plan showing noise and vibration monitoring positions

Date: 25 January 2016

FIGURE 13718.SP1

KP acoustics

3 Greenaway Gardens, London
Environmental Noise Time History
11th January to 12th January 2016

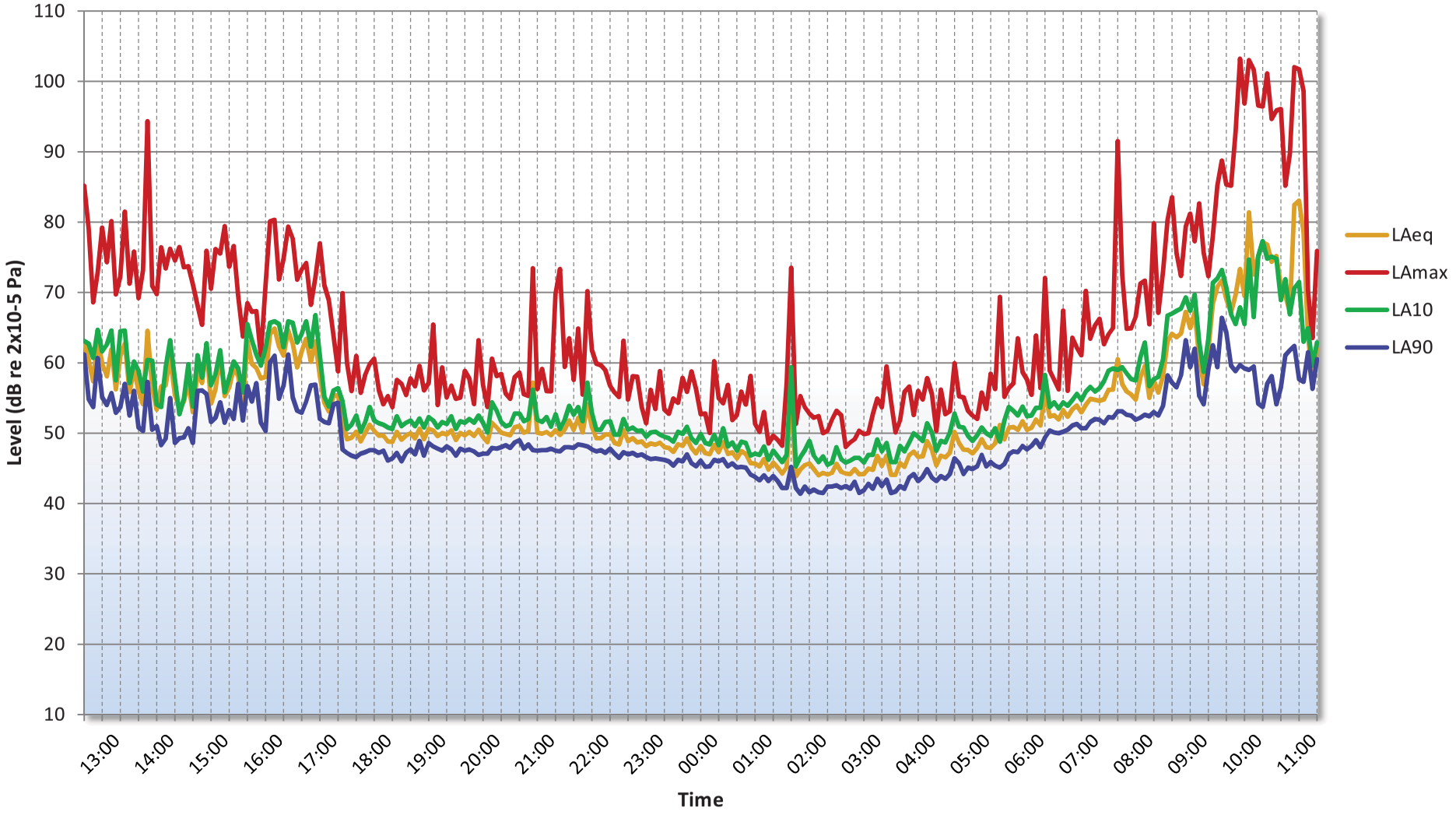


Figure 13718.TH1

3 Greenaway Gardens, London

MAXIMUM HORIZONTAL VIBRATION LEVELS

X-AXIS

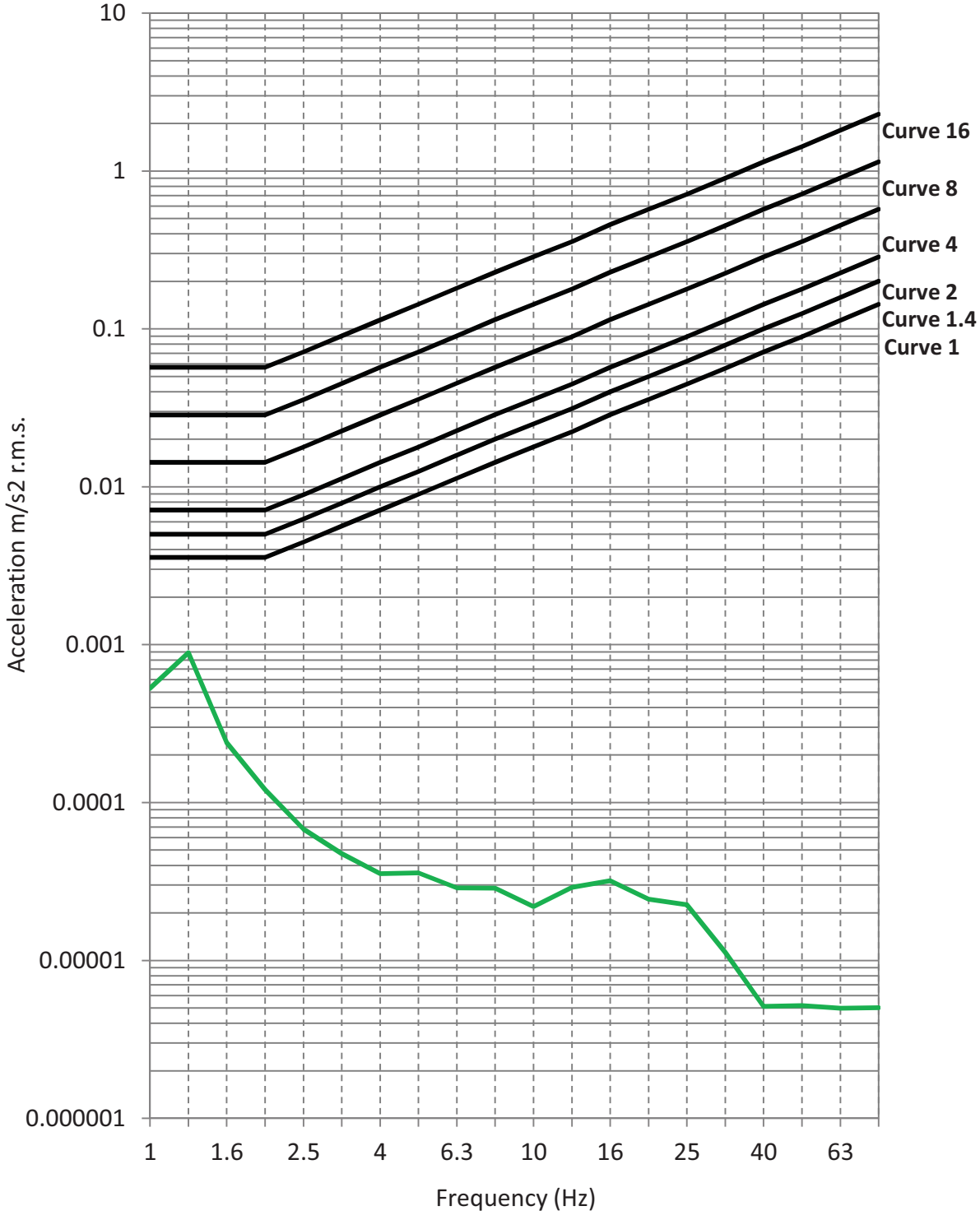


Figure 13718.VS1

3 Greenaway Gardens, London

MAXIMUM HORIZONTAL VIBRATION LEVELS

Y-AXIS

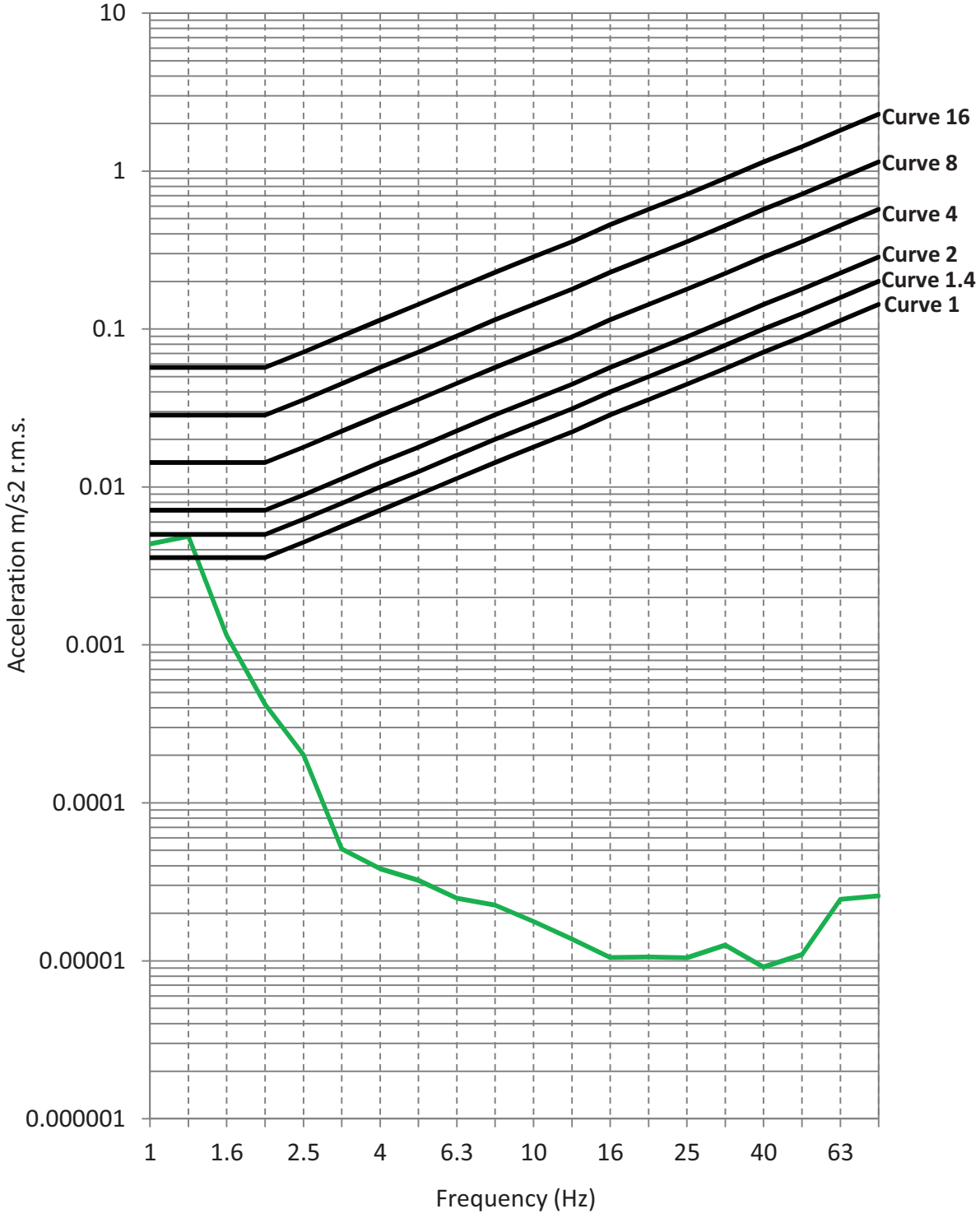


Figure 13718.VS2

KP acoustics

3 Greenaway Gardens, London

MAXIMUM VERTICAL VIBRATION LEVELS

Z-AXIS

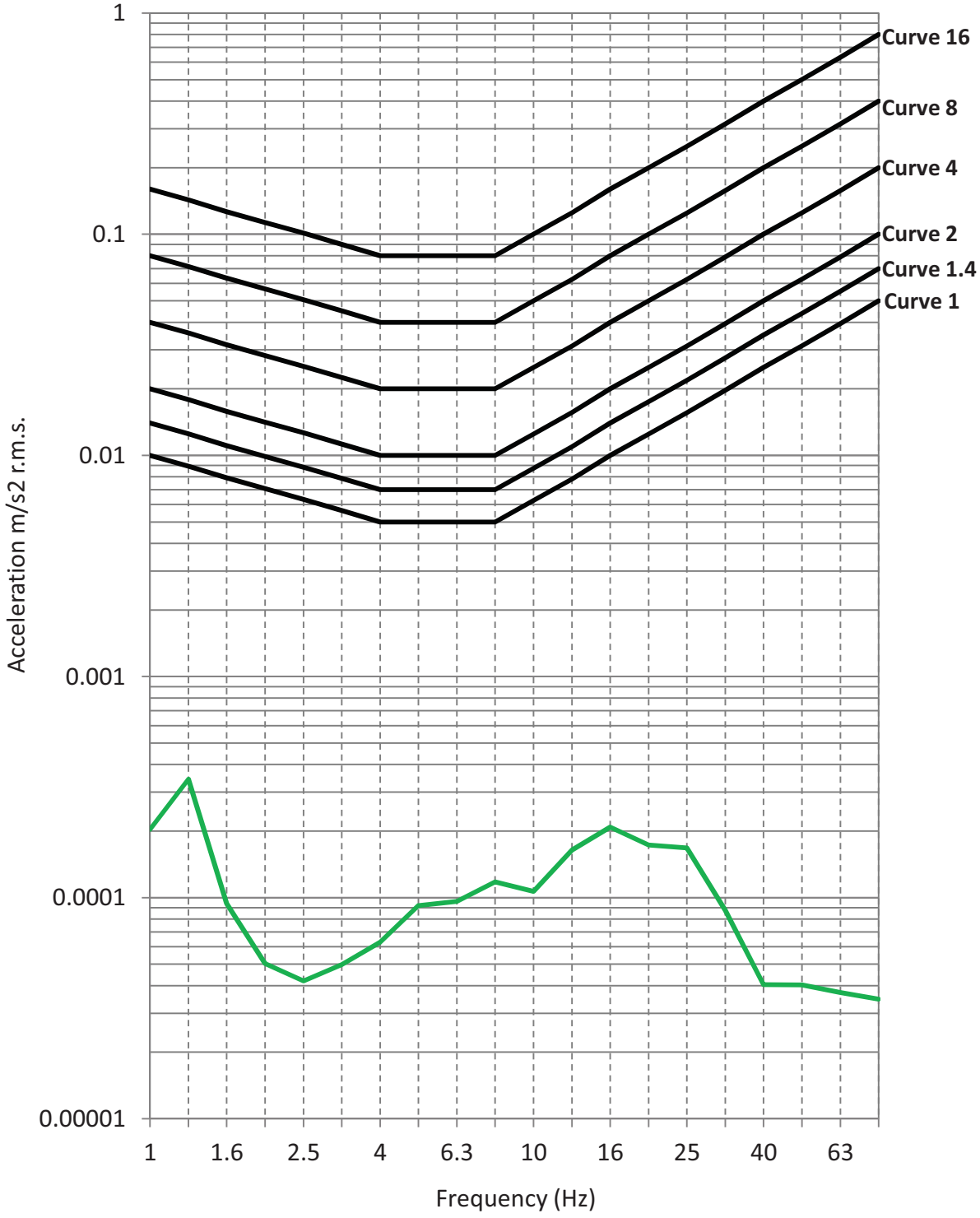


Figure 13718.VS3

3 Greenaway Gardens, London

MAXIMUM HORIZONTAL VIBRATION LEVELS

X-AXIS

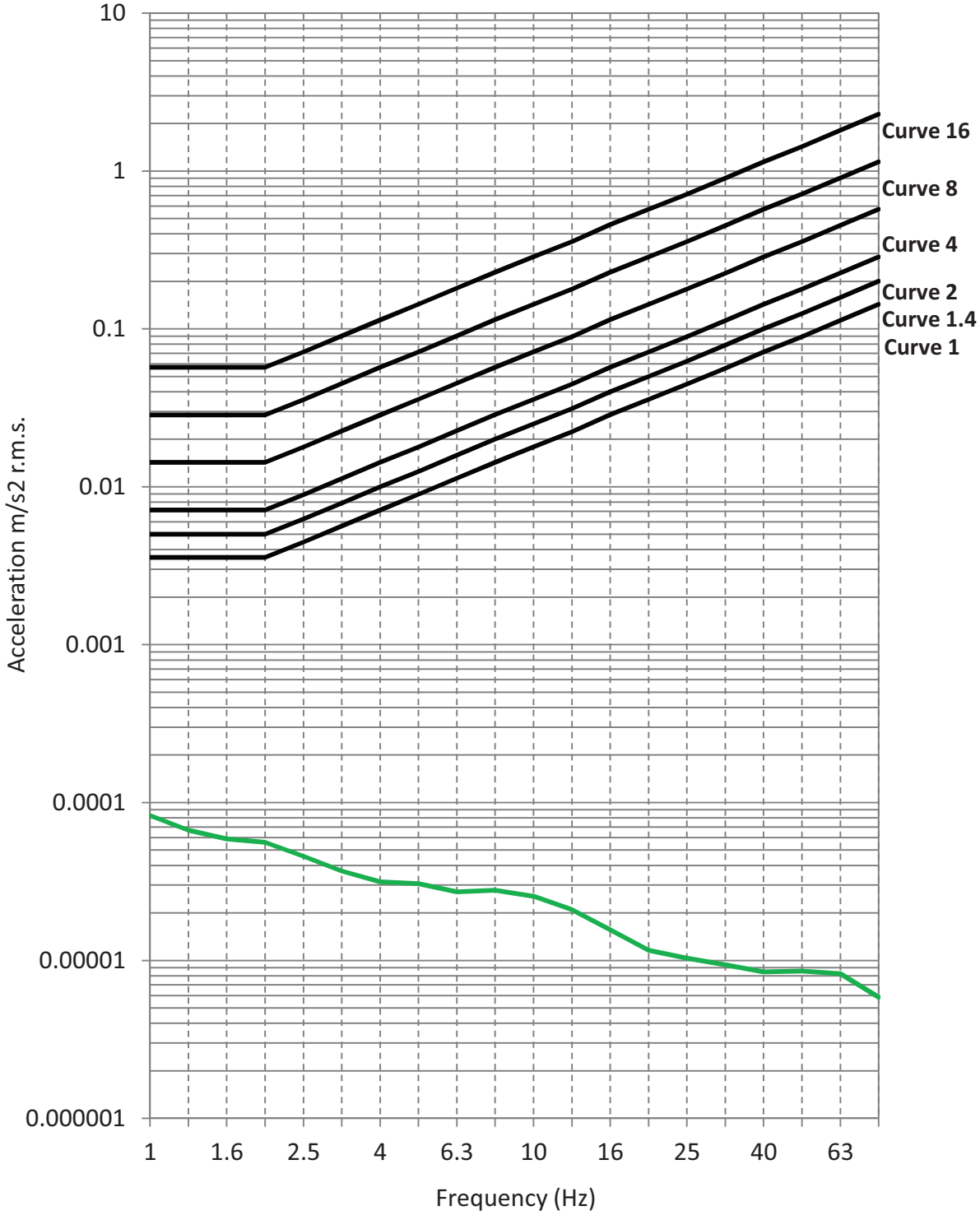


Figure 13718.VS4

3 Greenaway Gardens, London

MAXIMUM HORIZONTAL VIBRATION LEVELS

Y-AXIS

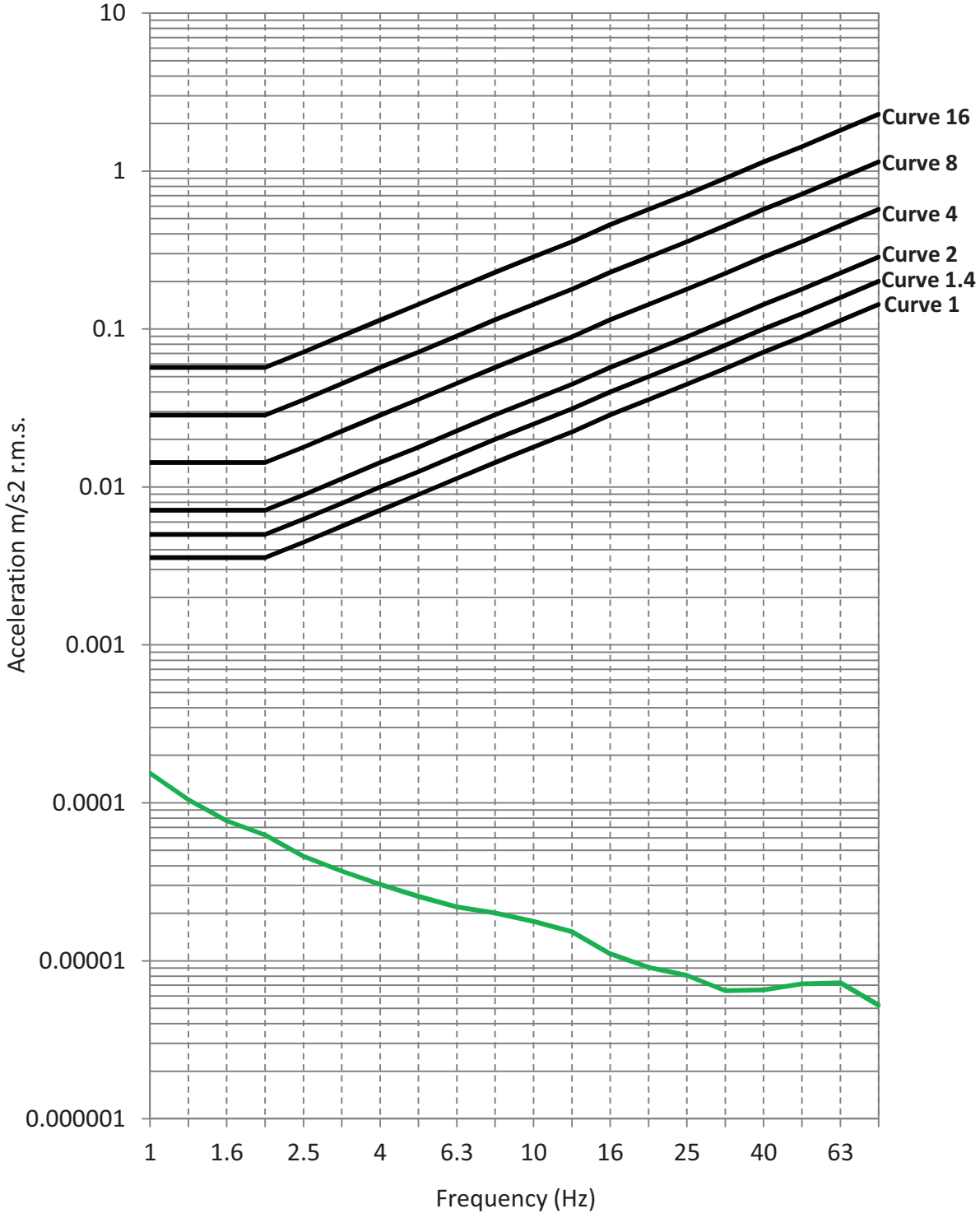


Figure 13718.VS5

3 Greenaway Gardens, London

MAXIMUM VERTICAL VIBRATION LEVELS

Z-AXIS

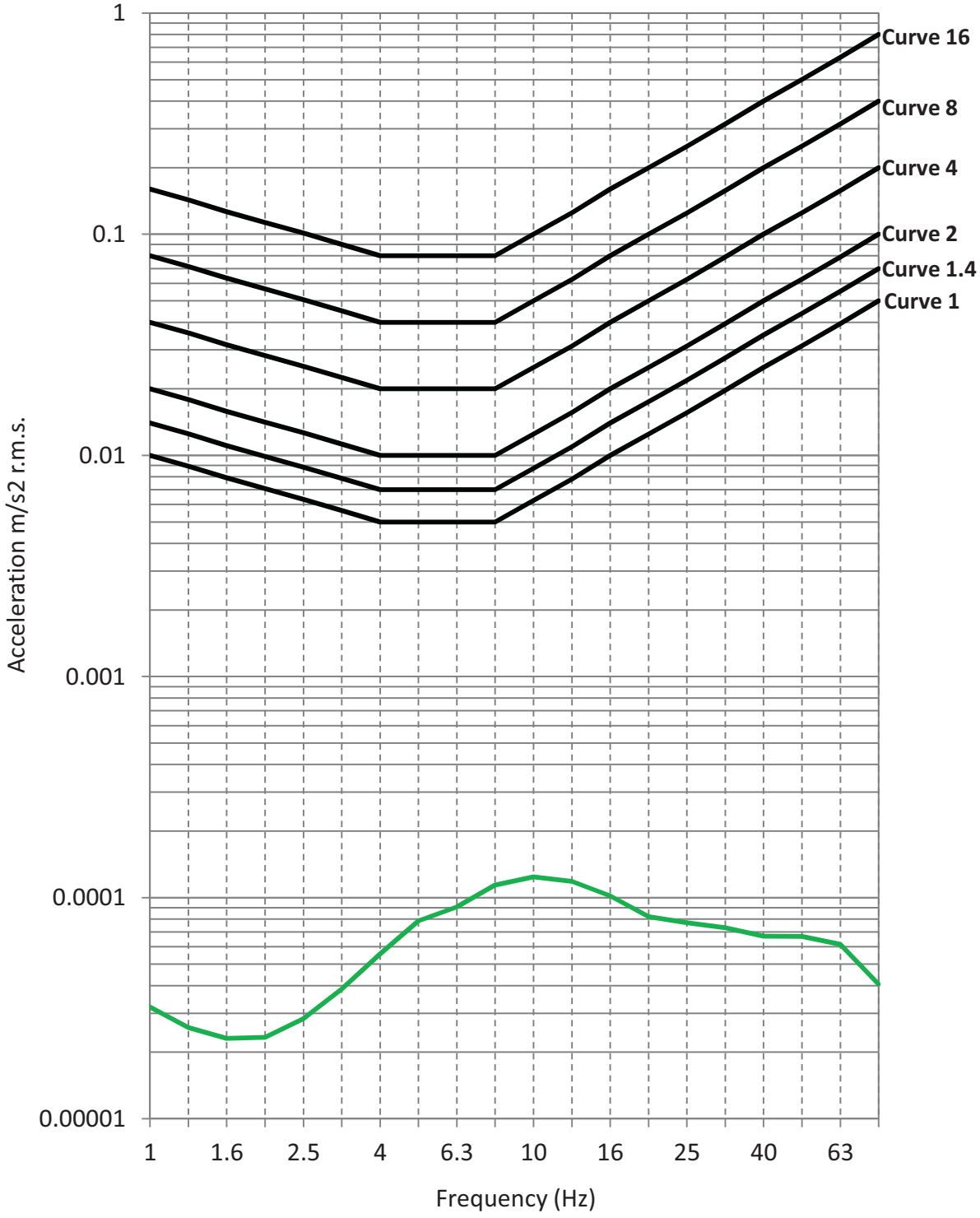


Figure 13718.VS6

APPENDIX A

GENERAL ACOUSTIC TERMINOLOGY

Decibel scale - dB

In practice, when sound intensity or sound pressure is measured, a logarithmic scale is used in which the unit is the 'decibel', dB. This is derived from the human auditory system, where the dynamic range of human hearing is so large, in the order of 10^{13} units, that only a logarithmic scale is the sensible solution for displaying such a range.

Decibel scale, 'A' weighted - dB(A)

The human ear is less sensitive at frequency extremes, below 125Hz and above 16Khz. A sound level meter models the ears variable sensitivity to sound at different frequencies. This is achieved by building a filter into the Sound Level Meter with a similar frequency response to that of the ear, an A-weighted filter where 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 no 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 no 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 11 such octave bands whose centre frequencies are defined in accordance with international standards. These centre frequencies are: 16, 31.5, 63, 125, 250, 500, 1000, 2000, 4000, 8000 and 16000 Hertz.

Environmental noise terms are defined in BS7445, *Description and Measurement of Environmental Noise*.

APPENDIX A

APPLIED ACOUSTIC TERMINOLOGY

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 a single source and 4 sources produce a 6dB 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

Hearing perception is 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 guide to explain increases or decreases in sound levels for many scenarios.

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

Transmission path(s)

The transmission path is the path the sound takes from the source to the receiver. Where multiple paths exist in parallel, the reduction in each path should be calculated and summed at the receiving point. Outdoor barriers can block transmission paths, for example traffic noise. The effectiveness of barriers is dependent on factors such as its distance from the noise source and the receiver, its height and construction.

Ground-borne vibration

In addition to airborne noise levels caused by transportation, construction, and industrial sources there is also the generation of ground-borne vibration to consider. This can lead to structure-borne noise, perceptible vibration, or in rare cases, building damage.

Sound insulation - Absorption within porous materials

Upon encountering a porous material, sound energy is absorbed. Porous materials which are intended to absorb sound are known as absorbents, and usually absorb 50 to 90% of the energy and are frequency dependent. Some are designed to absorb low frequencies, some for high frequencies and more exotic designs being able to absorb very wide ranges of frequencies. The energy is converted into both mechanical movement and heat within the material; both the stiffness and mass of panels affect the sound insulation performance.

Monday to Friday (08:00-18:00)											
	Phase 1 - Site Clearance/Demolition								***Ambient noise level without site-works***	***With site-works***	***Limit***
Operation	Sound Pressure Level at 10m	Potential Receiver Distance (m)	Attenuation due to distance (dB)	Attenuation due to screening buildings envelope (dB)	Correction for operating time (50%)	Result	Result + Ambient	Operating Hours (08:00-18:00)	LAeq	LAeq 10hours	LAeq 10 hours
110v Heavy Breakers	92	15	-4	-3	-3	82	83	10	68	82.6	75
110v Medium Duty Breakers	83	15	-4	-3	-3	73	75	10	68	74.6	
110v 9" Grinders	85	15	-4	-3	-3	75	76	10	68	76.2	
13 Tonne Excavator With Pecker/ Breaker	90	15	-4	-3	-3	80	81	10	68	80.7	
5 Tonne Dumper	78	15	-4	-3	-3	68	71	10	68	71.3	
Muck Away Lorry	79	20	-6	-3	-3	67	71	10	68	70.5	
Site Concrete Crusher	82	15	-4	-3	-3	72	74	10	68	73.8	
Diesel Compressor With 25kg Sullair Breakers	65	15	-4	-3	-3	55	68	10	68	68.2	

Monday to Friday (08:00-18:00)											
	Phase 2 - Piling/Foundations								***Ambient noise level without site-works***	***With site-works***	***Limit***
Operation	Sound Pressure Level at 10m	Potential Receiver Distance (m)	Attenuation due to distance (dB)	Attenuation due to screening buildings envelope (dB)	Correction for operating time (50%)	Result	Result + Ambient	Operating Hours (08:00-18:00)	LAeq	LAeq 10 hours	LAeq 10 hours
CFA Piling Rig	79	15	-4	-3	-3	69	72	10	68	71.8	75
13 Tonne Excavator	74	15	-4	-3	-3	64	70	10	68	69.6	
5 Tonne Dumper	78	15	-4	-3	-3	68	71	10	68	71.3	
Concrete Lorry	80	20	-6	-3	-3	68	71	10	68	71.0	
Static Concrete Pump	67	15	-4	-3	-3	57	68	10	68	68.4	

Monday to Friday (08:00-18:00)											
	Phase 3 - RC Frameworks								***Ambient noise level without site-works***	***With site-works***	***Limit***
Operation	Sound Pressure Level at 10m	Potential Receiver Distance (m)	Attenuation due to distance (dB)	Attenuation due to screening buildings envelope (dB)	Correction for operating time (50%)	Result	Result + Ambient	Operating Hours (08:00-18:00)	LAeq	LAeq 10hours	LAeq 10 hours
Petrol Grinders	91	15	-4	-3	-3	81	82	10	68	81.7	75
110V Hammer Drills	77	15	-4	-3	-3	67	71	10	68	70.8	
Static Concrete Pump	67	15	-4	-3	-3	57	68	10	68	68.4	
Concrete Lorries	80	20	-6	-3	-3	68	71	10	68	71.0	
110V Concrete Vibrator/ Poker	78	15	-4	-3	-3	68	71	10	68	71.3	
Hand Tools/ Impact Battery Cordless	73	15	-4	-3	-3	63	69	10	68	69.3	

Construction Dust Assessment	
Greenaway Gardens, Camden	
Job number:	J0064
Document number:	J0064/1/F1
Date:	21 January 2016
Client:	MY Construction
Prepared by:	Mr Bob Thomas

Air Quality Assessments Ltd
Tel: 07940 478134
Email: bob@aqassessments.co.uk
Web: http://aqassessments.co.uk

Registered Office: c/o Ardwyn Channon, 12 Victoria Street, Burnham-on-Sea, Somerset, TA8 1AL
Companies House Registration: 8895617

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Contents

1 Introduction

1.1.1 Air Quality Assessments Ltd (AQA) has been commissioned by MY Construction to undertake an air quality and construction dust risk assessment for the construction phase of the development at 3 Greenaway Gardens, Camden (see **Figure 1**). The construction phase will involve the demolition of existing buildings at the site followed by the construction of a new building. The site is bounded by Greenaway Gardens to the east, with neighbouring dwellings and gardens to the south, west and north.

1.1.2 The relevant air quality legislation and the background air quality are presented to provide context with regard to fine particulate matter (PM_{10}).

1.1.3 The construction dust risk assessment describes the potential for construction activities to impact upon existing properties. The main pollutants of concern related to construction activities are dust and PM_{10}. The risk assessment has been prepared taking into account all relevant local and national guidance and regulations and follows the methodology in the London Plan SPG on The Control of Dust and Emissions During Construction and Demolition (GLA, 2014). The risk assessment will be used to inform the Construction Management Plan for the site.

1.1.4 The references and a glossary of common air quality terminology used in this assessment are shown in **Section 7** and **Section 8** respectively.

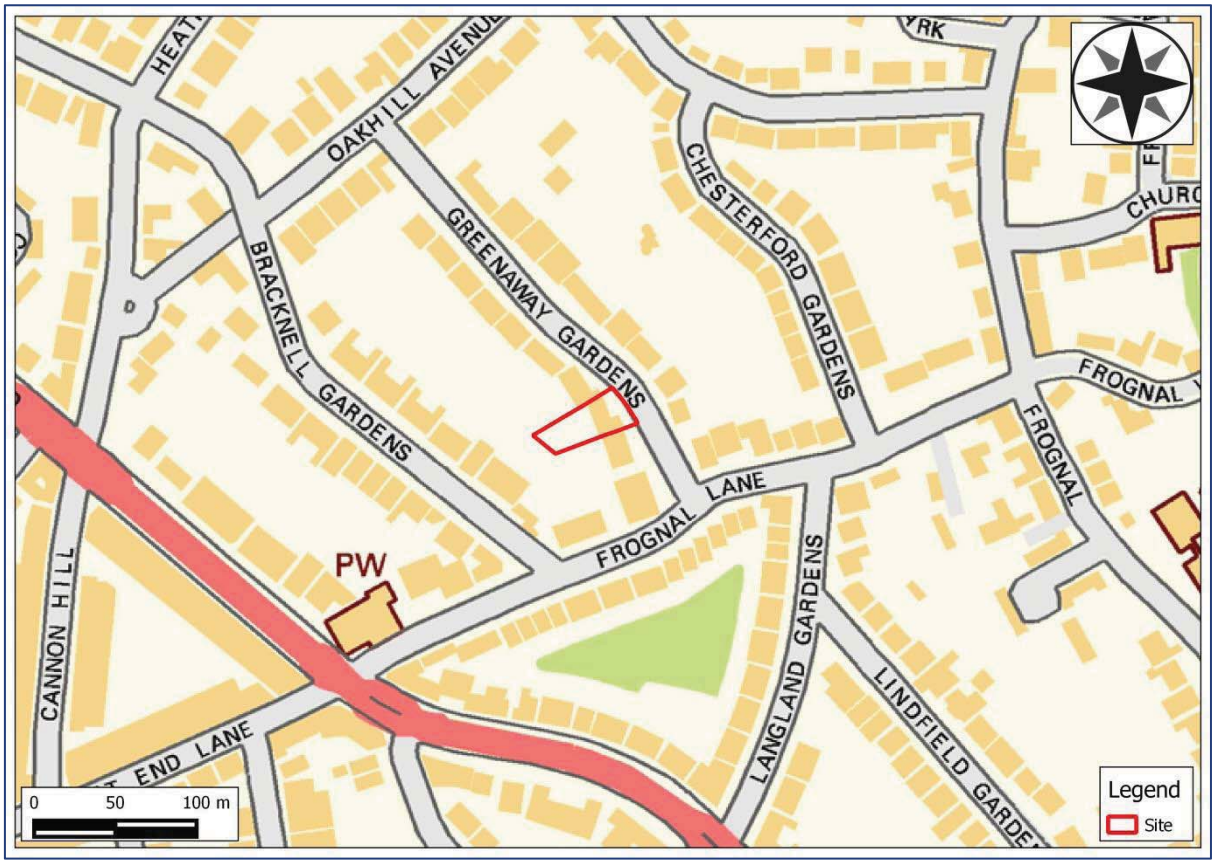

Figure 1: Site Location
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2 Air Quality Legislation

2.1. EU Limit Values

2.1.1 The European Union's Directive on ambient air quality and cleaner air for Europe (European Parliament, Council of the European Union, 2008) set legally binding limit values for PM_{10}. The Air Quality Standards Regulations 2010 (The Stationary Office, 2010) implement the EU Directive limit values in English legislation. Achievement of the limit values is a national obligation rather than a local one.

2.1.2 The limit values are the same as the objective values (see **Table 1**) however, the compliance dates differ, and the limit values apply at all locations (apart from where the public does not have access, where health and safety at work provisions apply and on the road carriageway). The PM_{10} limit value applied from 2005.

2.2. The Air Quality Strategy

2.2.1 Part IV of The Environment Act 1995 required the UK Government to prepare an Air Quality Strategy. The Air Quality Strategy (Defra, 2007), provides an overview and outline of ambient air quality policy in the UK and the devolved administrations. The strategy sets out air quality standards and objectives intended to protect human health and the environment.

2.2.2 Standards are the concentrations of pollutants in the atmosphere, below which there is a minimum risk of health effects or ecosystem damage; they are set with regard to scientific and medical evidence. Objectives are the policy targets set by the Government, taking account of economic efficiency, practicability, technical feasibility and timescale, where the standards are expected to be achieved by a certain date.

2.2.3 The Air Quality Strategy also describes the system of Local Air Quality Management (LAQM), introduced in Part IV of the Environment Act 1995, which requires every local authority to carry out regular review and assessments of air quality in its area. Where an objective has not been, or is unlikely to be achieved, the local authority must declare an Air Quality Management Area (AQMA), and prepare an action plan which sets out appropriate measures to be introduced in pursuit of the objectives.

2.2.4 The objectives for PM_{10}, as prescribed by the Air Quality (England) Regulations 2000 and the Air Quality (England) (Amendment) Regulations 2002 (The Stationary Office, 2000; The Stationary Office, 2002), are shown in **Table 1**. The objectives for PM_{10} were to have been achieved by 2004, and continue to apply in all future years thereafter.

Table 1: The Objectives for PM_{10}

Pollutant	Concentration Measured As	Objective
PM_{10}	24-hour Mean	50 µg/m^3 not to be exceeded more than 35 times a year
	Annual Mean	40 µg/m^3

2.2.5 The objectives apply at locations where members of the public are likely to be regularly present and are likely to be exposed for a period of time appropriate to the averaging period of the objective. Examples of where the objectives should apply are provided in the Local Air Quality Management Technical Guidance (Defra, 2009) issued by the Department for Environment, Food and Rural Affairs (Defra). The annual mean PM_{10} objectives should apply at the building façades of residential properties, schools, hospitals, care homes etc.; they should not apply at the building façades of places of work, hotels, gardens or kerbside sites. The 24-hour mean PM_{10} objective should apply at all locations where the annual mean objective applies, as well as the gardens of residential properties and hotels.

3 Air Quality and Dust Risk Assessment

3.1. Introduction

3.1.1 Without mitigation, there is a risk that the construction phase of the development will lead to dust soiling and elevated concentrations of PM_{10}. These impacts may occur during demolition, earthworks and construction, as well as from trackout of dust onto the public highway, as vehicles leave the construction site.

3.2. Existing Conditions

LAQM Review and Assessment

3.2.1 Camden Council has declared the entire borough an air quality management area (AQMA) due to exceedences of the annual mean nitrogen dioxide and 24-hour mean PM_{10} objectives.

Local Air Quality Monitoring

3.2.2 Camden Council operates three automatic monitoring sites within its area that measure PM_{10} concentrations. Measured data from the closest monitoring site, at Swiss Cottage, approximately 1.3 km south east of the construction site, are shown in **Table 2,** and the monitoring site location is shown in **Figure 2**.

Table 2: Summary of PM_{10} Monitoring Data (2009 to 2013) [a]

Site Name	Site Type	2009	2010	2011	2012	2013
Annual Mean (µg/m^3)						
Swiss Cottage	Kerbside	25	26	27	23	21
Objective		**40**				
Number of Days > 50 µg/m^3						
Swiss Cottage	Kerbside	25	26	31	21	8
Objective		**35**				

a The data have been taken from the most recent Progress Report (London Borough of Camden, 2014).

3.2.3 The data in **Table 2** shows that the annual mean and 24-hour mean objectives for PM_{10} have been achieved at the kerbside monitoring site at Swiss Cottage between 2009 to 2013. The monitoring site is located adjacent to the heavily trafficked Finchley Road (A41) close to a congested junction. The construction site is in a residential area adjacent to a quiet road, where PM_{10} concentrations are likely to be much lower, and close to background levels.

Figure 2: Camden Council's Swiss Cottage PM_{10} Monitoring Site
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Background Concentrations

3.2.4 The estimated annual mean background concentration of PM_{10} at the construction site, taken from background pollutant concentration maps published by Defra (Defra, 2015), are shown in **Table 3**. The estimated background concentration is well below the annual mean objective.

Table 3: Estimated Annual Mean Background Concentrations in 2016 (µg/m^3)

Grid	PM_{10}
525500,185500	21.6
Objective	**40**

3.3. Dust Risk Assessment

Methodology

3.3.1 A construction dust risk assessment has been undertaken following the guidance in the London Plan SPG on The Control of Dust and Emissions During Construction and Demolition (GLA, 2014), which utilises the methodology in the Institute of Air Quality

Management (IAQM) Guidance on the Assessment of Dust from Demolition and Construction (IAQM, 2014).

3.3.2 The guidance divides activities on construction sites into four main types: demolition, earthworks, construction and trackout. The methodology is based on a sequence of steps. Step 1 screens the requirement for more detailed assessment; if there are no receptors within 50 m of the site boundary, or within 50 m of roads used by construction vehicles, then there is no need for further assessment. Step 2 assesses the risk of dust impacts from each of the four activities, considering the scale and magnitude of the works (Step 2A), and the sensitivity of the area (Step 2B). Site-specific mitigation for each of the four activities is then determined based on a dust risk category defined at Step 2C. **Appendix A1** sets out the construction dust assessment methodology in more detail.

Screening

3.3.3 There are human receptors within 50 m of the construction site to the north, east, south and west. There are also receptors within 50 m of the route used by construction vehicles on the public highway, up to 500 m from the site entrance. Therefore, further assessment of the construction phase impacts is necessary. There are no ecological receptors within 50 m of the construction site, and the effects on ecology will not be considered further.

Risk of Dust Impacts

Potential Dust Emission Magnitude

3.3.4 Buildings with a total volume of around 1,350 m^3 will need to be demolished. These buildings are made of potentially dusty materials, such as brick and concrete; however, given the low volume of the buildings to be demolished and based on the example definitions in **Table A1** in **Appendix A1**, the dust emission class for demolition is considered to be small.

3.3.5 Earthworks are likely to take place across the construction site during remodelling and landscaping works, and the preparation of the ground for the construction of the basement. The total area of earthworks will be approximately 550 m^2. Data from the UK Soil Observatory (NERC, 2015) have been used to determine that the soil at the site has a light to heavy clayey-loam to silty-loam texture, and may be prone to suspension when dry. Given the small size of the site, based on the example definitions in **Table A1** in **Appendix A1**, the dust emission class for earthworks is considered to be small.

3.3.6 The new building, including the basement, will have a total volume of around 3,500 m^3. Based on the example definitions in **Table A1** in **Appendix A1**, the dust emission class for construction is considered to be small.

3.3.7 The number of daily outward heavy duty vehicle (HDV) movements from the application site during the construction phase has been estimated at no more than 10 during the height of the construction phase. Based on the example definitions in **Table A1** in **Appendix A1**, the dust emission class for trackout is considered to be small.

3.3.8 A summary of the likely dust emission magnitudes is shown in **Table 4**.

Table 4: Likely Dust Emission Magnitudes

Source	Dust Emission Magnitude
Demolition	Small
Earthworks	Small
Construction	Small
Trackout	Small

Sensitivity of the Area

3.3.9 The sensitivity of the area depends on the specific sensitivities of local receptors, the proximity and number of receptors, local PM_{10} background concentrations and other site specific factors, e.g. natural screening by trees.

Sensitivity of the Area to Dust Soiling

3.3.10 Residential properties are considered to be 'high' sensitivity receptors to dust soiling (see **Table A2** in **Appendix A1**).

3.3.11 The buildings adjacent to the construction site, to the north and south, are within 20 m of construction activities, and as the building to the south is an apartment block (Bracknell Gate), there is a risk that more than 10 residential properties will be affected. With reference to **Table A5** in **Appendix A1**, the area is thus considered to be of high sensitivity to dust soiling.

3.3.12 **Table 4** shows that the dust emission magnitude for trackout is small; therefore there is a risk of material being tracked up to 50 m from the site exit. Site traffic will leave the site onto Greenaway Gardens, and could travel north or south. There are between 10-100 residential properties within 50 m of the roads along which material could be tracked. With reference to **Table A5** in **Appendix A1**, the area is thus considered to be of high sensitivity to dust soiling from trackout.

Sensitivity of the Area to the Health Effects of PM_{10}

3.3.13 Residential properties are considered to be 'high' sensitivity receptors to the health effects of PM_{10} (see **Table A3** in **Appendix A1**).

3.3.14 The construction site is located in a residential area, away from any significant PM_{10} emissions sources (i.e. road traffic), and air quality at receptors near the site is likely to be close to the annual mean background level of 21.6 $\mu g/m^3$ (see **Section 3.2**).

3.3.15 With reference to **Table A6** in **Appendix A1**, the area is thus described to be of low sensitivity to the health effects of PM_{10}.

3.3.16 The roads along which material could be tracked are very lightly trafficked residential streets, and PM_{10} concentrations are likely to remain close to background levels; the area adjacent to the surrounding roads along which material could be tracked is thus described to be of low sensitivity to the health effects of PM_{10}.

3.3.17 A summary of the sensitivity of the area to the effects of the construction works is shown in **Table 5**.

Table 5: Summary of the Area Sensitivity

Potential Effect	Sensitivity of the Area	
	On-site Works	Trackout
Dust Soiling	High	High
Health	Low	Low

Risk of Impact and Significance

3.3.18 The dust emission magnitudes in **Table 4** have been combined with the area sensitivities in **Table 5** and a risk category has been assigned to each construction activity using the matrix in **Table A8** in **Appendix A1**. The resultant risk categories, shown in **Table 6**, have then been used to determine the appropriate level of mitigation necessary.

Table 6: Summary of the Risk of Impacts Without Mitigation

Construction Activity	Dust Soiling	Health
Demolition	Medium	Negligible
Earthworks	Low	Negligible
Construction	Low	Negligible
Trackout	Low	Negligible

4 Mitigation

4.1.1 Overall, the construction site has been identified as a low risk site for dust soiling and a negligible risk site for health effects, as set out in **Table 6**. The dust risk categories have been used, along with the professional judgement of the consultant, to determine the appropriate level of mitigation at the site. The professional experience of the consultant preparing the report is set out in **Appendix A2**.

4.1.2 The mitigation measures, taken from the London Plan SPG on The Control of Dust and Emissions During Construction and Demolition (GLA, 2014), are described below.

4.1.3 The mitigation measures will be included in an Air Quality and Dust Management Plan (AQDMP), which should be submitted to the local planning authority for approval prior to commencement of work on site.

Site Management

- Develop a dust management plan;
- Display the name and contact details of person(s) accountable for air quality pollutant emissions and dust issues on the site boundary;
- Display the head or regional office contact information;
- Record and respond to all dust and air quality pollutant emissions complaints;
- Make a complaints log available to the local authority when asked;
- Carry out regular site inspections to monitor compliance with air quality and dust control procedures, record inspection results, and make an inspection log available to the local authority when asked;
- Increase the frequency of site inspections by those accountable for dust and air quality pollutant emissions issues when activities with a high potential to produce dust and emissions and dust are being carried out, and during prolonged dry or windy conditions; and
- Record any exceptional incidents that cause dust and air quality pollutant emissions, either on or off the site, and the action taken to resolve the situation in the log book.

Preparing and Maintaining the Site

- Plan the site layout: machinery and dust-causing activities should be located away from receptors;
- Erect solid screens or barriers around dust activities or the site boundary that are, at least, as high as any stockpiles on site;
- Fully enclose site or specific operations where there is a high potential for dust production and the site is active for an extensive period;
- Avoid site runoff of water or mud;
- Keep site fencing, barriers and scaffolding clean using wet methods;
- Remove materials from site as soon as possible; and
- Cover, seed or fence stockpiles 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;
- Ensure all non-road mobile machinery (NRMM) comply with the standards set within the London Plan SPG on The Control of Dust and Emissions During Construction and Demolition;
- Ensure all vehicles switch off their engines when stationary – no idling vehicles;
- Avoid the use of diesel- or petrol-powered generators and use mains electricity or battery-powered equipment where possible; and
- Implement a Travel Plan that supports and encourages sustainable travel (public transport, cycling, walking, and car-sharing).

Operations

- Only use 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 mitigation (using recycled water where possible);
- Use enclosed chutes, conveyors and covered skips; and
- Minimise drop heights from conveyors, loading shovels, hoppers and other loading or handling equipment and use fine water sprays on such equipment wherever appropriate.

Waste Management

- Reuse and recycle waste to reduce dust from waste materials; and
- 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 water suppression is used during demolition operations;
- Avoid explosive blasting, using appropriate manual or mechanical alternatives; and
- Bag and remove any biological debris or damp down such material before demolition.

Measures Specific to Construction

- Avoid scabbling (roughening of concrete surfaces) if possible; and
- Ensure sand and other aggregates are stored in bunded areas and are not allowed to dry out, unless this is required for a particular process, in which case ensure that appropriate additional control measures are in place.

Measures Specific to Trackout

- Ensure vehicles entering and leaving sites are covered to prevent escape of materials during transport; and
- Implement a wheel washing system (with rumble grids to dislodge accumulated dust and mud prior to leaving the site where reasonably practicable).

5 Conclusion

5.1.1 The IAQM guidance is clear that, with appropriate mitigation in place, the residual effect will normally be 'not significant'.

5.1.2 During adverse weather conditions, or where there is an interruption to the water supply, there may be occasional, short-term dust annoyance; however, the likely scale and duration of these effects would not change the conclusion that the residual effects are insignificant.

6 References

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7 Glossary

AQMA	Air Quality Management Area
Defra	Department for Environment, Food and Rural Affairs
Exceedence	A period of time when the concentration of a pollutant is greater than the appropriate air quality objective. This applies to specified locations with relevant exposure
HDV	Heavy Duty Vehicles (> 3.5 tonnes)
IAQM	Institute of Air Quality Management
LAQM	Local Air Quality Management
µg/m^3	Microgrammes per cubic metre
Objectives	A nationally defined set of health-based concentrations for nine pollutants, seven of which are incorporated in Regulations, setting out the extent to which the standards should be achieved by a defined date. There are also vegetation-based objectives for sulphur dioxide and nitrogen oxides
PM_{10}	Small airborne particles, more specifically particulate matter less than 10 micrometres in aerodynamic diameter
Standards	A nationally defined set of concentrations for nine pollutants below which health effects do not occur or are minimal

8 Appendices

A1 Air Quality and Dust Risk Assessment Methodology

A1.1. Introduction

A1.1.1 The London Plan SPG on the Control of Dust and Emissions During Construction and Demolition (GLA, 2014) divides activities on construction sites into four types to reflect their different potential impacts:

- demolition;
- earthworks;
- construction; and
- trackout.

A1.1.2 A series of steps then consider the potential impact due to:

- the risk of health effects from an increase in exposure to PM_{10} and $PM_{2.5}$;
- annoyance due to the deposition of dust;
- harm to the natural environment.

A1.2. Step 1: Screen the Need for a Detailed Assessment

A1.2.1 An assessment is required where there is a human receptor within 50 m of the site boundary, and/or within 50 m of the route(s) used by construction vehicles on the public highway, up to 500 m from the site entrance(s), or where there is an ecological receptor within 50 m of the site boundary, and/or within 50 m of the route(s) used by construction vehicles on the public highway, up to 500 m from the site entrance(s).

A1.2.2 Where the need for a more detailed assessment is screened out, it can be concluded that the level of risk is negligible, and any effects will be not significant.

A1.3. Step 2: Assess the Risk of Dust Impacts

A1.3.1 A site is allocated to a risk category based on two factors:

- the scale and nature of the works, which determines the potential dust emissions magnitude (Step 2A); and
- the sensitivity of the area to dust impacts (Step 2B).

A1.3.2 These two factors are combined at Step 2C to determine the risk of dust impacts from each type of construction activity, with no mitigation applied.

Step 2A: Potential Dust Emissions Magnitude

A1.3.3 The dust emission magnitude is classified as small, medium or large. Examples of how the potential dust emission magnitude for each activity can be defined are shown in **Table A1**.

Table A1: Examples of How the Dust Emission Magnitude can be Defined

Class	Example
Demolition	
Large	Total building volume >50,000 m^3, potentially dusty construction material (e.g. concrete), on site crushing and screening, demolition activities >20 m above ground level.
Medium	Total building volume 20,000 m^3 – 50,000 m^3, potentially dusty construction material, demolition activities 10-20 m above ground level.
Small	Total building volume <20,000 m^3, construction material with low potential for dust release (e.g. metal cladding or timber), demolition activities <10 m above ground, demolition during wetter months.
Earthworks	
Large	Total site area >10,000 m^2, potentially dusty soil type (e.g. clay, which will be prone to suspension when dry to due small particle size), >10 heavy earth moving vehicles active at any one time, formation of bunds >8 m in height, total material moved >100,000 tonnes.
Medium	Total site area 2,500 m^2 – 10,000 m^2, moderately dusty soil type (e.g. silt), 5-10 heavy earth moving vehicles active at any one time, formation of bunds 4 m – 8 m in height, total material moved 20,000 tonnes – 100,000 tonnes.
Small	Total site area <2,500 m^2, soil type with large grain size (e.g. sand), <5 heavy earth moving vehicles active at any one time, formation of bunds <4 m in height, total material moved <20,000 tonnes, earthworks during wetter months.
Construction	
Large	Total building volume >100,000 m^3, piling, on site concrete batching; sandblasting.
Medium	Total building volume 25,000 m^3 – 100,000 m^3, potentially dusty construction material (e.g. concrete), on site concrete batching.
Small	Total building volume <25,000 m^3, construction material with low potential for dust release (e.g. metal cladding or timber).
Trackout [a]	
Large	>50 HDV (>3.5t) outward movements in any one day, potentially dusty surface material (e.g. high clay content), unpaved road length >100 m.
Medium	10-50 HDV (>3.5t) outward movements in any one day, moderately dusty surface material (e.g. high clay content), unpaved road length 50 m – 100 m.
Small	<10 HDV (>3.5t) outward movements in any one day, surface material with low potential for dust release, unpaved road length <50 m.

a These numbers are for vehicles that leave the site after moving over unpaved ground.

Step 2B: Define the Sensitivity of the Area

A1.3.4 The sensitivity of the area takes account of:

- the specific sensitivities of receptors in the area;
- the proximity and number of those receptors;
- in the case of PM_{10}, the local background concentrations; and
- site-specific factors, such as whether there are natural shelters, such as trees, to reduce the risk of wind-blown dust.

A1.3.5 The specific sensitivities of different types of receptor to dust soiling and PM_{10} are shown **Table A2**, **Table A3** and **Table A4**. Professional judgement should be used to identify where on the spectrum of sensitivity a receptor lies, taking account of specific circumstances, i.e. the first occupants of residential units on a phased development may be expected to be less sensitive to dust soiling.

A1.3.6 The sensitivity of the area is then determined from the specific sensitivities of the receptors using the matrices set out in **Table A5**, **Table A6** and **Table A7**. Professional judgement should be used to determine the final sensitivity of the area, taking account of:

- any history of dust generating activities in the area:
- the likelihood of concurrent dust generating activity on nearby sites;
- any pre-existing screening between source and receptors;
- any conclusions drawn from analysing local meteorological data which accurately represents the area; and if relevant, the season during which the works will take place;
- any conclusions drawn from local topography;
- duration of the potential impact, as a receptor may become more sensitive over time; and
- any other known specific receptor sensitivities.

Step 2C: Define the Risk of Impacts

A1.3.7 The dust emission magnitude determined at Step 2A is combined with the sensitivity of the area determined at Step 2B to determine the risk of impacts with no mitigation applied. The level of risk for each activity is determined using the matrix in **Table A8**.

A1.4. Determine Site Specific Mitigation

A1.4.1 The dust risk category determined at Step 2C has been used, along with the professional judgement of the consultant, to determine the appropriate level of mitigation at the site. The highly recommended and desirable mitigation measures set out in the London Plan SPG form the basis of the mitigation set out in **Section 4**.

A1.4.2 The mitigation measures will inform an Air Quality and Dust Management Plan (AQDMP), which will be submitted to the local authority for approval prior to works commencing on-site.

A1.4.3 The London Plan SPG is clear that the primary aim of the risk assessment is to identify site specific mitigation that, once adopted, will ensure that there will be no significant effect.

Table A2: Sensitivities of People to Dust Soiling

Class	Principles	Examples
High	Users can reasonably expect enjoyment of a high level of amenity; or the appearance, aesthetics or value of their property would be diminished by soiling; and the people or property would reasonably be expected a to be present continuously, or at least regularly for extended periods, as part of the normal pattern of use of the land.	Dwellings, museum and other culturally important collections, medium and long term car parks and car showrooms.
Medium	Users would expect to enjoy a reasonable level of amenity, but would not reasonably expect to enjoy the same level of amenity as in their home; or the appearance, aesthetics or value of their property could be diminished by soiling; or the people or property wouldn't reasonably be expected to be present here continuously or regularly for extended periods as part of the normal pattern of use of the land.	Parks and places of work.
Low	The enjoyment of amenity would not reasonably be expected; or property would not reasonably be expected to be diminished in appearance, aesthetics or value by soiling; or there is transient exposure, where the people or property would reasonably be expected to be present only for limited periods of time as part of the normal pattern of use of the land.	Playing fields, farmland (unless commercially-sensitive horticultural), footpaths, short term car parks and roads.

Table A3: Sensitivities of People to PM_{10}

Class	Principles	Examples
High	Locations where members of the public may be exposed for eight hours or more in a day.	Residential properties, hospitals, schools and residential care homes.
Medium	Locations where the people exposed are workers, and where individuals may be exposed for eight hours or more in a day.	Office and shop workers, but will generally not include workers occupationally exposed to PM_{10}
Low	Locations where human exposure is transient.	Public footpaths, playing fields, parks and shopping streets.

Table A4: Sensitivities of Receptors to Ecological Effects

Class	Principles	Examples
High	Locations with an international or national designation and the designated features may be affected by dust soiling; or locations where there is a community of a particularly dust sensitive species.	Special Areas of Conservation (SAC) with dust sensitive features.
Medium	Locations where there is a particularly important plant species, where its dust sensitivity is uncertain or unknown; or locations with a national designation where the features may be affected by dust deposition.	Sites of Special Scientific Interest (SSSI) with dust sensitive features.
Low	Locations with a local designation where the features may be affected by dust deposition.	Local Nature Reserves with dust sensitive features.

Table A5: Sensitivity of the Area to Dust Soiling Effects on People and Property[1]

Receptor Sensitivity	Number of Receptors	Distance from the Source (m)			
		<20	<50	<100	<350
High	**>100**	High	High	Medium	Low
	10-100	High	Medium	Low	Low
	1-10	Medium	Low	Low	Low
Medium	**>1**	Medium	Low	Low	Low
Low	**>1**	Low	Low	Low	Low

Table A6: Sensitivity of the Area to Human Health Effects[1]

Receptor Sensitivity	Annual Mean PM_{10}	Number of Receptors	Distance from the Source (m)				
			<20	<50	<100	<200	<350
High	**>32 µg/m^3**	**>100**	High	High	High	Medium	Low
		10-100	High	High	Medium	Low	Low
		1-10	High	Medium	Low	Low	Low
	28-32 µg/m^3	**>100**	High	High	Medium	Low	Low
		10-100	High	Medium	Low	Low	Low
		1-10	High	Medium	Low	Low	Low
	24-28 µg/m^3	**>100**	High	Medium	Low	Low	Low
		10-100	High	Medium	Low	Low	Low
		1-10	Medium	Low	Low	Low	Low
	<24 µg/m^3	**>100**	Medium	Low	Low	Low	Low
		10-100	Low	Low	Low	Low	Low
		1-10	Low	Low	Low	Low	Low
Medium	**-**	**>10**	High	Medium	Low	Low	Low
	-	**1-10**	Medium	Low	Low	Low	Low
Low	**-**	**>1**	Low	Low	Low	Low	Low

[1] For demolition, earthworks and construction, the distances are measured from the dust source, or the application site boundary. For trackout, the distances are measured from the side of the roads used by construction traffic. Without site-specific mitigation, trackout may occur from roads up to 500 m from large sites, 200 m from medium sites and 50 m from small sites, as measured from the site exit. The impact declines with distance from the site, and it is only necessary to consider trackout impacts up to 50 m from the edge or the road.

Table A7: Sensitivity of the Area to Ecological Effects[1]

Receptor Sensitivity	Distance from the Source (m)	
	<20	<50
High	High	Medium
Medium	Medium	Low
Low	Low	Low

Table A8: Defining the Risk of Dust Impacts

Sensitivity of the Area	Dust Emission Magnitude		
	Large	Medium	Small
Demolition			
High	High Risk	Medium Risk	Medium Risk
Medium	High Risk	Medium Risk	Low Risk
Low	Low Risk	Low Risk	Negligible
Earthworks			
High	High Risk	Medium Risk	Low Risk
Medium	Medium Risk	Medium Risk	Low Risk
Low	Low Risk	Low Risk	Negligible
Construction			
High	High Risk	Medium Risk	Low Risk
Medium	Medium Risk	Medium Risk	Low Risk
Low	Low Risk	Low Risk	Negligible
Trackout			
High	High Risk	Medium Risk	Low Risk
Medium	Medium Risk	Low Risk	Negligible
Low	Low Risk	Low Risk	Negligible

A2 Professional Experience

Bob Thomas, BSc (Hons) PgDip MSc MIEnvSc MIAQM CSci

Bob Thomas is a Director at AQA, with over eight years' experience in the field of air quality management and assessment. He has carried out air quality assessments for a wide range of developments, including residential, commercial, industrial, minerals and waste developments. He has been responsible for air quality projects that include ambient air quality monitoring of nitrogen dioxide, dust and PM_{10}, the assessment of nuisance odours and dust, and the preparation of Review and Assessment reports for local authorities. He has extensive dispersion modelling experience for road traffic, energy centre and industrial sources, and has completed many stand-alone reports and chapters for inclusion within an Environmental Statement. Bob has worked with a variety of clients to provide expert air quality services and advice, including local authorities, planners, developers, architects and process operators, and has provided expert witness services at public inquiry. He is a Chartered Scientist, a Member of the Institute of Air Quality Management and a Member of the Institution of Environmental Sciences.

A full CV for Bob Thomas is available at http://aqassessments.co.uk/about