

Road traffic noise

information from the yearbooks Prague Environment 2006, 2005 and 2004

(this text is based on information from the yearbooks Prague Environment 2004-2006)

Noise measurements

Regular noise measurements at selected localities of Prague were carried out either within the system of the IOŽIP from 1984 to 2000 at eight localities (see the Yearbook 2001). Repeated measurements of noise has been carried out on a long-term basis by the Public Health Authorities namely within the framework of the National Programme of the National Institute for Public Health called "Monitoring of the Environment Aspects Related to Public Health". Results of all-day measurements confirmed that at localities of stable traffic solution and more or less used traffic capacity noise conditions do not change much either. Due to all-day traffic load the effects of rush hours are minimised. At noisier localities the acceptable values of L_{Aeq} are permanently exceeded all day and night.

Occasional noise measurements, timely limited measurements of noise are carried out mostly as a part of environmental studies of larger investment projects. Studies performed also usually include design of noise prevention barriers and implementation follow-up check of their performance. Further one-time measurements are performed as checks in the course of investigation of complaints or in order to verify results of model calculations.

Noise maps

Noise maps have become a frequently used tool to describe urban noise nuisance in the world as well as in the Czech Republic. The impulse for essential increase of their importance is undoubtedly the recently adopted directive of the European Parliament and European Council on noise evaluation and control in the environment (Directive 2002/49/EC).

The Directive is based on three main principles: harmonisation (noise indicators, noise evaluation, calculation methods, measurement methods, monitoring, strategy, and legislation), collecting of information on noise in the form of noise maps, and informing the public on the current noise situation and on strategy and financing of noise reduction. Noise maps represent noise levels (values of indicators and their comparison to limit values), then they express population noise nuisance (number of persons or housings in a certain area affected by a certain noise). They are oriented on the application mostly in the land-use planning and urban planning and in strategy development. They will be required for large agglomerations, main road and railway routes, and important airports. They shall be developed by the end of 2007 at the latest; their update is assumed to be done in 5 years since they have been developed. The strategic noise maps shall be followed up by action plans, which shall be developed by 18 July 2008.

The City of Prague has long-term experience in the field of the noise map development. Concerning time and methodology the noise map development in Prague can be characterised by three development stages as follows:

1. Development of **measurement-based** noise maps. This period covers the period 1976 to 1996 when 5 automotive traffic noise maps for daytime were completed in the 5-year interval. The maps demonstrate noise levels on selected major roads on the City territory. They were developed using the results from a great number of short-term measurements (300–500).

2. The noise map development based on the **combination of long-term and short-term measurements (probes) and follow-up calculations**. This phase has the “transitional” character (both measurements and calculations were applied) and covers period of years 1993 to 1997 when 6 noise nuisance distribution maps (MRHZ) for daytime were successively developed for selected parts of the City territory. This phase was followed by a **pilot project of areal calculated automotive traffic noise map** for daytime for the City District of Prague 2, which was implemented in 1998.

3. The development of **calculated noise maps**. Between 1998 and 2005, 5 calculated noise maps for the whole City of Prague were developed, identifying noise-levels on Prague’s territory, or more precisely in the areas surrounding a selected communication network, for which there are input data on traffic intensity available. These maps include: automotive traffic noise maps for daytime and night-time, tramway traffic noise maps for daytime, aggregated calculated map of automotive and tramway traffic for daytime and night-time. A calculated noise map of automotive traffic for day-time mapping north-western part of Prague in 2000, which was developed using alternative calculation methods, also belongs to this category.

Tab. Overview of noise mapping projects in Prague

Project name	Time period	Procedures applied
Noise maps of automotive traffic (HMAD)	1976–1996	measurements (short-term)
Noise nuisance distribution maps (MRHZ)	1992–1997	measurements (short-term, long-term), calculations
Area noise map of automotive traffic in Prague 2	1998	calculation (verification study)
Calculated noise map of automotive traffic (VHMAD)	2000	calculations
Calculated noise map of automotive traffic, Prague - Northwest	2000	calculation (alternative methodology)
Analysis of population load with excessive noise according to the VHMAD	2001	calculation (GIS analysis)
Calculated noise map of tramway traffic in daytime	2002	calculation
Calculated noise map of automotive traffic in night-time	2004	calculation
Summary calculated noise map of automotive and tramway traffic in daytime and night-time	2005	calculation (summary)

Note: The calculated maps developed after the year 2000 were compiled using the same input data on automotive traffic intensity in 2000.

Basic information concerning the results of regular noise measurements in Prague as well as outputs of noise maps development have been published on regular basis in the [Prague Environment Yearbooks](#) since 1989. Since 1997, following the digitalisation and the transformation of noise maps into GIS, noise maps have been included in the Atlas of the Prague’s Environment on the Internet at www.premis.cz/atlaszp. These essential outputs of the Prague Environmental Information System (IOŽIP) have been published to serve the needs of the City’s management, professionals, and, first of all, the public. They are available in an electronic format (both the Czech and English versions) on this City’s website at envis.praha.eu and on the CD-ROM. The summary presentation of noise maps in Prague is available on the CD-ROM Prague – The Environment 6.

In 2000–2001 the Project of the Development of the Noise Map of Automotive Traffic in Prague was delivered in accordance with procedures applied in other European cities (modelling and GIS technology) and the subsequent assessment of the population noise nuisance. This project was followed with works on other maps developed namely in

relation to the solutions of public health authorities pursuant to the Act No. 258/2000 Code on public health protection. "Calculated noise maps of automobile and tramway traffic in Prague in 2002" were developed due to co-operation of the Department of Transport Development and the Department of Informatics of the Prague City Hall, Public Transport Company of Prague, and Technical Administration Service of Roads. These maps developed for daytime were presented in the last-year Yearbook. They also served as the basis for further steps as a proposal for the identification and removal of the "old noise nuisance" and the developing of maps for night-time.

[Calculated road and tramway traffic noise map, 2001](#) (Atlas of the Prague's Environment)

Pilot study of a proposal for the removal of „old noise nuisance“ from the Prague's territory (2003)

In the study, which was developed by the company of ENVICONSLT Co. for the Technical Administration Service of Roads Prague, localities (premises and structures) were identified on the Prague's territory where immission values of $L_{Aeq} < 72$ dB were found during daytime from 6 to 22 o'clock in 2000. The summary of basic results obtained is given in Table below.

Tab. - Occurrence of premises and structures falling under the "old noise nuisance" regime within decibel zones

Premises typology	$L_{Aeq} > 72$ dB	$L_{Aeq} > 75$ dB	$L_{Aeq} > 80$ dB
Premises having exclusive residential function	1 220 premises	354 premises	11 premises
Other premises	2 375 premises	752 premises	20 premises

The new Order of the Government of the Czech Republic No. 88/2004 Code, which is the executive regulation to the Act No. 258/2000 Code on the public health protection, the limit of the old noise nuisance has been changed from the limit value of $L_{Aeq} 72$ dB for daytime to the new limit value of $L_{Aeq} 70$ dB for daytime. This way the number of premises having exclusive residential function affected by noise of values exceeding the limit value was raised from the original number of 1,220 to 1,707 premises.

The results given are one of the background materials for the development of a schedule for the „old noise nuisance“ removal from the Prague's territory. In the short-term protective measures shall be worked out for the areas where exceedance of the immission value of $L_{Aeq} = 80$ dB was detected. The reduction in the „old noise nuisance“ places where exceedance of the immission value of $L_{Aeq} = 75$ dB was found, and furthermore the development of the strategic noise map of the City of Prague can be referred as medium-term objectives. The long-term objective should be to reduce the „old noise nuisance“ in areas where the immission value of $L_{Aeq} = 72$ dB has been exceeded and then to develop action plans for the City of Prague and subsequent implementation thereof.

Calculated noise map of automobile traffic in night-time, Prague 2004

The basic background material for was the calculated noise map of automobile traffic in daytime (HMAD). For the calculations in night-time the same characteristics were maintained – the descriptor L_{Aeq} , line-type of the immission map. In developing the map the objectives were pursuit as follows:

1. to obtain primary areal information on automobile traffic effects in night-time on the acoustic conditions along the road network monitored on the Prague's territory;
2. to establish the same calculation points for the automobile traffic noise maps in daytime as well as night-time;
3. to use the results acquired for the subsequent summary identification of locations of the „old noise nuisance“ originating from the automobile traffic noise on the Prague's territory.

All calculations for the automobile traffic noise map were obtained using 3-D version of the HLUK+ software. Calculations

results are related to points located at 4 metres above ground and 2 metres from facades of premises, which face the roads and for which input data necessary for the calculations of the L Aeq values were known. The calculations included all premises within 120-metre wide, both direction zone along the roads considered. Data for the calculations were prepared in a GIS environment using digital map background materials of the City.

The traffic data supplied (inputs from the ÚDI Praha) enabled to calculate values of L Aeq.night at 85,907 calculation points. Summary of results is given in Tables below for the distribution of L Aeq values in various zones (by 5 dB, by 2 dB, and according to the public health limits).

Frequency distribution of emission values of L Aeq.night - tables:

[Frequency distribution of emission values of L Aeq.night zoned at the step of 2 dB](#) Order of the Government of the Czech Republic No. 502/2000 Code (i.e. as amended by the Order of the Government of the Czech Republic No. 88/2004 Code on health protection against adverse effects of noise and vibrations)

The analysis of the set of calculation points, in which there are values of L Aeq night and L Aeq day, revealed that the limit value for the “old noise nuisance” in night-time is always exceeded if the limit value of L Aeq for the “old noise nuisance” is also exceeded at the given point in daytime.

Furthermore, it was found that

1. all calculation points, in which immission value of L Aeq night **higher than 62.0 dB** were calculated, were proven to fall under the regime of the “old noise nuisance”;
2. immission values of L Aeq night **within the interval 58.0 dB ≤ L Aeq night ≤ 62.0 dB potentially indicate** the fact that **the appropriate calculation point could be reclassified** into the regime of the “old noise nuisance”;
3. **other** immission values of **L Aeq night do not meet** the provisions of the “old noise nuisance” criterion.

Therefore the current relevant base for the removal of the “old noise nuisance” from the Prague’s territory is **only** the set of calculation points with immission values L Aeq night **higher than 62.0 dB. There are 21,978 such calculation points and they have been assigned to 8,429 real estates.**

Calculated noise map of automobile traffic in night-time, Prague 2004 (Atlas of the Prague's Environment)

[An example of the calculated noise map of road traffic for night-time, Prague 2004](#)

Source: MHMP, Enviconsult, Hydrossoft Veleslavín

[Examples of the calculated noise map of road traffic for night-time, Prague 2004 – details](#)

Source: MHMP, Enviconsult, Hydrossoft Veleslavín

[Noise assessment in the Czech Republic](#)