

## Settlement Protection against Noise

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**Introduction.** Solving noise complaints coming from dense urbanized territories, the authorities came to the conclusion that some of the complaints can be solved by using short-term noise measurements. In some EU cities since the 1980s stationary noise monitoring stations have been installed across the city, which measure sound. All these stations were linked to a central data logging centre where noise maps on empirical algorithms were built comprising the long-term average noise levels with positioning information and average weather data. By means of those strategic noise maps, municipalities identified the places where immediate actions should be taken to protect the population. Since the implementation of Directive 2002/49/EC noise monitoring stations have remained in use for validation of noise map measurements. The “European Directive 2002/49/EC on the assessment and management of environmental noise” obliges the European Union Member states to draw noise maps of communities with more than 100,000 inhabitants and of areas near major transport infrastructures for the assessment of noise outdoors. The Directive also obliges the EU Member states to draw noise reduction action plans. In Latvia it refers to Riga and Daugavpils.

**The aim, materials and methods.** The aim of the study is to search the places of Riga agglomeration where noise levels exceed the allowed limit for the development of noise reduction action plan with a view to be integrated into the land use plan. Riga agglomeration strategic noise map was calculated using software “IMMI 6.3” and has been completed, covering all noise indicators ( $L_{den}$ ,  $L_{day}$ ,  $L_{evening}$  and  $L_{night}$ ) and various noise sources (industrial sites, railways, airports) and dwelling sites, where noise levels exceed the allowed limits.

**Results.** The estimated total number of Riga City inhabitants living in dwellings are exposed to each of the stated bands of values of  $L_{den}$  and  $L_{night}$  in dB 4 m above the ground on the most exposed facades. The map shows Riga as a rather noisy city because industry, service companies and major roads, railway lines cross the city centre. The Freeport of Riga with its access roads also contributes to the total noise level. In Riga City one can find few territories where the night noise indicator  $L_{night}$  meets the limit value fixed in Latvia (40 dBA). The assessment relating to the first round of noise mapping suggests that around 40 million people across the EU are exposed to noise above 50 dB from roads within agglomerations during night. More than 25 million people are exposed to noise at the same level from major roads outside agglomerations. These numbers are expected to be revised upwards as more noise maps are assessed. The Directive 2002/49/EC requires that noise mitigation measures are put in place to deal with areas considered to be noisy, and suggestions have been made within the Directive about the measures that could perhaps be utilized by the city authorities. The difficulty to choose adequate noise mitigation measure is trying to connect the correct mitigation measure with the appropriate problem. The noise barriers in Riga City appeared not to be an appropriate measure to adopt in streets because of the potential aesthetic consequences and possible disturber of the access of underground supply and communication lines. However, noise barriers may be appropriate for areas aside of underground communications and in places that are less visually sensitive. In contrary, reducing the speed limit on motorways may be less suitable than the erection of a noise barrier. As tools for identification of areas to be protected and for the assessment of the results after the protective measures implemented were used previously created noise maps. Some areas on noise maps are red and brown. These colors identify areas as more polluted by traffic and industrial noise and designated as zones of acoustic discomfort (ADZ) in agglomeration. ADZ is subjected to detailed analysis and necessary actions to reduce noise levels beside dwellings. There is a special criterion to assess harmful effects and noise annoyance of inhabitants for every particular house.

**Conclusion.** A more comprehensive and realistic assessment of the effectiveness of the Directive 2002/49/EC can only be made after the second round of noise mapping when the knowledge on noise pollution will have improved further on. The Riga City Noise Reduction Action Plan is still under consideration and in the process of development because the interests of too many third parties are involved there.