



**Danbank Developments Limited**

**Proposed Commercial and Residential Development,  
Land off Brookhouse Way, Cheadle**

Noise Impact Assessment

8553744/R3 – August 2014



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## Document Control Sheet

Identification	
<b>Client</b>	Danbank Developments Limited
<b>Document Title</b>	Proposed Residential Development, Land off Brookhouse Way, Cheadle, Staffordshire Moorlands
<b>Bureau Veritas Ref No.</b>	8553744

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Configuration				
Version	Date	Author	Reason for Issue/Summary of Changes	Status
01	15/04/14	Paul Johnson	Issue for Comment	Superseded
02	27/08/14	David Gray	Inclusion of commercial development	Superseded
03	27/08/14	David Gray	HOW amendments	Final

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# 1 Executive Summary

- 1.1 Bureau Veritas has undertaken an environmental noise study for a proposed mixed commercial and residential development at land off Brookhouse Way, Cheadle, Staffordshire Moorlands.
- 1.2 Unattended and attended noise measurements were taken between the 10<sup>th</sup> – 11<sup>th</sup> April 2014 to assess the prevalent noise levels at sensitive areas of the proposed development site. The dominant noise source affecting the site is the existing industrial development to the north of the site and road traffic on Brookhouse Way, which borders the north of the site to the east.
- 1.3 At each of the properties within the proposed site, it is expected that the indoor ambient noise levels would be achieved in living rooms and bedrooms, in accordance with recommended guidelines, using standard double glazing, when closed. With the windows open, the attenuation provided by the façade will be reduced. The inclusion of acoustic ventilation may be appropriate at the design stage, once the site layout has been finalised.
- 1.4 At this stage details of plant items at the proposed commercial development are unknown. As such, plant noise limits have been set based on measured background noise data for daytime and night time periods. A reassessment should be conducted once details of proposed plant items are known to demonstrate that these limits would be achieved.
- 1.5 An assessment of other potential noise sources at the commercial development, namely vehicle movements in car parks and delivery bays (if applicable), indicates that, with appropriate consideration at the design and permitting (where applicable) stages, noise levels are unlikely to be significant at existing and proposed residential receptors.
- 1.6 For the purposes of an outline planning application it is concluded that with appropriate mitigation and consideration to site layout, the development proposals would not give rise to any significant adverse impacts.



## 2 Introduction

- 2.1 Bureau Veritas was instructed by Danbank Developments Ltd to undertake an environmental noise study to support an outline planning application for a proposed mixed commercial and residential development on land off Brookhouse Way, Cheadle, Staffordshire Moorlands.
- 2.2 A commercial development is proposed at the northern section of the development with residential development to the south.
- 2.3 The northern section of the proposed development site is located within a mixed industrial and residential setting with industrial units located on the boundary to the north and west. To the east of the northern part of the site Brookhouse Way, a relatively low volume trafficked road, forms access to an established residential development incorporating garden spaces.
- 2.4 The southern section of the site is bounded by an established residential development incorporating garden spaces to the north boundary. The immediate west and south of the site is characterised by open grassland with a number of hedges, trees and shrubs.
- 2.5 This report assesses the results of a noise survey carried out in accordance with current guidance and best practice. Outline recommendations for noise mitigation measures have been detailed to ensure the required internal noise levels are achieved in proposed residential dwellings.
- 2.6 An assessment of potential noise impacts has been carried out with regards to the proposed employment zone in the northern area of the site. At this stage details of proposed activities are not known and as such suitable plant noise limits have been set based on measured background noise data.
- 2.7 A glossary of acoustic terminology is included in Appendix One.

## 3 Criteria for Assessment

### Assessment Methodology

3.1 The potential noise impacts at proposed sensitive receptors have been assessed with reference to the following current guidance;

- National Planning Policy Framework (NPPF) 2012; and the supplementary National Planning Practice Guidance for Noise (NPPGN) 2014;
- World Health Organisation (WHO) Guidelines for Community Noise 1999; and
- British Standard 8233: 2014, "Guidance on sound insulation and noise reduction for buildings".
- British Standard 4142: 1997, "Method for rating industrial noise affecting mixed residential and industrial areas"

### National Planning Policy Framework, 2012

3.2 The 2012 NPPF sets out the Government's planning policies for England. It states:

*109. 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; and ....'*

*'123. Planning policies and decisions should aim to:*

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

3.3 The terms 'significant adverse impact' and 'other adverse impacts' are defined in the explanatory notes of the 'Noise Policy Statement for England (NPSE), which states:

*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*



*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*

- 3.4 It should be noted that specific noise limits for LOAEL and SOAEL have not yet been specifically defined, and would be specific to different sectors. However, guidance from other acoustic standards may be employed to determine suitable levels within the overall principle of the NPPF.

**British Standard 8233: 2014 Guidance on Sound Insulation and Noise Reduction for Buildings and World Health Organisation Guidelines for Community Noise**

- 3.5 BS 8233:2014 provides guidance for the control of noise in and around buildings. It is applicable to the design of new buildings, or refurbished buildings undergoing a change of use.
- 3.6 The World Health Organisation (WHO) Guidelines for community noise provides recommendations aimed to limit the adverse effects of noise.
- 3.7 With regards to external noise sources affecting habitable residential spaces, Table 4 of BS8233:2014 provides guideline values that it is desirable are not exceeded during daytime and night time periods. These guideline values are based on guidelines issued by the WHO are reproduced in Table 3.1.

**Table 3.1: Indoor ambient noise levels for dwellings**

Activity	Location	07:00 to 23:00	23:00 to 07:00
Resting	Living Room	35 dB $L_{Aeq,16hour}$	-
Dining	Dining room/area	40 dB $L_{Aeq,16hour}$	-
Sleeping (daytime resting)	Bedroom	35 dB $L_{Aeq,16hour}$	30 dB $L_{Aeq,16hour}$

- 3.8 The internal noise requirements are not intended to be met with open windows, although BS8223:2014 states that the internal noise levels should take account of the proposed ventilation strategy.
- 3.9 BS8233:2014 does not provide specific guidance noise levels for regular individual noise events, such as passing trains, which can cause sleep disturbance. Guidance on suitable noise levels for individual events is provided in the WHO Guidelines for Community Noise.
- 3.10 The WHO guidelines state that for a reasonable standard in bedrooms to be achieved individual noise events should not normally exceed 45dB  $L_{Amax}$  10 to 15 times during the night-time period.
- 3.11 With regards to external noise sources affecting office accommodation, Table 6 of BS8233:2014 provides recommended design ranges for non-domestic building uses (when

unoccupied), i.e. relating to external noise intrusion and building service plant noise. The relevant design range values are reproduced in Table 3.2.

**Table 3.2: Typical noise levels in non-domestic buildings**

Activity	Location	Design Range dB L <sub>Aeq,T</sub>
Study or work requiring concentration	Meeting room	35 – 45
	Executive office	35 – 40

**British Standard 4142: 1997 Method for rating industrial noise affecting mixed residential and industrial areas**

- 3.12 The potential impact of the operational activities of the proposed employment unit at sensitive residential receptors has been assessed in accordance with BS4142. The Standard provides a method for assessing whether an industrial noise source (e.g. fixed mechanical and electrical (M&E) plant) is likely to cause a disturbance to persons living in the vicinity of the site.
- 3.13 BS4142 assesses the likelihood of complaint by comparing the 'specific noise level' of an industrial source to the typically representative background noise level (L<sub>A90</sub>). Certain acoustic features can increase the likelihood of complaints over that expected from a simple comparison between the specific noise level and the background noise level. In particular, BS4142 identifies noise that contains discrete impulses and/or audible tonal qualities and in these cases recommends that a 5dB correction be added to the specific noise level. The specific noise level along with any applicable correction is referred to as the 'rating level'.
- 3.14 The greater the difference between the rating level and the background noise level; the greater the likelihood of complaints. The assessment criteria given by BS4142 are as follows:
- A difference of +10dB indicates that complaints are likely.
  - A difference of +5dB is of marginal significance.
  - If the rating level is more than 10dB below the measured background noise level, this is a positive indication that complaints are unlikely.
- 3.15 During the daytime and evening, BS4142 requires that noise levels are assessed over 1-hour periods. However, during the night-time, because sleep disturbance is the important issue and individual noise events are, therefore, more important, noise levels are assessed over 5-minute periods.
- 3.16 The office units will include standard externally mounted air-conditioning units which would operate during normal office hours only. Heating plant would potentially operate 1-hour before normal office hours to heat the building and at water, and may also operate (for heating) intermittently through the night during very cold spells to protect pipes.
- 3.17 During consultation discussions, Staffordshire Moorlands District Council (SMDC) advised that the noise from fixed plant should achieve a rating noise level of no more than 10dB below the typical representative background noise level.

## 4 Baseline Noise Survey

- 4.1 To determine the current levels of ambient noise affecting sensitive areas of the proposed development site and neighbouring sensitive receptors, attended and unattended noise measurements were carried out at the site.
- 4.2 Between the 10<sup>th</sup> and 11<sup>th</sup> April 2014, Bureau Veritas carried out a continuous unattended survey (ML1) to assess the noise levels at the area of the site considered to be the worst affected area of the proposed development site (i.e. closest to the industrial units to the north).
- 4.3 Attended daytime and night-time short-term measurements were also carried out to establish the noise levels at three other locations (ML2, ML3 and ML4) on the proposed development site.
- 4.4 Details of each monitoring location is provided below, and are shown in Figure 4.1:
- ML1: Located in the northern part of the site, approximately 30m South of the industrial unit to the north of the site and 85m to the east of the industrial unit located on new Haden Road to the west of the site. Unattended long term measurements were carried out between 1220 and 1035 hours on the 10<sup>th</sup> April 2014 and 11<sup>th</sup> April 2014. Measurements were logged at 5-minute intervals.
  - ML2: Located in the northern part of the site to the east boundary, approximately 18m to the west of Brookhouse Way. Attended short term measurements were carried out between 1514 and 1546 hours on the 10<sup>th</sup> April 2014 and 0050 and 0111 on the 11<sup>th</sup> April 2104 to establish the variation in ambient noise levels at this location of the site. Measurements were logged at 5-minute intervals.
  - ML3: Located in the northern part of the site to the west boundary, approximately 63m to the east of the industrial unit on New Haden Road. Attended short term measurements were carried out between 1439 and 1511 hours on the 10th April 2014 and 0027 and 0047 on the 11th April 2104 to establish the variation in ambient noise levels at this location of the site. Measurements were logged at 5-minute intervals.
  - ML4: Located in the centre of the southern part of the site, approximately 63m from the south east boundary and 63m from the south west boundary. Attended short term measurements were carried out between 1402 and 1433 hours on the 10th April 2014 and 0000 and 0020 on the 11th April 2104 to establish the variation in ambient noise levels at this location of the site. Measurements were logged at 5-minute intervals.

**Figure 4.1: Noise Monitoring Location Plan**



**4.5** The dominant noise sources identified during the survey are detailed below:

- **ML1:** The noise climate at this location was generally of a low level. During the daytime measurements, the dominant noise source was attributed to the industrial units to the north and west of the monitoring position. The noise sources included a persistent drone from plant at an industrial unit to the northwest of the site and general activities associated with the industrial units to the north of the site including a radio, vehicle movements and fork lift truck movements. Intermittent traffic noise associated with Brookhouse Way also influenced the noise climate, but to a lesser degree than that of the industrial units to the north and west of the site.  
  
During the night-time measurements, the dominant noise source continued to be associated with the persistent drone from plant located at an industrial unit to the north west of the site. The industrial units to the north of the site were not operating during the night-time period. Distant road traffic noise from the A521 to the north of the site influenced the noise climate during the night-time period but to a lesser degree.
- **ML2:** The noise climate at this location was generally of a low level. During the daytime measurements, the dominant noise source at this location was attributed to the industrial units immediately north of the site boundary. The noise sources included general activities associated with the industrial

units including a radio, vehicle movements and fork lift truck movements. The persistent drone from the plant at an industrial unit to the northwest of the site influenced the noise climate but was considered secondary to the noise from the industrial units immediately to the north boundary. Other intermittent traffic noise associated with Brookhouse Way influenced the noise climate but to a lesser degree than that of the industrial units to the north and west of the site.

During the night-time measurements, the dominant noise source became the drone from plant located at an industrial unit to the north west of the site. The industrial units to the north of the site were not operating during the night time period. Distant road traffic noise from the A521 to the north of the site influenced the noise climate during the night time period but to a lesser degree.

- ML3: The noise climate at this location was generally of a low level. During the daytime measurements, the dominant noise sources at this location were attributed to general activities from the industrial units to the north of the site and also the persistent drone from the plant located at an industrial unit to the north west of the site. Other intermittent traffic noise associated with Brookhouse Way influenced the noise climate at this monitoring location.

During the night-time measurements, the dominant noise source became the persistent drone from plant located at an industrial unit to the north west of the site. The industrial units to the north of the site were not operating during the night-time period. Distant road traffic noise from the A521 to the north of the site also influenced the noise climate during the night-time period.

- ML4: The noise climate at this location was generally of a low level. During the daytime measurements, the dominant noise source at this location was attributed to the distant drone from the plant located at an industrial unit to the north west of the site. Distant road traffic noise from the A521 to the north of the site also influenced the noise climate during the day time period.

During the night-time period, the dominant noise source was from the persistent drone of plant located at an industrial unit to the north west of the site. The industrial units to the north of the site were not operating during the night time period, however there was intermittent industrial noise associated with activities believed to be located in the vicinity of Glebe Road on the industrial estate to the north east of the site. Distant road traffic noise from the A521 to the north of the site also influenced the noise climate during the night-time period.

4.6 The baseline noise levels determined during the daytime at locations ML2, ML3 on the proposed development site are notably similar than those determined at the ML1. However, the daytime noise levels determined at ML4 within the southern (proposed residential) area of the site are slightly lower. This is to be expected, given the increased distance from the main noise sources to the north of the site.

4.7 The baseline night-time noise levels determined across the proposed development site are considered to be relatively steady. This is due to the majority of the industry to the north boundary of the site ceasing to operate during the night. During the night-time monitoring, audibility of the industrial units that were still operating on the trading estate and also the road noise from the A521 to the north of the site was considered similar throughout the

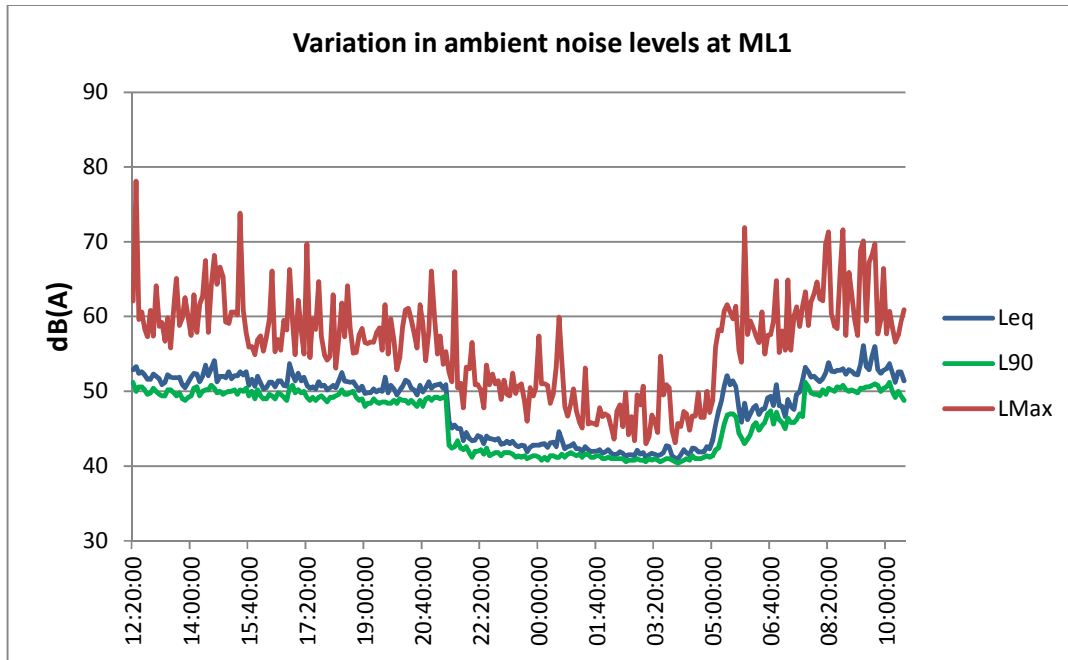
whole site and this is reflected in the data taken at all four monitoring locations. As expected, the night time noise levels at ML4 are slightly lower than that at the other positions, due primarily to sound divergence and propagation factors (including absorption by the atmosphere and intervening soft ground) away from the dominant noise sources.

- 4.8 As expected, the areas of the site subject to the highest noise exposure are to the north and north west of the site, in closest proximity to the industrial units.
- 4.9 Table 4.1 presents a summary of the noise survey results, whilst a graph showing the variation in ambient noise levels throughout the long-term unattended monitoring period at Monitoring Location 1 is presented in Figure 4.2.

**Table 4.1: Summary of Measured Noise Levels**

Start Date	Measurement Time	Sound Pressure Level, dB re: 20µPa (Fast, Free-field)			
		L <sub>Aeq,5min</sub>	L <sub>Amax,5min</sub>	L <sub>A90,5min</sub>	L <sub>A10,5min</sub>
Monitoring Location 1					
Day	1220-2300 0700-1035	42 - 56	46 - 70	41 - 50	43 - 60
Night	2300-0700	41 - 52	46 - 62	40 - 47	41 - 55
Monitoring Location 2					
10/04/14	1514-1546	51 - 52	57 - 67	49 - 50	53 - 54
11/04/14	0050-0111	40 - 43	46 - 50	38 - 39	41 - 46
Monitoring Location 3					
10/04/14	1439-1511	51 - 56	51 - 63	49 - 52	51 - 58
11/04/14	0027-0047	40 - 47	49 - 61	36 - 37	43 - 46
Monitoring Location 4					
10/04/14	1402-1433	44 - 46	50 - 59	41 - 42	46 - 48
11/04/14	0000-0020	37 - 39	46 - 52	33 - 34	39 - 42

Figure 4.2: Variation in Ambient Noise Levels at ML1 (10/04/14 – 11/04/14)



## 5 Residential Noise Assessment and Mitigation Measures

### Introduction

- 5.1 The assessment of site suitability for residential development is based upon the measured ambient noise levels ( $L_{Aeq,T}$ ) during the day and night periods, as described in Section 4. Where the need to provide higher specification acoustic design (glazing/ventilation) or other mitigation measures are identified, evidence of the effectiveness of these measures is provided.

### Assessment

- 5.2 Noise levels around the site generally range from 45 – 55 dBA during daytime periods. The northern section of the site experiences noise levels towards the higher end of this range and lower levels towards the southern part of the site. It should be noted that residential development is on the southern part of the site with commercial development to the north.
- 5.3 Noise levels around the site generally range from 37 – 52 dBA during the night time period. Noise levels towards the higher end of this range are experienced in the early morning period (0600 – 0700). Again, higher noise levels are experienced towards the northern part of the site where commercial development is proposed.
- 5.4 Maximum instantaneous noise levels during night time periods are typically in the range of 45 to 60 dB  $L_{Amax,5minutes}$ . It is noted that there are no sources of significant maximum noise levels in the site vicinity.
- 5.5 It is expected that at these levels, standard building design (thermal double-glazing with standard passive ventilators) will provide adequate protection to internal spaces for any proposed properties that may be positioned towards the northern section of the site. Furthermore, this assessment does not take account of further screening that may be provided by the proposed employment zone units or other features such as standard garden fencing to proposed properties at this location.
- 5.6 The noise levels at the southern part of the site are lower than those to the north of the site and it can therefore be assumed that the same glazing specification as specified for the north of the site will be sufficient to meet any criteria for habitable rooms to the south of the site.
- 5.7 Evidence to demonstrate that suitable amenity can be achieved through appropriate and sustainable building and site design is provided below.

### Mitigation

- 5.8 Determination of glazing requirements for the site is based principally upon the measured and predicted incidental noise levels at the façades of proposed dwellings.
- 5.9 The sound reduction performance required for living room and bedroom windows at residential units is shown in Tables 5.1, based on an assessment in accordance with BS8233:2014.

**Table 5.1: BS8233 assessment– sound reduction requirements for all proposed properties**

Habitable Room Type	Room	Minimum Glazing Specification	Ventilation Strategy	Target Internal Noise Levels	Highest Predicted Internal Noise Levels
Bedroom	(Night time)	4/16/4 32 dB R <sub>w</sub>	Standard Passive Ventilation (Trickle Vents)	30 dB L <sub>Aeq</sub>	20 dB L <sub>Aeq</sub>
Bedroom	(Daytime)			35 dB L <sub>Aeq</sub>	29 dB L <sub>Aeq</sub>
				45 dB L <sub>AFmax</sub>	36 dB L <sub>AFmax</sub>

- 5.10 The glazing and ventilation scheme provided above would be sufficient to control external noise to acceptable internal levels in accordance with BS8233 2014 for resting in living rooms during the day, and for sleeping in bedrooms during the night at all properties that may be located throughout the site. In all situations and based on predicted noise levels at this site, the use of standard thermal double-glazing (typical construction 4mm glass / 16mm cavity / 4mm glass) will be sufficient to achieve internal levels at all properties.
- 5.11 A higher glazing specification (greater pane thicknesses or/and cavity width) may be used if required for non-acoustic reasons (i.e. thermal performance).
- 5.12 These assessments and mitigation advice provided above are based upon precautionary assumptions, with no account taken of potential screening attenuation provided by other proposed buildings or features, e.g garden perimeter fences (1.8m close-boarded timber fence).

#### Ventilation Requirements

- 5.13 It is recommended that the acoustic ventilation proposed at the site should, as a minimum, comply with Building Regulations 2010 Approved Document F Means of Ventilation and British Standard BS5925 1991: “Code of Practice for Ventilation Principles and Designing for Natural Ventilation”.
- 5.14 Suitable internal noise levels are expected to be achieved via the use of passive trickle vents or/and openable windows. However, given the unknown nature of the proposed commercial development at this stage, consideration may be given to installing acoustically rated passive ventilation to dwellings along the northern boundary of the residential development (i.e. those façades facing the commercial development).
- 5.15 Acoustically rated passive ventilation should be capable of achieving a sound reduction of at least 41 dB D<sub>n,e,w</sub> in the open position. Standard non-acoustic vents should typically be capable of achieving a sound reduction of 31 dB D<sub>n,e,w</sub> in an open position.
- 5.16 The implementation of the recommended glazing together with passive ventilation should ensure that the required internal daytime and night-time noise criteria are met.

#### External Noise Levels

- 5.17 The WHO Guidelines recommend a noise limit value of 55dB L<sub>Aeq,T</sub> to avoid serious annoyance in outdoor living areas (gardens, balconies etc.). Baseline noise measurements taken at the site indicate that the gardens of any proposed properties will typically be in the order of 45 - 55dB L<sub>Aeq,T</sub>. However, the measured levels do not take account of the screening that could be provided by a standard garden perimeter fence (1.8m wooden



fence) or proposed buildings. The inclusion of the commercial aspect of the development provides a barrier between the existing industrial sites and proposed residential dwellings. Noise limits, as described in Section 6 will protect the garden noise levels of proposed dwellings.

- 5.18** The baseline noise measurements taken to the south of the site (ML4) indicate that the noise levels in gardens of any proposed properties will not exceed WHO criteria recommended to avoid moderate annoyance therefore no further action is required to reduce the noise levels at this location.
- 5.19** It should be noted that the levels proposed in the WHO guidance are considered to be guideline values only, as approximately 40% of the population of the European Union is already exposed to road traffic noise in excess of the 55dB(A) value and more than half of all European Union residents live in areas that do not ensure acoustical comfort. However, the limit can be considered an aspirational target to improve the amenity of residential use on site, while not a strict statutory limit.

## 6 Commercial Noise Assessment

### Assessment Overview

- 6.1 At this stage details of the proposed commercial development at the north of the development site, in terms of associated plant items and operating times, are unknown. However, noise limits can be set in order to protect the amenity of existing nearby residential receptors.
- 6.2 An appropriate method for assessing whether or not noise from the proposed plant is likely to give rise to complaints is given in BS4142:1997 'Method for rating industrial noise affecting mixed residential and industrial areas'. Details of this assessment methodology are given in Section 3 above.
- 6.3 Office accommodation that may form part of the proposed commercial units may have moderate sensitivity to extraneous noise. Given the baseline noise levels determined at ML4, detailed in Section 4 above, it is unlikely however that this would be significant. It should not be difficult at the design stage to incorporate measures (appropriate glazing/ventilation and siting of fixed M&E plant) to ensure these areas are suitable for their intended use. No further detailed assessment of sensitive commercial uses has therefore been undertaken.

### Environmental Noise Limits

- 6.4 It is generally accepted that plant noise should be limited such that the background noise at existing residential receptors does not increase. As requested by SMDC, noise from proposed plant items should therefore not exceed 10dB below the existing background noise level for strict compliance with this criterion. Practically, however, and given the existing mix of residential and commercial development in the area, strict compliance with this criterion may not be required and a suitable target of plant noise below the existing background noise level may be acceptable.
- 6.5 Table 6.1 identifies the recommended noise limits which should be satisfied for there to be no increase in the background noise level at the nearby existing residential receptors.

**Table 6.1: Plant Noise Limits**

Time Period	Measured $L_{A90}$ , dB	Target Plant Noise Limit, $L_{Aeq}$ , dB (Rating Level)
Daytime	49	39
Night Time	38	28

- 6.6 Given the distance between the proposed site and existing residential dwellings, such noise limits are capable of being achieved with the correct choice of plant, siting and, if required, mitigation such as enclosures or barriers.
- 6.7 The above limits should be applicable to the proposed residential development in order to protect amenity.
- 6.8 It should be noted that BS4142:1997 implies that rating levels below 35dBA are very low. This may therefore be considered as a suitable night time noise limit. Such a level is unlikely to cause a detrimental effect at nearby existing residential dwellings.

- 6.9 An assessment of plant noise should be conducted as plant details become available to confirm compliance with the proposed environmental noise limits.

### **Other Sources of Commercial Noise**

- 6.10 At this stage the nature of the proposed commercial development is unknown. Apart from plant noise, which is assessed above, the main other source of noise may include vehicle movements in designated car parks and delivery bays.

#### **Car Park / Delivery Bay Movements**

- 6.11 Vehicle movements are likely to peak during morning and afternoon periods as staff arrive and depart their place of work. The main potentially intrusive noise source would be from car/van doors slamming. A typical car door closes with a noise level in the region of 70dB  $L_{Amax}$  at 5m. The nearest properties are located approximately 25m from the site and as such an external noise level in the region of 56dB  $L_{Amax}$  is expected. Such noise levels are typical in the area as existing and are therefore unlikely to be significant. Furthermore, internal noise levels are expected to be in the region of 41 dB  $L_{Amax}$  through an open window or 26dB  $L_{Amax}$  through a closed window. When compared to BS8233 and WHO criteria, such noise levels are not expected to be significant during either daytime or night time periods.
- 6.12 Another potential noise source associated with commercial activities that require regular deliveries (typically large vans or LGVs) would be the use of reversing beepers, mounted either on delivery vehicles or forklift trucks, or both. The potential noise impact of these can be minimised by: the use of broadband or 'Smart' reversing alarms wherever possible; sensitive siting of turning/unloading areas; and/or installation of acoustics barriers (if required).
- 6.13 Appropriate consideration of noise issues at the detailed design stage, including site layout development and ultimately the end-users management procedures (where applicable), should ensure that the potential noise impact of commercial activities on existing and proposed dwellings would not be significant.

## 7 Conclusions

- 7.1 Bureau Veritas has undertaken an environmental noise study for the site of a proposed residential development on land off Brookhouse Way, Cheadle, Staffordshire Moorlands. As part of the assessment, unattended and attended measurements were carried out to determine the noise climate across the site.
- 7.2 To achieve suitable internal noise levels in bedroom areas and to meet the criteria set out in BS8233:2014, double-glazing (4/12/4 specification) together with standard passive ventilation in a solid brick or blockwork façade would be sufficient.
- 7.3 The implementation of the recommended glazing should ensure that internal noise levels are met in living rooms and bedroom areas across the site with the windows closed. However, with the windows open the attenuation provided by the façade will be no more than 15dB(A), which may allow the internal noise limit to be exceeded in some living rooms and bedrooms within certain the properties. Acoustic ventilation may therefore need to be considered for some habitable rooms of proposed properties at the detailed design phase.
- 7.4 The façades of properties further into the site will be protected by other buildings, and/or additional distance attenuation. Standard passive ventilation would be sufficient for these properties.
- 7.5 At this stage details of plant items at the proposed commercial development are unknown. As such, plant noise limits have been set based on measured background noise data for daytime and night time periods. A reassessment should be conducted once details of proposed plant items are known to demonstrate the proposed limits can be achieved.
- 7.6 An assessment of other potential noise sources at the commercial development, namely vehicle movements in car parks and delivery bays (if applicable), indicates that, with appropriate consideration at the design and permitting (where applicable) stages, noise levels are unlikely to be significant at existing and proposed residential receptors.
- 7.7 For the purposes of an outline planning application it is concluded that with appropriate mitigation and consideration to site layout, the development proposals would not give rise to any significant adverse impacts.

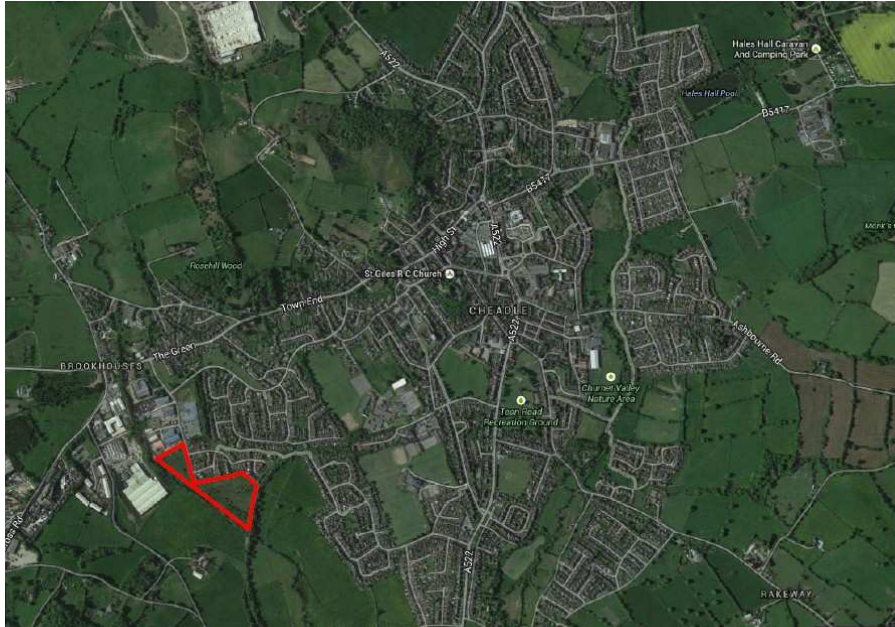
## Appendix One – Glossary of Acoustic Terminology

<b>"A" Weighting (dB(A))</b>	The human ear does not respond uniformly to different frequencies. "A" weighting is commonly used to simulate the frequency response of the ear. It is used in the assessment of the risk of damage to hearing due to noise.
<b>Decibel (dB)</b>	The range of audible sound pressures is approximately $2 \times 10^{-5}$ Pa to 200 Pa. Using decibel notation presents this range in a more manageable form, 0 dB to 140 dB.
<b>Frequency (Hz)</b>	The number of cycles per second, for sound this is subjectively perceived as pitch.
<b>Frequency Spectrum</b>	Analysis of the relative contributions of different frequencies that make up a noise.
<b><math>L_{eq}(T)</math></b>	The equivalent continuous sound level. It is that steady sound level which would produce the same energy over a given time period T as a specified time varying sound.
<b><math>L_{90}(T)</math></b>	The noise level which is exceeded for 90% a given measurement time period T, i.e. the background noise level.
<b><math>L_{Amax}(T)</math></b>	The maximum RMS A-weighted sound pressure level occurring within a specified time period.
<b>Noise</b>	Unwanted sound.
<b>Ambient Noise</b>	Totally encompassing sound in a given situation at any given time composed of noise from many sources, near and far.
<b>Residual Noise</b>	The ambient noise remaining at a given position in a given situation when the specific noise source is suppressed to a degree such that it does not contribute to the ambient noise.

## Appendix Two – Schedule of Monitoring Equipment

Noise Equipment – Attended and Unattended Monitoring	
0.1dB SOLO Class 1 Sound Level Meter	Serial Number 60598
0.1dB SOLO Microphone System	Serial Number 14016
Brüel & Kjær 2260 Class 1 Sound Level Meter	Serial Number 2520444
Brüel & Kjær 4189 ½" Microphone	Serial Number 2523838
Brüel & Kjær 4231 Sound Calibrator	Serial Number 2292692

## Appendix Three – Indicative Site Location



## Appendix Four – Raw data

Start Date	Start Time	Duration, T (mins)	Sound Pressure Level, dB re: 20µPa (Fast, Free-field)			
			L <sub>Aeq,T</sub>	L <sub>Amax,T</sub>	L <sub>A90,T</sub> *	L <sub>A10,T</sub> *
Monitoring Location 2 Day						
10/04/14	15:14	5	52	57.4	49.7	53.7
10/04/14	15:20	5	51.9	58.1	48.8	53.7
10/04/14	15:25	5	52.3	67	49.1	53.1
10/04/14	15:31	5	51.5	57.5	49.3	53.1
10/04/14	15:36	5	51.5	56.6	48.8	53.3
10/04/14	15:41	5	51.3	61.8	48.7	53
Monitoring Location 2 Night						
11/04/14	00:50	5	42.9	48.8	39	46.2
11/04/14	00:55	5	40.6	46.6	38.5	42.2
11/04/14	01:00	5	41.5	49.8	38.4	44
11/04/14	01:05	5	39.5	46.3	37.8	40.5
Monitoring Location 3 Day						
10/04/14	14:39	5	55.6	62.9	49.3	58.3
10/04/14	14:45	5	54.9	58.6	51.7	56.8
10/04/14	14:50	5	53.4	57.9	48.5	56.3
10/04/14	14:55	5	54.3	59.7	50.1	56.4
10/04/14	15:00	5	53.5	59.4	49.8	55.9
10/04/14	15:06	5	50.7	51.3	49.6	51.3
Monitoring Location 3 Night						
11/04/14	00:27	5	40.4	49.3	36.4	43.2
11/04/14	00:32	5	44.4	56.6	36.1	45.2
11/04/14	00:37	5	47.3	61.1	36.6	46
11/04/14	00:42	5	40.8	51.4	36.9	43.1
Monitoring Location 4 Day						
10/04/14	14:02	5	46.3	55.8	41.8	48.4
10/04/14	14:07	5	44.9	50.4	42.2	47
10/04/14	14:12	5	45.4	51.3	42.2	47.3
10/04/14	14:18	5	44.9	59.2	41.9	46.2
10/04/14	14:23	5	44	50	41.2	45.9
10/04/14	14:28	5	45.1	54.6	41.6	46.8
Monitoring Location 4 Night						

11/04/14	00:00	5	37.9	50.4	33.9	40.2
11/04/14	00:05	5	36.8	45.5	33.2	39.3
11/04/14	00:10	5	39.3	51.6	34.1	42.4
11/04/14	00:15	5	38.6	47.5	32.6	41.7
Monitoring Location 1 Day/Night						
10/04/14	12:20	5	52.9	62.1	51.2	54
10/04/14	12:25	5	53.3	78.1	50	53.8
10/04/14	12:30	5	52.4	59.6	50.6	53.6
10/04/14	12:35	5	52.6	60.6	50.6	54
10/04/14	12:40	5	52.2	58.4	50.2	54
10/04/14	12:45	5	51.6	57.3	49.6	53.2
10/04/14	12:50	5	51.6	60.8	49.8	52.8
10/04/14	12:55	5	52.3	57.4	50.4	53.6
10/04/14	13:00	5	52	64.1	50	53.2
10/04/14	13:05	5	51.7	58.7	49.6	53.2
10/04/14	13:10	5	50.9	59.2	49.4	52.2
10/04/14	13:15	5	51.2	56.7	49.4	53
10/04/14	13:20	5	52.2	59.8	50.2	53.6
10/04/14	13:25	5	51.9	55.8	50.2	53
10/04/14	13:30	5	51.8	61.2	49.8	53.2
10/04/14	13:35	5	51.8	65.1	49.4	52.8
10/04/14	13:40	5	51.9	58.8	49.8	53.2
10/04/14	13:45	5	50.9	59.9	49	52.4
10/04/14	13:50	5	50.5	62.5	48.8	51.4
10/04/14	13:55	5	51.2	59.9	49.2	52.6
10/04/14	14:00	5	51.9	57.5	49.4	53.6
10/04/14	14:05	5	52.4	62.9	50.4	53.8
10/04/14	14:10	5	52.3	57.9	50.6	53.6
10/04/14	14:15	5	51.3	61.6	49.4	52.6
10/04/14	14:20	5	52	62.7	50	53
10/04/14	14:25	5	53.5	67.5	50.2	55.2
10/04/14	14:30	5	52.1	57.9	50.2	53.6
10/04/14	14:35	5	53.1	64.1	50.8	54.6
10/04/14	14:40	5	54.1	68.2	50.4	55.6
10/04/14	14:45	5	51.3	64.3	49.8	52.6
10/04/14	14:50	5	52	66.6	50	53.2



10/04/14	14:55	5	52	65.4	49.6	52.8
10/04/14	15:00	5	51.8	59.3	49.8	53.4
10/04/14	15:05	5	52.6	59.1	50	54.4
10/04/14	15:10	5	51.7	60.6	50	53
10/04/14	15:15	5	52.1	60.6	50.2	53.2
10/04/14	15:20	5	52.1	60.2	49.6	54
10/04/14	15:25	5	52.6	73.8	50.2	53.6
10/04/14	15:30	5	52.2	60.9	50	53.8
10/04/14	15:35	5	52.6	57.9	50.4	54.4
10/04/14	15:40	5	50.8	55.9	49.4	52
10/04/14	15:45	5	51.6	56	50	52.8
10/04/14	15:50	5	50.7	54.9	49	52
10/04/14	15:55	5	52	56.9	50.2	53.2
10/04/14	16:00	5	51.1	57.4	49.4	52.4
10/04/14	16:05	5	50.3	55.4	49	51.2
10/04/14	16:10	5	50.5	57.2	49	51.6
10/04/14	16:15	5	51.2	59.7	49.6	52.6
10/04/14	16:20	5	51.2	66.1	49.4	52
10/04/14	16:25	5	50.6	55.3	49	51.8
10/04/14	16:30	5	51.4	56.9	49.8	52.6
10/04/14	16:35	5	51.4	55.5	49.6	52.6
10/04/14	16:40	5	50.8	59.5	49.2	51.8
10/04/14	16:45	5	50.7	58.2	48.8	52
10/04/14	16:50	5	53.7	66.3	50.4	54.6
10/04/14	16:55	5	52.3	59.4	50.8	53.4
10/04/14	17:00	5	51.4	54.9	49.8	52.4
10/04/14	17:05	5	52.4	62.2	50.2	53.6
10/04/14	17:10	5	51.4	58.2	49.8	52.8
10/04/14	17:15	5	51.9	55	50	53
10/04/14	17:20	5	50.8	69.7	49.2	51.4
10/04/14	17:25	5	50.4	54.5	48.8	51.4
10/04/14	17:30	5	50.6	59.7	49.2	51.6
10/04/14	17:35	5	50.3	58.3	48.8	51
10/04/14	17:40	5	51.3	64.7	49.2	52.4
10/04/14	17:45	5	50.7	57.4	49.4	51.6
10/04/14	17:50	5	50.8	54.9	49	52

10/04/14	17:55	5	50.2	54.2	48.6	51.2
10/04/14	18:00	5	50.5	54.7	49.2	51.6
10/04/14	18:05	5	50.8	62.9	49.2	51.8
10/04/14	18:10	5	50.5	53.1	49.4	51.4
10/04/14	18:15	5	51.4	57.3	49.6	53
10/04/14	18:20	5	52.5	61.8	50.2	54.2
10/04/14	18:25	5	51.4	57.3	49.6	52.8
10/04/14	18:30	5	51.3	64.1	49.6	52.4
10/04/14	18:35	5	51.2	58.5	49.8	52
10/04/14	18:40	5	51.3	55.1	50	52.2
10/04/14	18:45	5	50.7	55.2	49.2	51.8
10/04/14	18:50	5	50.1	57.5	48.8	51
10/04/14	18:55	5	50.7	58.4	49	51.8
10/04/14	19:00	5	49.7	56.5	48	51
10/04/14	19:05	5	49.8	56.4	48.4	50.8
10/04/14	19:10	5	49.8	56.6	48.4	50.8
10/04/14	19:15	5	50.3	56.6	49	51.4
10/04/14	19:20	5	49.9	57.8	48.6	50.6
10/04/14	19:25	5	50.2	58.5	48.4	51.4
10/04/14	19:30	5	50	55.5	48.6	51
10/04/14	19:35	5	51.9	61.6	48.6	52.8
10/04/14	19:40	5	49.8	55	48.4	50.8
10/04/14	19:45	5	50.8	59.7	48.4	52.4
10/04/14	19:50	5	50.3	56.8	48.8	51.2
10/04/14	19:55	5	49.5	52.9	48.4	50.4
10/04/14	20:00	5	50.1	54.4	49	51
10/04/14	20:05	5	50.7	58.6	48.8	52
10/04/14	20:10	5	51.5	60.9	48.8	53.6
10/04/14	20:15	5	51.3	61.1	48.4	53.6
10/04/14	20:20	5	50.4	59.6	48.8	52
10/04/14	20:25	5	50.2	57.8	48.4	51.4
10/04/14	20:30	5	49.5	55.8	48	50.6
10/04/14	20:35	5	50.8	61.6	48.8	52.4
10/04/14	20:40	5	49.9	59.2	48	51.2
10/04/14	20:45	5	50.5	54.1	49	51.6
10/04/14	20:50	5	51.3	58.1	49.2	52.6



10/04/14	20:55	5	50.4	66.1	48.8	51.2
10/04/14	21:00	5	50.8	59.8	49.2	51.8
10/04/14	21:05	5	50.9	55	49.2	52.2
10/04/14	21:10	5	51	57.4	49	52.8
10/04/14	21:15	5	50.4	53.6	49.2	51.4
10/04/14	21:20	5	50.9	55.3	49.4	52
10/04/14	21:25	5	46	52.6	42.8	49.4
10/04/14	21:30	5	45.1	51.3	42.4	46.8
10/04/14	21:35	5	45.5	66	42.6	46.8
10/04/14	21:40	5	45	50.5	43.4	46.4
10/04/14	21:45	5	45	51.1	42.4	46.4
10/04/14	21:50	5	43.4	47.8	42.2	44.4
10/04/14	21:55	5	44.5	53.2	42.6	45.8
10/04/14	22:00	5	43.7	53	41.8	45.2
10/04/14	22:05	5	43.4	56.5	41.2	44.6
10/04/14	22:10	5	43.5	50.9	42	44.6
10/04/14	22:15	5	44.1	50.9	42	45.6
10/04/14	22:20	5	43.9	50.2	42.2	45.6
10/04/14	22:25	5	43	47.8	41.6	44.2
10/04/14	22:30	5	44	53.5	42.4	45.2
10/04/14	22:35	5	43.7	50.9	41.4	45.4
10/04/14	22:40	5	43.6	52.3	41.6	45.4
10/04/14	22:45	5	43.5	51	41.8	45.2
10/04/14	22:50	5	43.7	51.4	41.8	45
10/04/14	22:55	5	42.9	48.9	41.4	44.2
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10/04/14	23:10	5	43	49.4	41.8	44
10/04/14	23:15	5	43.3	52.4	41.6	44.6
10/04/14	23:20	5	42.8	49.7	41.2	44.2
10/04/14	23:25	5	42.6	50.7	41.4	43.8
10/04/14	23:30	5	42.8	51	41.2	44
10/04/14	23:35	5	42.7	48.7	41.4	44
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10/04/14	23:45	5	42.5	50.5	41.2	43.6
10/04/14	23:50	5	42.8	49.4	41.4	44.2



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**VERITAS**

10/04/14	23:55	5	42.8	50.5	41.4	44
11/04/14	00:00	5	42.8	57.4	41.2	43.8
11/04/14	00:05	5	42.9	51	40.8	44.8
11/04/14	00:10	5	43	51	41.2	44.8
11/04/14	00:15	5	42.5	50.8	40.8	44.2
11/04/14	00:20	5	43.1	48.4	41.4	45.2
11/04/14	00:25	5	43.2	49.7	41.4	45
11/04/14	00:30	5	42.6	53.2	41.2	43.2
11/04/14	00:35	5	44.6	59.9	41.2	45.8
11/04/14	00:40	5	43.4	53.7	41.6	45
11/04/14	00:45	5	42.3	48	41.2	43.2
11/04/14	00:50	5	42.6	46.7	41.6	43.6
11/04/14	00:55	5	42.7	48.3	41.8	43.6
11/04/14	01:00	5	43	50.3	41.6	44.4
11/04/14	01:05	5	42.3	47.4	41.4	43
11/04/14	01:10	5	42.3	45.9	41.6	42.8
11/04/14	01:15	5	41.9	45.1	41.2	42.4
11/04/14	01:20	5	42.6	53.1	41.6	43.2
11/04/14	01:25	5	42.2	45.6	41.6	42.6
11/04/14	01:30	5	41.9	45.8	41.2	42.4
11/04/14	01:35	5	42	45.7	41.2	42.4
11/04/14	01:40	5	42	45.5	41.4	42.4
11/04/14	01:45	5	42.2	47.8	41.4	42.8
11/04/14	01:50	5	41.7	46.6	41	42.2
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11/04/14	02:05	5	41.7	45.1	41	42
11/04/14	02:10	5	41.5	43.6	41	41.8
11/04/14	02:15	5	41.6	47.4	41	41.8
11/04/14	02:20	5	41.9	48.2	41	42.6
11/04/14	02:25	5	41.7	45.3	41	42.2
11/04/14	02:30	5	41.3	49.8	40.6	41.6
11/04/14	02:35	5	41.5	44.2	40.8	42
11/04/14	02:40	5	41.5	46.6	40.8	41.8
11/04/14	02:45	5	41.4	43.4	40.8	41.8
11/04/14	02:50	5	42.1	49.5	41	42.8



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VERITAS**

11/04/14	02:55	5	41.6	48.2	40.8	42
11/04/14	03:00	5	41.8	50.7	40.8	43
11/04/14	03:05	5	41.1	43	40.6	41.4
11/04/14	03:10	5	41.5	43.9	41	42
11/04/14	03:15	5	41.7	46.8	40.8	42.4
11/04/14	03:20	5	41.6	46.1	41	42
11/04/14	03:25	5	41.4	44.5	40.8	41.6
11/04/14	03:30	5	41.5	54.7	40.6	41.8
11/04/14	03:35	5	41.8	49.5	40.8	42
11/04/14	03:40	5	42.7	50.9	41	44.2
11/04/14	03:45	5	42.6	50.5	41	43.8
11/04/14	03:50	5	41.3	44.8	40.8	41.6
11/04/14	03:55	5	41.1	43.1	40.6	41.4
11/04/14	04:00	5	41	45.7	40.4	41.4
11/04/14	04:05	5	41.5	45.3	40.6	42.2
11/04/14	04:10	5	42.2	47.3	40.8	43.4
11/04/14	04:15	5	41.8	47	41	42.4
11/04/14	04:20	5	41.5	44.8	40.8	42.2
11/04/14	04:25	5	42.4	46.7	41.4	43.4
11/04/14	04:30	5	42.3	46.7	41	43.6
11/04/14	04:35	5	41.9	49.8	41	42.4
11/04/14	04:40	5	41.9	46.5	41	42.6
11/04/14	04:45	5	41.9	46.5	41.2	42.4
11/04/14	04:50	5	42.6	50	41.4	43.6
11/04/14	04:55	5	42.3	47.2	41.2	43.4
11/04/14	05:00	5	43.5	48.8	41.4	45.2
11/04/14	05:05	5	45.6	55.9	42.2	48
11/04/14	05:10	5	47.3	58.2	42.4	50.4
11/04/14	05:15	5	48.7	58.1	44	51.8
11/04/14	05:20	5	50.7	60.7	45.6	53.8
11/04/14	05:25	5	52.1	61.6	46.8	55
11/04/14	05:30	5	50.9	60.6	47	53.4
11/04/14	05:35	5	51.4	59.7	47	54.2
11/04/14	05:40	5	50.6	61.4	46.6	53
11/04/14	05:45	5	47.7	55.5	44.4	50.2
11/04/14	05:50	5	45.9	53.9	43.8	47.6



11/04/14	05:55	5	48.4	71.9	43	49.8
11/04/14	06:00	5	46.2	57.6	43.6	48
11/04/14	06:05	5	47	59.4	44.2	48.8
11/04/14	06:10	5	47.8	58.5	45.4	49.4
11/04/14	06:15	5	48.1	57.4	45.8	49.4
11/04/14	06:20	5	46.9	56.5	44.8	48.8
11/04/14	06:25	5	47.6	60.6	45.4	49.2
11/04/14	06:30	5	47.7	55	45.8	49
11/04/14	06:35	5	49.1	57.5	47	50.8
11/04/14	06:40	5	49.3	57.6	47.4	50.8
11/04/14	06:45	5	48.1	59.4	45.6	50.2
11/04/14	06:50	5	50.9	64.8	47.2	52.6
11/04/14	06:55	5	48.1	55.2	46.2	49.4
11/04/14	07:00	5	48	58.1	45.8	49.8
11/04/14	07:05	5	46.6	55.5	45	47.6
11/04/14	07:10	5	48.9	64.9	46.4	50.2
11/04/14	07:15	5	48	55.5	45.8	49.6
11/04/14	07:20	5	47.6	60	45.8	49
11/04/14	07:25	5	49.6	61.3	46.2	51.2
11/04/14	07:30	5	49.9	58.7	47	51.8
11/04/14	07:35	5	51.5	61.4	46.6	54.2
11/04/14	07:40	5	53.2	63.3	51.2	54.4
11/04/14	07:45	5	52.6	58.8	50.6	54
11/04/14	07:50	5	51.9	62	49.8	53
11/04/14	07:55	5	52	63	49.6	53.4
11/04/14	08:00	5	51.6	64.6	49.6	52.6
11/04/14	08:05	5	51.3	62.4	49.4	52.4
11/04/14	08:10	5	51.7	62.1	50.2	52.8
11/04/14	08:15	5	52.5	69.8	49.6	53.8
11/04/14	08:20	5	53.8	71.3	50.4	54.8
11/04/14	08:25	5	52.7	60.3	50.2	54.4
11/04/14	08:30	5	52.6	58.7	50	54.4
11/04/14	08:35	5	52.8	58.4	50.6	54.2
11/04/14	08:40	5	52.8	66.4	50.4	54.2
11/04/14	08:45	5	53	71.6	50.8	54
11/04/14	08:50	5	52.3	57.5	50.2	53.8



11/04/14	08:55	5	52.9	65.9	50	55
11/04/14	09:00	5	52.7	63.2	50.2	54.6
11/04/14	09:05	5	52.3	59.5	50	54
11/04/14	09:10	5	52.2	57.5	49.8	53.8
11/04/14	09:15	5	53.5	68.8	50.4	55
11/04/14	09:20	5	56.1	70.1	50.4	59.8
11/04/14	09:25	5	53.3	59.4	50.6	55.4
11/04/14	09:30	5	52.9	67.2	50.6	54.2
11/04/14	09:35	5	54.7	68.3	50.8	56.8
11/04/14	09:40	5	56	69.7	51	59
11/04/14	09:45	5	52.9	57.7	50.8	54.4
11/04/14	09:50	5	52.4	59.5	50	54.2
11/04/14	09:55	5	52.8	66.4	50.4	54
11/04/14	10:00	5	53	57.7	50.6	55
11/04/14	10:05	5	53.7	60.7	51.2	55.2
11/04/14	10:10	5	52.5	58.7	50	54.2
11/04/14	10:15	5	51.2	56.6	49.2	52.6
11/04/14	10:20	5	52.6	57.5	50	54.2
11/04/14	10:25	5	52.6	59.3	49.4	54.6
11/04/14	10:30	5	51.4	60.9	48.8	53.2