

# JORNADA SOBRE LA APLICACIÓN DE LA DIRECTIVA 2002/49/CE SOBRE EVALUACIÓN Y GESTIÓN DEL RUIDO AMBIENTAL.

***LAS SIGUIENTES FASES: EL MÉTODO CNOSSOS-EU***

Fernando Segués Echazarreta

CEDEX

# ANÁLISIS COMPARATIVO DE LOS RESULTADOS DE EXPOSICIÓN DE LA 1ª Y 2ª FASES

Se observaron considerables diferencias en los resultados debidas a

## DATOS DE ENTRADA

Definición de las aglomeraciones

Definición de los años de referencia de los datos: tráfico, población, etc.

Calidad de los datos geográficos y topográficos

Disponibilidad de datos meteorológicos

Calidad y extensión de los datos de fuentes sonoras

Calidad de los datos de población

## MÉTODOS DE EVALUACIÓN

Métodos de asignación de niveles de ruido a edificios

Métodos de cálculo de niveles sonoros

## SOFTWARE

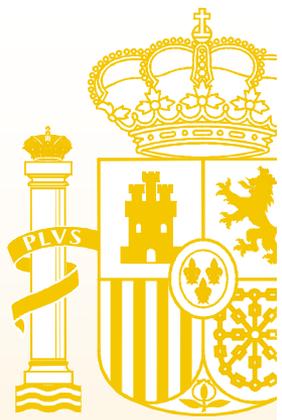
Implementaciones de los programas informáticos comerciales (softwares)

Valores y criterios por defecto de los diferentes “softwares”

## USUARIOS FINALES

Criterios de definición de los escenarios y condiciones de cálculo





# CNOSSOS-EU

## Common Noise Assessment Methods in Europe



### **Fase preparatoria: Diciembre 2009 –Mayo 2010**

- Revisión de métodos y primeros borradores
- Joint Research Centre (DG\_JRC) y grupos de expertos

### **Fase A (Noviembre 2010 - Marzo 2012):**

- Desarrollo de la metodología del CNOSSOS-EU
- Se involucra en el proceso el Noise Regulatory Committee NRC (desde Junio 2010)
- Se crea el “CNOSSOS-EU Technical Committee” con expertos de los Estados Miembros (2 expertos de España). Se crean los grupos de trabajo (WGs) (desde Noviembre 2010 a Marzo 2012)

### **Fase B (Junio 2012 – 2016):**

- Instrumentos, validación e implementación práctica del CNOSSOS-EU



# COMITÉ TÉCNICO CNOSSOS-EU

## GRUPOS DE TRABAJO

### Fase A

WG 1 (Quality framework)

WG 2 (Road traffic noise source emission)

WG 3 (Railway traffic noise emission)

WG 4 (Aircraft noise prediction)

WG 5 (Sound propagation and industrial noise source emission)

**WG 6 (Good practice guidelines)**

WG 9 (Revised electronic noise data reporting mechanism)

WG 10 (Assigning noise levels and population to buildings)

### Fase B

**WG 6 (Good practice guidelines)**

WG 7 (CNOSSOS-EU database)

WG 8 (CNOSSOS-EU reference software)

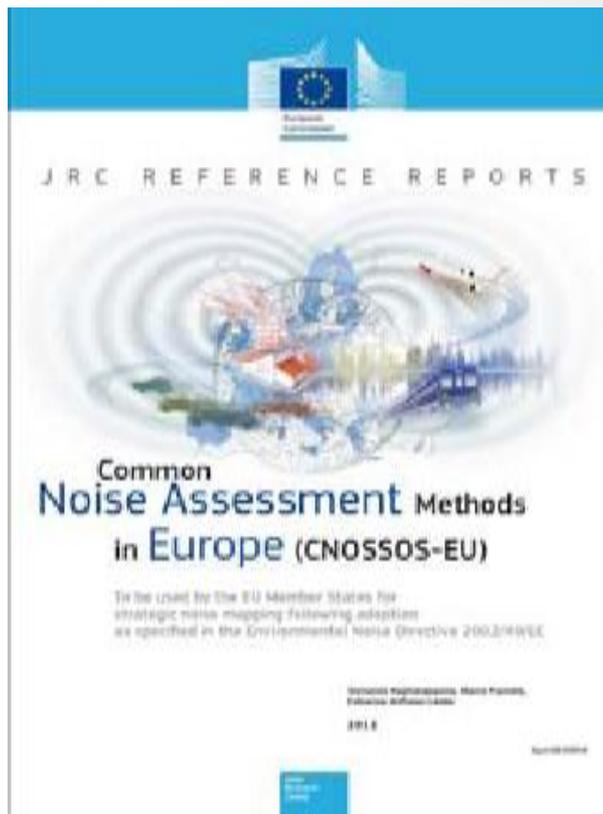
WG 11 (Burden of disease estimation) (*OMS - WHO*)

WG 12 (Pilot studies for CNOSSOS-EU validation)

WG 13 (Help desk and training for EU MS)

# INFORME FINAL DEL JOINT RESEARCH CENTRE SOBRE CNOSSOS-EU” (Septiembre 2012)

JRC Reference report on “Common Noise Assessment methods in EU (CNOSSOSEU) for strategic noise mapping”



[http://ihcp.jrc.ec.europa.eu/our\\_activities/public-health/env\\_noise](http://ihcp.jrc.ec.europa.eu/our_activities/public-health/env_noise)



# MÉTODO DE PROPAGACIÓN

## Selección definitiva

### Métodos analizados y comparados

HARMONOISE

NMPB 2008

ISO-9613-2

### Criterios de comparación

Precisión (Precision)

Exactitud (Accuracy)

Velocidad de cálculo

Flexibilidad

Simplicidad

Número de parámetros



# PRUEBAS (Test cases)

Case	Acronym	Note	Meteo	Meteo %	Ground	Barrier	Building	Slope	Short description
1.1	FR-Massiac	8 meteo cases	HOM&FAV	23%fav	ABS	NO	NO	YES	Countryside, open space
1.5	FR-Massiac	8 meteo cases	HOM&FAV	90%fav	ABS	NO	NO	YES	Countryside, open space
2.3	FR-MolsheimNord	10 meteo cases	HOM&FAV	38%fav	ABS	NO	NO	YES	Countryside, open space
2.8	FR-MolsheimNord	10 meteo cases	HOM&FAV	100%fav	ABS	NO	NO	YES	Countryside, open space
3.3	FR-MolsheimSud	6 meteo cases	HOM&FAV	19%fav	ABS	NO	NO	YES	Countryside, open space
3.5	FR-MolsheimSud	6 meteo cases	HOM&FAV	100%fav	ABS	NO	NO	YES	Countryside, open space
4.4	FR-Mulhouse	5 meteo cases	HOM&FAV	100%fav	ABS	NO	NO	YES	Countryside, open space
4.5	FR-Mulhouse	5 meteo cases	HOM&FAV	38%fav	ABS	NO	NO	YES	Countryside, open space
5.3	FR-SaintOmer	9 meteo cases	HOM&FAV	40%fav	ABS	NO	NO	YES	Countryside, open space
5.8	FR-SaintOmer	9 meteo cases	HOM&FAV	100%fav	ABS	NO	NO	YES	Countryside, open space
6	GR		HOM		REF	NO	NO	NO	Very near to a major road
7	1A		HOM		ABS	NO	NO	NO	Countryside, open space
8	1B		HOM		REF	NO	NO	NO	Countryside, open space
9	2C (ex 1C)		FAV		ABS	NO	YES	NO	Urban area, buildings
10	1D		FAV		REF	NO	NO	NO	Countryside, open space
11	2A		HOM		REF	NO	YES	NO	Urban area, buildings
12	2B		HOM		ABS	NO	YES	NO	Countryside, open space
13	3A		HOM		REF/ABS	YES	NO	NO	Countryside, noise barrier
14	3B		FAV		REF/ABS	YES	NO	NO	Countryside, noise barrier
15	4A		HOM		ABS	NO	NO	YES	Mountain
16	4B		FAV		ABS	NO	NO	YES	Mountain
17	AT-Road	Against calculated values	FAV		ABS	NO	NO	YES	Mountain, theoretical values
18	IT		HOM		REF	NO	YES	NO	Urban area, buildings

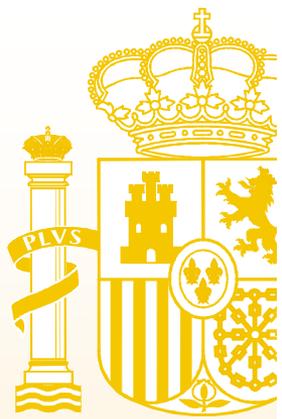


Figure 4 - FR- Mulhouse site

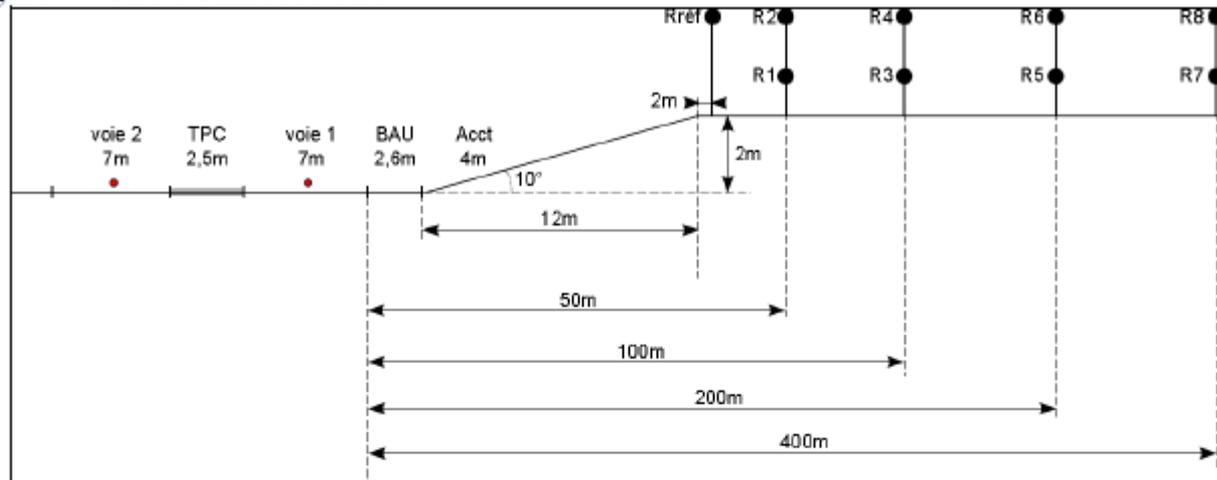
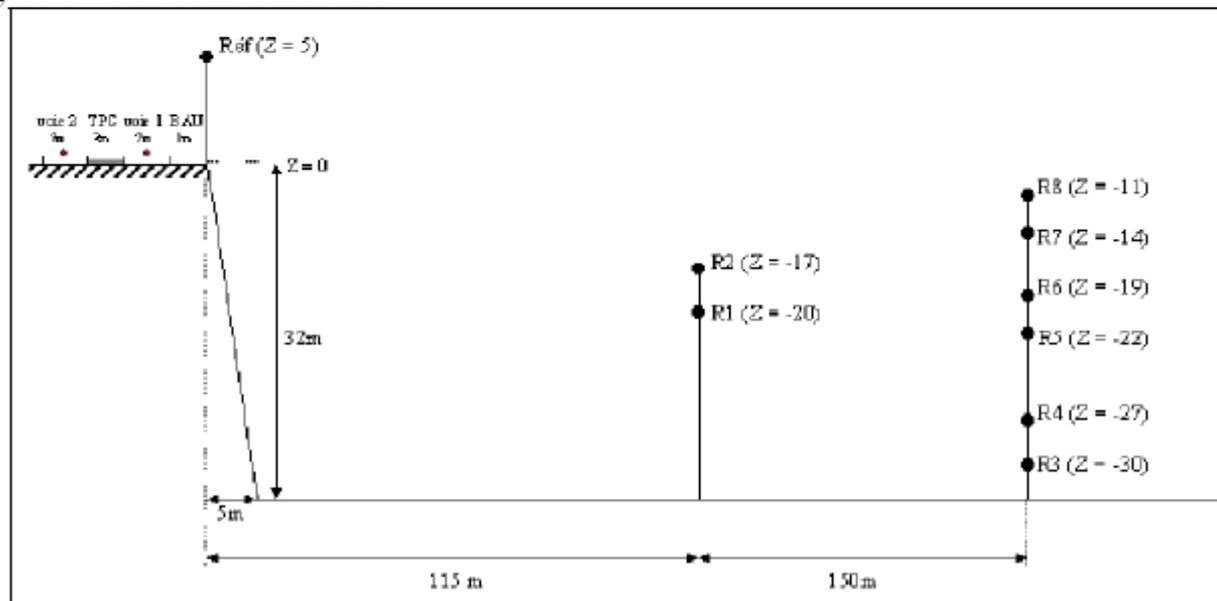
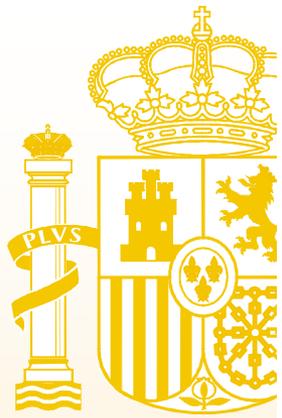


Figure 5 - FR-SaintOmer site





# RESULTADOS DE LAS PRUEBAS

**Precisión:** se facilitó un software de código abierto. Se consideran los tres métodos equivalentes

**Exactitud:** aproximadamente equivalentes, dependiendo de la complejidad de los casos testados

**Velocidad de cálculo:** Harmonoise requiere tiempos mucho mayores (hasta 20 veces). Ha sido determinante para su exclusión

**Flexibilidad:** El NMPB resulta algo más adaptado a las posibles situaciones que la ISO 9613-2

**Simplicidad:** equivalentes

**Número de parámetros:** los mismos



# RUIDO DEL TRÁFICO

## Categorías de vehículos

Table 4  
Road vehicle classes.

Category	Name	Description	Vehicle category in EC Whole Vehicle Type Approval <sup>a</sup>
1	Light motor vehicles	Passenger cars, delivery vans $\leq$ 3.5 tons, sport utility vehicles (SUVs), multi-purpose vehicles (MPVs) including trailers and caravans	M1 and N1
2	Medium heavy vehicles	Medium heavy vehicles, delivery vans > 3.5 tons, buses, motor home vehicles, etc. with two axles and twin tyre mounting on rear axle	M2, M3 and N2, N3
3	Heavy vehicles	Heavy duty vehicles, motor home vehicles, buses, with three or more axles	M2 and N2 with trailer, M3 and N3
4	Mopeds and motorcycles	4a Two-, three- and four-wheel mopeds 4b Motorcycles with and without sidecars, tricycles and quadricycles	L1e, L2e, L6e (UNECE R63) L3e, L4e (UNECE R41) L5e, L7e (UNECE R9).
5	Open category	To be defined according to future needs	N/A

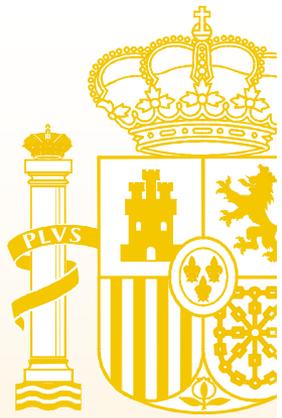
<sup>a</sup> Directive 2007/46/EC of the European Parliament and of the Council of 5 September 2007 (OJ L 263/1 9/10/2007) establishing a framework for the approval of motor vehicles and their trailers, and of systems, components and separate technical units intended for such vehicles.

## Emisión sonora

**Se consideran dos fuentes: rodadura y propulsión**

**Correcciones:**

- **Tipo de superficie**
- **Neumáticos con clavos**
- **Aceleraciones y deceleraciones**
- **Gradiente de la carretera**



# RUIDO FERROVIARIO

## Clasificación de trenes

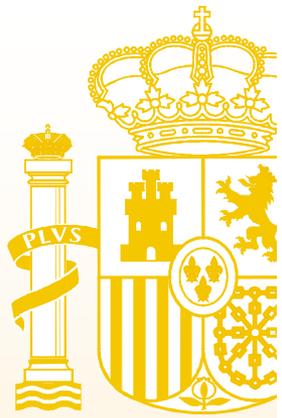
### Criterios:

- Tipo de vehículo
- Número de ejes por vehículo
- Tipo de frenos
- Ruedas

## Clasificación de vías

### Criterios:

- Tipo de vía
- Tipo de base (balasto, placa, etc.)
- Tipo de traviesa
- Uniones y juntas
- Rugosidad
- Etc.

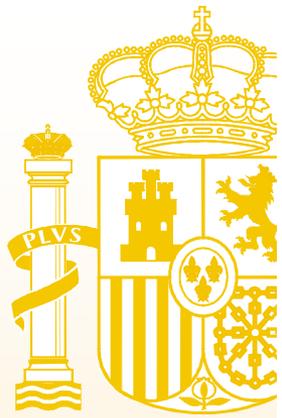


## **RUIDO INDUSTRIAL**

**Bases de datos proporcionadas por los Estados Miembros**

## **RUIDO AERONAUTICO**

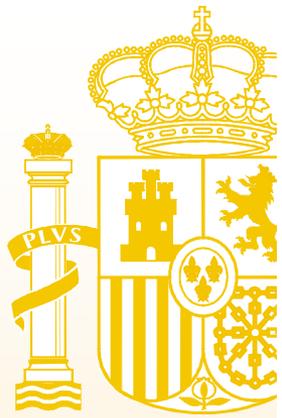
**Bases de datos: Base de datos ANP (Aircraft Noise and Performance) adpatada al ECAC Doc. 29**



## Crossos- EU

# JRC 2012 version 12 con el método de propagación NMPB 2008

-  AnnexI\_v12\_JRC2012\_final
-  APPENDIX\_A-E\_AIR\_final
-  APPENDIX\_F\_ROAD\_final
-  APPENDIX\_G\_RAILWAY\_final
-  APPENDIX\_H\_INDUSTRIAL\_final
-  APPENDIX\_I\_1\_AIR\_Aerodyn\_final
-  APPENDIX\_I\_2\_AIR\_Aircraft\_final
-  APPENDIX\_I\_3\_AIR\_Approach\_final
-  APPENDIX\_I\_4\_AIR\_Depar\_final
-  APPENDIX\_I\_5\_AIR\_Profiles\_final
-  APPENDIX\_I\_6\_AIR\_Weights\_final
-  APPENDIX\_I\_7\_AIR\_JetEngine\_final
-  APPENDIX\_I\_8\_AIR\_PropEngine\_final
-  APPENDIX\_I\_9\_AIR\_NPD\_final
-  APPENDIX\_I\_10\_AIR\_SpectClass\_final
-  APPENDIX\_I\_11\_AIR\_GeneralAvi\_final
-  APPENDIX\_I\_12\_AIR\_Helicopter\_final



## CNOSSOS-EU

### Usos previstos

**CNOSSOS-EU para los mapas estratégicos de ruido  
(obligatorio para la 4 fase)**

**CNOSSOS-EU para los planes de acción (*voluntario*)**

Algunos países han expresado su voluntad de empezar a utilizar CNOSSOS-EU para la 3ª fase de los Mapas Estratégicos de (2017), pero hay dudas de que pueda estar completamente operativo a tiempo (software comercial)

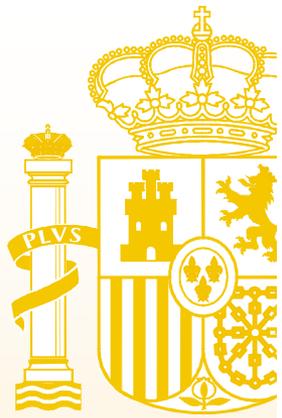
# Guía de uso de CNOSSOS-EU

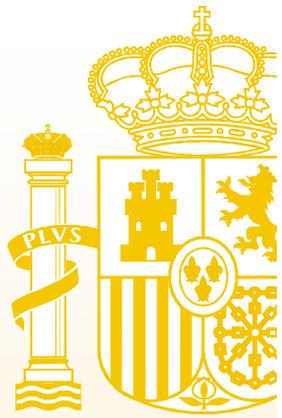
## Fines:

- Proporcionar una guía de uso obligatoria para la aplicación de CNOSSOS-EU para los Mapas Estratégicos de Ruido
- Disponer de una guía con recomendaciones, y compartir experiencias en la aplicación de CNOSSOS-EU para los Planes de Acción

## Características:

- Debería abarcar el proceso completo desde la definición de aglomeraciones y fuentes principales hasta la entrega de resultados
- Debería indicar el impacto de las diferencias en la calidad de los datos de entrada
- Debería proporcionar instrucciones para la evaluación de los datos de emisión
- Debería indicar cómo importar las bases de datos nacionales para su uso CNOSSOS-EU, y cómo se incorporan nuevos datos a las bases de datos CNOSSOS-EU
- Debería ser flexible para acomodarse a las situaciones locales y regionales
- Deberá poder ser gestionada y actualizada en el futuro, acorde a la evolución de CNOSSOS-EU (WG 13)





## Guía de uso de CNOSSOS-EU

### Contenido:

1. Introducción
2. Implementación de la Directiva END
3. Aplicación de CNOSSOS-EU
4. Visión general del proceso de elaboración de los MER
5. Areas de estudio (áreas de evaluación)
6. Métodos de cálculo del ruido – experiencias previas
7. GIS y especificaciones técnicas
8. Datos de entrada a los modelos
9. Cálculos de niveles sonoros
10. Medidas
11. Procesado final y análisis de resultados
12. Comunicación de datos y resultados (“Reporting”)

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## News

**Jul 5, 2010**[New guideline online](#)Category: *General*Posted by: *reinavi*

This is the text for the new guideline news.

## Home



Whereas the direct consequences of noise pollution lead to permanent hearing loss and impairments, the indirect health effects encompass a wide range of health complications resulting from increased anxiety, psychological distress, depression, and communication problems. In chronic cases this can result in cardiovascular problems.

The report highlights that:

- One in three Europeans experience annoyance during the daytime and one in five has disturbed sleep at night because of noise from roads, railways and airports.
- Traffic-related noise accounts for over 1 million healthy years of life lost annually to ill health, disability or early death in the western countries in the WHO European Region.

The report which was released on 30 March 2011 reviews the evidence of health effects consequent to noise exposure and estimates the burden of disease in western European countries. It also provides guidance on how best to quantify risks from environmental noise.

In order to reduce the health effects of environmental noise, the European Commission, the WHO/Europe and the European Environment Agency are collaborating closely to improve implementation of the 2010 [Parma Declaration](#) and the European Union's noise-related directives. JRC, on behalf of the European Commission's Environment Directorate-General, develops and coordinates the common noise assessment methodological framework (CNOSSOS-EU).

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[Aircraft noise source emission](#)

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[GIS and dataset specifications](#)

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▼ [Measurements](#)

▼ [Reporting of Results](#)

## Road noise source emission



CNOSSOS-EU is a framework of methods, which allows a two-level application according to the objective of the assessment. The first simplified level of application allows performing an overall impact assessment of exposure to noise in the context of strategic noise mapping as required by the END with reasonable approximations. At the second more sophisticated level of application, which requires a more precise determination of the noise levels, CNOSSOS-EU can also be used by the EU MS on a voluntary basis in its detailed version to assess the effectiveness of actions plans and potential new noise reduction measures.

For road noise, the methods allows calculation of noise levels of:

- Motorized road traffic sources, such as passenger cars, delivery vans and lorries, using standard infrastructure (road) including typical pavement types, both on main highroads, local and regional roads.

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      - ▶ **Speed - TOOLKIT**
      - Speed - DETAILS
      - No data available - TOOLKIT
    - ▼ Number and position of sources
    - ▼ Road Surface Type
    - ▼ Speed Fluctuation at Road Junctions
    - ▼ Road gradient
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  - ▼ Railway noise source emission
  - Industrial noise source emission
  - Aircraft noise source emission
  - Sound propagation
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  - ▼ Measurements

### Speed - TOOLKIT

Available information	Complexity	Accuracy	Cost	Use
Speed for day, evening and night	Low	<0.5 dB	Low	<input type="radio"/>
Speed for each hour of the day	Low	<0.5 dB	Medium	<input checked="" type="radio"/>
Speed for day and night	Low	<0.5 dB	High	<input type="radio"/>
Traffic speed for an 18-hour day or a full 24-hour day (or longer period of time)	Low	1 dB	High	<input type="radio"/>
Speed for weekdays	Low	<0.5 dB	High	<input type="radio"/>

Available information	Complexity	Accuracy	Cost	Use
+/- 5 km/h	High	<0.5 dB	Medium	<input type="radio"/>
+/- 10 km/h	Low	1 dB	Medium	<input checked="" type="radio"/>
+/- 20 km/h	Low	2 dB	Low	<input type="radio"/>

For more details please click [HERE](#)

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▼ Composition of road traffic

▶ **Speed**

▶ **Speed - TOOLKIT**

**Speed - DETAILS**

No data available - TOOLKIT

▼ Number and position of sources

▼ Road Surface Type

▼ Speed Fluctuation at Road Junctions

▼ Road gradient

▼ Roads - Hints

▼ Railway noise source emission

Industrial noise source emission

Aircraft noise source emission

Sound propagation

GIS and dataset specifications

▼ Noise levels calculations

▼ Measurements

▼ Reception of Results

## Speed - DETAILS

### General discussion

It will generally be impractical for Member States to make traffic flow, composition and speed measurements for all the roads covered by the END. Therefore, it is likely that most Member States will use traffic models as the basis of obtaining a lot of this data for strategic noise mapping purposes (especially for agglomerations). These models often only provide peak hour flow and composition data and journey time speeds. Such data cannot be used directly for the calculation of the Lden and Lnight indicators and, therefore, need to be factored to provide long-term day, evening and night data. There are several possibilities for doing this, for example, by using the traffic data that has been measured to develop, validate or maintain a traffic model. From such measurements it may be possible to produce conversion factors for various categories of roads that can then be used to estimate the day, evening and night-time flow on these roads. Alternatively, such conversion factors could be developed from long-term flow and speed measurement studies specifically undertaken for this purpose.

Road traffic models often provide traffic speeds that are based on journey times. These speeds include the delay experienced at junctions, traffic lights etc. For strategic noise mapping, the average speed on free flowing sections of the road is generally required.

Traffic flows and speeds are frequently not readily available for every lane of multi-lane road corridors and occasionally may not even be available for each direction. Alternative ways of assigning flows and speeds in such circumstances are discussed below: Assignment by lane. Where data is available for each lane of a multi-lane corridor and this shows that there is a significant difference between the traffic data for each lane it may be appropriate to assign different data to each lane. It may be important to do this where reception points are close to the road or when the immediate surroundings of the road may have a strong influence on noise propagation (for example, where a road is in a cutting or on an embankment). Assignment by direction. This is normally necessary and particularly so when it is known that traffic data for the different directions are significantly different or when the road gradient may significantly affect the noise emission (as determined by the model being used but typically when the gradient is greater than 3%). Assignment by road. In this case a combined two-way flow is assigned to a multi-lane road (normally to the centre line of the road corridor). This is generally only acceptable for strategic assessment when the road gradient is not important (as determined by the model being used but typically when the gradient is less than 3%).

Annex IV (3) of the END indicates that noise maps for agglomerations have to place a special emphasis on road traffic. A strict interpretation of the END could mean that all roads in agglomerations have to be mapped. However, no advice is provided on how to deal with speed on low flow roads where reliable flow data is unavailable, or indeed on which low flow roads need to be mapped.

### Low flow roads

Level 4



## ACCIONES EN MARCHA Y PREVISTAS en relación a la implementación de la Directiva 2002/49/CE

Finalizar el proceso administrativo de revisión del Anexo II de la Directiva

Adaptar e incluir CNOSSOS-EU en los softwares comerciales

Avanzar en la guía de uso de CNOSSOS-EU

Definir las zonas tranquilas

Planes de acción contra el ruido ????



## AREAS TRANQUILAS

### **Directiva 2002/49/CE (traspuesto por RD 1513)**

Artículo 8 (RD 1513 artículo 10): los planes de acción de las aglomeraciones de más de 250.000 habitantes tendrán por objeto también proteger las zonas tranquilas

Los planes de acción cumplirán los requisitos mínimos del Anexo V

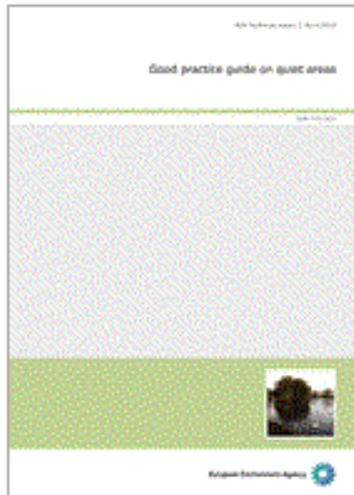
Anexo V: Los PAR incluirán actuaciones previstas por las autoridades competentes dentro de los cinco próximos años, **incluidas medidas para proteger las zonas tranquilas**



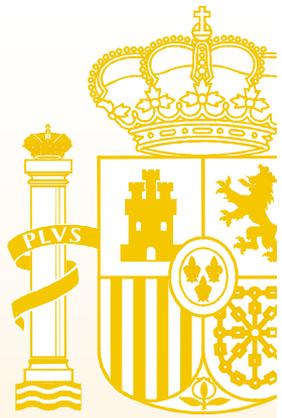
# AREAS TRANQUILAS

La EEA ha publicado una guía

## Technical report No 4/2014



Noise pollution is a growing problem for Europe's environment. Transport and industry are the main sources of concern and long term exposure can damage human health and adversely affect ecosystems. European legislation aims to reduce noise pollution and also highlights the need to preserve areas that are currently unaffected. These so called quiet areas may be found, not only in rural areas, but also inside our busiest cities. They are not only where people recreate, but also where they live and work, so how can they be identified and preserved in order to protect environmental health and well-being? This report offers a digest of actions from all across Europe to identify and protect environments with good acoustic quality.



## AREAS TRANQUILAS

Dentro de aglomeraciones:

Es donde más se ha avanzado. Se definen a nivel local con conocimiento de la situación muy detallado. Son bastantes las aglomeraciones europeas (entre ellas algunas españolas) que las han definido

Fuera de aglomeraciones: Hay muy pocos ejemplos, y existen muchas dudas respecto a su consideración y gestión

Las guías trabajan en la siguiente línea

- Establecer una superficie mínima
- Establecer unos valores límite de indicadores de ruido
- Establecer usos posibles y permitidos

Existe bastante controversia, incluso en su propia definición



## RECORDATORIO

Preparar la lista de aglomeraciones, aeropuertos, carreteras y líneas ferroviarias para la tercera fase

En las infraestructuras lineales es necesario definir UMEs, es decir, segmentos de carretera o línea ferroviaria que forman una unidad de mapa. Se les asigna un código.

No es suficiente con enviar los listados de tráficos utilizados en otros campos.

En las líneas ferroviarias, la definición de las UMEs está ligada a la infraestructura no a la explotación de líneas

**ENTREGA DE MAPAS EN 2017**  
**ENTREGA DE PLANES EN 2018**