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RRG GIS Database User Manual

Datasets

Trans-European Transport Networks
Administrative Boundaries
Geographical Objects

Road Network
Railway Network
Airports of the World
Flight Connections
Inland Waterways and Short Sea Shipping Routes
Inland Ports and Seaports
Ferry Connections and Shipping Routes
Freight Villages and Transport Terminals
Travel Analysis Districts
NUTS Regions and Countries in Europe
INTERREG IIIB Co-operation Areas
VASAB Co-operation Area
Raster Systems
Cities in Europe
Water bodies: Lakes and Rivers
Tabular Data

Oldenburg in Holstein, Germany

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General information

Contents

The overall *RRG GIS Database* provides digital data on geographical objects for Europe in standard GIS-formats to be used for cartographic map productions, illustrations and visualisations, for application development and for the analysis of spatial phenomena. The overall database contains information on

- the pan-European road network;
- the pan-European rail network, including railway stations;
- the pan-European inland waterway network, ferry and short sea shipping routes, including inland ports and seaports;
- European airports and flight networks;
- Freight transport terminals and intermodal transhipment facitilies;
- Travel analysis districts;
- Administrative boundaries for Europe for different NUTS, EFTA and CEC levels;
- International co-operation areas;
- Cities and places, as well as on
- Water bodies, such as lakes and rivers

for 38 European countries (all countries of the European Union as well as Switzerland, Norway, Iceland, Albania, Rumania, Bulgaria, the European part of Turkey, former Yugoslavia and the countries of the European part of the former USSR).

The *RRG GIS Database* is maintained as individual layers of ESRI´s ArcGIS. Each mode is stored in a separate layer. The *RRG GIS Database* is subdivided in

- Transport network database
- Administrative boundaries
- Geographical objects
- Interaction and regional data

The trans-European transport network database is the core part of the overall *RRG GIS Database*. In addition to the transport networks, the *RRG GIS Database* also contains the boundaries of statistical regions according to the *'Nomenclature d'unités territoriales statistiques'* (NUTS) of the Statistical Office of the European Union (Eurostat, 1995; 1999a; 1999b; 2004). In the NUTS system of regions the area of the European Union is subdivided corresponding to national administrative areas into NUTS-0, NUTS-1, NUTS-2 and NUTS 3 regions; equivalent regions for the new EU member states and the remaining candidate countries and other European countries have also been defined, based on EFTA and CEC region hierarchies. Moreover, some other geographical features such as cities, shorelines, lakes and rivers are also available in the overall *RRG GIS Database*.

Resolution and Projection

Digitisation was performed at scales of 1:1 000 000, 1:500 000 and 1:200 000. The networks were coded using a Lambert Conformal Conic Projection with the two standard parallels at 27° and 63° North, the central meridian at 10° East and the map origin at 10° East and 52° North. This is the standard projection of the *RRG GIS Database*. The standard projection parameters can be summarised as follows:

```
Projection:                          Lambert
Datum:                               (none)
Units:                               Meter
Spheroid:                            Clarke1866
1st standard parallel:               27 0 0.000
2nd Standard parallel:               63 0 0.000
Central meridian:                    10 0 0.000
Latitude of projection's origins:    52 0 0.000
False easting (meters):                0.000
False northing (meters):               0.000
```

This type of projection is best suited for European-wide databases and analysis. The main criterion for the choice of these particular standard parallels was to preserve as best as possible the length of line segments for main parts of central Europe, notwithstanding distortions in Scandinavian regions and areas in southern Europe. However, the database would also be available in other projections. For standard applications, the database is provided in geographical projection.

Accuracy and quality of the database

However, as tests have shown, the quality of the resolution of the *RRG GIS Database* is about +/- 5 percent, i.e. comparing the link lengths of the database with real distances yields an average shift of between + 5 percent or -5 percent. The following *Table 1* demonstrates these effects by samples from the inland waterway dataset. The lengths of selected inland waterways of the GIS database (column 'RRG') are compared against the official German ELWIS/WESKA classification.

Table 1. Quality of the resolution.

Inland waterway	ELWIS / WESKA	RRG	Difference %
Dortmund-Ems-Chanel: Dortmund-Papenburg	225 km	212 km	5.8
Elbe: Border DE/CZ until Cuxhaven	728 km	716 km	1.6
*Main:*Bamberg/Viereth until Rhine river	388 km	364 km	6.2
Mittellandkanal: Dortmund-Ems-Kanal until Magdeburg-Rothensee	321 km	306 km	4.7
Moselle: Apach until Rhine river	242 km	229 km	5.4
Neckar: Plochingen until Rhine river	203 km	192 km	5.4
Rhine: Border DE/CH until border DE/NL	696 km	645 km	7.3
Main-Donau-Chanel: Regnitz until Altmühl	171 km	159 km	7.0

Another test was conducted assessing the quality of the RRG GIS Database for travel time applications. Here, travel times calculated based on the RRG GIS Database for the greater Oslo area (Norway) between Oslo and surrounding regional cities were tested against Microsoft´s Autoroute 2005. *Table 2* is summarising the results by contrasting the calculated travel times for both data sources:

Table 2. Travel times according to RRG GIS Database and MS Autoroute.

Route Oslo - …	RRG (in minutes)	MS Autoroute (in minutes)
Gol	145	151
Skien	109	109
Elverum	102	106
Larvik	102	104
Gjovik	92	101
Notodden	82	97
Halden	86	93
Hamar	87	91
Kongsvinger	68	78
Fredrikstad	75	74
Kongsberg	62	66
Momarken	55	63
Hønefoss	49	50
Moss	51	45
Airport Gardermoen	34	36
Drammen	32	36

Generally the fit between both data sources can be considered good. The above travel times based on the RRG GIS Database are also visualised in the following *Figure 1*:

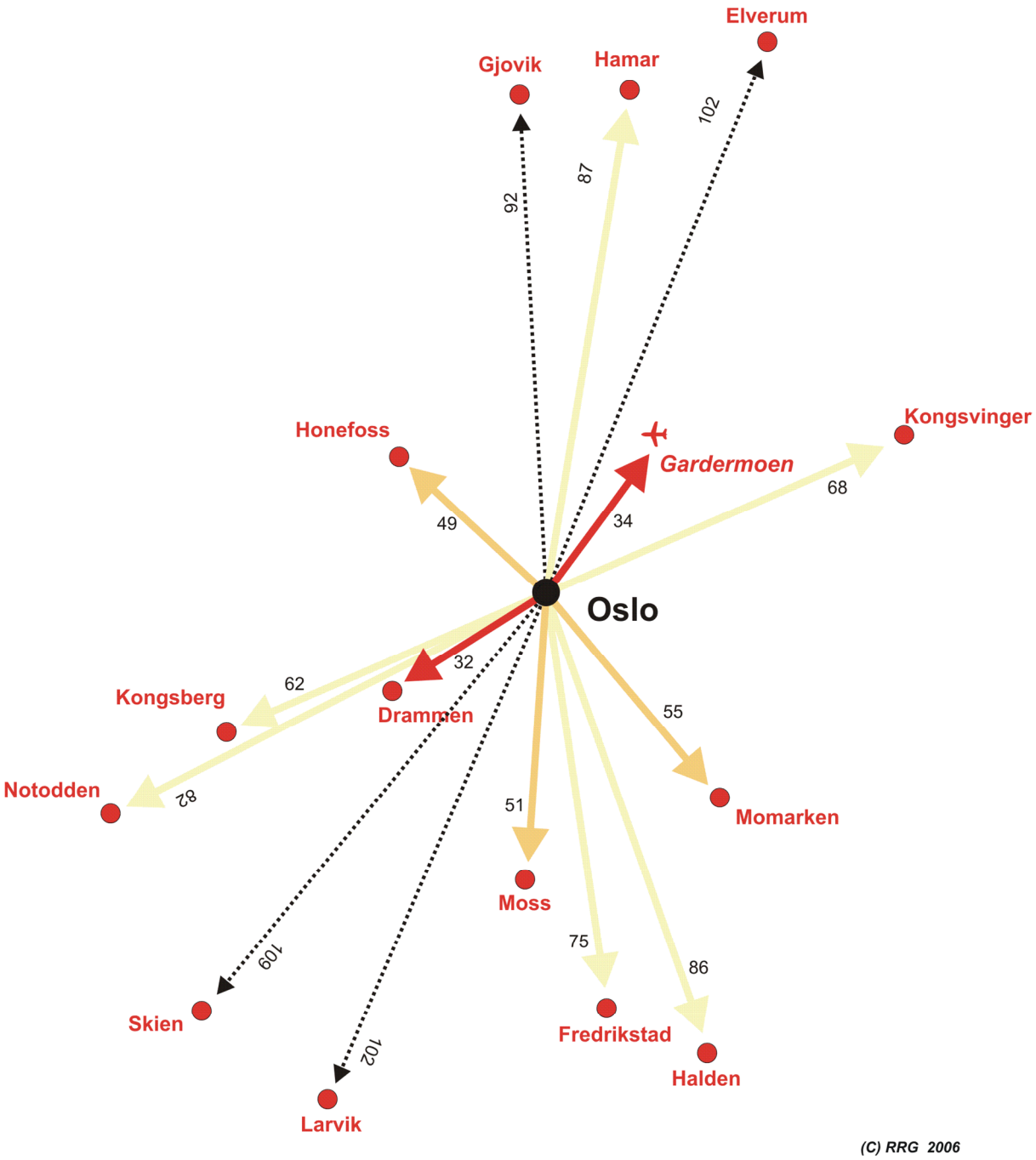


Figure 1. Schematic representation of travel times from Oslo to major destinations based on RRG GIS Database (in min).

Other General Information

RRG is aiming at providing the most up-to-date state of the networks as possible. However, RRG cannot give any warranty on the actual state, in particular with respect to the most recent network developments and changes to the regional subdivision.

The *RRG GIS Database* is a successor and further development of the *IRPUD trans-European Transport Network Database,* as developed during the last decade at the Institute of Spatial Planning at the University of Dortmund (IRPUD, 2003; Mantyk and Altenhoff, 1992),

and described at the IRPUD webpage at http://irpud.raumplanung.uni-dortmund.de/irpud/pro/ten/ten_e.htm.

The following sections are dedicated to give detailed database descriptions, i.e. to describe the user attributes associated with the feature classes of the different layers. ArcInfo / ArcGIS / ArcView internal attributes will, however, not be explained here. The descriptions of the individual layers follows common rules:

First, a general introduction will be given, with a brief textual summary, some tables and maps. Second, the user attributes of each feature class will be presented in tabular format, supplemented by short descriptive paragraphs. Third, the Annex provides some detailed tabular information on certain aspects of the database.

Despite their different network characteristics, one common feature of all layers of the *RRG GIS Database* is that the same kind of information is stored in the same user attributes. For instance, the ISO country code assigned to each node of the different networks is always stored in an attribute called **`COUNTRY1`**. Similarly, a user defined node number for all nodes of the networks is always stored in an attribute called **`NODEID1.`** This principle should help the user to easily explore the different layers.

Actual information on the *RRG GIS Database* can also be found at the RRG webpage at http://www.brrg.de/database.php?language=de.

As an first introduction to the *RRG GIS Database*, the following *Table 3* gives an overview on the number of features by country available in the different feature classes of the individual layers.

Table 3. Number of features by country and layer.

Country	Road network		Rail network		Waterway network		Ports
	Links	*Nodes*	*Links s*	*Nodes*	*Links ***	*Nodes*	*Points*
EU Member States							
Austria	10,690	8,576	2,267	2,162	38	38	13
Belgium	2,814	1,881	1,708	1,442	309	287	25
Bulgaria	2,032	1,698	269	253	10	12	10
Cyprus	46	38	0	0	2	4	2
Czech Republic	2,913	2,143	2,126	1,949	60	60	10
Denmark	4,480	3,251	566	548	147	285	44
Estonia	474	327	468	438	19	34	16
Finland	3,153	2,315	529	513	139	195	67
France	7,481	5,154	6,037	5,612	667	682	56
Germany	54,184	40,535	22,777	20,926	1,086	1,064	266
Greece	2,407	1,788	646	632	76	152	72
Hungary	5,345	4,431	1,213	1,092	42	41	9
Ireland	2,030	1,478	177	171	7	14	6
Italy	8,364	4,438	4,227	3,891	108	152	56
Latvia	622	390	889	841	11	15	3
Lithuania	547	371	289	275	13	16	5
Luxembourg	164	110	82	78	1	5	1
Malta	1	4	0	0	5	10	5
Netherlands, The	3,155	2,638	795	727	628	556	82
Poland	5,377	3,850	3,389	3,045	123	121	27
Portugal	2,837	702	324	299	15	24	11
Romania	724	558	809	740	61	58	17
Slovakia	623	444	541	500	12	13	3
Slovenia	1,366	941	452	437	1	2	1
Spain	6,168	4,442	2,390	2,243	41	80	39
Sweden	5,938	4,302	2,554	2,472	161	239	105
United Kingdom	4,405	3,118	2,937	2,658	130	195	64
Other countries							
Albania	800	672	161	155	0	0	0
Belarus	765	487	188	171	22	23	0
Bosnia-Herzegovina	573	427	216	216	0	2	0
Croatia	1,666	1,170	604	583	48	85	38
Iceland	44	39	0	0	6	12	6
Liechtenstein			5	4	0	0	
Macedonia	1,574	1,405	456	405	0	0	0
Moldova	222	160	38	38	8	6	1
Montenegro			52	50	0	0	
Norway	3,653	3,027	744	702	116	232	116
Russia	1,328	966	741	654	47	59	18
Serbia- Montenegro	478	347	593	572	25	19	4
Switzerland	1,181	899	2,559	2,386	6	8	3
Turkey	178	132	77	74	41	82	37
Ukraine	1,220	843	339	269	57	78	24
Shipping routes *	***842***	***0***	***34***	***0***	***1,201***	***0***	***0***
Total	***151,063***	***111,795***	***65,348***	***60,231***	***5,507***	***4,579***	***1,280***

Features counted for entire countries; numbers are indicative and are subject to updates (State: October 2011).

* *Shipping routes cannot be assigned to any one country.*

** *Border rivers between two countries are in this table arbitrarily assigned to one of the countries only.*

Table 3. Number of features by country and layer (cont.).

Country	Airports [2]	Terminals	TADs[1]	Cities
	Points	*Points*	*Polygons*	*Points*
EU Member States				
Austria	48	38	n.a.	79
Belgium	18	40	n.a.	55
Bulgaria	49	11	n.a.	43
Cyprus	7	3	n.a.	5
Czech Republic	80	27	n.a.	37
Denmark	31	46	n.a.	51
Estonia	12	9	n.a.	13
Finland	58	70	n.a.	40
France	252	91	n.a.	287
Germany	486	358	101	584
Greece	59	11	n.a.	83
Hungary	25	35	n.a.	87
Ireland	25	9	n.a.	12
Italy	95	90	n.a.	382
Latvia	10	8	n.a.	16
Lithuania	13	12	n.a.	11
Luxembourg	1	4	n.a.	8
Malta	3	4	n.a.	2
Netherlands, The	21	53	n.a.	90
Poland	85	43	n.a.	151
Portugal	35	12	n.a.	83
Romania	29	31	n.a.	67
Slovakia	15	9	n.a.	35
Slovenia	13	3	n.a.	18
Spain	69	64	n.a.	161
Sweden	101	135	n.a.	82
United Kingdom	172	94	n.a.	318
Other countries				
Albania	7	n.a.	n.a.	11
Belarus	29	1	n.a.	25
Bosnia-Herzegovina	6	2	n.a.	6
Croatia	19	11	n.a.	9
Iceland	15	6	n.a.	2
Macedonia	13	1	n.a.	5
Moldova	6	4	n.a.	5
Montenegro	5	1		1
Norway	76	78	n.a.	46
Russia	124	14	n.a.	91
Serbia	12	5	n.a.	20
Switzerland	52	11	n.a.	59
Turkey	24	13	n.a.	38
Ukraine	99	26	n.a.	64
Shipping routes *	***0***	***0***	n.a.	0
Total	***2,299***	***1,477***	***101***	***3,182***

Features counted for entire countries; numbers are indicative and are subject to updates (State: October 2011).
[1] TAD = Travel analysis districts. Data only available for Germany.
[2] World-wide airport layer is available; only European countries listed in the table

Data formats

In general, each mode of the transport networks and each hierarchy level of the regional subdivision is available as an individual layer. The *RRG GIS Database* is basically maintained in form of individual coverages of ESRI' s ArcGIS. Hence, the database is available in different formats supported by ESRI, as there are:

- Personal Geodatabase Format
- File Geodatabase Format
- ArcView Shapefiles
- ArcInfo coverages
- MS Access tables
- MS Excel files
- Specific ASCII file versions

All the ifferent formats contain the same set of information, i.e. include the same set of attributes assigned to the different layers. However, it is worth to mention that the various data formats handle database topology in different ways:

The ArcInfo coverage format and the ASCII file formats maintain all topological relationships between arcs and nodes, arcs and polygons, or polygons and labels. By default, the ArcView Shapefile format does not maintain these topological relationships, as each feature class will be provided as a separate shapefile. In the case of the personal and file geodatabase, it depends on the licence purchased whether or not the geodatabase includes any topological relationships. Each layer of the RRG GIS Database is available in the personal geodatabase and in the file geodatabase as individual feature dataset and feature class. However, the basic personal geodatabase licence does not include any relationship classes between the different features and objects, whereas the advanced personal geodatabase licence does include such relationship classes.

The MS Access tables and MS Excel files lack topological relationships, however, in Access some simple relations can be established by using databank operators to link features of different tables with each other.

As regards the ASCII file format, this specific format will maintain full topological relationships. The actual record structure of the ASCII file(s) is subject to individual agreements between RRG and the licensee.

Further information concerning the various data formats in general, and the differences between them in particular, can be obtained from ESRI software products documentation (www.esri.com).

Main Features and Advantages of the RRG GIS Database

Compared to other similar databases, the *RRG GIS Database* is distinguished by the following features and main characteristics:

- seamless coverage for the whole of Europe.
- inclusion of all modes of transport (road, rail, air, public transport, freight hubs), plus other geographical objects such as region boundaries or city locations.
- harmonised attribute codings and attribute definitions across all layers and all countries, allowing easy understanding and easy working with all layers.
- medium scale adjusted for usage for strategic (transport) planning projects or strategic analyses at regional, national and international level.
- the trans-European Transport Outline Plans (TEN-T) of the European Commission are fully coded in the database, plus additional national outline plans, together providing information on the future network evolution until the year 2025.
- availability of important attributes necessary for transport modelling at a strategic (nationnal or regional) level. Such fields include, *inter alias*, link capacities, speed limits, timetable travel times or link-node topology.
- On top of the railway network, timetable travel times between major stations are available for various years. For the first time also maximum rail speeds according to actual timetables are available for railway sections (such speeds do not represent the design speed of a section, but the actual speeds travelled by operating train services).
- open and flexible data format, i.e. the user can query, edit, add, remove or otherwise adjust all geometries as well as all attributes and attribute structures according to his specific needs.
- the database is available in different data formats, including customized ASCII formats.
- basic data formats (ArcGIS personal geodatabase, ArcInfo coverage, ASCII file format) maintain all topological relationships between different feature classes (such as arc-node topology, polygon-arc topology etc.).
- upon request a backcast of the road and railway networks back to 1975 would also be available, allowing to illustrate the historic development of the road and railway networks from 1975 up to 2025 (taken into account the future outline plans).
- upon request additional customised attributes may be added to the different layers.
- the database can be delivered in a variety of projections and co-ordinate systems.
- the database can be licensed as a whole package including all layers for entire Europe, or as individual configuration. Individual configuration may include a selection of specific layers, but may also include specific spatial subsets (e.g. only a limited number of countries or regions).
- open and flexible licensing conditions.

Road network

General information

The *RRG European road network* contains all motorways, highways, dual-carriageway roads, E-roads and national roads as well as additional principal roads in agglomerations and important car ferries (*Figure 2*). Currently the road network contains some 150,000 links and 111,000 nodes. In addition to currently existing roads, the database contains all future projects of the trans-European transport network (TETN) programme of the European Union as specified in Decision 1692/96/EC of the European Parliament and of the Council (European Communities, 1996), further specified in the *TEN Implementation Report* (European Commission, 1998) and latest revisions of the TEN guidelines provided by the European Commission (1999; 2002a; 2004a; 2004b), information on priority projects (European Commission, 1995), latest publications on the priority projects (European Commission, 2002b; 2005), as well as so-called TINA networks (TINA = ‚Transport infrastructure needs assessment'; TINA Secretariat, 1999; 2002) for the new member states and candidate countries and the Helsinki corridors for the remaining east European countries, as shown in *Figure 3*.

A subset of the full road network is the 'strategic road network' which contains the trans-European road links as specified in Decision 1692/96/EC of the European Parliament and of the Council, the TINA networks for the candidate countries and the Helsinki corridors (European Commission, 1995) for the remaining east European countries as well as selected additional links in eastern Europe and links to guarantee connectivity of regions and centroids. The strategic road network is dedicated as a transport modelling network, e.g. for accessibility calculations, on the European level and comprises almost half of the full road network. For transport modelling purposes, it also contains virtual access or connector links linking the centroids of the transport zones to the network. The transport zones correspond to the NUTS-2 regions of the system of region as defined by Eurostat (Eurostat: 1995; 1999a; 1999b; 2004; 2007). The trans-European road network contains important existing trunk roads as well as planned links and roads under construction.

Planned TEN-T and TINA links are coded with their current characteristics and reflect the situation in 2010. The attribute "planned" means that in future some development will take place either in form of upgrading, e.g. from a national road to a motorway, or by construction of a new road or motorway. If the alignment of the planned link is known, it is assumed that the upgrading will take place on that alignment. If the future alignment is not known, it is assumed that the development will take place in a corridor along the present link.

In addition to the coding of the TEN-T outline plans, also other national outline plans of the European countries are coded in the road network layer. By applying this information, future road networks until 2030 may be extracted from the *RRG GIS Database*.

Similar to the future developments, the road network layer also comprises the historic development of the road networks since 1970, which means that the development over time of the road networks from 1970 until 2030 is coded in the database. Thus, layers representing the road network for any of the years in between 1970 and 2030 may be provided.

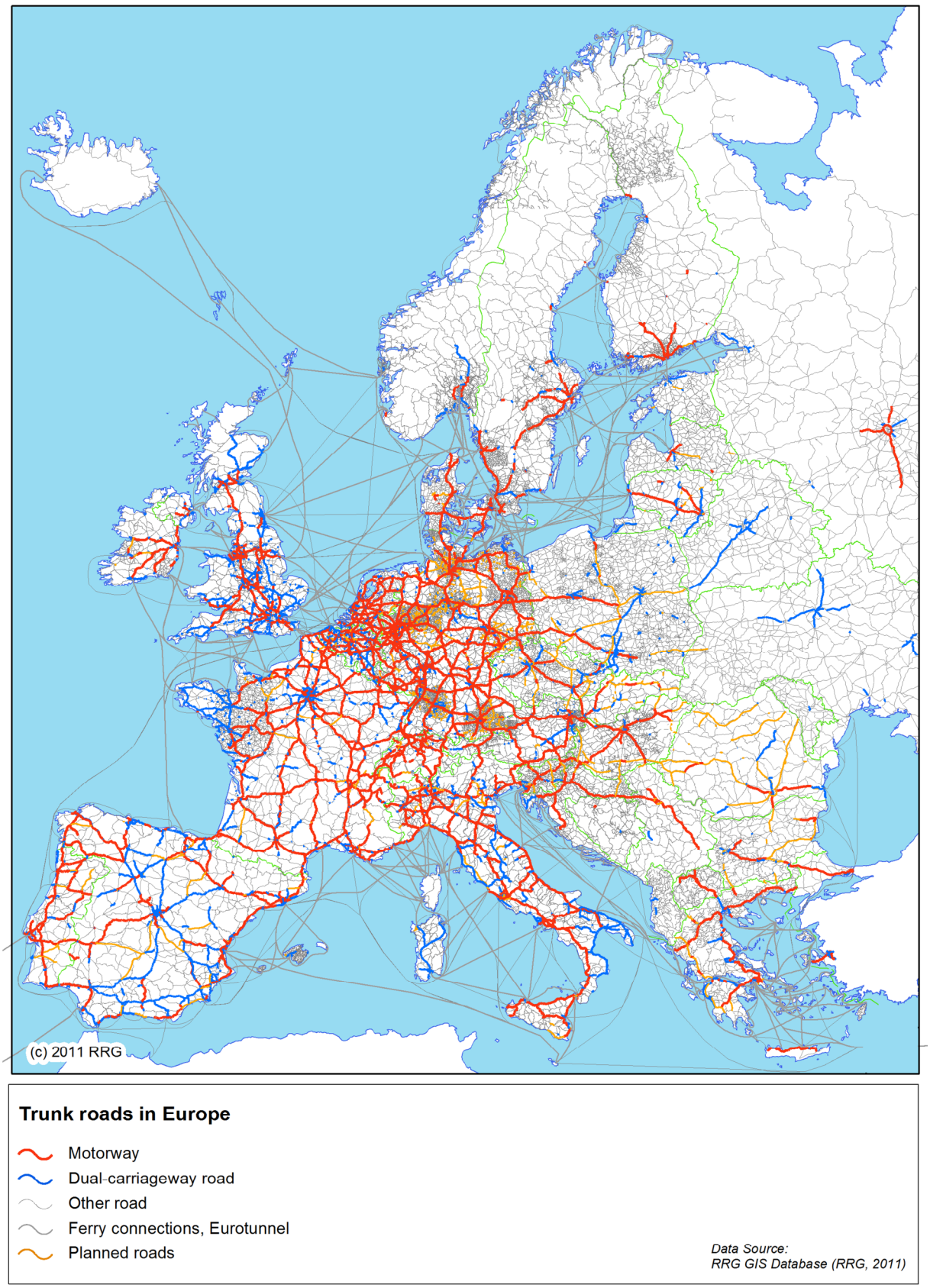


Figure 2. Motorways, dual-carriageway roads and other roads of the road network layer.

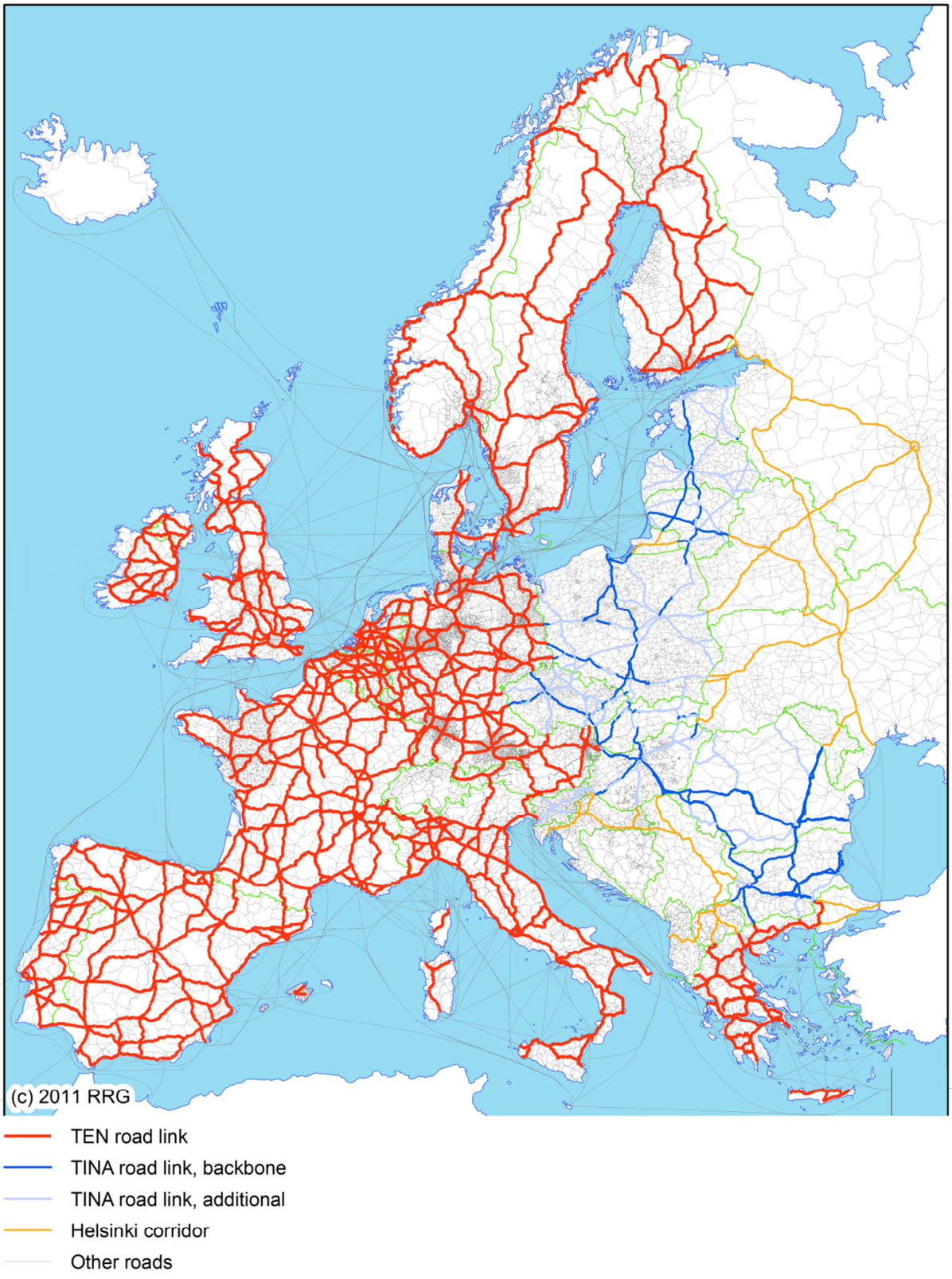


Figure 3. Road network: TEN and TINA classification.

The name of the layer containing the trans-European road network is **ROADxx** and comprises arc (**ROADARC**) and node (**ROADPNT**) feature classes. Its main characteristics are:

Layer name:	**ROADxx**
Feature classes:	Arcs, nodes
No of arc features:	151,063
No of node features:	111,795
User fields associated with the arcs:	42
User fields associated with the nodes:	8

Detailed description of the arc feature class

The following user-defined fields are available in the **ROADARC** layer for the arc feature class:

Table 4. Fields of the **ROADARC** *layer.*

Attribute	Type	Contents
COUNTRY	Character	ISO country code (see *Table 43*) 'YY' = Ferry link
LINKTYPE	Integer	Link type 0 = Access link to/from centroid 1 = Road 2 = Car ferry 4 = Eurotunnel / Motorail
LINKCAT	Integer	Link category in 2011 0 = Access link to/from centroid 1 = Motorway 2 = Dual-carriageway road 3 = Other trunk road 4 = Car ferry 5 = Eurotunnel / Motorail 6 = Planned link, link not existing in 2011 8 = Regional road 9 = Local road, city street, pathway 10 = Motoways of the Sea 11 = Short Sea Shipping links
CODE	Character	Actual road designation ‘ ‘ = Access link to/from centroid ME = Motorway, European road M = Motorway NED = National road, dual-carriageway, E-road NE = National road, E-road ND = National road, dual-carriageway N = National road TE = Other major trunk road, E-road TD = Other major trunk road, dual-carriageway TED = Other major trunk road, dual-carriageway, E-road T = Other trunk road RL = Regional road, city road, pathway FF = Car ferry, Eurotunnel, motorail MoS = Motorways of the Sea SSS = Short sea shipping links
TRUNK	Integer	Trunk road classification 0 = No trunk road 1 = Trunk road
INTERURBAN	Integer	Urban road classification

		0 = No urban or interurban road (road section outside urban areas) 1 = Urban road (road section within cities and towns)
EURID	Character	European road identifier, e.g. E40 E67
NATID	Character	National road identifier, e.g. M10 A8
SPEEDLIMCA	Integer	National speed limits for cars (km/h) (see *Table 9*) 30 = Access link
SPEEDLIMLO	Integer	National speed limits for lorries (km/h) (see *Table 9*) 30 = Access link
OPERATION	Integer	Operation 0 = Access link to/from centroid 1 = Road under operation 2 = Planned road / road under construction 3 = Road out of use/abandoned
MARITIM_TIME	Integer	Timetable travel times for ferry connections (in min) 0 = Regular road, access link >0 = Ferry connection
SERVICE_FREQ	Integer	Frequency of ferry services 0 = No ferry service, regular road, access link 1 = Several daily connections 2 = One daily connection 3 = Several connections per week, but not daily 4 = One connection per week 5 = Less than one connection per week 99 = Frequncy unknown
SAILING_DIST	Integer	Sailing distances of ferry services (in km) 0 = No ferry service, regular road, access link
LABEL	Character	Label of road link
TENCAT	Integer	TEN / TINA category 0 = No TEN/TINA link 1 = Existing TEN / TINA link 2 = Planned TEN / TINA link
TENALIGN	Integer	TEN / TINA alignment 0 = No TEN/TINA link 1 = TEN/TINA link with precise alignment 2 = TEN/TINA link with unknown precise alignment
CATEGORY	Integer	Road category 0 = No link of strategic network 1 = TEN road link 2 = TINA road link, backbone 3 = TINA road link, additional 4 = Helsinki corridor 5 = Additional link of strategic network
CORRIDORS	Character	Corridors towards Eastern Europe I … IX = Corridor number
PRIOEL	Integer	TEN priority project number (Essen list) 0 = No TEN/TINA priority project 7 = Greek motorways (Via Egnatia, Pathe) 8 = Motorway Lisboa-Valladolid 11 = Øresund road/rail link 12 = Nordic triangle 13 = Ireland/United Kingdom/Benelux

		20 = Fixed link Fehmarn Belt
PRIOEU03	Character	Adjusted TEN priority project number (rev. 2003) 0 = No TEN/TINA priority project 1 = Fixed link road/rail Messina bridge 7 = Greek motorways, motorways in BG & RO 8 = Motorway Lisboa-Valladolid 11 = Øresund road/rail link 12 = Nordic triangle 13 = Ireland/United Kingdom/Benelux 20 = Fixed link Fehmarn Belt 25 = Motorway Gdansk-Katowice-Brno-Vienna 26 = Multi-modal link IE, UK; Europe
PRIOVM	Character	Priority project code (Van Miert group) ‘ ‘ = No Van Miert project L0P5 = Oeresund road/rail link L0P10 = Greek motorways L0P11 = Motorway Lisboa-Valladolid/Sevilla/Coruna L0P12 = Nordic Triangle L0P13 = Ireland/UK/Benelux L1P12 = Multi-model links IE, UK, Europe L1P13 = Road/rail Messina bridge L1P14 = Fixed road link Fehmarn Belt L1P15 = Nordic triangle L1P16 = Multi-modal link PT-ES- Europe L1P17 = Motorways in BG & RO L1P18 = Motorway Gdansk-Katowice-Brno-Vienna L3P9 = Road link Dover-Fishguard L3P10 = Motorway Dresden/Nuernberg-Praha-Linz L3P12 = Motorway Zilina-Bratislava-Vienna L3P14 = Motorway (Ljubljana) – Maribor – Pince -Zamardi L3P15 = Upgrading Pyreness links
PRIOSEC	Character	TEN priority projects: prioritised sections ‘ ‘ = None prioritised section, none priority link PS = Prioritised section
STRATEGIC	Integer	Strategic network 0 = No link of strategic network 1 = Link of strategic network
CONST	Integer	Specific artificial buildings 0 = No tunnel nor bridge 1 = Tunnel 2 = Bridge
DATE_OPEN	Date	Date of first road opening (opened to traffic) MM/DD/YY (e.g. 08/01/06 for 1 August 2006)
SOURCE_OPEN	Character	Source(s) for obtaining opening dates
STATUS	Integer	Status of construction works 0 = No construction works going on 1 = Not yet planned 2 = Study phase 3 = Impact study phase 4 = Planned 5 = Under construction 6 = Completed, opened to traffic 7 = Under construction, partly completed 8 = Planned, partly under construction 9 = Partly completed, partly planned 10 = Partly completed

		11 = Under review phase 12 = almost completed, close to openening 13 = works underway 14 = Information not available 15 = Project access link
TYPE	Integer	Type of construction works 0 = No construction works going on 1 = New road: Ordinary road 2 = New road: High quality road 3 = Upgrade: ordinary road to high quality road 4 = Upgrade: motorway 2x2 lanes 5 = New road: Motorway 2x3 lanes 6 = Upgradeg: high quality road to motorway 7 = New road: motorway 2x2 lanes 8 = New road: bridge 9 = New road: combined bridge & tunnel 10 = New road: tunnel 11 = Upgrade: motorway 2x3 12 = Upgradeg: ordinary road > motorway 13 = New road: bypass 14 = Upgrading ordinary road 15 = New road: Motorway 2x2 bypass 16 = Upgrading 17 = Upgrade: motorway 2x2 lanes 19 = Upgrade: motorway 2 lanes > 3 lanes 20 = New road: motorway intersection 21 = Upgrade: high quality road from 2 to 3 lanes 22 = Upgrade: motorway from 2 to 3 lanes 23 = New construction (action not yet specified) 24 = Upgrade: from 1 to 2 lanes per direction 25 = New road: 2nd tunnel ube 26 = Upgrade: motorway additional lane 27 = New road: motorway 2x3 28 = Upgrade: high quality road 29 = Upgrade: technical improvements 30 = New road: new high quality road 31 = Upgrade: high quality road to motorway 2x3 32 = New road: bypass high quality road 33 = Upgrade: high quality road to motorway 2x4 34 = Study phase (actions not yet specified) 35 = Upgrade: bridge 36 = TEN project but not included in implementation 37 = Project access link 38 = Unknwon project type 39 = Actions not yet specified 40 = Upgrade: from 4 to 6 lanes 41 = Upgrade: from 3 to 4 lanes per direction 42 = Upgrade: adding opposite direction
YEAR	Integer	Year of completion of construction works (estimated)
LINKCAT71	Integer	Link category 1971 (see LINKCAT)
LINKCAT76	Integer	Link category 1976 (see LINKCAT)
LINKCAT81	Integer	Link category 1981 (see LINKCAT)
LINKCAT86	Integer	Link category 1986 (see LINKCAT)
LINKCAT91	Integer	Link category 1991 (see LINKCAT)
LINKCAT96	Integer	Link category 1996 (see LINKCAT)

LINKCAT2001	Integer	Link category 2001 (see LINKCAT)
LINKCAT2006	Integer	Link category 2006 (see LINKCAT)
LINKCAT2011	Integer	Link category 2011 (see LINKCAT)
LINKCAT2016	Integer	Link category 2016 (see LINKCAT)
LINKCAT2021	Integer	Link category 2021 (see LINKCAT)
LINKCAT2026	Integer	Link category 2026 (see LINKCAT)
LINKCAT2031	Integer	Link category 2031 (see LINKCAT)

COUNTRY indicates the ISO code of the country in which the link is located. Because car ferries cannot be assigned to any country, car ferry links have the country code '**YY**'.

LINKTYPE, **LINKCAT**, **CODE**, **EURID** (*Figure 5*), **NATID**, **CONST**, **TRUNK**, **INTERURBAN**, **SPEEDLIMCAR**, **SPEEDLIMLOR**, **OPERATION** and **MARITIME_TIME** give general information on all links. **TRUNK** indicates whether or not a road represents a trunk road. Trunk roads are defined as motorways, E-roads, national roads and other dual-carriageway roads. **INTERURBAN** indicates whether or not a road section is a urban road located within urban centers, towns and villages, with local speed limits. **SPEEDLIMCAR** gives the national speed limits for cars, subject to the link category and country, while **SPEEDLIMLOR** provides the same kind of information for lorries. Access links have a general speed of 30 km/h. In case of car ferries, the Eurotunnel link or motorail services (vehicle pick-ups in Swiss rail tunnels) **SPEEDLIMCAR** and **SPEELIMLOR** are not set, but the field **MARITIM_TIME** provides the respective timetable travel times for ferry services and shipping links. *Table 9* illustrates and overview on the speed limits differentiated by mode, country, link category and urban/non-urban road sections. Local speed limits due to specific local conditions are not availabl in the database. **CONST** represents specific artificial buildings (‘constructions’) along road sections: tunnels and bridges. However, only major buildings are indicated in the dataset. **OPERATION** indicates whether a road section is under operation, planned or already abandoned.

For ferries and shipping links, **SAILING_DIST** and **SERVICE_FREQ** provide information on the sailing distance across the waters, and on the frequency of the (ferry) services.

TENCAT, **TENALIGN**, **PRIOEL**, **PRIOEU03**, **PRIOVM**, **PRIOSEC**, **CORRIDORS** and **CATEGORY** give information on those links which are included in the "Trans European Transport Network Outline Plan, Section Road" based on the Joint Decision of the European Parliament and of the Council published in the Official Journal of the European Communities (L228, 9 September 1996), or are part of the TINA network (TINA Secretariat 1999; 2002). The road corridors towards eastern Europe were first agreed at the second pan-European Conference of the European Ministers of Transport in Crete in March 1994 ("Crete Corridors") and secondly confirmed at the Helsinki meeting (now: "Helsinki Corridors"). The *'TINA road link, backbone'* (**CATEGORY=2**) are the former Crete Corridors in the candidate countries, whereas the *'TINA road link, additional'* (**CATEGORY=3**) represent additional links identified by the TINA Secretariat in correspondence with the candidate countries to connect important cities to the trans-European road network. Additional links of the strategic network (**CATEGORY=5**) are (semi-) important road links identified by RRG which are neither part of the TEN or TINA networks nor part of the Helsinki corridors (**CATEGORY=4**) but are used to guarantee connectivity of regions and centroids to the trans-European road network. They were introduced mainly for modelling reasons.

A planned TEN link in association with unknown alignment (**TENCAT=2** and **TENALIGN=2**) represents a planned road to be constructed, whereas a planned TEN link with known alignment (**TENCAT=2** and **TENALIGN=1**) represents improvements on existing roads (e.g. extension, addition of a further track).

The three attributes **PRIOEL**, **PRIOEU03**, **PRIOVM** and **PRIOSEC** inform about whether or not a road section is part of the priority projects. Priority projects were first identified by the European Commission at the Essen summit (**PRIOEL**) (European Commission, 1995). These projects are part of the TEN and were considered of crucial importance for the further development of the trans-European transport networks. Hence, efforts and money was concentrated on them. The priority projects of the Essen list concentrated on the old EU member states. Partly these projects are already under operation, partly they are in the construction phase, and some of them are even in the planning stage. In 2003, the Van Miert high level group was established to develop suggestions and recommendations for the further development of the TEN and TINA networks in general, and for the priority projects in particular (HLG, 2003). Their suggestions are laid down in **PRIOVM**. In the light of the enlargement of the EU, this list now extends into the new member states. However, not all of the suggestions of the Van Miert group were finally adopted by the Commission (European Commission, 2003). Therefore, **PRIOEU03** represents the final revised list of the priority projects, as listed in *Table 5* and shown in *Figure 6*. Parts of these priority projects are furthermore subsumed under the so-called *Quick Start Programme* (QSP, European Commission, 2004). These prioritised sections can be identified by querying the attribute **PRIOSEC**. If, for instance, one wants to select all prioritised sections of the priority project 8 (motorway Lisboa-Valladolid), the following selection criterion has to be applied:

```
PRIOEU03 = 8 and PRIOSEC = 'PS'
```

whereas the selection criterion

```
PRIOEU03 = 8 and PRIOSEC = ''
```

will identify all other sections of this priority project that are not prioritised. Table 4 provides an overview on the prioritised sections from the quick start programme. A collection of individual country maps showing the priority projects one-by-one by differentiating prioritised sections from none-prioritised sections can be downloaded from the DG TREN webpage (European Commission, 2005).

Table 5. Priority road projects.

Priority road project	No	Countries	QSP
Fixed link road/rail Messina bridge	1	IT	
Greek motorways (Via Egnatia, Pathe), motorways in Bulgaria and Romania	7	BG, GR, RO	• [1]
Motorway Lisboa-Valladolid	8	ES, PT	
Øresund rail/road link	11	DK, SE	
Nordic triangle	12	FI, SE	
Ireland / UK / Benelux road link	13	BE, IE, UK	• [2]
Fixed link Fehmarn Belt	20	DE, DK	
Motorway Gdansk-Katowice-Brno-Vienna	25	AT, CZ, PL, SK	• [3]
Multi-modal link Ireland/UK/continental Europe	26	BE, FR, IE, UK	

1 QSP: Sections of the Via Egnatia and the cross-border section Greece-Bulgaria
2 QSP: Sections in the UK between Liverpool and Londin
3 QSP: Cross-border sections between Ostrava (CZ) and Vienna (AT)

Source: Revised version as of 2003, European Commission, 2003; 2004b; 2005

STRATEGIC indicates whether or not the link is part of the strategic road network. The strategic road network contains the trans-European road links specified in Decision 1692/96/EC, the TINA networks for the candidate countries as defined by the TINA secretariat and the east European road corridors ('Helsinki Corridors') as well as selected additional links in Eastern Europe and further links to guarantee connectivity of regions and centroids.

The access links are functional links used for transport modelling to connect NUTS-2 region centroids to the network. Centroids represent the centres of transport analysis zones (TAZ) and are used as origins and destinations. Each centroid is connected to the real-world network via one (*Figure 4*, left) or several access links (*Figure 4*, right). The latter feature becomes particular important in the rail network. The geographical position of centroids is the same in both the road and rail networks. In contrast, the waterway network is lacking centroids.

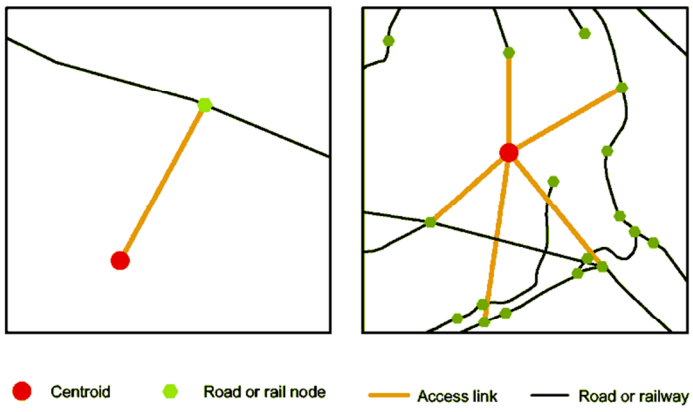


Figure 4. Centroids and access links in the road and rail networks.

A hierarchy of roads can be established using different link attributes. Such hierarchies may be important for plotting the road network (e.g. producing maps), or may be required for certain types of network analysis or transport modelling. There are several possibilities in the database to establish such hierarchies, ranging from rather simple differentiations to more complex ones.

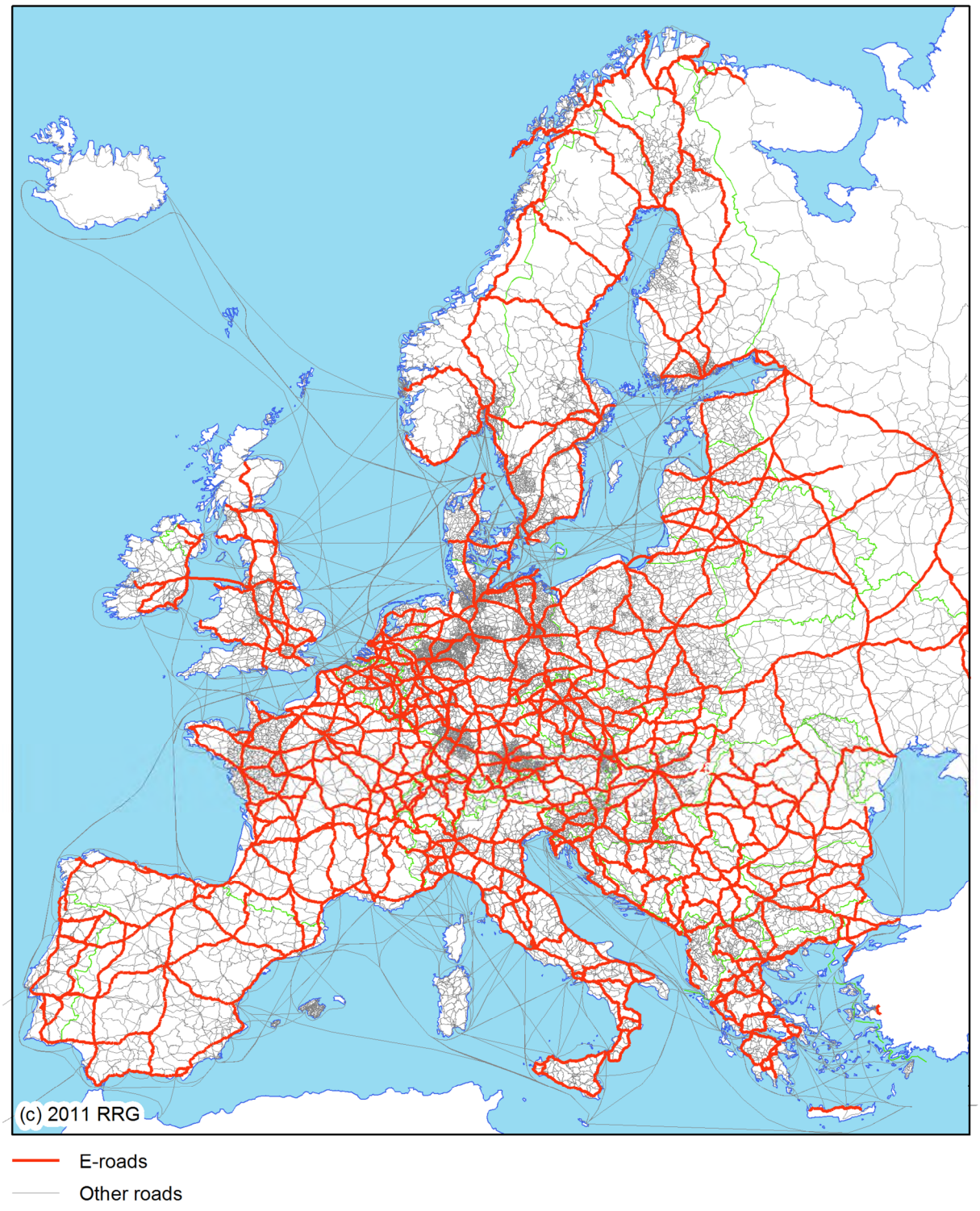


Figure 5. Overview about E-roads.

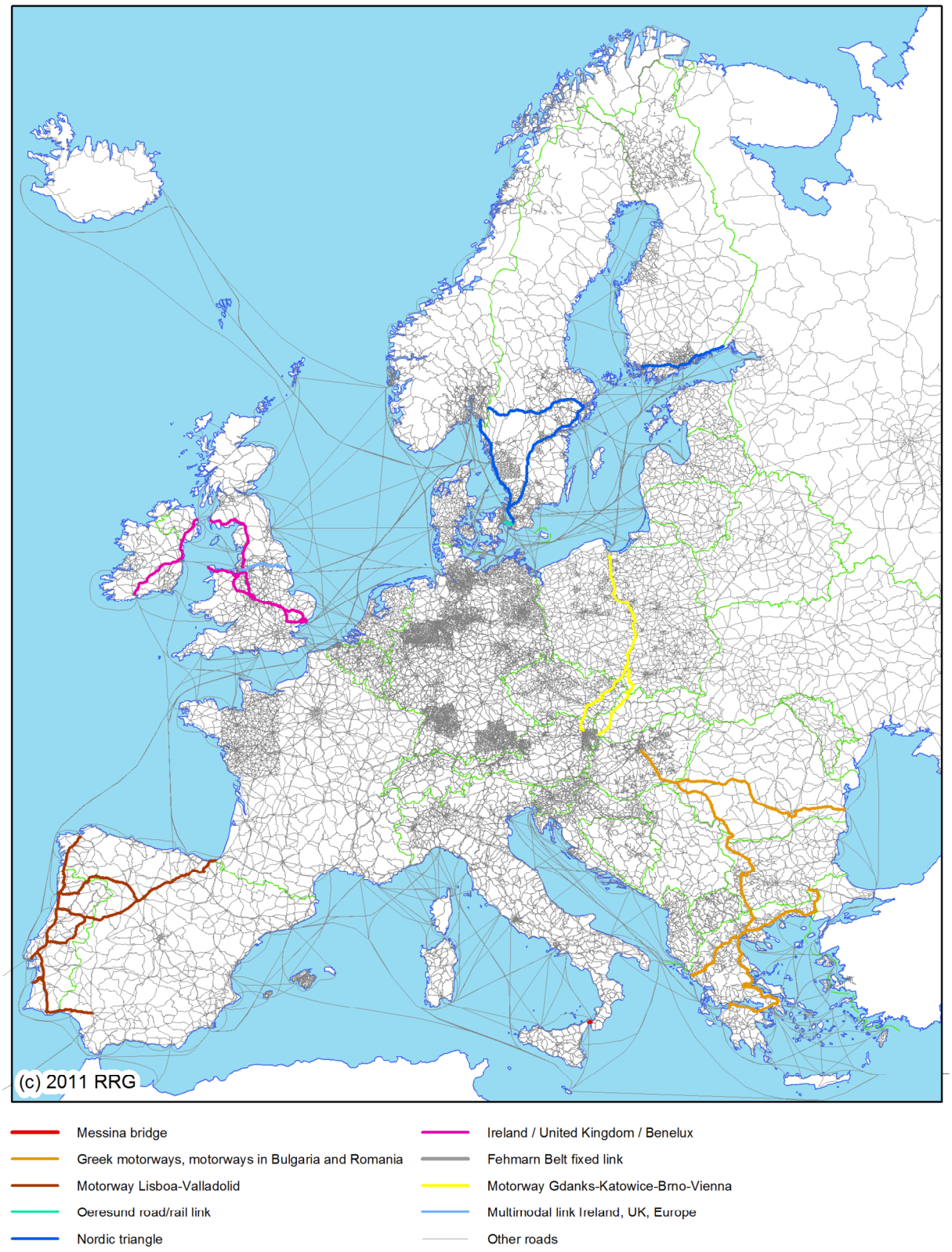


Figure 6. Priority road projects.
Source: European Commission, 2003; 2005

The easiest way is to apply the **LINKCAT** attribute, which allows to differentiate motorways, dual-carriageway roads, trunk roads, regional roads and local roads and planned roads, which eventually totals up to six categories (see *Figure 2*). Alternatively, applying the **CODE** attribute yields the same set of differentiation, however, this attribute also distincts E-roads from non-E-roads as further subcategories, i.e. it combines information from the **LINKCAT** and **EURID** attributes. Altogether, eleven categories are differentiated here (see *Table 4*). For classified trunk roads, the official national road identifiers are coded in the database in the attribute **NATID**, offering a third option for building and mapping road hierarchies. The **NATID** attribute can either be combined with **LINKCAT** or with the **CODE** attribute.

A combination of **NATID** and **LINKCAT** enables to further differentiate *other trunk roads* (**LINKCAT=3**) into *other classified trunk roads* (**LINKCAT=3** and **NATID** set) and *non-classified trunk roads* (**LINKCAT=3** and no **NATID** available); similarly, *dual-carriageways* (**LINKCAT=2**) can be further differentiated into *classified dual-carriageways* and *non-classified dual-carriageways*, and also *regional roads* (**LINKCAT=8**) can be further differentiated into *classified regional roads* and *non-classified regional roads*. Altogether, this totals up to nine different road types.

Another option is to combine **NATID** with the **CODE** attribute. By definition, all '**M**' and '**N**'-**CODE** values (**ME**,**M**,**NED**,**NE**,**ND**,**N**) do have entries in **NATID**. Thus, only all the '**T**' and '**RL**'-**CODE** values (**TE**,**TD**,**TED**,**T**,**RL**) can be further differentiated into classified roads (i.e. those having entries in **NATID** as well) and non-classified roads (i.e. those lacking entries in **NATID**), which eventually amounts to 16 road categories available.

Beyond these options, it is of course also possible to use the other attributes available (*Table 4*) to establish different kinds of road hierarchies with other degrees of complexity and other foci.

DATE_OPEN, **SOURCE_OPEN**, **STATUS**, **TYPE** and **YEAR** provide additional information on the date of first opening of a road section (**DATE_OPEN**, **SOURCE_OPEN**), and on possible construction works taking place along the road section (**STATUS**, **TYPE** and **YEAR**). **DATE_OPEN** provides the date when the road was first opened to traffic, whereas **SOURCE_OPEN** indicates the source from which this information was obtained. Note that this information is currently only available for a subset of all roads (in the countries of Denmark, Germany and Ireland). **STATUS**, **TYPE** and **YEAR** in turn provide information on completed and actual construction works taking place along the road segment. **TYPE** informs about the type of the construction works going on, **STATUS** gives the work status (planned, under construction, completed), and **YEAR** provides the envisaged completed year of that works. Note that such works may also be completed in the past. Information provided in **STATUS** and **YEAR** are subject to the actual progress of the construction work, and so differences may occur between information provided in the RRG GIS Database and reality. **LINKCAT71**, **LINKCAT76**, **LINKCAT81**, ... , **LINKCAT2021**, **LINKCAT2026** and **LINKCAT2031** provide the road link categories for the respective years. The range of accepted values in these fields correspond to those for the field **LINKCAT**. This information, together with the information on road opening and construction works, may be used to keep track about the development of the road networks over time.

Optional link information

Optionally, additional fields would be available upon request which might be used for transport modelling purposes. This additional information refers to slope gradients and slope penalties by road section, and on agglomeration penalties.

The fields **FROMELEVAT** and **TOELEVAT** will represent the elevation above sea level for the from-node and the to-node of the road section and the attribute **SLOPEGRADIENT** will then represent the slope of the road section and the attribute **SLOPEPEN** will give a penalty on travel times due to the road gradient. Depending on the population densities of the location where the from-node and to-node of the road section are located, the field **AGGLOPEN** will provide a specific penalty which might also be of interest. The penalty will be the higher the higher the population densities are. It represents two types of information that are not directly available in the database: first, it could be used to introduce local speed limits and waiting times at traffic lights that are not included in the database. It is assumed that the higher the population density the higher the traffic volumes are and so the more likely it is that local speed limits and traffic lights occur. Second, this field takes account of higher traffic volumes and congestion in agglomerations, and so can be used as a proxy for lower actual speeds (compared to the maximum speed limit allowed).

All optional fields are derived through GIS techniques by overlaying the road network layer with a digital terrain model, with settlement layers and population density layers, respectively.

Detailed description of the node feature class

The following user-defined fields are available in the **ROADPNT** layer for the node festure class:

NODEID1 is a unique identifier for each node in the network. The first three digits indicate the number of the region in which the node is located. **COUNTRY1** indicates the ISO code of the country in which the node is located. **REGION1** is a four-character acronym of the name of the region. The main city (not necessarily the greatest city) of each region is the centroid of the region. For each region the nodes are counted from **0000**, with **0000** indicating the centroid.

Border nodes are nodes at national borders. At each border crossing there is a border node. Border nodes have two node numbers, country codes and region codes indicating that they belong to two different countries. Regular nodes have no entries in **NODEID2**, **COUNTRY2** and **REGION2**.

NODETYPE represents the type of the node. Centroids (**NODETYPE=0**) are functional access nodes used for transport modelling. Road nodes (**NODETYPE=2**) are nodes where link characteristics change (i.e. link attributes of the **ROADAT** layer change). Motorail loading stations (**NODETYPE=6**) represent terminals where cars and trucks are loaded onto trains for transit through the Eurotunnel or for transit to other Swiss railway tunnels.

Table 6. Fields of the **ROADPNT** *layer.*

Attribute	Type	Contents
NODETYPE	Integer	Node type 0 = Centroid of NUTS-2 region 1 = Border node 2 = Road node 3 = Ferry (sea)port 4 = Motorway interchange 5 = Motorway exit 6 = Motorail loading station 7 = Tunnel portal or bridge portal 9 = Airport 11 = Pass / Col 12 = Rail station
NODEID1	Float	Unique node number xxx.yyyy xxx = NUTS-2 region-ID yyyy = Node number in region (0001 ….)
COUNTRY1	Character	ISO country code (see *Table 43*)
REGION1	Character	NUTS-2 region code
NODEID2	Float	Node-ID xxx.yyyy (see **NODEID1**)
COUNTRY2	Character	ISO country code (see *Table 43*)
REGION2	Character	NUTS-2 region code
LABEL	Character	Node label

For selected nodes a node label is provided in **LABEL**. The label may represent the name of a city (if the node is representing the centre of a town or a village), may represent the name of a ferry port, a border crossing, the name of a region centroid, or the name of a motorway exit or a motorway intersection. Sometimes also the name of important tunnel portals or bridges are provided. If the node represents a region Centroid (**NODETYPE=0**) than **LABEL** will be constituted by the name of the centroid followed by the capital letter '**C**' (**=Centroid**). For example, the Berlin centroid will be indicated like '**Berlin C**'. If a node represents a motorway exit (motorway ramp) (**NODETYPE=5**), usually **LABEL** is proceeded with a keyword to indicate that this noide represents an motorway exit, followed by the exit name. As a rule, the keyword used dependes in the country. *Table 7* provides these keywords for different countries.

Table 7. Keywords used to designate motorway exit nodes.

Country	Keyword (abreviation)	Meaning
Austria, Germany, Switzerland	AS	Anschlußstelle
Belgium	Uuit	
France	Sortie, diffuseur	
Hungary	Csomopont	
Ireland, United Kingdom	J	Junction, exit
Italy	Stazione	
Netherlands, The	Aansluiting	
Portugal	Acesso	
Spain	Acceso	
Sweden	Trafikplats	

Similar to the motorway exits, a keyword is used in **LABEL** to designate motorway interchanges (**NODETYPE=4**). Again, this keyword is country-specific (*Table 8*). However, unlike for the motorway exits, this keyword may also not proceed **LABEL** in any case.

Table 8. Keywords used to designate motorway interchanges nodes.

Country	Keyword (abreviation)	Meaning
Austria, Germany, Switzerland	AK / Kreuz, AD / Dreieck, Knoten (Austria), Verzweig (Schweiz)	Autobahnkreuz / Autobahndreieck
Belgium, Netherlands	Kn	Knoppunt
Belgium, Luxembourg	Croix	
France, Switzerland	Exchangeur, echangeur	
Ireland, United Kingdom	Interchange, junction	
Denmark	Motorvejkryds	

The information in **LABEL** is mainly attached for location purposes. Please note that this attribute is not available for all notes, but for a limited subset thereof only.

Optional node fields

Similar to the arc feature class, there is an optional field available that might be of interest for transport planning purposes. This field is called **ELEVATION** and represents the elevation above sea level at the node location. This attribute is derived by GIS techniques through an overlay of the road network layer with a digital terrain model.

Speed limits by type of vehicle and type of road link

The RRG GIS Database contains a table called **ROAD_SPEED_LIMITS** providing actual general speed limits by type of vehicle (car/truck) and type of road link (urban/non-urban, normal road, expressway, motorway). Table 9 summarizes this geodatabase table. The table in the geodatabase can be linked to any geometry by using the country field. Altogether nine fields are available in the table (see *Table 10*).

Table 9. Speed limits by type of vehicle, country and link category (MAN, 2009; Wikipedia, 2009).

Country	Cars				Heavy trucks *			
	urban	normal road	expressways	motorways	urban	normal road	expressways	motorways
AL	50	70	70	100	30	45	60	60
AT	50	100	100	130	50	70	70	80
BA	50	80	80	120	50	80	80	100
BE	50	90	90	120	50	60	90	90

BG	50	90	90	130	50	80	80	100
BY	60	90	90	90	60	70	90	90
CH	50	80	100	120	50	80	80	80
CY	50	80	80	110	50	65	80	100
CZ	50	90	130	130	50	80	80	80
DE	50	100	130	130	50	60	60	80
DK	50	80	80	130	50	70	70	80
EE	60	90	90	90	50	90	90	90
ES	50	90	100	120	50	70	80	90
FI	50	80	100	120	50	80	80	80
FR	50	90	110	130	50	60	80	90
GR	50	90	90	120	50	80	90	90
HR	50	80	100	130	50	70	70	80
HU	50	90	110	130	50	70	70	80
IE	50	80	100	120	50	80	80	80
IS	50	80	90	90	50	90	90	90
IT	50	90	110	130	50	70	70	80
LT	60	90	90	90	50	80	80	80
LU	50	90	110	130	50	75	75	90
LV	60	90	90	90	60	70	70	90
MA	50	80	80	80	50	80	80	100
MD	60	90	90	90	60	70	70	70
MK	60	80	80	110	50	70	70	70
NL	50	80	100	120	50	80	80	80
NO	50	80	90	100	50	80	80	80
PL	50	90	110	130	50	70	80	80
PT	50	90	100	120	50	80	80	90
RO	50	90	100	120	50	70	80	90
RU	60	90	90	110	60	70	70	90
SE	50	80	90	110	50	80	80	80
SI	50	90	110	130	50	80	80	80
SK	50	90	130	130	60	80	80	80
TR	50	90	130	130	50	80	80	80
UA	60	90	110	130	60	70	70	90
UK	48	96	112	112	48	64	80	96
YU	60	80	100	120	60	70	70	80

** speed limits for heavy trucks; characterisation of heavy trucks according to national nomenclature.*

Table 10. Fields of the **`ROAD_SPEED_LIMITS`** *geodatabase table.*

Attribute	Type	Contents
COUNTRY	Character	ISO country code (see *Table 43*)
CAR_URB	Integer	Speed limit for cars in urban areas (km/h)
CAR_ROAD	Integer	Speed limit for cars on normal roads outside urban areas (km/h)
CAR_EXPRESS	Integer	Speed limit for cars on express roads (dual-carriageways) (km/h)
CAR_MOTORWAY	Integer	Speed limit for cars on motorways (km/h)

LOR_URB	Integer	Speed limit for heavy trucks in urban areas (km/h)
LOR_ROAD	Integer	Speed limit for heavy trucks, normal roads outside urban areas (km/h)
LOR_EXPRESS	Integer	Speed limit for heavy trucks, express roads (dual-carriageways) (km/h)
LOR_MOTORWAY	Integer	Speed limit for heavy trucks on motorways (km/h)

Railway network

General information

The *RRG European rail network* layer contains all passenger and freight railway lines under operation today, and rail ferries of 38 European countries, except for some private freight railway tracks (*Figure 7*). The database contains all railway stations which are under operation today, plus those that are planned (future stations) and many of those that are currently closed (see *Table 11* and *Figure 8*). However, station names are not available for all stations (for instance they may be missing for planned stations, or for closed stations or sometimes are also missing for freight terminals), so that some of them can only be identified by node type (**`NODETYPE=3,5,6,7,8,9,10,11,12,13,15,16,17`**, see table below). For many agglomerations tram and subway stations are coded in the database as well. Altogether, there are currently 43,633 railway, tram or subway stations coded in the layer, of which 41,136 can be identified by name. Information on railway stations were taken, inter alias, from the *railfaneurope* web page (Railfaneurope.net, 2006).

Table 11. Number of railway, tram and subway stations by country.

Country	Stations		Country	Stations	
	Total	By name		Total	By name
Albania	78	76	Austria	1,662	1,621
Belarus	144	139	Belgium	1,074	941
Bosnia-Herzegovina	123	122	Bulgaria	237	236
Croatia	421	419	Cyprus	0	0
Czech Republic	1,567	1,560	Denmark	504	493
Estonia	293	227	Finland	327	325
France	4,856	4,738	Germany	13,905	13,189
Greece	564	532	Hungary	932	931
Ireland	157	152	Iceland	0	0
Italy	2,984	2,948	Latvia	589	524
Lithuania	235	173	Liechtenstein	3	1
Luxembourg	64	64	Macedonia	85	85
Malta	0	0	Moldavia	23	22
Montenegro	22	22	Netherlands, The	580	559
Norway	559	422	Poland	1,641	1,509
Portugal	203	200	Romania	655	654
Russia	433	378	Serbia	452	452
Slovakia	418	417	Slovenia	316	311
Spain	1,543	1,536	Sweden	1,569	794
Switzerland	1,970	1,922	Turkey	65	65
Ukraine	179	178	United Kingdom	2,201	2,199

Note:
The above number of stations per country are indicative numbers subject to continuous database updates. State: October 2011.

Currently the rail network altogether contains about 65,348 links and 60,231 nodes, including tramways and subways for selected cities. In addition to currently existing rail lines, the database contains all future projects of the trans-European transport network (TETN) programme

of the European Union as specified in Decision 1692/96/EC of the European Parliament and of the Council (European Communities, 1996), further specified in the *TEN Implementation Report* (European Commission, 1998), and latest revisions of the TEN guidelines provided by the European Commission (1999; 2002a; 2004a; 2004b), information on priority projects (European Commission, 1995; 2002b; 2005), as well as the so-called TINA networks (TINA = Transport infrastructure needs assessment‘; TINA Secretariat, 1999; 2002) for the new member states and candidate countries and the "Helsinki Corridors" for the remaining east European countries (*Figure 9*).

A subset of the rail network is the 'strategic rail network' which contains the trans-European rail links specified in Decision 1692/96/EC of the European Parliament and of the Council, the TINA networks for the candidate countries and the Helsinki corridors (European Commission, 1995) for the remaining east European countries as well as selected additional links in eastern Europe and links to guarantee connectivity of regions and centroids. The strategic rail network is dedicated as a transport modelling network, e.g. for accessibility calculations, on the European, national and regional level. For modelling purposes, it also contains virtual access or connector links linking the centroids of the transport zones to the network. The transport zones correspond to the NUTS-2 regions of the system of region as defined by Eurostat (Eurostat, 1995; 1999a; 1999b; 2004).

For rail lines that are part of the trans-European rail network of the European Union or of the new member states and remaining candidate countries, the database distinguishes between high-speed lines, upgraded high-speed lines and conventional lines. High-speed lines are recently built or planned tracks for a maximum speed equal to or greater than 250 km/h or average speeds between 150 and 250 km/h depending on the country and the system. Links upgraded for high-speed are designed for speeds up to 200 km/h or average speeds between 100 and 150 km/h. All other TETN rail links are conventional lines.

The Trans-European Transport Outline Plan, Section Railways, and the TINA network cover not only the member states of the European Union and the new member states, bust also the two other candidate countries. Moreover, the Helsinki corridors extend into the remaining east European countries.

In addition to the coding of the TEN-T outline plans, also other national outline plans of the European countries are coded in the rail network layer. By applying this information, future rail networks until 2030 may be extracted from the *RRG GIS Database*.

Similar to the future developments, the rail network layer also comprises the historic development of the rail networks since 1970, which means that the development over time of the rail networks from 1970 until 2030 is coded in the database. Thus, layers representing the rail network for any of the years in between 1970 and 2030 may be provided.

Figure 7. Railways by TEN link category.

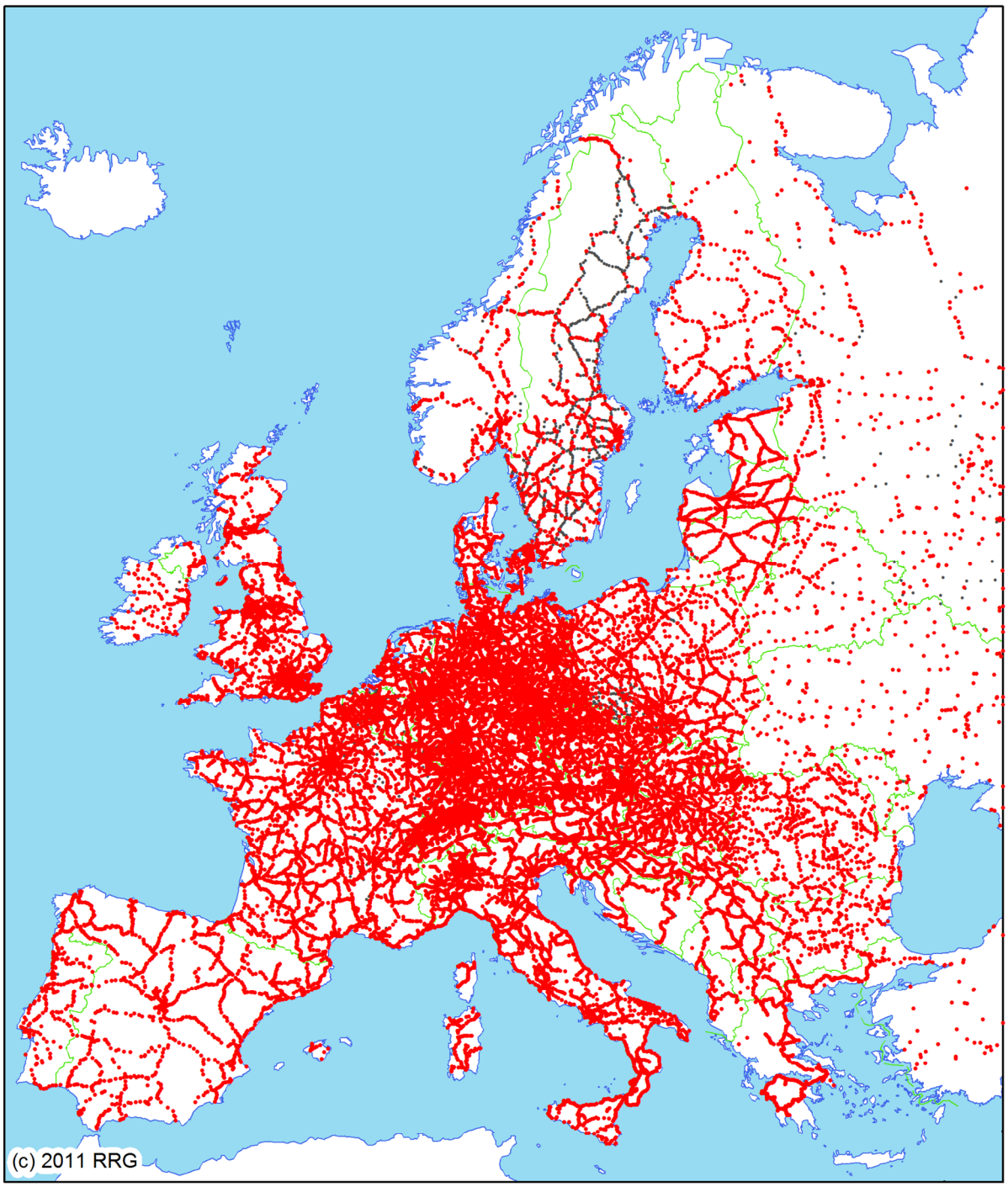


Figure 8. Railway stations across Europe.

Figure 9. Rail network: TEN and TINA classification.

The name of the layer containing the trans-European railway network is **RAILxx** and comprises arc (**RAILARC**) and node (**RAILPNT**) feature classes. Its basic characteristics are:

Layer name:	**RAILxx**
Feature classes:	Arcs, nodes, tables
No of arc features:	65,348
No of node features:	60,231
User fields associated with the arcs:	36
User fields associated with the nodes:	16
User fields associated with the tables:	12/8/10

Detailed description of the are feature class

The following user-defined fields are available in the **RAILARC** layer for the arc feature class:

Table 12. Fields of the **RAILARC** *layer.*

Attribute	Type	Contents
COUNTRY	Character	ISO country code (see *Table 43*) 'YY' = Ferry link
LINKTYPE	Integer	Link type 0 = Access link to/from centroid 1 = Rail 2 = Rail ferry 4 = Subway / Tram 5 = Monorail, other types of rail 6 = Pathway, connecting footway
LINKCAT	Integer	Link category in 2011 0 = Access link to/from centroid 1 = Main line, double track, electrified 2 = Main line, double track 3 = Main line, single track, electrified 4 = Main line, single track 5 = Secondary line, double track, electrified 6 = Secondary line, double track 7 = Secondary line, single track, electrified 8 = Secondary line, single track 9 = Narrow gauge line 10 = Rail ferry 11 = Passenger ferry 15 = Planned link, not existing in 2011 16 = Subway 17 = Tramway 18 = Monorail system 19 = Pathway, connecting footway
LINKUSE	Integer	Usage of link 0 = Access link to/from centroid 1 = Passengers line only 2 = Freight line only 3 = Passengers and freight line
OPERATION	Integer	Link operation mode 0 = Access link to/from centroid 1 = In operation 2 = Planned link (link to be newly constructed)

		3 = Link not in use, out of operation 4 = Link not in use, former tracks removed 5 = Railway museum track, steam railway line 6 = Link not in use, reactivation planned
LABEL	Character	Label, name of the line
TENCAT	I	TEN / TINA category 0 = No TEN/TINA link 1 = High speed line 2 = High speed line, planned 3 = Upgraded high speed line 4 = Upgraded high speed line, planned 5 = Conventional line 6 = Conventional line, planned
CONTINENT	Integer	Continent code 1 = Asia 2 = Africa 3 = North America 4 = South America 5 = Europe 6 = Australia / Oceania 7 = Antarctica 8 = Water bodies 9 = Arctiva
TENALIGN	Integer	TEN / TINA alignment 0 = No TEN/TINA link 1 = TEN/TINA link with precise alignment 2 = TEN/TINA link with unknown precise alignment
CATEGORY	Integer	Railway category 0 = No link of strategic network 1 = TEN rail link 2 = TINA rail link, backbone 3 = TINA rail link, additional 4 = Helsinki corridor 5 = Additional link of strategic network
PRIOEL	Integer	TEN priority project number (Essen list) 0 = No TEN/TINA priority project 1 = HST/combined transport Nuernberg-Berlin 2 = HS rail Paris-Cologne-Amsterdam-London 3 = HS rail south: Madrid-Barcelona-Montpellier/Dax 4 = HS rail Paris-Karlsruhe-Luxembourg/ Saarbrücken 5 = Betuwe line Rotterdam-Rhine/Ruhr 6 = HS rail Lyon-Venice-Trieste 8 = Multimodel link Portugal-Spain-Europe 9 = Rail Cork-Dublin-Belfast-Larne-Stranraer 11 = Øresund road/rail link 12 = Nordic triangle 14 = West coast main line (UK) 16 = High capacity rail line across the Pyrenees 17 = HST/combined transport East-West 19 = HS interoperability on Iberian peninsula 20 = Fixed link Fehmarn Belt
PRIOEU03	Character	Adjusted TEN priority project number (rev. 2003) 0 = No TEN/TINA priority project 1 = HST/combined transport Nuernberg-Berlin, Milano-Naples-Messina-Palermo 2 = HS rail Paris-Cologne-Amsterdam-London 3 = HS rail south: Madrid-Barcelona-Montpellier / Dax-

		Bourdeaux-Tours 4 = HS rail Paris-Karlsruhe-Luxembourg/ Saarbr. 5 = Betuwe line Rotterdam-Rhine/Ruhr 6 = HS rail Lyon-Venice-Trieste/Koper-Ljubljana 8 = Multimodel link Portugal-Spain-Europe 9 = Rail Cork-Dublin-Belfast-Larne-Stranraer 11 = Øresund road/rail link 12 = Nordic triangle 14 = West coast main line (UK) 16 = High capacity rail line across the Pyrenees, freight line Sines-Badajoz 17 = HST/combined transport East-West Vienna-Bratislava 19 = HS interoperability on Iberian peninsula 20 = Fixed link Fehmarn Belt incl. links Hannover / Bremen-Hamburg, Øresund-Fehmarn 22 = Rail Athina-Kulata-Sofia-Budapest-Vienna-Praha-Nürnberg 23 = Rail Gdanks-Warszawa-Katowice-Brno/Zilinia 24 = Rail Lyon/Genua-Basel-Duisburg-Rotterdam / Antwerp 26 = Multimodel link IE/UK/Europe (Hull-Liverpool, Felix-stowe-Nuneaton, Crewe-Holyhead) 27 = Rail Baltica 28 = Eurocaprail Brussels-Luxembourg-Strasbourg 29 = Intermodal corridor Ioannian Sea/Adria
PRIOVM	Character	Priority project code (Van Miert group) ‘ ‘ = No Van Miert project L0P1 = HS rail Paris-Cologne-Amsterdam-London L0P2 = Betuwe line Rotterdam-Rhine/Ruhr L0P3 = Rail Cork-Dublin-Belfast-Larne-Stranraer L0P5 = HST/combined transport Nuernberg-Berlin, Verona-Munich, Milano-Naples L0P7 = HS rail south: Madrid-Barcelona-Montpellier/ Dax-Bourdeaux-Tours L0P8 = HS rail Paris-Karlsruhe-Luxembourg/Saarbr. L0P9 = HS rail Lyon-Venice-Trieste L0P11 = Multimodel link PT-ES-Europe L0P12 = Nordic triangle L0P14 = West coast main line (UK) L1P4 = Rail Lyon-Triest/Koper-Ljubljana-Budapest L1P5 = Rail Berlin-Verona-Napoli/Milano-Bologna L1P6 = Rail Kulata-Sofia-Budapest-Vienna-Praha-Nürnberg L1P7 = HST southwest (PT, ES, FR) L1P8 = Rail Gdanks-Warszawa-Katowice-Brno/ Zilinia L1P9 = Rail Lyon/Genua-Basel-Duisburg-Rotterdam L1P10 = Rail Paris-Strasbourg-Stuttgart-Vienna-Bratislava L1P11 = HS interoperability on Iberian peninsula L1P12 = Multimodel link IE/UK/Europe L1P13 = Messina road/rail bridge L1P14 = Fixed link Fehmarn Belt L1P15 = Nordic triangle L1P16 = Multimodal link PT-ES-Europe L2P1 = New Pyrenees rail link L2P2 = Rail Baltica L2P3 = Rail freight corridor Gdanks.-Bydgoszcs-Katowice-Zwardon L3P2 = Rail Bari-Durres-Sofia-Varna/Burgas L3P3 = Rail Napoli-Reggio Calabria-Palermo L3P8 = Intermodal corridor Ioannian Sea/Adria L3P11 = Rail link Praha-Linz
PRIOSEC	Character	TEN priority projects: prioritised sections ‘ ‘ = None prioritised section, none priority link

		PS = Prioritised section
HSL	Integer	High-speed rail lines 0 = No high speed rail line 1 = Upgraded high speed rail line 2 = New constructed and dedicated HSL 3 = Upgraded HSL in future 4 = New constructed and dedicated HSLin future
EUFRANET	Integer	EUFRANET network 0 = Not part of Eufranet 1 = Dedicated rail freight net: core network 2 = Dedicated rail freight net: intermediate network 3 = Additional freight corridor (not part of Eufranet)
COOKNET	Integer	Thomas Cook railway network 0 = Link not part of Thomas Cook rail network 1 = High speed line 2 = Main line 3 = Secondary line
STRATEGIC	Integer	Strategic network 0 = No link of strategic network 1 = Link of strategic network
CONST	Integer	Specific artifical buildings 0 = No tunnel nor bridge 1 = Tunnel 2 = Bridge
CORRIDORS	Character	Corridors towards Eastern Europe I … IX = Corridor number
LINKCAT71	Integer	Link category 1971 (see LINKCAT)
LINKCAT76	Integer	Link category 1976 (see LINKCAT)
LINKCAT81	Integer	Link category 1981 (see LINKCAT)
LINKCAT86	Integer	Link category 1986 (see LINKCAT)
LINKCAT91	Integer	Link category 1991 (see LINKCAT)
LINKCAT96	Integer	Link category 1996 (see LINKCAT)
LINKCAT2001	Integer	Link category 2001 (see LINKCAT)
LINKCAT2006	Integer	Link category 2006 (see LINKCAT)
LINKCAT2011	Integer	Link category 2011 (see LINKCAT)
LINKCAT2016	Integer	Link category 2016 (see LINKCAT)
LINKCAT2021	Integer	Link category 2021 (see LINKCAT)
LINKCAT2026	Integer	Link category 2026 (see LINKCAT)
LINKCAT2031	Integer	Link category 2031 (see LINKCAT)
STATUS	Integer	Status of construction works 0 = No construction works going on 1 = Completed 2 = Under construction 3 = Planned 4 = Study phase 5 = Partly under construction, planned 6 = Work underway

		7 = Partly completed 8 = Not yet planned 9 = Under construction, partly completed 10 = Feasibility study phase 11 = TEN project but no further information 12 = Information n.a.
TYPE	Integer	Type of construction works 0 = No construction works going on 1 = New link: high speed 2 = Upgrading high speed 3 = Information n.a. 4 = New link 5 = New link: high speed 6 = New link, partly upgrading existing link 7 = New link, partly upgrading to high speed 8 = Upgrade 9 = Improvement, reconstruction works 10 = Upgrade: high speed, with more than 4 tracks 11 = Upgrading conventional line 12 = Electrification 13 = Conventional 14 = Electrification: designed for speed 100 km/h 15 = Upgrade: designed for speed > 300 km/h 16 = Upgrade: designed for speed > 200 km/h 17 = Upgrade: high speed CT 19 = Upgrade and electrification for speed > 200 km/h 20 = Upgrade and electrification 21 = Upgrade and tilting 22 = New link: subway/metro 23 = Upgrade: new additional track 24 = Upgrade: high speed from 1 to 2 tracks 25 = Upgrade: designed for speed 120 km/h 26 = Upgrade: high speed traffic control system 27 = Upgrade: traffic control system 28 = Upgrade: conventional line from 1 to 2 tracks 29 = Upgrade: conv. Line from 1 to 2 track & electr. 31 = Study phase (i.e. actions not yet defined) 32 = Upgrade: conventional route improvement 33 = Upgrade: conventional line, TCS & electr. 34 = Upgrading gauge line 35 = Study phase for high-speed line 36 = New link (no further information) 37 = Study phase for high-speed line/new line 38 = Upgrade: from 2 to 4 tracks 39 = New link: descigned for speed > 200 km/h 40 = Upgrade: high speed from 2 to 4 tracks 41 = New link: new tunnel or new bridge 42 = Upgrade: designed for speed 160 km/h 43 = Upgrade: conventional line additional track 44 = Upgrading capacity 45 = Removal of level crossings 46 = Reactivation of closed link for passenger trans. 47 = Planned conventional line 48 = Planned high speed line
YEAR	Integer	Year of completion of construction works (estimated)
SPEED_TT	Integer	Speed on railway section according to actual timetables (km/h)

COUNTRY indicates the ISO code of the country in which the link is located. Because rail and passenger ferries cannot be assigned to any country, ferry links have the country code '**YY**'.

LINKTYPE, **LINKCAT**, **LINKUSE**, **OPERATION**, **COOKNET** and **CONST** give general information on all links. **COOKNET** differentiates those links which are part of the Thomas Cook rail network from the other links, while **CONST** represents specific artificial buildings ('constructions') along rail sections: tunnels and bridges. However, only major buildings are coded in the dataset.

TENCAT, **TENALIGN**, **PRIOEL**, **PRIOEU03**, **PRIOVM**, **PRIOSEC**, **CATEGORY**, **CORRIDORS** and **EUFRANET** give information on those links which are included in the "Trans European Transport Network Outline Plan, Section Railways" based on the Joint Decision of the European Parliament and of the Council published in the Official Journal of the European Communities (L228, 9 September 1996) or are part of the TINA network (TINA Secretariat, 1999; 2002). The railway corridors towards eastern Europe were first agreed at the second Pan-European Conference of the European Ministers of Transport in Crete in March 1994 ("Crete Corridors") and secondly confirmed at the Helsinki meeting (now: "Helsinki Corridors"). The *'TINA rail link, backbone'* (**CATEGORY=2**) are the former Crete Corridors in the candidate countries, whereas the *'TINA rail link, additional'* (**CATEGORY=3**) represent additional links identified by the TINA Secretariat in correspondence with the candidate countries to connect important cities to the trans-European railway network. Additional links of the strategic network (**CATEGORY=5**) are (semi-)important rail links identified by RRG which are neither part of the TEN or TINA networks nor part of the Helsinki corridors (**CATEGORY=4**) but are used to guarantee connectivity of regions and centroids to the trans-European railway network. They were introduced mainly for modelling reasons. **EUFRANET** indicates whether or not a link is included in the so-called *Dedicated Rail Freight Network* as proposed by the Eufranet (2001) project. The dedicated rail freight network distinguishes between a core network and an intermediate network (*Figure 11*).

A planned conventional line (**TENCAT=6**) is a new conventional railway line to be constructed that currently not exists. A planned upgraded high speed line (**TENCAT=4**) is currently a conventional rail line planned to be upgraded for high speed traffic in future. Similarly, an upgraded high speed line (**TENCAT=3**) represents a formerly conventional line that was upgraded for high speeds by technical improvements (signalling techniques, removal of level crossings etc,). A planned high speed line (**TENCAT=2**) is a new high speed link to be constructed that currently does not exist. Finally, a high speed line (**TENCAT=1**) is an existing high speed rail link constructed on separate alignment specially designed for high speed traffic.

The four attributes **PRIOEL**, **PRIOEU03**, **PRIOVM** and **PRIOSEC** inform about whether or not a rail section is part of the priority projects. Priority projects were first identified by the European Commission at the Essen summit (**PRIOEL**). These projects are part of the TEN and were considered of crucial importance for the further development of the trans-European transport networks. Hence, efforts and money was concentrated on them. The priority projects of the Essen list concentrated on the old EU member states. In 2003, the Van Miert high level group developed suggestions and recommendations for the further development of the TEN and TINA networks in general, and for the priority projects in particular. Their suggestions are laid down in **PRIOVM**. In the light of the enlargement of the EU, this list now extends into the new member states. However, not all of the suggestions of the Van Miert group were finally adopted by the Commission. Therefore, **PRIOEU03** represents the final revised list of the rail priority projects (*Table 13*, *Figure 10*). Parts of these projects are furthermore subsumed un-

der the so-called *Quick Start Programme* (QSP, European Commission, 2004). These prioritised sections can be identified by the attribute **PRIOSEC**. If, for instance, one wants to select all prioritised sections of the priority project 8 (motorway Lisbon-Valladolid), the following selection criterion has to be applied:

```
PRIOEU03 = 8 and PRIOSEC = 'PS'
```

whereas the selection criterion

```
PRIOEU03 = 8 and PRIOSEC = ''
```

will identify all other sections of this priority project that are not prioritised. *Table 13* provides an overview on the prioritised sections of the railway network from the quick start programme. A collection of individual country maps showing the priority projects one-by-one by differentiating prioritised sections from none-prioritised sections can be downloaded from the DG TREN webpage (European Commission, 2005).

Table 13. Priority rail projects (2003).

Priority rail project	No	Countries involved	QSP
High speed train combined transport North-South, incl Messina bridge	1	AT, DE, IT	• [1]
High speed rail Paris-Cologne-Amsterdam-London	2	BE, DE, FR, NL, UK	• [2]
High speed rail south: Madrid-Barcelon-Montpellier/Madrid-Dax	3	ES, FR	• [3]
High speed rail Paris-Karlsruhe / Luxembourg / Saarbruecken	4	DE, FR, LU	• [4]
Betuwe line Rotterdam-Rhein/Ruhr	5	DE, NL	
High-speed rail Lyon-Venice-Trieste/Koper-Ljubljana-Budapest	6	FR, HU, IT, SI	• [5]
Multimodal link Portugal-Spain-Central Europe	8	ES, FR, PT	
Rail Cork-Dublin-Belfast-Larne-Stranraer	9	IE, UK	
Øresund rail/road link	11	DK, SE	
Nordic triangle	12	FI, SE	• [6]
West coast main line	14	UK	
High capacity rail across the Pyrenees, freight line Sines-Badajoz	16	ES, FR, PT	
High speed train, combined transport East-West	17	AT, DE, FR, SK	• [7]
Fixed link Fehmarn Belt	20	DE, DK	
Rail Athina-Kulata-Sofia-Budapest-Vienna-Praha-Nuernberg	22	AT,BE,CZ,DE,GR, HU	• [8]
Rail Gdansk-Warsaw-Katowice-Brno/Zilinia	23	CZ, PL, SK	• [9]
Rail Lyon/Geneva-Basel-Duisburg-Rotterdam-Antwerp	24	BE, DE, FR, NL	• [10]
Multi-modal link Ireland/UK/continental Europe	26	BE, FR, IE, UK	• [11]
Rail Baltica	27	EE, LT, LV, PL	
Eurocaprail Brussels-Luxembourg-Strasbourg	28	BE, FR, LU	
Intermodal corridor Ioannian Sea/Adria	29	GR	

1 *QSP: Brenner section between Innsbruck (AT) and Verona (IT)*
2 *QSP: Cross-border section Belgium-Germany*
3 *QSP: Cross-border sections Portugal-Span and Spain-France*
4 *QSP: Cross-border section Strasbourg (FR) – Karlsruhe (DE)*
5 *QSP: Cross-border sections France-Italy and Slovenia-Hungary*
6 *QSP: Sections in the Stockholm and Malmø areas (SE) and East of Lahti (FI)*
7 *QSP: Section between Munich and Bratislava*
8 *QSP: Section between Gyor and Budapest (HU)*

9 QSP: Section between Katowice and Polish-Slovakia border
10 QSP: Section between Dijon-Mulhouse (FR) and Germany, and cross-border section Germany-Netherlands
11 QSP: Section between Dublin (IE) and Liverpool (UK)

Source: Revised for version as of 2003; European Commission, 2003; 2004b; 2005

STRATEGIC indicates whether or not the link is part of the strategic rail network. The strategic rail network contains the trans-European rail links specified in Decision 1692/96/EC, the TINA networks for the candidate countries as defined by the TINA secretariat and the east European rail corridors ('Helsinki Corridors') as well as selected additional links in Eastern Europe and further links to guarantee connectivity of regions and centroids.

HSL indicates whether a link represents a (upgraded) high speed line (with design speeds of more than 200 km/h). The attribute is similar to the **TENCAT** attribute, however, the main difference is that **TENCAT** is only referencing the Trans-European Rail Networks (TEN-Ts) with the TEN-T classification, whereas **HSL** is referencing the full rail network, including non-EU countries, and including sections that are not part of the TEN-Ts. Existing high speed rail lines today may represent upgraded high speed lines (**HSL=1**; upgraded from conventional lines) or new constructed high speed rail lines (**HSL=2**), specifically dedicated forhigh-speed operations; similarly, **HSL** is also referencing planned future high speed rail lines, which may either be upgraded in future (**HSL=3**) or may be new constructed (**HSL=4**). *Figure 12* illustrates existing and future high speed rail lines in Europe. Main information concerning the HSL characterisation was taken from tne following webpage: "Die schnellsten Züge der Welt" (Werske, A. (2006): www.hochgeschwindigkeitszuege.com). **SPEED_TT** provides the maximum speeds on railway sections according to actual timetables. Often, datasets provide the maximum design speeds that can ideally be travelled by trains along a section, however, in reality the maximum design speeds are rarely reached due to different operating and maintenance reasons. Therefore, speeds derived from the timetables provide a more realistic picture on the speeds that are actually travelled.

The access links are functional links used for transport modelling to connect NUTS-2 region centroids to the network. Centroids represent the centres of transport analysis zones (TAZ) and are used as origins and destinations. Each centroid is connected to the real-world network via one or several access links (see *Figure 4*). The latter aspect is particularly important for the rail network, to connect centroids to all the four directions. The geographical position of centroids is the same in both the road and rail networks. In contrast, the waterway network is lacking centroids, but introduces so called *port access links*.

A hierarchy of railways can be established using different link attributes. Such hierarchies may be important for plotting the railway network (e.g. producing maps), or may be required for certain types of network analysis and transport modelling. There are several possibilities in the database to establish such hierarchies, ranging from rather simple differentiations to more complex ones.

Figure 10. Priority rail projects.
Source: European Commission (2003; 2005)

Figure 11. Dedicated rail freight network
Source: Eufranet (2001).

Figure 12. Existing and future high speed rail lines in Europe.

The easiest way is to apply the **LINKCAT** attribute, which allows to differentiate main and secondary lines and narrow gauges, single or double track, electrified or non-electrified, existing and planned lines, which eventually totals up to ten categories. Alternatively, the **TENCAT** attribute can be used to differentiate high-speed lines, upgraded high speed lines and conventional lines, both existing and planned. However, the **TENCAT** attribute only provides information for the TEN and TINA networks and is lacking information for the other lines. Altogether, six categories are available (see *Figure 7*). A third option would be to use the **OPERATION** attribute, which distinguished operational lines from planned lines and those lines out of operation and museum lines.

More complex hierarchies can be established by combining different attributes, such as **LINKCAT** and **OPERATION**, or **LINKCAT** and **TENCAT** information, or **LINKCAT** and **HSL**. This way further sub-hierarchies of railway lines can be established.

STATUS, **TYPE** and **YEAR** provide additional information on possible construction works taking place along the road section. **TYPE** informs about the type of the construction works going on, **STATUS** gives the work status (planned, under construction, completed), and **YEAR** provides the envisaged completed year of that works. Note that such works may also be completed in the past. **LINKCAT71**, **LINKCAT76**, **LINKCAT81**, ... , **LINKCAT2001**, and **LINKCAT2006** provide the railway link categories for the respective years. The values of these fields correspond to those for the field **LINKCAT**. This information may be used to keep track about the development of the road networks over time.

Optional arc fields

Optionally, additional fields would be available upon request which might be used for transport modelling purposes. This additional information refers to slope gradients and slope penalties by railway section.

The attributes **FROMELEVAT** and **TOELEVAT** will then represent the elevation above sea level for the from-node and the to-node of a rail section and the attribute **SLOPEGRADIENT** will then represent the slope of the railway section and the attribute **SLOPEPEN** will give a penalty on travel times due to the gradient.

All optional fields are derived through GIS techniques by overlaying the railway network layer with a digital terrain model.

Detailed description of the node feature class

The following fields are available in the **RAILPNT** layer for the node feature class:

Table 14. Fields of the **RAILPNT** *layer.*

Attribute	Type	Contents
NODETYPE	Integer	Node type 0 = Centroid of NUTS-2 region 1 = Border node 2 = Rail node 3 = Ferry (sea)port

		4 = Rail junction, branching 5 = Railway station, passenger (and freight) 6 = Railway station, freight terminal 7 = Intermodal terminal station 8 = Combined road-rail transhipment 9 = Regional train station 10 = Railway stop, secondary passenger train stop 11 = Former railway station (out of operation) 12 = Marshalling yard 13 = Industrial terminal, power station 14 = Tunnel portal, bridge portal 15 = Railway station and regional train stop 16 = Subway/Metro station (for selected cities only) 17 = Tramway station (for selected cities only) 18 = Station entrance point 19 = Subway entrance point 20 = Regional train entrance point 21 = Monorail halt, narrow gauge halt
NODEGROUP	Integer	Node group 0 = Centroid 1 = Border node 2 = Rail node (incl. nodes, junctions, bridges, tunnels) 3 = Stations 4 = Station entrances
PLATFORMS	Integer	Number of gates/platforms at passenger train stations 0 = No passenger train station 1, 2, 3, …. , 30 = Number of gates/tracks 99 = More than 30 gates -99 = Information not available
NODEID1	Float	Node-ID xxx.yyyy xxx = Region-ID yyyy = Node number in region (0001 ….)
COUNTRY1	Character	ISO country code (see *Table 43*)
REGION1	Character	NUTS-2 region code
NODEID2	Float	Node-ID xxx.yyyy (see **NODEID1**)
COUNTRY2	Character	ISO country code (see *Table 43*)
REGION2	Character	NUTS-2 region code
LABEL	Character	Node label
OPERATION	Integer	Status operation of train stations 0 = No train station 1 = In operation 2 = Planned, new station 3 = Out of operation, closed 4 = Reactivation of closed station
PNR	Integer	Unique station node point number (1 …)
ECESTAT	Integer	Stations for long distance traffic 0 = No IC/EC train station 1 = IC/EC train station
ICESTAT	Integer	High-speed train stations 0 = No high-speed train station 1 = High-speed train station
REGSTAT	Integer	Rapid regional train stations

		0 = No rapid regional train station 1 = Rapid regional train station
CONTINENT	Integer	Continent code 1 = Asia 2 = Africa 3 = North America 4 = South America 5 = Europe 6 = Australia / Oceania 7 = Antarctica 8 = Water bodies 9 = Arctiva

NODETYPE and **NODEGROUP** indicate the type of the node in the rail network. Centroids, border nodes, rail ferry ports, rail junctions and branchings, as well as railway, tram and subway stations and tunnel and bridge portals are differentiated. Rail nodes (**NODETYPE=2**) are used at locations where characteristics of the railway tracks change (e.g. where a one track line is changing to a dual track line). This information can also be used to establish a hierarchy of railway stations: main stations (**NODETYPE=5**), regional train stations (**NODETYPE=9**), secondary passenger train stops (**NODETYPE=10**), freight terminals (**NODETYPE=6**), ferry seaports (**NODETYPE=3**) and stations out of operation (**NODETYPE=11**). However, **NODETYPE** reflects only the main character of a node. A node identified as railway station (**NODETYPE=5**) may, at the same time, also represent a subway or tram station (**NODETYPE=16,17**). Therefore, the attributes **ECESTAT**, **ICESTAT** and **REGSTAT** provide further information on the character of a station: **ECESTAT** identifies stations for long distance trains (i.e. intercity trains, Eurocity trains), whereas **ICESTAT** identifies high-speed train stations, and lastly **REGSTAT** identifies stations with rapid regional trains. At any station, at the same time rapid regional trains, long distance (international) trains and high-speed trains may stop. Basic information for the **ECESTAT** and **ICESTAT** attributes were derived from the DB German Railway Company (DB Netz, 2005a; 2005b), whereas base information for the attribute **REGSTAT** were derived from Schweers&Wall (2002; 2004; 2005a; 2005b; 2007; 2008). However, the attributes **ECESTAT**, **ICESTAT** and **REGSTAT** are not yet available for all countries. **NODEGROUP** provdes a more aggregated differentiation of the nodes, but distinguishing only between centroids, border nodes, rail nodes, stations and station entrances. By using **NODEGROUP** a general selection of all stations is much more convenient. Sometimes major stations may have different station entrances at either side of the railway line. The station entrances are model explicitly (**NODEGROUP=4**); they are linked to the station node by so-called ‘pathways’ (see description of rail links feature class). Similarly, if a major station also comprise tram or subway station, the tram or subway station is linked to the train station via these pathways. By that, pathways help to model connecting times between trains and tramsways and subways properly.

OPERATION indicates the operation status of a station, whether the station is under operation, is being planned (or constructed), is closed or is expected to be reactivated, again derived from Schweers&Wall (2002; 2004; 2005a; 2005b; 2007; 2008). **PNR** provides a unique station node point number (integer), while **PLATOFRMS** indicate the number of gates for selected stations (only available for a limited number of stations; for freight or intermodal terminals it is not applicable to indicate **PLATFORMS**).

NODEID1 is a unique identifier for each node in the rail network. The first three digits indicate the number of the region in which the node is located. **COUNTRY1** indicates the ISO code of

the country in which the node is located. **REGION1** is a four-character acronym of the name of the region. The main city (not necessarily the greatest city) of each region is the centroid of the region. For each region the nodes are counted from 0000, with 0000 indicating the centroid. **CONTINENT** indicates the name of the continent on which the rail node is located.

Border nodes are nodes at national borders. At each border crossing there is a border node. Border nodes have two node numbers, country codes and region codes indicating that they belong to two different countries. Regular nodes have no entries in **NODEID2**, **COUNTRY2** and **REGION2**.

LABEL gives general information on the designation of a node. The label may represent the name of a station, may represent the name of a ferry port, a border crossing or the name of a region centroid. Sometimes also the name of important tunnel portals or bridges are provided. If a node represents a station, **LABEL** gives the name of the station. If a node represents a border node, **LABEL** shows a '**Border**' string, followed by the names of the two respective countries. If the node represents a region Centroid (**NODETYPE=0**) than **LABEL** will be constituted by the name of the centroid followed by the capital letter '**C**' (**=Centroid**). For example, the Berlin centroid will be indicated like '**Berlin C**'. Please note: This item is neither set for every station (only for the main ones) nor for every node. Nevertheless this items supports orientation / identification of the geographical position.

A railway (and subway or tram) station can be selected using the **NODETYPE** attribute (**NODETYPE=3,5, 6,9,10**,**11**,**12,13,15,16,** and **17**, resp.) For several stations in Germany, one of the following suffixes is attached to the station name in **LABEL** (abbreviation, followed by English translation (*Table 15*)).

Table 15. Common abbreviations in station names and its meanings.

Abbreviation	Full label	English translation
Bbf	Betriebsbahnhof	Station for maintenance works (not opened to public)
Bf	Bahnhof	Train station
Bz.	Bezirk	District
CS	Centraal Station	Central or main station (often used in the Netherlands)
Gbf	Gueterbahnhof	Freight terminal
Hbf	Hauptbahnhof	Central or main station
Hp	Haltepunkt	Secondary railway stop
Kr.	Kreis	County
Rbf	Rangierbahnhof	Marshalling yard
S-Bahn	S-Bahn	Rapid regional train station
Uest	Ueberleitstelle	Transmission station for signalling (not opened to public)

Optional node fields

Similar to the arc feature class, there is an optional attribute available in the node feature class that might be of interest for transport planning purposes. This attribute is called **ELEVATION** and represents the elevation above sea level at the node location. This attribute is derived by GIS techniques through an overlay of the railway network layer with a digital terrain model.

Timetable information

Timetable information on travel times between stations are stored in a number of tables, which are

- Route.brd Timetables for Germany representing the year 2000/2001
- Route.cook81 International European-wide timetables for 1981-1986
- Route.cook86 International European-wide timetables for 1986-1991
- Route.cook91 International European-wide timetable for 1991-1996
- Route.cook96 International European-wide timetables, 1996 until present

Common to all these tables is that they store information about the origin and destination station by station numbers, the relevant year(s) for which the information is valid, and the route length and travel times between them. Information on the route alignment is, however, not provided through these tables.

ROUTE.BRD provides timetables for Germany for the year 2000/2001 for all German railway stations, regional train stations and other railway stops (except for subway and tram). Same routes between the same station pairs may appear several times in this table if there are different train services operating between these stations (like IC trains, regional trains and other trains). The available fields in the table are as follows:

Table 16. Fields available in **Route.BRD** *table.*

Attribute	Type	Contents
F_NODEID	Float	From-Station number xxx.yyyy (see NODEID1) xxx = Region-ID yyyy = Node number in region (0001 ….)
F_NAME	Character	Name of From-Station
F_PNR	Integer	Unique station number of From-Station (see PNR in *Table 14*)
F_CC	Character	ISO country code of From-Station (see *Table 43*)
T_NODEID	Float	To-Station number xxx.yyyy (see NODEID1) xxx = Region-ID yyyy = Node number in region (0001 ….)
T_NAME	Character	Name of To-Station
T_PNR	Integer	Unique station number of To-Station (see PNR in *Table 14*)
T_CC	Character	ISO country code of To-Station (see *Table 43*)
TIME	Integer	Travel time (in minutes)
LENGTH	Float	Route length (in m)
FILLIN	Integer	Start year of route (i.e. year when route becomes valid)
DROP	Integer	End year of route (i.e. year when route changed)

F_NODEID and **T_NODEID** represent the node number of the from-station (i.e. route origin) and to-station (i.e. route destination); both numbers correspond to the **NODEID1** field of the **ROADPNT** feature class (see *Table 14*). Following this concept, **F_PNR** and **T_PNR** represent the unique station numbers of the from- and to-station, corresponding to the field **PNR** of the

ROADPNT feature class (see *Table 14*). **F_NAME** and **T_NAME**, as well as **F_CC** and **T_CC** then present the names and ISO countries codes of the origin and destination. **TIME** and **LENGTH** represent the route travel time and length, respectively. **FILLIN** indicates the year when the actual route became valid, and **DROP** gives the year where the route became invalid (either because the route stopped operation or because the travel time changed).

ROUTE.COOK81 provides international European-wide timetables representing the years 1981-1986 between main stations of the Thomas Cook railway network. Railway stops, smaller or secondary stations, as well as subway and tram stations are not included in this table. Similarly, **ROUTE.COOK86** and **ROUTE.COOK91** provide international timetables for main stations for the years 1986-1991 and 1991-1996, respectively. Again, smaller stations are not covered. The fields available in these tables are:

Table 17. Fields available in the **Route.Cook81**, **Route.Cook86** *and* **Route.Cook91** *tables.*

Attribute	Type	Contents
F_NAME	Character	Name of From-Station
F_PNR	Integer	Unique station number of From-Station (see PNR in *Table 14*)
F_COUNTRY	Character	ISO country code of From-Station (see *Table 43*)
T_NAME	Character	Name of To-Station
T_PNR	Integer	Unique station number of To-Station (see PNR in *Table 14*)
T_COUNTRY	Character	ISO country code of To-Station (see *Table 43*)
TIME	Integer	Travel time (in minutes)
LENGTH	Float	Route length (in m)

F_PNR and **T_PNR** represent the unique station numbers of the from- (i.e. origin) and to-station (i.e. destination station), corresponding to the field **PNR** of the **ROADPNT** feature class (see *Table 14*). **F_NAME** and **T_NAME**, as well as **F_COUNTRY** and **T_COUNTRY** then present the names and ISO countries codes of the origin and destination. **TIME** and **LENGTH** represent the route travel time and length, respectively.

Finally **ROUTE.COOK96** covers international timetables for main stations since 1996, and includes also respective times for the period between 1996 and the present, and also selected projections into the future, based on the coded outline plans. Following fields are provided:

*Table 18. Fields available in Route.***Cook96** *table.*

Attribute	Type	Contents
F_NAME	Character	Name of From-Station
F_PNR	Integer	Unique station number of From-Station (see PNR in *Table 14*)
F_COUNTY	Character	ISO country code of From-Station (see *Table 43*)
T_NAME	Character	Name of To-Station

T_PNR	Integer	Unique station number of To-Station (see PNR in *Table 14*)
T_COUNTRY	Character	ISO country code of To-Station (see *Table 43*)
TIME	Integer	Travel time (in minutes)
LENGTH	Float	Route length (in m)
FILLIN	Integer	Start year of route (i.e. year when route becomes valid)
DROP	Integer	End year of route (i.e. year when route changed) 9999 = Route still valid, not dropped

F_PNR and **T_PNR** represent the unique station numbers of the from- (i.e. origin) and to-station (i.e. destination station), corresponding to the field **PNR** of the **ROADPNT** feature class (see *Table 14*). **F_NAME** and **T_NAME**, as well as **F_COUNTRY** and **T_COUNTRY** then present the names and ISO countries codes of the origin and destination. **TIME** and **LENGTH** represent the route travel time and length, respectively. **FILLIN** indicates the year when the actual route became valid, and **DROP** gives the year where the route became invalid (either because the route stopped operation or because the travel time changed). **FILLIN** and **DROP** work together as the following example shows:

Imagine a route between stations A and B. From 1996 to end of 2001, a route between these stations may take 60 minutes, whereas in 2002 the same route takes only 50 minutes and in 2007 the travel time further decreased to 45 minutes, because the route was upgraded meanwhile, or faster train services operate on the route. This would be reflected in the table as follows:

Table 19. **FILLIN** *and* **DROP** *fields in the route tables.*

Record	F_NAME	T_NAME	FILLIN	DROP	Time
1	A	B	1996	2001	60
2	A	B	2002	2006	50
3	A	B	2007	9999	45

Because the travel time did not change since beginning of 2007, and the route is still under operation, the field **DROP** of Record 3 has a value of **9999** indicating that this information is still actual (**9999 = infinity**). In this case there are three records for the same route available in the **Route.COOK96** table. If, in contrast, no route characteristics changed since 1996, there would only be one record in the table with **FILLIN=1996** and **DROP=9999**; the more changes affected a route in the curse of time, the more records are available in the table. Note that this concept is also extended into the future: For selected o/d-pairs there may already be information available on future travel times, which means the fields **FILLIN** and **DROP** may also include future years up to a planning horizon of 2030.

In order to join the timetable tables to the stations in the **RAILPNT** feature class, one of the following fields can be used: **F_NODEID** and **T_NODEID** or **F_PNR** or **T_PNR**. However, these tables cannot be joined to the links of the **RAILARC** feature class.

Railway electrification

The table on rail electrification systems in Europe provide information on volts and hrz of the systems used, on a country basis.

Table 20. Rail electrification systems in Europe.

Attribute	Type	Contents
COUNTRY	Character	2-letter ISO country code (see *Table 43*)
ELECTRIFICATION	Character	Electrification standards

Airports of the World

General information

The *RRG World airport* database contains 7,094 airports of international (world-wide), European and regional importance (*Figure 13*) following the airport classification of the Trans-European Transport Network Outline Plan, Section Airports as specified in Decision 1692/96/EC of the European Parliament and of the Council European Communities, 1996), as well as airports of the so-called TINA networks (TINA = Transport infrastructure needs assessment'; TINA Secretariat, 1999; 2002) for the new member states and candidate countries.

In contrast to the other layers of the *RRG GIS Database*, the airport layers also comprises airports outside of Europe in all other parts of the world (Asia, Africa, North America, South America, Australia) (*Figure 16*). *Table 21* summarises the number of airports by country for European countries.

Table 21. Number of airports in Europe by TEN category and country.

Country	Airports				Country	Airports			
	I	C	R	O		I	C	R	O
Albania	0	0	0	4	Armenia	0	0	0	1
Austria	1	1	4	41	Azerbaijan	0	0	0	3
Belarus	0	0	0	31	Belgium	2	1	1	15
Bosnia-Herzegovina	0	0	0	6	Bulgaria	0	1	4	30
Croatia	0	0	0	16	Cyprus	1	1	0	4
Czech Republic	1	0	2	77	Denmark	2	1	7	13
Estonia	1	0	4	7	Finland	1	1	21	20
France	9	10	34	172	Georgia	0	0	0	12
Germany	9	8	10	443	Greece	2	6	29	21
Hungary	1	0	2	21	Iceland	0	1	9	1
Ireland	1	2	9	13	Italy	5	14	18	48
Kazakstan	0	0	0	1	Latvia	0	1	3	6
Lithuania	0	1	2	9	Luxembourg	1	0	0	0
Macedonia	0	0	0	2	Malta	0	1	0	0
Moldavia	0	0	0	6	Netherlands, The	1	0	4	13
Norway	1	2	24	43	Poland	1	1	6	77
Portugal	2	3	12	14	Romania	0	2	9	18
Russia	0	0	0	134	Serbia-Montenegro	0	0	0	16
Slovakia	0	1	2	11	Slovenia	0	1	1	12
Spain	8	9	26	11	Sweden	2	3	38	53
Switzerland	0	0	0	48	Turkey	0	0	0	24
Ukraine	0	0	0	82	United Kingdom	11	10	20	108
Uzbekistan	0	0	0	2					

I *International connecting points*
C *Community connecting points*
R *Regional connecting and accessibility points*
O *Other airports*

As for the other modes, there is also a subset of airports defined which are considered 'strategic' airports due to their significant importance for passenger and freight transport in Europe,

which can be used for purposes of transport modelling. These strategic airports include all TEN and TINA airports, as well as some additional airports in remaining Europe and some smaller airports to guarantee connectivity of regions.

The name of the RRG airport layer is **AIRPORTS**, and its basic features are:

Layer name:	**AIRPORTS**
Feature classes:	Points
No of point features:	7,094
User fields associated with the points:	39

Detailed description of the point feature class

The following user-defined fields are available in the **AIRPORTS** layer:

Table 22. Fields of the **AIRPORTS** *layer.*

Attribute	Type	Contents
AIRPORT_NUMBER	Integer	Unique airport number (1, 2, 3, ...)
COUNTRY	Character	ISO country code (see *Table 43*)
REGION	Character	NUTS-2 region code
LABEL	Character	Airport name
NAME_ALIAS	Character	Airport name (alias) (if applicable)
CONTINENT	Integer	Continent code 1 = Asia 2 = Africa 3 = North America 4 = South America 5 = Europe 6 = Australia / Oceania 7 = Antarctica 8 = Water bodies 9 = Arctiva
IATA	Character	Official IATA airport code
ICAO	Character	Official ICAO airport code
ELEVATION	Integer	Elevation abov sea level (in m) -99 = Information not available
TENCAT	Integer	TEN category 0 = No TEN/TINA airport 1 = International connecting point 2 = Community connecting point 3 = Regional connecting and accessibility point 4 = Other non-TEN/TINA but strategic airports
TENAS	Integer	TEN airport system 0 = Airport not part of airport system 1 = Airport part of international airport system 2 = Airport part of community connecting points
CATEGORY	Integer	Airport category 0 = Not part of strategic airports 1 = TEN airport

		2 = TINA airport 3 = Airport in remaining Europe 4 = Additional strategic airport
PRIOEL	Integer	Priority project number (Essen list) 0 = No TEN/TINA priority project 10 = Milano-Malpensa airport
PRIOVM	Character	Priority project code (Van Miert group) ‘ ‘ = NO TEN/TINA priority project L0P4 = Milano-Malpensa airport
NODIRECTDEST	Integer	Number of direct destinations served -99 = Information not available 0 = No scheduled flights >0 = Number of destinations (by direct flights)
RAIL_CONNECT	Integer	Railway station facilities availability -99 = Information not available 0 = No railway station available at airport 1 = Station for metros/trams 2 = Station for regional trains, metros or trams 3 = Station for intercity trains, regional trains, metros or trams
OPERATION	Integer	Status operation of airports 1 = Under operation 2 = Closed 3 = Airport planned or under construction, new airport 4 = Airport planned or under construction, airport extensions / upgradings
TYPE	Character	Airport type -99 = Information not available 1 = Internaiotnal airport 2 = Domestic airport 3 = Military air base 4 = Sailplanes airfield 5 = private (small) airfield, company airfield 6 = Heliport 1,3 = International airport, military air base 1,6 = International airport, heliport 2,3 = Domestic airport, military air base 2,6 = Domestic airport, heliport
RUNWAYS	Integer	Number of runways -99 = Number not available 1 ... x = Runways available
RUNWAY_LENGTH	Character	Runway length (in meters) 1(xxxx);2(xxxx);...
TERMINALS	Integer	Number of passenger terminals -99 = Information not available 1 ... x = Number of passenger terminals
CAR-GO_TERMINALS	Integer	Number of cargo terminals -99 = Information not available 1 ... x = Number of passenger terminals
GATES	Integer	Number of passenger gates -99 = Information not available 1 ... x = Number of passenger gates
DESKS	Integer	Number of desks (passenger service) -99 = Information not available

		1 ...x = Number of desks
BAGGA-GA_CLAIMS	Integer	Number of baggage claims -99 = Information not available 1 ...x = Number of baggage claims
CON_DOM_DOM	Integer	Minimum connecting time domestic-domestic flights (in min) -99 = Information not available
CON_DOM_INT	Integer	Minimum connecting time domestic-international flights (in min) -99 = Information not available
CON_INT_INT	Integer	Minimum connecting time international-international flights (in min) -99 = Information not available
CAP_PASS	Integer	Annual passenger capacity -99 = Information not available
CAP_CARGO	Integer	Annual cargo capacity (in tons) -99 = Information not available
CAP_WAREHOUSE	Integer	Annual warehouse capacity (in square meters) -99 = Information not available
TRAF_PAS	Character	Annual passenger traffic n.a. = Information not available
TRAF_CARGO	Character	Annual cargo handled (in tons) n.a. = Information not available
TRAF_CARGO_LBS	Character	Annual cargo handled (in lbs) n.a. = Information not available
TRAF_MOVE	Character	Annual aircraft movements n.a. = Information not available
HOTELS	Character	Number of hotels nearby airport -99 = Information not available 1 ...x = Number of hotels
SHORT_PARKING	Integer	Number of parking lots for short time parking -99 = Information not available 1 ...x = Number of lots
LONG_PARKING	Integer	Number of parking lots for long time parking -99 = Information not available 1 ...x = Number of lots
AOTWH	Integer	AOTW - Aiport hierarchy -99 = Information not available 1 = Large airport 2 = Small scheduled passenger airport 3 = Other airport 4 = Airport not listed

AIRPORT_NUMBER, **COUNTRY**, **REGION**, **LABEL**, **NAME_ALIAS**, **OPERATION**, **TYPE**, **ELEVATION**, **AOTWH**, **CONTINENT**, **IATA** and **ICAO** give general information on all airports. **AIRPORT_NUMBER** is a unique identifier for all airports. **COUNTRY** indicates the ISO code of the country in which the airport is located. **REGION** is a four-character acronym of the name of the region. **CONTINENT** indicates the name of the continent on which the airport is located. **IATA** and **ICAO** represent the official airport codes as defined by these airport organisations. Not all airports do have such codes, i.e. some airports of the database are lacking such codes.

The layer not only includes airports under operation today, but also includes airports that are closed, planned or under construction; the status of the airport operation can be queried by using the **OPERATION** attribute. **TYPE** provides further information on the predominant character of the airport, whether it is an international or domestic airport, an military air base or sailplanes airfield, or whether it represents a (small) heliport. In exceptional cases also combinations of the numbers are provided (for instance '2,6' indicates a domestic airport which also hosts a heliport; another example would be '2,3' for a domestic airport with military airbase). However, it is worth to note that **TYPE** only refers to the predominant character of each airport: of course international airports will also have domestic flights, and even predominantly domestic airports may have also individual international flights.

AOTWH provides a hierarchy of airports according to the *Airport-of-the-world* webpage (http://www.flightstats.com/go/Airport/airportsOfTheWorld.do). There, larger airports are differentiated from smaller scheduled passenger airports and from other airports; however, this web resource does not include all airports; therefore, another category (**AOTWH**=4) was added holding airports that are not listed.

RUNWAYS provides the number of runways for each airport, while **RUNWAY_LENGTH** gives the length of each runway. If an airport has got several runways, all lengths of all runways are provided here, if available. The structure of this string variable is as follows: First, the runway number is identified, followed by the length of that runway, enclosed in brackets; if there is a second runway, again the runway number is followed by its length, which is enclosed in bracket again. This is done similarly for all available runways. If the length of the runway is unknown, it is indicated by (-99); if the number of runways and also their lengths is not available for any airport, the attribute just indicates '-99'. **TERMINALS**, **CARGO_TERMINALS**, **GATES, DESKS** and **BAGGAGE_CLAIMS** provide detailed information on the airport infrastructures for passenger and cargo handling, while **HOTELS, SHORT_PARKING** and **LONG_PARKING** indicate availability of related secondary airport infrastructures.

CON_DOM_DOM, CON_DOM_INT and **CON_INT_INT** provide information on the minimum connecting times (or changing times) for domestic-domestic flights (**CON_DOM_DOM**), domestic-internaitonal flights (**CON_DOM_INT**) and between internaitonal flights (**CON_INT_INT**). **CAP_PASS**, **CAP_CARGO** and **CAP_WAREHOUSE** give information on the maximum annual passenger and cargo and warehouse capacities, subject to the handling equipment and handling infrastructure of each airport. **TRAF_PASS, TRAF_CARGO, TRAF_CARGO_LBS** and **TRAF_MOV** list the annual number of passengers (**TRAF_PASS**), the annual cargo handled (**TRAF_CARGO** and **TRAF_CARGO_LBS**) and the annual number of aircraft movements (**TRAF_MOV**) for one or several years in a string. First, the year in question is provided, followed by the actual figures enclosed in brackets. Several years are separated by semicolons. That way for a number of airports time-series are provided with figures for several years, dating back to the mid-1990ies.

TENCAT, **TENAS**, **CATEGORY**, **PRIOEL** and **PRIOVM** give information on those airports included in the TEN and TINA programmes of the European Commission, and those 'strategic' airports used for transport modelling purposes. **TENCAT** differentiates airports into hierarchical classes of functional importance. **TENAS** indicates whether or not the airport is part of an airport system, consisting of several airports closely located to each other with certain functional subdivision. Airport systems exist in the following cities: Berlin, Buccuresti, Kopenhagen-Malmø, Lisboa, London, Milan, Paris, Roma, Stockholm, and Venezia. **CATEGORY** differentiates TEN and TINA airports from other strategic and non-strategic airports throughout Eu-

rope. It is worth to note that these fields concern airports located within the territory of the European Union only.

NODIRECTDEST represents the number of destinations served from that particular airport through direct scheduled flights in 2006. Only scheduled flights are considered, while charter, cargo or other flights are not counted. The timetables as of winter 2005/spring 2006 are laid down, based on information provided by the OAG (2004; 2005a; 2005b; 2006). Zero indicates that an airport does not have any scheduled flights. *Figure 14* is classifying the airports according to the number of destinations served.

RAIL_CONNECT indicates whether or not an airport has railway station facilities, and if yes, which type of trains stop at the airport. Rail connections are very often one of the main feeder modes of airports. Information were taken from OAG (2006), Schweers&Wall (2002; 2004; 2005a; 2005b; 2007; 2008) as well as the individual airports webpages. *Figure 15* is illustrating the airports in Europe with railway station facilities. Apart from rail services, most of the airports are also served by direct bus and taxi services from/to city centres.

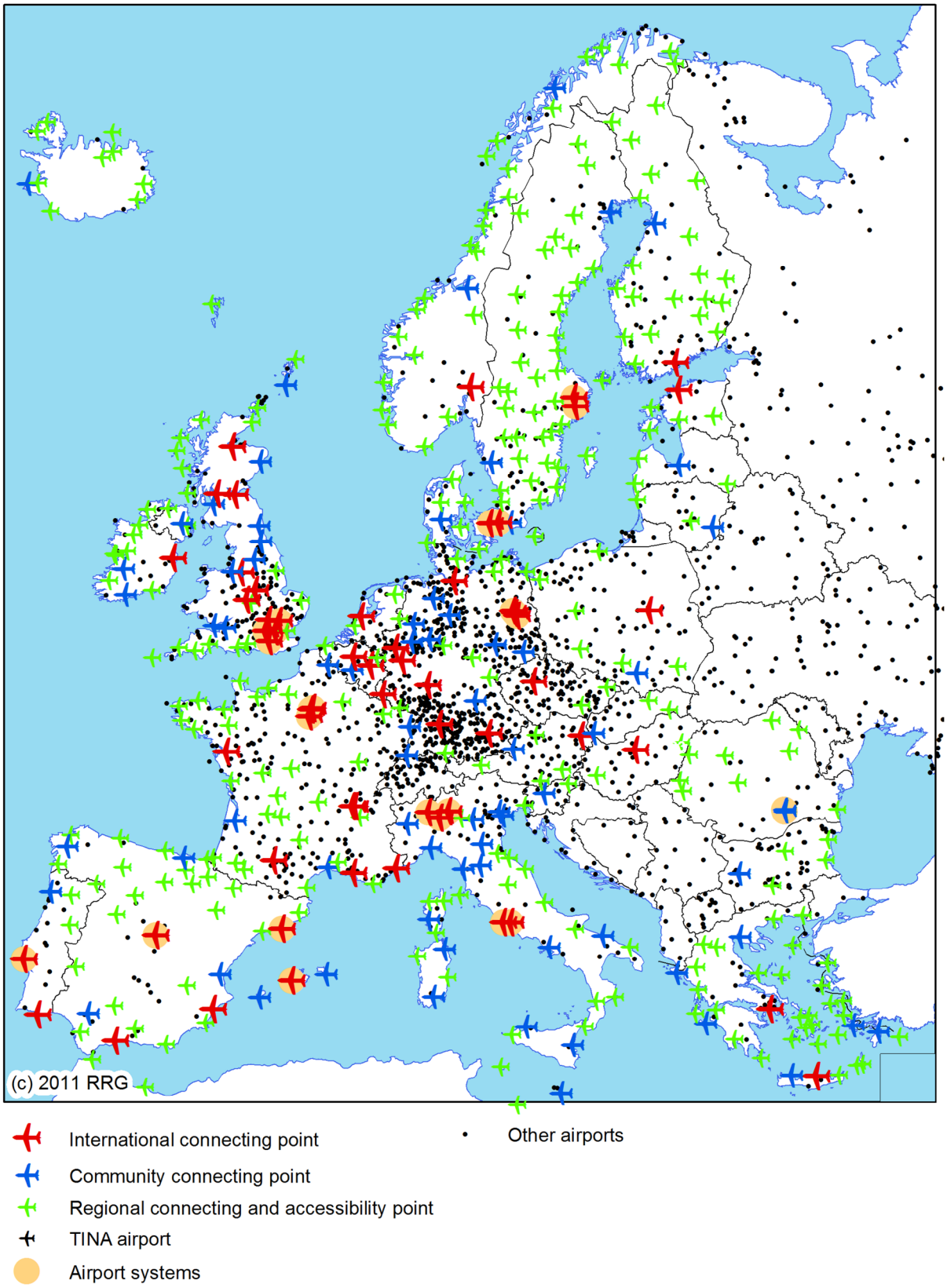


Figure 13. Airports in Europe according to TEN classification.

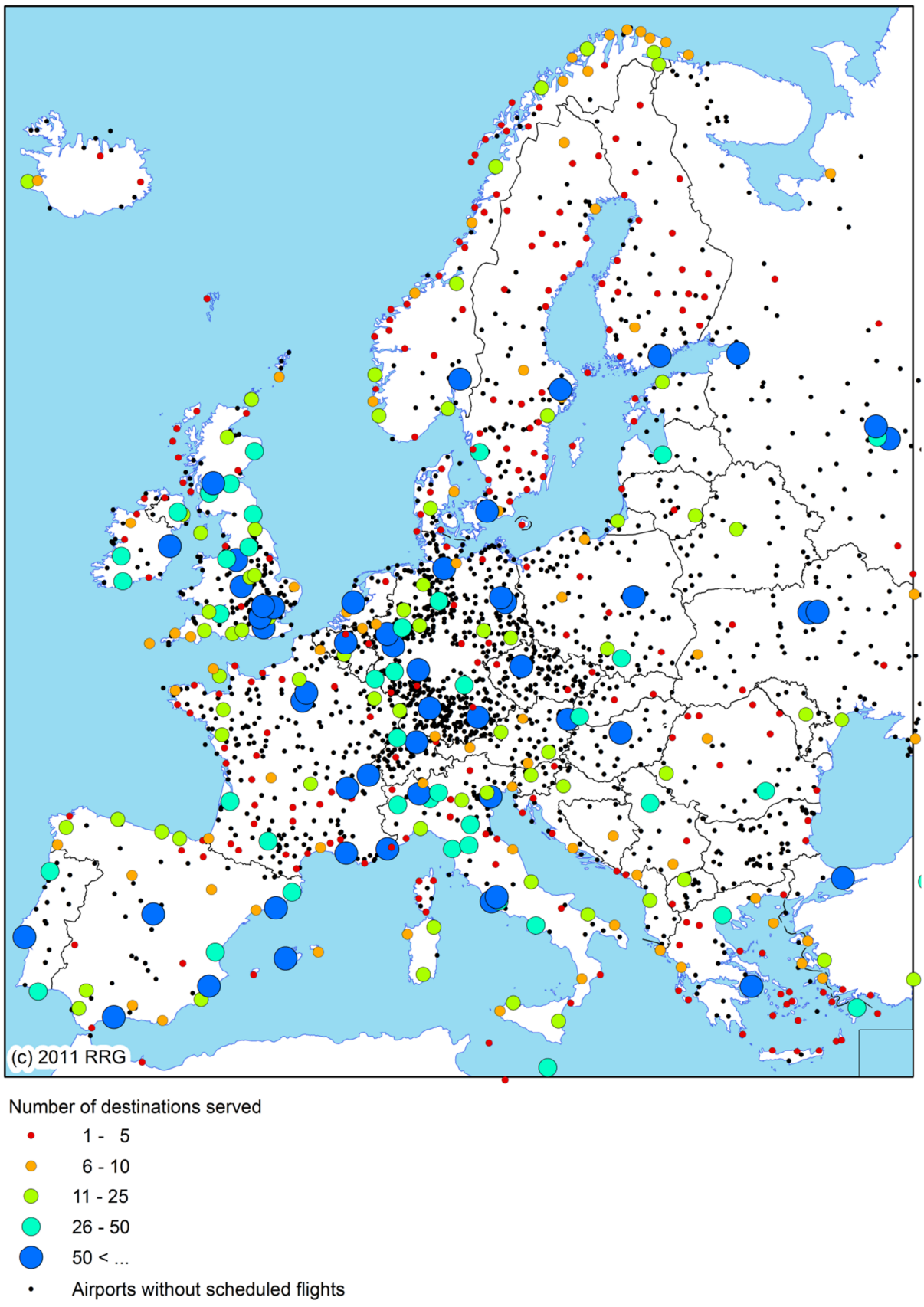


Figure 14. Airports in Europe: Number of destinations served.

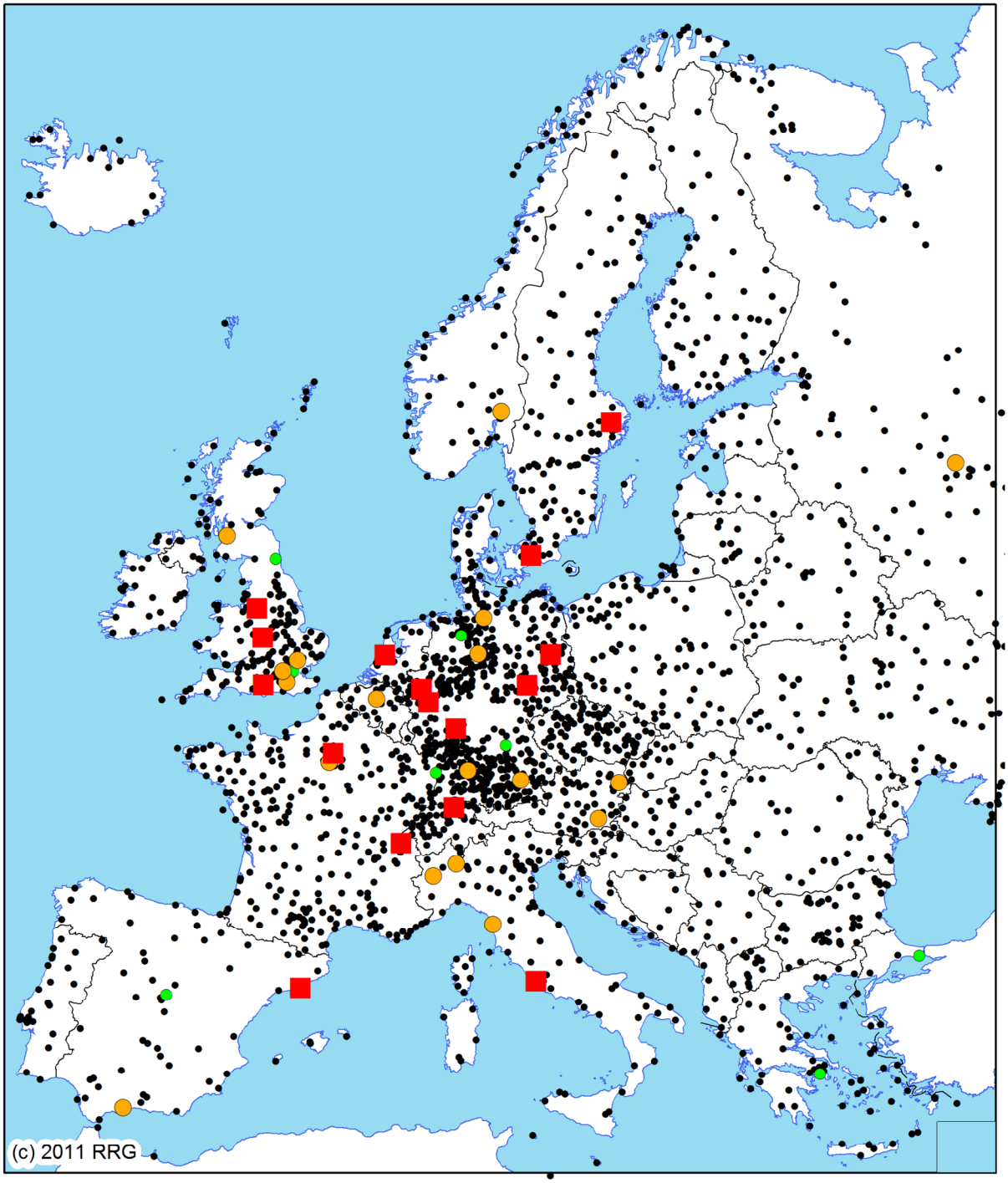


Figure 15. Airports in Europe: Railway station facilities.

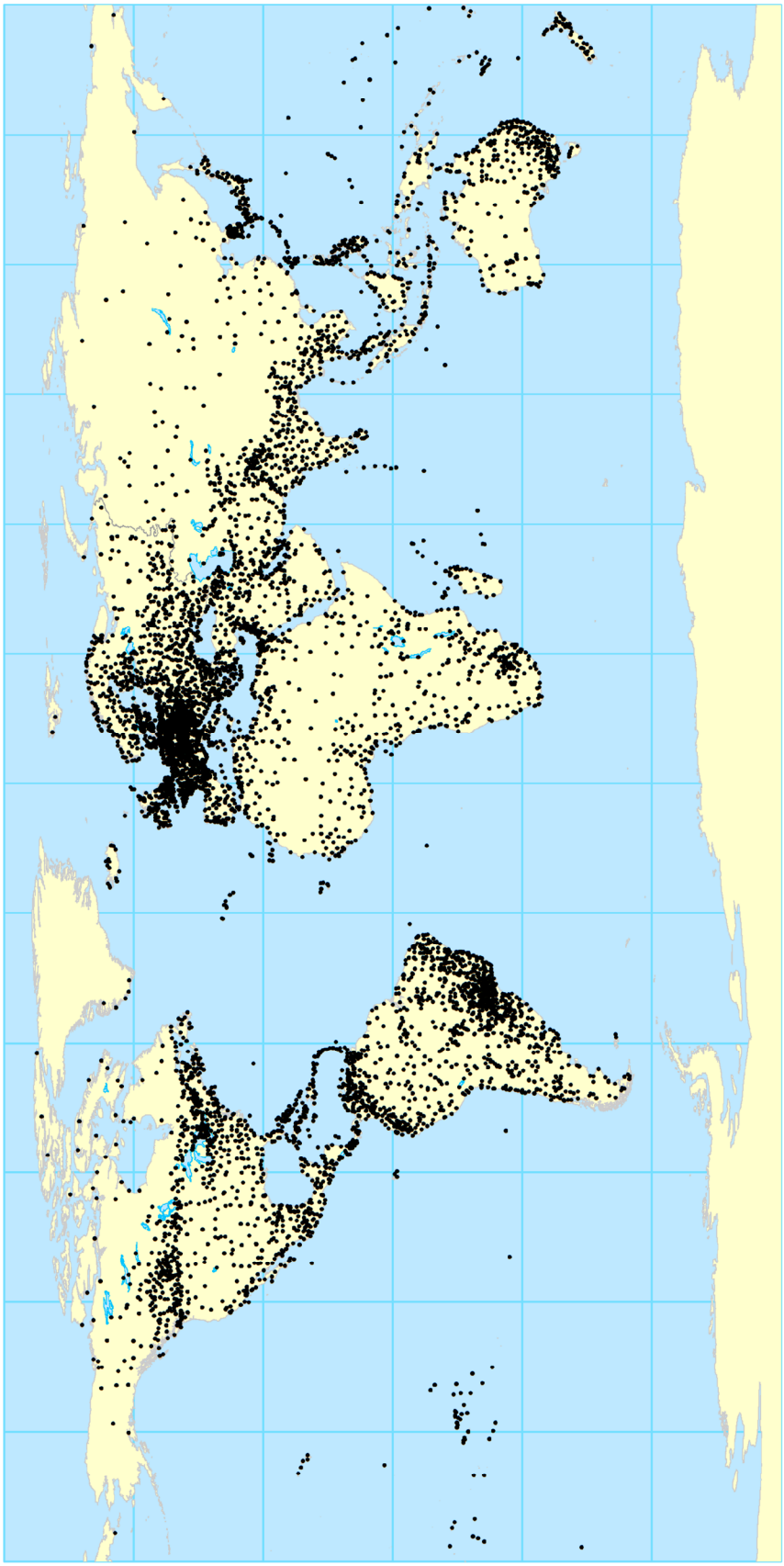


Figure 16. Airports of the world.

Flight Connections

General information

This layer contains the flight connections across Europe in spring 2006 and summer 2011 between all airports in Europe offering scheduled flight services. Thus it comprises all regular, scheduled flights, compiled based on information provided by OAG (2004; 2005a; 2005b; 2006; 2011). The information coded includes flight times and frequencies. Flights other than regular scheduled flights are, however, not covered in this layer. The layer was compiled by our cooperation partner S&W Urban and Regional Research (S&W, Dortmund, Germany).

This layer includes the flight routes only, i.e. the airports itself are not represented in it. A full link-node typology can only be generated by the combination of this flight routes layer with the airports layer.

The name of the RRG flight connections layer is **FLIGHTS**, and its basic features are:

Layer name:	**FLIGHTS**
Feature classes:	Arcs
No of point features:	8,317
User fields associated with the points:	8

Detailed description of the arc feature class

The following user-defined fields are available in the **FLIGHTS** layer:

Table 23. Fields of the **FLIGHTS** *layer.*

Attribute	Type	Contents
O_IATA	Character	Official IATA code of origin airport
O_NAME	Character	Name of origin airport
O_COUNTRY	Character	ISO country code of origin country
D_IATA	Character	Official IATA code of destination airport
D_NAME	Character	Name of destination airport
D_COUNTRY	Character	ISO country code of destination country
FREQ	Integer	Frequency of flight route 1 = Several daily flight 2 = One daily flight 3 = Non-daily flight
FLIGHTTIME	Integer	Travel time (in min)

There are six fields indicating the origin and destination airport: **O_IATA** and **D_IATA** represent the IATA codes of both the origins and destinations, while **O_NAME** and **D_NAME** give the name of the two airports, and **O_COUNTRY** and **D_COUNTRY** indicate the origin and destination countries.

The remaining two fields characterize the flight route itself by providing an frequency index (**FREQ**) (how often is the route operated?) and the flight time (**FLIGHTTIME**). If two or more airlines operate on a particular route, the frequency index is calculated across all airlines, while the travel time represents the weighted average travel time on that route.

Inland waterways and short sea shipping routes

General information

The *RRG inland waterway and short sea shipping* network contains all navigable rivers, canals and maritime shipping routes in Europe, as well as some 465 inland ports, 910 sea ports and about 31 dedicated small fishing ports and marinas (*Figure 17*, *Table 24*). Concerning rivers, only those sections that are navigable by commercial vessels are included (*Figure 18*). The spatial coverage of the layers is Europe as a whole, covering North Sea, Baltic Sea, Mediterranean Sea, and parts of the Atlantic Ocean, plus shipping connections in the Black Sea and Caspian Sea, as well as ports of Iran.

Table 24. Number of inland and sea ports by country.

Coutnry	Number of ports			
	Inland	Sea	Public fishing port, Marina [1]	Total
Albania	0	0	0	0
Austria	13	0	0	13
Azerbaijan	0	1	0	1
Belarus	0	0	0	0
Belgium	20	6	0	26
Bosnia-Herzegovina	0	0	0	0
Bulgaria	8	2	0	10
Croatia	2	37	0	39
Cyprus	0	2	0	2
Czech Republic	10	0	0	10
Denmark	0	124	17	141
Estonia	1	15	0	16
Finland	12	55	0	67
France	26	30	0	56
Georgia	0	2	0	2
Germany	210	45	12	267
Greece	0	76	0	76
Hungary	9	0	0	9
Ireland	0	7	0	7
Iceland	0	6	0	6
Iran	2	9	0	11
Italy	10	53	0	63
Kazakhstan	0	3	0	3
Latvia	0	3	0	3
Lithuania	3	2	0	5
Luxembourg	1	0	0	1
Macedonia	0	0	0	0
Malta	0	5	0	5
Moldavia	1	0	0	1
Netherlands, The	48	35	1	84
Norway	0	116	0	116
Poland	18	9	0	27
Portugal	3	9	0	12

Romania	15	2	0	17
Russia	7	11	0	18
Serbia-Montenegro	3	1	0	4
Slovakia	3	0	0	3
Slovenia	3	1	0	4
Spain	1	38	0	39
Sweden	22	84	1	107
Switzerland	3	0	0	3
Turkey	0	41	0	41
Turkmenistan	0	1	0	1
Ukraine	15	9	0	24
United Kingdom	0	69	0	69

[1] *Work underway to add small fishing ports, as well as dedicated yacht ports and marinas.*

For central Europe all locks are included, whereas for eastern and southern Europe only the most important locks can be provided (Binnenschiffahrts-Verlag, 1995; 1997). The current version of the inland waterway network contains 4,764 links and 4,418 nodes. In addition to the currently existing waterways the RRG database furthermore includes all future projects of the trans-European transport network (TETN) programme of the European Union as specified in Decision 1692/96/EC of the European Parliament and of the Council (European Communities, 1996), further specified in the *TEN Implementation Report* (European Commission, 1998) and latest revisions of the TEN guidelines provided by the European Commission (1999; 2002a; 2004a; 2004b), information on priority projects (European Commission, 1995), latest publications on the priority projects (European Commission, 2002b; 2005), as well as all projects of the so-called TINA networks (TINA = Transport infrastructure needs assessment‘; TINA Secretariat, 1999; 2002) for the new member states and candidate countries.

As being one import link attribute, the waterway class can be used to link additional information on maximal permitted ship dimensions (height, width, length and draught) to the network. The lock dimensions usually follow these waterway classes. *Table 25* links the waterway classes to the permitted ship dimensions:

Table 25. Waterway classes and permitted ship dimensions.

Waterway class	Length (m)	Width (m)	Draught (m)	Tonnage (t)
Motor vessels				
I (west of Elbe)	38-50	5.05	1.80-2.20	250-400
II (west of Elbe)	50-55	6.60	2.50	400-650
III (west of Elbe)	67-80	8.20	2.50	650-1,000
I (east of Elbe)	41	4.70	1.40	180
II (east of Elbe)	57	7.50-9.00	1.60	500-630
III (east of Elbe)	61-70	8.20-9.00	1.60-2.00	470-700
IV	80-85	9.50	2.50	1,000-1,500
Va	95-110	11.40	2.50-2.80	---
Vb	---	---	---	---
Via	---	---	---	---
VIb	140.00	15.00	3.90	---
VIc	---	---	---	---
VII	---	---	---	---

Pushed vessels				
III (east of Elbe)	118-132	8.20-9.00	1.60-2.00	1,000-1,200
IV	85	9.50	2.50-2.80	1,250-1,450
Va	95-110	11.40	2.50-4.50	1,600-3,000
Vb	172-185	11.40	2.50-4.50	3,200-6,000
VIa	95-110	22.80	2.50-4.50	3,200-6,000
VIb	185-195	22.80	2.50-4.50	6,400-12,000
Vic	270-280 195-200	22.80 33.00-34.20	2.50-4.50	9,600-18,000
VII	285	33.00-34.20	2.50-4.50	14,500-27,000

Source: UN, 1994.

The basic characteristics of the full RRG inland waterway and shipping route layer can be summarised as follows:

Layer name:	**`WATERWAYSxx`**
Feature classes:	Arcs, nodes (points)
No of arc features:	5,289
No of node (point) features:	4,742
User fields associated with the arcs:	25
User fields associated with the nodes:	17

Moreover, specific subsets of this layer are also available as individual layers, such as *ferry lines and shipping routes*, or *inland ports and seaports*. The basic features of these two layers are as follows:

(a) Ferry lines and shipping routes

Layer name:	**`SHIPPING`**
Feature classes:	Arcs
No of arc features:	1,655
User fields associated with the arcs:	25

(b) Inland ports and seaports

Layer name:	**`PORTS`**
Feature classes:	Points
No of point features:	1,132
User fields associated with the points:	17

(c) Seaports

Layer name:	**`SEAPORTS`**
Feature classes:	Points
No of point features:	668
User fields associated with the points:	17

The geometric features and attributive information included in the latter three layers correspond to the geometric features and attributive information provided in the overall **WATERWAYSxx** are and node layers.

So, the number and type of attributes available in the **SHIPPING** layer is identical to the number and type of attributes available in the arc feature class of the **WATERWAYSxx** layers; consequently, the number and type of attributes available in the **PORTS** and **SEAPORTS** layers is identical to the number and type of attributes available in the node (points) feature class of the **WATERWAYSxx** layers. A detailed description of the arc and node/points attributes available will follow in the sections below. Tabular overviews are provided through *Table 26* and *Table 27*.

Detailed description of the arc attributes

The following user-defined fields are available in the **IWWARC/SHIPPING** layers for the arc feature class:

Table 26. Fields of the **WATERWAYSARC/SHIPPING** *layers.*

Attribute	Type	Contents
COUNTRY1	Character	ISO country Code (see Table 43) YY = Maritime shipping route
COUNTRY2	Character	ISO country code (see Table 25) YY = Maritime shipping route
LINKTYPE	Integer	Link type 1 = Free flowing river 2 = Canalised river 3 = Canal 4 = Maritime shipping route 5 = Port link
LINKCAT	Integer	Present link category 1 = Port link 2 = Waterway class VII 3 = Waterway class VIc 4 = Waterway class VIb 5 = Waterway class VIa 6 = Waterway class Vb 7 = Waterway class Va 8 = Waterway class IV 9 = Waterway class III East of Elbe 10 = Waterway class II East of Elbe 11 = Waterway class I East of Elbe 12 = Waterway class III West of Elbe 13 = Waterway class II West of Elbe 14 = Waterway class I West of Elbe 15 = Maritime shipping route 16 = Planned link 17 = Not navigable rivers
ALIGNMENT	Integer	Waterway link alignment 1 = Precise alignment known 2 = Precise alignment unknown (planned link) 3 = Maritime shipping/ferry route

MARITIME	Integer	Travel times on maritime shipping routes (min) 0 = Inland waterway > 0 = Maritime shipping route
LABEL	Character	Name of the waterway
TENCAT	Integer	TEN/TINA category 0 = No link of strategic network 1 = Existing TEN/TINA waterway 2 = Planned TEN/TINA waterway
TENALIGN	Integer	TEN/TINA alignment 0 = No TEN/TINA link 1 = TEN/TINA link with precise alignment 2 = TEN/TINA link with unknown precise alignment
CATEGORY	Integer	Waterway category 0 = No link of strategic network 1 = TEN waterway link 2 = TINA waterway link, backbone 3 = TINA waterway link, additional 4 = Helsinki corridors 5 = Short Sea Shipping Routes, Motorways of the Sea 6 = Additional link of strategic network
PRIOEL	Integer	TEN priority project number (Essen list) 0 = No priority project 18 = Danube improvement between Vilshofen and Straubing
PRIOEU03	Integer	Adjusted TEN priority project number (rev. 2003) 0 = No priority project 18 = Rhine/Meuse-Main-Danube inland waterway axis 21 = Motorways of the sea 30 = Inland waterway Seine-Scheldt
PRIOVM	Character	Priority project code (Van Miert group) ‘ ‘ = No priority project L1P2 =Removal of bottlenecks: Rhine, Main, Danube L1P3 = Motorways of the Sea L2P4 = Inland waterway connection Seine-Schelde
PRIOSEC	Character	TEN priority projects: prioritised sections ‘ ‘ = None prioritised section, none priority link PS = Prioritised section
STRATEGIC	Integer	Strategic network 0 = Not included in strategic network 1 = Part of strategic network
ORIGIN	Character	Name of origin port
OCC	Character	Country code of origin port
OPORTCAT	Integer	Port category of origin port (TENCAT in NAT) 0 = No shipping route 1 = Seaport 2 = Sea- and inland port 3 = Inland port with facilities for combined transport 4 = Inland port without facilities for combined transport
OPORTNUMB	Integer	Port number of origin port (PORTNUMBER in NAT)

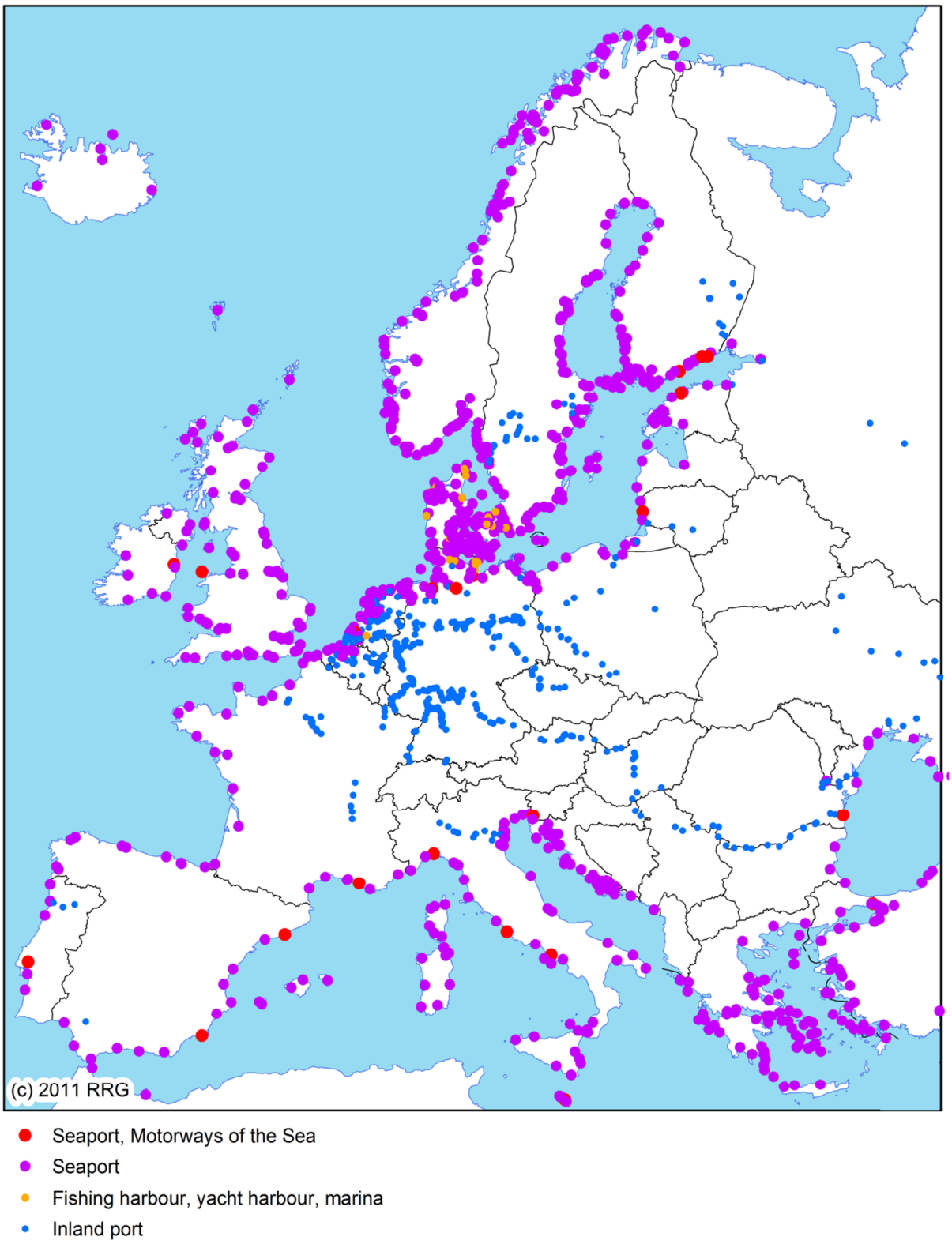


Figure 17. Location of seaports and inland ports in Europe.

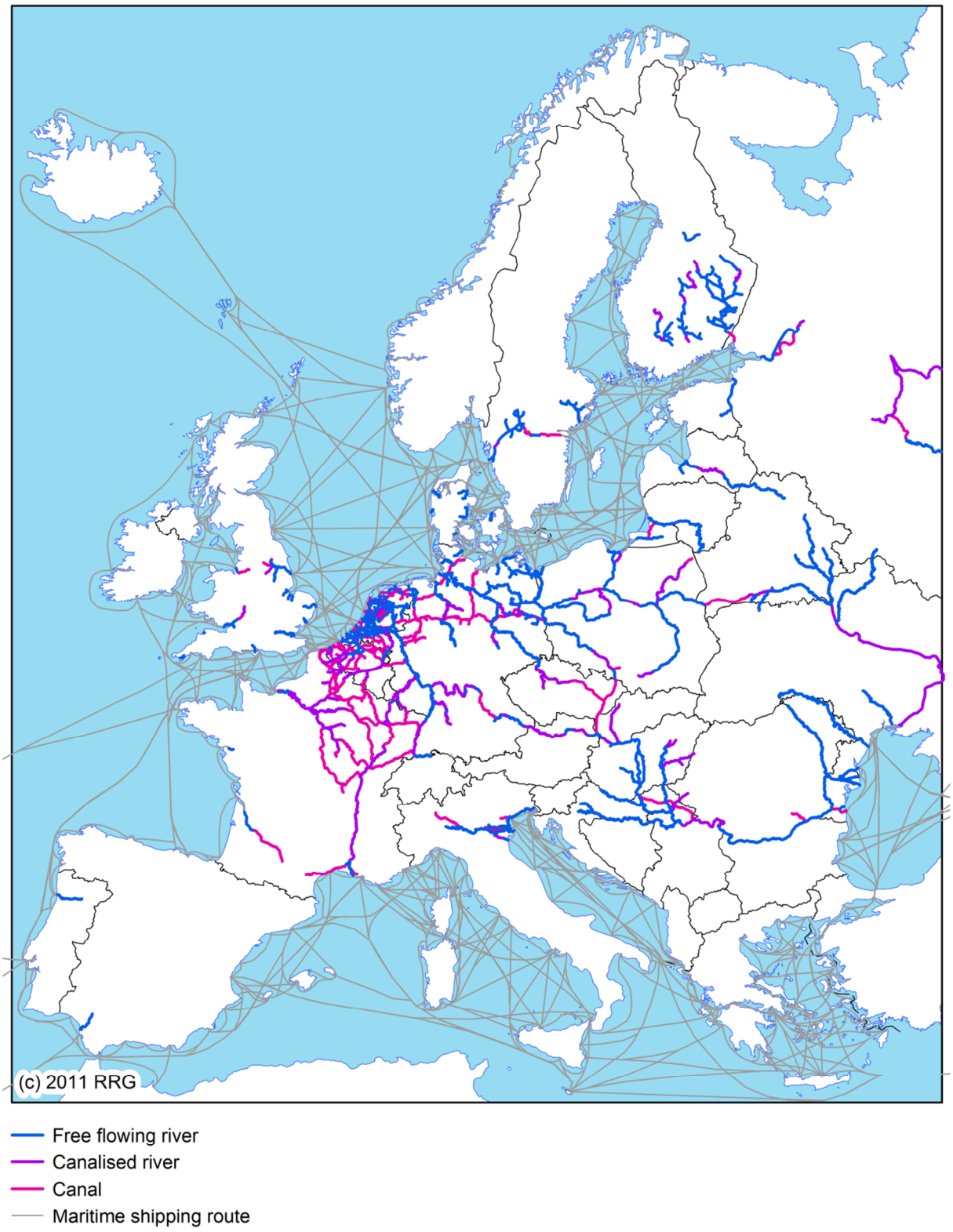


Figure 18. Navigable rivers, canals and shipping routes across Europe.

*Table 19. Fields of the **WATERWAYSARC/SHIPPING** layers (cont.).*

Attribute	Type	Contents
DESTINATION	Character	Name of destination port
DCC	Character	Country code of destination port
DPORTCAT	Integer	Port category of destination port (**TENCAT** in NAT) 0 = No shipping route 1 = Seaport 2 = Sea- and inland port 3 = Inland port with facilities for combined transport 4 = Inland port without facilities for combined transport
DPORTNUMB	Integer	Port number of destination port (**PORTNUMBER**)
CORRIDORS	Character	Corridors towards Eastern Europe ‘ ‘ = No corridor I … IX = Corridor number
SERVICE_FR	Integer	Service frequency of maritime shipping/ferry routes 0 = No maritime shipping route 1 = Several daily connections 2 = One daily connection 3 = Several connections per week 4 = One connection per week 5 = Less than one connection per week 99 = Frequency unknown
SAILING_DI	Integer	Sailing distances of maritime shipping routes (km)
STATUS	Integer	Status of construction works 0 = Not a project 1 = Study not yet decided 2 = Study phase 3 = Planning phase 4 = Work underway 5 = TEN project not included in implementation report 6 = Completed
TYPE	Integer	Type of construction works 0 = Not a project 1 = Upgrading 2 = Upgrading EEA 3 = Upgrading: Deepening 4 = Upgrading: Lock 5 = Upgrading: Lock improvement, bridge enlargement 6 = Upgrading: Enlargement of bridges 7 = Deepening 8 = Deepening / Increase height under bridges 9 = Deepening / Doubling locks 10 = Improvement 11 = Improvement, renovation of lock Ijmuiden and Oranje-Lock 12 = Rivercrossing, deepening, increase height under bridges 13 = Increase height under bridges 14 = New construction 15 = Modernisation 16 = Alternative route 17 = Lengthening of ship lift 18 = Enlargement, deepening, adaption of bridges 19 = Enlargement of locks 20 = Enlargement of harbours, traffic guidance 21 = Water regulation / enlargement

		22 = Works not specified 23 = TEN project not included in implementation report 24 = Speed link
YEAR	Integer	Estimated completion year of construction works

COUNTRY1 indicates the ISO code of the country in which the link is located. If a link represents a border river, **COUNTRY2** is used to indicate that the link is also part of the waterway network of the neighbouring country.

LINKTYPE, **LINKCAT**, **ALIGNMENT**, **LABEL**, **STATUS** and **TYPE** give general information on all links. Port links are virtual links representing docks/facilities of a port. If there are constructions works going on along a waterway segment, **STATUS** and **TYPE** provide detailed information about the type of works and their status. **YEAR** then gives the estimated completion year of the construction works.

TENCAT, **TENALIGN**, **CATEGORY**, **PRIOEL**, **PRIOEU03**, **PRIOVM** and **PRIOSEC** and **CORRIDORS** give information on those links which are included in the „Trans European Transport Network Outline Plan, Section Inland Waterways“ and are taken from the „Joint Decision of the European Parliament and of the Council“ published in the Official Journal of the European Communities (L228, 9 September 1996). A planned TEN link in association with unknown alignment (**TENCAT**=2 and **TENALIGN**=2) represents a planned inland waterway link to be constructed, whereas a planned TEN link with known alignment (**TENCAT**=2 and **TENALIGN**=1) represents improvements on existing waterways (e.g. extension, widening).

The four attributes **PRIOEL**, **PRIOEU03**, **PRIOVM** and **PRIOSEC** inform about whether or not a waterway section is part of the priority projects. Priority projects were first identified by the European Commission at the Essen summit (**PRIOEL**) (European Commission, 1995). These projects are part of the TEN and were considered of crucial importance for the further development of the trans-European transport networks. Hence, efforts and money was concentrated on them. The priority projects of the Essen list concentrated on the old EU member states. Partly these projects are already under operation, partly they are in the construction phase, and some of them are even in the planning stage. In 2003, the Van Miert high level group was established to develop suggestions and recommendations for the further development of the TEN and TINA networks in general, and for the priority projects in particular (HLG, 2003). Their suggestions are laid down in **PRIOVM**. In the light of the enlargement of the EU, this list now extends into the new member states. However, not all of the suggestions of the Van Miert group were finally adopted by the Commission (European Commission, 2003). Therefore, **PRIOEU03** represents the final revised list of the priority projects. Parts of these projects are furthermore subsumed under the so-called *Quick Start Programme* (QSP, European Commission, 2004). These prioritised sections can be identified by the attribute **PRIOSEC**.

Figure 20 is illustrating the priority projects and prioritised sections of the waterway networks, while Table 27 is summarising them.

Table 27. Priority waterway projects (2003).

Priority waterway project	No	Countries covered	QSP
Rhine/Meuse-Main-Danube inland waterway axis	18	AT,BE,BG,DE,HU, NL,RO,SK	•[1]
Motorways of the sea	21	---	
Inland waterway Seine-Scheldt	30	BE,FR	•[2]

1 QSP: Liege-Rhine river, Straubing-Vilshofen, Vienna-Bratislava, Palkovicava-Mohacs, border section Bulgaria-Romania
2 QSP: Compiegne-Cambrai, Deulemont-Gent

Source: European Commission, 2003; 2004b; 2005

STRATEGIC indicates whether or not the link is part of the strategic road network. The strategic road network contains the trans-European road links specified in Decision 1692/96/EC, the TINA networks for the candidate countries as defined by the TINA secretariat and the east European road corridors ('Helsinki Corridors') as well as selected additional links in Eastern Europe and further links to guarantee connectivity of regions and centroids. In contrast to the road and rail networks, the inland waterway network does not include access links to/from centroids (and hence does not include any NUTS-2 region centroid), but includes virtual port access links (**LINKCAT=1**). These functional links represent all port facilities, and can be used for transport modelling purposes. The modelling principle of the port access links is as follows:

The node representing the seaport or inland port is connected to the real-world waterway network using virtual *port access links* (**LINKTYPE=5**). The port node can be identified using the **NODETYPE** attribute of the node attribute table (see below, **NODETYPE=4**, **NODETYPE=14** or **NODETYPE=17**). The node to which the port access link connects to the real-world waterways is considered a so-called *port access node* (**NODETYPE=12**). *Figure 19* gives a schematic demonstration of this database design principle. One port access node can be the gateway for one (*Figure 19*, left) or for two or more port access links (for instance, if two ports are located on opposite sides of the waterway) (*Figure 19*, middle), and can ale represent the gateway for either inland ports or seaport (*Figure 19*, right).

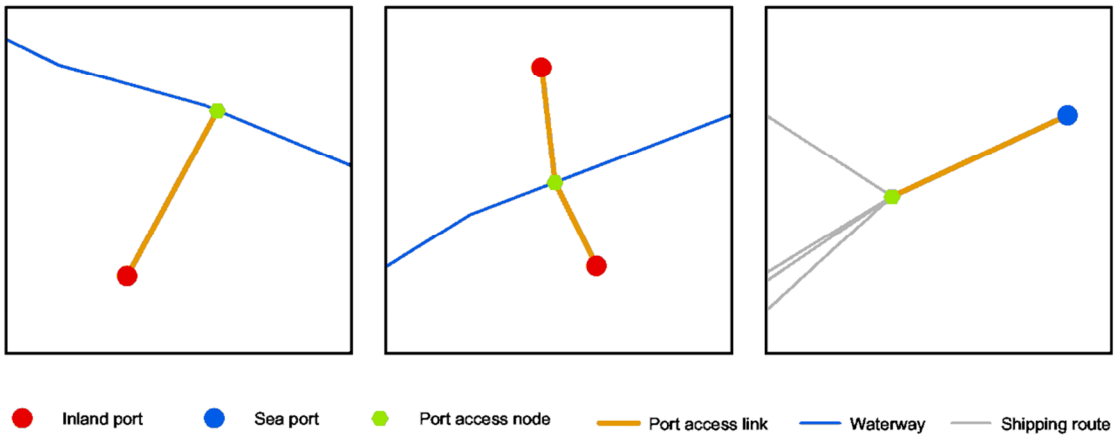


Figure 19. Port access links and port access nodes in the waterway layer.

Several attributes give further information on maritime shipping and short sea shipping routes: **MARITIME** represents the travel times between the two seaports. **ORIGIN** gives the name of the origin seaport, **OCC** its ISO country code, and finally **OPORTCAT** represents its port category, while **OPORTNUMB** represents its port number. **DESTINATION**, **DCC**, **DPORTCAT** and **DPORTNUMB** provide equivalent information to the destination ports. **SERVICE_FR** provides information on the travel frequency of the ferries or shipping routes, while eventually **SAILING_DI** approximates the shipping distance in km.

Detailed description of the node feature class

The following user-defined fields are available in the **WATERWAYSPNT/PORTS/SEAPORTS** layers for the node (point) feature class:

Table 28. Fields of the **WATERWAYSPNT/PORTS/SEAPORTS** *layers.*

Attribute	Type	Contents
NODEID1	Float	Node-ID xxx.yyyy xxx = Region-ID yyyy = Node number in region (0001 ….)
COUNTRY1	Character	ISO country code (see *Table 43*)
REGION1	Character	NUTS-2 region code
NODEID2	Float	Node-ID xxx.yyyy (see **NODEID1**)
COUNTRY2	Character	ISO country code (see *Table 43*)
REGION2	Character	NUTS-2 region code
NODETYPE	Integer	Node type 1 = Border node 2 = Waterway intersection 3 = River mouth 4 = Seaport 5 = Lock, double lock, ship lift, lock system 8 = Safety gate 9 = Changing link attributes 12 = Port access node 13 = Dam without locks 14 = Inland port 15 = Border river node 17 = Seaport, port of motorways of the sea 18 = Fishing harbour, yacht harbour, marina
PORTNUMBER	Integer	Port number 0 = No port node
LABEL	Character	Port or lock name, node label
LOCKS	Integer	Number of locks in line 0 = No lock node 1 … Number of locks in line
CHAMBERS	Integer	Lock chambers 0 = No lock node 1 = Lock with one chamber 2 = Double lock

		3 = Lock system with several chambers 4 = Ship lift, elevator
CATEGORY	Integer	Port category 0 = No TEN/TINA port 1 = TEN port 2 = TINA port 3 = Additional port of strategic network
TENCAT	Integer	TEN/TINA category 0 = No TEN/TINA (sea)port 1 = Seaport 2 = Sea and inland port 3 = Inland port with facilities for combined transport 4 = Inland port without facilities for combined transport
PRIOEU03	Integer	Adjusted TEN priority project number (rev. 2003) 0 = No priority project 18 = Upgrading for Lanaye lock
PRIOVM	Character	Priority project code (Van Miert group) ‘ ‘ = No priority project L1P2 = Upgrading of Lanaye lock L3P5 = Limassol port development L3P6 = Larnaka port development L3P7 =Valletta and Marsaxlokk port development
CONT_TURNOVER	Float	Container turnover (in 1,000 TEU; last available year) -9999 = data n.a. 0 = No container turnover
CONT_TEU	Character	Development of container turnover (in 1,000 TEU; time series) n.a. = data not available
PASS_DEV	Character	Passenger movements of ferries (in 1,000; development over last years; without cruise passengers)
CONTINENTS	Integer	Continent code where the node is located 1 = Asia 5 = Europe
STATUS	Integer	Status of construction works 0 = Not a project 1 = Study not yet decided 2 = Study phase 3 = Planning phase 4 = Works underway 5 = Completed
TYPE	Integer	Type of constructon works 0 = Not a project 1 = Upgrading, Modernisation, Improvement 2 = Upgrading: Deepening 3 = Upgrading: Lock (enlargement, lengthening of ship lift) 4 = Deepening / Doubling locks 5 = New lock 6 = New node 7 = Upgrading port 8 = New port
YEAR	Integer	Estimated completion year of construction works
PT_BULK	Integer	Identification of bulk ports 0 = No bulk port 1 = Bulk port
PT_GCG	Integer	Identification of general cargo ports 0 = No general cargo port 1 = General cargo port

Figure 20. Priority projects and prioritised sections of the waterway networks.

Table 29. Fields of the **WATERWAYPNT/PORTS/SEAPORTS** *layers (cont.).*

Attribute	Type	Contents
PT_UNT	Integer	Identification of unitised cargo ports 0 = No unitised cargo port 1 = Unitised cargo port
CT_BULK	Integer	Bulk turnover (in tonnes)
CT_GCG	Integer	General cargo turnover (in tonnes)
CT_UNT	Integer	Unitised cargo turnover (in tonnes)

NODEID1 is a unique identifier for each node in the network. The first three digits indicate the number of the region in which the node is located. **COUNTRY1** indicates the ISO code of the country in which the node is located. **REGION1** is a four-character acronym of the name of the region. The main city (not necessarily the greatest city) of each region is the centroid of the region. For each region the nodes are counted from 0000, with 0000 indicating the centroid. Because the layer includes ports along the Caspian Sea, Black Sea and also along the Arabic Gulf, the field **CONTINENTS** indicates whether the feature is located in Europe or Asia.

Border nodes are nodes at national borders. At each border crossing there is a border node. Border nodes (**NODETYPE=1**), or a node located along a border river (**NODETYPE=15**) have two node numbers, country codes and region codes indicating that they belong to two different countries. Regular nodes have no entries in **NODEID2**, **COUNTRY2** and **REGION2**. With the exception of river mouths (**NODETYPE=3**), seaports (**NODETYPE=4**,**17**), inland ports (**NODETYPE=14**) and end nodes (**NODETYPE=11**) all other nodes might have also entries in **NODEID2**, **COUNTRY2** and **REGION2**, if they are located along a border river.

STATUS and **TYPE** give general information on all nodes. If there are constructions works going on at waterway node, **STATUS** and **TYPE** provide detailed information about the type of works and their status. **YEAR** then gives the estimated completion year of the construction works.

LABEL gives general information on selected nodes such as ports or locks. However, this attribute is not available for all nodes, but only for a subset of them, mainly serving for location purposes. **PORTNUMBER** represents a unique port identifier in integer format. In addition to **NODEID1**, this attribute can be used to link for further information and data to (sea)ports. A label is assigned to each port.

Lock nodes represent locks with one chamber, double locks represent locks with two parallel chambers, and lock system nodes represent several locks in line with unknown location and unknown number of chambers per lock. The item **LOCKS** will then give the number of locks in line. **CHAMBERS** will give the number of parallel chambers per lock.

CATEGORY, **TENCAT**, **PRIOEU03** and **PRIOVM** give information on those inland and sea ports included in the "Trans European Transport Network Outline Plan, Section Waterways" based on the Joint Decision of the European Parliament and of the Council published in the Official Journal of the European Communities (L228, 9 September 1996) or are part of the TINA network (TINA Secretariat, 1999; 2002). **CATEGORY** distinguishes between TEN ports (located in the old EU member states) and TINA ports (located in the candidate countries) and those

ports added to the strategic modelling network. **TENCAT** can be used to differentiate between sea and inland ports, and those ports with or without facilities for combined transport.

CONT_TURNOVER and **CONT_TEU** give the container turnover for the main container seaports in Europe for the most recent year (**CONT_TURNOVER**), and as a time series over the last decade (**CONT_TEU**). Data for seaports in Western Europe are as of 2001-2008, data for Black Sea ports are of 2007. **PASS_DEV** provides information on the development of passenger movements at main passenger seaports in Europe, excluding cruise passengers, over the last decade.

Ferry lines and shipping routes layer

The number and type of attributes available in the ferry lines and shipping routes layer **SHIPPING** is identical to the number and type of attributes shown in *Table 26*. However, as this layer covers ferries and shipping routes only, free flowing rivers (**LINKTYPE=1**), canalised rivers (**LINKTYPE=2**), and canals (**LINKTYPE=3**) are generally not included, with the markable exception of some big rivers representing the gateways for seaport (for instance, the Elbe river to Hamburg). Port links (**LINKTYPE=5**) are only included if the represent the gateways for seaports.

Inland ports and seaports layer

The number and type of attributes available in the inland ports and seaports layer **PORTS** and **SEAPORTS** is identical to the number and type of attributes shown in *Table 28*. However, as this layer covers (sea)ports only, several other node types such as locks (**NODETYPE=5**) or waterway intersections (**NODETYPE=2**) are not included and so are some attribute values missing in the various attributes. Port access nodes (**NODETYPE=12**) are, however, also not included in these layers.

Freight Villages and Transport Terminals

This layer provides the location of freight villages and transport terminals across Europe. The layer comprises dedicated freight villages, intermodal transhipment terminals and other container or transport terminals (ICT), as well as seaport and inland ports and other rail stations for combined transport (Figure 21). Airports with dedicated cargo handling capacities are also included representing an interface between air transport and ground modes. Intermodal terminals are generally defined as infrastructure facilities where containers, semitrailers, trailers and lorries and railway carriages can be transhipped from one mode to the other, e.g. from roads to railways ("rolling road trains", "iron highways") or from road or rail to ships.

In particular the layer includes all villages and terminals, but is not limited to, that are members in the following logistic organisations or companies: Deutsche GVZ Gesellschaft (DGG, Germany), Deutsche Umschlaggesellschaft Schiene-Straße (DUSS, Germany), Eurotrans Partners (Eurotrans), European Association of Freight Villages, Foreningen af Danske Transportcentre (FDT, Denmark), Interporti (Italy), MAV Kombiterminal (Hungary), ProLogis, Sogaris (France), Stanton Grove (UK), TDG, and of the International Union of Combined Road-Rail Transport Companies (UIRR). Furthermore, all freight villages which were assessed and ranked in a study by the German DGG association (Koch et al., 2010) are included in the layer as well.

Freight villages and transport terminals have specific names in different languages, as Table 30 shows:

Table 30. Naming of freight villages in different countries.

Country	Name / Label
UK, Ireland	Freight village
France, Belgium, Switzerland	Plate Forme Logistique / Plat Forme multimodales
Germany, Austria, Switzerland	Güterverkehrszentrum (GVZ)
Italy	Interporto
Netherlands, Belgium	Distripark, Rail Service Centr (RSC)
Denmark	Transport Centre
Lithuania	Logistikos Parka

The name of the RRG freight villages and transport terminal layer is **TERMINALS**, and its basic features are:

Layer name:	**TERMINALS**
Feature classes:	Points
No of point features:	1,477
User fields associated with the points:	28

Detailed description of the point feature class

The following user-defined fields are associated with the **TERMINALS** layer:

Table 31. Fields of the **TERMINALS** *layer.*

Attribute	Type	Contents
NODEID	Float	Unique terminal number xxx.yyyy xxx = NUTS-2 region ID yyyy = Terminal number in region
COUNTRY	Character	ISO country code (see *Table 43*)
REGION	Character	NUTS-2 region code
CITY	Character	Name of the city in which terminal is located
LABEL	Character	Terminal name
TERMINAL_CODE	Integer	Unique terminal code
OPERATION	Integer	Development stage of the terminal -9999 = Information n.a. 1 = under operation 2 = under operation, extensions planned or underway 3 = planned terminal, not existing in 2007
TYPE	Integer	Terminal type 1 = Freight village 2 = Seaport 3 = Inland port 4 = Airport (with cargo handling capacities) 5 = Others
AREA	Integer	Overall terminal area (in ha) -9999 = Area n.a.
INDUSTRY	Integer	Number of companies in freight village -9999 = Information n.a.
STORAGE_CAP	Integer	Storage capacity (in TEU) -9999 = Information n.a.
STOCK_SURFACE	Integer	Stock surface (in m^2) -9999 = Information n.a.
TRACKS	Integer	Number of loading tracks -9999 = Information not available 0 = Terminal without train connection 1, 2, 3, ... = Number of rail loading tracks
TRACK_LENGTH	Integer	Overall track lengths (in m) -9999 = Information not available 0 = Terminal without train connection 1< = Overall track length of all tracks
TRACK_LENGTH_IND	Character	Lengths of individual loading tracks (in m) 1(xxxx);2(xxxx); ....
ASSOCIATIONS	Character	Membership in logistic associations, terminal manager
TRAIN_CON	Integer	Train connection -9999 = Information n.a. 1 = direct train connection available 2 = no train connection available
MW_CON	Integer	Motorway connection -9999 = Information n.a. 1 = direct motorway connection available

		2 = no direct motorway connection available
SHIP_CON	Integer	Shipping connection -9999 = Information n.a. 1 = direct port access 2 = no port access
PLANE_CON	Integer	Plane connection (airport) -9999 = Information n.a. 1 = direct plane access 2 = no plane access
TRAM_CON	Integer	Tram connection -9999 = Information n.a. 1 = direct tram access to fright village 2 = no tram access3
MODALITY	Integer	Modality -9999 = Information n.a. 1 = bi-modal freight village 2 = tri-modal freight village
UIC	Character	UIC Terminal Code
UIRR	Integer	UIRR Terminal Code
WEBLINKS	Character	Hyperlink to terminal webpage
EUROSTAT_P	Character	Eurostat Terminal Number
DGG_RANKING	Integer	Ranking of freight villages by DGG 0 = Terminal not included in 2010 ranking 1-70 = Rank of freight village in 2010 DGG ranking, with 1 indicating top 1 freight villages (the best) and 70 indicating the last rank. 71 = Terminal assessed, but performance rather poor so that freight village not among top 70 99 = planned freight village (not yet included in ranking)
DGG_PERFORMANCE	Integer	Performance index of freight villages according to 2010 DGG study 0 = Terminal not included in 2010 ranking 81-211 = Overall performance index with 211 indicating the highest (best) performance, and 81 indicating the lowest overall performance. -99 = planned freight village

NODEID is a unique identifier for each node in the layer. The first three digits indicate the number of the region in which the node is located. **COUNTRY** indicates the ISO code of the country in which the node is located. **REGION** is a four-character acronym of the name of the region. For each region the nodes are counted from 0000.

CITY, LABEL, TERMINAL_CODE, OPERATION, TYPE, EUROSTAT_P, DGG_RANKING, DGG_PERFORMANCE and **AREA** give general information for each freight village. **CITY** gives the name of the city or agglomeration in which the freight village/the terminal is located, while **LABEL** provides the name of the terminal. **TERMINAL_CODE** represents a unique integer number for each terminal, which can be used to link additional information. Similarly, **EUROSTAT_P** gives the official Eurostat code of the terminal. Currently this information is only available for terminals in the Nordic countries, i.e. in Norway, Sweden and Finland. **DGG_RANKING** gives the rank of the freight village in the 2010 terminal

ranking of the DGG (Deutsche GVZ-Gesellschaft - German Association of Freight Villages; Koch et al., 2010). A zero value indicates that the freight villages/terminal was not included in the 2010 DGG ranking. Following this, the field **DGG_PERFORMANCE** gives the overall performance index estimated in the DGG study for those freight villages that participated in the study. The worst performance index was estimated as 81, while the best one was estimated to be 211. A performance index of 0 indicates that the freight villages was not participating in this study. **AREA** gives the overall area of the freight village (in ha). **TYPE** indicates the terminal type, whether it represents a 'classical' freight village, a seaport or inland port, or an airport with dedicated cargo handling capabilities.

ASSOCIATIONS, UIC, UIRR and **WEBLINKS** can be used to review further information for each terminal. **UIC** and **UIRR** provide, if available, the terminal codes assigned by the International Union of combined Road-Rail transport companies (UIRR).

INDUSTRY, STORAGE_CAP, STOCK_SURFACE, TRACKS, TRACK_LENGHT and **TRACK_LENGTH_IND** provide important operating characteristics for each fright village. **INDUSTRY** provides the number of companies that are located on the terminal area, while **STORAGE_CAP** gives the storage capacity in TEU, and **STOCK_SURFACE** indicates the available area for cargo storage; **TRACKS** gives the number of rail loading tracks. **TRACK_LENGTH** sums the overall lengths of all rail loading tracks, whereas **TRACK_LENGTH_IND** gives the length of the individual railway track ramps. If a freight village has got several ramps, all lengths of all ramps are provided here, if available. The structure of this string variable is as follows: First, the ramp number is identified, followed by the length of that ramp, enclosed in brackets; if there is a second ramp, again the ramp number is followed by its length, which is enclosed in bracket again. This is done similarly for all available ramps. If the length of any ramp is unknown, it is indicated by **(-99)**; if the number of ramps and also their lengths is not available for any terminal, the field just indicates **'-99'**.

Finally, there are six fields providing information on the available modes for each freight village: **TRAIN_CON, MW_CON, SHIP_CON, PLANE_CON, TRAM_CON** indicate whether or not the terminal has direct access to railways (**TRAIN_CON**), motorways (**MW_CON**), ships (**SHIP_CON**), planes (**PLANE_CON**) or tramways (**TRAM_CON**). As a rule, direct train and tram connections are only given if the railways or trams extend onto the area of the freight village. The terminal has a motorway connections if the next motorway ramp is within reach of 500 meters; the freight village has only direct ship or plane access, if the freight village comprises a port (**SHIP_CON**) and if the terminal is part of an aiport area (**PLANE_CON**), respectively. **MODALITY** then summarises these connectivity characteristics, in that bi-modal terminals are differentiated from tri-modal terminals.

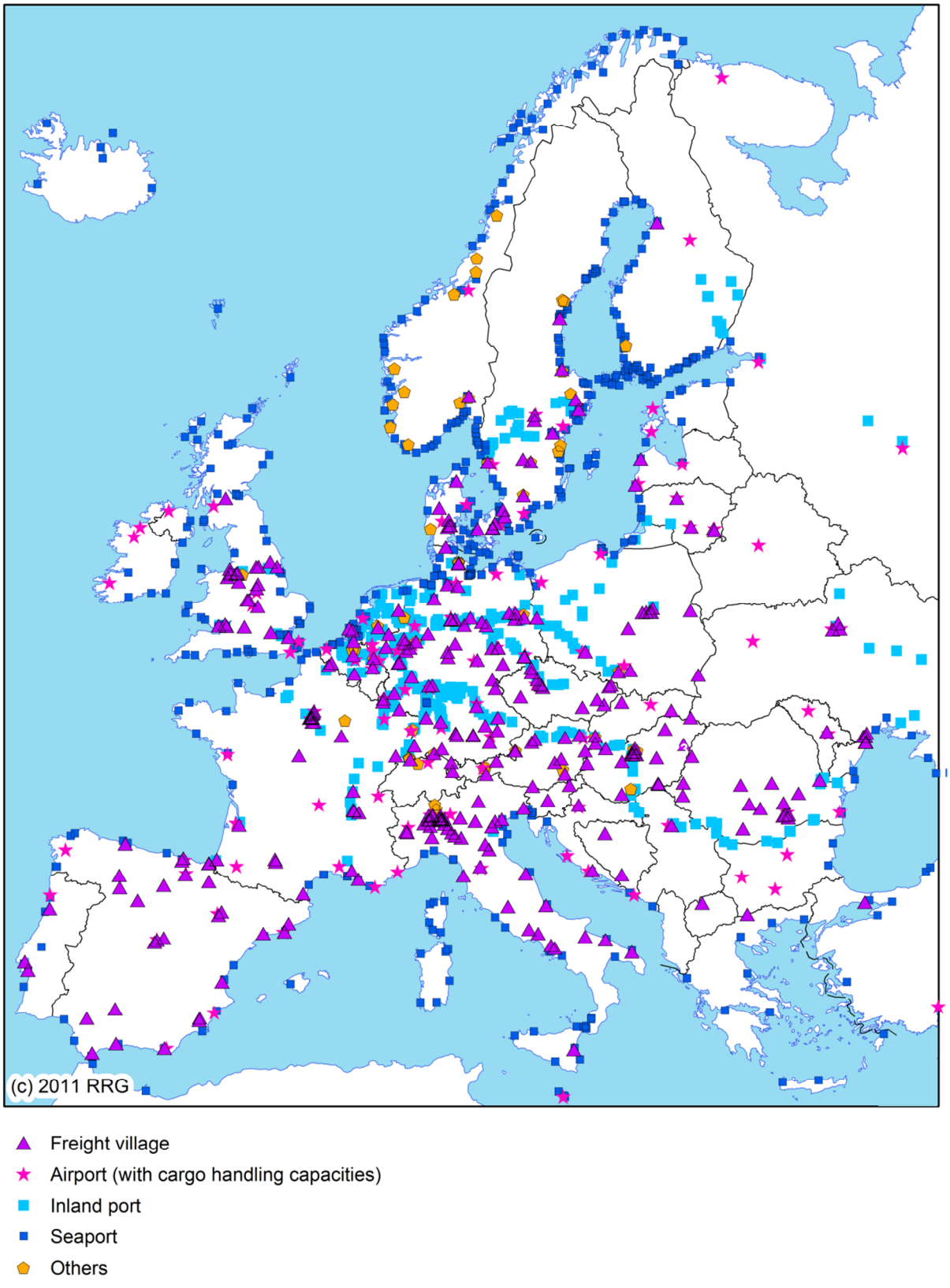


Figure 21. Freight villages and transhipment points in Europe.

Travel Analysis Districts

The *travel analysis districts* (or transport analysis districts; German: *Verkehresbezirke*) layer represents the travel analysis zones used for tranvel analyses and traffic forecasts at national (federal) level in Germany. Currently this layer is only available for Germany. The layer contains the polygon boundaries of these polygons, along with the district codes and the coordinates of the district centroids. *Table 33* gives a full list of all districts in Germany. The district codes can also be used to aggregate them to the next higher level, i.e. the so-called *travel analysis regions* (**TARs**; German: *Verkehersgebiete*).

At the federal level, there are currently 101 travel analysis districts (**TADs**), which can be aggregated to 27 travel analysis regions.

The basic features of the **TAD** layer are as follows:

Layer name:	**TAD**
Feature classes:	Polygons
No of polygon features:	130
User fields associated with polygons:	7

Detailed description of the polygon attributes

The **TAD** layer comprises seven fields which are associated with each polygon (see following table).

Table 32. Fields of the **TAD** *layer.*

Attribute	Type	Contents
ISO_COUNTR_CODE	Character	ISO country code 2-digits (see *Table 43*)
VB_CODE	Character	Code of TAD (3-digits)
VB_NAME	Character	Name of TAD
VBK_NAME	Character	Name of travel analysis region (aggregates of TAD)
VB_CENTROID	Character	Name of TAD centroid
X-COORD	Float	X-coordinate of TAD centroid (in m)
Y-COORD	Float	Y-coordinate of TAD centroid (in m)

ISO_OUNTRY_CODE indicates the 2-digits ISO code of the country in which the teavel analysis disteict is located. Because currently only Germany is covered in the layer, all polygons are marked as "**DE**".

VB_CODE, **VB_NAME**, **VBK_NAME** and **VB_CENTROID** provide necessary information for each **TAD**. **VB_CODE** indicates the 3-digit code for each **TAD**. The code is generated in a hierarchical way, i.e. by aggregating the 3-digit codes with the first two digits one yield the code of the corresponding aggregated travel analysis region (**TAR**). **VB_NAME** provides the name of the **TAD**, while **VB_CENTROID** give the name of the centroid of each **TAD**. Usually the centroid name corresponds to the **VB_NAME**, but there are some exceptions from this rule. **VBK_NAME**

then provides the name of the aggregated travel analysis region; this attribute may also be used by the **DISSOLVE** command to aggregate the **TAD**s to the **TAR**s.

X-COORD and **Y-COORD** then provide the x- and y-coordinates of the **TAD** centroids. Usually this centroid location does not correspond to the mathematical / geographical centroid of the polygon, but it represents the main town within the district. In specific cases where one **TAD** consists of several polygons, each of these polygons will have the same x-/y-coordinates.

Table 33. List of travel analysis districts in Germany ('Verkehrsbezirke').

TAR	District code	Type	District name	Centroid name
Schleswig-Holstein (01)	011	VB	Flensburg	Flensburg
	012	VB	Flensburg/Ostsee	Schleswig
	013	VB	Husum/Nordsee	Husum
	014	VB	Itzehoe	Itzehoe
	015	VB	Kiel	Kiel
	016	VB	Neumünster	Neumünster
	017	VB	Eutin	Eutin
	018	VB	Lübeck	Lübeck
	019	VB	Segeberg/Ratzeburg	Segeberg
Hamburg (02)	020	VB	Hamburg	Hamburg
Niedersachsen-Nord (03)	031	VB	Stade/Harburg	Stade
	032	VB	Ülzen	Ülzen
	033	VB	Verden	Verden
Niedersachsen-West (04)	041	VB	Emden	Emden
	042	VB	Oldenburg	Oldenburg
	043	VB	Osnabrück	Osnabrück
	044	VB	Emsland	Meppen
Niedersachsen-Südost (05)	051	VB	Braunschweig	Braunschweig
	052	VB	Hannover	Hannover
	053	VB	Hildesheim	Hildesheim
	054	VB	Göttingen	Göttingen
Bremen (06)	061	VB	Bremen	Bremen
	062	VB	Bremerhaven	Bremen
Nordrhein-Westfalen Nord (07)	071	VB	Münster	Münster
	072	VB	Wesel	Wesel
Ruhrgebiet (08)	081	VB	Duisburg	Duisburg
	082	VB	Essen	Essen
	083	VB	Dortmund	Dortmund
Nordrhein-Westfalen Südwest (09)	091	VB	Hagen	Hagen
	092	VB	Düsseldorf	Düsseldorf
	093	VB	Krefeld	Krefeld
	094	VB	Aachen	Aachen
	095	VB	Köln	Köln
Nordrhein-Westfalen Ost (10)	101	VB	Bielefeld	Bielefeld
	102	VB	Paderborn	Paderborn
	103	VB	Arnsberg	Arnsberg
	104	VB	Siegen	Siegen
Hessen-Nord (11)	111	VB	Kassel	Kassel
	112	VB	Marburg	Marburg
Hessen-Süd (12)	121	VB	Gießen	Gießen
	122	VB	Fulda	Fulda
	123	VB	Frankfurt/Main	Frankfurt/Main
	124	VB	Darmstadt	Darmstadt
Rheinland-Pfalz Nord (13)	131	VB	Montabaur	Montabaur
	132	VB	Koblenz	Koblenz

	133	VB	Trier	Trier
Rheinland-Pfalz Süd (14)	141	VB	Mainz	Mainz
	142	VB	Kaiserslautern	Kaiserslautern
	143	VB	Ludwigshafen	Ludwigshafen
Baden-Württemberg Nordwest (15)	151	VB	Mannheim	Mannheim
	152	VB	Karlsruhe	Karlsruhe
	153	VB	Pforzheim	Pforzheim
Baden-Württemberg Ost (16)	161	VB	Heilbronn	Heilbronn
	162	VB	Stuttgart	Stuttgart
	163	VB	Ostwürttemberg	Heidenheim
	164	VB	Tübingen	Tübingen
	165	VB	Ravensburg	Ravensburg
	166	VB	Donau-Iller	Ulm
Baden-Württemberg Südwest (17)	171	VB	Freiburg	Freiburg
	172	VB	Donaueschingen	Donaueschingen
	173	VB	Konstanz/Lörrach	Konstanz
Nordbayern (18)	181	VB	Aschaffenburg/Würzburg	Würzburg
	182	VB	Schweinfurt	Schweinfurt
	183	VB	Bayreuth	Bayreuth
	184	VB	Nürnberg	Nürnberg
	185	VB	Ansbach	Ansbach
Ostbayern (19)	191	VB	Regensburg	Regensburg
	192	VB	Amberg/Weiden	Amberg
	193	VB	Passau	Passau
	194	VB	Landshut	Landshut
Südbayern (20)	201	VB	Ingolstadt	Ingolstadt
	202	VB	Augsburg	Augsburg
	203	VB	München	München
	204	VB	Kempten	Kempten
	205	VB	Garmisch-Partenkirchen	Garmisch-Part.
	206	VB	Rosenheim	Rosenheim
	207	VB	Memmingen	Memmingen
Saarland (21)	211	VB	Saarland	Saarbrücken
Berlin (22)	221	VB	Berlin (West)	Berlin (West)
	222	VB	Berlin (Ost)	Berlin (Ost)
Mecklenburg-Vorpommern (23)	231	VB	Rostock	Rostock
	232	VB	Schwerin	Schwerin
	233	VB	Neubrandenburg	Neubrandenburg
Brandenburg (24)	241	VB	Neuruppin	Neuruppin
	242	VB	Frankfurt/Oder	Frankfurt/Oder
	243	VB	Potsdam	Potsdam
	244	VB	Cottbus	Cottbus
Sachsen-Anhalt (25)	251	VB	Stendal	Stendal
	252	VB	Magdeburg	Magdeburg
	253	VB	Halberstadt	Halberstadt
	254	VB	Wittenberg	Wittenberg
	255	VB	Halle	Halle
Thüringen (26)	261	VB	Nordthüringen	Nordhausen
	262	VB	Mittelthüringen	Erfurt
	263	VB	Ostthüringen	Gera
	264	VB	Südthüringen	Suhl
Sachsen (27)	271	VB	Leipzig	Leipzig
	272	VB	Görlitz	Görlitz
	273	VB	Dresden	Dresden
	274	VB	Chemnitz	Chemnitz
	275	VB	Zwickau	Zwickau

Figure 22. Travel analysis districts in Germany.

NUTS Regions and Countries in Europe

General information

The system of regions of the *Nomenclature d'unités territoriales statistiques* (NUTS) of the Statistical Office of the European Union (Eurostat, 1995; 1999a; 1999b; 2004; 2007) subdivides the area of the European Union and of the new member states and the remaining candidate countries corresponding to national administrative areas into NUTS-0, NUTS-1, NUTS-2, NUTS-3, NUTS-4 and NUTS-5 regions, where the number indicates the level within the hierarchy.

The member states are NUTS-0 regions. Each member state consists of several NUTS-1 regions, each NUTS-1 region consists of several NUTS-2 regions, etc. For instance, in Germany the NUTS-1 regions are the German 'Länder', the NUTS-2 regions are administrative districts and the NUTS-3 level represent counties (‘Kreise’ and ‘kreisfreie Städte’). In some cases NUTS-1 regions are also NUTS-2 region, and NUTS-2 regions are also NUTS-3 regions. Moreover, one NUTS region may be constituted of several polygons, for instance if several islands are encountered, together forming one overll NUTS region.

For the other European countries, similar region hierarchies are available based on the EFTA and CEC classification (see http://ec.europa.eu/eurostat/ramon/nuts/codelist_de.cfm?list=nuts for the NUTS classification, http://ec.europa.eu/eurostat/ramon/nuts/codelist_de.cfm?list=efta for the EFTA classification for Iceland, Liechtenstein, Norway, and Switzerland, and http://ec.europa.eu/eurostat/ramon/nuts/codelist_de.cfm?list=cec for the CEC classification for Croatia and Turkey).

The RRG NUTS-3 region layer consists of 4,781 arcs and 1,965 polygons, representing 1,342 different NUTS-3 regions or regions equivalent to the NUTS-3 level (*Figure 23*). The equivalent NUTS-2 region layer comprises polygons for 265 NUTS-2 regions within the European Union, plus equivalent regions in the other European countries. These layer already reflects latest amendments to the NUTS system as published by Eurostat in 2004.

The size of the regions at each level varies considerably depending on the member state. Regional information, such as socio-economic data from Eurostat´s REGIO database, can be linked to the regions via the unique region code.

There are individual layers available in the database for each hierarchy level of NUTS levels 3, 2, 1 and 0; however, aggregated levels can also be derived from the more disaggregated layers. Altogether, the following layers are available:

NUTS3xx	NUTS-3 level
NUTS2xx	NUTS-2 level
NUTS1xx	NUTS-1 level
COUNTRY	NUTS-0 level

There are three different feature classes available for each level, which are polygons (representing the region areas), arcs (representing the region boundaries), and points (representing the region centroids).

The basic features of the above layers are as follows:

Layer name:	**NUTS3xx**
Feature classes:	Arcs, polygons, points
No of arc features:	4,781
No of polygon features:	1,965
User fields associated with the arcs:	1
User fields associated with the polygons:	9

Layer name:	**NUTS2xx**
Feature classes:	Arcs, polygons, points
User fields associated with the arcs:	1
User fields associated with the polygons:	6

Layer name:	**NUTS1xx**
Feature classes:	Arcs, polygons, points
User fields associated with the arcs:	1
User fields associated with the polygons:	2

An aggregated layer called **COUNTRIES** (also known as NUTS-0) is also available which represents the European countries as multipart polygon features. The basic features of this layer are as follows:

Layer name:	**COUNTRIESxx**
Feature classes:	Arcs, polygons, points
User fields associated with the polygons:	2

Detailed description of the arc feature class

The arc feature classes of the above mentioned layers, i.e. the **NUTS3ARC, NUTS2ARC, NUTS1ARC, and COUNTRIESARC** layers, contain only one user-defined attribute, as outlined in *Table 34*. The classification of the **BOUNDARY** attribute can be used to select and draw different types of boundaries, if required. Since the NUTS system is a hierarchical system, all higher level boundaries represent at the same time also a lower level boundary. For example, a country boundary is at the same time always a NUTS-1 region boundary, and all NUTS-1 region boundaries are at the same time NUTS-2 region boundaries, and lastly all NUTS-2 region boundaries are at the same time NUTS-3 region boundaries.

Table 34. Fields of the **NUTS3ARC/NUTS2ARC/NUTS1ARC/COUNTRIESARC** *layers.*

Attribute	Type	Contents
BOUNDARY	Integer	Boundary classification 1 = Shores 2 = Country boundary 3 = NUTS 1 region boundary 4 = NUTS 2 region boundary 5 = NUTS 3 region boundary

Detailed description of the polygon attributes

The following user-defined polygon attributes are available in the various **NUTSxx** layers. The meaning and contents of the attributes are always the same. The attribute descriptions follows after the tables.

Table 35. Polygon fields of the **NUTS3** *layer.*

Attribute	Type	Contents
ISO_COUNTR_2DIG	Character	ISO country code 2-digits (see *Table 43*)
ISO_COUNTR_3DIG	Character	ISO country code 3-digits (see *Table 43*)
NUTS1_CODE	Character	NUTS-1 region code
NUTS2_CODE	Character	NUTS-2 region code
NUTS3_CODE	Character	NUTS-3 region code
NUTS3_NAME	Character	Name of NUTS-3 region
NUTS3_AREA	Float	Total area of NUTS-3 region (km^2)
EUACCESSION	Integer	Year of EU accession (see *Figure 24*)
NUTS2_NAME	Character	Name of NUTS-2 region
NUTS2_CENT	Character	Name of centroid of NUTS-2 region
NUTS2_AREA	Float	Total area of NUTS-2 region (kim^2)

Table 36. Polygon fields of the **NUTS2** *layer.*

Attribute	Type	Contents
ISO_COUNTR_2DIG	Character	ISO country code 2-digits (see *Table 43*)
ISO_COUNTR_3DIG	Character	ISO country code 3-digits (see *Table 43*)
NUTS1_CODE	Character	NUTS-1 region code
NUTS2_CODE	Character	NUTS-2 region code
EUACCESSION	Integer	Year of EU accession (see *Figure 24*)
NUTS2_NAME	Character	Name of NUTS-2 region
NUTS2_CENT	Character	Name of centroid of NUTS-2 region
NUTS2_AREA	Float	Total area of NUTS-2 region (kim^2)

Table 37. Polygon fields of the **NUTS1** *layer.*

Attribute	Type	Contents
ISO_COUNTR_2DIG	Character	ISO country code 2-digits (see *Table 43*)
ISO_COUNTR_3DIG	Character	ISO country code 3-digits (see *Table 43*)
NUTS1_CODE	Character	NUTS-1 region code
EUACCESSION	Integer	Year of EU accession (see *Figure 24*)

Table 38. Polygon fields of the **COUNTRIES** *layer.*

Attribute	Type	Contents
ISO_COUNTR_2DIG	Character	ISO country code 2-digits (see *Table 43*)
ISO_COUNTR_3DIG	Character	ISO country code 3-digits (see *Table 43*)
EUACCESSION	Integer	Year of EU accession (see *Figure 24*)
POLY_FLAG	Integer	Polygon flag 1 = Mainland / main country polygon 2 = Island 3 = Main island polygon 4 = Enclave 5 = Inland waters, sea, big lake

The attributes **ISO_COUNTR_2DIG**, **ISO_COUNTR_3DIG**, **NUTS1_CODE**, **NUTS2_CODE** and **NUTS3_CODE** represent the official ISO codes as defined by the ISO initiave and used, *inter alias*, by Eurostat for the respective NUTS, EFTA and CEC levels. Latest changes to the NUTS system as published by Eurostat 2004 are already incorporated in this layer. **ISO_COUNTR_2DIG** represents the 2-digit ISO country code, while **ISO_COUNTR_3DIG** represents the 3-digit ISO country code. These codes can be used both to join statistical data to the layer and to aggregate NUTS-3 regions to higher levels. **NUTS3_NAME** gives the official NUTS-3 region name. **NUTS3_AREA** represents the total area of the NUTS3 region, derived from the Eurostat/Regio database (Eurostat, 2005). The attributes **ISO_COUNTR**, **NUTS1_CODE** and **NUTS2_CODE** can also be used to aggregate the NUTS-3 polygons to the respective higher NUTS levels. The different NUTS-level codes can also be used to join statistical data such as socioeconomic or socio-demographic indicators to the region layer. **NUTS2_NAME** gives the official NUTS-2 region name of the NUTS-2 region to which the NUTS-3 region belongs. **NUTS2_CENT** provides the name of the centroid of the NUTS-2 region. The centroid represents the administrative center of the region. Usually this is the biggest city in that region. **NUTS2_AREA** represents the total area of the NUTS-2 region, derived from GIS statistics.

The ISO county codes used in this layer (and also used in the **COUNTRY**, **COUNTRY1** and **COUNTRY2** fields of the other arc, node and point feature classes of the other layers available in the *RRG GIS Database*) are summarised in *Table 43*. In addition, *Table 45* lists the NUTS-2 region codes and names according to the NUTS 1995 system (Eurostat, 1995) which are used in the region code node fields of the road and railway and inland waterway networks. Although the NUTS 1995 system has been updated by Eurostat, it is still used here in the network datasets as the referencing system, mainly used for compatibility reasons with older network versions.

The field **EUACCESSION** indicates the year when the country accessed the European Union – if it is a EU Member States or an candidate country. In case of candidate countries the prospective accession years are indicated (*Figure 24*).

The country polygon feature class furthermore contains a **POLY_FLAG** field which characterises each polygon according to its type, i.e. whether it is the main country polygon, an island or an enclave. If a country is only represented by one polygon (like Hungary, Czech Republic, etc.), this polygon represents the main country polygon, thus has a **POLY_FLAG=1**. If a country consists of several polygons (like Germany, Italy, Greece etc.), there is one polygon

tagged as the main country polygon, whereas the other polygons represent islands (**POLY_FLAG=2**; if they are surrounded by the sea), or enclaves (**POLY_FLAG=4**; if the polygon is fully surrounded by another polygon of the neighbouring country). If a country is fully constituted by islands (like Ireland, the UK, Cyprus, Malta), all polygons are tagged with **POLY_FLAG=2** except for the main polygon (main island of the country), which is tagged with **POLY_FLAG=3**. Big inland lakes, which are integral part of a country, are tagged with **POLY_FLAG=5**.

Detailed description of the point feature class

The point layers representing the administrative regional subdivision represent the centroids of each region. These centroids are not the (geographical) centre of gravity of each polygon, but they represent the main administrative city in that region. Therefore, there will only be one centroid per NUTS region, even though some regions may consist of several polygons.

The following tables give an overview about the attributes available at each hierarchical level:

Table 39. Fields of the **NUTS3PNT** *layer.*

Attribute	Type	Contents
POINTID	Integer	Unique point ID xx.yyyy xx = Country ID yyyy = point number 0001...
LABEL	Character	City name / centroid name
ISO_COUNTR_2DIG	Character	ISO country code 2-digits (see *Table 43*)
ISO_COUNTR_3DIG	Character	ISO country code 3-digits (see *Table 43*)
NUTS1_CODE	Character	NUTS-1 region code
NUTS2_CODE	Character	NUTS-2 region code
NUTS3_CODE	Character	NUTS-3 region code
NUTS3_NAME	Character	Name of NUTS-3 region
POPCITY	Integer	City population (in 1,000)
POPAGG	Integer	Agglomeration population (in 1,000)
POPNUTS3	Integer	Population of NUTS-3 region (in 1,000)
X-COORD	Float	X-coordinate (in m)
Y-COORD	Float	Y-coordinate (in m)
CENTROID	Integer	NUTS region centroid 0 = No centroid 1 = NUTS-1, -2 and -3 region centroid 2 = NUTS-2 and NUTS-3 region centroid 3 = NUTS-3 region centroid 4 = NUTS-0 region centroid (capital city)

Table 40. Fields of the **NUTS2PNT** *layer.*

Attribute	Type	Contents
POINTID	Float	Unique point ID xx.yyyy xx = Country ID yyyy = point number 0001...
LABEL	Character	City name / centroid name
ISO_COUNTR_2DIG	Character	ISO country code 2-digits (see *Table 43*)
ISO_COUNTR_3DIG	Character	ISO country code 3-digits (see *Table 43*)
NUTS1_CODE	Character	NUTS-1 region code
NUTS2_CODE	Character	NUTS-2 region code
NUTS2_NAME	Character	Name of NUTS-2 region
POPCITY	Integer	City population (in 1,000)
POPAGG	Integer	Agglomeration population (in 1,000)
POPNUTS2	Integer	Population of NUTS-2 region (in 1,000)
X-COORD	Float	X-coordinate (in m)
Y-COORD	Float	Y-coordinate (in m)
CENTROID	Integer	NUTS region centroid 0 = No centroid 1 = NUTS-1, and NUTS-2 region centroid 2 = NUTS-2 region centroid 4 = NUTS-0 region centroid (capital city)

Table 41. Fields of the **NUTS1PNT** *layer.*

Attribute	Type	Contents
POINTID	Float	Unique point ID xx.yyyy xx = Country ID yyyy = point number 0001...
LABEL	Character	City name / centroid name
ISO_COUNTR_2DIG	Character	ISO country code 2-digits (see *Table 43*)
ISO_COUNTR_3DIG	Character	ISO country code 3-digits (see *Table 43*)
NUTS1_CODE	Character	NUTS-1 region code
NUTS1_NAME	Character	Name of NUTS-1 region
POPCITY	Integer	City population (in 1,000)
POPAGG	Integer	Agglomeration population (in 1,000)
POPNUTS1	Integer	Population of NUTS-1 region (in 1,000)
X-COORD	Fload	X-coordinate (in m)
Y-COORD	Float	Y-coordinate (in m)
CENTROID	Integer	NUTS region centroid 0 = No centroid 1 = NUTS-1 region centroid 4 = NUTS-0 region centroid (capital city)

Table 42. Fields of the **COUNTRYPNT** *layer.*

Attribute	Type	Contents
POINTID	Float	Unique point ID xx.yyyy xx = Country ID yyyy = point number 0001...
LABEL	Character	City name / centroid name
ISO_COUNTR_2DIG	Character	ISO country code 2-digits (see *Table 43*)
ISO_COUNTR_3DIG	Character	ISO country code 3-digits (see *Table 43*)
COUNT_NAME	Character	Name of country
POPCITY	Integer	City population (in 1,000)
POPAGG	Integer	Agglomeration population (in 1,000)
POPCOUNT	Integer	Country population (in 1,000)
X-COORD	Float	X-coordinate (in m)
Y-COORD	Float	Y-coordinate (in m)
CENTROID	Integer	NUTS region centroid 0 = No centroid 4 = NUTS-0 region centroid (capital city)

The meaning and contents of the attributes are the same for all the above point layers.

POINTID represents a unique point ID, with x.0000 representing the capital city (x = country ID; see column 'No' in *Table 43*). The **POINTIDs** of those cities that at the same time represent a NUTS-2, NUTS-1 or NUTS-0 region centroid are identical to the **POINTIDs** in the **COUNTRYPNT**, **NUTS1PNT** or **NUTS2PNT** layers.

LABEL gives the name of the city / centroid.

ISO_COUNTRY_2DIG and **ISO_COUNTRY_3DIG** indicate the 2-letter and 3-letter ISO country code of the country in which the city is located, whereas **NUTS1_CODE**, **NUTS2_CODE** and **NUTS3_CODE** provide the official NUTS-1, NUTS-2 and NUTS-3 region codes as published by Eurostat in which the city is located. In case of non-EU countries, these code represent the respective EFTA or CEC codes.

NUTS3_NAME, NUTS2_NAME, NUTS1_NAME and **COUNT_NAME** store the name of the respective NUTS regions (and countries) which the centroid represents. Sometimes the city/centroid name and the region name are identical. At the country level, the centroids represent the capital cities.

POPCITY, POPAGG, POPNUTS3, POPNUTS2, POPNUTS1 and **POPCOUNT** provide actual population figures for the city (**POPCITY**), for the entire agglomeration area (**POPAGG**) in which the city/centroid is embedded, and for the the respective NUTS3 (**POPNUTS3**), NUTS-2 (**POPNUTS2**) and NUTS-1 regions (**POPNUTS1**), as well as for the overall country (**POPCOUNT**). If a city does not constitute a greater agglomeration area, then the population figures provided in **POPAGG** and **POPCITY** are identical.

X-COORD and **Y-COORD** give the geographical position of the city centre.

Table 43. ISO country codes.

No	Country	ISO country code		Super region	Political area
		3-letters	2-letters		
8	Albania	ALB	AL	Balkans	
40	Austria	AUT	AT	Western Europe	EU
112	Belarus	BLR	BY	Eastern Europe	
56	Belgium	BEL	BE	Western Europe	EU
70	Bosnia-Hercegovina	BIH	BA	Balkans	
100	Bulgaria	BGR	BG	Balkans	
191	Croatia	HRV	HR	Eastern Europe	
196	Cyprus	CYP	CY	Eastern Europe	EU
203	Čzech Republic	CZE	CZ	Eastern Europe	EU
208	Denmark	DNK	DK	Scandinavia	EU
233	Estonia	EST	EE	Eastern Europe	EU
246	Finland	FIN	FI	Scandinavia	EU
250	France	FRA	FR	Western Europe	EU
276	Germany	DEU	DE	Western Europe	EU
300	Greece	GRC	GR	Eastern Europe	EU
348	Hungary	HUN	HU	Eastern Europe	EU
352	Iceland	ISL	IS	Scandinavia	
372	Ireland	IRL	IE	Western Europe	EU
380	Italy	ITA	IT	Western Europe	EU
428	Latvia	LVA	LV	Eastern Europe	EU
438	Liechtenstein	LIE	LI	Western Europe	
440	Lithuania	LTU	LT	Eastern Europe	EU
442	Luxembourg	LUX	LU	Western Europe	EU
807	Macedonia	MKD	MK	Balkans	
470	Malta	MLT	MT	Western Europe	EU
498	Moldova	MDA	MD	Eastern Europe	
528	Netherlands, The	NLD	NL	Western Europe	EU
578	Norway	NOR	NO	Scandinavia	
616	Poland	POL	PL	Eastern Europe	EU
620	Portugal	PRT	PT	Western Europe	EU
642	Romania	ROM	RO	Balkans	
643	Russia	RUS	RU	Eastern Europe	
891	Serbia and Montenegro	SCG	CS	Balkans	
703	Slovakia	SVK	SK	Eastern Europe	EU
705	Slovenia	SVN	SI	Eastern Europe	EU
724	Spain	ESP	ES	Western Europe	EU
752	Sweden	SWE	SE	Scandinavia	EU
756	Switzerland	CHE	CH	Western Europe	
792	Turkey	TUR	TR	Eastern Europe	
804	Ukraine	UKR	UA	Eastern Europe	
826	United Kingdom	GBR	GB	Western Europe	EU

The country codes and numbers refer to ISO 3166 Codes (Countries). A full list of all countries can be found at http://userpage.chemie.fu-berlin.de/diverse/doc/ISO_3166.html.

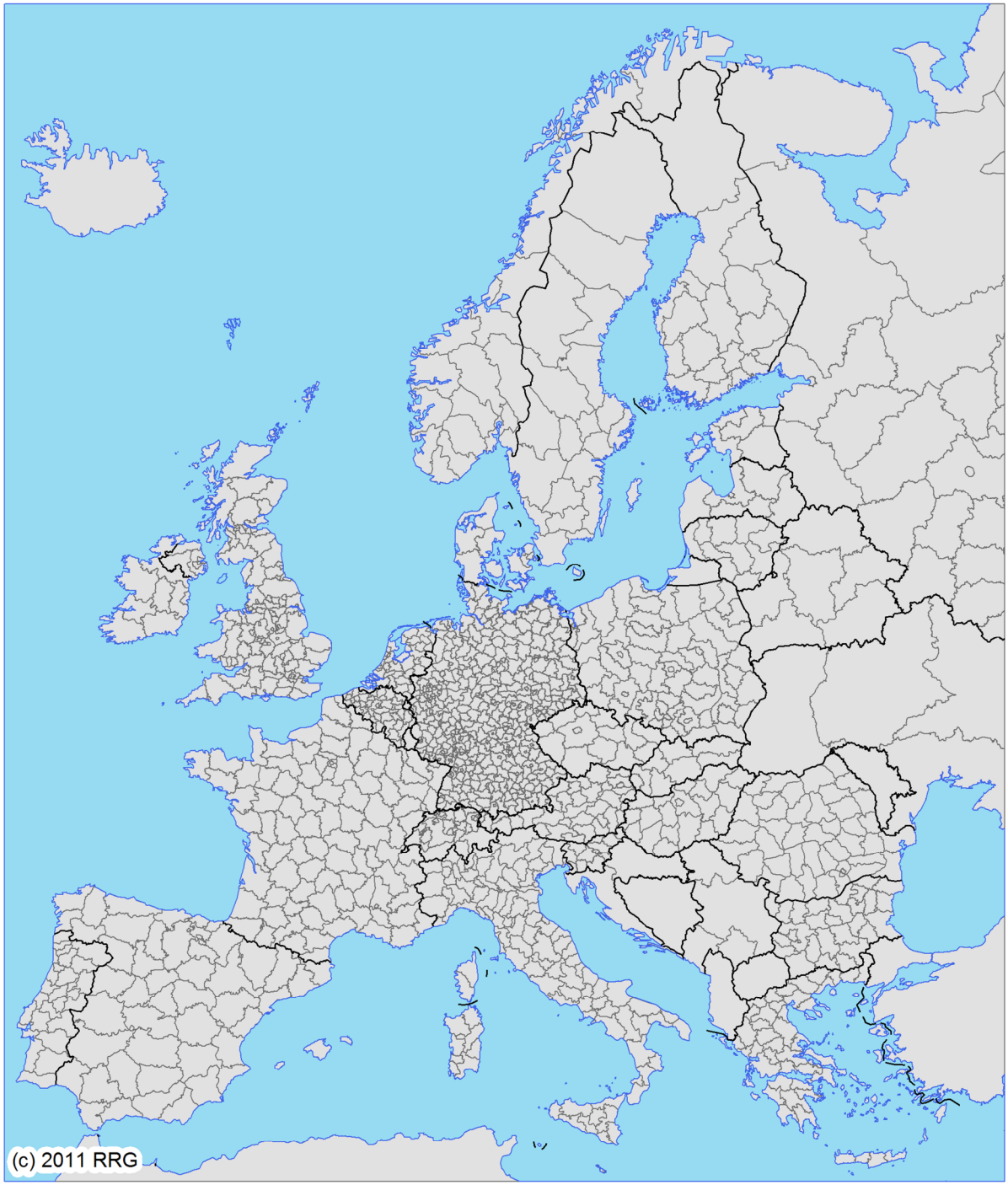


Figure 23. NUTS-3 regions (2006/2007) in EU member states and equivalent regions in other countries.

Source: Eurostat, 2006/2007

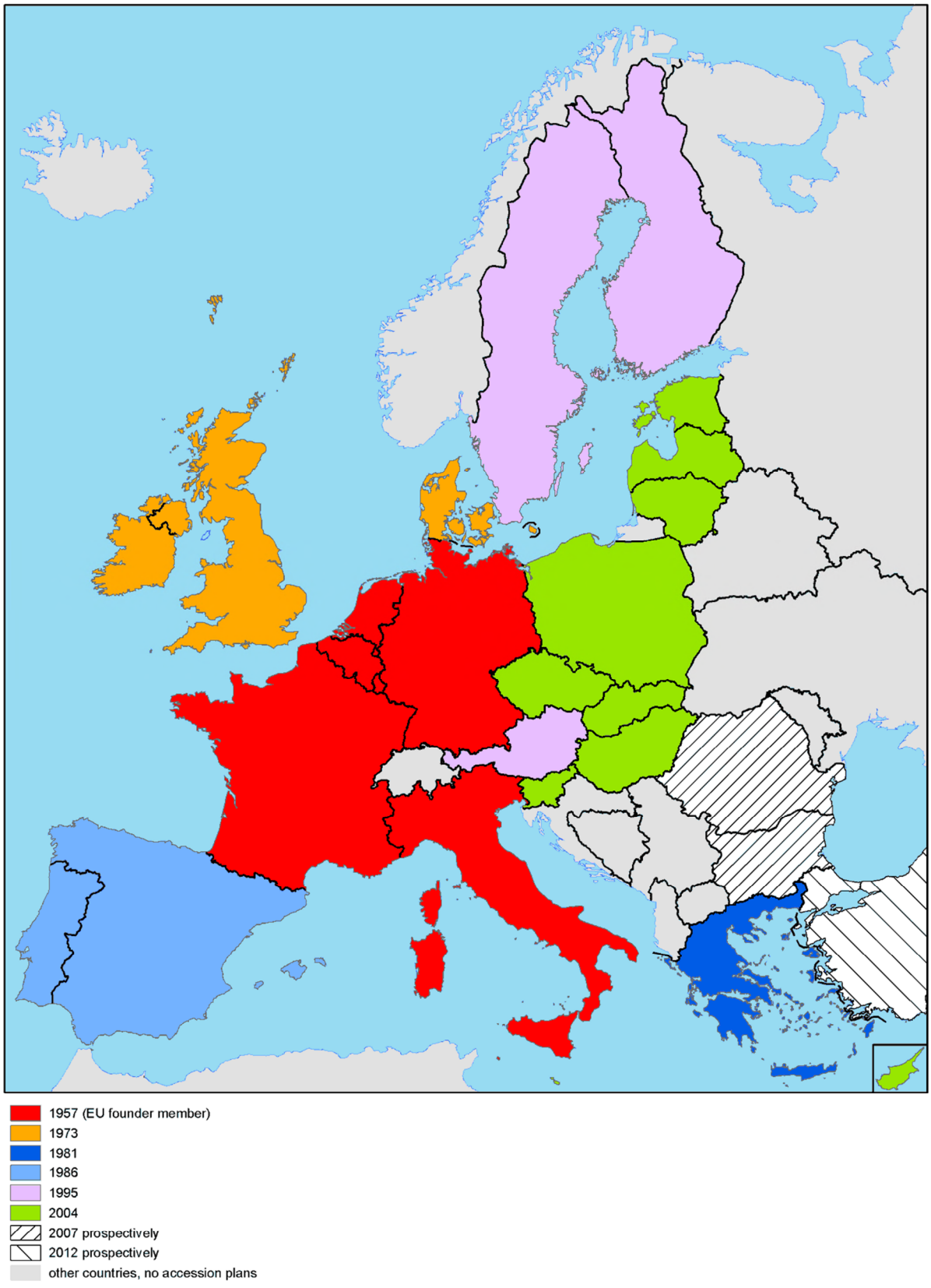


Figure 24. Accession years of EU member states and EU candidate countries.

Table 44. Present NUTS-2 system of regions in the European Union (Eurostat, 2004).

Country	Code	Region Name	Centroid
Austria	AT11	BURGENLAND	EISENSTADT
	AT12	NIEDEROESTERREICH	ST. POELTEN
	AT13	WIEN	WIEN
	AT21	KAERNTEN	KLAGENFURT
	AT22	STEIERMARK	GRAZ
	AT31	OBEROESTERREICH	LINZ
	AT32	SALZBURG	SALZBURG
	AT33	TIROL	INNSBRUCK
	AT34	VORALBERG	DORNBIRN
Belgium	BE10	REGION DE BRUXELLES-CAPITALE/BRUSSELS HOOFDSTEDEL*	BRUXELLES/BRUSSEL
	BE21	PROV. ANTWERPEN	ANTWERPEN
	BE22	PROV. LIMBURG (B)	HASSELT
	BE23	PROV. OOST-VLAANDEREN	GENT
	BE24	PROV. VLAAMS BRABANT	LEUVEN
	BE25	PROV. WEST-VLAANDEREN	BRUGGE
	BE31	PROV. BRABANT WALLON	WAVRE
	BE32	PROV. HAINAUT	CHARLEROI
	BE33	PROV. LIEGE	LIEGE
	BE34	PROV. LUXEMBOURG (B)	ARLON
	BE35	PROV. NAMUR	NAMUR
Bulgaria	BG11	SEVEREN TSENTRALEN	VRACA
	BG12	SEVEROZAPADEN	PLEVEN
	BG13	SEVEROIZTOCHEN	WARNA
	BG21	YUGOZAPADEN	SOFIJA
	BG22	YUZHEN TSENTRALEN	PLOVDIV
	BG23	YUGOIZTOCHEN	BURGAS
Cyprus	CY00	CYPRUS	NIKOSIA
Czech Republic	CZ01	PRAHA	PRAHA
	CZ02	STREDNI CECHY	KLADNO
	CZ03	JIHOZAPAD	PLZEN
	CZ04	SEVEROZAPAD	USTI NAD LABEM
	CZ05	SEVEROVYCHOD	LIBEREC
	CZ06	JIHOVYCHOD	BRNO
	CZ07	STREDNI MORAVA	OLOMOUC
	CZ08	MORAVSKOSLEZSKO	OSTRAVA
Germany	DE11	STUTTGART	STUTTGART
	DE12	KARLSRUHE	MANNHEIM
	DE13	FREIBURG	FREIBURG IM BREISGAU
	DE14	TUEBINGEN	TUEBINGEN
	DE21	OBERBAYERN	MUENCHEN
	DE22	NIEDERBAYERN	LANDSHUT
	DE23	OBERPFALZ	REGENSBURG
	DE24	OBERFRANKEN	BAMBERG
	DE25	MITTELFRANKEN	NUERNBERG
	DE26	UNTERFRANKEN	WUERZBURG
	DE27	SCHWABEN	AUGSBURG
	DE30	BERLIN	BERLIN
	DE41	BRANDENBURG-NORDOST	FRANKFURT(ODER)
	DE42	BRANDENBURG-SUEDWEST	POTSDAM
	DE50	BREMEN	BREMEN
	DE60	HAMBURG	HAMBURG
	DE71	DARMSTADT	FRANKFURT AM MAIN
	DE72	GIESSEN	GIESSEN
	DE73	KASSEL	KASSEL
	DE74	MECKLENBURG-VORPOMMERN	ROSTOCK

Table 28. Present NUTS-2 system of regions in the European Union (cont.) (Eurostat, 2004).

Country	Code	Region Name	Centroid
Germany (cont.)	DE91	BRAUNSCHWEIG	BRAUNSCHWEIG
	DE92	HANNOVER	HANNOVER
	DE93	LUENEBURG	LUENEBURG
	DE94	WESER-EMS	OLDENBURG
	DEA1	DUESSELDORF	DUESSELDORF
	DEA2	KOELN	KOELN
	DEA3	MUENSTER	MUENSTER
	DEA4	DETMOLD	BIELEFELD
	DEA5	ARNSBERG	DORTMUND
	DEB1	KOBLENZ	KOBLENZ
	DEB2	TRIER	TRIER
	DEB3	RHEINHESSEN-PFALZ	MAINZ
	DEC0	SAARLAND	SAARBRUECKEN
	DED1	CHEMNITZ	CHEMNITZ
	DED2	DRESDEN	DRESDEN
	DED3	LEIPZIG	LEIPZIG
	DEE1	DESSAU	DESSAU
	DEE2	HALLE	HALLE
	DEE3	MAGDEBURG	MAGDEBURG
	DEF0	SCHLESWIG-HOLSTEIN	KIEL
	DEG0	THUERINGEN	ERFURT
Denmark	DK00	DANMARK	KOBENHAVN
	DKZZ	DANMARK	EXTRA REGIONS
Estonia	EE00	EESTI	TALLINN
Spain	ES11	GALICIA	VIGO
	ES12	PRINCIPADO DE ASTURIAS	GIJON
	ES13	CANTABRIA	SANTANDER
	ES21	PAIS VASCO	BILBAO
	ES22	COMUNIDAD FORAL DE NAVARRA	PAMPLONA
	ES23	LA RIOJA	LOGRONO
	ES24	ARAGON	ZARAGOZA
	ES30	COMUNIDAD DE MADRID	MADRID
	ES41	CASTILLA Y LEON	VALLADOLID
	ES42	CASTILLA-LA MANCHA	ALBACETE
	ES43	EXTREMADURA	BAJADOZ
	ES51	CATALUNA	BARCELONA
	ES52	COMUNIDAD VALENCIANA	VALENCIA
	ES53	ILLES BALEARES	PALMA DE MALLORCA
	ES61	ANDALUCIA	SEVILLA
	ES62	REGION DE MURCIA	MURCIA
	ES63	CIUDADD AUTONOMA DE CEUTA	CEUTA
	ES64	CIUDADD AUTONOMA DE MELILLA	MELILLA
	ES70	CANARIAS	LAS PALMAS DE GRAN CANARIA
Finland	FI13	ITAE-SUOMI	KUOPIO
	FI18	ETELAE-SUOMI	HELSINKI
	FI19	LANSI-SUOMI	JYVAESKYLAE
	FI1A	POHJOIS-SUOMI	OULU
	FI20	AHVENANMAA/ALAND	MAARIANHAMINA
France	FR10	ILE DE FRANCE	PARIS
	FR21	CHAMPAGNE-ARDENNE	REIMS
	FR22	PICARDIE	AMIENS
	FR23	HAUTE-NORMANDIE	LE HAVRE
	FR24	CENTRE	ORLEANS
	FR25	BASSE-NORMANDIE	CAEN
	FR26	BOURGOGNE	DIJON

Table 28. Present NUTS-2 system of regions in the European Union (cont.) (Eurostat, 2004).

Country	Code	Region Name	Centroid
France (cont.)	FR30	NORD-PAS-DE-CALAIS	LILLE
	FR41	LORRAINE	METZ
	FR42	ALSACE	STRASBOURG
	FR43	FRANCHE-COMTE	BESANCON
	FR51	PAYS DE LA LOIRE	NANTES
	FR52	BRETAGNE	BREST
	FR53	POITOU-CHARENTES	POITIERS
	FR61	AQUITAINE	BORDEAUX
	FR62	MIDI-PYRENEES	TOULOUSE
	FR63	LIMOUSIN	LIMOGES
	FR71	RHONE-ALPES	LYON
	FR72	AUVERGNE	CLERMONT-FERRAND
	FR81	LANGUEDOC-ROUSSILLON	MONTPELLIER
	FR82	PROVENCE-ALPES-COTE D AZUR	MARSEILLE
	FR83	CORSE	AJACCIO
Greece	GR11	ANATOLIKI MAKEDONIA	KAVALA
	GR12	KENTRIKI MAKEDONIA	THESSALONIKI
	GR13	DYTIKI MAKEDONIA	KOZANI
	GR14	THESSALIA	LARISSA
	GR21	IPEIROS	IOANNINA
	GR22	IONIA NISIA	KERKYRA
	GR23	DYTIKI ELLADA	PATRAI
	GR24	STEREA ELLADA	LAMIA
	GR25	PELOPONNISOS	TRIPOLIS
	GR30	ATTIKI	ATHINAI
	GR41	VOREIO AIGAIO	MYTILINI
	GR42	NOTIO AIGAIO	ERMOUPOLIS
	GR43	KRITI	IRAKLEION
Hungary	HU10	KOZEP-MAGYARORSZAG	BUDAPEST
	HU21	KOZEP-DUNANTUL	SZEKESFEHERVAR
	HU22	NYUGAT-DUNANTUL	GYOR
	HU23	DEL-DUNANTUL	PECS
	HU31	ESZAK-MAGYAROSZAG	MISKOLC
	HU32	ESZAK-ALFOLD	DEBRECEN
	HU33	DEL-ALFOLD	SZEGED
Ireland	IE01	BORDER, MIDLAND AND WESTERN	GALWAY
	IE02	SOUTHERN AND EASTERN	DUBLIN
Italy	ITC1	PIEMONTE	TORINO
	ITC2	VALLE D AOSTA/VALLEE D AOSTE	AOSTA
	ITC3	LIGURIA	GENOVA
	ITC4	LOMBARDIA	MILANO
	ITD1	PROVINCIA AUTONOMA BOLZANO / BOZEN	BOLZANO
	ITD2	PROVINCIA AUTONOMA TRENTO	TRIENT
	ITD3	VENETO	VENEZIA
	ITD4	FRIULI-VENEZIA GIULIA	TRIESTE
	ITD5	EMILIA-ROMAGNA	BOLOGNA
	ITE1	TOSCANA	FIRENZE
	ITE2	UMBRIA	PERUGIA
	ITE3	MARCHE	ANCONA
	ITE4	LAZIO	ROMA
	ITF1	ABRUZZI	PESCARA
	ITF2	MOLISE	CAMPOBASSO
	ITF3	CAMPANIA	NAPOLI
	ITF4	PUGLIA	BARI
	ITF5	BASILICATA	POTENZA
	ITF6	CALABRIA	REGGIO

Table 28. Present NUTS-2 system of regions in the European Union (cont.) (Eurostat, 2004).

Country	Code	Region Name	Centroid
Italy (cont.)	ITG1	SICILIA	PALERMO
	ITG2	SARDEGNA	CAGLIARI
Lithuania	LT00	LIETUVA	VILNIUS
Luxembourg	LU00	LUXEMBOURG (GRANDE-DUCHE)	LUXEMBOURG
Latvia	LV00	LATVIJA	RIGA
Malta	MT00	MALTA	VALETTA
Netherlands	NL11	GRONINGEN	GRONINGEN
	NL12	FRIESLAND	LEEUWARDEN
	NL13	DRENTHE	EMMEN
	NL21	OVERIJSSEL	ENSCHEDE
	NL22	GELDERLAND	APELDOORN
	NL23	FLEVOLAND	LELYSTAD
	NL31	UTRECHT	UTRECHT
	NL32	NOORD-HOLLAND	AMSTERDAM
	NL33	ZUID-HOLLAND	ROTTERDAM
	NL34	ZEELAND	MIDDELBURG
	NL41	NOORD-BRABANT	EINDHOVEN
	NL42	LIMBURG (NL)	MAASTRICHT
Poland	PL11	LODZKIE	LODZ
	PL12	MAZOWIECKIE	WARSZAWA
	PL21	MALOPOLSKIE	KRAKOW
	PL22	SLASKIE	KATOWICE
	PL31	LUBELSKIE	LUBLIN
	PL32	PODKARPACKIE	RZESZOW
	PL33	SWIETOKRZYSKIE	KIELCE
	PL34	PODLASKIE	BIALYSTOK
	PL41	WIELKOPOLSKIE	POZNAN
	PL42	ZACHODNIOPOMORSKIE	SZCZECIN
	PL43	LUBUSKIE	GORZOW WIELKOPOLSKI
	PL51	DOLNOSLASKIE	WROCLAW
	PL52	OPOLSKIE	OPOLE
	PL61	KUJAWSKO-POMORSKIE	BYDGOSZCZ
	PL62	WARMINSKO-MAZURSKIE	OLSZTYN
	PL63	POMORSKIE	GDANSK
Portugal	PT11	NORTE	PORTO
	PT15	ALGARVE	FARO
	PT16	CENTRO (PT)	COIMBRA
	PT17	LISBOA	LISBOA
	PT18	ALENTEJO	EVORA
	PT20	REGIAO AUTONOMA DOS ACORES	PONTA DELGADA
	PT30	REGIAO AUTONOMA DOS MADEIRA	FUNCHAL
Romania	RO01	NORD-EST	BACAU
	RO02	SUD-EST	CONSTANTA
	RO03	SUD-MUNTENIA	PLOIESTI
	RO04	SUD-VEST OLTENIA	CRAIOVA
	RO05	VEST	TIMISOARA
	RO06	NORD-VEST	CLUJ-NAPOCA
	RO07	CENTRU	BRASOV
	RO08	BUCURESTI-ILFOV	BUCURESTI
Sweden	SE01	STOCKHOLM	STOCKHOLM
	SE02	OESTRA MELLANSVERIGE	UPPSALA
	SE04	SYSVERIGE	MALMOE
	SE06	NORRA MELLANSVERIGE	GAEVLE
	SE07	MELLERSTA NORRLAND	SUNDSVALL

Table 28. Present NUTS-2 system of regions in the European Union (cont.) (Eurostat, 2004).

Country	Code	Region Name	Centroid
Sweden (cont.)	SE08	OEVRE NORRLAND	UMEA
	SE09	SMALAND MED OEARNA	JOENKOEPING
	SE0A	VAESTSVERIGE	GOETEBORG
Slovenia	SI00	SLOVENIJA	LJUBLJANA
Slovakia	SK01	BRATISLAVSKY KRAJ	BRATISLAVA
	SK02	ZAPADNE SLOVENSKO	NITRA
	SK03	STREDNE SLOVENSKO	ZILINA
	SK04	VYCHODNE SLOVENSKO	KOSICE
United Kingdom	UKC1	TEES VALLEY AND DURHAM	MIDDLESBROUGH
	UKC2	NORTHUMBERLAND,TYNE AND WEAR	NEWCASTLE UPON TYNE
	UKD1	CUMBRIA	CARLISLE
	UKD2	CHESHIRE	WARRINGTON
	UKD3	GREATER MANCHESTER	MANCHESTER
	UKD4	LANCASHIRE	BLACKPOOL
	UKD5	MERSEYSIDE	LIVERPOOL
	UKE1	EAST RIDING AND NORTH LINCOLNSHIRE	KINGSTON
	UKE2	NORTH YORKSHIRE	HARROGATE
	UKE3	SOUTH YORKSHIRE	SHEFFIELD
	UKE4	WEST YORKSHIRE	LEEDS
	UKF1	DERBYSHIRE AND NOTTINGHAMSHIRE	NOTTINGHAM
	UKF2	LEICESTERSHIRE, RUTLAND AND NORTHAMPTONSHIRE	LEICESTER
	UKF3	LINCOLNSHIRE	LINCOLN
	UKG1	HEREFORD, WORCESTERSHIRE AND WARWICKSHIRE	WARWICK
	UKG2	SHROPSHIRE AND STAFFORDSHIRE	NEWCASTLE UNDER LYME
	UKG3	WEST MIDLANDS	BIRMINGHAM
	UKH1	EAST ANGLIA	CAMBRIDGE
	UKH2	BEDFORDSHIRE AND HERTFORSHIRE	LUTON
	UKH3	ESSEX	SOUTHEND-ON-SEA
	UKI1	INNER LONDON	LONDON
	UKI2	OUTER LONDON	LONDON
	UKJ1	BERKSHIRE, BUCKINGHAMSHIRE AND OXFORDSHIRE	READING
	U KJ2	SURREY, EAST AND WEST SUSSEX	BRIGHTON
	UKJ3	HAMPSHIRE AND ISLE OF WIGHT	SOUTHAMPTON
	UKJ4	KENT	MAIDSTONE
	UKK1	GLOUCESTERSHIRE, WILTSHIRE AND NORTH SOMERSET	BRISTOL
	UKK2	DORSET AND SOMERSET	B
	UKK3	CORNWALL AND ISLES OF SCILLY	OURNEMOUTH
	UKK4	DEVON	TRURO
	UKL1	WEST WALES AND THE VALLEYS	PLYMOUTH
	UKL2	EAST WALES	WREXHAM MAELOR
	UKM1	NORTH EASTERN SCOTLAND	CARDIFF
	UKM2	EASTERN SCOTLAND	ABDERDEEN
	UKM3	SOUTH WESTERN SCOTLAND	EDINBURGH
	UKM4	HIGHLANDS AND ISLANDS	GLASGOW
	UKN0	NORTHERN IRELAND	INVERNESS
			BELFAST

Table 45. NUTS-2 region codes used in network datasets (Eurostat, 1995).

Country	NUTS code or equivalent	NUTS Level	Region Name	Centroid City	No
Österreich	AT11	2	Burgenland	Eisenstadt	1
	AT12	2	Niederösterreich	St. Pölten	2
	AT13	2	Wien	Wien	3
	AT21	2	Kärnten	Klagenfurt	4
	AT22	2	Steiermark	Graz	5
	AT31	2	Oberösterreich	Linz	6
	AT32	2	Salzburg	Salzburg	7
	AT33	2	Tirol	Innsbruck	8
	AT34	2	Voralberg	Dornbirn	9
Bel-gique/België	BE1	12	Bruxelles/Brussel	Bruxelles/Brussel	10
	BE21	2	Antwerpen	Antwerpen	11
	BE22	2	Limburg (BE)	Hasselt	12
	BE23	2	Oost-Vlaanderen	Gent	13
	BE24	2	Vlaams Brabant	Leuven	14
	BE25	2	West-Vlaanderen	Brugge	15
	BE31	2	Brabant Wallon	Wavre	16
	BE32	2	Hainaut	Charleroi	17
	BE33	2	Liege	Liege	18
	BE34	2	Luxembourg (BE)	Arlon	19
	BE35	2	Namur	Namur	20
Deutschland	DE11	2	Stuttgart	Stuttgart	21
	DE12	2	Karlsruhe	Mannheim	22
	DE13	2	Freiburg	Freiburg im Breisgau	23
	DE14	2	Tübingen	Tübingen	24
	DE21	2	Oberbayern	München	25
	DE22	2	Niederbayern	Landshut	26
	DE23	2	Oberpfalz	Regensburg	27
	DE24	2	Oberfranken	Bamberg	28
	DE25	2	Mittelfranken	Nürnberg	29
	DE26	2	Unterfranken	Würzburg	30
	DE27	2	Schwaben	Augsburg	31
	DE3	12	Berlin	Berlin	32
	DE4	12	Brandenburg	Potsdam	33
	DE5	12	Bremen	Bremen	34
	DE6	12	Hamburg	Hamburg	35
	DE71	2	Darmstadt	Frankfurt am Main	36
	DE72	2	Giessen	Giessen	37
	DE73	2	Kassel	Kassel	38
	DE8	12	Mecklenburg-Vorpommern	Rostock	39
	DE91	2	Braunschweig	Braunschweig	40
	DE92	2	Hannover	Hannover	41
	DE93	2	Lüneburg	Lüneburg	42
	DE94	2	Weser-Ems	Oldenburg	43
	DEA1	2	Düsseldorf	Düsseldorf	44
	DEA2	2	Köln	Köln	45
	DEA3	2	Münster	Münster	46
	DEA4	2	Detmold	Bielefeld	47
	DEA5	2	Arnsberg	Dortmund	48
	DEB1	2	Koblenz	Koblenz	49
	DEB2	2	Trier	Trier	50
	DEB3	2	Rheinhessen-Pfalz	Mainz	51
	DEC	12	Saarland	Saarbrücken	52
	DED	12	Sachsen	Leipzig	53
	DEE1	2	Dessau	Dessau	54

Table 29. NUTS-2 region codes used (Eurostat, 1995) (cont.).

Country	NUTS code or equivalent	NUTS Level	Region Name	Centroid City	No
Deutschland (cont.)	DEE2	2	Halle	Halle	55
	DEE3	2	Magdeburg	Magdeburg	56
	DEF	12	Schleswig-Holstein	Kiel	57
	DEG	12	Thüringen	Erfurt	58
Danmark	DK11	2	Hovedstadsregionen & Øst for Storeb.	København	59
	DK12	2	Vest for Storebælt	Arhus	60
España	ES11	2	Galicia	Vigo	61
	ES12	2	Principado de Asturias	Gijon	62
	ES13	2	Cantabria	Santander	63
	ES21	2	Pais Vasco	Bilbao	64
	ES22	2	Comunidad Foral de Navarra	Pamplona	65
	ES23	2	La Rioja	Logrono	66
	ES24	2	Aragón	Zaragoza	67
	ES3	12	Comunidad de Madrid	Madrid	68
	ES41	2	Castilla y Leon	Valladolid	69
	ES42	2	Castilla-la Mancha	Albacete	70
	ES43	2	Extremadura	Bajadoz	71
	ES51	2	Cataluña	Barcelona	72
	ES52	2	Comunidad Valenciana	Valencia	73
	ES53	2	Islas Baleares	Palma de Mallorca	74
	ES61	2	Andalucia	Sevilla	75
	ES62	2	Región de Murcia	Murcia	76
Suomi/ Finland	FI11	2	Uusimaa	Helsinki	77
	FI12	2	Etelä-Suomi	Tampere	78
	FI13	2	Itä-Suomi	Kuopio	79
	FI14	2	Väli-Suomi	Jyväskylä	80
	FI15	2	Pohjois-Suomi	Oulu	81
	FI2	12	Ahvenanmaa/Åland	Maarianhamina	82
France	FR1	12	Île de France	Paris	83
	FR21	2	Champagne-Ardenne	Reims	84
	FR22	2	Picardie	Amiens	85
	FR23	2	Haute-Normandie	Le Havre	86
	FR24	2	Centre	Orleans	87
	FR25	2	Basse-Normandie	Caen	88
	FR26	2	Bourgogne	Dijon	89
	FR3	12	Nord-Pas-de-Calais	Lille	90
	FR41	2	Lorraine	Metz	91
	FR42	2	Alsace	Strasbourg	92
	FR43	2	Franche-Comté	Besancon	93
	FR51	2	Pays de la Loire	Nantes	94
	FR52	2	Bretagne	Brest	95
	FR53	2	Poitou-Charentes	Poitiers	96
	FR61	2	Aquitaine	Bordeaux	97
	FR62	2	Midi-Pyrénées	Toulouse	98
	FR63	2	Limousin	Limoges	99
	FR71	2	Rhône-Alpes	Lyon	100
	FR72	2	Auvergne	Clermont-Ferrand	101
	FR81	2	Languedoc-Roussillon	Montpellier	102
	FR82	2	Provence-Alpes-Côte d'Azur	Marseille	103
	FR83	2	Corse	Ajaccio	104
Ellada	GR11	2	Anatoliki Makedonia	Kavala	105

Table 29. NUTS-2 region codes used (Eurostat, 1995) (cont.).

Country	NUTS code or equivalent	NUTS Level	Region Name	Centroid City	No
Ellada (cont.)	GR12	2	Kentriki Makedonia	Thessaloniki	106
	GR13	2	Dytiki Makedonia	Kozani	107
	GR14	2	Thessalia	Larissa	108
	GR21	2	Ipeiros	Ioannina	109
	GR22	2	Ionia Nisia	Kerkyra	110
	GR23	2	Dytiki Ellada	Patrai	111
	GR24	2	Sterea Ellada	Lamia	112
	GR25	2	Peloponnisos	Tripolis	113
	GR3	12	Attiki	Athinai	114
	GR41	2	Voreio Aigaio	Mytilini	115
	GR42	2	Notio Aigaio	Ermoupolis	116
	GR43	2	Kriti	Irakleion	117
Ireland	IE11	2	Dublin, Mid-East	Dublin	118
	IE12	2	Border, Midland-West	Galway	119
	IE13	2	Mid-West, S-East, S-West	Cork	120
Italia	IT11	2	Piemonte	Torino	121
	IT12	2	Valle d'Aosta	Aosta	122
	IT13	2	Liguria	Genova	123
	IT2	12	Lombardia	Milano	124
	IT31	2	Trentino-Alto Adige	Bolzano	125
	IT32	2	Veneto	Venezia	126
	IT33	2	Friuli-Venezia Giulia	Trieste	127
	IT4	12	Emilia-Romagna	Bologna	128
	IT51	2	Toscana	Firenze	129
	IT52	2	Umbria	Perugia	130
	IT53	2	Marche	Ancona	131
	IT6	12	Lazio	Roma	132
	IT71	2	Abruzzi	Pescara	133
	IT72	2	Molise	Campobasso	134
	IT8	12	Campania	Napoli	135
	IT91	2	Puglia	Bari	136
	IT92	2	Basilicata	Potenza	137
	IT93	2	Calabria	Reggio	138
	ITA	12	Sicilia	Palermo	139
	ITB	12	Sardegna	Cagliari	140
Luxembourg	LU	12	Luxembourg	Luxembourg	141
Nederland	NL11	2	Groningen	Groningen	142
	NL12	2	Friesland	Leeuwarden	143
	NL13	2	Drenthe	Emmen	144
	NL21	2	Overijssel	Enschede	145
	NL22	2	Gelderland	Apeldoorn	146
	NL23	2	Flevoland	Lelystad	147
	NL31	2	Utrecht	Utrecht	148
	NL32	2	Noord-Holland	Amsterdam	149
	NL33	2	Zuid-Holland	Rotterdam	150
	NL34	2	Zeeland	Middelburg	151
	NL41	2	Noord-Brabant	Eindhoven	152
	NL42	2	Limburg (NL)	Maastricht	153
Portugal	PT11	2	Norte	Porto	154
	PT12	2	Centro (PT)	Coimbra	155
	PT13	2	Lisboa e Vale do Tejo	Lisboa	156
	PT14	2	Alentejo	Evora	157
	PT15	2	Algarve	Faro	158

Table 29. NUTS-2 region codes used (Eurostat, 1995) (cont.).

Country	NUTS code or equivalent	NUTS Level	Region Name	Centroid City	No
Sverige	SE01	2	Stockholm	Stockholm	159
	SE02	2	Östra Mellansverige	Uppsala	160
	SE03	2	Småland med Oearna	Jönköping	161
	SE04	2	Sydsverige	Malmö	162
	SE05	2	Västsverige	Göteborg	163
	SE06	2	Norra Mellansverige	Gävle	164
	SE07	2	Mellersta Norrland	Sundsvall	165
	SE08	2	Övre Norrland	Umea	166
United Kingdom	UK11	2	Cleveland, Durham	Middlesbrough	167
	UK12	2	Cumbria	Carlisle	168
	UK13	2	Northumberland,Tyne & Wear	Newcastle upon Tyn.	169
	UK21	2	Humberside	Kingston	170
	UK22	2	North Yorkshire	Harrogate	171
	UK23	2	South Yorkshire	Sheffield	172
	UK24	2	West Yorkshire	Leeds	173
	UK31	2	Derbyshire, Nottinghamshire	Nottingham	174
	UK32	2	Leicestershire, Northamptonshire	Leicester	175
	UK33	2	Lincolnshire	Lincoln	176
	UK4	12	East Anglia	Cambridge	177
	UK51	2	Bedfordshire, Hertforshire	Luton	178
	UK52	2	Berkshire, Buckinghamshire, Ox-	Reading	179
	UK53	2	fords,	Brighton	180
	UK54	2	Surrey, East-West Sussex	Southend-on-Sea	181
	UK55	2	Essex	London	182
	UK56	2	Greater London	Southampton	183
	UK57	2	Hampshire, Isle of Wight	Maidstone	184
	UK61	2	Kent	Bristol	185
	UK62	2	Avon, Gloucestershire, Wiltshire	Plymouth	186
	UK63	2	Cornwall, Devon	Bournemouth	187
	UK71	2	Dorset, Somerset	Warwick	188
	UK72	2	Hereford & Worcester, Warwickshire	Newcastle under Ly.	189
	UK73	2	Shropshire, Staffordshire	Birmingham	190
	UK81	2	West Midlands (County)	Warrington	191
	UK82	2	Cheshire	Manchester	192
	UK83	2	Greater Manchester	Blackpool	193
	UK84	2	Lancashire	Liverpool	194
	UK91	2	Merseyside	Wrexham Maelor	195
	UK92	2	Clwyd, Dyfed, Gwynedd, Powys	Cardiff	196
	UKA1	2	Gwent, Mid-South-West, Glamorgan	Edinburgh	197
	UKA2	2	Borders, Central, Fife, Lothian,	Glasgow	198
	UKA3	2	Taside	Inverness	199
	UKA4	2	Dumfries & Galloway, Strathclyde	Abderdeen	200
	UKB	12	Highlands, Islands	Belfast	201
			Grampian		
			Northern Ireland		
Shqipëria	AL	012	Shqipëria	Tiranë	202
Bosna i Herc.	BA	012	Bosna i Hercegovina	Sarajevo	203
Balgarija	BG	012	Balgarija	Sofija	204
Belarus	BY	012	Belarus	Minsk	205
Schweiz	CH1	12	Schweiz (West)	Bern	206
Česko	CH2	12	Schweiz (East)	Zürich	207
Eesti	CZ	012	Česko	Praha	208
Hrvatska	EE	012	Eesti	Tallinn	209
Magyarország	HR	012	Hrvatska	Zagreb	210
	HU	012	Magyarország	Budapest	211

Table 29. NUTS-2 region codes used (Eurostat, 1995) (cont.).

Country	NUTS code or equivalent	NUTS Level	Region Name	Centroid City	No
Island	IS	012	Island	Reykjavik	212
Lietuva	LT	012	Lietuva	Vilnius	213
Latvija	LV	012	Latvija	Riga	214
Moldova	MD	012	Moldova	Chisinau	215
Makedonija	MK	012	Makedonija	Skopje	216
Norge	NO	012	Norge	Oslo	217
Polska	PL1	12	Polska (East)	Warszawa	218
	PL2	12	Polska (North-West)	Poznan	219
	PL3	12	Polska (South-West)	Wroclaw	220
România	RO	012	România	Bucuresti	221
Rossija	RU1	12	Rossija (Moskva)	Moskva	222
	RU2	12	St. Peterburg	St. Peterburg	223
Slovenija	SI	012	Slovenija	Ljubljana	224
Slovensko	SK	012	Slovensko	Bratislava	225
Türkiye	TR	012	Türkiye	Istanbul	226
Ukraina	UA	012	Ukraina	Kyiv	227
Jugoslavija	YU	012	Jugoslavija	Beograd	228
Cyprus	CY	012	Cyprus		229
Malte	MT	012	Malta		230
Georgia	GE	012	Georgia		235
Portugal	PT	2			232
Azerbaijan	AZ	012	Azerbaijan	Baku	233
Armenia	AM	012	Armenia	Yerevan	234
Kazakhstan	KZ	012	Kazakhstan	Teheran	236
Iran	IR	012	Iran		237
Turkmenistan	TM	012	Turkmenistan		238

INTERREG IIIB Co-operation Areas

General information

There are ten polygon layers available representing the ten different INTERREG IIIB (2000-2006) cooperation areas, i.e. there is one layer available for each individual cooperation area. Each layer covers only those NUTS regions that constitute the specific cooperation area; however, the boundaries of the NUTS regions correspond to the boundaries provided with the NUTS-3 layer (see previous chapter).

The following cooperation areas are available (the name of the layer is given in brackets):

- Norther Periphery (COPNP)
- North Sea (COPNS)
- Baltic Sea (COPBS)
- North West Europe (COPNWE)
- Atlantic Area (COPAA)
- CADSES (COPCAD)
- South West Europe (COPSWE)
- Western Mediterranean (COPWM)
- Alpine Space (COPAS)
- Archimed (COPARC)

Figure 25 illustrates the set of ten co-operation areas in map gallery format.

Each layer includes arc and polygon feature classes, whose attributes basically are identical with the attributes provided with the NUTS-3 region layer (see previous chapter).

Layer names:	**COPNP, COPNS, COPBS, COPNWE, COPAA, COPCAD, COPSWE, COPWM, COPAS, COPARC**
Feature classes:	Arcs, polygons
User fields associated with the arcs:	1
User fields associated with the polygons:	6

Detailed description of the arc feature classes

The arc feature classes of the ten cooperation area layers contain only one user-defined attribute, as outlined in *Table 46*. The classification of the **BOUNDARY** attribute can be used to select and draw different types of boundaries, if required. Since the NUTS system is a hierarchical system, all higher level boundaries represent at the same time also a lower level boundary. For example, a country boundary is at the same time always a NUTS-1 region boundary, and all NUTS-1 region boundaries are at the same time NUTS-2 region boundaries, and lastly all NUTS-2 region boundaries are at the same time NUTS-3 region boundaries.

Table 46. Arc fields of the cooperation area layers.

Attribute	Type	Contents
BOUNDARY	Integer	Boundary classification 1 = Shores 2 = Country boundary 3 = NUTS 1 region boundary 4 = NUTS 2 region boundary 5 = NUTS 3 region boundary

Detailed description of the polygon feature classes

The following user-defined polygon attributes are available in the ten co-operation area layers:

Table 47. Polygon fields of the cooperation area layers.

Attribute	Type	Contents
COUNTRY	Character	ISO country code 2-digits (see *Table 43*)
NUTS1_CODE	Character	NUTS-1 region code
NUTS2_CODE	Character	NUTS-2 region code
NUTS3_CODE	Character	NUTS-3 region code
NUTS3_NAME	Character	Name of NUTS-3 region
NUTS3TOTAREA	Float	Total area of NUTS-3 region (in km^2)

The attributes **COUNTRY**, **NUTS1_CODE**, **NUTS2_CODE** and **NUTS3_CODE** represent the official ISO codes as defined and used by Eurostat for the respective NUTS levels. These codes can be used both to join statistical data to the layer and to aggregate NUTS-3 regions to higher levels.

NUTS3_NAME gives the official NUTS-3 region name, whereas **NUTS3_TOTAREA** represents the total NUTS-3 region area. This attribute should not be confused with the ArcInfo / ArcGIS / ArcView internal area attribute, which represents the area of the individual polygon in question. In contrast, **NUTS3_TOTAREA** represents the total region area, i.e. if the region consists of several polygons, the areas of all polygons are summed up in this attribute.

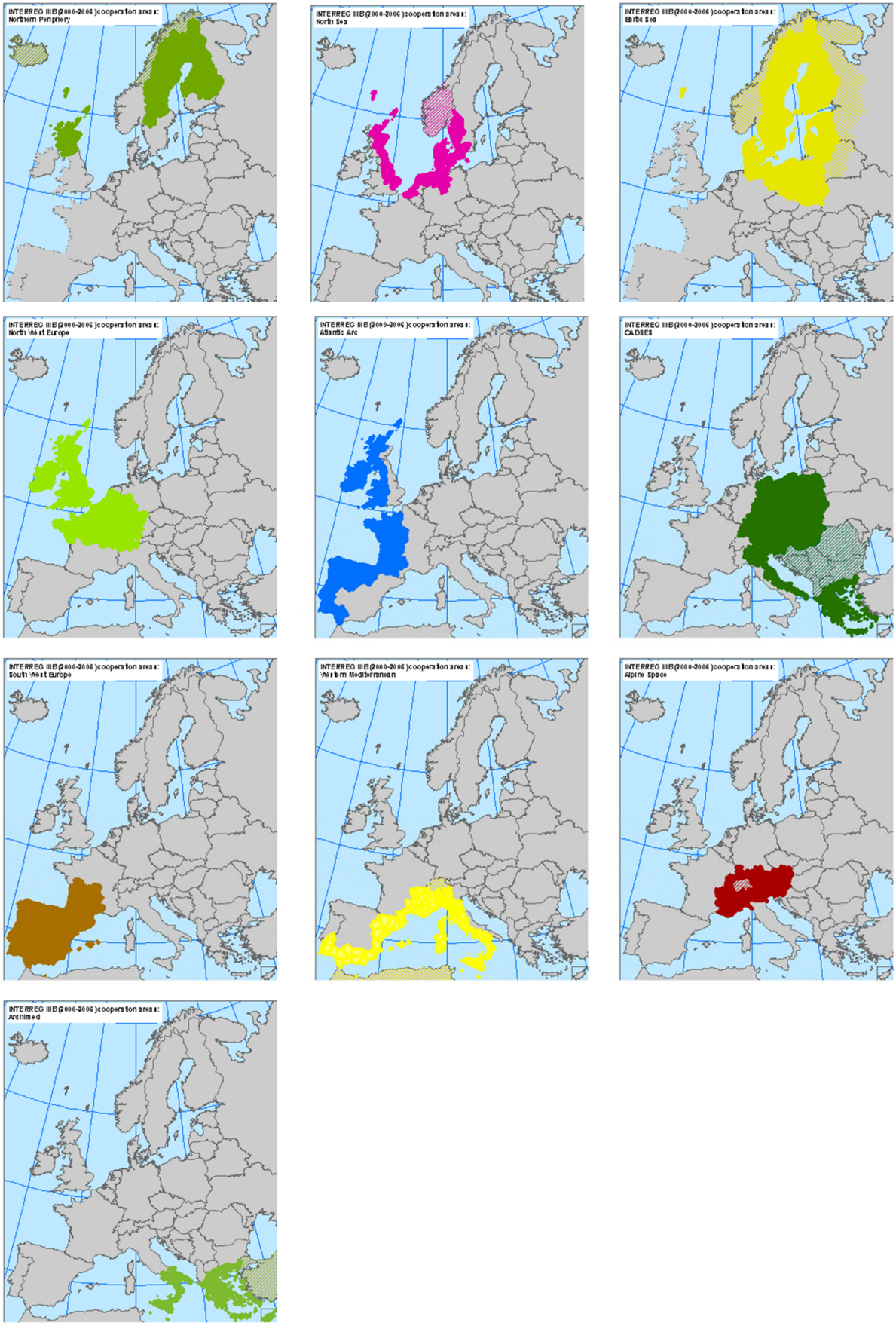


Figure 25. The ten INTERREG IIB co-operation areas (2000-2006).

VASAB Co-operation Area

General information

This layer representing the VASAB co-operation area basically corresponds to the INTERREG IIIB (2000-2006) Baltic Sea Co-operation area, plus the German county Lüneburg and the German Land Bremen in addition. Altogether, it covers the regions around the Baltic Sea, including the entire countries of Denmark, Sweden, Finland and Norway, Poland and the three Baltic countries Estonia, Latvia and Lithuania; in addition, parts of Russia, Belarus and Germany are covered as well (*Figure 26*).

This layer just provides the outline of the VASAB co-operation area in form of a polygon layer, without any further attributes assigned to it. Thus, the layer can basically be used for mapping purposes or to clip other GIS data. The basic features of this layer can be summarised as follows:

Layer name:	**VASAB**
Feature classes:	Polygons
No of polygon features:	290
User fields associated with the polygons:	1

There is only one user-defined attribute associated with the polygon feature class, namely **VASAB** which distinguished the VASAB co-operation area (**VASAB=1**) from other areas outside the co-operation area (**VASAB=0**).

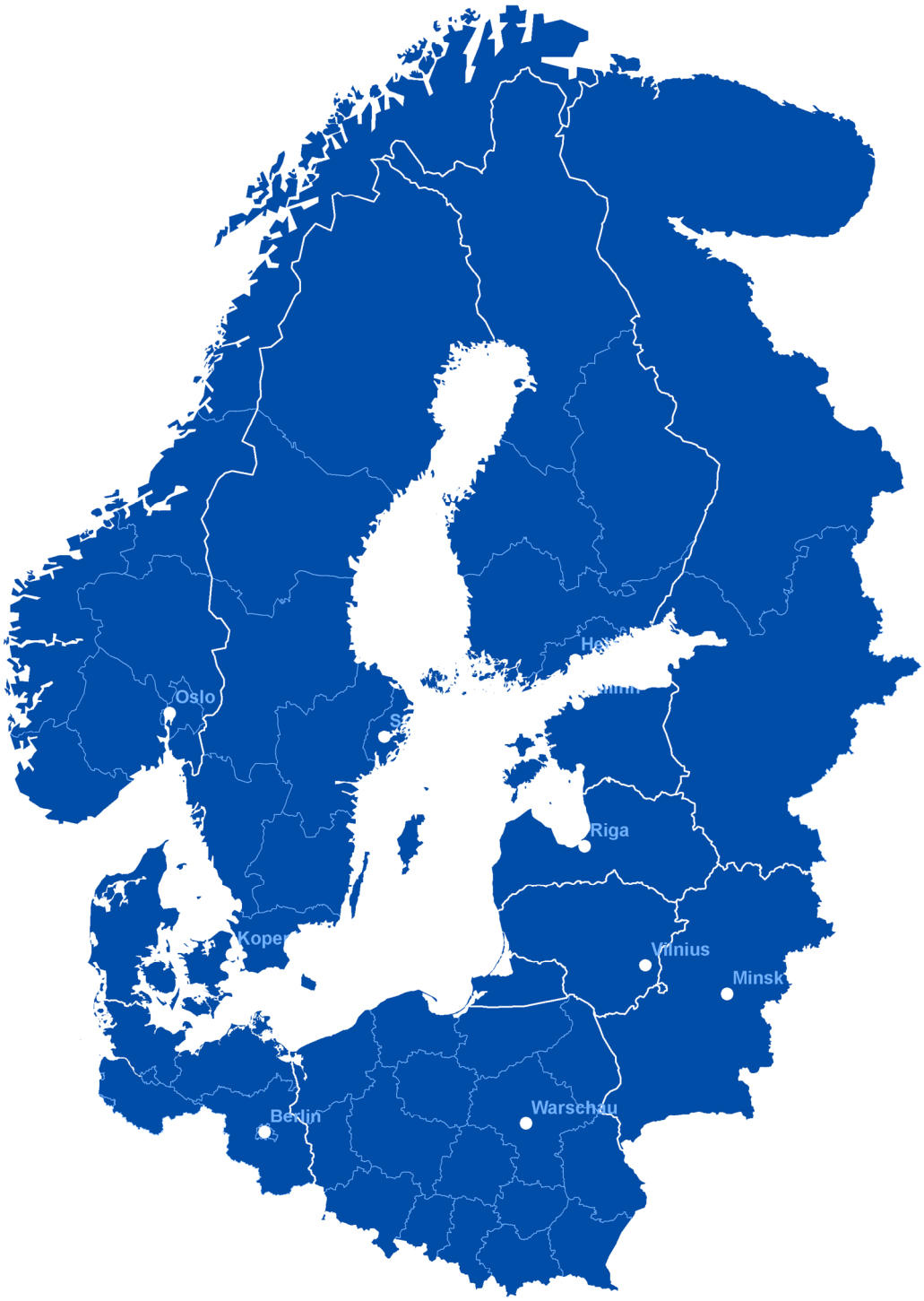


Figure 26. The VASAB co-operation area.

Raster Systems

Raster systems (also often called ‘grid’ systems) are regular polygon systems of different resolutions that are used as tools or as spatial entities in many scientific, research and planning applications. Individual raster systems can be generated according to the needs of the client. Basically the client may specify

- The spatial resolution (i.e. grid size, examples would be: 50x50 meters, 1x1 km, 5x5 km)
- Spatial coverage (for instance, the whole of Europe, individual countries, specific areas)
- Origin of the raster system

Upon consultation there would be a number of possible attributes available that can be associated with the raster system. Such information include, but are not limited to:

- Raster cell identification number
- Land use or land coverage
- Accessibilities or travel times from/to certain origin(s) or destination(s)
- Population density or population potential
- Country, region or municipality codes or names
- X-/y-coordinates of the grid centroid

One or more of such information could be assigned to the raster cells, generated based on the other available layer of the RRG GIS Database.

Optionally it would also be possible to generate hierarchical regular raster systems, i.e. where one raster cell is constituted of four smalle raster cells each of which in turn may also be constituted of four cells etc. The number and resolutions of the hierarchy levels may be specified according to the actual application needs.

Possible applications for such raster systems are, among others,

- Environmental applications and environmental models
- Transport planning
- Town and regional planning
- Urban and regional research
- Location decisions

Cities in Europe

General information

The RRG GIS city point layer provides the location and attributive information for cities in Europe. Generally, all cities with more than 50,000 inhabitants are includes, as well as all cities which are members of the Hanse (Städtebund DIE HANSE, 2008), all cities participating in the *Urban Audit* programme of the European Commission (DG Regio, 2008; European Union, 2007), all cities analysed in *ESPON Project 1.1.1* on urban areas as nodes in a polycentric development (Nordregio, 2004; ESPON Project 1.1.1, 2008), all cities under investigation in the *RePUS* project on *Regional Polycentric Urban Systems* (Benini and Nali, 2007; RePUS, 2008), and all cities that represent NUTS-3 region centroids. All these cities are included in the GIS database even if they have less than 50,000 inhabitants. While the Urban Audit programme and also the ESPON Project 1.1.1 cover cities in the whole of Europe, the RePUS project is concerned with town and cities development in central-European countries like Austria, Czech Republic, Hungary, Italy, Poland, Slovakia and Slovania. Cities that are member of the Hanse association are located in Belarus, Belgium, Estonia, Finland, France, Germany, Iceland, Latvia, Lithuania, the Netherlands, Norway, Poland, Russia, Sweden and the UK.

Figure 27 then illustrates the spatial distribution of the available cities. Altogether, 3,174 cities for the whole of Europe are available. This layer can be used just for mapping purposes or as points of interest, but can also be used for specific analytical purposes. The basic features of this layer are:

Layer name:	**CITIES**
Feature classe:	Points
No of point features:	3,174
User fields associated with the points:	21

Specific subsets of this overall city layer representing the capital cities (**COUNTRYPNT**), NUTS-1 region centroids (**NUTS1PNT**), NUTS-2 region centroids (**NUTS2PNT**) and NUTS-region centroids (**NUTS3PNT**) are also available (see previous sections of this user manual).

Detailed description of the point fields

The following user-defined attributes are available in the **CITIES** layer for the point feature class:

Table 48. Fields of the **CITIES** *layer.*

Attribute	Type	Contents
POINTID	Float	Unique point ID xx.yyyy xx = Country ID yyyy = City number 0001 ....
LABEL	Character	City name
COUNTRY	Character	ISO country code (see *Table 43*)

TYPE	Integer	Type of city 0 = Regular city 1 = NUTS-1 region centroid 2 = NUTS-2 region centroid 3 = NUTS-3 region centroid 4 = Capital city
N1CODE	Character	NUTS-1 region code
N2CODE	Character	NUTS-2 region code
N3CODE	Character	NUTS-3 region code
POPCITY	Integer	City population (in 1,000)
POPAGG	Integer	Agglonmeration population (in 1,000)
POPNUTS3	Integer	Population of NUTS-3 region (in 1,000)
POPNUTS2	Integer	Population of NUTS-2 region (in 1,000)
POPNUTS1	Integer	Population of NUTS-1 region (in 1,000)
POPCOUNT	Integer	Country population (in 1,000)
HANSE	Integer	Membership Hanseatic League 0 = City not a member / not participating 1 = City member of Hanse association
UA_CODE	Character	Urban Audit city code xxyyyC xx = 2-digit ISO country code (see *Table 43*) yyy = 3-digit city number
FUA_ID	Integer	Unique city identifier of ESPON Project 1.1.1
FUA_TYPE	Integer	City classification according to ESPON project 1.1.1 0 = City not representing a Functional Urban Area 2 = Regional and local FUAs 3 = Transnational and national FUAs 4 = Metropolitan Growath Areas (MEGAs)
REPUS_ID	Integer	Unique city identifier of RePUS
REPUS_TYPE	Integer	City classification according to RePUS 0 = City not participating in RePUS 1 = Local level town or village 2 = Regional level 1 town or city 3 = Regional level 2 town or city 4 = Trans-regional and national city 5 = European level city
X-COORD	Float	X-coordinate (in m)
Y-COORD	Float	Y-coordinate (in m)

POINTID represents a unique point ID, with **x.0000** representing the capital city (x = country ID). The **POINTID**s of those cities that at the same time represent NUTS-2, NUTS-1 or NUTS-0 region centroids are identical to the **POINTID**s in the **NUTS0CENT** or **NUTS1CENT** or **NUTS2CENT** layers.

LABEL gives the name of the city. **TYPE** hierarchically differentiates the capital cities, NUTS-1 region, NUTS-2 region and NUTS-3 region centroids from the other cities. Higher level centroids are always centroids of the lower level, i.e. a NUTS-2 region centroid is always also

a NUTS-3 region centroid; similarly, a NUTS-1 region centroid represents at the same time a NUTS-2 region centroid.

COUNTRY indicates the ISO country code of the country in which the city is located, whereas **N3CODE** provide the official NUTS-3 region codes as published by Eurostat in which the city is located.

POPCITY, POPAGG, POPNUTS3, POPNUTS2, POPNUTS1 and **POPCOUNT** provide actual population figures for the city (**POPCITY**), the entire agglomeration area (POPAGG), for the respective NUTS-3 (**POPNUTS3**), NUTS-2 (**POPNUTS2**) and NUTS-1 regions (**POPNUTS1**) and for the overall country (**POPCOUNT**). If a city does not constitute a greater agglomeration area, then the population figures provided in **POPAGG** and **POPCITY** are identical.

HANSE indicates whether or not a city is member of the Hanseatic League, which is the newly revived city network of towns and cities in northern Europe trying to keep alive and promote the cities as a place to life and a place for culture. It dates back to the 'old' **HANSE** network of cities which reached their greatest influence during the 16th and 17th centuries with strong political and commercial power (Städtebund DIE HANSE, 2008).

UA_CODE, FUA_ID, FUA_TYPE, REPUS_ID and **REPUS_TYPE** provide information on those cities participating in the Urban Audit programme, or the ESPON Project 1.1.1 or RePUS project. **UA_CODE**, **FUA_ID** and **REPUS_ID** provide the respective city codes or city number, which can be used to link additional information from the projects to the cities. **FUA_TYPE** and **REPUS_TYPE** represent the city classification, or city typologies, which were elaborated in the ESPON 1.1.1 and RePUS projects.

X-COORD and **Y-COORD** give the geographical position of the city centre.

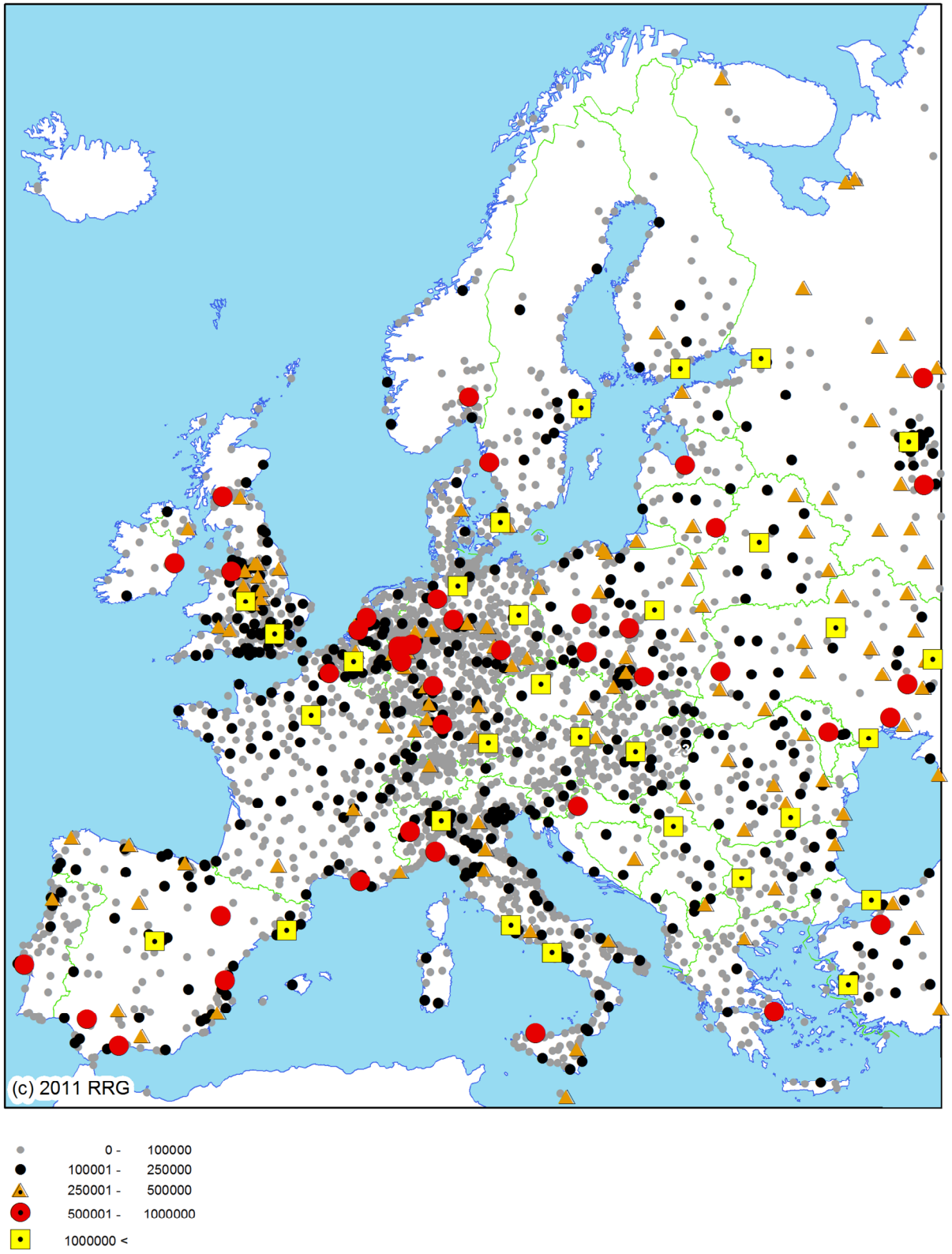


Figure 27. Cities in Europe.

Water bodies: Lakes and Rivers

General information

There is one overall layer available in the RRG GIS Database representing lakes and river in Europe. This layer basically provides additional features (i.e. geographical objects) for mapping purposes. The water bodies includes in this layer represent the major lakes and major rivers in Europe only. Beyond their geometric shape, only basic attributive information are associated with the features. The basic features of the layer are as follows:

Layer name:	**WATERS**
Feature classes:	Polygons
No of polygon features:	1,807
User fields associated with the polygons:	4

Figure 28 illustrates the lakes and rivers available in the layer, while *Table 49* lists the available fields.

Table 49. Fields of the **WATERS** *layer.*

Attribute	Type	Contents
TYPE	Integer	Type of water body 0 = No water body 1 = Lake, artificial lake (reservoir) 2 = River 3 = Channel, canalised river 4 = Ocean,sea, bay
COUNTRY	Character	ISO country code (see *Table 43)*
LABEL	Character	Name of water body
CONTIENT	Integer	Continent 1 = Asia 2 = Africa 3 =North America 4 = South America 5 = Europe 6 = Australia

TYPE differentiats the various types of water bodies, such as lakes, rivers, or bays. **COUNTRY** gives the 2-digit ISO country code of the country in which the water body is located. **LABEL** provides the name of the lake or river, while **CONTINENT** indicates on which continent the water body is located.

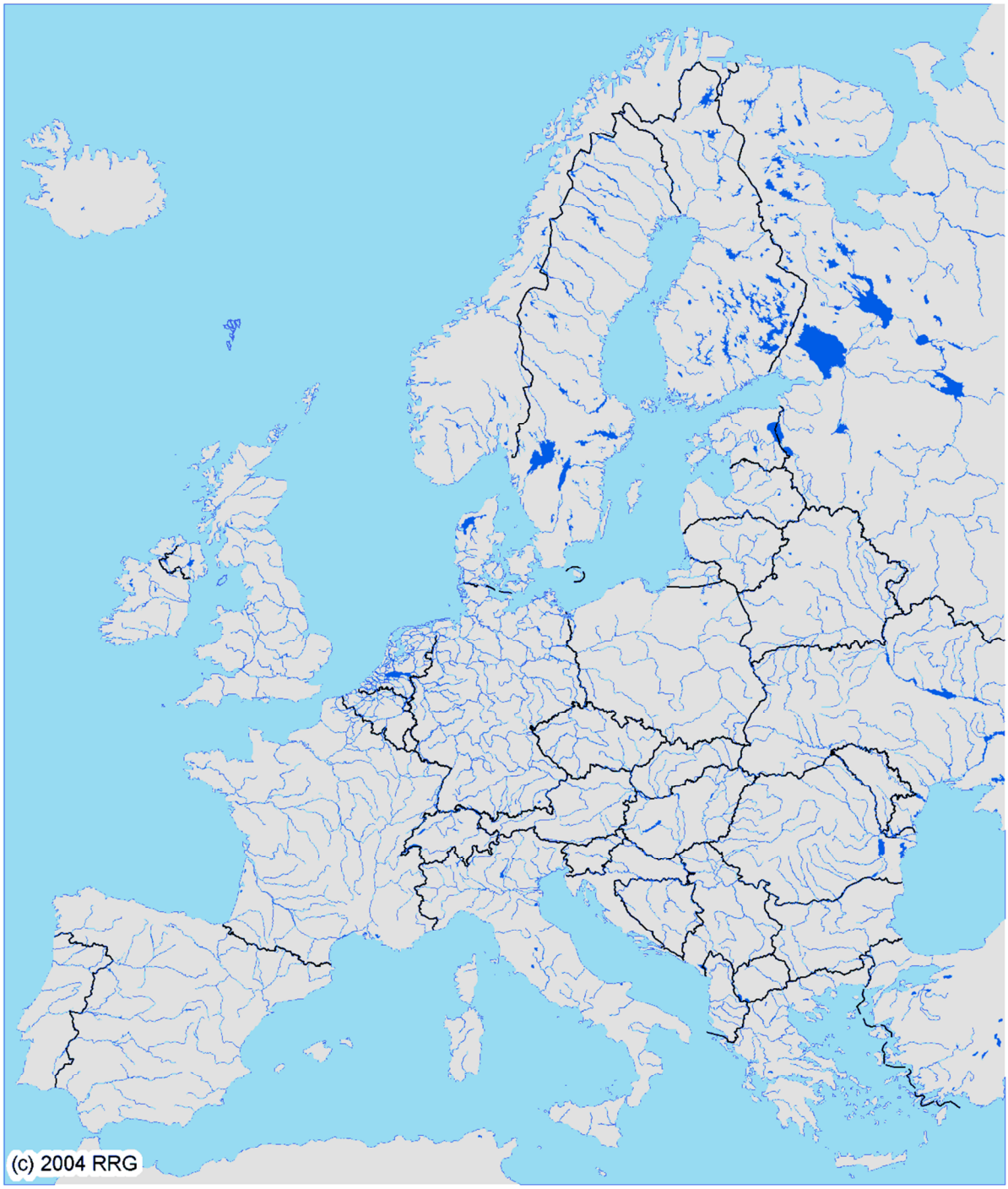


Figure 28. Water bodies in Europe: Lakes and rivers.

Tabular Data

In addition to the various feature layers available at the RRG GIS Database, a number of tables are also stored in this database providing basic information to various datasets. Currently the following tables are available

- ISO_COUNTRY_CODE
- NUTS_SYSTEM_2003
- NUTS_SYSTEM_2006

The contents of these tables and the available fields are as follows:

Country code table

This table provides the 2- and 3-digit world-wide country codes as specifid by ISO for all countries of the world, along with the country number. The 2-digit codes are used as country codes in many layers of the RRG GIS Database. Altogether, some 241 countries and territories are listed. The available fields are:

Table 50. Fields of the **ISO_COUNTRY_CODES** *table.*

Attribute	Type	Contents
COUNTRY	Character	Full official name of the country
ISO2D	Character	2-digits ISO country code (see Table 43)
ISO3D	Character	3-digits ISO country code
NUMB	Integer	Unique country number

Hierarchy of NUTS regions

These two tables lists the hierarchy of NUTS regions of the European Union, as defind by Eurostat in consultation with the Member States (Eurostat, 2004; 2007) for the years 2003 (**NUTS_SYSTEM_2003**) and 2006 (**NUTS_SYSTEM_2006**), ranging from NUTS-0 level (i.e. country level) down to NUTS-3 level. The tables provides a unque region number (**REGNO**), the official NUTS-3 region code as defined by Eurostat (**N3CODE**), the country name (**COUNTRY**), as well as the NUTS-1 level names (**N1_NAME**), NUTS-2 level names (**N2_NAME**), as well as the NUTS-3 level names (**N3_NAMES**):

The **N3CODE** can be used to derive higher NUTS-level codes such as NUTS-2 level codes (which are substring 1-4 of **N3CODE**), or NUTS-1 level codes (which are substring 1-3 of **N3CODE**), or country codes (which are substring 1-2 of **N3CODE**).

The attribute structure of both the **NUTS_SYSTEM_2003** and **NUTS_SYSTEM_2006** tables are identical.

Table 51. Fields of the **NUTS_SYSTEM_2003** *and* **NUTS_SYSTEM_2006** *tables.*

Attribute	Type	Contents
REGNO	Integer	Unique region name
N3CODE	Character	Official NUTS-3 region code
COUNTRY	Character	Name of the country
N1_NAME	Character	NUTS-1 level name
N2_NAME	Character	NUTS-2 level name
N3_NAME	Character	NUTS-3 level name

Available Layers and Datasets

The *RRG GIS Database* offers a number of layers and datasets, which can be summarized as follows:

(A) Transportation Networks
- a. Road network (links, nodes)
- b. Railway network (links, nodes)
- c. Railway stations in Europe (points)
- d. Airports of the world (points)
- e. Flight routes (links)
- f. Inland waterway and short sea shipping routes (links)
- g. Inland ports and seaports (points)
- h. Ferry connections and shipping routes (links)
- i. Freight villages, transport terminals and transshipment centres (points)
- j. Travel analysis districts for Germany (polygons)

(B) Administrative Boundaries
- a. Country boundaries (polygons, links)
- b. NUTS-1 regions (polygons, links, points)
- c. NUTS-2 regions (polygons, links, points)
- d. NUTS-3 regions (polygons, links, points)
- e. Municipalities in Germany (polygons, points)
- f. INTERREG IIIB cooperation areas (polygons)
- g. VASAB cooperation area (polygons)
- h. Raster systems (polygons, points)

(C) Geographical Objects
- a. Cities in Europe (points)
- b. Places of the world (points)
- c. Capital cities in Europe (points)
- d. NUTS-1 region centroide (points)
- e. NUTS-2 region centroide (points)
- f. NUTS-3 region centroide (points)
- g. Water bodies: lakes and rivers (polygons, links)
- h. Continents and seas (polygons)
- i. Shoreline (links)
- j. Relief / terrain (contour lines, polygon mesh, points)

(D) Interaction and Regional Data
- a. Neighbourhood matrices
- b. Airline distances, distances over transport networks, 'Manhattan' distances
- c. Travel time or travel cost matrices
- d. Accessibility indicators, peripherality indicators
- e. Isochrones
- f. Aggregated climatic data
- g. Quality-of-life
- h. Topography

(E) Other tabular datasets
- a. List of ISO country codes
- b. List of hierarchy of NUTS system for 2003
- c. List of hierarchy of NUTS system for 2006
- d. Rail timetable information (excerpts for Germany, various years)
- e. Pan-European rail timetable information (excerpts for Europe, various years)

The RRG GIS Database is continuously being updated and extended with new layers or tables, and of course also existing layers and tables are being updated and improved continously.

Except where indicated, all layers basically cover entire Europe. The interaction and regional data would be available for different spatial levels, i.e. for NUTS levels 0, 1, 2 and 3. They need to be generated according to the requirements and wishes of the client. The following illustrations are just examples of applications and maps derived by using the RRG GIS Database.

Following are sample maps of projects and applications where layers of the RRG GIS Database have been utilized.

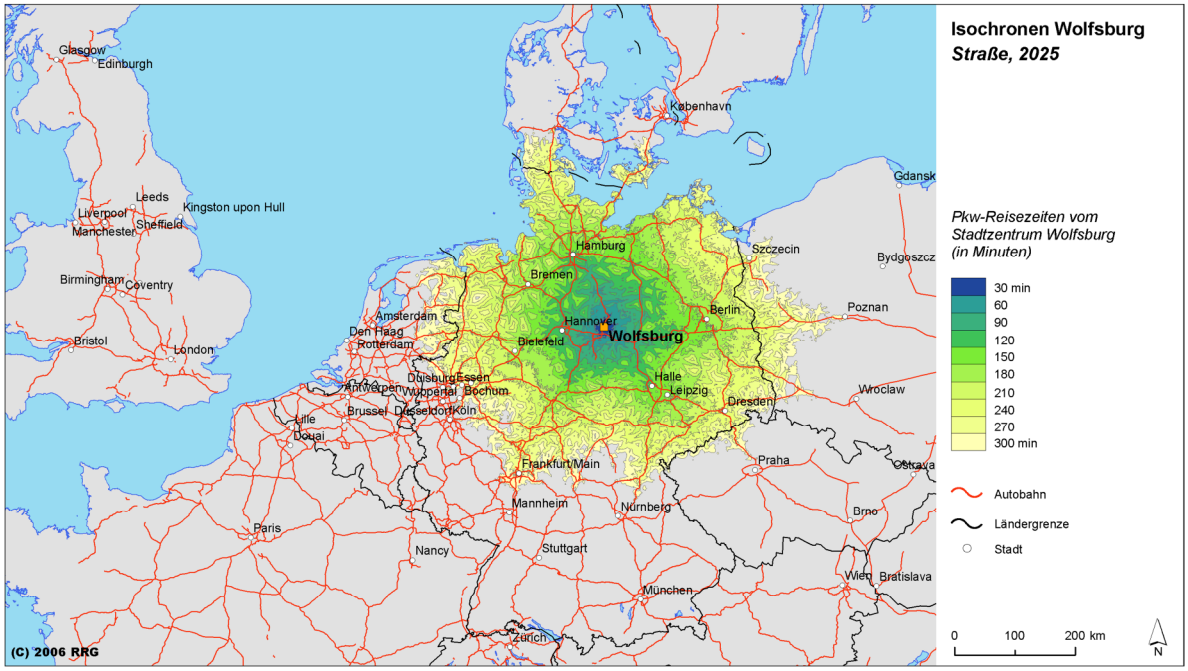


Figure 29. Road isochrones, city of Wolfsburg, projection for 2025.

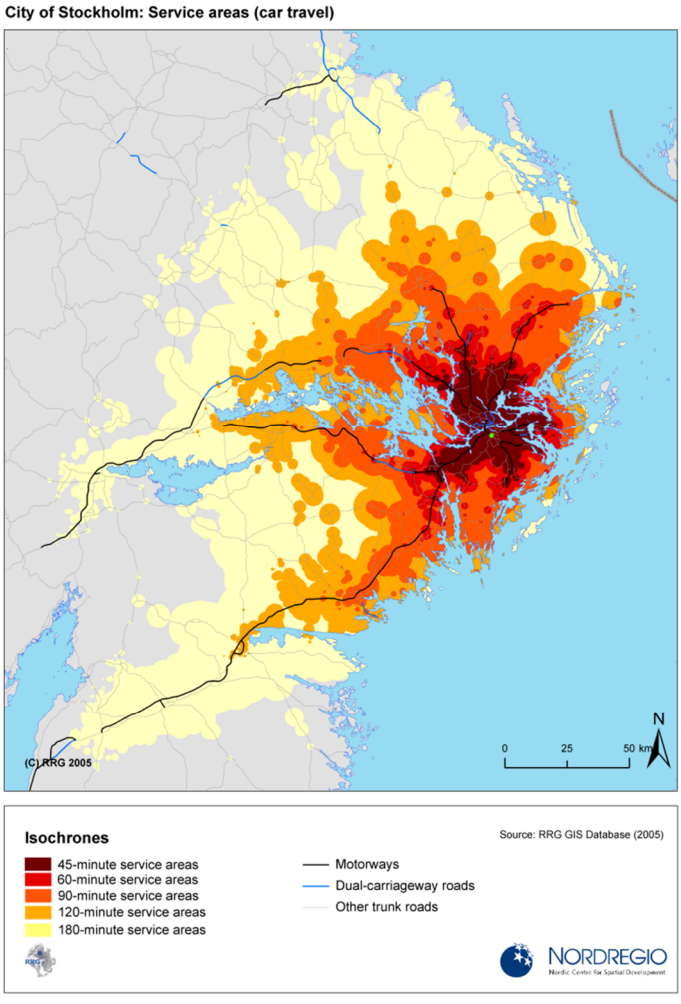


Figure 30. City of Stockholm: Service Areas

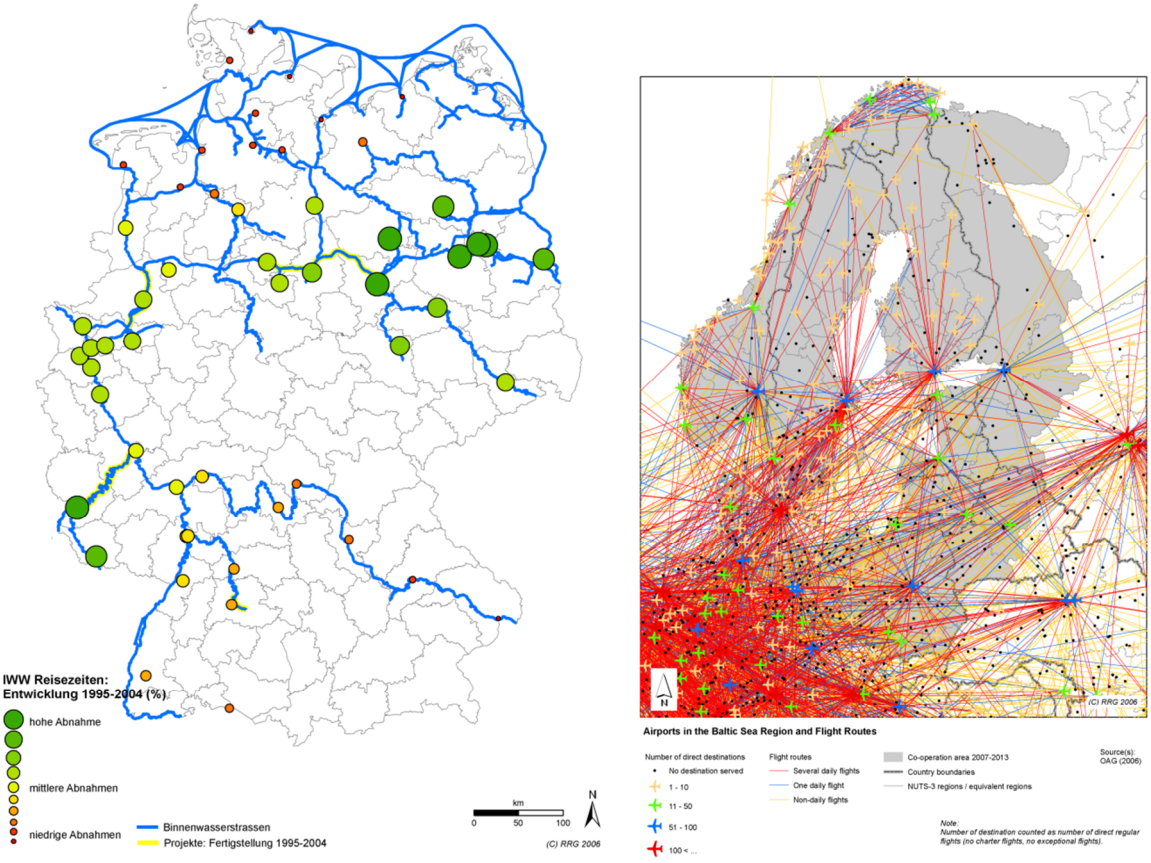


Figure 31. Changes in average travel times between travel districts, inland waterways, Germany 1995-2004 (left); airports and flight routes in Northern Europe (right).

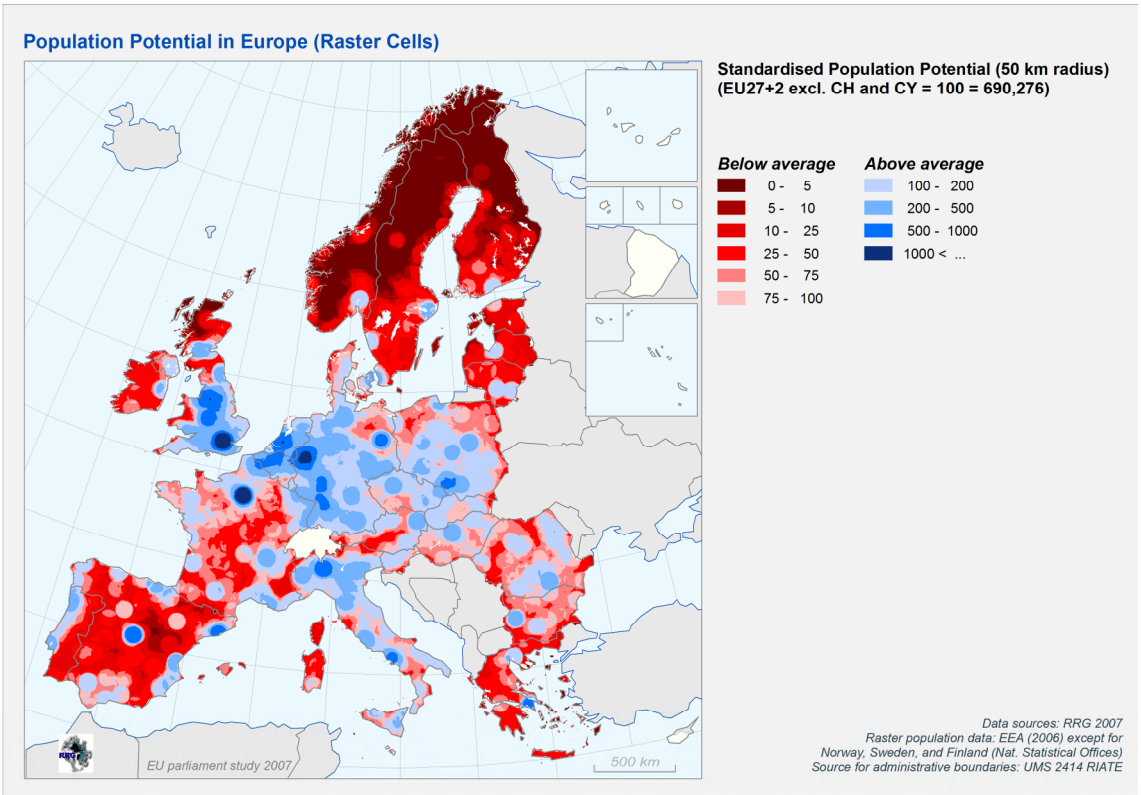
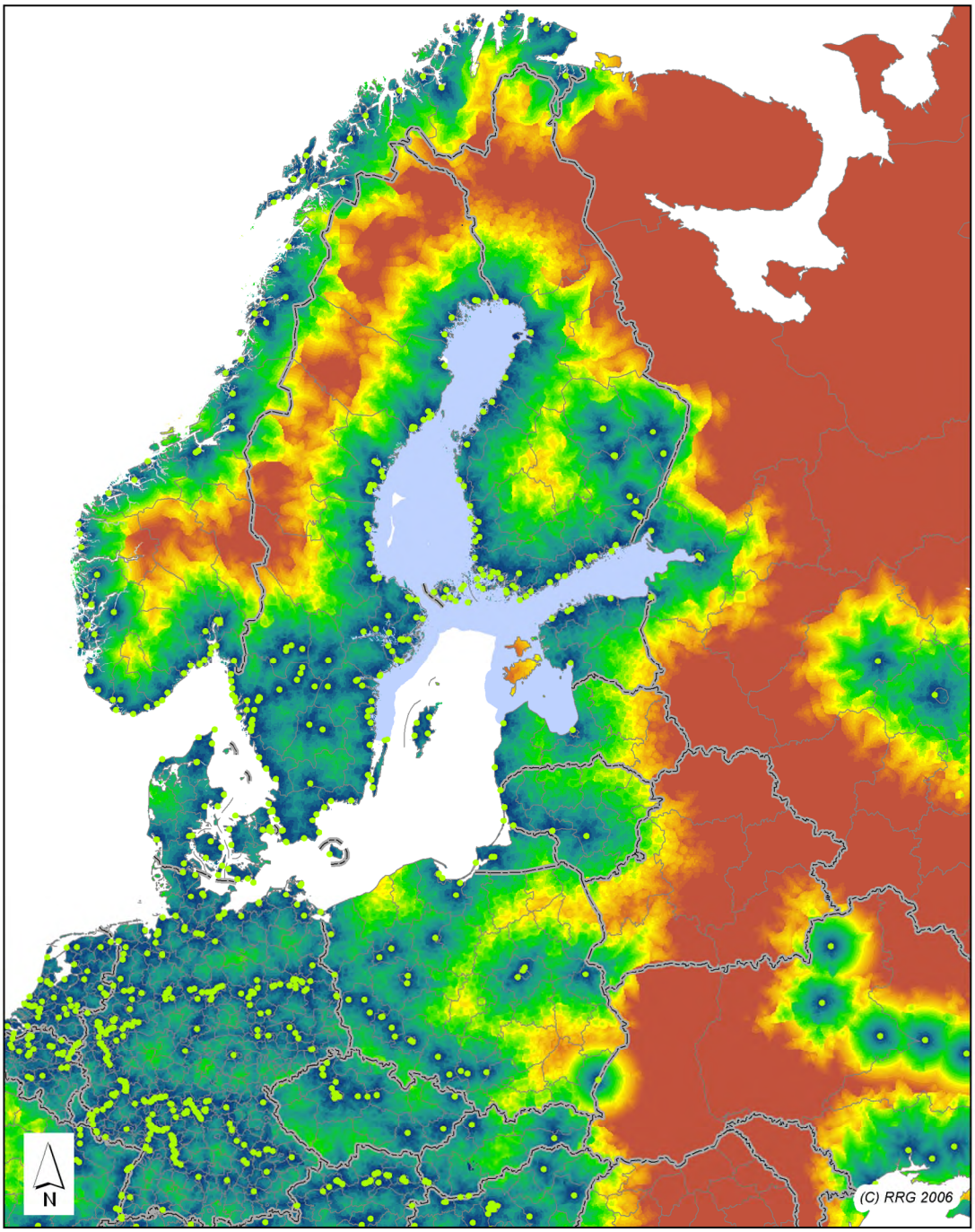


Figure 32. Population potential in Europe (2.5x2.5 km raster grid).



Lorry Travel Times to Transport Terminals (in min)

300 < ...	195 - 210	90 - 105
285 - 300	180 - 195	75 - 90
270 - 285	165 - 180	60 - 75
255 - 270	150 - 165	45 - 60
240 - 255	135 - 150	30 - 45
225 - 240	120 - 135	15 - 30
210 - 225	105 - 120	1 - 15

Transport terminals
Country boundaries
NUTS-3 regions / equivalent regions
Ico coverage (as of 16/03/2005)

Source(s):
RRG (2006), UIRR (2006), DUSS (2006), Finnish Institute of Marine Research (2005)

Note:
Transport terminals represented by seaports and inland ports, as well as selected container terminals and rail-road transshipment terminals.

Figure 33. Lorry travel time to transport terminals in the Baltic Sea Region.

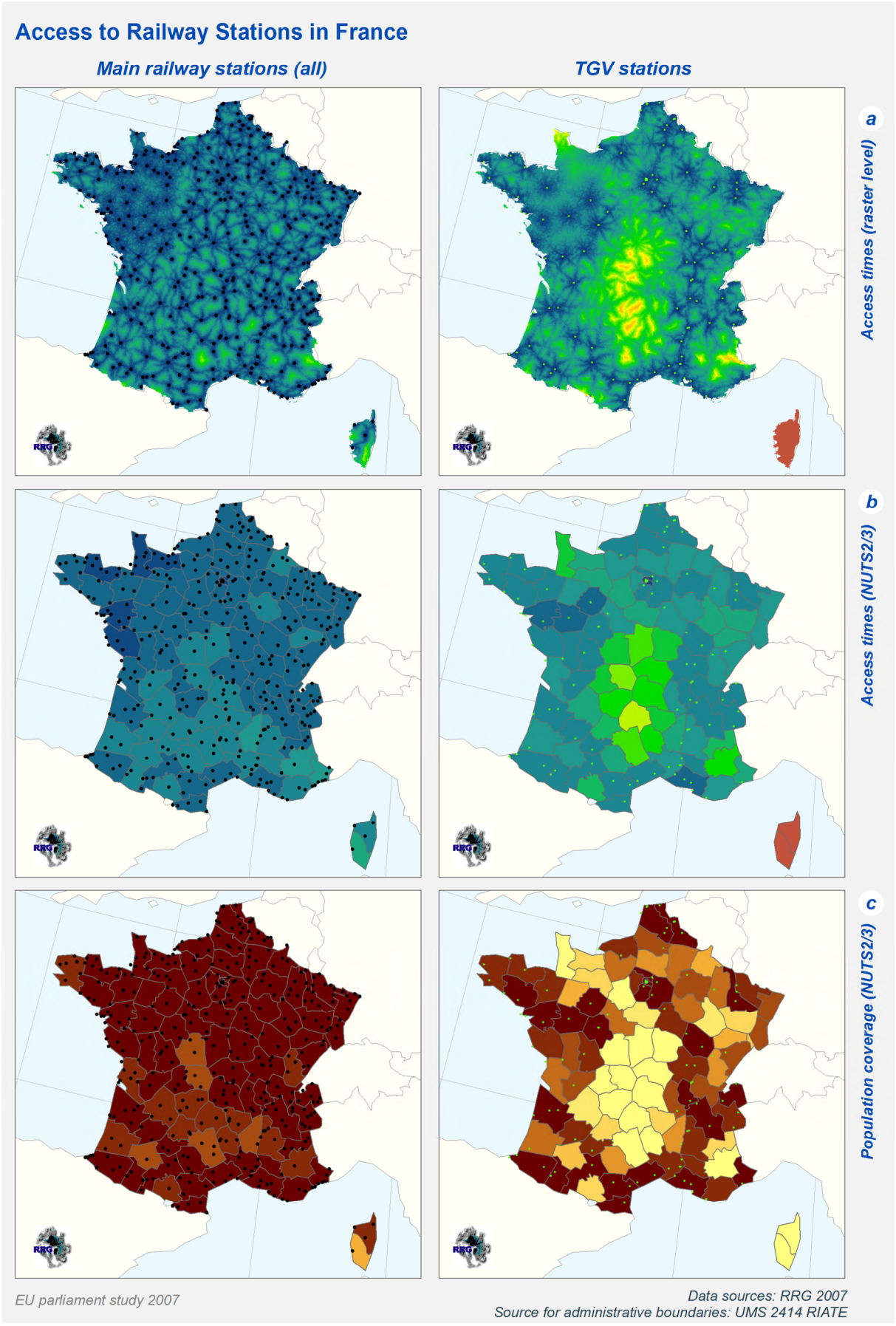


Figure 34. Access to Railway Stations in France.

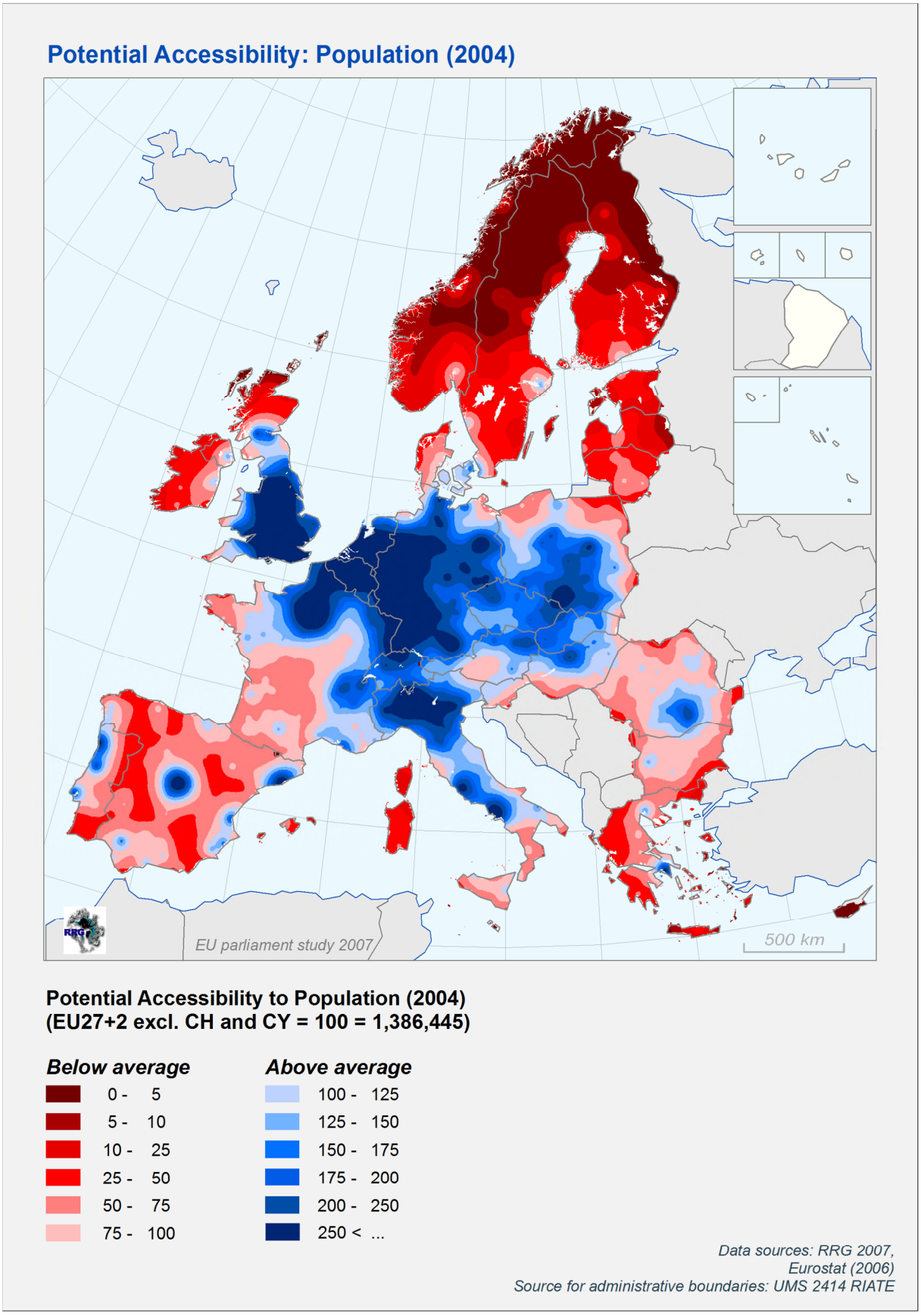


Figure 35. Potential Accessibility to Population (2.5x2.5 km raster grid).

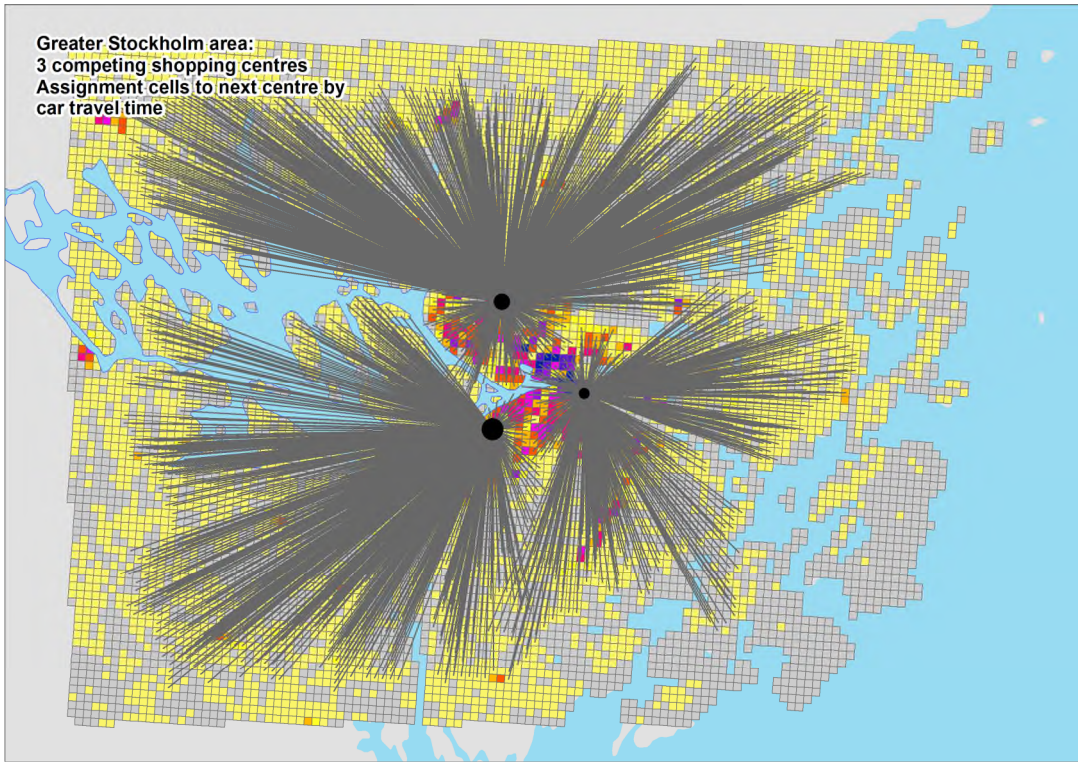


Figure 36. Greater Stockholm area: Assignment of raster cells to nearest shopping centre (based on car travel times).

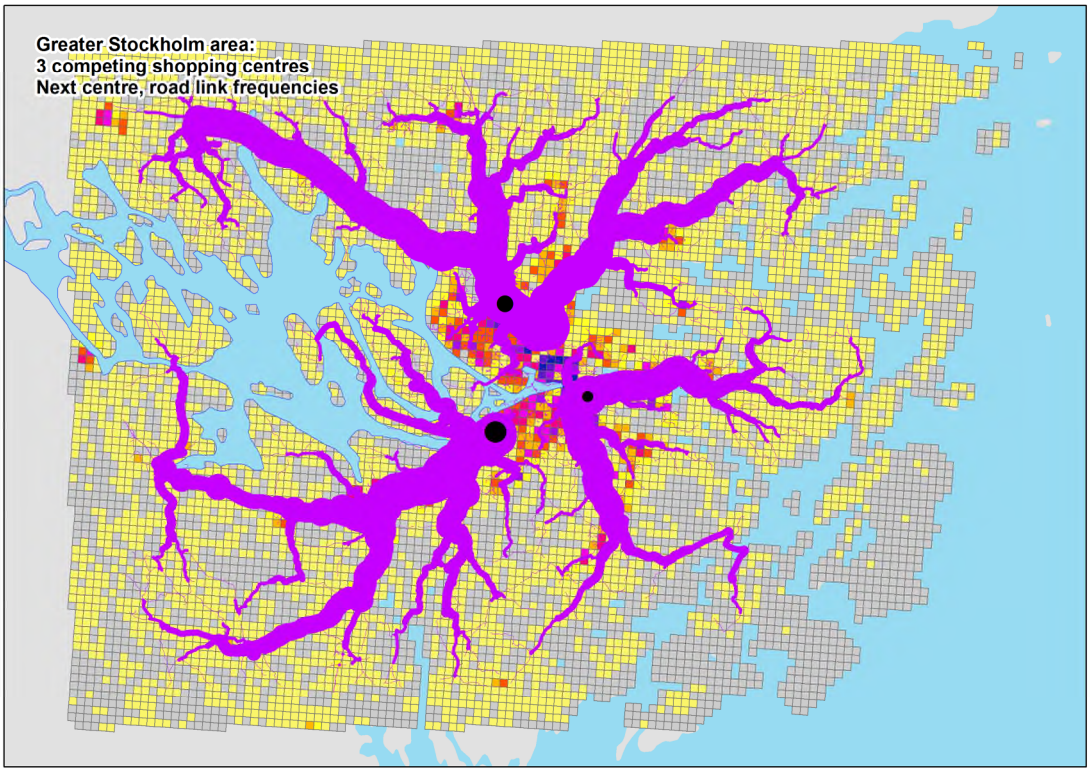


Figure 37. Greater Stockholm area: Road link frequencies.

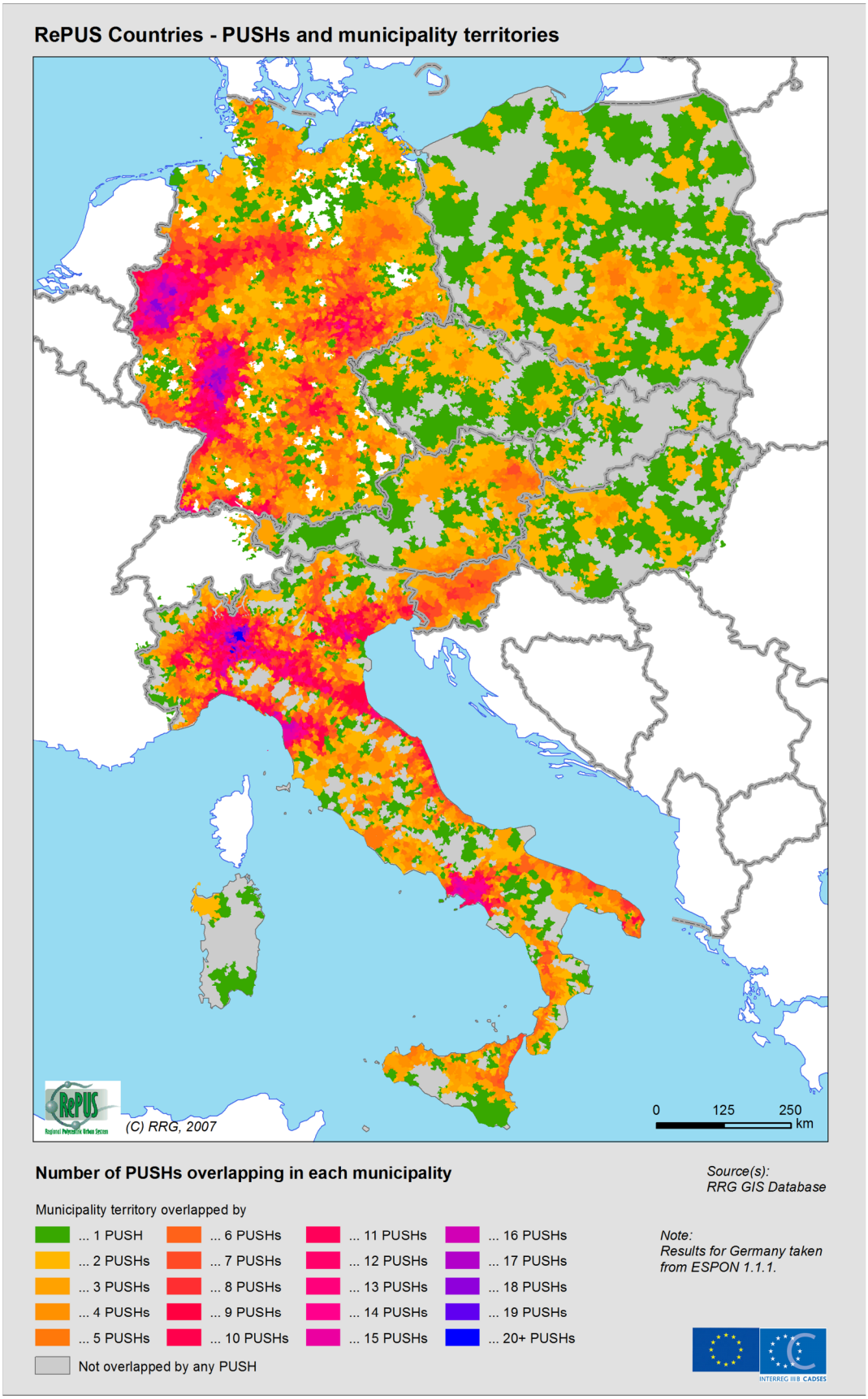


Figure 38. Number of PUSHs (=Potential Urban Strategic Horizons) overlapping in each municipality (CADSES space).

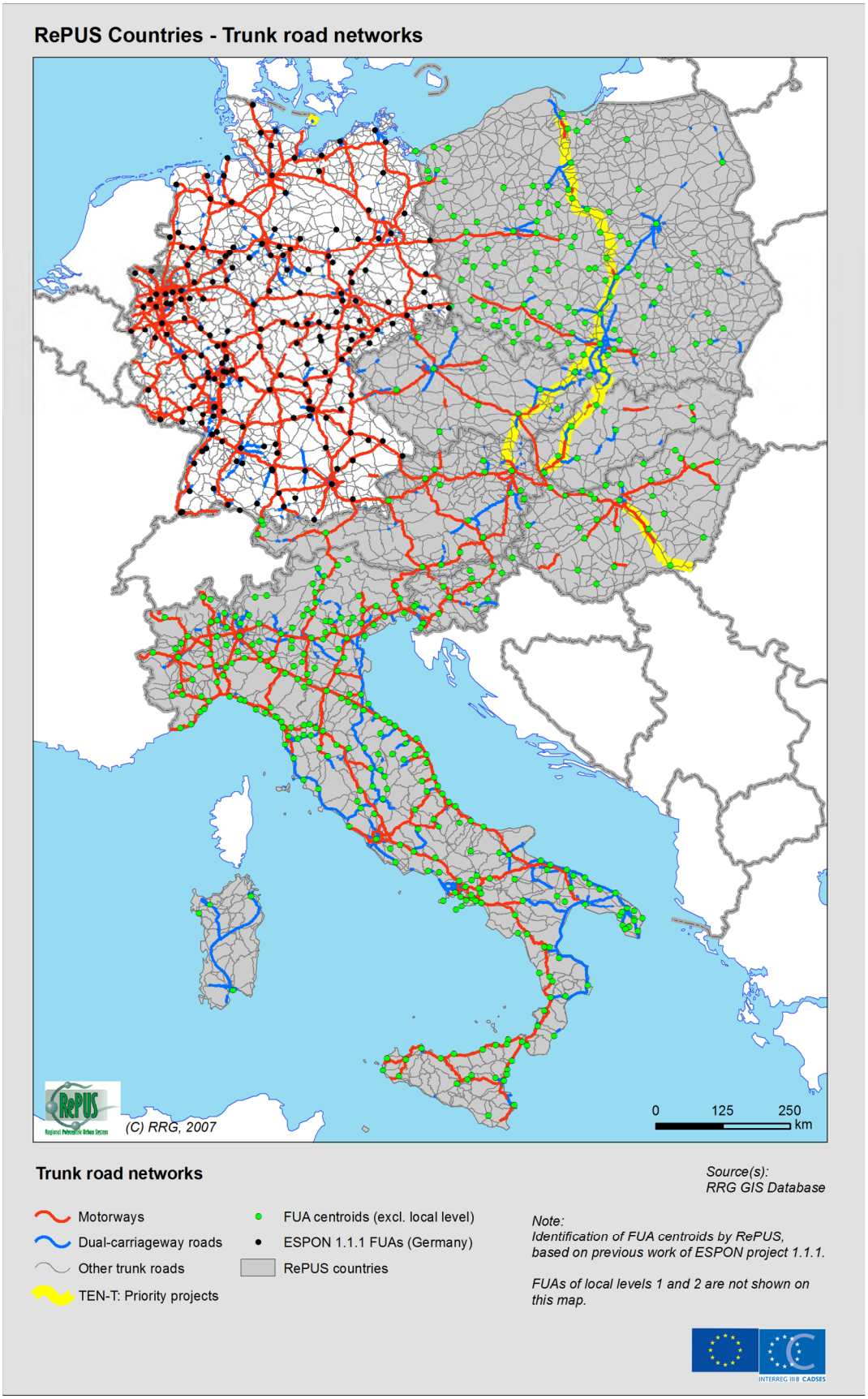


Figure 39. CADSES space: Road networks.

Further Information

Further information on the overall *RRG GIS Database* including other datasets not describe in this document can be found at the RRG webpage at

http://www.brrg.de/database.php?language=de

Database orderings or questions on the *RRG GIS Database* should be addressed to

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Data sources used for setting up the RRG GIS Database are listed in the following section, differentiated by EC Document, data sources for all modes, and data sources for the individual modes.

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Datasets
Trans-European Transport Networks
Administrative Boundaries
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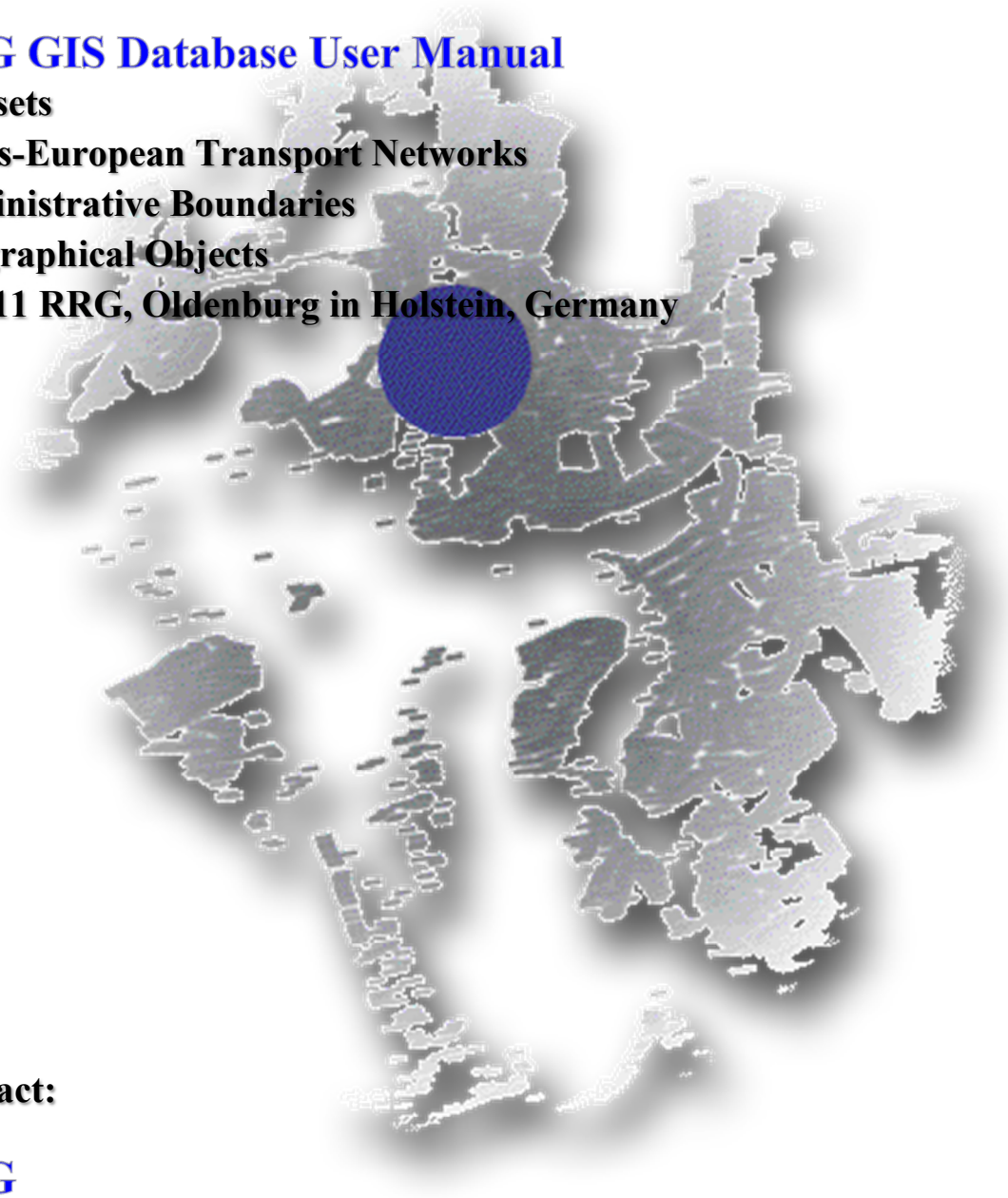

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