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## **NOISE ABATEMENT PLANNING IN NORTH RHINE-WESTFALIA**

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**ABSTRACT**

For the government of North Rhine-Westphalia (NRW) noise abatement planning is one of the most important instruments to reduce noise in cities. A noise abatement plan on the basis of article 47 a of the German Federal Immission Control Act is a sustainable and long-term concept for noise reduction which considers the urban and traffic development. The government supports local authorities in NRW in order to make noise abatement planning succeed. Communities get subsidies to develop plans and to realize noise abatement measures. The environmental agency of NRW has made a screening of the noise exposure as a good basis for the investigations of the communities. To initiate a new generation of noise abatement planning a pilot project with the community of Mülheim is carried out. Possibilities to combine noise abatement planning with municipal planning and clean air planning are examined.

**1 - GENERAL REMARKS**

North Rhine-Westphalia (NRW) is one of the sixteen states which make up the Federal Republic of Germany. Situated in the West of the country, it borders on Belgium and the Netherland. Well-known large cities such as Bonn, Cologne, Düsseldorf, Aachen, Münster and Duisburg are situated here. The traditional concentration of industry and trade in the Rhine and Ruhr area together with the highest-density transportation network in the whole of Europe cause a noise level which is one of the most severe environmental problems in cities and towns of NRW. Despite all efforts of noise abatement, noise exposure has increased because of the substantial growth of road traffic. Near and on many main roads noise reaches harmful levels. About 75 % of the inhabitants in middle and upper centres feel stressed by noise. In the future it will be more and more the task of local, regional and national authorities to find solutions which enable the noise situation to be essentially and effectively improved.

In North Rhine-Westphalia noise abatement planning is an important part of noise control policy. By the means of noise abatement planning areas with unacceptable high noise levels can get reasonable residential conditions. By early combining noise abatement planning with town planning and traffic planning noise immissions can be reduced and municipalities get a well-balanced urban, traffic and economic development.

The legal basis for the development of noise abatement plans was established in 1990 by article 47 a of the German Federal Immission Control Act. According to article 47 a, the local authority or the authority competent under land law shall draw up noise abatement plans for residential areas and other areas worthy of protection, if the harmful effects on the environment due to noise that have occurred or are expected to occur in such areas are not only temporary and the abatement or reduction of such harmful effects on the environment call for a concerted action against various types of noise sources. For this purposes first of all it is necessary to determine the noise exposure for such areas and to point out the environmental consequences.

**2 - EXPERIENCES**

For a long time NRW attaches great importance to noise abatement planning. First concepts have already been developed in NRW in the seventies. In 1985 article 12 a was established in the immission

control act of NRW as a legal basis for local authorities to develop noise abatement plans for residential areas. The legislation in NRW was a model of the formulation of article 47 a on the German federal immission control act in 1990. To explain local authorities the practical procedure for developing noise abatement plans NRW has published a decree concerning the realisation of article 47 a in 1993.

Since 1990 the experiences with noise abatement plans in North Rhine-Westphalia have shown that local authorities are unsure how to deal with these instruments. Essentially there are the following reasons for this:

- Ample personnel and technical means are necessary to describe the existing noise situation.
- The noise abatement plan is only an internal plan for the administration. It states that noise abatement measures have to be realized. But the polluter of noise is not forced to realize the planned noise abatement measures only because of the noise abatement plan.  
The legal basis for orders are the specific laws and regulations. The individual authority establish their own priorities and the local authorities hesitate to take over the coordination function.
- Traffic noise (road traffic noise, railway noise) is the most important source of noise in cities. The local authorities do not see the necessity of a concerted action and think little of noise abatement plans as a means of noise abatement.
- Noise plans demonstrate noise exposure to the citizens who hope that noise will be reduced. But local authorities cannot fulfil these expectations, in particular because of the missing financial means.
- The problems of traffic noise cannot be solved within a short time. The networks of traffic have evolved gradually along the centres of settlement and along the economic centres and they cannot be changed by simple means.  
For example: The possibilities to reduce traffic noise by traffic planning or by traffic guidance are limited. The installation of porous road surfaces for example entails high costs of investment and maintenance. Acoustical barriers represent an effective method, but they are difficult to install in the city centres and very expensive. Windows for noise abatement are effective as long as they are closed but they cannot protect the outer residential areas.

### **3 - SUPPORTS FOR THE COMMUNITIES**

To bring forward the instruments of noise abatement planning and to raise the interest of local authorities the government of NRW has decided to support local authorities in the following way:

- Since 1996 the ministry of environment gives subsidies to communities to develop noise abatement plans. The ministry bears the costs of the analysis of the noise situation up to 80 percent.
- For the first time in 2000 the ministry of environment make subsidies available to local authorities for realizing noise abatement measures which result from noise abatement planning. With this financial measure the government of NRW wants to demonstrate that noise abatement plans would contribute to a healthy and dignified environment for inhabitants in towns and cities to live in.
- In addition to local authorities the environmental agency in NRW has the competence for noise abatement planning. The environmental agency of NRW gives the local authorities technical and advisory support to manage all problems concerning noise abatement planning.
- The environmental agency has made a screening of the noise exposure for the whole area of NRW. The results of the screening are sent per decree to all local authorities in NRW. The screening should help the communities to fix the areas where harmful effects on the environment due to noise can not certainly be excluded. In this areas the communities are liable to carry out a more detailed investigation according to article 47 a. With the results of the screening the community can make a previous examination of the noise situation. This procedure can limit the expenditure of the ascertainment.
- To develop a favourable and practicable strategy for noise abatement planning the ministry of environment is carrying out a pilot project with the community of Mülheim.

The screening and the pilot project in Mülheim are represented in detail in the following chapters.

#### **4 - SCREENING OF THE NOISE EXPOSURE IN NRW**

The screening of the noise exposure gives a survey of the noise exposure for the whole area of NRW. The results show the noise polluted areas, the relevant sources of noise and the magnitude of the existing noise levels. The screening points out the areas where communities have to develop noise abatement plans on the basis of article 47 a. The screening also delivers valuable information for regional planning purposes because noise aspects can be taken into consideration. For example quiet zones in NRW are pointed out.

To calculate noise levels the environmental agency has used propagation models and emission levels which are laid down in German orders and standards. The agency accepted additional simplifications to make the calculations feasible for the whole area of North Rhine-Westphalia. For example damping scales are used as a flat rate to consider the screening of built-up areas. Only the barriers at motor highways are registered in a simple way. Emission data are used which are available in existing data bases or which could be made available with suitable expenditure. For example road traffic data are based on a NRW-wide emission-model in context with air-pollution near roads. Generally it can be said, that noise levels are determined rather too high to take all potential noise loaded areas into consideration, that means in cases of doubt emission data are estimated rather too high and noise level reductions during the propagation are estimated too low.

The screening results are separately calculated for road-, rail-, air- and water-traffic as well as for industrial sources. The noise levels of road- and rail traffic are distinguished between day-time and night-time. Noise levels for industry are calculated on the supposition that all industrial areas are completely operating. In addition to noise levels of single noise sources sum levels are determined. Sum levels can not be compared with limit values. But sum levels give an overview on the noise load. Noise levels over 65 dB(A) point to health risks. The remaining green zones are little affected by noise and in view of planning processes they must especially be protected. The calculation was made for the whole district of a local authority in a grid of 50 m and at a height of 6 m. The results are figured in maps with a scale of 1:100000.

The screening results for road traffic of the Mülheim project are shown in the following figure.

#### **5 - THE PILOT PROJECT OF MÜLHEIM**

Because of the above specified problems the ministry of environment has started in 1999 a new model project with the community of Mülheim. Mülheim is a city with about 175.000 inhabitants and it is a typical city in the highly industrialized and populated area around the Ruhr. In the course of the pilot project a strategy should be developed to optimally manage noise abatement planning and to successfully implement the proposed noise abatement measures. Especially the project should help to:

- demonstrate how screening results can be used for the purposes of article 47 a,
- demonstrate how noise abatement planning can be combined with methods of traffic restrictions on the basis of article 40 (2) of the Federal Immission Control Act,
- make an overview on existing data bases for making noise maps,
- strengthen the cooperation between local authorities which have started noise abatement planning, between regional authorities and other ministries and between municipal associations and
- make a guideline for the communities.

At the beginning of the pilot project a working group was formed in which different departments of the community of Mülheim, the ministry of environment, the environmental agency of NRW and the municipal association of the Ruhr-area are participated. The working group should accompany the project and try to solve the running problems. In the following the state of the pilot project is reported. In general the communities are not able to develop a noise abatement plan for the whole district. They have to set priorities and to fix the area which should be investigated at first. Possible criteria to do this are the results of the screening. An other important aspect also for the community of Mülheim was to investigate areas where the traffic and building structure will be changed essentially in the near future and planning processes are actually carried on. For this reason it is necessary to discuss this question with all departments of the administration. The area around Mülheim Rhine-Ruhr shopping centre was selected for investigation due to the additional traffic caused by the enlargement of the centre.

One major problem for noise abatement planning is to provide input-data for the calculation. The pilot project demonstrates that input-data of the screening especially for rail and air traffic can be used. The screening data for industrial sources have to be more concretised by expertises. Detailed data for industry are necessary where noisy zones are situated near residential areas.

Mülheim tried to use road traffic data from analyses in connection with § 40 (2) of the Federal Immission Control Act. According to § 40 (2) authorities may restrict or even ban motor vehicle traffic in order to reduce harmful effects on the environment through air pollution or even prevent the formation thereof. A result of the pilot project was that the data of clean air can hardly be used because they show an other structure, they meet other requirements and the data bases have other contents. Nevertheless it is already obvious that it is an advantage to combine clean air aspects with noise abatement planning. The same persons of the local authorities deal with noise abatement planning and clean air aspects. They know all about road traffic data and they are as well interested in improving generally the quality of life for inhabitants. Further profits are expected in the future because noise abatement measures for road traffic will also influence the air pollution near roads. For that reason it is an aim of the pilot project to show how noise abatement measures can be harmonized with measures of traffic planning and with traffic restrictions on the basis of article 40 (2).

In the course of the pilot project new bases for topographic and building data are systematically selected and checked. For example mobile phone companies have built up data bases to calculate the capacities of their networks since a few years. This data originate from flying over the ground and they exist especially in the condensed populated areas. Mobile phone data can be bought by the communities.

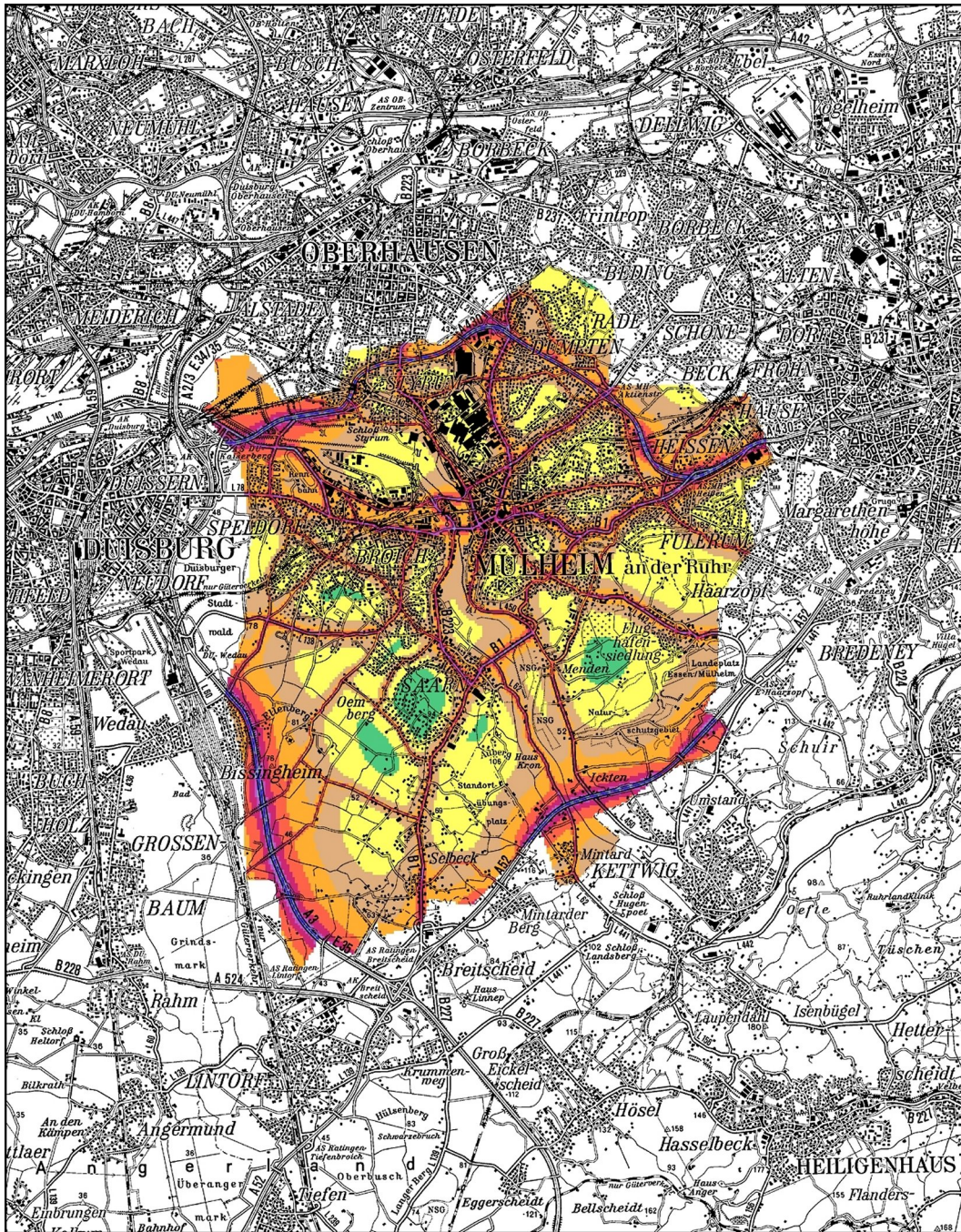
To get a multiplier effect the ministry of environment has included into the pilot project other local authorities which have started with noise abatement planning, regional authorities, other ministries and municipal associations. Different working groups were found as bases to exchange experiences, to solve problems and to raise the interest of other communities. Especially it is shown that the three municipal head associations which represent the interests of the communities in NRW play an important role in this context. Only if this associations support the aims of noise abatement planning progresses in noise abatement planning can be made.

The inventory for the model project will be completed at the end of this year. It is expected that noise abatement measures can be carried out in 2001. The results of the project should lead to a guideline for noise abatement planning in NRW.

## **6 - RESULTS**

In North-Rhine Westphalia a sustainable and long-term concept for noise abatement is necessary which considers both the urban and traffic development. The possibilities of noise sanitation in towns and cities are extremely limited today. Noise abatement can only be successful if noise abatement plans are integrated parts of the municipal planning such as traffic and land use planning. Combining noise abatement plans with municipal planning processes save local authorities high costs and unpleasant corrections which follow automatically after having taken successive and false planning steps. The noise abatement plan as an instrument with long-term planning aims must be in the centre of attention of noise abatement policy.

It was shown that regional and national authorities like the ministry of environment play a key role in starting noise abatement planning. The government of NRW build a supportive and financial framework which launches noise policy at local level by facilitation municipalities decisions to initiate noise abatement planning.




<p><b>Landesumweltamt NRW</b></p>  <p>Screening der Geräuschbelastung in Nordrhein-Westfalen</p> <p>Erläuterungen im Textteil!</p> <p>© Topographische Karten: LVermA NRW</p>	<p>Mülheim an der Ruhr</p> <p>2570400.5709300 2552400.5686300</p> <p>LUA-ID: 412 (Stand 99/10) GKZ: 5117000</p> <p>M: 1:100000 N↑</p>	<p><b>Strassenverkehr tags</b></p> <table border="0"> <tr> <td></td> <td>≤35</td> <td></td> <td>&gt;50</td> <td></td> <td>&gt;70</td> </tr> <tr> <td></td> <td>&gt;35</td> <td></td> <td>&gt;55</td> <td></td> <td>&gt;75</td> </tr> <tr> <td></td> <td>&gt;40</td> <td></td> <td>&gt;60</td> <td></td> <td>&gt;80</td> </tr> <tr> <td></td> <td>&gt;45</td> <td></td> <td>&gt;65</td> <td></td> <td></td> </tr> </table> <p>Pegel in dB(A)</p>		≤35		>50		>70		>35		>55		>75		>40		>60		>80		>45		>65		
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Figure 1: Sound immission contour map of Mülheim – road traffic at day-time.