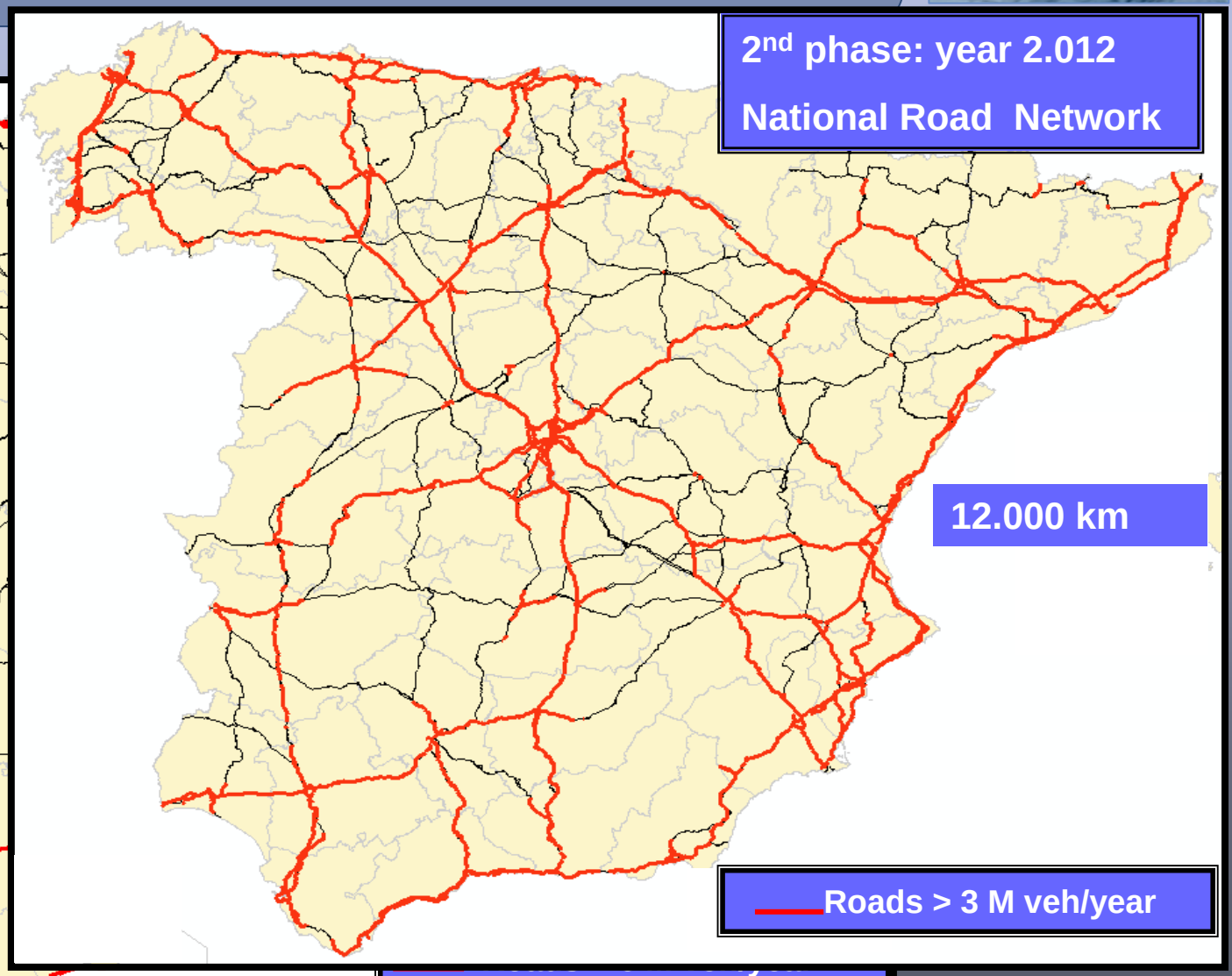
From Strategic Noise Maps to Action Plan: perspective of Spanish Main Roads

María Dolores Jiménez — *General Directorate of Roads*
Jesús Rubio — *General Directorate of Roads*
Fernando Segués — *CEDEX*
Pilar Fernández — *TECNALIA LABEIN*

From Strategic Noise Maps to Action Plan: perspective of Spanish Main Roads

STRATEGIC NOISE MAPS



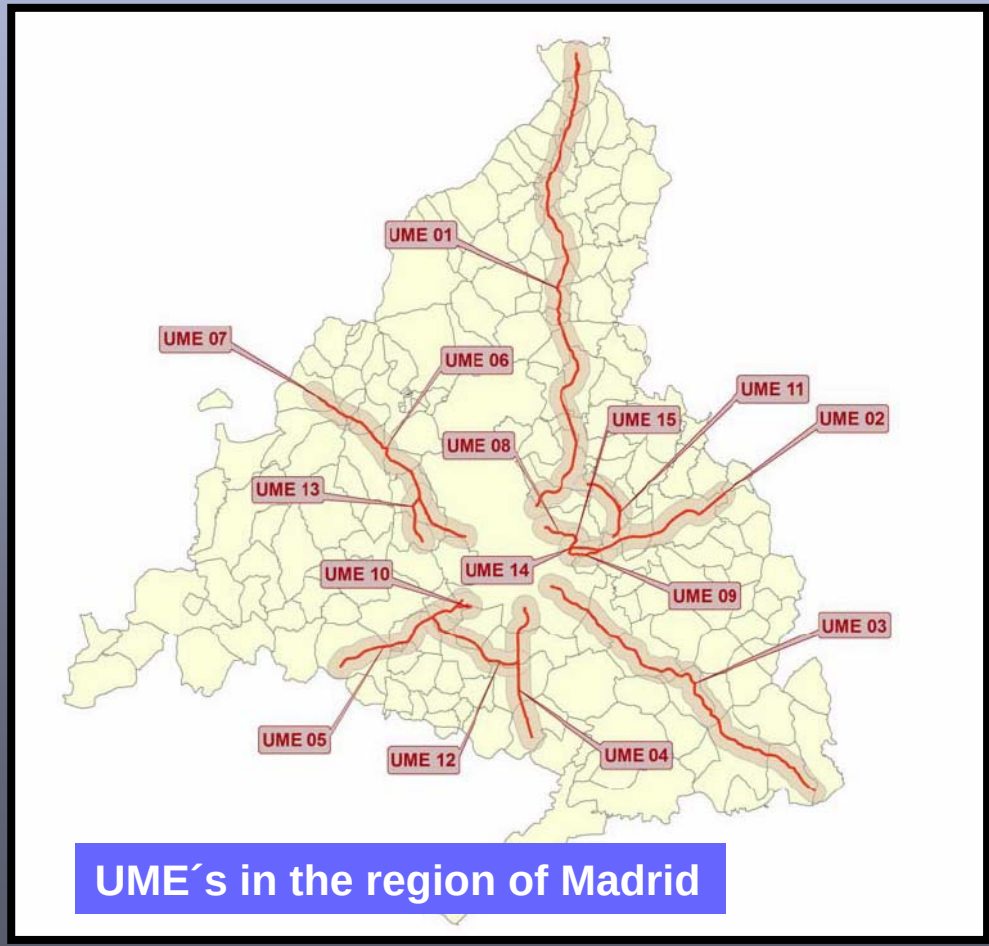
From Strategic Noise Maps to Action Plan: perspective of Spanish Main Roads

STRATEGIC NOISE MAPS

The first concern is to define a **Unit of Strategic Map (UME)** of each road.

The **criteria** are continuity and geometric design of the roadway.

All the information that the END requests of exposed population, dwellings, schools and hospitals, is **analyzed for each UME separately.**



UME´s in the region of Madrid

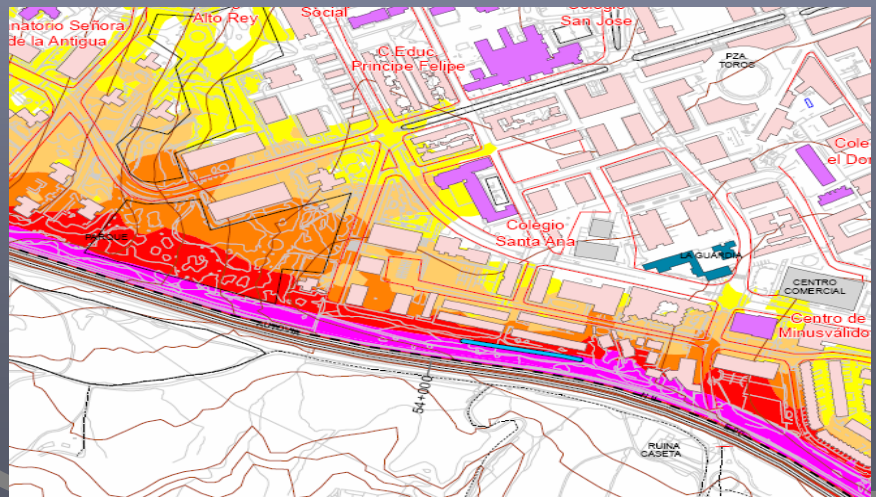
From Strategic Noise Maps to Action Plan: perspective of Spanish Main Roads

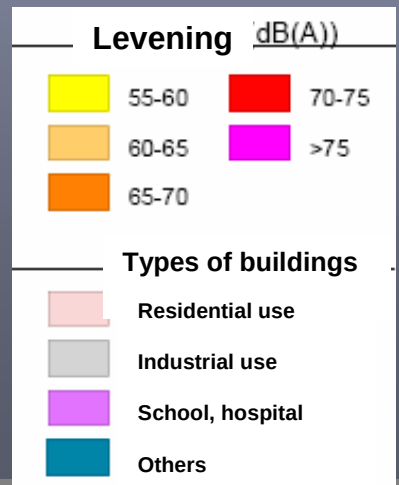
STRATEGIC NOISE MAPS

The General Directorate of Roads has carried out 20 studies. Each study includes several major roads of a region.

The strategic noise maps are presented as graphical plots with numerical data in tables of the number of people, dwellings, schools and hospitals that are exposed to specific values of the indicator L_{den} and L_{night}.

In addition, the same analysis is done for the indicators L_{day} and $L_{evening}$.





From Strategic Noise Maps to Action Plan: perspective of Spanish Main Roads
THE CREATION OF EGRA

The strategic noise maps of the national roads are available in the website www.cedex.es/egra

All the information can be consulted and downloaded from this website.

In each study there is a description of each UME that has more than 6 M annual vehicles.

REGION OF CANTABRIA

The zone of study is located in the region of Cantabria. In a first approach two corridors can be distinguished. They go from East to West and North to South and they intersect at Torrelavega, where all road sections of this study ara located.

From East to West, the study area begins in the limit with the Province of Biscay and finalizes in the neighborhoods of Cabezón de la Sal. From North to South, the corridor begins in Santander and finalizes in Los Corrales de Buelma.

Press the image to see the distribution of IGN sheets

The study has been divided in the following seven UME's:

- **UME 01. S-10**, (old N-635), from the access to Santander to Astillero, PK, 2,010 to PK. 7,090.
- **UME 02. S-20**, from north access to Santander to Bezana, PK. 0,000 to PK. 5,150.

From Strategic Noise Maps to Action Plan: perspective of Spanish Main Roads
THE CREATION OF EGRA

The information that requires END is in EGRA:

- **A report summary that summarizes the main characteristics of the study**
- **Maps of noise**

From Strategic Noise Maps to Action Plan: perspective of Spanish Main Roads
THE CREATION OF EGRA

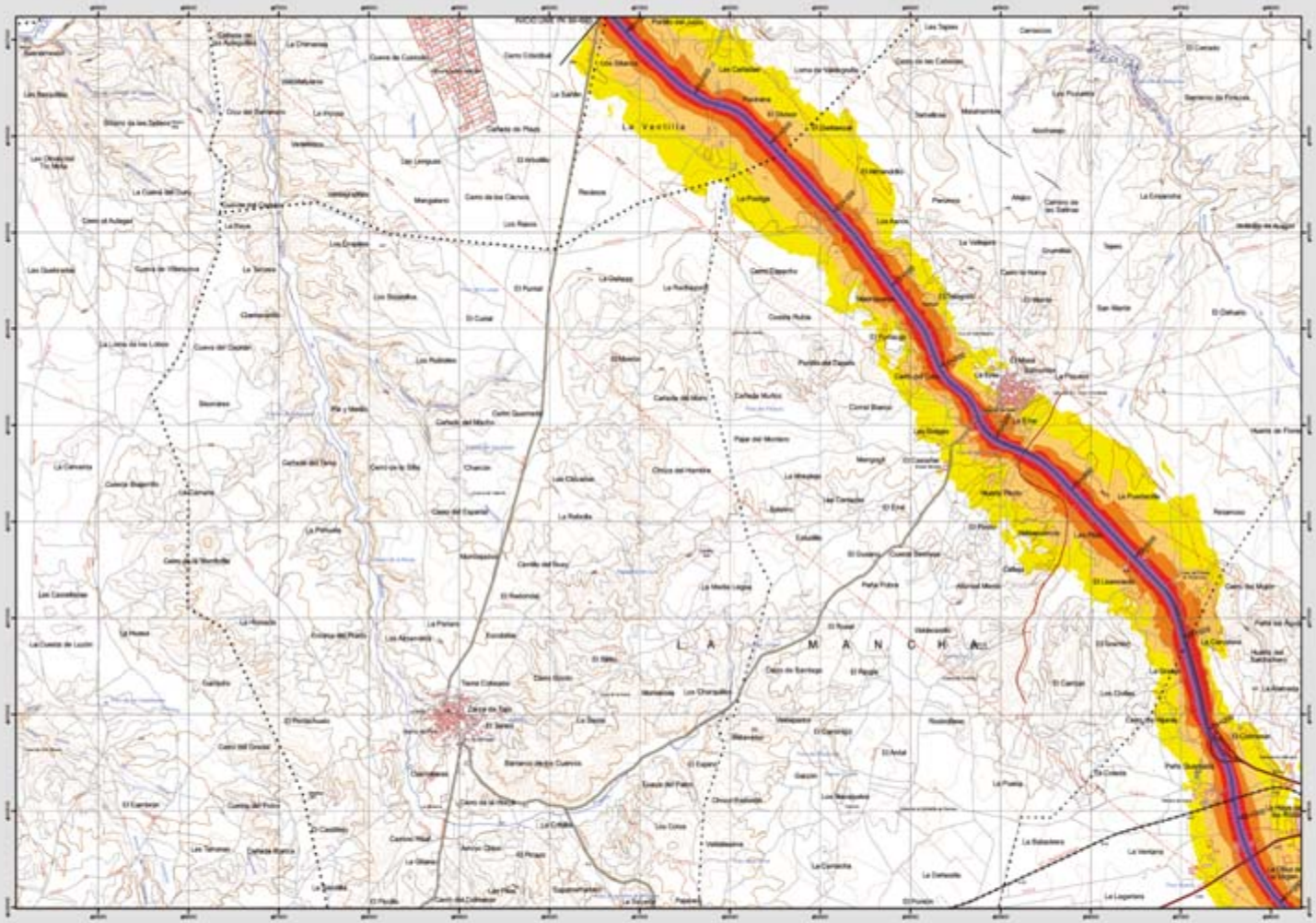
Maps of noise.

There are three types of maps for each UME standardized according to the Spanish sheet division of the National Geographic Institute:

- **Noise map of isophones Lden**
- **Noise map of isophones Lnight**
- **Map of affected zone.**

It contains information related to Lden and includes a table with the number of people, dwellings and surfaces exposed to Lden values higher than 55, 65 and 75 dB.

Belinchón

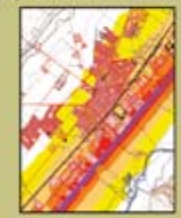


607 - III

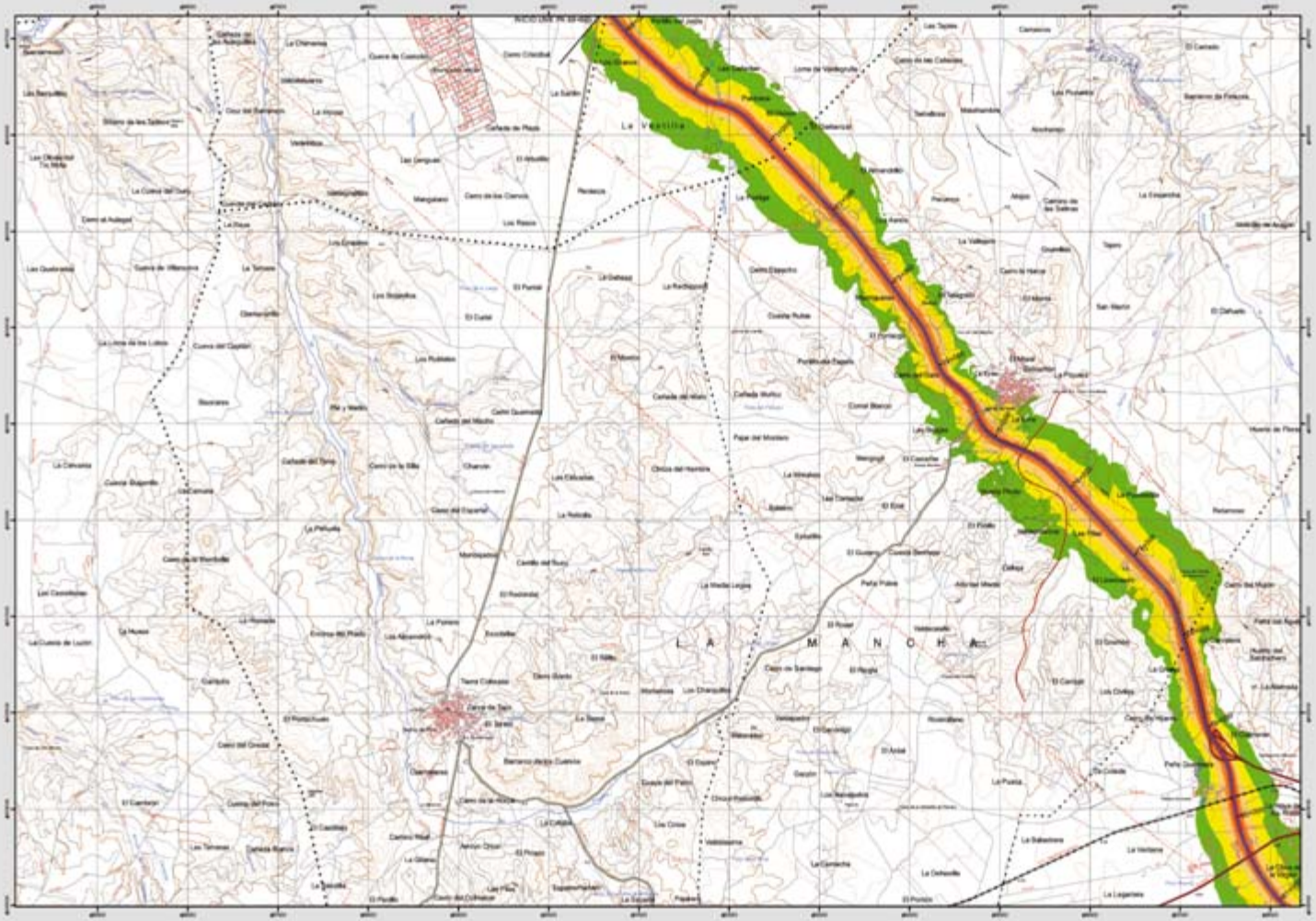
Belinchón

MAPA ESTRATÉGICO DE RUIDO
CASTILLA-LA MANCHA. CORREDORES A-3 Y A-4
UNIDAD DE MAPA ESTRATÉGICO A-3-01

Mapa de niveles sonoros Lden



Belinchón



607 - III

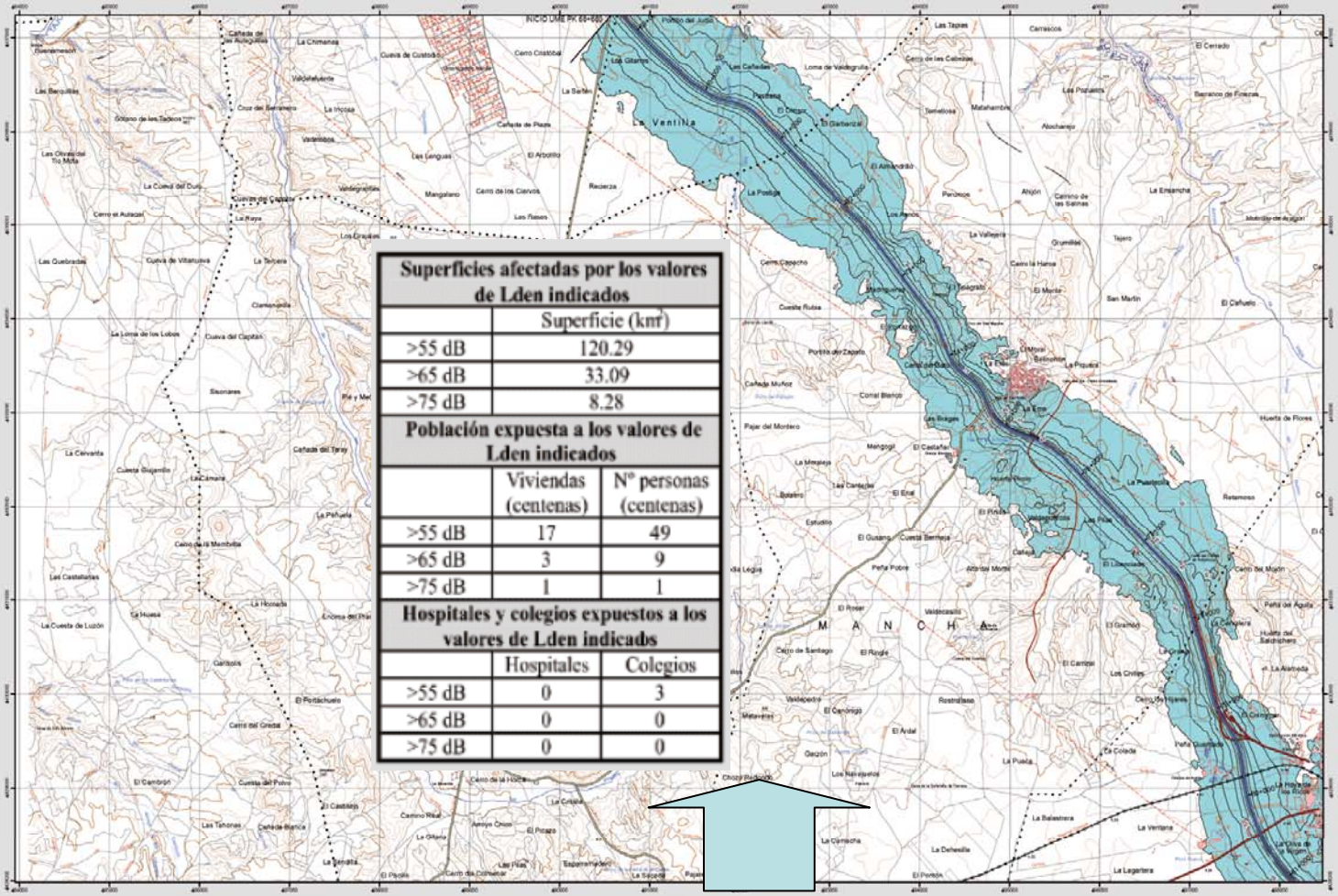
Belinchón

MAPA ESTRATÉGICO DE RUIDO
CASTILLA-LA MANCHA: CORREDORES A-3 Y A-4
UNIDAD DE MAPA ESTRATÉGICO A-043

Mapa de niveles sonoros Lnoche

1 : 25.000

Belinchón



Superficies afectadas por los valores de Lden indicados		
	Superficie (km²)	
>55 dB	120.29	
>65 dB	33.09	
>75 dB	8.28	
Población expuesta a los valores de Lden indicados		
	Viviendas (centenas)	Nº personas (centenas)
>55 dB	17	49
>65 dB	3	9
>75 dB	1	1
Hospitales y colegios expuestos a los valores de Lden indicados		
	Hospitales	Colegios
>55 dB	0	3
>65 dB	0	0
>75 dB	0	0

Superficies afectadas por los valores de Lden indicados		
	Superficie (km²)	
>55 dB	120.29	
>65 dB	33.09	
>75 dB	8.28	
Población expuesta a los valores de Lden indicados		
	Viviendas (centenas)	Nº personas (centenas)
>55 dB	17	49
>65 dB	3	9
>75 dB	1	1
Hospitales y colegios expuestos a los valores de Lden indicados		
	Hospitales	Colegios
>55 dB	0	3
>65 dB	0	0
>75 dB	0	0

607 - III

Belinchón

MAPA ESTRATÉGICO DE RUIDO
CASTILLA-LA MANCHA: CORREDORES A-31/A-3
UNIDAD DE MAPA ESTRATÉGICO A3-01

Escala 1 : 25.000

Mapa de Zona de Afección

Ministerio de Fomento

SECRETARÍA DE ESTADO DE INFRAESTRUCTURAS Y PLANIFICACIÓN
DIRECCIÓN GENERAL DE CARRETERAS
SUBDIRECCIÓN GENERAL DE PLANIFICACIÓN

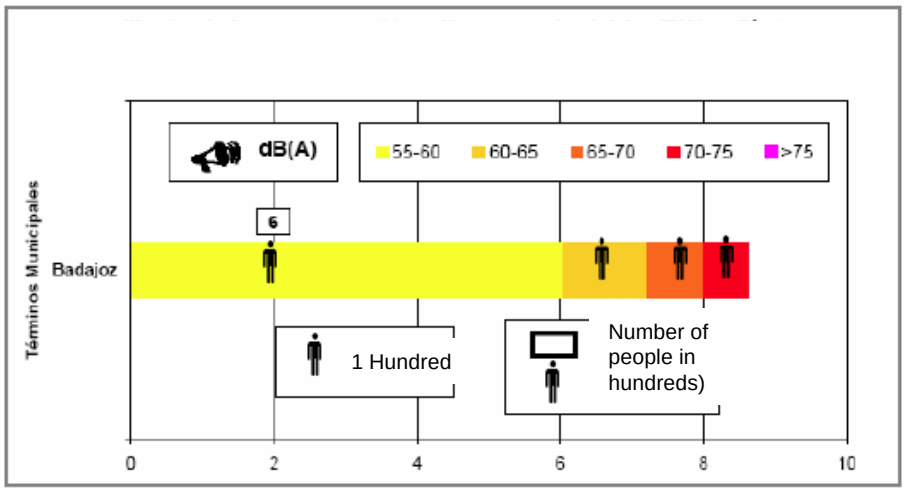
egra

From Strategic Noise Maps to Action Plan: perspective of Spanish Main Roads
THE CREATION OF EGRA

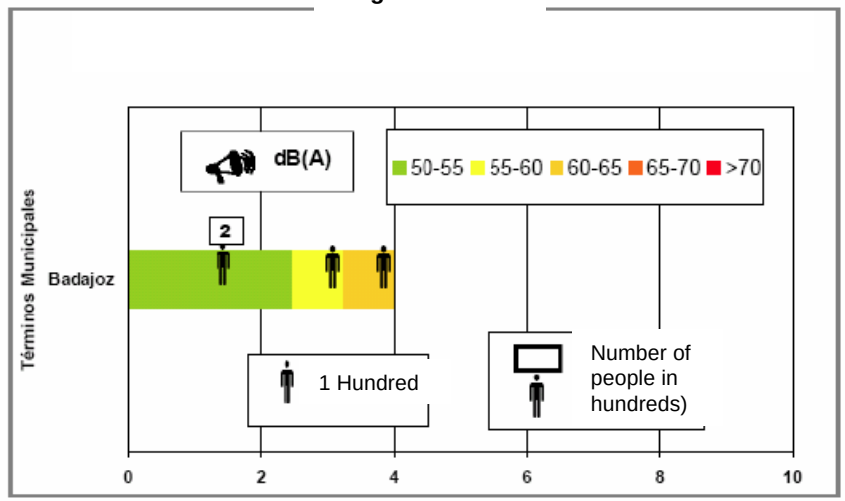
Each Unit of Strategic map presents a table with the population exposed to the indicators, Lden and Lnight in 5 dB ranges.

Example of tables with the number of people (in hundreds) exposed to bands of Lden and Lnight.

Lden UME 6



Lnight UME 6



From Strategic Noise Maps to Action Plan: perspective of Spanish Main Roads
DIAGNOSIS AND ACTION PLAN

The report summary is a document that summarizes:

- **the main characteristics of the study**
- **the local and regional legislation in the zone**
- **the description of the roads, and an analysis of the conflict areas with the possible solutions.**

Process:

1. **The identification of the most exposed zones**
2. **To establish a diagnosis**

From Strategic Noise Maps to Action Plan: perspective of Spanish Main Roads

DIAGNOSIS AND ACTION PLAN

CONFLICT ZONES						
UME	**Length**	**Name Conflict Zone**	**Lenth (meters)**	**% UME length**	**Conflict**	**Proposal**
S-10	5.080	Maliño	1.000	7 %	Population closet o the road	Noise Barrier
		Astillero	1.500	29 %	High number of dwellings near to the road	Complex solution
S-20	5.150	Santander	1.000	20 %	New buildings. Close to a future technologic park	New buildings in the future, noise barriers
N-623	6.780	Murieras	1.000	14 %	Dispersion of people.	Complex solution
A-67-01	12.500	Los Corrales de Buelna	1.000	9 %	Buildings with different heights	There are noise barriers

From Strategic Noise Maps to Action Plan: perspective of Spanish Main Roads
DIAGNOSIS AND ACTION PLAN

The possible solutions in the exposed areas are the followings:

- **Acoustical barriers**

- **“Other complex solutions”**

The solution should be taken not only by the road, but also by the other sources.

The joint of these proposals will form the action plan and will provide the effective tools for noise pollution abatement.

From Strategic Noise Maps to Action Plan: perspective of Spanish Main Roads
DIAGNOSIS AND ACTION PLAN

Criteria applied in the noise protection.

The criteria applied are not universal for the whole road network. Although the source –the road- the terrain and the buildings are perfectly defined, different cases appear to define a typology of situations and solutions.

The criteria have been based on the number of people exposed to the L_{night} indicator of 55 dB in consolidated residential zones and the number of schools exposed to levels of 60 dB L_{day} and the number of hospitals. This new parameter is called exposure degree. This parameter takes into account the sensitive land uses to protect them from noise pollution.

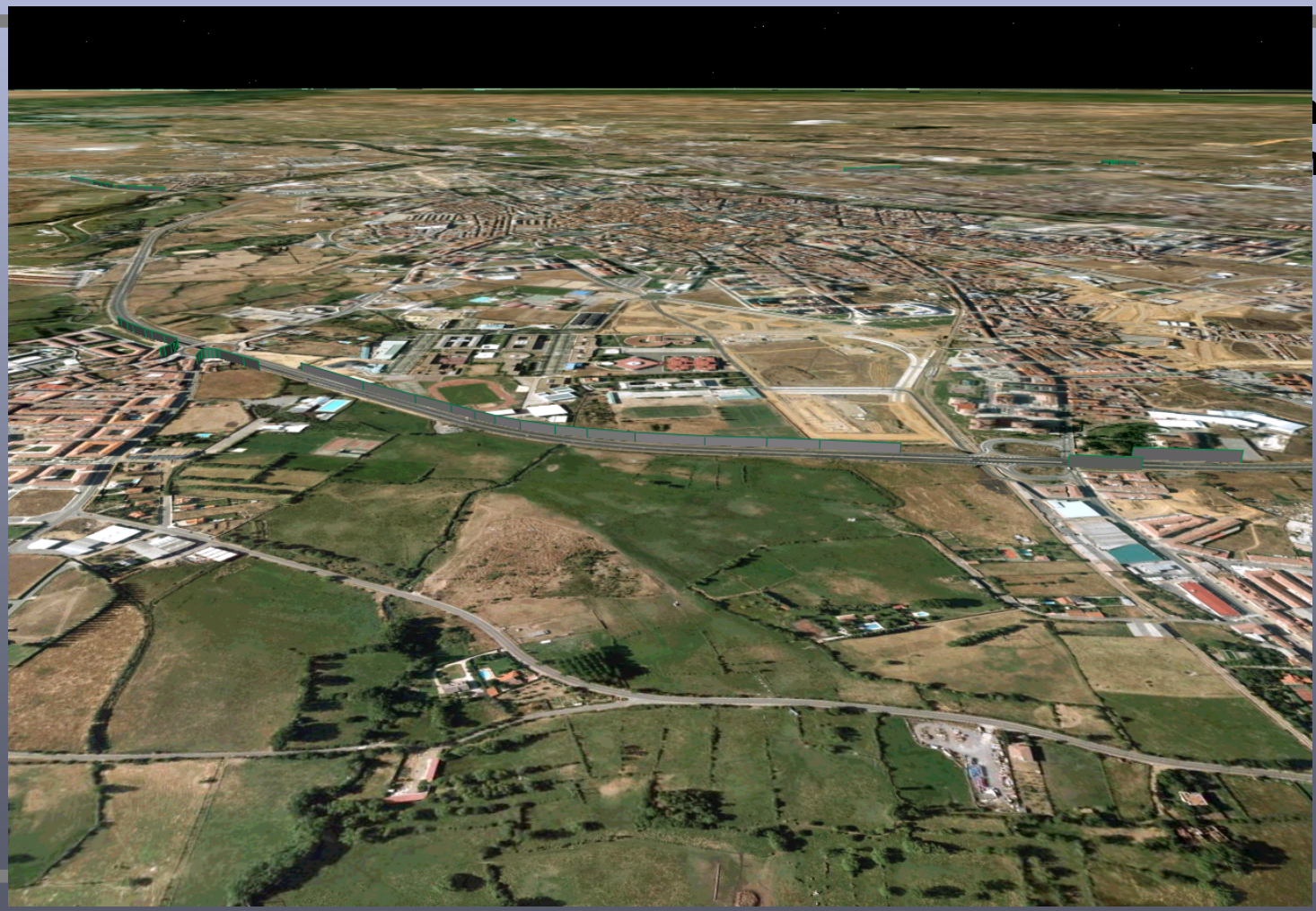
From Strategic Noise Maps to Action Plan: perspective of Spanish Main Roads
DIAGNOSIS AND ACTION PLAN

- **When the area has mainly residential use:**

Prop **or** **L_{nigh}**

From Strategic Noise Maps to Action Plan: perspective of Spanish Main Roads

DIAGNOSIS AND ACTION PLAN



From Strategic Noise Maps to Action Plan: perspective of Spanish Main Roads

DIAGNOSIS AND ACTION PLAN

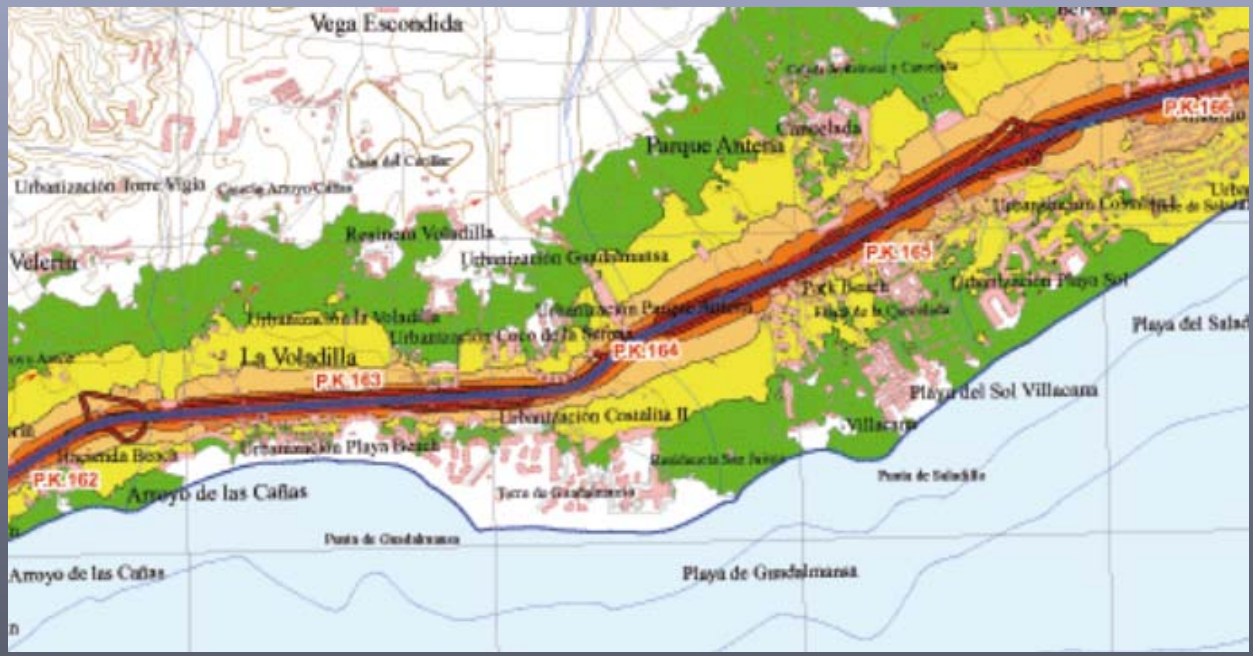
From Strategic Noise Maps to Action Plan: perspective of Spanish Main Roads

DIAGNOSIS AND ACTION PLAN

- 

From Strategic Noise Maps to Action Plan: perspective of Spanish Main Roads
DIAGNOSIS AND ACTION PLAN

- **“SECOND RESIDENCES”**



From Strategic Noise Maps to Action Plan: perspective of Spanish Main Roads

DIAGNOSIS AND ACTION PLAN

From Strategic Noise Maps to Action Plan: perspective of Spanish Main Roads
DIAGNOSIS AND ACTION PLAN

Priorities in the proposals

A new concept is established and it is called "environmental benefit" or "sonorous benefit".

It means the effectiveness forecast for the implementation of the solution. Noise barriers can be extremely effective tools for noise pollution abatement, but certain locations and topographies are not suitable for use of any reasonable noise barrier.

From Strategic Noise Maps to Action Plan: perspective of Spanish Main Roads
DIAGNOSIS AND ACTION PLAN

Priorities in the proposals

The **environmental benefit is high** when it is expected to obtain good results with the execution;

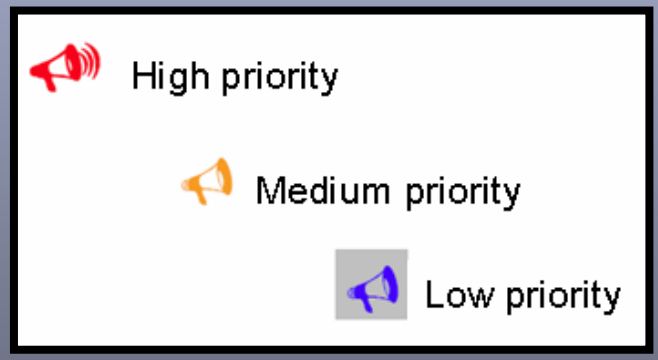
The **environmental benefit is medium** when it is expected to obtain an improvement on the current situation although this improvement is not able to eliminate the affection totally.

The **environmental benefit is low** when it is foreseen that the improvements obtained with these solutions are going to be limited.

From Strategic Noise Maps to Action Plan: perspective of Spanish Main Roads
DIAGNOSIS AND ACTION PLAN

Based on the exposure degree and the effectiveness in the implementation of the solution or environmental benefit, priorities are established classified in three levels: high, medium or low.

Finally, NEXT STEPS…



From Strategic Noise Maps to Action Plan: perspective of Spanish Main Roads

DIAGNOSIS AND ACTION PLAN

UME	PK	Name	Edge	Building type	Length (meters)	Proposal	Priority
A-66	12	La Vega	Right	Detached, 1-2 heights	200	Noise barrier	
A-66	14	Santa Rosa	Right	Semidetached, 1-2 heights	250	Noise barrier	
A-66	18	Fonciello	Left	School	100	Noise barrier	
A-66	21,5	La Fresneda	Boths	Buildings of 4-5 heights	700	Complex solution	

From Strategic Noise Maps to Action Plan: perspective of Spanish Main Roads

SUMMARY AND CONCLUSIONS

In the studies made in 6.000 kilometres of the Spanish national road network there have been detected zones with consolidated constructions, distinguishing residential, sanitary and educative uses and determining the possible solutions for each UME.

An **action priority** has been marked where it is estimated that the noise affects more population and a priority classified in three levels (high, medium and low) is marked.

From Strategic Noise Maps to Action Plan: perspective of Spanish Main Roads
SUMMARY AND CONCLUSIONS

The exposure population, the presence of specific buildings (hospitals and schools), the indicator named as a **exposure degree,** - index defined by the values of exposed population to Lnight by unit of length and the number of schools exposed to Lday by km of length, and the number of hospitals exposed to noise during the three periods (day-evening and night)- and the **viability of the proposals**, are defined in these studies.

A priority has been established for each area.

The priority weighs the necessity of an action and the viability and the effectiveness of the proposal.

From Strategic Noise Maps to Action Plan: perspective of Spanish Main Roads

CONCLUSIONS

1. It is underlined the importance of the creation of a website to exchange information of the strategic maps of environmental noise.

2. It is necessary to have a tool that allows evaluating the benefit of the measures and to establish priorities in the proposals.

3. The criteria established in the noise maps have been specific for each zone. It is necessary to define a reference parameter to evaluate the efficiency of the propose measures.

4. It is necessary to incorporate a pursuit so that once the noise barriers are built, the effect of the measurements should be quantified.

From Strategic Noise Maps to Action Plan: perspective of Spanish Main Roads

From Strategic Noise Maps to Action Plan: perspective of Spanish Main Roads