



**NOISE TRAINING  
PROJECT**

**TRAINING NEED ANALYSIS  
REPORT and  
CURRICULUM DEVELOPED  
for ENVIRONMENTAL  
NOISE TRAINING**



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# IMPROVEMENT OF ENVIRONMENTAL NOISE MANAGEMENT SKILLS IN AUDITS-NOISE TRAINING PROJECT

## Training Need Analysis Report and Curriculum Developed for Environmental Noise Training

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### Developing of Output

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## LIST OF ABBREVIATION

END: Environmental Noise Directive: END

RAMEN: Regulation on Assessment and Management of Environmental Noise: RAMEN

EU: European Union

EC: European Commission

NTP: Noise Training Project

WHO: World Health Organization

## EXECUTIVE SUMMARY

This handbook is the baseline for the “Intellectual Outputs of Noise Training Project (NTP)” which was funded by the Erasmus+ Program (Strategic Partnership of Cooperation for Innovation and Exchange of Good Practices) of European Commission

When considering the noise policy instruments including the legislative, economic and communicative way, it is seen that the policy applications are mostly rely on legislative instruments. Although, there is intensive control strategies based on legislations related to environmental noise and legal punishments (as economic way) to the facilities, the public noise complaints have been still increasing. Hence, it is required to increase the capability of staff on the use of communicative instruments of noise management. With NTP, it is aimed to improve the skills and practices of staff working on environmental noise management using innovative methods through the well-developed project partners on these issues. Moreover, it is aimed to develop sharing of good practices on noise management in audits between European countries to provide the high acoustic quality of urban cities.

Environment noise management applications in Europe shows differences from one country to another country especially on audits and permit process of the plants although they apply the same directive as Environmental Noise Directive (END).

This handbook focuses on the evaluation and comparison of noise training system in the three partner countries as Turkey, Italy and Spain. Since the partner countries carry on the environmental noise management applications in the scope of Environmental Noise Directive, it is important to reveal the applications of project partner countries from Mediterranean region that has similar climatic conditions and has also nearly similar environment noise sources. Therefore, this output has transferability potential.

In this handbook a training need analysis on environmental noise in project partner countries based on the questionnaires results has been performed. Then, starting from the training needs of the three countries new curriculum proposals and training course contents have been developed.

## 1. INTRODUCTION

In the EU context, professions and education and training are regulated by Directive 2006/123/EC on internal market service and by Directive 2005/36/EC on the recognition of professional qualifications.

Regulated profession is an activity, or group of professional activities, the exercise of which is subordinated, directly or indirectly, to the possession of certain professional qualifications, established by legislative, regulatory or administrative provisions. Regulated education and training are specifically oriented to the exercise of a specific profession, and consists of a course of study completed, a vocational training, a training period or a professional practice.

In this articulated framework, an open issue regards the question on how to become a Professional Acoustician and the differences in the profession's regulation.

The current document deals with the proposal of a new and shared curriculum content for Competent Technicians in Acoustics, developed in the frame of the NTP Project.

The first step consisted in a survey carried out with stakeholders related to the three Countries taking part in the project, asking them about their experience in the acoustic field, the frequency with which they carry out acoustic measurements, the typology of experienced noise audits, problems encountered and the proposed solutions.

Secondly, starting from results obtained from the analysed questionnaires and from project partners experience a final and detailed proposal for Competent Technicians in Acoustics has been developed.

## **2. BACKGROUND –EUROPEAN QUALIFICATIONS FRAMEWORK**

The European Qualifications Framework (EQF) is a common European reference framework whose purpose is to make qualifications more readable and understandable across different countries and systems. This is important to support cross-border mobility of learners and workers and lifelong learning across Europe. 39 European countries are currently involved in its implementation. Turkey is committed to providing the Turkish Qualifications Framework, harmonized with the European Qualification Framework. The core of the EQF is its eight reference levels defined in terms of learning outcomes, i.e. knowledge, skills and autonomy-responsibility as illustrated in the following tables.

EQF LEVEL 8	ACADEMIC LEVEL	DOCTORATE
EQF LEVEL 7		MASTER
EQF LEVEL 6	POST UPPER SECONDARY LEVEL	BACHELOR
EQF LEVEL 5		HIGHER NATIONAL DIPLOMA
EQF LEVEL 4	UPPER SECONDARY LEVEL	HIGHER NATIONAL CERTIFICATE, UPPER SECONDARY DIPLOMA
EQF LEVEL 3	SECONDARY LEVEL	SECONDARY DIPLOMA OR VOCATIONAL DIPLOMA
EQF LEVEL 2	PRIMARY LEVEL	SECONDARY SCHOOL WITH NO DIPLOMA
EQF LEVEL 1		PRIMARY SCHOOL

Level	Knowledge	Skills	Responsibility and autonomy
1 to 8	Described as theoretical and/or factual.	Described as cognitive (involving the use of logical, intuitive and creative thinking) and practical (involving manual dexterity and the use of methods, materials, tools and instruments).	Described as the ability of the learner to apply knowledge and skills autonomously and with responsibility

### 3. STATE OF THE ART ABOUT PROFESSIONAL ACOUSTICIANS IN ITALY-TURKEY-SPAIN

#### **Summary for Turkey:**

In Turkey, the requirements of expertise in acoustics are based on which studies to be carried on in the scope of regulation. The main works consist of preparing strategic noise maps, strategic action plans, environmental noise measurements for preparing the acoustic reports for industrial plants or environmental noise level assessment reports for the facilities, enterprises or entertainment places etc. In order to provide such works, technical staff should take training courses depending on which type of works they will do.

Students are graduates of engineering, architecture or science faculties or vocational high schools (as 2 year university) degree if they work only noise measurement

They should take the training course given by the institution which has protocol under certain circumstances defined by the Ministry. There are mainly 6 different certificate/training programs as listed below;

- A1: Basic Acoustic Training and Noise Measurements (max. 15 hours)
- A2: Engineering Acoustic (includes noise measurements and preparation of noise assessment reports) (max. 30 hours)
- B1: Noise Report and Noise Mapping for Industrial Plants (max. 36 hours)
- B2: Noise Report and Noise Mapping for Transportation Sector (max 30 hours)

- C1: Building Acoustics (max. 30 hours)
- C2: Noise Action Planning (max. 40 hours)

### **Requirements for giving training course on certificate programs**

University lecturers who have conducted theoretical or practical work and those who have completed postgraduate and doctoral programmes in topics of expertise announced by the Ministry shall be considered to have the level of expertise to conduct the works specified under the first paragraph.

The institutions to give the training course certificates should have a protocol with the Ministry. The protocol includes also the qualifications of the trainers. Trainers should have the prerequisites as follows;

- He/she has a PhD. on acoustic and vibration and he/she is still working on this field.
- He/she has applicable studies on noise measurements/insulation/noise mitigation.
- He/she is capable of using environmental noise measurement device and of using the computational methods on this.

## **Summary for Spain**

In Spain, for training courses no direct and explicit requirements are indicated at National level.

In some regions, the laboratories must be certified according to ISO 17025 and training requirements are defined by each laboratory and are evaluated by an external auditor. However, no academic level or qualification requirements are requested.

## **Summary for Italy**

In Italy there is a National Register of Competent Technicians in Acoustics established at the Ministry of the Environment.

It is necessary to have a Bachelor's or master's degree in technical or scientific subjects, and one of the following requirements:

- to have a University master with a module of at least 12 credits in acoustics (3 of acoustics laboratories);
- to pass a Course in acoustics for competent technicians, referred to a defined program;
- to obtain 12 university credits in acoustics (3 of acoustics laboratories);
- to have a PhD, with a doctoral thesis in acoustics.

The courses are provided by the following institutions:

- Universities, research bodies;
- professional orders or colleges;
- other “certified” institutions.

The course program has the following minimal features:

- 180 hours (60 practice hours);
- recognized by regional authority;
- a reference program organized in modules (as defined in the following table).

<b>COURSE PROGRAM (MODULES)</b>	<b>Hours</b>
Fundamental acoustics	8 - 12
Sound propagation and room acoustics	12 - 14
Instruments and Procedures for noise measurements	10 - 14
National / Regional / Municipal regulations	8 - 12
Traffic Noise and Railway noise	6 - 8
Aircraft and Harbor noise	6 - 8
Other National and EU regulations and directives	6 - 8
Building acoustics	10 - 16
Criteria for planning, mitigate and control of noise emissions	16 - 20
Noise and vibration in working places	12 - 24
Legal (forensic) acoustics	6 - 8
Training on the use of sound level meters and relative software	15 - 30
Training on the use of building acoustics software	15 - 20
Training on the use of noise propagation software	15 – 20

## 4. CURRENT SITUATION ON TRAINING NEED ON ENVIRONMENTAL NOISE MANAGEMENT

### 1.1 TRAINING NEED ANALYSIS IN TURKEY

#### **Summary for Turkey**

In the scope of Noise Training Project, the questionnaire was developed to determine the training need for vocational skills on environmental noise management applications during the audits and to determine the main problems faced with during the audits. It is delivered to 81 provinces in Turkey and municipalities and laboratories via the Google Forms with a link. It was conducted between the dates 01.06.2018-30.06.2018.

<https://docs.google.com/forms/d/1ZCG2u6WCGCJospbwb2ok4rqviFN7dCZ5NeGDmJ1MwKo/edit>

Totally, 225 staff answered and we highlight the next findings according the sample who answered the questionnaire:

- Most of the respondents (70% of them) in the field of noise audits are part of Provincial directorates of Environment and Urbanization and 18 %of them from municipalities and 7.8% of them from laboratories.
- The educational level of the professionals is really high, 93% of them has a university degree
- The experience of respondents is not so high. More than 50% of them have 1-5 years' experience and 40% more than ten years.

- About 29 % of them carry out an acoustic measurement at least once a week, 29,5% of them conduct between one and five audits per month.
- The noise audits are mainly related with recreational activities (78 % of respondents stated), workplaces/factories (stated by 64% of respondents) and air conditioners and ventilation system mostly coming from the big shopping centres and markets) were selected in third place by 51.1% of the participants.
- During the noise audits and measurements, they mostly encountered the problem regarding the negative attitude towards the technical staff performed by both the facility owners and the person who annoyed the noise during the audits and noise measurements (15% of respondents stated). The secondly most encountered one is inappropriate workplace allowance given by the Municipality especially for the recreational places locating near or adjacent to residential buildings. The third problem is stated by 10.6 % of the respondents that the deficiency in staff's knowledge on noise measurements and standards due to deficiency in training courses mostly based on the theoretical information.
- The solutions for the problems encountered is given as follows; conducting noise audits by Municipality and give authority them by law is mostly stated solution by 20% of the respondents. This is followed by increasing the regular training for staff on environmental noise (based on in situ rather than theoretical) stated by 18.7 % of the respondents, Not giving music allowance to the premises near the residential areas is mostly stated one in the third rate by 13.3% of the respondents.

- 86 % of respondents took these courses from external institution (which are the institutions having protocol on this issue with the Turkish Ministry of Environment and Urbanization)
- and 9.8 % of them took them in their institutions and only 5.2 % of them took that course during their university education.
- Over 30% of respondents reported that they agree with the duration and the content of the course, nearly 40% of them do not agree on this. Moreover, over 40 of them feel the courses on environmental noise management contributed positively to his/her professional career.
- The topics more addressed during the courses are noise audits, Leq and theoretical background in acoustics. Moreover, the less ones FFT analysis, sound diffraction and uncertainty measurement.
- In legislative basis; most of respondents (64%) consider that they have sufficient knowledge on legislative aspects on environmental noise control, but knowledge on the international standards in this field (25%). Moreover, most of the respondents (78 %) is agree that environmental noise audits conducted by municipalities which are already authority to give work permission license would be more effective
- In technical basis; %65 of the respondents considered that they need training basic knowledge acoustic concepts (sound power level, sound pressure level, octave band analysis, combining-subtracting decibels, weighting scales etc.). Moreover, 50% of respondents considered that they have difficulty on computations of tonality/impulse/low frequency during the preparation of noise assessment reports.

- In communicative basis, 39% percent of respondents admit having difficulty on communication with the people who with person who has noise complaint. Moreover, 39% of the respondents stated that they have difficulty on communication with person responsible for the noise source.
- There is nearly full consensus on the importance of raising awareness of the noise problem among policy makers (92% of the participants). Regarding the effectiveness of continuous noise monitoring system to control the noise, the 78.5% of technicians believe that it could improve the processes,
- 90,8% of respondents consider that the design and implementation of quiet areas would be effective for the management of environmental noise.

## **Conclusions for Turkey**

The results of the questionnaire developed under the Noise Training Project give the important findings and clues to improve the vocational skills of staff working on environmental noise management applications and to provide the information at which points to be met for the training needs.

- First of all, since the most part of the respondents (70% of them) are from Provincial directorates of Environment and Urbanization, it is needed to convey this questionnaire to more municipalities and laboratories and also universities so that the quality of representativeness of the findings would be increased.
- The findings showed that most of the respondents considered that the courses contributed positively to his/her professional career. However, while, half of the respondents agree with the duration and the content of the course, nearly 40% of them do not agree on this due to mostly based on theoretical information rather than in situ practices. This is in line with the fact that %65 of the respondents considered that they need training basic knowledge acoustic concepts (sound power level, sound pressure level, octave band analysis, combining-subtracting decibels, weighting scales etc.). Moreover, 50% of respondents considered that they have difficulty on computations of tonality/impulse/low frequency during the preparation of noise assessment reports. In addition to this, the thirdly most encountered problem is stated as the deficiency in staff's technical knowledge.

- Therefore, it is necessary to share these findings by Ministry as policy maker and the educational institutions specifically which have protocol with Ministry to give the training courses on environmental noise under the Turkish Regulation on Environmental Noise Assessment and Management.
- The one of the mostly encountered problem is stated as inappropriate workplace allowance given by the Municipality especially for the recreational places locating near or adjacent to residential buildings. Regarding this, the mostly stated solution is that not giving music allowance to the premises near the residential areas, revising the regulation on working permissions and conducting noise audits by Municipality and give them noise authority directly by law.

There is nearly full consensus on the importance of raising awareness of the noise problem among policy makers, the effectiveness of establishing the continuous noise monitoring system and designing the quiet areas in agglomerations.

Finally, referring to training needs, needs for specific courses devoted to perform noise measurements and audits seem to be relevant.

## 1.2 TRAINING NEED ANALYSIS IN SPAIN

### Summary for Spain

We highlight the next findings according the sample who answered the questionnaire:

- Most of the workers in the field of noise audits are part of acoustic consultancy firms/laboratories
- The educational level of the professionals is really high, 97% of them has a university degree
- The experience of acousticians is really high. More than 70% of them have more than 5 years of experience, and 53% more than ten years.
- Due to the high experience, they do not show problems related to technical aspects on Environmental Noise Management, except with the measure of uncertainty (39% of them have problems to calculate it).
- 40% professionals make measurements at least once a week, mainly related to recreational activities, transportation and ventilation systems. On the other hand, 22% of them never measure during their daily tasks.
- 69% professionals have taken at least one course about environmental noise management or measurement. With more than 46% of them taking the course from external institutions, and more than 30% during their university education. 67% agree with the duration and the content of the courses, and 90% believe that those courses contributed positively to their existing work.

- The topics more addressed during the courses are Background noise, Noise indicators and theoretical background in acoustics. And the less ones FFT analysis, sound diffraction and uncertainty measurement.
- Despite studying a lot background noise, they pointed problems to measure it during their noise audits, but they have the tools to measure it correctly.

The Spanish questionnaire for training need on environmental noise management was conducted between June 3 and June 22, 2018. A hundred professional started the survey, but only 34 completed it entirely. They used an average of seven minutes to complete it. A summary of the survey access and response results can be seen in Figure 1.

VIEWED  240	STARTED  105	COMPLETED  36	COMPLETION RATE  34.29%	DROP OUTS  69
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**Figure 1. Summary data of completion of the survey**

## **Conclusions for Spain**

Referring to training needs, needs for courses devoted to specific aspects of acoustics like the evaluation of uncertainty, and the evaluation and measurement of background noise seem to be relevant.

## 1.3 TRAINING NEED ANALYSIS IN ITALY

### **Summary for Italy**

In the scope of Noise Training Project, the questionnaire was developed to determine the training need for vocational skills on environmental noise management applications during the audits and to determine the main problems faced with during the audits. It is delivered to 30 municipalities, provinces and environmental control institutions in Italy via mail and phone calls. I was conducted between the dates 01.06.2018 - 20.10.2018.

<https://docs.google.com/forms/d/1ZCG2u6WCGCJospbwb2ok4rgvjFN7dCZ5NeGDmJ1MwKo/edit>

Totally, 38 staff answered and we highlight the next findings according the sample who answered the questionnaire:

- Most of the respondents (65,8% of them) in the field of noise audits are part of municipalities and 21% of them from provinces and 13,2% of them from environmental control institutions.
- Most of the respondents (68,4% of them) has a university degree and 31,6% have a secondary school diploma.
- The experience of respondents is not so high. 23,7% of them have 1-5 years' experience, 31,6% of them have 5-10 years' experience, and 44,7% more than ten years.
- 23,7% of them carry out an acoustic measurement at least once a week, 36,8% of them conduct between one and five audits per month, 36,8% of them conduct between one and five audits per year and 2,6% never. Those who work in the municipalities actually never

make the measurements themselves, but only require to other institutions to carry out checks.

- The noise audits are mainly related with transportation vehicles (stated by 71,1% of respondents. Those working in the provinces deal with noise problems almost exclusively related to transportation vehicles), temporary events outdoor (stated by 68,4% of respondents) recreational activities (60,5 % of respondents stated), air conditioners and ventilation system (stated by 60,5% of respondents) and workplaces/factories (stated by 13,2% of respondents)
- Most of the respondents (65,8% of them) never make the measurements themselves, but only require to other institutions to carry out checks so they were not able to indicate the problems during the noise audits and measurements, 13,5% of respondents mostly encountered the problem regarding the negative attitude towards the technical staff performed by both the facility owners and the person who annoyed the noise during the audits and noise measurements. The secondly most encountered one is the organization of environmental noise control in a short period of time after reporting and the problem to carrying out environmental noise measurements when there are more activities (10,5% of the respondents), some respondents also show problems of lack of trained personnel and adequate equipment.
- The solutions for the problems encountered is given as follows; installation of continuous monitoring systems is mostly stated solution by 10,5% of the respondents, some respondents also show increase of staff and equipment.

- 84,2 % of respondents took these courses from external institution and 13.2 % of them took that course during their university education.
- More than 60% of respondents reported that they agree with the duration and the content of the course, nearly 15% of them do not agree on this. Over 60% of them feel the courses on environmental noise management contributed positively to his/her professional career.
- The topics more addressed during the courses are theoretical background in acoustics.
- In legislative basis; most of respondents (more than 70%) consider that they have sufficient knowledge on legislative aspects on environmental noise control, but knowledge on the international standards in this field (about 34%). Most of the respondents (about 60%) is undecided that environmental noise audits conducted by municipalities which are already authority to give work permission license would be more effective.
- In technical basis; only %23,7 of the respondents considered that they need training basic knowledge acoustic concepts (sound power level, sound pressure level, octave band analysis, combining-subtracting decibels, weighting scales etc.), but about 40% answered undecided (who works in common does not take care of the technical part).
- In communicative basis, about 80% percent of respondents can not answer about difficulty on communication with the people who with person who has noise complaint and difficulty on communication with person responsible for the noise source because they do not do the checks.
- There is nearly full consensus on the importance of raising awareness of the noise problem among policy

makers (87% of the participants). Regarding the effectiveness of continuous noise monitoring system to control the noise, the 79% of technicians believe that it could improve the processes,

- 71,1% of respondents consider that the design and implementation of quiet areas would be effective for the management of environmental noise.

## **Conclusions for Italy**

The results of the questionnaire developed under the Noise Training Project give the important findings and clues to improve the vocational skills of staff working on environmental noise management applications and to provide the information at which points to be met for the training needs.

- First of all, since the most of the respondents (65,8% of them) are from Municipalities, and they actually never make the measurements, but only require to other institutions to carry out checks, it is needed to convey this questionnaire to more environmental protection agency that really make the measurements so that the quality of representativeness of the findings would be increased.
- The findings showed that most of the respondents considered that the courses contributed positively to his/her professional career and agree with the duration and the content of the course. This is in line with the fact that %70 of the respondents considered that they have sufficient knowledge on legislative aspects on environmental noise control. However, it is necessary to consider that these data have been provided by personnel who do not carry out measurements and do not produce technical reports but only verify them
- The most common problems concerning the management of outdoor temporary activities, in particular, there are difficulties in organizing environmental noise control in a short period of time after reporting, when environmental noise measurements are performed when there are more activities and the

impossibility of carrying out checks on the activity for many times. The lack of instrumentation and processing software is also highlighted

- There is nearly full consensus on the importance of raising awareness of the noise problem among policy makers, the effectiveness of establishing the continuous noise monitoring system and designing the quiet areas in agglomerations.

Finally, referring to training needs, needs for specific courses devoted to city managers about city noise management seem to be relevant.

## 2. CURRICULUM PROPOSAL ON ENVIRONMENTAL NOISE MANAGEMENT

According to needs arose from the questionnaire results, in the NTP project the following three figures are defined:

- The Environmental Noise Technician (able to perform noise measurements)
- The Environmental Noise Engineer (able to manage noise audit and other high level technical activities)
- The Environmental Noise Manager (support the policy maker for acoustic aspects).

Referring to the eight levels defined in the frame of the European Qualifications Framework (EQF), the following EQF levels are requested for the three figures:

- EQF level n° 4 for the Environmental Noise Technician,
- EQF level n° 6 for the Environmental Noise Engineer,
- EQF level n° 7 for the Environmental Noise Manager.

Finally, in the following table the contents of the skills to be achieved by the three different professional figures, together with related hours of training (theory and practice) are reported.

Main roles and skills of the three figures are summarized in the following table.

FIGURE	ROLE	MAIN SKILL
Environmental Noise Manager	Support to policy makers Noise mapping, action planning management Noise reduction plan management Management of audit	Basic level skills on theoretical and practical aspects High level skills to design noise monitoring activities, noise mapping, action planning, quiet areas, etc... Communication skills
Environmental Noise Engineer	Technical interface between polluters (real, presumed, potential) and (real, presumed, potential) polluted, control authorities and policy makers Support the acoustic managers of the local authority to define noise zoning and action planning Forensic assistant, technical auxiliary of the Judge in legal disputes regarding noise Building acoustics	Able to perform noise measurements and write the audit report according to law requirements Communication skills High level skills on theoretical and practical aspects High level skills to design noise monitoring activities, noise mapping, action planning, quiet areas, etc...
Environmental Noise Technician	Perform Audit and Noise measurements under the control of the Environmental Noise Engineer	Autonomy to perform noise measurements and write the audit report according to law requirements Communication skills

Skills	Environmental Technician		Noise		Environmental Noise Engineer		Environmental Noise Manager	
	Level of detail	Hours	Level of detail	Hours	Level of detail	Hours		
		Theory (T) / Practice (P)		Theory (T) / Practice (P)		Theory (T) / Practice (P)		
<b>Fundamentals of acoustics</b> <i>Sound pressure and sound power. Pure tones, frequency, the audible range, broadband noise, octave and third-octave frequency analysis of noise. Sound pressure level, sound intensity level, sound power level and the decibel scale. The range of decibel levels and the significance of level changes (3dB, 10dB, 20dB etc) in terms of energy content and loudness. The procedure for combining and subtracting decibel levels, including background levels.</i>	Medium	4T	Advanced	6T	Medium	4T		

<p><b>Frequency bands:</b> <i>The variation of hearing sensitivity with frequency and level: the A-weighting scale.</i></p>						
<p><b>Noise indicators:</b> <i>Steady and time-varying noise levels: LAeq, LAE and statistical levels LA10, LA90 etc. Calculations involving the LAeq and LAE. The effects of noise on people: hearing damage, annoyance, activity interference and sleep disturbance.</i></p>						
<p><b>Basic concept about the determination of sound power level</b></p>	<p>Medium</p>	<p>2T+4P</p>	<p>Advanced</p>	<p>4T+4P</p>	<p>-</p>	<p>-</p>

Skills	Environmentale Noise Technician		Environmental Noise Engineer		Environmental Noise Manager	
	Level of detail	Hours Theory (T) / Practice (P)	Level of detail	Hours Theory (T) / Practice (P)	Level of detail	Hours Theory (T) / Practice (P)
Outdoor sound propagation (Basic concept about sound source modelling according to point/line/planar source model; reflection, absorption, diffraction)	Medium	2T+2P	Medium	4T+2P	Basic	2T
Indoor sound propagation and basic concepts of building acoustics	Medium	2T+2P	Medium	4T+2P	Basic	2T
Training on the use of sound level meters	Advanced	4T+4P	Advanced	6T+4P	Basic	4T
Instrument features						
Instrument legal requirements						
Instruments maintenance and quality assurance						

Road Infrastructures noise: <i>Concepts and measurement. Measurement location selection. Measurement time sampling (time intervals and number of samples). Microphone position and corrections</i>	Basic	6P	Medium	6T+6P	Basic	4T
Railway Infrastructures noise: <i>Concepts and measurement. Measurement location selection. Measurement time sampling (time intervals and number of samples). Microphone position and corrections</i>						
Air traffic Infrastructures noise: <i>Concepts and measurement. Measurement location selection. Measurement time sampling (time intervals and number of samples). Microphone position and corrections</i>						

Skills	Environmentale Noise Technician		Environmental Noise Engineer		Environmental Noise Manager	
	Level of detail	Hours Theory (T) / Practice (P)	Level of detail	Hours Theory (T) / Practice (P)	Level of detail	Hours Theory (T) / Practice (P)
Road Infrastructures noise: <i>Processing and reporting</i>	Basic	2P	Advanced	2T+2P	-	-
Railway Infrastructures noise: <i>Processing and reporting</i>	Basic	2P	Advanced	2T+2P	-	-
Air traffic Infrastructures noise: <i>Processing and reporting</i>	Basic	2P	Advanced	2T+2P	-	-
Activities: <i>Industrial, construction sites, leisure, temporary. Measurement and processing. Background noise, penalties (ISO 1996). Measurement location selection. Measurement time sampling (time intervals and number of samples). Microphone position and corrections</i>	Advanced	12T+8P	Advanced	12T+8P	Basic	4T
Legal acoustics	-	-	Advanced	8T	Advanced	8T
Noise monitoring (including low cost sensor networks)	Basic	2T	Advanced	8T	Medium	4T

Skills	Environmentale Noise Technician		Environmental Noise Engineer		Environmental Noise Manager	
	Level of detail	Hours Theory (T) / Practice (P)	Level of detail	Hours Theory (T) / Practice (P)	Level of detail	Hours Theory (T) / Practice (P)
Interpretation of local/regional noise regulation	-	-	Medium/ Advanced	8T	Advanced	10T
National noise regulation						
European noise regulation						
Extended regulation related to noise sources	-	-	-	-	Basic	2T
Noise maps in relation to END	-	-	Advanced	8T	Medium/ Advanced	6T
Noise mapping input data						
Noise maps interpretation						
Noise prediction software	-	-	Advanced	8T + 16P	Basic	4T + 2P
Action plans in relation to END	-	-	Medium	4T + 12P	Medium/ Advanced	8T + 2P
Noise mitigation measures						

Skills	Environmentale Noise Technician		Environmental Noise Engineer		Environmental Noise Manager	
	Level of detail	Hours Theory (T) / Practice (P)	Level of detail	Hours Theory (T) / Practice (P)	Level of detail	Hours Theory (T) / Practice (P)
Quiet areas identification and analysis	-	-	Medium	4T	Advanced	8T + 2P
Quiet areas preservation and management						
Criteria for acoustic planning and zoning related to land use	-	-	Basic	2T	Advanced	8T + 2P
Non acoustic factors (mobility, landscape,	-	-	Basic	4T	Advanced	8T

communication, people engagement, etc)						
Calculation of uncertainty of measurements results	-	-	Advanced	10T	-	-
Interpretation of uncertainty of instruments and results	Advanced	2T	Advanced	2T	Advanced	2T
Quality assurance procedures (ISO 17025)	Basic	2T	Advanced	8T	Basic	2T
Health risks	Basic	2T	Basic	2T	Basic	2T
Communication skills (for interaction with receivers and noise source managers during audit)	Basic	2T	Basic	2T	-	-

### 3. CONCLUSIONS

According to both the Professional Acoustician figures experienced in Italy, Spain and Turkey and the needs coming from the results of questionnaires submitted to the main stakeholders, three different new Professional Figures have been identified in the framework of NTP project:

- the Environmental Noise Technician;
- the Environmental Noise Engineer;
- the Environmental Noise Manager.

Roles, tasks and skills of the three professional figures have been proposed and the structure of course has been identified

In the following table the EQF levels and a summary of theory and practice hours assigned to each professional figure are reported.

	<b>EQF LEVEL</b>	<b># THEORY HOURS</b>	<b># PRACTICE HOURS</b>
Environmental Noise Technician	4	36	32
Environmental Noise Engineer	6	126	60
Environmental Noise Manager	7	92	8

## ANNEX

### QUESTIONNAIRE FOR TRAINING NEED ON ENVIRONMENTAL NOISE MANAGEMENT

This questionnaire is aimed to determine the training need for vocational skills on environmental noise management applications during the audits and to determine the main problems faced with during the audits.

Thank you for taking the time to complete this questionnaire. Your contribution is greatly appreciated.

#### **A. PERSONAL INFORMATIONS**

##### **1. Please tick the institution you currently work in.**

- a. Provincial Directorate of Environment
- b. Municipality with authority on Environmental Noise Regulation
- c. Consultancy or laboratories conducting noise measurements and reporting
- d. Other, please explain.

##### **2. What is your education level?**

- a. Primary studies
- b. Secondary studies
- c. University studies

##### **3. How long have you been working on environmental noise?**

-

##### **4. Have you ever taken a course addressing specifically environmental noise management or measurement?**

- a. Yes
- b. No

##### **5. If it is yes, from which institution did you take the training course?**

- a. During the university education
- b. Course within my institution
- c. Specific course given by external institution
- d. Other

##### **6. If it is yes, what was the duration of the course (aprox. In hours)?**

7. If it is yes, which of the following concepts were addressed (deep enough) during that course?

Noise audits	1/1 and 1/3 octave bands	Frequency weighting (A, C)	Time weighting (F,S,I)	Leq
Ld, Le, Ln, Lden	Noise mapping software	Noise monitoring	Specific noise vs. Residual noise assessment	Microphone placement
Iso 1996	Noise phases	Short-term measurements	Long-term measurements	Measurement uncertainty
Sound level meter	Sound analyzer	FFT analysis	Sound exposure level	Aircraft noise assessment
Noise action plans	Background noise correction	Diffraction	Effect of meteorological conditions	Sound insulation measurements

**B. INFORMATION ON ENVIRONMENTAL NOISE AUDITS**

1. Please rank the noise sources given below in reference to which are the most frequently worked on during the environmental noise audits/measurements
  - a. Recreational/Entertainment places ( bars, pubs, discos, terraces... )
  - b. Sport activities
  - c. Temporary events outdoor ( )
  - d. Workplaces/factories ( )
  - e. Air conditioners and ventilation systems ( )
  - f. Transportation vehicles (roads, airports, railways, airplanes)
  - g. Others ( ) Please explain.
2. In which frequency are you conducting noise audits/noise measurements?
  - a. At least once a week
  - b. approximately 1-5 in a month
  - c. approximately 1-5 in a year
  - d.Never
3. What are the main 5 problems faced with during the environmental noise audits/measurements?
4. What is your recommendation for the problems encountered during the audits?

## 5. OPINIONS ON TRAINING NEED

	Strongly disagree	Disagree	Undecided	Agree	Strongly agree
<b>Noise Training Courses</b>					
The duration of the course on environmental noise management was sufficient.					
The content of the course on environmental noise management was sufficient.					
I believe that the course on environmental noise management contributed positively to my existing work					
<b>Legislative Aspects on ENM</b>					
I have sufficient knowledge on legislative aspects of environmental noise control.					
I have sufficient knowledge on the international standards on environmental noise mitigation measures					
I usually have to make decisions that do not fully comply with the requirements in the standard					
I believe that the environmental noise audits conducted by municipalities which are already authority to give work permission license is more effective					
I believe that the acoustic planning is required to be in consideration during the building/urban planning.					
<b>Technical Aspects on ENM</b>					
I need training on basic knowledge acoustic concepts (sound power level, sound pressure level, octave band					

analysis, combining-subtracting decibels, weighting scales etc.)					
I have difficulty on determination of noise measurement points					
I have difficulty on choice of the microphone position and direction .					
I have difficulty on choice of sampling periods and duration of noise measurements (stages)					
I have difficulty on choice of time weighting (Fast, slow, Impulse) during the noise measurement.					
I have difficulty on frequency weighting (A or C					
I have difficulty on what I should do in the case of changing environmental conditions (meteorological conditions) and in the identification of anomalous events					
I have difficulty on interpretation and evaluation of noise measurement data.					
I have difficulty in background (residual) noise assessment					
I have difficulty on the assessment of measured noise levels in the scope of related regulation.					
I have difficulty on computations of tonality/impulse/low frequency during the preparation of noise assessment reports.					
I have difficulty on selecting/analyzing/managing of Quiet Areas, as defined by national Decree (transposition of END 2002/49/EC)					
I have difficulty to determine whether the scope of the audit covers fully or partially the activity under inspection					

I have difficulty calculation or interpretation of measurement uncertainty					
<b>Communicative Aspects on ENM</b>					
During the environmental noise audit/ noise measurement, I have difficulty on communication with person who has noise complaint.					
During the environmental noise audit/ noise measurement, I have difficulty on communication with person responsible for the noise source.					
I believe that it is important to increase the awareness of the policy makers and authorities on noise management					
I believe that continuous noise monitoring system would be effective on noise control.					
I believe that designing/preserving/managing of Quiet Areas, as defined by national Decree (transposition of END 2002/49/EC), would be effective on environmental noise management.					

