



**A380 South Devon Link Road
(Kingskerswell Bypass)**

Public Inquiry

Proof of Evidence

Noise and Vibration

Volume 1: Summary

by

**Richard Perkins BEng (Hons) CEng MIOA
Parsons Brinckerhoff Ltd**

June 2009

This Proof of Evidence is presented in the following documents:

Volume 1	Summary	DCC/SUM/9
Volume 2	Full statement	DCC/P/9
Volume 3	Appendices	DCC/A/9

Contents

		Page
1	INTRODUCTION	1
2	NOISE AND VIBRATION	1
3	LEGISLATION, GUIDANCE AND SIGNIFICANCE	2
4	METHODOLOGY	3
5	BASELINE NOISE	5
6	EFFECTS OF THE SCHEME	5
7	CONCLUSION	7

1 INTRODUCTION

1.1 My name is Richard Perkins. I am a Chartered Engineer and a Member of the Institute of Acoustics. I have a Bachelor of Engineering Degree in ElectroAcoustics from Salford University and I have had 15 years experience in the field of noise and vibration. I am a Technical Director with Parsons Brinckerhoff Ltd and have had responsibility for this Scheme since 2004.

2 NOISE AND VIBRATION

2.1 Noise as defined here is the sound emitted by road traffic or construction activities. The audible range of sounds is covered within the range 0 dB (the threshold of hearing) to 120 dB (the threshold of pain).

2.2 The level of road traffic noise is measured using the LA10, 18 hour index, which gives a reasonable correlation with the typical subjective response to traffic noise.

2.3 The level of construction noise is measured using the LAeq index, which is more suitable for the occasional short periods of intense noise typical of a construction site.

2.4 Vibration is a low frequency disturbance producing physical movement in buildings and their occupants. Vibration may be found in two forms: ground-borne vibration and airborne induced vibration.

2.5 Some construction activities can be a significant source of ground-borne vibration, whereas the majority of perceived traffic-induced vibration in dwellings is caused by low frequency airborne noise.

3 LEGISLATION, GUIDANCE AND SIGNIFICANCE

3.1 In the circumstances described in **The Noise Insulation Regulations, 1975 and 1988 (Amended)** (CD 4.8) there is an entitlement to insulation of property in respect of road traffic noise. The Regulations also provide discretionary powers to insulate properties against construction noise.

3.2 During the construction phase **The Control of Pollution Act 1974 (DCC/A/9, Annex 1)** would apply. This confers duties and powers on Local Authorities to control noise from construction operations.

3.3 Most people are able to distinguish a change of 1 dB in a pure continuous tone, but changes in a fluctuating sound, such as traffic noise, are not so easily perceived. A change of about 3 dB represents the threshold when, in the long-term, changes in traffic noise levels (as distinct from steady sounds) would be perceived. A difference of 10 dB corresponds to a 10 fold increase in sound energy which corresponds to an approximate subjective doubling in loudness.

3.4 For the purposes of this Scheme the magnitude of impact criteria have been defined as follows:

- Changes of less than 1 dB are considered to be negligible
- a change of 1 to 3 dB would be perceptible if the change occurs in the short-term. A change of 3 dB in the long-term would be just perceptible; these changes are described as **Minor**
- a change of 3 to 5 dB would be clearly perceptible both in the short and the long-term and is described as **Moderate**
- a change of 5 dB or greater is described as **Major**.

- 3.5 The likely threshold ambient noise levels during construction of the works have been assumed to be 72 dB (daytime). The significance criterion is assessed using the daily construction noise level at each receptor.

4 METHODOLOGY

- 4.1 The study area consists of corridors centred on the existing A380 and the Scheme, and extends up to 2km from the Scheme in rural areas, and 1km in urban areas. Within the study area there is a calculation area, within which noise predictions are made at individual receptors within 600m of the Scheme or an affected road. The study area for the Scheme is shown in document **DCC/A/9, Figure NV2**.
- 4.2 The Scheme includes low noise surfacing, false cuttings, retaining walls, and environmental barriers to achieve mitigation. The use of a chipped stone asphalt road surface allows a 2.5 dB reduction in calculated noise levels when compared to conventional hot rolled asphalt.
- 4.3 Prior to the start of construction, limits on construction noise levels would be established. Once construction commences, the contractor would be required to implement practical measures to reduce noise.
- 4.4 The methodology for the prediction of road traffic noise is given in the **Calculation of Road Traffic Noise (CRTN)** (CD 4.27). Further advice on noise and vibration impacts due to road traffic is set out in **HA213/08** (CD 4.33).
- 4.5 Central Growth annual average week day traffic flows (AAWT) for the 18-hour period from 0600 to 2400 hours have been used for the calculation of traffic noise. The noise levels at all receptors are calculated for Do Minimum

and Do Something in the Baseline Year (2013) and the Future Assessment Year (2028).

- 4.6 Noise Nuisance is defined by the World Health Organisation as “a feeling of displeasure evoked by noise”. Methods of assessing nuisance and the methodology used are set out in **HA213/08** (CD 4.33).
- 4.7 Construction noise predictions have been based on the methodology outlined in BS 5228-1:2009 Code of practice for noise and vibration control on construction and open sites. Noise (CD 5.18A).
- 4.8 The method for assessing airborne induced vibration is given in **HA213/08** (CD 4.33).
- 4.9 The impact from vibration due to construction has been assessed by calculating the vibration peak particle velocity (ppv) due to piling activities at the closest sensitive receptors using **BS5228: 2009 Part 2: Code of practice for noise and vibration control on construction and open sites. Vibration** (CD 5.19).
- 4.10 The calculated ppv values were then assessed over a 12-hour working day to predict the vibration dose value (VDV) using **BS6472-1 2008 Guide to evaluation of human exposure to vibration in buildings. Vibration sources other than blasting** (CD 5.20).
- 4.11 The VDV's calculated are then compared with levels for nuisance impacts with reference to BS6472-1 2008 Guide to evaluation of human exposure to vibration in buildings. Vibration sources other than blasting (CD 5.20).

5 BASELINE NOISE

5.1 Properties close to the existing trafficked roads are currently exposed to high traffic noise levels in excess of 68 dB. Properties over 100m from the existing trafficked roads have a lower ambient noise level.

6 EFFECTS OF THE SCHEME

6.1 If the Scheme were not built, 5784 properties would experience a Minimal to Moderate decrease in traffic noise levels in the fifteen years following the Scheme Baseline Year.

6.2 If the Scheme were built, the following effects would occur in the Scheme Future Assessment Year:

- 119 residential properties would experience no change,
- 718 residential properties would experience a **Negligible** increase,
- 807 residential properties would experience a **Minor** increase,
- 283 residential properties a **Moderate** increase,
- 203 residential properties a **Major** increase,
- 1854 residential properties would experience a **Negligible** decrease,
- 1026 residential properties would experience a **Minor** decrease,
- 325 residential properties would experience a **Moderate** decrease,
- 449 residential properties a **Major** decrease.

- 6.3 The noise nuisance assessment results are set out in **DCC/P/9**.
- 6.4 There would be a reduction in the number of properties exposed to traffic noise levels in excess of 68 dB from 656 in the Baseline Year Do Minimum to 234 in the Future Assessment Year, Do Something.
- 6.5 Noise effects from the Scheme are not predicted to significantly affect the area to the East of Kingskerswell village, with some **Minor** to **Moderate** increases between 600m and 1000m from the Scheme, reducing to **Negligible** increases beyond 1000m to the West of the Scheme.
- 6.6 Local diurnal traffic patterns are not expected to change significantly with the new bypass, and therefore night time noise is not considered to be any more significant than the impacts during the day.
- 6.7 Sixteen properties have been identified as likely to be entitled to road traffic noise insulation under the terms of the Regulations. These are as follows:
- 16, 17, 27-31 ADDISON ROAD
 - 3,5,7 & 9 ST. LUKES ROAD
 - 42 ALLER PARK ROAD
 - FREEWAY EDGINSWELL LANE
 - HOMESTEAD EDGINSWELL LANE
 - 1 GREENHILL ROAD
 - 1 HUXNOR ROAD
- 6.8 The significance criterion for construction noise is predicted to be exceeded at nearby receptors during the following activities:
- Piling at Penn Inn flyover and support ramp
 - Piling to support the new retaining wall at St. Lukes Road
 - Piling to support the Aller Road Bridge
 - Piling to support the Torbay Ring Road Bridge
 - Demolition of the existing retaining wall at St. Lukes Road

- Replacement of the Brookedor Bridge
- Rock drilling south of Maddacombe Overbridge

6.9 Properties adjacent to these activities are predicted to experience the highest potential noise levels from construction activities. Should the Scheme proceed, a detailed assessment would be undertaken to determine if these properties qualify for an offer by Devon County Council to exercise discretionary insulation measures.

6.10 In relation to vibration due to road traffic, by 2028, 2032 properties would experience a decrease in “bother” from airborne vibration if the Scheme did not proceed. If the Scheme proceeded, 497 properties would experience an increase in bother and 1746 properties would experience a decrease.

6.11 The predicted VDV’s from the following piling activities could give rise to a low probability of adverse comment at some local receptors:

- Piling at Penn Inn flyover and support ramp
- Piling to support the new retaining wall at St. Lukes Road

7 CONCLUSION

7.1 The area around Kingskerswell village is currently affected by high levels of traffic noise. Some properties are currently exposed to traffic noise levels in excess of 68 dB L_{A10} .

7.2 If the Scheme were not to proceed, all properties would experience a decrease in traffic noise levels in the fifteen years following the Scheme Baseline Year. A growth in traffic over this period is predicted, but this is offset by a decrease in line speed on some roads, and the commitment from

DCC to resurface the existing roads by the Future Assessment Year with a quieter surface.

- 7.3 If the Scheme were to proceed, 3654 residential properties would experience decreases in noise as a result of the Scheme. 2011 residential properties would experience increases in noise. There would be a large reduction in the number of properties exposed to traffic noise levels in excess of 68 dB. Overall the Scheme would bring benefits to the area, particularly to Kingskerswell village.
- 7.4 Sixteen properties have been identified as likely to be entitled to road traffic noise insulation under the terms of the Noise Insulation Regulations
- 7.5 Properties adjacent to piling activities are predicted to experience potential noise levels from construction activities such that they may qualify for an offer by Devon County Council to exercise discretionary insulation measures.
- 7.6 The Scheme would lead to a majority of properties experiencing a reduction in bother from airborne road traffic vibration. If the Scheme were not built, bother from airborne road traffic vibration would also decrease.
- 7.7 Temporary construction vibration impacts have been predicted at various locations along the Scheme where piling and rock removal activities are predicted. This would not cause any long term impacts.