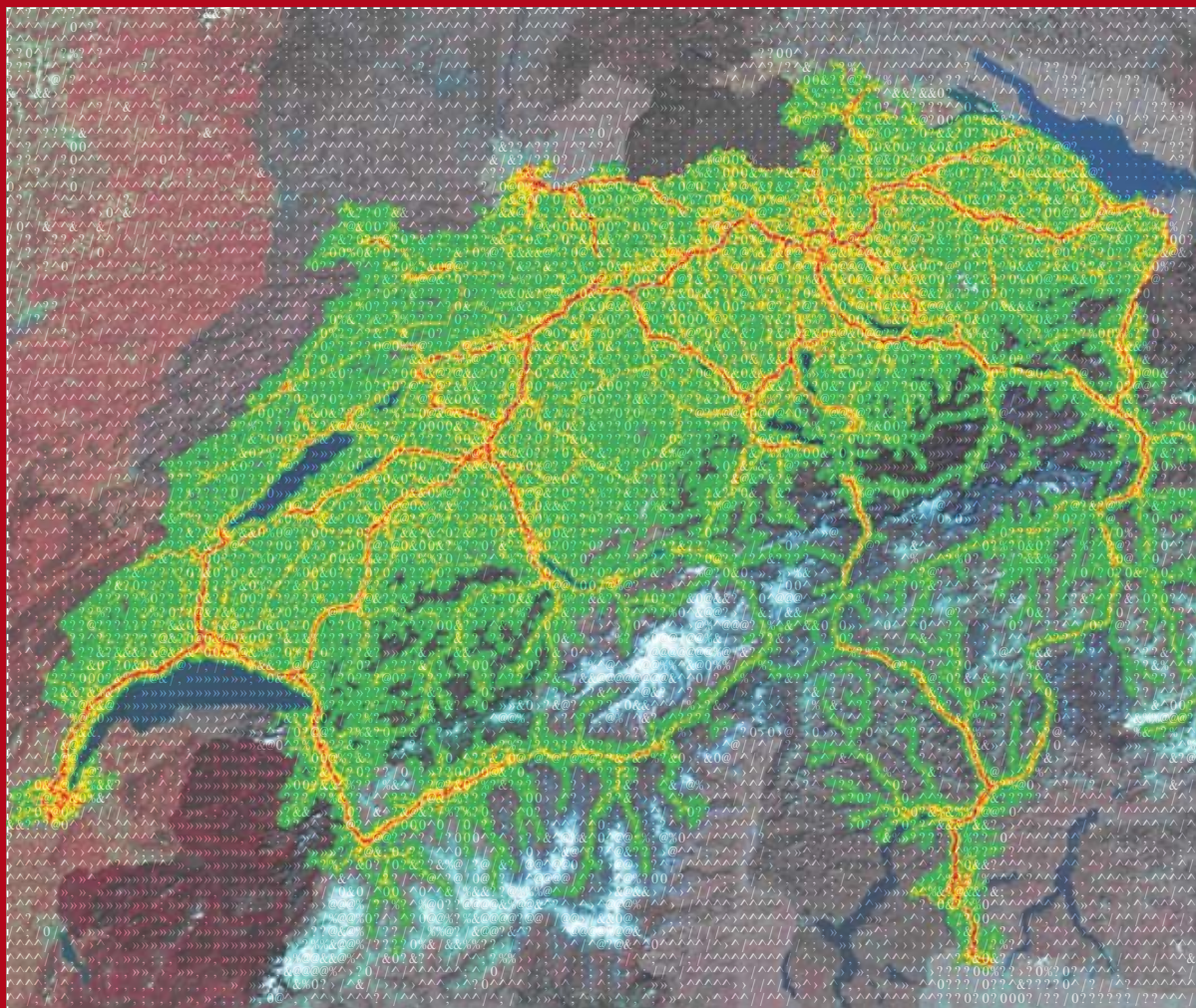


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# > Noise Pollution in Switzerland

*Results of the SonBase National Noise Monitoring Programme*



Schweizerische Eidgenossenschaft  
Confédération suisse  
Confederazione Svizzera  
Confederaziun svizra

Swiss Confederation

Federal Office for the Environment FOEN

**sonBASE**

Swiss Noise Database



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09

# > Noise Pollution in Switzerland

*Results of the SonBase National Noise Monitoring Programme*

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## > Abstracts

This report summarises the main findings obtained from the SonBase noise-monitoring tool. For the first time it is possible to provide comprehensive and scientifically based data concerning the current extent of noise pollution in Switzerland. The database records data from the three main noise sources in Switzerland (road, rail and air traffic), as well as the surfaces, private households, buildings, workplaces exposed to noise. Despite intensive efforts aimed at combating noise, numerous people remain exposed to noise emissions above the legally specified maximum levels. It is therefore essential to further intensify efforts to protect the population against noise pollution.

Der Bericht fasst die wichtigsten Resultate des Lärm-Monitorings SonBase zusammen. Zum ersten Mal können wissenschaftlich fundierte und flächendeckende Aussagen zum Ausmass der aktuellen Lärmbelastung in der Schweiz gemacht werden. Erfasst wurden die drei Hauptlärmquellen Strassen-, Eisenbahn- und Flugverkehr sowie die vom Lärm betroffenen Flächen, Personen, Wohnungen, Gebäude und Arbeitsplätze. Trotz grosser Anstrengungen bei der Bekämpfung des Lärms sind viele Menschen Lärmimmissionen über den gesetzlichen Belastungsgrenzwerten ausgesetzt. Die Anstrengungen zum Schutz der Bevölkerung vor Lärm müssen deshalb verstärkt werden.

Le rapport récapitule les principaux résultats de SonBase, base de données SIG pour le monitoring du bruit. C'est la première description à l'échelle nationale de l'ampleur de l'actuelle pollution sonore en Suisse. Le rapport couvre les trois sources majeures de bruit, la circulation routière, le trafic ferroviaire et le trafic aérien, ainsi que les récepteurs du bruit: surfaces, personnes, logements, bâtiments et places de travail soumis au bruit. En dépit des grands efforts déployés en matière de lutte contre le bruit, trop de personnes sont exposées à des immissions supérieures aux valeurs limites légales. Il faut donc renforcer la protection de la population contre le bruit.

Il rapporto riassume i risultati più importanti del sistema di monitoraggio del rumore SonBase. Per la prima volta è stato possibile illustrare in modo scientifico e ampio lo stato attuale dell'inquinamento fonico in Svizzera. La ricerca si è concentrata sulle tre fonti di rumore principali, ossia la strada, la ferrovia e l'aviazione, come pure su superfici, persone, abitazioni, edifici e posti di lavoro colpiti dal rumore. Nonostante i notevoli sforzi compiuti nella lotta contro i rumori, vi è tuttora un elevato numero di persone esposte a immissioni foniche superiori ai valori limite fissati dalla legge. L'impegno a proteggere la popolazione dal rumore deve pertanto essere rafforzato.

Keywords:

Noise pollution  
road traffic noise  
railway noise  
aircraft noise  
noise map  
SonBase  
World Health Organisation (WHO)

Stichwörter:

Lärmbelastung  
Strassenverkehrslärm  
Eisenbahnlärm  
Fluglärm  
Lärmkarte  
SonBase  
WHO

Mots-clés:

pollution sonore  
bruit de la circulation routière  
bruit du trafic ferroviaire  
bruit du trafic aérien  
carte du bruit  
SonBase  
OMS

Parole chiave:

Inquinamento fonico  
rumore del traffico stradale  
rumore del traffico ferroviario  
rumore del traffico aereo  
carta dei rumori  
SonBase  
OMS





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## > Foreword

Peace and quiet is a valuable commodity, but it can no longer be guaranteed everywhere at all times. Human activity is leading to increased levels of noise pollution in the environment. Peace and quiet is becoming an increasingly scarce resource and therefore one well worth protecting.

This report sheds light for the first time on the extent of noise pollution in Switzerland. The results are worrying: some 1.2 million people in Switzerland are exposed to hazardous or disturbing road traffic noise by day. Numerous maps and diagrams show where the noise hotspots are located and what the noise sources are.

Unfortunately noise is still seen as a necessary evil for our standard of living. This is why the effect of noise on our psychological and social well-being continues to be trivialised, but more and more studies are finding that people do not get used to noise. Excessive and chronic noise also causes physical illness. The consequences include disturbed sleep, high blood pressure and even heart attacks. Noise also generates costs running into billions. Apart from the health costs, a very important factor is the depreciation in real estate values.

The noise abatement strategy in Switzerland is based on three fundamental principles: measures at source, precautionary measures and remediation. The most important legal bases are the Environmental Protection Act and the Noise Abatement Ordinance. Despite numerous road and rail remediation measures, noise remains a widespread problem. Although the measures implemented or planned to date do offer a minimum level of protection, they are still inadequate. The objective of noise abatement is to reduce the excessive noise pollution to a level which is deemed healthy and as far as possible to protect regions which are still peaceful and keep them free from disturbing noise pollution.

Gérard Poffet  
Vice Director  
Federal Office for the Environment (FOEN)

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## > Summary

Noise is unwanted sound which can harm people exposed to it physically, psychologically and socially. Chronic and excessive noise poses a health risk, reduces indoor environment quality and the attractiveness of the regions affected and generates high costs to the national economy.

For Switzerland, the extent of noise pollution from the three sources - road, rail and air traffic – has been calculated nationwide for the first time. The noise calculations and analyses cover Switzerland as a whole, from cities and conurbations through to rural zones. The noise was assessed:

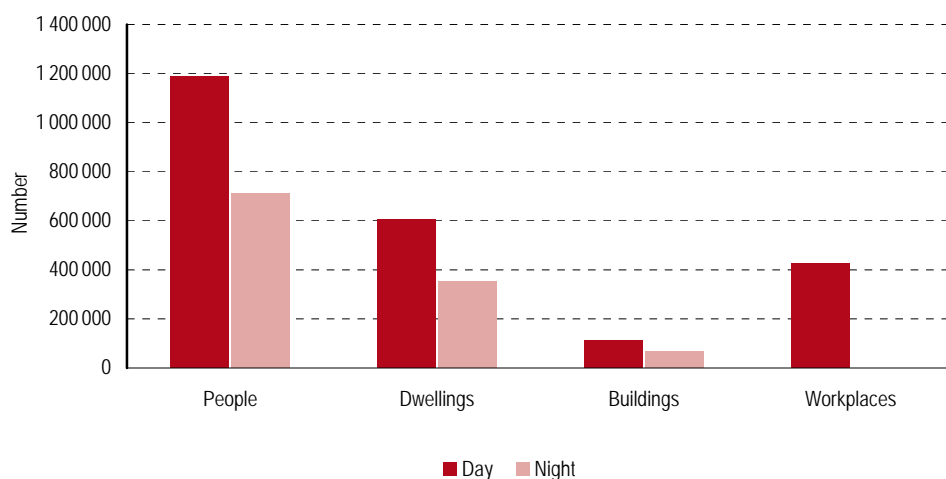
1. according to the current limits in the Noise Abatement Ordinance (NAO)
2. using lower thresholds (absolute decibel classification)
3. according to the World Health Organization (WHO) Guidelines which take account of the general adverse and disturbing effects that noise has on people.

**Road traffic noise**

- > Road traffic is the main source of noise in Switzerland. It gives rise to an extensive noise footprint which covers large parts of the country.
- > A land area of 175 km<sup>2</sup> by day and 110 km<sup>2</sup> at night is affected by high road traffic noise emissions.
- > Some 1.2 million people are exposed to hazardous or disturbing road traffic noise during the day (Fig. 1). This represents 16 % of the Swiss population.
- > Noise pollution drops during the night (Fig. 1). The ban on night-time driving covering heavy goods vehicles has the predominant positive impact on noise pollution, but road traffic is still the dominant source of noise during the night: About 10 % of the Swiss population (700 000 people) are exposed to hazardous or disturbing noise at night.
- > Some 600 000 dwellings are affected by hazardous or disturbing road traffic noise by day, representing 17 % of the Swiss housing stock (Fig. 1). 350 000 dwellings are still affected by pollution at night (10 % of all dwellings).
- > Over 110 000 buildings are affected by hazardous or disturbing road traffic noise during the day (Fig. 1). This represents 10 % of all buildings in Switzerland. 6 % of buildings (nearly 65 000) are exposed to night-time road traffic noise.
- > Some 420 000 workplaces are exposed to excessive road traffic noise (Fig. 1), which is 12 % of all workplaces in Switzerland.

**Fig. 1 > People, dwellings, buildings and workplaces affected by hazardous or disturbing road traffic noise in Switzerland**

*Basis of assessment: Limits in the Noise Abatement Ordinance (NAO)*

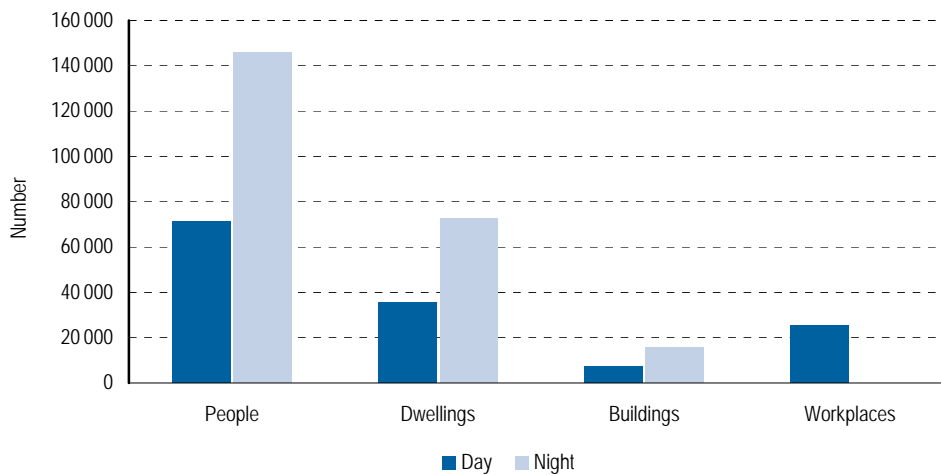


## Railway noise

- > Railway noise occurs along narrow noise corridors.
- > A land area of 15 km<sup>2</sup> during the day and 31 km<sup>2</sup> at night is exposed to excessive railway noise pollution.
- > By comparison with the extensive pollution from road traffic noise, few people are affected by railway noise, namely 70 000 people by day and 140 000 at night (Fig. 2).
- > Some 35 000 dwellings and 7 000 buildings are exposed to excessive or disturbing railway noise during the day. These figures rise to 75 000 and 15 000 at night. Therefore twice as many dwellings and buildings are affected by excessive railway noise at night as are exposed during the day (Fig. 2). This is primarily due to goods traffic which mainly operates at night.
- > Around 25 000 workplaces are polluted by excessive railway noise, which is 0.7% of all workplaces in Switzerland.

**Fig. 2** > People, dwellings, buildings and workplaces affected by hazardous or disturbing railway noise in Switzerland

*Basis of assessment: Limits in the Noise Abatement Ordinance (NAO)*

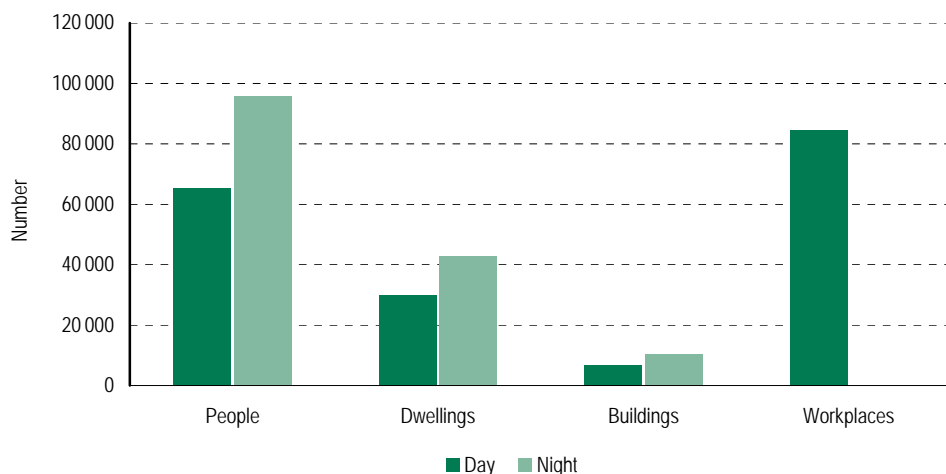


**Aircraft noise**

- > Aircraft noise is concentrated around the two international airports of Zurich and Geneva and the associated conurbations.
- > The aircraft noise data has not been analysed according to legal limits. This is because firstly there are different limits for military airfields and civil airports and secondly the data is mainly available in 5 dB steps (isophones 50 dB(A), 55 dB(A), 60 dB(A) etc.), whereas the legal limits are between the dB(A) limits given, as can be the case with civil airfields (43 dB(A), 47 dB(A), 53 dB(A), etc.). Interpolation would theoretically be possible but would not reflect the actual situation with sufficient accuracy. The following levels form the basis: > 60 dB(A) by day and > 50 dB(A) by night.
- > By day an area of 150 km<sup>2</sup> is exposed to noise levels over 60 dB(A), corresponding to 0.4% of the land area. If the threshold is lowered to 50 dB(A), the critical range covers an area of 730 km<sup>2</sup>.
- > At night over 180 km<sup>2</sup> are affected by aircraft noise of more than 50 dB(A). As many as 120 km<sup>2</sup> are within the 50 to 55 dB(A) range.
- > High aircraft noise during the day affects about 0.9% of the total population (65 000 people), 1% of dwellings (30 000) and 0.6% of buildings (7000) (Fig. 3). Aircraft noise pollution is higher at night than during the day. The figures increase at night to 1.3% of people (95 000), 1.2% of dwellings (42 000) and 0.9% of buildings (10 000).
- > For a threshold which is 5 dB(A) lower (55 dB(A)), 225 000 people or 3% of the population are affected in the daytime.
- > About 85 000 workplaces are affected by noise levels of over 60 dB(A) during the day.

**Fig. 3 > People, dwellings, buildings and workplaces affected by aircraft noise in Switzerland**

*Basis of assessment: Limits > 60 dB(A) day, > 50 dB(A) night*

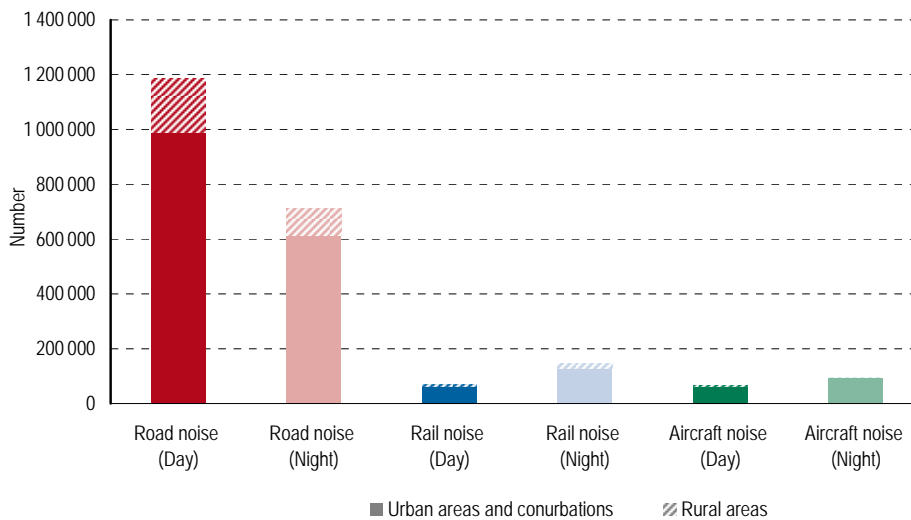


### Geographic distribution of noise

- > Urban areas and conurbations in particular are severely affected by noise (Fig. 4): 85 % of those exposed to hazardous or disturbing road traffic noise by day live in these areas. The figure is 90 % for railway noise and as high as 95 % for aircraft noise.
- > 85 % of dwellings affected by road traffic noise are in urban zones or conurbations. For railway noise the figure is 89 % and for aircraft noise almost 100 %.
- > Workplaces affected by harmful or disturbing road traffic and railway noise total over 90 % in the urban centres.

**Fig. 4 > People affected by hazardous or disturbing noise pollution in Switzerland by location**

*Basis of assessment: Limits in the Noise Abatement Ordinance (NAO) for road traffic and railway noise, > 60 dB(A) day, > 50 dB(A) night for aircraft noise*

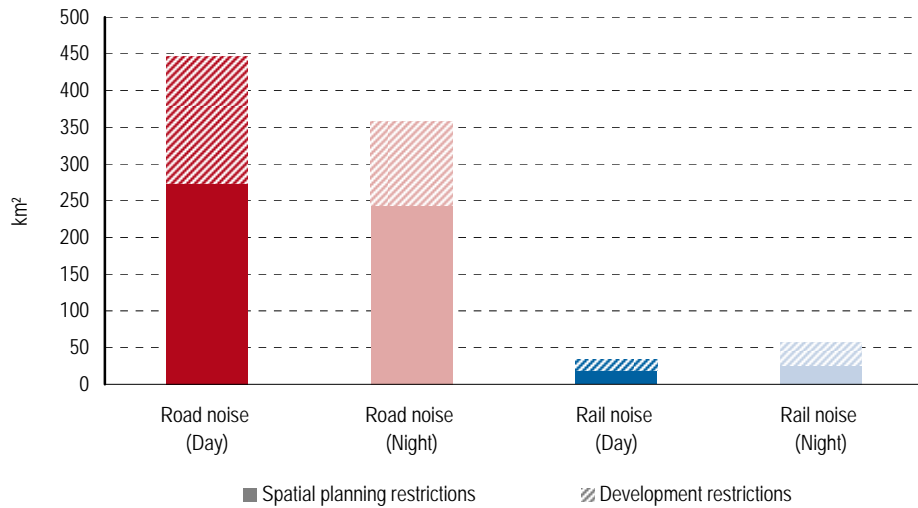


**Spatial planning and suitability for development**

- > Under Federal legislation, areas zoned for development in Switzerland can only be divided up or developed (on noise abatement grounds) if the planning values are complied with (see section 1.3) or can be complied with by structural, engineering or design measures. However, planning permission may only be granted for new buildings or major building alterations if the impact thresholds are complied with (see section 1.3). If these noise levels are exceeded, planning permission is only allowed if the building is screened against noise or the susceptible rooms are located on the sides of the building away from the noise.
- > In Switzerland an area of 450 km<sup>2</sup> is exposed to road traffic noise pollution by day at a level which is subject to restrictions on the division and development of zoned areas or on planning permission. At night this figure falls to 350 km<sup>2</sup>.
- > Railway noise affects an area of 35 km<sup>2</sup> by day and 55 km<sup>2</sup> at night.

**Fig. 5 > Areas polluted by noise with restrictions on development and spatial planning by type of noise**

*Basis of assessment: Limits in the Noise Abatement Ordinance (NAO)*



### Areas with noise pollution from combined sources

- > In some regions, the three main noise sources are overlaid and give rise to relevant noise pollution (per noise type: day > 55 dB(A), night > 45 dB(A)). The areas affected are mainly located near to Zurich and Geneva international airports. The surface area with three kinds of pollution extends over 3.7 km<sup>2</sup> by day and 1.8 km<sup>2</sup> at night.
- > Noise pollution from tandem sources occurs along many railway lines with roads running parallel to them. It affects a total of about 85 km<sup>2</sup> by day and 125 km<sup>2</sup> at night. The regions with excessive daytime road and aircraft noise pollution cover an area of around 100 km<sup>2</sup>.

### The situation for thresholds of 60 dB(A) by day and 50 dB(A) at night

- > If the calculations apply the same thresholds for aircraft noise (> 60 dB(A) by day and > 50 dB(A) at night) to road traffic noise and railway noise, the noise problem is exacerbated.
- > In Switzerland 1.68 million people or 23 % of the total population are exposed to daytime road traffic noise levels of more than 60 dB(A). 24 % of dwellings and 13 % of buildings are affected. These figures drop at night to 13 % of the population, 14 % of dwellings and 8 % of buildings.
- > The number of people affected by railway noise during the day totals 100 000. At night nearly 200 000 people are exposed to these noise emissions.

### Situation according to the WHO Guidelines

- > The World Health Organization (WHO) Guideline values for the effect of noise on people are > 55 dB(A) by day and > 45 dB(A) at night. These Guideline values can be used to quantify the need for action on noise abatement in terms of a long-term strategic objective.
- > If these strict Guideline values were applied, it would have to be assumed that 3.5 million people or nearly 50 % of the total population of Switzerland are affected by road traffic noise pollution. That is about three times as many as under the controlling exposure limits in the Noise Abatement Ordinance.
- > The corresponding daytime figures for rail and aircraft noise are 215 000 and 225 000 people respectively.
- > Under the WHO criteria, at night 2.8 million people are exposed to problematic road traffic noise and 330 000 to problematic railway noise.