



DEFRA

**METHOD FOR CONVERTING THE
UK ROAD TRAFFIC NOISE INDEX $L_{A10,18h}$ TO
THE EU NOISE INDICES FOR
ROAD NOISE MAPPING**

A Report prepared by

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Defra – Converting $L_{A10,18h}$ to L_{den} etc**DOCUMENT CONTROL SHEET**

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1.0 Introduction

- 1.1 The Environmental Noise Directive [Ref. 1] requires member states to produce noise exposure information in the form of strategic noise maps utilising common noise indicators (referred to as EU Noise Indices). The Directive requires the information to be presented in terms of the L_{den} and L_{night} indices. For road traffic noise, it is also proposed to obtain information in terms of the following supplementary noise indicators: $L_{A10,18h}$ (06.00-24.00), $L_{Aeq,12h}$ (07.00-19.00), known as L_{day} , $L_{Aeq,4h}$ (19.00-23.00), known as $L_{evening}$, and $L_{Aeq,16h}$ (07.00-23.00).
- 1.2 The national method for predicting road traffic noise is described in the publication Calculation of Road Traffic Noise (CRTN) [Ref. 2]. The noise index derived from this method (L_{A10}) is, however, different from the main indices required by the Directive. Defra therefore commissioned TRL Limited to advise on the development of an interim computation method for use in the UK, which would comply with the Directive for noise mapping purposes [Ref. 3]. TRL suggested that, for UK conditions, the best interim approach is to adapt CRTN by applying an 'end correction' to obtain the relevant EU indices from calculated values of L_{A10} .
- 1.3 Subsequent work has identified some issues with the originally proposed CRTN back-end correction, referred to as Method 3 in the TRL report. The TRL method took into account that the road network is divided into acoustically homogenous segments, according to the procedures set out in CRTN. However, some commercially available software packages divide the road network into a larger number of segments than required under the CRTN method. For the method to be consistent, dividing the road into a number of smaller segments, calculating the contribution from each segment and then combining all the contributions together to provide the total noise at a receptor, should provide the same result. However, if the $L_{A10,18h}$ noise levels from each of the smaller segments are converted to EU indices separately and then combined to provide the total, inconsistencies in the results could occur.



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- 1.4 Further work was carried out by TRL to review Method 3 and a revised methodology has been produced. This document details the revised procedure to be used when applying the Directive.

2.0 Revised Method

2.1 It is recommended that the following procedure is adopted in the UK as an interim measure to calculate the following indices for road traffic noise: L_{den} , L_{day} , $L_{evening}$ and L_{night} .

- i. Figure 1, overleaf, shows the flow chart of the process to be used for converting the UK noise index $L_{A10,18h}$ to EU indices. The flow chart shows that, after dividing the road scheme into a number of different segments, each segment is identified as either non-motorway or motorway depending on the segmented road type¹
- ii. For each segment, the noise level, $L_{A10,18h}$ is calculated using CRTN.
- iii. For each road type, the combined noise level, $L_{A10,18h}$, is calculated and, using the appropriate regression equations (Equations 1 – 6, below), the indices L_{day} , $L_{evening}$ and L_{night} are calculated.

For non-motorway roads:

$$L_{day} = 0.95 \times L_{A10,18h} + 1.44 \text{ dB} \quad (\text{Equation 1})$$

$$L_{evening} = 0.97 \times L_{A10,18h} - 2.87 \text{ dB} \quad (\text{Equation 2})$$

$$L_{night} = 0.90 \times L_{A10,18h} - 3.77 \text{ dB} \quad (\text{Equation 3})$$

For motorways:

$$L_{day} = 0.98 \times L_{A10,18h} + 0.09 \text{ dB} \quad (\text{Equation 4})$$

$$L_{evening} = 0.89 \times L_{A10,18h} + 5.08 \text{ dB} \quad (\text{Equation 5})$$

$$L_{night} = 0.87 \times L_{A10,18h} + 4.24 \text{ dB} \quad (\text{Equation 6})$$

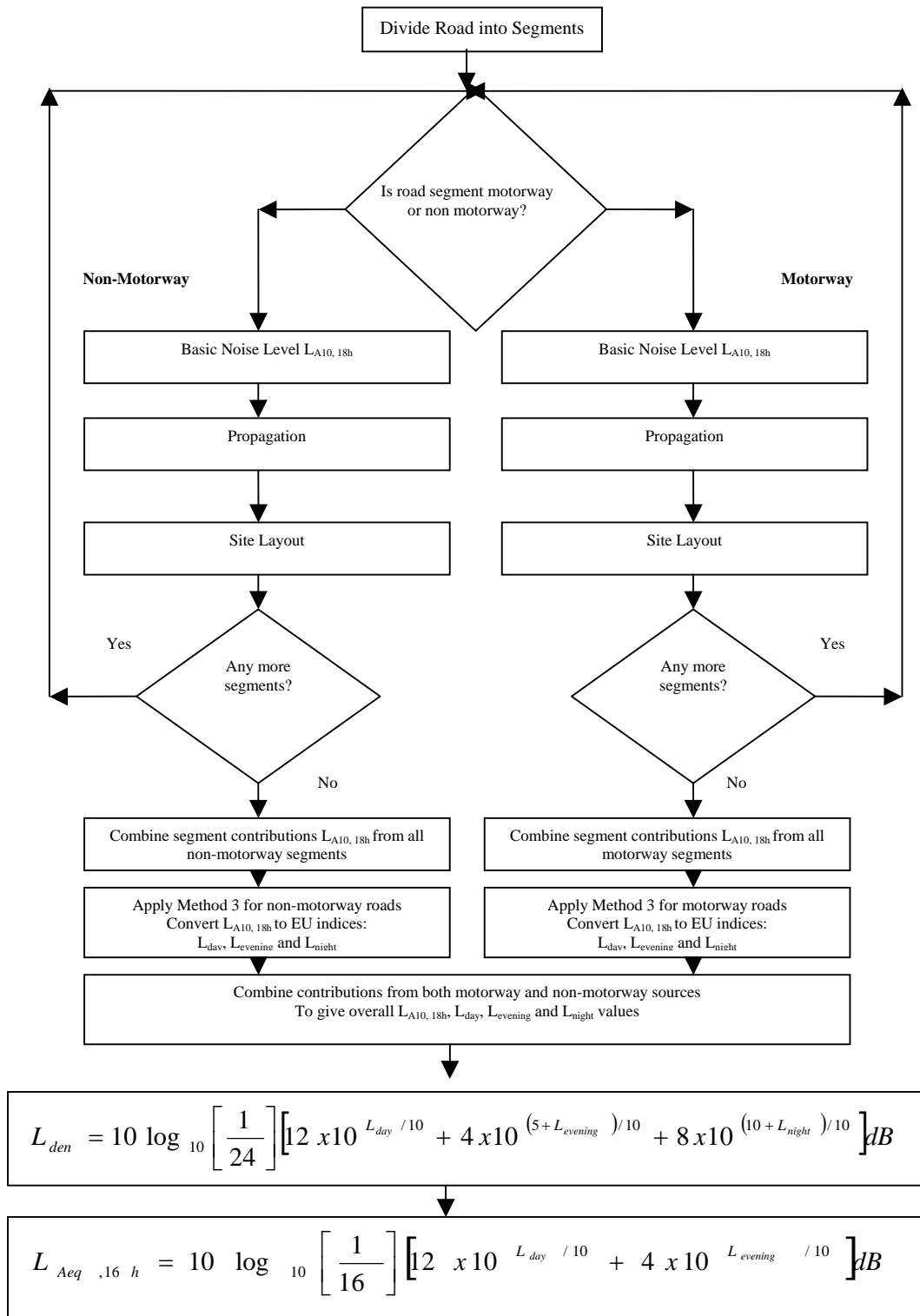
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- iv. For each index, the contribution from the non-motorway and motorway sources are combined to give the total value for the whole road network together with the combined $L_{A10,18h}$ value.
- v. The resulting values of L_{day} , $L_{evening}$ and L_{night} are used to calculate L_{den} using the formula shown in Figure 1. Similarly, the noise level $L_{Aeq,16h}$ (07:00 to 23:00) is calculated using the formula shown in Figure 1.

¹ 3 lane dual carriageway roads which are designed to be freely flowing (i.e. do not have frequent signalled junctions) should be regarded as motorways regardless of their actual classification

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Figure 1 -Process for Converting $L_{A10,18h}$ to EU Indicators





3.0 References

1. Directive 2002/49/EC of the European Parliament and of the Council of 25 June 2002 relating to the assessment and management of environmental noise (OJ L 189, 18.07.2002, p12)
2. Department of Transport and the Welsh Office. "Calculation of Road Traffic Noise" (CRTN), HMSO, 1988, ISBN 0-11-550847-3.
3. P G Abbott and P M Nelson. "Converting the UK traffic noise index $L_{A10,18h}$ to EU noise indices for noise mapping". Project Report PR/SE/451/02. TRL Ltd. Crowthorne. 2002.
<http://www.defra.gov.uk/environment/noise/research/crtn/index.htm>