



# White Roads EU PROJECT

Final Report (D 0.3)



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## 1. INTRODUCTION

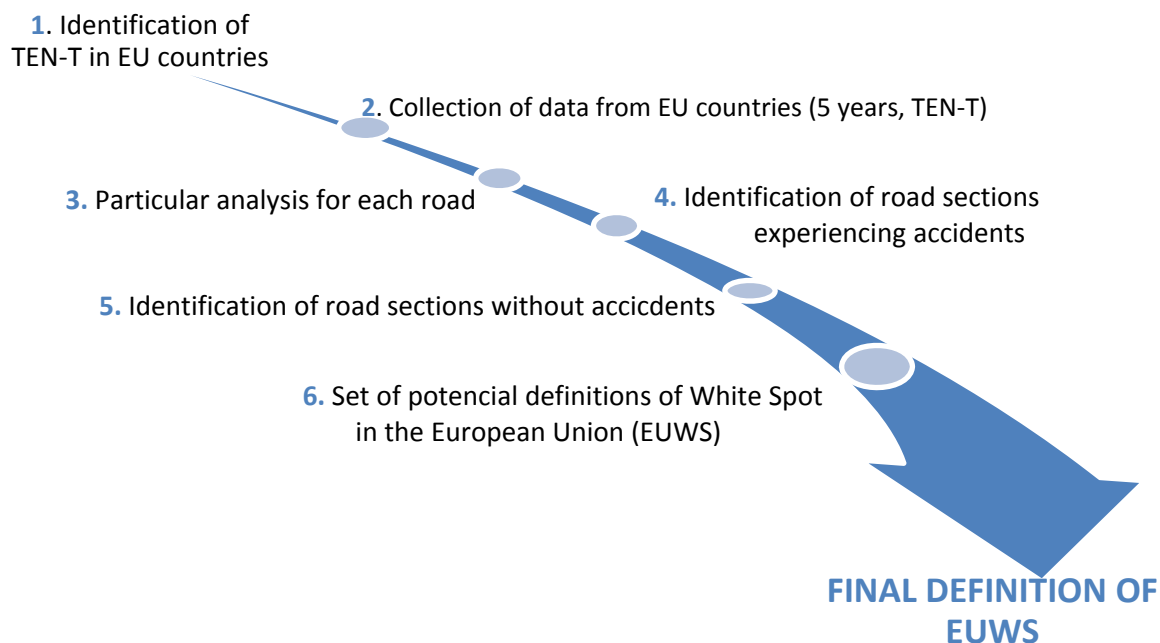
### 1.1. BACKGROUND

The concept of “Whitespot” and “Whiteroads” were first introduced in 2000 by the Spanish Road Association and Mapfre Foundation.

The philosophy of WhiteRoads aims to identify the characteristics of the road sections where there were no accidents during a certain period of time; under these circumstances, these road sections can be considered as the perfect field for obtaining recommendations to the design and operation of safer roads.

In the definition of white spot there are two unknowns variables: space and time. For the resolution of these two questions is necessary handle a wide range of statistics and complementary information about the accident on the road network. Consequently the definition of white spot is not universal and it needs to be adapted to particular state of different regions of the EU context.

For the determination of the space and time variables in TETN-T, the consortium has analysed a total of 84,700 km and 248,069 accidents. During more the 3 years, the following process has been conducted for the analysis and elaboration of the definition of European White Spot - EUWS.



Graphic 1. European White Spot analysis process

After this analysis, the **DEFINITION OF EUROPEAN WHITE SPOT** is:

**European White Spot (EUWS) is defined as a road section, at least 15 kilometres long, where no fatality accidents have happened during the last 5 years considered**

## 1.2. PURPOSE

Starting from the assumption that more useful information can be obtained analysing road sections with low road accident frequency, the project aims at identifying the best road sections in Europe and comparing them to the adjacent stretches characterised by a higher volume of accidents.

The objective of this report is to analyse the common characteristics to all road sections that fit into the definition of European Union White Spot, through a field work and an office work.

The main purpose of this paper is to analyse the geometric characteristics, design, traffic, etc. of the white spots identified in Lithuania, France, Belgium, Poland, Spain, Romania and Baltic countries.

## 1.3. ACRONYMS

Acronyms used in this document and needing a definition are included in the following table:

| ACRONYM | DEFINITION                                                     |
|---------|----------------------------------------------------------------|
| AEC     | Asociación Española de la Carretera – Spanish Road Association |
| EC      | European Commission                                            |
| EU      | European Union                                                 |
| ERF     | European Union Road Federation                                 |
| EUWS    | EUROPEAN UNION WHITE SPOT                                      |
| NRA     | National Road Association                                      |
| TEN-T   | Trans-European transport network                               |

Table 1. Acronyms used in the document

## 2. DATA COLLECTION METHODOLOGY (D1.1)

During the 3 year period of analysis, the consortium has focussed its efforts in gathering correct information related to traffic accidents, TEN-T maps and traffic flow statistics. More than 100 road safety experts were contacted from Ministries of Infrastructures, Home Affairs and Transport, National Roads Administrations, Traffic Police Department, National Statistical Offices, etc.

For this purpose a data collection methodology was prepared to liaise the consortium with responsible bodies at national level to collect database and statistics uniformly from the 27 Member States.

The identification of white spots has required the analysis of a great amount of data about traffic accidents and list of TEN-T in each member state. In particular, with the support of the EC, the following accident data was initially requested to all EU members from 2004 to 2009:

- Number of road
- Location of the accident
- Date
- Type of road
- Number of fatalities and serious injuries
- Types of vehicles involved
- Existing infrastructure and equipment places in the spot where the accident happened

The analysis of the data received could provide the consortium the information necessary to locate the following white sections:

- Road sections, in the TEN-T, where no injury accidents have happened in the period 2004-2009, both included
- Road sections, in the TEN-T, where no injury accidents involving motorcyclists have happened in the period 2004-2009, both included.
- Road sections, in the TEN-T, where no fatal accidents have happened in the period 2004-2009, both included.
- Road sections, in the TEN-T, where no fatal accidents involving motorcyclists have happened in the period 2004-2009, both included.

However, the need for very concrete information about accidents represented an important challenge as some countries were not allowed to provide any data due to strict privacy regulations. Frequently, data was incomplete and thus, required further analysis and in some cases, even the use of special software tools in order to map the exact location of the accidents. In addition the definition of injury differed from country to country so the lack of information in some countries and in general inexistence of a harmonised term in others made that the definition of EUWS covered only sections without fatalities. The same situation happened with accidents involving motorcyclists.

The consortium has collected information from 26 Member States except Germany where due to high protective privacy regulations it has been impossible to obtain any information related to location of traffic accidents. The other country which has created difficulties in the analysis has been Malta. Although information about traffic accidents has been received, no concrete location was provided (i.e. the information available only provided the number of the road where the accident happened without specifying Kms).

The project has shown that the lack of clear information, statistics and correlation between accidents and road sections remains a serious obstacle to road safety analysis, not only for the WhiteRoads consortium but also for black spot management works or other research studies. Following aspects can be highlighted:

- Some countries do not provide accident data for analysis (although all privacy concerns are respected). This is the situation of Germany.
- Countries like United Kingdom, Finland, Ireland and Sweden refer the accidents in coordinates "x,y", which do not correspond to the road network (classified in name of road and kilometre). This makes the analysis extremely difficult, as it is not always possible to identify the correspondence between x,y coordinates and exact road section. An external company has been contracted for this work.
- Countries like Italy and Denmark provide accident data in road sections 1 kilometre long, but they do not specify the exact point where the accident happened. Thus, this introduces a different analysis for these countries.

On the other hand, WhiteRoads has obtained valid information from 25 member states. The table below shows number of accidents and total road length analysed by ERF and AEC during the lifetime of the project<sup>1</sup>:

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<sup>1</sup> **Period covered:** 2005-2009, both included, in most EU countries. Only in Bulgaria accident data was only available for 2007-2009. In Belgium 2004-2008.

| COUNTRY        | NUMBER OF ACCIDENTS | TOTAL ROAD LENGTH ANALYZED | PERIOD COVERED |
|----------------|---------------------|----------------------------|----------------|
| Austria        | 1.754               | 1.823,7                    | 2005-2009      |
| Be (Flanders)  | 2.328               | 990,1                      | 2004-2008      |
| Be (Wallonia)  | 5.852               | 887,5                      | 2004-2008      |
| Bulgaria       | 1.163               | 2.735,0                    | 2007-2009      |
| Cyprus         | 234                 | 183,6                      | 2005-2009      |
| Czech Republic | 1.488               | 2.709,2                    | 2007-2009      |
| Denmark        | 1.072               | 935,8                      | 2005-2009      |
| Estonia        | 1.455               | 1.017,5                    | 2005-2009      |
| Finland        | 2.996               | 4.188,5                    | 2005-2009      |
| France         | 27.986              | 16.317,3                   | 2005-2009      |
| Greece         | 508                 | 753,7                      | 2005-2009      |
| Hungary        | 14.168              | 2.216,7                    | 2005-2009      |
| Ireland        | 3.567               | 2.492,6                    | 2005-2009      |

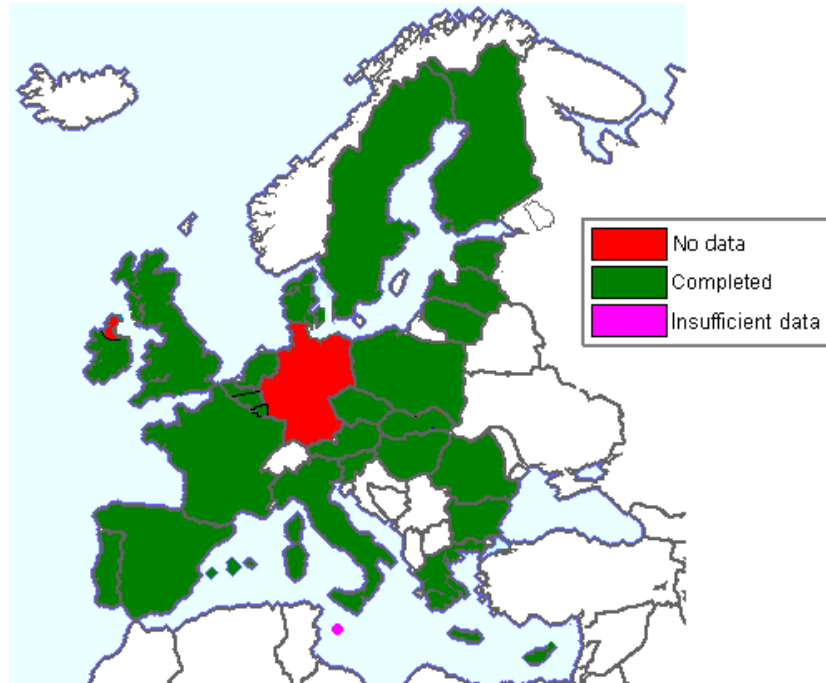
Table 2. Number of accidents and total road length analyzed



| COUNTRY                                                                                | NUMBER OF ACCIDENTS | TOTAL ROAD LENGTH ANALYZED | PERIOD COVERED           |
|----------------------------------------------------------------------------------------|---------------------|----------------------------|--------------------------|
| Italy                                                                                  | 39.885              | 6.076,2                    | 2004-2008                |
| Latvia                                                                                 | 11.092              | 1.755,6                    | 2005-2009                |
| Lithuania                                                                              | 1.392               | 811,2                      | 2005-2005                |
| Luxembourg                                                                             | 73                  | 91,2                       | 2005-2009                |
| Poland                                                                                 | 14.300              | 4.339,6                    | 2005-2009                |
| Portugal                                                                               | 1.058               | 2.860,6                    | 2005-2009                |
| Romania                                                                                | 7.899               | 3.576,4                    | 2005-2009                |
| Slovakia                                                                               | 184                 | 416,7                      | 2005-2009                |
| Slovenia                                                                               | 401                 | 417,0                      | 2005-2009                |
| Spain                                                                                  | 59.924              | 11.811,5                   | 2005-2009 <sup>(1)</sup> |
| Sweden                                                                                 | 1.230               | 5.729,2                    | 2005-2009                |
| The Netherlands                                                                        | 2.218               | 3.112,6                    | 2005-2009                |
| United Kingdom                                                                         | 43.941              | 7.169,2                    | 2005-2009                |
| <b>TOTAL</b>                                                                           | <b>248.168</b>      | <b>85.418</b>              |                          |
| <sup>(1)</sup> except for the AP-7 road which has been considered the period 2006-2010 |                     |                            |                          |

**Table 3. Number of accidents and total road length analyzed**

The map below shows in green number of member states where the analysis has been successfully completed:



Map 1. Map of Member States where analysis has been successfully completed

### 3. EU WHITE SPOT DENITION AND CRITERIA (D2.1)

The definition of EU white spot (EUWS) has required the completion of the analysis of white spots in all the EU countries. In order to identify white spots, the two following analyses have been developed:

- Considering 1Km long road sections where there have been fatal accidents in the last 5 years
- Considering 1Km long road sections where there have been killed and serious injured on accidents in the last 5 years

After identifying road sections where accidents have occurred in the last five years, white sections would be those where, for the same period, no accidents with killed or killed and serious injured have happened. In addition, an EUWS should have a harmonized length so a minimum number of Kms should be considered: 15/20/25 Kms. Subsequently the initial structure of the EUWS definition was:

Road section xxxx km long, without accidents, during yyyy years

Consequently, different possibilities with different road section lengths have been analysed in order to obtain a realistic definition of white spot peculiarities of different Member States. Following tentative definitions of white spots were initially considered:

- Road section, 5 km long, where no fatal accidents have happened in the last 5 years.
- Road section, 10 km long, where no fatal accidents have happened in the last 5 years.
- Road section, 15 km long, where no fatal accidents have happened in the last 5 years.
- Road section, 20 km long, where no fatal accidents have happened in the last 5 years.
- Road section, 25 km long, where no fatal accidents have happened in the last 5 years.
- Road section, 5 km long, where no accidents with killed or serious injured have happened in the last 5 years.
- Road section, 10 km long, where no accidents with killed or serious injured have happened in the last 5 years.
- Road section, 15 km long, where no accidents with killed or serious injured have happened in the last 5 years.
- Road section, 20 km long, where no accidents with killed or serious injured have happened in the last 5 years.
- Road section, 25 km long, where no accidents with killed or serious injured have happened in the last 5 years.

After the analysis of the data available, and in search of the most accurate definition, the consortium adopted a definition based only in fatalities:

**European White Spot (EUWS) is defined as a road section, at least 15 kilometres long, where no fatality accidents have happened during the last 5 years considered.**

Final definition of EUWS considers a minimum length of 15 Kms long but other lengths were also considered initially<sup>2</sup>. According to those lengths, the number of EUWS varied:

|                                   | <b>EUWS<br/>15 km long</b> | <b>EUWS<br/>20 km long</b> | <b>EUWS<br/>25 km long</b> |
|-----------------------------------|----------------------------|----------------------------|----------------------------|
| Number of EUWS                    | 982                        | 634                        | 438                        |
| Total km of White Roads           | 34.087                     | 28.025                     | 23.739                     |
| % of white roads over total TEN-T | 40%                        | 33%                        | 28%                        |

Table 4. Number of EUWS according to length used during the study (15, 20, 25 Kms)

<sup>2</sup> EUWS of 20 Km and 25 Kms long are also included as EUWS 15 Km long under final definition of EUWS

#### 4. WHITE SPOTS IN THE TEN-T (D3.1)

White Roads consortium has identified **982 EUWS** in 25 member states. The table below shows the relation of EUWS per country:

| COUNTRY           | NUMBER OF EUWS | COUNTRY         | NUMBER OF EUWS |
|-------------------|----------------|-----------------|----------------|
| Austria           | 16             | Italy           | 45             |
| Belgium (Flandes) | 8              | Latvia          | 23             |
| Belgium (Walonia) | 7              | Lithuania       | 1              |
| Bulgaria          | 40             | Luxembourg      | 1              |
| Cyprus            | 3              | Poland          | 9              |
| Czech Republic    | 22             | Portugal        | 46             |
| Denmark           | 16             | Romania         | 7              |
| Estonia           | 11             | Slovakia        | 5              |
| Finland           | 79             | Slovenia        | 5              |
| France            | 242            | Spain           | 150            |
| Greece            | 4              | Sweden          | 106            |
| Hungary           | 18             | The Netherlands | 59             |
| Ireland           | 42             | United Kingdom  | 17             |

Table 5. Relation of EUWS per Member State

Below another map indicating the number of white Kms per member state in comparison to the number of TEN-T Kms analysed:

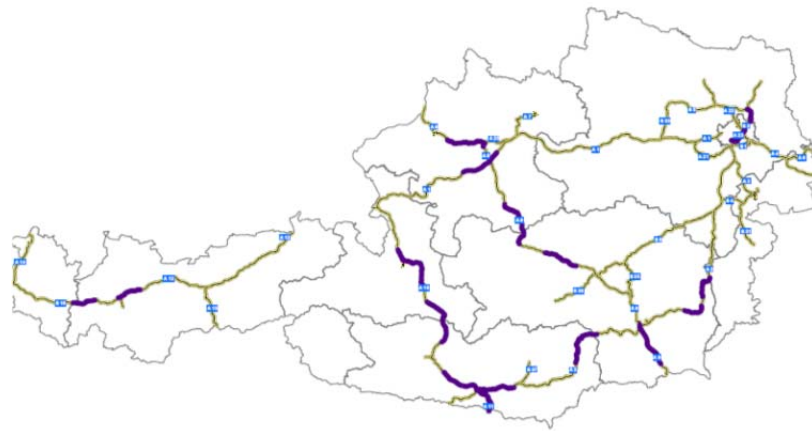


Map 2. Number of white Kms per Member State

Detailed information about the location and length for every EUWS can be found in Deliverable 3.1. However, the national maps with EUWS are displayed below:

#### 4.1. AUSTRIA

TEN-T road network in Austria has a length of 1.651,3 km divided into 18 sections of national roads. After the analysis of the accident databases, 16 white spots have been identified in 8 roads: A1, A2, A8, A9, A10, A11, A12, A23.



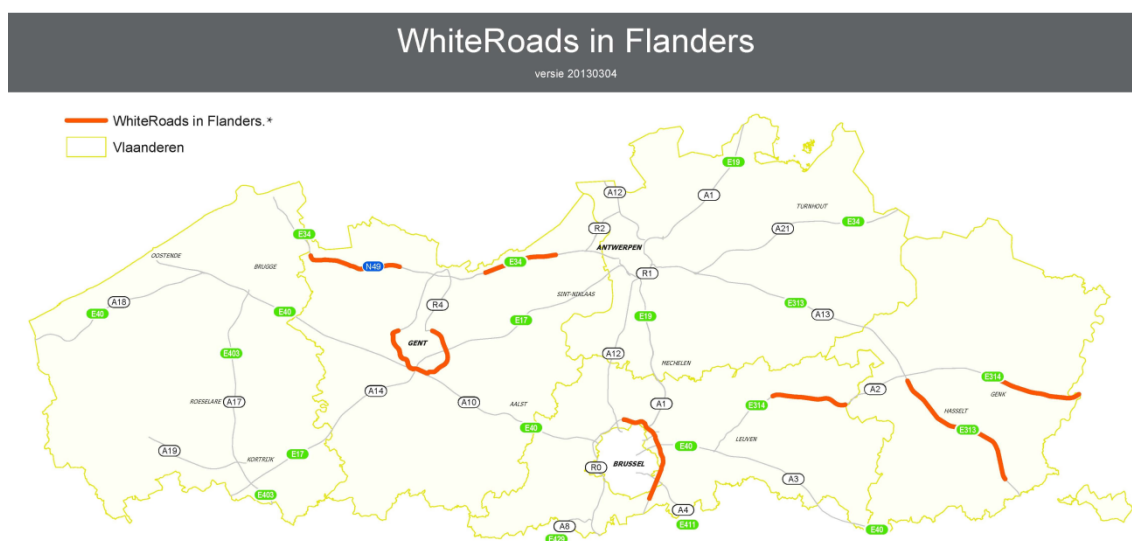
disclaimer: Data "White roads projects", graphics: ASPINA G

Map 3. Location of EUWS in Austria

## 4.2. BELGIUM

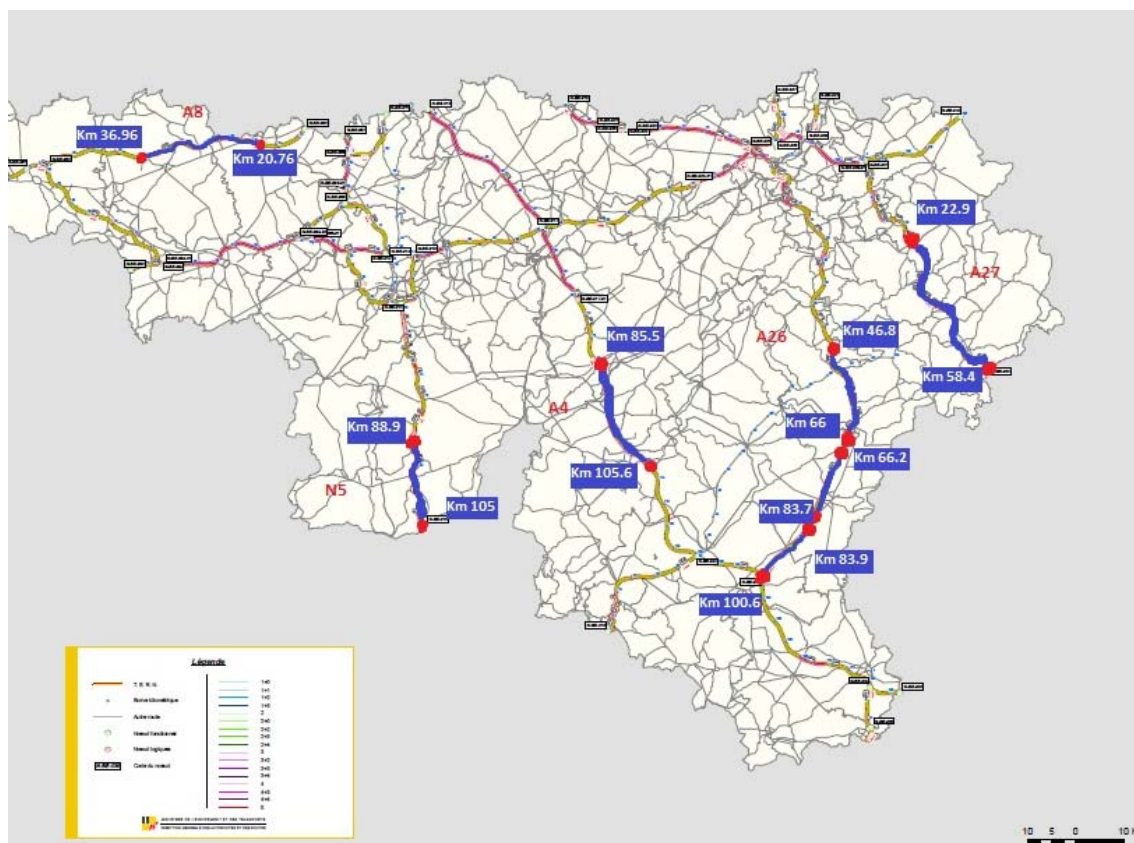
As regards Belgium, the consortium has obtained data from Flanders and Wallonia.

TEN road networks in Flanders have a length of 990,1 km divided into 25 sections of national roads. After the analysis of the accident database, 8 white spots have been identified in 5 roads: A2, A13, N49, R0, R4.



Map 4. Location of EUWS in Flanders (Belgium)

TEN road networks in Wallonia have a length of 887,5 km divided into 21 sections of national roads. After the analysis of the accident database, 7 white spots have been identified in 5 roads: A4, A8, A26, A27, N5.

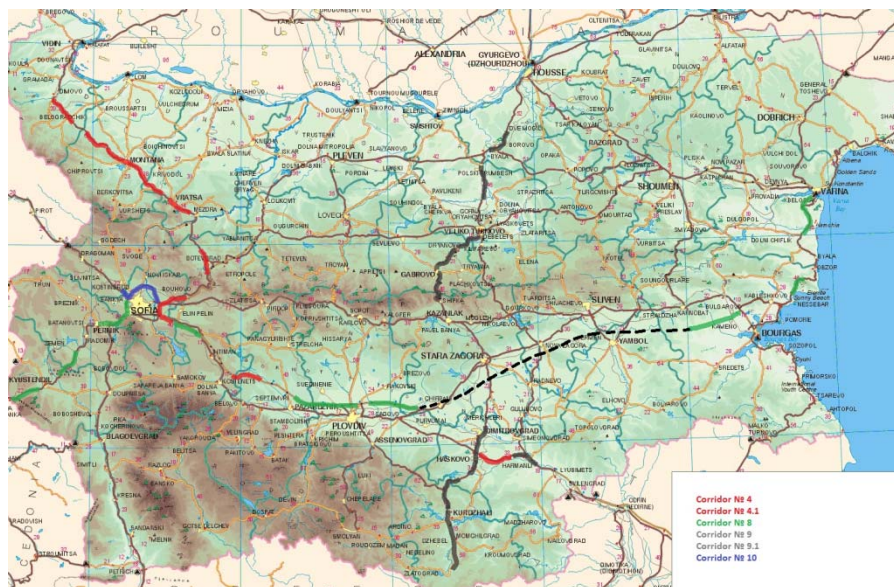


Map 5. Location of EUWS in Wallonia (Belgium)

#### 4.3. BULGARIA

TEN-T network in Bulgaria has a length of 2.435 km divided into 6 sections of national roads. After the analysis of the accident database, 40 white spots have been identified in 6 roads: Corridor № 4 (Vidin – Kulata), Corridor № 4.1 (Vidin - Border check point Kapitan Andreevo), Corridor № 8 (Gueshevo – Varna), Corridor № 9 (Ruse - Border chek point Makaza), Corridor № 9.1 (Ruse - Border checkpoint "Kapitan Petko Voivoda"), Corridor № 10 (Border check point Kalotina – Sofia).





Map 6. Location of EUWS in Bulgaria

#### 4.4. CYPRUS

TEN road networks in Cyprus have a length of 183,6 km divided into 5 sections of national roads. After the analysis of the accident database, 3 white spots have been identified in 2 roads: A1, A6.



Map 7. Location of EUWS in Cyprus

#### 4.5. CZECH REPUBLIC

TEN-T road network in Czech Republic has a length of 2.163,4 km divided into 15 sections of national roads. After the analysis of the accident database, 22 white spots have been identified in 10 roads: I/55, E442, E462, 49, E48, E50, E55, E65, E67, I/37.

The location of traffic accidents in CZ uses coordinates "X,Y" making the analysis more complicate. In addition no proper map has been provided with the location of TEN-T roads consequently no map has been drafted by the consortium as it is extremely difficult to match "x,y" coordinates with its respective road section.

#### 4.6. DENMARK

TEN-T road network in Denmark has a length of 2.709,2 km divided into 15 sections of national roads. After the analysis of the accident database, 26 white spots have been identified in 10 roads: 3, 20, 30, 40, 50, 52, 60, 80, 90, 9670003, 9670025.



Map 8. Location of EUWS in Denmark

#### 4.7. ESTONIA

TEN-T road network in Estonia has a length of 1.017,5 km divided into 7 sections of national Roads. After the analysis of the accident database, 11 white spots have been identified in 4 roads: 1, 2, 3, 4. Detailed information about EUWS in Estonia can be found in D4.6 (Report on WS in Baltic countries).



Map 9. Location of EUWS in Estonia

#### 4.8. FINLAND

TEN-T road network in Finland has a length of 4.188,5 km divided into 15 sections of national roads. After the analysis of the accident database, 79 white spots have been identified in 13 roads: 1, 3, 4, 5, 6, 6b, 7, 9, 13, 22, 40, 82, 89.

As regards the map of Finland, it happens the same situation that Czech Republic where accidents are located in coordinates "x,y" without any link to the road Kms. Therefore, the consortium has not been able to draft the map.

#### 4.9. FRANCE

TEN-T road network in France has a length of 16.317,3 km divided into 153 sections of national roads. France is the member state with the highest number of EUWS.

After the analysis of the accident database, 242 white spots have been identified in 100 roads: A7, A8, A9, A10, A11, A13, A14, A16, A19, A20, A21, A23, A25, A28, A29, A30, A31, A35, A36, A39, A40, A41, A 42, A48, A49, A50, A57, A61, A 62, A64, A66, A68, A71, A 72, A75, A77, A83, A85, A87, A88, A89, A131, A410, A432, A750, A837, RN2, RN4, RN7, RN14, RN19, RN20, RN21,



RN24, RN25, RN27, RN31, RN36, RN42, RN52, RN57, RN59, RN61, RN66, RN67, RN77, RN79, RN84, RN88, RN90, RN94, RN102, RN106, RN116, RN122, RN124, RN125, RN134, RN141, RN145, RN147, RN149, RN151, RN154, RN157, RN162, RN 165, RN166, RN171, RN171, RN174, RN176, RN184, RN202, RN205, RN249, RN569, RN1019.

The map below of EUWS in France reflects only those sections which has been analysed during the on-site inspection of D4.2 (further details can be found in this Deliverable).



Map 10. Location of EUWS in France

#### 4.10. GREECE

TEN-T road networks in Greece have a length of 753,7 km divided into 4 sections of national roads. After the analysis of the accident database, 4 white spots have been identified in 1 road: E-75 Athens-Evzoni.

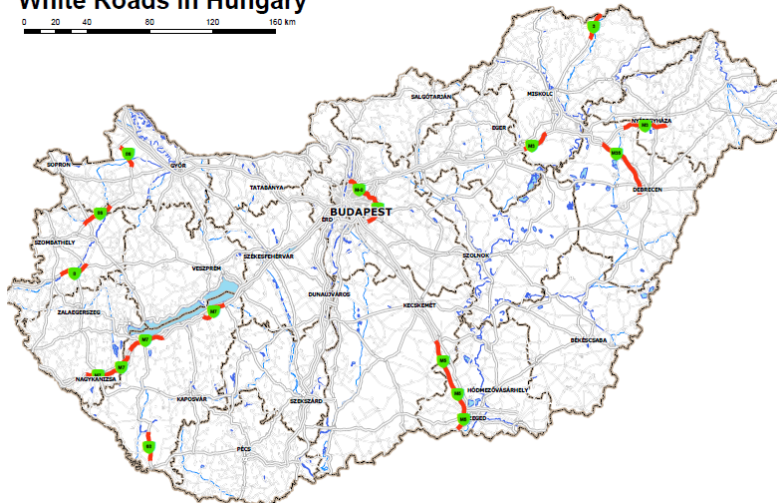


Map 11. Location of EUWS in Greece

#### 4.11. HUNGARY

TEN-T road network in Hungary has a length of 2.216,7 km divided into 38 sections of national roads. After the analysis of the accident database, 18 white spots have been identified in 9 roads: 3, 8, 68, 86, M0, M3, M35, M5, M7.

##### White Roads in Hungary



Map 12. Location of EUWS in Hungary

#### 4.12. IRELAND

TEN-T road network in Ireland has a length of 2.492,6 km divided into 22 sections of national roads. After the analysis of the accident databases, 42 white spots have been identified in 19 roads: N2 North, N4/M4, N6, N7, N8, N9, N10, N11, N15, N16, N17, N18, N21, N24, N25, M1, M7, M18, R446.

As regards the map, the consortium has faced the same problem that in other countries which use coordinates “x,y” for the location of the accidents. Therefore no map has been drafted for Ireland.

#### 4.13. ITALY

TEN-T roads in Italy has a length of 6.076,2 km divided into 30 sections of national roads.

After the analysis of the accident databases, 45 white spots have been identified in 20 roads: A03 ( Salerno-Reggio Calabria), A05 (Torino-Aosta), A10 (Genova-Ventimiglia/Autostrada dei Fiori), A12 (Genova-Roma/tratto Roma-Civitavecchia), A14 (Bologna-Taranto/Autostrada Adriatica), A15 (Parma-La Spezia/Autostrada della Cisa), A16 (Napoli-Canosa/Autostrada dei due Mari), A18 (Messina-Catania), A19 (Palermo-Catania), A20 (Messina-Palermo), A21 (Torino-Piacenza-Brescia/Autostrada dei Vini), A22 (Brennero-Modena/Autostrada del Brennero), A23 (Palmanova-Tarvisio/Autostrada Alpe-Adria), A24 (Roma-L'Aquila-Teramo), A25 (Torano-Pescara), A29 (Diramazione Trapani-Alcamo, A29 (Palermo-Mazara del Vallo), A30 (Caserta-Salerno), A32 (Torino-Bardonecchia), SS 131 (Carlo Felice).

North West



Map 13. Location of EUWS in Italy (North West)



## North East



Map 14. Location of EUWS in Italy (North East)



Map 15. Location of EUWS in Italy (Centre)



Map 16. Location of EUWS in Italy (South)



Map 17. Location of EUWS in Italy (South-East)





Map 18. Location of EUWS in Italy (Sicily)

#### 4.14. LATVIA

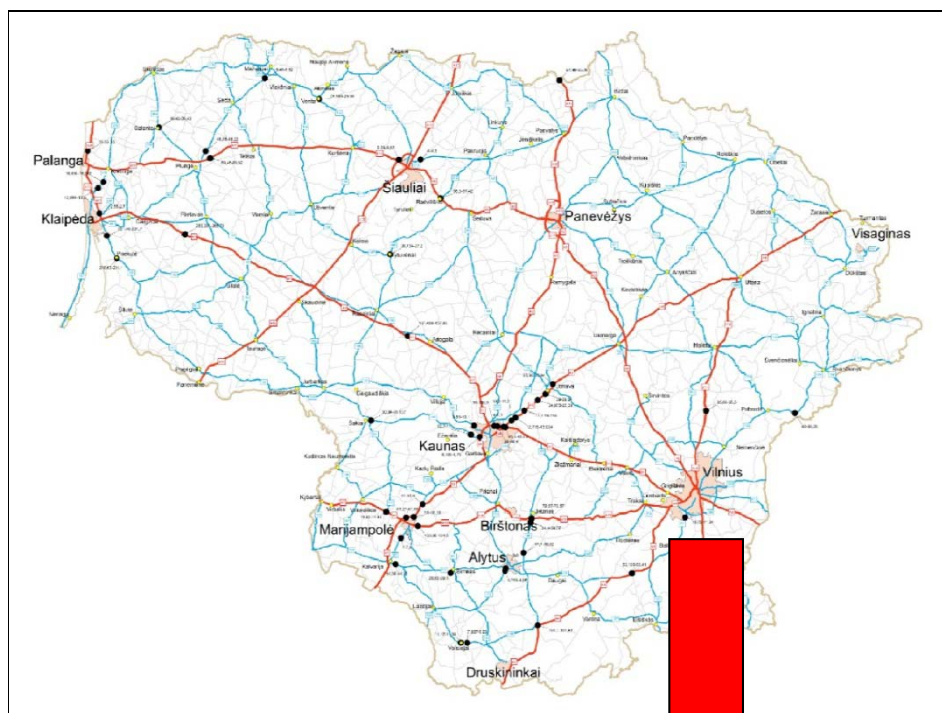
TEN-T road network in Latvia has a length of 1.755,6 km divided into 15 sections of national roads. After the analysis of the accident database, 23 white spots have been identified in 10 roads: A1, A2, A3, A6, A7, A9, A10, A11, A12, A13. Further information about the onsite inspections of EUWS in Latvia can be found in Deliverable 4.6 (Report on WS in Baltic countries).

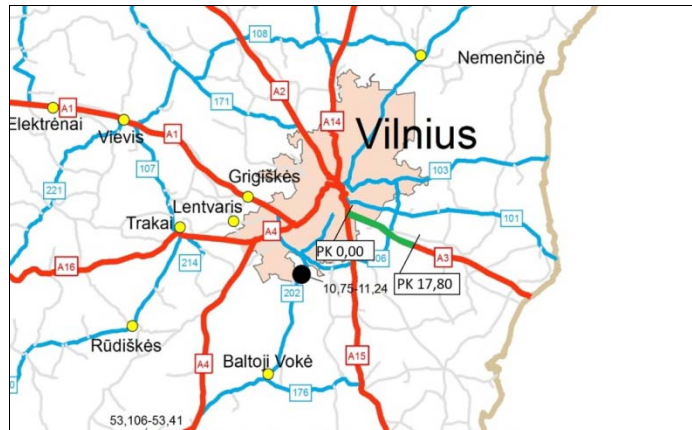


Map 19. Location of EUWS in Latvia

#### 4.15. LITHUANIA

TEN-T road networks in Lithuania have a length of 811,2 km divided into 8 sections of national roads. After the analysis of the accident databases, 1 white spots have been identified in 1 road: A3.

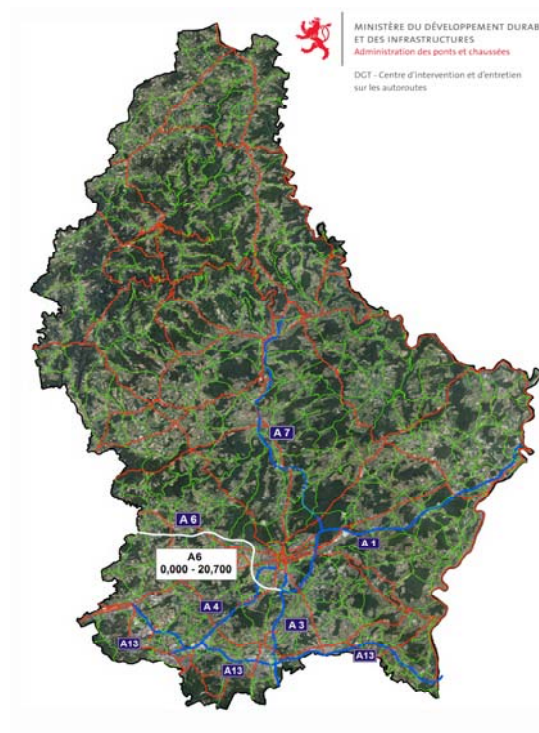




Map 20. Location of EUWS in Lithuania

#### 4.16. LUXEMBOURG

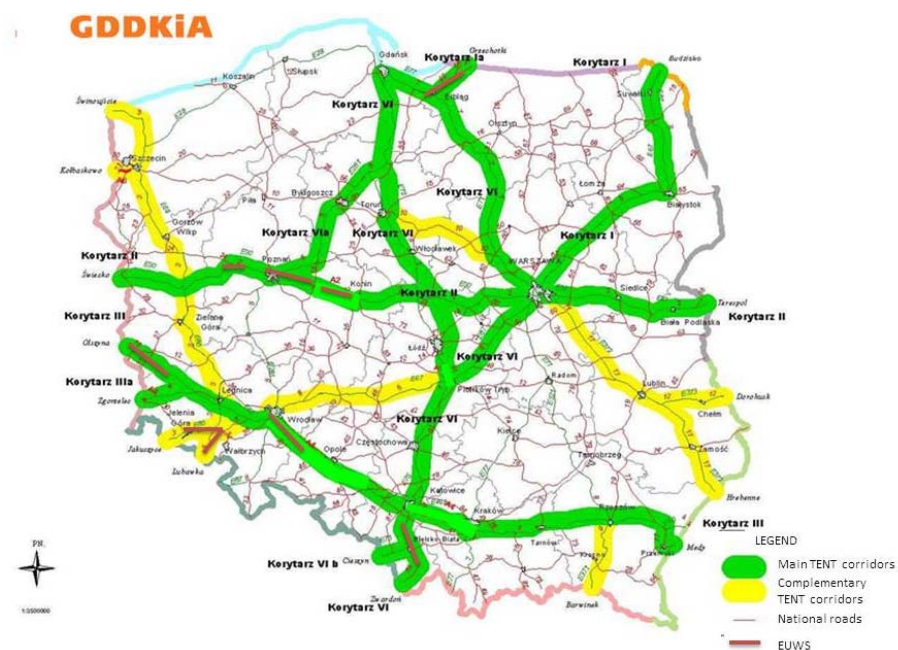
TEN road networks in Luxembourg have a length of 91,2 km divided into 4 sections of national roads. After the analysis of the accident databases, 1 white spots have been identified in 1 road: A6.



Map 21. Location of EUWS in Luxembourg

#### 4.17. POLAND

TEN-T road network in Poland has a length of 4.339,6 km divided into 39 sections of national roads. After the analysis of the accident database, 9 white spots have been identified in 7 roads: 3, 5, 18, 22, A2, A4, S1. Further information about the EUWS in those roads can be found in Deliverable 4.5 (Report on WS in Poland).

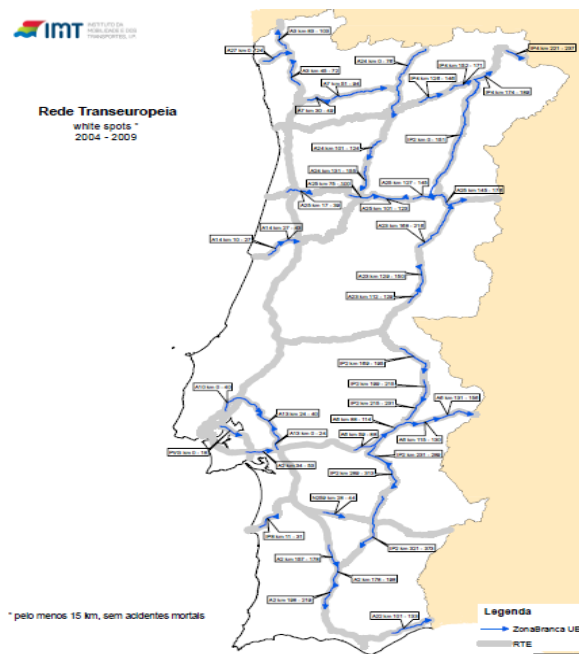


Map 22. Location of EUWS in Poland

#### 4.18. PORTUGAL

TEN-T road network in Portugal has a length of 2.860,6 km divided into 35 sections of national roads. After the analysis of the accident database, 46 white spots have been identified in 19 roads: A2, A3, A6, A7, A10, A13, A14, Via PVG, A22, A23, A24, A25, A27, Via IP8, Via EN18, Via EN102, Via EN259.

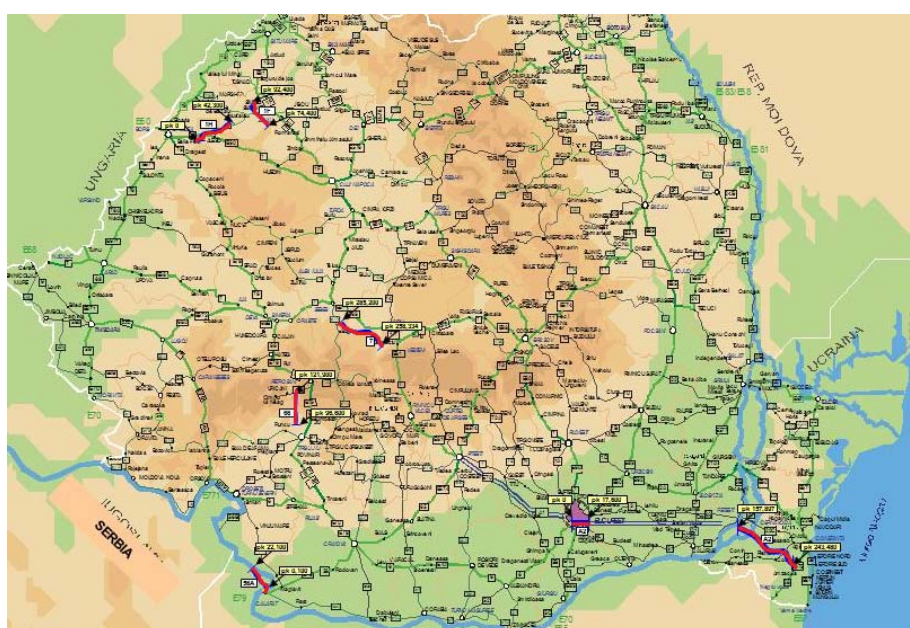




Map 23. Location of EUWS in Portugal

#### 4.19. ROMANIA

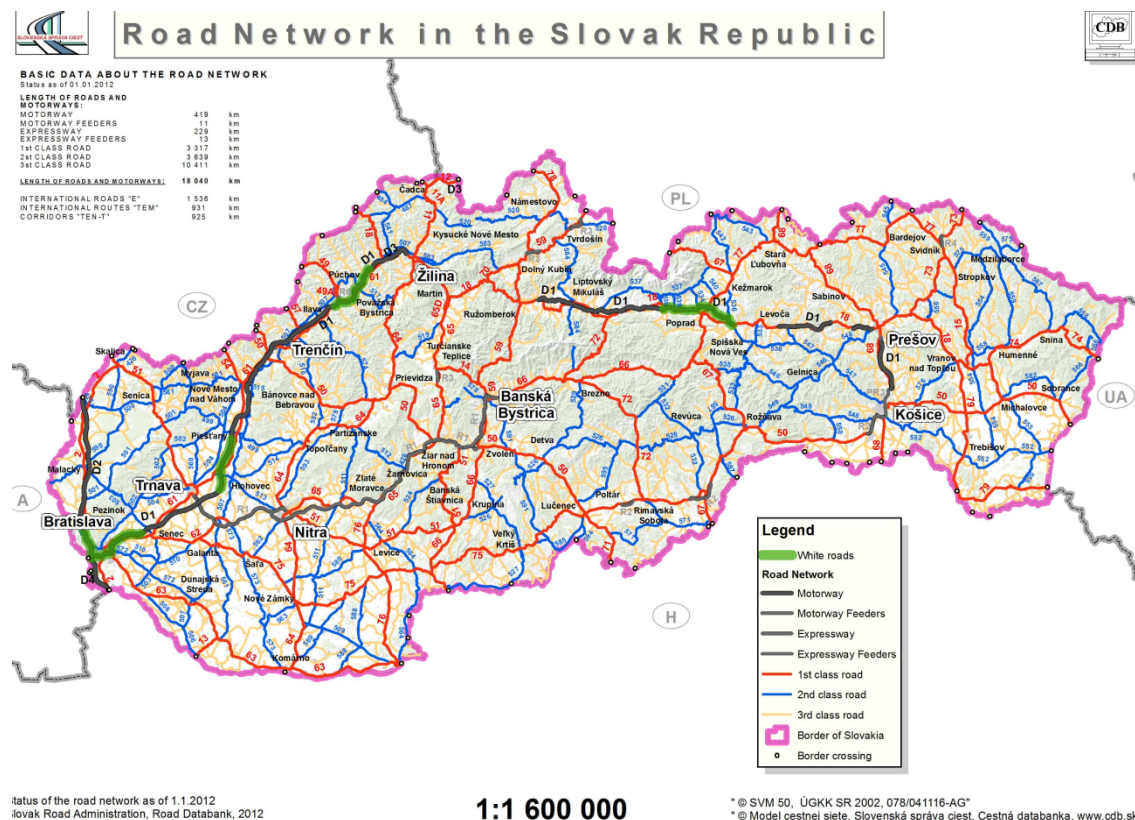
TEN-T road network in Romania has a length of 3.576,4 km divided into 24 sections of national roads. After the analysis of the accident database and considering all the data provided from the Romanian Administration a total of 7 white spots have been identified in 6 roads: 1F, 1H, 7, 56A, 66, A2. However, the WhiteRoads consortium completed the onsite inspections of those EUWS and numerous contradictions were found despite numerous trials to clarify them.



Map 24. Location of EUWS in Romania

## 4.20. SLOVAKIA

TEN-T road network in Slovakia has a length of 416,7 km divided into 3 sections of national roads. After the analysis of the accident databases, 5 white spots have been identified in 2 roads: D1, D2.

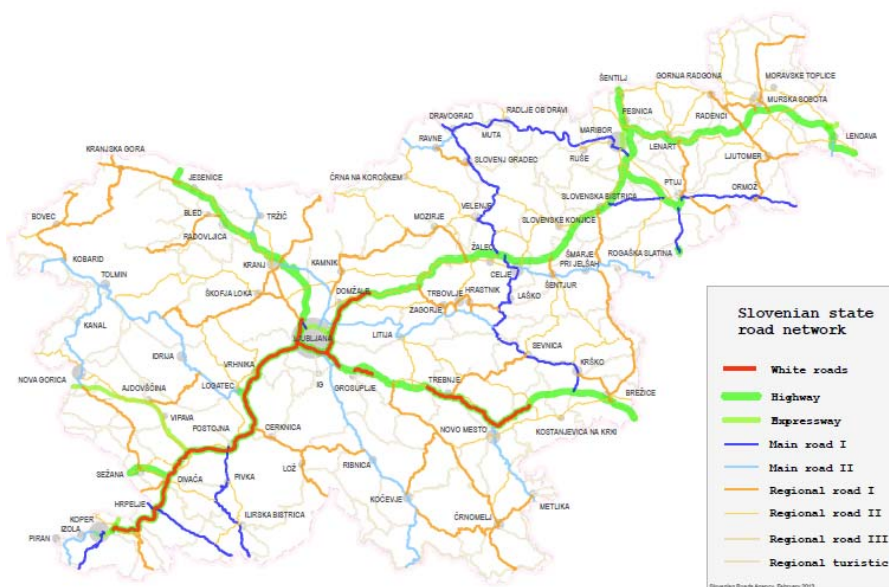


Map 25. Location of EUWS in Slovakia

## 4.21. SLOVENIA

TEN-T road network in Slovenia has a length of 417 km divided into 2 sections of national roads. After the analysis of the accident database, 5 white spots have been identified in 2 roads: A1 (Šentilj – Srmin), A2 (Karavanke – Obrežje).

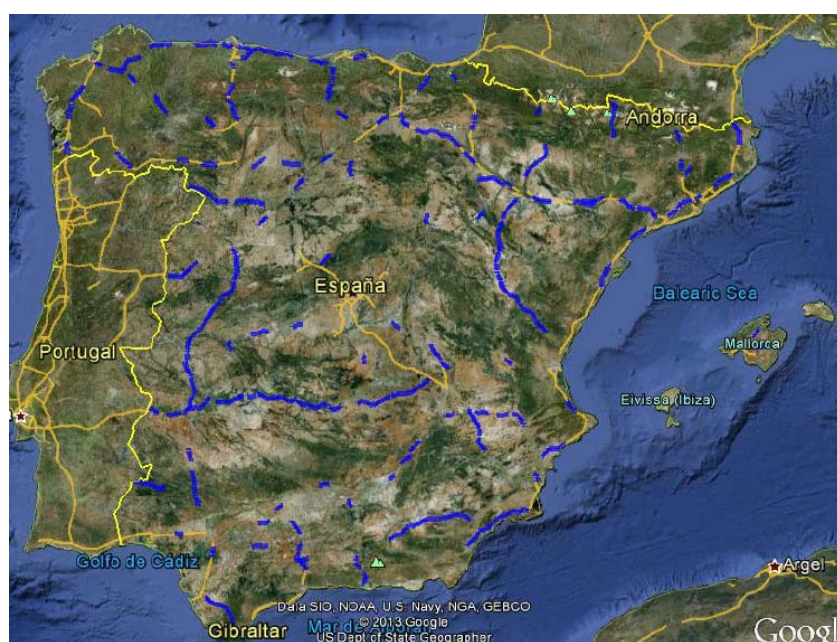




Map 26. Location of EUWS in Slovenia

## 4.22. SPAIN

TEN-T road network in Spain has a length of 11.811,5 km divided into 70 sections of national roads. After the analysis of the accident database, 145 white spots have been identified in 48 roads: A1, A11, A15, A2, A23, A30, A31, A381, A4, A43, A44, A45, A49, A5, A52, A6, A62, A64, A66, A67, A8, A92, A92N, AP1, AP15, AP2, AP4, AP61, AP66, AP68, AP-7N, AP7S, AP9, AP-9F, C16, C25, Ma13, Ma15, N111, N122, N230, N322, N330, N430, N433, N610, N627.



Map 27. Location of EUWS in Spain

#### 4.23. SWEDEN

TEN-T road network in Sweden has a length of 5.729,2 km divided into 21 sections of national roads. After the analysis of the accident database, 106 white spots have been identified in 10 roads: 4, 6, 10, 14, 18, 20B, 22, 40, 45, 65.

Accidents are located using coordinates “x,y” so as in other member states the production of the map has not been possible for the consortium.

#### 4.24. THE NETHERLANDS

TEN-T road network in The Netherlands has a length of 3.112,6 km divided into 57 sections of national roads. After the analysis of the accident database, 59 white spots have been identified in 32 roads: 1, 2, 4, 6, 7, 9, 11, 12, 13, 15, 17, 27, 28, 30, 31, 32, 33, 35, 36, 44, 48, 50, 57, 58, 59, 61, 65, 73, 76, 79, 99, 835.



Map 28. Location of EUWS in The Netherlands

## 4.25. UNITED KINGDOM

TEN-T road network in United Kingdom has a length of 7.169,2 km divided into 78 sections of national roads. After the analysis of the accident databases, 17 white spots have been identified in 14 roads: A30, A34, A38, A8, A82, A90, M1, M20, M27, M4, M42, M56, M52, M9.

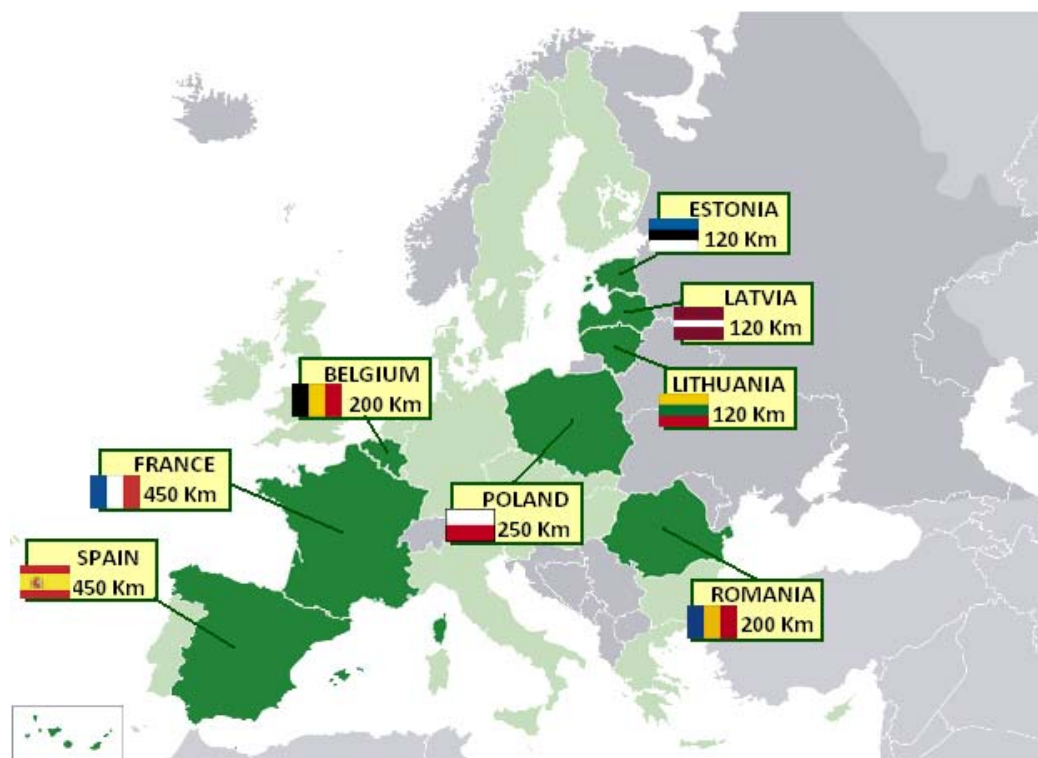
As in other countries accident data is produced using coordinates so the draft of the map has not been possible to complete for the consortium.

## 5. FIELD WORK IN DIFFERENT EUROPEAN COUNTRIES

### 5.1. COUNTRIES ANALYZED IN THE FIELD WORK

As mentioned above, a **European Union White Spot** has been defined as a **road section, of at least 15 kilometres long, where no fatality accidents have happened during the last 5 years** considered.

The field work of the EUWS has been conducted in eight countries (Spain, France, Belgium, Poland, Romania, Estonia, Latvia and Lithuania). Those countries were chosen as they gathered different conditions: location in the centre of Europe with high traffic flow, countries in the North and South of Europe with different weather conditions, countries recently joined to the EU with poor road infrastructure, countries with an infrastructure developed by using EU funds, etc.



Map 29. Countries analyzed during the field work

## 5.2. WEATHER CONDITIONS AND TIME FOR THE EUWS INSPECTIONS

The consortium carried out the inspections from May to October 2012 under the following weather conditions:

| Country | ROAD | from Km | to Km   | Date      | Weather conditions      | Time                |
|---------|------|---------|---------|-----------|-------------------------|---------------------|
| ESTONIA | 1    | 94,00   | 113,60  | 2-10-2012 | Sunny with some clouds  | Morning             |
|         | 2    | 153,717 | 172,517 | 3-10-2012 | Sunny with some clouds  | Morning             |
|         |      | 194,017 | 214,617 | 3-10-2012 |                         |                     |
|         |      | 214,717 | 232,317 | 3-10-2012 |                         |                     |
|         | 3    | 24,30   | 50,00   | 4-10-2012 | Sunny with some clouds  | Morning / Afternoon |
|         |      | 93,40   | 110,90  | 4-10-2012 |                         |                     |
|         |      | 153,90  | 174,00  | 4-10-2012 |                         |                     |
|         |      | 198,90  | 213,90  | 4-10-2012 |                         |                     |
|         | 4    | 17,6    | 39,7    | 7-10-2012 | Sunny with some showers | Afternoon           |
|         |      | 139,9   | 170     | 7-10-2012 |                         |                     |
|         |      | 171,5   | 192,7   | 7-10-2012 |                         |                     |

Table 6. Weather conditions and timing for each EUWS inspection in Estonia

| Country   | ROAD | from Km | to Km | Date       | Weather conditions | Time    |
|-----------|------|---------|-------|------------|--------------------|---------|
| LITHUANIA | A3   | 0       | 17,8  | 13-07-2012 | Sunny              | Morning |

Table 7. Weather conditions and timing for each EUWS inspection in Lithuania



| Country | ROAD | from Km | to Km | Date      | Weather conditions           | Time      |
|---------|------|---------|-------|-----------|------------------------------|-----------|
| LATVIA  | A1   | 61,1    | 79,9  | 7-10-2012 | Sunny but some heavy showers | Afternoon |
|         |      | 80,1    | 101   | 7-10-2012 | Sunny but some heavy showers | Afternoon |
|         | A2   | 118,1   | 133,9 | 5-10-2012 | Cloudy and heavy showers     | Afternoon |
|         |      | 143,2   | 159,9 | 5-10-2012 |                              |           |
|         |      | 160,1   | 201   | 5-10-2012 |                              |           |
|         | A10  | 66,1    | 81,9  | 6-10-2012 | Sunny with some clouds       | Morning   |
|         |      | 97,1    | 128,9 | 6-10-2012 |                              |           |
|         |      | 129,1   | 145,9 | 6-10-2012 |                              |           |
|         |      | 148     | 178,9 | 6-10-2012 |                              |           |

**Table 8. Weather conditions and timing for each EUWS inspection in Latvia**

| Country | ROAD | from Km | to Km | Date      | Weather conditions | Time                |
|---------|------|---------|-------|-----------|--------------------|---------------------|
| SPAIN   | A3   | 74,1    | 90    | 15-4-2012 | Clear and sunny    | Morning / Afternoon |
|         |      | 142     | 162,5 | 15-4-2012 |                    | Morning             |
|         |      | 166,1   | 189,9 | 15-4-2012 |                    | Morning             |
|         | A30  | 1       | 19,4  | 5-10-2012 | Clear and sunny    | Morning             |
|         |      | 19,6    | 48,4  | 5-10-2012 |                    |                     |
|         |      | 48,6    | 71,1  | 5-10-2012 |                    |                     |
|         | A31  | 88,4    | 110,2 | 1-09-2012 | Clear and sunny    | Morning             |
|         |      | 122,1   | 138,9 | 1-09-2012 |                    |                     |
|         |      | 145     | 172,8 | 1-09-2012 |                    |                     |

**Table 9. Weather conditions and timing for each EUWS inspection in Spain**



| Country | ROAD | From Km | To Km | Date    | Weather conditions     | Time    |
|---------|------|---------|-------|---------|------------------------|---------|
| FRANCE  | A4   | 182     | 197   | 10-2012 | Cloudy                 | Morning |
|         | A7   | 130     | 145   | 10-2012 | Sunny with some clouds | Morning |
|         | A8   | 33      | 48    | 11-2012 | Sunny                  | Morning |
|         | A10  | 265     | 280   | 11-2012 | Sunny                  | Morning |
|         | A11  | 132     | 147   | 11-2012 | Cloudy and rain        | Morning |
|         | A14  | 5       | 20    | 10-2012 | Cloudy                 | Morning |
|         | A19  | 113     | 128   | 11-2012 | Sunny and clouds       | Morning |
|         | A20  | 370     | 385   | 11-2012 | Cloudy                 | Morning |
|         | A25  | 45      | 60    | 10-2012 | Cloudy and rain        | Morning |
|         | A31  | 19      | 34    | 10-2012 | Cloudy                 | Morning |
|         | A36  | 60      | 75    | 10-2012 | Rainy                  | Morning |
|         | A42  | 38      | 53    | 10-2012 | Rainy                  | Morning |
|         | A61  | 266     | 281   | 11-2012 | Sunny                  | Morning |
|         | A54  | 216     | 231   | 11-2012 | Sunny                  | Morning |
|         | A71  | 240     | 255   | 10-2012 | Sunny                  | Morning |
|         | A75  | 123     | 138   | 11-2012 | Cloudy                 | Morning |
|         | A83  | 22      | 37    | 11-2012 | Sunny                  | Morning |
|         | N4   | 0       | 15    | 10-2012 | Sunny                  | Morning |
|         | N21  | 112     | 127   | 10-2012 | Sunny with clouds      | Morning |
|         | N42  | 22      | 37    | 10-2012 | Sunny with clouds      | Morning |
|         | N67  | 30      | 45    | 11-2012 | Sunny with clouds      | Morning |
|         | N79  | 62      | 77    | 11-2012 | Cloudy                 | Morning |
|         | N106 | 25      | 40    | 10-2012 | Cloudy                 | Morning |
|         | N122 | 85      | 100   | 11-2012 | Sunny with clouds      | Morning |

|      |    |    |         |                   |         |
|------|----|----|---------|-------------------|---------|
| N124 | 27 | 42 | 10-2012 | Sunny with clouds | Morning |
| N141 | 53 | 68 | 10-2012 | Sunny with clouds | Morning |
| N145 | 40 | 55 | 10-2012 | Sunny with clouds | Morning |
| N149 | 53 | 68 | 11-2012 | Sunny with clouds | Morning |
| N154 | 30 | 45 | 11-2012 | Sunny             | Morning |
| N164 | 27 | 42 | 11-2012 | Sunny             | Morning |
| N202 | 23 | 38 | 11-2012 | Sunny             | Morning |

**Table 10. Weather conditions and timing for each EUWS inspection in France**

| Country | ROAD | from Km | to Km  | Date       | Weather conditions | Time      |
|---------|------|---------|--------|------------|--------------------|-----------|
| ROMANIA | 1F   | 74,4    | 92,4   | 17-10-2012 | Sunny              | Morning   |
|         | 1H   | 0       | 42,3   | 17-10-2012 | Sunny              | Afternoon |
|         | 7    | 258,3   | 285,2  | 18-10-2012 | Sunny              | Afternoon |
|         | 56A  | 0,1     | 22,1   | 18-10-2012 | Sunny              | Afternoon |
|         | 66   | 96,6    | 121,9  | 19-10-2012 | Sunny              | Afternoon |
|         | A2   | 0       | 17,6   | 20-10-2012 | Sunny              | Morning   |
|         |      | 157,89  | 243,48 | 20-10-2012 | Sunny              | Afternoon |

**Table 11. Weather conditions and timing for each EUWS inspection in Romania**

| Country | ROAD | from Km | to Km   | Date      | Weather conditions | Time    |
|---------|------|---------|---------|-----------|--------------------|---------|
| POLAND  | A2   | 125     | 140     | 12-7-2012 | Sunny              | Morning |
|         |      | 157,6   | 203,3   | 12-7-2012 | Sunny              | Morning |
|         |      | 251,6   | 276,023 | 12-7-2012 | Sunny              | Morning |

**Table 12. Weather conditions and timing for each EUWS inspection in Poland**

| Country | ROAD | from Km | to Km  | Date      | Weather conditions     | Time      |
|---------|------|---------|--------|-----------|------------------------|-----------|
| BELGIUM | A2   | 0       | 18,06  | 17-9-2012 | Sunny with some clouds | Morning   |
|         |      | 53,4    | 69,5   | 17-9-2012 |                        |           |
|         | A13  | 63,4    | 80     | 17-9-2012 | Sunny with some clouds | Afternoon |
|         |      | 80,2    | 95,4   | 17-9-2012 |                        |           |
|         | N49  | 14,2    | 29,86  | 18-9-2012 | Sunny                  | Morning   |
|         |      | 48,91   | 69,05  | 18-9-2012 |                        |           |
|         | R0   | 17,8    | 40,5   | 26-6-2012 | Sunny                  | Morning   |
|         | R4   | 16,2    | 43,01  | 18-9-2012 | Sunny                  | Afternoon |
|         | A4   | 85,47   | 105,67 | 28-6-2012 | Sunny with some clouds | Morning   |
|         | A8   | 20,76   | 36,96  | 27-6-2012 | Sunny with some clouds | Morning   |
|         | A26  | 46,8    | 66     | 28-6-2012 | Sunny with some clouds | Afternoon |
|         |      | 66,2    | 83,7   |           |                        |           |
|         |      | 83,9    | 100,6  |           |                        |           |
|         | A27  | 22,9    | 58,4   | 28-6-2012 | Sunny with some clouds | Afternoon |
|         | N5   | 88,9    | 105    | 27-6-2012 | Sunny with some clouds | Afternoon |

**Table 13. Weather conditions and timing for each EUWS inspection in Belgium**

### 5.3. CHECKLIST USED DURING THE INSPECTIONS

During the inspections, different infrastructure elements were analysed following a checklist<sup>3</sup>:

- General data location of the road, length, direction, etc.
- Traffic: average daily traffic, composition, motorcycle itinerary, cycle path, etc.
- Alignment and cross section: number of curves, speed limits, consistency of alienation, number of lanes per direction, lane width, hard shoulder, width of hard shoulder, type of ground, limited visibility.
- Pavement: type of surface, existence of potholes, longitudinal or transversal cracks.
- Vertical signing: number of vertical signs, number of directional signs, condition, credibility, visibility.
- Road markings: correspondence between vertical and horizontal signs, possibility and percentage of overtaking, condition.
- Road restrain systems: length of barriers installed, additional length required, good or bad installation, turned-down ending, motorcyclist protection, general condition.
- Traffic guidance equipment: profile road markings, directional signs in curves, existence of road studs, side posts or posts/cushions in exits.
- Lighting: section with lighting or lighting on particular sites.
- Existence of variable message panels.

### 5.4. DESCRIPTION OF FIELD WORK IN BELGIUM (D4.3)

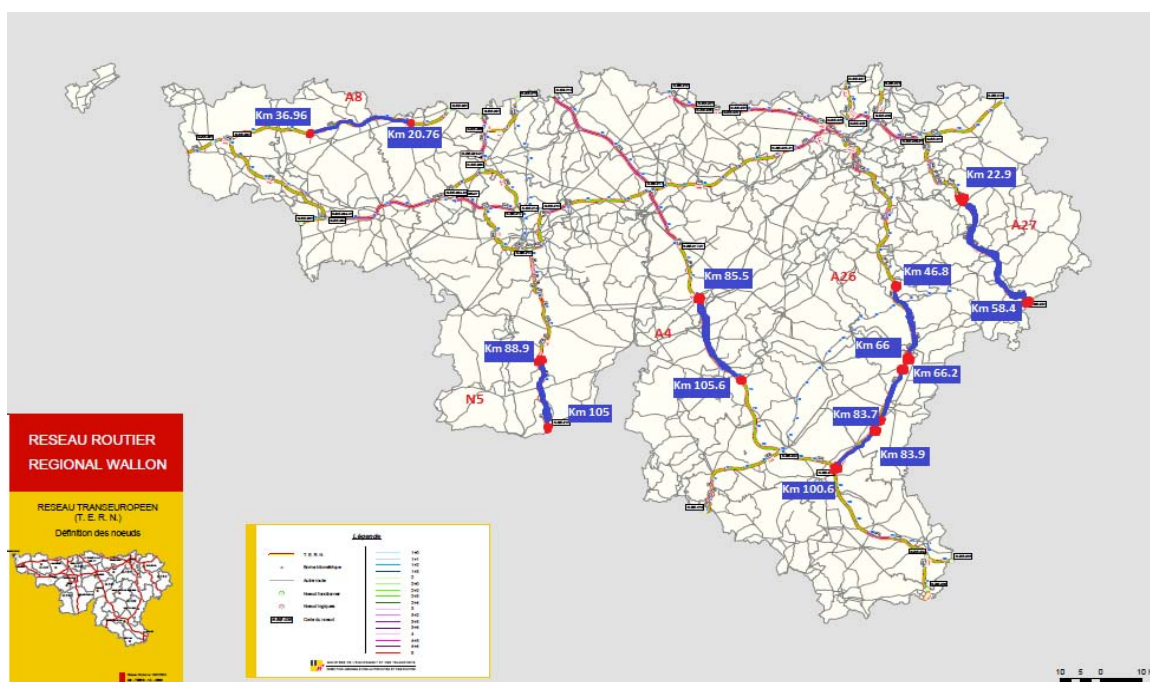
The Kingdom of Belgium covers an area of 30.528 square kilometres and it is geographically located in the centre of Europa. Due to its strategic location, Belgian roads play a key role for EU transport connecting other important member states as France, The Netherlands, Germany and Luxembourg.

After the analysis of the data, a total of 14 white sections have been found in the TEN-T road network of Belgium during the period 2005-2009 (in Flanders the period covered is 2004-2008). The total length of WhiteRoads in Wallonia is 147 Kms, corresponding to 5 EUWS in 5 different roads part of the TEN-T. On the other hand, the total length of WhiteRoads in Flanders is 151,27 Kms corresponding to 8 EUWS located in 5 roads part of the TEN-T.

The following pictures show the main road network in Flanders and Wallonia with the white roads sections.

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<sup>3</sup> Further information about the checklist and guidelines for data collection can be found in the annex attached to this Deliverable



Map 1. White Roads sections in Flanders and Wallonia.

**The region of Wallonia** is situated in the South of Belgium. There are five white roads in this area: A27, A26, A4, N5 and A8. The consortium has done an extensive fieldwork on the following section:

- A27 / E42: from Km 22,9 to Km 58,4
- A26 / E25: from Km 46,8 to Km 66
- A26 / E25: from Km 66,2 to Km 83,7
- A26 / E25: from Km 83,9 to Km 100,6
- A4 / E411: from Km 85,47 to Km 105,67
- N5 / E420: from Km 88,9 to Km 105
- Road A8/E429: from Km 20,7 to Km 36,9

**The Region of Flanders** is located in the north of Belgium. There are 4 white roads in the area: A2, A13, N49 and R4. The R0 (ring of Brussels) is a special motorway as it covers the three regions of Belgium: Flanders, Brussels and Wallonia. The consortium has done an extensive fieldwork on the following section:

- Road A13/E313: from Km 63,4 to Km 80
- Road A13/E313: from Km 80,2 to Km 95,4
- Road N49 / E34: from Km 14,2 to Km 29,86
- Road N49 / E34: from Km 48,91 to Km 69,05
- Road 2 / E314: from Km 0 to Km 18,06
- Road 2 / E314: from Km 53,4 to Km 69,5
- R0: from Km 17,8 to Km 40,5
- R4: from Km 16,2 to Km 43



The field work of the EUWS in Belgium completed by the consortium determined the existence of a minimum number of safety elements. Those elements are common to all the sections analysed and installed where it is necessary to protect drivers from collisions. However, there is a lack of maintenance in some points after extreme weather conditions during the last winters. As consequence, some of the sections do not present a good surface originating a degradation of the roads.

General characteristics common to all the EUWS are presented below:

- **ALIGNMENT AND CROSS SECTION**

Most of the EUWS in Belgium are dual carriageway motorways with broad lanes and paved left/right hard shoulder. Speed limit for these roads is 120 Km/hr and good design with small curves permitting a safe driving. There is consistency between lanes and in most of the cases there is no low traffic lane except in some EUWS located in the south of the country where the ground is more undulated. Very good visibility in general.

|                                            |                     |
|--------------------------------------------|---------------------|
| Speed limit                                | 120 Km/h            |
| Consistency in alienation                  | Correct             |
| Nº of lanes per direction                  | 2/per direction     |
| Lane width                                 | > 3.5 m             |
| Existence of hard shoulder                 | Yes, paved          |
| Width of right hard shoulder               | > 1.5 m             |
| Width of left hard shoulder                | 0.5 m-1.5 m         |
| Existence of slow traffic lane in the EUWS | No, with exceptions |
| Type of ground                             | Mainly flat         |
| Limited visibility (hills, grounds, etc..) | Good visibility     |

Table 14. Alignment and cross section conclusions.

- **PAVEMENT**

Surface of the EUWS in Belgium varies. Some sections are constructed of bituminous, other of concrete and even there are dual carriageway with one lane made of concrete and other of asphalt. There are sections with potholes, or longitudinal and transversal crackings originated after the last hard two winters. Those crackings need to be repaired as size increase gradually due to the lack of maintenance.

|                      |                      |
|----------------------|----------------------|
| Type of road surface | Bituminous/ Concrete |
| Potholes             | Yes                  |
| Longitudinal cracks  | Yes                  |
| Transversal cracks   | Yes                  |

Table 15. Pavement conclusions.

- **GUIDANCE EQUIPMENT**

The EUWSs present a comprehensive number of traffic and directional signs. Signs are credible, visible, mainly in good condition and located in strategic points warning to drivers of

road conditions with enough time to react. There are signs practically in every Km of the EUWS. In general number of traffic signs is double than traffic signs per Km.

|                                                                            |          |
|----------------------------------------------------------------------------|----------|
| Nº of vertical signs per Km (not include directional signs)                | 2        |
| Nº of orientation signs per Km                                             | 1        |
| Condition (painted, de-colouration, wear, etc.)                            | Good     |
| Credibility of signalling (speed limit-speed operation)                    | Credible |
| Signalling visibility (signalling hidden by vegetation, other signs, etc.) | Good     |

**Table 16. Vertical signing conclusions.**

As regards markings, good in general with some exceptions where the surface is not in good condition either. Markings are in correspondence with signs.

|                                                 |          |
|-------------------------------------------------|----------|
| Correspondence road markings and vertical signs | Yes      |
| % of permitted overtaking                       | >60% Yes |
| Condition                                       | Good     |

**Table 17. Road markings conclusions.**

The EUWSs have also variable message panels at concrete points.

#### • **ROAD RESTRAINT SYSTEMS**

The EUWS type is a dual carriageway with a central barrier. The central barrier is mostly made of concrete. There are metallic barriers at the right side in all the EUWS but the length is not continuous. Right barriers are always metallic and installed when necessary to avoid run-offs. There are in most of the cases reflectors on the barriers which delimit the edge of the road.

Barriers are in good condition, with turn-down ending and it is not necessary to extend its length. In general, there is no protection for motorcyclists so this could be the main aspect to improve.

#### • **ROAD SIDE EQUIPMENT**

The EUWSs in Belgium present good maintained road side equipment where it is necessary. All the roads present light yellow post or signs in exits. There are profile road markings and post on the sides delimiting the road very often. There are very few directional signs in curves. There are no road studs.

|                             |                           |
|-----------------------------|---------------------------|
| Profiled road markings      | Yes, when it is necessary |
| Directional signs in curves | No, except in some cases  |
| Road studs                  | No                        |
| Side posts                  | Yes, in most of the cases |
| Posts or cushion on exits   | Yes                       |

**Table 18. Traffic guidance equipment conclusions.**

- **ROAD LIGHTING**

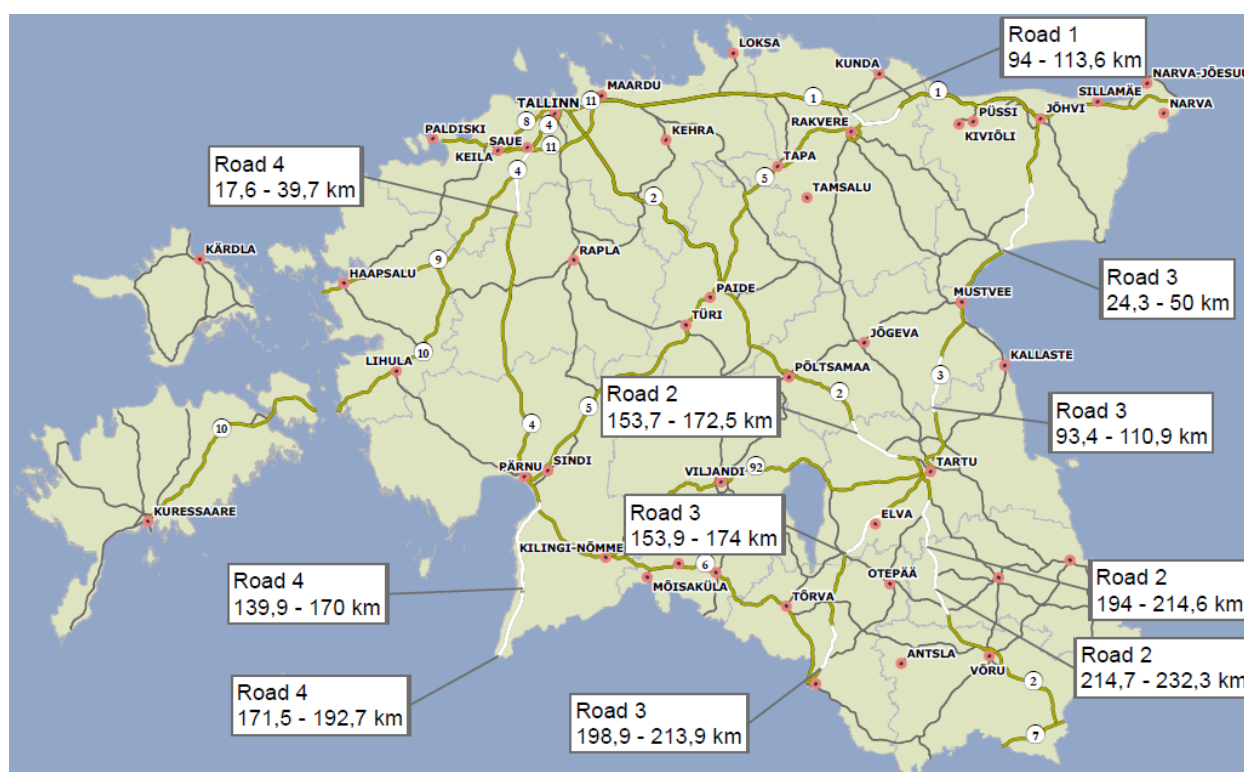
Lighting is also a common element for all the EUWS in Belgium. There is double lighting in case of exits or junctions.

## 5.5. DESCRIPTION OF FIELD WORK IN ESTONIA (D4.6)

The Republic of Estonia covers an area of 45,227 square kilometers and is geographically located in the Baltic region of Northern Europe. It borders the Gulf of Finland to the north, the Baltic Sea to the west, Latvia to the South, and Lake Peipus and Russia to the east .

After the analysis of the data, a total of eight valid white sections have been found in the TEN-T road network of Estonia during the period 2005-2009. The total length of White roads in Estonia is 164 Kms. The table below shows in detail all the white sections and its corresponding starting and ending Kms.

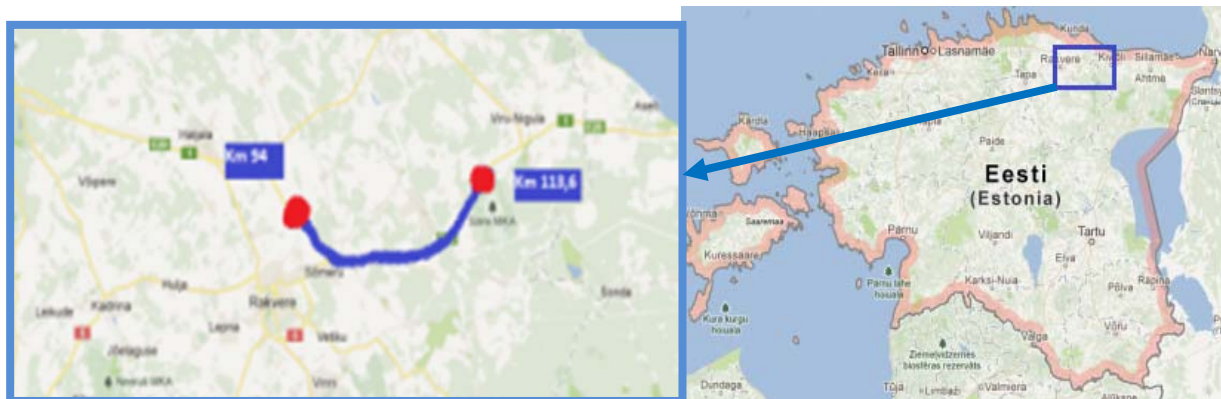
The following picture shows the main road network in Estonia with the white roads sections.



Map 20. White roads sections y Estonia.

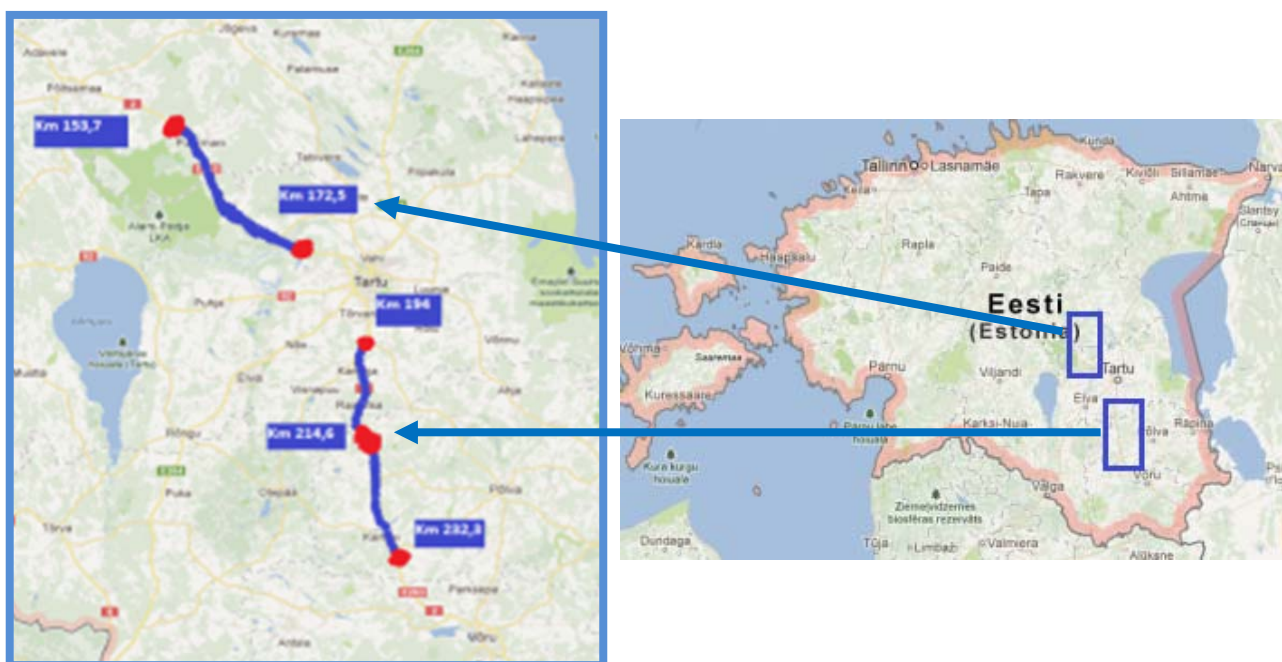
The consortium has done an extensive fieldwork on the following section:

- Road 1 / E20: from Km 94 to Km 113,6



Map 31. EUWS on road 1/E20

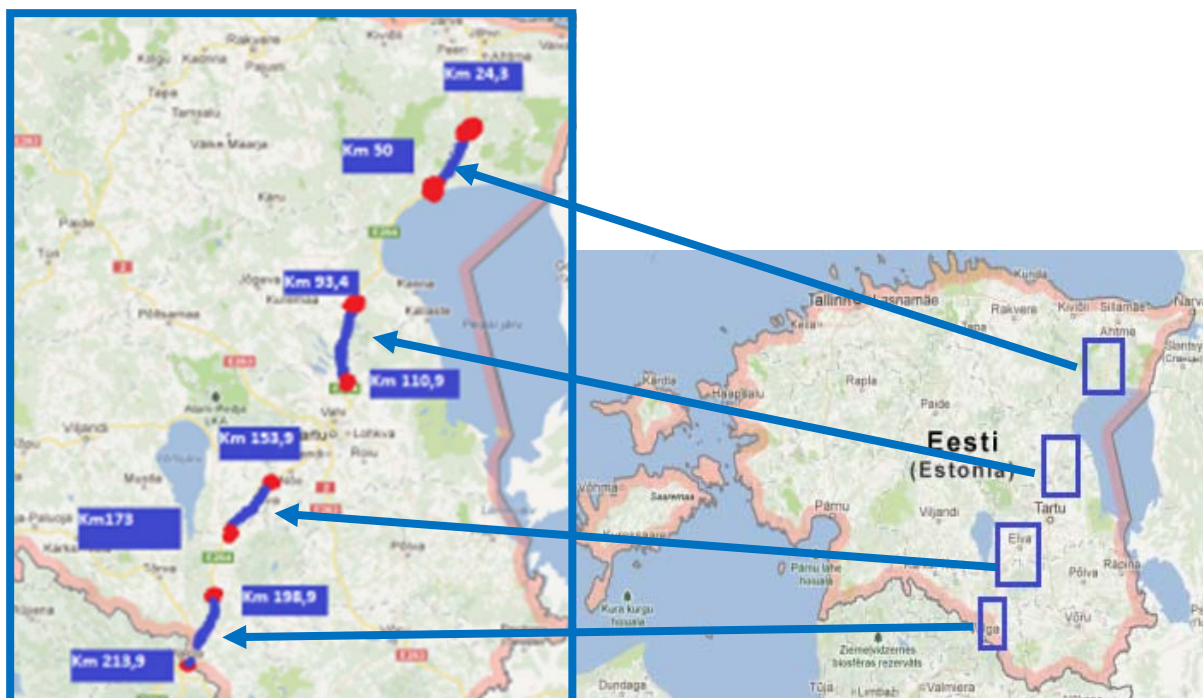
- Road 2 / E263: from Km 153,7 to Km 172,5
- Road 2 / E263: from Km 194 to Km 214,6
- Road 2 / E263: from Km 214,7 to Km 232,3



Map 32. EUWS on road 2/E263

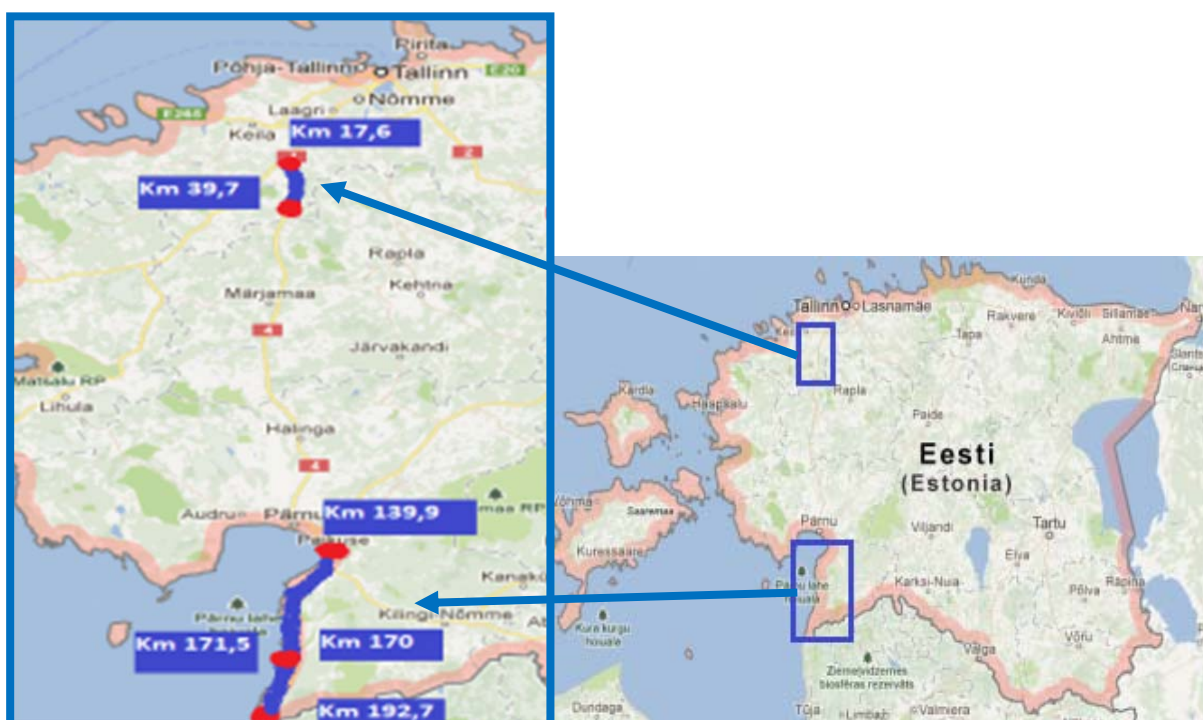
- Road 3 / E264: from Km 24,3 to Km 50
- Road 3 / E264: from Km 93,4 to Km 110,9
- Road 3 / E264: from Km 153,9 to Km 173
- Road 3 / E264: from Km 189,9 to Km 213,9





Map 33. EUWS on road 3/E264

- Road 4 / E67: from Km 66,1 to Km 81,9
- Road 4 / E67: from Km 97,1 to Km 128,9
- Road 4 / E67: from Km 129,1 to Km 145, 9
- Road 4 / E67: from Km 148 to Km 178,9



Map 34. EUWS on road 4/E67



The field work conducted along EUWS in Estonia concluded that these particular road sections present an adequate standard of design with good road equipment, the presence of potholes and cracking is usual.

The following chapters present the conclusions of the field work.

- **ALIGNMENT AND CROSS SECTION**

The majority of EUWS of Estonia are located in conventional roads of a single carriageway except for a small subsection in Road 4 which is a dual expressway in the proximity of Tallinn. All the EUWSs have broad lanes wider than 3,5 m per direction and hard shoulders paved or non-paved depending on the location but always between a width of 0,5 and 1,5 mts. There is always an additional lane in those stretches where there is a bus-stop. Depending of the EUWS, the ground is either being flat or undulated but never mountainous. There is no low traffic lane in any of the EUWS. In general, visibility is good in the EUWS and there are a few roadside obstacles which protected by barriers when needed.

As result, it can be concluded that the roads are well-designed permitting good and safe driving even in bad weather conditions. Some of these roads have been upgraded receiving EU funds.

- **TRAFFIC**

The Average Daily Traffic has been only data available for study of the EUWS analyzed.

|              |                          |
|--------------|--------------------------|
| ADT interval | 2,128 – 13,786 veh / day |
|--------------|--------------------------|

Table 19. Traffic conclusions

- **PAVEMENT**

The surface of all the EUWSs located in 4 different roads is always asphalt. In general, the condition is good with few or no potholes, longitudinal or transversal cracks. It is important to stress the quality of materials with resistance to extreme temperatures and products (as salt) used during winter season to ensure a safe driving.

- **GUIDANCE EQUIPMENT**

Traffic and directional signs in the EUWSs are well located, in good condition and easily visible for drivers who can smoothly adapt the vehicle to changing driving conditions. Signs correspond with markings which are also in good condition. Overtaking is permitted in all the EUWSs and there are no variable message panels as this is a typical element for motorways and not conventional roads.

- **ROAD RESTRAINT SYSTEMS**

The EUWSs in Estonia have always steel barriers only where needed to avoid run-offs and protect against any external obstacles as trees, walls or houses. In general good condition and correct installation with turn-down ending although no protection for motorcyclists.

In case there are stretches with no barriers, there is no danger of collision with other external elements as there is enough safety distance.

- **ROAD SIDE EQUIPMENT**

The EUWSs have in general no profiled road markings. There is no directional panels in curves except in some exceptions where the turn is dangerous. A common element for the white section in Estonia is the existence of post on the side to delimit the edges of the roads. Those side posts are complemented by road studs located in the central marking of the road.

These elements make driving safer especially during winter time when nights are much longer than in the rest of Europe.

- **ROAD LIGHTING**

None of the EUWSs have continuous lighting. There is only lighting in particular sites as junctions or when approaching urban areas.

## 5.6. DESCRIPTION OF FIELD WORK IN FRANCE (D4.2)

In France, all roads belonging to the TEN-T have been analysed. The volume of analysed data is included in the following table:

|                              |             |
|------------------------------|-------------|
| Period covered               | 2005 – 2009 |
| Number of roads analysed     | 153         |
| Total Km analysed            | 16,317.3    |
| Number of accidents analysed | 27,986      |

Table 20. Volume of analysed data

After analysing data, in France have identified a total of 242 white sections in TEN-T Road Network during the period 2005-2009, a total of 10,093.4kilometres long and divided among 100 sections of roads.

The consortium has done an extensive fieldwork on the following sections:

- Motorway A4 (E42): from Km 182 to Km 197
- Motorway A7(E25): from Km 130 to Km 145
- Motorway A8 (E411): from Km 33 to Km 48
- Motorway A10 (E411): from Km 265 to Km 280
- Motorway A11 (E411): from Km 132 to Km 147
- Motorway A14 (E411): from Km 5 to Km 20
- Motorway A19 (E411): from Km 113 to Km 128
- Motorway A20 (E411): from Km 370 to Km 385
- Motorway A25 (E411): from Km 45 to Km 60
- Motorway A31 (E411): from Km 19 to Km 34
- Motorway A36 (E411): from Km 60 to Km 75
- Motorway A42 (E411): from Km 38 to Km 53
- Motorway A61 (E411): from Km 266 to Km 281
- Motorway A64 (E411): from Km 216 to Km 231
- Motorway A71 (E411):from Km 240 to Km 255
- Motorway A75 (E411): from Km 123 to Km 138
- Road N4 (E34 and E313): from Km 0 to Km 15
- Road N21: from Km 112 to Km 127
- Road N42: from Km 22 to Km 37
- Road N67: from Km 30 to Km 45
- Road N79: from Km 62 to Km 77
- Road N106: from Km 25 to Km 40
- Road N122: from Km 85 to Km 100
- Road N124: from Km 27 to Km 42

- Road N141: from Km 53 to Km 168
- Road N145: from Km 40 to Km 55
- Road N149: from Km 53 to Km 168
- Road N154: from Km 30 to Km 45
- Road N164: from Km 27 to Km 42
- Road N202: from Km 23 to Km 38



The following chapters present the conclusions of the field work.

- **ALIGNMENT AND CROSS SECTION**

Most of the EUWS in France are located in dual carriageway motorways with speed limit of 130 km/hr. Consistency between lanes is correct. Lanes are wide except in some EUWS which are part of a single carriageway road. There is always hard shoulder although only totally paved whether the road is a motorway. There is no low traffic lane even if the ground is mountainous. In general there is no limited visibility and EUWS has good maintenance conditions.

- **PAVEMENT**

Pavement is all the EUWSs in France is always asphalt. There are never potholes. However there are EUWSs with some longitudinal and transversal crackings which however do not have a negative impact on safety.

- **GUIDANCE EQUIPMENT**

As regards traffic and directional signs of the EUWSs in France, they are well located in places which make them more visible. Signs are in good conditions and credible. Signs are always in correspondence with markings which by general are also in good condition although some sections have poor markings. Overtaking is possible in the majority of the EUWSs as they are motorways. Existence of variable message panels but less in comparison with other countries of study.

- **ROAD RESTRAINT SYSTEMS**

All the EUWSs have barriers correctly installed and in good condition. In motorways barriers are installed in both sides of the road. Always there is turned-down ending and also in some of the sections there is protection for motorcyclists. Most of the barriers do not require additional length except in some cases located in single carriageway roads.

- **ROAD SIDE EQUIPMENT**

As regards road side equipment, the EUWSs have different passive safety elements as profiles road markings, directional signs in curves, side posts and posts on exits. Those elements are not installed all together in the same sections except some particular cases. There are no road studs. Road side elements are normally well maintained too.

- **ROAD LIGHTING**

As general rule, the EUWSs have no continuous lighting. At maximum, there is only lighting in particular sites as junctions, resting areas, petrol stations, etc.

## 5.7. DESCRIPTION OF FIELD WORK IN LATVIA (D4.6)

The Republic of Latvia covers an area of 64,589 square kilometres and it is geographically located in the Baltic region of Northern Europe. Due to its strategic location, Latvian roads play a key role for EU transport connecting other member states such as Estonia and Lithuania, and also connecting the EU with Russia.

In Latvia, all roads belonging to the TEN-T have been analysed. The volume of analysed data is included in the following table:

|                              |             |
|------------------------------|-------------|
| Period covered               | 2005 – 2009 |
| Number of roads analysed     | 15          |
| Total Km analysed            | 1,755.6     |
| Number of accidents analysed | 11,092      |

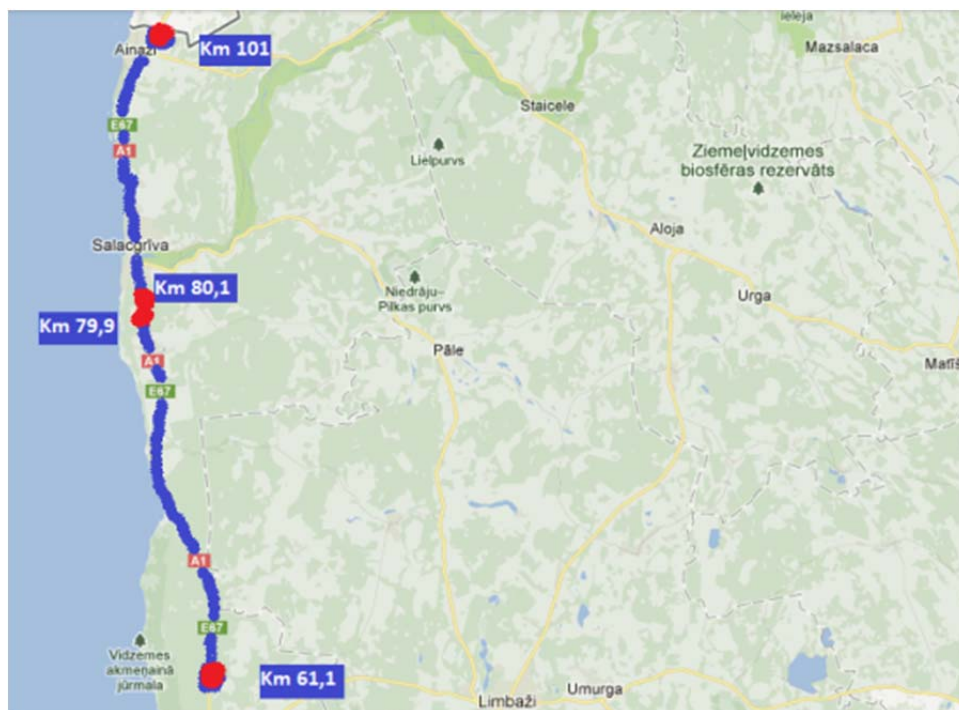
Table 21. Volume of analysed data

After analysing data, in Latvia have identified a total of 23 white sections in TEN-T Road Network during the period 2005-2009, a total of 548.3 kilometres long and divided among 10 sections of roads.



The consortium has done an extensive fieldwork on the following section:

- A1 / E67: from Km 61,1 to Km 79,9
- A1 / E67: from Km 80,1 to Km 101



Map 36. EUWS on road A1/E67.

- A2 / E77: from Km 118,1 to Km 133,9
- A2 / E77: from Km 143,2 to Km 159,9
- A2 / E77: from Km 160,1 to Km 201

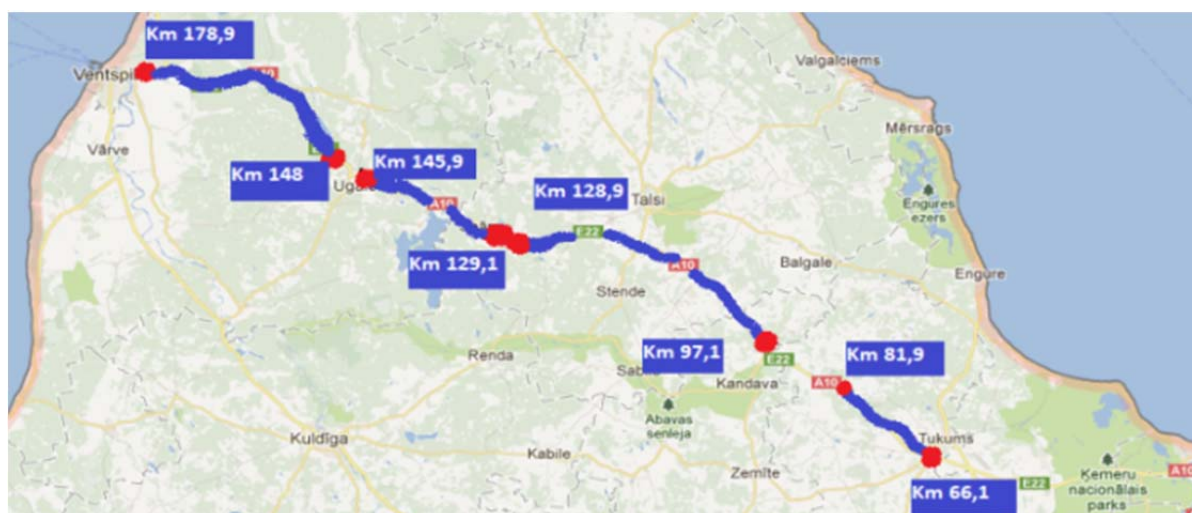


Map 37. EUWS on road A2/E77

- A10 / E22: from Km 66,1 to Km 81,9
- A10 / E22: from Km 97,1 to Km 128,9
- A10 / E22: from Km 129,1 to Km 145,9



- A10 / E22: from Km 148 to Km 178,9



Map 38. EUWS on road A10/E22

The field work conducted along EUWS in Latvia concluded that these particular road sections present an adequate standard of design, some subsection need additional road equipment, as well as a general increased maintenance effort, the presence of potholes and cracking is usual.

The following chapters present the conclusions of the field work.

- **ALIGNMENT AND CROSS SECTION**

White spots analysed are located on conventional roads, with a design speed of 70-90 km / h, lane wider than 3.5 metres and no paved shoulders. The layout of the segments analysed consists mainly of straight alignments with an average of one large radius curve every 2 kilometres.

The following table summarizes the main aspects collected in the field work:

|                                            |                    |
|--------------------------------------------|--------------------|
| Speed limit                                | 70-90              |
| Consistency in alienation                  | correct            |
| Nº of lanes per direction                  | 1/per direction    |
| Lane width                                 | > 3.5 m            |
| Existence of hard shoulder                 | Yes, non paved     |
| Width of right hard shoulder               | Mainly 0.5 m-1.5 m |
| Width of left hard shoulder                | Mainly .5 m-1.5 m  |
| Existence of slow traffic lane in the EUWS | No                 |
| Type of ground                             | Flat - undulated   |
| Limited visibility (hills, grounds, etc..) | No                 |

Table 22. Alignment and cross section conclusions

- **TRAFFIC**

The Average Daily Traffic has been only data available for study of the EUWS analyzed.

|              |                       |
|--------------|-----------------------|
| ADT interval | 874 – 3,790 veh / day |
|--------------|-----------------------|

**Table 23. Traffic conclusions**

- **PAVEMENT**

The EUWS analysed have bituminous pavement; most of them present potholes and longitudinal and transversal cracks.

|                      |            |
|----------------------|------------|
| Type of road surface | Bituminous |
| Potholes             | Yes        |
| Longitudinal cracks  | Yes        |
| Transversal cracks   | Yes        |

**Table 24. Pavement conclusions**

- **ROAD SIGNING AND MARKING**

This section discusses the following road equipment: vertical signing, road marking and variable message signs.

In relation to road signing, the EUWS analysed have an average of one vertical signal by kilometre and 1 orientation signals by kilometre. Signing is, in general, credible, properly maintained and has adequate visibility.

|                                                                             |          |
|-----------------------------------------------------------------------------|----------|
| Nº of vertical signs per Km (not include directional signs)                 | 1        |
| Nº of orientation signs per Km                                              | 1        |
| Condition (painted, de-colouration, wear, etc.)                             | Good     |
| Credibility of signalling (speed limit-speed operation)                     | Credible |
| Signalling visibility (signalling hidden by vegetation, other signs, etc..) | Good     |

**Table 25. Vertical signing conclusions**

Road markings are properly maintained and are consistent with vertical signs installed.

|                                                 |      |
|-------------------------------------------------|------|
| Correspondence road markings and vertical signs | Yes  |
| % of permitted overtaking                       | >60% |
| Condition                                       | Good |

**Table 26. Road markings conclusions**

The EUWS do not have any variable message signs.

- **ROAD RESTRAINT SYSTEMS**

In the field work, a total of 11,19 km of road safety barrier have been identified, most of them with turned down endings. The sections lack of motorcyclist protection systems.

Additional length of barriers is required in some specific points and/or sections.

|                                                |                           |
|------------------------------------------------|---------------------------|
| Total length of barriers installed (in meters) | 11,190                    |
| Additional length required                     | Yes, in specific sections |
| Installation                                   | correct                   |
| Turned-down ending                             | Yes                       |
| Motorcyclist protection                        | No                        |
| General conditions                             | Good                      |

Table 27. Road restraint systems conclusions

- TRAFFIC GUIDANCE EQUIPMENT**

Traffic guidance equipment is properly maintained and located at those points and / or sections where necessary.

|                             |                           |
|-----------------------------|---------------------------|
| Profiled road markings      | Yes, when it is necessary |
| Directional signs in curves | Yes, when it is necessary |
| Road studs                  | Yes, when it is necessary |
| Side posts                  | Yes, when it is necessary |
| Posts or cushion on exits   | Yes, when it is necessary |

Table 28. Traffic guidance equipment conclusions

- ROAD LIGHTING**

The EUWS analysed have no lighting except in some particular sections.

## 5.8. DESCRIPTION OF FIELD WORK IN LITHUANIA (D4.6)

In Lithuania, all roads belonging to the TEN-T have been analysed. The volume of analysed data is included in the following table:

|                              |             |
|------------------------------|-------------|
| Period covered               | 2005 – 2009 |
| Number of roads analysed     | 8           |
| Total Km analysed            | 811,2       |
| Number of accidents analysed | 1,392       |

Table 29. Volume of analysed data

After analysing data, in Lithuania have been identified a total of 1 white section in TEN-T Road Network during the period 2005-2009, a total of 17.8 kilometres long.

The consortium has done an extensive fieldwork on the following section:

- ✓ **TEN-T Road A3:**
  - From Km 0 to Km 17.8.



Map 39. EUWS on motorway A3

The field work conducted along EUWS in Lithuania concluded that this particular road section present in general a good standard of design, appropriate road equipment, as well as a good level of maintenance, although the presence of pedestrian crossing, pedestrian or change of level at the same level is a risk for road safety.

The following chapters present the conclusions of the field work.

- **ALIGNMENT AND CROSS SECTION**

White spot analysed is located on a motorway and a conventional road, with a design speed of 80 km / h, lane wider than 3.5 metres and paved shoulders. The layout of the segments analysed consists mainly of straight alignments.

The following table summarizes the main aspects collected in the field work:

|                                             |                                                                                |
|---------------------------------------------|--------------------------------------------------------------------------------|
| Speed limit                                 | 80                                                                             |
| Consistency in alienation                   | correct                                                                        |
| Nº of lanes per direction                   | 2/per direction on the motorway and<br>1/per direction on de conventional road |
| Lane width                                  | > 3.5 m                                                                        |
| Existence of hard shoulder                  | Yes, paved                                                                     |
| Width of right hard shoulder                | 0.5 m-1.5 m                                                                    |
| Width of left hard shoulder                 | 0.5 m-1.5 m                                                                    |
| Existence of slow traffic lane in the EUWS  | No                                                                             |
| Type of ground                              | flat                                                                           |
| Limited visibility (hills, grounds, etc...) | No                                                                             |

Table 30. Alignment and cross section conclusions

## • TRAFFIC

It is important to highlight the relationship between the total traffic and the traffic of heavy vehicles; EUWS associated to high traffic volumes usually present a low or normal heavy traffic.

|                            |                  |
|----------------------------|------------------|
| ADT interval               | 34,736 veh / day |
| heavy percentages interval | 12.5%            |

**Table 31. Traffic conclusions**

## • PAVEMENT

The EUWS analysed have bituminous pavement; in the section belong to the conventional road the pavement presents longitudinal cracks.

|                      |            |
|----------------------|------------|
| Type of road surface | Bituminous |
| Potholes             | No         |
| Longitudinal cracks  | No/Yes     |
| Transversal cracks   | No         |

**Table 32. Pavement conclusions**

## • ROAD SIGNING AND MARKING

This section discusses the following road equipment: vertical signing, road marking and variable message signs.

In relation to road signing, the EUWS analysed have an average of 3 vertical signals by 2 kilometres and 2 orientation signals by kilometre. Signing is, in general, credible, properly maintained and has adequate visibility.

|                                                                              |          |
|------------------------------------------------------------------------------|----------|
| Nº of vertical signs per Km (not include directional signs)                  | 1        |
| Nº of orientation signs per Km                                               | 2        |
| Condition (painted de-colouration, wear, etc.)                               | Good     |
| Credibility of signalling (speed limit-speed operation)                      | Credible |
| Signalling visibility (signalling hidden by vegetation, other signs, etc...) | Good     |

**Table 33. Vertical signing conclusions**

Road markings are properly maintained and are consistent with vertical signs installed.

|                                                 |                                                        |
|-------------------------------------------------|--------------------------------------------------------|
| Correspondence road markings and vertical signs | Yes                                                    |
| % of permitted overtaking                       | >60% on the section belonging to the conventional road |
| Condition                                       | Good                                                   |

**Table 34. Road markings conclusions**

The EUWS have not variable message signs.



- **ROAD RESTRAINT SYSTEMS**

In the field work, a total of 11 km of road safety barrier have been identified, most of them with turned down endings. The sections lack of motorcyclist protection systems.

|                                                |                                                                                                                                                                           |
|------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Total length of barriers installed (in meters) | 11,000                                                                                                                                                                    |
| Additional length required                     | No, this is sufficient, but in the section between Km 16 and Km 17.8 additional length is required at intersections with other roads and passing through populated areas. |
| Installation                                   | correct                                                                                                                                                                   |
| Turned-down ending                             | Yes                                                                                                                                                                       |
| Motorcyclist protection                        | No                                                                                                                                                                        |
| General conditions                             | Good                                                                                                                                                                      |

Table 35. Road restraint systems conclusions

- **TRAFFIC GUIDANCE EQUIPMENT**

Traffic guidance equipment is properly maintained and located at those points and / or sections where necessary.

|                             |                           |
|-----------------------------|---------------------------|
| Profiled road markings      | No                        |
| Directional signs in curves | Not necessary             |
| Road studs                  | Yes, when it is necessary |
| Side posts                  | Yes, when it is necessary |
| Posts or cushion on exits   | Yes, when it is necessary |

Table 36. Traffic guidance equipment conclusions

- **ROAD LIGHTING**

The EUWS analysed, have lighting in the motorway section.

## 5.9. DESCRIPTION OF FIELD WORK IN POLAND (D4.5)

In Poland, all roads belonging to the TEN-T have been analysed. The volume of analysed data is included in the following table:

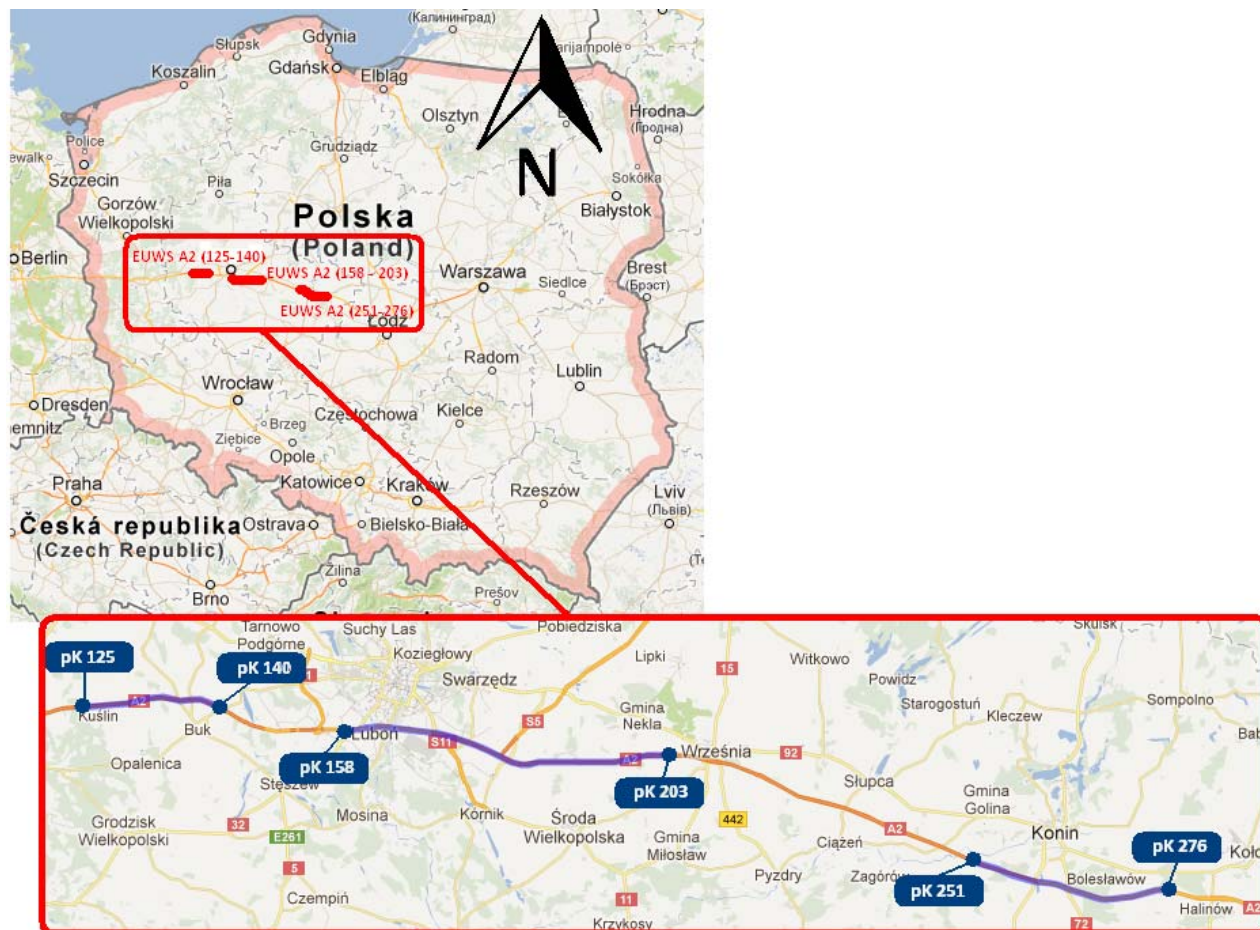
|                              |             |
|------------------------------|-------------|
| Year covered                 | 2005 – 2009 |
| Number of roads analysed     | 39          |
| Total Km analysed            | 4.339,6     |
| Number of accidents analysed | 14.300      |

Table 37. Volume of analysed data

After analysing data, in Poland have been identified a total of 9 white sections in TEN-T Road Network during the period 2005-2009, a total of 230,809 kilometres long and divided among 7 sections of roads.

The consortium has done an extensive fieldwork on the following sections:

- ✓ **TEN-T Road A2:**
  - From Km 125.0 to Km 140.0.
  - From Km 157.6 to Km 203.3.
  - From Km 251.6 to Km 276.023.



Map 40. EUWS on motorway A2.

The field work conducted along EUWS in Poland concluded that these particular road sections present a good standard of design, appropriate road equipment, as well as a general good level of maintenance, although the presence of potholes and cracking is usual.

The following chapters present the conclusions of the field work.

- **ALIGNMENT AND CROSS SECTION**

White spots analysed are located on motorways, with a design speed of 120 km / h, lane wider than 3.5 metres and no paved shoulders. The layout of the segments analysed consists mainly of straight alignments with an average of a wide radius curve.

The following table summarizes the main aspects collected in the field work:

|                                            |                 |
|--------------------------------------------|-----------------|
| Speed limit                                | 120             |
| Consistency in alienation                  | correct         |
| Nº of lanes per direction                  | 2/per direction |
| Lane width                                 | > 3.5 m         |
| Existence of hard shoulder                 | Yes. no paved   |
| Width of right hard shoulder               | 0.5 m-1.5 m     |
| Width of left hard shoulder                | ≤0.5 m          |
| Existence of slow traffic lane in the EUWS | No              |
| Type of ground                             | flat            |
| Limited visibility (hills. grounds. etc..) | No              |

**Table 38. Alignment and cross section conclusions**

- TRAFFIC**

It is important to note that there is a high % of heavy traffic, in all the analyses sections

|                            |               |
|----------------------------|---------------|
| ADT interval               | 18752 Veh/day |
| heavy percentages interval | 42.7%         |

**Table 39. Traffic conclusions.**

- PAVEMENT**

The EUWS analysed has a bituminous surface. The pavement presents potholes between Km 134 and Km 137 and longitudinal and transversal cracks in two sections: from Km 134 to 137, and from Km 266 to 272.

|                      |            |
|----------------------|------------|
| Type of road surface | Bituminous |
| Potholes             | Yes        |
| Longitudinal cracks  | Yes        |
| Transversal cracks   | Yes        |

**Table 40. Pavement conclusions**

- ROAD SIGNING AND MARKING**

This section discusses: vertical signings, road marking and variable message signs.

In relation to road signings, the EUWS analysed have an average of one vertical signal by 2 kilometres and 1 orientation signals by kilometre. In general, signing is credible, properly maintained and has adequate visibility.

|                                                                            |          |
|----------------------------------------------------------------------------|----------|
| Nº of vertical signs per Km (not include directional signs)                | 2        |
| Nº of orientation signs per Km                                             | 1        |
| Condition (painted. de-colouration. wear. etc.)                            | Good     |
| Credibility of signalling (speed limit-speed operation)                    | Credible |
| Signalling visibility (signalling hidden by vegetation. other signs. etc.) | Good     |

**Table 41. Vertical signing conclusions**

Road markings are properly preserved and are consistent with vertical signs installed.

|                                                 |                |
|-------------------------------------------------|----------------|
| Correspondence road markings and vertical signs | Yes            |
| % of permitted overtaking                       | Not applicable |
| Condition                                       | Good           |

**Table 42. Road markings conclusions**

The EUWS only have variable message signs at specific points.

- **ROAD RESTRAINT SYSTEMS**

In the field work, a total of 132.77 km of road safety barrier have been identified, most of them with turned down endings. The sections lack of motorcyclist protection systems.

|                                                |                        |
|------------------------------------------------|------------------------|
| Total length of barriers installed (in meters) | 132770                 |
| Additional length required                     | No. this is sufficient |
| Installation                                   | Correct                |
| Turned-down ending                             | Yes                    |
| Motorcyclist protection                        | No                     |
| General conditions                             | Good                   |

**Table 43. Road restraint systems conclusions**

- **TRAFFIC GUIDANCE EQUIPMENT**

Traffic guidance equipment is properly maintained and located at those points and / or sections where necessary.

|                             |                           |
|-----------------------------|---------------------------|
| Profiled road markings      | Yes. when it is necessary |
| Directional signs in curves | No. not necessary         |
| Road studs                  | No. not necessary         |
| Side posts                  | Yes. when it is necessary |
| Posts or cushion on exits   | Yes. when it is necessary |

**Table 44. Traffic guidance equipment conclusions**

- **ROAD LIGHTING**

The EUWS analysed have no lighting except in some particular point.

## **5.10. DESCRIPTION OF FIELD WORK IN ROMANIA (D4.4)**

In Romania, all roads belonging to the TEN-T have been analysed. The volume of analysed data is included in the following table:

|                              |             |
|------------------------------|-------------|
| Period covered               | 2005 – 2009 |
| Number of roads analysed     | 24          |
| Total Km analysed            | 3,576.4     |
| Number of accidents analysed | 7,899       |

**Table 45. Volume of analysed data**

After analysing data received from the Administration, the consortium has identified in Romania a total of 6 EUWS in TEN-T Road Network during the period 2005-2009, a total of 237.6 kilometres long and divided among 7 sections of roads.

The consortium has completed an extensive fieldwork on the identified sections. The on-site inspections of the EUWS identified in Romania were complicated due to the following circumstances:

- Lack of precise information concerning the exact starting and end mileages of the EUWSs identified
- No correspondence between the milestones indicated on the map and the mileage indications along the road
- Delays in the transfer from one area to the other, due to a very bad road network, especially the local and regional roads (some sections were like tracks)
- Some sections were impossible to inspect, as they were just under construction (or reconstruction)
- Despite the fact that a road like the 1H seemed to currently benefit from EU financial support for upgrading and reconstruction, it is difficult to believe that this road is part of the TEN-T network as Public Authorities declared it
- For some sections (the ones of the A2 motorway near Costanța) it was totally impossible to carry out a proper inspection, as when we drove on them, they had been rehabilitated and upgraded to a higher standard very recently. This did not give us the possibility to inspect the road as it was during the period considered for collecting the data (between 2004 and 2009).

Consequently, all these problems did not allow the consortium to carry out a useful inspection of the sections identified as EUWS in Romania. This should be considered as a missed opportunity taking into consideration the safety conditions of Romanian roads which are not always positive due to different circumstances:

- o low level road network
- o huge volume of traffic, especially trucks
- o few large roads (motorway type)
- o lack of respect of driving rules by the road users
- o lack of enforcement

However, it might be interesting to consider a possible extension of the WhiteRoads project, focused on more recent road safety data, with correct and precise identification of road sections which have recently been rehabilitated or upgraded, and to compare the road safety statistics of these sections before and after the upgrading works.



## 5.11. DESCRIPTION OF FIELD WORK IN SPAIN (D4.1)

In Spain, all roads belonging to the TEN-T have been analysed. The volume of analysed data is included in the following table:

|                              |                            |
|------------------------------|----------------------------|
| Period covered               | 2005 – 2009 <sup>(1)</sup> |
| Number of roads analysed     | 70                         |
| Total Km analysed            | 11,811,5                   |
| Number of accidents analysed | 59,924                     |

<sup>(1)</sup> except for the road AP-7 which has been considered the period 2006-2010

Table 46. Volume of analysed data

After analysing data, in Spain have been identified a total of 145 white sections in TEN-T Road Network during the period 2005-2009 (except for the road AP-7 which has been considered the period 2006-2010), a total of 4,001.2 kilometres long and divided among 48 sections of roads.

The consortium has done an extensive fieldwork on the following sections:

### ✓ TEN-T Road A3:

- From Km 74.1 to Km 90.0.
- From Km 142.0 to Km 162.5.
- From Km 166.11 to Km 189.9.



Map 41. EUWS on motorway A3



### ✓ TEN-T Road A30:

- From Km 1.0 to Km 19.4.
- From Km 19.6 to Km 48.4.
- From Km 48.6 to Km 71.1.



Map 42. EUWS on motorway A30

✓ **TEN-T Road A31:**

- From Km 88.4 to Km 110.2.
- From Km 122.1 to Km 138.9.
- From Km 145.0 to Km 172.8



Map 43. EUWS on motorway A31

The field work conducted along EUWS in Spain concluded that these particular road sections present a good standard of design, appropriate road equipment, as well as a general good level of maintenance, although the presence of potholes and cracking is usual.

The following chapters present the conclusions of the field work.

### • ALIGNMENT AND CROSS SECTION.

White spots analysed are located on motorways, with a design speed of 120 km / h, lane wider than 3.5 metres and paved shoulders. The layout of the segments analysed consists mainly of straight alignments with an average of one large radius curve every 2 kilometres.

The following table summarizes the main aspects collected in the field work:

|                                             |                 |
|---------------------------------------------|-----------------|
| Speed limit                                 | 120             |
| Consistency in alienation                   | correct         |
| Nº of lanes per direction                   | 2/per direction |
| Lane width                                  | > 3.5 m         |
| Existence of hard shoulder                  | Yes, paved      |
| Width of right hard shoulder                | 0.5 m-1.5 m     |
| Width of left hard shoulder                 | 0.5 m-1.5 m     |
| Existence of slow traffic lane in the EUWS  | No              |
| Type of ground                              | flat            |
| Limited visibility (hills, grounds, etc...) | No              |

Table 47. Alignment and cross section conclusions

### • TRAFFIC

It is important to highlight the relationship between the total traffic and the traffic of heavy vehicles; EUWS associated to high traffic volumes usually present a low or normal heavy traffic.

|                            |                           |
|----------------------------|---------------------------|
| ADT interval               | 12,478 – 36,087 veh / day |
| heavy percentages interval | 13% - 26%                 |

Table 48. Traffic conclusions

### • PAVEMENT.

The EUWS analysed have bituminous pavement; most of them present potholes and longitudinal and transversal cracks.

|                      |            |
|----------------------|------------|
| Type of road surface | Bituminous |
| Potholes             | Yes        |
| Longitudinal cracks  | Yes        |
| Transversal cracks   | Yes        |

Table 49. Pavement conclusions

### • ROAD SIGNING AND MARKING

This section discusses the following road equipment: vertical signing, road marking and variable message signs.

In relation to road signing, the EUWS analysed have an average of one vertical signal by kilometre and 2 orientation signals by kilometre. Signing is, in general, credible, properly maintained and has adequate visibility.

|                                                                              |          |
|------------------------------------------------------------------------------|----------|
| Nº of vertical signs per Km (not include directional signs)                  | 1        |
| Nº of orientation signs per Km                                               | 2        |
| Condition (painted de-colouration, wear, etc.)                               | Good     |
| Credibility of signalling (speed limit-speed operation)                      | Credible |
| Signalling visibility (signalling hidden by vegetation, other signs, etc...) | Good     |

**Table 50. Vertical signing conclusions**

Road markings are properly maintained and are consistent with vertical signs installed.

|                                                 |      |
|-------------------------------------------------|------|
| Correspondence road markings and vertical signs | Yes  |
| % of permitted overtaking                       | -    |
| Condition                                       | Good |

**Table 51. Road markings conclusions**

The EUWS only have variable message signs at specific points.

- **ROAD RESTRAINT SYSTEMS.**

In the field work, a total of 242.6 km of road safety barrier have been identified, most of them with turned down endings. The sections lack of motorcyclist protection systems

|                                                |                        |
|------------------------------------------------|------------------------|
| Total length of barriers installed (in meters) | 242,600                |
| Additional length required                     | No, this is sufficient |
| Installation                                   | correct                |
| Turned-down ending                             | Yes                    |
| Motorcyclist protection                        | No                     |
| General conditions                             | Good                   |

**Table 52. Road restraint systems conclusions**

- **TRAFFIC GUIDANCE EQUIPMENT.**

Traffic guidance equipment is properly maintained and located at those points and / or sections where necessary.

|                             |                           |
|-----------------------------|---------------------------|
| Profiled road markings      | Yes, when it is necessary |
| Directional signs in curves | Yes, when it is necessary |
| Road studs                  | Yes, when it is necessary |
| Side posts                  | Yes, when it is necessary |
| Posts or cushion on exits   | Yes, when it is necessary |

**Table 53. Traffic guidance equipment conclusions**

- **ROAD LIGHTING.**

The EUWS analysed, have no lighting except in some particular point.

## 5.12. CONCLUSIONS: CHARACTERIZATION OF WHITE ROADS IN THE TENT-T

The field work conducted along EUWS in the seven countries analysed concluded that this particular road section present in general a good standard of design, appropriate road equipment, as well as a good level of maintenance, although in some countries the presence of pedestrian crossing, pedestrian or change of level at the same level is a risk for road safety.

Here are the main features identified in the sections analyzed:

- ✓ Most of TEN-T are dual carriageway, but also single carriageway.
- ✓ In general, the consistency of alignment (coherence between consequent pieces of alignment) is correct.
- ✓ Analyzed white sections consist mostly of lanes wider than 3,5 m with paved shoulder between 0,5-1,5 m width.
- ✓ Good visibility. Seeing and being seen are fundamental prerequisites for the safety of all road users.
- ✓ Medium - high traffic volume (10,000-35,000 vehicles / day)<sup>4</sup>
  - Variable % of heavy vehicles: 13-26% in Spain, 43% in Poland or 12% in Latvia
- ✓ Analyzed road sections have proper road equipment maintenance level:
  - Road restraint systems.
  - Road signing.
  - Road markings.
  - Traffic guidance equipment.
  - Variable message signs.
  - Lighting at some specific spots: like crossings, fuel stations, etc.
- ✓ Road pavement presents a variable level of maintenance.
  - Some road sections are quite new of road works are being conducted.
  - Other road section presents cracking, potholes,... as a consequence of a reduction in the level of maintenance.
- ✓ In some sections analyzed were found undesirable situations, specially involving vulnerable road users, as shown next photos:
  - Pedestrian crossing across both carriage of a motorway.

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<sup>4</sup> It is important to note that not all countries have this data available



The analysis shows that White Sections represent stretches in the main European roads which have received proper funding for maintenance of pavement and passive road safety equipment. However, although the project can contribute to the creation of safer roads, ultimately it is necessary a holistic safe system approach including users, vehicle, infrastructure, enforcement and governments.

## 6. DEVELOPMENT OF THE CHECKLIST (D5.1)

After the analysis of database and the completion of the onsite inspections, the consortium gathered enough information to elaborate the checklist which will complement current guidelines for the design, maintenance and management of “roads without accidents” as stated by Directive 2008/96/CE.

EU roads are not homogeneous, even in the Trans European Road Network. Although there are common elements among roads in Member States, every country considers different regulations on roads alignment, roads signing, markings or road restraint system implementation guidelines. These guidelines follow a common vision but still there are differences although no practice is contradictory to others implemented in other Member States. For example, some of the road sections inspected in the field work showed unpaved hard-shoulders. This is not allowed in other countries for any motorway or highway; others sections for instance present pedestrian crosses which should not be found in the main road network of the EU Member States.

Consequently, the WhiteRoads checklist provides a set of general aspects to be considered in order to design and build in the safest conditions from the infrastructural and equipment perspective, thus generating the so-called “White Roads”.

Infrastructure key aspects included in the checklist which must be checked are the following<sup>5</sup>:

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<sup>5</sup> Further details about the checklist can be found in Deliverable 5.1 (Comparative checklist for determining characteristics of WR in the TEN-T).



## CHECKLISTS FOR DESIGNING WHITE ROADS

| CHAPTER                        | ASPECT                                                                                                                                                                                   | CHECKED |     | COMMENTS |
|--------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|-----|----------|
|                                |                                                                                                                                                                                          | YES     | NOT |          |
| Previous road safety treatment | Was a safety impact assessment conducted in the planning stage?                                                                                                                          |         |     |          |
|                                | Has a road safety audit been conducted during this stage?                                                                                                                                |         |     |          |
| Functionality of road          | Check that the road, expected type of traffic and equipment are suitable for the functionality of the TEN-T                                                                              |         |     |          |
| Connection with the network    | Check safety conditions of the connection with other roads, although not part of the TERN.                                                                                               |         |     |          |
| Tunnels                        | Conduct a road safety audit in the road section included in the tunnel                                                                                                                   |         |     |          |
| Alignment                      | Ensure proper consistency of the alignment.                                                                                                                                              |         |     |          |
| Cross section                  | Check suitability of lane width and shoulder width, which should be paved.                                                                                                               |         |     |          |
| Traffic                        | Carefully analyse the expected traffic; if a high volume of heavy traffic is expected, a decrease in the speed limit should be valued; variable speed limits are advisable.              |         |     |          |
| Pavement                       | Carefully analyse pavement layer and road foundation and its suitability to expected traffic, in order to avoid structural damage causing bad maintenance condition in the road surface. |         |     |          |
| Traffic signs                  | Are traffic signs credible with the alignment and surroundings of the road?                                                                                                              |         |     |          |
|                                | Ensure that directional traffic signs are easily and undoubtedly perceived by foreign users.                                                                                             |         |     |          |
|                                | Are traffic signs homogeneous along the itinerary?                                                                                                                                       |         |     |          |
| Variable message signs         | Provide variable message signs                                                                                                                                                           |         |     |          |
| Vehicle restraint systems      | Ensure that containment level of vehicle restraint systems fulfils with safety requirements of all expected users, including motorcyclists and heavy vehicles along the whole road.      |         |     |          |
| Road lighting                  | Provide lighting to all singular road sections (interchanges, crossroads, etc)                                                                                                           |         |     |          |
| Vulnerable road users          | Pedestrians should not be allowed; check that they are clearly informed by signs and physical barriers are provided, in order to avoid their entrance to the road area.                  |         |     |          |



## CHECKLISTS FOR DESIGNING WHITE ROADS

| CHAPTER          | ASPECT                                                                                                                                                                                                                                       | CHECKED |     | COMMENTS |
|------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------|-----|----------|
|                  |                                                                                                                                                                                                                                              | YES     | NOT |          |
|                  | If cyclists are allowed, is their safety guaranteed? If not, it is reasonable to prohibit their access to the infrastructure, in order to preserve their safety.                                                                             |         |     |          |
|                  | Check that motorcyclist's protection systems are installed in safety barriers in road sections with high risk for this type of users.                                                                                                        |         |     |          |
| Public transport | If there are bus stops along the road, check not only the right placing and safety conditions, but also the existence of a "safe way" for pedestrians getting in and off the bus. Otherwise, bus stops should be placed in the service road. |         |     |          |
| Others           | Is the road expected to be self-explaining from the road user perspective?                                                                                                                                                                   |         |     |          |
|                  | Value and limit work load of the road section, considering frequent users point of view and also elderly drivers                                                                                                                             |         |     |          |
|                  | Ensure legibility of the road                                                                                                                                                                                                                |         |     |          |
|                  | Consider a strategy for variable speed limits depending on traffic and weather conditions                                                                                                                                                    |         |     |          |

Table 54. Checklist for designing white roads