Planning Application Submission – February 2014

Noise Impact Assessment

Consultant: Mayer Brown

Latchmere House – Scheme 1

Berkeley Homes (Central London) Ltd

Berkeley
Designed for life

PROPOSED RESIDENTIAL DEVELOPMENT AT LATCHMERE HOUSE, HAM COMMON, RICHMOND

NOISE IMPACT ASSESSMENT

DECEMBER 2013

Project Code:	BHLATCHMERE.9
Prepared by:	Simon Grubb
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PROPOSED RESIDENTIAL DEVELOPMENT AT LATCHMERE HOUSE, HAM COMMON, RICHMOND

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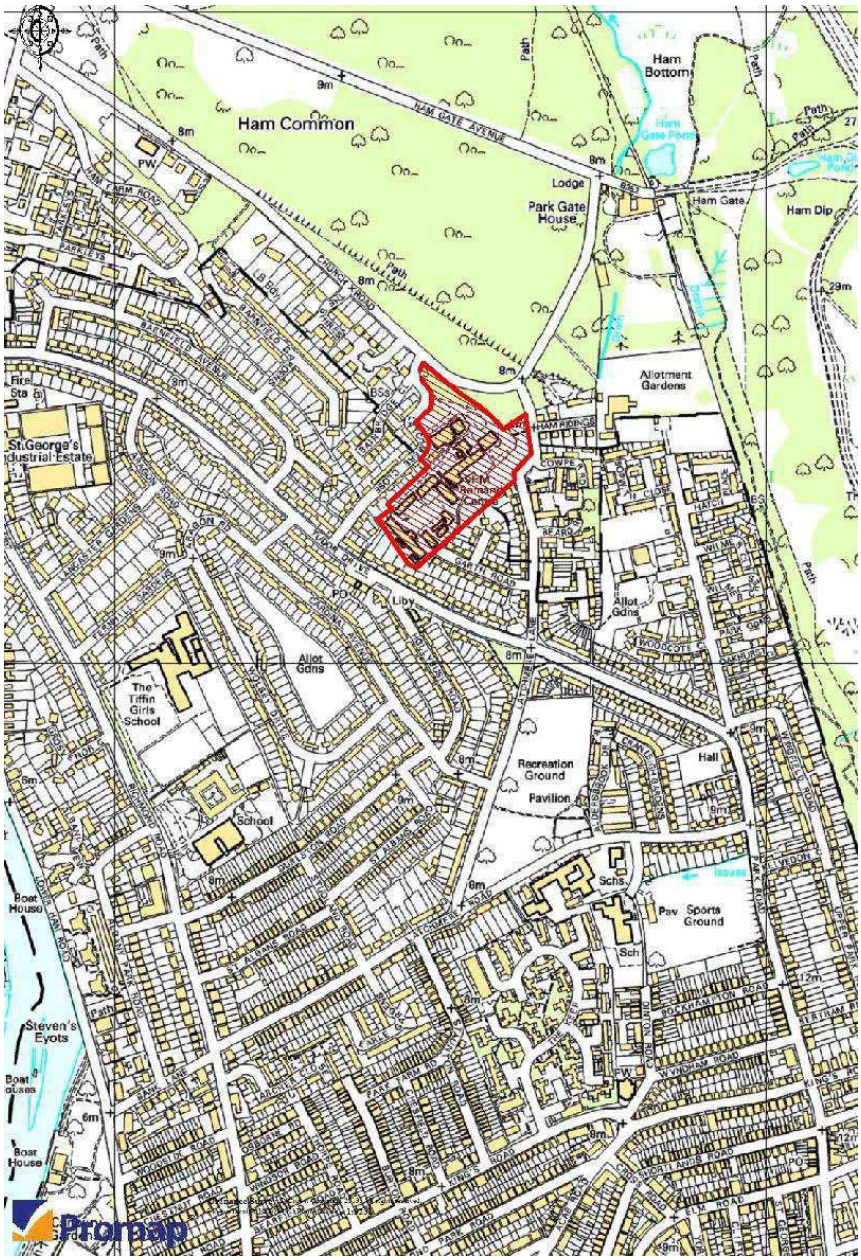
1. INTRODUCTION

1.1 Mayer Brown Ltd (MB) has been appointed by Berkeley Homes (Central London) Limited to prepare this Noise Assessment, in respect of the proposed residential development at Latchmere House, Ham Common, in the London Borough of Richmond-Upon-Thames. It should be noted that, part of the site is within the jurisdiction of the London Borough of Kingston-Upon-Thames. The site location is illustrated in Figure 1: Site Location in Relation to the Local Highway Network.



(Source: Ordinate Survey, Licence: AL100002189)

Figure 1. Site In Relation to the Local Highway Network

1.2 The area is predominantly residential with Ham Common to the north. The site is currently vacant after Latchmere House was closed down in 2011. This is illustrated in Figure 2: The Existing Site Layout.

Source:©2013 infoterra Ltd & Bluesky ©2013 Googel: Google Earth

Figure 2. The Existing Site Layout

1.3 The proposed development seeks to construct approximately 73 new residential dwellings. This is illustrated in Figure 3: The Proposed Site Layout.

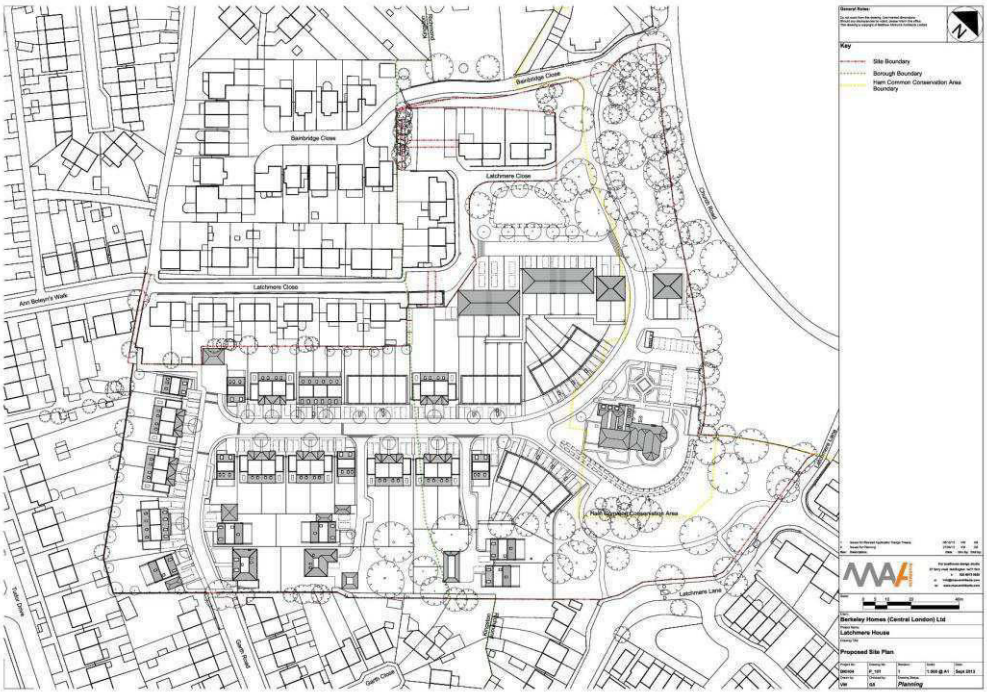


Figure 3. The Proposed Site Layout

1.4 Noise modelling to establish any change in traffic associated noise levels, as a result of the development has been based upon existing and proposed traffic data provided by Mayer Brown Ltd. Further details regarding the predicted traffic can also be seen in Section 4. Noise emission associated with the proposed Energy Centre has also been considered.

1.5 This assessment also seeks to establish if the proposed development site is considered to be suitable for residential occupation, in terms of noise.

1.6 This assessment has been undertaken using the guidance and parameters set out in Section 2 and the scope of works undertaken has been discussed with London Borough of Richmond and the London Borough of Kingston.

1.7 This report contains references of a technical nature. A glossary of acoustic terminology has, therefore, been provided in Appendix A to assist with any interpretation.

2. NATIONAL AND LOCAL POLICIES AND PRINCIPLES

2.1 This assessment has been prepared using many published policies, standards, guidelines and best practice documents, which will be referred to throughout this chapter. Below is a summary of each document.

Legislation

The Control of Pollution Act 1974

2.2 The Control of Pollution Act 1974 section 62 and 62 contains powers for local authorities to deal with noise and vibration from construction and demolition sites.

The Health and Safety at Work Act 1974

2.3 The Health and Safety at Work Act 1974, though aimed primarily at the protection of workers (and providing, through Regulations, controls over workplace noise), also places a duty on employers to conduct their businesses so as to ensure that others too are not exposed to risks to their health. This can include risks arising to the public at large from noisy work activities.

The Planning and Compulsory Purchase Act 2004

2.4 The Planning and Compulsory Purchase Act 2004 requires local authorities to draw up local Development plans, setting the broad framework for acceptable Development in their area and reconciling the conflicts inherent in Development. Under the Town and Country Planning Act 1990, and in their Development management role, local planning authorities may attach conditions to Planning Consents which may include controls on the emission of noise. Advice on the use of these powers is given to English authorities in the light of the Government's Noise Policy Statement for England in the National Planning Policy Framework (March 2012) These are further discussed below.

The Noise Insulation Regulations

2.5 The Noise Insulation Regulations were introduced under the powers of The Land Compensation Act 1973 in order to alleviate road traffic noise problems caused by new, altered or additional carriageways, and to set down standards and criteria for noise insulation treatment of residential

dwellings. These Regulations were amended by the Noise Insulation (Amendment) Regulations 1988, and are applied when predicting road traffic noise levels set out in CRTN.

The Environmental Protection Act 1990

2.6 The Environmental Protection Act 1990 provides the principal controls over so-called "statutory nuisances", including noise emitted from premises so as to be prejudicial to health or a nuisance. By virtue of the Noise and Statutory Nuisance Act 1993, it also applies to nuisances arising from vehicles (e.g. from car alarms but not traffic), machinery and other equipment, in the street. Under the Act, local authorities have a duty to inspect their areas from time-to-time to detect nuisances and, subject to discretion to defer for seven days, when satisfied that a statutory nuisance exists or is likely to occur or recur, to serve an abatement notice on the person responsible. They also have a duty to investigate any complaint made by a person living within their area. Though businesses have a defence of "best practicable means", failure to comply with a notice is a criminal offence. Local authorities have a power of entry to private premises, power to seize noise-making equipment and powers to carry out works in default of Notices.

The Building Regulations 2010

2.7 The Building Regulations 2010 govern standards of construction for new buildings and major conversion and repair work. Part E deals with resistance to the passage of sound and requires, among other things, that houses, flats and rooms for residential purposes shall be designed and constructed in such a way that they provide reasonable resistance to the passage of sound from other parts of the same building and from adjoining buildings.

The Housing Act 2004

2.8 The Housing Act 2004 provides local authorities with the powers to reduce the likelihood of harm occurring within dwellings as a result of 29 specified hazards, of which noise, both neighbourhood and ambient, is one. Local authorities can require improvement works to be carried out, prohibit an activity or even close or demolish the dwelling in order to reduce the likelihood of harm from the hazard under investigation.

National Planning Policy

National Planning Policy Framework

2.9 In March 2012, the current Planning Policy Guidance and Policy Statement documents were superseded by the National Planning Policy Framework (NPPF). The aim of this document is to set out the Government's requirements for the planning system only to the extent that it is relevant, proportionate and necessary to do so. It, also, aims to enable local people and councils to produce their own distinctive local and neighbourhood plans.

2.10 The NPPF is based upon 12 Core planning principles, a number of which have relevance to the proposals:

2.11 Number 4 states that planning should:

"contribute to conserving and enhancing the natural environment and reducing pollution....."

2.12 Core Planning Principle 11 Conserving and Enhancing the Natural Environment, also, states that the planning system should contribute to and enhance the natural and local environment by:

"preventing both new and existing development from contributing to or being put at unacceptable risk from, or being adversely affected by unacceptable levels of soil, air, water or noise pollution or land instability;

2.13 The local authorities have advised that at this time, they have not produced any additional guidance on the assessment of noise and that in the absence of any local guidance, the recommendations of NPPF are applicable.

The Noise Policy Statement for England (NPSE)[1]

2.14 This document aims to provide clarity regarding current policies and practices to facilitate noise management decisions and sets out the long term vision of Government noise policy.

2.15 The NPSE vision is to:

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

2.16 This long term vision is supported by the following aims:

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

- *Avoid significant adverse impacts on health and quality of life;*
- *Mitigate and minimise adverse impacts on health and quality of life; and*
- *Where possible, contribute to the improvement of health and quality of life."*

[1] Department for Environment, Food and Rural Affairs (2010) Noise Policy Statement for England. HMSO, London.

2.17 The vision and aims of the NPSE should be read in conjunction with the set of 'shared UK principles' which make up the Government's sustainable development strategy, which are listed in the NPSE as:

- *"Ensuring a Strong Healthy and Just Society – meeting the diverse needs of all people in existing and future communities, promoting personal wellbeing, social cohesion, and creating equal opportunity for all.*
- *Using Sound Science Responsibly – Ensuring policy is developed and implemented on the basis of strong scientific evidence, whilst taking into account scientific uncertainty (through the precautionary principle) as well as public attitudes and values.*
- *Living Within Environmental Limits – Respecting the limits of the planet's environment, resources and biodiversity – to improve our environment and ensure that the natural resources needed for life are unimpaired and remain so for future generations.*
- *Achieving a Sustainable Economy – Building a strong, stable and sustainable economy which provides prosperity and opportunities for all, and in which environmental and social costs fall on those who impose them (polluter pays), and efficient resource use is incentivised.*
- *Promoting Good Governance – Actively promoting effective, participative systems of governance in all levels of society – engaging people's creativity, energy and diversity."*

2.18 Through the introduction of the NPSE, it is intended that:

"By describing clear policy vision and aims the NPSE provides the necessary clarity and direction to enable decisions to be made regarding what is an acceptable noise burden to place on society"

Regional Planning Policy

The London Plan[2]

2.19 The London Plan is the overall strategic plan for London, setting out an integrated economic, environmental, transport and social framework for the development of London over the next 20–25 years.

2.20 In Chapter 3 – London's People, paragraph 3.11 states the following:

[2] Greater London Authority (GLA) (2011) The London Plan. Spatial development strategy for Greater London . GLA, London.

"Housing has a major impact on the health of residents, and the policies in this Plan are intended to enable Londoners to live in well designed, high quality homes, appropriately sized and energy efficient, warm and dry, safe, providing good access to high quality social infrastructure, green spaces, and limiting disturbance from noise…"

2.21 Policy 5.3, Sustainable design and construction states:

Major development proposals should meet the minimum standards outlined in the Mayor's supplementary planning guidance and this should be clearly demonstrated within a design and access statement. The standards include measures to achieve other policies in this Plan and the following sustainable design principles:

(…) minimising pollution (including noise, air and urban run-off)

2.22 Chapter 7 – London's Living Spaces and Places, paragraph 7.18, states the following:

"The effects of traffic can have a significant impact on the quality of the public realm in terms of air quality, noise and amenity of a space. The negative effects of traffic should be minimised to ensure people's enjoyment of public realm is maximised…"

2.23 Policy 7.15 – Reducing Noise and Enhancing Soundscapes that:

*"**Strategic***

A. The transport, spatial and design policies of this plan will be implemented in order to reduce noise and support the objectives of the Mayor's Ambient Noise Strategy.

Planning decisions

B. Development proposals should seek to reduce noise by:

a) minimising the existing and potential adverse impacts of noise on, from, within, or in the vicinity of, development proposals

b) separating new noise sensitive development from major noise sources wherever practicable through the use of distance, screening, or internal layout in preference to sole reliance on sound insulation

c) promoting new technologies and improved practices to reduce noise at source.

LDF preparation

C. Boroughs and others with relevant responsibilities should have policies to:

a) reduce the adverse impact of noise through the distribution of noise making and noise sensitive uses, and in highway management and transport policies…

b) protect Quiet Areas, to be formally identified under Environmental Noise (England) Regulations 2006 (as amended) and consider protection of spaces of relative tranquillity or high soundscape quality, particularly through borough open space strategies."

Greater London Authority Ambient Noise Strategy[3]

2.24 The Greater London Authority Ambient Noise Strategy considers a wide range of issues relating to noise which may affect this particular development. These include noise from transportation sources, known as ambient noise, and construction activities, which are described as neighbourhood noise.

2.25 The general objectives are identified as minimising the adverse impacts of road traffic noise and improving noise environments in London's neighbourhoods, especially for housing, schools, hospitals and other noise sensitive uses.

2.26 The strategy states the following policies for urban noise sensitive development:

"Policy 69

The London Plan, 2004 (Policy 4A.14) states that the Mayor will and boroughs should reduce noise by:

- *Minimising the existing and potential adverse impacts of noise on, from, within, or in the vicinity of, development proposals;*
- *Separating new noise sensitive development from major noise sources wherever practicable;*
- *Supporting new technologies and improved practices to reduce noise at source, especially in road, rail and air transport;*
- *Reducing the impact of traffic noise through highway management and transport policies;*

[3] Greater London Authority (GLA). (2004).The Mayor's Ambient Noise Strategy.GLA, London.

- *Containing noise from late night entertainment and other 24-hour activities, and where appropriate promoting well-managed designated locations."*

"Policy 70

The Mayor will, in strategic referrals which include residential development on sites with noise levels higher than Noise Exposure Category A of Planning Policy Guidance Note 24, or the equivalent level in any revision of guidance, seek specific evidence on the action to be taken to address noise."

Local Planning Policy

London Borough of Richmond Core Strategy[4]

2.27 The "London Borough of Richmond Core Strategy" sets out the planning policy for the Royal Borough of Richmond. The Core Strategy was adopted in April 2009 and sits below the Government's strategic NPPF.

2.28 CP1 Sustainable Development states:

"1.D Reducing environmental impact

The environmental benefits of retaining and, where appropriate, refurbishing existing buildings, should be compared against redevelopment.

Development should seek to minimise the use of open land for development and seek to maintain the natural vegetation, especially trees, where possible.

Local environmental impacts of development with respect to factors such as noise, air quality and contamination should be minimised."

London Borough of Richmond Development Management Plan[5]

2.29 The "London Borough of Richmond Development Plan" takes forward the Core Strategy. The Development Plan was adopted in 2011.

2.30 Policy DM DC 5 Neighbourliness, Sunlighting and Daylighting states:

"In considering proposals for development the Council will seek to protect adjoining properties from unreasonable loss of privacy, pollution, visual intrusion, noise and disturbance.

[4] London Borough of Richmond (LBoR) (2009). Core Strategy. LBoR, London.

[5] London Borough of Richmond (LBoR) (2011). Development Plan. LBoR, London.

To protect privacy, for residential development there should normally be a minimum distance of 20 m between main facing windows of habitable rooms

The Council will generally seek to ensure that the design and layout of buildings enables sufficient sunlight and daylight to penetrate into and between buildings, and that adjoining land or properties are protected from overshadowing in accordance with established standards."

London Borough of Kingston Upon Thames Core Strategy[6]

2.31 The "London Borough of Kingston Core Strategy" sets out the planning policy for Kingston and its surrounding hinterland. The Core Strategy was adopted in April 2012 and sits below the Government's strategic NPPF.

2.32 Policy DM1 is not specifically associated with noise but considers the BREEM assessment which considers noise acoustics.

2.33 Policy DM10 Design Requirements for New Developments states:

"Development proposals should also…

k). have regard to the amenities of occupants and neighbours, including in terms of privacy, outlook, sunlight/daylight, avoidance of visual intrusion and noise and disturbance…"

[6] London Borough of Kingston-Upon-Thames (LBoKUT) (2011). Core Strategy. LBoKUT, London.

3. ASSESSMENT METHODOLOGY AND CRITERIA

Standards and Guidelines

3.1 Regional Guidance and Local Development Frameworks put the assessment of noise into the context of the regional and local plans for the area.

3.2 Guidelines on Community Noise has been developed by the World Health Organisation, in order to *"…consolidate actual scientific knowledge on the health impacts of community noise and to provide guidance to environmental health authorities..."*

3.3 *BS5228: 2009: Code of practice for noise and vibration control on construction and open sites – Part 1: Noise*[7] gives recommendations for basic methods of noise control relating to construction and open sites. It applies to work activities and operations that generate significant noise levels. It also includes industry-specific guidance.

3.4 *BS5228: 2009: Code of practice for noise and vibration control on construction and open sites – Part 2: Vibration*[8] gives recommendations for basic methods of vibration control relating to construction and open sites, where work activities/operations generate significant vibration levels.

3.5 *BS8233:* Sound Insulation and Noise Reduction for Buildings 1999[9] provides information on the design of buildings that have internal acoustic environments.

3.6 *British Standard 4142: Method of Rating Industrial Noise Affecting Mixed Residential and Industrial Areas*[10] describes a method of determining the level of a noise of an industrial nature, together with procedures for assessing whether the noise in question is likely to give rise to complaints from persons living in the vicinity. The standard is intended to be used for assessing the measured or calculated noise levels from both existing premises and new or modified premises.

[7]British Standard Institute (2009) BS5228: Code of practice for noise and vibration control on construction and open sites – Part 1: Noise. BSI, London.

[8] British Standard Institute (2009) BS 5228. Code of practice for noise and vibration control on construction and open sites – Part 2: Vibration. BSI, London.

[9] British Standards Institute (1999) BS8233 Sound Insulation and Noise Reduction for Buildings. BSI, London

[10] British Standard Institute (1997) BS 4142: Method for Rating Industrial Noise Affecting Mixed Residential and Industrial Areas. BSI. London

Design Manual Roads and Bridges Noise and Vibration Assessment

3.7 The Design Manual for Roads and Bridges (DMRB) Volume 11 Section 3 Part 7 '*Noise and Vibration'* should be considered for a new road scheme, or a development that may alter traffic noise levels on an existing road.

3.8 As the proposal is for a large residential led development, the impact of site generated traffic upon the local road network may be significant. A DMRB assessment will determine both the impact of the development upon the local noise environment and any associated changes to noise induced annoyance levels for local residents, as a result of the development.

3.9 For a change in road traffic noise to be audible, an increase or decrease of 3dB is typically required. Table 11.4 details the magnitude of noise impacts both in the short and the long term as published in DMRB 11.3.7 (2011).

Short Term		**Long Term**	
Noise Change $LA_{10,18Hr}$ dB	Magnitude of Impact (Opening Year)	Noise Change $LA_{10,18Hr}$ dB	Magnitude of Impact (Future Year)
0	No change	0	No change
0.1 - 0.9	Negligible	0.1 - 2.9	Negligible
1 - 2.9	Minor	3 - 4.9	Minor
3 - 4.9	Moderate	5.9.9	Moderate
5+	Major	10 +	Major

Table 1. DMRB Road Traffic Noise Assessment Criteria

Background to Noise Legislation

3.10 The band of the frequency response of the ear, that is, the audible range of the human ear, is usually taken to be from about 20 Hz to 20,000Hz. Since the auditory system is not equally sensitive throughout this frequency range (being less sensitive at low and high frequencies), this is taken into account when making acoustic measurements by the use of A-weighting, a weighting filter which has a frequency response similar to the human auditory system. All the measurement results referred to in this report are A-weighted.

3.11 For many types of noise, the noise level index Equivalent Continuous A-Weighted Sound Pressure Level (L_{Aeq},T) is used as the basis of determining community response. The L_{Aeq},T is defined as the A-Weighted sound pressure level of the steady sound, which contains the same acoustic energy as the noise being assessed over a specific time period, T, and is used in this assessment as the unit of measurement for the average noise level throughout the survey period.

3.12 The procedures used in the Calculation of Road Traffic Noise[11], which are used in this assessment, assume typical traffic and noise propagation conditions, which are consistent with moderately adverse wind velocities and directions during the specified periods. All road noise levels expressed here are in terms of index L_{10} (18-hour) dB(A). This is the arithmetic average of the values of L_{10} hourly dB(A) for each of the eighteen one-hour periods between 06:00 to 24:00 hours.

3.13 All noise monitoring was undertaken in accordance with guidelines set out in the pertinent documents such as BS8233:1999 and BS4142:1997.

The Potential Effects of Noise

3.14 The WHO 'Guidelines for Community Noise' states that physically, there is no distinction between sound and noise. Sound is a sensory perception and the complex pattern of sound waves is labelled noise, music speech etc. Noise is thus defined as unwanted sound.

3.15 Sound in air can be considered as the propagation of energy through air in the form of oscillatory changes in pressure. The size of the pressure changes in acoustic waves is quantified on a logarithmic decibel (dB) scale firstly, because the range of audible sound pressures is very great and secondly, because the loudness function of the human auditory system is approximately logarithmic.

3.16 The dynamic range of the auditory system is generally taken to be 0dB to 140dB. Generally, the addition of noise from two sources producing the same sound pressure level, will lead to an increase in sound pressure level of 3dB. A 3dB noise change is generally considered to be just noticeable, whilst a 5dB change is generally accepted as clearly perceptible. A 10dB change leads to the subjective impression of a doubling or halving of loudness.

3.17 The principal potential adverse effects of noise are:
i) Activity disturbance;
ii) Annoyance; and
iii) Interference with processes or activities.

[11] Department of Transport. (1998) Calculation of Road Traffic Noise (CRTN). HMSO. London.

Noise Model Parameters

Traffic Flows

3.18 Mayer Brown Ltd commissioned a traffic survey to assess the existing traffic levels along the local highway network in July 2013, for the Transport Statement and Noise Assessment.

3.19 The baseline traffic data was utilised to calculate an 18hr 2-way traffic flow for the adjacent highway network with reference to an existing 2013 assessment scenario with and without development traffic.

3.20 It should be noted that the current baseline flows for 2013 were utilised as the TEMPRO growth factor for the 2015 development opening year demonstrated a predicted reduction in flows. Therefore, for a more robust assessment the current baseline flows were used.

3.21 Development traffic was obtained with reference to traffic surveys undertaken of the site access, as set out within the accompanying Transport Statement and distributed on the basis of national census travel to work census data.

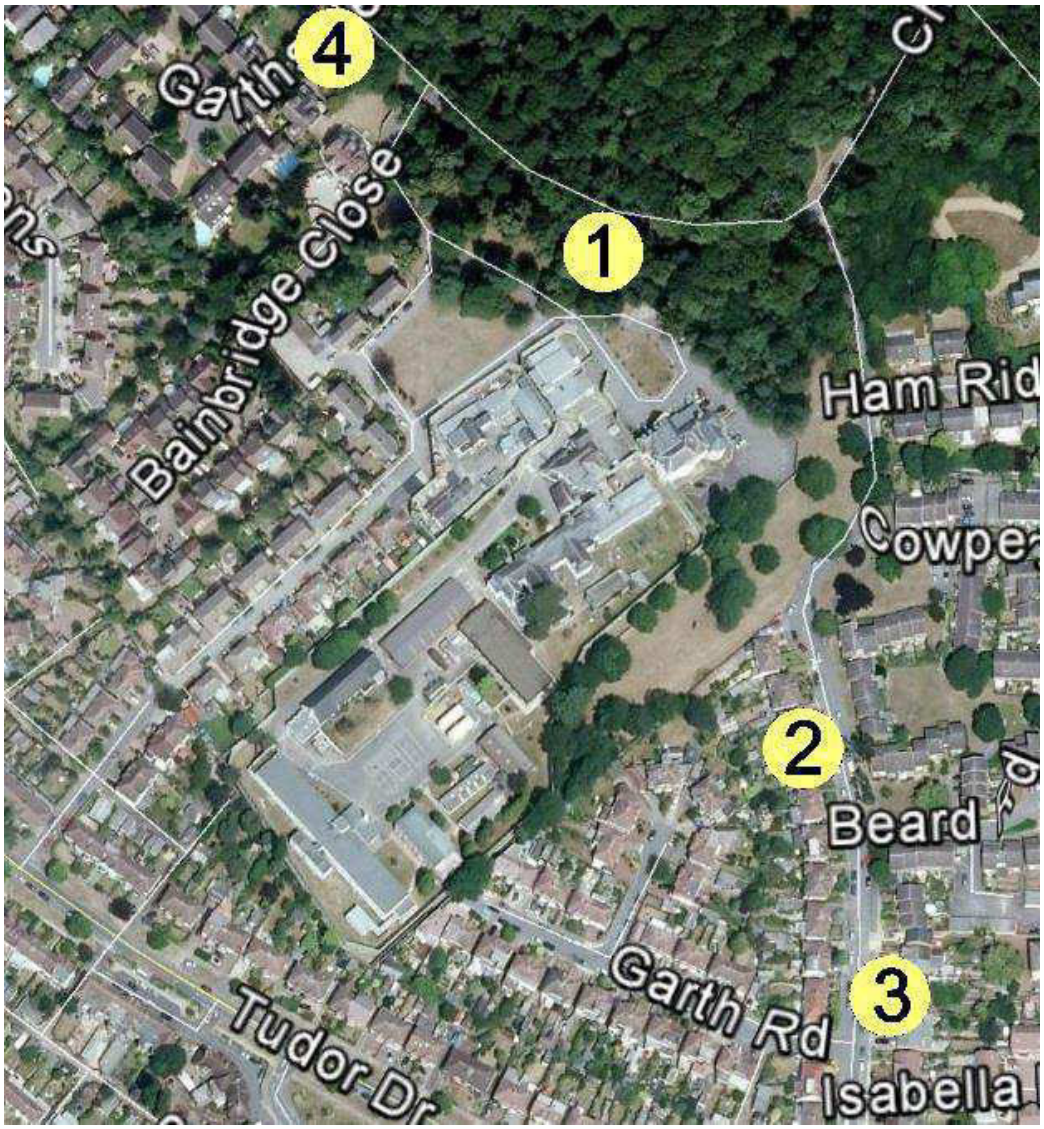
3.22 The Transport Statement outlines that there will be a net reduction in trips during the weekday peak periods and throughout the day, compared to the previous Remand Centre site use. However, to be robust and to provide a sensitivity test, modelling has been undertaken of the potential development impact.

Model Receptor Locations

3.23 It is considered that the main impacts of additional traffic will occur upon Church Road. Therefore, the impacts of the proposed development traffic have been modelled for this location. This location is shown in Figure 4 and set out in Table 3 below.

Position	Description
1	Position modelled at the northern boundary.
2	Position modelled at the front façade of 137 Latchmere Lane.
3	Position modelled at the front façade of 32 Latchmere Lane.
4	Position modelled at the front façade of 9 Church Road.

Table 2. Modelled Receptor Locations



Source:©2013 infoterra Ltd & Bluesky ©2013 Googel: Google Earth

Figure 4. Noise Modelling Locations

Model Verification

3.24 The initial process of data verification has involved a first level screening of the input and output data by manual methods, to ensure there are no obviously erroneous results.

3.25 Where the noise model has been used to assess the impact of road traffic, local monitored data has been used to verify the modelled results for systematic error, by comparing the monitored and modelled data for the same locations. This has produced a ratio for monitored/modelled results.

3.26 The source of monitored data used in this exercise is discussed in Section 4. Table 3 below sets out the data used in this verification exercise:

Monitoring/Modelling Location	Modelled $L_{A10\ 18hr}$	Monitored $L_{A10\ 18hr}$	Ratio Mod:Mon
1	54	46	+8
2	52	44	+8

Table 3. Estimated Systematic Error

3.27 Table 3 indicates that the modelled results overestimate the monitored data by up to 8 dB(A).

3.28 All site monitored data and traffic flow data was subsequently re checked for errors.

3.29 It is likely that this overestimate is partially due to the fact that the monitored results were obtained along a thick band of trees. It is possible that this mass of trees has had an 'absorbing' effect on the road traffic noise at this location. Whilst the model results were modelled at the same location, but assuming a free-field position, it is not possible to accurately quantify or model this effect.

3.30 As a result, the modelled results have been amended by 8dBA in order to more accurately reflect the actual measured values on site.

Model Limitations and Uncertainties

3.31 As discussed above, it should be noted that the modelled values overestimate the monitored values by up to 8dB(A). Therefore, caution is advised in applying any modelled results outside of the context of this assessment. Where actual site noise levels are required, monitored site data should be referred to.

3.32 It should be noted that the modelling process is dependant in the first instance upon projected traffic data. Where this data is subject to change this may affect the results of the modelling process.

3.33 It should also be noted that, whilst the noise model has been built to reflect the site topography, this can only be an approximation of the real world situation and results may be subject to small scale variations in ground heights.

3.34 Due regard has been taken of all the above limitations in the following assessment.

Significance Criteria

3.35 The significance criteria used within this assessment is in line with Table 1.

Calculation Methodology

Construction

3.36 Assessment of specific construction impacts is dependent upon a number of detailed building design details, which are not available at this stage. Therefore, the impact of construction activities should not significant and will be adequately controlled through the Demolition & Construction Management Plan (DCMP).

Operation

3.37 The assessment of operational traffic impacts has been based upon the operational traffic flows for the development year. Worst case operational traffic impacts have been quantitatively modelled by assessing the worst-case traffic flows nearest the most sensitive receptors.

3.38 Impacts have been calculated by subtracting the development year modelled 'baseline' from the development year baseline 'with development' scenario. The resultant changes in noise have then been assessed against the significance criteria given in Table 1.

3.39 A consideration of the suitability of the site for residential occupation has also be undertaken based upon noise measurements taken on site.

4. BASELINE CONDITIONS

Noise Monitoring

4.1 Fully automated environmental noise monitoring was undertaken between approximately 11:00 hours on Tuesday 16th July 2013 and 11:00 hours on Wednesday 17th July 2013, by Hann Tucker Associates.

4.2 Due to the nature of the survey, i.e. unmanned, it is not possible to accurately comment on the weather conditions throughout the entire survey period. However, at the beginning of the survey period the wind conditions were calm. We understand that generally throughout the survey period the weather conditions were moderate and dry and are considered suitable for obtaining representative measurements.

4.3 Additionally, it is also not possible to accurately describe the dominant noise sources, or specific noise events throughout the entire survey period. However, at the beginning and end of the survey period the dominant noise sources were noted to be road traffic.

4.4 Measurements were taken continuously of the A-weighted (dBA) L_{10}, L_{90}, L_{eq} and L_{max} sound pressure levels over 15 minute periods.

4.5 The noise level measurements were undertaken at 3 points across the site in order to monitor the noise levels. The measurement positions are described in the Table 4 below and illustrated in Figure 5:

Position	Description
1	The microphone was attached to the top of the hoarding at what was the main entrance to the detention centre, by Latchmere Close. The microphone was approximately 2.5m from the ground.
2	The microphone was attached to the perimeter fence of the site closest to Latchmere Lane. The microphone was approximately 2.5m from the ground.
3	The microphone was attached to one of the former cell blocks to the West rear of the properties located on Tudor Drive. The microphone was approximately 2m from the ground.

Table 4. Environmental Noise Survey Locations.

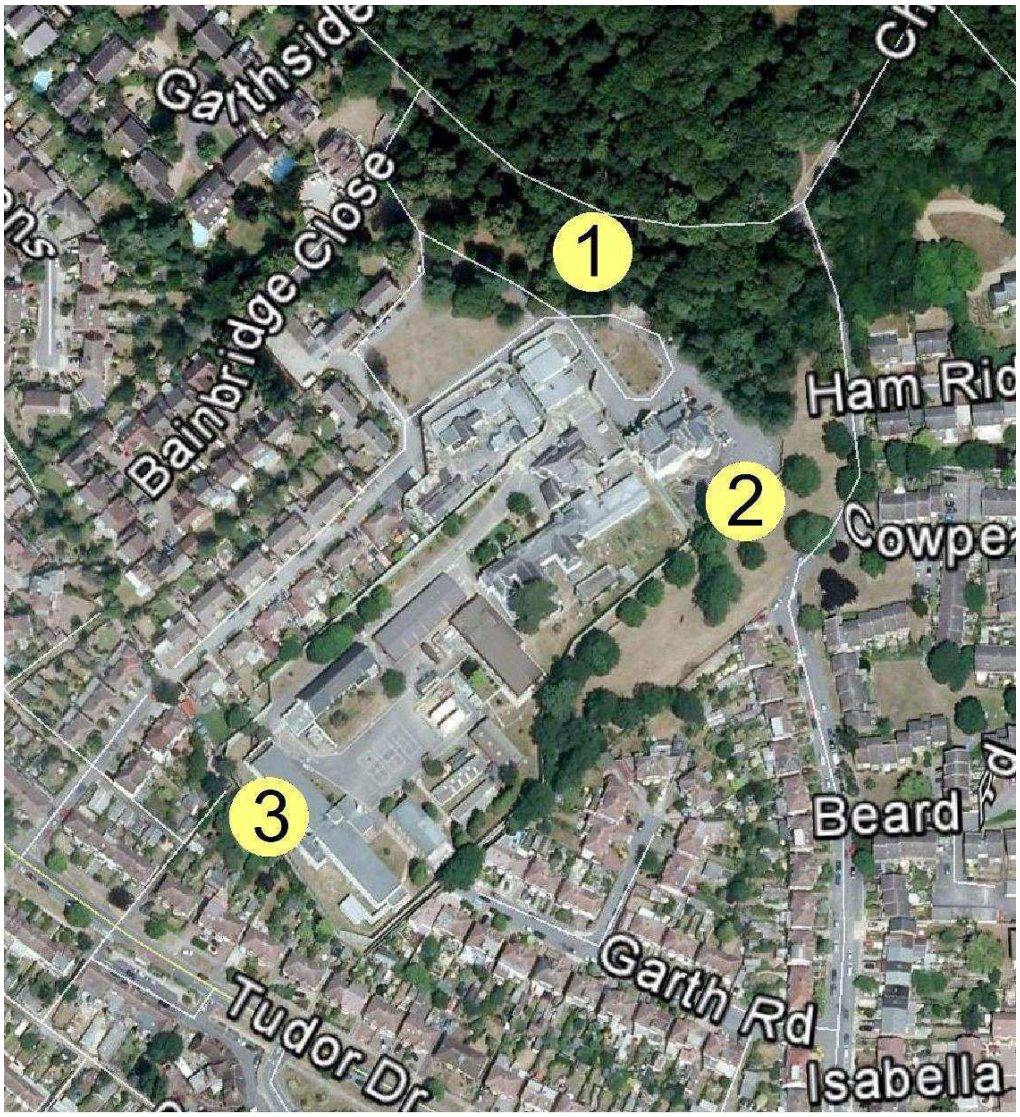


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Figure 5. Noise Monitoring Locations

4.6 Details of the Instrumentation used is set out in Appendix B.

Results

4.7 The results have been plotted on Time History Graphs in Appendix C, presenting 15 minute A-weighted (dBA) L_{10}, L_{90}, L_{eq} and L_{max} levels at each measurement position throughout the duration of the survey.

4.8 In order to compare the results of our survey with suitable guidelines it is necessary to convert the measured $L_{Aeq(15\ minute)}$ noise levels into single figure daytime $L_{Aeq(16\text{-}hour)}$ (07:00-23:00 hours) and night-time $L_{Aeq(8\text{-}hour)}$ (23:00-07:00 hours) levels.

4.9 A summary of the measured $L_{Aeq,16hr}$ and $L_{Aeq,8hr}$ is presented in Table 5 below.

Position	Daytime $L_{Aeq16\text{-}hour)}$	Night-Time $L_{Aeq(8\text{-}hour)}$
1	44dB	38dB
2	44dB	38dB
3	49dB	41dB

Table 5. Measured L_{Aeq} Environmental Noise

4.10 A summary of the lowest measured L_{A90} is presented in Table 6 below.

Position	Daytime (07:00 – 23:00)	Night-Time (23:00 – 07:00)	24 Hours
1	34	32	32
2	34	31	31
3	36	31	31

Table 6. Lowest Measured L_{A90} Noise Levels

4.11 A summary of the lowest measured L_{A10} is presented in Table 7 below.

Position	Noise Levels ($L_{A10\ 18hr}$ 06:00 – 0:00)
1	46
2	44
3	49

Table 7. Measured L_{A10} Noise Levels

Night-time L_{max} Results

4.12 There were no L_{max} events which exceeded 82dBA during the night-time at any measurement positions .

5. POTENTIAL IMPACTS

5.1 The potential noise impacts of the development have been assessed as worst-case scenarios with no allowance for mitigation.

Sources of Noise Effects

Operational Traffic

5.2 The potential worst case, unmitigated noise impact of traffic from the completed development, on residential receptors, has been assessed based on the traffic flows anticipated, as advised in the Transport Assessment. The results of these assessments can be seen in Table 11 below.

Receptor	Development Year $L_{A10\ 18hr}$		
	Without Development	With Development	Impact
1	44.6	46.5	1.9
2	46.6	47.6	1.0
3	44.3	45.2	0.9
4	38.4	39.1	0.7

Table 8. Modelled Traffic Noise Impacts at Specified Receptor Locations.

5.3 Table 8 demonstrates that when the predicted 'with development' traffic flows are compared to the predicted 'without development' traffic flows, it is concluded that the traffic associated noise levels will be considered negligible.

Garden Noise Levels

5.4 The WHO guidelines on Community Noise note that:

"to protect the majority of people from being seriously annoyed during daytime, the outdoor sound levels from steady continuous noise should not exceed 55 dB LAeq ....in outdoor living areas."

5.5 A review of the masterplan in relation to all measured noise levels demonstrates that all of the garden areas are likely to be below these level.

Operational Activities

5.6 At this stage, it is not anticipated that there will be significant noise emissions from plant associated with the completed development. However, any stationary plant and services proposed will be selected in accordance with BS:4142 and with the design criteria that LA_{eq} noise from building services would not exceed baseline background noise levels. This will ensure that no significant effects are likely from on-site stationary noise

sources. The likely plant associated with this development will for an energy centre.

The site will have an energy centre which will house 3 Hamworthy Wessex 150c boilers. The energy centre will be located to the north of Latchmere House on the eastern boundary of the site.

Hamworthy Wessex WM 150c	
Noise Emission @ 1m	
Max dB(A)	60
Min dB(A)	47

Table 9. Boiler Specification.

5.7 Using the unmitigated noise attenuation over distance calculation the noise level at the closest residential property at Latchmere House would be 41dBA.

Construction Noise

5.8 As well as considering the effect of the existing noise on the future residents of the proposed development, consideration must also be given to the effects of construction noise upon the existing residents in the vicinity of the site, albeit that it will be a temporary impact.

5.9 Existing residential properties are located immediately around the site. These residents may be adversely affected by construction noise related to the proposed development.

5.10 Examples of possible sources of noise include:

- Increased noise levels on-site due to construction activities, plant and road haulage vehicles;
- Increased noise levels caused by any ground treatment; and
- Increased noise levels off-site due to road haulage vehicles.

5.11 Assessment of specific construction impacts is dependent upon a number of detailed building design details which are not available at this stage. The impact of construction activities should be controlled by the use of a detailed DCMP, to be set at the site boundary ensure that residents and workers are not disturbed by site activities.

6. MITIGATION MEASURES AND RESIDUAL IMPACTS

Construction

6.1 Potentially significant impacts during the construction phase are associated with noise generating activities adjacent to potentially sensitive receptors. By employing appropriate site management practices, the potential for adverse noise impacts from construction vehicles and plant during the works will be minimised. A range of measures are suggested, which can form part of a site specific DCMP within which all contractor activities will be undertaken.

6.2 Prior to any construction activity on site, a full DCMP will be drawn up and agreed with the councils to set out the appropriate site management practices to be adhered to.

6.3 The DCMP will cover the following matters:

- Methods and materials that should be used to ensure that the generation of noise is minimised;
- Regarding site layout for site construction, noise generating activities to be located away from sensitive receptors; and
- Good housekeeping and management, i.e.
    - Review of plant and activities to ensure noise minimisation measures are in place and operating;
    - Public relations, e.g. provision of telephone numbers for complaints, pre-warning of noisy activities, sensitive working hours;
    - Controlling of site traffic and setting up of access routes away from sensitive receptors; and
    - Provision of noise monitoring during activities likely to affect sensitive receptors;

6.4 Berkeley Homes (Central London) Limited will be responsible for the execution of the DCMP and will ensure that appropriate personnel understand their responsibilities in terms of the minimisation of noise and the appropriate reporting and dealing with incidents. They will also be responsible for identifying and organising appropriate training.

6.5 Mitigation measures will include the following where possible:

- Regular monitoring where the potential for significant noise is identified;
- Where possible, 'silenced' plant and equipment to be used;
- Where vehicles are standing for a significant period of time, engines to be switched off;
- Location of noise generating plant at a low level and as far distant as possible from sensitive receptor;
- Plant to operate at low speeds, where possible and incorporate automatic low speed idling;
- Location of site haul roads, entrances and exits to prevent the need for vehicles to reverse and also minimise impacts upon sensitive receptors;
- all plant to be properly maintained (greased, blown silencers replaced, saws kept sharpened, teeth set and blades flat, worn bearings replaced, etc);
- Consideration to be given to temporary screening or enclosures for static noisy plant to reduce noise emissions and plant should be certified to meet any relevant EC Directive standards; and
- All contractors to be made familiar with the guidance in BS 5228 (Parts 1 and 2,) which should form a pre-requisite of their appointment; and
- Early and good public relations with the adjacent tenants and occupants of buildings will also reduce the likelihood of complaints.

6.6 Once the exact methods and plant to be employed are confirmed, the need for further mitigation measures can be determined and specified within the DCMP.

6.7 It has been advised by the local authority that for a site of this size and the close proximity of local residents a Section 61 prior consent application (under The Control of Pollution Act 1974) will be required due to the potential of major infrastructure works.

Completed Development

6.8 BS 8233: 1987 has been withdrawn and replaced by British Standard 8233: 1999: "Sound insulation and noise reduction for buildings". Section 7.6.1 of BS 8233: 1999 states that reasonable resting and sleeping conditions in living rooms and bedrooms can be achieved by the following target $L_{Aeq,T}$ internal noise levels:

Room Type	$L_{Aeq,T}$	
	Good	Reasonable
Living Room	30dB	40dB
Bedrooms	30dB	35dB

Table 10. BS 8233: 1999 Reasonable Resting and Sleeping Conditions

6.9 The Standard also states *"For a reasonable standard in bedrooms at night, individual noise events (measure with F time-weighting) should not normally exceed 45dB L_{Amax}."*

6.10 The World Health Organisation document on "Guidelines for Community Noise" states the following guideline values for community noise in specific environments.

Specific environment	Critical Health Effects	L_{Aeq}	$L_{Amax,fast}$
Dwelling, indoors	Speech intelligibility and moderate annoyance	35dB	-
Inside Bedrooms	Sleep disturbance, night-time	30dB	45dB

Table 11. WHO Guideline values for Community Noise

6.11 The document also states *"For a good sleep, it is believed that indoor sound pressure levels should not exceed approximately 45dBA L_{Amax} more than 10-15 times per night, (Vallet & Varnet 1991)."*

6.12 The above levels are, however, the subject of much controversy, as indicated by one of the feature articles in the January/February 2003 edition of the Institute of Acoustics' publication. Therefore, the above criteria for bedrooms should thus be regarded as preferred, rather than mandatory maxima to be achieved in all cases.

6.13 On the basis of the above and in respect of what constitutes an adequate level of insulation against external noise, internal noise levels within residential dwelling should meet the 'reasonable' standard detailed in BS 8233, i.e. 40 dB $L_{Aeq,16hour}$ during the day and 35 dB $L_{Aeq,8hour}$ during the night. As such, providing as a minimum, 'reasonable' internal noise levels is the design target that has been adopted for the proposed development, striving towards the provision of 'good' internal noise levels wherever possible. For clarity, it is proposed that the following internal noise levels be adopted as minimum design targets in the worst affected dwellings.

Room Type	Period	Criterion
Living Areas	Daytime (07:00-23:00 hours)	40dB LAeq, 16hr
Bedrooms	Night Time (23:00-07:00 hours)	35dB LAeq, 8hr

Table 12. Design Target Internal Noise Levels

6.14 The above levels correspond to "reasonable", as defined in BS 8233. If these criteria are adopted as minimum standards for worst affected dwellings, the typical levels in typical dwellings will approach, and in many cases exceed, "good" as defined in BS 8233.

6.15 Please note that the criteria termed "reasonable" in BS8233: 1999 would generally be considered to be stringent and acceptable. It would in fact be fair to substitute the word "reasonable" for "acceptable". To expect "good" in the worst case dwellings would thus be consistent with BS 8233: 1999. If the worst case was designed to "good" this would lead to "over design" for other dwellings – which could be undesirable for various reasons (including cost and acoustic privacy between dwellings).

6.16 At this stage of the design scheme, neither the precise types of window to be used are not known nor has the selection of acoustic vents been made.

6.17 Annex 6 of PPG24 (although it has been superseded, it is still relevant) states the following:

"Typical noise reduction of a dwelling façade with windows set in brick/block wall."

Difference between external and internal Noise Levels			
Noise Source	**Single Glazing**	**Thermal Double Glazing**	**Secondary Glazing**
Road Traffic	28dBA	33dBA	34dBA
Civil Aircraft	27dBA	32dBA	35dBA
Military Aircraft	29dBA	35dBA	39dBA
Diesel Train	28dBA	32dBA	35dBA
Electric Train	30dBA	36dBA	41dBA

Table 13. Difference Between External and Internal Noise Levels

6.18 Please note that the values in the above Table are the difference between dB(A) levels measured outside and inside typical dwellings, therefore 3dB(A) should be added to free field noise levels to determine outside levels.

6.19 A simple assessment based on the above indicates the following noise levels may be expected with conventional single glazing within the proposed worst case dwellings.

Position	**Daytime LAeq(16-hour) dBA**	**Night-time LAeq(8-hour)**
1	19dB	13dBA
2	19dB	13dB
3	24dB	16dB

Table 14. Predicted Worst Case Internal Noise Levels Using Thermal Double Glazing

6.20 The above predicted worst case internal noise levels exceed the proposed criteria as set out in paragraph 6.13 and Tables 12 and 13. It is thus demonstrated that acceptable internal noise levels are achievable.

6.21 Additionally, almost any night-time LAmax events would also be reduced to below 45dBA inside the proposed bedrooms.

Operational Activities

6.22 At this stage, it is not anticipated that there will be significant noise emissions from plant associated with the completed development. However, any stationary plant such as the energy centre and services proposed will be selected in accordance with BS4142 and with the design criteria that LA_{eq} noise from building services would not exceed baseline background noise levels. This will ensure that no significant effects are likely from on-site stationary noise sources.

6.23 An assessment of the energy assessment has demonstrated that the boilers won't have a negative impact on the environmental noise levels, but it is the assessment has shown that this impact will be negligible with further attenuation resulting from the housing the assessment is considered to represent worst case.

7. CONCLUSIONS

7.1 It is concluded that any noise impacts associated with development of land at the vacant Latchmere House and associated land, at Richmond are not considered to be significant. Therefore, the development should not be constrained on the basis of noise.

Demolition and Construction

7.2 A site-specific Construction Method Statement will be prepared and implemented to assist in reducing potential noise impacts. This will include best practice to minimise construction impacts, as specified in Section 5 of this report. The residual construction noise impacts are expected to be adverse, but only temporary and of small magnitude and of minor significance. These will be mitigated through the DCMP.

7.3 Furthermore, a Section 61 (The Control of Pollution Act 1974) prior consent application will be required for the demolition and construction stage.

Completed Development

7.4 This assessment has considered the impact of the existing noise environment on the proposed development, and the noise impact associated with development related traffic, and the commercial operations within the context of the local area.

7.5 With regards to residential development, the assessment has found that;

- predicted that 'good' internal noise levels could be achieved as a minimum on all facades when using conventional thermal double glazing units;
- It is predicted the site falls within the WHO external LAeq,16hr noise limit of 55dB;

7.6 With regards to the development related traffic, the assessment has found that;

- in the opening year the short term impact of development related traffic will have a minor impact at worst; and
- in the long term the $LA_{10,18hr}$ noise environment will increase by a negligible amount at all of the existing receptors assessed.

7.7 All plant and services will be selected in accordance with BS:4142 and with the design criteria based on the boundary noise limits. This will ensure that no significant effects are likely from on-site stationary noise sources.

7.8 With regards to the development related traffic, the assessment has found that the impact of the change in traffic is nil to negligible.

7.9 In respect of the energy centre it isn't anticipated to have any detrimental impact upon the development.

7.10 Based on the results of the assessment, noise should not pose a material constraint for the proposed development.

APPENDIX A

Glossary of Acoustic Terminology

The acoustic terms used in this report are explained below:

dB : Decibel - Used as a measurement of sound pressure level. It is the logarithmic ratio of the noise being assessed to a standard reference level.

dB(A) : The human ear is more susceptible to mid-frequency noise than the high and low frequencies. To take account of this when measuring noise the 'A' weighting scale is used so that the measured noise corresponds roughly to the overall level of noise that is discerned by the average human. It is also possible to calculate the 'A' weighted noise level by applying certain corrections to an un-weighted spectrum. The measured or calculated 'A' weighted noise level is known as the dB(A) level.

Because of being a logarithmic scale noise levels in dB(A) do not have a linear relationship to each other. For similar noises, a change in noise level of 10dB(A) represents a doubling or halving of subjective loudness. A change of 3dB(A) is just perceptible.

L10 & L90: If a non-steady noise is to be described it is necessary to know both its level and the degree of fluctuation. The Ln indices are used for this purpose, and the term refers to the level exceeded for n% of the time, hence L10 is the level exceeded for 10% of the time and as such can be regarded as the 'average maximum level'. Similarly, L90 is the average minimum level and is often used to describe the background noise.

It is common practice to use the L10 index to describe traffic noise, as being a high average, it takes into account the increased annoyance that results from the non-steady nature of traffic noise.

Leq : The concept of Leq (equivalent continuous sound level) has up to recently been primarily used in assessing noise in industry but seems now to be finding use in defining many other types of noise, such as aircraft noise, environmental noise and construction noise.

Leq is defined as a notional steady sound level which, over a stated period of time, would contain the same amount of acoustical energy as the actual, fluctuating sound measured over that period (e.g. 1 hour).

The use of digital technology in sound level meters now makes the measurement of Leq very straightforward.

Lmax : Lmax is the maximum sound pressure level recorded over the period stated. Lmax is sometimes used in assessing environmental noise where occasional loud noises occur, which may have little effect on the Leq noise level.

APPENDIX B

Instrumentation

Description	Manufacturer	Type	Serial Number	Latest Verification
Position 1 Type 1 Data Logging Sound Level Meter	Larson Davis	824	3700	LD Calibration on 05/04/2013
Position 1 Type 1 ½" Condenser Microphone	Larson Davis	2541	104981	LD Calibration on 05/04/2013
Position 2 Type 1 Data Logging Sound Level Meter	Larson Davis	824	3838	LD Calibration on 19/11/2012
Position 2 Type 1 ½" Condenser Microphone	Larson Davis	377B02	108306	LD Calibration on 19/11/2012
Position 3 Type 1 Data Logging Sound Level Meter	Larson Davis	824	3839	LD Calibration on 09/05/2011
Position 3 Type 1 ½" Condenser Microphone	Larson Davis	377B02	123225	LD Calibration on 09/05/2011
Type 1 Calibrator	Larson Davis	CAL200	3082	LD Calibration on 21/03/2013

Each sound level meter, including the extension cable, was calibrated prior to and on completion of the surveys. No significant changes were found to have occurred (no more than 0.1 dB). Each sound level meter was located in an environmental case with the microphone connected to the sound level meter via an extension cable. Each microphone was fitted with an appropriate windshield.

APPENDIX C

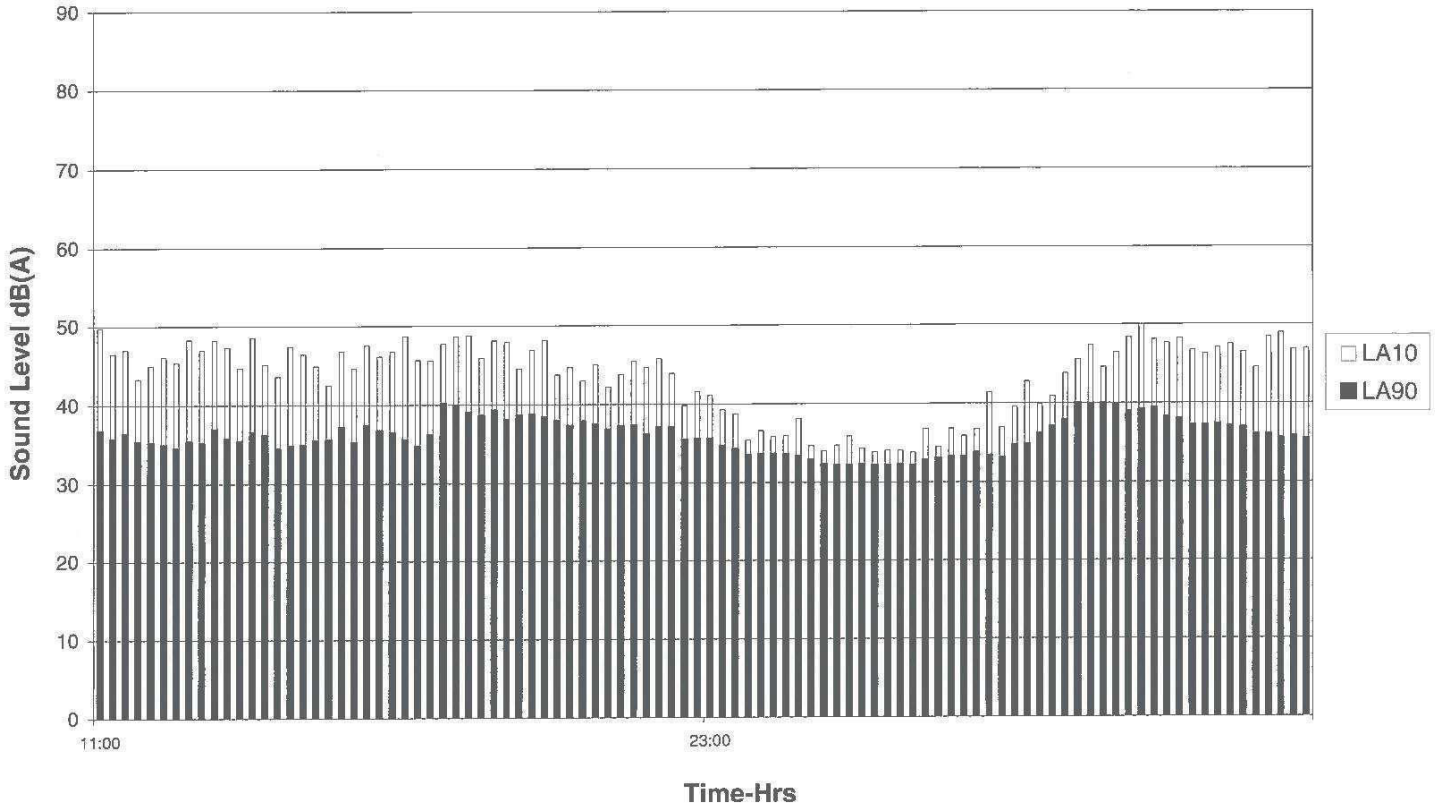
Noise Measurement Charts

Latchmere House, Richmond

Position 1

L_{A10} and L_{A90} Noise Levels

Tuesday 16/07/2013 to Wednesday 17/07/2013



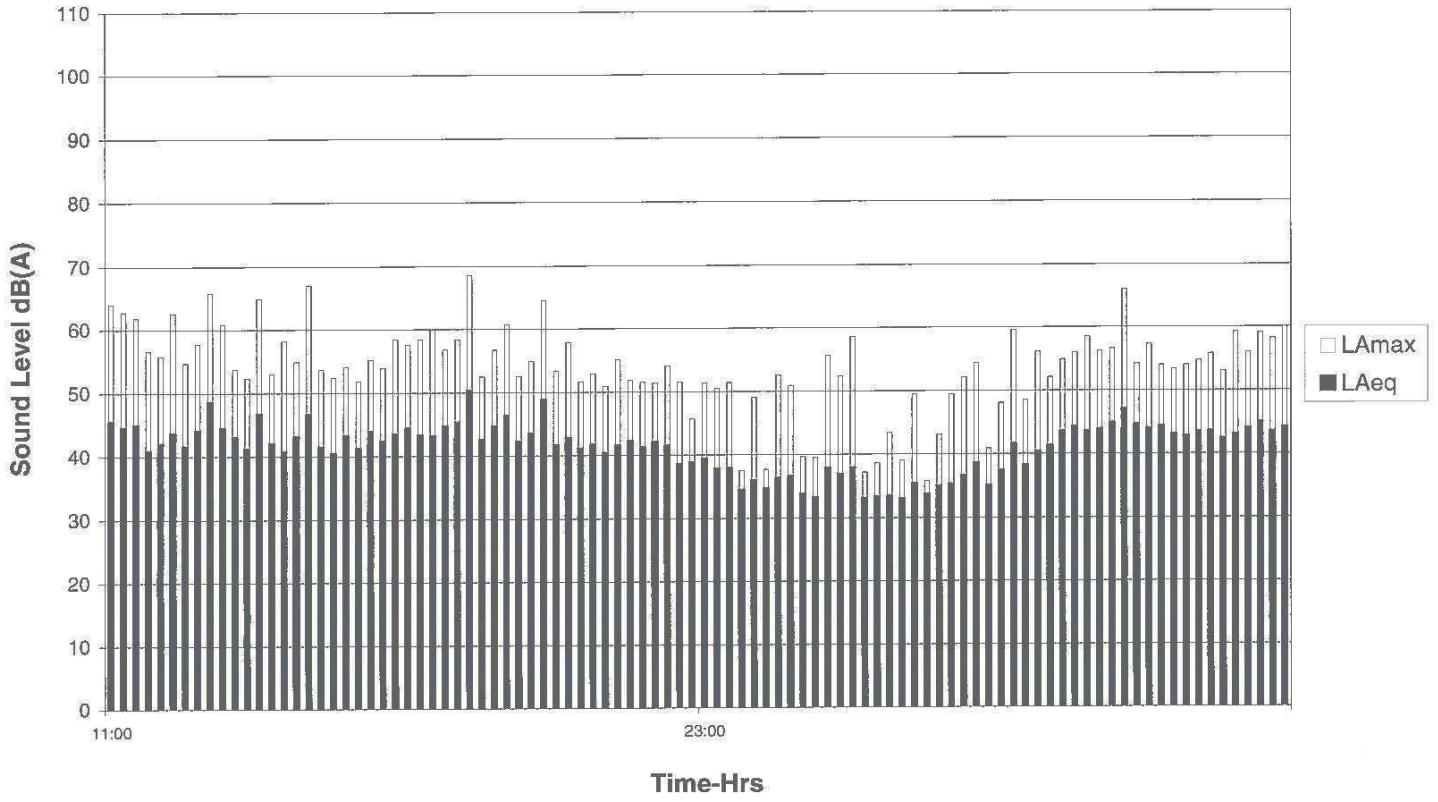
Time History Graph 19400/TH1

Latchmere House, Richmond

Position 1

L_{Aeq} and L_{Amax} Noise Levels

Tuesday 16/07/2013 to Wednesday 17/07/2013



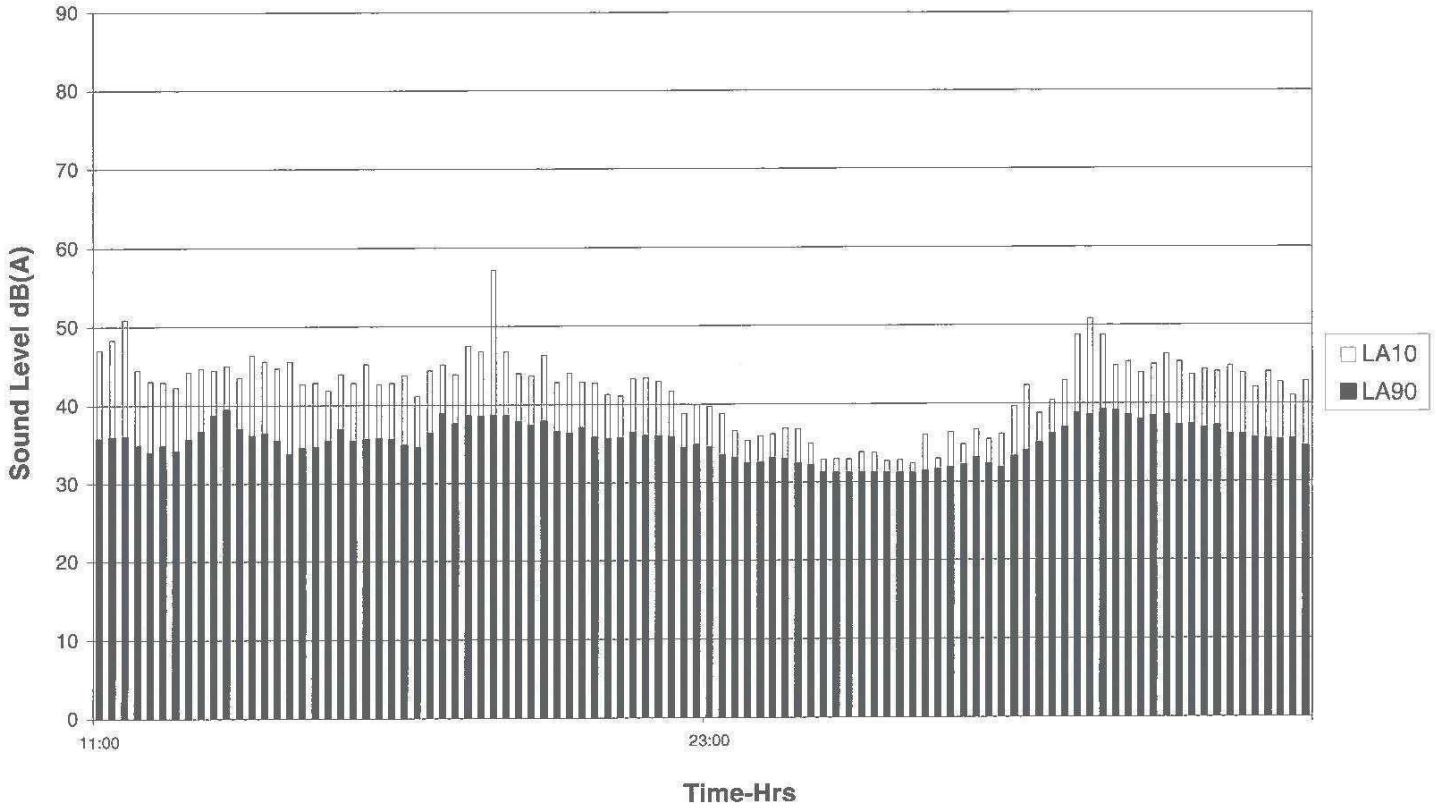
Time History Graph 19400/TH2

Latchmere House, Richmond

Position 2

L_{A10} and L_{A90} Noise Levels

Tuesday 16/07/2013 to Wednesday 17/07/2013



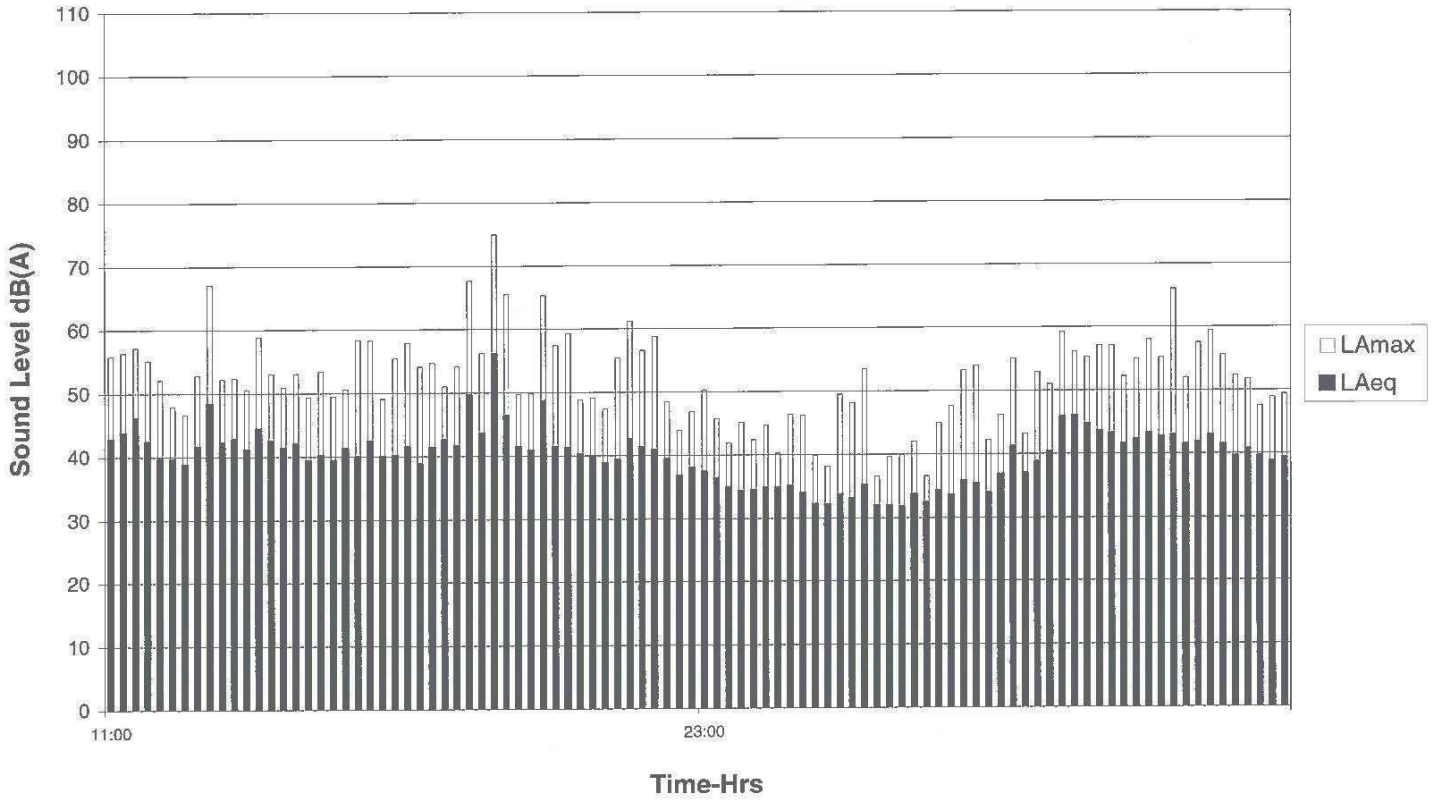
Time History Graph 19400/TH3

Latchmere House, Richmond

Position 2

L_{Aeq} and L_{Amax} Noise Levels

Tuesday 16/07/2013 to Wednesday 17/07/2013



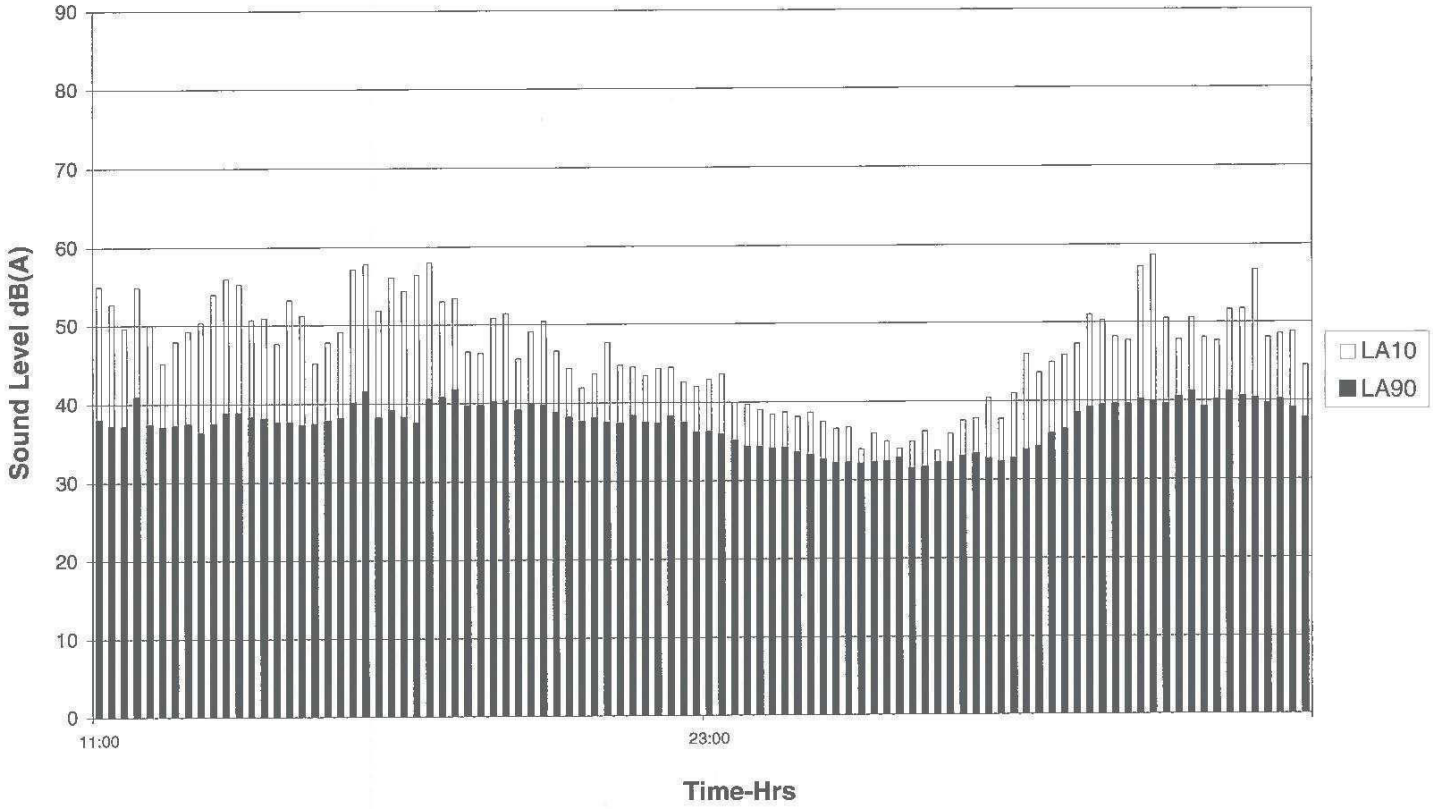
Time History Graph 19400/TH4

Latchmere House, Richmond

Position 3

L_{A10} and L_{A90} Noise Levels

Tuesday 16/07/2013 to Wednesday 17/07/2013



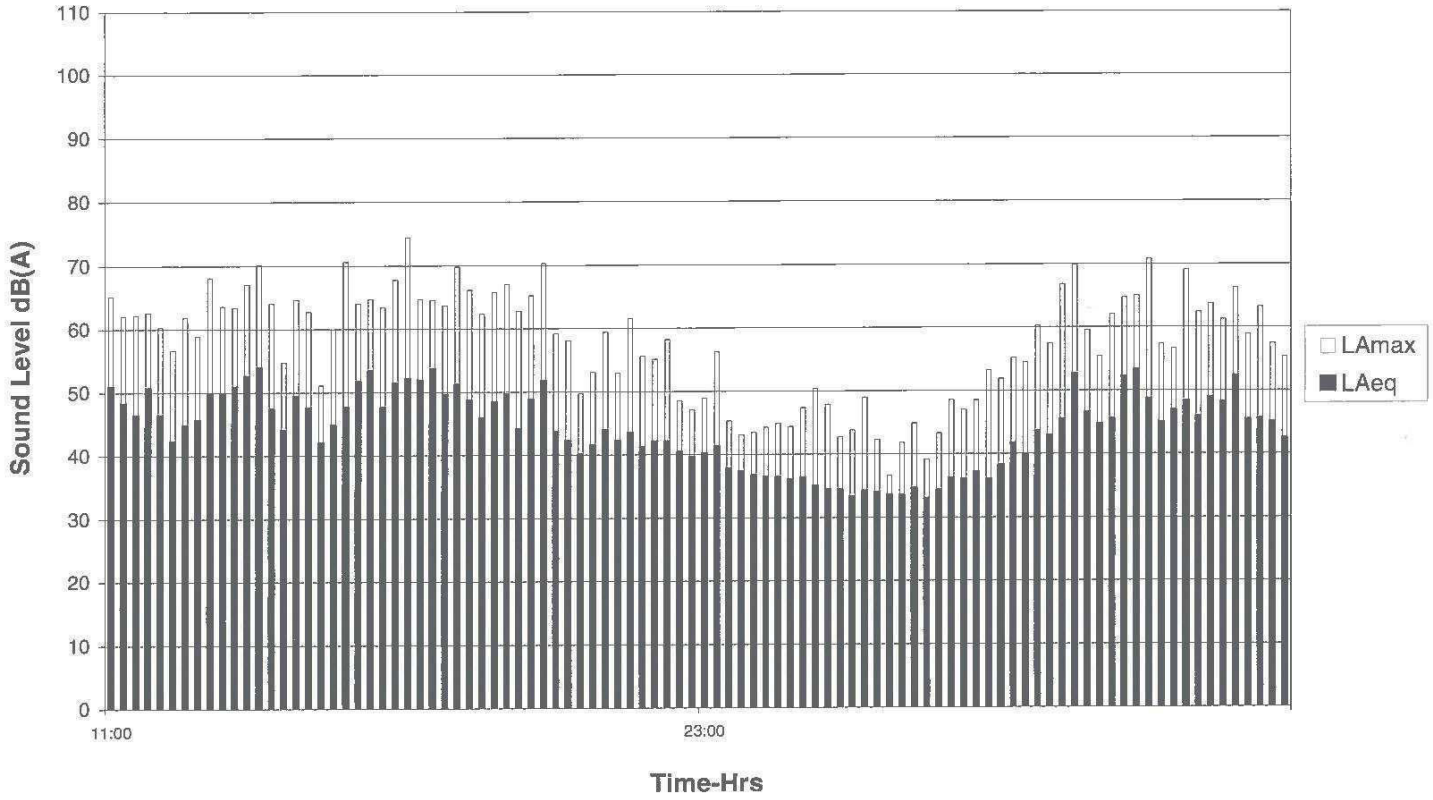
Time History Graph 19400/TH5

Latchmere House, Richmond

Position 3

L_{Aeq} and L_{Amax} Noise Levels

Tuesday 16/07/2013 to Wednesday 17/07/2013



Time History Graph 19400/TH6