



## **ASSESSMENT AND MANAGEMENT OF ENVIRONMENTAL NOISE IN TURKEY**

**Nuray Hüsmen**

*Ministry of Environment and Urbanisation, Ehlibeyt mah. Ceyhun Atf Kansu caddesi 1271 sok. No 13 / 06520 Balgat Ankara, Turkey. [www.csb.gov.tr](http://www.csb.gov.tr); [nuray.husmen@csb.gov.tr](mailto:nuray.husmen@csb.gov.tr)*

**Esin Türkel**

*Ministry of Environment and Urbanisation, Ehlibeyt mah. Ceyhun Atf Kansu caddesi 1271 sok. No 13 / 06520 Balgat Ankara, Turkey. [www.csb.gov.tr](http://www.csb.gov.tr); [esin.turkel@csb.gov.tr](mailto:esin.turkel@csb.gov.tr)*

**Simon J. Shilton**

*Acustica Ltd, 3000 Manchester Business Park, Aviator Way, Manchester, M22 5TG, United Kingdom. [url: www.acustica.co.uk](http://www.acustica.co.uk); e-mail: [simon.shilton@acustica.co.uk](mailto:simon.shilton@acustica.co.uk)*

**Vitor Rosão**

*SCHIU, Lda., Av. Villae Mileu, Bloco E, Loja E, Estoi, 8005-466 Faro, Portugal. [url: www.schuu.com](http://www.schuu.com); e-mail: [vitorrosao@schuu.com](mailto:vitorrosao@schuu.com)*

**Álvaro Grilo**

*INASEL, P.T. Aerópolis, C/Juan Olivert, 10. 41300 Seville. Spain [url: www.inasel.com](http://www.inasel.com); e-mail: [alvarogrilo@inasel.com](mailto:alvarogrilo@inasel.com)*

Following Turkey being recognised as a full candidate country for full membership of the European Union in 1987, and commencement of negotiations in December 1999, Turkey has been working hard to comply with EC law. Significant progress has been made with environmental legislation, and the Regulation on the Assessment and Management of Environmental Noise was first published in 2005, and most recently amended in June 2010. The Regulations include the transposition of the environmental Noise Directive (END), EC Directive 2002/49/EC, into Turkish law, as well as a number of other provisions including noise limits and noise management zones. With a population of more than 70 million people, it is estimated that there are up to 50 agglomerations with more than 100,000 inhabitants, resulting in one of the most significant requirements for strategic noise mapping, and noise action plans, under the Directive. Within the context of the ongoing EC funded project “Technical Assistance for Implementation Capacity for the Environmental Noise Directive” (EuropeAid/131352/D/SER/TR) this paper will provide an overview of the Turkish Regulations on environmental noise including the designation of competent authorities, noise limit values, noise management zones and additional provisions.

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## 1. Introduction

Directive 2002/49/EC of the European Parliament and of the Council relates to the assessment and management of environmental noise, and is commonly referred to as the Environmental Noise Directive or END [1]. The aim of the Directive is: “to define a common approach intended to avoid, prevent or reduce on a prioritised basis the harmful effects, including annoyance, due to exposure to environmental noise”. And to that end three stages are set out:

- Undertake strategic noise mapping to determine exposure to environmental noise;
- Ensure information on environmental noise and its effects is made available to the public;
- Adopt action plans, based upon the noise-mapping results, with a view to preventing and reducing environmental noise where necessary and particularly where exposure levels can induce harmful effects on human health and to preserving environmental noise quality where it is good.

The END requires Member States to produce strategic noise maps for the main sources of environmental noise, i.e. major roads, major railways, major airports and agglomerations with a population of more than 100,000 persons (and a population density such that the Member State considers it to be an urbanised area) each 5 years from 2012.

Since the commencement of negotiations with the EC in December 1999, Turkey has been working hard to comply with EC law. Significant progress has been made with environmental legislation, and the Regulation on the Assessment and Management of Environmental Noise was first published in 2005, and most recently amended in April 2011 [2], replacing the previous by-law on noise control which had been in place since 1986.

The Regulations include the transposition of the Environmental Noise Directive into Turkish law. With a population of more than 70 million people, it is estimated that there are up to 50 agglomerations with more than 100,000 inhabitants, resulting in one of the most significant requirements for strategic noise mapping, and noise action plans, under the Directive in Europe.

This paper provides an overview of the Turkish Regulations on environmental noise including the designation of competent authorities, noise limit values, noise management zones and additional provisions.

## 2. Transposition of Directive 2002/49/EC

The Regulation on the Assessment and Management of Environmental Noise [2] includes a transposition of the END into Turkish law and includes the designation of competent authorities responsible for strategic noise mapping, noise action planning and national reporting.

### 2.1 Competent Authorities

#### 2.1.1 Ministry of Environment

The Ministry of Environment and Urbanisation is the designated national competent authority responsible for:

- Collecting and approving strategic noise maps and noise action plans;
- Providing guidance and coordination;
- Determining qualifications for making noise maps, action plans and reports;
- Imposing sanctions in case of violation of the by-law;
- Creating a database of noise maps and action plans.

#### 2.1.2 Special Provincial Administrations

Special Provincial Administrations are responsible for:

- Collecting data required for strategic noise maps, other than sources, outside agglomerations;

- Preparing noise maps of ports and licensed industrial facilities outside agglomerations and near to major sources;
- Undertaking public consultation;
- Publishing final strategic noise maps and noise action plans outside agglomerations and near to major sources.

### 2.1.3 Municipalities

Municipalities and Greater Municipalities are responsible for:

- Defining agglomerations;
- Collecting data required for strategic noise maps, other than sources, inside agglomerations;
- Preparing noise maps inside agglomerations for roads, light railways and trams, licensed industrial facilities and ports;
- Undertaking public consultation;
- Preparing noise action plans for the mapped sources inside the agglomerations;
- Publishing final strategic noise maps and noise action plans inside agglomerations.

### 2.1.4 Ministry of Transport

The Ministry of Transport is responsible for:

- Identifying major railways, major airports, and state roads and motorways which are major roads;
- Providing data required for noise mapping of state roads and motorways inside agglomerations to the Municipalities;
- Preparing noise maps of state roads and motorways identified as major roads outside agglomerations;
- Preparing noise maps of major railways inside and outside agglomerations;
- Preparing noise maps of major airports inside and outside agglomerations;
- Publishing final strategic noise maps.

## 2.2 Timetable

Article 29 sets out the timetable for strategic noise mapping:

- 30 June 2011 for identification of Round 1 agglomerations and major sources to be mapped with thresholds of; agglomeration >250,000 inhabitants, major roads >6 million vehicles per year, major railways >60,000 trains per year and major airports >50,000 movements per year;
- 30 June 2013 for the Round 1 strategic noise mapping results;
- 30 June 2014 for identification of Round 2 agglomerations and major sources to be mapped with thresholds of; agglomeration >100,000 inhabitants, major roads >3 million vehicles per year, major railways >30,000 trains per year and major airports >50,000 movements per year;
- 30 June 2018 for the Round 2 strategic noise mapping results.

Article 30 sets out the timetable for noise action plans to be drawn up:

- 18 July 2014 action plans for Round 1 agglomerations and major sources;
- 18 July 2019 action plans for Round 2 agglomerations and major sources.

As can be seen, the timetable is currently offset by 2 years with regards to the timetable in the END.

## 2.3 Extent of Noise Mapping

At present it is understood that the estimated extent of strategic noise mapping to be undertaken in Turkey is approximately:

- 6,150 km of major roads;
- 250 km of major railways;
- 5 major airports;

- 50 agglomerations.

Istanbul is the largest city in Turkey with approximately 18 million inhabitants. There are an estimated seven other cities with a population over 1 million people, including Ankara, Izmir, Bursa and Adana.

## 2.4 Assessment Methods

Annex I confirms the time periods as:

- Day: from 07.00 to 19.00 up to 12 hrs;
- Evening: from 19.00 to 23.00 up to 4 hours;
- Night: from 23.00 to 07.00 up to 8 hours.

Annex I also states the noise indicators to be used are  $L_{den}$  and  $L_{night}$  while supplementary noise indicators  $L_{day}$ ,  $L_{evening}$  and  $L_{eq}$  may be used as appropriate.

Annex II sets out the assessment methods as the EC recommended adapted Interim Methods, based upon:

Aircraft:

- ECAC/CEAC Doc. 29 'Report on Standard Method of Computing Noise Contours around Civil Airports', 1997.

Industry and ports:

- ISO 9613-2: 'Acoustics — Abatement of sound propagation outdoors, Part 2: General method of calculation'.

Railways:

- 'Reken- en Meetvoorschrift Railverkeerslawaai '96, Ministerie Volkshuisvesting, Ruimtelijke Ordening en Milieubeheer, 20 November 1996'.

Roads:

- 'NMPB-Routes-96 (SETRA-CERTU-LCPC-CSTB)', referred to in 'Arrêté du 5 mai 1995 relatif au bruit des infrastructures routières, Journal Officiel du 10 mai 1995, Article 6'.

## 2.5 Reporting Requirements

Chapter 10 concerns informing the public, data collection and reporting.

### 2.5.1 Informing the public

In line with the END, Article 31 requires the results of the strategic noise maps and action plans to be published and made available to the public in a complete, comprehensible and easily accessible manner.

### 2.5.2 Data collection

Similar to the END, Article 32 requires the competent authorities to report the strategic noise maps and summary noise action plans to the Ministry within six months. The Ministry are then required to set up a database and prepare a report every five years summarizing the results received. The first of these reports is due 18 June 2015.

### 2.5.3 Data reporting

The data to be reported to the Ministry is set out in Annex VII of the Regulations and includes the requirements set out in Annexes V and VI. It includes all the relevant requirements set out within Annex VI of the END, with some additional mandatory reporting:

- Noise exceedance maps are to be produced for each noise source type (roads, railways, airports and industries), in all areas;
- Combined noise maps are to be produced in agglomerations using weighted logarithmic addition, as presented in equation (1):
  - o Industry + 0;
  - o Roads + 0;

- o Aircraft + 3;
- o Railway – 3.

$$(1) L_{combined} = 10 \log \left[ 10^{\left(\frac{L_{road}}{10}\right)} + 10^{\left(\frac{L_{railway}-3}{10}\right)} + 10^{\left(\frac{L_{industry}}{10}\right)} + 10^{\left(\frac{L_{aircraft}+3}{10}\right)} \right]$$

### 3. Noise Emission Levels

Chapter 3 defines the regulation of noise emission levels from sources.

Motor vehicles, railway transport, aircraft, waterways transport and household appliances are each referenced to a number of other by-laws under the Ministry of Transport or the Ministry of Trade and Industry.

Noise and vibration from machinery used in industrial facilities is referenced to two by-laws under the Ministry of Trade and Industry, whilst noise from outdoor equipment is referenced to the by-law on Environmental Noise Emitted by Outdoor Equipment [3] which transposes EC Directive 2000/14/EC [4].

### 4. Noise & Vibration Immission Limits

Articles 18, 19, 20, 22 and Annex VII set out the noise limit values for road, railway, aircraft and industry noise levels as shown in Table I. The noise limits are set out in four categories for each noise source, based upon the type of land use:

1. Noise sensitive areas, including residential, educational or health related uses;
2. Mixed use areas with predominance of dwellings
3. Mixed use areas with a predominance of commercial
4. Industrial areas.

**Table 1.** Noise limit values in Turkey.

Noise source	Land use category	L <sub>day</sub>	L <sub>evening</sub>	L <sub>night</sub>
Road (existing)	1	65	60	55
	2	68	63	58
	3	70	65	60
	4	72	67	62
Road (planned or Improved)	1	60	55	50
	2	63	58	53
	3	65	60	55
	4	67	62	57
Railway	1, 2, 3, 4	65	60	55
Industry	1	60	55	50
	2	65	60	55
	3	68	63	58
	4	70	65	60
Aircraft (Major Airport)	1	65	60	55
	2	68	63	58
	3	72	67	62
	4	75	70	65
Aircraft (non-Major Airport)	1	63	58	53
	2	65	60	55
	3	67	62	57

Noise source	Land use category	L <sub>day</sub>	L <sub>evening</sub>	L <sub>night</sub>
	4	70	65	60
Heliports	1, 2, 3, 4	65	60	55
Water transport, piers & ports	1, 2, 3, 4	65	60	55

The noise limits are façade noise levels without the façade self-reflection. The results of the façade noise level calculations from the strategic noise mapping may be used to generate exceedance noise maps.

Annex VII also contains noise limit values for passenger noise exposure levels on light railway platforms and in underground stations, and there is also a table of internal ambient noise level limits for a range of uses.

Noise and vibration limits for construction activities are set out in Annex VII and discussion further in Article 23 where construction activities around residential settlements are forbidden during evening and night periods, during weekends and official holidays, and possibly for a few months in resorts and tourist areas. There is an exception for projects of public interest, such as dams, bridges, tunnels, motorways, urban main roads, public housing and construction activities which may block traffic during the day which may be continued into the evening and night periods with noise limit values 5dBA and 10dBA lower than the day period limit.

Entertainment noise exposure is assessed using a comparison with the measured background noise inside the noise sensitive premises, with a maximum exceedance allowed of 5 dB L<sub>Aeq</sub> or 7 dB L<sub>Ceq</sub>, or up to a maximum of 10 dB L<sub>Aeq</sub> when there are multiple entertainment venues.

## 5. Planning and Noise

Chapter 7 covers noise criteria in the planning stage. Article 27 sets out four noise exposure categories as shown in Table II. Municipalities are to take account of the noise exposure categories in Article 27 at the preparation phase of Master Plan and Implementation Plans.

**Table 2.** Noise exposure categories.

Area Category	L <sub>day</sub>	Plan
A	< 55	The highest noise level under this category is not very obtrusive. When planning decisions are made, noise shall not be considered as a determining factor.
B	55 – 64	The noise level shall be considered in planning decisions. Planning decisions shall be made taking necessary measures against noise.
C	65 – 74	Usually planning decisions are not made. However, in cases where the public interest requires, measures shall be taken against noise taking into consideration the background noise level, in the event permission has been given because of inability to find a quieter place.
D	> 74	Planning decisions shall not be made.

Article 28 sets out the mandatory criteria for the planning stage:

- a. Interior ambient noise limit values in Annex VII Table 9 are to be met for architectural projects;
- b. Development of new noise sources should meet the noise and vibration limit values previously discussed;
- c. The noise exposure categories should be considered preparing the Environment Plans, Master Plans and Implementation Plans;



- d. Additional measures may be taken to create a quieter environment in areas where there is very sensitive or sensitive uses, such as residential areas, hospitals, educational institutions.

Special Provincial Administrations and Municipalities are to observe the conditions laid down in Article 28 in architectural projects of buildings and construction permits.

## **6. Licensed Industrial Facilities**

Chapter eleven sets out the requirements for industrial facilities. Article 33 covers facilities subject to environmental permits and licenses under the Environmental Permit and Licensing Regulations [5]. Such facilities are to have acoustic reports prepared by suitable experts. There is an exemption to this requirement for facilities, operational before March 2008, which are also more than 500m from noise sensitive premises and outside agglomerations.

Article 34 covers facilities outside the scope of the licensing regulations where an acoustic report may be produced by the competent authority if required.

Article 35 requires new facilities to prepare a noise impact assessment in a format to be determined by the Ministry.

In all cases the noise level criteria are the limits set out in Article 22 and Annex VII.

## **7. Assessment Criteria for Expertise**

Chapter 12 sets out requirements regarding education and training for personnel who may prepare acoustic reports, undertake noise measurements, develop strategic noise mapping and prepare noise action plans.

The requirements to be met are to be determined by the Ministry, but are based upon a degree in engineering, architecture or science, and preferably with relevant post graduate or post-doctoral certificate.

For six different categories of work to be undertaken, a pre-qualification/competency certificate must be obtained from the Ministry in order to be able to prepare the relevant reports. The Ministry is to publish a list of the agencies and organisations to which the Ministry has issued such certificates.

## **8. Evaluation, Guidelines and Sanctions**

Article 39 requires the relevant competent authorities to undertake audits of noise from licensed facilities or investigate complaints relating to noise. To facilitate this there is a requirement to set up an Environmental Audit Unit with at least two staff, one being at least a University graduate, and the other being at least a high school graduate.

Article 40 provides the Ministry with powers to issue guidelines relating to any of the matters covered within the Regulations, including noise mapping, noise control measures, assessment reports and administrative sanctions. To date the Ministry has published a number of supporting documents under the Regulations, including “2009-2010 Environmental Noise Action Plan” [6], 2009, an “Environmental Noise Measurement and Evaluation Guide”, in 2011 [7], report formats for submissions to the MoEU [8], and reports developed under the Twinning Project 2006 - 2008 [9].

Article 41 states that the Misdemeanour Law No. 5326 [10] shall apply to those violating the provisions of the Regulation.

## 9. Conclusions

The Regulation on the Assessment and Management of Environmental Noise in Turkey addresses a wide range of situations, including both noise emissions from sources and immissions at noise sensitive receptors.

Many of the provisions relate to the implementation of EC Directives, including transposition of the EC Directive on Environmental Noise (END) which includes some optional and additional aspects included as mandatory, such as exceedance maps and combined maps in agglomerations.

The Regulations also include noise limit values, articles on planning and noise, and noise in relationship to licensed industrial facilities.

An overview of the Regulations has been provided, along with a summary of the key points, particularly regarding the means of implementing the Environmental Noise Directive in Turkey.

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