ERA-NET ROAD FTP2: A DECISION SUPPORT GUIDE FOR THE PERFORMANCE MANAGEMENT OF LOW NOISE PAVEMENTS

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Abstract

Low Noise Pavements (LNP) have numerous advantages compared to other traffic noise abatement measures (noise screens, façade insulation). Some negative experiences in the past however have led to some reluctance to use LNP. In the ERA-NET ROAD FTP2 project, a consortium of the Belgian Road Research Centre and the Danish Road Institute investigated in an objective and quantitative way and based on state of the art facts and figures the performance of LNP for a variety of aspects. In the present contribution the available data, the followed method of the performance (risk) analysis and the results are outlined. The project lead to state of the art conclusions about all aspects for three bituminous types of LNP: single and double layer porous asphalt and thin layers. Twenty seven aspects (risks) were studied in detail: a.o. initial slipperiness, winter maintenance, loss of noise reduction due to clogging, effectiveness of cleaning techniques, raveling by wringing traffic, etc.

1. INTRODUCTION

Reduction of traffic noise has become an increasing priority in the environmental policy of European countries, not in the least by the European Noise Directive 2002/49/EC imposing to EU member states to produce noise maps and action plans regarding road traffic noise. Improvement of human well being and reduction of noise related adverse health effects being an important motivation, it should be clear that traffic noise reduction represents an economical profit. The working group “Health and Socio-Economic Aspects” of the EU estimated the value of 1 dB(A) reduction of the outdoor \(L_{den}\) level to be 25 €/household/year [1].

Now, LNP applications represent the preferred solution to reduce traffic noise, especially in urban context, where it is generally the most cost-effective one. They have numerous advantages with respect to other noise abatement measures (like noise screens or facade insulation), among others:

- In most cases, they appear to be by far the most cost-effective measure\(^1\)
- Their noise reduction effect cannot be annihilated by weather conditions like wind or temperature inversion, contrary to noise screens

\(^1\) Lowest cost per dB(A) noise reduction.
They are not intrusive, contrary to noise screens, which are in a lot of situations even not applicable (often too little space in urban situations)

They are not vulnerable to vandalism (tagging, glass braking,…) like most types of noise screens

Porous LNP prevents an increase of noise during rainy weather due to droplet projection, contrary to ordinary dense road surfaces

During rainy weather, porous LNP increases safety by reducing splash and spray and by avoiding aquaplaning

During wet weather and darkness, a LNP avoids the formation of a water film on the road surface, reducing glare by the lights of approaching cars

Low noise pavement is a powerful tool in the abatement of traffic noise, but experience with some types of LNP have not always led to satisfactory results. This has led to reluctance to use LNP, which is not always based on objective figures and facts. The aim of the project was to objectively list all risks involved with the use of LNP and to quantify those risks objectively, based on the present international experience and state of the art. This paper focuses on the followed methodology in the project and the general conclusions/recommendations. The intermediate results are in the present paper only illustrated with examples, but can be found in full detail in the final report of the project [2].

2. PROJECT APPROACH

2.1 Phase 1: Performance Analysis

As aforesaid, the ERA-NET FTP2 project aimed basically to list and quantify the risks when using a LNP and to make recommendations on how to deal with the risks. The analysis is based on the types of LNP used in the five ERA-NET ROAD countries (the Netherlands, Switzerland, Norway, Sweden and the United Kingdom) participating in the project. This will allow decision makers in these and other countries to decide on a rational basis whether or not to use LNP for traffic noise abatement. The approach consists of identifying critical factors in processes, activities and regulations that may affect the acoustic performance of LNP, including identification of possible improvements to manage and control these critical factors.

The project started with an information gathering round, where each of the five countries was visited by a member of the project team (PT). The procedures and techniques for the realisation, use and maintenance of LNP were described in detail. The low noise pavement types encountered were single layer porous asphalt, two layer porous asphalt and thin layers (porous and dense types).

Then the procedures and techniques were investigated in detail and a list of critical factors was made for each of the five countries. It concerns factors which could influence the performance of the LNP related to six aspects: the initial acoustic performance, average acoustic performance (over time), durability, social impact, financial impact and legal consequences. It became already during the information gathering round clear that there is no experience of legal consequences in any of the five countries. Therefore, in the subsequent steps of the project, this aspect was left out of consideration. For each country the PT attributed a score representing the importance of the probability of occurrence, and a score representing the importance of the impact for the mentioned aspects. These scores were attributed on a relative scale based on expert judgement. The product of occurrence probability and impact yields the “risk”, i.e. an indication for the importance of the factor. An example of this analysis for a few factors for the Netherlands is given in Table 1.