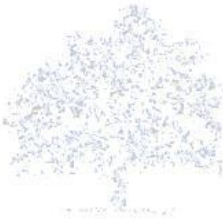


BlueTreeAcoustics



11 Colley Road • Sheffield • S5 9GT

T: +44 (0)7594 293 486

E: rw@bluetreeacoustics.com

W: www.bluetreeacoustics.com

VAT Reg. No: 970 8150 14

**Noise Assessment Report
for Proposed Residential Development
at 6 Queensgate, Huddersfield**

**Report Reference no. 1917.11/1
17th December 2013**

Report prepared by:

Richard Watson BEng(Hons) CEng MIOA MAES MIEEE

On behalf of:

Jaguar Estates / Wortley Developments
8 Town End Road
Ecclesfield
Sheffield
S35 9YY

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1.0 INTRODUCTION

- 1.1 Blue Tree Acoustics have been appointed jointly by Jaguar Estates and Wortley Developments to carry out an assessment of the existing noise climate at the site of a proposed residential development at 6 Queensgate, Huddersfield.
- 1.2 The development site is located in Huddersfield town centre and is situated between Queensgate, to the north, and Chapel Street, to the south. The site currently comprises various retail units, with a car parking area fronting onto Queensgate. There is a gym and a martial arts centre occupying the units fronting onto Chapel Street. The potential development plan proposes construction of new residential buildings on the site.
- 1.3 The surrounding area is mainly commercial in character with nearby retail, office, and industrial premises. Adjacent to the site to the west is Queensgate House which accommodates Huddersfield County Court. To the east and south are the premises of Thomas Broadbent & Sons, which is an engineering and manufacturing firm, although the Broadbent & Sons buildings on Chapel Street appear to be used for office/storage purposes rather than any manufacturing. There are residential properties on the nearby Chapel Hill and Queen Street South, situated to the west and east, respectively.
- 1.4 Queensgate is a busy dual carriageway and forms part of the A62 inner ring road where it passes the site. Chapel Street is a quieter road with occasional passing vehicles typically accessing the street parking available on both sides of the road.
- 1.5 The noise impact assessment has included:
- i) Inspection of the site and surroundings and study of the proposal documents provided by Jaguar Estates.
 - ii) Noise monitoring surveys undertaken at the site.
 - iii) Evaluation of the site in accordance with relevant planning policy guidance.
 - iv) Consideration of noise control measures required to maintain acceptable noise levels within the proposed bedrooms and living rooms in accordance with relevant guidance and the Kirklees Noise Design Advice document.

2.0 NOISE SURVEY

- 2.1 Noise monitoring was undertaken by Blue Tree Acoustics on 29th and 31st October 2013 in order to determine the existing ambient noise climate at the site. Attended measurements were taken at accessible locations around the site perimeter, as indicated in Figure 1.
- 2.2 Noise measurements were carried out using a Rion NL32 Class 1 Integrating Sound Level Meter, and a Svan 971 Class 1 Integrating Sound Level Meter. Noise was measured in terms of broadband A-weighted indices and at 1/3 octave bands from 50Hz to 10kHz. In each case the measurement microphone was mounted on a tripod at approximately 1.5m height from local ground, and the proprietary environmental windshield was fitted to the microphone. Calibration checks were carried out both before and after the measurements with no variance observed. Each sound level meter was within a valid period of laboratory calibration.
- 2.3 Weather conditions during the survey periods were dry and calm (wind speeds < 5m/s).
- 2.4 The primary noise source observed at the development site was road traffic from the A62 and surrounding roads. Some fan and plant noise from Thomas Broadbent & Sons' office and the Queensgate House buildings was audible during quieter periods. There was no manufacturing noise from the Thomas Broadbent & Sons works observed at the development site during the surveys.
- 2.5 The noise measurement results are detailed in Appendix II and are summarised in the tables below.

Table 1: Averaged Daytime Noise Levels (1230 – 1600 hours)

| Location | dB L _{Aeq} | dB L _{Amax} | dB L _{A1} | dB L _{A10} | dB L _{A90} |
|----------|---------------------|----------------------|--------------------|---------------------|---------------------|
| 1 | 73.2 | 85.6 | 80.7 | 76.6 | 65.2 |
| 2 | 57.7 | 71.5 | 66.6 | 58.7 | 50.7 |
| 3 | 58.5 | 71.9 | 66.9 | 59.2 | 55.0 |

Table 2: Averaged Night-time Noise Levels (0530 – 0700 hours)

| Location | dB L _{Aeq} | dB L _{Amax} | dB L _{A1} | dB L _{A10} | dB L _{A90} |
|----------|---------------------|----------------------|--------------------|---------------------|---------------------|
| 1 | 70.3 | 82.4 | 79 | 74 | 58.9 |
| 2 | 53.5 | 72.9 | 64.5 | 52.3 | 47.6 |
| 3 | 54.4 | 70.4 | 63.6 | 54.7 | 49.2 |

- 2.6 From the tables above, it can be seen that noise levels are greatest at Location 1 on Queensgate, which is most exposed to A62 traffic noise. Noise levels are notably lower at Locations 2 and 3, on Chapel Street, which are much less exposed to traffic noise.
- 2.7 Indicative measurements taken outside the front elevation of the existing shop-fronts facing the car park on site indicate that L_{Aeq} and L_{Amax} noise levels at this location are around 4dB lower than those measured at Location1 on the site boundary, being at approximately 13m further distance.

3.0 NOISE ASSESSMENT AND CRITERIA

National Planning Policy Framework

3.1 In March 2012, the National Planning Policy Framework came into force. This document replaced a great many planning guidance documents which previously informed the planning system in England. The new framework states that:

The planning system should contribute to and enhance the natural and local environment by:

- *protecting and enhancing valued landscapes, geological conservation interests and soils;*
- *recognising the wider benefits of ecosystem services;*
- *minimising impacts on biodiversity and providing net gains in biodiversity where possible, contributing to the Government's commitment to halt the overall decline in biodiversity, including by establishing coherent ecological networks that are more resilient to current and future pressures;*
- *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;*
and
- *remediating and mitigating despoiled, degraded, derelict, contaminated and unstable land, where appropriate.*

Planning policies and decisions should aim to:

- *avoid noise from giving rise to significant adverse impacts²⁷ on health and quality of life as a result of new development;*
- *mitigate and reduce to a minimum other adverse impacts²⁷ on health and quality of life arising from noise from new development, including through the use of conditions;*
- *recognise that development will often create some noise and existing businesses wanting to develop in continuance of their business should not have unreasonable restrictions put on them because of changes in nearby land uses since they were established,²⁸*
and
- *identify and protect areas of tranquillity which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason.*

²⁷ See Explanatory Note to the Noise Policy Statement for England (Department for the Environment, Food and Rural Affairs).

²⁸ Subject to the provisions of the Environmental Protection Act 1990 and other relevant law.

3.2 In addition, the Noise Policy Statement for England (NPSE) states:

Noise Policy Vision

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

Noise Policy 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.

Guiding principles of sustainable development

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 inclusion, 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.

Source: Securing the future – delivering UK sustainable development strategy, HM Government, March 2005.

3.3 The Noise Policy Statement for England Explanatory note states that:

Noise is an inevitable consequence of a mature and vibrant society. For some the noise of city life provides a desirable sense of excitement and exhilaration, but for others noise is an unwanted intrusion that adversely impacts on their quality of life, affecting their health and well being.

The management of noise has developed over many years as the types and character of noise sources have altered and as people's attitude to noise has changed. The Noise Abatement Act came into law in 1960 and the Report from the Committee on the Problem of Noise was published in 1963 (the Wilson report). Since then, examples of noise management can be found in many areas including reducing noise at source; the use of the land use and transport planning systems, compensation measures, the statutory nuisance and licensing regimes and other related legislation.

Furthermore, the broad aim of noise management has been to separate noise sources from sensitive noise receivers and to 'minimise' noise. Of course, taken in isolation and to a literal extreme, noise minimisation would mean no noise at all. In reality, although it has not always been stated, the aim has tended to be to minimise noise as far as reasonably practical. This concept can be found in the Environmental Protection Act 1990, where, in some circumstances, there is a defence of 'best practicable means' in summary statutory nuisance proceedings.

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.

The intention is that the NPSE should apply to all types of noise apart from noise in the workplace (occupational noise). For the purposes of the NPSE, "noise" includes:

- *"environmental noise" which includes noise from transportation sources;*
- *"neighbour noise" which includes noise from inside and outside people's homes;*

And

- *"neighbourhood noise" which includes noise arising from within the community such as industrial and entertainment premises, trade and business premises, construction sites and noise in the street.*

The application of the NPSE should mean that noise is properly taken into account at the appropriate time. In the past, the opportunity for the cost effective management of noise has often been missed because the noise implications of a particular policy, development or other activity have not been considered at an early enough stage.

In addition, the application of the NPSE should enable noise to be considered alongside other relevant issues and not to be considered in isolation. In the past, the wider benefits of a particular policy, development or other activity may not have been given adequate weight when assessing the noise implications.

In the longer term, the Government hopes that existing policies could be reviewed (on a prioritised basis), and revised if necessary, so that the policies and any noise management measures being adopted accord with the vision, aims and principles of the NPSE.

Noise management is a complex issue and at times requires complex solutions. Unlike air quality, there are currently no European or national noise limits which have to be met, although there can be specific local limits for specific developments. Furthermore, sound only becomes noise (often defined as 'unwanted sound') when it exists in the wrong place or at the wrong time such that it causes or contributes to some harmful or otherwise unwanted effect, like annoyance or sleep disturbance. Unlike many other pollutants, noise pollution depends not just on the physical aspects of the sound itself, but also the human reaction to it. Consequently, the NPSE provides a clear description of desired outcome from the noise management of a particular situation.

The guiding principles of Government policy on sustainable development should be used to assist in its implementation. The development of further principles specifically to underpin implementation of noise management policy will be kept under review as experience is gained from the application of the NPSE.

There are several key phrases within the NPSE vision and these are discussed below.

Health and quality of life

The World Health Organisation defines health as a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity, and recognises the enjoyment of the highest attainable standard of health as one of the fundamental rights of every human being.

It can be argued that quality of life contributes to our standard of health. However, in the NPSE it has been decided to make a distinction between 'quality of life' which is a subjective measure that refers to people's emotional, social and physical well being and 'health' which refers to physical and mental well being.

It is recognised that noise exposure can cause annoyance and sleep disturbance both of which impact on quality of life. It is also agreed by many experts that annoyance and sleep disturbance can give rise to adverse health effects. The distinction that has been made between 'quality of life' effects and 'health' effects recognises that there is emerging evidence that long term exposure to some types of transport noise can additionally cause an increased risk of direct health effects. The Government intends to keep research on the health effects of long term exposure to noise under review in accordance with the principles of the NPSE.

Promote good health and good quality of life

This statement expresses the long term desired policy outcome, but in the use of 'promote' and 'good' recognises that it is not possible to have a single objective noise-based measure that is mandatory and applicable to all sources of noise in all situations.

Effective management of noise

This concept confirms that the policy applies to all types of 'noise' (environmental, neighbour and neighbourhood) and that the solution could be more than simply minimising the noise.

Within the context of Government policy on sustainable development

Sustainable development is a core principle underpinning all government policy. For the UK Government the goal of sustainable development is being pursued in an integrated way through

a sustainable, innovative and productive economy that delivers high levels of employment and a just society that promotes social inclusion, sustainable communities and personal wellbeing. The goal is pursued in ways that protect and enhance the physical and natural environment, and that use resources and energy as efficiently as possible.

There is a need to integrate consideration of the economic and social benefit of the activity or policy under examination with proper consideration of the adverse environmental effects, including the impact of noise on health and quality of life. This should avoid noise being treated in isolation in any particular situation, i.e. not focussing solely on the noise impact without taking into account other related factors.

There are several key phrases within the NPSE aims and these are discussed below.

“Significant adverse” and “adverse”

There are two established concepts from toxicology that are currently being applied to noise impacts, for example, by the World Health Organisation. They are:

NOEL . No Observed Effect Level

This is the level below which no effect can be detected. In simple terms, below this level, there is no detectable effect on health and quality of life due to the noise.

LOAEL . Lowest Observed Adverse Effect Level

This is the level above which adverse effects on health and quality of life can be detected.

Extending these concepts for the purpose of this NPSE leads to the concept of a significant observed adverse effect level.

SOAEL . Significant Observed Adverse Effect Level

This is the level above which significant adverse effects on health and quality of life occur.

It is not possible to have a single objective noise-based measure that defines SOAEL that is applicable to all sources of noise in all situations. Consequently, the SOAEL is likely to be different for different noise sources, for different receptors and at different times. It is acknowledged that further research is required to increase our understanding of what may constitute a significant adverse impact on health and quality of life from noise. However, not having specific SOAEL values in the NPSE provides the necessary policy flexibility until further evidence and suitable guidance is available.

The first aim of the Noise Policy Statement for England

Avoid significant adverse impacts on health and quality of life from environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development.

The first aim of the NPSE states that significant adverse effects on health and quality of life should be avoided while also taking into account the guiding principles of sustainable development.

The second aim of the Noise Policy Statement for England

Mitigate and minimise adverse impacts on health and quality of life from environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development.

The second aim of the NPSE refers to the situation where the impact lies somewhere between LOAEL and SOAEL. It requires that all reasonable steps should be taken to mitigate and minimise adverse effects on health and quality of life while also taking into account the guiding principles of sustainable development. This does not mean that such adverse effects cannot occur.

The third aim of the Noise Policy Statement for England

Where possible, contribute to the improvement of health and quality of life through the effective management and control of environmental, neighbour and neighbourhood noise within the context of Government policy on sustainable development.

This aim seeks, where possible, positively to improve health and quality of life through the proactive management of noise while also taking into account the guiding principles of sustainable development, recognising that there will be opportunities for such measures to be taken and that they will deliver potential benefits to society. The protection of quiet places and quiet times as well as the enhancement of the acoustic environment will assist with delivering this aim.

3.4 Unfortunately, the above guidance gives no objective, tangible standards or criteria which enable planning decisions to be made. In the absence of such guidance, inevitably, reference to the former principal noise planning policy document (PPG24) may be made in order to quantify the exposure of the site to noise, particularly with regard to residential development. Quantification of noise impact in terms of PPG24 and associated guidance such as BS8233, which present noise limits and criteria based on World Health Organisation recommendations, can be considered as appropriately assessing the potential noise impact with regard to toxicology concepts and hence in line with the principles of the NPPF and NPSE. Therefore, meeting the recommendations of BS8233 and any associated local authority noise requirements can be considered as below the level where there is no detectable adverse effect on health and quality of life due to noise and this meets the NOEL (No Observed Effect Level) set out in the NPSE.

BS8233

3.5 *British Standard 8233:1999 “Sound Insulation and Noise Reduction for Buildings – Code of Practice”* (BS8233) provides information on the design of internal acoustics in buildings. It deals with control of noise from outside the building, noise from plant and services within it, and room acoustics for non critical situations. Table 3 sets out BS8233 recommended internal noise levels for residential rooms.

Table 3: BS8233 indoor ambient noise level criteria

| Criterion | Typical Situations | Design Range $L_{Aeq,T}$ dB | |
|--|-----------------------|-----------------------------|------------|
| | | Good | Reasonable |
| Reasonable resting / sleeping conditions | Living rooms | 30 | 40 |
| | Bedrooms ¹ | 30 | 35 |

¹For a reasonable standard in bedrooms at night, individual noise events (measured with F time-weighting) should not normally exceed 45 dB L_{Amax}

- 3.6 In addition, BS8233 makes reference to noise levels in gardens and balconies, etc., and states it is desirable that the steady noise level does not exceed 50dB $L_{Aeq,T}$ dB, and 55dB $L_{Aeq,T}$ should be regarded as the upper limit.

PPG24

- 3.7 *Planning Policy Guidance note No 24 'Planning and Noise'* (PPG24), issued by the Department of the Environment in 1994, set out the Government's policies relating to noise until its recent withdrawal in March 2012. The document gave guidance to local authorities in England on the use of their planning powers to minimise the adverse impact of noise. PPG24 outlined the considerations to be taken into account in determining planning applications, both for noise-sensitive developments and for those activities which generate noise. It introduced the concept of Noise Exposure Categories (NEC) for new residential developments.
- 3.8 The noise climate in the area of the development site is dominated by road traffic noise and can be assessed using the CRTN shortened method. The CRTN shortened measurement method involves measuring the L_{A10} noise level over a representative time period in three consecutive hours between 1000 and 1700 hours. The arithmetic mean of these L_{A10} values can then be corrected to give an $L_{Aeq(16 \text{ hour})}$. CRTN states that this arithmetic mean minus 1dB gives a value for the $L_{A10 (18 \text{ hour})}$ value. This $L_{A10 (18 \text{ hour})}$ value can then be converted to give the equivalent $L_{Aeq (16 \text{ hour})}$ value, as PPG24 states that $L_{Aeq(16 \text{ hour})} = L_{A10 (18 \text{ hour})} - 2\text{dB}$. The $L_{Aeq(16 \text{ hour})}$ can then be compared to the noise exposure categories specified in PPG24.

Table 4: PPG24 NEC Categories

| Categories For New Dwellings dB L_{Aeq,T} | | | | |
|--|--------------------------------|----------|----------|----------|
| | Noise Exposure Category | | | |
| Noise Source | A | B | C | D |
| Road Traffic | | | | |
| 07.00 - 23.00 | <55 | 55 – 63 | 63 – 72 | >72 |
| 23.00 - 07.00 | <45 | 45 – 57 | 57 – 66 | >66 |
| Rail Traffic | | | | |
| 07.00 - 23.00 | <55 | 55 – 66 | 66 – 74 | >74 |
| 23.00 - 07.00 | <45 | 45 – 59 | 59 – 66 | >66 |
| Air Traffic | | | | |
| 07.00 - 23.00 | <57 | 57 – 66 | 66 – 72 | >72 |
| 23.00 - 07.00 | <48 | 48 – 57 | 57 – 66 | >66 |
| Mixed Sources | | | | |
| 07.00 - 23.00 | <55 | 55 – 63 | 63 – 72 | >72 |
| 23.00 - 07.00 | <45 | 45 – 57 | 57 – 66 | >66 |

3.9 PPG24 states that the NEC categories are interpreted as follows:

NEC A

“Noise need not be considered as a determining factor in granting planning permission, although the noise level at the high end of the category should not be regarded as a desirable level.”

NEC B

“Noise should be taken into account when determining planning applications and, where appropriate, conditions imposed to ensure an adequate level of protection against noise.”

NEC C

“Planning permission should not normally be granted. Where it is considered that permission should be given, for example because there are no alternative quieter sites available, conditions should be imposed to ensure a commensurate level of protection against noise.”

NEC D

“Planning permission should normally be refused.”

- 3.10 From Table 1, it can be seen that the northern side of the site, facing Queensgate, falls within NEC D and the southern side of the site, facing Chapel Street, falls within NEC B.
- 3.11 In order to protect potential future residential amenity, noise would be taken into account and suitable acoustic mitigation measures will be included in the scheme as appropriate.

Local Planning Policy

- 3.12 The Kirklees Council UDP states the following policies:

BE1 ALL DEVELOPMENT SHOULD BE OF GOOD QUALITY DESIGN SUCH THAT IT CONTRIBUTES TO A BUILT ENVIRONMENT WHICH:

- i CREATES OR RETAINS A SENSE OF LOCAL IDENTITY;**
- ii IS VISUALLY ATTRACTIVE;**
- iii PROMOTES SAFETY, INCLUDING CRIME PREVENTION AND REDUCTION OF HAZARDS TO HIGHWAY USERS;**
- iv PROMOTES A HEALTHY ENVIRONMENT, INCLUDING SPACE AND LANDSCAPING ABOUT BUILDINGS AND AVOIDANCE OF EXPOSURE TO EXCESSIVE NOISE OR POLLUTION;**
- v IS ENERGY EFFICIENT IN TERMS OF BUILDING DESIGN AND ORIENTATION AND CONDUCIVE TO ENERGY EFFICIENT MODES OF TRAVEL, IN PARTICULAR WALKING, CYCLING AND USE OF PUBLIC TRANSPORT.**

EP4 PROPOSALS FOR NOISE SENSITIVE DEVELOPMENT IN PROXIMITY TO EXISTING SOURCES OF NOISE, OR FOR NOISE GENERATING USES OF LAND CLOSE TO EXISTING NOISE SENSITIVE DEVELOPMENT, WILL BE CONSIDERED TAKING INTO ACCOUNT THE EFFECTS OF EXISTING OR PROJECTED NOISE LEVELS ON THE OCCUPIERS OF THE EXISTING OR PROPOSED NOISE SENSITIVE DEVELOPMENT.

- 3.13 The Kirklees Noise Design Advice document is provided by the Council to help those involved in development in Kirklees achieve an acceptable noise environment for people living and working in the area.
- 3.14 The Noise Design Advice document presents five potential development scenarios and respective noise criteria. The five scenarios are:

- 1 - *New Industrial or Commercial Use near to Residential Use*
- 2 - *New Residential Properties near to Transportation Noise Sources (such as busy roads) or in Areas of Mixed industrial and Transportation Sources*
- 3 - *New Residential Development near to existing Industrial or Commercial Use where industrial noise is the dominant source.*
- 4 - *New Entertainment Premises near to existing Residential. Or Development containing New Entertainment and New Residential*
- 5 - *New Noise Sensitive Premises near to Places of Entertainment*

3.15 The second scenario, 'New Residential Properties near to Transportation Noise Sources', is most representative of the proposed development. For this scenario, the Noise Design Advice document states:

2 New Residential Properties near to Transportation Noise Sources (such as busy roads) or in Areas of Mixed industrial and Transportation Sources

2.1 *This advice aims to protect the future occupiers of your residential development from transportation noise or mixed transportation and industrial noise.*

Developers should carry out an assessment in accordance with PPG24 to determine the Noise Exposure Category (NEC) of the proposed residential development site. Noise Exposure Categories are used to determine whether noise is a factor in granting permission for the development. They range from Category A where noise is unlikely to be a determining factor to Category D where the development should normally be refused on noise grounds.

Once the NEC of the site has been determined regard should be had for the advice contained in PPG24. However it is recognised that a more flexible approach may be required in circumstances where the need is justified. In these situations the following minimum standards should be observed.

- Where the site falls into **Category B** the design/orientation of the site or sound insulation of the new dwelling must be sufficient to produce noise levels that don't exceed the levels specified in Appendix 1. Levels can be calculated with windows closed but if trickle vents are provided then levels will be calculated with the vents open. It may be necessary, depending on the external noise levels, to install glazing with a higher sound attenuation than the basic package, and to acoustically treat the trickle ventilation in order to achieve these levels.
- Where the site falls on the **boundary of Category B and C, in Category C or Category D** the design/orientation of the site and/or the sound insulation of the new dwelling must be sufficient to produce internal noise levels that don't exceed the levels specified in Appendix 1. It may be necessary, depending on the external noise levels and building design/orientation, to install glazing with a higher sound attenuation than the basic package, and to acoustically treat the trickle ventilation in order to achieve these levels. All indoor levels shall be taken with windows open **or** with alternatively provided acoustic ventilation over and above "background" ventilation.

2.2 Justification for advice

PPG24 states that one should try and separate noise sensitive developments from major sources of noise. It is good practice to try and keep a suitable distance between noise sensitive development and sources of transportation noise. PPG24 also states that acceptable internal noise levels are given in BS 8233. Levels in BS 8233 are used in this guidance.

- 3.16 Recommended criteria for internal noise levels in new dwellings are given in Appendix 1 of the Kirklees Council document “Noise Design Advice” as shown below.

Table 5: Noise level criteria as specified within Kirklees Noise Design Advice

| Room/Area | $L_{Aeq(16hr)}$ (0700-2300) | $L_{Aeq(8hr)}$ (2300-0700) | $L_{A1(15min)}$ (2300-0700) | $L_{Amax(15min)}$ (2300-0700) |
|----------------------|--------------------------------|-------------------------------|--------------------------------|----------------------------------|
| Living rooms/Studies | 35 dB | - | - | - |
| Gardens | 55 dB | - | - | - |
| Bedrooms | - | 30 dB | 45 dB | 55 dB |

- 3.17 The Kirklees Noise Design Advice document states that it is acceptable to assume an open window will provide a sound reduction of 12 dB(A). Based on this, and the measured day and night noise levels at site, noise ingress via an open window will result in internal noise levels above the Kirklees design criteria. Hence, measures to mitigate noise impact should be provided, e.g. by provision of glazing and ventilation with enhanced sound insulation.

4.0 NOISE MITIGATION MEASURES

4.1 In order to mitigate noise impact, PPG24 acknowledged a variety of proportionate and reasonable techniques that could be introduced. These were, specifically:

Engineering: reduction of noise at source (e.g. use of quiet machinery and working methods), containment of generated noise, and protection of noise-sensitive buildings (e.g. by sound insulation and/or screening them by purpose-built barriers);

Layout: adequate distance between source and noise-sensitive building; screening by natural barriers, other buildings or non-critical rooms in a building;

Administrative: limiting operating time of source, restricting activities on site, specifying an acceptable noise limit.

Dwelling Layout

4.2 The rooms most exposed to noise will be those on northern building elevations overlooking Queensgate. It would therefore be beneficial to design the internal room layout or orientate the dwellings as much as possible such that windows serving less noise-sensitive spaces (e.g. kitchens, bathrooms, corridors/circulation) face the Queensgate traffic. Wherever possible, the most noise sensitive rooms, i.e. bedrooms, should be positioned on facades less exposed to the primary noise sources. It should be noted that Queensgate traffic noise at the elevation of the existing shop-fronts is around 4-5dB lower than at the northern site boundary.

4.3 Based on the noise survey data, any external balconies on building elevations overlooking Queensgate or Chapel Street will be exposed to daytime noise levels above Kirklees Council's 55dB L_{Aeq} criterion. If it is desirable to provide private external garden areas where noise levels are below 55dB L_{Aeq} , then the building design will need to incorporate suitable screening from the surrounding roads, e.g. an inner courtyard space, or walled gardens.

Dwelling Protection

4.4 The design of the building envelope of the new dwellings can incorporate suitable sound insulation to satisfy Kirklees Council's criteria. The precise requirements will depend on the external noise level experienced at each property; based on the measured noise levels, the following examples would be indicative of suitable building envelope construction.

- 4.5 We understand that design of the proposed development is at an early stage and therefore detailed plans are not currently available. The following outline guidance is based on typical residential accommodation and assumed room sizes, etc. Calculations have assumed that glazing comprises no more than 25% of the total external wall area in living rooms and bedrooms.
- 4.6 Noise ingress calculations have been carried out in accordance with BS8233 in order to determine appropriate sound insulation measures. Based on the noise ingress calculations, the following sound insulation measures are expected in order to achieve the design criteria stated above.

Walls & Roof

Table 6: Recommended Wall Sound Reduction

| | Octave Band Minimum Sound Reduction Indices (dB) | | | | | | |
|------|---|------------|------------|------------|-----------|-----------|-----------|
| | 63 | 125 | 250 | 500 | 1k | 2k | 4k |
| Wall | 34 | 40 | 40 | 48 | 60 | 60 | 60 |

- 4.7 The above performance is achievable with a well sealed insulated cavity masonry construction, e.g. brick outer leaf and blockwork inner leaf. Any lightweight framed sections of outer wall (for example, to render or cladding areas), should be designed to achieve an equivalent acoustic performance; typically, this will require inclusion of additional mass layers within the wall build-up. Further advice for such wall types should be sought at the detailed design stage.
- 4.8 Roof constructions should be designed to provide suitable sound insulation. Tiled roof construction will likely require sound insulating ceilings to rooms below comprising a minimum of 2 layers of solid gypsum-based board (total minimum mass per unit area 20kg/m²), and overlaid with 100mm mineral fibre insulation. Any proposed rooms in the roof-space should be designed to have suitable internal linings to achieve the required sound insulation, e.g. by provision of multiple layers of dense plasterboard and insulation.

Glazing & Ventilation

4.9 The following figure shows outline glazing and ventilator facade requirements around the development in order to achieve suitable sound insulation. The following table summarises suitable example glazing and ventilator configurations for the marked building facade areas in the figure below. Glazing acoustic performance specifications are given below the table, based on acoustic data used in the BS8233 noise ingress calculations.

Table 7: Example Suitable Wall & Ventilation Specification – Living Rooms & Bedrooms




| Façade | Example Glazing Configuration | Example Ventilator Type |
|---|---|--|
|  | Wide airspace double glazing comprising 6mm glass/150mm cavity/4mm glass in well sealed solid framing, or alternatively, a standard double glazed outer unit, minimum 150mm void and inner secondary glazing comprising single 10mm glass with solid frame. | Ducted ventilation, e.g. 'whole house' or MVHR/MEV system |
|  | Double glazing comprising minimum 10mm glass/12mm airgap/6mm glass | Passive acoustic ventilator, minimum 44dB $D_{n,e,w}$ sound insulation |
|  | Double glazing comprising minimum 4mm glass/12mm airgap/6mm glass | Passive acoustic ventilator, minimum 40dB $D_{n,e,w}$ sound insulation |

Table 8: Example Glazing Minimum Octave Band Sound Reduction

| Glazing Configuration | Octave Band Minimum Sound Reduction Indices (dB) | | | | | | |
|---|--|-----|-----|-----|----|----|----|
| | 63 | 125 | 250 | 500 | 1k | 2k | 4k |
| Wide airspace double glazing comprising 6mm glass/150mm cavity/4mm glass in well sealed solid framing | 24 | 29 | 35 | 45 | 51 | 52 | 52 |
| 10mm glass/12mm airgap/6mm glass | 21 | 26 | 27 | 34 | 40 | 38 | 46 |
| 4mm glass/12mm airgap/6mm glass | 18 | 23 | 22 | 27 | 38 | 40 | 41 |

Outline Glazing & Ventilation Requirements



- 4.10 For all windows, the required acoustic performance should be attained by the glazing system as a whole, including frames. To achieve the required sound insulation, it is anticipated that this will require solid or insulated frames rather than hollow section.
- 4.11 Note that where a ducted ventilation system is utilised, e.g. 'whole house' ventilation, this assumes a fan system designed with no requirement for ventilation openings in window frames or external walls into habitable rooms on building elevations directly exposed to noise sources. Such a system should be designed such that there are no external wall terminations exposed to habitable rooms.
- 4.12 Suitable $D_{n,e,w}$ sound insulation performance is achievable with a number of acoustic passive ventilation options including the Rytons Cowled Acoustic Aircore AAC635HMCW, Greenwood EHA574, or Renson Invisivent AK49. There should be no other ventilators in the rooms other than the acoustic ventilators. Acoustic performance should be checked to ensure suitable sound insulation is provided for the room location.
- 4.13 Glazing and ventilators to non-habitable rooms or spaces may not require special acoustic measures. For the purposes of noise assessment, separate kitchens, bathrooms, WCs, etc., are considered as non-habitable spaces.
- 4.14 The glazing configurations and ventilation units given above are suitable recommendations. Equivalent acoustic performance satisfying the required sound insulation performance may be achieved by other configurations or products; any alternatively proposed systems should be checked by a competent acoustic consultant prior to any installation, in order to ensure adequate acoustic performance will be achieved.
- 4.15 It should be noted that the above ventilation treatments will enable provision of background ventilation to rooms whilst maintaining acoustic performance. Should higher ventilation rates be required, e.g. open windows, then it should be acknowledged that internal noise levels may occasionally exceed the Kirklees Council criteria referenced above, but are expected to be within the 'reasonable' limits defined in BS8233.
- 4.16 Precise specification of sound insulation measures should be undertaken at the detailed design stage once the site layout and dwelling designs are confirmed. For example, it may be feasible

to reduce specifications for rooms located on building elevations that are more shielded from noise sources.

- 4.17 All recommendations given above are for acoustic purposes only. Any other requirements such as structural, thermal, fire safety, etc. should be checked by suitably qualified specialists.

5.0 SUMMARY AND CONCLUSIONS

- 5.1 A noise assessment has been carried out for the proposed residential development site at 6 Queensgate, Huddersfield.
- 5.2 The assessment has included measurements of the prevailing ambient noise levels at the site during daytime and night-time survey periods.
- 5.3 Local and distant road traffic noise was found to be the dominant noise source impacting upon the site during day and night.
- 5.4 The suitability of the noise climate at the site for residential development has been determined. The assessment has been undertaken in accordance with the *National Planning Policy Framework* (NPPF) and the *Noise Policy Statement for England* (NPSE). Noise assessment and design targets for internal and external noise levels recommended in PPG24, BS8233 and Kirklees Council guidance have been used to quantify noise impact and determine suitability for residential development with due regard to effects on health and quality of life as set out in the NPSE.
- 5.5 The measured noise levels at the site are relatively high at the northern site boundary with Queensgate and fall within PPG24 Noise Exposure Category D. The southern site boundary on Chapel Street falls within Noise Exposure Category B.
- 5.6 Outline noise control measures have been recommended in order to meet suitable noise level criteria for the proposed residential development in accordance with Kirklees MC Noise Design Advice guidance. These include consideration of enhanced glazing and ventilation measures for the building envelope to provide suitable sound insulation.
- 5.7 We consider the implemented noise survey assessment methodology and recommendations for sound insulation measures to meet the Kirklees Council guidance and the principles set out in the NPPF and NPSE, and that suitable design for residential development can be achieved.

FIGURE 1 – SITE AERIAL PHOTO & APPROXIMATE NOISE MONITORING LOCATIONS

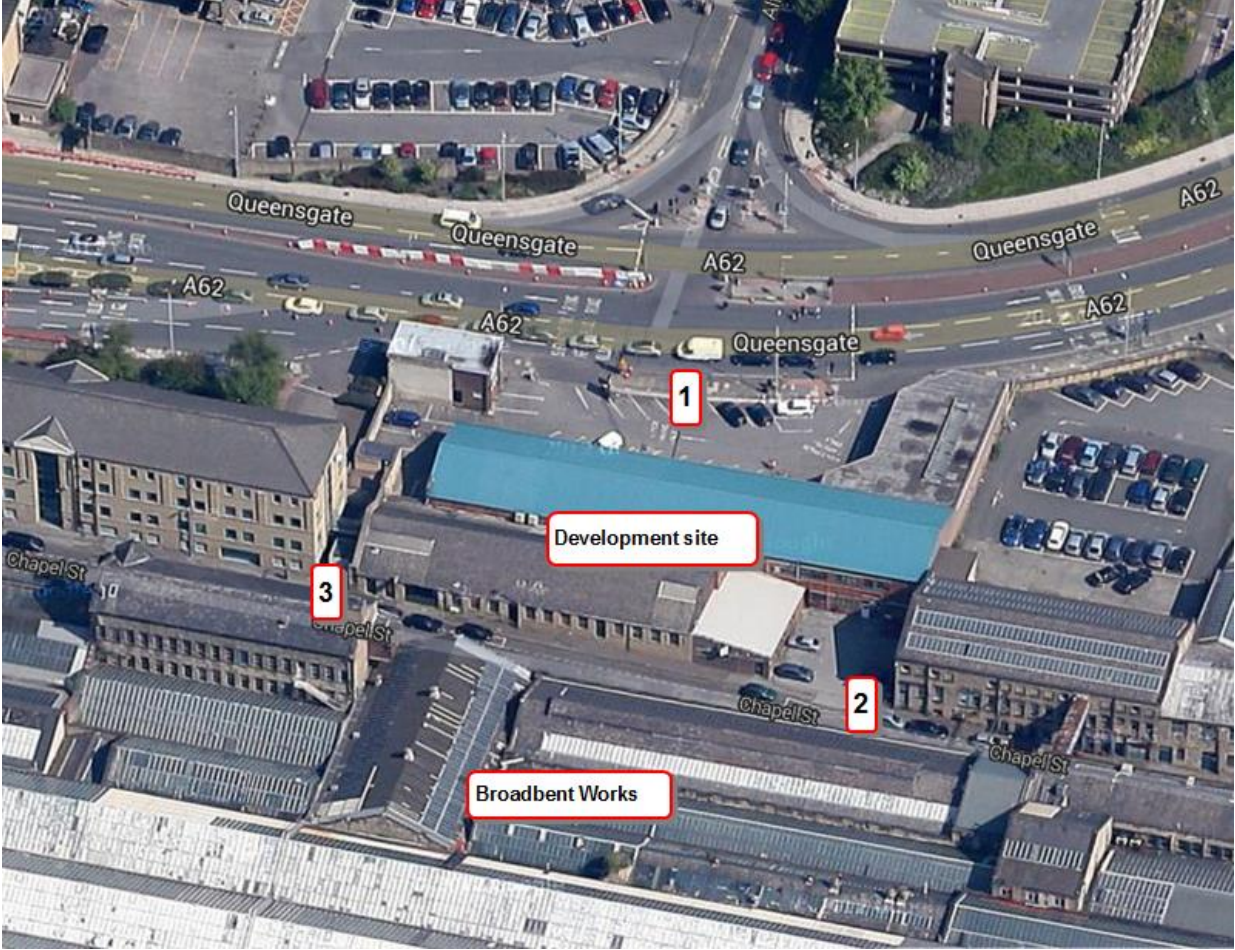
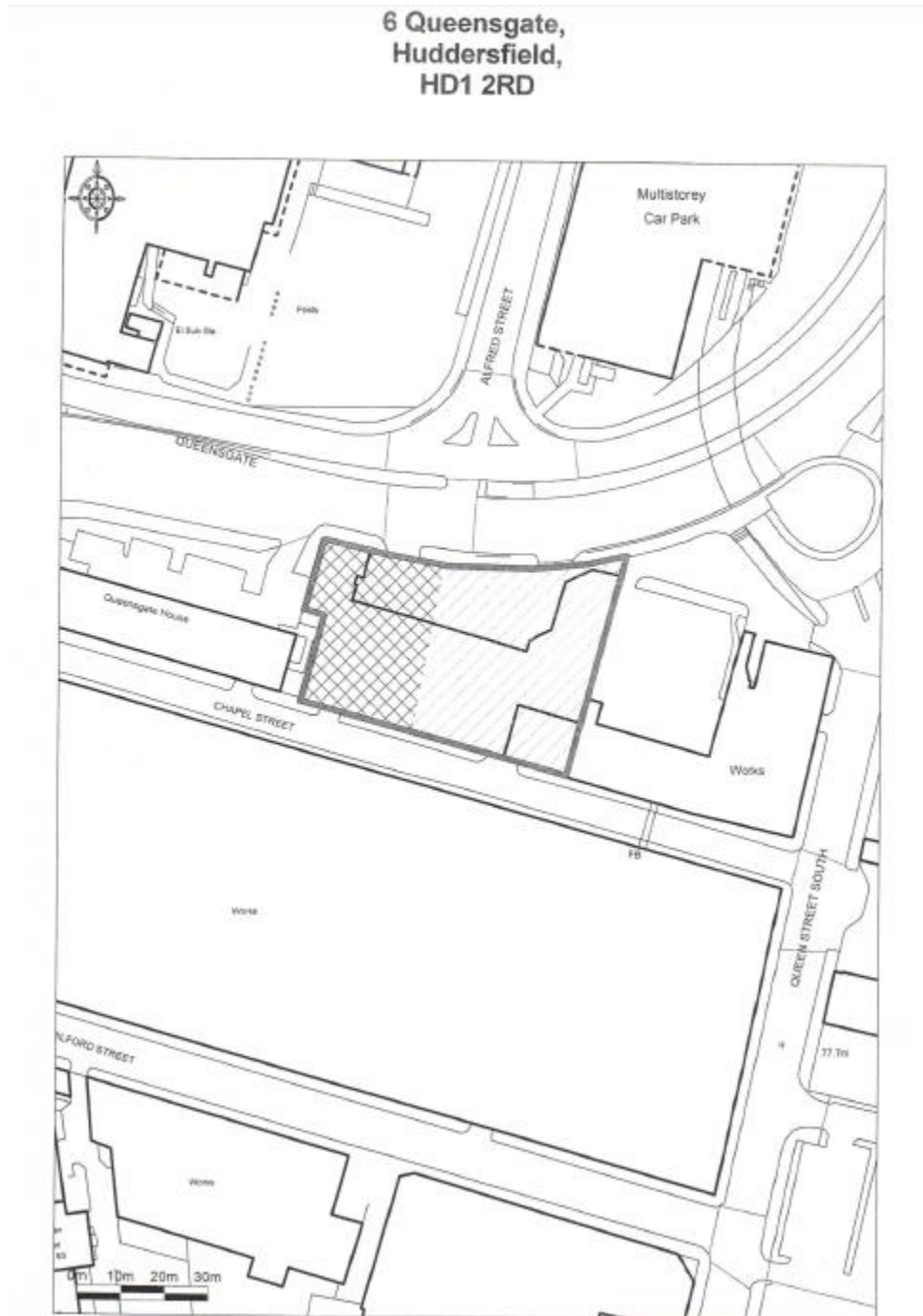


FIGURE 2 – INDICATIVE DEVELOPMENT SITE LOCATION

Site perimeter indicated by thick grey line:



APPENDIX I – NOISE UNITS AND INDICES

a) Sound Pressure Level and the decibel (dB)

A sound wave is a small fluctuation of pressure in air. The human ear responds to these variations in pressure, producing the sensation of hearing. The ear can detect a very wide range of pressure variations. Due to the wide range of pressure variations detectable by the ear, a logarithmic scale is used to convert the values into manageable numbers. The dB (decibel) is the logarithmic unit used to describe sound (or noise) levels. The usual range of sound pressure levels is from 0 dB (threshold of hearing) to 120 dB (threshold of pain).

b) Frequency and Hertz (Hz)

Frequency is a measure of the rate of fluctuation of a sound wave. The unit used is cycles per second, or Hertz (Hz). Sometimes large frequencies are often written as kilohertz (kHz), where 1kHz = 1000Hz.

Young people with normal hearing can hear frequencies in the range 20Hz to 20kHz. However, the upper frequency limit gradually reduces as a person gets older.

As the ear hears some frequencies better than others, the A-weighting scale is used to mimic human hearing. A-weighting applies a correction to the sound level at a given frequency depending on how well the ear hears that frequency.

c) Glossary of Terms

In order to describe noise where the level is continuously varying, a number of other indices, including statistical parameters, are used. The indices used in this report are described below.

L_{Aeq} This is the A-weighted equivalent continuous sound level which is an average of the total sound energy measured over a specified time period. In other words, L_{Aeq} is the level of a continuous noise which has the same total (A-weighted) energy as the real fluctuating noise, measured over the same time period.

L_{Amax} This is the maximum A-weighted sound level that was recorded during the monitoring period.

L_{A90} This is the A-weighted sound level exceeded for 90% of the time period. L_{A90} is used as a measure of background noise.

L_{A10} This is the A-weighted sound level exceeded for 10% of the time period and is often used in the assessment of road traffic noise.

APPENDIX II – NOISE SURVEY DATA

Equipment: Rion NL32 Class I integrating sound level meter

All values in dB(A), free field, 10 minute measurement periods unless stated otherwise.

Location 1, Northern boundary of the development site with A62

| Date | Time | L_{Aeq} | L_{Amax} | L_{A1} | L_{A10} | L_{A90} | Comments |
|-------------|-------------|------------------------|-------------------------|-----------------------|------------------------|------------------------|-----------------|
| 29/10/13 | 12:37 | 73.2 | 84.2 | 80.7 | 76.5 | 65.9 | A62 traffic |
| 29/10/13 | 12:47 | 73.6 | 88.0 | 80.8 | 77.0 | 65.8 | |
| 29/10/13 | 12:57 | 73.2 | 82.6 | 80.3 | 76.8 | 65.1 | |
| 29/10/13 | 13:07 | 73.0 | 81.1 | 79.8 | 76.7 | 65.6 | |
| 29/10/13 | 13:57 | 72.6 | 84.3 | 79.8 | 76.0 | 64.8 | |
| 29/10/13 | 14:07 | 73.6 | 90.8 | 82.1 | 76.5 | 64.9 | |
| 29/10/13 | 14:17 | 73.1 | 87.9 | 81.5 | 76.5 | 64.6 | |
| | | | | | | | |
| 31/10/13 | 05:26 | 65.6 | 80.3 | 76.0 | 69.4 | 51.9 | |
| 31/10/13 | 06:05 | 70.4 | 83.2 | 80.0 | 74.9 | 56.1 | |
| 31/10/13 | 06:28 | 70.7 | 82.6 | 79.4 | 75.0 | 61.9 | |
| 31/10/13 | 06:38 | 71.6 | 83.6 | 79.7 | 75.6 | 62.7 | |
| 31/10/13 | 06:48 | 71.1 | 82.4 | 80.0 | 75.0 | 62.1 | |

Equipment: Svan 971 Class I integrating sound level meter

All values in dB(A), free field, 5-10 minute measurement periods unless stated otherwise.

Location 2, South-east corner of the development site, on Chapel Street

| Date | Time | L _{Aeq} | L _{Amax} | L _{A1} | L _{A10} | L _{A90} | Comments |
|----------|-------|------------------|-------------------|-----------------|------------------|------------------|---|
| 29/10/13 | 13:31 | 54.1 | 63.3 | 62.1 | 57.4 | 49.2 | Distant traffic, occasional passing car |
| 29/10/13 | 14:22 | 55.0 | 73.5 | 63.8 | 54.9 | 51.4 | |
| 29/10/13 | 15:39 | 57.2 | 71.2 | 68.6 | 58.8 | 51.5 | |
| 31/10/13 | 05:54 | 54.0 | 75.5 | 65.3 | 51.2 | 47.1 | Distant traffic, occasional passing car, fan noise from Broadbent premises noticeable |
| 31/10/13 | 06:24 | 52.9 | 70.2 | 63.6 | 53.4 | 48.1 | |
| 31/10/13 | 07:13 | 61.0 | 78.0 | 71.8 | 63.7 | 50.5 | As above, increased traffic, Broadbent office open at 7am |

Location 3, South-west corner of the development site, on Chapel Street

| Date | Time | L _{Aeq} | L _{Amax} | L _{A10} | L _{A10} | L _{A90} | Comments |
|----------|-------|------------------|-------------------|------------------|------------------|------------------|--|
| 09/10/13 | 14:33 | 58.5 | 74.3 | 69.3 | 58.6 | 55.3 | Distant traffic, occasional passing car, faint plant noise from Queensgate House |
| 09/10/13 | 15:49 | 57.2 | 65.4 | 60.3 | 58.4 | 55.7 | |
| 09/10/13 | 05:44 | 51.2 | 67.0 | 60.0 | 53.5 | 46.0 | Distant traffic |
| 09/10/13 | 06:14 | 56.2 | 73.9 | 67.2 | 55.8 | 52.3 | Distant traffic, occasional passing car, faint plant noise from Queensgate House |
| 09/10/13 | 07:03 | 59.4 | 75.9 | 71.0 | 60.5 | 53.9 | |