



Lessons from round 2 noise mapping in England

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ABSTRACT

The second round of noise mapping required under the EU Environmental Noise Directive has been completed. Lessons learnt during the initial round of noise mapping led to some differences in approach to the second round of mapping. Some of the changes have been contractual/organisational and have been made to facilitate greater efficiency in the production of noise maps. Other changes have been implemented to produce a higher level of comparability between different noise maps. This paper considers the differences in approach for Round 1 and Round 2 road and railway noise maps produced for the English government. The reasons for the changes are discussed and the outcomes that resulted from the changes are reported.

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1. INTRODUCTION

The authors of the paper were all involved in the END Round 2 noise mapping work for England carried out on behalf of the Department for Environment, Food and Rural Affairs (Defra). Hepworth Acoustics was the contractor chosen by Defra to carry out the calculation work for the England road and rail noise map. Within the Hepworth Acoustics team, Simon Shilton of Acustica acted as project manager. Extrium is employed by Defra as their Geographic and Acoustic Data Advisor, and was responsible for production of the noise model input data, and the population exposure assessments from the calculated results. All four authors had worked on Round 1 noise mapping for Defra.

2. CONTRACTUAL/ORGANISATIONAL CHANGES BETWEEN R1 AND R2

The Round 1 noise maps completed in 2007 were the first noise maps carried out across all of the major urban areas of England. Whilst there had been individual urban noise maps produced previously, such as Birmingham in 1999 (1) and Westminster, a borough of London (2) in 2001, there had not been a systematic scheme of noise mapping across the country. This meant that there were few experienced contractors for producing large scale noise maps. Therefore, in the first round of noise mapping, Defra divided the agglomerations, major roads and railways in to 21 separate contracts that were awarded to a number of different contractors.

In preparation for the second round of END noise mapping, Defra reviewed the contractual options. The noise mapping coverage was greater for Round 2 than for Round 1, because the criteria within the END changed. Agglomerations with a population greater than 100,000 had to be mapped for Round 2 compared with a threshold of 250,000 for Round 1. Also, the traffic flows denoting major roads and railways, were halved for Round 2. This meant that there was an approximately three fold increase in the amount of noise mapping required. In addition, there was a budget available for the Round 2

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calculations of approximately 20% of the Round 1 budget. Defra made the decision that the noise mapping work for Round 2 would be procured using two contracts, with Extrium undertaking the data sourcing, data management and input data preparation task, and Hepworth Acoustics chosen to undertake the noise level calculation task.

The contractual arrangement used minimised the project management task and costs for Defra in two ways. Firstly, there were only two contracts to set up and manage compared with 21 in Round 1. Secondly, a high degree of relevance was placed by Defra on the importance of experience and expertise in END noise mapping when choosing the contractors, and this allowed the work to be sourced and completed within the timescale and budget available. In the tender document for the noise calculation work, 80% of the tender mark was based on the technical submission, with only 20% of the mark based on price (albeit there was a maximum tender price specified).

The contractual arrangements adopted were very successful in meeting Defra's requirements. All of the noise calculation work was carried out within a six month period, significantly quicker than the calculation work for Round 1. In addition, the work was carried out within budget. For the noise calculation work, this worked out at a cost of approximately 1p/person within the noise model calculation area.

The speed and cost-effectiveness of the work was primarily down to the contractual arrangements and the prior experience of the contractors working for Defra. The speed of work relied upon an effective work process being set up, involving the transmission of data from Extrium to Hepworth Acoustics, an effective noise calculation process with rigorous QA checks prior to the calculation work being carried out, to minimise any recalculation work, and transmission of results back to Extrium as soon as they had been QA checked. The previous experience of the contractors working together allowed a working protocol to be agreed very quickly, facilitating the meeting of the timescales. Minimisation of project management costs and learning time by using experienced contractors facilitated the reduced cost of production of noise maps without sacrificing accuracy.

3. TECHNICAL CHANGES

In order to make valid comparisons between different noise maps, it is necessary to ensure that input data, as well as prediction methodologies, are comparable, otherwise differences noted will be partially accounted for by the different input data and/or prediction methodologies used. The initial two rounds of END Noise Mapping have used a number of different prediction methodologies across Europe, and so direct comparison of results between countries is difficult because of inherent differences in the methods of predicting Lden and other parameters. However, there have also been some variations in methods of determining input data that will also lead to variations in results.

One item in the END requirement that received different views on how to interpret, was the requirement for mapping of roads within agglomerations. In the Round 1 noise mapping, Defra took the view that all roads within agglomerations should be mapped. Therefore, all roads were modelled within the noise map and assumed road traffic flows were given to those roads where national road traffic count data was not available. It became apparent after submission of the noise maps from other EU countries, that a variety of interpretations had been made, and some countries had only mapped main roads (using their national definition for main) within agglomerations.

For the second round of END noise mapping, Defra took the decision to map main roads (motorways and A roads) within agglomerations. This decision made England more comparable to a number of other EU countries, but meant that there was a difference between R1 and R2 results for England, irrespective of changes in road traffic flows in the intervening five years. It was considered that the change in number of properties (and hence population) exposed to the various noise bands, as a result of this difference, would not be uniform across the noise bands. Therefore, Defra commissioned research work from Hepworth Acoustics to assess the typical differences produced by the different data assumptions.

This work was carried out by looking at a sample of five out of the 65 agglomerations modelled for the Round 2 work. These agglomerations varied in size from just over 100,000 population to just under

1,000,000 population and were a mix of pre-existing (Round 1) and new (Round 2 only) agglomerations. The methodology adopted was to compare the Round 2 results with those achieved by using the Round 1 methodology of adding in all other roads (non motorways or A roads) with an assumed traffic flow. The work was carried out by the same team as the Round 2 work, with Extrium providing the source data and carrying out the population exposure assessment, and Hepworth Acoustics and Acustica carrying out the calculation work using the same equipment and the same noise model calculation settings.

The assessment showed significant differences in population exposures in certain noise level bands as a result of the different methodologies. Unsurprisingly, the Round 1 methodology provided higher population exposures than the Round 2 methodology as shown in Table 1 below.

Table 1: Population Exposure Results – Round 2 as a percentage of Round 1 methodology

	Noise Level Band (dB) Lden				
	55-60	60-65	65-70	70-75	>75
Percentage range	22-83%	4-8%	42-86%	85-100%	60-100%

The biggest difference in population exposure between the two methodologies is in the range 60-65 dB Lden. The likely reason for this is that the Round 1 methodology which assigned traffic flows to all minor roads, would potentially lead to an overestimation of noise exposure in the 60-65dB range.

The figures above show that large differences in population noise exposures can result from decisions made at the initial stages of the mapping process, where explicit guidance has not been provided in the END or other guidance. This introduces additional variation in to the national noise exposure results produced across the EU, which already has an element of variation as a result of different noise prediction methodologies being used in different nations.

4. CONCLUSIONS

This paper has discussed some of the differences in the noise assessment work carried out for the END Round 1 and 2 in England. A different contractual approach has led to a more cost-effective way of producing the calculated noise values. In addition, the English results may now be more comparable with some other EU country's results, because of the interpretation used on which roads to model within agglomerations. However, direct comparison between Round 1 and Round 2 results for England is discouraged because of the different assessment methodologies used.

The use of CNOSSOS, if implemented, for Round 3 calculations across the EU will enhance comparability of results between different countries, but will also make comparison back to Round 1 and 2 results difficult. The experience of England with the first two rounds of mapping has reinforced the point that it is always important to know exactly what is being compared, before attempting to draw conclusions.

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