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TITLE	**Quiet City Transport**
Subproject 3	**Quantification of effect of contributing parameters to wheel/infrastructure noise**
Work Package 3.5	**Refine & optimise the road surface**
	Field studies of the poroelastic road surface
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PRIORITY 6
Sustainable development, global change & ecosystems

EXECUTIVE SUMMARY

A recipe for a poroelastic[1] road surface has been developed partly through modelling and simulations in the FEM Software "Comsol Multiphysics" and partly by laboratory studies (including measurements of dynamic stiffness, sound absorption as well as various strength, durability and stability tests etc.). A method was also developed for impregnating the crumb rubber grains, used in the poroelastic road surface, with bitumen in order that the grains would be saturated with bitumen to prevent the rubber to soak up the binder that keeps the mix together. A test section 80 m long at Tagenevägen in Gothenburg was paved with the poroelastic road surface according to the developed recipe. Measurements with the aim to characterise the noise benefits from the poroelastic road surface, were performed on October 4, 2006.

External tyre/road noise from the poroelastic road surface, further developed and refined within the QCITY project, has been compared to standard road surfaces worn to various degrees. Comparisons, between the poroelastic road surface and standard reference road surfaces, reported here has been made to SMA11 and SMA16. SMA11 is an Asphalt Bitumen surface with maximum stone size 11 mm and with a high content of the bigger stones in the aggregate mix. SMA16 is the same type of surface but with 16 mm maximum stone size.

Both the Close Proximity (tyre/road noise is measured with aid of on-board carried microphones) and the Drive-by-method (the test vehicle is passing by a road side microphone 7.5 m from the centre of the vehicle track) has been performed to measure the sound reducing effect of the poroelastic road surface compared to conventional standard road surfaces.

Measurement results reveal a reduction in the external tyre/road noise for the poroelastic road surface of **6 dB(A)-units** (5.6-5.9 dB(A)) **compared to the SMA11** (see Fig A below) and **7.5 dB(A)-units** (7.3-7.6 dB(A)) **compared to the SMA16**.

By further increasing the void content from the current 15 % up to >20% it is expected that the noise reduction would increase to 7-9 dB(A) units relative to a newly paved SMA11 and 10-11 dB(A) units relative to an SMA16.

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[1] A Poroelastic road surface is a road surface that display the characteristics **sound absorption** (by communicating pores in the road surface) ***and*** **high elasticity** (by adding rubber granulate to the asphalt mix)

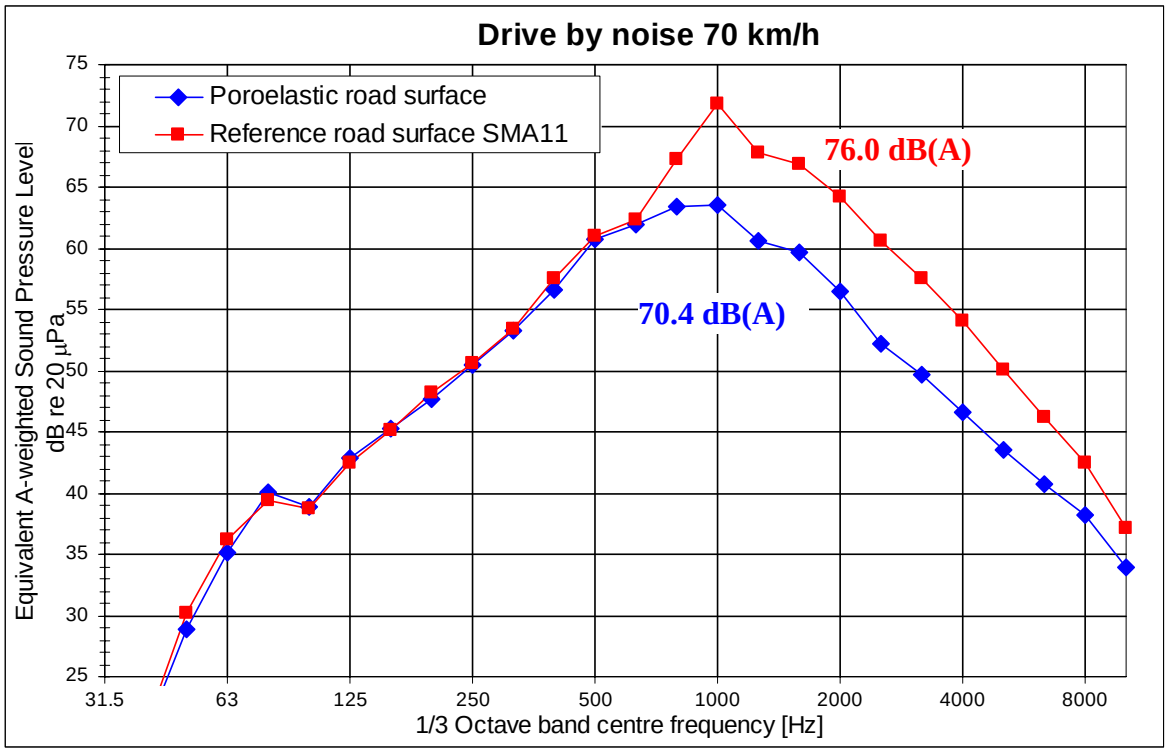

Fig A. Example of the reduction found for the reduction of a poroelastic road surface as compared to the new SMA11 (Asphalt Bituemen Stone max. size 11 mm. The reduction is presented as A-weighted sound pressure levels in third octave bands. Note the distinct reduction at higher frequencies from 800 Hz. The reduction as A-weighted broad band level L_{pA} in dB(A) is **6 dB(A) units**.