

The implementation of a noise barrier clearly improved the acoustic situation in the analysed area and supports the achievement of quiet agglomeration area conditions.

- During the night period, the barrier reduced noise by up to 13.6 dB, which is important for achieving quiet agglomeration area conditions
- The number of residents exposed to all-day noise decreased from 197 to 139
- Estimated loss of healthy life years decreased from 3.53 to 2.13 per year.

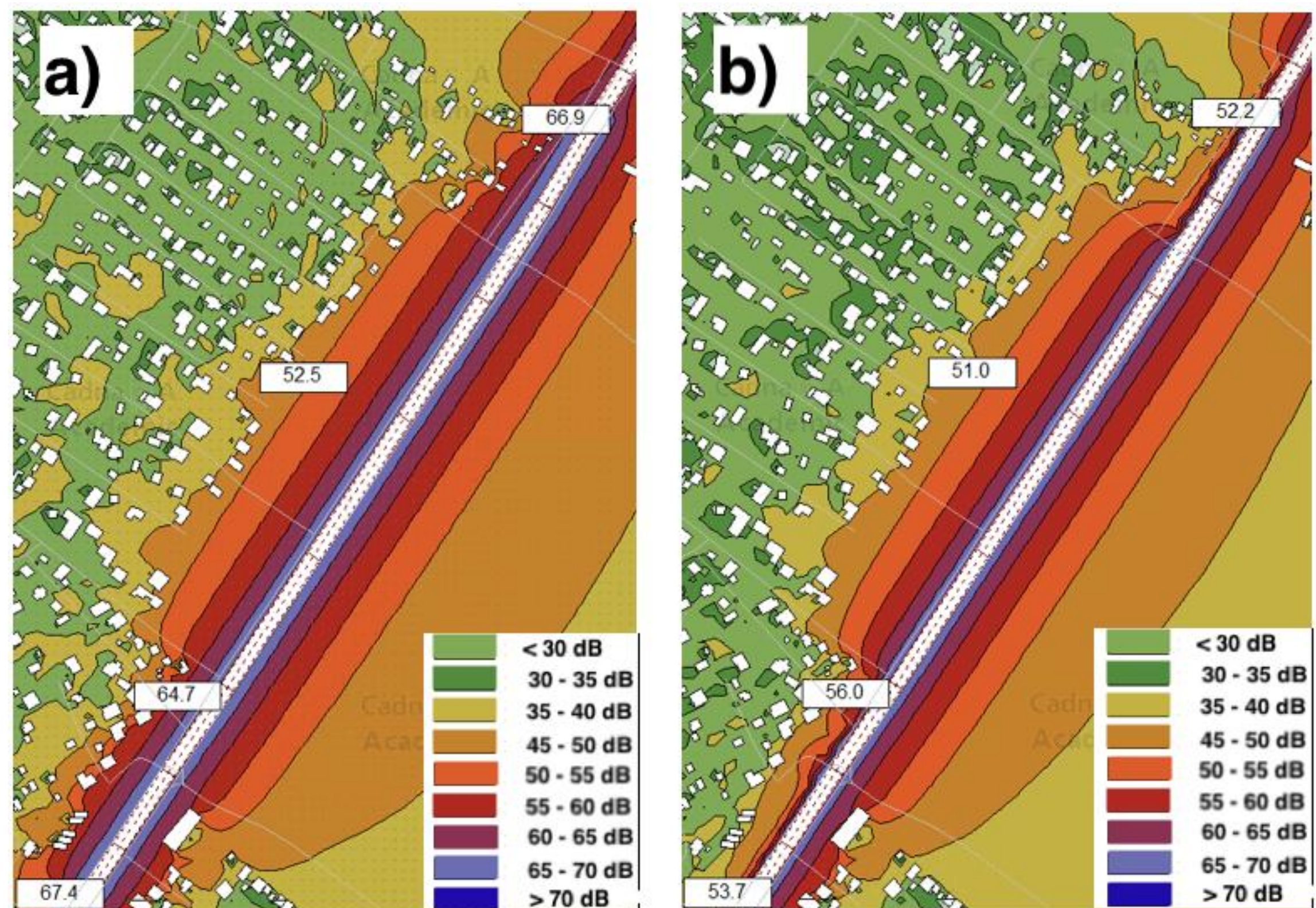


Fig. 1 Implementation of 4 m noise barrier effectiveness: a) before implementation; b) situation after the implementation

## Introduction

Environmental noise is a growing urban problem that directly affects residents' health, well-being and quality of life. Road traffic is one of the main noise sources in cities, especially in residential areas located close to busy roads. In Vilnius, quiet agglomeration areas are designated to protect acoustic comfort, but some of these areas are still affected by traffic noise. This study focuses on the Talkos, Smėlynės and Rudausiy Sodų area, where noise from Nemenčinė Highway creates pressure on the acoustic environment. The aim is to assess the current noise situation and evaluate whether mitigation measures can help this area meet quiet agglomeration area conditions.

## Methodology

The study area was analysed using CadnaA noise modelling software. The current road traffic noise situation from Nemenčinė Highway was modelled and compared with several mitigation scenarios, including speed reduction, porous asphalt pavement, noise barrier, and combined measures.

Noise exposure was assessed for whole-day noise and night-time noise. The modelled noise zones were combined with residential building data to estimate how many residents are exposed to different noise levels.

The health effect was assessed using the DALY method. DALY means Disability-Adjusted Life Year and shows how many healthy life years are lost due to a health impact. In this study, DALY was used to estimate the loss of healthy life years caused by traffic-noise-related annoyance and sleep disturbance.

## Results

Table 1. Comparison of noise mitigation measures in terms of exposure and health impact

Scenario	Whole-day exposed residents	Night-time exposed residents	Lost healthy life years/year
Current situation	197	156	3.53
Speed reduction to 50 km/h	163	146	3.09
Speed reduction to 40 km/h	175	123	2.98
Speed reduction to 50 km/h + porous asphalt	151	84	2.35
Speed reduction to 40 km/h + porous asphalt	149	76	2.25
Porous asphalt	175	132	3.07
Porous asphalt + noise barrier	113	46	1.59
Noise barrier	139	74	2.13