

ENVIRONMENTAL NOISE INVESTIGATION PROCEDURE IN THE URBAN ROAD NETWORK IN MALTA

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Abstract

The purpose of the project is the implementation of the Noise Regulations and the setting up of procedures to be followed in conjunction with said Noise Regulations Environmental noise. Environmental noise seriously harms the quality of life and road traffic noise and neighborhood noise are the most common causes of complaints in Malta. Over a long period of time, noise has a determinable influence on well-being and perceived quality of life. Sleep disturbance from noise may possibly affect public health. With local councils already making their complaints, sources need to be identified and noise limits set out in proper regulations.

In Malta, there have never been specific noise levels that could be used during investigations, and thus it has always been a problem how such complaints from the general public could be investigated. At present, complaints regarding 'noise pollution' are referred to the Police who may take action against offenders if they cause 'nuisance to neighbours'. However this method is not efficient.

The expected results of this project were effective public health regulations for the control of residential noise and proficiency in residential noise investigations and monitoring. Trained health inspectors able to effectively and professionally apply investigations procedures and make use of the appropriate noise monitoring equipment.

A very important and effective tool for the Malta Authorities was the project deliverable "DRAFT LEGISLATION ON NOISE POLLUTION LIMITS MEASUREMENT & CONTROL FOR VARIOUS LAND USES" which includes a)Main Definitions b)Noise Sources & Affected Receptors (Premises & Land Uses) c)Noise Limits and Indices d)Measurement methods & Correction factors e)Suggestions for Procedures & Penalties f)Measurement test report.

1. INTRODUCTION

The environmental noise problem that is the object of this project is a problem of special importance for Malta but also for all other south European member states of the European Union. The local climatic conditions in the southern countries of the Union result in the organization of many outdoor events, increasing the overall noise level in urban areas. These events are generally organised indoors in the other European countries. At the same time the

same conditions lead many people to live outside, or in spaces with open doors and windows for a considerable amount of time during the year, a fact that leads to a substantially higher exposure to noise of the local population.

The fact that the problem has been underestimated in Malta has led to an upsurge of noise stress in the present days. Thus noise nowadays has been proclaimed the environmental plague number one, mainly in urban areas, where the majority of Malta citizens resides. Public interest in noise issues is rising in the country of Malta.

One of the most important tools against environmental noise which was also a scope of this project was to create effective public health regulations for the control of environmental noise and proficiency in residential noise investigations and monitoring.

The activities which were taken for the scopes of this project are:

- 1. Advises to the Public Health Department (PHD) on issues pertaining to «noise pollution» regulation, investigations and monitoring
- 2. Training of Health inspectors on the necessary procedures
- 3. Study-visit to Greece: Meetings Site visits & Practical site investigations
- 4. Seminar for all health inspectors on the new regulations being drafted and their implementation in the course of the relevant investigations
- 5. Expert advice on the technical specification concerning the noise monitoring equipment that will be procured
- 6. Training on the use of noise measuring and monitoring equipment
- 7. Assistance and advice on the elaboration of a set of residential noise investigation and assessment procedures

2. EUROPEAN AND MALTESE FRAMEWORK

Community environment policy aims to promote sustainable development and protect the environment for present and future generations, and is based on the integration of environmental protection into other Community policies, preventive action, the polluter pays principle, fighting environmental damage at source, and shared responsibility. The acquis comprises of over 200 legal acts covering horizontal legislation, water and air pollution, management of waste and chemicals, biotechnology, nature protection, industrial pollution and risk management, noise, and radiation protection. Ensuring compliance with the acquis requires significant investments, but also brings significant benefits for public health and reduces costly damage to forests, buildings, landscapes and fisheries. A strong and well-equipped administration at a national, regional and local level is imperative for the application and enforcement of the environment acquis.

The environmental acquis covers a wide range of measures, mostly in the form of directives. In broad terms, EU environmental legislation covers environmental quality protection, polluting and other activities, production processes, procedures and procedural rights, as well as products. Apart from horizontal issues (environmental impact assessments, access to information on environment, combating climate change), quality standards are set for Air, Waste management, Water, Nature protection, Industrial pollution control, Chemicals and genetically modified organisms, Noise and Nuclear Safety and Radiation Protection (safety issues arising from the use of nuclear energy are part of the energy chapter).

Despite significant improvements, such as cleaner air and safer drinking water the environmental acquis is developing significantly. The new Environment Action Programme identifies four priority areas: Climate Change, Nature and Biodiversity, Environment and Health and Natural Resources and Waste.

A strong and well-equipped administration at a national, regional and local level is imperative for the application and enforcement of the environment acquis. Horizontal legislation is in place and is in line with the acquis, except for the recent acquis on strategic environmental impact assessment. Administrative capacities in the area are in place, but further work is however needed within the Malta Environment and Planning Authority to ensure a proper implementation of the acquis. The Health Inspectorate Services that forms part of the Department of Public Health within the Ministry for Health, the Elderly and Community Care, is in charge for undertaking the overall co-ordination of the residential noise control.

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Currently, Malta is in the process of strengthening its capacity to enforce new environmental regulations recently adopted as part of the transposition of Chapter 22 of the EU acquis.

Today there is an objective need to enhance and foster the institutional capacity within the Department of Public Health to facilitate compliance with obligations arising from Chapter 22 – Environment of the Acquis Communautaire through the establishment and co-ordination of the residential noise control.

3. AIMS

On a general scale, the project aims at the achievement of the capacity for the effective implementation of the acquis on Residential Noise.

The specific aims of the project are:

Assistance and advice in drafting and presentation of effective public health regulations for the prevention and control of residential noise. These will be drafted taking into consideration the recommended guidelines for residential noise of the World Health Organization (WHO) and current European practices. Special attention will be given to the urban and building conditions associated with the lifestyle and particular Mediterranean environmental terms such as temperature and weather.

Assistance and advice in the provision of the options necessary for the selection of the most appropriate procedure and practice in residential noise investigations and monitoring. A selection of reliable options for the framework of investigation (comprising first noise check, necessary documentation, possible penalties, re-checks etc.) will be provided on a cost/benefit basis to secure sustainability of the noise investigation procedure. The selected procedure will be examined in relation with the national legal system and citizen rights as well as the European environmental legislation.

Proper training programmes for the education of health inspectors in order to effectively and professionally apply investigations procedures and make use of the appropriate noise monitoring equipment. If necessary, special auditing schemes can be designed.

Assistance and advice for the management of the maintenance, calibration, accreditation etc. of the noise level meters used in order to comply with international standards and specifications

Assistance and advice in designing the reporting of the inspection results through annual departmental records and reports to serve both as information bulletins for the general public and in the same time to act as policy testing indicators.

4. THE NEED OF A COMPREHENSIVE AWARENESS FRAMEWORK FOR NOISE MANAGEMENT & ABATEMENT

Beside all the above activities it is very important to inform the citizens about Noise Management & Abatement and to increase the awareness about noise issues. The best way to archive this is a comprehensive awareness Framework for Noise Management & Abatement. The most important reasons why a **awareness framework** for noise is needed are:

- Low level of understanding on the subject of noise in the EU Mediterranean countries, particularly in Malta.
- Increased need for noise abatement mitigation measures because of widespread outdoor activities and outdoor living due to climatic & cultural conditions
- Limited NGOs activities on the subject of noise
- Media focused mainly on accusations and complains about noise, not on an overall noise abatement policy
- Limited public knowledge about the legislation work of the EU in noise and noise abatement
- Low level of the understanding on the practical measures taken by other EU countries, especially on Noise Abatement Action Plans
- Limited central and local authorities actions in most aspects of noise abatement, including the preparation to apply the relevant EU Directives on Noise

General objective is to provide general and specific information on environmental and urban noise in order to increase citizens awareness in the matter of noise distribution in the urban environment, to inform citizens about the actions of other EU countries on the subject of noise, to provide information about the EU directives on the subject of noise, to provide knowledge about noise and quality of life in the urban environment, and to provide information about noise and the individual behaviour of the citizens.

The Implementation of a comprehensive awareness framework includes the following activities:

- Press publications and media references about the proposed action in order to promote the awareness framework and start primary dissemination processes.
- Radio spots to promote the public awareness in new and existing EU legislation concerning noise management and noise abatement aiming to link noise with health and quality of life in the urban environment.
- Web site construction with detailed downloadable information on the above items, mainly for the interested media, NGOs, relevant Health authorities and the general public.
- Various forms of public events in order to promote the framework and its targets to the general public, focusing on the media resources ensuring the development of a complete dissemination process.

The expected results from this comprehensive awareness Framework for Noise Management & Abatement are :

- citizens with increased awareness in the matters of noise in the urban environment,
- citizens better informed on the relation between noise and the quality of life within the relation of noise with personal health and sustainable development,
- citizens better informed on urban noise issues and on EU relevant directives,
- local authorities with a better understanding of their role on noise, and
- an on line web based questionnaire that will give the opportunity to citizens to describe the noise conditions they live in aiming to provide some additional pressure to the central and local authorities

5. LONG TERM URBAN NOISE MONITORING SYSTEMS (UNMS) IN MAJOR GREEK CITIES - THE CASE OF VERIA

During this project, 5 noise-monitoring stations had been set up. Great attention had been given to the selection of the exact locations of the stations so as to be most representative in terms of area geography and usage. Having this in mind, the following areas were selected for the placement of the monitoring stations.

- a major city road with commercial buildings and the council-house
- a city access road with heavy traffic passing through a residential area
- a low income residential urban district
- a ring road with commercial buildings
- a shopping area with residences

The stations were all placed according to the requirements of the Directive 2002/49/EC i.e. 4m above ground at the most exposed forefront of the buildings. The period of measurement for each station was 1 hour i.e. receiving 24 values per day so as to be able calculate the new indices L_{den} , L_{night} etc.

The stations remained at their locations for 24 months, resulting in the collection of a large number of measurement data and hence in the capability of forming useful conclusions.

The analysis of the urban noise variation in the city of Veria during those two years was based on the new indices L_{den} , L_{night} .

Long term noise monitoring projects according to the 2002/49/EC Directive in cooperation with an analysis of the traffic conditions can give an effective tool to the city Authorities to deal with Noise. The above actions become more efficient if they are accompanied by a Noise Abatement Awareness Project since with this project we can involve the citizens in the Noise treatment.

6. DRAFT LEGISLATION ON NOISE POLLUTION LIMITS MEASUREMENT & CONTROL FOR VARIOUS LAND USES

A very important and effective tool for the Malta Authorities was the project deliverable "DRAFT LEGISLATION ON NOISE POLLUTION LIMITS MEASUREMENT & CONTROL FOR VARIOUS LAND USES". Here are some of the most important contents of this draft Legislation

6.1 Main Definitions

The following terms were defined according to the existing Maltese legal framework

"noise" "noise nuisance" "noise annoyance" "noise pollution" "Decibel "dB(A) or Aweighted decibels "airborne noise" "ground borne or structure borne noise" "vibration" "vibration velocity (in z axis)" "background noise" "ambient or background noise measurements" "Sound pressure level" "Equivalent A- weighted sound level (Leq)". "Frequency" "Hertz (Hz)" "Octave band" "Octave band level" "1/3 octave band" "Impact sound" "Loudness "Noise indices" "Noise reduction (NR)" "authorised or nominated officer" "Superintendent "owner" "person" "practicable" "private dwelling" "public health" "public health emergency" "public health risk"

6.2 Noise_sources_& Affected Receptors (Premises & Land Uses)

"noise sources" are regrouped in the following major groups : (S1) "<u>Machinery</u>" type sources such us :

- all industrial and/or commercial activities and installations,
- power generators & all kind of air conditioning and/or ventilation systems
- all construction activities and public/private work worksites,
- car repairing workshops & gasoline/petrol etc. pump stations
- car alarm installation workshops
- stationary furnaces
- storage buildings with mechanical equipment

(S2) "Neighborhood or residential" type sources such us :

- surrounding neighborhood noise,
- indoor residential activities (tv, radio, discussions, etc..
- home pc's or other types of home appliances

(S3) "<u>Recreation and/or tourist</u>" type sources including music, human reactions (but not machinery as above), such us :

- bars, snack bars & restaurants (see definition hereafter)
- discotheques, night clubs (see definition hereafter) & billiard play rooms
- open air seasonal concerts or similar recreation activities
- various hotel activities, cinemas, & social events etc..

The following terms were defined according to the existing Maltese legal framework

"bar "discotheque" "kiosk" "nightclub" "restaurant" "snack bar" "inhabited area "receptor premises "residential area or land use" "industrial area or land use" "commercial area or land use" "recreation/tourist area or land use" "minimum mixed residential and industrial and/or commercial and/or handcraft factories, and/or recreation/tourist activities"

"average mixed (AM) residential and industrial and/or commercial and/or handcraft factories, and/or recreation/tourist activities

"mostly mixed (MM) residential and industrial and/or commercial and/or handcraft factories, and/or recreation/tourist activities"

"extreme mixed (EM) residential and industrial and/or commercial and/or handcraft factories, and/or recreation/tourist activities"

"country/agricultural or forest areas"

6.3. Noise Limits and Indices

6.3.1 Noise sources S1 & S2 - SPL & Leq air borne noise limits

(a) The maximum permitted noise limits which are allowed to be transmitted from the noise sources (types S1 & S2) to the urban or rural environment are shown in table 1 and refers to the boundary area of the given land use which is closest to the affected receptor (for types r1 r3 & r4 as presented above). Both SPL & Leq maximum noise criteria should be fulfilled:

Table 1 :Max. permissible noise limits for both SPL & Leq indices for S1 & S2 types of noise

Characteristics of th	Leq Noise Level in dB(A) measured at boundary of			
surrounding land us	e the property (r1,r2 &	the property (r1,r2 & r3) where the installation is		
of the affected recepto	located towards the affected land use having the			
in a residential area	minimum horizontal distance source-receptor.			
	Day (07:00-23:00)	Night (23:00 – 07:00)		
Residential or	e 45	40		
Country area (a	s			
characterized b	v			

sources for different affected receptors (r1, r2 & r3) characteristics

existing Maltese legislation)			
AM residential area	50	45	
MM residential area	65	55	
EM residential area	75	65	

Characteristics of the surrounding land use of the affected receptor in a residential area	SPL Noise Level in dB(A) measured at boundary of the property where the installation is located towards the affected land use having the minimum horizontal distance source-receptor.DayNight (23:00 - 07:00)	
Residential ore Country area (as characterized by existing Maltese legislation)	60	45
AM residential area	70	55
MM residential area	80	65
EM residential area	90	75

6.3.2 Noise sources S3 - SPL air borne noise limits

Table 2 : Max. permissible noise limits for SPL index for S3 types of noise sources for all

different affected	receptors	characteristics
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Characteristics of the	SPL Noise Level in dB(A) measured at
surrounding land use of the	boundary of the property where the
affected receptor in a residential	installation is located towards the affected
area	land use having the minimum horizontal
	distance source-receptor during full
	operation according to relevant permit ⁽¹⁾
Residential ore Country area (as	35
characterized by existing	
Maltese legislation)	
AM residential area	40
MM residential area	50
EM residential area	60

Type of noise sources	Max permissible SPL Noise Level in dB(A) inside the noise source installation area during full operation according to relevant permit ⁽¹⁾
Restaurants, Bars & Snack bars	80
Discotheques, Night clubs &	100
Billiard play rooms	
Open air seasonal concerts or	100

similar recr	eation ac	tivities		
Various	hotel	activities,	85	
cinemas, & social events		vents		

6.3.3 Ground borne noise for all noise sources

Table 4 Maximum Permissible Ground Borne Noise Levels dB(A)

Type of Building or Room	Single Event Maximum
	Permissible Ground Borne
	Noise Level in dB(A) based on
	1/3 octave band analysis in the
	range of 10 to 200Hz
Concert Halls - Radio and TV Studios	25
Museums, Auditoriums & Music Rooms	30
Churches – Theatres - Hospitals	35
Courtrooms and Parliament	35
Schools Libraries & University	40
Buildings	
Offices	45
Commercial Buildings	50

6.4. Measurement methods & Correction factors

- 6.4.1 Measurement of sound insulation for S3 noise sources type
- 6.4.2 Measurement of various noise limits for all noise sources types both with prototype noise source or existing noise source full operation

6.5. Suggestions for Procedures & Penalties

7. SUMMARY

Projects which contents training of Health Inspectors on the Investigation Procedures of Domestic Residential Noise and on the use of Noise Monitoring Equipment like the above described one, are supported by the European Community in order to help countries who joint recently the E.U. to deal with noise issues. Partners with Experience in noise issues from other E.U. countries can assist to settle the right fundamentals which are needed to deal effectively with Noise.

REFERENCES

- [1] "Transition Facility Programme for Malta 2004" European Community, Malta, Department of Public Health, Ministry for Health, The Elderly and Community Care
- [2] "Noise limits of open field installations" Act Nr 1180, Greek Ministry of Environmental
- [3] "Long Term Noise Monitoring in the city of Veria", Consortium Sinthesis SA and Traffic Transportation & Environment Consultants LTD (2003-2005).
- [4] Emmanuel Tzekakis, Constantinos Vogiatzis and Vasilis Vasiliadis "Long term Environmental & Transportation Noise Monitoring in the Cities of Veria & Ioannina in northern Greece according to the 2002/49/EC Directive", *Proceedings of the Thirteenth International Congress on Sound and Vibration* (ICSV13),2-6 July 2006, Viena, Austria