

BAE Systems

Waterlooville

Noise Assessment

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June 2012

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Waterlooville
Noise Assessment

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Waterlooville
Noise Assessment

Contents

Executive Summary	1
1 Introduction.....	2
1.1 Context.....	2
1.2 Site Location	2
2 Legislation, Planning and Guidance.....	3
3 Methodology	6
3.1 Consultation with Havant Borough Council	6
3.2 Noise Survey.....	6
3.3 Noise Model and Calculations	8
4 Results and Assessment	10
4.1 Noise Survey.....	10
4.2 Noise Model and Calculation.....	10
4.3 Off Site Road Traffic	10
4.4 On Site Heavy Vehicles	11
4.5 Proposed Hotel	12
5 Mitigation.....	13
5.1 Fixed Plant Noise Limits	13
5.2 Proposed Hotel	13
6 Conclusions	15

Tables

Table 2.1: BS 4142 Assessment Levels.....	5
Table 2.2: Recommended Internal Ambient Noise Levels.....	5
Table 3.1: Noise Survey Location Description	7
Table 3.2: Noise Instrumentation used in the Survey	7
Table 3.3: Impact Magnitude.....	8
Table 3.4: Noise – Sensitive Receptors	9
Table 4.1: Summary Daytime Short Term Measurements	10
Table 4.2: Summary Night-Time Short Term Measurements	10
Table 4.3: Summary Long Term Measurements.....	10
Table 4.1: Change in Traffic Noise Levels	11
Table 4.2: Daytime BS4142 Assessment for Dwellings from HGV's Manoeuvring On -site.....	11
Table 4.3: Highest External Noise Levels Daytime	12
Table 5.1: Design Rating level at Nearest Noise-Sensitive Receptors	13
Table 5.2: Mitigation Measures – Glazing Units.....	14

Appendices

- Appendix A: Glossary of Acoustic Terminology
- Appendix B: Correspondence with Havant Borough Council
- Appendix C: Noise Model Assumptions
- Appendix D: Noise Survey Results

Executive Summary

Peter Brett Associates LLP (PBA) has been instructed by BAE Systems to undertake a noise assessment to support the outline planning application of a proposed mixed development at Waterlooville, Havant.

The proposed development is likely to include industrial units and mixed commercial uses.

Consultation was undertaken with Havant Borough Council (HBC) on 13th April 2012 to agree the noise survey and assessment methodologies. It was agreed that the noise assessment would be undertaken in accordance with National Planning Policy Framework (NPPF), British Standard 4142 and British Standard 8233.

A baseline noise survey was undertaken between 1st and 2nd May 2012 to establish the noise climate at the nearest noise sensitive receptors. A noise model was prepared to determine the likely noise impact arising from the operation of the proposed development.

The magnitude of development road traffic impact would be classified as negligible in accordance with the criteria defined in [Table 3.3](#).

The industrial noise impact arising from the operation of the proposed development upon the nearest-sensitive receptors would give rise to 'complaints unlikely', in line with the BS4142 assessment criteria agreed with HBC.

Fixed plant noise limits have been recommended (see [Table 5.1](#)) and outline mitigation measures have been recommended for the hotel façade overlooking Hambledon Road (see [Table 5.2](#)).

The assessment demonstrates that there are no significant adverse impacts from the proposed development. It is therefore considered that the proposed development meets the policy requirements of NPPF and British Standards 4142 and 8233. Therefore, there should be no material reasons from a noise impact perspective why development could not come forward.

1 Introduction

1.1 Context

- 1.1.1 Peter Brett Associates LLP (PBA) has been commissioned by BAE Systems to undertake a noise assessment to support the outline planning application for a mixed development at Waterlooville, Havant.
- 1.1.2 The proposed development will consist of industrial units and a mix of commercial units. The proposal comprises:
- Buildings for Class B uses in the western part of the site (around 8,500m² of floor area);
 - A 60-bedroom hotel at the east of the site;
 - A restaurant in the south-east of the site;
 - A restaurant with drive-thru facility in the north-east of the development;
 - A car showroom and forecourt to the east of the access from Elettra Avenue from the north; and
 - Associated access and parking provisions.
- 1.1.3 This report assesses the likely noise impact arising from the development upon nearby sensitive receptors. In addition, it assesses the internal noise levels likely to be experienced within the bedrooms of the proposed hotel use.

1.2 Site Location

- 1.2.1 The site is located west of the B2150, surrounded by Elettra Avenue and Silverthorne Way (Brambles Farm Industrial Estate).
- 1.2.2 The nearest noise sensitive receptors are on Hambledon Road at approximately 50m to the east of the site boundary. There are also residential receptors in the intersection of Hambledon Road with Milton Road at approximately 70m to the north east of the site boundary. A major new development (Newlands¹), including residential use, will be located to the west of the site. The nearest residential areas in this development will be situated approximately 90m to the south west of the site boundary.
- 1.2.3 A glossary describing the acoustic terminology contained in this report is presented in **Appendix A**.

¹ www.newlandshampshire.co.uk/vision.php

2 Legislation, Planning and Guidance

National Policy

The National Planning Policy Framework (NPPF)

- 2.1.1 The National Planning Policy Framework was published in March 2012. In respect of noise, the document states that:

"The planning system should contribute to and enhance the natural and local environment by ...preventing both new and existing development from contributing to or being put at unacceptable risk from, or being adversely affected by unacceptable levels of ... noise pollution".

- 2.1.2 It goes on to advise that

"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."*

- 2.1.3 The NPPF revokes Planning Policy PPG 24 which was previously used to assess noise impacts of planning applications. PPG 24:

- Outlined the considerations to be taken into account in determining planning applications both for noise-sensitive developments and for those activities that will generate noise;
- Introduced the concept of "Noise Exposure Categories" for residential development, encouraged their use and recommended appropriate levels for exposure to different sources of noise; and
- Advised on the use of planning conditions to minimise the impact of noise.

- 2.1.4 The NPPF indicates that the Noise Policy Statement for England (NPSE) should be used to define *"significant adverse impacts"*. A summary of the NPSE is provided below, and it is understood that the UK government is currently undertaking research to quantify the significant observed adverse effect levels for noise.

Noise Policy Statement for England

- 2.1.5 The Noise Policy Statement for England was published in March 2010. The document seeks to clarify the underlying principles and aims in existing policy documents, legislation and guidance that relate to noise. It also sets out the long term vision of Government noise policy: "to promote good health and a good quality of life through the effective management of noise within the context of Government policy on sustainable development"
- 2.1.6 The NPSE clarifies that noise should not be considered in isolation of the wider benefits of a scheme or development, and that the intention is to minimise noise and noise effects as far as is reasonably practicable having regard to the underlying principles of sustainable development.

Noise Guidance

British Standard 4142: 1997 Method for Rating Industrial Noise Affecting Mixed Residential and Industrial Areas

- 2.1.7 British Standard 4142 (BS4142) sets out methods for determining the effects of industrial noise on residential buildings:
- Noise levels from factories, industrial premises, fixed installations or sources of an industrial nature in commercial properties;
 - Background noise level (background noise levels below 30 dB are considered to be 'very low'); and
 - Assessing whether the noise referred to above is likely to give rise to complaints from people residing in the building being considered.
- 2.1.8 The method subtracts the background noise level $L_{A90,T}$ (that which is exceeded for 90% of a given duration) from the 'rating level', $L_{A,Tn}$, which is calculated by adjusting the noise source for a character correction if required. **Table 2.1** shows the assessment levels and advice.

Table 2.1: BS 4142 Assessment Levels

$L_{A,T,r} - L_{A90,T}$ (dB)	Advice
+ 10	Complaints likely
+ 5	Marginal significance
- 10	Complaints unlikely

British Standard 8233: 1999 Sound Insulation and Noise Reduction for Buildings – Code of Practice

- 2.1.9 British Standard 8233 (BS 8233) sets out recommended indoor noise levels in habitable rooms for dwellings, such as living room and bedrooms, when they are unoccupied. These recommended levels are given in **Table 2.2**.

Table 2.2: Recommended Internal Ambient Noise Levels

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

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

British Standard 7445: 2003 Description and measurement of environment noise – Part 1: Guide to quantities and procedures

- 2.1.10 BS7445-1 describes methods and procedures for measuring noise from all sources which contribute to the total noise climate of a community environment, individually and in combination. The results are expressed as equivalent continuous A-weighted sound pressure levels, $L_{Aeq,T}$.
- 2.1.11 BS7445-1 states that sound level meters that are used should conform to Type 1 (or Type 2 as a minimum) as described in BS EN 61672:2003 Electroacoustics. Sound Level Meters should be calibrated according to the instructions of the manufacturer and field calibration should be undertaken at least before and after each series of measurements.

ISO 9613 – 2: 1996 Acoustics – Attenuation of Sound During Propagation Outdoors – Part 2: General Method of Calculation

- 2.1.12 This standard provides a calculation method for the prediction of noise propagation outdoors at a distance from a variety of sources. The method predicts the equivalent continuous A-weighted sound pressure level under meteorological conditions favourable to propagation.

3 Methodology

3.1 Consultation with Havant Borough Council

3.1.1 Scoping consultations were undertaken with Mark Moss, Environmental Health Officer at Havant Borough Council (HBC), on 13th April 2012. The survey and assessment methodologies were discussed and agreed as detailed in correspondence with HBC, presented in **Appendix B**.

3.1.2 The following bullet points summarise the discussion:

- The noise assessment will be prepared in accordance with NPPF and Noise Policy Statement for England to determine the likely 'significant adverse impacts' arising from the operation of the proposed development.
- A daytime and night-time survey will be undertaken to establish the existing noise climate at the nearest sensitive receptors in Hambledon Road. The noise readings will also be representative of the proposed hotel receptors;
- During daytime, the survey will consist of three series' of 15-minute readings between 10:00 and 17:00 hrs at each measurement location. During the night-time period, three series' of 15-minute readings will be undertaken between 23:00 and 01:00 hrs at the same locations. A 24-hour unattended reading will be undertaken, subject to access arrangements;
- A computer model using SoundPLAN version 7.1 will be prepared. Noise sources in the model will include loading activities in the service yards, fixed plant and reversing alarms. Industrial noise will be assessed having regard to BS4142. Noise limits for fixed plant will be set at the noise sensitive receptors. A rating level of 5dB above the measured background noise levels will be set as an upper limit; and
- The change in noise levels due to additional traffic generation on the local network will be assessed against a significance criteria.

3.1.3 Mitigation will be outlined, where necessary. For the hotel, mitigation measures will be outlined to achieve internal noise levels recommended in BS8233 ('good design target').

3.2 Noise Survey

3.2.1 A baseline noise survey to establish the existing noise climate surrounding the site was undertaken between 1st and 2nd May 2012.

3.2.2 The noise survey was undertaken at locations representative of the nearest existing and proposed sensitive receptors. **Figure 1** shows the noise survey locations. **Table 3.1** presents a description of the locations.

- 3.2.3 The noise measurements recorded the parameters L_{Aeq} , L_{A90} , L_{A10} and L_{Amax} dB. In addition, sound recording was made in all measurements.

Table 3.1: Noise Survey Location Description

Location	Description	Dominant Source	Measurement Period
1	App. 25m from main road	B2150	45 minutes daytime / 45 minutes night-time
2	App 4m from main road	B2150/Milton Road	45 minutes daytime / 45 minutes night-time
3	App. 25m from main road	B2150	45 minutes daytime / 45 minutes night-time
4	App. 10m from main road	B2150	4 hours 24 minutes daytime

- 3.2.4 The weather conditions remained dry with temperatures above 13°C during the day and 4°C during the night with average wind speeds below 1m/s during the day and night.

Instrumentation

- 3.2.5 Two type 1 sound level meters were used for the survey. Each was mounted at 1.5m above the ground and at a minimum of 3 m away from any reflective surface.
- 3.2.6 The noise instrumentation has valid laboratory certification, which is available upon request. Field calibrations were performed before and after the measurements with no significant fluctuation recorded. The instrumentation used in the noise monitoring is listed in **Table 3.2**.

Table 3.2: Noise Instrumentation used in the Survey

Item	Type	Manufacturer	Serial Number	Laboratory Calibration Date
Sound Calibrator	4231	Bruel & Kjaer	2619372	13 th January 2011
Hand-Held Analyzer	2250	Bruel & Kjaer	2626230	19 th January 2010
Hand-Held Analyzer	2250	Bruel & Kjaer	2626231	20 th January 2010
Prepolarized free-field ½ " Microphone	4189	Bruel & Kjaer	2621208	19 th January 2010
Prepolarized free-field ½ " Microphone	4189	Bruel & Kjaer	2621209	20 th January 2010

3.3 Noise Model and Calculations

- 3.3.1 A computer noise model using SoundPLAN version 7.1 has been prepared to determine the likely noise impact arising from the proposed development.
- 3.3.2 The model was setup having regard to the layout 'Proposed Masterplan', Drawing No. 11.074.002, prepared by HGP Architects, dated June 2012.
- 3.3.3 The propagation of the industrial noise has been calculated using the methodology described in ISO9613. OS mapping and topographical data² have been incorporated into the model.
- 3.3.4 As agreed with HBC, noise sources have been included in the model to consider the industrial activities from the proposed development. These include loading/unloading activities, HGV manoeuvring within the site, reversing alarms and fixed plant. Details of the noise source assumptions used in the model are presented in [Appendix C](#).
- 3.3.5 In addition to industrial activities within the site, the changes to the traffic flows on the B2150 have been incorporated into the model to determine the potential change in noise levels and impact upon the nearest existing and proposed residential receptors. The traffic data used in the model is presented in [Appendix C](#).
- 3.3.6 The road traffic calculations in the model have been undertaken following the methodology described in CRTN. The impact of operational traffic noise on surrounding roads has been predicted by calculating the Basic Noise Level (BNL) for a future year (2020). This does not take into consideration the distance between the carriageway and any receptor and instead only predicts the change in noise at a position alongside each carriageway. Corrections for traffic speed and heavy vehicles percentage have been incorporated.
- 3.3.7 Two traffic scenarios for the future year 2020 have been assessed to account for the potential difference in volume and nature of the traffic flows. These are described as follows:
- Development Scenario 1 – B1c, B2 and B8 use; and
 - Development Scenario 2 – B1c use only.
- 3.3.8 The change in noise levels as a result of the proposed development traffic have been assessed against the criteria presented in [Table 3.3](#).

Table 3.3: Impact Magnitude

Noise Change dB(A)	Magnitude of Impact
< 3	Negligible
3 – 6	Minor
6 – 10	Moderate
10+	Major

² Topographical survey undertaken by Lewis Brown in March 2012.

- 3.3.9 In addition to the future traffic scenarios indicated above, a baseline scenario has been incorporated into the model for validation purposes against the noise survey results. The difference between measured and model results does not exceed 1dB, hence within a good correlation. Results of the validation are presented in **Appendix C**.
- 3.3.10 The noise impact arising from the industrial elements of the proposed development has been assessed in accordance with BS4142 (i.e. reference time period of 1 hour during daytime and 5 minutes during night-time). The Transport Assessment does not anticipate heavy vehicle movements during the night-time period. Therefore, it has been assumed that the only potential noise source during night-time would be fixed plant.
- 3.3.11 The noise impact arising from the HGV vehicle manoeuvring (i.e. daytime) has been assessed having regard to Development Scenario 1, as a worst case.
- 3.3.12 The noise-sensitive receptors considered in the assessment are presented in **Table 3.4** and **Figure 2**. The associated survey location is also presented with the numbering system outlined in **Table 3.1**.
- Table 3.4: Noise – Sensitive Receptors
- | Receptor | Representative Survey Location |
|---|--------------------------------|
| 1 – 2 Fennel Close | 1 |
| 2 -1a Milton Road | 2 |
| 3 – 72 Hambledon Road | 3 |
| 4 – Committed Development, South west of development site | 3 |
- 3.3.13 Noise limits for fixed plant are recommended at the noise-sensitive receptors having regard to BS4142 and the design targets agreed with HBC (i.e. Rating Level of +5dB above measured background noise levels).
- 3.3.14 Details of the fixed plant and equipment are not available at this stage. Sound Power Levels and location (i.e. roof plant) have been assumed for the operation of these plant items during daytime and night-time to test the deliverability of the recommended limits. Results are presented in **Appendix C**. Calculations should be revised at a detailed design stage when this information is available.
- 3.3.15 Further calculations have been undertaken within the model to predict the noise levels at the facades of the proposed hotel. A cumulative effect scenario of industrial and road traffic noise sources has been considered to determine the likely mitigation required to comply with the good design standard in BS8233, as agreed with HBC.
- 3.3.16 Break-in noise calculations (noise transmission from outside to inside bedrooms) have been undertaken. Calculations have been based on the Building Envelope Insulation spreadsheet prepared by Building Research Establishment (BRE). These calculations should be revised at the detailed design stage once room layouts and a window schedule are finalised.

4 Results and Assessment

4.1 Noise Survey

- 4.1.1 A summary of the noise survey results is presented in **Table 4.1 – 4.3**. A complete set of results is presented in **Appendix D**.

Table 4.1: Summary Daytime Short Term Measurements

Location	Start Time	Duration HH:MM:SS	L _{Aeq,T} dB	L _{A90,T} dB
1	11:50:06	00:15:00	66	59
2	12:12:04	00:15:00	71	59
3	12:28:57	00:15:00	58	54

Table 4.2: Summary Night-Time Short Term Measurements

Location	Start Time	Duration HH:MM:SS	L _{Aeq,T} dB	L _{A90,T} dB
1	23:27:14	00:15:00	53	31
2	00:04:44	00:15:00	59	28
3	00:20:51	00:15:00	48	29

Table 4.3: Summary Long Term Measurements

Location	Period	Duration HH:MM:SS	L _{Aeq,T} dB	L _{A90,T} dB
4	Daytime	4:24:54	70	62

4.2 Noise Model and Calculation

4.3 Off Site Road Traffic

- 4.3.1 The BNL has been calculated for the 2020 base scenario and the 2020 Do Something development scenario 1 and the 2020 Do Something development scenario 2.
- 4.3.2 The differences in the predicted BNLs are then calculated to ascertain the change in noise level due to the development. This is shown in **Table 4.1**.

Table 4.1: Change in Traffic Noise Levels

Link	BNL (dB)				
	2020 Base	2020 Development Scenario 1	2020 Development Scenario 2	Development Impact: 2020 Development Scenario 1 minus 2020 Base	Development Impact: 2020 Development Scenario 2 minus 2020 Base
Hambledon Road	74.1	74.5	74.5	+0.4	+0.4

- 4.3.3 The likely noise impact arising from the road traffic generated by the proposed development (Scenario 1 and Scenario 2) would be +0.4 dB. The magnitude of this impact would be classified as negligible in accordance with the criteria defined in [Table 3.3](#).

4.4 On Site Heavy Vehicles

- 4.4.1 The rating level ($L_{A,Tr}$) due to HGV's manoeuvring on site, including loading activities, is presented in [Table 4.2](#) for the daytime (i.e. there is no night-time operation anticipated). The background noise level (L_{A90} dB) and the difference between the two parameters are also presented.
- 4.4.2 The background noise levels have been taken from the noise measurements at Locations 1 – 3. The lowest measured background noise level has been assumed to be representative of receptor location 4 (i.e. committed mixed development to the south west of the proposed development).

Table 4.2: Daytime BS4142 Assessment for Dwellings from HGV's Manoeuvring On-site

Receptor	Rating Level dB $L_{A,Tr}$	Background Noise Level dB $L_{A90,T}$	$L_{A,Tr} - L_{A90,T}$	BS4142 Assessment – Likelihood of complaint	Meets HBC Criteria
1 – 2 Fennel Close	35	59	-24	'complaints unlikely'	Yes
2 -1a Milton Road	31	59	-28	'complaints unlikely'	Yes
3 – 72 Hambledon Road	35	54	-19	'complaints unlikely'	Yes
4 – Committed Development, South west of development site	44	54	-10	'complaints unlikely'	Yes

- 4.4.3 The likelihood of complaints upon the sensitive receptors has been assessed in accordance with the methodology presented in **Table 2.1**.
- 4.4.4 It can be seen from **Table 4.2** that the industrial noise impact arising from the operation of the proposed development upon the nearest sensitive receptors would give rise to 'complaints unlikely', meeting the BS4142 assessment criteria agreed with HBC.
- 4.4.5 The NPPF indicates in footnote 27 that the NPSE should be used to define 'significant adverse impacts'. The assessment demonstrates that there are no significant adverse impacts from the proposed development. Hence it is considered that the proposed development meets the requirements in NPPF.

4.5 Proposed Hotel

- 4.5.1 Noise levels were calculated on the different floors of the hotel overlooking Hambledon Road. **Table 4.3** presents the highest predicted external noise level for the daytime.

Table 4.3: Highest External Noise Levels Daytime

Facade	Daytime $L_{Aeq,16h}$ dB
Proposed Hotel overlooking Hambledon Road	64

- 4.5.2 Outline mitigation is presented in the following section to meet the internal noise levels within bedrooms, as agreed with HBC. The night-time noise levels were predicted to be lower than those calculated for the daytime period, hence, the mitigation has been derived from the daytime noise levels as it is considered that for a hotel use sleeping conditions should also be preserved during the daytime.

5 Mitigation

5.1 Fixed Plant Noise Limits

- 5.1.1 **Tables 5.1** presents the design rating levels (noise limits) proposed at 1m from the nearest facades of the noise sensitive receptors in line with the agreement with HBC.
- 5.1.2 It should be noted that when determining compliance with these noise limits, a 5 dB correction must be applied if any of the acoustic features presented in section 8 (Rating Level) of BS4142 are likely to occur, such as whine, hiss, screech, hum, bangs, thumps, etc.
- 5.1.3 Consideration has been given to the cumulative noise impact in determining the noise limits for fixed plant. An example of deliverability of these limits is presented in **Appendix C**.

Table 5.1: Design Rating level at Nearest Noise-Sensitive Receptors

Nearest Affected Noise-Sensitive Properties	Daytime		Night Time	
	Measured Background	Design Rating Limit	Measured Background	Design Rating Limit
	dB L _{A90} 1 hour	dB L _{A7Tr}	dB L _{A90} , 5 mins	dB L _{A7Tr}
2 Fennel Close	59	64	31	36
1a Milton Road	59	64	28	33
72 Hambledon Road	54	59	29	34
Committed Development, South west of development site	54	59	28	33

- 5.1.4 Compliance with the above noise limits will mean that the likelihood of complaints from existing nearest sensitive receptors due to noise will be below 'marginal significance' and therefore no loss of amenity would be expected to occur. This is in accordance with the assessment levels presented in **Table 2.1** and the criteria agreed with HBC.

5.2 Proposed Hotel

- 5.2.1 Outline mitigation measures are indicated in **Table 5.2** for the most exposed facade of the hotel within the development to achieve the 'good' BS 8233 internal noise levels with the windows closed.
- 5.2.2 **Table 5.2** presents the Weighted Sound Reduction Index (R_w) dB for glazing units. Example of the glazing unit (glass width mm / air gap width mm / glass width mm) to meet the R_w specification is also provided.

Table 5.2: Mitigation Measures – Glazing Units

Facade	Glazing R_w dB	Glazing Example
Proposed Hotel overlooking Hambledon Road	35	10/12/4

- 5.2.3 The mitigation outlined above is indicative and is not intended for procurement of building elements. Requirements for alternative ventilation where windows need to be closed to meet internal noise levels should also be considered at the detailed design stage.

6 Conclusions

- 6.1.1 A noise assessment has been undertaken to support the outline planning application of a proposed mixed development at Waterlooville, Havant.
- 6.1.2 The proposed development comprises industrial units and a mix of commercial uses.
- 6.1.3 Consultation was undertaken with Havant Borough Council (HBC) on 13th April 2012 to agree the noise survey and assessment methodologies. A baseline noise survey was undertaken between 1st and 2nd May 2012 to establish the noise climate at the nearest noise sensitive receptors.
- 6.1.4 A noise model was prepared to determine the likely noise impact arising from the operation of the proposed development. Noise sources included HGV manoeuvring on site, loading/unloading activities, fixed plant and road traffic. Existing and proposed receptors were assessed (see [Table 3.4](#)).
- 6.1.5 The magnitude of development road traffic impact would be classified as negligible in accordance with the criteria defined in [Table 3.3](#).
- 6.1.6 The industrial noise impact arising from the operation of the proposed development upon the nearest-sensitive receptors would give rise to 'complaints unlikely', in line with the BS4142 assessment criteria agreed with HBC.
- 6.1.7 Fixed plant noise limits have been recommended (see [Table 5.1](#)) and outline mitigation measures have been recommended for the hotel façade overlooking Hambledon Road (see [Table 5.2](#)).
- 6.1.8 The assessment demonstrates that there are no significant adverse impacts from the proposed development. It is therefore considered that the proposed development meets the policy requirements of NPPF and British Standards 4142 and 8233. Therefore, there should be no reasons from a noise impact perspective why development could not come forward.

Figures



Appendix A: Glossary of Acoustic Terminology

Decibel (dB)	A unit of level derived from the logarithm of the ratio between the value of a quantity and a reference value. It is used to describe the level of many different quantities. For sound pressure levels the reference quantity is 20 μ Pa. The threshold of normal hearing is in the region of 0 dB and 140 dB is the threshold of pain. A change of 1 dB is only perceptible under controlled conditions.
dB(A), L_{Ax}	Decibels measured on a sound level meter incorporating a frequency weighting (A weighting) which differentiates between sounds of different frequency (pitch) in a similar way to the human ear. Measurements in dB(A) broadly agree with people's assessment of loudness. A change of 3 dB(A) is the minimum perceptible under normal conditions, and a change of 10 dB(A) corresponds roughly to halving or doubling the loudness of a sound. The background noise in a living room may be about 30 dB(A); normal conversation about 60 dB(A) at 1 metre; heavy road traffic about 80 dB(A) at 10 metres; the level near a pneumatic drill about 100 dB(A).
$L_{A90,T}$	The A weighted noise level exceeded for 90% of the measurement period, T. ETSU-R-97 states that this descriptor should be used for both the background noise level and the wind farm noise.
$L_{A10,T}$	The A weighted noise level exceeded for 10% of the measurement period, T.
$L_{Aeq,T}$	The equivalent continuous sound level – the sound level of a notionally steady sound having the same energy as a fluctuating sound over a specified measurement period (T). $L_{Aeq,T}$ is used to describe many noises and can be measured directly with an integrating sound level meter.
L_{day} , $L_{evening}$, L_{night}	They are the equivalent continuous A-weighted sound pressure determined over a day (07:00 – 19:00), evening (19:00 – 23:00) and night (23:00 – 07:00).
Rating Level, $L_{Ar,T}$	The specific noise level plus any adjustments for the characteristic features of the noise.
Weighted sound reduction index R_w	Single number quantity which characterizes the airborne sound insulating properties of a material or building element over a range of frequencies.

Appendix B: Correspondence with Havant Borough Council

Waterlooville
Noise Assessment

Esteban Olmos

From: Esteban Olmos
Sent: 13 April 2012 16:31
To: 'mark.moss@havant.gov.uk'
Subject: Waterloooville - Noise Assessment Methodology
Attachments: Waterloooville - Noise Assessment Methodology - 13 April 2012.pdf

Dear Mark,

Thanks for your time on the phone this afternoon. Please find attached a summary of our methodology.

Please do not hesitate to provide any further comments.

Regards,

Esteban Olmos
Senior Acoustic Engineer

For and on behalf of Peter Brett Associates LLP
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Roger Tym & Partners and Baker Associates are now part of Peter Brett Associates LLP.

TECHNICAL NOTES



Job Name: Waterlooille
Job No.: 26365
Note No.: 01
Date: 13 April 2012
Subject: Noise Assessment Methodology
Prepared By: Esteban Olmos

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Item	Subject
1.	Introduction Peter Brett Associates LLP (PBA) has been instructed by BAE Systems to undertake a noise assessment to support the outline planning application of a mixed use development in Waterlooille, Havant. The proposed development is likely to include industrial uses (B2 & B8) and mixed commercial units (car showroom, hotel, restaurant and drive-thru restaurant). The site is located west of the B2150, surrounded by Elettra avenue and Silverthorne Way (Brambles Farm Industrial Estate).
2.	Survey Methodology A day time and night-time noise survey will be undertaken to establish the existing noise climate representative of the nearest existing sensitive receptors (Hambledon Road). Readings will be also taken representative of the proposed noise sensitive receptors on site (hotel). Short-term noise readings (three series of 15 minutes) will be taken between 10:00 and 17:00 hrs. Similarly, during the night-time, short term readings (three series of 15 minutes) will be taken between 23:00 and 01:00 hrs. Should a secure location be available on site, an unattended noise survey will be undertaken during 24-hours¹.
3.	Assessment Methodology A computed noise model² will be prepared to assess the likely noise impact arising from the proposed development associated with the industrial uses. Receptors will include existing dwellings and the nearest residential area of the committed development to the south west of the site. Noise sources in the model will include loading activities, fixed plant and reversing alarms. Industrial noise will be assessed having regard to BS4142. Noise limits for fixed plant will be set at the noise sensitive receptors. A rating level of 5 dB above the measured background noise levels will be used as an upper limit target.

¹ Subject to access and security on site.

² SoundPLAN version 7.1

	The change in noise levels due to the additional traffic generation on the local network will be assessed against significance criteria developed for the project. Mitigation will be outlined, where necessary. For the hotel, mitigation measures will be outlined to meet the internal noise levels recommended for bedrooms in BS8233 ('good design target'). The National Planning Policy Framework indicates in footnote 27 that the Noise Policy Statement for England should be used to define 'significant adverse impacts'. Conclusions for this will be derived based on the methodology described above.
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Appendix C: Noise Model Assumptions

Validation

The noise model has been validated against the survey location alongside Hambledon Road (Location 4) for which a continuous 4 hour measurement was taken, enabling comparison with the $L_{Aeq,16h}$ in the model. A change in noise levels of 3 dB is stated in DMRB to be the minimum perceptible under normal conditions. Therefore, if the measured and modelled results are within ± 3 dB it is considered to demonstrate a good correlation.

A receptor was incorporated in the baseline scenario of the model at the monitoring location. **Table C.1** presents the comparison of measured and predicted noise levels.

Table C1: Noise Model Validation

Location	Measured $L_{Aeq,4}$ dB Daytime	Modelled $L_{Aeq,16h}$ dB Daytime	Difference (Model-Measured)
4	70	71	+1

Noise Model Input – Vehicle Movement Noise Levels

The noise sources associated with the delivery vehicles used within this assessment are the engine noise and the reversing alarm. The sound power levels of these sources are shown in **Table C.2**.

Table C.2: Noise Model - Activity Noise Levels

Activity	Sound Power Level	Data Source
Heavy vehicle reversing with alarm	92 dB(A)	Brigade Electronics
Heavy vehicle engine noise	98 dB(A)	BS 5228

A time correction has been applied for the heavy vehicles as they manoeuvre within the boundary of the site. It has been assumed that the vehicle travels at 20mph and the correction has been made per hour. An on time of 1 min per hour has been assumed for reversing alarms per heavy vehicle.

Noise Model Input – Loading Activities

Within the noise model a source attributable to HGV unloading/loading has been entered in the service yard areas³. The sound power level and SEL for the unloading/loading is provided in **Table C.3**. It has been further assumed that the unloading/loading activities would occur continuously throughout the one hour period and therefore no time correction has been applied.

Table C.3: Noise Model – HGV Loading/unloading activities

Activity	SEL at 10m	Sound Power Level
HGV unloading/loading activities	97	91 dB(A)

³Proposed Site Plan Option 4', Drawing No. 11.074.sk04, prepared by HGP Architects, dated 7 June 2012

Noise Model Input – Road Traffic at Hambledon Road

Table C.4: Hambledon Road Traffic Noise Data

Year and Scenario	18hr Flow	%HGV
2012 Base	28470	3
2020 Base	33396	3
2020 Base +Development Scenario 1	36133	3
2020 Base +Development Scenario 2	36598	3

Heavy vehicle flows over a 24 hour period used to assist the BS4142 assessment is provided below

Table C.5: Proposed HGV Flows in and out of Development

Time	Number of HGVs
00:00 – 01:00	0
01:00 – 02:00	0
02:00 – 03:00	0
03:00 – 04:00	0
04:00 – 05:00	0
05:00 – 06:00	0
06:00 – 07:00	0
07:00 – 08:00	13
08:00 – 09:00	13
09:00 – 10:00	24
10:00 – 11:00	17
11:00 – 12:00	14
12:00 – 13:00	18
13:00 – 14:00	16
14:00 – 15:00	16
15:00 – 16:00	11
16:00 – 17:00	15
17:00 – 18:00	4
18:00 – 19:00	5
19:00 – 20:00	0
20:00 – 21:00	0
21:00 – 22:00	0
22:00 – 23:00	0
23:00 – 00:00	0

Noise Impact – Fixed Plant Limits – Deliverability Test

A sound power limit for the fixed plant at the industrial and commercial units has been tested such that the BS 4142 criterion agreed is not exceeded. It is assumed that the plant would operate for 24 hours continuously.

A representative Sound Power Level L_{WA} of 95 dB(A) during the daytime and 75 dB(A) during the night-time, have been tested at each of the building units. **Tables C.6 – C.7** set out the Rating level and background levels based on these sound power levels for the daytime and night-time at each receptor.

Table C.6: Daytime BS 4142 Assessment for Fixed Plant

Location	Design Rating Limit dB $L_{A,Tf}$	Calculated Rating Level dB $L_{A,Tf}$	Background Noise Level dB $L_{A90,T}$	$L_{A,Tf} - L_{A90,T}$
2 Fennel Close	64	50	59	-9
1a Milton Road	64	45	59	-14
72 Hambledon Road	59	47	54	-7
Committed Development, South west of development site	59	43	54	-11

Table C.7: Night-time BS 4142 Assessment for Fixed Plant

Location	Design Rating Limit dB $L_{A,Tf}$	Calculated Rating Level dB $L_{A,Tf}$	Background Noise Level dB $L_{A90,T}$	$L_{A,Tf} - L_{A90,T}$
2 Fennel Close	36	30	31	-1
1a Milton Road	33	25	28	-3
72 Hambledon Road	34	27	29	-2
Committed Development, South west of development site	33	23	28	-5

Appendix D: Noise Survey Results

Waterlooville
Noise Assessment

Date	Start Time	Reading	L _{Aeq,15min}	L _{A90,15min}	L _{A10,15min}	L _{ASmax, 15min}	L _{AFmax, 15min}
02.05.2012	11:50:06	A	66.3	60.1	68.9	77.8	80.6
02.05.2012	12:46:32	B	65.9	59.8	68.8	79.0	82.0
02.05.2012	13:38:59	C	65.6	59.2	68.5	76.2	77.8

Table D.1: Daytime Short Term Measurement Location 1

Date	Start Time	Reading	L _{Aeq,15min}	L _{A90,15min}	L _{A10,15min}	L _{ASmax, 15min}	L _{AFmax, 15min}
02.05.2012	12:12:04	A	69.8	59.3	73.3	79.4	81.8
02.05.2012	13:03:34	B	71.2	58.9	74.7	85.1	91.8
02.05.2012	14:03:15	C	71.9	59.0	75.8	82.9	86.2

Table D.2: Daytime Short Term Measurement Location 2

Date	Start Time	Reading	L _{Aeq,15min}	L _{A90,15min}	L _{A10,15min}	L _{ASmax, 15min}	L _{AFmax, 15min}
02.05.2012	12:28:57	A	57.9	54.1	60.1	65.9	67.6
02.05.2012	13:21:13	B	57.8	53.9	60.1	65.4	68.2
02.05.2012	14:20:01	C	58.3	54.4	60.1	74.4	76.6

Table D.3: Daytime Short Term Measurement Location 3

Date	Start Time	Reading	L _{Aeq,15min}	L _{A90,15min}	L _{A10,15min}	L _{ASmax, 15min}	L _{AFmax, 15min}
01.05.2012	23:27:14	A	56.7	39.4	59.5	72.4	73.6
02.05.2012	00:38:22	B	51.1	31.5	54.1	69.0	70.9
02.05.2012	01:30:54	C	46.7	30.7	46.9	64.8	66.8

Table D.4: Night-Time Short Term Measurement Location 1

Date	Start Time	Reading	L _{Aeq,15min}	L _{A90,15min}	L _{A10,15min}	L _{ASmax, 15min}	L _{AFmax, 15min}
02.05.2012	00:04:44	A	60.5	30.8	54.2	81.1	84.0
02.05.2012	00:56:38	B	59.0	28.0	49.2	78.1	81.1
02.05.2012	01:48:45	C	56.6	29.1	47.8	77.1	79.8

Table D.5: Night-Time Short Term Measurement Location 2

Waterlooville
Noise Assessment

Date	Start Time	Reading	L _{Aeq,15min}	L _{A90,15min}	L _{A10,15min}	L _{ASmax, 15min}	L _{AFmax, 15min}
02.05.2012	00:20:51	A	49.6	31.3	52.7	67.2	68.6
02.05.2012	01:13:37	B	47.8	30.2	50.8	62.5	64.7
02.05.2012	02:05:51	C	43.2	28.5	42.6	59.5	61.6

Table D.6: Night-Time Short Term Measurement Location 3

Date	Start Time	Duration	L _{Aeq,T}	L _{A90,T}	L _{A10,T}	L _{ASmax,T}	L _{AFmax,T}
02.05.2012	11:32:21	1:00:00	70.2	62.3	73.6	77.5	79.1
02.05.2012	12:32:21	1:00:00	70.0	61.7	73.4	77.9	79.7
02.05.2012	13:32:21	1:00:00	70.0	61.9	73.3	79.4	81.7
02.05.2012	14:32:21	1:00:00	70.4	62.4	73.7	82.7	86.3
02.05.2012	15:32:21	0:24:54	70.6	63.2	73.6	78.8	80.3

Table D.7: Daytime Long Term Measurement Location 4