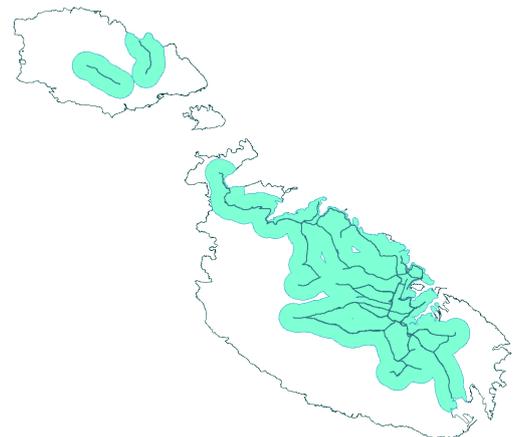
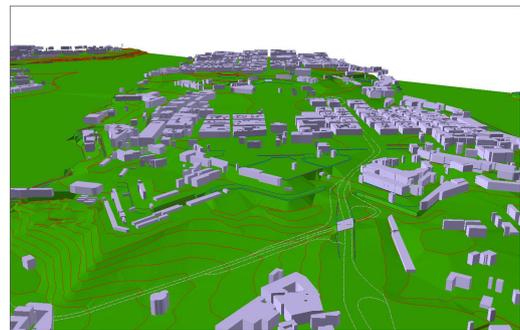
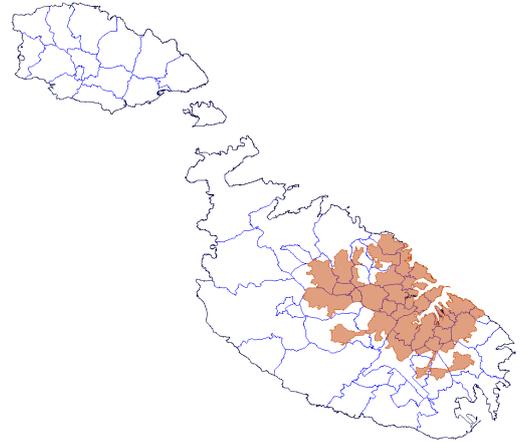


**Consultancy and  
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Implement the EU  
Noise Directive  
2002/49/EC in Malta**

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Noise Action  
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**Acustica Ltd**

**DARH2 Acoustics & Civil Engineering Ltd**

Report for



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## Consultancy and Field Surveys to Implement the EU Noise Directive 2002/49/EC in Malta

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Ref: 536-1-29/4

Document Code: 536-1-29/4

June 2011

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## Noise Action Planning Process

This report forms a technical annex to the report 536-1-27 “Implementation of the Directive 2002-49-EC in Malta” which sets out the main strategy and methodology for the future monitoring and management of environmental noise in Malta.

The objective of this technical annex is to set out the basis of a process for noise action planning under the Environmental Noise Regulations, which meets the requirements of the Directive, and provides a transparent and accountable approach to environmental noise management and mitigation.

The approach set out may be summarised as a five stage process:

- Stage 1 - Extent of noise exposure when assessment is considered necessary
  - Identify the important area by identifying noise sensitive locations above the proposed onset levels for noise mitigation measures.
- Stage 2 - Review strategic noise maps to identify priorities
  - Using a noise scoring decision matrix to draw up a short list of potential areas for action, both above the onset values, and below the level for preservation, to help identify Quiet Areas.
- Stage 3 - Confirmation of extent of impact
  - Undertake noise level measurements to confirm that the noise levels indicated by the strategic noise mapping are being experienced by the properties and population at a particular location.
- Stage 4 - Review possible mitigation measures
  - Once the extent of the existing noise impact has been confirmed for the locations under review, the potential noise mitigations measures may be investigated, and a cost benefit analysis undertaken for each, with the aim of developing a selection matrix which leads towards a recommendation for action.
- Stage 5 - A recommendation for action
  - The mitigation measures may then be put forward to the relevant departments and fund holders to be incorporated within their future work plans.

This report provides a review of the background, aims and objectives of the Regulations. It also sets out a recommended approach to noise action planning, and a framework process for the assessment of options for action. It also sets out a first proposal for indicative noise levels, as assessed by the strategic noise mapping, above which the framework process would be followed.

Finally, attention is drawn to the minimum requirements of an Action Plan, as defined within the Regulations and Directive, and offers a practical approach to how these requirements may be met.

This document should be read in conjunction with the following:

- Directive 2002/49/EC of the European Parliament and of the Council of 25 June 2002 relating to the assessment and management of environmental noise, Official Journal of the European Communities (OJEC) L189/12-25, 18 July 2002;
- Assessment and Management of Environmental Noise Regulations, S.L.504.63, L.N. 193 of 2004, as amended by L.N. 426 of 2007;
- Commission Recommendation 2003/613/EC of 6 August 2003 concerning the guidelines on the revised interim computation methods for industrial noise, aircraft noise, road traffic noise and railway noise, and related emission data, Official Journal of the European Union (OJEU) L212/49-64, 22 August 2003;
- EC recommended RM2007 “Reporting Mechanism proposed for reporting under the Environmental Noise Directive 2002/49/EC”;
- Acustica report 536-1-27 “Implementation of the Directive 2002-49-EC in Malta”, 2011;
- Acustica report 536-1-28 “Strategic Noise Mapping in Malta”, 2011;
- European Commission Working Group Assessment of Exposure to Noise (WG-AEN), Position Paper, Good Practice Guide for Strategic Noise Mapping and the Production of Associated Data on Noise Exposure, Version 2, 13th August 2007;
- European Commission Working Group Assessment of Exposure to Noise (WG-AEN), Position Paper, Presenting Noise Mapping Information to the Public, March 2008; and
- European Environment Agency Technical Report No 11/2010 “Good practice guide on noise exposure and potential health effects”, ISSN 1725-2237, October 2010.

This technical annex is appropriate for use under the current text of the Regulations and Directive at the time of writing. It may need to be updated in future should the Regulations or Directive be amended in a way which changes the requirements for noise action plans. Similarly, should Maltese noise policy change, this may also lead to a need to change the approach described within this report.

This report should not be considered as a legal document, nor does it purport to provide comprehensive legal advice or guidance on all acoustical matters. If, in any circumstance, the recommendations contained in this guidance seem to be at variance with the Directive, or Regulations, then the text of the Directive must be applied in the first instance, or the Regulations in the second. In many situations it may be necessary to seek expert advice and assistance.

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# 1 Introduction

## 1.1 Background

This report forms a technical annex to the report 536-1-27 “*Implementation of the Directive 2002-49-EC in Malta*” which sets out the main strategy and methodology for the future monitoring and management of environmental noise in Malta.

The objective of this technical annex is to set out the basis of a process for noise action planning under the Environmental Noise Regulations, which meets the requirements of the Directive, and provides a transparent and accountable approach to environmental noise management and mitigation.

A glossary of acoustic and technical terms used is set out in Appendix A.

## 1.2 Why prepare an Action Plan?

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<sup>1</sup>.

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; and
- 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 250,000 persons in 2007, and those with a population of more than 100,000 persons in 2012 and subsequent rounds.

The process of undertaking strategic noise mapping is described in Acustica report 536-1-28 “*Strategic Noise Mapping in Malta*”.

The third phase of the work under the Directive requires MEPA to produce Noise Action Plans for the first round during 2008, for the second round during 2013, and every five years thereafter. MEPA is then required to submit summaries of the Action

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<sup>1</sup> Official Journal of the European Union, L 189, 12-25, 18 July 2002.  
Available from: <http://eur-lex.europa.eu/JOIndex.do?ihmlang=en> [accessed May 2008]

Plans to the EC no later than 18th January the following year. The Action Plans must be produced based upon the results of the strategic noise mapping. It is also required to review and revise the action plans if necessary from time to time and whenever a major development<sup>2</sup> occurs which affects the existing noise situation.

It is the responsibility of MEPA to determine whether a change in situation within the noise management zone constitutes a major development which would trigger a revision to the Action Plans. Some situations which could be considered to constitute a major development may include: the opening of a new arterial or distributor road; the opening of a large new residential area or construction of a large number of residential properties.

A major development could be considered to have occurred if it is known, or thought likely, that greater than 10% of the exposed population within the noise management zone have experienced a change in the prevailing noise situation of greater than 3dB  $L_{den}$  or  $L_{night}$ . When such a situation arises the Action Plans should be revised as necessary within the regular 5 year revision cycle required under the Regulations, and such a revision may require a reassessment of the strategic noise maps and the population exposure assessment.

### 1.3 Statutory Background

In Malta, the END is transposed by the “*Assessment and Management of Environmental Noise Regulations, 2004*”, L.N. 193 of 2004 (Regulations). The Regulations were made by the Minister for Rural Affairs and the Environment under the Environmental Protection Act, 2001 (CAP. 435), subsequently amended in 2005. Following the passing of CAP 504, *Environment and Development Planning Act, 2010*, the regulations were subsequently renumbered as Subsidiary Legislation 504.63 of 2007, *Assessment and Management of Environmental Noise Regulations, 2004*. This guidance makes specific reference to clauses in these Regulations. The END is transposed separately in each Member state of the EU.

### 1.4 Scope of the Action Plans

The Action Plans are to be drawn up as part of the third phase of work under the Directive. The Regulations set out to:

*“define a common approach intended to avoid, prevent or reduce on a prioritised basis the harmful effects, including annoyance, due to the exposure to environmental noise.”<sup>3</sup>*

The Regulations are to apply to environmental noise to which people are exposed, in particular in built up areas, in public parks or other quiet areas in an agglomeration, in quiet areas in open country, near schools, near hospitals, and near other noise-sensitive buildings and areas.<sup>4</sup>

The Regulations shall not apply to noise caused by an exposed person, noise from domestic activities, noise created by neighbours, noise at work places, noise inside means of transport, or noise due to military activities in military areas.<sup>5</sup>

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<sup>2</sup> The term ‘major development’ is not defined in the Regulations or the END.

<sup>3</sup> Article 2 (1)

<sup>4</sup> Article 3 (1)

<sup>5</sup> Article 3 (2)

In the context of the Regulations, environmental noise is defined as unwanted or harmful outdoor sound created by human activities, including noise emitted by means of transport, road traffic, rail traffic, air traffic, and from sites of industrial activity.<sup>6</sup>

Furthermore the Action Plans are not to cover the whole of Malta, rather the areas covered by the Action Plans are defined as those areas which are affected by environmental noise, as identified by the strategic noise mapping. This is further discussed in Section 2.1 below.<sup>7</sup>

## 1.5 Timetable

The mapping for agglomerations and major sources affected by the Regulations was to be completed in 2007. The following timetable applies with regard to Action Plans for the first and second rounds of the Directive:

- **18 July 2008** – MEPA to have drawn up action plans designed to manage, within their territories, noise issues and effects<sup>8</sup>;
- **18 January 2009** – MEPA to submit a report to the EC/EEA providing summaries of action plans related data as listed in annex VI for major roads, railways, airports and agglomerations concerned by 1<sup>st</sup> round, and any criteria used in drawing up action plans – ENDRM DF7.<sup>9</sup>
- **18 July 2013** – MEPA to have drawn up action plans notably to address priorities which may be identified by the exceeding of any relevant limit value or by other criteria chosen by the Member States for the agglomerations and for the major roads as well as the major railways within their territories.<sup>10</sup>;
- **18 January 2014** – MEPA to submit a report to the EC/EEA providing summaries of action plans related data as listed in annex VI for major roads, railways, airports and agglomerations concerned by 2<sup>nd</sup> round, and any criteria used in drawing up action plans – ENDRM DF10.<sup>11</sup>

There is a 6 month time span between action plans being drawn up, and the date by which they are to be reported into the EC/EEA. In many MS across EC27 the national competent authority or national reporting body, is not the authority designated to draw up noise action plans, which may be the highway authority, or the airport operator. In these cases, the 6 months is to enable the action plans to be approved, if necessary, and summaries to be produced for reporting.

The timetable set out above repeats on a 5 yearly cycle.

## 1.6 Overview of Environmental Noise Management

The Directive aims to prevent and reduce, where necessary, environmental noise through the adoption of action plans. The action plans are to act as a means of managing environmental noise.

The Regulations define the term “acoustical planning” as:

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<sup>6</sup> Article 3 (1)

<sup>7</sup> Article 9 (1)

<sup>8</sup> ENDR Article 8 (1)

<sup>9</sup> ENDR Article 10 (2)

<sup>10</sup> ENDR Article 8 (2)

<sup>11</sup> ENDR Article 10 (2)

*“controlling future noise by planned measures, such as land-use planning, systems engineering for traffic, traffic planning, abatement by sound-insulation measures and noise control of sources”*

It is therefore considered appropriate to provide a brief overview of environmental noise management, and a review of current national guidance and practice in this area; as such provisions could become the tools available for assessment and protection within the scope of an action plan.

## 1.7 Aspects of Noise Management

In order to understand the position of environmental noise control within the wider landscape of noise management it is worth considering the draft I-INCE publication “*A Global Approach to Noise Control Policy*”<sup>12</sup> which classifies three areas of noise policy:

- Occupational Noise
  - Unwanted sound in the workplace, indoors or outdoors, caused by sources in the vicinity of a workplace;
- Community Noise
  - Unwanted sound in a non-occupational setting, indoors or outdoors, caused by sources over which an individual has little or no control, including sounds produced by neighbours; and
- Consumer Product Noise
  - Unwanted sound at the position of a user or bystander of a noise-producing product over which an individual may have some control, including noise in passenger compartments of vehicles, but excluding occupational and community noise.

Occupational and consumer product noise are covered by separate Regulations and are the responsibilities of the Occupational Health and Safety Authority, and Malta Standards Authority respectively.

The I-INCE description of community noise covers a wide range of situations:

- New roads, railways, airports, industry or recreational activities adjacent to residential properties or noise sensitive premises such as schools or hospitals, or recreational spaces;
- New residential properties or noise sensitive premises such as schools or hospitals, adjacent to existing roads, railways, airports, industry or recreational activities;
- The development of mixed residential/commercial use buildings, and multi-part residential buildings;

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<sup>12</sup> Noise Control Engineering. J. 52 (6), 2004 Nov–Dec

- The management of noise levels within noise sensitive properties, such as schools and hospitals, to address external noise break-in, as well as room to room transmission and noise levels within public spaces;
- Noisy neighbours, barking dogs;
- Gardening machinery, construction activities, ice cream vans and street cleaning;
- Air-conditioning equipment;
- Public house, night clubs, restaurants or other recreational activities; and
- Industrial operations, workshops and factories.

In line with the provisions of the Directive, the “*Assessment and Management of Environmental Noise Regulations*”, S.L.435.59, are designed to cover environmental noise as defined as:

*“unwanted or harmful outdoor sound created by human activities, including noise emitted by means of transport, road traffic, rail traffic, air traffic, and from sites of industrial activity”<sup>13</sup>.*

The Regulations are thus concerned with certain aspects of the I-INCE description of community noise, whilst other aspects could be described as noise nuisance or neighbourhood noise issues and should be managed and controlled via other legislation and guidance as they are clearly outside the scope of the Directive and these Regulations.

It is suggested that a fully encompassing noise management policy would provide guidelines, targets, and possibly limits across all aspects of occupational, community and consumer product noise, backed up by legislative powers and regulations as appropriate, however this discussion is limited to the scope of the Environmental Noise Regulations.

There are a number of means of addressing the range of policy areas described by I-INCE. Some are best served by regulation, type approval testing and certification, others may be addressed in some way through the planning process for new or altered developments, whilst others may need to be addressed as noise nuisance issues where best practical means, or best available technology approaches could be appropriate.

### **1.7.1 Current Community Noise Management Situation**

The noise Regulations sit within a wider framework of noise and nuisance legislation which sit on the Maltese statute. An initial search has identified over 70 current items of primary or subsidiary legislation. In addition to these were found 10 guidance or review documents which provide support on how to interpret or implement the legislation. Further details can be found in Appendix B.

In broad outline the agencies responsible for noise management include:

- **Police**

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<sup>13</sup> Article 4

A number of the chapters of the Code of Police Laws make reference to either noise or nuisance. These typically cover street and certain licensed activities. As is normal with primary legislation there is no detail as to how “nuisance” should be interpreted, or at what level and in what situation a noise becomes unacceptable, which means that application of the powers, and enforcement, may be inconsistent.

- **Office of the Prime Minister**

The OPM is responsible for environmental policy, including noise. The OPM is also responsible for undertaking Strategic Environmental Assessments (SEA) to assess the impact of any strategic policies or plans, which could possibly include a noise strategy.

- **Department of Health**

The DOH is responsible for public health, and within the 2006 National Environmental Health Action Plan included noise as a risk factor. The emerging evidence base linking long term environmental noise to health impact, reported by the WHO, also links the DOH to long term noise policy.

- **Department of Consumer Affairs**

The DCA is responsible for product safety, which includes noise limit values associated with certain types of outdoor equipment and recreational craft.

- **Malta Environment and Planning Authority**

Due to the multi-disciplinary nature of the organisation MEPA hold responsibilities for three related areas.

The Planning Directorate are responsible for planning policy, development control and licensing of development. Within this remit is included environmental impact assessment and licensing of certain trading activities. In recent years two draft acts have been issued for consultation, Draft Building Regulation Act 2009 and Draft Environment and Development Act 2010, both of which are relevant to management of noise.

The Environment Protection Directorate is the regulator enforcing environment policy. Responsibilities cover a wide range of activities, including waste management, construction sites and IPPC permitting.

The Directorate for Corporate services is responsible for mapping and land surveying as the national mapping agency and would be the primary supplier of the data required for the strategic noise mapping.

MEPA have also issued a number of guidance documents covering issues such as quarry working, shooting ranges, micro wind turbines, planning policy, rural development, EIAs and traffic calming measures.

- **Malta Standards Authority**

The MSA are responsible for product safety, and included within this remit is the type approval legislation which includes noise level requirements for motor vehicles, rail systems, machinery, hearing defenders, motor cycles, agricultural machinery and fireworks.

- **Transport Malta**

Transport Malta are responsible for aspects of noise emissions from roads, airports and ports. TM is responsible for management of the road network, including vehicle licensing and roadworthiness tests, road development and road maintenance.

For civil aviation TM is responsible for noise certification and regulation of certain airport operations. TM is also responsible for the ports, and crew noise exposure whilst working inside merchant and fishing vessels.

- **Occupational Health and Safety Authority**

The OHSA is responsible for the regulation of noise exposure in the workplace, including mineral extraction and construction sites.

- **Malta Tourism Authority**

MTA regulate the licensing of bars, restaurants and nightclubs, under which they have powers to control noise from kitchen equipment and music reproduction equipment.

- **Local Council**

Local Councils have some powers of control through licensing certain trading activities. Including within the scope of the licensing powers is the ability to avoid excessive noise impact from the activities.

(b) This sign conveys the information that there is a hospital in the neighbourhood. Vehicles should be driven with the minimum of noise possible.

(4)



(d) The first sign prohibits the use of acoustic signals by all motor vehicles, except in an emergency. Unless the sign is attached to the name plate of a built-up area (in which case the prohibition applies to the whole built-up area) the distance over which the prohibition extends may be indicated by means of a plate, of the type shown as No.(4) or (5) under paragraph G of this Part of the Schedule, appended to the sign. The second sign cancels the first one.

(8)



NO HORN BLOWING

(9)



END OF NO HORN BLOWING

**Figure 1.1:** Noise control traffic signs

- **Multi-Agency**

The Traffic Signs and Carriageway Markings Regulations, SL 65.05, enables the Police, Director of Public Works or Transport Malta to erect traffic signs. These include two with either specified or implied noise control aspects.

## 1.8 Structure of this Report

- Section 2 contains information about the requirements of Action Plans;
- Section 3 discusses the issues to be considered when drawing up noise action plans to fulfil the requirements of the Regulations and Directive, and sets out a noise action planning process to be followed between the reporting deadlines which aims to identify and propose suitable noise mitigation measures, where necessary;
- Section 4 discusses how to meet the requirements for public participation in the action planning process, and provides information on the finalisation and publication process; and
- Section 5 sets out the reporting requirements.

The text is supported by text boxes that summarise the key parts of the Regulations and Directive.

- Appendix A provides a short glossary of acoustic terms;
- Appendix B provides a list of background reference material and information sources;
- Appendix C presents an example of a prioritisation decision support matrix;
- Appendix D sets out an example of information to be contained in noise action plans; and
- Appendix E sets out a recommended colour scheme for presentation of noise level bands.

## 2 Requirements for Action Plans

### 2.1 General Requirements for Action Plans

The Regulations state that MEPA are the competent authority for drawing up actions plans. These action plans:

- Should be designed to manage, within its territories, noise issues and effects, including noise reduction if necessary for:
  - places near the major roads which have more than six million vehicle passages a year, major railways which have more than 60,000 train passages per year and major airports;
  - agglomerations with more than 250,000 inhabitants. Such plans shall also aim to protect quiet areas against an increase in noise.<sup>14</sup>
- The measures within the plans are at the discretion of the competent authority, but should notably.

**Note 1:** Noise from major sources is regarded as affecting an area if it causes either an  $L_{den}$  value of 55 dB(A) or greater or an  $L_{night}$  value of 50 dB(A) or greater anywhere within an area.

The measures within Action Plans are at the discretion of MEPA, however they should meet several general requirements, set out below:

- Address priorities which may be identified by exceeding of any relevant limit value or by other criteria chosen by the competent authority and apply in particular to the most important areas as established by strategic noise mapping;<sup>15</sup>
- The Action Plan must be designed to manage noise issues and effects, including noise reduction if necessary<sup>16</sup>.
- The Action Plan must satisfy the minimum requirements of Annex V of Directive 2002/49/EC<sup>17</sup>. See Section 2.2 below.
- The Action Plan must aim to protect quiet areas in an agglomeration<sup>18,19</sup>. This requirement will affect:
  - major roads whose noise affects agglomerations; and
  - roads, industrial sources and airports located within an agglomeration, or outside the boundary of the agglomeration, whose noise affects first round agglomerations .

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<sup>14</sup> Article 9 (1)

<sup>15</sup> Article 9 (1)

<sup>16</sup> Article 4

<sup>17</sup> Article 9 (3)

<sup>18</sup> Article 9 (1) and 4

<sup>19</sup> The detailed identification of quiet areas is to form part of the duties of the action planning authorities responsible for preparing Action Plans for first round agglomerations.

**Note 2:** Noise from sources is regarded as affecting an agglomeration if it causes either an  $L_{den}$  value of 55 dB(A) or greater or an  $L_{night}$  value of 50 dB(A) or greater anywhere within an agglomeration.

- The Action Plan must aim to protect quiet areas in open countryside<sup>20,21</sup>.
  - major roads whose noise affects open countryside

**Note 4:** Noise from major sources is regarded as affecting open countryside if it causes either an  $L_{den}$  value of 55 dB(A) or greater or an  $L_{night}$  value of 50 dB(A) or greater anywhere within the open countryside.

- The Action Plan must apply in particular to the most important areas as established by strategic noise maps<sup>22</sup>. See Section 3.

Appendix D sets out general guidelines on the possible contents of a noise action plan.

**Box 1**  
**General requirements for Action Planning**

Action Plans must

- Meet the objectives of Article 1(c) of the Directive;
- Be designed to manage noise issues and effects, including noise reduction if necessary;
- Aim to protect quiet areas;
- Address priorities identified by criteria to be determined by MEPA;
- Apply to the most important areas as established by strategic noise maps;
- Meet the requirements in Annex V of the Directive.

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<sup>20</sup> Article 3 (1) and 12 (1)

<sup>21</sup> The detailed identification of quiet areas is to form part of the duties of the action planning authorities responsible for preparing Action Plans for an agglomeration.

<sup>22</sup> Article 9 (1)

## 2.2 Annex V of the Directive

Annex V of the END sets out the minimum requirements of Action Plans. These minimum requirements are shown in Box 2. Appendix D sets out guidance on how the minimum requirements set out in Annex V of the Directive may be incorporated into a noise action plan.

The Summary of the noise Action Plan which is to be produced should include the main elements of each of the minimum requirements set out in Annex V of the Directive.

### Box 2

#### Annex V from the END

An Action Plan must at least include the following elements:

- a description of the agglomeration, the major roads, the major railways or major airports and other noise sources taken into account,
- the authority responsible,
- the legal context,
- any limit values in place in accordance with Article 5,
- a summary of the results of the noise mapping,
- an evaluation of the estimated number of people exposed to noise, identification of problems and situations that need to be improved,
- a record of the public consultations organised in accordance with Article 8(7),
- any noise-reduction measures already in force and any projects in preparation,
- actions which the action planning authorities intend to take in the next five years, including any measures to preserve quiet areas,
- long-term strategy,
- financial information (if available): budgets, cost-effectiveness assessment, cost-benefit assessment,
- provisions envisaged for evaluating the implementation and the results of the action plan.

The Action Plan should contain estimates in terms of the reduction of the number of people affected (annoyed, sleep disturbed, or other)

The following discusses how the various elements of Annex V might be met.

#### **A description of the agglomeration, the major roads, the major railways or major airports and other noise sources taken into account**

This information will be available as part of the data collected for the strategic noise mapping. No other noise sources will have been taken into account.

#### **The authority responsible**

This is the name and contact details of the designated competent authority responsible for preparing the Action Plan, in this case MEPA.

### **The legal context**

This requires reference to the Regulations which place the responsibility of preparing the Action Plan onto MEPA. Thus reference to the relevant Article should be made. Action Plans should also include a description and assessment of the existing national and local framework of control directly or indirectly relating to the management of environmental noise e.g. current government policies, planning guidelines, statutory instruments, any local planning agreements and restrictions, any local voluntary agreements, noise preferential routes, Master Plans, strategic policies etc.

### **Any limit values in place**

Reference should be made to any planning conditions or other agreements that set a constraint on operations that could affect the level of noise generated. These limit values may have already been described and reported as part of the noise mapping process.

### **A summary of the results of the noise mapping**

The aim of this requirement is to provide a description of the current noise impact of the noise source on its surroundings.

These results should include, for the various noise indicators for which mapping was carried out, the area enclosed by the various contour bands. The area information will have already been determined through the strategic noise mapping work.

MEPA should determine the number of noise sensitive premises that lie within the various contour bands. Housing, hospitals and schools should generally be regarded as noise sensitive premises. MEPA may choose to include other premises or specific types of land use within this definition, depending on policy, circumstances or priorities, in which case a clear description should be presented of all premises and/or land types deemed to be noise sensitive. The premises information may have already been determined through the noise mapping work.

### **An evaluation of the estimated number of people exposed to noise, identification of problems and situations that need to be improved**

MEPA should determine the population exposure information for the various noise indicators for which mapping was carried out. The population exposure information will have already been determined through the strategic noise mapping work.

An approach for identifying problems and situations that need to be improved is set out in Section 3.

### **A record of the public consultations organised in accordance with Article 8(7)**

Part of the action planning process requires formal public consultation to occur regarding the proposed Action Plan<sup>23</sup>. More details are provided in Section 4 below.

### **Any noise reduction measures already in force and any projects in preparation**

Noise sources may have existing measures in place to manage and mitigate noise impacts. This may include procedures such as impact assessment guidelines, noise complaint handling protocols, development planning guidelines, noise insulation

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<sup>23</sup> Article 9 (6)

schemes, noise barrier construction projects etc. As part of the noise mapping process, information about such measures may have been collected. This requirement can be met by reviewing any previously prepared information about noise control measures and updating it as appropriate.

**Actions which the action planning authorities intend to take in the next five years, including measures to preserve quiet areas**

This element will comprise a description of the timetabled process described in Section 3.

**Long term strategy**

MEPA should set out a strategic policy objective for the management of environmental noise. Additionally MEPA should describe any likely future developments, and reference should be made to how the consequential noise impact would be managed.

**Financial information (if available): budgets, cost-effectiveness assessment, cost-benefit assessment**

Any new noise control measure that is considered for inclusion as part of the Action Plan must take into account the cost of implementation, and the likely benefit expected to be accrued. (see also Section 3).

**Provisions envisaged for evaluating the implementation and the results of the Action Plan**

The Action Plan must show how the outcome expected, from any measure that is to be implemented, will be monitored. MEPA should consider providing an update, locally, on a periodic basis that takes any changes in local circumstances into account. For example, the outcomes could be monitored in terms of: numbers of people with a reduced noise level; or noise level reduction: or reduction in people, dwellings or area exposed above a certain noise level.

**The Action Plan should contain estimates in terms of the reduction of the number of people affected (annoyed, sleep disturbed, or other)**

The Action Plan must contain an indication of the expected outcome of any proposed measures, for example, in terms of the reduction in the number of people affected, etc.

### 3 Action Planning Process

As discussed above, it is required to:

- Base the Action Plans on the results of the strategic noise mapping;
- Address priorities which may be identified by exceeding of any relevant limit value or by other criteria chosen by the competent authority;
- Apply in particular to the most important areas as identified from the strategic noise mapping; and
- Identify and protect Quiet Areas in agglomerations.

It is recommended that a staged approach is followed to identify potential locations for actions, review possible actions and determine the cost effectiveness of actions, prior to determination of any proposed action. This provides a clear traceable decision process, whilst ensuring that options are reviewed at each stage of the process. An overview of the recommended approach is shown in Figure 3.1.

The action planning process set out undertakes an assessment to determine the need for noise mitigation or protection, the potential for change, and the cost benefit of possible action culminating in a proposal to act. This assessment procedure can be applied at any location within the noise management zone, and by applying consistent criteria it provides a traceable and equivalent method of assessment for all locations. The assessment process could be started as the result of a noise complaint in a particular location, or by MEPA selecting a location based upon the results of the strategic noise mapping.

#### 3.1 Stage 1 - Extent of noise exposure when assessment is considered necessary

The management of environmental noise under the Regulations introduces the potential for actions and controls on existing transportation noise sources to an extent not previously seen. As the coverage of the strategic noise mapping is significant, it is not considered practical to undertake a detailed assessment of need for every noise sensitive premises within the extent of the noise management zones. It is therefore necessary to develop a means of identifying the most important locations via some form of decision support matrix or selection process in order to address them on a prioritised basis.

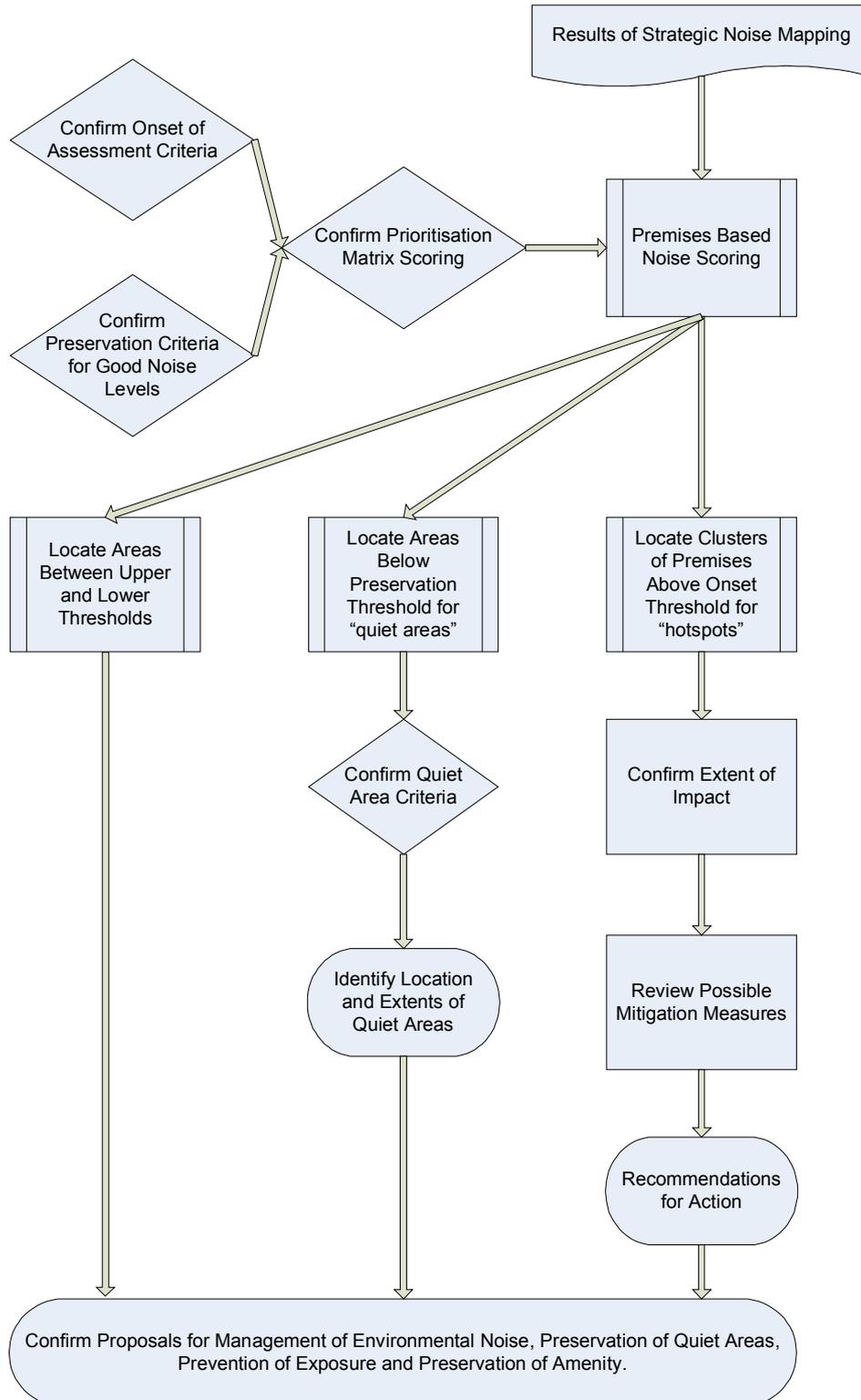
The commencement of this process requires some form of noise level value, or noise level values, which may be used as the starting point for a review process. Set out below are recommended noise levels, as indicated by the strategic noise mapping, for the onset of the assessment process. They do not constitute any form of design guideline for noise management, nor do they necessarily indicate that at or above such levels the environmental noise should be considered undesirable. They are set out as a starting point in a process which seeks to identify locations exposed to existing levels of environmental noise for which it may be considered necessary to address the exposure through mitigation measures.

At some point in the future it may be considered appropriate to develop guidelines on noise limit values, or other relevant criteria for assessment of environmental noise. Indeed MEPA is responsible to report to the Minister in due course in this regard<sup>24</sup>.

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<sup>24</sup> Article 12

However at present these recommendations do not represent MEPA or Ministerial policy.



**Figure 3.1: Overview of Recommended Approach to Determine Actions to Be Undertaken**

### 3.1.1 World Health Organisation

Guidelines produced under the auspices of the World Health Organisation<sup>25</sup> make a number of recommendations for noise levels in specific environments which will minimise the health impact of environmental noise. In the context of the WHO definition of health as “*a state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity*” these guideline values can be seen as aspirational targets based on the precautionary principle.

The guidelines set out a number of external and internal values for daytime and nighttime noise levels which aim to minimise all identified adverse health effects, including annoyance, for residential properties and other noise sensitive premises.

Examples of the guideline values:

- 55 dB  $L_{Aeq, day}$ , outdoor living area, serious annoyance;
- 50 dB  $L_{Aeq, day}$ , outdoor living area, moderate annoyance;
- 35 dB  $L_{Aeq, day}$ , dwelling indoors, moderate annoyance;
- 30 dB  $L_{Aeq, night}$ , inside bedrooms, sleep disturbance; and
- 45 dB  $L_{Aeq, night}$ , outside bedrooms with open window, sleep disturbance.

Whilst the recent report on night noise guidelines<sup>26</sup> proposed the following recommended values:

- Night noise guideline (NNG)       $L_{night, outside} = 40$  dB;
- Interim Target (IT)                 $L_{night, outside} = 55$  dB;

In reality, any city is likely to have many situations exceeding the WHO guideline values, however the guidelines provide a frame of reference for decisions on planning controls and noise management going forward.

### 3.1.2 Airports

The assessment of noise from aircraft in flight has commonly been undertaken within Europe using an “average summer’s day”  $L_{Aeq, 16hr}$  noise level indicator. This is somewhat different to the “annual average day”  $L_{den}$ ,  $L_{day}$ ,  $L_{evening}$ , and  $L_{night}$  indicators assessed under the Regulations. Unfortunately this means that the assessed noise levels, contour extents, and numbers of people exposed are not directly comparable between the two assessments.

In the UK the DfT uses a level of 57 dB  $L_{Aeq, 16hr}$  as the onset of community annoyance, although there is likely to be a section of the community that may be severely annoyed below this level. The UK PPG24<sup>27</sup> suggests that planning for new housing should not normally be granted for levels above 66 dB  $L_{Aeq, 16hr}$  and 57 dB  $L_{night}$ . The UK Air Transport White Paper<sup>28</sup> also required airport operators with immediate effect to “offer

<sup>25</sup> *Guidelines for Community Noise*, WHO, 1999

<sup>26</sup> *Night Noise Guidelines for Europe*, WHO Regional Office for Europe, 2009

<sup>27</sup> *Planning Policy Guidance 24: Planning and Noise*, Department for Communities and Local Government, October 1994

<sup>28</sup> *The Future of Air Transport*, Department for Transport, December 2003

*households subject to high levels of noise (69 dB  $L_{Aeq,16hr}$  or more) assistance with the costs of relocating”.*

Having due regard to the issues raised above, the proposed onset levels for assessment of noise mitigation measures are:

- 63 dB,  $L_{Aeq,16hr}$ <sup>29</sup>; and
- 55 dB,  $L_{night}$ .

The proposed onset levels for assessment of noise level preservation where they are good are:

- 55 dB,  $L_{den}$ ; and
- 45 dB,  $L_{night}$ .

These levels reflect an annual average 24 hour period.

### 3.1.3 Industry

Under the Regulations, the assessment of noise impact from industry is only required within agglomerations. The industrial process sites considered within the strategic noise mapping were those subject to IPPC licensing. The provisions of an IPPC license include for noise emissions from sites, where necessary.

At present there is no MEPA guidance on noise related to schedules activities. In the context of the reported thresholds of 55 dB  $L_{den}$  and 45 dB  $L_{night}$ , it may be appropriate to develop such guidance in the future which sets these levels as boundary noise conditions for IPPC licensed operations to ensure that the IPPC process delivers noise protection to nearby sensitive locations. At present there is no evidence that any of the IPPC licensed sites within the agglomeration exceed these proposed limit values.

Having due regard to the existing licensing of industrial noise under IPPC the proposed onset levels, for assessment of noise mitigation measures, are:

- 55 dB,  $L_{den}$ ; and
- 45 dB,  $L_{night}$ .

The proposed onset levels, for assessment of noise level preservation where they are good, are:

- 55 dB,  $L_{den}$ ; and
- 45 dB,  $L_{night}$ .

These levels reflect an annual average 24 hour period.

### 3.1.4 Roads

Under the Regulations, the noise due to all road traffic sources is required within agglomerations, and “major roads” outside agglomerations. A major road is defined as an international, national or regional road with an annual traffic volume above 3 million vehicles. In Malta this means that for a road to be considered as a “major road” under

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<sup>29</sup> This is  $L_{Aeq,16hr}$  derived from the  $L_{day}$  and  $L_{evening}$  results assessed under the Regulations, not the  $L_{Aeq,16hr}$  assessment undertaken for an average summers day

the Regulations, it must be classified as a part of the TEN-T network, or be an arterial road or a distributor road, with a traffic flow above 3 million vehicles per annum.

The UK PPG24 suggests that planning for new housing should not normally be granted for levels above 63 dB  $L_{Aeq,16hr}$  and 57 dB  $L_{Aeq,8hr}$ . The UK Noise Insulation Regulations set out a level of 68 dB  $L_{A10,18hr}$  above which a noise insulation package must be offered to property owners.

Having due regard to the discussion above the proposed onset levels, for assessment of noise mitigation measures, are:

- 65 dB,  $L_{den}$ ; and
- 55 dB,  $L_{night}$ .

The proposed onset levels, for assessment of noise level preservation where they are good, are:

- 55 dB,  $L_{den}$ ; and
- 45 dB,  $L_{night}$ .

These levels reflect an annual average 24 hour period.

### **3.2 Stage 2 - Review strategic noise maps to identify priorities**

The results of the strategic noise mapping provide information on the assessed noise levels at properties within the assessment area, along with an estimate of the number of inhabitants. These resultant datasets may then be used in combination with the recommended onset of assessment noise levels to develop a noise scoring decision matrix. This decision matrix is used to draw up a short list of potential areas for action, both above the onset values, and below the level for preservation to help identify Quiet Areas.

Once a shortlist of locations has been drawn up, these could be mapped within a GIS system to look for any clusters which could be considered “hot spots”. It may be relevant to then draw up a second shortlist which takes into account the presence of any “hot spots”.

### **3.3 Stage 3 - Confirmation of extent of impact**

Following the prioritisation exercise based upon the results of the strategic noise mapping, an ordered shortlist of areas may be drawn up which will proceed to the next stage in the process. The aim of this stage is to confirm that the noise levels assessed by the strategic noise mapping are experienced by the properties and population within the areas being addressed.

#### ***3.3.1 Do the noise maps indicate that this exposure has been exceeded?***

The approach set out within the Directive is to first undertake strategic noise mapping within cities, and for major sources outside cities, and then assess the numbers of people exposed to noise within 5 dB bands. The strategic noise mapping process is a predominantly technical process requiring an array of different input datasets across large geographical areas. These datasets are combined to form 3D models, through which an assessment of noise propagation is undertaken using specialist computer software systems.

The noise level is assessed on a regular grid pattern across the model, and these results are used with an estimated population distribution model to assess the numbers of people exposed. The nature and extent of the various datasets required, coupled with the fact that 2007 was the first time this had been attempted on such a large scale, inevitably means that the results provide a best estimate, rather than a complete and wholly accurate account.

Within the context of the Directive and its requirement for the strategic noise maps to “provide a representation of the noise levels perceived within that area” (Para 10), and the development of strategic policy it is important to understand the scale of the uncertainties inherent within the results at this stage, rather than strive for an unachievable goal of total accuracy. Knowledge of the strategic noise mapping process and uncertainties will be beneficial during the development and execution of noise action plans.

The results of the strategic noise mapping process help to gain an understanding of:

- Where environmental noise is located;
- The approximate magnitude of noise levels within the assessment area; and
- Approximately how many people are exposed to differing levels of environmental noise.

### ***3.3.2 Is the population exposed to these indicated noise levels?***

The results of the strategic noise mapping provide information on the estimated population distribution. This may be used to determine an estimate of the number of people exposed above the onset of assessment criteria. If a number of clustered “hot spots” have been identified, the exposed population within these locations may be totalled to assess the extent to which the population may benefit from any noise mitigation measures.

Prior to the review of potential noise mitigation measures, and any subsequent commitment of budget to undertake any necessary actions, it is considered advisable to confirm that the noise levels indicated by the strategic noise maps are being experienced by the population within the study area.

This could be undertaken by reviewing and refining the noise models, if appropriate, or by undertaking field survey work to measure noise levels prior to the commencement of any works. In a best practice situation it is recommended that both are undertaken, with measurements repeated after any actions are carried out in order to confirm the delivered results.

Section 5, below, discusses the use of noise level measurements in support of both of these scenarios, for verifying the source emission levels within the calculation model, and verifying the receptor immission levels.

Any field survey work could also ascertain as to whether the properties being assessed had noise sensitive rooms on the most exposed facades, or whether noise mitigation measures were already present which may not be indicated within the calculation model.

As the Directive requires a long term assessment based upon the annual average noise levels, it is important to note that any on-site measurements of noise need to be able to

determine the long term average noise level with a reasonable degree of accuracy. Work undertaken as part of the IMAGINE research project<sup>30</sup> developed a procedure for determining  $L_{den}$  and  $L_{night}$  using measurements. The field survey work as part of the action planning process will typically require measurements over a number of weeks at each location of interest.

### 3.4 Stage 4 - Review possible mitigation measures

Once the extent of the existing noise impact has been confirmed for the locations under review, the potential noise mitigations measures may be investigated, and a cost benefit analysis undertaken for each, with the aim of developing a selection matrix which leads towards a recommendation for action.

#### 3.4.1 Scenario analysis

At this stage a review of potential noise mitigation schemes should be undertaken and a cost benefit analysis carried out.

There are a wide range of potential noise mitigation measures, some of which may act at a national or regional level, others which may be purely localised. Likewise there are a number of levels of authority which may be capable of making actions. A non-exhaustive list of example may include:

- Vehicle noise emissions and tyre noise regulations would be set at EU level.
- National planning guidance or noise regulations would be set at national level.
- Transport policy objectives may be set at national level;
  - improved public transport;
  - getting people out of cars; and
  - increasing bus, train, bicycle journeys.
- At national and local authority level there are powers to act:
  - Replace diesel vehicles with Compressed natural gas / electric;
  - Truck routes;
  - Night time delivery restrictions or limits;
  - Planning permissions;
  - Enforcement of speed limits;
  - Road closures / traffic routing;
  - Road re-surfacing;
  - Planning zones;
  - Façade insulation requirements;
  - Noise barriers;
  - Public liaison groups; and

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<sup>30</sup> Available from: <http://www.imagine-project.org/artikel.php?ac=direct&id=53> [Accessed February 2011]

- Long term targets.
- Airport operators may act in the following way:
  - Noise surcharge;
  - Fines for off track aircraft;
  - Aircraft restrictions;
  - Noise level limits;
  - Operating restrictions;
  - Defined periods of respite;
  - Purchase of most affected properties;
  - Land use planning process; and
  - Noise insulation packages.
- Roads authorities could undertake the following:
  - Traffic management – routes and HGVs;
  - New road construction (bypass);
  - Re-surface roads;
  - Vehicle speed management;
  - Noise screening measures; and
  - Façade insulation measures.

There are various examples of possible noise mitigation measures within the EC funded projects EffNoise<sup>31</sup>, Silence<sup>32</sup> and QCity<sup>33</sup>. Where MEPA identifies a potentially beneficial action for which it is not the managing authority or organisation, there is a requirement to liaise with the relevant authority to discuss the viability of actions, or support any move by other authorities to undertake the desired actions.

### 3.4.2 *Cost benefit analysis*

For the locations under review a list of potential noise mitigation actions is now drawn up. In order to develop a prioritised list of actions to be undertaken it is relevant to carry out a cost-benefit analysis on the potential actions being considered in order to maximise value for money and deliver benefit from investment.

The cost-benefit analysis should address lifetime construction and maintenance cost against noise reduction benefit.

The extent of noise reduction may be a reasonably simple assessment if global source related measures are being considered, or may be more detailed and complex if specific local measures are being reviewed. Assessment of noise benefit may even involve the

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<sup>31</sup> *Effectiveness of Noise Mitigation Measures*, EffNoise, <http://www.calm-network.com/bluebook/content/projects/p023.htm> [accessed February 2011]

<sup>32</sup> *Quieter Surface Transport in Urban Areas*, Silence, <http://www.silence-ip.org/> [accessed February 2011]

<sup>33</sup> *Quiet City Transport*, QCity, <http://www.qcity.org/> [accessed February 2011]

use of the strategic noise models to undertake scenario testing to determine estimates of the noise reduction from identified design options. However there are a number of potential noise reduction measures which can be difficult to assess within the current calculation models, such as enhanced barrier design, quiet pavement surfaces and use of electric vehicles for example.

The benefit of noise reduction may be viewed in terms of decibels / people / time or could be monetised to fully process the analysis. Monetisation of noise is becoming increasingly common, and various approaches and valuations may be found within the HEATCO<sup>34</sup> project, WG-HSEA reports, WebTAG<sup>35</sup> and STAG<sup>36</sup> for example. It is important to note that the studies which form the basis of these monetary assessments of noise levels tend to take two differing approaches, (i) impact upon property market value and (ii) willingness to pay by residents exposed to noise to produce a reduction. As may be expected these tend to lead to somewhat differing suggested levels of financial benefit.

When MEPA undertakes a cost-benefit analysis of the mitigation options it may also wish to consider the guidance within the CSF Evaluation Units report from 1999<sup>37</sup>.

### 3.5 Stage 5 - A recommendation for action

Following the cost-benefit analysis the locations under review may be prioritised to form a list of beneficial, achievable actions for noise mitigation.

With the cost and timescale implications of each action understood from the analysis, the mitigation measures may then be put forward to the relevant departments and fund holders to be incorporated within their future work plans.

### 3.6 Wider Considerations

Any new noise management measure in the Action Plan must reflect the wider context of local and national sustainable development plans, policies and strategies, including but not necessarily limited to, the following:

- Local Area Plans;
- Sustainable transport and sustainable urban mobility strategies;
- Strategic environmental assessment regulations;
- Environmental impact assessment regulations;
- Air quality regulations and Action Plans;
- Renewable Energy Action Plan;
- Local Authority Open Spaces policies;
- Planning policy statements and design guides;
- Airport master plans;

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<sup>34</sup> HEATCO, Developing Harmonised European Approaches for Transport Costing and Project Assessment, Final Technical Report, December 2006.

<sup>35</sup> Department for Transport, Transport Analysis Guidance, Noise, TAG Unit 3.3.2, November 2006.

<sup>36</sup> Transport Scotland, Scottish Transport Appraisal Guidance, 6.11 Noise and Vibration, September 2006.

<sup>37</sup> Community Support Framework (CSF) Evaluation Unit, Proposed Working Rules for Cost-Benefit Analysis, June 1999.

- Emerging climate change initiatives;
- Spatial data strategy;
- Urban regeneration strategies; and
- Noise abatement policy.

Where possible the synergies and conflicts presented should be reviewed and discussed.

## 4 Public Consultation and Reporting

MEPA will have acquired information in accordance with Section 3 and reached a view on whether or not the current noise impact is considered acceptable, and whether or not current noise control measures are considered adequate. In coming to this view MEPA will have considered the noise maps, MEPA strategy on environmental noise management, government policy on noise and the noise policies of any key stakeholders.

MEPA should assemble this information, and any initial proposals for a way forward, into a Draft Noise Action Plan for wider consultation. This document must include prominently displayed wording identifying it as a draft subject to public consultation by the action planning authority.

### 4.1 Consulting the public

The Regulations require the Action Planning Authorities to consult the public when drawing up and revising Action Plans<sup>38</sup>:

**Box 3**  
**Action Plans – Public Participation**

In preparing and revising Action Plans Action Planning Authorities must ensure that:

- the public is consulted about proposals for Action Plans;
- the public is given early and effective opportunities to participate in the preparation and review of the Action Plans;
- the results of the public participation are taken into account;
- the public is informed of the decisions taken; and
- reasonable time frames are provided allowing sufficient time for each stage of public participation.

Once the Draft Noise Action Plan has been prepared, a formal public consultation exercise should be undertaken. The Draft Noise Action Plan and accompanying summary needs to be issued for Public Consultation to all relevant stakeholders and the public in accordance with the dates in the Regulations<sup>39</sup>. These documents must include prominently displayed wording identifying them as a draft subject to the outcome of the Public Consultation process.

The Regulations require MEPA to consult with the public when drawing up and revising Action Plans<sup>40</sup>. Once the draft noise action plan has been prepared a formal public consultation exercise should be undertaken. The Draft Noise Action Plan and accompanying summary should be issued for public consultation to all relevant stakeholders and the public. These documents should include prominently displayed wording identifying them as a draft subject to the outcome of the Public Consultation process. It is recommended that in parallel to the wider public consultation, MEPA proactively seek consultation from relevant groups such as:

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<sup>38</sup> Article 9 (6)

<sup>39</sup> Articles 8 (1) & 8 (2)

<sup>40</sup> Article 9(6)

- Office of the Prime Minister;
- Transport Malta;
- Department of Health;
- The Police;
- Malta International Airport;
- Local Councils;
- Noise pressure groups;
- NGOs and professional bodies; and
- Local citizen groups.

Following the public consultation, MEPA should examine and reflect upon the comments received, and complete the Noise Action Plan including a description of the comments received during the consultation process, and a reasoned justification for the response to the issues raised.

## 4.2 Reporting

The Member States within the EC need to submit the results of the strategic noise mapping and action planning to the Commission. As the designated national authority it is the responsibility of the MEPA to report the results of the strategic noise mapping and action planning to the Commission<sup>41</sup>.

To this end the EC have published the recommended Electronic Noise Data Reporting Mechanism (ENDRM)<sup>42</sup> for reporting under the END, which sets out 11 Data Flow templates covering the Member State (MS) reporting obligations set out in the Directive. The Data Flows cover the first and second round implementations of the END with deadlines ranging from 2005 to 2014.

Information on noise control programmes that have been carried out in the past, and noise-measures in place before adoption of action plans are to be submitted to the Commission by 18th January 2009 using Data Flow 6 (DF6). The information to be reported under DF6 covers the following:

- Per agglomeration  $\geq 250,000$  inhabitants, including:
  - Agglomeration Roads
  - Agglomeration Airports
  - Agglomeration Industry
- For overall major roads  $\geq 6$  million vehicles/y

Any information pertinent to this report is to be included by APAs and clearly identified within the noise action plan.

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<sup>41</sup> Article 5 (4)

<sup>42</sup> Available at:

[http://circa.europa.eu/Public/irc/env/d\\_2002\\_49/library?l=/reporting\\_mechanism/reporting\\_mechanism&vm=detail&sb=Title](http://circa.europa.eu/Public/irc/env/d_2002_49/library?l=/reporting_mechanism/reporting_mechanism&vm=detail&sb=Title) [accessed February 2011]

The summaries of noise action plans are to be submitted to the Commission using Data Flow 7 (DF7) for the first round, and Data Flow 10 (DF10) for the second round. The information to be reported under DF7 & DF10 covers the following:

- Action plans related data as listed in annex VI for major roads, major railways, major airports and agglomerations concerned by 1st round, and any criteria used in drawing up action plans
- Per agglomeration  $\geq 250,000$  inhabitants, including:
  - Agglomeration Roads
  - Agglomeration Airports
  - Agglomeration Industry
- For overall major roads  $\geq 6$  million vehicles/y

The reports are to be submitted to the European Environment Agency (EEA) using the EIONET Reporting Obligations Database (ROD) system.<sup>43</sup> EIONET also contains the latest versions of the reporting templates, along with supplementary guidance issued subsequent to ENDRM.

In addition to the reporting requirements to the EC set out in the directive, the Regulations set out a requirement to produce a report which assesses the need for further actions on environmental noise and, if appropriate, propose implementing strategies<sup>44</sup>. The aspects to be covered include:

- long-term and medium-term goals for the reduction of the number of persons harmfully affected by environmental noise;
- additional measures for a reduction of the environmental noise emitted by specific sources, in particular outdoor equipment, means and infrastructures of transport and certain categories of industrial activity, building on those measures already implemented or under discussion for adoption; and
- the protection of quiet areas in open country.

The second bullet point is of particular interest, as this is related to the emission from sources, and therefore outside the scope of the Environmental Noise Directive, and relates to a number of other EC Directives which are transposed into separate Regulations.

The report is to include:

- a review of the acoustic environment quality in Malta, and shall take account of scientific and technical progress and any other relevant information;
- MEPA shall propose strategies and measures taking into account the reduction of harmful effects and the cost-effectiveness ratio shall be the main criteria for the selection of the strategies and measures proposed;
- an assessment of the implementation of these regulations; and

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<sup>43</sup> Available at: <http://rod.eionet.europa.eu/> [accessed February 2011]

<sup>44</sup> Article 12

- if appropriate, be accompanied by proposals for the amendment of the Regulations.

There is no date specified within the Regulations as to when this report is to be drawn up, however it is stated that it is to be reviewed every five years.

### 4.3 Information to the Public

Within the context of the Regulations, and the Directive, the action plans are to serve as a public statement delivering the central tenet of the Directive to communicate to the public the effects of environmental noise, the extent to which environmental noise currently affects the area covered by the action plan, the proposed approach to managing noise issues and noise reduction where necessary.

To this end information for the public on noise action plans, and their summaries, should be clear and comprehensible, and include a summary setting out the most important points<sup>45</sup>.

Dissemination to the public should be via any appropriate means, including through the use of available information technologies<sup>46</sup>, and should be in accordance with the Freedom of Access to Information on the Environment Regulations, and in conformity with Annexes IV and V of Directive.

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<sup>45</sup> Article 10 (2)

<sup>46</sup> Article 10 (1)

## 5 Noise Level Measurements

Within the action planning process set out in Section 3, above, there is a requirement to confirm that the noise exposure indicated by the strategic noise mapping are being experienced by the properties and population within the areas being addressed.

It is recommended that two types of noise measurement procedures are undertaken at this stage of the process for the specific site being assessed:

- Verification of the modelled source emissions levels; and
- Verification of the receptor immission levels.

### 5.1 Verify Modelled Source Emissions Levels

The application of measurements for use in capturing input data for strategic noise mapping was also emphasised in the Commission Recommendation of 6 August 2003 concerning the guidelines on the revised interim computation methods for industrial noise, aircraft noise, road traffic noise and railway noise, and related emission data. Herein specific measurement procedures were described for parameters used within the road and railway source terms, some acoustics, and others non-acoustic such as speed.

The source emissions levels (defined as a sound power level,  $L_w$ , usually expressed as octave band levels or overall dB(A)) values, cannot be determined directly using measurement techniques due to the wide range of application in terms of flows, speed, ratio of heavy vehicles and road surface types. Therefore it is more typical to undertake sound level or sound intensity measurements in order to ascertain the relevant values of specific input parameters required for the assessment of the emission level.

#### 5.1.1 Road Traffic Source Emissions Levels

In order to determine road traffic source emissions levels for use within the END strategic mapping assessment, the following procedures are recommended<sup>47</sup>:

*“The noise emission level of a vehicle is characterized by the maximum pass-by sound level in dB(A),  $L_{Amax}$  measured at 7.5m from the centreline of the trajectory of the vehicle. This sound level is determined separately for different vehicle types, speeds and traffic flows. The slope of the road is identified. The road surface is not explicitly taken into account. To remain compatible with the original measurement conditions, measurements should be made for vehicles driving on either of the following road surface types: cement concrete, very slim bituminous concrete 0/14, half-granulated bituminous concrete 0/14, superficial seal 6/10, superficial seal 10/14. A surface correction is later added according to the scheme. It should be noted that the proposed road surface correction is not tied to and were determined in complete independence of any specific French road surface data. The aforementioned road surface types were used in France in the 1970s when the noise emission measurements for the Guide du Bruit were conducted. The vehicle speed should be measured with a Doppler radar (accuracy of approximately 5% at slow speeds). The traffic flow is determined either by*

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<sup>47</sup> AR-INTERIM-CM (CONTRACT:B4-3040/2001/329750/MAR/C1)

Adaptation and revision of the interim noise computation methods for the purpose of strategic noise mapping; Wölfel Meßsysteme et al. EC DG Environment, March 2003

*measurement or by subjective observation (accelerated, decelerated or fluid).”*

This brief summary of the measurement procedure clearly shows that in addition to the acoustic noise measurements, there is also a necessity for additional specialist measurement equipment such as traffic counters, meteorological stations, Doppler radar guns and as well specific techniques for the measurement of the road surface correction.

#### Example of road traffic analyser



**Figure 6.1:** Portable traffic analyser

There are a wide variety of options for undertaking traffic flow counting surveys. Before undertaking such an automated survey, it would be necessary to confirm that the possible measurement equipment will provide all the necessary information for the purposes of the noise calculations. It would be advisable that Transport Malta undertakes traffic counts, and that MEPA liaises with Transport Malta and provides details of the input data requirements for the strategic noise mapping, such as road vehicle categories, speed data requirements, and time periods of assessment.

An example of a temporary road traffic analyser<sup>48</sup> is shown on Figure 6.1.

#### Measurement of road surface characteristics

For the purpose of measuring the acoustic characteristics of road surfaces, there are currently two recommended methods:

- ISO 11819-1:1997 Acoustics -- Measurement of the influence of road surfaces on traffic noise -- Part 1: Statistical Pass-By method, and
- ISO/CD 11819-2 Acoustics -- Measurement of the influence of road surfaces on traffic noise -- Part 2: Close-proximity method.

The later Part 2, provides a comfortable method for recording noise characteristics of a road surface as a function of distance. The method is highly suitable for road maintenance authorities to acoustically assess road surfaces. The design of the trailer excludes the effects of background noise during the measurement and makes it suitable for application in a noisy environment<sup>49</sup>.

<sup>48</sup> <http://www.sterela.fr/systemes-electroniques.asp?idcat=1> [Accessed February 2011]

<sup>49</sup> <http://www.mp.nl/leaflets/leaflets.php?langID=2&page=CPX> [Accessed February 2011]



**Figure 6.2: CPX Trailer**

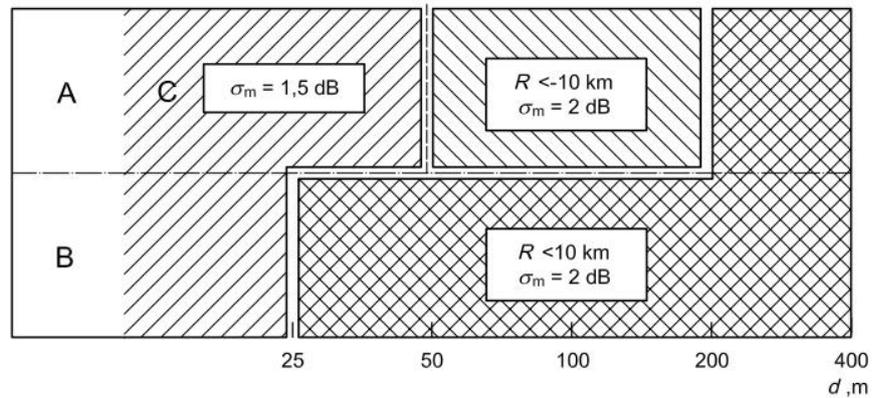
Additionally, if it is necessary to acquire all the characteristics of the road surfaces, not just the acoustics characteristics, it is possible to use ISO 13472:

- ISO 13472-1:2002 Acoustics -- Measurement of sound absorption properties of road surfaces in situ -- Part 1: Extended surface method
- ISO 13472-2:2010 Acoustics -- Measurement of sound absorption properties of road surfaces in situ -- Part 2: Spot method for reflective surfaces
- ISO 13473-3:2002 Characterization of pavement texture by use of surface profiles -- Part 3: Specification and classification of profilometers
- ISO/TS 13473-4:2008 Characterization of pavement texture by use of surface profiles -- Part 4: Spectral analysis of surface profiles
- ISO 13473-5:2009 Characterization of pavement texture by use of surface profiles -- Part 5: Determination of megatexture,

#### **Measurement of the meteorological data**

As the “Nouvelle Methode Prevision de Bruit de Trafic” (NMPB) is a  $L_{eq}$ -based method, and predicts propagation effects for both neutral meteorological conditions and downwind conditions according to ISO 9613-2 (ISO 1996), it is necessary to include such meteorological parameters within the noise measurement procedure.

ISO 1996-2:2007 also provides the definition of a so called “meteorological window” that describes the set of weather conditions during which measurements can be performed with limited and known variation in measurement results due to weather variation. On the basis of the measurement site (source-receiver distance, height) and meteorological data the soundpath radius of curvature  $R$ , which describes radius approximating the curvature of the sound paths due to atmospheric refraction, must be determined.



**Key**  
 A high  
 B low  
 C no restriction

**Figure 6.3:** Sound path radius of curvature,  $R$ , and the associated measurement uncertainty contribution, expressed as the standard deviation,  $\sigma_m$ , due to weather influence, for various combinations of source/receiver heights (A to C) over porous ground

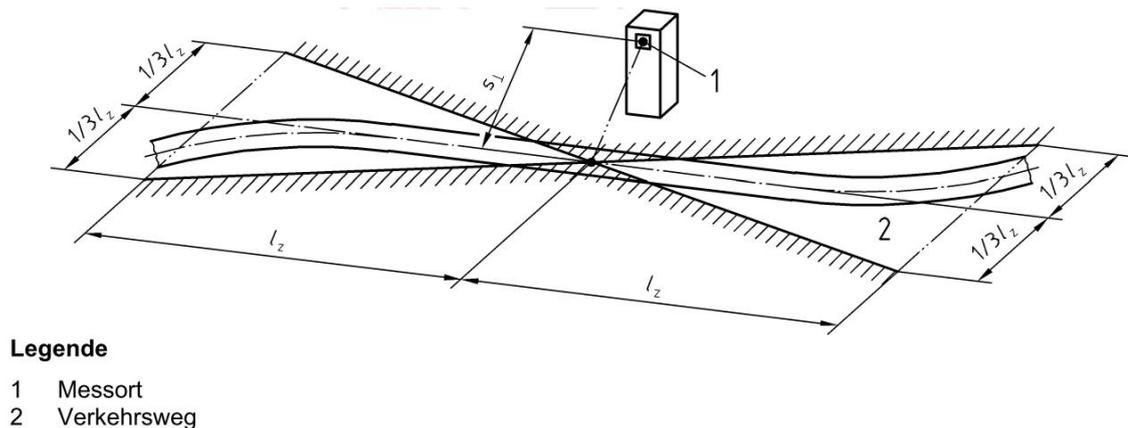
It should be noticed that according to the ISO 1996 it is mandatory to measure meteorological parameter (temperature, humidity, wind speed and direction) at heights from 0.5 up to 11 m. It can therefore be seen that even for short term measurements, a portable meteorological stations is required.



**Figure 6.4:** Example of the meteorological station mounted on the 10m mast.

**German standard DIN 45642:2004: Messung von Verkehrsgeräuschen (Measurement of traffic noise)**

One possible option is to use the German standard DIN 45642:2004: Messung von Verkehrsgeräuschen (Measurement of traffic noise) which covers the emission and immision noise measurements of the road, rail and water traffic. The requirement for the proper placement of the noise emission point is presented in Figure 6.5



**Bild 1 — Definition des langen geraden Verkehrswegs**

**Figure 6.5:** Graphical determination of the required position of the noise emission assessment point according to the DIN 45642

### 5.1.2 Industry Source Emissions Levels

There are two primary influencing factors on the quality of the results which may be obtained for strategic noise mapping of industrial sources. On the one hand the nature of the sound power levels that acoustically describe the industrial sound sources; and on the other hand the precision with which the geometry of the industrial zone and its surroundings have been transformed into the computer model. The most precise approach will be based upon the actual measured and calculated sound power levels of the entire industrial installations or, if possible, even of discrete individual sound sources. It should be borne in mind that unless the source emission data is previously available, almost every strategic noise mapping project of industrial sources will not be able to determine the individual source sound power levels in this way due to time and budget constraints in the context of the benefit to the quality of the assessment which such measures will introduce.

Currently it is possible to use four different approaches for obtaining data about sound power levels of industrial sources for use with the interim method (ISO 9613-2)<sup>50</sup>.

<sup>50</sup> Adaptation and revision of the interim noise computation methods for the purpose of strategic noise mapping - WP 3.4.2: Industrial noise - Guidance on noise emission measurement methods

Input Data		Accessibility	Precision
From	As		
Type 1: Public database	$L_w/m^2$ for entire site	Public	Rudimentary estimate
	$L_w$ for individual source		
Type 2: Theoretical exploitation conditions	$L_w/m^2$ or $L_w$	Public	Pre-established limit
Type 3: Environmental Impact Assessment (EIA)	$L_w/m^2$ or $L_w$	Public	Estimate after calculation
Type 4: Noise measurements of the actual situation	$L_w/m^2$ or $L_w$	Usually not public	Best possible approach to actual situation

For the purpose of the strategic noise mapping of industrial sources, there are three possible methods of measurement:

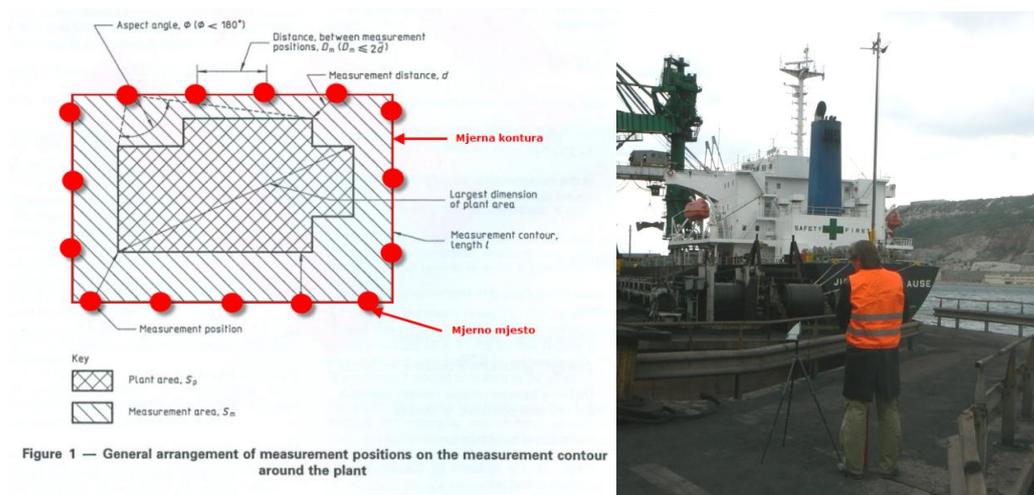
- ISO 3744:1994 Acoustics -- Determination of sound power levels of noise sources using sound pressure -- Engineering method in an essentially free field over a reflecting plane
- ISO 3746:1995 Acoustics -- Determination of sound power levels of noise sources using sound pressure -- Survey method using an enveloping measurement surface over a reflecting plane, ISO 3746:1995/Cor 1:1995
- ISO 8297:1994 Acoustics -- Determination of sound power levels of multisource industrial plants for evaluation of sound pressure levels in the environment -- Engineering method

Standards ISO 3744 and ISO 3746 are much more suitable for determining the sound power level of individual sound sources of limited dimensions (despite the fact there are no restrictions relating to the volume of the sound sources for the application of that two norms). Noise measurements in accordance with ISO 3744 and ISO 3746 of source groups or entire companies, to which measuring heights of 20m and more would apply, are neither realistic nor cost-effective. Therefore it can be concluded that ISO3744 & ISO3746 can be applied to separate sound sources, insofar as they are not located too close to one another.

Within the framework of the END, it is advisable to determine global sound power levels of entire industrial companies without for this purpose examining their internal distribution over individual sources. For this purpose, sound pressure measurements can be carried out around the entire installation. For measuring the sound power levels of larger installations and entire companies, ISO 8297 (and methods derived from it) are highly suitable. Sound pressure measurements are carried out on a previously defined measuring line located between 5 and 35 m equidistant around the installation. Depending on the height of the installation under study and the possibilities on site, the measuring height is +/- 5m. The average sound pressure level along the measurement contour is calculated on the basis of these measurements. Standard also describes in a step-by-step procedure the calculation of the sound power level for evaluating levels in the environment. This sound power level is the combination of the average sound

pressure level, the area term for the enclosed measurement surface, and correction terms for proximity, microphone and sound attenuation. A common advantage to this method is that the competent authority, or its representatives, does not need agreed access to the industrial area, which can avoid conflict with the site owner, as well as being safer for the operatives undertaking the measurements.

The short graphical presentation of the measurement concept is given in Figure 6.6, with the photo taken during measurements<sup>51</sup>.



**Figure 6.6:** Graphical determination of the measurement contour (red line), measurement points (red points) and photo during measurements according to ISO 8297

## 5.2 Verify Receptor Immision Levels

In order to obtain assessment values according to the END, immision measurements of noise levels at receptors points should be measured over the long-term according to the standards:

- ISO 1996-1:2003 Acoustics -- Description, measurement and assessment of environmental noise -- Part 1: Basic quantities and assessment procedures;
- ISO 1996-2:2007 Acoustics -- Description, measurement and assessment of environmental noise -- Part 2: Determination of environmental noise levels

As mentioned previously, the utilisation of measurement procedures for assessment of receptor immision levels is currently rare, as only the results obtained via permanent noise monitoring stations can be treated as suitable for such an assessment.

<sup>51</sup> Port of Rijeka Noise Mapping project - Measurements of the sound power levels of the conveyer for bulk load (coal, sand, etc.), DARH 2, 2008.



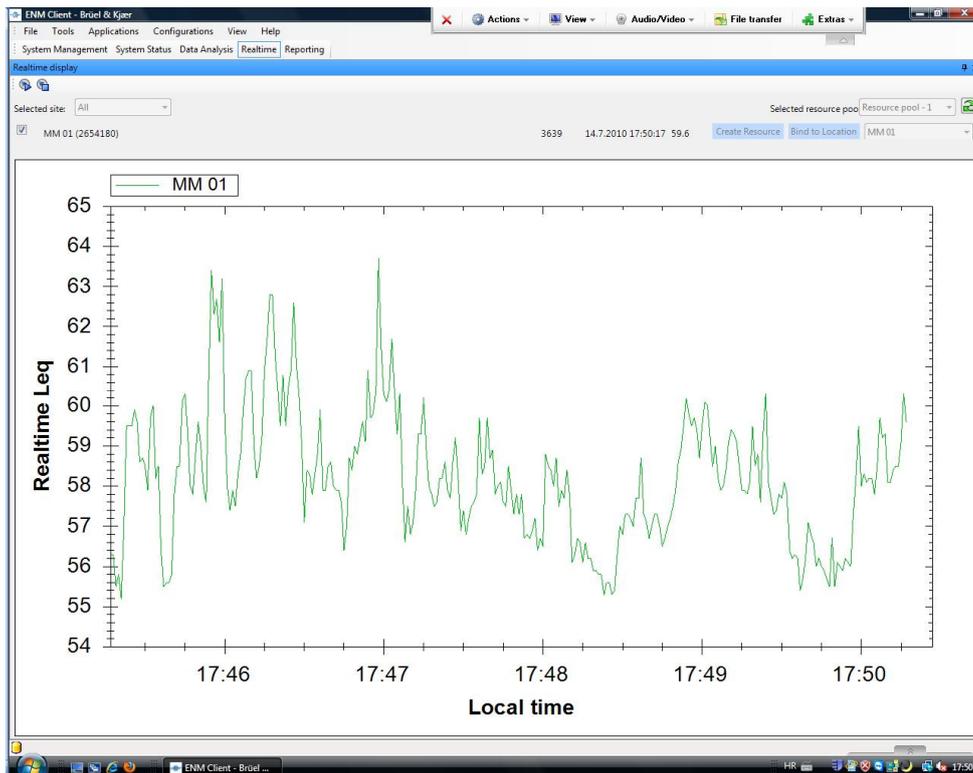
**Figure 6.7:** Installation of the permanent outdoor noise monitoring terminal near Shipyard “Viktor Lenac”, Rijeka, Croatia

The noise monitoring stations are usually (semi)permanently mounted in the vicinity of the industrial areas, major roads/railways and most often around the major airports. Outdoor noise monitoring stations are usually equipped in rugged outdoor cases suitable for installations in industrial, urban and rural environment. Hence such systems are designed for stable, long-term, continuous outdoor monitoring, and they usually support at least:

- logging of broadband and 1/3-octave parameters with wide dynamic range of sound levels;
- logging of percentiles and creation of periodic statistical reports by using database structures on embedded PC;
- event analysis and sound recording;
- integrated calibration capabilities;

- communication with control software packages via phone line, LAN, WIFI, GPRS, 3G etc; and
- communication for monitoring meteorological data.

The typical installation of a permanent outdoor noise monitoring terminal is presented on Figure 6.7, while the example of the real-time feed from noise monitoring is presented on Figure 6.8.



**Figure 6.8:** Screenshot of the real time feed from the noise monitoring terminal at the location of the permanent outdoor noise monitoring terminal near Shipyard “Viktor Lenac”, Rijeka, Croatia

## Appendix A: Glossary of Acoustic and Technical Terms

Term	Definition
Agglomeration	Major Continuous Urban Area as set out within the Regulations
Attribute Data	A trait, quality, or property describing a geographical feature, e.g. vehicle flow or building height
Attributing (Data)	The linking of attribute data to spatial geometric data
Data	Data comprises information required to generate the outputs specified, and the results specified
dB	Decibel
DEM	Digital Elevation Model
DSM	Digital Surface Model
DTM	Digital Terrain Model
DVD	Digital Versatile Disk
EC	European Commission
END	Environmental Noise Directive (2002/49/EC)
ESRI	Environmental Systems Research Institute
GIS	Geographic Information System
INM	Integrated Noise Model
Malta National Grid (MNG)	The official spatial referencing system of Malta
ISO	International Standards Organisation
Metadata	Descriptive information summarising data
NA	Not Applicable
Noise Bands	<p>Areas lying between contours of the following levels (dB):</p> <p><math>L_{den}</math> &lt;55, 55 – 59, 60 – 64, 65 – 69, 70 – 74, <math>\geq 75</math></p> <p><math>L_d</math> &lt;55, 55 – 59, 60 – 64, 65 – 69, 70 – 74, <math>\geq 75</math></p> <p><math>L_e</math> &lt;55, 55 – 59, 60 – 64, 65 – 69, 70 – 74, <math>\geq 75</math></p> <p><math>L_n</math> &lt;45, 45-49, 50 – 54, 55 – 59, 60 – 64, 65 – 69, <math>\geq 70</math></p> <p>Notes:</p> <ol style="list-style-type: none"> <li>1) It is recommended that class boundaries be at .00, e.g. 55 to 59 is actually 55.00 to 59.99</li> <li>2) The assessment and reporting of the 45 – 49dB band for <math>L_{night}</math> is optional under the Regulations</li> </ol>
Noise Levels	Free-field values of $L_{den}$ , $L_d$ , $L_e$ , $L_n$ , and $L_{A10,18h}$ at a height of 4m above local ground level
Noise Level - $L_d$ - Daytime	$L_d$ (or $L_{day}$ ) = $L_{Aeq,12h}$ (07:00 to 19:00)
Noise Level - $L_e$ - Evening	$L_e$ (or $L_{evening}$ ) = $L_{Aeq,4h}$ (19:00 to 23:00)
Noise Level - $L_n$ - Night	$L_n$ (or $L_{night}$ ) = $L_{Aeq,8h}$ (23:00 to 07:00)
Noise Level - $L_{den}$ – Day/Evening/Night	<p>A combination of <math>L_d</math>, <math>L_e</math> and <math>L_n</math> as follows:</p> $L_{den} = 10 * \log 1/24 \{ 12 * 10^{((L_{day})/10)} + 4 * 10^{((L_{evening}+5)/10)}$

<b>Term</b>	<b>Definition</b>
	$+ 8 * 10^{((L_{\text{night}}+10)/10)}$
Noise Mapping (Input) Data	Two broad categories: (1) Spatial (e.g. road centre lines, building outlines). (2) Attribute (e.g. vehicle flow, building height – assigned to specific spatial data)
Noise Mapping Software	Computer program that calculates required noise levels based on relevant input data
Noise Model	All the input data collated and held within a computer program to enable noise levels to be calculated.
Noise Model File	The (proprietary software specific) project file(s) comprising the noise model
Output Data	The noise outputs generated by the noise model
Processing Data	Any form of manipulation, correction, adjustment factoring, correcting, or other adjustment of data to make it fit for purpose. (Includes operations sometimes referred to as ‘cleaning’ of data)
QA	Quality Assurance
RMR	The railway noise calculation method published in the Netherlands in ‘Reken- en Meetvoorschrift Railverkeerslawaaai '96, Ministerie Volkshuisvesting, Ruimtelijke Ordening en Milieubeheer, 20 November 1996’.
Spatial (Input) Data	Information about the location, shape, and relationships among geographic features, for example road centre lines and buildings.
WG - AEN	Working Group – Assessment of Exposure to Noise
XPS 31-133	The French road traffic noise calculation method published in ‘NMPB-Routes-96 (SETRA-CERTULCPC-CSTB)’, referred to in ‘Arrêté du 5 mai 1995 relatif au bruit des infrastructures routières, Journal Officiel du 10 mai 1995, Article 6’ and in the French standard ‘XPS 31-133’.

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WG-HSEA	<a href="http://ec.europa.eu/environment/noise/health_effects.htm">http://ec.europa.eu/environment/noise/health_effects.htm</a>
WHO noise	<a href="http://www.euro.who.int/Noise">http://www.euro.who.int/Noise</a>
HARMONOISE	<a href="http://www.harmonoise.org/why.asp">http://www.harmonoise.org/why.asp</a>
IMAGINE	<a href="http://www.imagine-project.org/">http://www.imagine-project.org/</a>
SILENCE	<a href="http://www.silence-ip.org">http://www.silence-ip.org</a>
EffNoise	<a href="http://www.calm-network.com/bluebook/content/projects/p023.htm">http://www.calm-network.com/bluebook/content/projects/p023.htm</a>
QCity	<a href="http://www.qcity.org">http://www.qcity.org</a>
GOAL project	<a href="http://www.goal-graz.at">http://www.goal-graz.at</a>
SMILE	<a href="http://www.smile-europe.org">http://www.smile-europe.org</a>
SILVIA	<a href="http://www.trl.co.uk/silvia/Silvia/pages/index.html">http://www.trl.co.uk/silvia/Silvia/pages/index.html</a>
EUROCITIES	<a href="http://workinggroupnoise.web-log.nl">http://workinggroupnoise.web-log.nl</a>
NOMEports	<a href="http://nomeports.ecoports.com">http://nomeports.ecoports.com</a>
INQUEST	<a href="http://www.fehrl.org/inquest">http://www.fehrl.org/inquest</a>
HEATCO	<a href="http://heatco.ier.uni-stuttgart.de/">http://heatco.ier.uni-stuttgart.de/</a>
GLA Noise Strategy	<a href="http://www.london.gov.uk/mayor/strategies/noise">http://www.london.gov.uk/mayor/strategies/noise</a>

## Appendix C: Example Prioritisation Decision Support Matrix

A decision support matrix is a chart which enables identification, analysis and rating of the strength of relationships between various sets of information. It enables a number of different factors to be examined and facilitates the assessment of the relative importance of each.

Table 1 provides an example prioritisation decision support matrix.

**Table 1:** Decision support matrix

		Priority Matrix		
		Location:		
Decision Selection Criteria		Score Range Lden	Score Range Lnight	SubTotal
Noise Band(dB(A))	<45	5	6	
	45 - 49	4	5	
	50 - 54	3	4	
	55 - 59	2	2	
	60-64	1	3	
	65-69	2	4	
	70-74	3	5	
	75 - 79	4	6	
	>=80	5	7	
Type of Location	City Centre	1	1	
	Commercial	1	2	
	Residential	2	3	
	Noise Sensitive Location	3	3	
	Quiet Area	3	3	
	Recreational open space	2	2	
Type of Noise Source	Air	3	4	
	Industry	2	3	
	Rail	2	3	
	Road	3	4	
<b>Total Score</b>				<b>0</b>

**Note:** for Air noise the L<sub>DEN</sub> column is used with the L<sub>Aeq,16hr</sub> results.

The use of the table may be automated using a spreadsheet or database application, with each noise sensitive premises allocated to one of the “types of Location” categories, and the noise level at the most exposed façade scored as per the “noise Band” and the source scored as per the “Type of Noise Source”.

The scoring matrix could be applied to all locations within the results dataset from the strategic noise mapping, or could be pre-filtered to only include locations below the chosen “preservation” levels, and above the onset of assessment levels.

The process of scoring is undertaken separately for each of the relevant noise sources, to produce a short list per noise source.

An example of the use of the matrix for a residential property exposed to road traffic noise levels of 71 dB  $L_{DEN}$  and 63 dB  $L_{night}$  is shown in Table 2.

**Table 2:** Example of use of decision support matrix

		Priority Matrix		
		Location:		
Decision Selection Criteria		Score Range Lden	Score Range Lnight	SubTotal
Noise Band(dB(A))	<45	5	6	3
	45 - 49	4	5	
	50 - 54	3	4	
	55 - 59	2	2	
	60-64	1	3	
	65-69	2	4	
	70-74	3	5	
	75 - 79	4	6	
>=80	5	7	3	
Type of Location	City Centre	1	1	5
	Commercial	1	2	
	Residential	2	3	
	Noise Sensitive Location	3	3	
	Quiet Area	3	3	
Recreational open space	2	2		
Type of Noise Source	Air	3	4	7
	Industry	2	3	
	Rail	2	3	
	Road	3	4	
			<b>Total Score</b>	18

A score of approximately 17 or above indicates that the threshold levels have been exceeded and the location should be included in the shortlist for further assessment.

Optionally, MEPA may wish to add an additional weighting factor to include the number of residents.

## **Appendix D: Guidelines on the Information to be contained in Noise Action Plans**

The Draft Noise Action Plan must at least include the information required by Annex V of the Directive (see Box 2 and Section 2 above), and set out an approach to protect quiet areas. In addition the Draft Noise Action Plan should include, in a separate Appendix, the specific information that was relied upon to develop the Action Plan. In addition, MEAP shall prepare a summary of the Draft Noise Action Plan (not exceeding 10 pages in length).

The following is a framework setting out the information to be contained within a noise action plan. Any items not specifically mentioned in this framework, but which are mentioned in the main body of this report, the Regulations or Directive are still to be included.

### **Executive Summary**

#### **Table of Contents**

#### **1. Background/Introduction**

- 1.1 Purpose and Scope of the END Directive
- 1.2 Purpose and Scope of the Regulations
- 1.4 Roles and Responsibilities of designated bodies
- 1.5 Key Phases
  - Identification of areas required to be mapped.
  - Preparation of strategic noise maps
    - Purpose and scope
    - Extent/range
    - Noise Mapping bodies responsible
  - Development of the noise action plans.
    - Purpose and scope
    - Extent/range
    - Public participation and their role
  - Implementation of the plans (5 year time scale).

#### **2. Existing noise management legislation and guidance**

- 2.1 National legislation or guidance, including:
  - MEPA Act
  - IPPC,
  - Planning guidance,
  - Building Regulations etc
  - include description of any statutory limit values in place or in preparation etc

### **3. Description of the Action Planning Area**

- 3.1 Extent of the area (e.g., boundaries of the agglomeration and how this was defined. In relation to the extent of major roads outside of agglomerations, the action plans must extend to “near” these sources. Thus, there needs to be a clear definition given for “near”.
- 3.2 Description of the topography/ geographical location.
- 3.3 Description of the general population (numbers, distribution patterns, housing types (single dwelling, multi-dwellings, etc.).
- 3.4 Location of noise sensitive groups (e.g., schools, hospitals and other noise sensitive buildings and areas).
- 3.5 Description of the main infrastructure/services.

### **4. The Responsible Authority for Action Planning**

- 4.1 Name and contact details for the Responsible Authority
- 4.2 Description of other bodies of relevance
- 4.3 Description of associated working groups/steering groups, where relevant
- 4.4 Description of any noise-reduction measures already in force within the action planning area, or projects in preparation

### **5. Summary of the results of the noise mapping**

- 5.1 Overview of the preparation of the noise map
  - Who, when, where etc
  - Data sources
  - Methodology
- 5.2 Presentation of results
  - Noise contour maps for action planning area
  - Summary exposure statistics for action planning area
    - Area, dwellings and people in various noise bands, per source
- 5.3 Limitations of the maps/results (consideration should be given to the inclusion of measures to address these deficiencies as part of the implementation plan).

### **6. Identification of areas to be subjected to noise management activities**

- 6.1 Description of the criteria/ decision matrix to be used for the identification of areas qualifying for action
  - Confirmation of onset of assessment thresholds
  - Confirmation of protection thresholds for quiet areas
  - Confirmation of approach to determining Quiet Areas in agglomerations
  - Confirmation of approach to determining Quiet Areas in open country
- 6.2 Application of the criteria/matrix.

6.3 Results of the analyses, if available. If not available a commitment as to when they will be available.

## **7. Mitigation and protection measures**

- 7.1 Description of how areas above onset of assessment criteria will be processed
- 7.2 Description of how areas below protection threshold will be preserved
- 7.3 Description of how areas between the thresholds will be managed
- 7.4 Discuss any known future developments within the action planning area and describe how noise impact from these are / will be managed
- 7.5 Describe how extent of noise impact will be confirmed
- 7.6 Review of possible mitigation measures, where necessary
  - if locations not yet identified, discuss process and sources of examples
  - discuss potential for noise mitigations measures
  - discuss measures applicable at different levels of responsibility
  - discuss potential noise reduction achievable, and costs associated (if known)
- 7.7 Discuss how noise reduction effects of potential measures will be assessed
- 7.8 Discuss budgets, cost-effectiveness assessment, cost-benefit analysis etc.)
- 7.9 Outcome (selection of the most appropriate mitigation/protection measures).

## **8. Public Participation**

- Why, when, how. Submission / contact details etc.

## **9. Implementation Plan**

- Plan should span a five year period commencing in 2008 and finishing in 2013 and finish with next round of noise mapping and action planning
- 10.1 Roles and Responsibilities.
- 10.2 Targets and Objectives.
  - Long term aims / objectives / MEPA strategy regarding management of noise
  - Over next 5 years, and beyond to subsequent rounds
- 10.3 Programme of Works
  - broken down per year
- 10.4 Evaluation, Review and Corrective Action Programmes
  - Ongoing review:
    - This should state how often reviews of progress against the original programme of works will be undertaken,

- An evaluation of the outputs of the measures taken and any corrective actions/changes to the original programme to be undertaken as a result of the evaluation
- And who the responsible bodies are for this
- End of Program review:
  - A description of how the progress and results of the Action Plan will be evaluated and measured in 2013 when the second round action plan is drawn up

## 10. Summary and Conclusions

### **Appendix A:**

Glossary of acoustic and technical terms

### **Appendix B:**

Bibliography and references

### **Appendix C:**

Strategic noise map(s)

### **Appendix D:**

Overview / flow diagram of process for action planning decision making

### **Appendix E:**

Final / completed Decision/Selection Matrix

### **Appendix F:**

Public Consultation: Provide details of the public consultations organised in accordance with Article 9 (6) of the Regulations. This should include the following:

- Description of the consultations undertaken with the public on the proposed action plans including dates and duration of consultations and methods of consultation used e.g., newsletters, news paper articles, public meetings, website etc.
- The results of the public participation and how these were taken into account in the finalisation of the action plans.
- Description as to how the public were informed of the decisions taken in relation to the action plans.

***Note that the Regulations require that reasonable time frames be adopted to allow sufficient time for each stage of the public participation process.***

## Appendix E: Colour Scheme for Presentation of Noise Level Bands

The colour bands below are for use in the production of noise level contour maps. The colour bands are based upon those set out within ISO 1996-2 (1987). Furthermore, the colour bands should be made semi-transparent such that the base mapping below remains partly visible such that orientation and location remains possible.

Table E-1: Noise Level Bands for Maps of  $L_{den}$

Noise zone dB	Colour	Code	Red	Green	Blue
< 55	Transparent				
55 to 59	Orange 	# FF 66 00	255	102	0
60 to 64	Cinnabar 	# FF 33 33	255	51	51
65 to 69	Carmines 	# 99 00 33	153	0	51
70 to 74	Lilac red 	# AD 9A D6	173	154	214
$\geq 75$	Blue 	# 00 00 FF	0	0	255

Table E-2: Noise Level Bands for Maps of  $L_{night}$

Noise zone dB	Colour	Code	Red	Green	Blue
<45	Transparent				
45 to 49	Yellow 	# FF FF 00	255	255	0
50 to 54	Ochre 	# FF C7 4A	255	199	74
55 to 59	Orange 	# FF 66 00	255	102	0
60 to 64	Cinnabar 	# FF 33 33	255	51	51
65 to 69	Carmines 	# 99 00 33	153	0	51
$\geq 70$	Lilac red 	# AD 9A D6	173	154	214

**Notes:**

- Class boundaries be at .00, e.g. 55 to 59 is actually 55.00 to 59.99;
- The assessment and mapping of  $L_{night}$  values in the 45 to 49dB band is optional under the Directive; if results are not available, or are chosen not to be mapped, below 50dB  $L_{night}$ , the maps should show levels <50dB as transparent.