Výskumný ústav dopravný

Strategic Plan for Transport Development in the Slovak Republic by the Year 2030 – Phase II

Environmental Report

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ABSTRACT

The submitted report contains an assessment of the impact of the "Strategic Plan for Transport Development in the Slovak Republic by the Year 2030" on the environment and human health. The strategic plan is a long-term strategic document that aims to set an effective direction for development of the transport sector and determines a way of realizing this development vision. It is an output of Phase II of the preparation of the strategy for transport development in the Slovak Republic up to 2030 and represents the fulfilment of conditions stipulated ex ante. The customer for this strategic document is the Ministry of Transport, Construction and Regional Development of the Slovak Republic.

The Environmental Report has been developed in line with Act No. 24/2006 on Environmental Impact Assessments and on the Amendment and Supplements to Certain Acts, as amended (hereinafter referred to as the "Act") in the scope determined pursuant to Section 8 (3) of the Act. The Environmental Report contains an elaboration of all clauses stated in Annex No. 4 to the Act and deals with all issues determined by the scope of evaluation issued by the Ministry of Transport, Construction and Regional Development of the Slovak Republic and the Ministry of Environment on 12th April 2016. At the same time, the Environmental Report drawn up in August 2016 considers all positions and statements sent as notification on the strategic document and on the scope of the assessment.

The outcome of the assessment is an evaluation of the impact of the strategic plan and any significant impact of the plan's measures on the environment and human health and recommendations for the prevention, elimination and minimizing of and compensation for any negative impact. The annex to the Environmental Report is a reasonable evaluation of the strategic plan's impact on the territories of the Natura 2000 system pursuant to Article 6.3 of Directive 92/43/EEC (Habitats Directive) developed in line with the Methodology for Assessing the Significance of Impacts of Plans and Projects in the Territory of the Natura 2000 System in the Slovak Republic Developed by the State Nature Conservation Organization of the Slovak Republic 2014.

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BAU 2030	Transport model of the Slovak Republic for the state in 2030 without implementing this strategy
ESEU	evaluated soil ecological units
BBc	Biosphere Bio-centre
GIS	Geographic Information System
HIA	Health risk assessment
PS	Protected site
PLA	Protected landscape area
PLE	Protected landscape element
PAN	Protected areas of nature
PWMA	Protected water management area
PBA	Protected bird area
MTCRD SR	Ministry of Transport, Construction and Regional Development of the Slovak Republic
MS	Mineral springs
UHZ	Urban heritage zone
MoEnv SR	Ministry of Environment of the Slovak Republic
NHIC	National Health Information Centre
NP	National park
NNH	National natural heritage
NNR	National natural reserve
SrBc	Supra-regional bio-centre
SrBcor	Supra-regional bio-corridor
PZ	Protection zone
PAH	Polycyclic aromatic hydrocarbons
PBc	Provincial bio-centre
NH	Natural heritage
NR	Natural reserve
WCB	Water course basin
HZ	Heritage zone
Q100	Water course flow volume during a hundred-year flood
Q1000	Water course flow volume during a thousand-year flood
RBc	Regional bio-centre

RBcor	Regional bio-corridor
WFD	Water Framework Directive
SD	Strategic document
SHMI	Slovak Hydrometeorological Institute
ER	Environmental report
SPTD SR 2030	Strategic Plan for Transport Development in the Slovak Republic by the Year 2030
SR	Slovak Republic
ABT	Administrative basin territory
DŠ SGI	Dionýz Štúr State Geological Institute
AEI	Area of European importance
UNESCO	United Nations Educational, Scientific and Cultural Organization
TSES	Territorial system of ecological stability
VOC	Volatile organic compounds
PPT	Public passenger transport
RHZ	Rural heritage zone
WS	Water/water management sources

Explanation of terms

The process of SEA (Strategic Environmental Assessment) is, in this Environmental Report, understood as the process of evaluating the impact of strategic documents implemented pursuant to the second part of Act No. 24/2006 Coll., on Environmental Impact Assessments and on the Amendment and Supplements to Certain Acts, as amended.

The process of EIA (Environmental Impact Assessment) is, in this Environmental Report, understood as the process of evaluating proposed activities to be performed pursuant to Act No. 24/2006 Coll.

The Building Act is, in this Environmental Report, understood as Act No. 50/1976 Coll., on Spatial Planning and the Building Code, as amended.

The Water Act is, in this Environmental Report, understood as Act No. 364/2006 Coll., on Water and on the Amendment of and Supplements to Act No. 372/1990 Coll., on Offences, as amended (the Water Act).

The EIA Act is, in this Environmental Report, understood as Act No. 24/2006 Coll., on Environmental Impact Assessments and on the Amendment of and Supplements to Certain Acts, as amended.

The Nature and Landscape Conservation Act is, in this Environmental Report, understood as Act No. 543/2002 Coll., on Nature and Landscape Conservation, as amended;

I. BASIC INFORMATION ABOUT THE CUSTOMER

I.1 DESIGNATION

Ministry of Transport, Construction and Regional Development of the Slovak Republic (hereinafter referred to as the "MTCRD SR")

I.2 REGISTERED OFFICE

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It is possible to consult on the issue of the assessed strategic national impact document pursuant to Section 63 (1) of Act No. 24/2006 Coll., on Environmental Impact Assessments and on the Amendment of and Supplements to Certain Acts, as amended (hereinafter referred to as the “Act”), apart from any consultations separately stipulated in the Act, such as public discussions, submissions of written positions on the notification and/or the scope of assessment, on the Environmental Report etc., throughout the whole process of the strategic document assessment.

The time of consultations shall be determined ad hoc by the contact person and according to the requirements and agreements of entities interested in consultations.

II. BASIC INFORMATION ON THE STRATEGIC DOCUMENT

II.1 TITLE.

Strategic Plan for Transport Development in the Slovak Republic by the Year 2030 ("SPTD SR 2030")

II.2 TERRITORY (SR, REGION, DISTRICT, MUNICIPALITY).

SPTD SR 2030 is a strategic document with national impact covering the whole territory of the Slovak Republic.

II.3 AFFECTED MUNICIPALITIES.

The affected municipalities are the individual municipalities subsumed into 79 districts and 8 regions belonging to the territory of the Slovak Republic.

II.4 AFFECTED BODIES.

Government Office of the Slovak Republic
Ministry of Finance of the Slovak Republic
Ministry of Economy of the Slovak Republic
Ministry of Culture of the Slovak Republic
Ministry of Defence of the Slovak Republic
Ministry of Agriculture and Rural Development of the Slovak Republic
Ministry of Labour, Social Affairs and Family of the Slovak Republic
Ministry of Justice of the Slovak Republic
Ministry of Education, Science, Research and Sports of the Slovak Republic
Ministry of the Interior of the Slovak Republic
Ministry of Foreign and European Affairs of the Slovak Republic
Ministry of Health of the Slovak Republic
Ministry of Environment of the Slovak Republic
Bratislava Self-governing Region
Trnava Self-Governing Region
Trenčín Self-Governing Region
Banská Bystrica Self-governing Region
Nitra Self-governing Region
Žilina Self-governing Region
Prešov Self-governing region
Košice Self-Governing region
Association of Towns and Communities of Slovakia
The Union of Towns and Cities of Slovakia, Biela 6

The Union of Transport, Post Offices and Telecommunications of the Slovak Republic
The Slovak Chamber of Commerce and Industry
The Association of Trade Unions, Transport, Post Offices and Telecommunications
The Confederation of Trade Unions of the Slovak Republic
The Federation of Employer's Associations of the Slovak Republic
The National Union of Employers
The Slovak Association of Construction Entrepreneurs
The Public Health Authority of the Slovak Republic, Trnavská cesta 52, 826 45 Bratislava
Slatinka Association, ul. A. Sládkovičova 2, P.O. Box 67, 960 01 Zvolen
The Railway Workers' Union, Vajnorská 1, 831 04 Bratislava
RNDr. Anna Zemanová, Koncová 25, 831 07 Bratislava

II.5 AFFECTED NEIGHBOURING COUNTRIES.

Czech Republic, Austria, Hungary, Ukraine, Poland

II.6 APPROVING BODY.

The proposals of the strategic document shall be approved on the national level by the government of the Slovak Republic.

II.7 THE CONTENT AND MAIN AIMS OF THE STRATEGIC DOCUMENT AND ITS RELATIONSHIP TO OTHER STRATEGIC DOCUMENTS.

The Strategic Plan of Transport Development in the Slovak Republic up to 2030 is a long-term strategic document that sets an effective direction for transport sector development and a method for realizing its development vision. It is an output of Phase II of the preparation of the strategy for transport development in the Slovak Republic up to 2030 and represents the fulfilment of conditions stipulated ex ante. The funding of developmental activities by European funds in the period between 2016 – 2020 is thus, in this document or its approval by the EC, directly dependent.
The document was drawn up in line with the Action Plan for the Preparation of the Program Period of 2014-2020 in the Sector of Transport, as approved at the second meeting in November 2012 by the Working Group for programming in the sector of transport in the program period of 2014-2020.

Key issues in the transport sector

Key problems in the transport sector were identified based on extensive analysis. The analytic part focused on individual transport modes, divided into road, railway, public passenger, water and civil aviation transport, and on cross-sectoral transport, which limit multimodal functionality in passenger and cargo transport.

From the global perspective, it is necessary to mention one of the basic problems faced by the transport sector in Slovakia: the long-term negative development in the division of transport works in favour of roads, meaning mainly individual (non-public) transport. Neighbouring European countries with similar economic development face the same problem.
While in 1995, public and non-public transport output was almost the same, in 2014 public transport represented only one quarter of total transport output. A logical consequence of this situation is a disproportionate increase in individual transport, which represents a burden for road infrastructure and the environment. A not insignificant negative effect of overloaded roads are time losses due to congestion, which indirectly impacts economic activity.

Vision and objectives of the transport sector

The identification of the vision and objectives of the Slovak transport sector was aligned with EU and national legislative development documents setting global vision and objectives and the requirements of individual transport subsectors identified as part of the performed analyses. The vision and goals of the transport sector of the Slovak Republic thus reflects European requirements as well as national interests and the problems faced by the sector.

This approach ensures a sufficient level of integration of the Slovak Republic as part of the European transport area and the progressive elimination of internal problems and requirements.

The vision of transport sector development by 2030 is a "sustainable integrated multimodal transport system meeting the economic, social and environmental needs of society and contributing to the full integration of the Slovak Republic in the European Economic Area".

Global strategic objectives were set in analogy to the above-stated vision for the Slovak transport sector. They reflect trends and requirements stipulated by EU and national strategic, i.e. analytical documents.

- Strategic Global Objective 1 (SGO 1): Secure equivalent accessibility of urban units and industrial zones supporting economic growth and social inclusion in all Slovak regions (in both national and European scales) using a non-discriminatory approach to infrastructure and services.
- Strategic Global Objective 2 (SGO 2): The long-term sustainable development of the Slovak transport system with an emphasis on the generation and effective utilization of funds in connection with the real needs of users.
- Strategic Global Objective 3 (SGO 3): Increased competitiveness in personal and freight transport (the opposite poles of road transport) by setting the relevant operational, organizational and infrastructural parameters leading to an effective integrated multi-modal transport system supporting the economic and social needs of the Slovak Republic.
- Strategic Global Objective 4 (SGO 4): Increased safety and security of transport leading to a permanent guarantee of safe mobility through safe infrastructure, introducing new technologies/procedures while using preventive and control mechanisms.

- Strategic Global Objective 5 (SGO 5): Decreasing environmental and socioeconomic impact of transport (including climate change) by environment monitoring, effective planning/realization of infrastructure and reducing conventionally fuelled transport means, i.e. use of alternative fuels.

Horizontal specific objectives and specific objectives for individual transport modes have been set.

Horizontal specific objectives

- SHO1: Ensure preparation and conditions for systematic and conceptual transport development in the Slovak Republic.
- SHO2: Improved safety, efficiency and sustainability of transport operations by strengthening new technologies
- SHO3: Systematic reduction of socio-economic and environmental impacts of transportation
- SHO4: Consistently increased parameters of safety and security of spot and linear elements of the traffic system

Modal specific objectives

Road transport

- Sroad1: Secure accessibility of all Slovak regions through efficient and sustainable infrastructure

Railway transport

- Srail1: To strengthen the role of the railway as a haulage transport mode in the system of public mass transport where justifiable.
- Srail2: Size up the share of railway freight in the overall traffic performance
- Srail3: Improvement of quality and environmental impact of railway traffic

Public passenger and non-motor transport

- Spp1: To make attractive public and non-motor transport a social certainty everywhere and a natural choice for roads in urban agglomerations.
- Spp2: Reorganize the institutional arrangement of public transport
- Spp3: To integrate, geographically and technically, public transport in conurbations and their environs and at national level.
- Spp4: Secure improved conditions for bicycle and pedestrian traffic at local and regional levels

Water transport

- SW1: To improve sailing conditions on the Danube when and where proven to be justifiable and viable.
- SW2: Improving Slovakia's public harbours system
- SW3: Setting the justifiability and conditions for development, modernization and reconstruction of other monitored waterways in Slovakia

Sector Strategy Performance Measures

Measures to perform the strategy were identified based on global trends, international treaties and the obligations of the Slovak Republic and issues identified in the analytic part of the strategy preparation. Each comprises a set of activities, initiatives or projects integrated based on the nature of the objective, i.e. issue to be solved. As in other parts of this strategic document, measures are also divided in terms of infrastructure, organization, operation, and individual transport modes.

The set of measures as a whole represents a tool for achieving the global strategic objectives, specific objectives and the development vision for the transport sector up to 2030.

Strategy Definition Principle

The strategy for transport development in the Slovak Republic up to 2030 is based on the principle “from analysis to design”, which was consistently applied during the whole preparation process. Based on problems identified in the analytical part, the target development vision by 2030 was defined in connection with European strategic and development documents.

Achieving the vision is structured into number of levels – global strategic objectives, specific objectives and measures. The strategy is based on setting “strategic priorities”, i.e. measures assessed and prioritized with regard to their potential benefit for the transport sector and economic efficiency. Each group of priorities is then assigned strategic principles that need to be considered within the implementation process.

The relationship between SPTD SR 2030 and other strategic documents

The development of the transport sector is a key process from the perspective of the national economy, the consequences of which will affect a range of other sectors. Therefore related activities must be coordinated and the transport sector developed effectively so that it generates important synergies in connection with other sectors. Therefore important national as well as European development documents have been identified that need to be considered when developing transport sector strategy.

European strategic and conceptual documents

Conceptual and strategic EU documents in the field of transport lead the way in developing transport, security, environment etc. This mainly involves the following:

- White paper: A plan of the single European transport area – creation of a competitive transport system with effective use of sources, KOM (2011) 144 in its final wording
- Europe 2020 A strategy for smart and sustainable growth supporting integration, KOM (2010) 2020 in its final wording

- Agenda 2030
- The plan of transition to a competitive low-carbon economy by 2050, KOM (2011) 112 in its final wording

Apart from the above-stated documents, we can further discuss a series of modally specific materials, such as:

- The action plan to support the deployment intelligent transport systems (ITS) KOM (2008) 886 in its final wording
- Green paper: On the way to new cultural urban mobility (2007) and its Action Plan (2009)
- Resolution of the European Parliament on 27 September 2011 on European road transport safety in 2011-2020
- Inland water transport and the Natura 2000 system – sustainable development and management of inland water courses in the context of EU Birds and Habitats Directives
- The joint position on the main principles of development for inland navigation and environmental protection in the Danube river basin
- Danube Strategy

National strategic and conceptual documents

In the analogy to the above-mentioned, further key strategic and conceptual documents on the national level are listed. This mainly involves the following documents:

- Transport Policy of the Slovak Republic by 2020
- Program Declaration of the Government of the Slovak Republic of 2016
- Strategy for Transport Development of the Slovak Republic by 2020
- Strategic Plan for Transport Development in the Slovak Republic by 2020
- Partnership Agreement of the Slovak Republic for 2014-2020
- Operational Program Integrated Infrastructure 2014-2020
- The concept of territorial development of Slovakia (CTD) and its implementation

III. BASIC DATA ON THE CURRENT STATE OF THE ENVIRONMENT IN THE TERRITORY AFFECTED

III.1 INFORMATION ON THE CURRENT STATE OF ENVIRONMENT, INCLUDING HEALTH AND PROBABLE HEALTH DEVELOPMENT, IF THE STRATEGIC DOCUMENT IS NOT IMPLEMENTED, AND THE CHARACTERISTICS OF THE ENVIRONMENT, INCLUDING HEALTH, IN AREAS THAT WILL PROBABLY BE SIGNIFICANTLY AFFECTED.

III.1.1 AIR

The proposed strategy contains transport measures dispersed over the whole area of the Slovak Republic. Its impact on air quality will thus be national, focused mainly on the area of the proposed changes in transport infrastructure, especially roads (the burdens on existing roads which will probably be lightened in the majority of cases, and the area of proposed new constructions where, on the contrary, pollution will increase).

The n impact of air pollutants from transport differs on local and regional levels. This always involves low emission sources, meaning pollutants have an effect at low altitudes above ground level. Diffusion in the air and the reach of air pollutants from transport is limited when compared to other sources of air pollution. Pollutants thus affect inhabited areas directly in the breathing zone of inhabitants. Emissions from transport have a primarily local effect; that is, mainly within the first hundred meters from the road (in terms of impact significance, particulate matter such as nitrogen oxides and polycyclic aromatic hydrocarbons are decisive). From the regional aspect, we must not ignore the significant impact of emissions of nitrogen oxides and evaporable organic substances from car transport on the origin of secondary aerosol, which is responsible for a significant share of the total concentration of particulate matter pollutants in heavily urbanized areas with developed transport.

A negatively cumulative effect of many roads within larger urbanized territorial units often has a crucial influence on the total pollution impact of transport. Due to this interaction in larger conglomerations, particulate matter pollution limits (mainly the permitted number of excesses of the maximum daily values) are often exceeded and at the sites of busy road junctions, even nitrogen oxide limits are exceeded (the average annual concentration). With the cumulative impact of line sources, the contribution of transport emissions of polycyclic aromatic hydrocarbons is of greater importance in larger conglomerations, but not significant in rural housing areas. Transportation may thus make up the dominant share of the total emission concentration of benzo(a)pyrene in towns and cities.

Apart from the above-mentioned pollutants, transportation is also the source of many other polluting substances, e.g. benzene and other volatile organic substances and carbon monoxide. Relevant emission limits on these substances are met on Slovak territory including a reserve.

Current state of air quality

Based on data from the annual reports of SHMI for 2010-2014 and based on the set of data measured by the emission monitoring network in 2015, an analysis of the current air quality was carried out as part of SEA documentation. Its findings are contained in the following text.
A total of 35 emission monitoring sites in the Slovak Republic were evaluated and divided into 4 groups for the purposes of the SEA assessment:

- stations representing the situation in strongly urbanized areas (larger settlements) where the air quality is determined by a complex of several pollution sources with significant automobile traffic (including transport hot-spots): Bratislava – Kamenné nám., Bratislava – Trnavské mýto, Bratislava – Jeséniova, Bratislava – Mamateyova, Košice – Amurská, Košice – Štefánikova, Banská Bystrica – Štefánikovo nábr., Banská Bystrica – Zelená, Zvolen – J. Alexyho, Žiar nad Hronom – Jilemnického, Malacky, Krompachy – SNP, Nitra – Janka Kráľa, Humenné – Nám. slobody, Prešov – Arm. gen. L. Svobodu, Handlová – Morovianska cesta, Prievidza – Malonecpalská, Trenčín – Hasičská, Trnava – Kollárova, Martin – Jesenského, Ružomberok – Riadok, Žilina – Obežná, Nitra – Štúrova;
- Stations representing smaller human settlements with an estimated lower share of automobile transport, the nature of which more closely resembles a regional background representing inhabited rural areas with smaller industrial impact: Hnúšťa – Hlavná, Strážske – Mierová, Nitra – Janíkovce, Vranov nad Topľou – M. R. Štefánika, Bystričany – electricity distribution plant, Senica – Hviezdoslavova, Topoľníky – Aszód;
- Stations near important industrial sources with an estimated higher share of these sources on the total emission concentration when compared to other parts of Slovakia: Jelšava, Jesenského, Veľká Ida – Letná;
- Stations representing a regional background in uninhabited "unpolluted" areas: Stará Lesná – AI SAS, Kolonické sedlo – observatory, Starina – water reservoir.

The assessment considered the fact that each division of sites has its restrictions and uncertainties. Some sites are borderline in nature, i.e. they could have also been included in another group (e.g. Strážske, Handlová, where increased industrial impact can be expected, but considering its intensity, the sites were left in the group with other settlements and not considered predominantly industrial).
The site of air pollution monitoring stations on the territory of the Slovak Republic is documented in the following image.

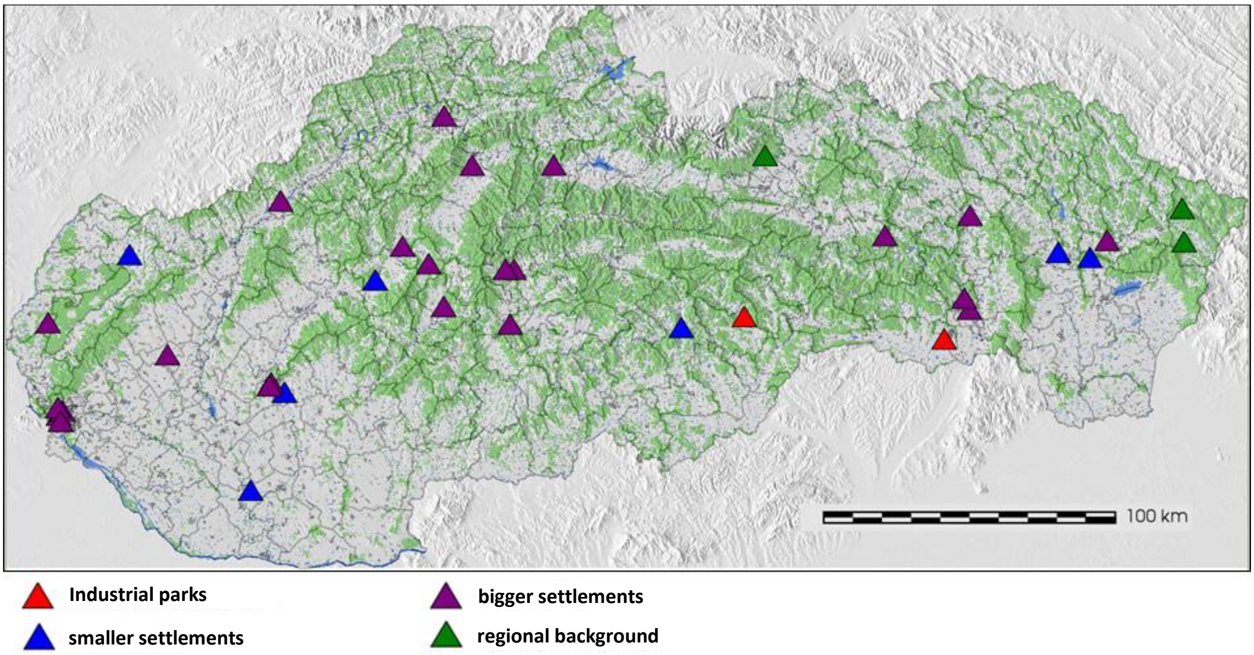


Fig. III-1 Location of air pollution monitoring stations

Source: SHMI, Report on Air Quality and the Proportion of Air Pollution from Individual Sources in the Slovak Republic for 2010-2014

The assessment focuses on PM_{10} and $PM_{2.5}$ particulate matter and nitrogen oxides as substances whose emission concentration is most influenced by the automobile industry. The assessment of the emission situation of benzo(a)pyrene is very problematic, since very little relevant information is available. The air pollution measurements take place at 4 sites: Veľká Ida, Krompachy, Prievidza, Trnava. Until 2012, pollution concentration measurements of benzo(a)pyrene also took place at other sites: Bratislava, Trnavské mýto, Bratislava – Jeséniova, Nitra, Trenčín, Starina. All this information was used for the SEA, but its detailed nature does not allow for an assessment in the same scope as for the above-named substances.

Considering the scope of available air pollution data, the main attention of the assessment focuses on average annual concentrations. The maximum short-term values (in the case of the evaluated substances, this means daily and hourly concentrations) are evaluated with a lower level of detail, but their values in a specific period depend on many local and often short-term factors in the field (anthropogenic as well as climatic). It is largely true that, for systemic changes in the sources of air pollution leading to a reduction in average annual concentrations of pollution, it is possible also to expect a reduction in the highest short-term values or a reduction in the number of days or hours with an exceeded air pollution limit.

Suspended particles and nitrogen oxides

To limit the effect of fluctuation of concentrations due to natural year-on-year changes in climatic conditions, a five-year average of emission concentrations at the measured site was calculated for each pollutant. An overview of these values for 2011-2015 is contained in the following table. It is not possible to base the assessment of the valid emission limits exceeded only on this five-year average, but the size of fluctuation in pollution concentrations (the dispersion of measured values) in the assessed period must inevitably be considered. The table thus also includes the calculated upper limit of the confidential interval for the average level of significance of 90% (UCL95). If this value is lower than the value of the relevant emission limit, the conclusion can be reached that, unless there is a change in the emissions from pollution sources, the pollution limits will not be exceeded at the site with a probability of 90%.

Tab. III-1 Five-year averages of the annual pollution concentrations of relevant substances (µg.m-3)

Site	PM_{10}		$PM_{2.5}$		NO_2	
	2011–2015 arith. average	2011–2015 UCL90	2011–2015 arith. average	2011–2015 UCL90	2011–2015 arith. average	2011–2015 UCL90
Air Pollution limit:	40	40	25	25	40	40
Unit:	$\mu g.m^{-3}$	$\mu g.m^{-3}$	$\mu g.m^{-3}$	$\mu g.m^{-3}$	$\mu g.m^{-3}$	$\mu g.m^{-3}$
Banská Bystrica, Štefánikovo nábr.	36.3	41.2	29.4	40.3	41.3	49.7
Banská Bystrica, Zelená	-	-	18.4	20.8	7.3	8.7
Bratislava, Jeséniova	24.8	26.8	15.7	-	16.6	20.1
Bratislava, Kamenné nám.	25.6	27.7	-	-	-	-
Bratislava, Mamateyova	29.5	31.6	22.5	-	26.0	29.9
Bratislava, Trnavské mýto	35.1	38.1	-	-	42.1	47.6
Bystričany, Electricity Distribution Station	34.0	36.4	22.7	24.6	-	-
Handlová, Morovianska cesta	26.2	29.0	20.1	23.4	-	-
Hnúšťa, Hlavná	27.6	30.0	18.8	21.2	-	-
Humenné, Nám. slobody	28.1	31.7	21.6	24.1	14.7	-
Jelšava, Jesenského	40.0	47.7	30.6	37.4	13.8	-
Kolonické sedlo, Observatory	19.5	23.3	13.7	16.3	-	-
Košice, Amurská	27.7	30.8	20.0	22.6	-	-
Košice, Štefánikova	33.9	36.4	22.9	25.2	30.1	35.1
Krompachy, SNP	32.2	34.7	25.6	28.3	12.4	15.4
Malacky	25.4	26.5	-	-	23.7	30.2
Martin, Jesenského	29.0	31.9	19.1	21.8	26.6	31.4
Nitra, Janíkovce	29.6	34.5	18.7	21.3	13.5	15.2
Nitra, Janka Kráľa	-	-	-	-	-	-
Nitra, Štúrova	29.6	33.4	29.5	41.3	36.3	42.1
Prešov, Arm. gen. L. Svobodu	34.5	37.2	23.1	25.9	39.4	42.9

Site	PM_{10}		$PM_{2.5}$		NO_2	
	2011–2015 arith. average	2011–2015 UCL90	2011–2015 arith. average	2011–2015 UCL90	2011–2015 arith. average	2011–2015 UCL90
Prievidza, Malonecpalská	30.9	35.0	23.1	27.5	21.6	-
Ružomberok, Riadok	38.2	43.8	25.4	28.8	25.9	-
Senica, Hviezdoslavova	29.0	30.2	19.1	22.1	-	-
Stará Lesná, AI SAS, EMEP	18.1	20.5	11.8	13.1	7.2	-
Starina, Reservoir, EMEP	-	-	-	-	-	-
Strážske, Mierová	29.2	31.9	21.2	22.5	-	-
Topoľníky, Aszód, EMEP	23.7	26.5	19.3	22.3	8.0	8.9
Trenčín, Hasičská	34.0	36.6	22.8	25.8	26.7	30.9
Trnava, Kollárova	31.0	33.6	21.4	23.2	29.4	36.2
Veľká Ida, Letná	41.4	43.1	25.6	28.3	-	-
Vranov nad Topľou, M. R. Štefánika	27.3	29.7	20.2	22.9	-	-
Zvolen, J. Alexyho	25.5	29.0	20.3	23.4	-	-
Žiar nad Hronom, Jilemnického	22.4	24.3	17.5	19.9	-	-
Žilina, Obežná	34.8	37.2	26.2	30.4	21.1	26.1

Explanations: ...considering the insufficiency of the data measured (more detailed data do not exist), the value cannot be calculated

Source: SHMI, Report on Air Quality and the Proportion of Air Pollution from Individual Sources in the Slovak Republic for 2010-2014; SMHI provided tabular data for the year 2015

The emission limits for nitrogen oxides exceeded at the sites Banská Bystrica – Štefánikovo nábr., Bratislava – Trnavské mýto, Nitra – Štúrova and Prešov – Arm. gen. L. Svobodu can be assigned to the impact of automobile transport with a high level of probability.

The reasons why the average annual PM_{10} particulate matter emission limits were exceeded are more complex. It is only to be expected that the relevant limits will be exceeded to a greater extent at the sites Banská Bystrica – Štefánikovo nábr. and Ružomberok – Riadok. In other places, this is mostly caused by industry.

In the case of $PM_{2.5}$ particulate matter, transportation significantly contributes to exceeded pollution limits at the following sites: Banská Bystrica – Štefánikovo nábr., Košice – Štefánikova, Nitra – Štúrova, Prešov – Arm. gen. L. Svobodu, Ružomberok – Riadok, Trenčín – Hasičská, Žilina – Obežná a Prievidza – Malonecpalská.

All in all, based on the average annual concentrations measured since 2010 as part of air pollution monitoring, it can be stated that the **burden of road transport is the main reason for exceeded pollution**

limits in towns of Bratislava, Banská Bystrica, Košice, Nitra, Prešov and Trenčín. It also significantly contributes to the exceedance of limits in the towns of Žilina, Ružomberok and Prievidza.

In terms of air protection, apart from the nitrogen oxide concentration, the issue of average annual concentrations of total nitrogen oxides (NO_x) is also important. The relevant pollution limit has been set for the protection of eco-systems. The assessment of compliance with this limit is relevant only in territories with sensitive eco-systems and only around busy roads, e.g. centres of larger settlements, highways and motorways and by road junctions on higher-level roads. In other places, there are no problems with compliance. Based on the assessor's professional estimate, it is to be expected that, in strongly urbanized locations with significant sources of nitrogen oxides, the share of NO_2 in NO_x can be expected to be at least 2/3 to 75%. At sites with low pollution (far from the sources of pollution) this share can reach 80-90%. The summary of five-year pollution concentration averages given in the table above suggests that, outside larger municipalities, all measured concentrations of NO_2 are below the value of 20 $\mu g.m^{-3}$. It is thus possible to estimate that the emission limit of NO_x of 30 $\mu g.m^{-3}$ is not exceeded at any site of emission measurements outside larger human settlements. It follows any NO_x emission limits potentially exceeded with a negative impact on eco-systems, can only be local on the territory of the Slovak Republic, in the close vicinity of some exceptionally busy road constructions. These small areas or potential measures to mitigate the impact of emissions can be identified considering the territorial measure of assessment identified in the EIA process, not in the submitted documentation. Due to the above reasons, total NO_x emissions are not subject to assessment in the following chapters of the documentation. In the Environmental Report, attention is focused on the significantly more serious situation of NO_2 in terms of pollution and health.

The exceedance of emission limits for the maximum daily and maximum hourly concentrations of the main substances relevant to automobile transport (the maximum daily concentrations of PM_{10} particulate matter and the maximum hourly concentrations of NO_2) are documented in the following table.

Tab. III-2 Five-year averages of maximum short-term emission concentrations of relevant substances ($\mu g.m^{-3}$)

Site	PM_{10}		NO_2
	2010–2014 arith. average	2010–2014 UCL90	2015 max.
Air Pollution limit:	50	50	200
Averaged over a period of:	24 hours	24 hours	1 hour
Unit:	$\mu g.m^{-3}$	$\mu g.m^{-3}$	$\mu g.m^{-3}$
Banská Bystrica, Štefánikovo nábr.	88	119	225
Banská Bystrica, Zelená	-	-	128
Bratislava, Jeséniova	16	25	142
Bratislava, Kamenné nám.	26	34	
Bratislava, Mamateyova	35	45	207

Site	PM_{10}		NO_2
	2010–2014 arith. average	2010–2014 UCL90	2015 max.
Bratislava, Trnavské mýto	39	62	208
Bystričany, Electricity Distribution Station	36	57	-
Handlová, Morovianska cesta	31	46	-
Hnúšťa, Hlavná	37	52	-
Humenné, Nám. slobody	18	27	89
Jelšava, Jesenského	56	61	37
Kolonické sedlo, Observatory	8	13	-
Košice, Amurská	29	46	-
Košice, Štefánikova	52	75	168
Krompachy, SNP	57	84	95
Malacky	43	62	101
Martin, Jesenského	39	63	180
Nitra, Janíkovce	26	47	249
Nitra, Janka Kráľa	19	42	-
Nitra, Štúrova	33	54	244
Prešov, Arm. gen. L. Svobodu	64	79	146
Prievidza, Malonecpalská	36	51	80
Ružomberok, Riadok	89	122	59
Senica, Hviezdoslavova	24	32	-
Stará Lesná, AI SAS, EMEP	3	5	29
Strážske, Mierová	36	49	-
Topoľníky, Aszód, EMEP	18	29	72
Trenčín, Hasičská	56	72	168
Trnava, Kollárova	42	53	236
Veľká Ida, Letná	101	118	-
Vranov nad Topľou, M. R. Štefánika	37	52	-
Zvolen, J. Alexyho	24	40	-
Žiar nad Hronom, Jilemnického	15	27	-
Žilina, Obežná	70	83	174

Explanations: ...considering the insufficiency of the data measured (more detailed data do not exist), the value cannot be calculated

Source: SHMI, Report on Air Quality and the Proportion of Air Pollution from Individual Sources in the Slovak Republic for 2010-2014; SHMI provided tabular data for the year 2015

Including the statistical level of uncertainty may lead to an exceeded pollution limit for the maximum daily values of PM_{10} particulate matter at similar sites as in the case of average annual concentrations of PM_{10} a $PM_{2,5}$. The situation at the sites Bystričany, Hnúšťa, Malacky, Martin – Jesenského, Trnava – Kollárova and Vranov nad Topľou can be considered as borderline.

Transportation hot-spots in the towns of Banská Bystrica, Bratislava, Nitra and Trnava are characterized by above-limit maximum daily values of nitrogen oxides.

The causes of exceeded short-term concentration pollution limits are similar to those of the above-stated average annual values.

Benzo(a)pyrene

The density of the monitoring network for benzo(a)pyrene pollution in the territory of Slovakia is smaller than for the above-stated substances. The results of measured sites for 2010-2014 (more recent data are not yet available) are included in the following table.

Tab. III-3 Five-year averages of average annual emission concentrations of benzo(a)pyrene ($ng.m^{-3}$)

Site	benzo(a)pyrene	
	2010–2014 arith. average	2010–2014 UCL90
Air Pollution limit:	1	1
Unit:	$ng.m^{-3}$	$ng.m^{-3}$
Bratislava, Trnavské mýto	0.9	1.1
Bratislava, Jeséniova	0.8	1.1
Veľká Ida, Letná	4.4	5.1
Krompachy, SNP	2.7	2.9
Nitra, Janka Kráľa	1.2	-
Prievidza, Malonecpalská	1.9	2.0
Trenčín, Hasičská	3.8	-
Trnava, Kollárova	1.1	1.2
Starina, Reservoir	0.3	-
Nitra, Štúrova	0.8	1.0

Explanations: ...considering the insufficiency of data measured (more detailed data do not exist), the value cannot be calculated

Source: SHMI, Report on Air Quality and the Proportion of Air Pollution from Individual Sources in the Slovak Republic for 2010-2014

Including the statistical level of uncertainty results, at all measured sites, in exceeding the emission level of benzo(a)pyrene, or the emission concentration is found to be borderline. This is a supra-regional problem common to all countries of the former Eastern bloc. The greatest exceedance traditionally occurs at the Veľká Ida site, which is significantly affected by the coke production at the U.S. STEEL factory.

In other measured sites, the exceedance is a result of the joint influence of transportation and local domestic heating using solid fuels. The proportion from these two groups of sources changes according to the size of settlements – in larger cities (Bratislava, Trnava), a relatively higher (probably dominant) proportion comes from transport, in smaller settlements (Krompachy, Prievidza) it is due to individual heating. Considering the sparsely distributed stations measuring benzo(a)pyrene, it should be noted that pollution limits for this substances are as likely to be exceeded both in surrounding areas and also in places where no measurements are carried out, mainly in badly ventilated communities in valleys where a high proportion of individual heating uses solid fuel.

Prior development of pollution

The arithmetical average of pollutant concentrations measured from 2010 at all pollution-monitoring stations in the territory of Slovakia for individual years is given in the following chart.

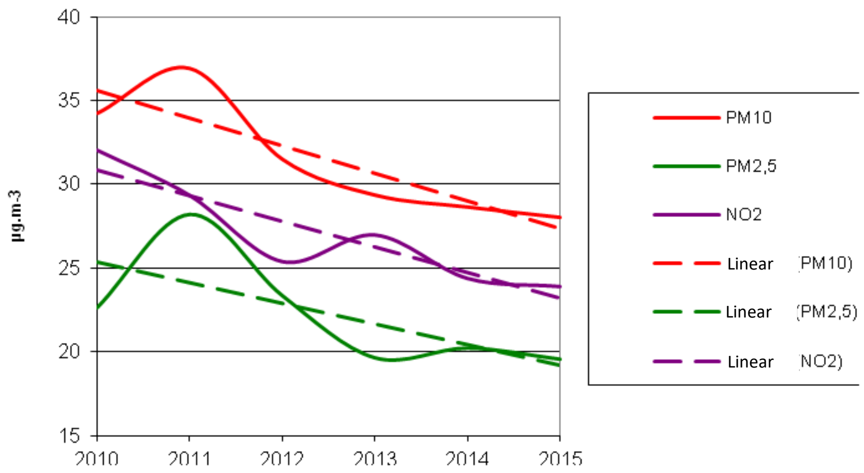


Fig. III-2 The average of average annual pollution concentrations from all pollution monitoring stations in the territory of the Slovak Republic (µg.m^{-3})

Source: analysis based on SHMI data (Report on Air Quality and the Proportion of Air Pollution from Individual Sources in the Slovak Republic for 2010-2014; SHMI provided tabular data for the year 2015)

Though the graph evaluating air quality is purely referential, since individual locations may differ in terms of tendencies in connection to local factors, the overall generally downward trend in the concentration of particulate matter and nitrogen oxides is clear.

A more detailed view is provided by the following chart containing the arithmetical average of pollutant concentrations calculated only from those stations where the pollution limit is exceeded (this calculation is stated above).

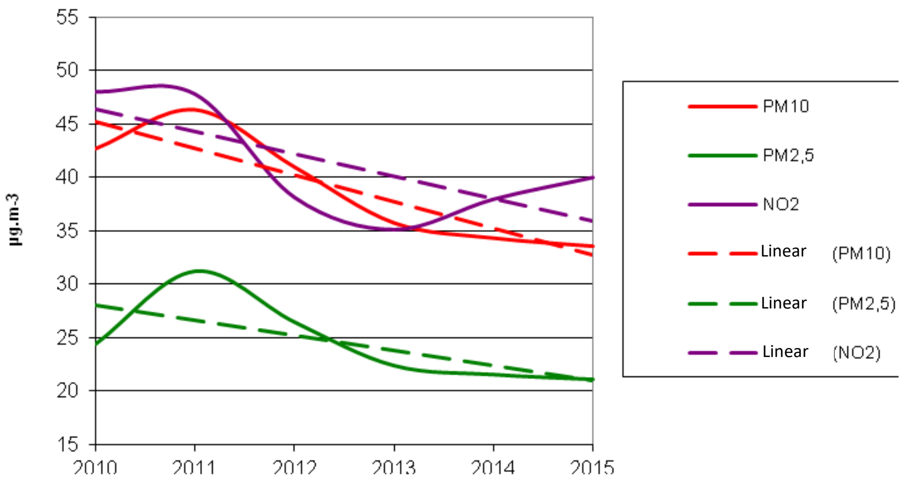


Fig. III-3 The average of average annual pollutant concentrations from stations with exceeded pollution limits ($\mu g.m^{-3}$)

Source: analysis based on SHMI data (Report on Air Quality and the Proportion of Air Pollution from Individual Sources in the Slovak Republic for 2010-2014; SHMI provided tabular data for the year 2015)

A comparison of the two given graphs suggests that, since 2010, pollutant concentrations have decreased most quickly at stations with unsatisfactory air quality.

This downward trend is very clear. The decline in PM_{10} and nitrogen oxide emission concentrations reached a rate of more than 2 $\mu g.m^{-3}$ per year in the assessed period at stations with exceeded limits of nitrogen oxides, and the rate of decline in concentrations of $PM_{2.5}$ particulate matter amounted to an average of 1.4 $\mu g.m^{-3}$ per year. This development is not predominantly caused by changes on the part of pollution sources, because the decrease in the measured concentrations occurred also at stations represented polluted sites (regional background) on which the impact of local sources is insignificant. A significant decrease occurred at these sites mainly in the case of PM_{10} particles. The situation is confirmed by the following graph.

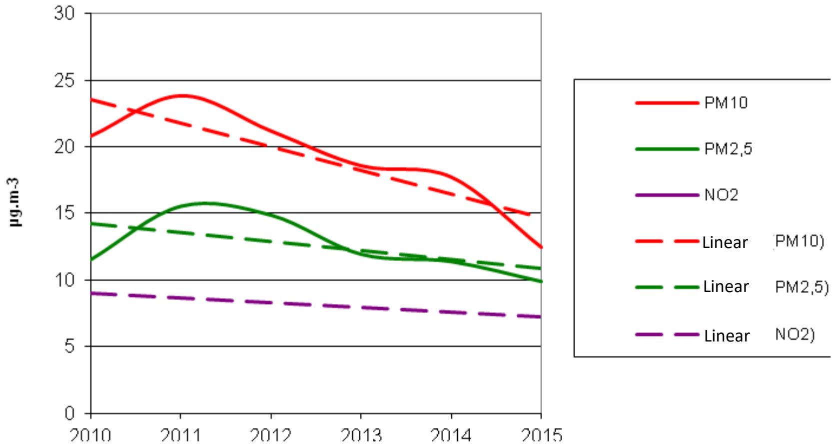


Fig. III-4 The average of average annual pollutant concentrations from basic stations (µg.m^{-3})
Source: analysis based on SHMI data (Report on Air Quality and the Proportion of Air Pollution from Individual Sources in the Slovak Republic for 2010-2014; SHMI provided tabular data for the year 2015)

The rate of the decline in average annual pollutant concentrations at the individual types of sites (their classification into relevant types is given above) is clear from the following table.

Tab. III-4 The average decrease in average annual concentrations in 2010–2015 in individual types of measured sites

	all stations except for basic stations	stations with exceeded limits	stations in smaller settlements	industrial stations	basic stations	unit
decrease in PM_{10}	1.6	2.5	1.2	1.4	1.8	µg.m^{-3}.year^{-1}
decrease in $PM_{2,5}$	1.2	1.4	0.8	1.2	0.7	µg.m^{-3}.year^{-1}
decrease in NO_2	1.5	2.1	N	N	N	µg.m^{-3}.year^{-1}

Explanations: N... trends cannot be assessed due to insufficient input data (at the majority of basic stations, nitrogen oxides are not measured)

Source: analysis based on SHMI data (Report on Air Quality and the Proportion of Air Pollution from Individual Sources in the Slovak Republic for 2010-2014; SHMI provided tabular data for the year 2015)

After deducting the decrease that has occurred since 2010 at basic stations, unrelated to changes on the part of pollution sources (linked to a change in the territory of Central Europe, not only in the Slovak Republic, probably due to the impact of climatic conditions), a **significantly downward trend has been demonstrated in the case of PM_{10} and $PM_{2.5}$ particulate matter at the stations currently most affected in terms of emissions** (see the following table).

Tab. III-5 The average decrease in average annual concentrations in 2010 – 2015 at individual types of measured sites after deducting the regional background decrease

	all stations except for basic stations	stations with exceeded limits	stations in smaller settlements	industrial stations	unit
decrease in PM_{10}	–0.2	0.7	–0.6	–0.4	$\mu g.m^{-3}.year^{-1}$
decrease in $PM_{2,5}$	0.5	0.7	0.1	0.5	$\mu g.m^{-3}.year^{-1}$
decrease in NO_2	N	N	N	N	$\mu g.m^{-3}.year^{-1}$

Explanations: N... trends cannot be assessed due to insufficient input data (at the majority of basic stations, nitrogen oxides are not measured)

Source: analysis based on SHMI data (Report on Air Quality and the Proportion of Air Pollution from Individual Sources in the Slovak Republic for 2010-2014; SHMI provided tabular data for the year 2015)

With regard to emissions, the trend in emissions from automobile transport is relevant from the perspective of the assessed strategy. A gradual modernization of the fleet is leading to a reduction in the quantity of exhaust emissions from automobile engines. However, in addition to exhaust gases, the re-suspension of dust from the roadway and the abrasion of brake linings, tires and road surfaces also significantly contribute to overall emissions from transport and is practically unaffected by vehicle modernization. In the long run, increases in the intensity of individual automobile transport will lead to a gradual increase in emissions. These conflicting forces jointly lead to a situation in which the trend in overall transport emissions can be characterized as stagnating in the longer term. Significant deviations from this overall trend occur at the local level, mainly due to infrastructural measures impacting on the local intensity of road transport.

Expected development if the strategy is not implemented

In the event that the assessed strategy is not implemented, a gradual decrease in exhaust emissions from automobile transport leading to a slight decrease in air pollutant concentrations at sites exposed to transport may be expected by 2030 (improvements in engines will be negatively compensated by an increase in transport intensities). A significant improvement can be expected in case of nitrogen oxides. The situation is more complicated in the case of particulate matter. Compared to prior development, the decrease in emissions of particulate matter will slow down as a result of the gradual increase in transport intensity combined with a growing share of abrasions in emissions from road transport. The relative decrease in transport emissions of particulate matter will be lower than for nitrogen oxides and the overall trend may thus even be sluggish.

By 2030, the emission situation will be significantly influenced by the completion of some transport structures, which are already contracted and are a part of the zero variant scenario is referred to as the 'BAU 2030'. Changes will occur mainly in the following areas:

- The southern and south-eastern Bratislava by-pass (relieving the centre and redirecting the emissions to a new high-capacity expressway);
- The highway link at the Bytča – Žilina – Vrútky – Krpeľany section (relieving Žilina, Martin and other smaller settlements along the current route);
- Linking D3 and I/11 before Žilina (relieving Žilina in terms of pollution);
- The new solution of the route Čadca – Jablunkov (Czech Republic), or Čadca – Zwardoń (PL) at the Čadca – Svrčinovec section (relieving Čadca and smaller settlements along the route in terms of pollution);
- Part of D1 on the northern Ružomberok by-pass (relieving the town and smaller municipalities along the route of the current road I/18);
- The south-western Prešov by-pass (linking D1 on the Poprad – Prešov route and D1 on the Prešov – Košice route (relieving the centre of Prešov in terms of pollution));
- The I/50 – D1 link at the Bidovce – Budimír section (redirecting some transit transport from Košice);
- Completion of the section of R2 between Detva and Zvolen (relieving the municipalities of Vígľaš and Zvolenská Slatina in terms of pollution);

In connection with the above-stated assessment of the current situation and considering the size of the population affected, these works for which completion is planned by 2030, can be considered as priority from the perspective of air protection:

- Part of D1 on the northern Ružomberok by-pass (relieving the town and smaller municipalities along the route of the current road I/18);
- The south-western Prešov by-pass (linking D1 on the Poprad – Prešov route and D1 on the Prešov – Košice route (relieving the centre of Prešov in terms of pollution));
- The I/50 – D1 link at the Bidovce – Budimír section (redirecting some transit transport from Košice);

If these works are not fully implemented, this may significantly affect the assessed impact of the strategy's zero variant on air quality and thus also on SEA outcomes which would consequently need to be revised.

All in all, a slight decrease in concentrations of nitrogen oxides can be expected in residential areas by 2030, and, less significantly, in other polluting substances produced by automobile transport along current busy roads. This improvement will be due to the modernization of the fleet (the use of new engines with lower emissions) as well as the completion of the above-mentioned road constructions.

Based on the prior development of air quality and the preparation of further strategies affecting air quality, the exceedance of air pollution limits at a number of sites can be predicted to continue until 2030 and at the very least over the next 10 years unless the strategy is implemented. This will mainly involve the centres of large cities as well as locations polluted by industrial activity, mainly related to the extraction of raw materials and iron and steel. Many places scattered throughout Slovakia can also be expected to exceed the pollution limit for benzo(a)pyrene (in the largest towns due to automobile transport, in smaller municipalities due to individual domestic heating using solid fuels, locally also near the coking plant of U.S. STEEL in Košice). **With regard to substances assessed in the submitted SEA documentation, we expect an overall slightly downward to sluggish trend in pollution concentrations in the territory of Slovakia over the medium-term.**

III.1.2 CLIMATIC CONDITIONS

<u>Greenhouse gas emissions</u>

Anthropogenic climatic change, caused by the production of greenhouse gases, is one of the most serious problems faced by society. The greenhouse gases are carbon dioxide (CO_2), methane (CH_4) and nitrous oxide (N_2O). Their danger lies mainly in their long-term presence in the atmosphere. The effect on atmospheric warming is expressed in terms of equivalent CO_2 representing the cumulative impact of all these greenhouse gases combined. According to the World Meteorological Organization, between 1990 and 2014, the impact of anthropogenic greenhouse gases increased by 36 %.

The Kyoto Protocol was signed in 1997 under the aegis of the UN as a response to the increase in production of greenhouse gases since 1992. This document defines the obligations of individual countries in reducing greenhouse gas emissions. The Slovak Republic undertook[1] to reduce emissions between 2008 – 2014 by 8.2 %. Another important step in reducing greenhouse gas emissions was the signing of the Paris Agreement[2] in April 2016, which is to limit CO_2 emissions by the year 2020. Within the EU, the aims to reduce emissions are defined in the document “Climatic and Energy Package 2020[3]”, which sets the obligation to reduce emissions from the baseline of 1990 in EU Member States by 20 % by the year 2020.

According to the last national inventory report on greenhouse gas emissions[4], total emissions in Slovakia reached the value of 40,673.62 Gg of equivalent CO_2 in 2014. This value represents a 45.5 % decrease in emissions when compared to the baseline year 1990. When compared to 2013, emissions decreased by 5 %. The decrease in 2014 was caused mainly by a decrease in the energy sector and a reduction in foreign

[1] Kyoto Protocol. 1997. Kyoto. 17 p. Available at: http://ghg-inventory.shmu.sk/documents.php
[2] Paris Agreement. 2016. New York. 16 p. Available at: http://www.minzp.sk/sekcie/temy-oblasti/ovzdusie/politika-zmeny-klimy/medzinarodne-zmluvy-dohovory/
[3] 2020 Climate & Energy Package. EU. http://ec.europa.eu/clima/policies/strategies/2020/index_en.htm
[4] Szemesová J. et al. (2016): National Inventory Report 2016. SHMI. Bratislava. 442 p.

trade and was equally due to higher use of renewable sources. The reduction in emissions is proof of successfully applied policies and measures, based on which the efficient use of energy sources was increased. Between 2008 and 2014, the production of greenhouse gas emissions in Slovakia decreased by 19 %.

Transport has a special position among emission-producing sectors, since it is very difficult to regulate with legislation. Moreover, in recent years, a shift from public passenger transport to individual automobile transport has been observed, and at the same time, the share of heavy transit freight transport has increased. Fuel consumption for road transport has significantly increased, while fuel consumption for the railways has decreased slightly. In relation to the decrease in greenhouse gas emissions it is, however, necessary to note that this decrease was caused mainly by improvements in sectors other than transportation. Just as in a large number of other EU states, transportation is a significant contributor to greenhouse gas production and moreover also demonstrates a deteriorating trend. The year 2014 was an exception, because transportation emissions decreased by 4 % when compared to 2013.

The share of transportation in overall greenhouse gas emissions was 16.1 % in 2014. The energy sector represented only 50.4 %, industrial production 22 %, agriculture 7.7 % and waste processing 3.8 %. Generally, the most important process in the creation of greenhouse gas emissions is the burning of fossil fuels, releasing as much as 80 % of equivalent CO_2. Overall emissions of equivalent CO_2 from the assessed road and railway transport amounted to 6,400.61 Gg, including CO_2 emissions of 6,321.57 Gg, in 2014. For methane, emissions reached 15.88 Gg and 63.16 Gg for nitrous oxide. CO_2 emissions thus represent 98.8 % of the total production of greenhouse gases from road and railway transportation.

Road transportation places first in the production of greenhouse gas emissions and makes up 97.7 % of greenhouse gas emissions from the assessed road and railway transportation. Emissions of equivalent CO_2 from road transportation were 6,255.13 Gg in 2014, of which 98.9 % was CO_2, 0.3 % was methane and 0.8 % was nitrous oxide. In road transport, greenhouse gas emissions by 36 % when compared to the 1990 baseline and by 1 % when compared to 2013.

Railway transportation places second in the production of greenhouse gas emissions and makes up 2.2 % of greenhouse gas emissions from the assessed road and railway transportation. Emissions of equivalent CO_2 from railway transportation were 145.49 Gg in 2014, of which 92.5 % was CO_2, 0.1 % was methane and 7.4 % was nitrous oxide. An increase in quality and energy efficiency and a decrease in negative environmental effects were observed in railway transportation thanks to EU subsidies. Thanks to modernization, railway fuel consumption decreased. There was a sudden reduction in emissions up to 2003. From this year, the decrease stabilized and its intensity decreased. Between 2013 and 2014, there was a 5.9 % decrease in greenhouse gas emissions from railway transportation.

Official SHMI data and the intensity of the transport model for the BASE 2014 scenario and the BAU 2030 scenario delivered by NDCon s.r.o. were used for a perspective on emission production. The calculation of emissions according to the BAU 2030 scenario was carried out by comparing the increase in intensity between this scenario and the BASE 2014 scenario. The ratio of intensity increase in 2030 compared to 2014 was the multiplied production of emissions in 2014 according to official SHMI data. Information on the expected development of greenhouse gas emissions by 2030 without the implementation of additional measures is included in Table III-6 below.

Tab. III-6 The expected development of greenhouse gas emissions from transportation in Slovakia by 2030 without implementing additional measures

Emissions			State in 2014	Outlook for "business-as-usual" scenario in 2030 (BAU 2030)	Difference
Total road transport	CO_2	kt	6,186.95	9,644.64	55.89%
	CH_4	kt	0.63	0.98	55.89%
	N_2O	kt	0.18	0.27	55.89%
Total railway transport	CO_2	kt	134.62	201.88	49.97%
	CH_4	kt	0.00	0.01	3.13%
	N_2O	kt	0.04	0.04	3.13%
Total road transport	**CO_2e**	**Gg**	**6,255.13**	**9,750.91**	**55.89%**
Total railway transport	**CO_2e**	**Gg**	**145.49**	**213.09**	**46.47%**

Source: The Transport Research Centre, a public research institution, based on source data from SHMI and NDCon s.r.o.

From the above, it follows that the continuation of current transport trends in Slovakia in 2030 will lead to a more than 55 % increase in total greenhouse gas emissions from road transport and to a more than 46 % increase in total greenhouse gas emissions from railway transport. This means, when following the BAU 2030 model scenario and without implementing additional measures, the Slovak Republic will have great difficulty in meeting the targets for reducing greenhouse gas emissions from transport defined at EU level as follows:

The White Paper "A Plan of the Single European Transport Area – the Creation of a Competitive Transport System Making Effective Use of Sources (2011)"[5]

- To reduce transport emissions of GHG by at least 20 % below 2008 levels by the year 2030.
- To reduce transport emissions of GHG by at least 60 % below 1990 levels by the year 2050.

Climatic-energy package 2020[6]

- To reduce total GHG emissions by 13 % compared to 2005 by 2020

[5] http://www.telecom.gov.sk/index/index.php?ids=117751
[6] http://ec.europa.eu/clima/policies/strategies/2020/index_en.htm

The plan to transition to a competitive low-carbon economy by 2050

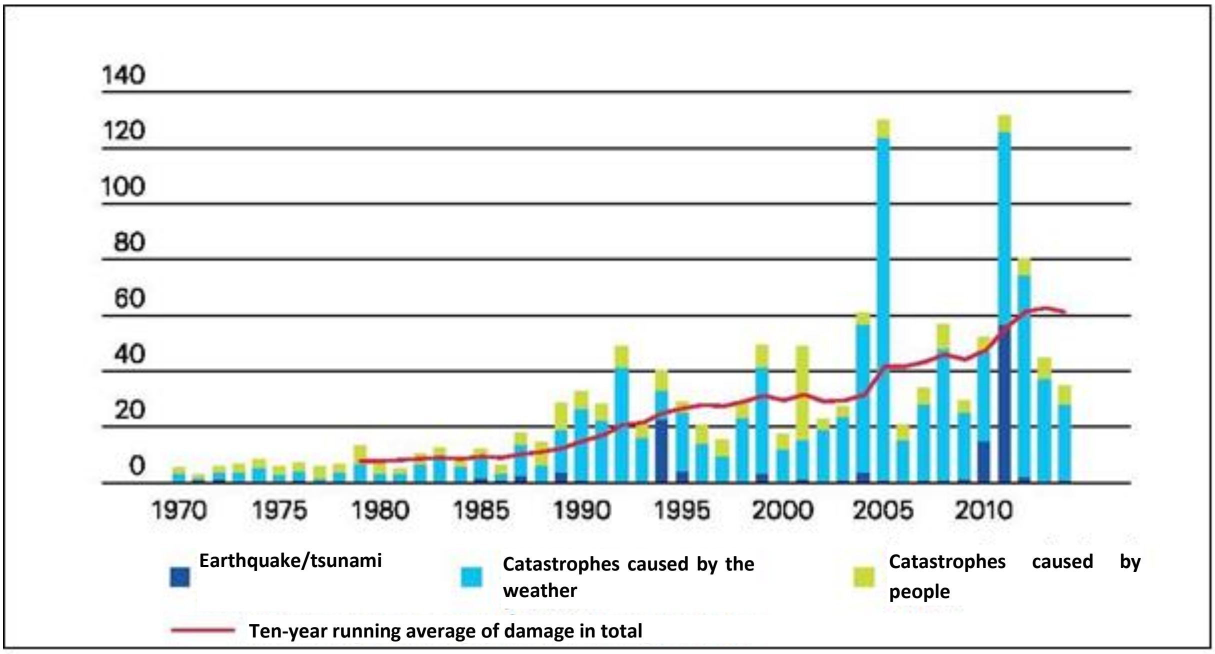
- To reduce total GHG emissions by 80–95 % compared to 1990 by 2050
- To reduce transport emissions of GHG by +20 to -9 % by 2030 and by -54 to -67 % compared to 1990 by 2050

Effort Sharing Decision (ESD)[7]

- An increase in GHG emissions must not reach values higher than 13 % compared to 2005 in sectors outside the Emission Trading System by 2020 (which applies mainly to transport)

Adaptations to climate change

Even though greenhouse gas emissions in Slovakia contribute only partially – and in global terms rather marginally – to the global emissions of greenhouse gases, it is currently already undeniable that climatic changes are taking place and cannot be completely stopped. It is thus desirable to respond to the already ongoing changes (mainly extreme fluctuations of weather such as rainstorms, long periods of drought, heat waves, warmer and more humid winters, less snow, etc.) and to prepare in a timely manner for the anticipated developments in order to mitigate or eliminate any negative impact. Adaptation to climate change is also an economic imperative, as globally, financial losses caused by extreme climatic events (see the figure below) have clearly risen since 1970.



[7] http://ec.europa.eu/clima/policies/effort/index_en.htm

Fig. III-5 Insurance losses caused by catastrophes (in billions of USD converted to 2014 prices). Source: Swiss Re Economic Research & Consulting a Cat Perils, 2015

The Slovak Republic's strategy of adaptation to the negative consequences of climatic changes (MoEnv SR, 2014)[8] emphasizes that the region of Central Europe has general features of climate change. Warming manifests itself here in all positions and climatic areas: Trends in atmospheric precipitation are not so clear, but this is due to their greater variability, as well as to the modification of aggregates by windward and leeward influences. The following could be observed in Slovakia between 1881 – 2010:

- An increase in average annual air temperature by around 1.7 °C;
- A decrease in annual aggregates of atmospheric precipitation by an average of around 0.5 % (in southern Slovakia, the decrease was even more than 10 % in some places, and in the north and north-east the aggregate of precipitation increased by up to 3 %);
- A decrease in relative air humidity (in southern Slovakia by 5 % between 1900 and the present, but less in the rest of the territory);
- A decrease in all snow coverage characteristics up to an altitude of 1,000 m in almost all of the Slovak Republic (a rise was recorded at higher altitudes);
- An increase in potential evaporation and a decrease in soil humidity – the characteristics of water evaporation from soil and plants, soil humidity and sun radiation confirm that especially southern Slovakia is gradually becoming drier;
- Changes in climate variability (especially precipitation aggregates) – for example, extremely dry years within a short space of time, such as 2003 and also 2007 in part, an extremely humid year in 2010 and an extremely dry year in 2011 and partly also in 2012; In the past 15 years, the incidence of extreme precipitation aggregates, both within one day and over several days, has grown significantly, leading to an increased risk of local flooding in various areas of the Slovak Republic. On the other hand, during the period 1989 – 2012, local or country-wide droughts occurred much more frequently than before, caused mainly by long periods of relatively warm weather with small precipitation aggregates in some parts of the growing season. Especially significant were the droughts in 1990-1994, 2000, 2002, 2003 and 2007.

Considering the outlook for the future, the Slovak Republic's Strategy of Adaptation to the Negative Consequences of Climate Change defines the following general outcomes of further climate development in Slovakia:

<u>Air Temperature</u>

- Average air temperatures should gradually increase by 2 to 4 °C compared to the averages in the period 1951 – 1980, while prior temporal annual and seasonal variability will be maintained;

[8] This whole text was taken practically without changes from the Slovak Republic's Strategy of Adaptation to the Negative Effects of Climate Change (MoEnv SR, 2014).

- Daily maximums and minimums such as daily maximum air temperatures should increase a little more quickly, which will cause a decrease in the average daily amplitude of air temperature;
- These scenarios do not predict significant changes in the annual air temperature cycles. In the autumn, the temperature increase should be less apparent than during the remainder of the year.

Precipitation Aggregate

- Annual precipitation aggregates should not change significantly, but rather a slight increase (around 10 %) is expected, mainly in northern Slovakia;
- Greater changes should occur during the annual cycle and temporal regime of precipitation – in summer, generally, a weaker decrease in precipitation aggregate (mainly in southern Slovakia) and in the remainder of the year, a weak to modest increase in precipitation (mainly in winter and in northern Slovakia) is expected. Variability in precipitation aggregates is expected in the warmer part of the year. Short rainy (or dry) periods will probably increase in length and frequency on the one hand, and short rainy periods will have more plentiful precipitation on the other;
- Since warmer weather is expected in winter, snow coverage will be irregular all the way up to an altitude of 900 m above sea level and winter floods will occur more frequently – snow coverage will probably, on average, be higher only at an altitude of more than 1,200 m above sea level. These locations however represent less than 5 % of the area of Slovakia and cannot significantly affect drainage conditions.

Other Climatic Elements and Characteristics

- No significant changes in the averages of global radiation, wind speed and direction are expected;
- Considering the greater strength of storms in the warm part of the year, the more frequent occurrence of strong winds, gales and storm-related tornadoes is expected;
- A decrease in soil humidity in southern Slovakia (the growth of potential evapotranspiration in the annual growing season by around 6 % per 1°C warming, precipitation aggregates will not significantly increase in the growing season).

III.1.3 NOISE AND VIBRATIONS

Analysis of the Current Condition

Ensuring the effective protection of the population from exposure to noise in the environment or not exceeding the permitted values of equivalent noise levels set by the Decree of the Ministry of Health of the Slovak Republic No. 549/2007 Coll., stipulating the allowed noise, infrasound and vibration values and the requirements for objectification of noise, infrasound and vibrations in the environment, as amended by the Decree of the Ministry of Health of the Slovak Republic No. 237/2009 Coll., is, pursuant to valid legislation (Section 27 (1) of Act No. 355/2007 Coll., on the Protection, Promotion and Development of Public Health and on the Amendment and Supplements to Certain Acts, as amended) the obligation of the legal entity or entrepreneur operating the source of the noise. In the case of noise caused by transportation, ensuring such protection is the responsibility of the relevant roads administrator, railway or airport operator etc.

The permitted noise levels in the external environment set by the above-stated decree for the purposes of health protection of the population take into consideration the nature of the territory, the nature of the source of noise, and also the time of day when the source of noise operates. The external space in a residential and recreational area, under the windows of residential rooms, school and healthcare facilities etc., are currently subject to the permitted value of equivalent noise levels for ground transportation and various stationary sources (LAeq) 50 dB. In an area situated near motorways, expressways, 1st and 2nd class roads, local communications with mass transportation, railways and airports, the noise values permitted from transportation are higher by 5 – 10 dB. Compliance with stricter permitted values is, on the contrary, required in a territory with special protection against noise, such as for instance spa and therapeutic complexes, but also in case of noise originating at night (10pm – 6am).

In the external environment and in terms of transportation, noise is differentiated mainly based on the following sources:

- Noise from transportation on roads and water, including municipal mass transportation;
- Noise from rail transportation on railways;
- Noise from air transportation and noise around airports;

From the aspect of noise levels, strategic noise maps have been created. This is due to the fact that road transportation is considered to be the biggest noise producer ever.

The strategic noise maps are aimed at an overall assessment of noise exposure in the given area caused by various noise sources (transportation, industry) and describe an existing, prior or anticipated noise situation expressed in form of noise indicators. The aim is to determine areas with exceeded set action values for individual noise indicators and to establish the number of people exposed to excessive noise in the assessed area.

ROAD TRANSPORT

Strategic noise maps were developed for motorways and expressways in 2011 – 2013 (the so-called 1st and 2nd stages). The assessment itself reflects only the state in 2011 with notes concerning potential changes in 2012 and 2013. In 2016, the 3rd stage was to be implemented (the results are so far not available). Strategic noise maps were developed for the following sections of motorways and expressways.

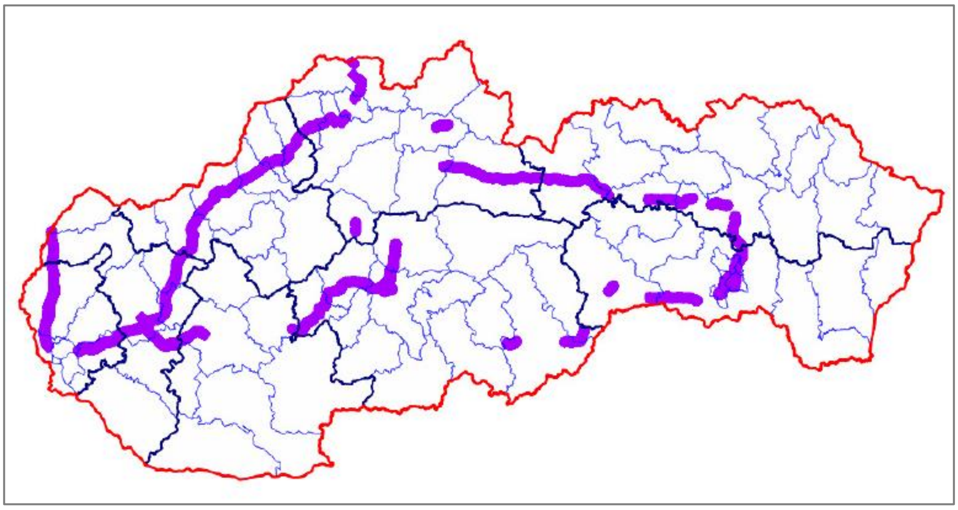


Fig. III-6 Map of sections for strategic noise maps – administered by NDS
Source: Action Plans for Noise Protection (2nd stage), Národná diaľničná spoločnosť, a.s

Strategic noise maps for 1st class roads owned by the Slovak Road Administration have not so far been completed in their second stage. The available strategic noise maps for these roads thus date from the year 2006.

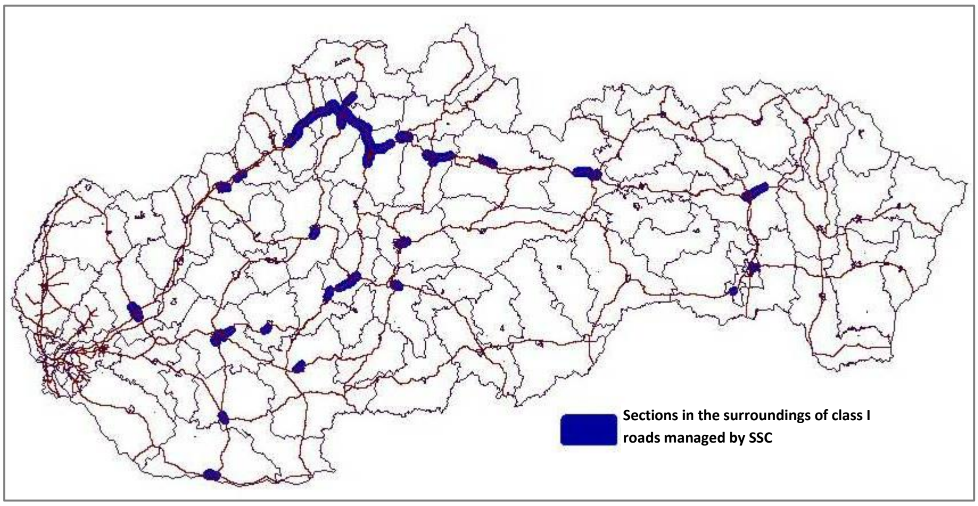


Fig. III-7 Map of sections for strategic noise maps – administered by the Slovak Road Administration
Zdroj: http://www.hlukovamapa.sk/

Data on transport volume from the direct census were not available at the time the noise maps were developed for the given year. Thus, data acquired from the 2005 census were used as the basis and data for 2006 were determined using the growth coefficient.

This applies to sections of various length distributed around the territory of Slovakia. These sections are usually new larger towns (Trnava, Nitra, Prievidza, Považská Bystrica – Žilina – Martin, Ružomberok, Liptovský Mikuláš, Svit – Poprad, Prešov, Košice, Banská Bystrica, Zvolen, Nové Zámky, Levice, Komárno). The total length of evaluated roads is more than 238 km. The noise burden was calculated over an area of almost 285 km^2.

RAIL TRANSPORT

Rail transport can also be considered as a source of noise. The strategic noise map of selected sections of railway track administered by Railways of the Slovak Republic for operation in 2011 was developed by EUROAKUSTIK, s.r.o. in 2013 for the Public Health Authority of the Slovak Republic. The following image displays the status of selected sections of larger railway routes in 2011 in the report by Railways of the Slovak Republic, where the strategic noise map was developed.

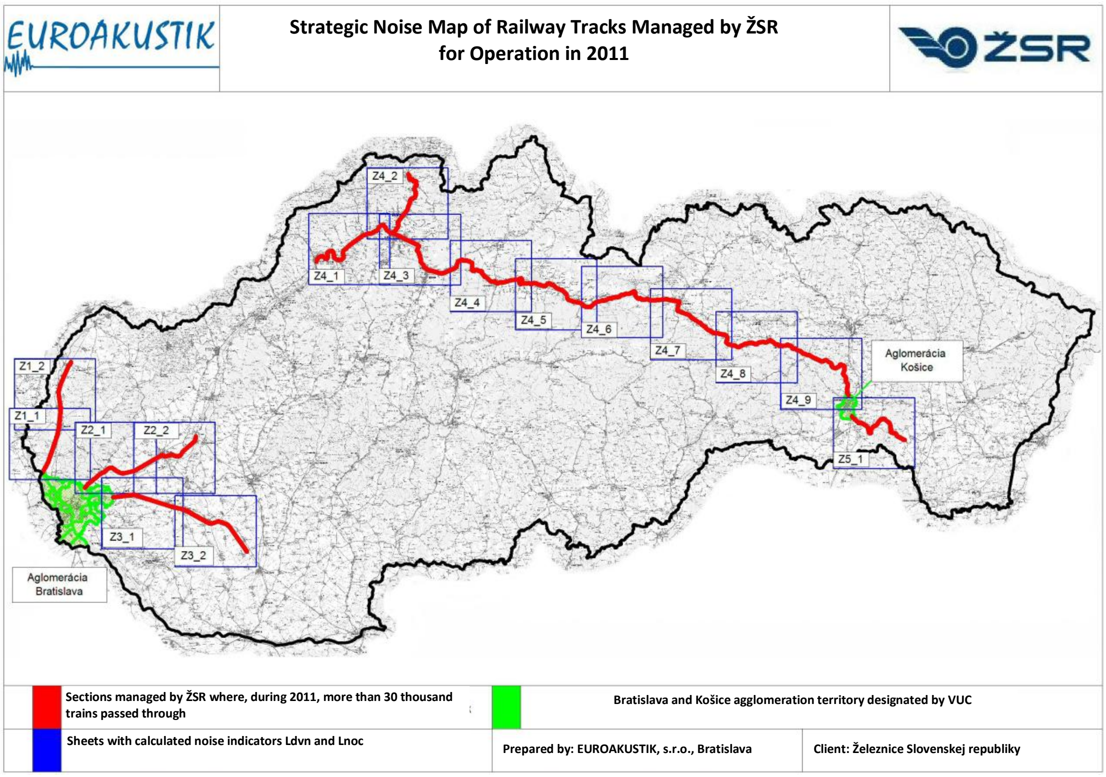


Fig. III-8 Map of sections for strategic noise maps of railway tracks administered by Railways of the Slovak Republic

Source: EUROAKUSTIK, s.r.o. Bratislava

Strategic noise maps (SNM) were developed by the city of Bratislava or the Bratislava Agglomeration, meeting the criteria of the Act. This SNM was also developed for railway transport, including trams. The overall length of railways in the agglomeration is 311 km and the length of tramlines is 73 km. There are two large marshalling yards in the assessed territory. There is a noise barrier near the railway route in the municipal district of Petržalka. The following table shows the number of people living in apartments exposed to individual monitored noise levels – L_{dvn} and L_{noc} in the prior period.

AIR TRANSPORT

The amendment of Act No. 2/2005 Coll., on Noise Assessment and Control in the External Environment, imposes the obligation on relevant entities to develop noise maps for larger airports with more than 50,000 take-offs and landings per year, namely by 30th June 2012. No airport situated in the territory of the Slovak Republic had met the requirement.

WATER TRANSPORT

A clear obligation to comply with the hygienic noise level of 70 dB (Directive 2006/87/ES of the European Parliament and of the Council of 12 of December 2006 laying down technical requirements for inland waterway vessels and repealing Council Directive 82/714/EEC) arises from construction requirements for inland waterway vessels. There are no relevant outputs (e.g. noise maps) concerning the issue of noise in the field of water transport.

The development of noise levels from transport without implementing the strategy

As part of the strategic assessment of noise levels from transport, data depicting the levels of edge of road acoustic pressure were developed based on the data on average daily intensities in automobile transport, the composition of transport flow and average speeds in the entire road network.

The edge of road acoustic pressure in the current road network with model transport intensities in 2014 (Base 2014 as the basis) is depicted in the following image, which also shows the main areas with high average population density crossed by these roads.

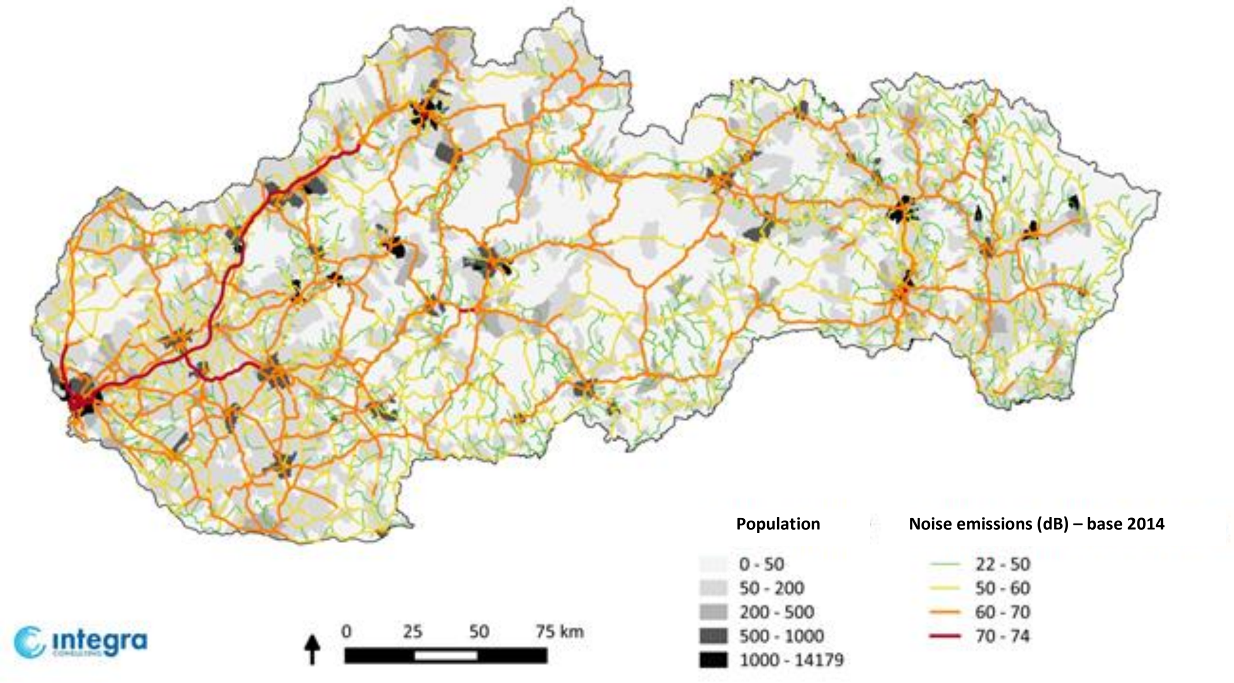


Fig. III-9 Population density and noise emissions from transport at the edge of road – Base 2014

Similar data on the edge of road acoustic pressure for model transport intensities in the future road network without implementing the measures proposed in SPTD SR 2030 in 2030 (BAU 2030 scenario) are presented in the following image.

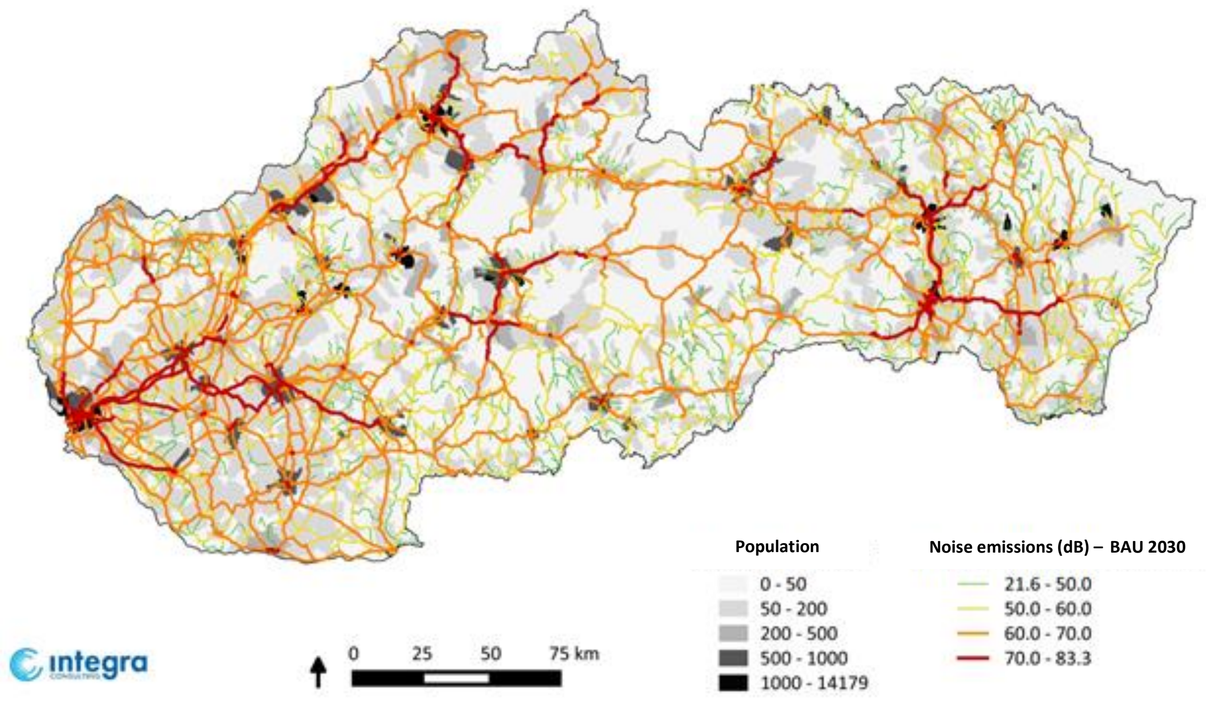


Fig. III-10 Population density and noise emissions from transport at the edge of the road – BAU 2030

The comparison of these data leads to the following changes in the edge of road acoustic pressure in selected sections of motorways, expressways and 1st class roads administered by the SRA:

Tab. III-7 Motorways and expressways administered by the National Motorway Company, a. s.

Road section	Section length (km)	Distance from axis (m)	Probable changes in the edge of road acoustic pressure by 2030 (BAU 2030 compared to Base 2014)
D1 BA (Vajnory) – Triblavina	2.855	1,000	No changes at the expense of increased noise emissions from successive transport roads
D1 BA Triblavina – Senec crossroads	8.146	1,000	
D1 crossroads Senec – bord. l. r. Senec	4.596	750	
D1 bord. l. r. Senec – Chocholná	87.497	750	Improvement at the expense of increased noise emissions from successive transport roads
D1 Chocholná – Beluša	38.439	750	
D1 Beluša – Sverepec	7.396	500	No changes at the expense of increased noise emissions from successive transport roads
D1 Sverepec – Hričovské Podhradie	22.837	500 to 750	Slight deterioration
D1 Ivachnová – Liptovský Mikuláš	15.345	500	No changes
D1 Liptovský Mikuláš – Podtureň	8.022	500	
D1 Podtureň – Jánovce	60.468	500	
D1 Jablonov – Fričovce	22.143	500	Slight deterioration

Road section	Section length (km)	Distance from axis (m)	Probable changes in the edge of road acoustic pressure by 2030 (BAU 2030 compared to Base 2014)
D1 Svinia – Prešov	7.961	500	Significant deterioration
D1 Prešov – Drienovská Nová Ves	6.731	500	
D1 Drienovská Nová Ves – Budimír	13.746	500	
D1 Trenčín feeder road	1.790	500	Improvement at the expense of increased noise emissions from traffic in town
D2 state border SK/CZ – Malacky	29.349	500	Improvement at the expense of increased noise emissions from successive transport roads
D2 Malacky – BA (Lamač)	25.697	750	
D3 Hričovské Podhradie – Žilina (west)	8.155	500	Slight deterioration
D3 (I/11) Žilina – Brodno	3.624	750	
D3 (I/11) Kysucký Lieskovec – Čadca	14.872	500	Significant deterioration
R1 Trnava – Malý Báb	27.442	750	No changes at the expense of increased noise emissions in successive roads
R1 Malý Báb – Lehota (NR)	10.735	750	
R1 Tekovské Nemce – Žarnovica	25.666	500	Slight deterioration
R1 Žarnovica – Šášovské Podhradie	17.839	500	
R1 Šášovské Podhradie – Budča	14.535	500	
R1 Budča – Banská Bystrica	22.301	750	
R2 (I/50) Budča – Zvolen	5.210	750	No changes
R2 (I/50) Ožďany bypass	5.170	500	No changes
R2 (I/50) Figa – Tornaľa	13.000	500	No changes at the expense of increased noise emissions in successive roads
R2 (I/50) Brzotín (Rožňava)	3.276	500	No changes
R2 (I/50) Hrhov – Mokrance	22.707	500	Partial slight deterioration
R2 (I/50) Košice (Šaca) – Košice (west)	8.856	750	Significant deterioration
R2 (I/50) Košice (west) – Košice (south)	2.603	750	
R2 (I/50) Košice (south) – Košice (Darg. hrdinov)	6.810	750	
R2 (I/50) Košice (Darg. hrdinov) – Budimír	6.348	750	
R3 Horná Štubňa	4.208	500	No changes
R3 Oravský Podzámok – Horná Lehota	5.728	500	No changes
R4 Košice south feeder road (1st part)	1.003	750	Deterioration
R4 Košice south feeder road (2nd part)	1.593	750	
R5 (I/11) Svrčinovec – SR/ČR state border	2.004	500	No changes
TOTAL:	**596.703**	---	

Tab. III-8 First class roads administered by the SRA

Section No.	Section	Length (km)	Probable changes in the edge of road acoustic pressure in the period 2014 – 2030 (BAU 2030 compared to Base 2014)
1	Komárno, road I/63	7.24	Very slight deterioration
2	Nové Zámky, road I/64	2.53	Very slight deterioration
3	Trnava, road I/51	6.97	Increase in noise emissions in town, slight decrease on part of the bypass
4	Nitra, roads I/64 and I/65	16.5	Significant deterioration in noise emissions in town
5	Zlaté Moravce, road I/65	1.83	No changes
6	Levice, road I/51	5.13	Very slight deterioration
7	Prievidza, road I/64 (I/50)	5.96	No changes
8	Žiar nad Hronom, road I/65	9.82	Deterioration
9	Žarnovica, road I/65	3.08	Very slight deterioration
10	Banská Bystrica, road I/66	3.79	Increase in noise emissions in town
11	Zvolen, road I/50	1.41	Significant deterioration
12	Trenčín, road I/61	4.52	Significant deterioration
13	Dubnica, road I/61	3.28	No changes
14	Považská Bystrica, Žilina, Martin, roads I/18, I/64 and I/65	111.32	Deterioration
15	Kraľovany, road I/18	4.77	Significant deterioration
16	Kysuce, road I/11	3.58	Significant deterioration
17	Ružomberok, road I/18	13.89	No changes
18	Liptovský Mikuláš, road I/18	6.36	No changes
19	Poprad, roads I/18 and 67	13	Slight deterioration
20	Prešov, road I/18	10.48	Significant deterioration
21	Košice, road I/50	1.65	Significant deterioration
22	Košice – Šaca, road I/50	0.59	Significant deterioration
TOTAL	22 sections	237.7	

Outside the above-mentioned territory in the BAU 2030 scenario, the edge of road acoustic pressure in the road network sections listed in tab. III-9 and III-10 will increase when compared to the situation modelled in 2014:

Tab. III-9 Further sections of the road network with significant increases in the levels of edge of road acoustic pressure

Section	Probable changes in the edge of road acoustic pressure in the period 2014-2030 (BAU 2030 compared to Base 2014)
Bratislava – Dunajská Streda, road I/63	Significant deterioration
Nitra – Levice, road I/51	Significant deterioration
Banská Bystrica – Brezno, road I/66	Significant deterioration
Košice – Michalovce, road I/19	Significant deterioration

Section	Probable changes in the edge of road acoustic pressure in the period 2014-2030 (BAU 2030 compared to Base 2014)
Bratislava – Modra, road II/502	Significant deterioration

Tab. III-10 A slight local increase in levels of edge of road acoustic pressure

Section	Probable changes in the edge of road acoustic pressure in the period 2014-2030 (BAU 2030 compared to Base 2014)
Zvolen – Krupina, road I/66	Slight deterioration
Prešov – Sabinov, road I/68	Slight deterioration
Poprad – Spišská Belá, road I/66	Slight deterioration
Lokca – Námestovo, road I/78	Slight deterioration
Podbiel – Trstená, road I/59	Slight deterioration
Jablonica – Senica, road I/51	Slight deterioration

The above suggests that, in the BAU 2030 scenario modelled, the overall acoustic pressure from traffic on a significant part of the road network will increase when compared to the situation modelled in 2014.

For the final summary, the number of registered buildings situated at a distance of 50, 100 and 200 m from various levels of edge of road acoustic pressure was calculated. The table below and the visualizations in the image suggest that there will be a reduction in the number of registered buildings situated at distances of 50, 100 and 200 m from acoustic pressure from traffic under 60 dB and an almost equivalent increase in the number of buildings situated at distances of 50, 100 and 200 m from acoustic pressure from traffic exceeding the limit of 60 dB.

Tab. III-11 Changes in the number of registered buildings situated 50, 100 and 200 m from various levels of acoustic pressure at the edge of the road network in the Slovak Republic

Road buffer	Levels of edge of road acoustic pressure (in dB)	Number of registered buildings in the Base 2014 model situation (thousands)	Number of registered buildings in the BAU 2030 model situation (thousands)	Difference in the number of registered buildings (thousands)
50 m	<50 dB	183	113	–70
	50–60 dB	256	211	–45
	60–70 dB	125	205	80
	>70 dB	2	31	29
100 m	<50 dB	276	173	–103
	50–60 dB	394	326	–68
	60–70 dB	218	336	118
	>70 dB	4	60	56
200 m	<50 dB	422	267	–155

Road buffer	Levels of edge of road acoustic pressure (in dB)	Number of registered buildings in the Base 2014 model situation (thousands)	Number of registered buildings in the BAU 2030 model situation (thousands)	Difference in the number of registered buildings (thousands)
	50–60 dB	628	513	–115
	60–70 dB	389	567	178
	>70 dB	9	121	112

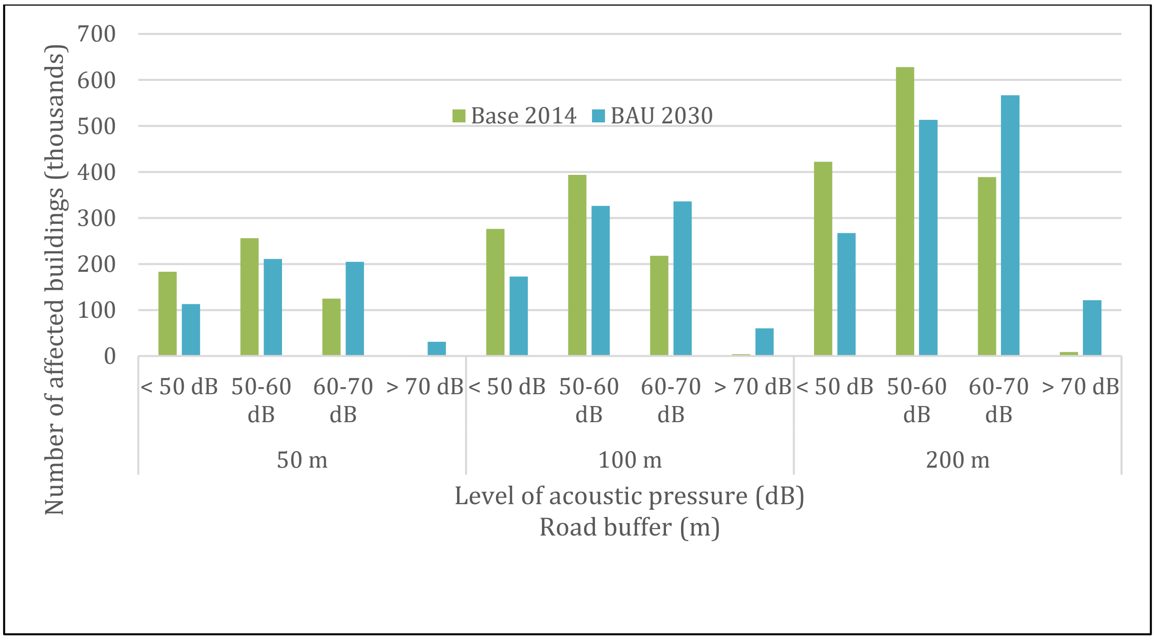


Fig. III-11 Numbers of registered buildings in the Slovak Republic situated 50, 100 and 200 m from levels of acoustic pressure up to 50 dB, 50-60 dB, 60-70 dB and greater than 70 dB from traffic at the edge of the road network

This finding suggests a clear conclusion that, without implementing the strategy (in the BAU 2030 model scenario), the total levels of acoustic pressure from transport will increase and will need to be dealt with as part of strategic noise maps and implementations of adequate anti-noise measures (anti-noise walls, culverts, lowering of drive-through speeds or limiting operations on the busiest roads) according to valid standards for dealing with noise in Slovakia. The priority concern of these measures are the larger urbanized areas of Bratislava, Trnava, Trenčín, Prievidza, Žilina, Nitra, Nové Zámky, Banská Bystrica, Poprad, Prešov, Košice, but also a whole series of partial problem sites.

III.1.4 WATER CONDITIONS

TERRITORY AND WATER BALANCE

Slovakia is landlocked country and an important watershed between the Baltic and Black Sea crosses its territory. 96 % of the country's area belongs to the Black Sea drainage area and water from this territory flows via the Danube or the Tisza to the Black Sea. The remaining 4 % (via the Dunajec and Poprad Rivers) drains into the Baltic Sea. A significant part of the Slovak Republic's surface water resources flows from neighbouring countries and the usability of these resources are limited. In total, a long-term average of approximately 2,514 $m^3.s^{-1}$ of water flows into the Slovak Republic, representing about 86 % of the total surface resources. Approximately 398 $m^3.s^{-1}$ of water, representing 14 % of water resources, rises in the Slovak territory over a long-term average.

There are relatively high fluctuations in the flow volumes of springs arising in the territory. Large flow volumes occur regularly during the spring months of March – April (and approximately 2 months later in the Danube, Poprad and Dunajec). Small flow volumes occur in the summer and autumn.

In the Slovak Republic, defined categories of surface water only contain rivers, including rivers whose category has changed (there are no lakes larger than 10 km^2 in the Slovak Republic and neither are there coastal or transitional waters, given that Slovakia is landlocked).[9]

WATER POLICY

The currently applicable water policy in the Slovak Republic is based on Directive 2000/60/EC of the European Parliament and of the Council of 23 October 2000, establishing a framework for Community Action in the Field of Water Policy (the Water Framework Directive, hereinafter referred to as the "WFD")[10], which was transposed into Act No. 364/2004 Coll., on Water (the Water Act).

The primary aim of the WFD is to achieve "good water status" by 2015[11], or by no later than 2027[12].

[9] Source: Blue Report 2012, Management Plan for the Administrative Territory of the Danube River Basin - updated 2015.

[10] The Water Policy Framework Directive applies to all waters – inland surface water, groundwater, transitional and coastal waters. It introduces, on the European level, the principle of an integrated approach to matters related to the quality and quantity of water and to the issue of surface and groundwater. For water management, the Directive introduces the principle of administration based on a unit of river basins, meaning that water is considered a coherent unit.

[11] This aim is subject to several exactly defined exceptions related to certain circumstances enabling a postponement of the achievement of good status by two planning periods, i.e. until 22 December 2027.

[12] The Water Framework Directive acknowledges that the achievement of good water status may take longer in the case of some bodies of water. Therefore, the Directive enables Member States to apply for an exception with regard to the natural status of the given body of water and to postpone the deadline until 2027 or even later (Article 4 Clause 4 Letter c) of the WFD). The deadline for achieving the good water status may also be postponed when it is technically impossible or prohibitively costly to achieve good status of the given body of water by 2015 (Article 4 Clause 5 and Clause 7 of the WFD).

Good status, especially for bodies of surface water, means the achievement of good ecological conditions and good chemical conditions, or good ecological potential and good chemical conditions for artificial and significantly changed bodies of surface water, and the achievement of good chemical conditions and good quantitative conditions for bodies of groundwater bodies.

The analysis of the status of bodies of water carried out in 2005 showed that 48 % of surface water formations and 23 % of groundwater formations in the Slovak Republic risk not achieving this objective.

The evaluation of the final status of bodies of water in the territory of the Slovak Republic achieved by the end of 2015 was carried out as part of an update of the river basin management plans[13] in 2015. The chapter on the assessment of progress achieved when compared to the first planning cycle makes the following summary evaluation:
The unsatisfactory status continues, the selected surface features of part of the flows achieved a good chemical and ecological status by 2012.

Significant water management problems identified as part of the 1st planning cycle remain significant also for the 2nd river basin management plans (i.e. for the period 2016-2021).

Evaluation of the Status of the Danube River Basin Administration Area (RBAA)
Surface waters

- Ecological status
  Based on the comparison of two periods of evaluation of the ecological status (2007 – 2008 and 2009 – 2012, or 2013) significant changes have been identified in very good and good status / potential. The differences are not significant in other classes. Changes in the classification results were caused by updating water formations and increased assessment reliability.
- Chemical status
  When compared to the 1st river basin management plans, the number of water formations not achieving good chemical status decreased from 84 to 36, which expressed in length means a decrease from 1,908.70 km to 555.550 km.

Groundwater

- Quantitative status
  When compared to the 1st river basin management plans, the number of formations with poor quantitative status decreased by 2.

[13] The basis for implementing the Water Framework Directive are the river basin management plans containing procedures and method (programme of measures) of achieving the WFD objectives. The update of river basin management plans is carried out every six years.

- Chemical status
  The assessment of chemical status was carried out in line with Annex III of Directive 2006/118/EC (on the protection of groundwater from pollution and deterioration) only for those quaternary and pre-quaternary groundwater formations that were classified as having poor status in the 1st Slovak water management plan in 2009. When compared to the 1st river basin management plan, the number of formations with poor chemical status decreased by 2.

Assessment of the condition for the Vistula River Basin Administrative Area[14]

Surface waters

- Ecological status
  Based on the comparison of two periods of evaluation of the ecological status (2007 – 2008 and 2009 – 2012, or 2013) significant changes have been identified in very good and good status / potential. Any differences in other classes of status are not significant[15].

- Chemical status
  Based on the evaluation of results of surface water status monitoring carried out in 2009 – 2012 in the Vistula RBAA, the chemical status was evaluated as good in 73 water formations out of a total number of 74 surface water formations, the environmental quality standard was exceeded in 1 body of water (SKP0055 – Vrbovský Creek) in the PAH (polyaromatic hydrocarbons) indicator for benzo(g,h,i)perylene and indeno(1,2,3-cd)pyrene.

Groundwater

- Quantitative status
  All 4 evaluated water formations in the partial basin of the Dunajec and Poprad Rivers have a good quantitative status.

- Chemical status
  The evaluation of the chemical status was carried out in line with Annex III of Directive 2006/118/EC (on the protection of groundwater from pollution and deterioration) only for those quaternary and pre-quaternary groundwater formations that were classified as having poor status in the 1st Slovak water plan in 2009. All classified formations have good chemical status. No change occurred when compared to the 1st river basin management plan.

[14] The Vistula RBAA includes the Dunajec and Poprad rivers and their tributaries.
[15] Changes in the classification results of classification were caused by updating water formations and increased assessment reliability.

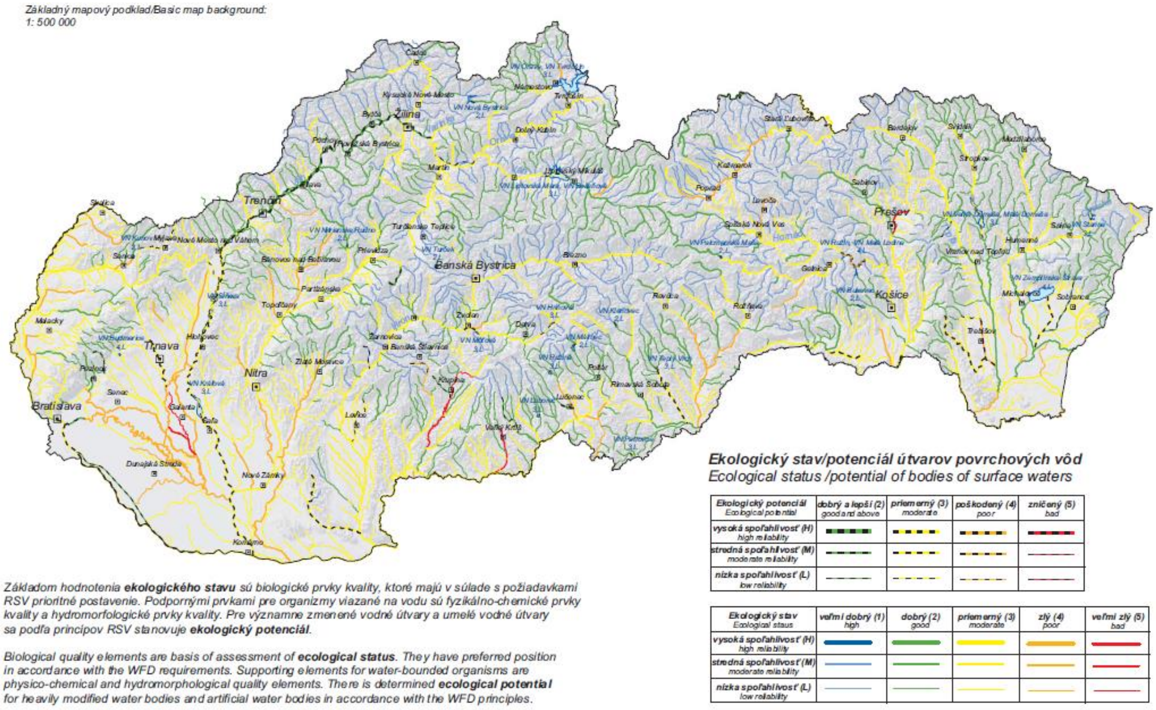
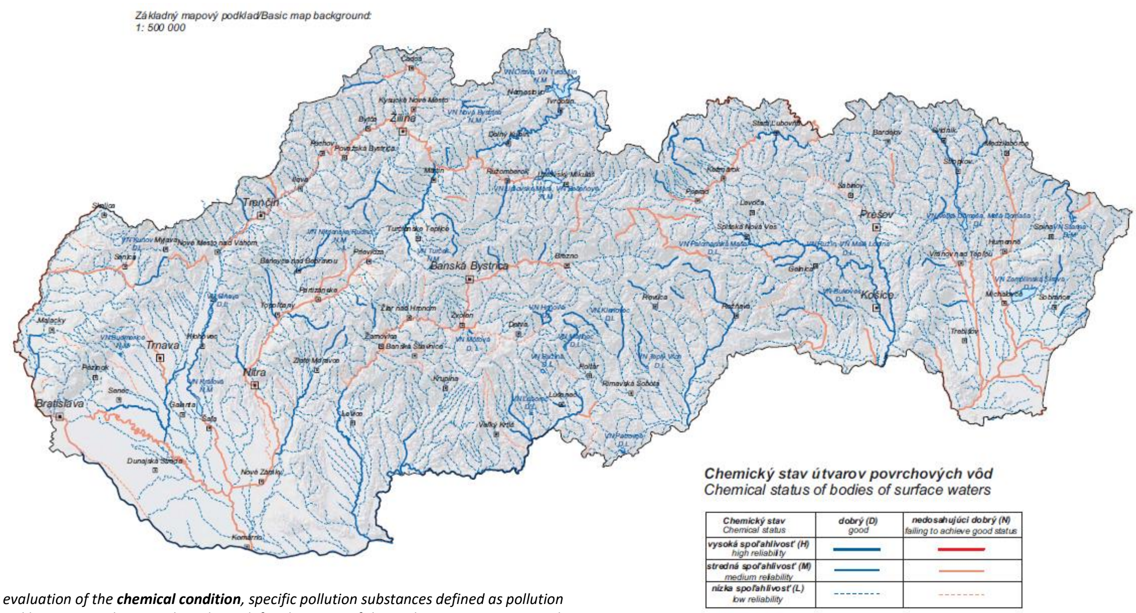


Fig. III-12 The ecological status / potential of groundwater formations

Data source: MoEnv SR, 2009, Compiled by: the Slovak Environment Agency – CDE Košice, 2010



*For evaluation of the **chemical condition**, specific pollution substances defined as pollution caused by priority substances have been defined. As part of the evaluation, environmental standards in compliance with the EU Directives apply.*

Fig. III-13 The chemical status of groundwater formations
Data source: MoEnv SR, SHMI Bratislava, 2009, Compiled by: the Slovak Environment Agency – CDE Košice, 2010

SURFACE WATER

Surface water quality:

Surface water quality is monitored by indicators according to the approved Water Condition Monitoring Programme. As many as 254 locations were monitored in 2014 (according to the most recently available data) as part of basic and operational monitoring.

In 2014, surface water quality in all (254) monitored locations met the limits for selected general indicators and radioactivity indicators. Limits were exceeded mainly for synthetic and non-synthetic substances, hydrobiological and microbiological indicators and general indicators especially of nitrate nitrogen and aluminium.

In line with the requirements of the Water Framework Directive, water quality is expressed by the ecological and chemical status of surface water bodies.

Obtaining a good status for surface waters means achieving good ecological status, the maximum ecological potential and good chemical status of the waters, namely through environmental objectives:

- To ensure that the ecological and chemical status of the waters does not deteriorate;
- To restrict interventions in the water management of protected areas;
- To ensure that the discharge conditions of the area do not deteriorate;

In the status evaluation period in 2014, very good or good ecological status was recorded in 59.50 % of the water formations in the Slovak Republic with a total length of 7,378.63 km. 31.37 % of the water formations had an average ecological status, representing a length of 6,374.47 km. Poor and very poor ecological status of surface water formations was identified in 9.13 % of water bodies with a length of 1,779.50 km.

An assessment of the chemical status of surface water formations was carried out in 1,513 water bodies in 2009 – 2012. Good chemical status was achieved in 1,477 (97.6 %) of water formations in the Slovak Republic and 36 (2.4 %) of water formations did not have good chemical status. The non-achievement of good chemical status due to breaching the quality standards was caused by non-synthetic substances (12 water formations) and by synthetic substances. Synthetic substances were indicated in 24 water formations, including 14 bodies of water where aggregated industrial pollutants were identified, 5 bodies of water with pesticides and 5 bodies of water in which other pollutants substances were detected.

For the 2nd planning cycle, 1,413 surface water formations were identified as part of the Danube RBAA (241 fewer than in the 1st planning cycle) and 74 water formations were identified as part of the Vistula RBAA, which is 9 fewer water formations than in the 1st river basin management plan.

Groundwater pollution

- The trend of reducing wastewater discharges, along with reducing the organic pollutant load continued steadily in 2010 and 2011;

The Danube RBAA: In terms of nutrient pollution, the discharge of pollution characterized by total N decreased in 2011 compared to 2007, from a value of 1,906.4 tons per year to 1,320.3 tons, and for total P, from the value of 67.2 to 50.4 tons.

The Vistula RBAA: The summary balance of discharged wastewater and pollution for indicators of total N and total P for 2011 from agglomerations above 2,000 PE, and of industrial and other pollution sources, confirms in the RBAA a dominance of agglomerations in the discharge of nutrient pollution from point sources. The proportion of nutrients from industrial sources in wastewater is negligible when compared to the quantity of nutrients from agglomerations. There are no significant point sources of pollution from agricultural production in the Vistula RBAA.

In 2011, 1 priority substance was discharged into the surface waters of the Vistula RBAA. Based on the comparison of data reported for 2007 and 2011, it can be stated that a significant decrease in the discharged quantity was recorded for this substance, namely from 9.3 kg to 0.5 kg. Of the relevant substances, only 1 pollutant was reported by the polluters in 2011 – zinc; there is no significant change in zinc quantities compared to 2007.

Use of surface water

Since 1990, there has been a significant decrease in surface water extraction in the territory of the Slovak Republic and in recent years up to 2014, extraction continued to decrease. In 2014, surface water extraction decreased by 22.7 % compared to the previous year. Industrial extraction decreased by 26.0 %, and a slight decrease of 5.7 % was recorded in the surface water extraction for water pipelines. Surface water extraction for irrigation decreased in 2014 by 24.2 %.

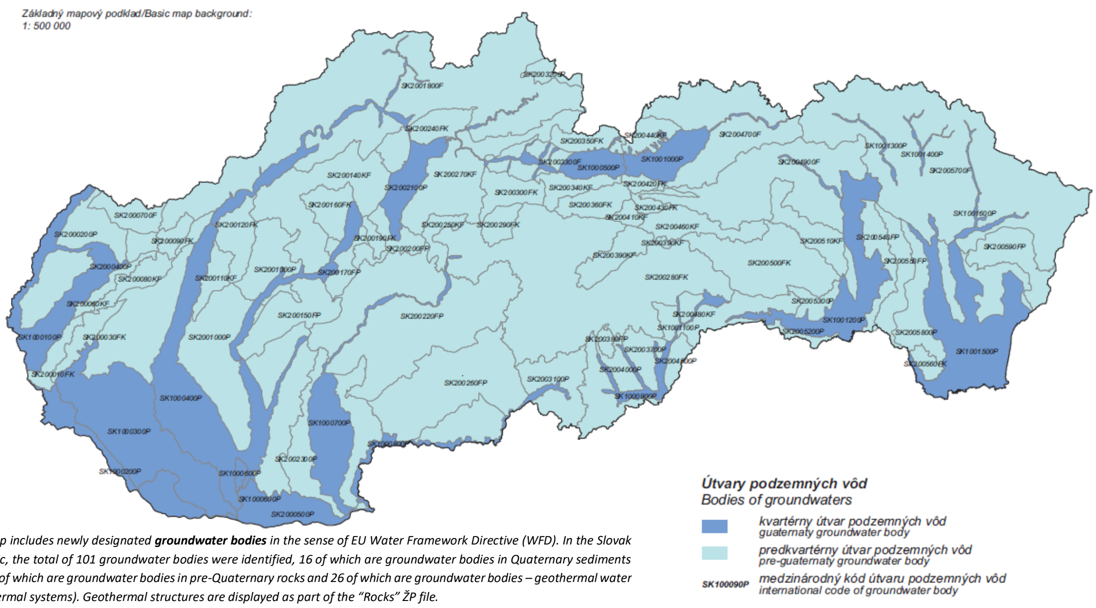
GROUNDWATER

Sources of ground water

Slovakia has a relatively large quantity of groundwater available. The most important quantities of groundwater are recorded in the Bratislava and Trnava Self-Governing Region, whereas the smallest quantity of groundwater is recorded in the Prešov and Nitra Self-Governing Region.

In line with data from the water management balance (WMB), natural sources in Slovakia represent on average 146.7 m^3/s. The greatest usable quantities (24.8 m^3/s) are documented in the Danube Lowlands (Žitný ostrov) and in the limestone and dolomite rocks of the mountain range in Central Slovakia and the Slovak Karst (Slovenský kras). Lower usable quantities of groundwater are recorded in eastern Slovakia and in southern central Slovakia.

In 2014, there were 80,310 l/s of usable quantities of groundwater in the Slovak Republic, representing an increase of 1.8 % compared to the previous year 2013[16]. Long-term assessments represent a 7.4 % increase in usable quantities when compared to 1990. The ratio of usable quantities of groundwater to extraction quantities was approximately at the same level as 2013 and reached a value of 7.88.



*The map includes newly designated **groundwater bodies** in the sense of EU Water Framework Directive (WFD). In the Slovak Republic, the total of 101 groundwater bodies were identified, 16 of which are groundwater bodies in Quaternary sediments and 59 of which are groundwater bodies in pre-Quaternary rocks and 26 of which are groundwater bodies – geothermal water (geothermal systems). Geothermal structures are displayed as part of the "Rocks" ŽP file.*

Fig. III-14 Groundwater formations

Data source: MoEnv SR, SHMI Bratislava, Government Decree No. 282 /2010 Coll. Developed by: Slovak Environment Agency – CDE Košice, 2010.

Groundwater use

Since 2000, extractions of groundwater have been more or less balanced. The development of groundwater use expressed by the ratio of usable groundwater quantities to extraction quantities has

[16] It may be assumed that current values of groundwater quantity will in turn show a downward trend due to significantly lower precipitation aggregates in the last season of 2015 and first half of 2016.

permanently shown a slight increase since 1995. In 2005, there were 5,720 usable sources recorded in the extractions register in Slovakia.

On average, 10,187.3 l/s of groundwater was used in the Slovak Republic in 2014, representing 12.69 % of the documented usable quantities. In the course of 2014, a decrease of 2.41 % in groundwater extractions was recorded compared to 2013.

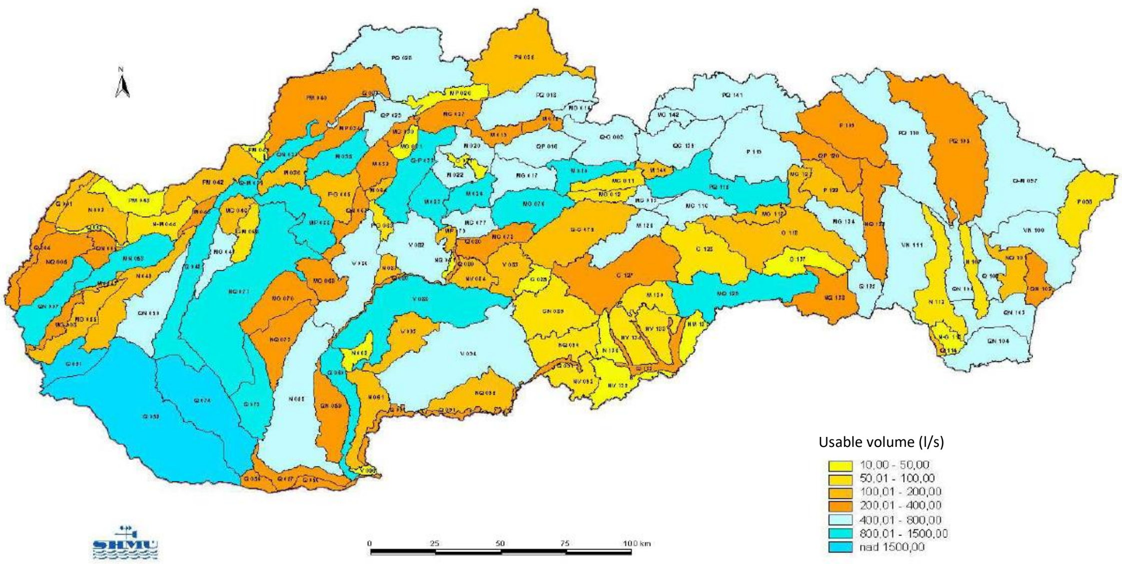


Fig. III-15 Usable groundwater quantities in the hydro-geological regions of the Slovak Republic in 2012
Note: Usable quantity in l/s, max. volumes per 1,500 l/s.
Source: SHMI

Evaluation of the Status of Groundwater Formations

The evaluation of the status of groundwater formations is carried out by evaluating their chemical and quantitative status. From a total of 75 groundwater formations, 11 were evaluated as having poor chemical status (14.7 % of formations, or 22.1 % of the total area of formations) and 64 as having good chemical status (85.3 % or 77.9 % of the total area of formations).

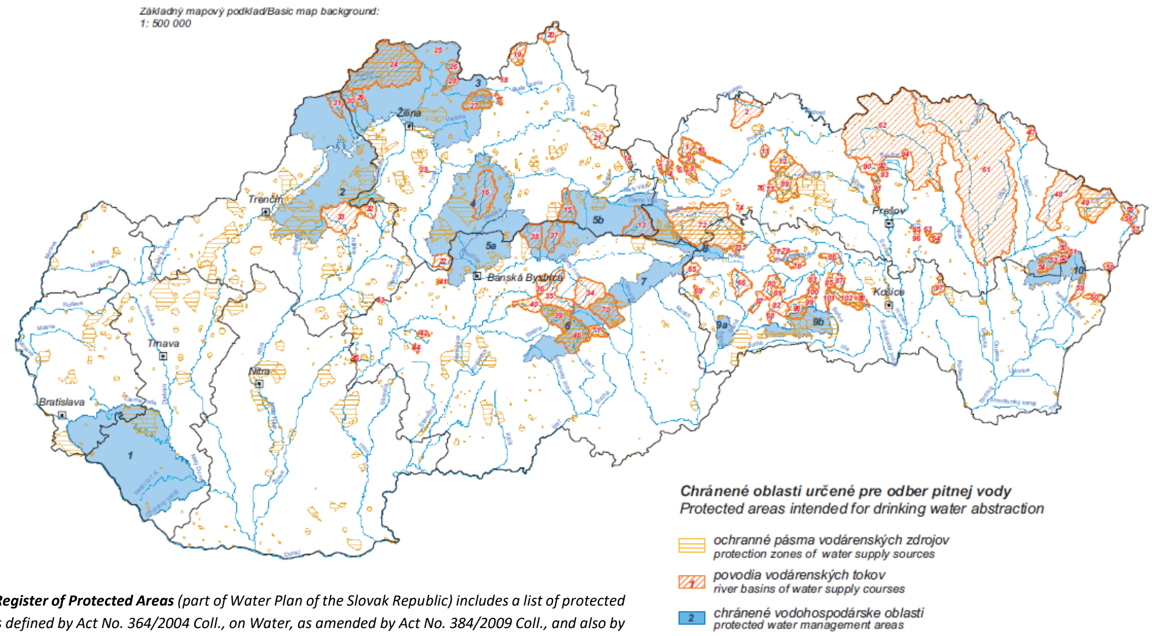
The basic indicator of the quantitative status of groundwater formations is the groundwater level regime (or spring yield). Other indicators include the balance evaluation of groundwater quantities and changes in the groundwater regime based on the results of the monitoring programme. In the Slovak Republic (2011), 5 groundwater formations were categorized as having poor quantitative status.

Groundwater quality

Exceedances of the set groundwater pollution limits were recorded in 2014. As many as 11 groundwater formations (14.7 %) had poor chemical status. As part of the groundwater in the monitored areas, the issue of adverse oxidation-reduction conditions comes to the foreground, suggested by frequent excessive concentrations of Fe, Mn a NH_4^+. The prevailing nature of land use in the monitored areas (urbanized and agricultural areas) is reflected in the increased oxidized content and reduced forms of nitrogen in the waters.

The trace elements most frequently recorded were concentrations of aluminium and arsenic. Nickel, mercury and lead exceeded twice the allowed concentration in 2005. Pollution by specific organic substances is local in nature only. In terms of groundwater quality, the most polluted were the lowland areas. Areas in the western part of Slovakia (the riverside zone of the lower Váh River from Galanta to Komárno) and in the eastern part of Slovakia (Medzibodrožie and Roňava River alluvia). The least polluted are waters in the river sediments in upper or central parts of the Váh, Hron, Poprad and Hornád river basins and groundwaters accumulated in the Mesozoic carbonates of mountain ranges.

The basic evaluation unit of the water management balance (WMB) of groundwater quantity in Slovakia is the hydro-geological region, with its consequent detailed division into sub-regions and partial regions. In line with WMB data (SHMI), natural groundwater sources in the territory of Slovakia represent on average 146.7 m^3/s, including documented usable groundwater quantities of 78,938.93 l/s in the Slovak Republic, i.e. more than 53 % of natural sources.



The Register of Protected Areas *(part of Water Plan of the Slovak Republic) includes a list of protected areas defined by Act No. 364/2004 Coll., on Water, as amended by Act No. 384/2009 Coll., and also by the requirements of the Water Framework Directive. The map identifies protected areas designated for the abstraction of drinking water.*

Fig. III-16 Water protection – protected areas designated for the abstraction of drinking water

Data source: WMRI Bratislava, 2006, Water Plan of Slovakia 2009, compiled by: Slovak Environment Agency – CDE Košice, 2010

Geothermal water

There are currently 26 geothermal areas in the Slovak Republic, also constituting bodies of geothermal water.

Special water

Based on the registration of mineral springs of the Ministry of Health of the Slovak Republic, there are 1,644 mineral water springs documented in the territory of the Slovak Republic. Protection zones are defined to protect these springs, in which activities that could negatively affect them are banned or restricted.

Mineral and geothermal water is used in 16 spas of national importance: Bardejovské kúpele spa, Bojnice, Brusno, Číž, Dudince, Kováčová, Lúčky, Nimnica, Piešťany, Rajecké Teplice, Sklené Teplice, Sliač, Smrdáky, Trenčianske Teplice, Turčianske Teplice, Vyšné Ružbachy. Mineral water in Korytnica is used for drinking purposes only.

DRINKING WATER SUPPLY

The quality of drinking water in the Slovak Republic has demonstrated long-term high standards. In 2014, the proportion of drinking water analysed satisfying the limits reached 99.69 %. The proportion of samples meeting the requirements for drinking water quality in all indicators reached 94.56 %[17]. In 2014, the highest percentage of analyses breaching hygienic drinking water limits was in distribution networks with the following indicators: *Escherichia coli*, coliform bacteria, Enterococcus, cultivated microorganisms at 22 °C and at 37 °C, microscopically detectable micromycetes, abioseston and *Clostridium perfringens*[18]. With regard to inorganic indicators of drinking water quality, limits were not met for the following indicators: iron, manganese, sulphates and turbidity, and, to a lesser extent, nitrates, nickel and lead. No limit values of organic indicators of drinking water quality were exceeded, except for the dichlorobenzene indicator that met the requirements in 99.86 % of 2,769 analyses performed.

The number of inhabitants supplied with water from public water pipelines in 2014 reached 87.7 % of the total population of the Slovak Republic. The Slovak Republic is behind neighbouring countries despite this gradual increase (77.8 % of the population was connected in 1993). Water consumption from public water

[17] These proportions do not include the free chlorine indicator, assessment of which was carried out separately in connection with the microbiological quality of drinking water.

[18] The presence of *Escherichia coli*, coliform bacteria and enterococci indicates faecal pollution from the gastrointestinal tract of warm-blooded animals, including humans, and points to the insufficient protection of water sources and shortcomings in terms of the treatment and sterilization of drinking water. The excessive levels of microorganisms culturable at 22 °C and at 37 °C is an indicator of general water contamination.

pipelines per inhabitant shows a long-term downward trend. The reasons for this may include high water prices, economic decline and changes in the population's awareness of and behaviour towards water.

SEWAGE DISPOSAL

Since 1994, the volume of sewage discharge to surface water has gradually decreased. In 2014, the total quantity of wastewater discharged to surface water amounted to 602,642 thousand m^3, which represented a decrease of 15 % compared to the previous year. Compared to 2000, it is less than 42.5 %. The decrease in organic pollution characterized by CODCr, BOD5, insoluble substance and NELuv parameters in wastewater in 2014 has not yet provided sufficient data to identify a trend. The level of population connected to the public sewage system for sewage disposal is only slowly increasing – in 1993, 51.5 % of the population was connected to the public sewage system; in 2000 it was 54.7 % of the population and in 2014 the proportion of the population connected amounted to 64.7 %. In 2014, approximately 436 mill. m^3 of wastewater was discharged into the public sewage system, representing a decrease of 16 mil. m^3 compared to the previous year and the quantity of treated wastewater discharged into the public sewage system reached the value of 430 mil. m^3.

SWIMMING WATER QUALITY

In 2014, the quality assessment of water for swimming included the 75 natural bodies of water most frequently used for swimming and recreation in the season of 2014. The limit value (LV) of established water quality indicators was exceeded in 32.07 % of the total number of samples (in 2013 it was 24.85 %) and in 8.47 % of the total number of indicators (in 2013 it was 4.84 %)[19]. When compared to 2013, unsatisfactory samples and unsatisfactory microbiological and biological water quality indicators increased, which can in part be attributed to the rainy weather with extensive precipitation and consequent drainage into water bodies.

Probable development without the implementation of the strategy

With the exception of water transport, the transport sector does not represent a significant factor in terms of impact on water quality and quantity and it can be assumed that, if the strategy is not implemented, this will not have a significant impact on the status of water formations and current trends described in the above chapter.

When evaluating the impact of current transport and transport measures on the anticipated development of water quality and quantity, it is necessary to consider impact related to the operation of existing infrastructure (discharge of harmful substances with rainwater from roads and the risk of emergency water pollution due to unsecured road sections crossing water management areas) and the impact of

[19] Source: Report on the Environmental Status of the Slovak Republic 2014

measures currently implemented or contracted as part of the already approved Strategic Plan for Transport Infrastructure Development in the Slovak Republic by 2020, known as the BAU scenario. This includes measures for the modernization or construction of new sections of road and railway networks which could be detrimental to the existing water management areas.

Apart from the transport sector, meeting the requirements of national legislation and the European Water Protection Framework Directive will have a significant impact on water quality and quantity and on dealing with water management issues through the river basin management plans and the programme of measures based on the Slovak Water Plan and further follow-up programmes and plans, e.g. the programme for reducing pollution through harmful and especially harmful substances. The implementation of these programmes, plans and measures should gradually lead to an improvement in the status of water formations.

III.1.5 SOILS, THE GEOLOGICAL ENVIRONMENT AND MINERAL RESOURCES

Agricultural and forest resources

Initial situation and trends

The priority impact on soil when implementing transport infrastructure projects is the permanent use of agricultural land and forests. When using and protecting agricultural land, it is necessary to proceed in accordance with Act No. 220/2004 Coll., on Agricultural Land Protection, as amended.

As part of transformation of the national economy, there is a gradual shift in land use, mainly between agricultural and forest land resources, as well as between other types of land. We have recorded an increase in built-in areas affected by demographic trends and transformation of the economy, and also by the construction of industrial parks and civil amenities requiring large areas.

From 2000 until 2014, an increase in built-in areas of 6.9 % was recorded. Currently, 4.8 % of the area of the Slovak Republic has been built on (as of 31 December 2014).

Tab. III-12 Index of development of built-up area sizes

Year	Built-up areas [Index 2000 = 100]
2000	100
2001	101.43
2002	101.83
2003	102.43
2004	102.84

Year	Built-up areas [Index 2000 = 100]
2005	103.15
2006	103.54
2007	103.92
2008	104.43
2009	104.83
2010	105.13
2011	105.76
2012	106.05
2013	106.37
2014	106.87

Source: The Geodesy, Cartography and Cadastre Authority of the Slovak Republic

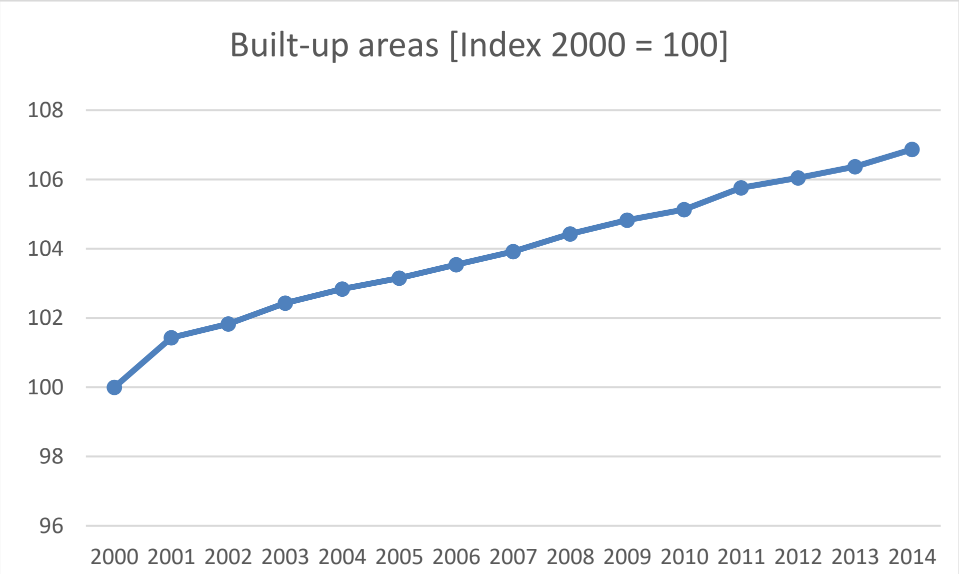


Fig. III-17 Index of development of built-up area sizes (Index 2000=100)
Source: The Geodesy, Cartography and Cadastre Authority of the Slovak Republic

Tab. III-13 The proportion of the size of built-up areas to the total size of the SR

Year	Proportion of built-up areas to the total size of the SR – total [%]
2001	4.54
2002	4.56
2003	4.58
2004	4.60

Year	Proportion of built-up areas to the total size of the SR – total [%]
2005	4.61
2006	4.63
2007	4.65
2008	4.67
2009	4.69
2010	4.70
2011	4.73
2012	4.74
2013	4.76
2014	4.78

Source: The Geodesy, Cartography and Cadastre Authority of the Slovak Republic

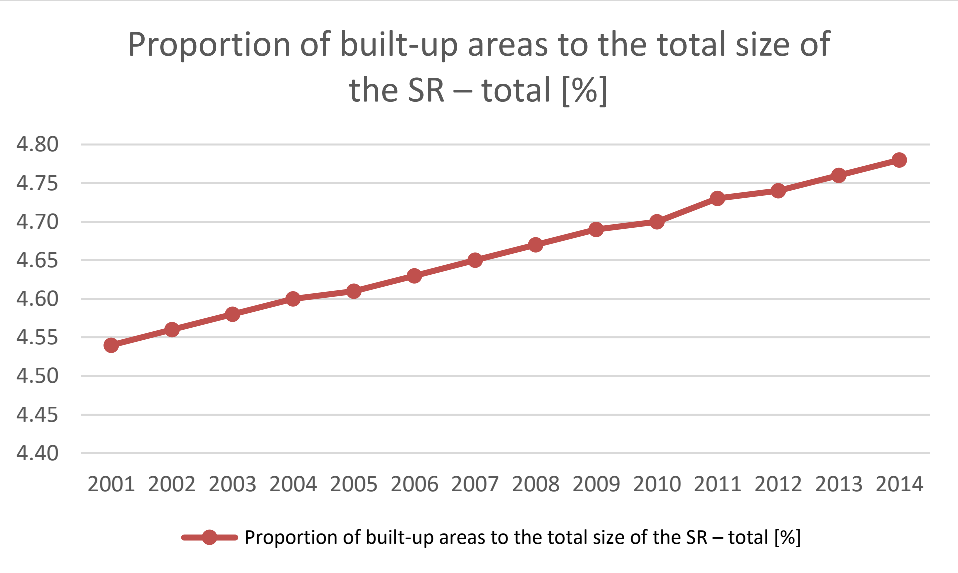


Fig. III-18 The proportion of the size of built-up areas to the total size of the SR
Source: The Geodesy, Cartography and Cadastre Authority of the Slovak Republic

The above trend can also be expected in the future with regard to the further construction of technical infrastructure. The construction of transport infrastructure is also a type of land use, where the greatest share of land use consists of road transport, followed by railway transport. The increase in acreage used by transport infrastructure in the Slovak Republic reached 394.9867 ha, i.e. 1.51 % in 2008. The development of transport, mainly road infrastructure, generates secondary effects due to the increased attractiveness of the territory, leading to the creation of new areas with the function of trade, services and manufacturing, which can be seen mainly around motorway and expressway junctions.

Probable development if the strategy is not implemented

If the infrastructural measures defined by SPTD SR 2030 are not implemented, the permanent and temporary land use for individual constructions and the above-stated secondary use would not occur.

Risks of slope deformations

A special problem in terms of soil and the rock environment is stability. Landslides are the most important geodynamic phenomenon endangering the existing transport infrastructure and are also the conditioning factor during the construction of new road and railway infrastructure sections. In Slovakia, slides occur mainly in built-up areas near Cretaceous and Paleogene flysch and fine grain (pelitic) Neogene sediments, including Neovulcanites.

According to the Atlas of Maps of Slope Stability of the Slovak Republic (ŠGÚDŠ), there are 21,192 slope deformations in Slovakia. They destroy an area of 257.5 thousand ha, amounting 5.25 % of the area of Slovakia. Landslides are the most commonly occurring slope deformation, and 19,104 were registered, representing a total of 90.2 % of all registered slope deformations.

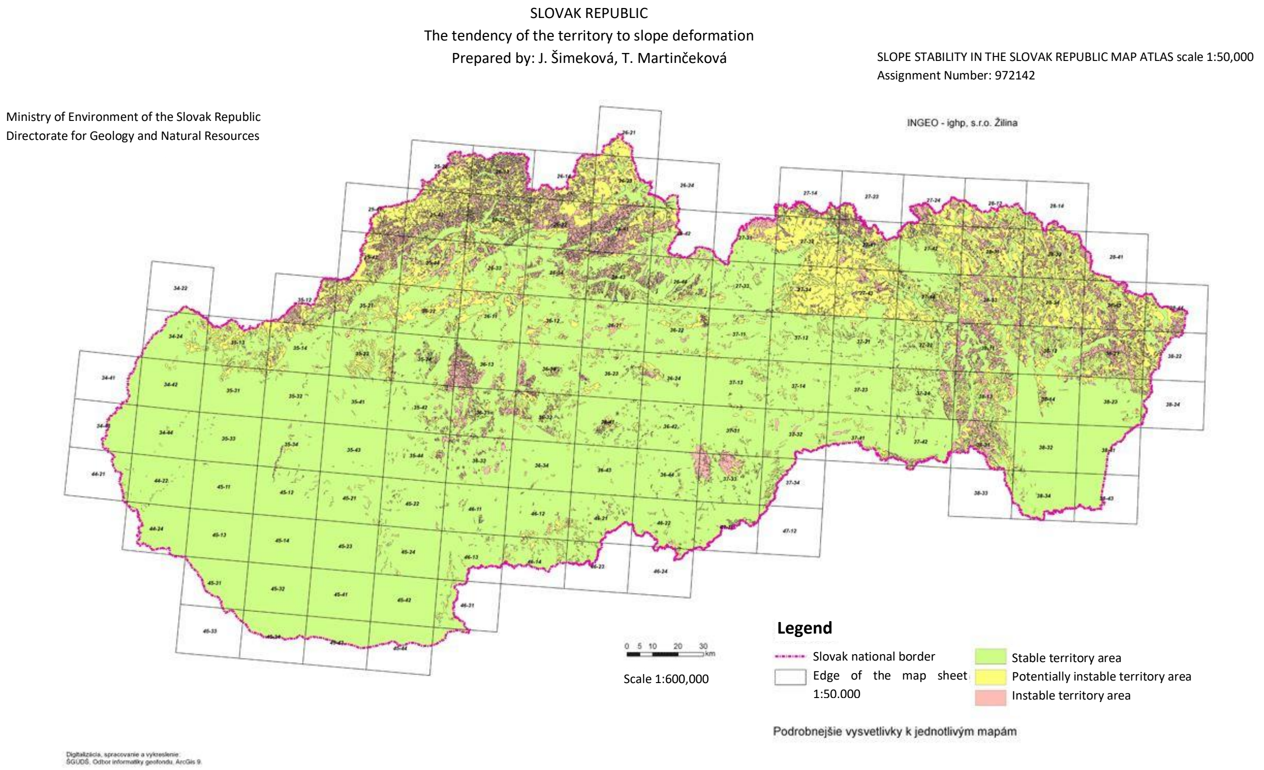


Fig. III-19 Map of slope stability with index of maps M 1: 50,000
Source: Atlas of Maps of Slope Stability of the SR

Of total number of registered slope deformations, as many as 94.5 % are landslides and slope currents. Other types of slope deformations represent less than 5.5 %; this includes 95 combined slope deformations (0.4 %). In terms of evaluating damaged areas, which is more representative than numeric evaluation, the representation of slides is by far the highest (78.12 %) over block deformations (15.31 %) and other types of slope flaws, including combinations (a total of 6.57 %).[20] A comparison of individual regions in terms of damaging slope deformations is depicted by the following image.

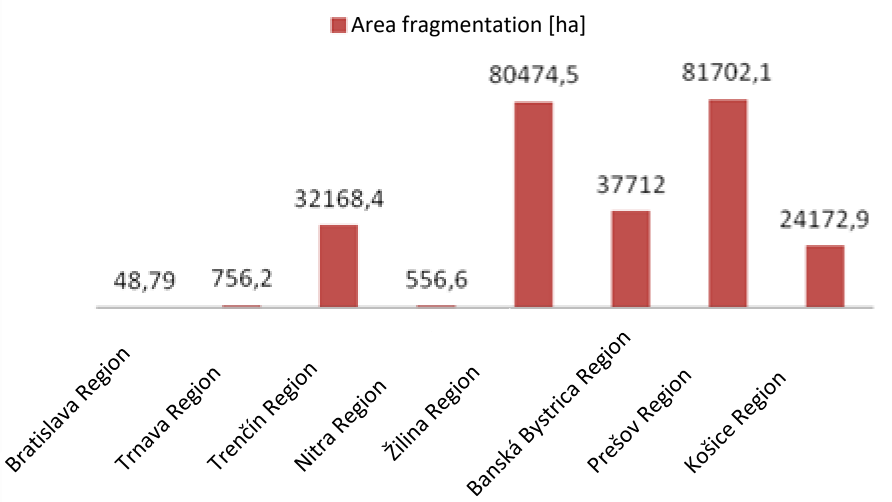


Fig. III-20 Areal damage of regions in the SR caused by slope deformations
Source: Programme for the prevention and management of landslide risks (2014 – 2020), MoEnv SR 2013

Slope deformations threaten 98.8 km of motorways and 1st class roads, 571.4 km of 2nd and 3rd class roads and 67.2 km of railways. Line constructions, i.e., motorways, expressways, railways and 1st, 2nd and 3rd class roads are most at risk from and damaged by landslides (99 %). Of the total length of motorways and 1st class roads, as much as 12.9 % is at risk from or damaged by active landslides. Active landslides are responsible for 11.2 % of risk and damage to 2nd and 3rd class roads, for 10.1 % of risk to railways and 5.1 % of risk or damage to ground structures. The proportion of active landslides causing risk or damage to other structures amounts to 6.5 %, to above-ground product pipelines, 3.7 %, to gas pipelines, 6.8 % and to water pipelines, 4.2 %.

Natural causes in the origin of slope deformations are climatic factors combined with the erosive activity of water courses, groundwater springs and the buoyancy effect of groundwater. The main cause of a large number of landslide-type slope deformations in the 1st half of 2010 was predominantly the long-lasting rainfall at the beginning of June, when daily precipitation aggregates were around 25 to 50 mm across the whole of Slovakia's territory and in the north and east of the country they reached 80 mm on occasion. Persistent and heavy rain caused a gradual rise of water levels in almost all water courses in Slovakia and subsequent flooding. The buoyancy effect of swollen rivers and the extremely high soil saturation after earlier rains weakened the slopes of the rock massifs, prone to landslides, resulting in the emergence and

[20] Programme for the prevention and management of landslide risks (2014 – 2020), MoEnv SR 2013

development of large-scale landslides causing huge material damage, with the greatest damage recorded in the Prešov and Košice regions.

The creation of slope deformations is further caused by anthropogenic interventions, particularly by inappropriate building interventions (undermining or aggravating unstable slopes) as well as the uncontrolled drainage of surface rainwater and sewage water or the absence of such drainage.[21]

Probable development if the strategy is not implemented

According to the report on emergency slope deformations and the need to eliminate threats to the lives and property of citizens, the risk of landslides conditioned by the primary prevalence of slope deformations has recently increased due to more intensive construction activity moving away from plains and slightly sloping areas to hilly and more exposed areas. This trend can be observed mainly in municipalities in the mountainous regions of Slovakia. It is caused by the lack of suitable building land on the plains, but also the targeted location of a building on a slope due to the attractiveness of the area (views, privacy, cleaner environment etc.). An increasing number of landslides is caused by not respecting the reduced stability of landslide areas and adverse interventions on natural slopes.

The activation of slope deformations linked to extreme precipitation and flooding in f Slovakia has recently caused huge damage to affected areas. Active slope movements will be manifested more clearly in the most vulnerable regions of the flysch zone in northern and northeastern Slovakia. Extensive landslides damage and endanger family homes and apartment blocks, economic buildings, manufacturing operations, engineering networks, state roads and communications, railway sections, protective dams and waterway fortifications, agricultural and forest land.[22] Due to adverse climatic conditions during the spring months, the number of registered landslides continues to grow.[23]

In 2010 – 2012, the Ministry of the Environment, pursuant to Section 36 (1) (y) of Act No. 569/2007 Coll., on Geological Works (the Geological Act), as amended, ensured geological works to prevent, mitigate or eliminate the consequences of a natural disaster, focusing on the registration of landslides, an engineering geological survey and the remediation of dangerous landslides in selected priority locations.

The Ministry is currently aware of **103 locations** where more than 250 buildings were damaged at the time of the landslide (family houses, economic buildings, support walls, roads), including 38 family houses destroyed and approximately 450 buildings at risk of slope deformations. In these locations, it is necessary to carry out an engineering geological survey and the consequent remediation of dangerous landslides

[21] Report on dangerous slope deformations and the need to eliminate threats to the lives and property of citizens
[22] Programme for the prevention and management of landslide risks (2014 – 2020), MoEnv SR 2013
[23] Report on dangerous slope deformations and the need to eliminate threats to the lives and property of citizens

due to the continued high risk to the lives and property of the inhabitants of the affected areas, including damage to the environment.[24]

III.1.6 NATURE AND LANDSCAPE

Current state

The greater part of the territory of the Slovak Republic (41 %) is covered by **forest**, while this area increased slightly between 2000 and 2012. In terms of species composition, 60 % are deciduous trees, although they were 79 % of the original natural composition, and the targeted value of forest management is 63 %. The most frequently used health indicator for forests is defoliation, thus the degree of loss of assimilatory organs (LAO). One of 5 grades (0 – 4) is assigned according to the percentage of leaf loss. Between 2000 and 2014, the proportion of healthy trees (degree 0) decreased from 18 % to 7 % for coniferous trees and from 29 % to 15 % for deciduous trees.

Tab. III-14 The development of forest health expressed by the degree of defoliation

		Degree of defoliation						
Year		0	1	2	3	4	0–1	2–4
2000	Coniferous	18	44	35	2	1	62	38
	Deciduous	29	57	13	1	0	86	14
	Total	25	52	22	1	0	77	23
2014	Coniferous	3.1	43.9	50.7	2.1	0.2	47	53
	Deciduous	11.8	41.7	44.6	1.7	0.2	53.5	46.5
	Total	8.3	42.6	47.1	1.8	0.2	50.9	49.1

Explanations: Degree 0 no defoliation (LAO 0 – 10 %), 1 weakly defoliated (LAO 11 – 25 %), 2 moderately defoliated (LAO 26 – 60 %), 3 strongly defoliated (LAO 61 – 99 %), 4 dying and dead trees.

Source: http://enviroportal.sk

Arable land covers 29 % of the area of the SR, although this share has decreased slightly since 2000. **Permanent grassland** covers 18 % of the territory and this share has also decreased slightly since 2000. On the other hand, the share of built-up areas, representing 5 % of the area, has increased.

Wetland eco-systems comprise 4.2 % of the area of the SR, while their condition is assessed as favourable only in the case of 3 % of wetlands and in the case of almost 70 %, the condition is assessed as unfavourable, and for others it is unknown. 14 wetlands with a total area of 407 ha have been registered in the List of Wetlands of International Significance of the Ramsar Convention.

[24] Ibid

Almost 15 % of **wild** higher **plants** and more than 11 % of the lower plants of Slovakia are on the red list in one of the endangered categories. Critically endangered are 155 species of higher plants from an overall number of 3,619. As many as 80 native species are considered extinct. The number of plant taxons protected by the government is 1,419, which includes 823 occurring in the SR (also protected are species of European importance included in Directive 92/43/EEC of the Council on the conservation of natural habitats and of wild fauna and flora not occurring in the territory of the SR). Of **animals,** according to the red list 6.6 % of invertebrates and 24.2 % of vertebrates are considered endangered, while most endangered are lampreys (100 % of species) and amphibians and reptiles (40 %). The number of government-protected animal taxons currently amounts to 1,042 taxons, including 746 occurring in the Slovak Republic.

In the second assessment **report on the state of habitats and species of European importance** of 2013, almost the same number of species and habitats were evaluated as being in poor condition when compared to the report for the first monitoring period, which suggests insufficient measures were taken for their protection. The proportion of species and habitats in a favourable condition increased, which is, however, rather a result of an improved level of knowledge, not of any improvement in real conditions. The status of many species is still evaluated as unknown. The most endangered habitats in Slovakia are the inland salt marshes and salt meadows, the Carpathian travertine salt marshes, the Pannonian inland sand dunes, Alpine and Sub-Alpine grasslands, Alpine snow beds, dry grassland and scrubland on limestone with the occurrence of species from the family Orchidaceae, active raised bogs, transitory mosses and peatbogs, calcareous fens with saw grass and species of Caricoin davallianae, high-alkaline fens and tufa petrifying springs. From the perspective of building transport infrastructure, the most endangered are the wetland habitats sensitive to changes in the water regime. In the report on the condition of birds pursuant to the Birds Directive, 243 species were evaluated, while in the case of 34 % of species their population in Slovakia is decreasing and in 76 % their populations are stable or increasing.

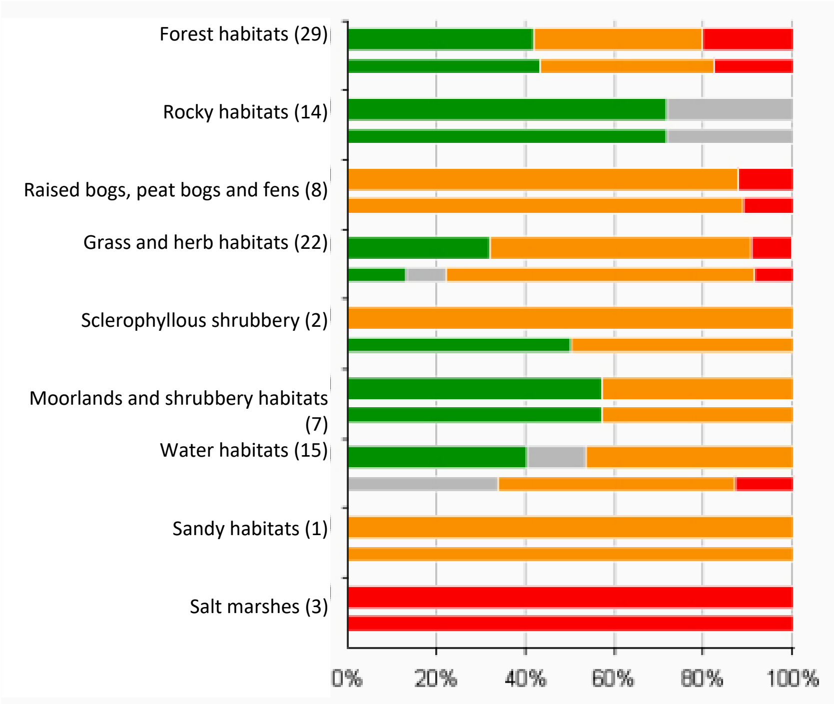


Fig. III-21 The status of protected habitats pursuant to the Habitats Directive

Source: V. National Report on the Implementation of Biological Diversity Convention in Slovakia, 2014

State in the years 2007–2012: broader upper band, state in 2004–2006: narrower bottom band. Green: favourable, orange: insufficient, red: unfavourable, grey: unknown)

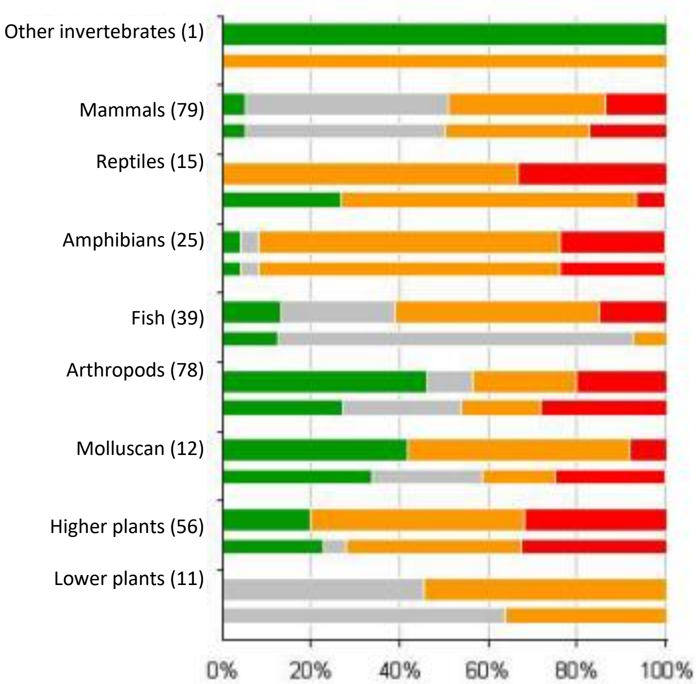


Fig. III-22 The status of protected species pursuant to the Habitats Directive

Source: V. National Report on the Implementation of Biological Diversity Convention in Slovakia, 2014

State in the years 2007–2012: broader upper band, state in 2004–2006: narrower bottom band. Green: favourable, orange: insufficient, red: unfavourable, grey: unknown)

Factors negatively affecting biodiversity

A significant factor endangering biodiversity is the **expansion of built-up areas** at the expense of natural and agricultural areas, including the land used for **transport constructions**. This results in the use of natural habitats and the habitats of endangered species. Problematic are not only constructions on the edge of protected areas, but also in open countryside where valuable landscape elements are destroyed. Moreover, large transport constructions lead to **fragmentation of the landscape** as a whole, of larger forests and natural habitats and to reduced migration permeability. Changes in the composition of species occur in near transport constructions due to the impact on vegetation, air, soil and water pollution during normal operations or potential emergencies as well as due to noise and light pollution. The direct killing of animals also occurs, while large species are also a significant factor reducing the safety of transport. In the case of regularly migrating species, such as amphibians or otters, the local population can even become extinct. Small songbirds are also endangered by consuming road salt. Last but not least, transport constructions also affect the character of the landscape. In some cases, the effects concern protected areas and Natura 2000 sites.

A big problem are the **invasive species** that continue to spread in spite of the measures implemented for their liquidation. Invasive plant species occur in many locations and protected territories. 7 invasive plant species are stated listed in the Decree of the MoEnv No. 24/2003 Coll. as a priority (Ambrosia artemisiifolia, Fallopia sp. (syn. Reynoutria), Helianthus tuberosus, Heracleum mantegazzianum, Impatiens glandulifera, Solidago canadensis, Solidago gigantea); their liquidation is, however, limited mainly due to insufficient funds. The removal of invasive plants thus focuses more on protected territories Invasive animal species are not systematically monitored, but they are also a danger to native species, mainly for some invasive types of fish or American mink.

Intensive agricultural management has a series of negative effects on biodiversity, caused, for example, by destruction of the landscape mosaic, destruction of habitats, overuse of surface waters, the addition of nutrients or the application of pesticides. On the other hand, the **absence of management** of meadows, especially water meadows, wetlands and other economically unprofitable or remote locations also has a negative effect.

The energy industry has a negative impact on biodiversity, e.g. due to the extraction of raw materials related to changes in the landscape, air pollution, heat pollution, the cultivation of energy crops, disrupting flow continuity or the killing of birds and bats by wind farms.

Biodiversity is negatively affected by **air pollution** causing the degradation of sensitive ecosystems, damage to forests by acid rain and adding nutrients to water and soil. **Climate change** has a significant impact on biodiversity. Changing conditions no longer suit a number of species, while, on the other hand they enable other species to spread. Changes in the climate due to natural causes are listed, as well as those caused by human actions, mainly by the production of greenhouse gases. The productions from stationary sources are reduced, while greenhouse gas emissions from transport are increasing. **Water extraction** can have negative effects with regard to surface waters and reducing the flow volume in water courses, connected to changes in the water ecosystem and reducing riverbank vegetation leading to the death of animals, as well as changes in vegetation due to changes in groundwater levels. The amount of surface and groundwater extraction will decrease in the long term, but problems may arise mainly in case of prolonged rainfall shortages. Another negative factor is **water pollution** caused by discharges of wastewater and discharges from agriculture and transport. **Technical interventions in water courses** also negatively affect biodiversity by causing changes in aquatic eco-systems. These interventions are sometimes carried out in connection with transport development. **Tourism development**, the building of accommodation facilities, the construction and expansion of sporting facilities and large numbers of visitors in some areas present a threat to biodiversity, mainly in protected areas.

Probable development if the strategy is not implemented

The continuation of prior trends may be anticipated. On the one hand, targeted care for the most precious locations and species will continue or even expand, while, on the other hand, demands for land use will continue to increase. From the perspective of development in the transport sector, some road and railway sections will be built or rebuilt with a negative effect on nature and the landscape as characterized above, even if the assessed strategy is not accepted. If the strategy is implemented, the implementation of even more building measures is to be expected, which will affect more areas.

III.1.7 CULTURAL HERITAGE

The most important part of cultural heritage is represented by the heritage fund. This consists of national cultural heritage sites and heritage areas. From the perspective of the content and purpose of the assessed strategy, especially relevant is the issue of ensuring the protection of immovable cultural heritage sites (around 15 thousand heritage objects) and heritage areas (28 heritage reservations and 97 heritage zones)[25]. A special part of cultural heritage is represented by archaeological heritage (Act No. 49/2002 Coll., on Heritage Fund Protection, defines terms such as “archaeological find” and “archaeological site”). The discovery and documentation of archaeological heritage is the basic prerequisite for its protection. The overwhelming majority of archaeological research is currently carried

[25] The Monuments Board of the Slovak Republic: Recording the national cultural heritage sites in Slovakia. 18th December 2014. http://www.pamiatky.sk/sk/page/evidencia-narodnych-kulturnych-pamiatok-na-slovensku.

out in the form of so-called rescue archaeology caused by investor activity, especially during the construction of transport infrastructure and other economic and construction activity.

Tab. III-15 The structure of the heritage fund of the Slovak Republic according to types: The number of heritage objects constituting national cultural heritage sites (hereinafter referred to as the "CHS")

CHS type classification	2009	2010	2011	2012
Architectural heritage	8,092	8,408	8927	9073
Archaeological heritage	393	407	408	464
Historical heritage	1,401	1,399	1164	1214
Historical green heritage	373	382	409	444
Heritage of folk architecture	2,055	2,099	2197	2199
Technical heritage	526	520	593	601
Fine art heritage	1,506	1,603	1379	1393
Total	14,346	14,818	15077	15388

Source: The Concept of Protection of Monuments – the annexes were updated as of 31st December 2012

According to the analysis contained in the document. the Concept of Protection of Monuments of the Slovak Republic, the status of monuments cannot be generally considered satisfactory. The percentage of heritage sites in various degrees of technical condition was maintained at approximately the same level. The proportion of damaged heritage sites is still maintained at the relatively high level of approximately 20 %; the proportion of heritage sites in a dilapidated condition is still approximately 5 %. However, it should be borne in mind that the protection of numerous heritage sites is cancelled every year mostly due to a dilapidated condition or physical decay. If these heritage sites are to remain recorded in the Central Register of the Heritage Fund, the percentage of dilapidated conditions would be even higher[26].

Tab. III-16 Building – technical condition (hereinafter referred to as the "BTC") of national cultural heritage sites the Slovak Republic (%): The number of heritage objects contained in CHS

Condition	2009	%	2010	%	2011	%	2012	*%
good	4,446	31.00	**4,584**	30.94	4711	31.25	4776	31.78
satisfactory	5,641	39.30	**5,746**	38.78	5633	37.36	5718	38.05
flawed	2,843	19.80	**2,949**	19.90	2984	19.79	3023	20.12
desolate	684	4.80	**850**	5.74	726	4.82	803	5.34
under reconstruction	732	5.10	**689**	4.65	675	4.48	709	4.72

Source: Protection of Monuments Conception of the Slovak Republic – update of annex part as of 31 December 2012.

[26] E.g. in 2010, the declaration of 53 heritage sites was cancelled mainly due to flawed technical condition. Source: Protection of Monuments Conception: Aims and objectives of monuments protection in the Slovak Republic by 2021. http://www.rokovania.sk/File.aspx/ViewDocumentHtml/Mater-Dokum-138307?prefixFile=m.

*note: Percentage share of BTC CHS is calculated from the overall value of 15,029 heritage objects (hereinafter referred to as the "HO"), including CHS with BTC of values from 1 to 5 ("good" to "under reconstruction").

According to the quoted analysis, "the situation in the area of territorial protection is not satisfactory, as heritage values of individual protected areas cannot be sufficiently protected and maintained". Conditions and principles of heritage preservation and heritage zone protection are not incorporated on time and sufficiently to the territorial documents, land use documentation, towns and townships do not have (mainly due to financial reasons) updated or valid territorial documents, especially land use plans of rural zones are missing. Even if the land use plan sets principles of using the territory in line with principles of heritage protection, in the praxis its philosophy is often changed by amendments and supplements promoted by local interest groups." Moreover: "Even more complex is the situation with the promotion of interests of monuments protection in protected zones that are alone not heritage zones" (Protection of Monuments Conception, update of annex as of 31 December 2012 [2013]))

UNESCO World Heritage Sites: A special category is made up of heritage sites or areas that are as Slovak locations entered in the List of UNESCO Heritage Sites. At the present, it includes the following locations:

- Banská Štiavnica and technical monuments in the surroundings
- Levoča, the Spiš Castle and monuments in the surroundings
- Reservation of Folk Architecture Vlkolínec
- Historical centre of Bardejov
- Wooden churches in the Slovak part of Carpathian Mountain Area

In the context of strategic planning of further development of (not only) transport architecture it is suitable to consider also the locations proposed, however not included in the List yet:

- Limes Romanus – Antique Roman Monuments on the Middle Danube
- Gemer and Abov churches with the medieval wall paintings
- System of Fortifications at the Confluence of the rivers Danube and Váh in Komárno – Komárom
- Chatam Sófer Memorial
- Tokay wine growing region, set of wine cellars
- Concept of historical lens-shaped city centre of Košice
- Memorial to Great Moravia: Slavonic Fortified Settlement at Mikulčice – Church of St. Margaret of Antioch

Probable development if the strategy is not implemented

The relationship of the strategy judged and cultural heritage issue is very loose. Failing to implement the structures of transport infrastructure, which divert a part of traffic from residential areas of towns and villages, endurance of negative impacts of traffic (emissions, vibrations) on the monuments situated at the centres of residencies, and thus worsening of existing disadvantageous status can be expected. Protection of cultural monuments is, however, predominantly an issue of source allocation, necessary for their maintenance, and thus relevant political decisions. Impacts of traffic are not an negligible, but a deciding factor of future development. Therefore, in the future we can expect rather stagnation or slight improvement of existing problems.

III.1.8 POPULATION AND HEALTH

With respect to nation-wide activity of SPTD SR 2030 and in terms of impacts on health, whole population of the Slovak Republic is potentially influenced, taking into account district differences, where it is strategically suitable and available.

Demography

In the territory of the Slovak Republic[27] (2014), which is approximately 49,035 km^2, there are **in total 5,421,349 citizens**, living in 79 districts, 8 regions, 2,890 villages and 138 towns. Out of that 2,779,021 are women. 2,921,600 citizens live in towns, out of that 1,517,158 women. Average population density is 111/km^2. However, the density in Bratislava I district amounts to 4,057 citizens/km^2, thus being the highest in the Slovak Republic. Number of inhabitants living in the territory of Slovakia is gradually increasing; stagnation is expected, however.

With growing number of citizens it is necessary to take into account gradually growing demands related to the transport scheme. Inequality of population density places different demands on transport connections, thus also higher health risk relating to traffic in bigger cities (in agglomeration of Bratislava, Košice, Banská Bystrica) than in a less inhabited village can be expected.

Number of inhabitants in Slovakia reached at the end of last year a new record, namely more than 5.42 million people. Population, however, is changing and at the latest in 2030 the number of inhabitants will start to decline. In 2014 more children were born than in 2013 and by contrast, fewer people died. Natural increase in population reached almost 3,700 people. By foreign migration Slovakia gained 1,713 persons, by 28% less than previous year. Number of inhabitants who moved abroad increased last year to the highest value since 2005.

[27] Source: Statistical annual of regions of Slovakia 2015, headquarters of the Statistical Office of the Slovak Republic

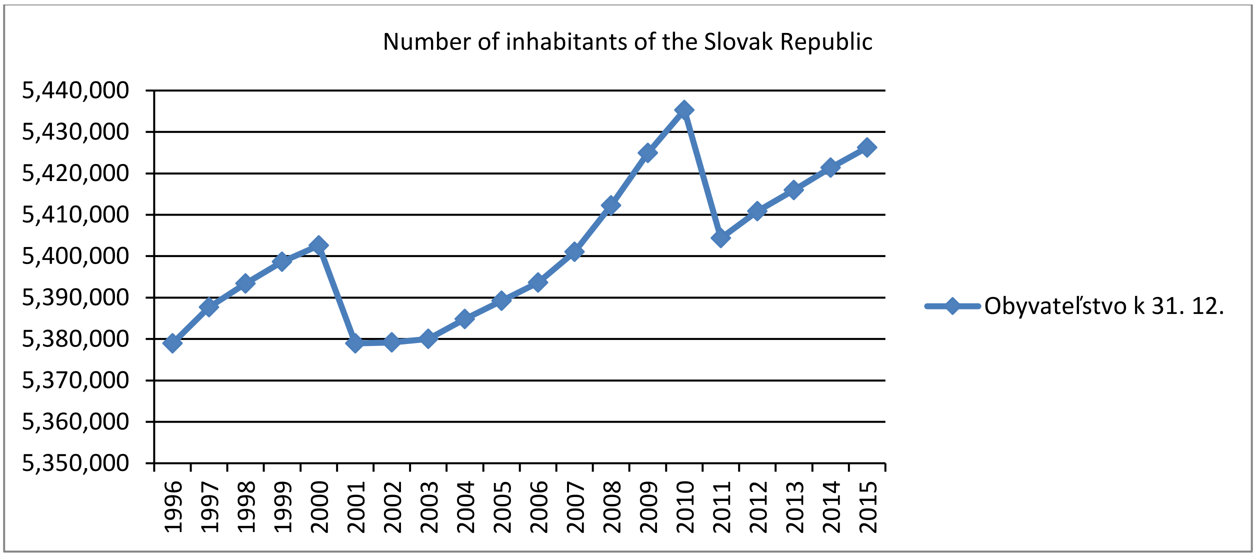


Fig. III-23 Development of number of citizens in the Slovak Republic. Data in 2001 and 2011 is after considering the results of population census

Source: Statistical Office of the Slovak Republic

Change of the number of citizens in individual regions is unequal. The trend of population decline in regions with prevailing rural population in favour of some urban agglomerations is obvious from following graph.

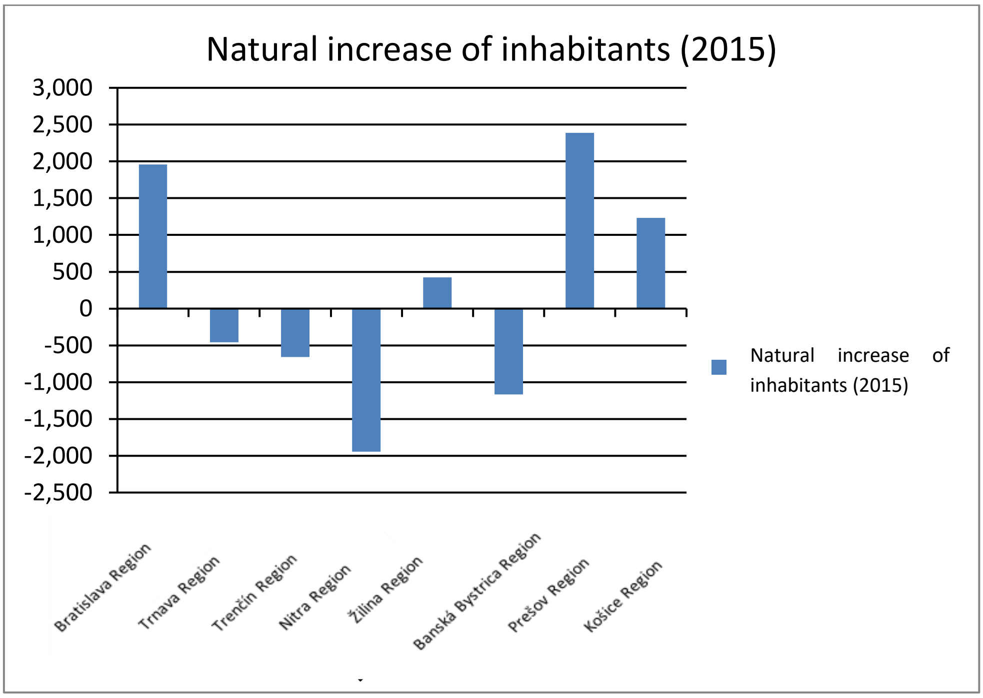


Fig. III-24 Natural increase of inhabitants in regions of the Slovak Republic in 2015

The trend of aging population still endures, being influenced also by life expectancy at birth. In 2014 the life expectancy at birth amounted to 73.19 years with men and 80 years with women. Representation of citizens in pre-productive age (0 – 14 years) was 15.3 %, on year-on-year basis it is changing only slightly. Proportion of productive part (15 – 64 years) dropped from 71.1 % to 70.7 %. **Proportion of citizens in post-productive age (65 years and more), on the other hand, increased by 0.4.** Citizens of the Slovak Republic live predominantly (3,765 m.) in villages with 2000 and more inhabitants. On a regional basis the number of people living in towns and small villages differentiates. Towns are associated with urban way of life and traffic concentration. Specific problems are connected with inappropriate forms of territorial development of urbanized area (e.g. "urban sprawl"), generating additional demands on traffic, or formation of so-called "street-canyon", where conditions leading to high pollution values of air and noise are concentrated.

Despite that there are studies, which unambiguously show that life expectancy is mostly higher with people living in towns than those living in the countryside[28]. Also, in towns and urban agglomerations the level of income and education is higher and level of unemployment lower.

Health state

Health state of citizens in Slovakia is basically not different from other Central European countries. Statistical data is more focused on health care as such, but some data can be gained for the whole Slovak Republic in Eurostat databases. Basic and current data on health state and some of its determinants can be found in inquiry publications **EHIS 2014** – Overview of health state of population of the Slovak Republic and its determinants[29] (EHIS 2014 results). Further data can be found in the Edition of Health Annual[30].

Health state of population is usually applied in strategic documents as "basic information – descriptor", which help formulate recommendations or with monitoring strategies. They help in orientations of meaning or weight of selected health determinants. Life expectancy is very often used for to describe the trend of health quality. Following chart shows gradually prolonging life expectancy, which is considered to be an advantageous trend.

Fig. III-17 Life expectancy at birth in years

Sex/year	2012	2013	2014
Men	72.5	72.9	73.2
women	79.5	79.6	80.0

Source:
http://www.nczisk.sk/Documents/publikacie/analyticke/zdravotnictvo_slovenskej_republiky_v_cislach_2014.pdf

[28] DesMeules, M., Pong, R., Lagacé, C., Heng, D., Manuel, D., Pitblado, R., Bollman, J., et al. (2006). How Healthy are Rural Canadians? An Assessment of their Health Status and Health
[29] http://www.uvzsr.sk/docs/info/podpora/Sprava_o_zdravotnom_stave_obyvatelstva_SR_za_roky_2009_2011.pdf
[30] http://www.nczisk.sk/Publikacie/Edicia_roceniek/Pages/default.aspx

Causes of death

On a long-term basis the most frequent **causes of death of women, as well as men** are **circulatory diseases** (women 13,726, men 11,472), although since 2012 the number of death as a consequence of circulatory disease (CHOS) significantly decreased, with men by 8 % and women by 11 %. **The share of deceased due to CHOS out of a total number of deceased dropped from 53 % in 2012 to 49.1 % in 2014.** It is connected to more convenient selection of codes of causes of death, stated in pharmacies in the letter of inspection of deceased person during statistical processing of reports in the Statistical Office of the Slovak Republic.

With regard to the impact of noise to human health numbers of deceased persons who died of cardiovascular diseases are stated in the following graphs.

G 2.2 Štandardizovaná miera úmrtnosti na choroby obehovej sústavy v SR podľa vekových skupín a pohlavia

Standardized Death Rate on Diseases of the Circulatory System by Age Groups and Sex

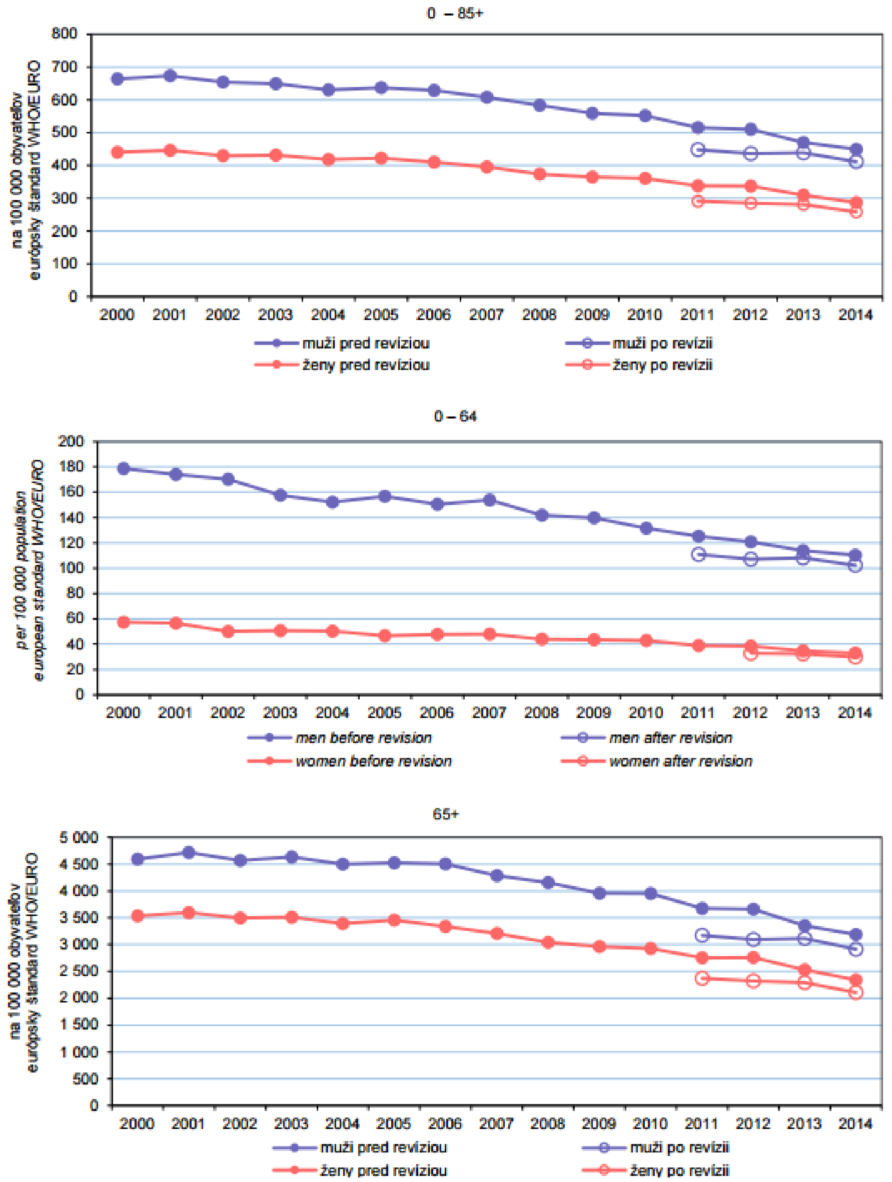


Fig. III-25 Standardized mortality due to cardiovascular diseases

From the graph it is obvious that in the past years the number of persons who died of cardiovascular disease has been decreasing.

The second most frequent and increasing cause of death in both sexes **are tumours** (men 7,581, women 5,888). Since 2012 their number increased with men by 9 % and women by 12 %. Most deceased men in the group of tumour diseases suffered from diagnosis C33 – C34 malignant neoplasm of trachea, bronchus and lung (1,579), malignant neoplasm of colon and rectum C18 – C21 (1,135) and malignant neoplasm of prostate C61 (737). For women the most frequent cause of death is malignant neoplasm of breast C50 (901), malignant neoplasm of colon and rectum C18 – C21 (839), as well as malignant neoplasm of trachea, bronchus and lung C33 – C34 (549).

Expected impact on health of individual groups of citizens, in particular with regard to their age, is different. Differences are with regard to the intensity of factors – e.g. traffic accidents of seniors, cyclists, such as in positive impact on mobility, availability of medical aid, etc. In the context of evaluation performed, health characteristics of the affected population of the Slovak Republic below are significant.

Persons who died of consequences of traffic accident

Following map of Eurostat serves for comparison.

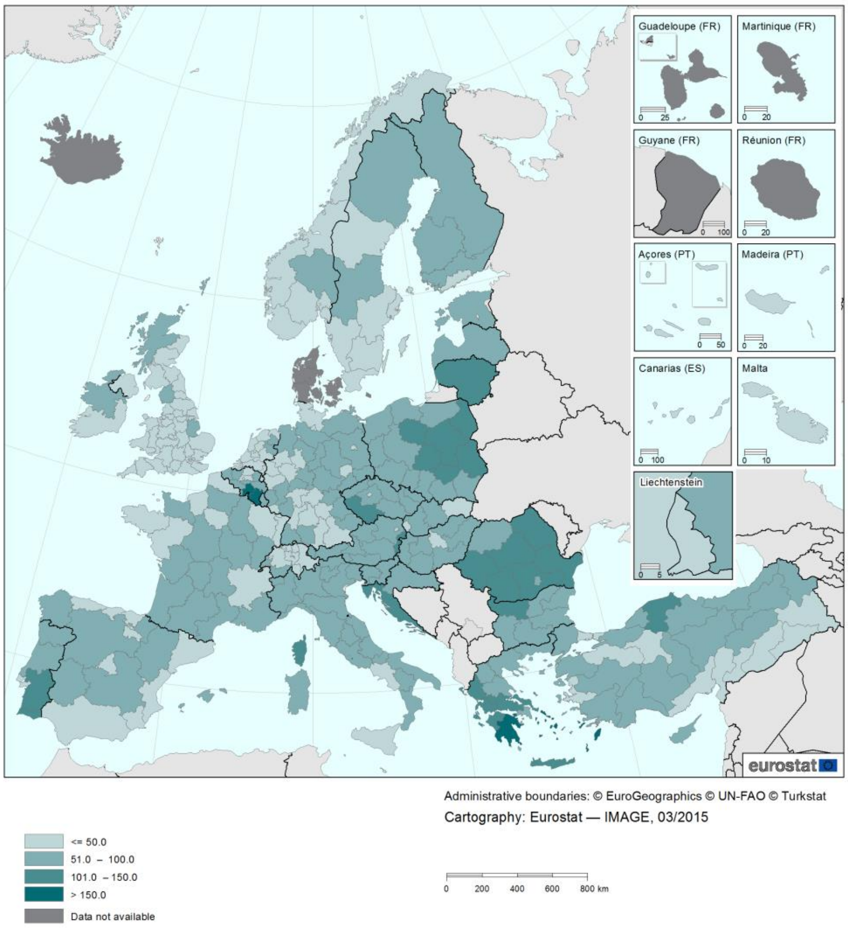


Fig. III-26 Number of persons who were killed in a car accident/million citizens according to EU NUTS 2 [31]

[31] Source: http://ec.europa.eu/eurostat/statistics-explained/index.php/File:Number_of_deaths_in_road_traffic_accidents_per_million_inhabitants,_by_NUTS_2_regions_2012.PNG

From the above it is obvious that deaths in connection to traffic accident is relatively equally represented, they are lower in the agglomeration of Bratislava, which can be explained by accessibility of fast medical aid and lower speed in accident, lower mortality after an accident is also in the east of Slovakia, probably due to traffic density.

Number of car accidents is a significant domain of men. From the following diagram the decline of car accident rate and number of persons injured in Slovakia in the period 2011 to 2013 is obvious.

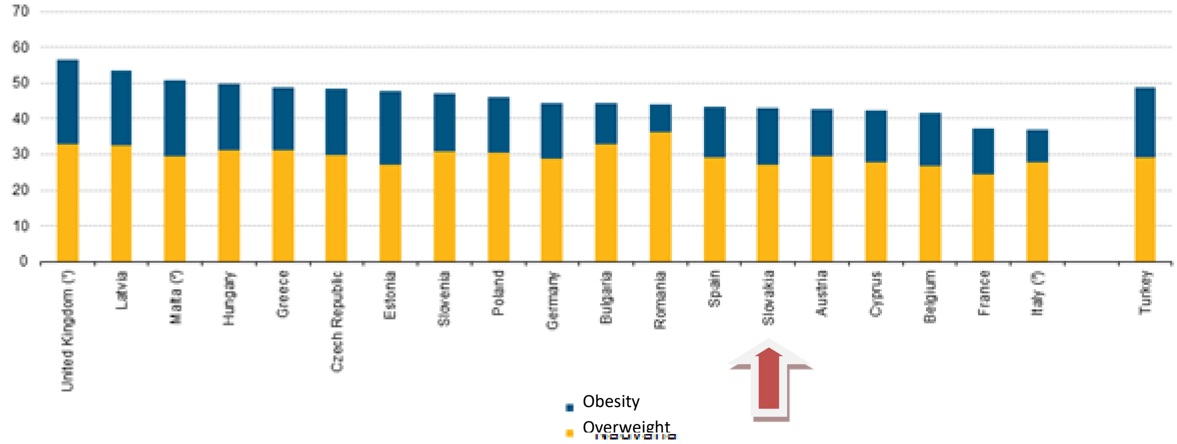
Fig. III-18 Number of car accidents and injuries[32]

		Units	2011	2012	2013
MEN	Car accidents (V01-V99)	Number	379.000	351.000	286.000
		Trend (rate)	14.720	13.560	11.380
	Walkers injured during a car accident	Number	118.000	118.000	110.000
		Trend (rate)	5.160	4.930	4.830
	Cyclists injured during a car accident	Number	29.000	33.000	23.000
		Trend (rate)	1.420	1.570	1.140
	Motor cyclists injured during a car accident	Number	35.000	33.000	24.000
		Trend (rate)	1.090	1.100	0.830
	Car crews of injuries during a car accident	Number	162.000	139.000	95.000
		Trend (rate)	5.710	4.760	3.180
	Truck crews of injuries during a car accident	Number	2.000	2.000	1.000
		Trend (rate)	0.070	0.060	0.030
WOMEN	Car accidents (V01-V99)	Number	103.000	114.000	92.000
		Trend (rate)	3.710	4.170	3.390
	Walkers injured during a car accident	Number	50.000	61.000	48.000
		Trend (rate)	1.880	2.320	1.790
	Cyclists injured during a car accident	Number	8.000	7.000	8.000
		Trend (rate)	0.300	0.250	0.320
	Motor cyclists injured during a car accident	Number	1.000	3.000	1.000
		Trend (rate)	0.040	0.100	0.030
	Car crews of injuries during a car accident	Number	42.000	38.000	30.000
		Trend (rate)	1.420	1.330	1.050
	Truck crews of injuries during a car accident	Number		1.000	0.030
		Trend (rate)		0.030	

Obesity

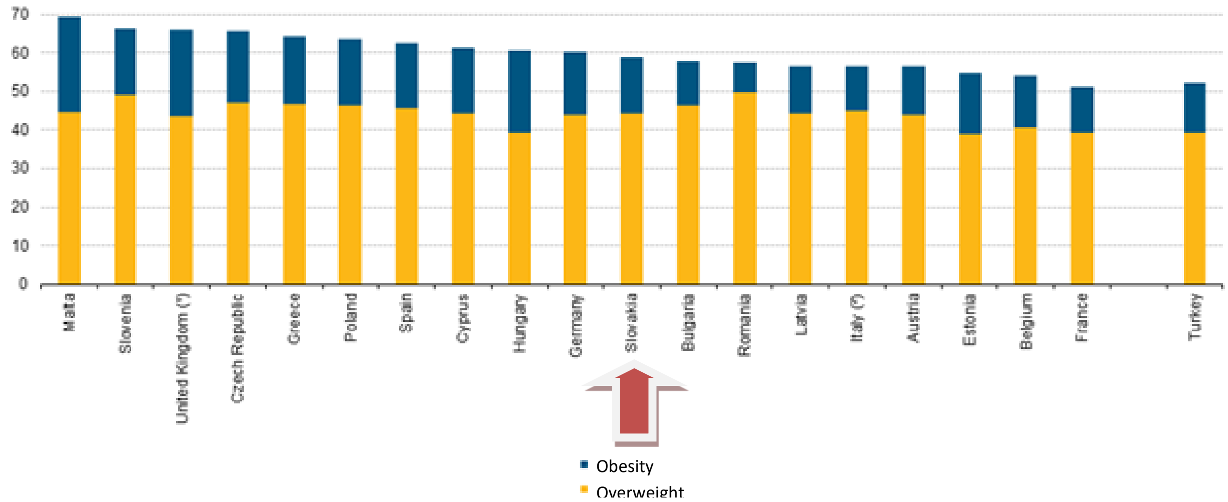
Obesity is a problem, which is closely connected to physical activity. As in other developed countries, Slovakia shows a significant share of obese people. Comparative data is available from 2008, see following diagrams.

[32] Source: https://knoema.com/hlth_cd_tro/deaths-related-to-transport-accidents-occurring-in-the-country?geo=1022450-slovakia#



(1) England only. Source: Health survey for England, 2009.
(2) Low reliability.
(3) Source: Aspects of daily living survey, 2009.
Source: Eurostat (online data code: hlth_ehis_de1)

Fig. III-27 Obesity and overweight of women in percentage points (2008)[33]



(1) England only. Source: Health survey for England, 2009.
(2) Source: Aspects of daily living survey, 2009.
Source: Eurostat (online data code: hlth_ehis_de1)

Fig. III-28 Obesity and overweight of men in percentage points (2008)[34]

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[33] *Source:http://ec.europa.eu/eurostat/statistics-explained/images/1/1e/Proportion_of_women_who_were_overweight_or_obese%2C_2008_or_nearest_year_%28%25%29_Health2015.png*

[34] Source:http://ec.europa.eu/eurostat/statistics-explained/images/0/0f/Proportion_of_men_who_were_overweight_or_obese%2C_2008_or_nearest_year_%28%25%29_Health2015.png

Based on the overview above and professional publications Slovakia[35] has the biggest problem with obesity as the most frequent metabolic disease. In the studies "*Incidence of overweight and obesity with schoolchildren and adolescents in the region of Middle Slovakia"* the incidence of overweight and obesity was lowest in the group of 13-year-old girls (5 %) and **highest in the group of 11-year-old boys (19 %)**. With boys the incidence of obesity was statistically significantly higher (p=0.003). In the group of 11 and 15-year-old respondents these differences were not statistically significant (11-year-old: p=0.011; 15-year-old: p=0.284). **With boys of all age groups statistically significantly higher obesity incidence was observed (p=0.001).**

Asthma

Asthma has been connected to polluted air, even if several studies did not confirm this connection or confirmed only the number of asthmatic seizures or course of diseases[36]. The situation in the Slovak Republic in 2013 was comparable with the Czech Republic and other European countries- due to the diagnosis of bronchial asthma a total of 96,271 persons attended out-patient clinic in Slovakia.

Tab. III-19 Number of persons who attended out-patient clinic due to bronchial asthma diagnosis in 2013

ZZ territory	Number of persons included in the health care				
	asthma bronchiale (J45.0) in total	of which			
		intermittent	mild persistent	medium persistent	serious persistent
Slovak Republic	**96,271**	**19,738**	**34,420**	**35,863**	**6,250**
Bratislava Region	6,760	1,779	2,724	1,840	417
Trnava Region	8,410	2,239	2,626	3,233	312
Trenčín Region	8,334	1,801	3,280	2,784	469
Nitra Region	17,461	2,643	6,186	6,921	1,711
Žilina Region	7,725	1,007	2,649	3,514	555
Banská Bystrica Region	10,558	2,199	3,868	3,947	544
Prešov Region	24,636	5,244	8,926	9,267	1,199
Košice Region	12,387	2,826	4,161	4,357	1,043

Health determinants

Summary overview of some health determinants is provided by following Eurostat diagram. It is obvious from the graph that the number of persons facing the risk of poverty and social exclusion is slightly above the EU average; employment is practically identical with the situation in the EU. It is quite obvious that greenhouse gas emissions significantly exceed the national target, as well as the average of EU countries.

[35] http://apps.szu.cz/svi/hygiena/archiv/h2013-1-03-full.pdf *HYGIENE, 2013, 58(1) p. 11–15*
[36] http://www.aafa.org/page/air-pollution-smog-asthma.aspx

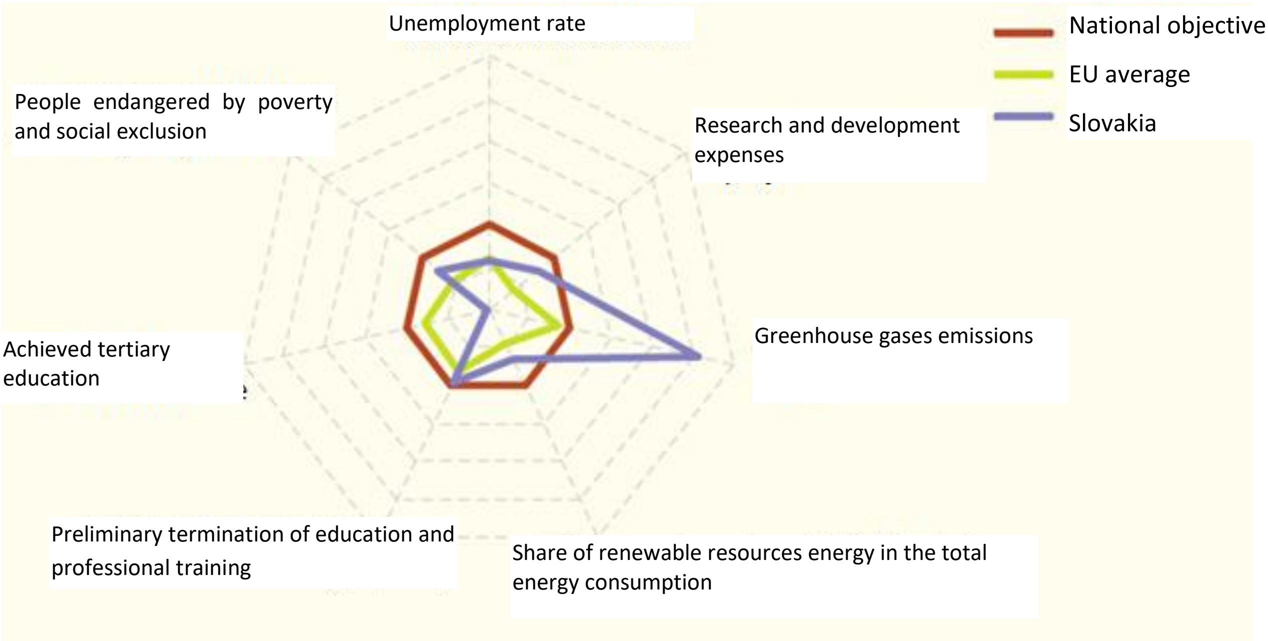


Fig. III-29 EURO2020 indicators[37]

Environmental health determinants

Air pollution – impact on health

Fundamental document for evaluation of air pollution impact was issued by the World Health Organization (WHO/EURO) in 2000 WHO Air quality guidelines for Europe, 2nd ed. Copenhagen, World Health Organization Regional Office for Europe, 2000 (WHO Regional Publications, European Series No.91), amended version for some harmful pollutants, including dust – solid aerosol (PM, TSP) dates back to 2005.[38]
Particles contained in air can be divided into primary and secondary ones. Primary particles are emitted directly to the atmosphere, either from natural (e.g. volcanic activity, pollen or sea aerosol) or anthropogenic sources (e.g. fossil fuel combustion in stationary and mobile sources, tire abrasion, brakes and roadways). Secondary particles are formed in the atmosphere from their gaseous precursors SO_2, $NO_{2(3)}$, NH_3 a VOC by process called gas – particle conversion. In some territories, the main sources of total particle emissions, i.e. primary particles and precursors of secondary particles are power engineering (production of electric and heat energy), **transport** and sector of services, households (including household heating) and agriculture. Due to variety of emission sources the suspended particles have a different chemical composition and different size. **Suspended PM_{10} particles have significant health risks, which are shown already with small concentrations without lower limit of safe concentration.**

[37] Source: http://ec.europa.eu/eurostat/statistics-explained/index.php/File:Distance_to_national_targets_and_comparison_with_EU_average_-_Slovakia.PNG#file
[38] http://whqlibdoc.who.int/hq/2006/WHO_SDE_PHE_OEH_06.02_eng.pdf

Health risks of particles are influenced by their concentration, size, shape and chemical composition. With acute action of particles the irritation of mucous membrane of the respiratory system or increased mucus production etc. may occur. These changes can incur decrease of immunity and increase of tendency towards respiratory system disease. Repeating diseases **may lead to formation of chronic bronchitis and cardiovascular problems**. With acute action of particles the symptoms with asthmatics can be intensified and total population morbidity and mortality increased. **Long-term exposure to the influence of particles may lead to formation of diseases of respiratory and cardiovascular system.** The extent of health impacts is influenced by a range of factors, such as current health condition of the individual, allergic disposition or smoking. Sensitive group are children, elderly people and people suffering from diseases of respiratory and circulatory system. Recently it has been shown that fine and ultra-fine particles have the most severe impact, i.e. cardiovascular and respiratory effects and increase of mortality. According to WHO, in the cities with higher air pollution the mortality is increased by 15 to 20 %, compared to mortality in cities with relatively cleaner air.

Air pollution by suspended particles of PM_{10} fraction remains one of main problems for air quality assurance. Primary emissions of particles from exhaust pipes of cars from traffic are in urban areas approximately 30 % fine particles (smaller, less than 2.5 µm aerodynamic diameter or $PM_{2,5}$). Concentrations of oxides of nitrogen, soot and ultra-fine particles (0.1 µm) are by far higher in 0.5 km wide strip along main urban traffic arteries than in the area with less intensive traffic. With fine particles up to ($PM_{2,5}$) the traffic participates with 15.8 % in primary dust emissions[14]. Between 1990- 2010 emissions in the EU declined, the Ministry of Transport participates in total decline with – 30.5 %[14]. Health risk due to dust, lies according to the European Centre for Health and Environment WHO in Bonn, which carried out a systematic evaluation in 2004, in the following:

- Dust increases death risk due to respiratory disease with children until one year of life, impacts development of pulmonary functions, aggravates asthma and other pulmonary symptoms, such as cough and children's bronchitis.
- $PM_{2,5}$ strongly influences health, increases the number of **deaths due to cardiovascular** and respiratory diseases and lung cancer. Increase of $PM_{2,5}$ concentrations leads to the increase of risk of acute acceptance to hospitals due to cardiovascular and respiratory diseases, PM_{10} influences respiratory morbidity and indicates admission to hospital for respiratory reasons.

For strategic development of traffic service there is a chance to decrease emissions or human exposure in better traffic management, use of transport other than car transport and use of territorial planning with traffic reduction in residential areas, allowing transport on bicycles and on foot.

While evaluating the impact of strategy on health and citizens, the basis is a potential human exposure, which is better characterized by pollutant concentrations; as an indicator (surrogate), however, models of spatial emission distribution are applied, which takes into account diffusion and the half-life of pollutants breakdown. The input data for HIA is from dispersion analysis along main traffic roads and location of human residences, density of population or other relevant information in terms of exposure.

Noise

Noise generally belongs to significant factors of human environment. Its health risks were reflected in legislative measures for public health protection, where surely also economic possibilities of society are reflected, the basic levels of acoustic pressure, however, by which the limits are underpinned, result from a certain risk level, acceptable for society.

Noise in environment – community noise has been defined by WHO[39] as noise which occurs from outside the industrial workplace. In the EU[40] the environmental noise has been defined as unwanted or dangerous outside noise, caused by human activities, including noise from roads, railways, airports and industrial areas.

In the European Union there is currently applicable Directive No. 2002/49/EC of the European Parliament and Council of 25th June 2002, which refers to evaluation and management of environmental noise, which has been reflected into the legal order of the Slovak Republic. It is Act No. 2/2005 Coll. on Assessment and Control of Environmental Noise, Decree No. 237/2009 amending and supplementing the Decree of the Ministry of Health of the Slovak Republic Decree No. 549/2007, laying down details on permissible values of noise, infra-sound and vibration and requirements on objectification of noise, infra-sound and vibration in the environment. The Ministry of Health of the Slovak Republic Decree No. 195/2005 Coll. on details and required data, provided for strategic noise maps and Regulation of the government No. 258/2008 Coll., amending and supplementing the regulation of the government of the Slovak Republic No. 43/2005 Coll., laying down details on strategic noise maps and noise protection action plans.

Impact of exposure to noise is described in the entire range of studies and in summary in WHO publications[41] – Burden of disease from environmental noise Quantification of healthy life years lost in Europe, Night noise guidelines for Europe[42].

A range of methodology has been elaborated to evaluate health risks or number of sick or negative impacts on noise comfort in environment, which however require specific values of acoustic pressure (measured or modelled), including information on persons' behaviour in area and time and their form.[43] Results of quoted study show a conservative estimate of DALY[44] (Disability-Adjusted Life Year, year of life with disease or lost year of healthy life). For EU inhabitants and other Western European countries losses incurred by exposure to noise in human environment are 61,000 years for ischemic heart disease, 45,000

[39] Guidelines for community noise. Geneva, World Health Organization, 1999 source: http://www.who. int/docstore/peh/noise/guidelines2.html, accessed 21 July 2010).
[40] Directive 2002/49/EC
[41] http://www.euro.who.int/__data/assets/pdf_file/0008/136466/e94888.pdf
[42] http://www.euro.who.int/__data/assets/pdf_file/0017/43316/E92845.pdf
[43] http://www.euro.who.int/__data/assets/pdf_file/0008/179117/Methodological-guidance-for-estimating-the-burden-of-disease-from-environmental-noise-ver-2.pdf
[44] http://www.who.int/healthinfo/global_burden_disease/metrics_daly/en/

years for cognitive deficits in children, 903,000 years for sleep disorder, 22,000 years for tinnitus and 645 years for noise pollution. Thus, the results show that approximately a half million year of health years is "lost" every year due to noise from traffic in the western part of Europe.
Impact of psycho-social effect increases community noise (noise from traffic), from certain intensity, risk of cardiovascular disease. In following diagrams the risk of noise for myocardial infarction is shown.

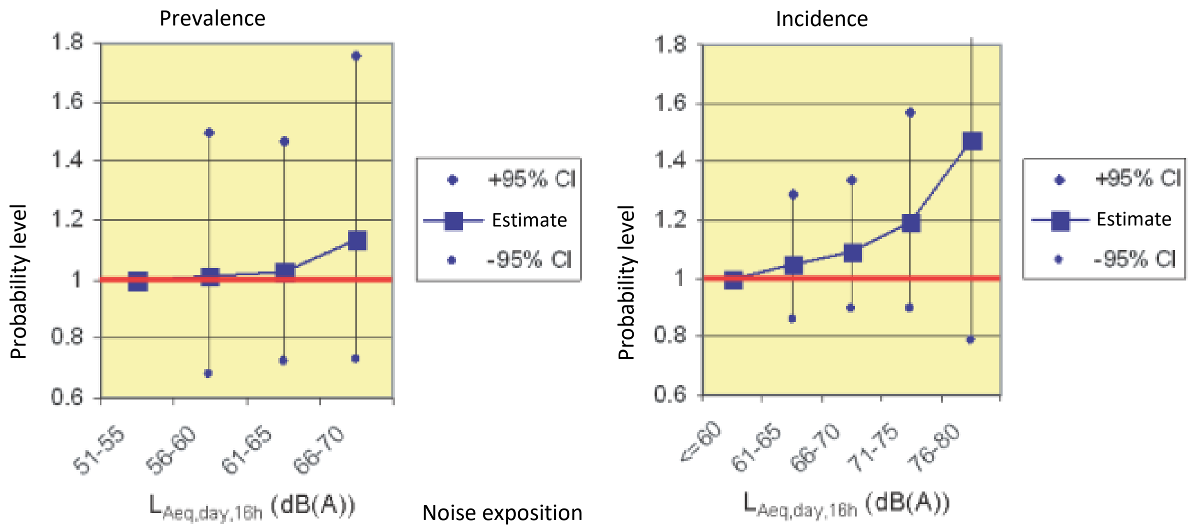


Fig. III-30 Relationship between the risk of myocardial infarction (incidence and prevalence) and exposure to traffic noise is shown.[45]

Fig. III-20 Summary of impacts and threshold values, for which there is a sufficient evidence[46]

Impact		Indicator	Threshold, dB
Biological influence	Changes in cardiovascular activity	*	*
	EEG excitation	LA max, inside	35
	Mobility, beginning of mobility	LA max, inside	32
	Changes in duration of different sleep phases in sleep structures, sleep fragmentation	LA max, inside	35
	Excitation at night or excitation early in the morning	LA max, inside	42
Sleep quality	Prolongation of the period of sleep beginning, trouble falling asleep	*	*
	Fitful sleep, reduction of sleeping time	*	*
	Average increase in unconscious movements during sleep	L night, outside	42

[45] http://www.who.int/quantifying_ehimpacts/publications/e94888.pdf
[46] Oliveira, R., Melo, V, de., IToledo J, C, Y., Loureiro, A, A, C: Cipullo J, P, C., Heitor Moren, H, jr., Martil, J, F, V.: Absence of nocturnal dipping is associated with stroke and myocardium infarction, Arq. Bras. Cardiol. vol.94 no. 1 São Paulo Jan. 2010.

	Disturbance during sleep, claimed by the subject	L night, outside	42
Comfort	Administration of sleeping pills and tranquillizers	L night, outside	40
Medical conditions	Environmental insomnia **	L night, outside	42

* Although the influence has been proven, plausibility of biological process was built, indicators or thresholds could not be determined

**note: "Environmental insomnia" is a result of diagnosis of healthcare professionals, whereas "disturbance during sleep, claimed by the subject" is basically the same, described however differently and in another social context and study. Number of questions and exact wording can differ.

For semi-quantitative evaluation following diagram can be used, especially in marginal values of acoustic pressure, i.e. while assessing so-called sublimit noise and noise in certain zones of acoustic pressures.

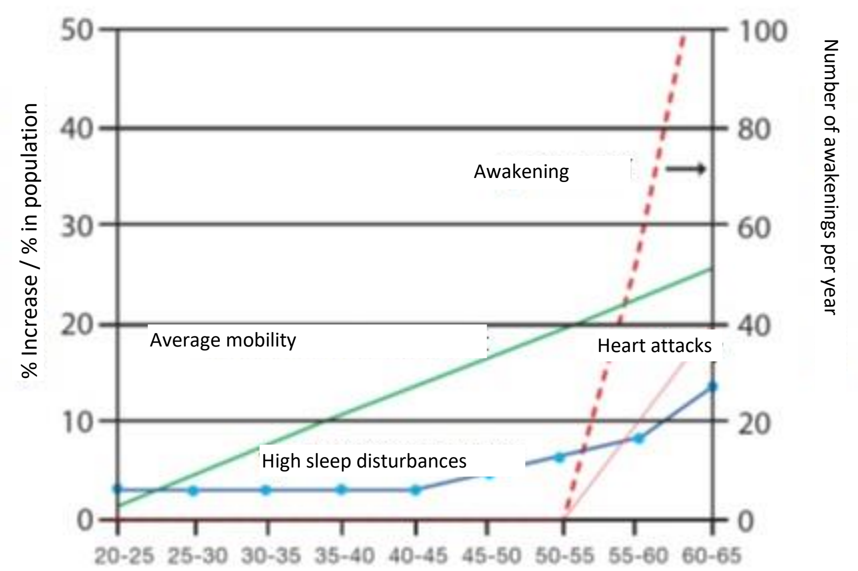


Fig. III-31 Health risks of exposure to noise at night.

Average of mobility and myocardial infarction is depicted in percentage points of increase (compared to initial number value), the number of people highly disturbed in sleep is expressed as percentage of population, excitation is expressed in the number of further (added) excitations per year. Source: WHO[47]

Main sources of community noise are road, railway and air transport, industry, constructions and public works. WHO night noise guideline[48] is as follows:

- Night noise guideline (NNG) $L_{night,\ outside}$ = 40 dB
- Intermediate target (IT) L_{night} = 55 dB

[47] http://www.euro.who.int/__data/assets/pdf_file/0017/43316/E92845.pdf

[48] WHO "Night noise – guideline for Europe", 2009 http://www.euro.who.int/en/what-we-do/health-topics/environment-and-health/noise/publications/2009/night-noise-guidelines-for-europe

WHO guidelines – *instructions for community noise* recommend less than 30 dbA in bedroom at night with good sleep quality and less than 35 dB (A) in the class for good learning conditions. WHO night noise guidelines recommend less than 40 dB (A) with annual average (L_{night}) outside bedroom to prevent health damage due to night noise.

Based on the above, WHO targets are as follows:

- Creation of silent zones – residential zones, schools, hospitals, parks, spa territories, where there should be noise sources from traffic (airports, motorways, railways, petrol stations etc. significantly muffled in particular during night hours and at weekends).
- Avoid increase of noise load of population where next to noise from traffic there are local sources (combined emissions and noise pollution).
- Follow noise limits at night, where the limits have been exceeded, reduce them.

Current noise load of significant traffic areas of Slovakia according to EU methodology is accessible under the website of Inžinierske služby s.r.o.[49] From strategic noise maps of the Slovak Republic, elaborated according to the Regulation of the government of the Slovak Republic No. 43/2005 for strategic noise maps of bigger road communication it is obvious how many (by estimate) citizens of the Slovak Republic were exposed in 2011.

Fig. III-21 Number of citizens (rounded to hundreds) exposed to acoustic pressure L_{dvn}(dB)[50]

	<55 dB	55–59 dB	60–64 dB	65–60 dB	70–74 dB	>75 dB
Total	95,600	71,500	29,600	8,400	1,200	300

Tab. III-22 Number of citizens (rounded to hundreds) exposed to acoustic pressure L_{noc}(dB)

	<50 dB	50–54 dB	55–59 dB	60–64 dB	65–69 dB	>70 dB
Total	136,900	50,900	14,300	4,400	500	0

Social and economic health determinants

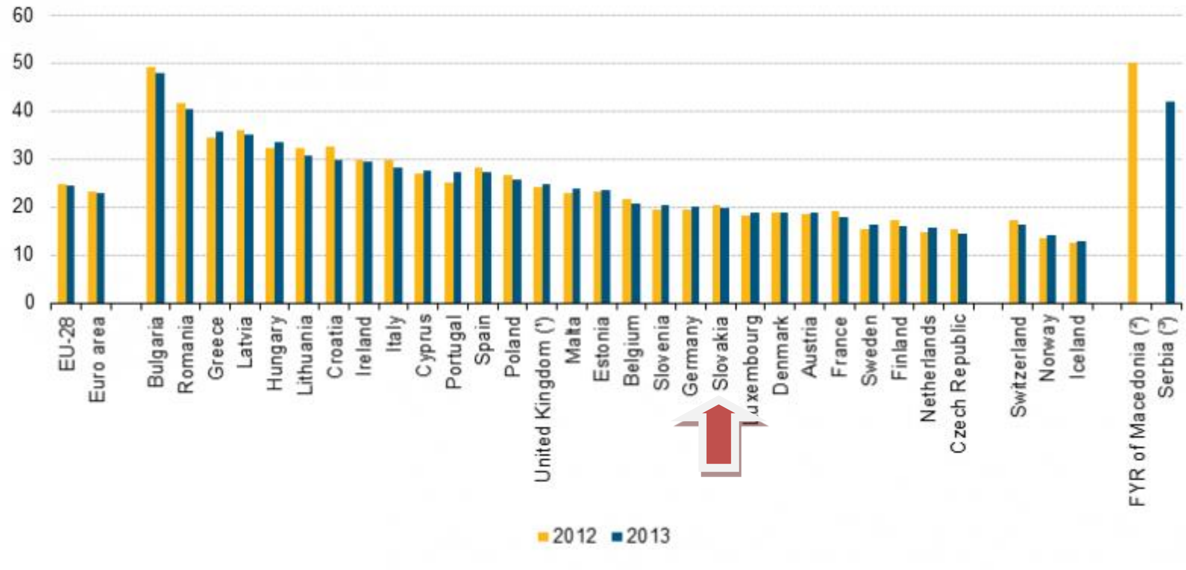
Department of Transport and functioning transport system are a precondition for economic development in a direct, indirect, way, but also by mediation[51]. In terms of social health determinants the economic development in building the transport infrastructure can be observed in decreased unemployment, development of working possibilities for people with lower education, manually working persons. Production of materials and components for traffic infrastructure is positively influenced in an indirect

[49] http://www.insl.sk/sk/SHM.alej
[50] http://www.insl.sk/sk/SHM.alej
[51] http://people.hofstra.edu/geotrans/eng/ch7en/conc7en/ch7c1en.html

way as well and indirectly, business increase in automotive industry can be expected. Neither the services that traffic development brings along should be neglected. Social and economic approximations are brought in particularly by policies based on the principle of sustainability[52]. Contribution to mobility of seniors, drivers, passengers, who thanks to smoother traffic are not afraid of driving for longer distances, and thus maintain their health, supporting social contacts and better use health-care services, is not negligible either.

With traffic system also social health determinants – poverty and social exclusion are indirectly connected. Even if better traffic infrastructure in general helps decrease social exclusions, in some cases, on the other hand, big line constructions lead to isolation of some areas, fragmentation of territories, thus building a possibility of social and geographical exclusion.

Position of Slovakia in terms of poverty and social exclusion is demonstrated by following Eurostat diagram.



(¹) Break in series, 2012.
(²) 2013 data not available.
(³) 2012 data not available.

Fig. III-32 Development of poverty and social exclusion in 2012-13[53]

Here, a decline in poverty and social exclusion in the Slovak Republic between 2012 and 2013 can be observed, although only slight.

[52] http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=URISERV:l24207
[53] *Source:http://ec.europa.eu/eurostat/statistics-explained/index.php/File:At-risk-of_poverty_or_social_exclusion_rate,_2012_and_2013.png*

For illustration, find in the charts bellow summarized data on state social aid in past years, which, if inflation and pension increase are considered, shows a relatively stable situation in provision of social benefit, and thus also of their beneficiaries. As it follows from the chart on social protection expenditure, unemployment allowance decline is clearly visible here.

Fig. III-23 State social benefits and allowances paid by state[54]

State social benefits and allowances paid by state in m. EUR, m. SKK				
Year	2011	2012	2013	2014
Total allowances paid by the state, m. EUR	834.22	828.73	838.78	873.421

Fig. III-24 Social protection expenditure in m. EUR

Social protection expenditure in m. EUR				
Year	2010	2011	2012	2013
Unemployment, m. EUR	608	580	512	452

From the above indicators of social health determinants it is obvious that the situation in the Slovak Republic is gradually improving not only in terms of the number of unemployed, but also the unemployment allowance. Financial increase of social support partly reflects the inflation and estimate of the impact of traffic and transport construction with zero variant is impossible.

Summary

Health state of citizens of Slovakia and basic demographic data is improving in basic indicators, getting closer to the average of EU or Europe.

The following can be considered to be a **positive indicator of public health**:

- increasing number of inhabitants,
- decrease of number of persons who died of cardiovascular diseases,
- decrease of number of persons who died due traffic accident.

The following can be considered to be a **negative indicator of public health:**

- increase of persons who died of tumour diseases,
- obesity increase, especially with adolescents,
- incidence of bronchial asthma or number of people being monitored for this diagnosis – increased course of the disease.

[54] http://www.statistics.sk/pls/elisw/casovy_Rad.procDlg

III.2 INFORMATION IN RELATION TO ENVIRONMENTALLY ESPECIALLY IMPORTANT AREAS, SUCH AS PROPOSED PROTECTED BIRD AREAS, SITES OF COMMUNITY IMPORTANCE, EUROPEAN SYSTEM OF PROTECTED AREAS (NATURA 2000), PROTECTED WATER MANAGEMENT AREAS, ETC.

III.2.1 PROTECTED AREAS

In accordance with Act No. 543/2002 Coll. on Nature and Landscape Protection, the national system of protected areas consists of 9 national parks (NP, 3rd level of protection, in protection zones 2nd level), 14 Protected Landscape Areas, (PLA, 2nd level of protection) and 1,109 small-scale protection areas (219 National Nature Reserves (NNR), 390 Nature Reserves (NR) and 2 Private Nature Reserves, 60 National Nature Monuments (NNM), 266 Nature Monuments (NM) and 172 Protected Sites (PS) with 3rd, 4th or 5the protection level). The acreage of national parks represents 6.48 % of area of the Slovak Republic, area of their protection zones represents 5.51 %, PLA acreage represents 10.66 %. Further, there is one general protected area and three Protected Landscape Elements (PLE).

Fig. III-25 Overview of national parks and Protected Landscape Areas in the Slovak Republic (Source: State Nature Conservancy of the Slovak Republic)

Name	Acreage (in ha)	Acreage of protected area (in ha)
Malá Fatra NP	22,630.0000	23,262.0000
Muránska planina NP	20,317.8021	21,697.9644
Nízke Tatry (Low Tatras) NP	72,842.0000	110,162.0000
Pieninský NP	3,749.6226	22,444.1676
Poloniny NP	29,805.0514	10,973.2893
Slovenský Kras NP	34,611.0832	11,741.5677
Slovak Paradise NP	19,763.0000	13,011.0000
Tatras NP	73,800.0000	30,703.0000
Veľká Fatra NP	40,371.3433	26,132.5817
In total 9 NP	**317,889.9026**	**270,127.5707**

Fig. III-26 Overview of Protected Landscape Areas of the Slovak Republic (Source: State Nature Conservancy of the Slovak Republic)

Name	Acreage (in ha)
Biele Karpaty	44,568.0000
Cerová vrchovina Mountains	16,771.2273
Dunajské luhy	12,284.4609
Horná Orava	58,738.0000
Kysuce	65,462.0000
Latorica	23,198.4602
Malé Karpaty (Small Carpathians)	64,610.1202

Poľana	20,360.4804
Ponitrie	37,665.4100
Strážovské vrchy (Strážov Mountains)	30,979.0000
Štiavnické vrchy (Štiavnica Mountains)	77,630.0000
Vihorlat Mountains	17,485.2428
Východné Karpaty (Eastern Carpathians)	25,307.1072
Záhorie	27,522.0000
In total 14 PLA	522,581.5090

Fig. III-27 Protection level categories

Degree of protection	Category
1st degree	open landscape
2nd degree	PLA, Protection Zone NP, PS, PLE, D zones
3rd degree	NP, PS, PS Protection Zone, NR Protection Zone, NNR Protection Zone, NM Protection Zone, NNM Protection Zone, C zones
4th degree	NNR, NR, NNM, NM, PS, PLA, NNR Protection Zone, NR Protection Zone, NNR Protection Zone, NM Protection Zone, NNM Protection Zone, C zones
5th degree	NNR, NR, NNM, NM, A zones

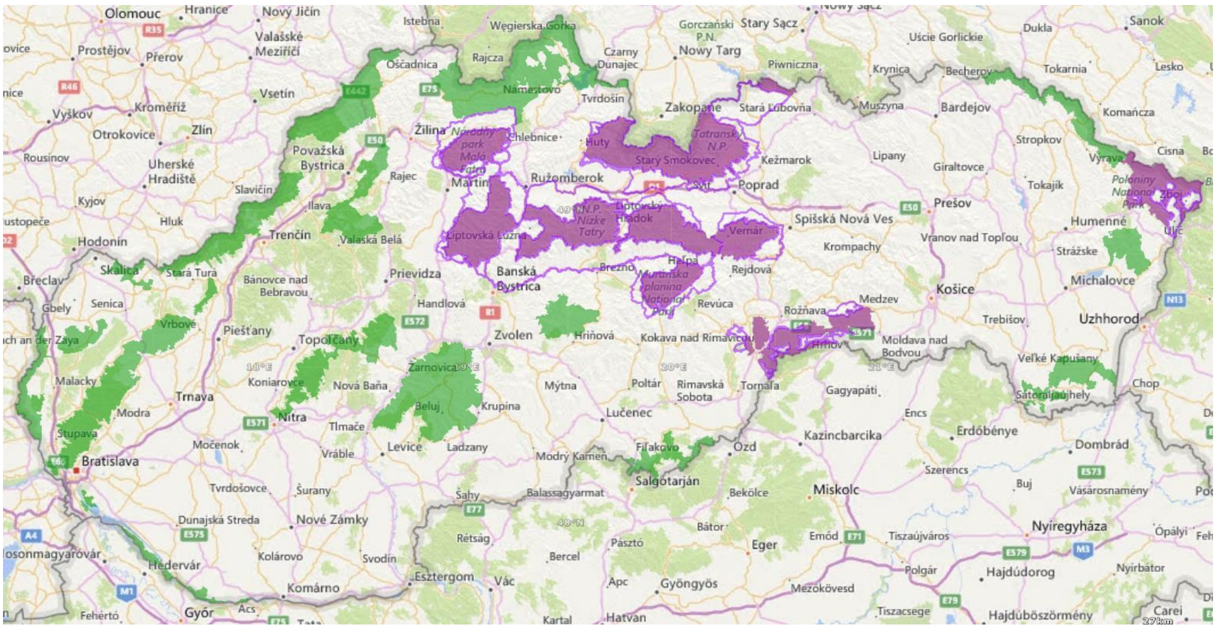


Fig. III-33 Large-scale protected areas including protected zones of national parks
Source: © State Nature Conservancy of the Slovak Republic, Banská Bystrica 2016

In optimum state there are almost two thirds of small-scale protected areas, 37 % are endangered locations and less than 2 % are degraded. Protected areas are endangered in particular by lack of care, improper way of management, intensive tourism and changes in surrounding landscape.

Protected areas can be influenced by direct encounter with transport constructions, in particular in case of large-scale areas. At the same time subjects of protection can be negatively impacted – by occupation of natural habitats and habitats of species, fragmentation and degradation of habitats, killing and disturbance of animals. Negative impact can take place without direct encounter, in particular through negative impacts on migration permeability of the landscape and its fragmentation, water and soil pollution and other transfer of impacts. Encounters can occur in particular during construction of roads, less in case of railways or development of water transport.

III.2.2 NATURA 2000

System of protected areas Natura 2000 is an integrated European network of areas, allowing preservation of natural habitats and habitats of species in their natural site of living or renewal of this state. It is a representative system of protected areas – locations, which are significant from European-wide point of view. Locations are declared for species of wild animals and plants which are endangered, vulnerable, precious or endemic and habitats which are endangered by disappearance, have a small site or represent unique samples of typical elements of certain biogeographical area. In terms of legislation Natura 2000 is a system given by EU Directives No. 79/409/EEC (Directive on the Conservation of Wild Birds) and No. 92/43/EEC (Directive on the Conservation of Natural Habitats and of Wild Fauna and Flora).

Based on the Birds Directive, 41 Protected Bird Areas (PBA) with total area of 1,282,811 h were declared in the territory of the Slovak Republic, which is 26.16 % of the area of the country. SPA are declared by Decrees of the Ministry of Environment of the Slovak Republic.

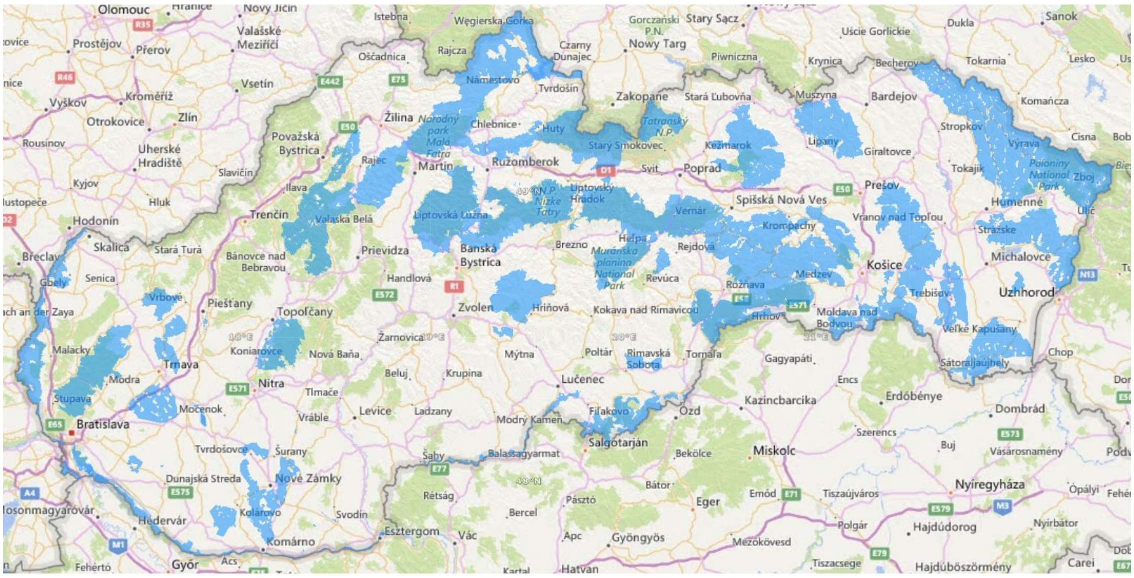


Fig. III-34 Protected Bird Areas in the Slovak Republic

Source: © State Nature Conservancy of the Slovak Republic, Banská Bystrica 2016

According to the Habitats Directive there are currently 473 Sites of Community Importance (SCI) with total area of 584,328 ha, which is 11.9 % of area of the Slovak Republic. National list of Sites of Community Importance was adopted by the Decree of the Ministry of Environment of the Slovak Republic No. 3/2004-5.1. In October 2011, by Resolution of the Government of the Slovak Republic No. 577/2011, the national list was extended by 97 locations and at the same time 6 original locations were excluded.

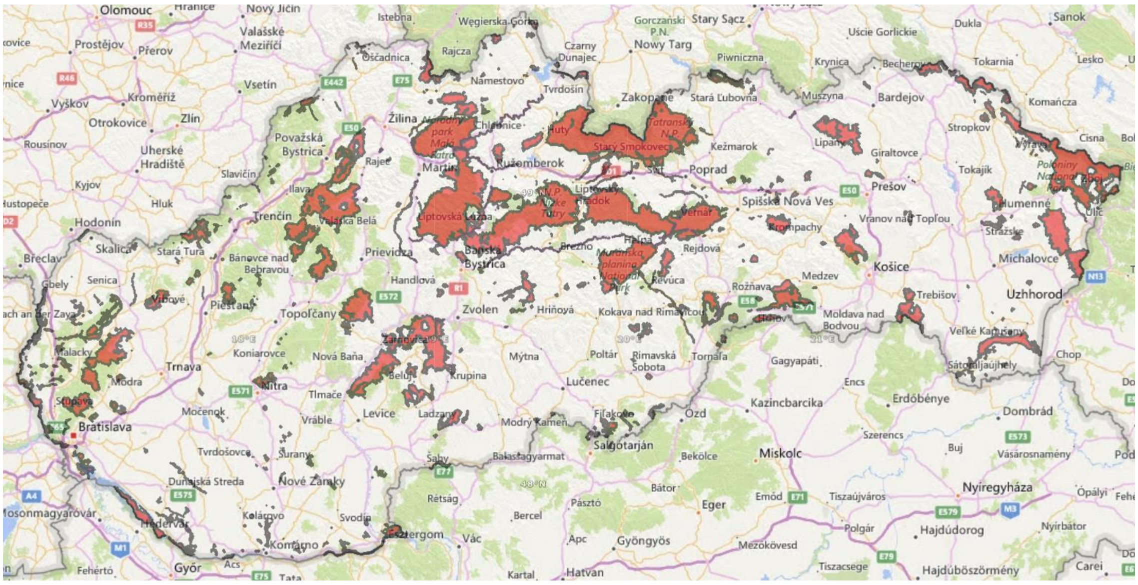


Fig. III-35 Sites of Community Importance in the Slovak Republic

Source: © State Nature Conservancy of the Slovak Republic, Banská Bystrica 2016

The impact on locations of Natura 2000 can be the same as protected areas described above.

III.2.3 RAMSAR LOCATIONS AND BIOSPHERE RESERVES

Four locations were recorded among UNESCO biosphere reserves: Slovenský kras, Poľana, the Eastern Carpathians and the High Tatras. According to the Ramsar Convention 14 location were recorded in the world List of Wetlands of International Importance.

Fig. III-28 Overview of Ramsar locations in the Slovak Republic (Source: State Nature Conserve 2016)

Name	Area (ha)
Domica	627.703
Šúr	1,006.035
Parížske močiare (Parížske Wetlands)	181.728
Dunajské luhy	14,870.759
Senné – ponds	405.247
Latorica	4,491.080
Wetlands of Orava basin	9,208.682
Alluvium of Moravia	5,305.628
Wetlands of Turiec	756.710
Alluvium of Rudava	2,261.154
Poiplie	387.316
Orava River and its Tributaries	582.532
Alluvium of Tisa	924.605
Caves of Demänovská Valley	1448.718

III.2.4 PROTECTED WATER MANAGEMENT AREA

According to Act of the National Council of the Slovak Republic No. 364/2004 Coll. on Water, as amended by later regulations (Water Act), § 5 par.1 letter c) protected areas are following types of areas:

a) areas intended for drinking water abstraction,
b) areas with bathing waters,
c) areas with surface water appropriate for life and reproduction of original fish species,
d) protected water management areas (PWMA)
e) protected zones (PZ) of water supply sources
f) sensitive areas,
g) vulnerable areas.

Protected water management areas

Protected water management areas (PWMA) represent areas where as a consequence of advantageous nature conditions natural **accumulations of surface and ground waters** are created. In these areas an activity can be planned and executed only if sufficient protection of surface and ground waters is ensured, as well as protection of their formation, occurrence, natural accumulation and renewal of supplies. For this reason, in PWMA, development, in particular production and traffic interests must be harmonized with PWMA requests.

In terms of building the transport infrastructure it means that pre-emptive measure must be taken into account not only during construction, but also during operation of roads, motorways and railways. Specific character of measures it the subject of EIA solution and technical possibilities.

Protected water management areas are declared by regulation of the Government of the Slovak Republic and they are also a part of register of protected areas according to Act on Water. Currently there are 10 PWMA with total area of 6,942 km^2, i.e. 14 % of the territory of the Slovak Republic.

List of Protected Water Management Areas:

1. Žitný ostrov
2. Strážovské vrchy (Strážov Mountains)
3. Beskydy and Javorníky
4. Veľká Fatra
5. Low Tatras (Western and Eastern part)
6. Upper basin of Ipeľ, Rimavica and Slatina
7. Muránska planina (plateau)
8. Upper basin of Hnilec river
9. Slovenský kras (Plešivecká planina, Horný vrch)
10. Vihorlat Mountains

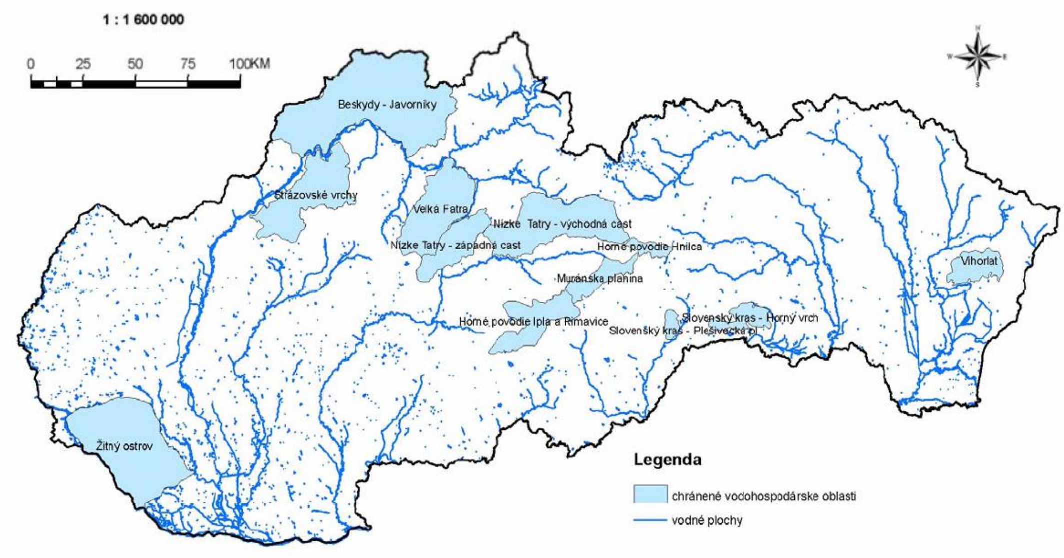


Fig. III-36 Protected water management areas of the Slovak Republic
Source: Soil Science and Conservation Research Institute Bratislava

Water supply sources and their protection zones

Protection zones (PZ) of water supply sources are established by the state water administration bodies for purposes of protection of their capacity and biological perfection. According to GORVV data (Set of measures for protection and rational use of water) of 2002 there are approximately 1,138 hygienic protection zones (HPZ), established in the territory of the Slovak Republic. For drinking surface water abstraction there are 73 hygienic protection zones, out of that 8 refer to abstractions from water supply reservoirs and 65 hygienic protection zones are intended for direct abstraction from surface watercourses, situated predominantly in the region of East Slovakia.

Sensitive areas

Sensitive areas are water bodies of surface waters, where due to increased concentration of nutrients unwished quality state of water occurs or may occur, which are considered to be or can be used as water supply sources, as well as those which require a higher level of discharged waste water treatment in the interest of increased protection.

In 2003 the Government of the Slovak Republic enacted the Regulation No. 249/2003 Z. z., laying down designation of sensitive and vulnerable areas. Sensitive areas are determined to be all water bodies of surface waters, located in or flowing through the territory of the Slovak Republic. It means that entire territory of the Slovak Republic has been declared to be a sensitive area.

Vulnerable areas

Vulnerable areas are areas used for agricultural purposes, from which rainwater flows to surface waters or is infiltrated into ground waters, where concentration of nitrates is higher or can be higher in near future than 50 mg/l. Vulnerable areas have been determined in Slovakia by Government Regulation No. 617/2004 in accordance with the Council Directive 91/676/EEC on protection of water against pollution by nitrates from agricultural activities "Nitrates Directive").

The Nitrates Directive is a set of measures aimed at decreasing the possibility of pollution of water sources (surface, as well as ground waters) by nitrates, which might come from mineral fertilizers a manures (dung, liquid manure, slurry), namely when they are applied in excessive doses and at wrong time or when they are stored in a wrong way. The Nitrates Directive requires 3 main obligations, when being implemented in practice:

- demarcation of vulnerable areas of water source danger,
- elaboration and publishing the Code of correct agricultural practice,
- elaboration and publishing of management in vulnerable areas,

Vulnerable areas have been specified in the territory of the Slovak Republic by the Regulation of the Government of the Slovak Republic No. 617/2004 Coll. Agricultural entities managing in vulnerable areas are obliged to respect special management principles. According to the regulation 1,546 villages have been declared as vulnerable areas with the area of 1,520 t. ha (62 %) agricultural soil. Management conditions in vulnerable areas are a part of amended Act No. 136/2000 Coll. on Fertilizers (amendment No. 394/2015, §10b, §10c).

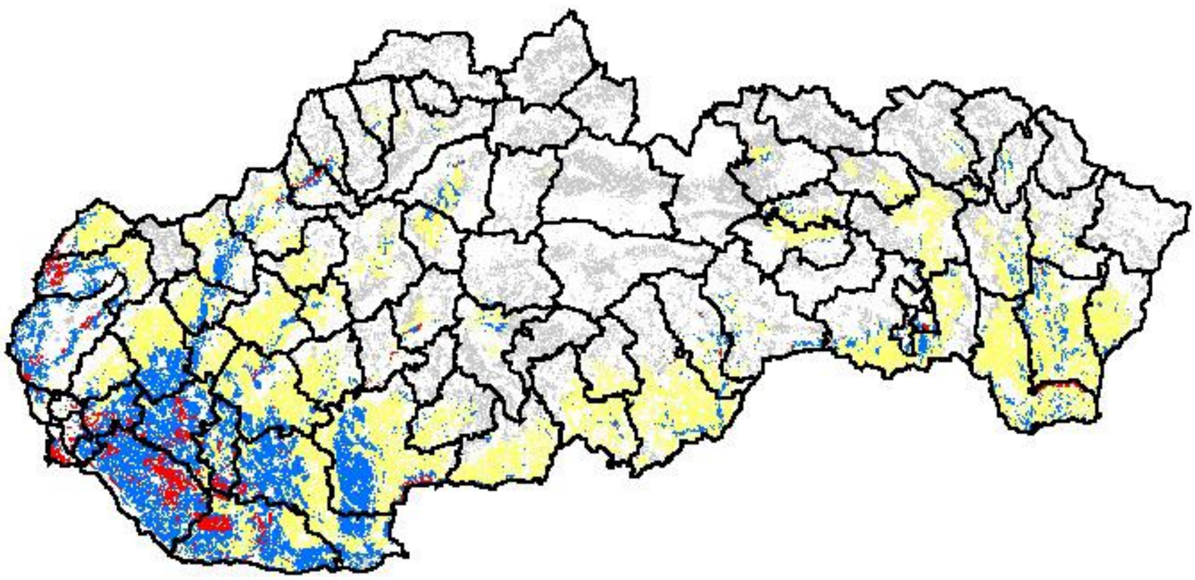


Fig. III-37 Vulnerable areas of the Slovak Republic,
Source: Soil Science and Conservation Research Institute Bratislava (www.podnemapy.sk)

III.3 CHARACTERISTICS OF THE ENVIRONMENT, INCLUDING HEALTH IN AREAS THAT WILL BE PROBABLY SIGNIFICANTLY AFFECTED.

To fulfil the formal requirements of Act No. 24/2006 Coll. and annex 4 the main characteristics are featured in this chapter as well. Full description, however, is stated in Chapter 1 hereof as logical allocation also corresponds to good international practice, as well as logical placement.

In terms of noise protection, in case of the assessed strategy, in particular the areas along road communications will be affected. The change will be reflected along all communications where due to strategy performance traffic intensity will change. This refers to current communications, where rather the decrease of pollutant load is estimated, in particular in case of new proposed sections, which represent a new burden or transfer of a part of current load to the environment of these new transport constructions. Strategy has been proposed as nation-wide, its impact will be thus reflected in the whole territory of the Slovak Republic.

The strategy will impact in particular the pollutant concentrations of substances produced by car transport, i.e. especially on nitrogen oxides, suspended particles and polycyclic aromatic hydrocarbons, condensed on them, including benzo(a)pyrene. The pollutant situation of other substances may be impacted only slightly, or the current emission situation of these substances is in terms of fulfilment of emission limits and risks to human health with significant reserve without problems.

In total, concentrations of relevant substances for the past 5 years have a significantly declining trend. This decline is to major extent caused by decline of regional background of pollutantconcentrations, decline, however is the biggest in locations with higher pollution. Thus, positive impact of decrease of emissions from main sources of pollution has been proven here.

In terms of noise protection, in case of the assessed strategy, in particular the areas along road communications and railway roads and in the airport surroundings will be affected. The change will be reflected along all communications where due to strategy performance traffic intensity will change. This refers to current communications, where basically the decrease of noise load is estimated, in particular in case of new proposed sections, which represent a new burden or transfer of a part of current load to the environment of these new transport constructions. Strategy has been proposed as nation-wide, its impact will be thus reflected in the whole territory of the Slovak Republic. There are strategic noise maps and action plans, elaborated for burdened areas. Implementation of the strategy assessed will influence the situation in some sections and will incur the necessity of updating the maps and plans.

Water issue in relation to the environment and health includes water source quality and quantity protection, flood issue, use of water for agriculture, industry, urbanized systems and recreation, protection of sources of mineral and thermal waters, handling waste and rain waters, etc. While assessing specific projects, it is necessary to consider all aspects mentioned.

Measures proposed or projects of transport infrastructure developments refer to the entire territory of Slovakia, not only the settlement area, but also the area outside the municipality boundaries. In relation to water and water management, they may have an impact on quality and quantity indicators of surface and ground waters, including protected sources of these waters.

The Slovak Republic features a relatively preserved **nature and countryside,** large total area of protected territories and locations Natura 2000, high proportion of forests with relatively advantageous species composition. On the other hand, a whole range of original species is endangered, there are fewer natural habitats and some, especially wetlands, are predominantly in disadvantageous state. Health condition of forests is getting worse. Main impacts of the strategy will be seen especially in places of building new transport infrastructure and then along reconstructed sections, where direct encounters with habitats, plants and animals, countryside elements and possibly also protected, as well as influence of the construction surroundings will occur. Concrete encounters are described in Chapter IV.

Health condition of citizens of Slovakia and basic demographic data are improving in basic indicators, getting closer to the average of EU or Europe. On a long-term basis, the most frequent cause of death of women, as well as men, are circulatory diseases, even if since 2012 the number of deaths due to circulatory diseases has significantly decreased. The second most frequent and increasing cause of death are tumours for both sexes. Since 2012 their number increased with men by 9 %, with women by 12 %. Most men from a group of tumour disease died of malignant neoplasm of trachea, bronchus and lung, malignant neoplasm of colon and rectum and malignant neoplasm of prostate The most frequent cause of death of women is malignant neoplasm of breast, malignant neoplasm of colon and rectum, as well as malignant neoplasm of trachea, bronchus and lung.

From environmental health determinants related to transport the following can be considered to be **positive**:

- Air quality with slight decline of pollutant concentration with the exception of some cities and benzo(a)pyrene concentrations

From environmental health determinants related to transport the following can be considered to be **negative or neutral**:

- Noise exposure or noise burden especially in cities and along main transport corridors

From social health determinants related to transport the following can be considered to be **positive**:

- Decline of the number of the unemployed
- Decline of social unemployment allowances

- Decline of poverty and social exclusion according to Eurostat methodology
- Stabilization of benefits of social allowances and sickness benefits

Other significant public health determinants have been **insufficiently documented** at a national level of the Slovak Republic:

- Physical activity – cycling as a possibility of commuting to work
- Territorial exclusion – disturbance of social, cultural connections and connections of roads or motorways, relevant for services, isolated areas
- Use of public transport especially to commute to school, work

III.4 ENVIRONMENTAL PROBLEMS INCLUDING HEALTH PROBLEMS, WHICH ARE RELEVANT IN TERMS OF THE STRATEGIC DOCUMENT

III.4.1 AIR POLLUTION

Transportation has a significant impact on air quality in the Slovak Republic.

Traffic emissions represent a significant share of national emission balance, in particular in case of nitrogen oxides, suspended particles and polycyclic aromatic hydrocarbons bound to them. Traffic emissions contribute to inconvenient air quality condition in a number of locations. In many location possible exceeding of pollution limits in past 5 years can be attributed to the impact of car traffic. Thus, the impact of evaluated strategy on the current pollution situation can be very significant.

Pollution limits have been exceeded in the past 5 years in suspended particles of PM_{10}, $PM_{2,5}$, $NO_{2,}$, as well as benzo(a)pyrene, namely in terms of average annual concentrations, as well as in terms of upper daily, or higher hourly values. In terms of percentage representation of locations where exceeding of emission limit was measured, the most disadvantageous situation is with suspended $PM_{2,5}$ a benzo(a)pyrene particles. These problems are connected to each other because benzo(a)pyrene is contained in particular in the finest fractions of suspended particles.

Dominant part of traffic impact on air quality is associated with road car transport, other modes are less significant. Their influence can be only slightly significant and local, namely only in extreme cases of accumulation of many means of transport on a small area (busy non-electrified railway stations, transport hubs, airports, frequented harbours etc.). In SEA of the strategy assessed, dealing with measures in nation-wide scale, in terms of air protection, other than road sources of air pollution are not relevant.

By 2030 the pollution situation will be significantly influenced by finishing some transport structures, which are already contracted and are a part of zero variant of strategy scenario, so-called BAU 2030 scenario. In case some of these constructions are not executed (planned motorway relief of Ružomberok, Prešov and Košice), it might have a significant impact on the evaluated impact of zero strategy variant on air quality and performed SEA assessment will probably have to be revised.

Potential positive impacts of the strategy are decrease of road transport intensity, thus also transport pollution contributions in human settlements. Negative impact may occur in case of placement of new high-capacity communications in insufficient distance from human settlements or in case of induction of higher traffic intensities in residential areas in current network. These situations have been assessed in the submitted SEA documentation based on transport model outputs and analyses of territorial encounters.

III.4.2 IMPACTS ON CLIMATE CONDITIONS

Greenhouse gas emissions

In the Slovak Republic and in the EU the increase of greenhouse gas emissions from the sector of road transport has not been stabilized yet. This trend contradicts the EU proposal in the White Paper "Plan of Single European Transport Area – Creation of competitive and resource efficient transport system", which calls for decreasing the greenhouse gas emissions in transport until 2050 by at least 60 %, compared to 1990 In terms of this ambitious target, there is a number of measures related to development and implementation of new and sustainable fuels and driving systems, optimization of performance of multi-mode logistic chains, including greater use of energy more efficient means of transport and increase of transport effectiveness and use of infrastructure by means of information systems and market-oriented incentives.

Adaptations to climate change

As climate change already takes place and will take place over the decades to come, it is necessary to consider also possible risks for transport infrastructure due to the change of climate conditions. As stated in the Strategy of adaptation of the Slovak Republic to disadvantageous consequences of climate change, issued by the Ministry of Environment of the Slovak Republic in January 2014, high and low temperatures, intensive storms and snow calamities, frequency and intensity of which is increasing as a consequence of this change, cause severe complications for almost all types of transport. Complex analysis of possible impacts of climate changes of individual departments, including transport department, was elaborated by the Scientific Forestry and Environmental Agency (EFRA). Its outcomes for the department of transport are stated in summary in the following chart.

Fig. III-29 Consequences of climate change in transport

Transportation	Impacts	Consequences

Road	Weather extremes – storms, floods	Layoff of road communications, detours, damages of road communication
	Worsened meteorological conditions – rain, snow, black ice, fog...	Decrease of safety and fluency in traffic, traffic congestions
	Worsened winter conditions – frequent snow, wind, long winters	Increase requests in terms of winter maintenance, possibility of damaging the cover of carriage way, higher demands as
Air	Weather extremes – storms, floods	Interruption of operation at airports, damage of infrastructure and facilities, cancellation or delay of flights
	Worsened meteorological conditions – rain, snow, black ice, fog...	Flight delays
Railway	Weather extremes – storms, floods	Interruption of transport, closures of traffic, infrastructure damage
	Worsened winter conditions – frequent snow, wind, long winters	Increased requests in terms of winter maintenance, damage of tracks and rail
Water	Weather extremes – storms, floods, droughts	Interruption of sea operation on water route, closures of traffic, infrastructure damage
	Worsened winter conditions – frequent snow, wind, long winters	Icing up of water courses, interruption of sea operation on water route

Source: Strategy of adaptation of the Slovak Republic to disadvantageous consequences of climate change (MoEnv SR, 2014)

III.4.3 NOISE AND VIBRATIONS

According to the outcomes of noise mapping, the main source of noise, exceeding the hygienic limit in the Slovak Republic, is the road transport (95 %). Main noise sources are in particular driving units, namely especially with low vehicle speed, with higher speeds the noise from tire movement on the road surface prevails. Railway transport, on the other hand, participates in the noise load rather locally. It can be proven that every noise incurs after some time disorders of higher nervous system, leading to auditory organ damage, but also damage of other physical organs, thus decreasing body resistance to external negative impacts, which stimulates development of other diseases. The closest relationship between long-term noise exposure and health state was shown in terms of cardio-vascular diseases.

Implementation of the strategy will lead to total decrease of noise load for citizens thanks to leading the traffic outside settlement agglomerations, as well as through modernization of railway infrastructure. Locally the state can get worse. To new built transport constructions, however, the condition of fulfilling the hygienic noise limits applies. Aviation transport has a locally significant impact on noise load; strategy impact will depend on specific measures proposed.

Vibrations, main source of which is road and railway transport, are next phenomenon, negatively influencing human health. Their incidence depends on vehicle structure, their axle pressures, speed and acceleration, quality of carriage way cover, structure and subbase of carriage way and in case of track transport on the contact of the track with the subbase. They are perceived predominantly in the immediate neighbourhood of traffic load. Long-term exposure, however, may incur permanent health damage, including pathological changes of central nervous system. Beside negative impact on human health, vibrations induced by traffic represent a risk in terms of impacts on buildings (tangible asset), especially in the immediate neighbourhood of traffic load.

III.4.4 IMPACTS ON SURFACE AND GROUND WATERS

In terms of proportion of individual transport types, road transport dominates as far as water quality and quantity is concerned, specific significant impacts are also connected to construction and operation of water transport.

General risks of transportation development are connected to construction and operation on communications in the areas defined in terms of water protection; during implementation of infrastructural measures, encounters with protected water management areas, water sources and their protective zones may occur.

The risk of water quality deterioration during operation is connected to discharge of rainwater, less with air pollution. Less frequent, but more severe for water quality could be accidental leakage of crude oil substances.

Surface and ground water pollution

In terms of water and soil pollution, road communications represent a potential source of area (diffusion) pollution. The risk of water quality deterioration during operation is connected to discharge of rainwater as rainwater from ground communications can contaminate surface and ground waters, as well as ambient soil. Less frequent, but more severe for water quality could be accidental leakage of crude oil substances (in case of crash during transport of chemical substances, leakages while handling driving fuels, etc.). Main risk for protection of ground waters are possible crashes, which could incur leakage of contaminants into water sources and destroy water sources.

Moreover, during own construction surface waters in the surroundings of constructions can be influenced by flush of earth. Pollution is characterized rather by low concentrations and conditions, classical treatment technologies cannot be applied there. Beside areas of road carriageways, source of diffusion pollution are bigger emergency or parking areas, rest areas and fuel stations for driving fuels and harbours.

Ground water quality can be influenced by leakage of dangerous substances. When dealing with disposal of rainwater by seepage, measures must be taken to limit infiltration of dangerous substances to ground waters. Separate category of impacts is possible collision with protected water management areas, water supply sources and their protective zones and sources of natural curing and mineral waters, as well as their protection zones. These impacts must be solved in particular during placement of constructions and their technical solution.

The Strategy must be in accordance with Act No. 364/2004 on Water and on the Amendment and Supplements to the Act No. 372/1990 Coll. on Offences, as amended. (Water Act), as well as with the Directive 2000/60/EC of the European Parliament and Council of 23 October 2000, laying down the scope for measures of the Community in the area of water management.

Hydromorphological changes in water bodies

In connection with water transport projects, the issue of hydromorphological changes in water is especially connected to transport infrastructure.

Worsened quantitative state of ground waters

No impacts in terms of ground water abstraction neither during construction, nor during the operation are anticipated, with the exception of standard maintenance of road network.

There is a risk of disturbing the conditions of water source building in the area of natural accumulation of waters in case of new traffic corridors, especially the road ones, passing through these areas.

The influence of ground water mode is possible during construction mainly in case of construction interference in the layer flooded, e.g. while excavating tunnels and grooves. Ground water level can drop and capacity of ground water sources, as well as habitats depending on water relations can be influenced.

Floods

Draining rainwater from paved surfaces into recipient accelerates the discharge of water from the countryside and worsens the course of flood situations. To major extent, negative impact can be mitigated by disposal of rainwater through seepage. Transport construction body can reduce the flow-through profile, thus representing an obstacle to the discharge of big waters, which must be respected during placement of constructions and while choosing the technical solution. Possible forest occupation and fragmentation, decreasing their anti-flood functions, can contribute to worsening the course of floods.

Water Framework Directive

In relation to Water Framework Directive following main water management problems have been defined:

- organic pollution of surface waters;
- organic pollution of surface waters by nutrients; eutrophication risk;
- pollution of surface waters by priority and chemical substances, relevant for the Slovak Republic;
- hydromorphological changes in water bodies;
- worsened quantitative state of ground waters;
- ground water pollution.

One of environmental objectives set within the assessment of the strategic document is minimization of encounters with significant water management areas and assurance of their protection.

III.4.5 SOILS, GEOLOGICAL ENVIRONMENT AND MINERAL RESOURCES

Agricultural and forest resources

Negative impacts of traffic on soil fund is reflected in particular as a consequence of construction of communications and entire traffic network, where temporary, but also permanent occupations of agricultural soil and forest land occurs. In places of temporary occupation of land (access roads, handling areas, building yards, humus dumping, etc.) heavy technology causes degradation and compaction of soil; soil can be also polluted. On the areas of temporary occupation after the end of construction, reclamation is performed and they are brought to the original or another appropriate state.

Acquisition of land for construction of transport infrastructure is a must from nation-wide point of view. During occupation and protection of agricultural soil it is necessary to proceed in accordance with Act No. 220/2004 Coll. on Agricultural Soil Protection[55], based on which all agricultural soils are assigned to nine quality groups based on the code of evaluated soil-ecological units (ESEU). Protection of agricultural soil in other than agricultural use is ensured by protection of agricultural soil of supreme quality in the boundary according to ESEU code[56]. Strategically and economically significant investments, approved by Decree of the Government of the Slovak Republic No. 882/2008[57] (as motorways and speedways), represent a reason for possible occupation of specially protected agricultural soils in justified scope. Area placement of agricultural soil of supreme quality in the respective territory must be considered when selecting variants of traffic infrastructure routes.

[55] Act No. 220/2004 Coll. on Protection and Use of Agricultural Soils and on Amendment of Act No. 245/2003 Coll. on Integrated Pollution Prevention and Control and on the Amendment and Supplements to Certain Acts, as amended

[56] Annex No. 2 to the Government Regulation No. 58/2013 Coll.: List of supreme quality agricultural soil in respective boundary according to evaluated soil-ecological units (ESEU)

[57] Resolution of the Government of the Slovak Republic No. 882/2008 Report on Fulfillment of Preparation and Construction Program for Motorways and Expressways for years 2007–2010.

During operation of constructions of transport infrastructure no significant impacts on soil quality are assumed. Exception are cases of potential soil contamination as a consequence of crash, connected to leakage of driving fuels or chemical substances transported.

Soil pollution in particular by heavy metals concentrates on the zone along the roadside in the distance of maximum 15 m; beyond this border the concentrations of harmful substances drop below limit values even on heavily burdened communications. In connection to gradual improvement of emission parameters in reconstructed vehicle fleet, partial improvement of the situation in the future can be expected.

Indirect impact is raw material extraction for construction and related opening of borrow-pits and increased extraction in existing quarries, as well as depositing of excessive material from earth-works. All interventions into rock environment will be performed based on the outcomes of detailed engineering-geological and hydrogeological research, which will be performed in accordance with Act No. 569/2007 Coll. on Geological works (Geological Act), as amended. Topography will be influenced by own construction of infrastructure also during extraction and temporary depositing of raw material. The effects on the rock environment, mineral resources and topography will be considerable and they will have to be eliminated by means of effective technical and preventive measures at project level.

Risks of slope deformations

Implementation of the project of road and railway infrastructure, especially when building tunnels, embankments and grooves will have a direct impact on rock environment. Stability of slopes can be disturbed, landslide activated, erosion may arise, weathering can be accelerated or rock environment contaminated. Emergency landslide affected in particular the areas of Eastern Slovakia, built by rocks of the Carpathian flysch, external Paleogene and Paleogene inside the Carpathians and by rocks of narrow strip of the klippen belt. These risks must be solved within connecting project work – especially in corridor studies (routing outside the risk areas), feasibility studies, territorial plans and detailed project proposals (measures for slope stabilization).

III.4.6 PRODUCTION OF WASTE

Waste in transport arises predominantly out of the change of the vehicle fleet, during construction and modernization of transport infrastructure and during transport itself.

Act No. 223/2001 Coll. on Waste defines waste management, such as collection, transport, recovery and disposal of waste, including care of disposal. In terms of waste production according to statistical classification of economic activities, section H – Transportation and Storage ranked the seventh in 2008 with a share of 1.81 %. In 2009 with the share of 2.50 % it ranked eighth and in 2010 and 2011 only tenth with shares of 1.35 % and 1.10 % respectively.

In connection to transport infrastructure development the issue of production of construction waste and waste from demolitions is important. Construction waste and waste from demolition arises during construction, but also during building maintenance, during changes of finished constructions and removal of buildings. From 2005 to 2011 total production of construction waste and waste from demolitions was increasing with a parallel increase of the share in total production of waste. In 2005 construction waste and waste from demolitions represented (including excavation earth from contaminated areas) 20.38 % from total production of waste and in 2011 as much as 27.53 %. The production increase in 2011 compared to 2005 is 33.92 % (755,672.10 t).

Construction waste and waste from demolitions represent a significant source of secondary raw materials. From the fact above it follows that the Waste Management Program of the Slovak Republic for 2011 – 2015, within which the target was set for construction waste and waste from demolitions, namely to increase the preparation for repeated use, recycling and recovery of construction waste (with the exception of waste 17 05 04 earth and aggregates other than stated in 17 05 03) to at least 35 % of weight of the waste generated by the end of 2015.

III.4.7 NATURE AND LANDSCAPE

Relevant problems in the area of nature and landscape protection are in particular decline of habitats, disadvantageous state of protected areas and locations of Natura 2000, endangering of a range of plants and animals, degradation and decline of natural habitats, spread of invasive species, landscape fragmentation and its decreased migration permeability, spread of built-up areas at the expense of natural, insensitive interventions in landscape character, disadvantageous state of water courses and pollution of water, soil and air. These problems have several causes, including transport.

Negative impacts of new infrastructure constructions on nature and landscape are in particular the following:

- fragmentation of habitats, eco-systems and landscape as such,
- intervention in specially protected areas and location of the system Natura 2000,
- influencing the landscape character,
- risk of spread of invasive species,
- changes of species composition of lands in close surroundings of constructed networks – increasing non-original species, species changes due to changed conditions (exhalations, chemical substances from winter maintenance of networks to operations, noise, etc.),
- disturbance of migration routes of animals (barrier effect),
- mortality of animals during operation on the transport network,

- disturbance of animals with noise, light – during construction, as well as operation of infrastructure.

Positive impact of transport development is the application of mitigation measures during reconstruction of transport infrastructure, e.g. incorporation of elements allowing migration and limiting encounters of animals with transport vehicles (construction of ecoducts, wide areas under bridges, floodgates, fencing, barriers against amphibians, etc.) and improvement of air quality in burdened areas, from which the traffic has been led away.

III.4.8 CULTURAL HERITAGE

The main problem in the area of cultural heritage is its protection and maintenance, as well as use in a way not damaging to its cultural and historical values. Relation to the issue of transport is very open.

According to the quoted analysis the state of the Monuments Fund has started reducing the Monuments Fund, as well as values of real estate in the monuments areas in connection to on-going long-term changes of building-technical state of real estate – national cultural monuments, real estate in monuments reserves, real estate in monuments zones, by strengthening the impact of climate changes, climate conditions, impact of construction and other management activity of man, worsening hydrogeological conditions, which have become more intensive recently during extraordinary events (floods, landslides, erosion of subbase, etc.).[58]

In terms of transportation, the main risk for preservation of cultural heritage is not a possible direct encounter of transport constructions with monuments protection (monuments protection is in this regard mostly satisfactorily ensured by respective bodies) but rather indirect impacts, e.g. penetration of intensive traffic to the historical centres of settlements, etc. In the context of the issue of transport the most important is the influence of atmospheric deposition of some polluting substances on materials representing precious objects in terms of monuments (buildings, statues and other artistic works, etc.) or also on natural elements of cultural monuments and extensive protected areas and monuments of UNESCO. It can be assumed that implementation of the range of constructions with potential of diverting a part of traffic from residential areas of towns and villages will contribute to changes in the emission and vibration load of certain cultural monuments, monuments zones and reserves with positive impact on their status. Development of new transport infrastructure can have in individual cases also a negative impact on values and character of historical locations or integrity of individual monuments. Risks of these negative impacts (encounters) with new proposed projects are a subject of EIA assessment.

[58] Concept of the Monuments Fund protection – update of Annex part as of 31 December 2012

III.4.9 HEALTH

Submitted and expected impacts of conceptual development of transport and transport services for citizen's health:

- Improvement and promotion of healthy lifestyle
  - Well-built transport infrastructure facilitates positive change in citizen's behavior and their lifestyle, in particular by better use of cycling as means of transport to work, creation of appropriate zones in the surroundings of schools and their use for physical activity. Improvement can be expected in decrease of incidence of obesity and cardiovascular diseases.
- Protection or improvement of air quality
  - Decrease of number of respiratory problems of exposed population (asthmatic seizures) and decrease of incidence of chronic obstructive pulmonary disease (COPD) in particular with non-smokers.
- Observation of noise limit and its reduction (where possible and advisable)
  - Improvement of life quality can be expected, as well as improvement of cognitive functions of children (at exposed schools) and decrease of myocardial infarction with population exposed to noise above limit.
- Equal and fair approach to healthcare and social care, education and job opportunities
  - Better transport infrastructure and organization of public transport will enable access to services, education and work to all (disabled, mothers with small children, poor).
- Decrease of poverty and social exclusion
  - Level of income, distribution of wealth are significant determinants of physical and psychological health. Transportation creates new jobs not only in construction, but also in using the infrastructure (fuel stations, restaurant services); transportation accessibility is the basic condition of economic development.

III.5 ENVIRONMENTAL ASPECTS, INCLUDING HEALTH ASPECTS FOUND IN INTERNATIONAL, NATIONAL AND OTHER LEVELS, WHICH ARE RELEVANT IN TERMS OF THE STRATEGIC DOCUMENT, AS WELL AS HOW THEY WERE CONSIDERED DURING PREPARATION OF THE STRATEGIC DOCUMENT.

In the Slovak Republic there is a whole range of conceptual documents, containing objectives of protection of environment and public health. For basic SEA assessment framework only those were selected which can be considered to be most significant in the relevant area and in terms of purpose of the assessed strategy. The chart below describes these relevant objectives and briefly summarizes extent of their fulfillment within SPTD SR 2030. Detailed assessment of connections between these objectives and objectives of the proposal of SPTD SR 2030 are presented in Annex 1 hereto.

Fig. III-30 Relevant objectives of environmental protection and their consideration in SPTD SR 2030

Topic	Objective	Assessment
Air	Maintain air quality in places with a good quality air and improve the quality of air in the other locations. A good quality of air is a level of air pollution which is lower than the limit and target value. *(Act No. 137/2010 Coll. on Air)*	Development of road transport infrastructure is in its basis potentially connected with an increase of intensities of personal and freight transport and thus also with an emission increase. On the other hand, railway support for personal and freight transport, increase of attraction of public and non-motorized transport in cities and measures focusing directly on monitoring and decreasing negative impacts of transport on environment will improve air quality. In total, predominantly positive impacts of the strategy can be expected if measures to support railway and public transport are consistently fulfilled.
	In the long term, achieve air pollution levels that provide effective protection of human health and the environment *(Air Act No. 137/2010 Coll.)*	
	Reduction of emissions of basic air pollutants (SO_2, NO_X, CO, C_XH_Y, particulate matter), volatile organic compounds (VOC), persistent organic pollutants (POP), and heavy metals in accordance with the international conventions *(National Environmental Action Plan)*	
Climatic conditions	To reduce, by 2030, GHG emissions from transport by at least 20 % below the level of 2008. (White Book *"Plan of the Single European Transport Area – Creation of a Cost-Effective Competitive Transport System")*	This objective has not been achieved – GHG emissions will be higher by 49.1 % compared to the reference year.
	To reduce, by 2050, GHG emissions from transport by 60 % below the level of 1990 *(White Book)*	This objective has not been achieved because in 2030 GHG emissions will be still higher by 99.6 % compared to the reference year.
	To reduce, by 2020, total GHG emissions by 13 % against 2005 *(2020 Climate and Energy Package)*	This objective refers to total reduction of production of GHG emissions from all sectors of national economy. Implemented measures will contribute to mitigation of increase of emissions from transport sector, which will have a negative impact on a total effort to

Topic	Objective	Assessment
		decrease GHG production from the Slovak Republic.
	By 2020, increase in GHG emissions must not exceed 13 % of 2005 levels in sectors outside of the Emission Trading System (*Effort Sharing Decision, ESD)*	This objective has not been achieved because in 2030 GHG emissions will be higher by 58.3 % compared to 2005.
	To reduce, by 2050, total GHG emissions by 80 - 95 % against 1990 *(The plan of transition to competitive low-carbon economy by 2050)*	This objective refers to total reduction of production of GHG emissions from all sectors of national economy. Implemented measures will contribute to mitigation of increase of emissions from transport sector, which will have a negative impact on a total effort to decrease GHG production from the Slovak Republic.
	To reduce, by 2030, GHG emissions from transport by +20 to -9 % and by -54 to -67 % of 1990 levels by 2050 *(The plan of transition to competitive low-carbon economy by 2050)*	Objective for 2030 has not been achieved – GHG emissions will be higher by 99.6 % compared to the reference year. Based on the above it can be judged that neither of the target values for 2050 are likely to be achieved.
	Promotion of climate change adaptation, risk prevention and management. Drafting transport infrastructure to best accommodate the impact of climate change, in particular, the risk of floods and torrential rain *(Adaptation strategy of the Slovak Republic for adverse consequences of climate change)*	Infrastructure measures implemented in the transport network until 2030 will probably contribute to fulfillment of this target.
Noise	Reduction of existing load and exposure of the population to traffic noise by maintaining the external environment limits, with particular respect to territorial functions (protection of spas, educational and healthcare facilities and housing development). (*Government of the Slovak Republic Regulation of 16 January 2002 concerning protection of health against noise and vibrations, as amended*)	Increase of availability is leading to operational increase, which will induce potential higher danger of noise or noise control requests. On the other hand, significant benefit is the introduction of motor transport from residential areas. Railway transport on the one hand has a potential to partially replace the car operation; on the other hand it will bring higher noise and it is necessary to focus on train routing relative to housing developments. Objectives focusing on support of public and non-motor transport.
Health	Creation of an environment in which the citizens have guaranteed conditions for promotion, protection, enhancement and restoration of health regardless of age or social group *(State Health Policy Conception of the Slovak Republic)*	Objectives and measures targeted at accessibility of settlements, decrease of air and noise pollution, decrease of accident rate and support of passenger and cycling transport contribute to achievement of this target.
	Create conditions to increase physical activity of citizens by developing routes for cycling, roller-skating and tourism, physical activity zones around schools and other facilities for children in order to reduce occurrence of cardiovascular	Objectives and measures targeted at non-motor transport potentially contribute to fulfillment of this objective and contribution to decrease of cardiovascular diseases with increased physical activity of citizens, especially

	diseases of adults and infantile and adolescent obesity *(National Cycling Traffic and Tourism Development Strategy of the Slovak Republic)*	children, as well as a decreased incidence of obesity in the population can be expected.
	Reduction or maintenance of the favorably decreasing trend in the number of traffic injuries and fatalities, particularly traffic accidents involving children, cyclists and pedestrians. *(National Action Plan for Children)*	Global strategic objective ŠGC4 is aimed at increasing safety, and thus decreasing the number of traffic accidents.
	Reduction of current load and exposure of the population to traffic noise by maintaining the external environment limits, with particular respect to territorial functions (protection of spas, educational and healthcare facilities and housing development). (*Government of the Slovak Republic Regulation of 16 January 2002 concerning protection of health against noise and vibrations, as amended*)	Specific horizontal objective ŠHC3 is targeted at decreasing the noise load. Supposition of positive impacts of strategy is observance of hygienic limits in particular during implementation of infrastructure measures.
	Focus on prevention and reduction of respiratory diseases resulting from exposure to indoor and outdoor air pollution, which should contribute towards reducing the frequency of asthma attacks and improving the living conditions of children. Focus on reduction of sickness and death rates due to acute and chronic respiratory diseases among children and youth *(Europe's Action Plan for the Environment and Health of Children, WHO and Action Plan for the Environment and Health of Slovak citizens IV)*	In particular measures to support railway transport, public personal transport and non-motorized transport and to divert road traffic outside of an exposed area are directed to fulfill the target. The question is to what extent the decrease will be achieved in these areas.
	Preemption of spatial social segregation in transportation strategy with adverse impacts on social cohesion. Analysis of major mechanism that induce segregation, taking account of existing and potential consequences while drafting solutions of transport serviceability that are suitable for preventing or reducing undesirable segregation. (*Leipziger Charter*)	The strategy does not directly devoted to a separate or specific health target. It can be assumed that global strategic targets ŠGC1, ŠGC2 will respect this health target and facilitate its fulfillment. Decrease of negative socio-economic impacts is one of the areas ŠGC5 is focused on.
	Transport serviceability should create conditions for creating jobs, particularly in economically weak and structurally underdeveloped regions to help solve regional issues.	Creation of temporary and permanent jobs is connected in particular with transport infrastructure and support of public transport.
Biodiversity, countryside, protected areas	Preclude further worsening of the condition of all species and biotopes, particularly those regulated under EU legislation while achieving a clear and measurable improvement of this condition (*Updated National Protection of Biodiversity Strategy by 2020*).	Development of transport infrastructure is always connected to negative impacts on biodiversity, protected species and landscape, often also protected territories, including the system Natura 2000. Interference elements are TSES and valuable landscape elements; migration permeability of the landscape is

	Maintaining and improving the condition of specially protected areas (*Strategy, Principles and Priorities of State Environmental Policy)*	deteriorating. Thus, fulfillment of strategy goes against mentioned targets of nature and landscape protection. Therefore, the strategy should tend to decrease negative impacts on nature and landscape to the minimum possible level with current fulfillment of the needs of transport development. It is predominantly about selection of really necessary and effective solutions and further rules for preparation and implementation of transport constructions and mitigation of negative impacts on nature and landscape. In chapter V of reports and evaluations changes and supplements to the strategy are proposed to decrease the risks of negative impacts.
Surface and ground water	Improved care of water sources and related water management infrastructure in implementation of EU legislation • Development and permanently-sustainable use of water sources • Protection of water sources • Creating conditions for navigability of water flows *(Concept of Water Management Policy of the Slovak Republic by 2015)*	Measures suggested by the Strategy in the area of water transport can potentially contribute to fulfillment of the target *Creation of conditions for navigation on water courses and Protection of water sources,* on the other hand, they can contribute also to significant risks in terms of fulfillment of the objective *Water source protection.* Implementing technical measures for navigability may have an effective impact on protected areas of water sources, adverse impact on river flow rates in water courses and negative impact on ground water level, as well as surface water quality. In case of impropriate routing and by its technical solution, the new construction of road networks might endanger the water source.
	Slovakia Water Plan: Environmental Goals: • preclude condition of surface water bodies from worsening, • protection, improvement and restoration of bodies of surface water to achieve good condition of surface waters by 22 December 2021, • protection and enhancement of artificial and heavily modified bodies of surface water to achieve good ecological potential and good chemical condition by 22 December 2021,	The strategy partially creates an opportunity to positively influence fulfillment of environmental targets in the area of railway transport, where shift of part of transport activities to railway and related decrease of emissions from car traffic will have a positive impact on water contamination and in the area of modernization and improvement of infrastructure maintenance of all types of transport which will generally lead to a decrease of accidents leading to risk of water contamination.

	• progressive reduction of contamination by priority substances and phasing out emissions, discharge and leaks of priority hazardous substances, • stopping or restricting penetration of contaminants into groundwater and precluding the worsening of the condition of groundwater formations, • protection, improvement and restoration of groundwater formations and securing groundwater balance between consumption and volume recharge to achieve good groundwater condition by 22 December 2021, • averting the trend of significantly increased contaminant concentration caused by human activity, to progressively reduce groundwater contamination. *Slovakia Water Plan – 2015 Update*	The strategy represents a risk of failure to fulfill the environmental targets in the part measures for infrastructure development for water transport and partly also road transport if measures to prevent risks and decrease negative impacts identified within the assessment are not sufficiently considered.
	Road and means for support of priorities and achievement of strategic goals of TUR SR – Decrease of environment pollution and damage • permanent improvement of water source quality, creation of conditions for total revitalization of most polluted water courses *(National Strategy TUR SR, 2001)*	The strategy contains measures, in particular in the area of water and road transport, which can potentially make the achievement of the objective harder. Development of transport infrastructure, especially the water and road networks, is connected to the risk of contamination of sources of drinking water and other waters – operation of road transport brings along risks of pollution due to deposition of emissions of polluting substances, thus the increase of intensities of personal and freight transport brings potential increase of these emissions (if not compensated by technology modernization). Transfer of a portion of the transport load to railway and the associated reduction of emissions from car traffic will vice versa have a favorable impact on water contamination. In the area of water transport in particular the operation of harbours and ship transport may induce a higher level of water contamination. The resulting impact on the target will depend on the way of strategy implementation, the extent of measure application to support the increase of a portion of railway and public transport and the extent of considering the recommendation to decrease and avoid identified negative impacts on water quality.

Soils	By soil protection, stabilize the area and volume and prevent unjustified occupation of top quality soils *(State soil policy of the Slovak Republic)*	During implementation of some measures encounters with soil protection might occur. In individual cases it is recommended to minimize acquisition of land, especially in 1–4 quality classes and avoid acquisition of land of highest quality.
	Activities unrelated to cultivation and use of soil should be made without jeopardizing the ecological functions of the soil. *(State soil policy of the Slovak Republic)*	During implementation of some measures encounters with soil protection might occur. It is recommended to care for maintaining soil quality and avoidance of soil contamination.
Cultural heritage	To know, protect, preserve, communicate and hand over to next generations the totality of monuments. *(Protection of Monuments Conception of the Slovak Republic, 2011)*	In individual cases, while fulfilling the strategy, encounters with cultural heritage protection might occur, e.g. building infrastructure close to the monuments objects. On the other hand, shift of a part of traffic to railroad, divert traffic outside the city centres and provide better accessibility of settlements with adverse impact on preservation of cultural monuments and their visit rate. These impacts, however, matter more than the strategy itself and the way of its fulfillment.
	Prevention of physical degradation of the material substance of monumental structures. *(Protection of Monuments Conception of the Slovak Republic, 2011)*	
Waste	Minimization of waste production and environmentally friendly waste management, waste recycling, secondary use, minimization of special and dangerous waste *(National Sustainable Development Strategy)*	Waste in transport arises predominantly out of the change of the vehicle fleet, during construction and modernization of transport infrastructure and during transport itself, whereas road transport represents substantial sources of waste production. The strategy proposes measures for transport development, which will in total bring an increase in waste production, thus being able to endanger the achievement of the objective. Higher production of waste, relating to construction and operation of transport infrastructure, must be solved within the valid legal regulations for waste management. At the same time, the strategy should discuss possibilities how to support measures to decrease waste production mainly from construction and operation of road transport and include the reduction of material demands or prefer re-using and recycling the waste from transport and other branches of human activity in the measures focused on new construction, modernization and/or safeguard of maintenance of transport infrastructure.
	Recycling of construction waste, increased use of waste from extractive industries, industrial technological waste and from anthropogenic sediments in water reservoirs.	

IV. BASIC DATA ON SUPPOSED IMPACTS OF THE STRATEGIC DOCUMENT, INCLUDING HEALTH

IV.1 IMPACTS OF SPTD SR 2030 PROPOSAL ON TRANSPORT SYSTEM

Compared scenarios

For 2030 within the national transport model of the Slovak Republic the basic variant, so-called BAU (Business As Usual) 2030, as modelled. This scenario extends the scenario infrastructure of the current state (BASE 2014) on the side of the transport offer by sections being currently built or construction which has been given contractually or in another way. Transport offer was prognosticated until 2030 based on parameters reflecting predicted demographic and economic development of the Slovak Republic.

Based on the strategy the supposed proposal scenario "Final 2030" was defined, which further extends the scenario of "BAU 2030" by measures or partial projects in form of new/modernized sections of transport infrastructure and related changes.

For purposes of identification of the impact of implementation of measures, defined within the Strategic Plan of Transport Development of the Slovak Republic until 2030, the scenarios "BAU 2030" and "Final 2030" were compared, which are identical in terms of transport demand and differ only regarding the offer.

Network-wide parameters

In the chart below is a basic comparison of network-wide parameters for both scenarios. Implementation of measures referring to construction of new road infrastructure, specifically motorway and expressway sections, led to about a 2 % decrease of output on the road network (due to shortening the road distances). On the other hand, modernization of railway sections together with related increase of the number of connections within measures "OPŽ4 – Upgrade of Žilina – Košice – Čierna nad Tisou core route" resulted in an increase of output on railways to the level of about 3,150 vehicle km/day, which represents a network-wide increase of performance on the railway by about 2 %.

In all modes, on the other hand, total time spent in network decreased, which is decreased by reduction of travelling time. As a result, this parameter represents an increase of availability of territories.

Fig. IV-1 Figure of network-wide parameters of scenarios "Final 2030" and "BAU 2030"

Scenario	Outputs [vehicle km/day]		Time spent in network			Length of network at level D-F [km]	
	Road network	Railway network	IAD	Buses	Trains	D+R	1st class
BAU 2030	149,685,737	154,009	4,032,799	867,543	251,214	614	712
Final 2030	146,190,747	157,160	3,836,941	854,470	248,837	696	541
Difference	–3,494,990	3,151	–195,858	–13,073	–2,377	82	–171
Difference in %	–2.3%	2.0%	–4.9%	–1.5%	–0.9%	13.4%	–24.0%

Source: Analysis of transport model, NDCon s.r.o. and Intens corporation s.r.o.

Regarding levels of smooth transport on road networks, the length of 1st class network on D-F level was reduced in the scenario "Final 2030" almost by one quarter. This decrease is caused by transfer of traffic intensities of 1st class roads to new motorway and expressway sections, which consequently represents deterioration of smooth transport on 82 km of bearing road infrastructure.

This shift is positive due to transfer of traffic to networks that are outside residential zones and in bigger distance from settlements, thus reducing negative impacts of transport on human health. Moreover, in these higher level classes, the relative accident rate (related to performance) is lower; the lower relative speed of vehicles divided in directions has a positive impact on severity of consequences of traffic accidents as well.

Graphical depiction of changes in road traffic intensities

Beside network-wide comparison of values, basic analysis of changes in the transport network, focusing on road transport intensity was prepared. The following maps provide a total overview of territories of the Slovak Republic with different intensities, representing an increase (red) or decrease (green) for average daily intensity for scenario "Final 2030" against "BAU 2030". Graphical outputs are elaborated not only for total average daily intensities (personal and freight transport), but also separately for intensities of trucks (together light and heavy trucks).

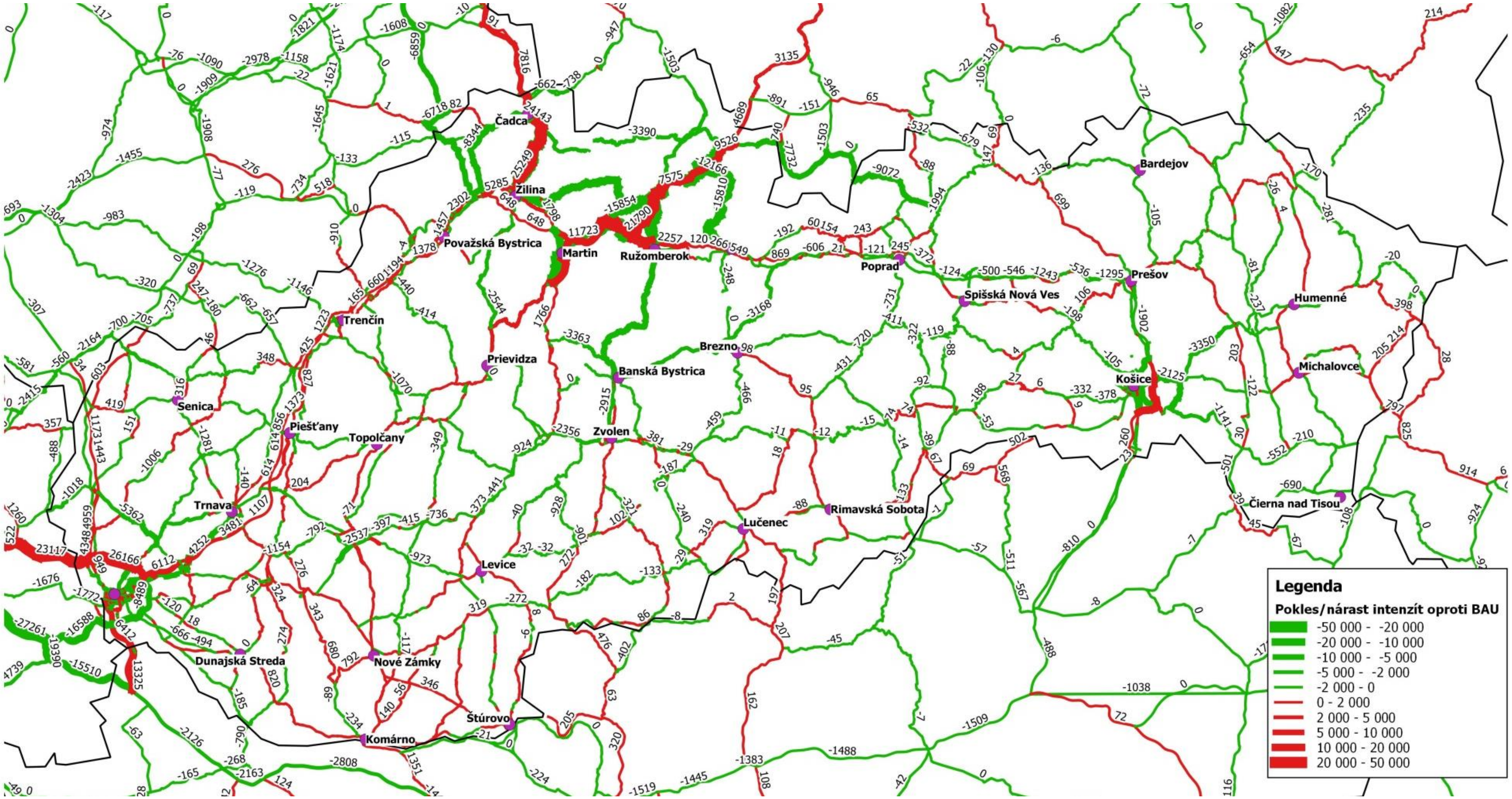


Fig. IV-1 Changes in total daily intensities in proposed scenario Final 2030 against BAU 2030[59]

[59] With road networks, which are divided in the model based on the direction (D+RC), the intensities are depicted for each direction separately.

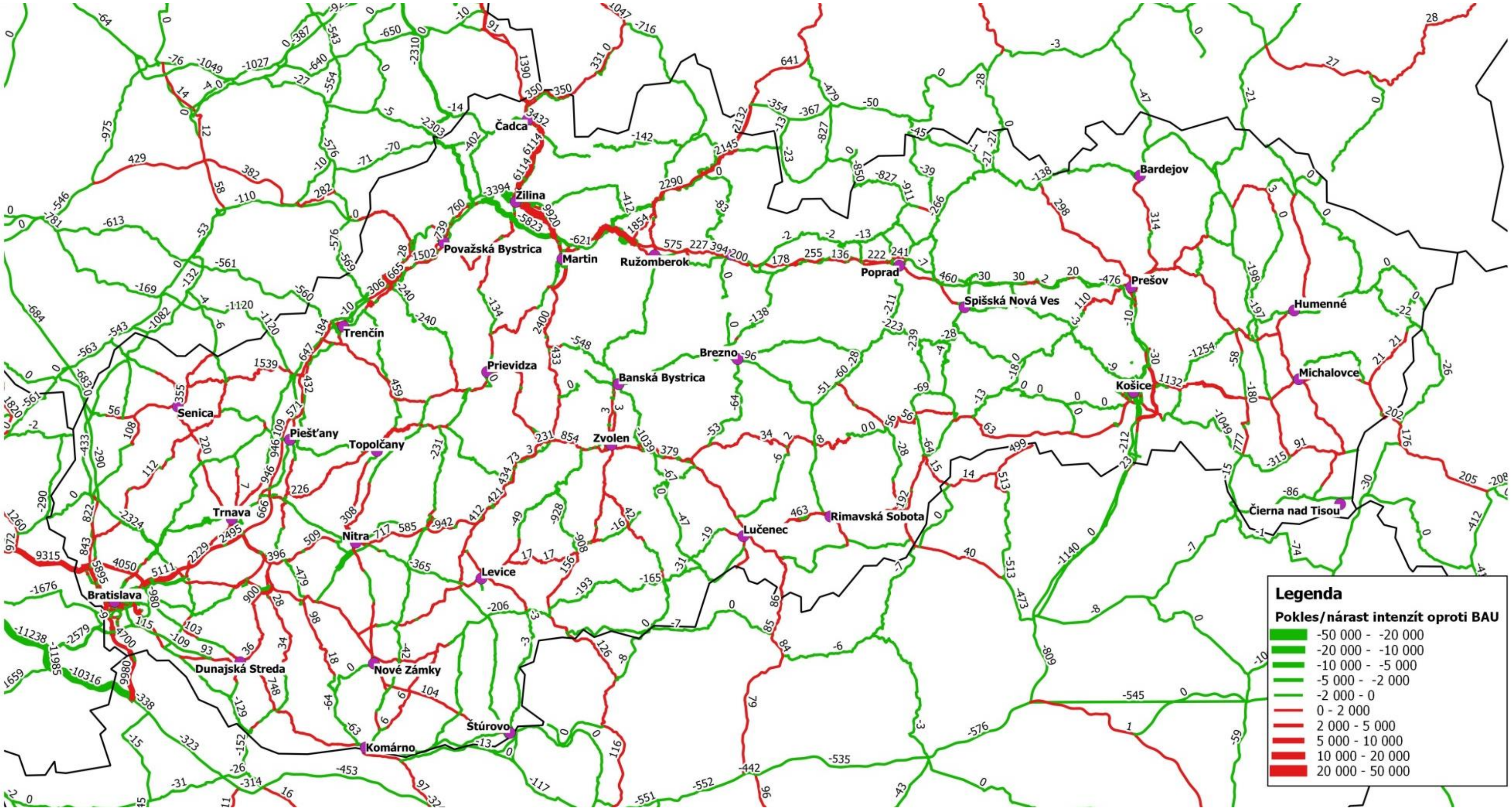


Fig. IV-2 Changes in total daily intensities of freight transport in proposed scenario Final 2030 against BAU 2030[60]

[60] With road networks, which are divided in the model based on the direction (D+RC), the intensities are depicted for each direction separately.

Changes in total daily intensities of road traffic

Projects implemented for road infrastructures, implementation of which should be by 2030, are focused in particular on 4 geographical regions. First of them is the area of Bratislava agglomeration, which is affected by the measure "OPC10 – Road network development in Bratislava Agglomeration". Compared to the BAU 2030 scenario, the change lies in completion of the northern part of D4[61] to the borders with Austria. By the impact of connection to the Austrian S8 section, completion of which is scheduled by 2030, the alternative of connection to Vienna is offered which will result in a significant shift of intensities from the southern D4 section (which is a part of "BAU 2030" scenario). At the same time, this measure has an impact on decrease of intensities in the network of urban communications in Bratislava. New D4 sections are loaded basically by 50,000 vehicles a day.

By the impact of implementation of projects D3 and R5 within measures "OPC6 – Completion of the north-south connection to Poland and the Czech Republic" significant shift of traffic from current networks of lower classes I/10, I/11 (concurrence with D3, R5), II/541 to newly built D3 sections (intensities at the level of 50,000 vehicles a day) or R5 (about 19,000 vehicles).

Another group of measures taken concentrates on the area between towns Martin, Ružomberok and Tvrdošín. These are D1 sections "OPC5 – Completing the priority axis west – east (Rhine-Danube Corridor, Czechoslovakian branch)", as well as R3 section of measures "OPC9 – Completion of the North-South road axis in Central Slovakia". Impact of construction of these new sections is observable in particular in transfer of traffic from lower classes (I/18, I/59, I/65, I/70, II/583), where decrease by 20–30,000 vehicles a day occurs. Completion of D1 in this region and completion of R3 section finally influenced also the connection/axis Ružomberok-Banská Bystrica-Zvolen-Nitra-Trnava as possible alternatives to D1 route, where intensities decrease. The increase, on the other hand, has been noticed on roads I/65 and II/519 as by the implemented construction the role of these routes as feeders from the area of Horná Nitra, Tekov and Turiec to D1.

In the east of the Slovak Republic the changes in scenario "Final 2030" against "BAU 2030" rely on construction of R2 section Šaca – Košické Oľšany, namely within the measures "OPC7 – Completion of the North-South Connection in Eastern Slovakia". Execution of this section has a significant impact on diverting traffic outside of Košice city. On a new section daily intensities expected are at the level of 20,000 vehicles, which will be diverted not only from lower class roads, but also from current route of the expressway R2 and R3.

Changes in total daily intensities of freight

[61] Projects of R7 communication are scheduled within "OPC12 – Modernization and development of other motorway and expressway network in BAU" are implemented within BAU scenario

Increases and decreases of freight traffic correspond to trends, identified in changes of total traffic intensities, where the most significant changes between scenarios were identified in the respective areas. In this context it is necessary to mention that in case of freight transport or freight transit its shift to routes of higher classes is required not only due to reasons described above, but also due to the destructive impact of especially heavy freight transport to the carriageways of lower classes.

Changes in VOD

In terms of VOD, comparison of scenarios is limited by the way of their presentation in the model, where its offer is limited by the number of connections (in which both scenarios defer only at the level of increasing the number of train connections with OPŽ4 measures and quality of transport infrastructure, which has an impact on shortening the travel period (with road infrastructure measures not only for buses, but also for IAD). Parameters relating to increasing the travelling quality level, e.g. in accordance with quality public means of transport, however, are not modelled. As a consequence of these restrictions, the numerical change in the modal split in the transport model, induced by implementation of measures or their partial projects, seems to be insignificant in terms of a network-wide point of view. Real impacts (change of division of transport work, etc.), referring to VOD development as they are set in the strategy, have a high potential, however.

IV.2 BASIC CONNECTIONS OF SPTD SR 2030 PROPOSAL TO THE ENVIRONMENT

System and sector measures in SPTD SR 2030 proposal

SPTD SR 2030 proposes a whole range of measures:

System measures

- OPS1 – Setting the principles of sustainable funding of the transport sector
- OPS2 – Periodic preparation and performance of maintenance plans of the transport infrastructure
- OPS3 – Process of preparation and realization of development project including related activities

- OPS4 – Completion and continuous maintaining of databases of individual subsectors
- OPS5 – Improvement of functionalities and management of multimodal transport model of the Slovak Republic
- OPS6 – Regular updates of strategic and development documents
- OPS7 – Regular monitoring of noise and air quality and implementation of measures reducing the negative impacts of transport on the environment
- OPS8 – Regular performance of safety audits and performance of measures increasing transport safety

Measures in road transportation

- OPC1 – Implementation of the new concept of road network
- OPC2 – Change in principles and ensuring management and maintenance of the road infrastructure
- OPC3 – Modernizing of service areas on the D and RC networks
- OPC4 – Conceptually implemented development of IDS
- OPC5 – Completion of the west-east priority axis (Rhine–Danube corridor, Czech and Slovak branch)
- OPC6 – Completion of the north-south connection to Poland and the Czech Republic
- OPC7 – Completion of the north-south connection in Eastern Slovakia
- OPC8 – Completion of the west-east road axis in Central Slovakia
- OPC9 – Completion of the north-south road axis in Central Slovakia
- OPC12 – Modernization and development of other motorway and expressway networks, if reasonable

Measures in Air Transport

- OPL1 – Optimization of the set of airports used by the airlines in order to provide for functional and effective planning of the air transport sector development
- OPL2 – Modernization and construction of civil aviation infrastructure for purposes of economic development of the country and the region and improving quality of the provided services within natural and special-purpose mobility

Measures in Water Transport

- OPV1 – Implement technical measures to improve navigability of the Danube waterway
- OPV2 – Introduction of extended river information services
- OPV3 – Modernization of public ports in Slovakia and subsequent regular maintenance
- OPV4 – Settlement of property-related and administrative relations in public ports
- OPV5 – Cooperate with the watercourse authority to maintain waterways and navigable objects on monitored waterways in SR to ensure year-round navigability

Measures in Public Passenger Transport

- OPVO1 – Preference of the public passenger transport in the urbanized territories
- OPVO2 – Establishment of the national transport authority and integration of public transport
- OPVO3 – Provision of the possibility to renew the vehicle fleet in the corresponding quality
- OPVO4 – Adjustment of public spaces in towns and construction of new infrastructure for pedestrians and cyclists
- OPVO5 – Building of retention highway shoulders and parking areas in the surrounding of railway stations and terminals OPVO6 – Revitalization of railway stations and stops in order to enhance travel culture and quality

- OPVO7 – Achieving high quality of terminals, transfer junctions and integrated stops with minimization of barriers and maximization of compactness and purposefulness
- OPVO8 – Modernization and construction of trolley and tram lines and the related maintenance base and infrastructure for low-emission buses and electric-powered buses

Measures in Railway Transport

- OPŽ1 – Completion of upgrade to major TEN-T routes, in an advanced stage of preparation: Púchov – Žilina, Žilina – Čadca – national border, Devínska N. Ves – Marchegg
- OPŽ2 – Drawing up the operational concept of passenger transport on railways (as a part of the national operating concept of public mass transport) and its implementation plan by 2030 with the outlook to 2050
- OPŽ3 – Completion of implementation of the Destination Train Diagram 2020
- OPŽ4 – Upgrade of Žilina – Košice – Čierna nad Tisou core route
- OPŽ5 – Upgrade of the Kúty state border – Bratislava – Štúrovo/Komárno state border corridor
- OPŽ6 – Drawing up and implementation of the Destination Train Diagram 2030 – adjustment of the time and number of connections on the a branch tracks to the Žilina – Košice and Kúty national border – Štúrovo/Komárno national border corridor related to infrastructure changes on those tracks
- OPŽ7 – Upgrade and enhancement of the wider Bratislava hub including the relevant concerned tracks, as necessary, according to the feasibility study of the Bratislava railway hub
- OPŽ8 – Modernization of TEN-T rail track Púchov – Horní Lideč
- OPŽ9 – Improvement of the conditions for the combined transport and operation of the connected sets of freight transport and support of interoperability of the freight transport vehicles (organisational, infrastructure and vehicles)
- OPŽ10 – Centralization of the operational management
- OPŽ11 – Rationalization of the operation on other tracks with regard to the operational concept of passenger transport

The table below demonstrates the basic framework links among the SPTD SR 2030 and individual components of the environment which were considered within this evaluation.

Table IV-2 Basic framework links among the SPTD SR 2030 and individual components of the environment

Legend:

++	+	-	- -	0	+/-
potential significant positive influence	potential positive influence	potential negative influence	potential significant negative influence	without influence	the influence may be positive and negative

Measure Category	ID measures	Air	Greenhouse gases emissions	Noise and vibrations	Population and health	Nature and landscape	Surface and ground water	Climate risks	Rock environment and raw materials	Soils	Cultural heritage	Waste
System measures	OPS1	0	0	0	0	0	0	0	0	0	0	0
	OPS2	0	0	+	0	0	+/-	+	0	0	0	0
	OPS3	0	0	0	0	0	0	+	-	-	0	0
	OPS4	0	0	0	0	0	0	+	0	0	0	0
	OPS5	+	+	+	0	0	0	0	0	0	0	0
	OPS6	+	+	+	0	0	+	+	0	0	0	0
	OPS7	+	++	++	+	0	+	+	+	+	+	+
	OPS8	0	0	0	+	0	+	++	0	0	0	0
Road transport	OPC1	+	+	+	+/-	0	+/-	+	0	-	0	0
	OPC2	+	0	+	0	0	+	+	0	0	0	0
	OPC3	0	0	-	+	-	+/-	0	-	-	0	0
	OPC4	0	0	+	0	0	0	+	0	-	0	0
	OPC5	++	+/-	+	+	- -	+/-	+/-	-	-	0	0
	OPC6	+	+/-	+	+/-	- -	-	+/-	-	-	0	0
	OPC7	++	+/-	+	+	- -	-	+/-	-	-	0	0
	OPC8	+	+/-	+	+	- -	-	+/-	- -	- -	0	0
	OPC9	+	+/-	+	+	- -	-	+/-	-	-	0	0
	OPC10	+/-	-	+/-	+	- -	-	+/-	- -	- -	0	0
	OPC11	++	-	-	+	- -	-	+/-	0	0	0	0
	OPC12	+/-	-	+/-	+	- -	-	+/-	- -	- -	0	0
Rail transport	OPŽ1	+	+	+/-	-/+	- -	+/-	+/-	-	-	0	0
	OPŽ2	+	+	+/-	+	0	0	+	0	0	0	0
	OPŽ3	+	+	+/-	0	0	0	0	0	0	0	0
	OPŽ4	+	+	+/-	-/+	-	0	+/-	-	-	0	0
	OPŽ5	0	0	+/-	-/+	-	0	+/-	- -	- -	0	0
	OPŽ6	+	+	+/-	+	-	0	+/-	0	0	0	0
	OPŽ7	+	+	-	+	-	0	+/-	0	0	0	0

Measure Category	ID measures	Air	Greenhouse gases emissions	Noise and vibrations	Population and health	Nature and landscape	Surface and ground water	Climate risks	Rock environment and raw materials	Soils	Cultural heritage	Waste
	OPŽ8	+	+	+/-	-/+	-	0	+/-	-	-	0	0
	OPŽ9	++	++	+	+	-	+	+/-	0	0	0	0
	OPŽ10	0	+	+	0	0	0	+/-	0	0	0	0
	OPŽ11	0	++	+/-	0	0	0	+/-	0	0	0	0
Water transport	OPV1	0	0	-	+/-	- -	- -	-	0	0	0	0
	OPV2	0	0	0	0	0	+	0	0	0	0	0
	OPV3	0	0	+/-	+	-	- -	+/-	0	0	0	0
	OPV4	0	0	0	0	0	0	0	0	0	0	0
	OPV5	0	0	0	0	-	0	+/-	0	0	0	0
Air transport	OPL1	0	+/-	+/-	+/-	0	0	0	0	0	0	0
	OPL2	-	-	-	0	-	-	0	0	0	0	0
Public passenger transport	OPVO1	++	++	+	++	0	0	+	0	0	0	0
	OPVO2	+	+	+	+	0	0	+	0	0	0	0
	OPVO3	++	++	++	+	0	+	0	0	0	0	0
	OPV04	+	++	++	++	-	0	+	0	0	+	+
	OPVO5	+	++	+	+	-	+/-	+	0	0	0	0
	OPVO6	0	+	0	++	0	0	0	0	0	0	0
	OPVO7	+	++	+	+	-	0	+	0	0	0	0
	OPVO8	++	++	+	+	-	0	+	0	0	0	0

The proposal SPTD SR 2030 contains, except for the purely conceptual and system measures and strategic principles for management of development of the transport system in Slovakia, also an entire range of the generally-formulated measures which, however, assume construction of transport corridors with potentially significant impacts on the environment. **For the SEA evaluation purposes, the transport corridors were identified based on description of measures in the strategy and transport model. The corridors were divided into logical sections.**

These measures and assessed transport corridors are briefly presented in the table and figure below.

Tab. IV-3 Measures proposing transport corridors with potentially significant impacts on environment

Measures proposing transport corridors with potentially significant impacts on environment	Considered transport corridors analysed in this SEA evaluation	Abbreviations on maps
OPC5 – Completion of the west-east priority axis (Rhine–Danube corridor, Czech and Slovak branch)	D1 – Turany – Hubová	D1a
	D1 – Behárovce – Branisko profile II	D1b
	D1 – Bidovce – border SR/UR	D1c
	R6 – state border SR/CZ – Púchov	R6
OPC6 – Completion of the north-south connection to Poland and the Czech Republic	D3 – Žilina Brodno – Oščadnica – Čadca Bukov, 2nd profile	D3a
	D3 – Skalité – state border SR/PR, 2nd profile	D3b
	R5 – Svrčinovec – state border SR/CZ	R5
OPC7 – Completion of the north-south connection in Eastern Slovakia	R2 – Šaca – Košické Oľšany	R2a
	R4 – state border PR/SR – Prešov northern bypass	R4
OPC8 – Completion of the west-east road axis in Central Slovakia	R2 – D1 intersection – Nováky	R2b
	R2 – Nováky – Žiar nad Hronom	R2c
	R2 – Zvolen west – Zvolen east	R2d
	R2 – Kriváň – Ožďany	R2e
	R2 – Ožďany – Figa	R2f
	R2 – Tornaľa – Šaca	R2g
OPC9 – Completion of the north-south road axis in Central Slovakia	R3 – Tvrdošín – Sedliacka Dubová	R3a
	R3 – Oravský Podzámok – D1 intersection	R3b
	R3 – Martin – Šahy	R3c
	R3 – Šahy – Zvolen	R3d
	R1 – Banská Bystrica – D1	R1a
OPC10 – Development of road network in the Bratislava agglomeration	D1 – Bratislava – Trnava, extension to 6 lanes	D1d
	D4 – Bratislava Jarovce – state border SR/Austria	D4
	I/65 Kremnica – Kremnické Bane – region borders	I/65
OPC12 – Modernization and development of other motorway and expressway networks, if reasonable	D2 – Bratislava Lamač – SK/CZ national border, increasing motorway capacity	D2
	R1 – Most pri Bratislave – Vlčkovce	R1b
	R7- Bratislava – Dunajská Streda	R7a
	R7 – Dunajská Streda – Nové Zámky	R7b
	R7 – Nové Zámky – Veľký Krtíš	R7c
	R7 – Veľký Krtíš – Lučenec	R7d
	R8 – Nitra – crossroads R2	R8
OPŽ1 – Completion of upgrade to major TEN-T routes, in an advanced stage of preparation: Púchov – Žilina, Žilina – Čadca – state border, Devínska N. Ves – Marchegg	Púchov – Žilina track	1
	Devínska Nová Ves track- state border SR/A, implementation	2
	Route CZ/SK national border – Čadca – Krásno nad Kysucou	3
	Route Žilina – Košice	4

OPŽ4 – Upgrade of Žilina – Košice – Čierna nad Tisou core route	Route Košice – Čierna nad Tisou	6
OPŽ5 – Upgrade of the Kúty state border – Bratislava – Štúrovo/Komárno state border	corridor Track state border CZ/SR – Kúty – Devínska Nová Ves (outside)	7
	Track Bratislava Vajnory (outside) – Štúrovo state border SR/MR	8
	Track Bratislava – Nové Zámky – Štúrovo/Komárno (ETCS L2 + GSM R)	9
OPŽ8 – Modernization of TEN-T rail track Púchov – Horní Lideč	Track Púchov – Horní Lideč	10

Referential scheme of planned infrastructural measures with potentially significant impact on the environment on the national level

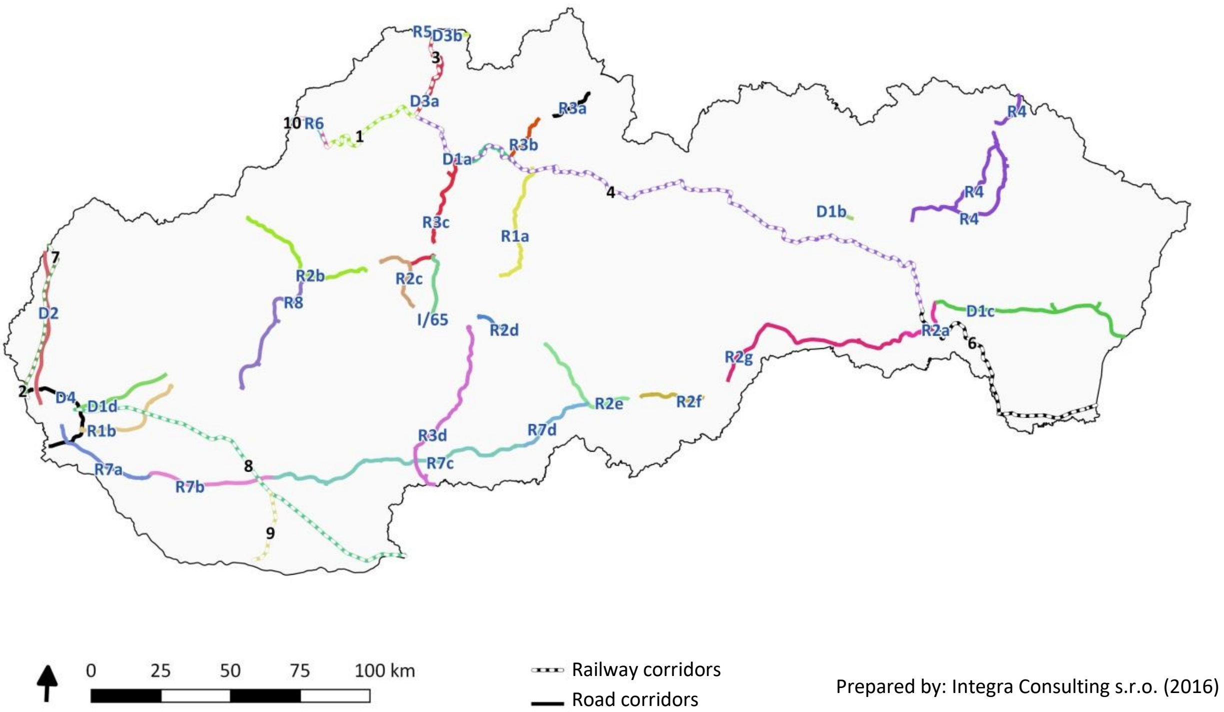


Fig. IV-3 Considered infrastructure corridors with potentially significant impact on environment on the national level

The draft SPTD SR 2030 deals neither with the territorial routing nor with the technical detail of the considered transport corridors or discussion on the draft itself. Part 5.3.1.3. of the strategy proposal instead of that clearly defines the strategic principles for preparation and implementation of the development activities as follows:

STRATEGIC PRINCIPLE NO. 7 OF THE DRAFT SPTD SR 2030

Within the preparation process of individual project plans, the observation of the steps below shall be thoroughly required, especially in the pre-implementation stage.

1. Conceptual preparation
   - 1.1 prognoses, surveys, land-use plans
   - 1.2 conceptual studies (feasibility studies and opportunities) – variant solution
   - 1.3 feasibility studies (SU)
   - 1.4 territory-technical study, background material for the building plan Documentation
2. Preparation of the investment – elaboration of the documentation
   - 2.1 documentation of the building plan for the selected variant
   - 2.2 documentation for the Environmental Impact Assessment (EIA) of the construction
   - 2.3 documentation for the planning permission
   - 2.4 documentation for the building permit
3. Investment – construction implementation
   - 3.1 documentation for the construction implementation, for the contractor selection
   - 3.2 construction implementation
   - 3.3 documentation of as-is construction implementation

The necessity to take all aforementioned steps and the related documents shall be evaluated on a case-by-case basis – some may be merged or omitted. In more complicated cases, on the contrary, these can be supplemented by various additional prognoses and surveys. Any plan should be incorporated in all levels of the land-use planning documentations. The basic step covers assessment, approval and incorporation of individual documentations in the strategic plans of MTCRD SR and other concerned entities and institutions.

STRATEGIC PRINCIPLE NO. 8 OF THE DRAFT SPTD SR 2030

In regard to the strategic principle 7, it is inevitable to define categories/types of projects with the required scope of the documentation in the phase of conceptual preparation. The failure to meet the required scope and time relationships of the conceptual preparation shall not be allowed to transfer to the investment preparation phase. The defined requirements of the scope and order of individual steps of the conceptual preparation shall be together with the recommended methodologies for their processing anchored in the respective regulations covering this issue.

Formulations of the proposed SPTD SR 2030 measures and the aforementioned principles of the preparation and implementation process of particular transport plans clearly state that the draft SPTD SR 2030 purposefully leaves the discussion on detailed solutions and impacts of transport plans to further surveys and subsequent steps of the project preparation of the construction.

Evaluation of the draft SPTD SR 2030 accepts this approach and stems from it. The evaluation methodology thus focuses on the main potential significant risks and impacts on environment and human health protection which can be resolved on the conceptual level of the draft SPTD SR 2030. The detailed territorial collisions and impacts of particular transport plans shall be dealt with in further levels of the project development of individual constructions.

IV.3 EVALUATION OF IMPACTS OF MEASURES

IV.3.1 IMPACTS ON AIR

The primary impact of the strategy on air shall be caused by the change of emissions of pollutants from the means of transport. With regard to the quite dominant emissions and emission share of car transport in total transport emissions, the impact shall be determined by the changes in the car transport sector, other transportation modes shall be meaningless from that point of view.

The air quality may be potentially affected especially by several pollutants, typical representatives in emissions from car transport. These include especially NO_x, suspended particles PM_{10} and $PM_{2,5}$ (exhaust emissions, brake pad abrasion dust, road surface and tyres, resuspension from the road surface) and poly-cyclical aromatic hydrocarbons (e.g. benzo(a)pyrene). While the spectrum of the emitted substances is wider, the above number represents pollutants that are emitted from transport in significant amounts and/or are representatives of such air concentration which currently exceed or are approaching the emission limits.

Other pollutants cannot be the cause of origination of significant negative impacts on environment. The above list fulfils the function of main markers of transport pollution. Unless significant impacts related to these substances occur in the respective area, then it is impossible to expect the significant impacts of the strategy in case of pollutants.

Primarily potential impacts of the strategy can be reflected in the change of emission concentrations along the transport routes in relation to the change of the traffic intensity. In the Slovak Republic such change will be significantly heterogenic, i.e. it is possible to delineate areas where both increase and decrease of pollutant concentration can be expected. The potential change due to the strategy does not occur only along the road sections which are subject to the proposed measures. The change in part of the road network often causes a change of traffic intensity and, along with it, related impacts on air in other areas, which is not subject to the measure. The impact of the strategy on air shall thus be evaluated in complexity with the use of the transport model.

Secondary impacts of the strategy can be perceived in the potential regional impact of the cumulative influence of the proposed measures on the share of the secondary aerosol in the total emission concentration. Automotive transport is a significant and from the national point of view probably the most significant source of precursors of the secondary particles. Thus, a total change of traffic intensity in large municipal areas will affect a total "background" concentration of $PM_{2,5}$ suspended particles in the area.

The cumulative impacts of the strategy shall consist in co-effect of individual conceptual measures. They can be significant especially in case of new infrastructure measures in the frequented transport corridors in valleys with the deteriorated dispersion conditions. In such cases the transport release of the current routes leading through residential municipal areas can be expected; however, a new source of pollution will be created by the new road in a relatively short distance from the current road, in connection to spatial limitations of this topography. In most cases such infrastructure measures are caused by the requirement for higher capacity of such transport through-flow, thus such corridors can see an increase in the amount of transport emissions relatively close to the residential areas. The applied methodology of the SEA evaluation enables identification of these cases of potential cumulative influence and appropriate attention is paid to them.

In regard to the time horizon of the scope of the assessed strategy, the potential impacts on air are mid-term or long-term.

In relation to the fact that impact of individual conceptual measures overlap on air quality and they overlap also with the emission impact of the current roads, the strategy's influence on air shall be assessed in the wider context, not only on the level of individual measures. Moreover, this approach fulfils the requirement for assessment of cumulative impacts of the strategy.

The evaluation is processed from two aspects:
- impact of the strategy on the emission burden from transport in territorial units (aggregated emission data on the zone territory),
- impact of the strategy on the emission situation in particular locations along the roads.

Impact of the strategy on the emission burden from transport in the territorial units

The size of change of emissions of the main pollutants was evaluated based on the output of the transport model representing the zero (scenario BAU 2030) and design variant of the strategy. Based on these data on road routing and traffic intensity, longitudinal gradient and design speed, and by means of emission factors EMEP/EEA Emission Inventory Guidebook 2013, rv. September 2014, the emission factors and the corresponding emissions of the mentioned substances on all roads which were included in the transport model were calculated. The calculated emissions include exhaust emissions, brake, road and tyre abrasion dust and resuspended dustiness from the road surface.

Aggregated emission data in zones

Calculated annual mass flows were subsequently aggregated (summed up) within territorial zones and recalculated per unit area (kg/km^2 or g/km^2). They thus express emission density from car transport. The aggregated data are for the BAU 2030 scenario and the design variant of the strategy presented in the following pictures.[62] Colourful distinction of zones was processed according to the standard deviation.

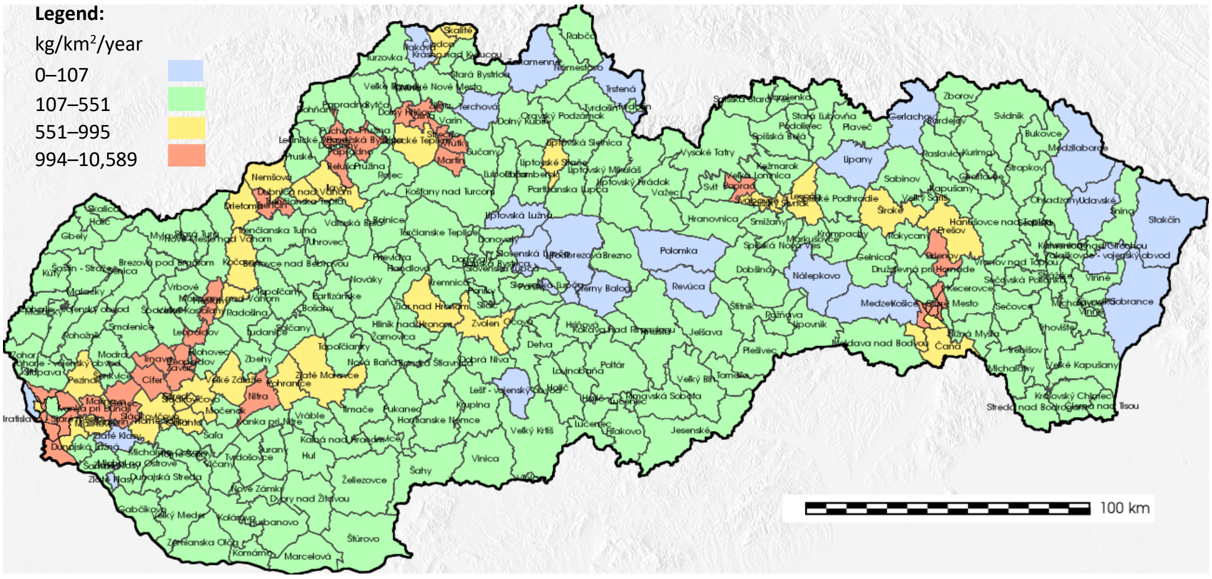
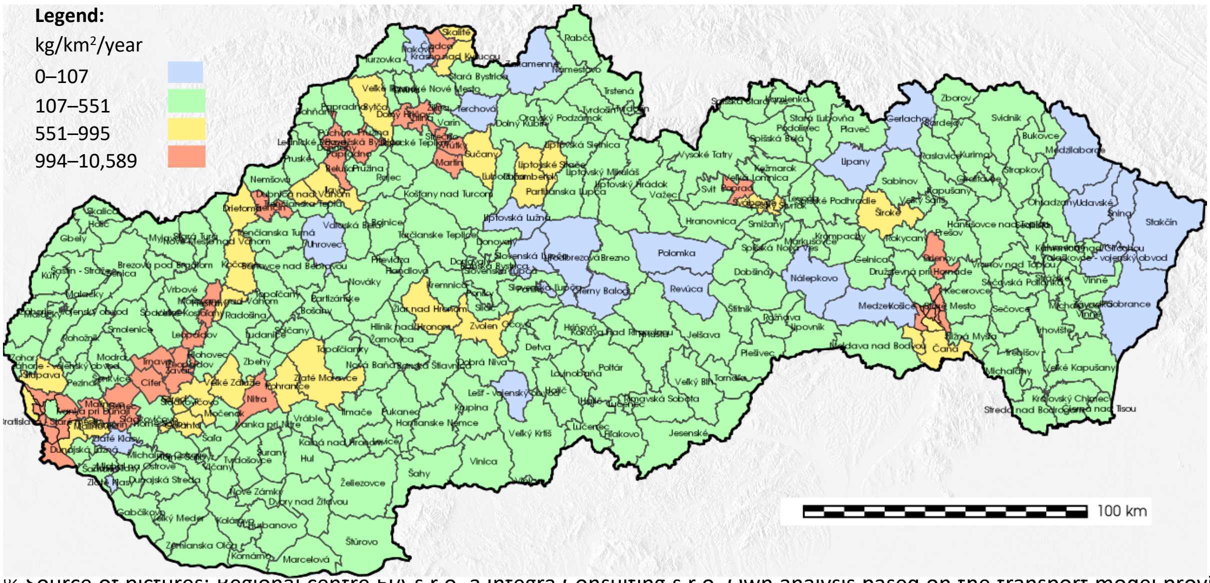


Fig. IV-4 Emission density of suspended particles PM_{10} – scenario BAU 2030



[62] Source of pictures: Regional centre EIA s.r.o. a Integra Consulting s.r.o. Own analysis based on the transport model provided by the strategy processor.

Fig. IV-5 Emission density of suspended particles PM_{10} – design scenario

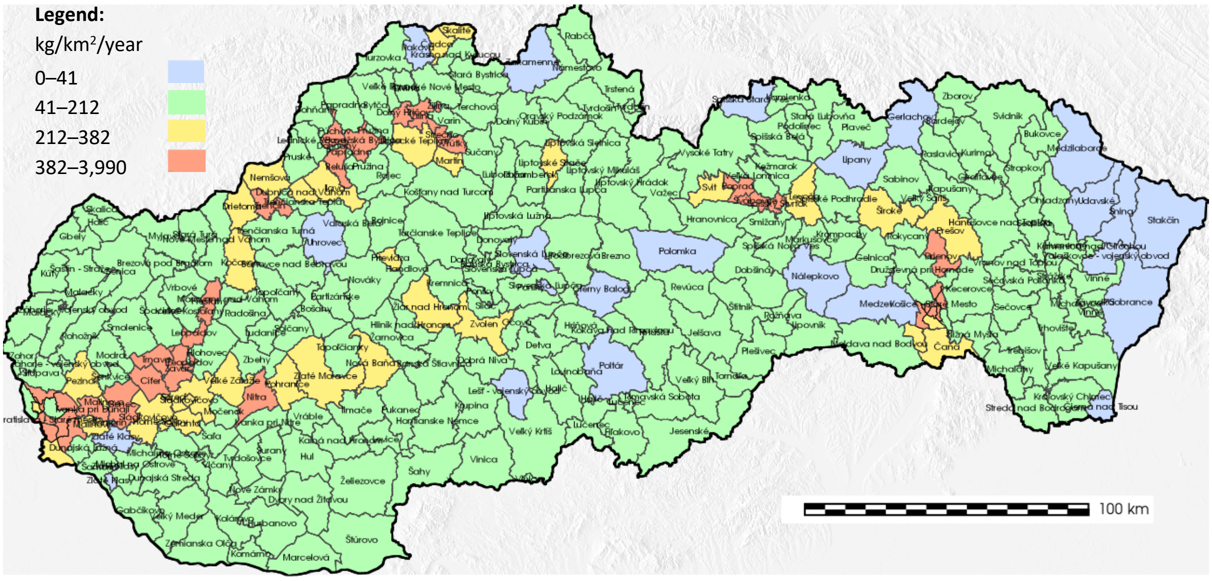


Fig. IV-6 Emission density of suspended particles $PM_{2,5}$ – scenario BAU 2030

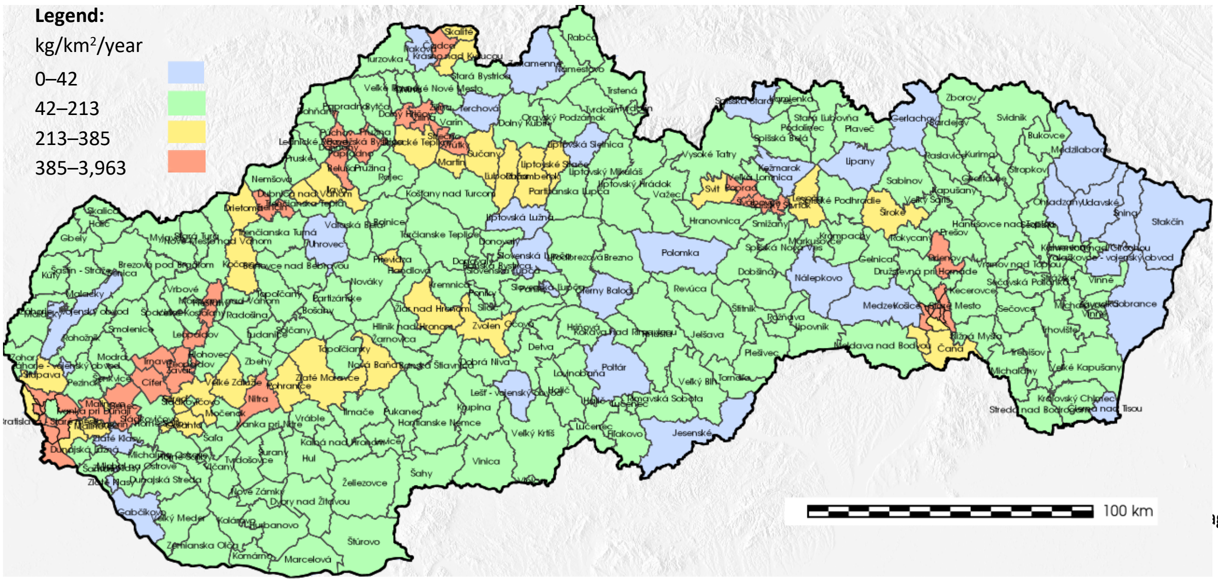


Fig. IV-7 Emission density of suspended particles $PM_{2,5}$ – design scenario

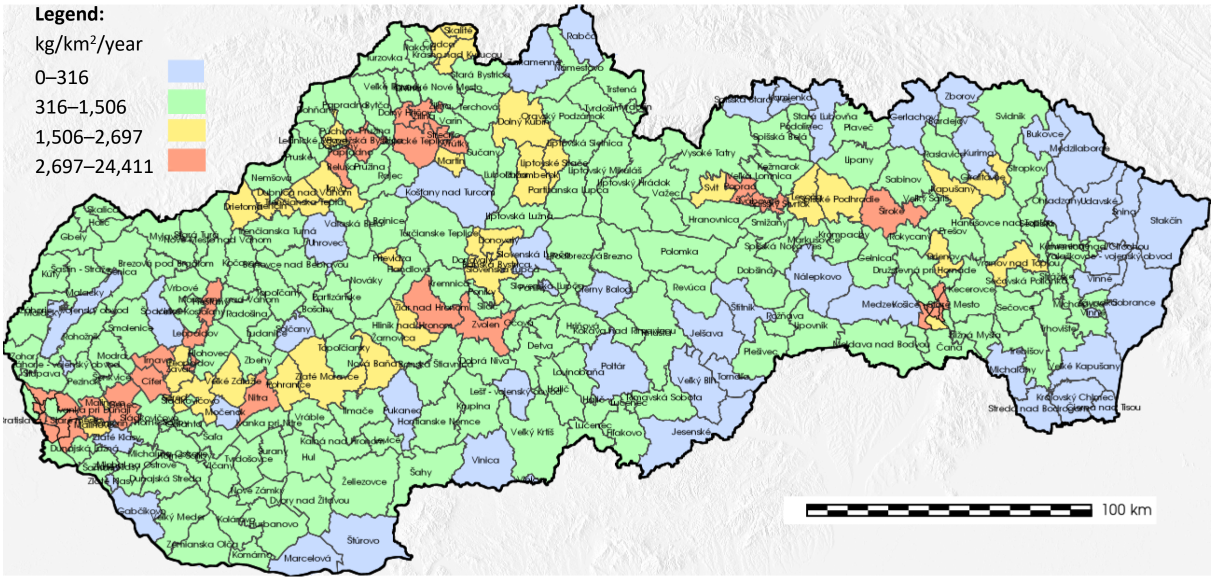


Fig. IV-8 Emission density of B(a)P – scenario BAU 2030

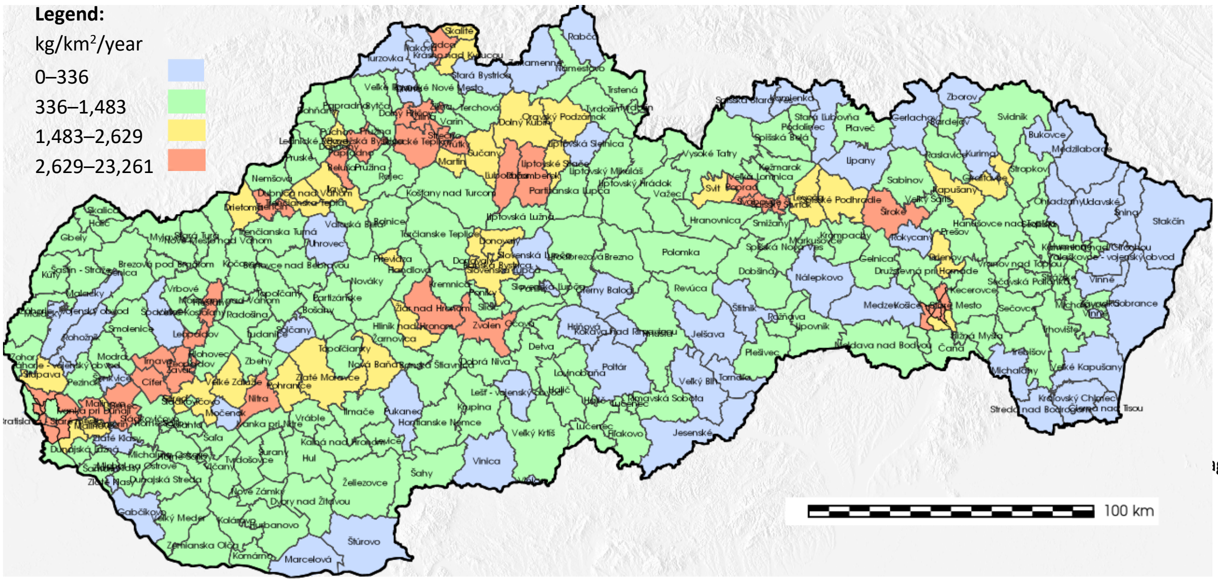


Fig. IV-9 Emission density of B(a)P – design scenario

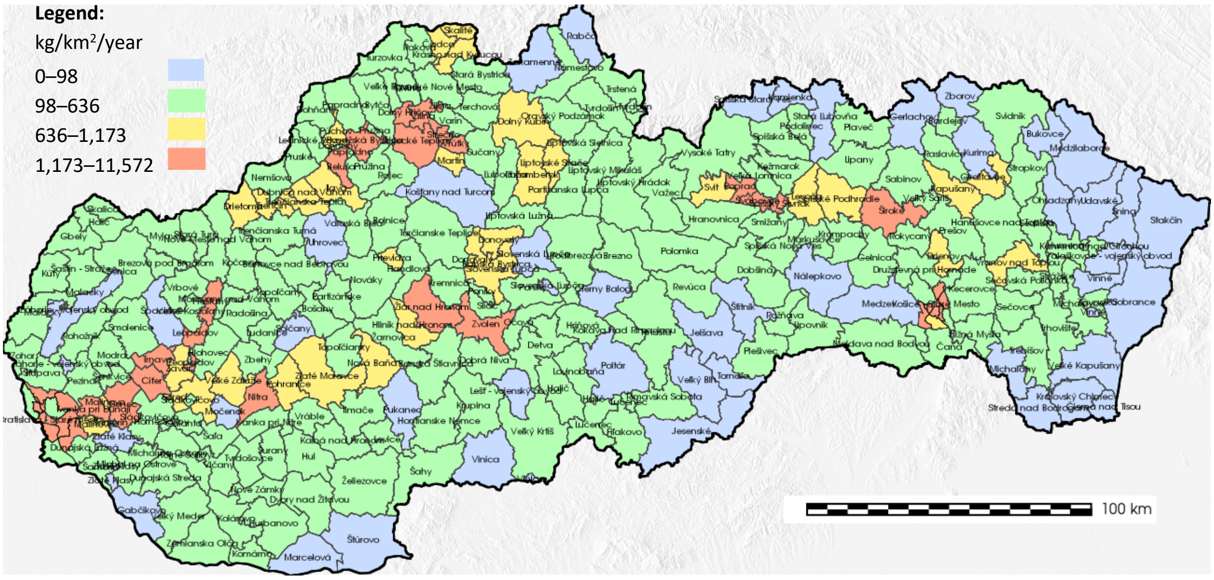


Fig. IV-10 Emission density of NO_x – scenario BAU 2030

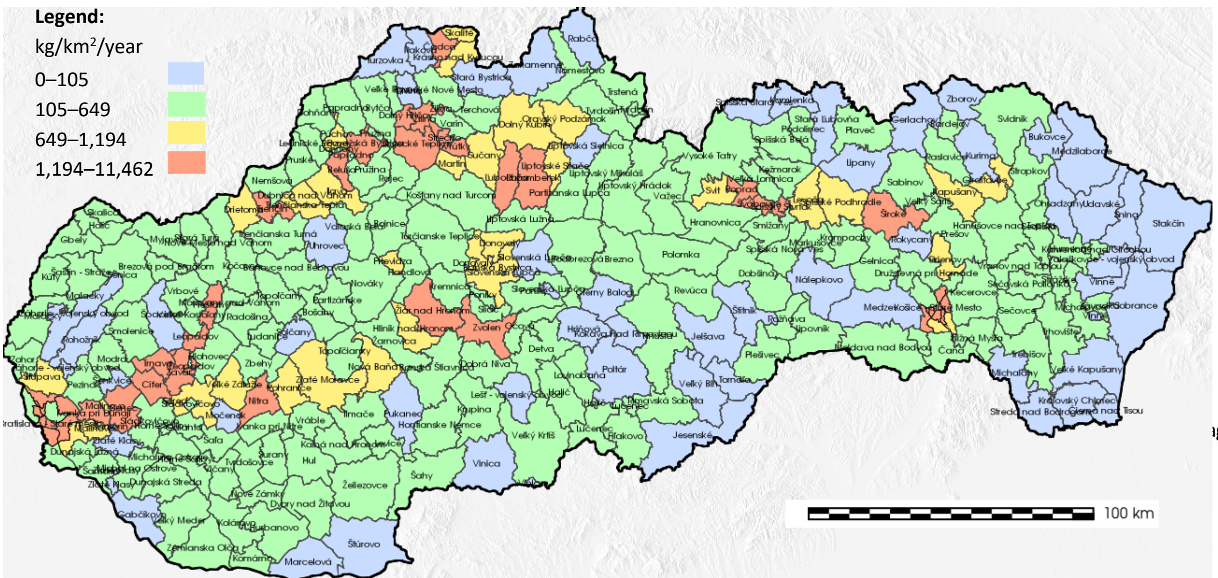


Fig. IV-11 Emission density of NO_x – design scenario

Based on the processed analysis it is possible to state that the highest density of emissions from the car transport is achieved in the following areas:
- Bratislava – Žilina corridor
- Žilina – Ružomberok corridor
- Poprad – Prešov corridor
- Nitra – Zvolen corridor
- City of Košice

Where the changes of emission density due to strategy implementation will not be significant:
- mild reduction in the zone of Prešov
- mild increase in the Žilina – Čadca – state border with the Czech Republic corridor
- mild increase in the Žilina – Ružomberok corridor

<u>Aggregated emission data in the whole Slovak Republic</u>

The values of the calculated emissions were also aggregated on the territory of the whole Slovak Republic. Comparison of assessed variants forms the content of the following table.

Table IV-4 Comparison of total emissions of assessed variants of the strategy

	BAU 2030	Design variant	Difference		Units
PM exhaust emissions	2.179	2.313	0.134	6%	kt/year
PM_{10} including resuspension and abrasion dust	16.024	17.527	1.503	9%	kt/year
$PM_{2,5}$ including resuspension and abrasion dust	6.047	6.530	0.483	8%	kt/year
NO_x	17.712	18.687	0.975	6%	kt/year
B(a)P including abrasion dust	43.232	44.112	0.88	2%	kg/year
B(a)P only exhaust	39.243	39.996	0.753	2%	kg/year

Source: own analysis based on the transport model provided by the strategy processor.

The statistical analysis of a set of all roads on the territory of the Slovak Republic results in the statements that all in all, due to strategy implementation it is possible to expect a decrease in traffic intensities in car passenger transport on average by 9%, in hot-spots (on 10% of the most occupied sections) by about 7%.

In case of freight transport, on the contrary, an increase of traffic intensities can be expected (on average by 3%, on 10% of the most occupied roads by 7%).

As the above table demonstrates, according to the results of the transport model, the design variant compared to the zero variant (BAU 2030) means a mild increase in transport emissions especially in case of suspended particles, which in relation to the mentioned facts is caused probably by higher transit freight transport due to better passability through the Slovak Republic after the strategy implementation.

In regard to the provided conclusions, it must be stated that only the impact of the assessed strategy free of external factors, which could significantly influence the development of transport emissions, is evaluated. These include mainly technical progress in development of car engines with lower emissions, development of use of alternative fuels in transport and electromobility. Gradual upgrade of the vehicle fleet will probably result by 2030 in a higher relative decrease of emissions than the mentioned maximum 9% increase of national emissions based on the strategy. Thus in absolute value, transport emissions within the design horizon of the strategy are expected to decrease or stay at the same level in the worst-case scenario. Therefore, in reality there will probably be no evaluated potential negative impacts. Potential negative impacts evaluated in the submitted documentation can be concluded only when compared to the strategy zero variant (BAU 2030 scenario).

Impact of the strategy on the emission situation in particular locations along the roads

In order to evaluate the impact of the strategy on the emission situation in particular locations along the roads, the methodology of semi-quantification, multi-criteria evaluation considering the following factors will be applied:

1) size of the emission change of the main pollutants relevant in terms of the assessed strategy, i.e. PM_{10}, $PM_{2,5}$, NO_x, B(a)P (the bigger the difference of emissions between the condition without the strategy implementation and in case of its implementation, the more significant impact),
2) current emission concentrations of the mentioned substances on the territory in regard to the level of the applicable emission limits (the more the current emission concentration approaches the emission limit of the respective substance, the more significant impact – in the assessment the emission limits for average annual concentrations were considered),
3) local diffusion conditions, in the respective case the tendency of the territory to ground inversions (the higher tendency of the territory to inversions with which the same size of emissions leads to substantially higher emission concentrations in the ground zone, the more significant impact),
4) population density (the more population is affected by the transport emission contributions, the more significant impact).

The above factors were considered by means of individual data layers:

ad 1) The size of change of emissions of the main pollutants was evaluated based on the output of the transport model representing the zero (scenario BAU 2030) and design variant of the strategy. Based on these data on road routing and traffic intensity, longitudinal gradient of the road and design speed, and by means of emission factors EMEP/EEA Emission Inventory Guidebook 2013, rv. September 2014, the emission factors and the corresponding emissions of the mentioned substances on all roads which were included in the transport model were calculated. In order to take the interaction of transport emissions from the surrounding roads into account, the calculation of the emission density from car transport was made (an evaluated circle within the distance of 1km from the road). Subsequently, the difference of this data layer for the design scenario and the BAU 2030 scenario was elaborated.

ad 2) The field of current emission concentrations of evaluated substances was assessed based on the emission monitoring performed within the Slovak Republic in the period 2010-2014. The overview of stations and results are described in Chapter III of the documentation.

ad 3) Local diffusion conditions were considered by means of the publicly available map "Burden of the territory with ground inversions" (SHMI).

ad 4) Data layer of the population density was taken over in digital form from the strategy processor.
Except for the layer "Burden of the territory with ground inversions" which has been processed using a 5-degree scale, the values in the above data layers were divided for multi-criteria analysis into 4 classes, border- limited by quarters. All 4 mentioned data layers were adjusted for the analysis up to the value range from 0 to 1. In the used evaluation, all above factors in the multi-criteria evaluation have the same weight.

In order to consider the significance of the strategy impact on a particular location, subsequently a significance index according to the following formula was calculated for individual pollutants:

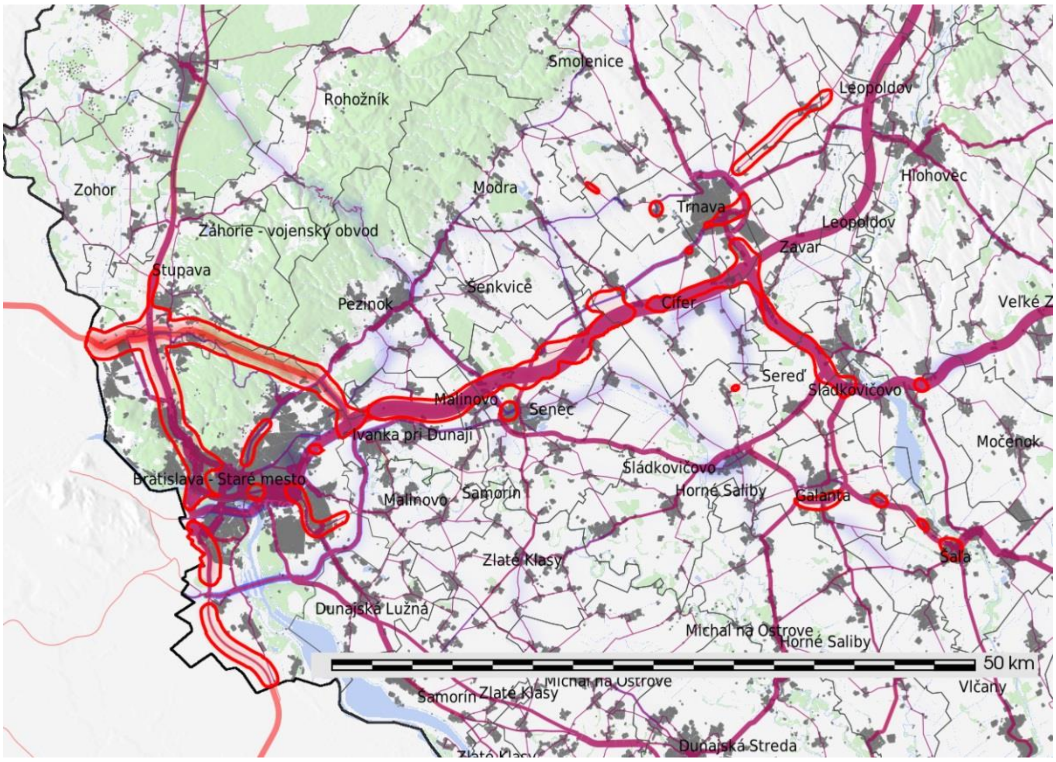
*significance index = (emission density in case of the design scenario – emission density in case of the BAU 2030 scenario) * (tendency to inversions + emission concentrations + population density)*

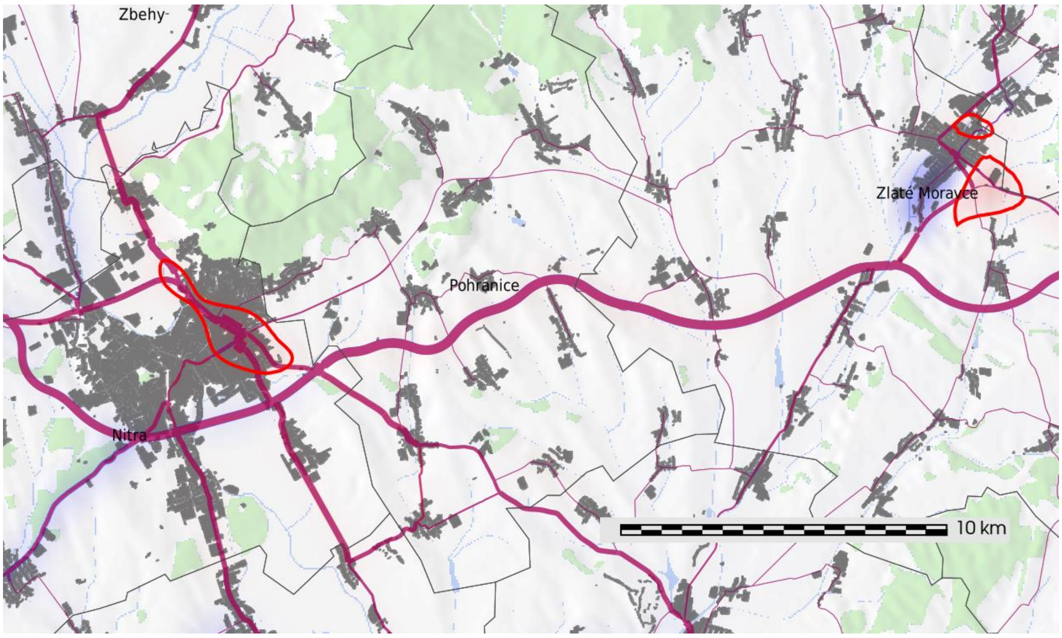
The above methodology was applied to identify the areas within the Slovak Republic in which the strategy brings relatively the best improvement or to the contrary, worsening of the emission situation. The identified areas with the biggest potential negative impact can be considered potentially dangerous locales in terms of the strategy implementation (locations with potential increase of the transport emission burden) which require higher attention to be paid to them accordingly in the future air protection.

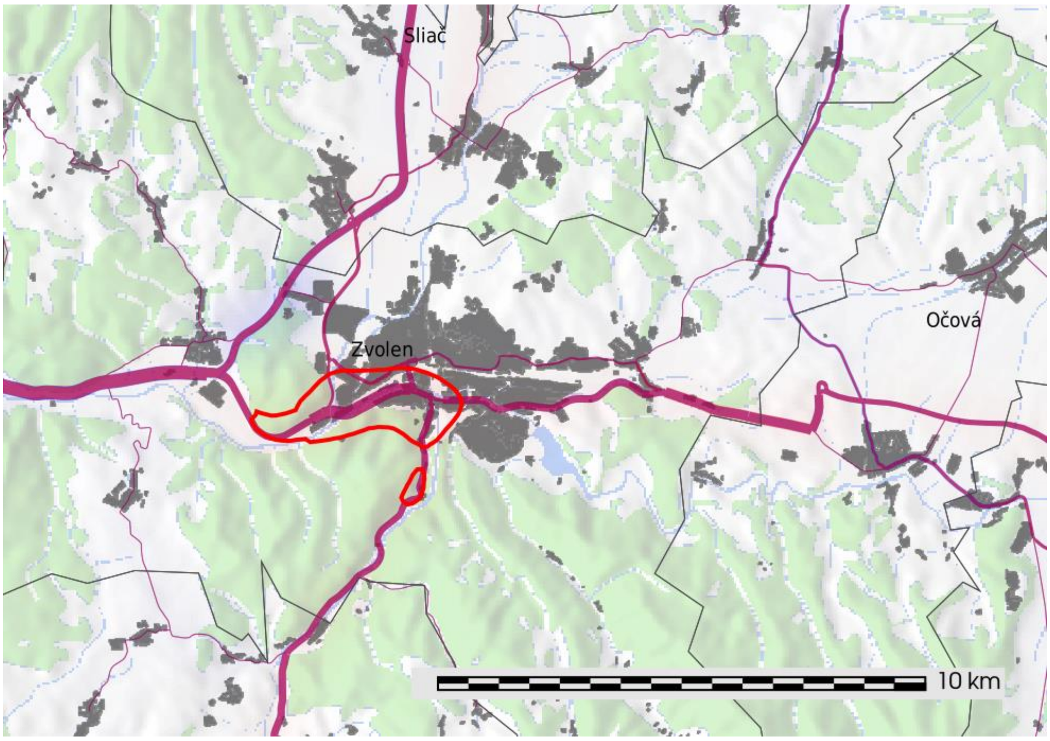
The result of the processed analyses is documented in the following map sections showing identified potential dangerous places. Red bordered locations have the significance index value > x + 3σ, where x is a mean value and σ is a standard deviation. These are locations in which the strategy implementation will lead to relatively the most significant potential worsening of air quality.

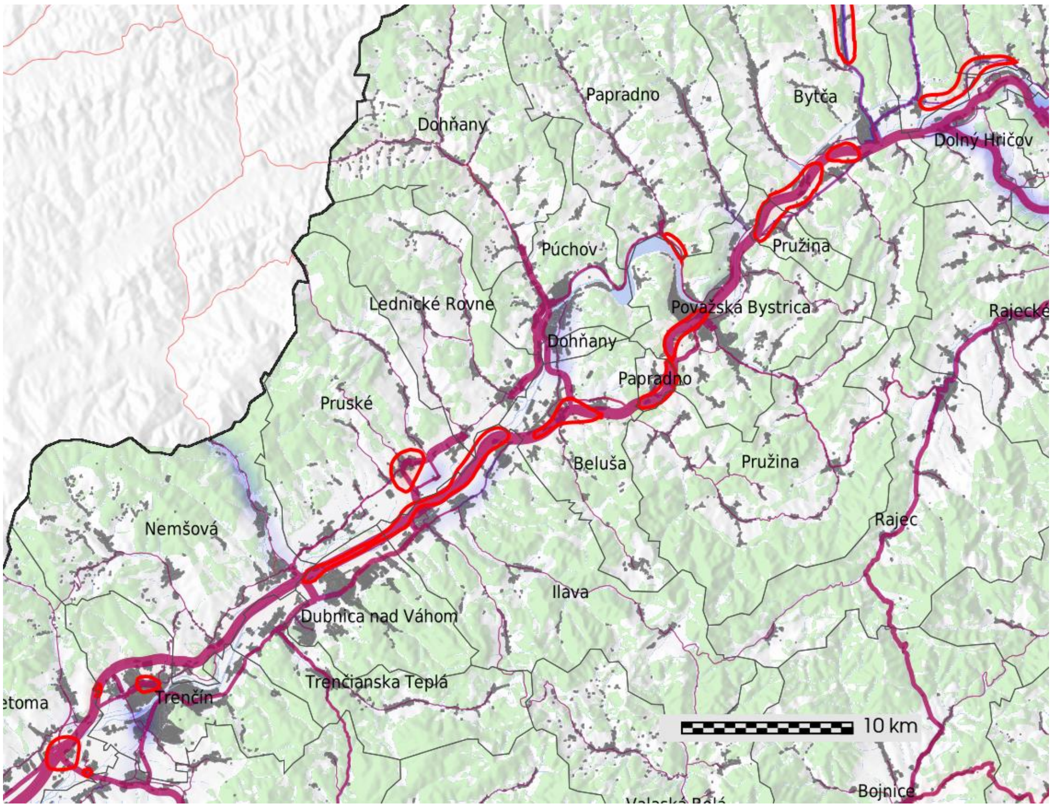
The following set of map sections shows the identified places with potentially the most relative negative impact of the strategy on the emission situation of the evaluated substances with a brief summary.

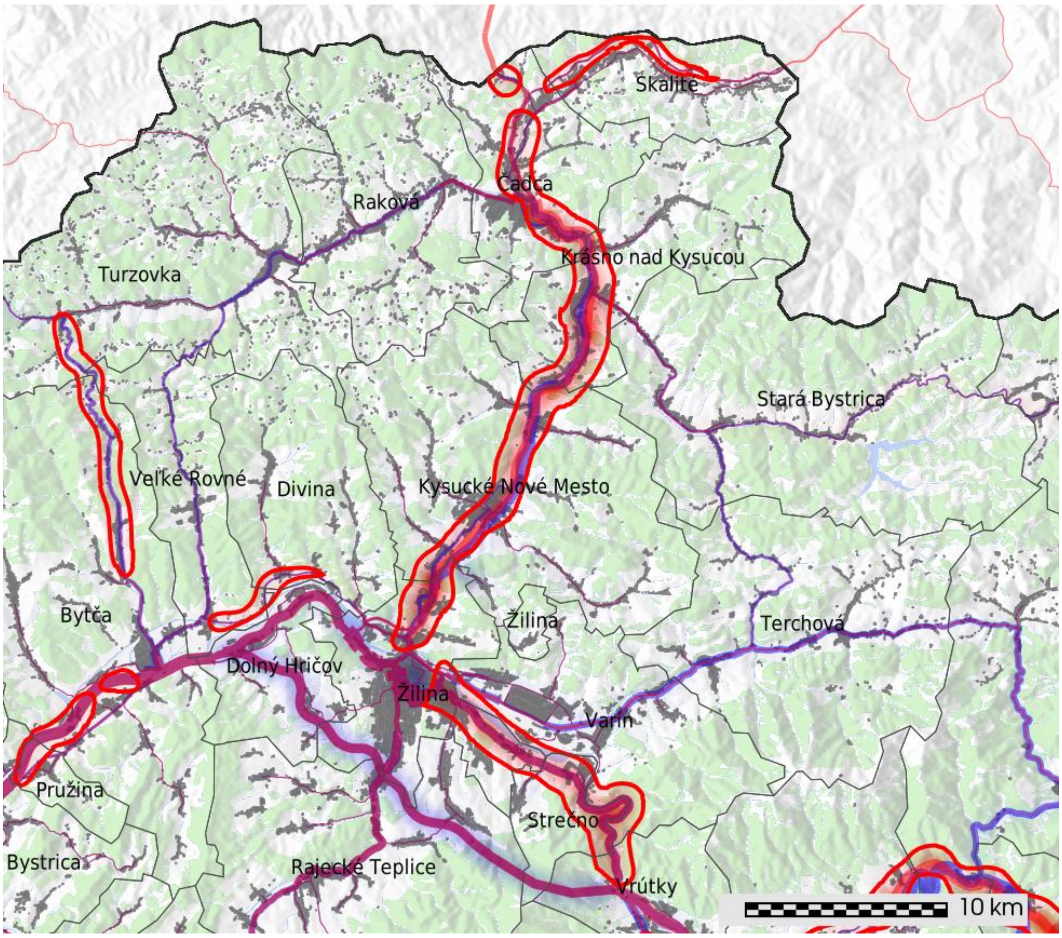
Suspended particles PM_{10}

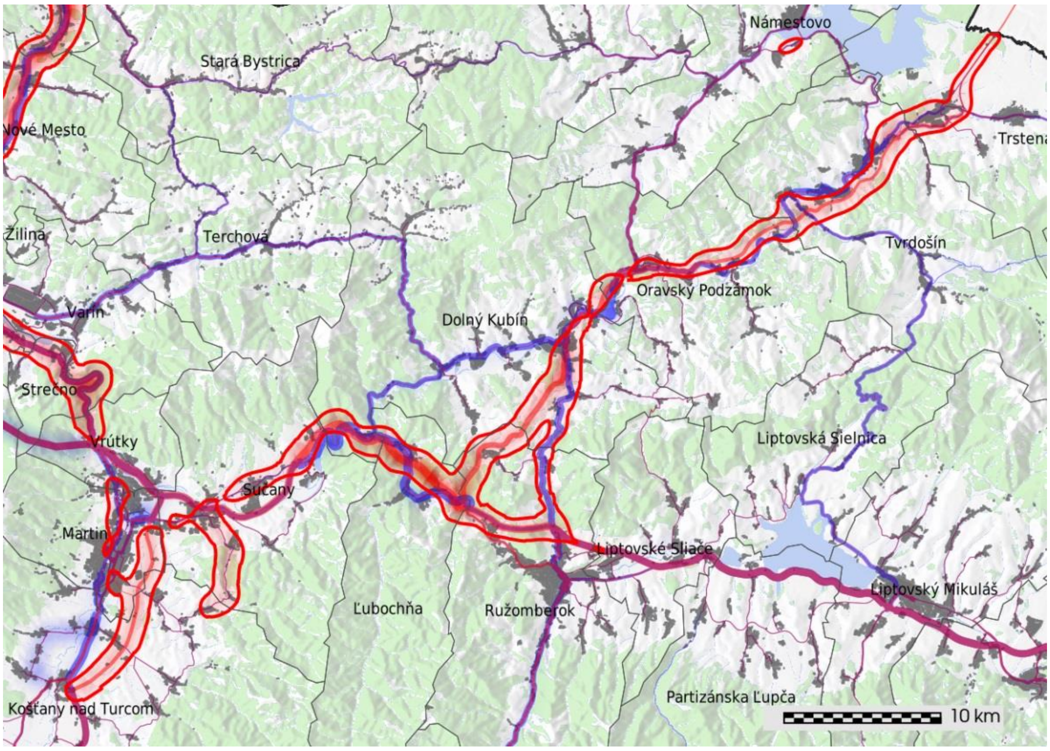


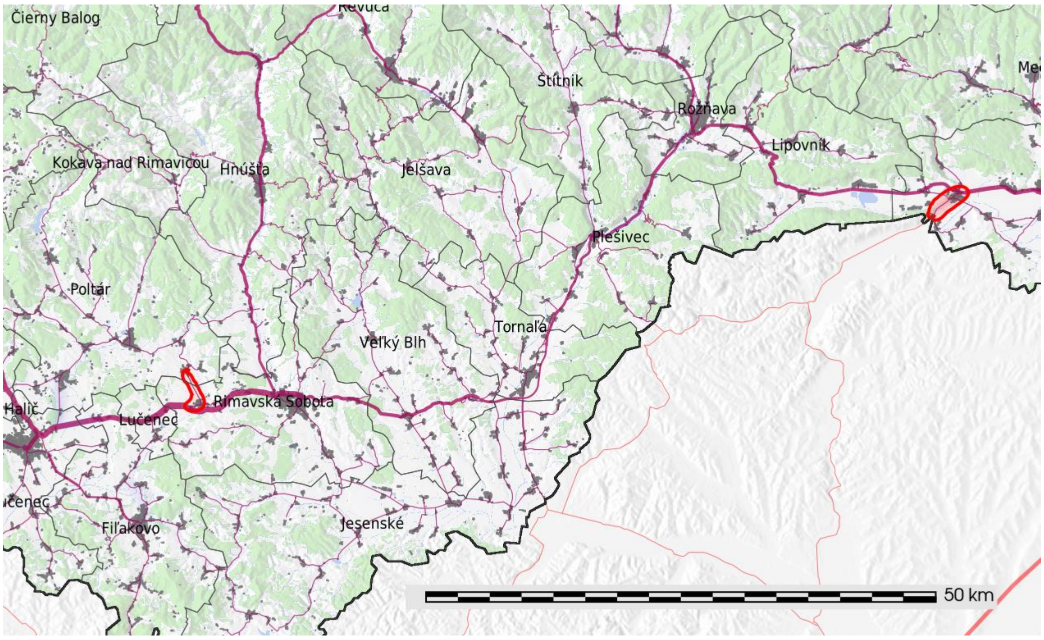



Sliač
Očová
Zvolen
10 km


Papradno
Bytča
Dohňany
Dolný Hričov
Púchov
Pružina
Lednické Rovne
Považská Bystrica
Rajecké
Dohňany
Papradno
Pruské
Beluša
Pružina
Nemšová
Rajec
Ilava
Dubnica nad Váhom
Trenčianska Teplá
Trenčín
10 km
Bojnice


Skalité
Čadca
Raková
Krásno nad Kysucou
Turzovka
Stará Bystrica
Veľké Rovné
Divina
Kysucké Nové Mesto
Bytča
Žilina
Terchová
Dolný Hričov
Žilina
Varín
Pružina
Strečno
Bystrica
Rajecké Teplice
Vrútky
10 km


Námestovo
Stará Bystrica
Nové Mesto
Trstená
Žilina
Terchová
Tvrdošín
Oravský Podzámok
Varín
Dolný Kubín
Strečno
Vrútky
Liptovská Sielnica
Sučany
Martin
Liptovské Sliače
Liptovský Mikuláš
Ľubochňa
Ružomberok
Partizánska Ľupča
Košťany nad Turcom
10 km


Čierny Balog
Štítnik
Rožňava
Lipovník
Kokava nad Rimavicou
Hnúšťa
Jelšava
Plešivec
Poltár
Tornaľa
Veľký Blh
Rimavská Sobota
Lučenec
Fiľakovo
Jesenské
50 km

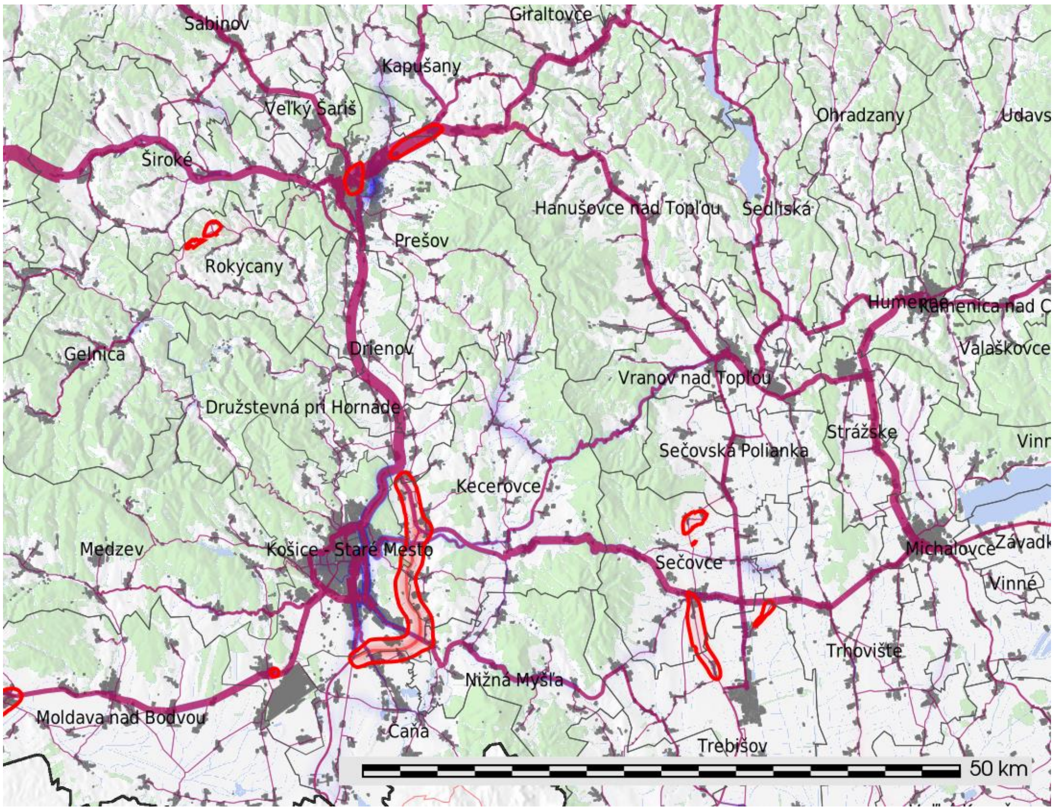


Fig. IV-12 Places with potentially the most relative negative impact of the strategy on the emission situation – of suspended particles PM_{10}

Source: own analysis based on the transport model provided by the strategy processor.

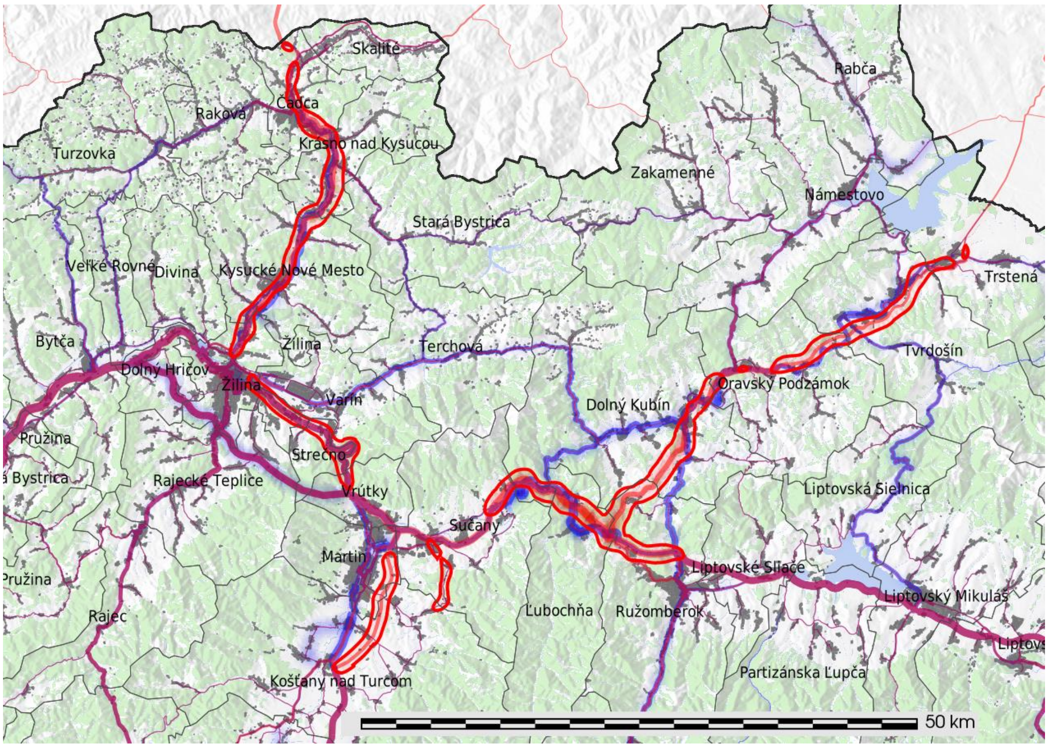
It is a pollutant with the highest number of potential dangerous locations in terms of impact of the strategy on air quality.

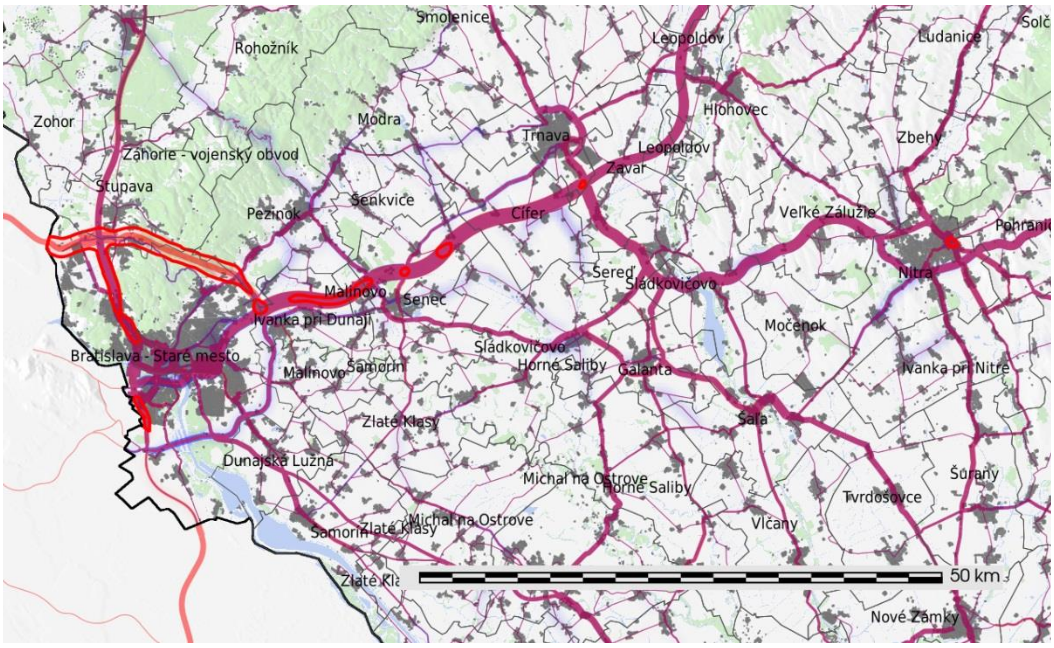
From the strategic point of view, the following conclusion can be made about the most significant problem areas of the suspended particles PM_{10}:

- the surroundings of all motorway constructions in the Bratislava agglomeration but for the south-east bypass where, on the contrary, reduction of the emission burden is expected; it is necessary to expect the persistent and locally even worsening emission situation in those places in relation to strengthening capacities of road connections of Bratislava and the surroundings, which will also be obvious on the motorway section of Bratislava – Trnava
- motorway corridor in the Trenčín – Žilina section,
- Žilina – Čadca – state border with the Czech Republic corridor,
- Žilina – Martin – Ružomberok corridor,
- Dolný Kubín – state border with Poland corridor,
- persisting or mildly worsening emission problems in the cities of Nitra, Zvolen, Prešov (big exposed population),

- eastern Košice motorway bypass which is positively compensated by reduction of transport emissions in the east outskirts of Košice, its emission contribution for Košice is, however, of low importance overall.

Suspended particles $PM_{2,5}$





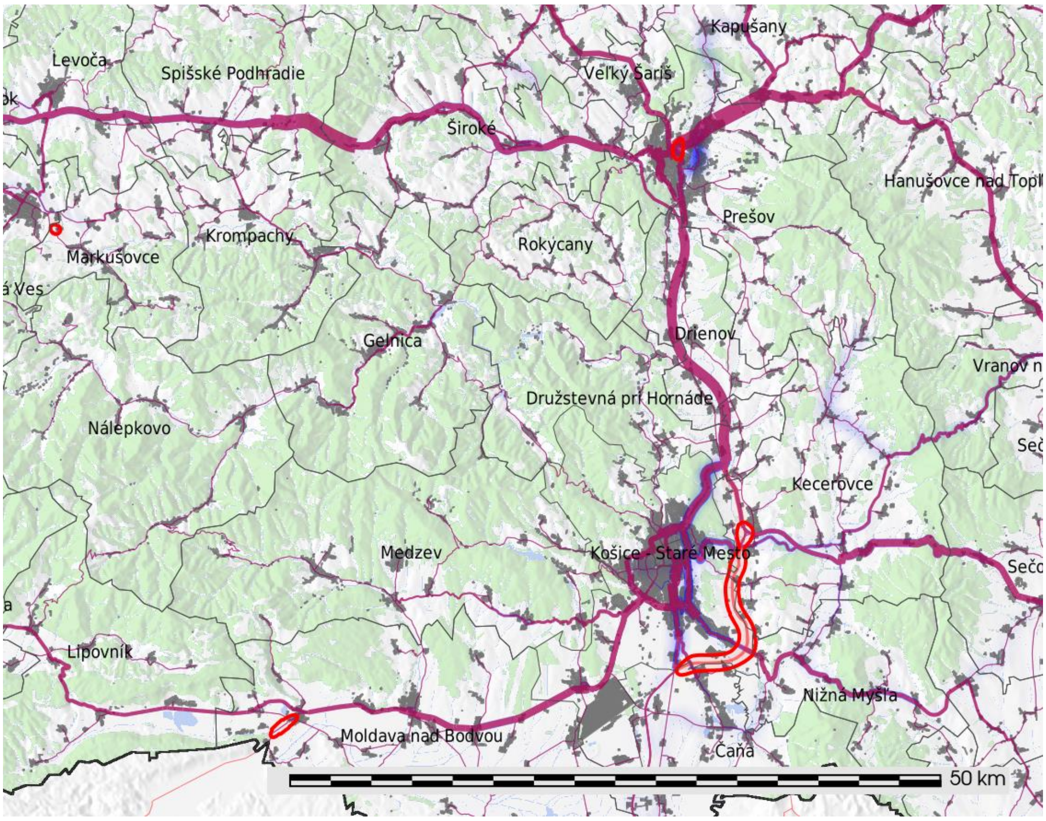


Fig. IV-13 Places with potentially the most relative negative impact of the strategy on the emission situation – of suspended particles $PM_{2,5}$

Source: own analysis based on the transport model provided by the strategy processor.

Potentially problematic areas in terms of possible worsening of emission situation of the suspended particles $PM_{2,5}$ overlap with the most significant problematic areas identified in case of particles PM_{10}:

- motorway connection of Bratislava north to Austria and the Czech Republic and also towards Trnava (Ivanka pri Dunaji to Senec),
- Žilina – Čadca – state border with the Czech Republic corridor,
- Žilina – Martin – Ružomberok corridor,
- Dolný Kubín – state border with Poland corridor,

Further problematic epicentres are less significant or compensated by emission contributions in other currently more burdened areas.

Benzo(a)pyrene

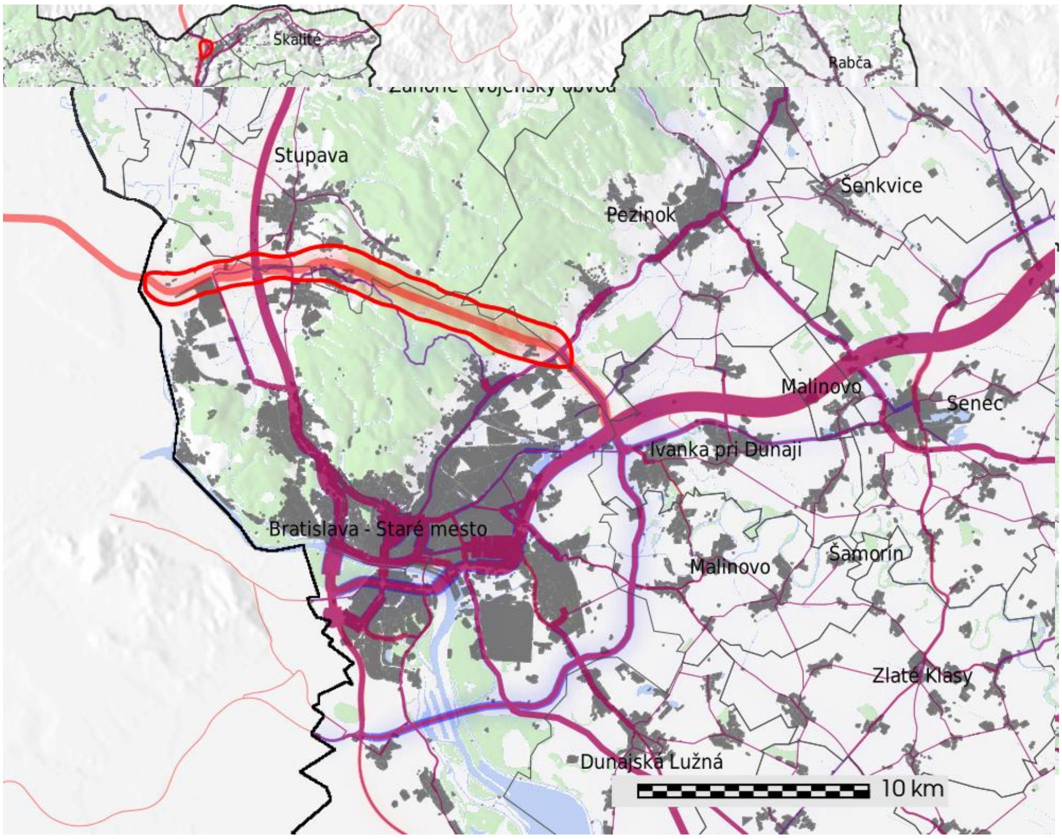


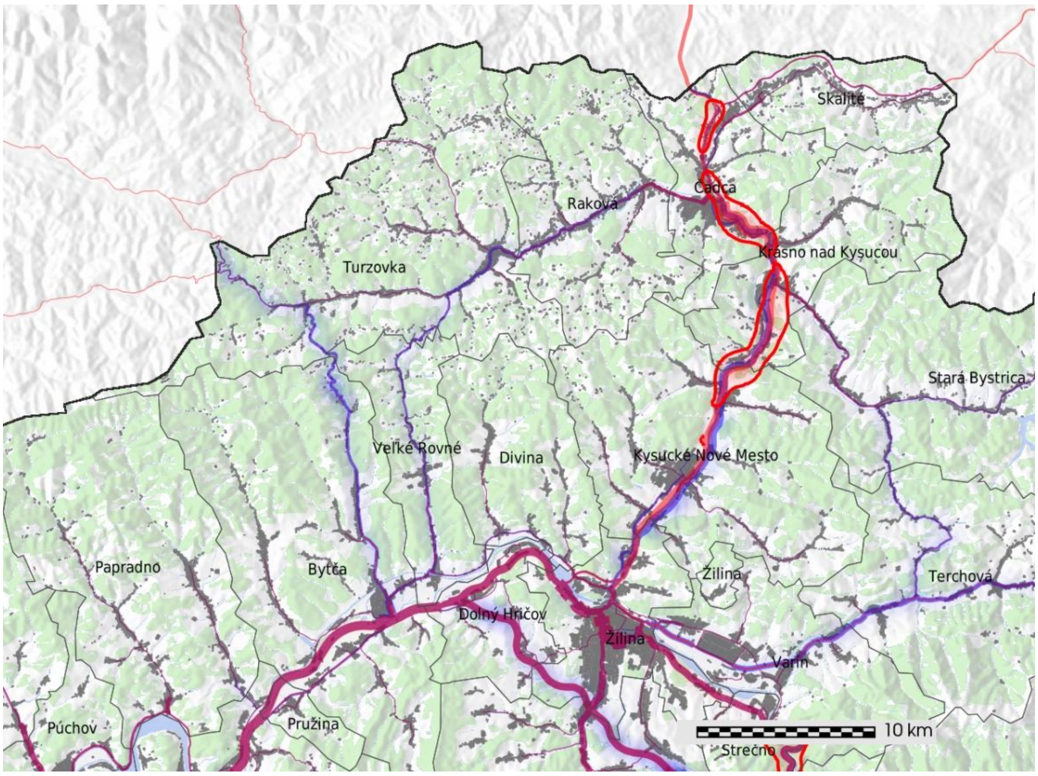
Fig. IV-14 Places with potentially the most relative negative impact of the strategy on the emission situation – of benzo(a)pyrene

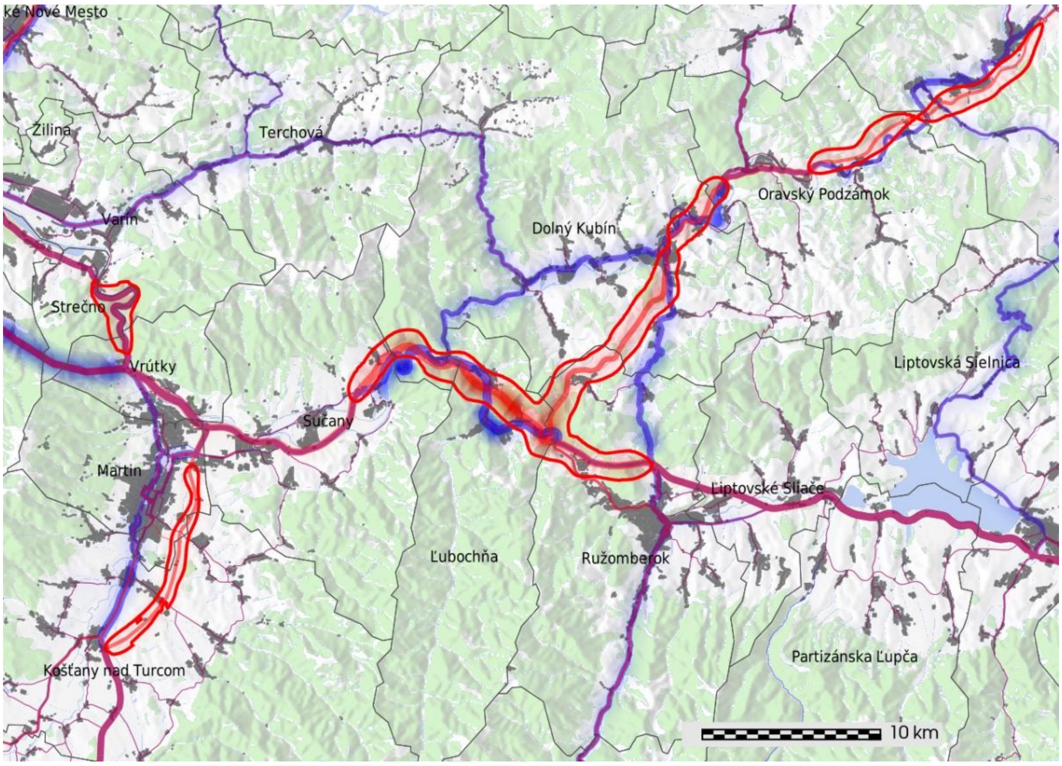
Source: own analysis based on the transport model provided by the strategy processor.

The most significant problematic areas of benzo(a)pyrene related to the strategy implementation can be summarized as follows:

- motorway connection of Bratislava in the north with Austria – section of Ivanka pri Dunaji – Záhorská Bystrica – state border with Austria,
- section of Kysucké Nové Mesto – Čadca – state border with the Czech Republic,
- section of Sučany – Ružomberok,
- Dolný Kubín – state border with Poland corridor,

Nitrogen oxide





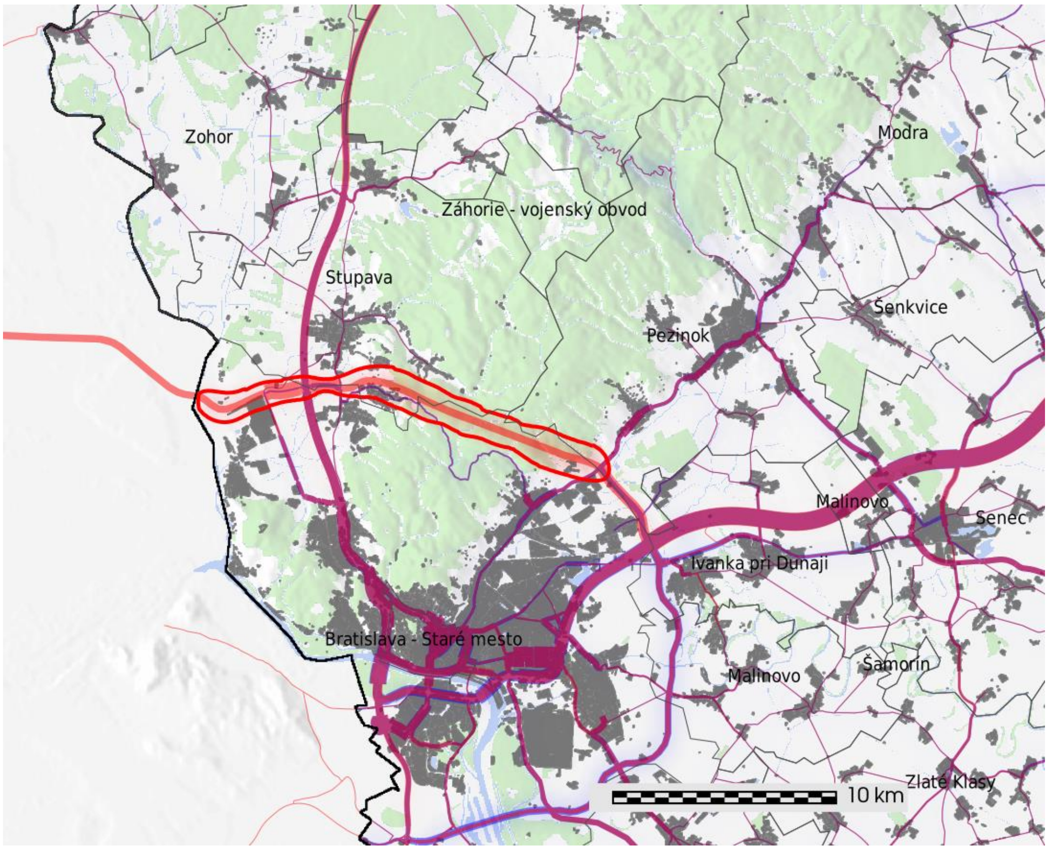


Fig. IV-15 Places with potentially the most relative negative impact of the strategy on the emission situation – of NO_X

Source: own analysis based on the transport model provided by the strategy processor.

Potential negative influence of the strategy on the emission situation of NO_x will be reflected in the similar areas as benzo(a)pyrene:

- motorway connection of Bratislava in the north with Austria – section of Ivanka pri Dunaji – Záhorská Bystrica – state border with Austria,
- Kysucké Nové Mesto – Čadca – state border with the Czech Republic section
- Sučany – Ružomberok section
- Dolný Kubín – state border with Poland corridor

Summary of conclusions concerning air impact assessment

Overall, the proposed strategy will be, in terms of impact on air compared to the zero variant, of low significant negative impact induced especially by a mild increase of freight transport.

This negative impact within the Slovak Republic will be partially compensated by reduction of personal individual car transport.

The strategy impact on air quality will be strongly heterogeneous. Possible worsening of emission conditions due to implementation of the strategy can be expected in the Bratislava and Žilina Region. The following picture demonstrates the transparent summary map which merges dangerous places for all 4 examined pollutants (PM_{10}, $PM_{2,5}$, B(a)P and NO_x).

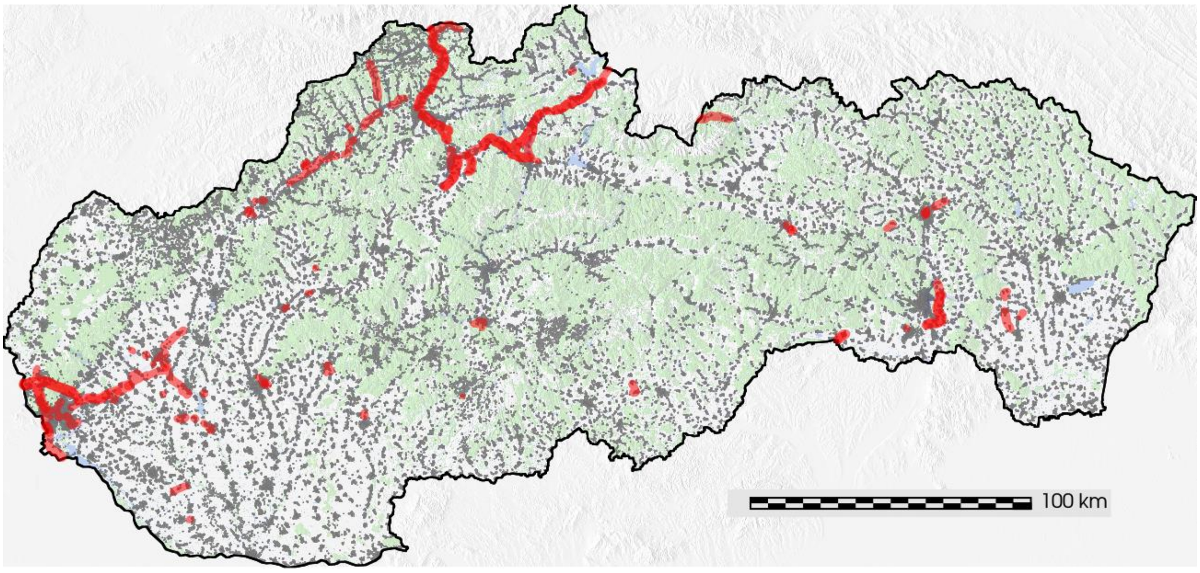


Fig. IV-16 Summary map of potential dangerous places in terms of the strategy implementation
Source: own analysis based on the transport model provided by the strategy processor.

In connection with the prepared infrastructure measures within the strategy, the transport model will bring an increase in car transport intensity and related potential negative impacts in the following transport routes:

- Bratislava – Trnava – Leopoldov or Bratislava – Trnava – Sládkovičovo,
- Žilina – Čadca – state border with the Czech Republic,
- Žilina – Martin – Ružomberok,
- Dolný Kubín – state border with Poland,
- eastern Košice motorway bypass.

Other epicentres of potentially most significant negative impacts of the strategy will be of local character or will be compensated by reduction of the negative emission impact of transport along other roads.

In regard to the provided conclusions, it must be stated that the assessed impact of the strategy did not include external factors, which could significantly influence the development of transport emissions. These include mainly technical progress in development of car engines with lower emissions, development of use of alternative fuels in transport and electromobility. Gradual upgrade of the vehicle fleet will probably result by 2030 in a higher relative reduction of emissions than the mentioned maximum 9% increase of the national emissions based on the strategy. Thus in absolute value, transport emissions within the design horizon of the strategy are expected to decrease or stay at the same level in the worst-case scenario. Therefore in reality there will probably be no evaluated potential negative impacts. Potential negative impacts evaluated in the submitted documentation can be concluded only when compared to the strategy zero variant (BAU 2030 scenario).

IV.3.2 IMPACTS ON GREENHOUSE GAS EMISSION

Based on the transport model for the design part of SPTD SR 2030, the emission analysis of greenhouse gases (GHG) on the transport network of the Slovak Republic was elaborated. Emissions were calculated for model scenarios of BASE 2014, BAU 2030, and 2030 with the measures (see the table below).

Table IV-5 Expected development of greenhouse gas emissions from transportation in Slovakia by 2030 with and without implementation of the proposed measures

Emissions			State in 2014	Outlook for "business-as-usual" scenario in 2030 (BAU 2030)	Outlook for the design scenario with measures in 2030
Total road transport	CO_2	kt	6,186.95	9,644.64	9,418.86
	CH_4	kt	0.63	0.98	0.96
	N_2O	kt	0.18	0.27	0.27
Total railway transport	CO_2	kt	134.62	201.88	203.76
	CH_4	kt	0.00	0.01	0.01
	N_2O	kt	0.04	0.04	0.06
Total road transport	**CO_2e**	**Gg**	**6,255.13**	**9,750.91**	**9,522.64**
Total railway transport	**CO_2e**	**Gg**	**145.49**	**213.09**	**221.23**[63]
Total road and railway transport	**CO_2e**	**Gg**	**6,400.61**	**9,964.00**	**9,743.87**

Source: CDV, v.v.i, processed based on the source data from SHMI and NDCon s.r.o.

As the above table shows, the transport measures stated in the draft SPTD SR 2030 in road and rail network will bring a saving of 220.13 Gg CO_2 by 2030 when compared to the scenario without implementation of measures. This forms a relatively significant 2.2% reduction of total emissions of greenhouse gases from the road and railway transport in Slovakia.

When emission production in the design scenario is compared with the emission values in the individual reference years, used in the relevant EU objectives for decrease of emissions of greenhouse gases from transport, we can see a significant increase in greenhouse gas production (see the table below).

63 Emissions were calculated based on outputs from the transport model according to which the increase of transport performance in the electric variation but diesel usage will not decrease and the values remain the same. Thus finally an emission increase will occur.

Table IV-6 CO_2 emissions in the reference years and modelled scenarios

	Emissions	Emissions (Gg)					
		1990*	2005*	2008*	2014**	BAU 2030**	2030** Measures
Road and railway transport	CO_2e	4,882.50	6,154.23	6,537.11	6,400.61	9,964.00	9,743.87
Change	CO_2e	4,861.37	3,589.64	3,206.76	3,343.26	–220.13	0
	%	**99.57%**	**58.33%**	**49.05%**	**52.23%**	**–2.21%**	0
* Source NIR 2016							
** Source Ndcon s.r.o.							

Based on this emission analysis in individual years it is possible to state that the infrastructure measures implemented on the transport network by 2030 shall contribute to fulfilling the objective of the draft SPTD SR 2030 “*Systemically reduce socio-economic and environmental impacts of transport not only on the exposed territories*”. The positive phenomenon is the transport performance on railways and in the electric variation in the model year 2030 with those measures compared against BAU 2030. With regard to a decrease of intensities in road transport, it is possible to assume, as above, the use of these more environmentally favourable transportation modes against IAD.

Moreover, the draft SPTD SR 2030 is a positive contribution to reach the objective of “*Decrease of total GHG emissions until 2020 by 13%*” vs. 2005 as defined by the EU in the 2020 Climate-Energy Package, and the objective of “*Decrease of total GHG emissions by 2050 by 80-95%*” as determined in Plan of Transition to Competitive Low-Carbon Economy by 2050. These objective refer to the total reduction of production of greenhouse gas emissions from all sectors of the national economy. Implementation of the measures proposed in SPTD SR 2030 will slightly decrease the expected increase in greenhouse gas emissions from the transport sector, which has negative impact on the total effort to decrease greenhouse gas production in Slovakia.

Table IV-7 Comparison of the model scenario 2030 with measures with reference years

Scenario comparison	Emissions	Change	
		(Gg)	(%)
Status after implementation of the proposed measures in 2030 against BAU 2030	CO_2e	–220.13	**–2.2**
State after implementation of the proposed measures in 2030 against 1990	CO_2e	4,861.37	**+99.6**
Status after implementation of the proposed measures in 2030 against 2005	CO_2e	3,589.64	**+58.3**
Status after implementation of the proposed measures in 2030 against 2008	CO_2e	3,206.76	**+49.1**

The detail comparison of the reduced emissions of greenhouse gases from transport due to SPTD SR 2030 with the required changes of the greenhouse gas emissions in individual reference years, however, point out the fact that the draft SPTD SR 2030 is a good but insufficient step for meeting the specific EU climate objectives for development of transport systems. In particular, there are the following objectives:

- The objective "*Reduce GHG emissions from transport by 20% below the level of 2008 (White Book) by 2030"* will not be reached because GHG emissions will be higher by 49.1% compared to the reference year.
- The objective "*Reduce GHG emissions from transport by 60% below the level of 1990 (White Book) by 2050"* will not probably be reached because GHG emissions will be higher by 99.6% in 2030 compared to the reference year.
- The objective "*Increase of GHG emissions may not by 2020 reach the values exceeding 13% against year 2005 in sectors outside the system of emission trading"* (Effort Sharing Decision) will not be reached because in 2030 the GHG emissions will be higher by 58.3% than in 2005.
- The objective to *"Reduce, by 2030, GHG emissions from transport by +20 to -9% and by -54 to -67% against 1990 levels by 2050"* (The plan of transition to competitive low-carbon economy by 2050) will not be reached in terms of objectives for 2030 – the GHG emissions will be 99.6% higher compared to the reference year. Based on the above, it can be judged that none of the target values for 2050 are likely to be achieved.

The question is how the assumed change of fuels and technological innovations in the transport system is reflected in the future development of greenhouse gas emissions.

In general, the biggest impact on decrease of production will be made by increased proportion of electric and hybrid vehicles. The size of the proportional increase of these vehicles, however, depends on the intensity of support for their use. The impact of alteration of the vehicle fleet is very difficult to determine since the expected alteration would have to be defined accurately in the outlook scenarios, which is currently not available. If we consider that the average life of a car is 15 years, it can be assumed that in 2016 the vehicle fleet will consist of the vehicles Euro 6 and higher. For the framework comparison – based on the document "Vision of road transport in 2030" issued for the Czech Republic, the decrease of CO_2 from transport by 2030 by 15.5% compared to 2010 can be assumed, meaning that CO_2 emissions from transport in the Czech Republic in 2030 will have dropped by more than 10% against year 2014. When applying the similar outlook for the draft SPTD SR 2030, it can be assumed in the rough and framework manner that greenhouse gas emissions may decrease in 2030 by up to 5% according to the design scenario versus the scenario without implementation of the draft SPTD SR 2030. Due to insufficient documentation these figures are provided just for informative purposes and cannot be relied on.

A further decrease in GHG production could be brought by an increased share of vehicles using CNG (compressed natural gas). CO_2 production from CNG is approximately 20% lower than from petrol and 25% lower than from diesel. For the Czech Republic, e.g. a study was processed based on which the tenfold increase of CNG consumption in transport between years 2010 and 2030 and a fourfold increase of electricity consumption in transport (mostly after 2020) would occur. Development of electromobility and use of CNG in Slovakia is, however, very hard to predict from the draft SPTD SR 2030.

To conclude, the overall positive impact of the implemented and proposed projects and measures for greenhouse gas emissions will be emphasized, which according to the model scenarios will not result in reaching a majority of the objectives but they will definitely contribute to coming closer to the target values.

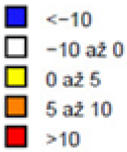
IV.3.3 NOISE AND VIBRATIONS

The noise situation is influenced by the means of transport used on the assessed roads. The use of car and track-based transport is assumed to be the dominant impact. Water transport, alternative forms of car transport, cycling and so forth will have minor influence on the noise situation. The considered impact is evaluated in the submitted assessment using noise emissions around transport routes or by evaluation of changes that will occur in such emissions due to implementation of the proposed measures (comparison with the BAU 2030 scenario), i.e. measures that will cause changes in transport intensity in the transport network. In the Slovak Republic, the assessed changes can be described as significantly heterogeneous, i.e. it is possible to delineate the areas where an increase in the noise load can be expected, and vice versa, where a decrease in the load is expected in the road surroundings.

In order to evaluate the impact of the strategy on the noise situation in the surroundings of the respective transport routes, the methodology of semi-quantification multi-criteria evaluation will be applied considering the following factors:

- frequency of transits by means of transport (OA, NA, trains) – values provided by the sponsor
- assumed noise emissions from the activity of the means of transport in relation to the transit frequency expressed by the calculated value of equivalent level of acoustic pressure (according to the Decree of the Ministry of Health of the Slovak Republic No. 549/2007 Coll.) at the edge of the road – it is impossible to work with the morphology of the terrain of the entire respective territory or with technical solution of constructions on the strategic level
- population density (the bigger population affected by noise, the more significant impact)

The following picture shows additions or reductions of the calculated value LAeq at the edge of the road of the proposed variant against the BAU 2030 situation.



Increments, i.e. decrements of the calculated Laeq value at the edge of the road of the designed option compared to the BAU 2030 situation

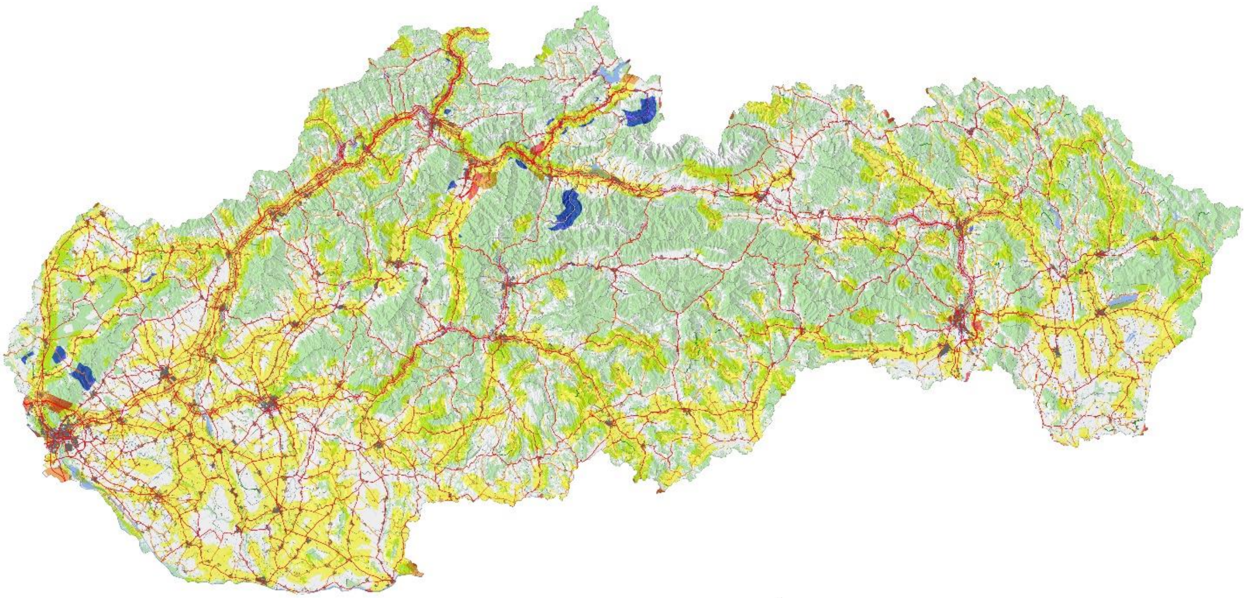


Fig. IV-17 Additions or reductions of the calculated value LAeq at the edge of the road of the proposed variant against the BAU 2030 situation

Source: The analysis by regional centre EIA s.r.o. and Integra Consulting s.r.o. based on the transport model provided by the strategy processor.

The additional picture shows the current transport network and the routes of road measures of the design variant; the critical points where LAeq > 85dB were calculated at the edge of the road are designated in the map and at the same time in the surroundings (up to 100m from the road) where there is a built-up area with higher population density. More detail maps of the critical places are included in the following pictures (IV-19 etc.).

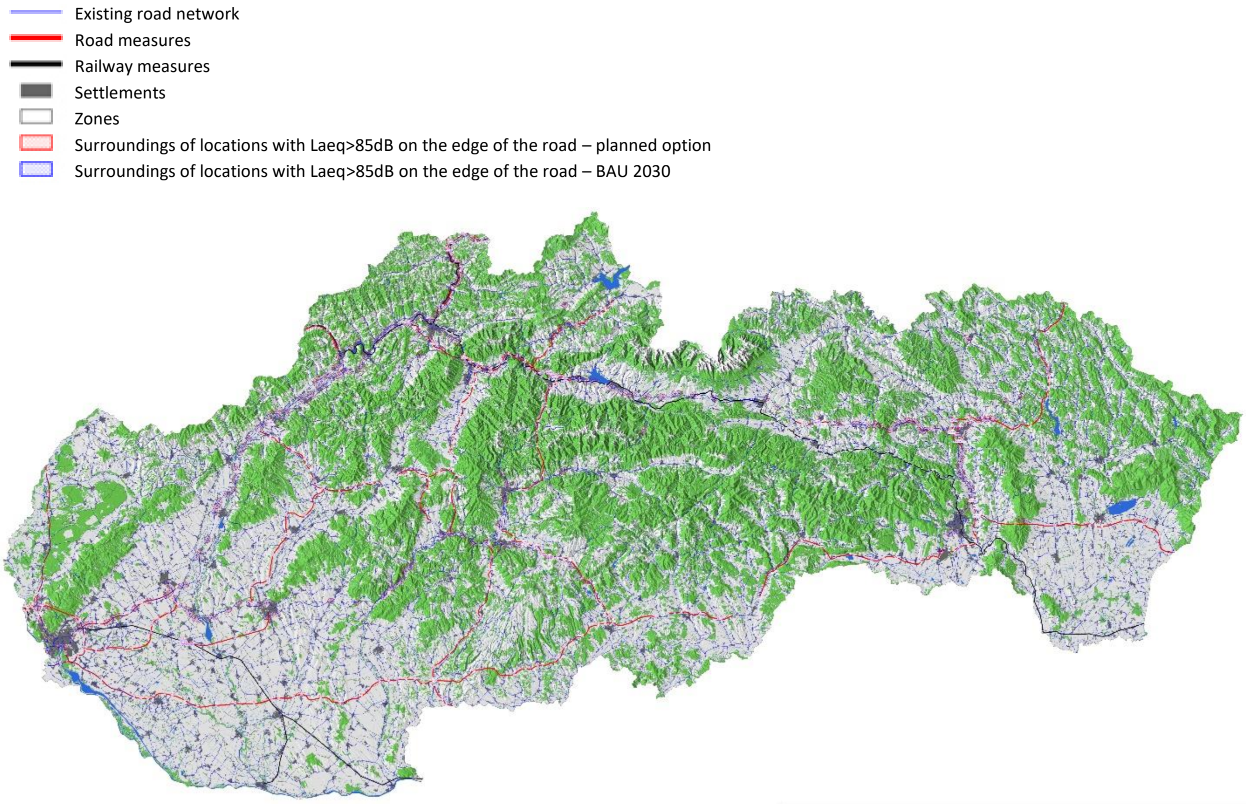


Fig. IV-18 Current transport network and the routes of road measures of the design variant, the critical points where LAeq > 85dB were calculated at the edge of the road are designated in the map and at the same time in the surroundings (up to 100m from the road) where there is a built-up area with higher population density

Source: The analysis by regional centre EIA s.r.o. and Integra Consulting s.r.o. based on the transport model provided by the strategy processor.

The proposed SPTD SR 2030 variant contains the following measures with potentially significant risks identified concerning the noise situation (places of noise load increase at the edge of the road exceeding 10db).

- OPC5 – Completion of the west-east priority axis (Rhine–Danube corridor, Czecho-Slovak branch)
- OPC6 – Completion of the north-south connection to Poland and the Czech Republic
- OPC9 – Completion of the north-south road axis in Central Slovakia
- OPC10 – Development of road network in the Bratislava agglomeration
- OPC12 – Modernization and development of other motorway and expressway network, if reasonable

It is, however, necessary to state that the calculation failed to assess noise spreading further from roads since the layout of the landscape morphology was not available and, moreover, or the effect of anti-noise measures that will certainly be implemented or strengthened in many sections in a way so as not to threaten the external protected area of those constructions near the built-up area. Proposal of anti-noise measures will, however, be related to the more detailed level of project preparation rather than to the national strategy and therefore it should be compared to the current solutions in action plans of individual locations.

Selected low-risk sites (i.e. sites with deterioration when compared with the BAU 2030 scenario) are provided in the following pictures. Blue section lining shows the surroundings of the roads with LAeq > 85dB at the edge of the road where, concurrently, a built-up area with higher population density in the BAU 2030 scenario (without the strategy implementation), red section lining in the proposed SPTD SR 2030 scenario. (Source: own analysis based on the transport model provided by the strategy processor).

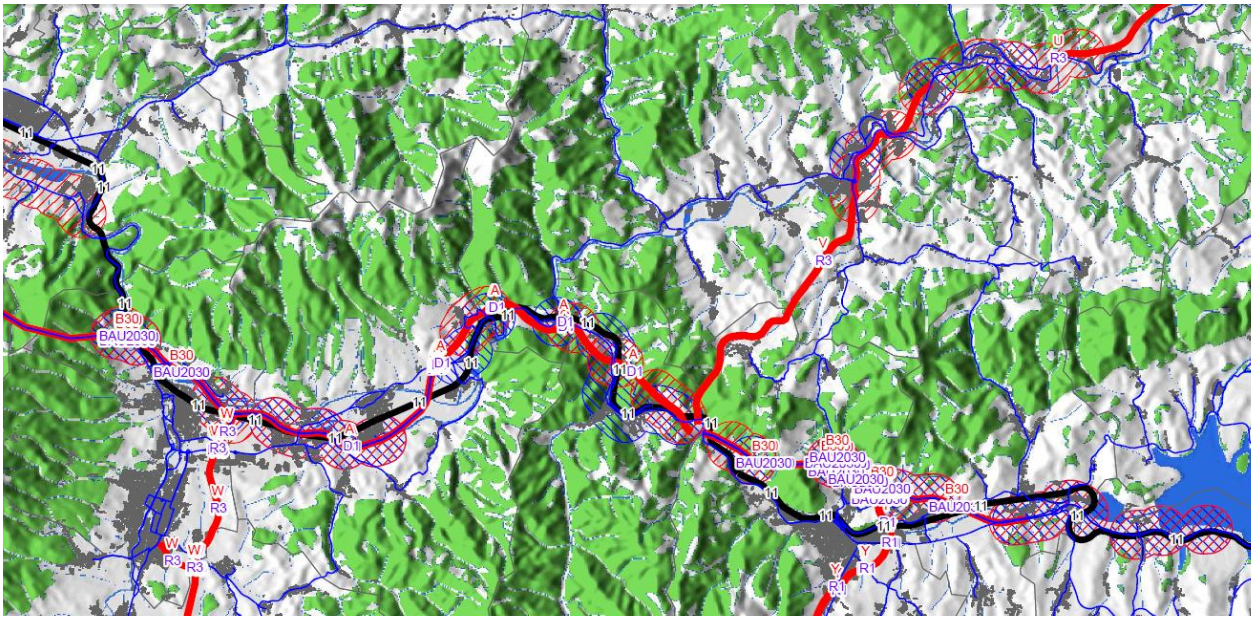


Fig. IV-19 Potential problematic places in terms of noise load: D1 Turany – Hubová corridor (in the surrounding of Šútova, Hubová – Švošov)

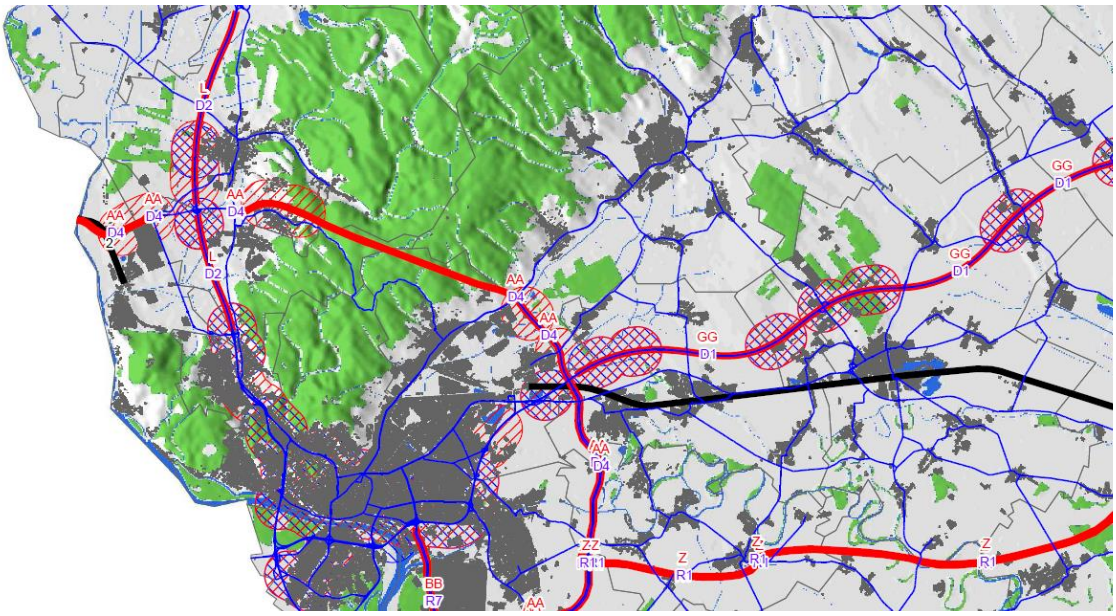


Fig. IV-20 Potential problematic places in terms of noise load: D4 corridor (in the surroundings of Devínska Nová Ves, Záhorská Bystrica, Marianka, Rača, Vajnory)

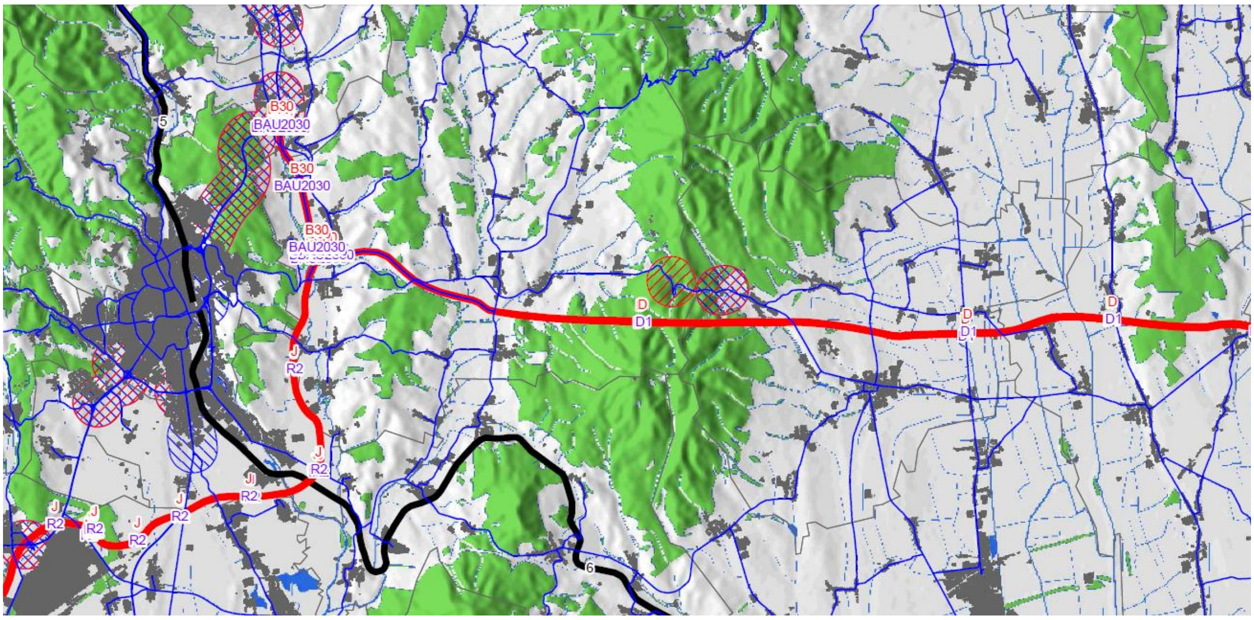


Fig. IV-21 Potential problematic places in terms of noise load: D1 Bidovce – state border SR/UR corridor (in the surroundings of Košický Klečenov)

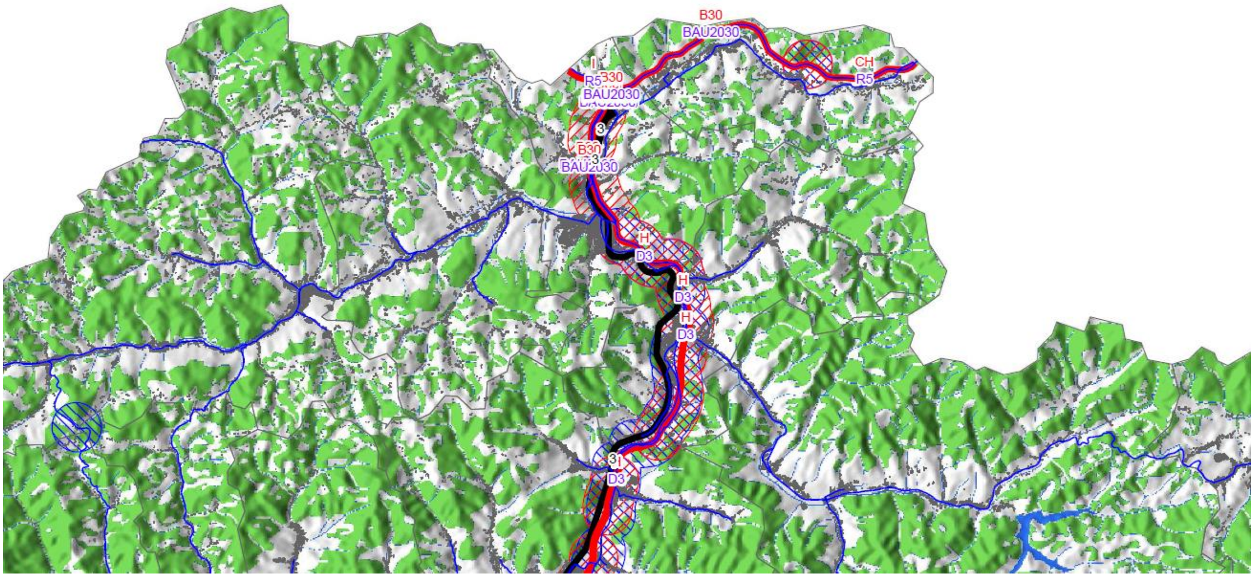


Fig. IV-22 Potential problematic places in terms of noise load: D3 Žilina – Čadca – Skalité – state border, R5 Svrčinovec – state border corridor (in the surroundings of Čadca – Podzávozy and Svrčinovec)

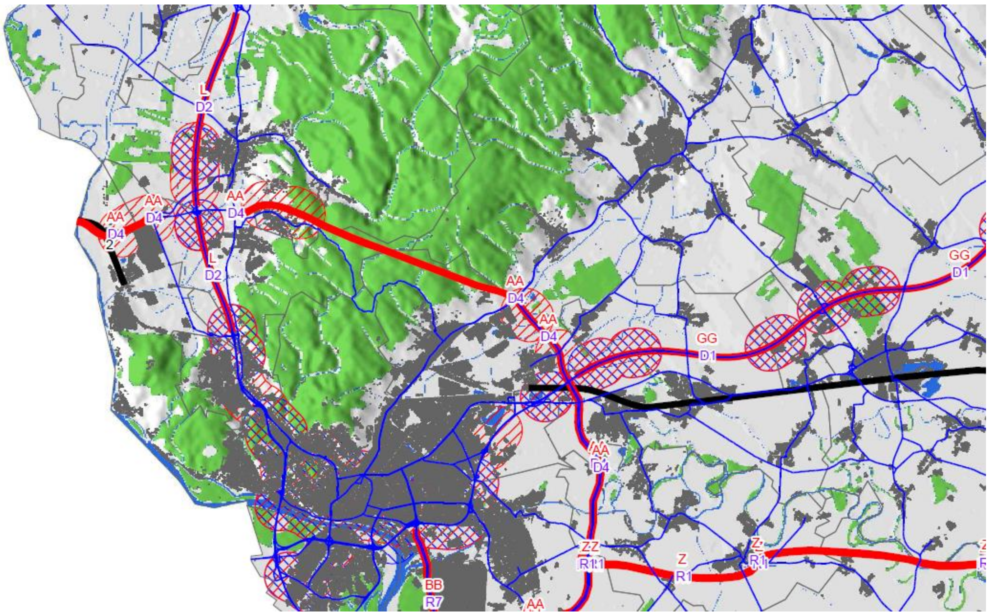


Fig. IV-23 : D2 corridor (in the surroundings of Dúbravka)

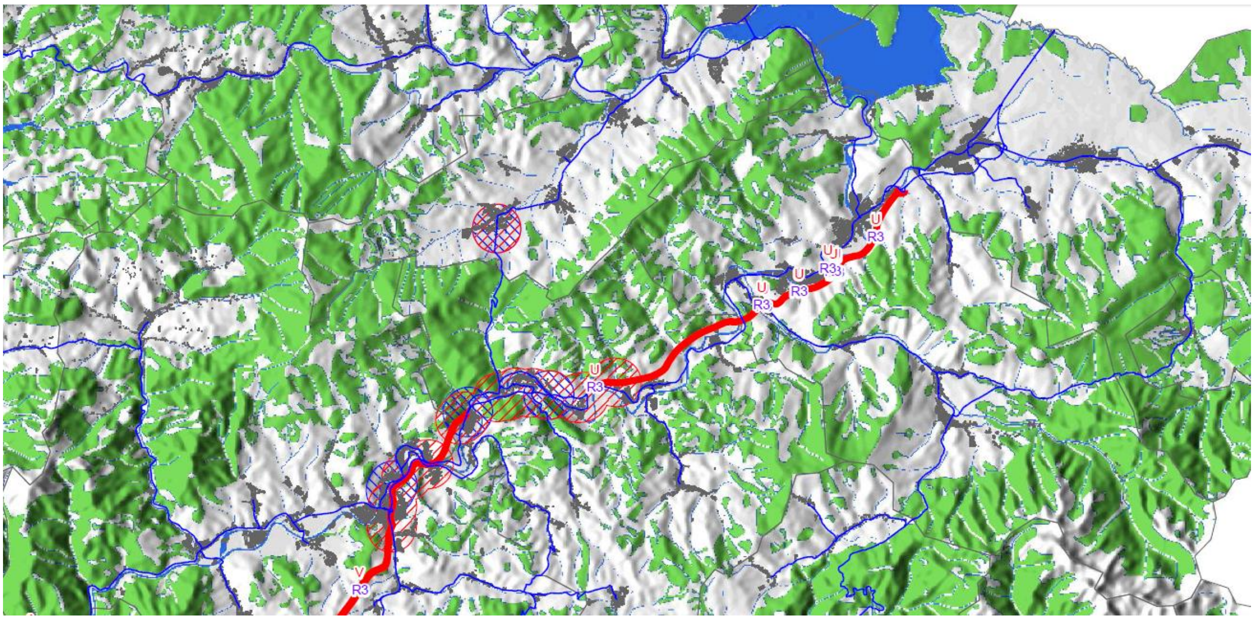


Fig. IV-24 Potential problematic places in terms of noise load: R3 Tvrdošín – Sedliacka Dubová corridor (in the surroundings of Dlhá nad Oravou, Krivá, Podbiel)

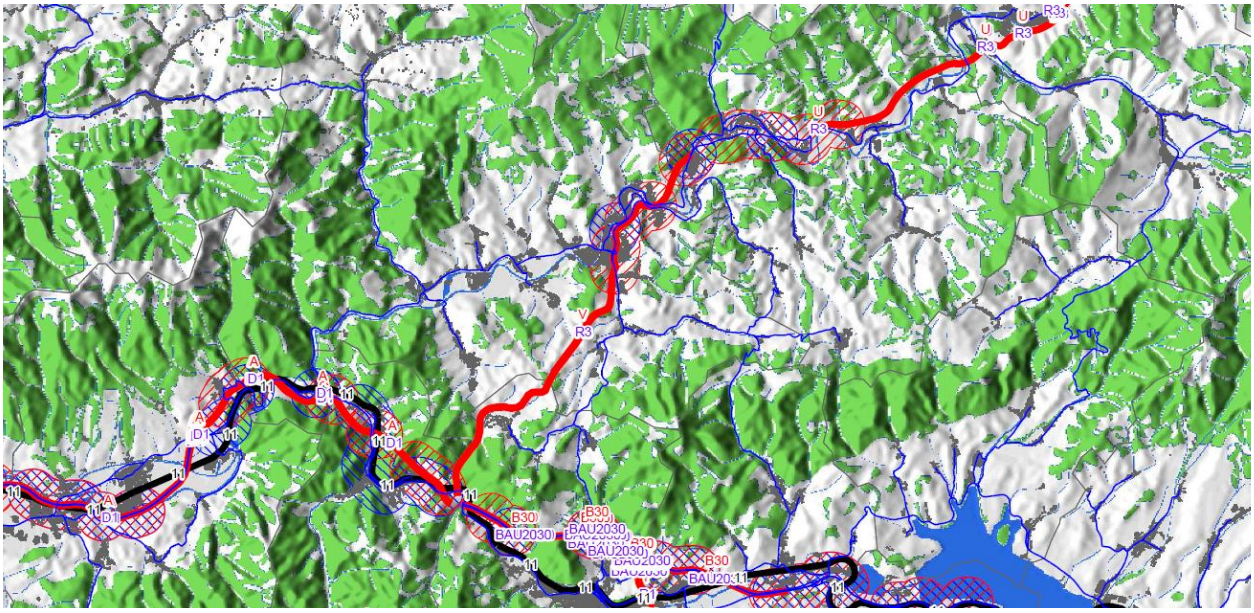


Fig. IV-25 Potential problematic places in terms of noise load: R3 Oravský Podzámok – D1 intersection corridor (in the surroundings of Dolný Kubín)

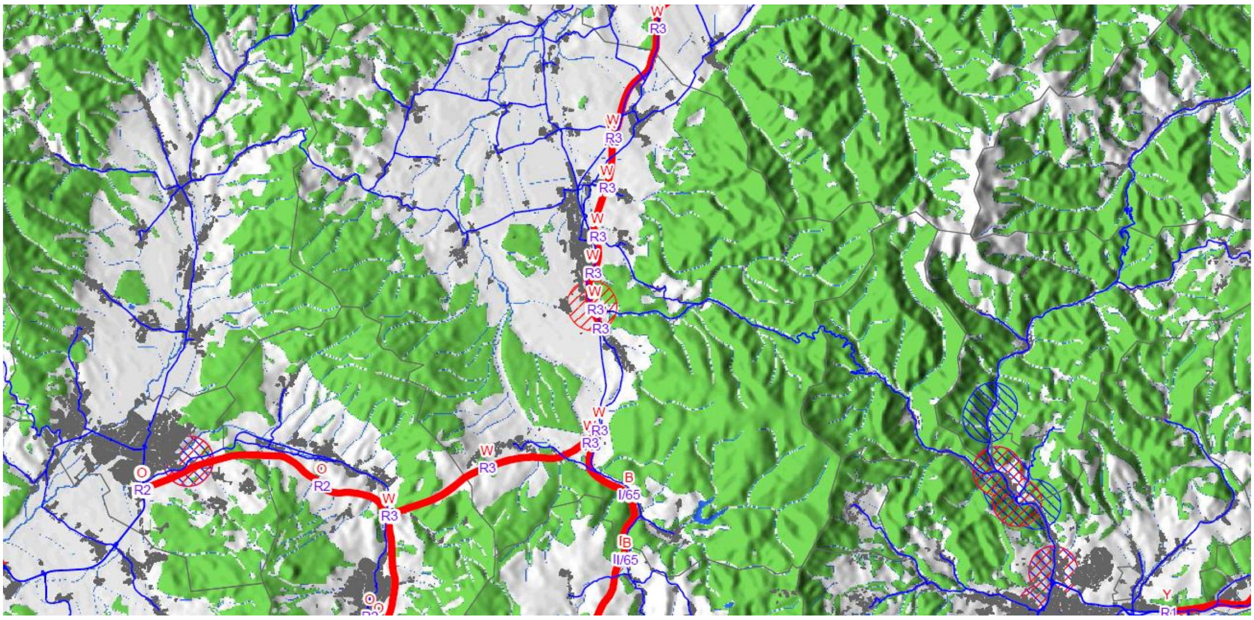


Fig. IV-26 Potential problematic places in terms of noise load: R3 Martin – Šahy corridor (in the surroundings of Turčianske Teplice)

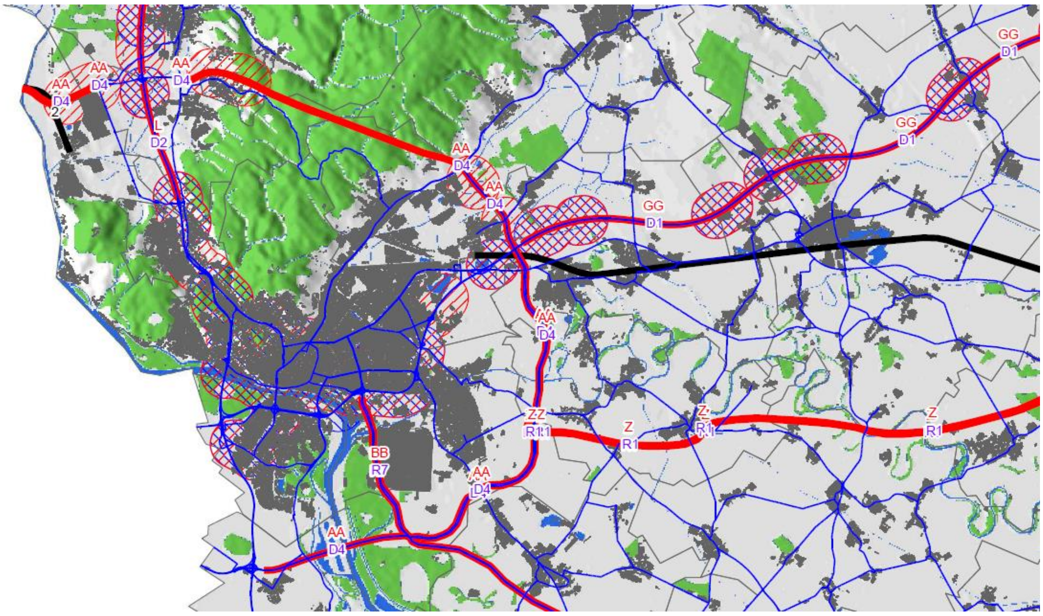


Fig. IV-27 Potential problematic places in terms of noise load: current D1 in the surroundings of Trnávka

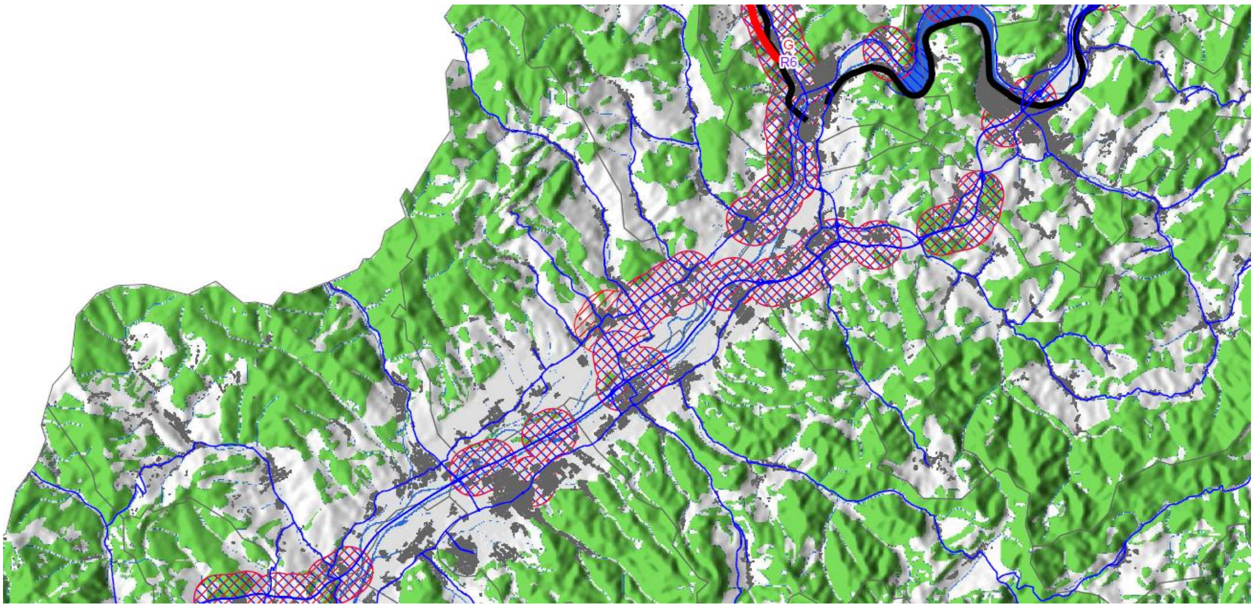


Fig. IV-28 Potential problematic places in terms of noise load: II/507 in the surroundings of Pruská (near Ilava)

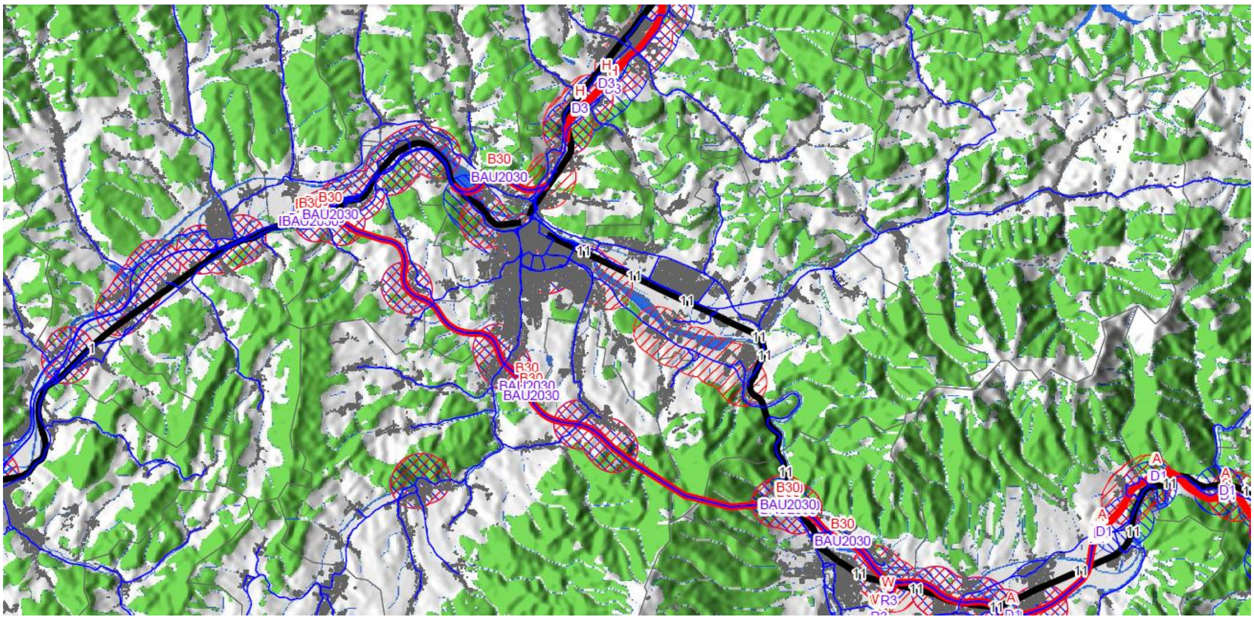


Fig. IV-29 Potential problematic places in terms of noise load: I/18 in the surroundings of Žilina – Mojšova Lúčka, Strečno

Map with impacts on noise in the entire Slovak Republic is in Annex 5.

The parts of the corridors in the above pictures can see impacts of implementation of the proposed measures (provided in the below table) in the form of the most significant increase in noise emissions. For assessment of the detailed extent of threats one needs to assess a particular technical proposal of solutions for the given road section (i.e. not at the strategic level) and also to propose specific and effective noise protection methods. In case of below design measures, the strategy modeling detected possible significant increase of noise; however, the situation mostly stems from the assumption that an increase of the territory passability (corridor completion), road capacity, flow increase, transport speed, etc. that many sections will become more attractive and it will lead to greater use by motorists – i.e. increase of transit frequency. At the same time it is expected that traffic on roads of lower classes will decline – i.e. decrease of noisiness from traffic on local roads.

Table IV-8 Measures with potentially significant risks for or impacts on noise situation

Number and name of measure	Considered transport corridors	Potentially significant risks for or impacts on noise situation
OPS7 – Regular monitoring of noise and air quality and implementation of measures reducing negative impacts of transport on environment		Monitoring itself does not mean a threat due to noise. It is, however, an important part of the noise issue that if underestimated could represent a significant risk. Regular monitoring of the transport network can be understood as a significant preventive tool. Depending on the particular territory, it may be resolved in residential areas that extend beyond the state borders, e.g. the agglomeration of Bratislava (railways and D2 between Petržalka and Kittsee). Depending on demographic development, it will be necessary to supplement monitoring points.
OPC6 – Completion of the north-south connection to Poland and the Czech Republic	D3 Žilina Brodno – Oščadnica – Čadca Bukov (D3a)	It is possible to predict potential worsening of the noise situation – changes in Lpa 85 projections and population against the current status (more frequent occurrence). Potential risk route – many residential areas in the surroundings of the road. Interstate impacts are not expected. It is necessary to consider proposals for effective noise control measures.
OPC10 – Development of road network in the Bratislava agglomeration	D4 Bratislava Jarovce – state border SR/Austria (D4)	The new road route can potentially be a threat for the newly affected population (Záhorská Bystrica, Marianka, Rača, etc.). In the southern part there is current routing that will provide capacity and increase of flow, however, a higher load of freight traffic is expected. Places on the Austrian side of the state border cannot be influenced (e.g. surroundings of Marchegg).
OPC12 – Modernization and development of other motorway and expressway networks, if reasonable	D2 Bratislava Lamač – state border SR/CZ, motorway capacity provision (D2)	Potential risk – great number of residential areas, more traffic.
OPZ6 – Drawing up and implementation of the Destination Train Diagram 2030 – adjustment of the time and number of connections on the branch tracks to the Žilina – Košice and Kúty state border –		It is just a potential, eventual significant risk of threat related to the traffic amount or transiting of car and railway transport. The intensification of railway transport will result in an increase in the noise load in the surroundings of tracks but by applying suitable anti-noise measures or reconstruction of railway superstructures,

Number and name of measure	Considered transport corridors	Potentially significant risks for or impacts on noise situation
Štúrovo/Komárno state border corridor related to infrastructure changes on those tracks		adjustment of track speeds, types of engines (substitute of diesel by electric) etc., the negative threat to protected buildings can be prevented.
OPV1 – Implement technical measures to improve navigableness of the channel of the Danube waterway		Even though water transport is less frequent and is operated in greater distances from built up areas, its intensification (e.g. recreational sailing of motor boats) may increase the noise load for a location. An international impact can be potentially assumed – traffic on border water (the Gabčíkovo waterworks, the Danube, and the population: Šamorín, Komárno, on the Hungarian side: Gönyű, Komárom, Lábatlam).
OPV3 – Modernization of public ports in Slovakia and subsequent regular maintenance		Regarding the fact that Bratislava has a city port, i.e. close to the residential area, an increased risk of noise threat for nearby inhabitants can be assumed. In the context of wider relations, depending on the types of ships, traffic intensity, transport routes of ships, an international influence can potentially be assumed (however not earlier).
OPL1 – Optimization of the set of airports used by the airlines in order to provide for functional and effective planning of development of the air transport sector		The impacts depend on air transport intensity; in general, the fewer number of airplanes, the less noise. Air corridors that are routed above built-up areas may have an effect. An international impact can be potentially expected; however, it depends on airport location or air corridors – detailed assessment of the interrelation of the transport solution on airport surroundings is required. In terms of impacts on noise from air transport, flights by airplanes with low operating altitude should rather be considered.
OPL2 – Modernization and construction of civil aviation infrastructure for purposes of economic development of the country and the region and improving the quality of the provided services within natural and special-purpose mobility		

Brief evaluation of total cumulative impacts of the strategy

Noise emissions are always connected with the place of their generation or within relatively close (hundreds of meters at most) vicinity of the source. In terms of possible cumulative impact of the design measures, it is possible to expect cumulative impacts only in the context of the entire transport solution on the territory since it is also an objective of the strategic planning and consideration. The frame objective of the proposed solutions is to make the Slovak Republic passable, ensure capacity of transport routes, shift transport from individual to mass transport, use measures to achieve better traffic flow, etc. Depending on the particular technical solution, we can assume whether, as a total impact on situation in the given area, implementation of the design measures will accumulate adverse noise impacts. Upon their completion, the measures aim to decrease the noise threat, both direct and cumulative impacts on the noise situation. Accumulation can be both a decrease/increase of noise from one source to another (e.g. shifting the type and route of transport from a current local road to a newly built bypass). In the entire context, completion of the proposed measures, including noise control measures will result in improvement of both transport and the noise situation around the main traffic arteries.

IV.3.4 IMPACT ON POPULATION AND HEALTH

Individual measures were assessed with regard to the potential impact on environmental health determinants – pollutants in the air from transport – emissions or modelled emissions, noise load on inhabitants and traffic accidents. Environmental determinants were evaluated based on air quality and noise load impact assessment (see the chapters on air and noise and the conclusions from the modelled data). The impact on public health was assessed along with these with regard to the local conditions. When assessing social health determinants, – the employment rate, economic level, physical activity and lifestyle –, the potential impacts on inhabitants of the Slovak Republic or their health conditions were considered.

In terms of impact on health or its determinants, the individual parts of the strategy can be divided into those where it is possible to evaluate marginal impacts of measures on health and those with which the impact is deemed significant. Further division is made according to the character of the measure. Some of them prove a prevailing impact on environmental determinants such noise or air quality while the entire set of measures has bigger strategic potential to influence social and economic health determinants such as – traffic accidents, employment rate, economic development, reduction of social exclusion, and others.

In evaluation of the strategy and its impact on the population of the Slovak Republic, the observable or measurable impact on some very robust indicators of health condition and demographic indicators cannot be expected.

The draft SPTD SR 2030 contains the following identified measures with potentially significant risks for, or impacts on, health. The following transport measures with potentially **significant** risks or impacts on health are tentatively planned and considered in these measures. The measures not provided herein have no assessable impacts on health.

Table IV-9 Measures with potentially significant risks for, or impacts on, public health

Number and name of measure	Potentially significant risks for or impacts on public health
OPS 1-7	Positive on social health determinants – employment rate, economic development.
OPS8	Potentially positive impact to reduce safety risks in transport, reduction of the number of traffic accidents and their consequences.

OPC1 – OPC4	Opportunity to reduce negative impacts on air quality and exposure to noise of particular population groups. On the other hand, there are places where increased exposure of inhabitants to harmful substances from transport occurs or can occur, see the Air Chapter and places requiring technical or organisational protection against noise. These objectives have the potential to increase employment and economic development. Positive impact of reducing traffic accidents and their consequences can be expected. OPC3 is conditioned by long-term maintenance of hygienic securing of waste disposal and cleanliness of public toilets in lay-bys.
OPC5 – OPC 12	The joint health risk is potential increase of exposure of inhabitants to harmful substances from transport – an increase of emission concentrations in some locations (detailed description is in Chapter IV.3.1 Impacts on air) which is only somewhat compensated by their decrease. Potential health risk of noise (detailed description is described in the chapter Impacts on noise situation) may be decreased by numerous technical and organisational measures exceeding the level of the SPTD SR 2030 detail. Positive potential consists also in reduction of traffic accidents and their consequences. This objective is related to ensuring jobs for manual workers with lesser opportunities on the labour market.
OPL1- OPL2	The impact on health will be related to the potential noise exposure of inhabitants to the airplane noise – (on the EIA level) and possible increase of emission concentrations from car service at the airport. Mildly positive is the opportunity for economic development and creation of new jobs.
OPV1 – OPV5	Water transport itself does not cause significant risks and negative impacts on health. Mildly positive is creation of jobs in regard to their development also at the time of technical implementations. A health risk cannot be excluded at construction of ports and their subsequent intense use where an increase of emissions or noise load can occur. In most cases this can be satisfactorily resolved in EIA.
OPVO1	Positive potential to reduce health risk from transport both by reduction of impact on environmental health determinants and by strengthening social determinants – employment rate, reduction of social exclusion (passenger public transport will be accessible to more inhabitants than the individual car transport).
OPVO4	The appropriate infrastructure for citizens’ physical activity and exercise has a positive impact on health since this can reduce the prevalence of obesity and reduce the prevalence and morbidity of cardiovascular disorders.
OPVO5-8	Potential beneficial impact on health if the needs of cyclists (safe parking) is respected along with the needs of inhabitants with disabilities – barrier-free access and no noise load in the surroundings of the implementation and no increase of exposure of citizens to harmful substances from means of transport – will occur but all these impacts on health can be evaluated only in the EIA phase.
OPŽ1- 10	Railway transport influences health especially by exposure to noise, but during reconstructions and through changes of the vehicle fleet the negative impact of exposure to railway noise can be mostly eliminated. The positive aspect is the potential to shift the traffic load from roads and motorways to railways, thus reducing transport emissions. Suitable organisation of suburban railway transport and its integration results in the potential for reduction of exclusion and better use of the public passenger transport.

The draft SPTD SR 2030 deals with impact of transport on health especially in the areas of safety, air quality and noise and less to other parts of the environment and especially health protection.

Considering the impacts of air quality on the health of inhabitants it needs to be concluded that even though the draft SPTD SR 2030 dedicates considerable space to air quality, exposure of inhabitants to harmful substances from transport is one of the most difficult issues to solve in the transport development. The assessed strategy in many places submits proposals for construction or completion or reconstruction of the road network which in the model shows the increased health risk for citizens living in the surroundings of the linear source. Even though the rise of concentration is not always high in percentage terms, such impact cannot be trivialized and it is necessary, as a preventive measure, to adjust vehicle travel so that no increase in concentrations of harmful substances occur, especially $PM_{2,5}$ and N_2O. Another measure (at certain sites that create conflict in terms of terrain, e.g. narrow valleys) is to locate bypasses far enough from urban settlements and to use more environmentally suitable transport around urban settlements. Further measures are described in Chapter IV.3.1. Impacts on air with locations showing potential worsening of air quality.

Considering the noise impact on human health, what needs to be highlighted is the unsatisfactory condition of noise exposure in Slovakia, mainly in certain agglomerations and large towns where noise is the dominant harmful substance affecting the health and well-being of inhabitants. Application of Slovak Government Regulation No. 549/2007 Coll., defining a reference period for which allowed noise levels are determined and determining land categories where such limit values are applicable, will enable improvement of health protection by reducing exposure to transport noise upon implementation of SPTD SR 2030. Limitation of inhabitant exposure is technically feasible and health risks can be reduced also in the fields of cardiovascular diseases (see Chapter III) and neurotic and learning disorders that reduce the quality of life.

Regards the social and economic impacts of the draft SPTD SR 2030 on human health, the strategy holds the potential to increase the number of jobs, which can partially eliminate the perception of negative impacts on health risk associated with new sources of pollution and noise. Transport services create job opportunities. When implementing SPTD SR 2030, it is necessary to also consider the social context of the construction or implementation of long-term measures and their impacts on society – on human health and to enhance inter-sector collaboration by the ministries of labour and health.

The potentially significant impacts on natural mineral resources and natural healing resources (and their protection zones) are assessed in Chapter IV.3.6. of this report.

IV.3.5 IMPACTS ON NATURE AND LANDSCAPE

The draft SPTD SR 2030 contains the measures which identified potential significant risks or impacts on nature protection interests, mainly locations of Natura 2000 and the national system of protected areas, as well as locations of wetlands protected under the Ramsar Convention, the territorial ecologic stability system, migration permeability, land fragmentation, valuable nature elements, protected species, and biodiversity. These are measures resulting in construction of big infrastructure projects on significant territories for nature and landscape protection. The measures of a character other than infrastructure cannot have significant influence. The impacts of infrastructure measures which are very general (e.g. OPC3 Upgrade of lay-bys or OPC11 Development of the network of 1st and 2nd class roads) cannot be identified at the SPTD SR 2030 level and these assessments should be performed on the project level.

Measures with Potentially Significant Impact on Nature and Landscape

- OPC5 – Completion of the west-east priority axis (Rhine–Danube corridor, Czecho-Slovak branch)
- OPC6 – Completion of the north-south connection to Poland and the Czech Republic
- OPC7 – Completion of the north-south connection in Eastern Slovakia
- OPC8 – Completion of the west-east connection in Central Slovakia
- OPC9 – Completion of the north-south road axis in Central Slovakia
- OPC10 – Development of road network in the Bratislava agglomeration
- OPC12 – Modernization and development of other motorway and expressway network, if reasonable
- OPŽ1 – Completion of upgrade to major TEN-T routes, in an advanced stage of preparation: Púchov – Žilina, Žilina – Čadca – national border, Devínska N. Ves – Marchegg
- OPŽ4 – Upgrade of Žilina – Košice – Čierna nad Tisou core route
- OPŽ5 – Upgrade of the Kúty state border – Bratislava – Štúrovo/Komárno state border corridor
- OPV1 – Implement technical measures to improve navigableness of the Danube waterway channel
- OPV5 – Cooperate with the waterways authority to ensure maintenance of waterways and navigable objects on monitored waterways in SR to the level of year-round navigableness
- OPL2 – Upgrade and construction of civil aviation infrastructure for purposes of economic development of the country and region and improving the quality of provided services within natural and special-purpose mobility

Negative impacts of new infrastructure constructions on nature and landscape are in particular the following:

- fragmentation of habitats, eco-systems (e.g. whole forests, river flood plains, TSES) and landscape as such,
- intervention in specially protected areas and locations of the Natura 2000 system: occupation and degradation of habitats – protection and habitats of protected species, collisions with animals, disturbance with noise and light, territory fragmentation,
- impact on the landscape character especially in continuous natural wholes, undulated relief, in rural areas with valuable cultural landscape, and others,
- risk of spread of invasive species due to significant movement of earth and origination of vas areas influenced by construction,
- changes of species composition of lands in close surroundings of constructed networks – increasing non-original species, species changes due to changed conditions (exhalations, chemical substances from winter maintenance of networks to operations, noise, etc.),
- disturbance of migratory routes of animals (barrier effect), in terms of long-distance migrations (e.g. big predators and wild gingers), and local relationships (e.g. amphibians),
- mortality of animals during operation on the transport network,
- disturbance of animals with noise, light – during construction, as well as operation of infrastructure.

Assessment of infrastructure measures stems from the current corridors or from significant implementation aspects (e.g. if the road route is planned through a tunnel of substantial length). Neither the exact territorial routing nor the details of the technical solution have been considered. The strategy, however, is not aimed at territorial routing of corridors or exact routes of infrastructure and technical details. In this phase, the individual projects will be assessed in land-use plans and on the project level. Moreover, not all corridors below will be implemented to their full extent (minimum by 2030). Thus, the impacts below must be perceived as risks that need to be eliminated while planning the routes and technical solution. In a number of cases it will apparently not be possible to avoid significant impacts; however, this can be assessed only based on determination and detailed assessment of various variants on the project level (EIA).

The following transport corridors with potential significant risks or impacts on nature and landscape are considered in the measures below:

Table IV-10 Transport corridors with potential significant risks or impacts.

Number and name of measure	Considered transport corridors	Potential significant risks or potential negative impacts on Natura 2000 areas	Potential significant risks or potential negative impacts on protected areas (national system)	Other impacts
OPC5 Completion of the west-east priority axis	D1 – Turany – Hubová (D1a)	Direct territorial conflict may occur at: • SKUEV0238 Greater Fatra • SKUEV0252 Lesser Fatra • SKUEV0253 Váh • SKCHVÚ013 Malá Fatra It may affect: • SKUEV 0254 Močiar • SKUEV 0243 Orava • SKUEV0663 Šíp Probably slight to significant negative impacts on some subjects of protection: seizure of habitats and species' habitats, migration barrier for big predators, animal collisions including birds and cars, water and soil pollution, disturbances. In particular, the territorial routing and technical solution is not subject to the assessed strategy.	The interventions on or impacts on protected areas may occur at: • PP Šútovská epigenéza • PP Kraľovniansky meander • PR Rojkovské rašelinisko • PP Rojkovská travertínová kopa • PR Hrabinka • PS Orava river • The Malá Fatra National Park • The Malá Fatra NP protection zone • The Veľká Fatra NP protection zone The Malá Fatra NP, Veľká Fatra NP protection zone, Malá Fatra NP protection zone and PP Šútovská epigenéza. Construction and operation of the motorway may adversely influence also other PA. Restriction of migration between PNA is a negative impact. Particular impacts and their significance depends on the selected variant.	This is an area with high significance for animal migration. In the direct conflict with the route or its close vicinity, there is whole set of TSES elements which might be substantially affected by the implementation. The construction may have significant impact on passability through the country. Occupation of natural habitats and conflicts with habitats of species of European significance, death of animals during construction and its operation will occur. Interventions in continuous forest wholes, water flows and areas will occur. Impacts on the landscape character can be expected. Particular impacts and their significance depends on the selected variant.
	D1 – Bidovce – border SR/UR (D1c)	Direct territorial conflict: • SKCHVU025 Slanské vrchy • SKCHVU037 Ondavská rovina • proposed SKUEV0847 Pozdišovský chrbát		The route crosses several SrBcor and RBcor. In the area of the Slanské vrchy, it crosses the significant migration corridor of animals but the impacts will obviously be mitigated by partial

		In both SPAs, seizure of bird habitats will occur; bird mortality will be increased due to collisions with cars and disturbance in the surroundings of the route. In case of passage through the Slanské vrchy hills, a part of the route might be led into a tunnel that may mitigate the impacts. The proposed SCI may be (in dependence on the variant) in direct conflict with the motorway with significant impacts. Possible impact: • SKCHVU009 Košická kotlina		leading of the route via a tunnel. On this territory, more significant impacts on the landscape character exist. The impacts on the territory fragmentation can also be deemed more significant.
OPC6 Completion of north-south connection to Poland and the Czech Republic	R5 – Svrčinovec – state border SR/CZ (R5)	Limitation of migration passability between EVL Beskydy (Czech Republic) and SCI Beskid Zywiecki (Poland), mildly negative impact.	Limitation of migration passability between PLA Beskydy (Czech Republic) and Zywiecki Park Krajobrazowy (Poland), mildly negative impact.	The route crosses SrBcor along the state border. More significantly the landscape character and migration passability are affected.
OPC7 Completion of north-east connection in Eastern Slovakia	R2 – Šaca – Košické Oľšany (R2a)	Direct territorial conflict: • SKCHVU009 Košická kotlina The route passes nearby and in short section through a SPA. The road will separate a part of the territory at its edge. The impacts can be assessed as slightly negative. Potential impact: • proposed SKUEV0935 Haništiansky les		Slightly negative impacts: The route crosses Rbcor Haništianský les and it is led along the Torysa and SrBcor Hornád, it crosses RBc Sady nad Torysou and RBs Viničná – Košická hora. Regarding the position around Košice, there are rather local impacts on migration passability.

		Potential significant impact – it depends on exact territorial routing and technical solution.		
	R4 – state border PR/SR – Prešov northern bypass (R4)	Direct conflict: • SKCHVU011 Laborecká vrchovina The subjects of protection of the SPA will be negatively affected by the measure implementation; the significance of impacts depends on the selected variant. • proposed SKUEV0939 Ondava The route crosses the territory, depending on the selected variant, the impacts could also be significant (the variant in the land-use plan would have no significant impacts). • proposed SKUEV0936 Topľa One of the variants crosses the territory, possible impacts. Possible impact: • SKUEV0048 Dukla Except for the possible territorial conflict, migration passability will be limited. • SKCHVU025 Slanské vrchy No probable intervention. Poland – slightly negative impacts: • SPA Beskid Niski • SCI Ostoja Jaśliska • SCI Ostoja Magurska	Direct territorial conflict: • PLA Východné Karpaty The route crosses PLA probably in the current route I/21. Migration passability and communication will be limited via a part of the territory NW and SE of the motorway or direct conflicts with subjects to protection may occur. Risk of being affected: • NR Dranec • NR Radomka • NR Radomská slatina With all 3 NRs the selected route is decisive (it might also be fully outside).	Significant impacts on the landscape character and migration passability. Probably, slightly significant to significant impacts on biodiversity, protected species and natural habitats. Conflicts with a set of TSES elements of a trans-regional and regional level.

		Increase in transport intensity on the connected route on the Polish territory, deterioration of migration passability.		
OPC8 – Completion of the west-east road axis in Central Slovakia	R2 – Kriváň – Ožďany (R2e)		Possible impact: • NH Kriváňsky potok – part NH is in the corridor, it is impossible to exclude conflict or other impacts.	Slightly negative impacts: The route crosses several SrBcor and RBcor. Migration passability will worsen.
	R2 – Ožďany – Figa (R2f)	Direct territorial conflict: • SKCHVU003 Cerová vrchovina and Rimavská kotlina The corridor passes through SPAs; the significance of impacts depends on the specific territorial routing but significant impacts are possible. • SKUEV Ťahan Depending on the specific route the area may be just marginally affected.		Slightly negative impacts: The corridor interferes in several TSES elements. Impact on protected species, especially birds.
	R2 – Tornaľa – Šaca (R2g)	Direct territorial conflict: • SKCHVU027 Slovenský kras • SKUEV0398 Slaná The significance of impacts depends on the specific territorial routing. A tunnel is planned through part of the SPA Slovenský kras, which will mitigate the impacts; however, the risk of significant impact cannot be excluded on this level. Possible impact: • SKCHVU009 Košická kotlina • SKUEV0343 Plešivské stráne • SKUEV0353 Plešivská planina • SKUEV0350 Brzotínske skaly	Direct territorial conflict: • Slovenský Kras NP and its protection zone The impacts should be mitigated by leading the route in the point of crossing the NP via a tunnel; risk of significant impact, however, cannot be excluded on this level. • PS Slaná The route crosses the protected water course in several points; depending on the solution these might also be significant impacts. Possible impact:	The route leads through a significant territory in terms of the landscape, biodiversity and protected species. It crosses a set of TSES elements. The impacts may be deemed significant regarding the territory quality.

		• SKUEV0352 Hrušovská lesostep • SKUEV0356 Horný vrch • proposed SKUEV0954 Bodva Impacts depending on the specific route and solution.	• NNM Gombasecká jaskyňa protection zone • NNR Brzotínske skaly • NH Jovické rašelinisko • NNR Hrušovská lesostep • NR Zemné hradisko Impacts depending on the specific route and solution.	
OPC9 Completion of the north-south road axis in Central Slovakia	R3 – Tvrdošín – Sedliacka Dubová (R3a)	Direct territorial conflict: • SKUEV0243 Orava The route crosses the river in several points, significant impacts might occur in case of interventions with the river course and shores. It can be eliminated.	Direct territorial conflict: • PS Orava river The route crosses the river in several points. • NRR Bielska skala The protection zone of NRR will be affected. Significant impacts can be eliminated.	Slightly negative impacts: It crosses several SrBcor and RBcor. Relatively bigger impacts on landscape character. The Orava River is a part of the Ramsar location, its protection is required.
	R3 – Oravský Podzámok – D1 intersection (R3b)	Direct territorial conflict: • SKUEV0243 Orava • SKUEV0253 Váh The route crosses both rivers, significant impact need not occur. • SKCHVÚ Chočské vrchy The route crosses SPA in the brand new route and likely it will have significant impact on the subjects of protection; the significance of the impact depends on the specific route. Possible impact: • SKUEV0252 Lesser Fatra • SKUEV0305 Choč • SKUEV0192 Prosečné	Direct territorial conflict: • PS Orava river The route crosses the river. Possible impact: • NP Malá Fatra • TANAP Limitation of migration passability among NPs.	Significant impacts: In the substantial part the route is led via continuous natural or agricultural territory without currently significant constructions. It is possible to expect more significant impacts on biodiversity and protected species. It crosses several TSES elements, with more significant impact on SrBc Chočské vrchy. It fragments continuous forest wholes and it will have more significant impact on the landscape character. The impact on migration passability will be more significant. Slightly negative impact:

		• SKUEV0307 Tatry Significant impact on migration passability among individual territories. Can be mitigated by the proposed ecoduct.		The Orava River is a part of the Ramsar location, it is crossed by the route.
	R3 – Martin – Šahy (R3c)	Direct territorial conflict: • SKUEV0382 Turiec and Blatnický stream The route passes close to the protected watercourses and it crosses them, probably without significant impact. • SKUEV0147 Žarnovica Possible crossing of SCI, probably without significant impact. Possible impact: • SKCHVU033 Greater Fatra • SKUEV0238 Greater Fatra The route approaches about 1km distance from the territory. The impact of limitation of the migration passability in the surroundings of SCI.	Direct territorial conflict: • PS Mošovské aleje Possible intervention on the edge of the territory; the impacts depend on the particular route. • PS Žarnovica Possible crossing of PS, probably without more significant impacts. • NRR Turiec The route crosses NRR, probably without more significant impacts. Possible impact: • NP Veľká Fatra • PLA Strážovské vrchy Limitation of migration passability among PNA. The route interferes in the NO protection zone.	Slightly negative impacts: The route crosses the Ramsar location Mokrade Turca in several points (the Turiec River and its tributaries). It crosses several SrBcor and RBcor, possible interference in Rbc. Limitation of migration passability.
	R3 – Zvolen – Šahy (R3d)	Direct territorial conflict: • SKUEV0260 Mäsiarsky bok The route is led along the border of the territory, potential impact. • proposed SKUEV0890 Pirovské Depending on the exact route, the road might have significant impacts.	Direct territorial conflict: • PLA Štiavnické vrchy The route is led along the PLA border, possible interventions in the territories and limitations of migration passability. • NRR Mäsiarsky bok	Slightly negative impacts: The route crosses several SrBcor and RBcor. It will contribute to the limitation of migration passability.

		Possible slightly negative impacts: • SKUEV0266 Skalka The route passes close to SCI. • SKCHVU021 Poiplie The route approaches SPA at the end of the section. • SKUEV0257 Alúvium Ipľa The route approaches SCI at the end of the section. Hungary – possible slightly negative impacts: • SCI and SPA Ipoly Völgye • SPA Börzöny és Visegrádi-hegység • SCI Börzsöny The connected routes on the Hungarian territory pass through Natura 2000 territories. The impact represents an increase in traffic intensity in this section associated with disturbance and increased risk of collisions of animals with cars.	The route is led along the border of the territory, potential impact depending on the route and solution. Possible impact: • NH Dudinské travertíny The route is led close to NH.	
	R1 – Banská Bystrica – D1 (R1a)	Direct territorial conflict: • SKCHVU018 Nízke Tatry The route passes through SPA with probable significant impact. • SKCHVU033 Greater Fatra The route is led along the border of SPA. Apart from the direct impact, the negative impact is represented by deterioration of the road between Veľká Fatra and Nízke Tatry.	Direct territorial conflict: • NP Nízke Tatry The route is led along the border and in short length through NP and mostly via the protection zone with probable significant impact. • NP Veľká Fatra The route touches NP and it is led through the protection zone. Except for the direct interventions, limitation of	Significant negative impacts: The route crosses several SrBcor and RBcor and it also reaches biocentres. During implementation of a part of the route through a tunnel, it will significantly affect migration passability and landscape fragmentation. Conflicts of animals, especially birds and bats with cars, as well as impacts on natural habitats and protected species will be

		• SKUEV0253 Váh The route crosses SCI, probably without more significant impacts. • SKUEV0197 Salatín The route is led along the border of the territory, potential impact. • SKUEV0164 Revúca The route is led close to SCI and it crosses it, probable significant impact. • SKUEV0198 Zvolen The route is led along the border of the territory, potential impact. • SKUEV0302 Ďumbierske Tatry The route passes through SCI with probable significant impact. • SKUEV1303 Alúvium Hrona The route is led close to SCI and it crosses it, probable impact. Possible impact: • SKUEV062 Príboj The route is led close to SCI. • SKUEV0238 Greater Fatra Limitation of migration passability. The planned tunnels can mitigate some impacts; most likely some significant impacts will remain.	migration passability among territories means a significant impact. • PS Revúca The route is led close to PS and crosses it. Possible impact: • NNM Liskovská jaskyňa The route is close to NNM • NH Skalná päsť The route is close to NNM • NH Krvavá skala The route is close to NH • NH Dogerské skaly The route is close to NH • NH Jazierske travertíny The route is close to NH • NR Kozí chrbát The route is close to NH • NR Mackov Bok The route is close to NR • NR Šupín The route is close to NR • NRR Príboj The route is led in close vicinity of NRR; intervention cannot be excluded. • NH Bukovinka The route is close to NH	more significant. The impacts on the landscape character will be significant.
OPC10 Development of road network in the Bratislava agglomeration	D4 – Bratislava Jarovce – state border SR/Austria (D4)	Direct territorial conflict: • SKCHVU007 Dunajské luhy The route passes through SPA and will have a significant impact on the	Direct territorial conflict: • PLA Dunajské luhy The route crosses PLA in a narrow point and it separates the northern end of the territory, significant impact.	Significant negative impact: The route directly interferes with the Ramsar localities of Alúvium Moravy (Morava Alluvium) and Dunajské luhy (Danube Floodplains) and passes along

		subjects of protection and fragmentation of the territory. • SKCHVU014 Malé Karpaty The route is planned in a tunnel, which might mitigate significant impacts; however, the SPA will be negatively affected at least in the place of entry points. • SKCHVU016 Záhorské Pomoravie When evaluating the EIA, it was concluded that with the tunnel option no significant impact on “most species that are the subjects to protection” will occur. This observation cannot be considered a sufficient conclusion of adequate assessment of the project. Surface variants have even more significant impacts. • SKUEV0295 Biskupické luhy The route crosses SCI and will significantly impact the subjects of protection. • SKUEV0104 Homoľské Karpaty With the tunnel option it will likely not be directly in conflict, however, the territory may be affected. • SKUEV0312 Devínske alúvium Moravy SCI is interrupted at the point of passing of the motorway, however, with execution of the construction, it will be practically fragmented into the northern and southern part. The tunnel option would decrease the impact.	• PLA Malé Karpaty A tunnel is planned through PLA, the impacts will be obvious especially in the entry points. • PS Devínske alúvium Moravy PS is interrupted in point of the motorway crossing the territory (due to planned construction); however, the construction will even worsen the road between the north and south part of the territory thus causing its fragmentation. The tunnel option would mitigate the impacts. Possible impact: • NRR Šúr The route is led along the NRR border and along its protection zone. There will mostly be indirect impacts. • NR Strmina The route is led close to NR, probably via a tunnel. • NR Gajc The route is led along the NR border. Direct conflict cannot be excluded. • NR Kopáčsky ostrov The route is led close to NR, indirect impacts. Depending on the final routing, other PNA may be affected. Except for direct conflicts, indirect impacts (noise, disturbance,	the border of the Šúr locality. It crosses several SrBcor and RBcor and directly interferes with Bratislavské luhy (Bratislava Floodplains) SrBc and Dolnomoravská niva (Lower Morava Floodplain) SrBc, it may also touch the edge of the Šúr SrBc and affect some RBc. It will increase the fragmentation of the coherent natural areas along the Danube and Morava Rivers and partially in the Small Carpathians. Coherent forest complexes and small landscape elements mostly of agricultural landscape east of Bratislava will be affected and fragmented.

		• SKUEV0314 Morava The route crosses the water course, probably without more significant impacts. Possible impact: • SKCHVU029 Sysľovské polia Possible impact due to noise (accumulation because of the existing motorway), slightly negative impact. • SKUEV0279 Šúr The route is close to SCI • SKUEV0269 Ostrovné lúčky The route is close to SCI The route through PA Dunajské luhy and SCI Biskupické luhy that was approved based on the prevailing public interest pursuant to Art. 6.4 of the Habitat Directive. Austria – potential slightly negative impact and significant impact of the related route: In Devínska Nova Ves, the route runs close to SCI and SPA March-Thaya-Auen in Austria. The planned construction would impact this territory, more significantly on the Austrian side which, if led above land and reconstruction on the motorway, would most probably have significant impact, while a tunnel solution depends on the particular	degradation of habitats close to motorway, migration barrier...) shall be applied.	

		design. This road, including the selection of the option, is the subject of an agreement between Slovakia and Austria.		
OPC12 Modernization and development of other motorway and expressway networks, if reasonable	Motorway 2 – Bratislava Lamač – state border SR/CZ, motorway capacity provision (D2)	Direct territorial conflict: • SKUEV0217 Ondriašov potok The creek crosses motorways probably without significant impacts. • SKCHVU016 Záhorské Pomoravie The route crosses PBA and since it is the extension of the present motorway, impacts may not be significant; however, they will be evaluated on the project level. Potential conflict: • SKUEV0218 Močiarka • SKUEV0167 Bezodné • SKUEV0121 Marhecké rybníky • SKUEV0219 Malina • SKUEV0169 Orlovské vŕšky • SKUEV0170 Mešterova lúka • SKUEV0153 Rudava • SKUEV0117 Abrod • SKUEV0165 Kútsky les • SKCHVU (SKPBA) Malé Karpaty (Small Carpathians) The level of conflict and any potential impact depend on the specific implementation of the motorway capacity enhancement.	Possible impact: • Záhorie PLA • PLA Malé Karpaty More significant impacts on both PLAs are unlikely. • Bezodné NR • Marhanecké rybníky (Marhanecké Ponds) NR • Orlovské vŕšky (Orlovské Hills) NR • Mešterova lúka (Mešterova Meadow) NR • Rudava PS • Abrod NNR The level of conflict and any potential impact depend on the specific solution of the motorway capacity enhancement.	Slightly negative impacts: Ramsar localities of Alúvium Moravy (Morava Alluvium) and Alúvium Rudavy (Rudava Alluvium) may be affected marginally and more significant impacts are unlikely. Impacts on natural habitats, migration permeability and biodiversity are limited considering it is a project of motorway capacity enhancement, not a new construction.

	R1 – Most pri Bratislave — Vlčkovce (R1b)	Direct territorial conflict: • SKCHVU023 Úľanská mokraď The route crosses and fragments PBA. Impacts on the objects of protection will be significant. • proposed SKUEV0822 Malý Dunaj The route crosses the area, impacts will be rather minor.	Possible impact: • Vlčkovský háj (Vlčkovský Grove) PS • Abrahámský potok (Abrahámský Greek) PS • Mačiansky háj (Mačiansky Grove) PS • Mačiansky presyp (Mačiansky Dune) NH Depending on the specific route there may be area conflict or indirect impact on some part of PNA.	Slightly negative impacts: The route crosses several SrBcor and RBcor, it may affect bio-centres. The route is led mostly in the agricultural landscape; it will affect valuable landscape elements (watercourses, linear greenery). Negative impact on the landscape character.
	R7 – Dunajská Streda – Nové Zámky (R7b)	Direct territorial conflict: • SKCHVU005 Dolné Považie The route crosses and fragments PBA. Accumulated with the following section the impacts will likely be significantly negative. • SKUEV0075 Klátovské rameno Depending on the selected option the route may cross the area; impacts will depend on the specific place and implementation. • proposed SKUEV0822 Malý Dunaj Crossing the route and AEI, impacts depend on the specific place and solution.	Direct territorial conflict: • Klátovské rameno (Klátovské distributary) NNP The route crosses NNP, impacts depend on the specific place and solution.	Moderate negative to significant impacts: The route crosses several SrBcor and Rbcor; it has more serious impact on RBc around the Little Danube and Stará Čierna water. The route is led mostly in the agricultural landscape; it will affect valuable landscape elements (watercourses, riparian vegetation, linear greenery). Negative impact on the landscape character.
	R7 – Nové Zámky – Veľký Krtíš (R7c)	Direct territorial conflict: • SKCHVU005 Dolné Považie The route crosses and fragments PBA. Accumulated with the previous section the impact will likely be significantly negative. • proposed SKUEV0872 Jedzina	Direct territorial conflict: • Chrenovka Creek NH The route crosses NH, impacts depend on implementation. Possible impact: • Cerínsky Creek PS	Moderate negative to significant impacts: The route crosses several SrBcor and RBcor, it affects bio-centres. The route is led mostly in the agricultural landscape; it will affect valuable landscape elements (watercourses, riparian vegetation, linear greenery).

		May be significantly affected depending on the selected route. Possible impact: • SKUEV0086 Krivé hrabiny • Proposed SKUEV2294 Bagovský vrch Significant impact on this area is unlikely. So far, no option of the route for the Čaka – Veľký Krtíš section has been selected, impacts may differ depending on the route option.	The route may be led in vicinity of PS, no significant impacts.	Negative impact on the landscape character.
	R7 – Veľký Krtíš – Lučenec (R7d)	Possible impact: • proposed SKUEV0956 Ľuboreč Depending on the specific route the area may be affected. The impact may vary from significantly negative to zero.		Moderate negative to significant impacts: The route crosses several SrBcor and RBcor. Significant impact on migration permeability. Valuable landscape elements (watercourses with riparian vegetation, linear greenery, forest complexes), natural habitat and biodiversity will be affected. Negative impact on the landscape character.
	R8 – Nitra – R2 (R8) intersection	Possible impact: • SKCHVU031 Tribeč Depending on the selected route PBA may be directly affected or unaffected. • SKÚEV0589 Chynoriansky luh Depending on the selected route the impact may vary from slightly negative to zero.	Possible impact: • Chynoriansky luh (Chinoriansky Floodplain) NR Depending on the selected route the impact may vary from slightly negative to zero.	Slightly negative impacts: The route crosses several SrBcor and RBcor. It will affect valuable landscape elements (watercourses with riparian vegetation, linear greenery). Negative impact on the landscape character.

OPŽ1 – Completion of upgrade to major TEN-T routes, in an advanced stage of preparation: Púchov – Žilina, Žilina – Čadca – state border, Devínska N. Ves – Marchegg	Route CZ/SK national border – Čadca – Krásno nad Kysucou	Possible impact: • proposed SKUEV0833 Kysuca The present route is led along the border of AEI; modernization could have an impact, the extent of impacts depends on the specific project nature.	Possible impact: • Kysucká brána (Kysucká Gate) NH • Rochovica NR • Brodnianka NR • Kysuce PLA The route runs in vicinity of these areas; they could be affected only if the route is relocated but the impact is unlikely.	Local impacts on TSES and biodiversity, increased risk of collision with animals when the speed and intensity of traffic is increased
OPŽ4 – Upgrade of Žilina – Košice – Čierna nad Tisou core route	Route Žilina – Košice	Possible impact: SKCHVU036 Volovské Hills, SKCHVU053 Slovak Paradise, SKCHVU018 Low Tatras, SKCHVU050 Chočské Hills, SKCHVU013 Lesser Fatra, SKUEV0238 Greater Fatra, SKUEV0253 Váh, SKUEV0143 White Váh, SKUEV0309 Poprad, SKUEV0139 Salt Meadows, SKUEV0146 Blatá, SKUEV0142 Hybica, SKUEV0328 Central Hornád River Basin, SKUEV0243 Orava, SKUEV0254 Močiar, SKUEV0252 Lesser Fatra, SKUEV0221 Varínka, SKUEV0286 Hornádske vápence, SKUEV0291 Svätojánsky Creek, SKUEV0287 Galmus, SKUEV0112 Slovak Paradise, SKUEV0782 Vydrnícka Fen, SKUEV0663 Šíp, SKUEV0708 Primovské Rocks, SKUEV0665 Váh meanders at Strečno, SKUEV0784 Mašianské sysľovisko, SKUEV1310 Kráľovohoľské Tatry, proposed	Possible impact: Lesser Fatra NP, protected zones of Greater Fatra NP, Low Tatras, TANAP and Slovak Paradise, Hrádok Arboretum PS, Blue Hill NR, Farská Rock NH, Margecany Line NH, Krivé NNR, Šíp NNR, Domašín Meander NH, Kraľovany Meander NH, Šútov Epigenesis NH, Močiar NR, Mašiansky Boulder NH, Bôrik NR, Bešeňov Travertines NH, Skalná pásť NH, Baba NR, Ivachnová Floodplain NR, Gánovce Travertines NNH, Briežky NH, Primovské Rocks NR, Bujanovská dubina NNR, Humenec NNR, Bokšov NNR, Markušovské steny NNR, Transgression of the Paleogene near Markušovce NH, Čingov Hillfort NR, Korbeľka NR, Rojkov Bog NR, Rojkov Travertine Heap NR, Orava River PS, Važecká Cave NNH, Liskovská Cave NNH	Local impacts on TSES and biodiversity, increased risk of collision with animals when the speed and intensity of traffic is increased

		SKUEV0928 Hornád, proposed SKUEV0941 Trebejovské Rocks Railways cross these areas or they run in their vicinity; impacts depend on the specific form of modernization especially at places of relocations due to conflicts.	Railways cross these areas or they run in their vicinity; impacts depend on the specific form of modernization especially at places of relocations due to conflicts.	
	Route Košice – Čierna nad Tisou	Possible impact: SKCHVU009 Košická kotlina, SKCHVU025 Slanské vrchy, SKCHVU015 Medzibodrožie, SKUEV0326 Strahuľka, SKUEV0236 Bodrog, SKUEV0019 Tarbucka including proposed completion. Railways cross these areas or they run in their vicinity; impacts depend on the specific form of modernization especially at places of relocations due to conflicts.	Possible impact: Latorica PLA, Boršiansky Forest PS, Tajba NNR Railways cross these areas or they run in their vicinity; impacts depend on the specific form of modernization especially at places of relocations due to conflicts.	Local impacts on TSES and biodiversity, increased risk of collision with animals when the speed and intensity of traffic is increased
OPŽ5 – Upgrade of the Kúty state border – Bratislava – Štúrovo/Komárno state border corridor	Track CR/SR state border – Kúty – Devínska Nová Ves	Possible impact: SKCHVU016 Záhorské Pomoravie, SKUEV0117 Abrod, SKUEV0167 Bezodné, SKUEV0217 Ondriašov potok, SKUEV0218 Močiarka, SKUEV0312 Devínske alúvium Moravy, SKUEV0313 Devínske jazero, SKUEV0314 Morava, SKUEV0163 Rudava, SKUEV0121 Marhecké rybníky, SKUEV0170 Mešterova lúka, proposed SKUV0904 Gbelský les.	Possible impact: Záhorie PLA, Abrod NNR, Rudava PS, Mešterova Meadow PS, Marhec Ponds PS, Bezodné NR, Alluvium of the Morava River at Devín PS Railways cross these areas or they run in their vicinity; impacts depend on the specific form of modernization especially at places of relocations due to conflicts.	Local impacts on TSES and biodiversity, increased risk of collision with animals when the speed and intensity of traffic is increased

		Railways cross these areas or they run in their vicinity; impacts depend on the specific form of modernization especially at places of relocations due to conflicts.		
	Track Bratislava Vajnory – Štúrovo/Komárno state border Slovakia/Hungary	Possible impact: SKCHVU023 Úľanská mokraď, SKCHU005 Dolné Považie, SKCHVU020 Parížske močiare, SKCHVU007 Dunajské luhy, SKUEV0095 Panské lúky, SKUEV0097 Palárikovské lúky, SKUEV0184 Burdov, SKUEV0393 Dunaj, proposed SKUEV0820 Dolný Hron, proposed SKUEV0824 Dolný Ipeľ Railways cross these areas or they run in their vicinity; impacts depend on the specific form of modernization especially at places of relocations due to conflicts.	Possible impact: Alluvium of Paris PS, Parížske Wetlands NNR, Galanta Park PS, Trnovské Distributary NH, Burdov NNR, Mužliansky Creek NH, Šúr NNR, Palárikovské Meadows NR Railways cross these areas or they run in their vicinity; impacts depend on the specific form of modernization especially at places of relocations due to conflicts.	Local impacts on TSES and biodiversity, increased risk of collision with animals when the speed and intensity of traffic is increased
OPV1 – Implement technical measures to improve navigability of the Danube waterway	Rkm 1880.260–1862.000	Depending on selected measures PBA and AEI including the Danube watercourse and its close vicinity may be affected: • SKCHVU007 Dunajské luhy • SKUEV0064 Bratislava floodplains including the part proposed to be added and including the watercourse itself • SKUEV0295 Biskupické luhy Possible impacts – intrusions into banks, alluvial mining, change in alluvial	Taking account of the general nature of measures without any specific technical projects, impacts on PNS along the Danube (Slovanský Island NR, Sihoť PS, Pečniansky Forest PS, Soví Forest PS, Hrabiny PS, Starý Grove NR, Chorvátske Distributary PS) may not be excluded.	Technical measures may include intrusions into natural habitats, sites of protected and endangered species and natural watercourse pattern. More detailed evaluation of impacts is impossible without specific measures.

		conditions, change in hydrological conditions in surroundings, disturbance of animals, etc. The impacts may not be assessed in further details on the general level. Austria – A part of the Danube along the Austrian border is a part of SCI AT1204000 Donau-Auen Östlich von Wien, and to a smaller extent a part of its namesake, SPA AT1204V00. Impacts on this area depend on the particular technical measures and need to be solved within feasibility studies and assessment of individual projects.		
	Rkm 1862.000 – Gabčíkovo Level	Depending on selected measures PBA and AEI including the Danube watercourse and its close vicinity may be affected: • SKCHVU007 Dunajské luhy • SKUEV0295 Biskupické luhy • SKUEV0270 Hrušov • SKUEV0269 Ostrovné lúčky • parts of AEI Bratislava floodplains and Danube floodplains proposed to be added More detailed evaluation of impacts on a general level is impossible.	Taking account of the general nature of measures without any specific technical projects, impacts on PNS along the Danube (Danube Floodplains PLA, Danube Islands NR) may not confirmed nor excluded.	Technical measures may include intrusions into natural habitats, sites of protected and endangered species and natural watercourse pattern. More detailed evaluation of impacts is impossible without specific measures.
	Gabčíkovo level to rkm 1708.200	Depending on selected measures PBA and AEI including the Danube watercourse and its close vicinity may be affected:	Taking account of the general nature of measures without any specific technical projects, impacts on PNS along the Danube (Danube Floodplains PLA,	Technical measures may include intrusions into natural habitats, sites of protected and endangered species and natural watercourse pattern. More

		• SKCHVU007 Dunajské luhy • SKUEV0293 Kľúčovské rameno (Kľúčovské Distributary) • SKUEV0182 Číčovské luhy (Číčovské Floodplains) • SKUEV0183 Veľkolélsky ostrov (Veľkolélsky Island) • SKUEV0393 Danube • a part of Danube Floodplains AEI proposed to be added. More detailed evaluation of impacts on a general level is impossible. Hungary – SCI and SPA areas of HUFH30004 Szigetköz and SCI HUDI20034 Duna és ártereon are on the Hungarian side of the Danube. All navigability measures must also respect these territories.	Zlatniansky Floodplain NR) may not confirmed nor excluded. The Danube is a borderline river, maintenance of the waterway must be solved in collaboration with the Hungarian party and it must respect domestic protected areas.	detailed evaluation of impacts is impossible without specific measures.
OPV5 cooperates with the watercourse authority to ensure maintenance of waterways and navigable objects on monitored waterways in SR on the level of year-round navigableness		Waterway maintenance may include projects affecting objects of AEI and PBA protection. The main waterway is Danube, and the second most important is the Váh. Possible impacts include interferences in the watercourse and banks, changes of water flow in the watercourse, changes in alluvial conditions, changes in hydrogeological conditions in surroundings and the like. All AEI and PBA along waterways may possibly be affected. More detailed	Intrusions into the watercourse and banks during the maintenance of the Danube waterway could affect objectives of protection of the Danube Floodplains PLA and small-area PNA along the Danube. The maintenance of the Váh waterway could affect small-area PNA along the river Váh and especially Apálsky Island NNR and Vrbina NR. More detailed evaluation of the impact is impossible due to a general nature of measures.	Technical measures may include intrusions into natural habitats, sites of protected and endangered species and natural watercourse pattern. More detailed evaluation of impacts is impossible without specific measures.

		evaluation of the impact is impossible due to the general nature of the measure. Hungary – SCI and SPA areas of HUFH30004 Szigetköz and SCI HUDI20034 Duna és ártereon are on the Hungarian side of the Danube. All navigability measures must also respect these territories.	The Danube is a borderline river, maintenance of the waterway must be solved in collaboration with the Hungarian party and it must respect domestic protected areas.	
OPL2 Modernization and construction of civil aviation infrastructure for purposes of economic development of the country and region and improving the quality of provided services within natural and special-purpose mobility	Measures at the M. R. Štefánik airport in Bratislava	The Little Danube proposed to be added as SKUEV0822 flows about 250m from the current end of the runway. If the runway is extended in the south-east direction AEI could be affected. Impacts depend on the specific project; if approved, EAI should be respected.		Slightly negative impact: Extension and rebuilding of the runway may be in conflict with the Little Danube SrBcor, Little Island Rbcor and the Little Danube RBC – Podunajské Biskupice WS. Intrusions in riparian vegetation may occur with a local negative impact on biodiversity.

Summary of impacts on nature and landscape and cumulative impacts

In course of the strategy implementation the area of Natura 2000, the national system of protected areas, protected species, biodiversity, migration permeability of the landscape, TSES, landscape and valuable landscape elements will be negatively affected. All big constructions also involve the risk of spreading invasive species caused by transport of soil and creation of new ruderal areas.

Impacts of some of the projects implemented with the measures and objectives of SPTD SR 2030 are likely to be significant. However, identification of significant negative impacts may not be unequivocal on the level of SPTD SR 2030 because the strategy fails to include territorial routing and technical details of measures and determination of specific projects to be implemented. This is expected to be done in following steps. It will be possible to identify, evaluate, change or eliminate impacts only in these steps.

With respect to possible routes of the following transport corridors there is a risk of significant negative impacts on the territory of Natura 2000 and the national system of protected areas:

- OPC5
  - D1 and D1 – Turany – Hubová (D1a)
  - D1 – Bidovce – SK/UA border (D1c)
- OPC7:
  - R2 – Šaca – Košické Oľšany (R2a)
  - R4 PL/SK national border — Prešov Northern Bypass (R4)
- OPC8
  - R2 – Kriváň – Ožďany (R2e)
  - R2 – Ožďany – Figa (R2f)
  - R2 – Tornaľa – Šaca (R2g)
- OPC9
  - R3 – Tvrdošín – Sedliacka Dubová (R3a)
  - **R3 – Oravský Podzámok – D1 crossroads(R3b)**
  - R3 – Martin – Šahy (R3c)
  - R3 – Šahy – Zvolen (R3d)
- OPC9
  - **R1 – Banská Bystrica – D1 (R1a)**
- OPC10
  - **D4 (Jarovce) Ivanka – Slovak/Austrian state border.**
- OPC12
  - D2 – Bratislava Lamač – SK/CZ national border (D2)
  - **R1 – Bridge close to Bratislava – Vlčkovce (R1b)**
  - R7 – Dunajská Streda – Nové Zámky (R7b)
  - R7 – Nové Zámky – Veľký Krtíš (R7c)

- R7 – Veľký Krtíš – Lučenec (R7d)
- OPL2
  - Measures at the M. R. Štefánik airport in Bratislava
- OPŽ1
  - Route CZ/SK national border – Čadca – Krásno nad Kysucou
- OPŽ4
  - Route Žilina – Košice
  - Route Košice – Čierna nad Tisou
- OPŽ5
  - Track CR/SR state border – Kúty – Devínska Nová Ves
  - Route Bratislava – Štúrovo/Komárno SK/H national border
- OPV1
  - Ensuring navigability of the Danube along the whole river
- OPV5
  - Complete measure

In case of corridors in **bold,** available information suggests high risk of significant negative impacts on the routes presently expected. However, this risk needs to be examined in more detail and finally evaluated on the basis of exact routes and technical solutions of constructions, and if necessary, to look for other options of traffic connection, or proceed pursuant to Art. 6.4 of Habitat Directive in case of impacts on areas of the Natura 2000 system, or pursuant to Act No. 543/2002 Coll. on Nature and Landscape Protection (permission for the activity in degree of protection one to five, or exceptions from protection conditions) in case of the national system of protected areas.

Impacts will be cumulated in connection with all measures, i.e. the strategy as a whole, and in connection with the current status and other plans and purposes in the area.

Impacts of measures are cumulated in the area of Lesser Fatra and Greater Fatra, and Low Tatras. In this area, the construction of D1 motorway, R1 and R3 expressways is planned with modernization of the significant railway line. Direct intrusions will occur only in some parts of protected areas with stronger impact on protection zones and especially overall deterioration in migration permeability between these areas. Cumulation of impacts applies to the national system of PNA and to the Natura 2000 national system.

Capacity enhancement is expected for the route of the existing D1 motorway which runs through the area of Úľanská mokraď (wetland) PBA and the construction of a new R1 expressway is planned. In this area, objects of protection (habitat taking, collisions of birds with vehicles, disturbance) will be affected cumulatively and the impacts may be significant.

Implementation of the strategy will significantly increase the fragmentation of the landscape and reduce migration permeability to low, it will have a negative impact on TSES especially on the transregional and regional level. It will significantly contribute to increased number of anthropogenic areas at the expense of natural ones. These impacts are cumulated especially in connection with other constructions not necessarily of transport character.

IV.3.6 IMPACTS ON SURFACE AND GROUND WATERS

Impacts were evaluated in two aspects. Proposed measures were evaluated in terms of potential impacts on surface and ground waters in course of construction and traffic impacts on water bodies. Potential territorial conflicts of transport corridors with areas where specific water protection applies were also evaluated. These areas are covered by the special regime of protection, e.g. limited water take-off, prohibition on discharge of polluted waste water, tightened regime of municipal waste management or tightened regime for transport of petroleum products.

Identification of conflicts with areas protected under the Water Act[64]

Based on data and information contained in the draft strategy, maps were prepared according to specified attributes used to evaluate possible conflicts with protected water management areas in connection with transport infrastructure placement and operation. Maps in the figures below show the location of routes within the planned measures of the transport infrastructure of road and railway systems, and specific areas protected in accordance with legal regulations for water protection (Water Act) – protected water management areas, protection zones of water supply sources and sources of mineral and healing waters and their protection zones. Potential conflicts with sites of operating natural healing spas or spa sanatoriums are also provided.

[64] Act No. 364/2004 Coll. on Water and on the Amendment and Supplements to Act No. 372/1990 Coll. on Offences, as amended (Water Act)

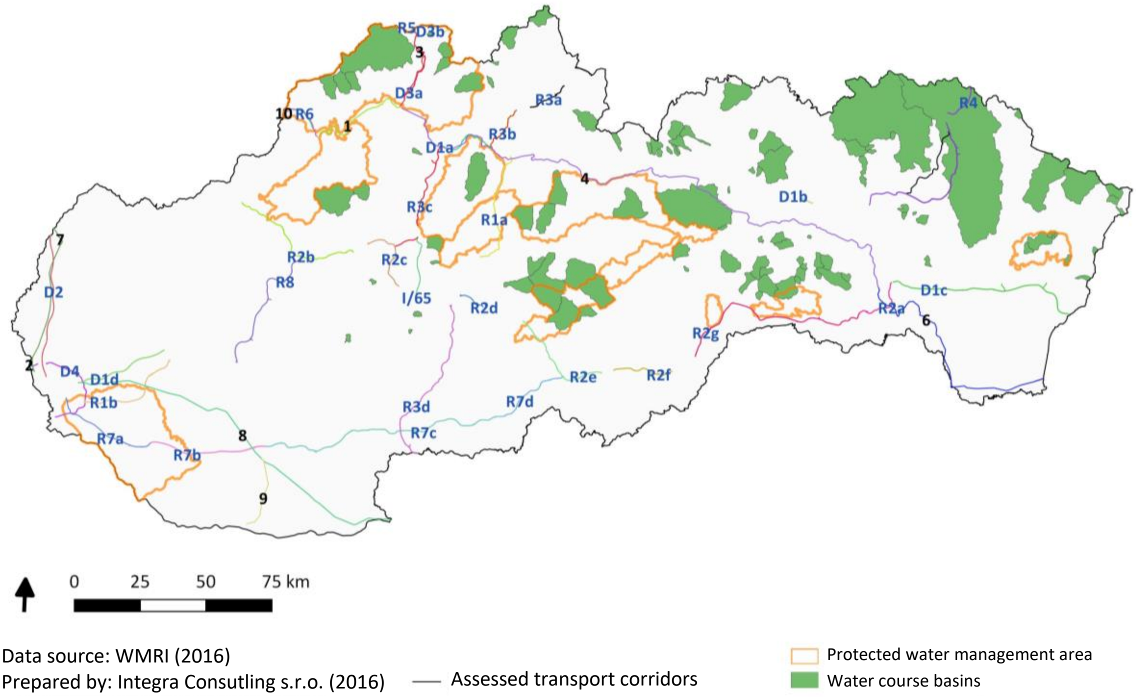


Fig. IV-30 Identification of potential conflicts of transport corridors and territories of protected water management areas and water course basins

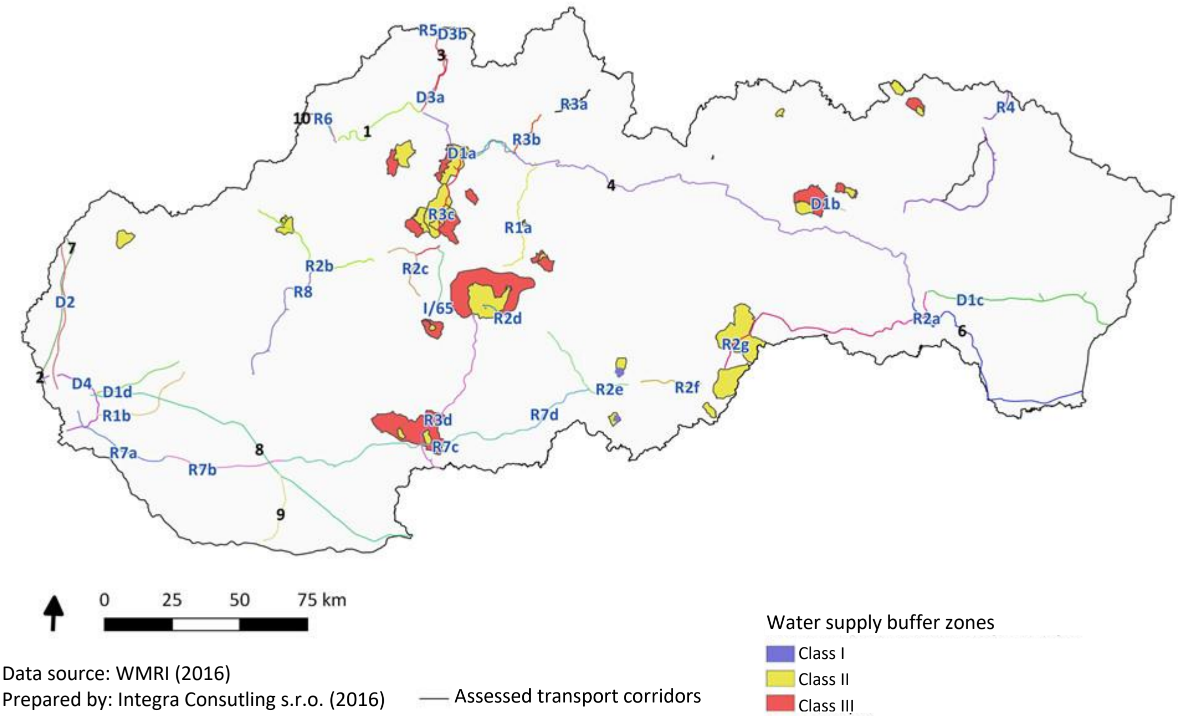


Fig. IV-31 Identification of potential conflicts of transport corridors and territories of protected zones of water supply sources

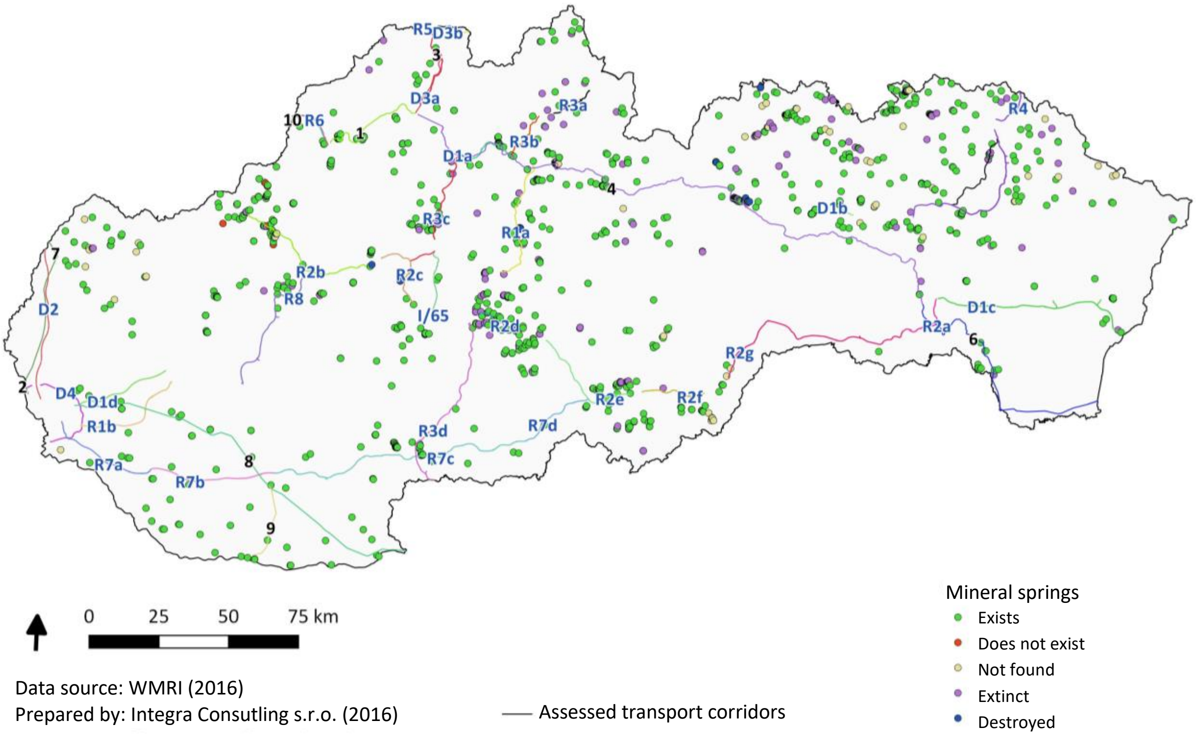


Fig. IV-32 Identification of potential conflicts of transport corridors and territories with mineral springs

Graphic illustration clearly shows that a set of planned corridors (line construction) specified in the evaluated strategy is in conflict with protected areas and could have an adverse impact on the quality of surface and ground waters. It is necessary to minimize intrusion of pollutants into surface and ground waters in all of the areas mentioned above. Implementation of the strategy measures or location and activity of transport infrastructure constructions in these territories will be subject to special attention and respect for transport activity conditions in the territory.

The draft SPTD SR 2030 identified the following measures for road transport with potentially minor risks or impacts on natural healing sources and natural mineral sources (and their protection zones).

Potential conflicts with territories of the following locations – spa sites were considered in terms of impacts **on natural healing waters**: Bardejov, Bojnice, Brusno, Červený Kláštor, Číž, Dudince, Kováčová, Lúčky, Nimnica, Piešťany, Rajecké Teplice, Sliač, Sklené Teplice, Smrdáky, Trenčianske Teplice, Turčianske Teplice, Vyšné Ružbachy, Lučivná, Liptovský Ján, Štós, the High Tatras.

In terms of conflicts, the following measures were identified as posing potential risks:

1. OPC9 – completion of the North-South road axis in Central Slovakia
   - R3 – Zvolen – Šahy: potential impact on the locality of Dudince (natural healing spa)
   - R3 Martin – Šahy: potential impact on the locality of Turčianske Teplice (natural healing spa)

2. OPC8 – completion of the west-east road axis in Central Slovakia
   - R2 – Zvolen west – Zvolen east: potential impact on the locality of Sliač

The findings correspond with the assessment of potential conflicts with the territory where mineral springs occur. The following transport corridors with potential risks or impacts **on natural mineral sources** are tentatively planned and considered in these measures:

1. OPC8 – completion of the West-East road axis in Central Slovakia
   The route of the designed project of R2 Zvolen west – Zvolen east reaches an area with large number of mineral springs, namely the protection zone of mineral and healing springs in the locality of Sliač. The territory is sensitive to interventions in surroundings which may have an impact on water conditions in the course of construction; and impacts and risks related to the operation of transport infrastructure.

2. OPC9 – completion of the North-South road axis in Central Slovakia
   The route of the proposed R3 Martin – Šahy corridor includes degree III protection zones of mineral and thermal waters and degree II protection zone of mineral and thermal waters (locale of Dudince) is in the vicinity of the proposed corridor. The territory is sensitive to interventions in surroundings which may have an impact on water conditions in course of construction; and impacts and risks related to the operation of transport infrastructure.

Impacts on natural mineral waters and natural healing waters must be solved in particular during placement of constructions and their technical solution.

The second step of assessment of measures includes **identification of potential impacts of the proposed measures on the quality of surface and ground waters** during construction and transport. The draft SPTD SR 2030 contains the following measures with potentially significant risks for or impacts on identified waters:

- OPV1 – Implement technical measures to improve navigableness of the channel of the Danube waterway;
- OPV3 – Modernize public ports in Slovakia and ensure their subsequent regular maintenance;
- OPV5 – Cooperate with the waterways authority to ensure maintenance of waterways and navigable objects on monitored waterways in SR on the level of year-round navigableness.

Tab. IV-11 Measures with potentially significant risks for or impacts on waters

Number and name of measure	Potentially significant risks for and/or impacts on waters
OPV1 – Implement technical measures to improve navigability of the Danube waterway	When implementing technical measures to adjust channel parameters of waterways, especially towards changes of hydrological conditions around the river (effect on groundwater level, adverse impact on river flow rates – changes of river currents, changes in alluvial conditions, changes in water level mixture) and to adverse effects on surface water quality. Measures to enhance capacity of the riverbed may represent interference in the natural hydromorphology of the territory. When technical measures are implemented on locks, adverse impacts may affect flows of watercourses due to intervention in the morphology of the riverbed impact on the ground water level or pollution of surface waters.
OPV3 – Modernization of public ports in Slovakia and subsequent regular maintenance	Measures for modernization and construction completion or construction of infrastructure parts for water transport (ports) may affect especially the quality of surface waters in the watercourse during construction. Ports represent a point source of water pollution and waste water production. Operation of the port is connected with the risk of pollution of surface and groundwater which may migrate further.
OPV5 – Cooperate with the waterways authority to ensure maintenance of waterways and navigable objects on monitored waterways in SR to the level of year-round navigableness	Waterway maintenance may include projects affecting objects of AEI and PBA protection. The strategy specifies that the measure is connected with the management and maintenance of waterways in SR and navigable objects in these waterways with the Danube and the Váh being the main waterways. Implementation of measures may include potential objectives which will represent impacts on the watercourses of these rivers. Potential impacts include interferences in the watercourse which will cause changes in hydrogeological conditions in the surroundings (water flow in the watercourse, changes in alluvial conditions, changes in water level mixture).

Thus significant negative impacts were identified solely in connection with water transport. In connection with measures related to water transport, negative impacts on hydromorphological changes in water bodies, for example as a result of capacity enhancement of the riverbed by means of dredging can be generally expected. Technical measures implemented directly on the watercourse may affect hydrological conditions in surroundings of the watercourse including impact on the level of groundwater, a change in water flow, change in alluvial conditions, and mixing of water levels, and it may have a negative impact on water quality in the watercourse. With increased water transport the risk occurs of direct pollution of surface water due to fluid leakage and waste water production[65]. In

[65] Water transport using diesel engines produces POPs, a significant percentage of which may penetrate into the water environment. However, the absolute quantity of PAC of this kind is negligible compared to the volume of emissions from other motor sources.

this context, the sector of water transport is considered to be the biggest source of potentially significant negative impact on water management.

Negative impacts of lower significance (+ small significance) were identified mainly for the road transport sector. The summary below assesses identified risks or negative impacts by respective kinds of transport – transport modes on a general level. Organizational or investment measures were defined for every transport mode in order to meet modal specific objectives of the strategy, and these measures were evaluated.

Impacts on water bodies

Water transport

Impacts on water bodies of surface and ground waters are expected especially in connection with implementation of measures in water transport and mainly in construction of new or reconstruction of existing waterways and ports, thus the evaluation focused on evaluation of impacts of measures in water transport to water bodies of surface and ground waters.

- **OPV1** measure – The following water bodies of the partial Danube basin may be potentially affected when the measure is implemented:
  a) Surface water bodies: D0005, D0016, D0020, D0019, D0017, D0015, D0012, D0004, D0018, D0011, D0002, D0001, D0010, D0013, D0014, D0008, D0006 and D0003
  b) Ground water bodies in Quaternary sediments: SK1000200P, SK1000600P
  c) Ground water bodies in pre-Quaternary rocks: SK200010FK, SK2000500P, SK2002300P
  d) Ground water bodies in geothermal structures: SK300240PF, SK300250PF, SK300020FK, SK300010FK

  1st update of the Management Plan of the Danube River Basin District contains the evaluation of the ecological situation or ecological potential of surface water bodies in the partial river basin and most of water bodies were classified as 3 (an average ecological situation or average ecological potential, a minor part was classified as 2 (good ES, or good and better EP), and the Ižianský channel water body was classified as 4 (bad EP). For a part of water bodies the risk is identified of failure to meet WFD objectives by 2021 especially in the indicator of organic pollution and the overall ecological situation or ecological potential (see the Management Plan of the partial Danube River Basin, updated in December 2015). Therefore impacts on particular water bodies will be evaluated in details already in the preparatory phase of specific intentions within OPV1 measures.

- **OPV2** measure focuses on organizational changes and no potential negative impacts have been identified here.

- **OPV3** measure focuses on modernization and maintenance of ports. This applies especially to the Komárno and Bratislava ports. The measure for modernization and construction completion or construction of infrastructure parts for water transport may affect especially the quality of surface waters in the watercourse during construction. If this is the case, all water bodies of the partial Danube basin could be potentially affected, and thus the description under evaluation of OPV1 above applies to it.

  OPV3 measure may create conditions for implementation of purposes that may be connected with the interference in the watercourse of the Váh River. Impacts on water bodies in the Váh basin may not be identified precisely especially due to the fact that the partial Váh basin includes a high number of these bodies and the draft Strategy fails to specify particular project intentions in detail.

- **OPV4** measure focuses on organizational changes and no potential negative impacts have been identified here

- **OPV5** measure is included in the draft strategy as an organizational measure connected with the management and maintenance of waterways in SR and navigable objects in these waterways with the Danube and the Váh being the main waterways. Waterway maintenance may include projects affecting water bodies. Thus, the implementation of measures may affect water bodies in partial Danube and Váh basins and the evaluation of impacts on surface and ground water bodies and it corresponds to intentions specified above:

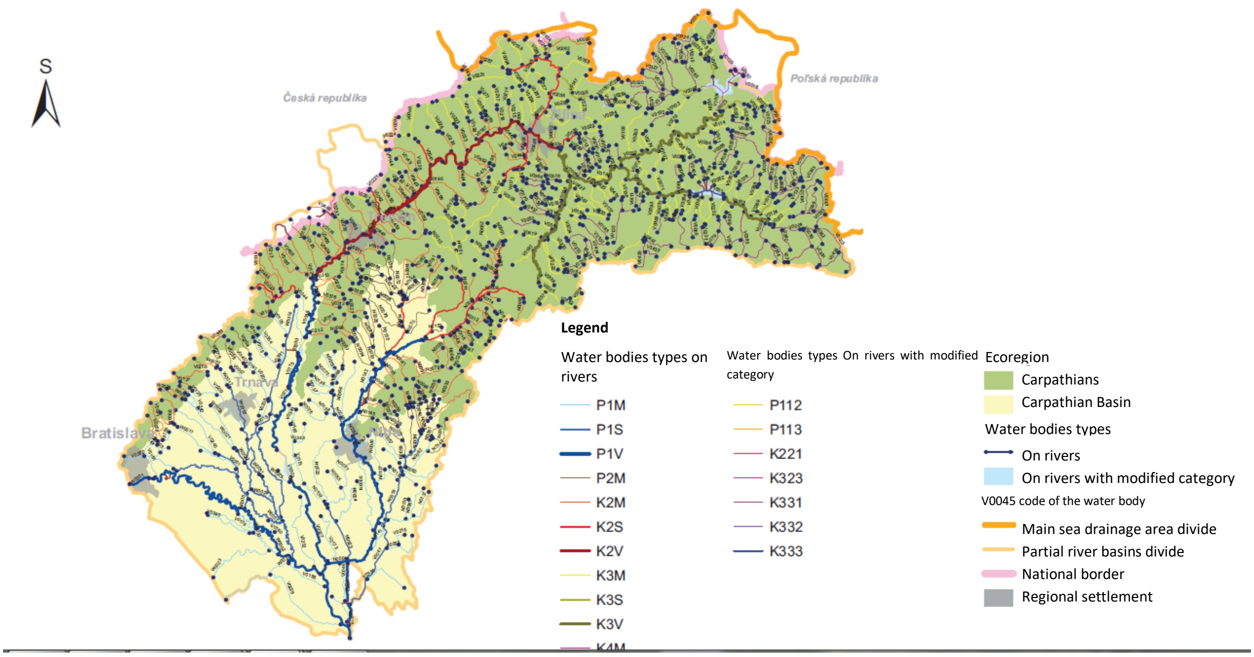
  Partial Danube basin

  - Surface water bodies: D0005, D0016, D0020, D0019, D0017, D0015, D0012, D0004, D0018, D0011, D0002, D0001, D0010, D0013, D0014, D0008, D0006 and D0003
  - Ground water bodies in Quaternary sediments: SK1000200P, SK1000600P
  - Ground water bodies in pre-Quaternary rocks: SK200010FK, SK2000500P, SK2002300P
  - Ground water bodies in geothermal structures: SK300240PF, SK300250PF, SK300020FK, SK300010FK

  1st update of the Management Plan of the Danube River Basin District contains the evaluation of the ecological situation or ecological potential of surface water bodies in the partial river basin and most of water bodies were classified as 3 (an average ecological situation or average ecological potential, a minor part was classified as 2 (good ES, or good and better EP), and Ižianský channel water body was classified as 4 (bad EP). For a part of water bodies the risk is identified of failure to meet WFD objectives by 2021 especially in the indicator of organic pollution and the overall ecological situation or ecological potential (see the Management Plan of the partial Danube River Basin, updated in December 2015). Therefore impacts on respective water bodies will be evaluated in detail already during the preparatory phase of specific intentions implemented to fulfil OPV1 measures.

Partial Váh basin

Impacts on water bodies in the Váh basin may not be identified precisely especially due to the fact that the partial Váh basin includes a high number of these bodies (see figure below) and it is impossible to identify in detail potentially affected water bodies without specification.



Road transport

Water quality risks during **implementation of measures** are associated mainly with the new construction and enlargement of road structures. The Strategy considers construction of new sections, including bypasses and feeders and in several cases enlargement of the existing road.

Construction and operation of line structures (road, railways) can have adverse impact on the drainage situation in the land, or on ground water quality and flow, especially if they are designed in a cut, embankment or tunnel. A route running in a deep cut will have a significant impact on hydrology of ground waters with potentially significant impact on water supply sources. Constructions of tunnels will represent relatively significant regional drain of ground waters in the rock environment and thus it is impossible to exclude their impact on used sources of ground waters in wider surroundings –the ground water level can drop and capacity of ground water sources, as well as habitats depending on water relations, can be influenced.

Moreover, during own construction surface waters in the surroundings of constructions can be influenced by flush of earth.

A decisive type of pollution caused by transport that could threaten the quality of water includes PAH pollution (polyaromatic hydrocarbons), or POP, or VOC (volatile organic substances), as well as excessive ingress of chloride into water from winter maintenance using salt. The risk of water quality deterioration during operation is connected to discharge of rainwater, less with air pollution (using so-called atmospheric deposition). Production of these substances is more serious especially in cases when transport runs near surface waters. Volatile organic substances (VOC) as precursors of tropospheric ozone are heavier than air in general and thus they are able to fall to the water surface or terrain and subsequently pollute water.

The situation is slightly more favourable than in case of PAH because a lot of VOC is biologically degradable in a water environment, at least in part. Road transport clearly bears the risk of affecting the quality of water with inorganic salts (chlorides) which get into ground and surface waters especially in spring as a result of salt spreading on roads. The content of chlorides in the recipient may increase depending on the quantity of water in the watercourse; in the given period the content of chlorides may amount to tens of mg/l, and the specified level of emission standard may be exceeded in a single case especially around bridges over watercourses.

The risk of pollution caused by atmospheric deposition of air pollutants is connected with increased intensity of traffic (dealt with in detail in the air impact assessment chapter). In this respect, all new corridors reaching water protection zones (PWMA, watercourse basins, water source PZ and mineral and healing water PZ) are considered to be the most important problematic areas.

Less frequent, but more severe for water quality could be accidental leakage of crude oil substances (in case of accidents when transporting chemicals, leaks during fuel handling, etc.).

In general, higher risks are connected with construction and activity on roads in areas protected pursuant to the Water Act (see above – territories of protected water management areas, basins of water management courses and protection zones of waters and mineral springs with protection zones). A part of routes of new and enlarged corridors stretch into these territories with the specific water protection regime and the implementation of the strategy measures or location and operation of road transport infrastructure constructions in these territories will be subject to special attention and respecting conditions for transport activity implementation in the territory.

In terms of proportion of sources in the load of water pollutants, transport is not considered to be decisive and the related impact is assessed as minor.

Reduction of emissions from transport including emissions of condensed hydrocarbons and PCDD and PCDF[66] will mean a positive contribution to the protection of ground and surface water quality. At the same time, protection of water in exposed water management areas (PWMA and PZ, vulnerable areas) will increase.

The opportunity to improve the quality of waters is connected with improved maintenance based on minimization of impacts on the water environment.

Public passenger transport

For **public passenger transport,** the risk is connected especially with the construction of accompanying infrastructure for parking areas near railway stations and terminals which may have the locally negative effect of faster rain water drainage partially contaminated with leaked fluids and abrasion materials in addition to the positive contribution based on the transfer of a part of individual passenger transport to the sector of public transport.

Railway transport

Railway transport measures are mostly evaluated as neutral in terms of potential risks and impacts on waters. Measures located in Beskydy and Javorníky PWMA where activities of heavy machinery used in implementation may affect water conditions are an exception.

On the other hand, positive impacts may be expected due to reduced risk of accidents on modernized lines and related leakage of pollutants.

Air transport

The proposed measures focus mostly on modernization and maintenance of the infrastructure and no negative impacts on waters are expected except for negative impacts during implementation and activities covered by the EIA process or subsequent permissions for activities. The measure

[66] PCDD and PCDF (dioxins + furans) are generated when fuels are burnt in motor vehicles.

"*Construction of Arrival Terminal at Sliač Airport*" is an exception, with potentially minor negative impact identified in the increased demand for water consumption for terminal maintenance.

Traffic organization

Evaluation of organizational measures seems to be ambiguous. The nature of impacts of the measures will depend on the level of integration of water protection in processes and consideration of water protection environmental objectives in planned activities.

In terms of potential positive impacts, it will be possible to mention the advantage of higher quality maintenance of the transport infrastructure and improved security reducing the risk of operational and accidental leakage of pollutants in water bodies. Transport infrastructure maintenance is also connected with a negative impact on the water environment due to winter maintenance of roads posing the risk of chloride flushing. Therefore, maintenance plans shall take account of impacts on the water environment.

Impact on water consumption

Water consumption will be demanded for technological use especially at the time of construction of transport infrastructure projects. In this respect, no pressure is expected on higher water take-off except for implementation of measures related to infrastructure for water transport.

At the time of construction activity, demands for water increase in connection with maintenance, fire-fighting devices and transport infrastructure activities – terminals, airports, filling stations and the like. Water take-off at operations is regulated by legal regulations and no significant impact from increased take-off is expected. The impact of water take-off on quantity or quality of ground or surface waters should not be crucial.

Cumulative impacts

No significant cumulation with other impacts implemented in other strategic documents is expected with respect to the share of transport in water pollution and the identified scope of risks and their negative impact.

Cumulation of the strategy impacts on water protection is evaluated as the risk in case of road transport measures located in the area of Beskydy and Javorníky PWMA and Žitný ostrov PWMA and also in the sector of water transport due to implementation of measures on the Danube and Váh watercourses. Cumulated implementation of new roads for road transport may result in concentration of negative impacts due to significant increase of consolidated areas (quicker rain water run-off, runoff from road maintenance, fluid leakage and abrasions from means of transport) and increased intensity of transport (pollution due to atmospheric deposition of contamination by PAH and VOC).

In the sector of water transport, technical measures implemented directly on the watercourse may affect hydrological conditions in surroundings of the watercourse including impact on the level of groundwater; they may also cause a change in water flow, change in alluvial conditions, and mixing of water levels, and it may have a negative impact on water quality in the watercourse. With increased water transport the risk occurs of direct pollution of surface water due to fluid leakage and waste water production.

Connection to Water Framework Directive

Act No. 364/2004 Coll. on Water, as amended serves as the legislative basis for water protection. It is necessary to put special emphasis on provisions of the act implementing Directive 2000/60/EC of the European Parliament and the Council of 23 October 2000, laying down the scope for measures of the EU in the area of water management (the so-called Water Framework Directive – WFD).

Article 4 of the Water Framework Directive lays down four types of environmental objectives – conditions in terms of environment, ecological potential, chemical composition and quantitative condition:

- achieving good ecological condition and good chemical composition of surface waters;
- achieving good ecological potential and good chemical composition of surface waters in artificial water bodies;
- achieving good condition of ground water (i.e. good chemical composition of ground water and good quantity of ground water);
- achieving good ecological potential in terms of environment and good chemical composition of surface waters in heavily modified water bodies.

The position of water transport projects is controversial on the general level with respect to WFD requirements. On one hand, water transport is considered to be “the most ecological” and on the other hand, together with development of waterworks in watercourses and anti-flood measures, it was one of the main driving forces giving rise to anthropogenic interventions in river systems and hydrological changes in particular.

From this point of view, the connection between objectives of the Strategy and environmental objectives of water protection as stated in Slovakia’s Water Plan in accordance with the Directive is assessed as conflicting.

On the general level of the strategy, it is impossible to further evaluate unambiguously whether the proposed Strategy measures contribute to fulfilment of specified WFD objectives or not. As a part of consideration, water bodies were identified which may be affected by implementation of measures in the water transport sector, and the risks related to surface and ground water quality and ground water quantity were assessed in detail on the level of all measures.

IV.3.7 IMPACTS ON FUTURE CLIMATE CHANGE RELATED RISKS

No significant changes in the averages of global radiation, speed and direction of wind are expected within climatic conditions; Considering the greater strength of storms especially in the warm part of the year, a more frequent occurrence of torrential downpours and windstorms related to storms is expected.

This evaluation focuses especially on risks related to the passage of flood waves. It is impossible to analyse impacts of torrential rains, calamitous snowfalls and glare ice on this strategic level and they need to be dealt with in more detail when respective corridors and specific transport plans are prepared.

The draft SPTD SR 2030 contains the following measures with potentially significant risks for or impacts on climatic conditions identified:

- OPC7 – Completion of the North-South Connection in Eastern Slovakia;
- OPC8 – Completion of the West-East road axis in Central Slovakia;
- OPC9 – Completion of the North-South road axis in Central Slovakia;
- OPŽ4 – Upgrade of Žilina – Košice – Čierna nad Tisou core route.

Tab. IV-12 Measures with potentially significant risks or impacts

Number and name of measure –	Considered transport corridors	Potentially significant risks for or impacts on climatic conditions
OPC7 – Completion of the north-south connection in Eastern Slovakia	R2 – Šaca – Košické Olšany (R2a)	Along the Torysa river and at the crossing with the Hornád river the corridor passes a large flood area. Sporadically high flow rates up to 4m/s.
	R4 PL/SK national border — Prešov Northern Bypass (R4)	Conflict with Q100 and Q1000 at the place of crossing with the Topľa and Topoľa rivers. The large flood area with flow rates up to 4m/s. The entire section along the Radomka river is problematic.
OPC8 – Completion of the west-east road	R2 – Zvolen west – Zvolen east (R2d)	At Sliač, the corridor crosses the Hron river, conflict with Q100 and Q1000 about 1,500m wide. Medium flow rate up to 1.5m/s.

axis in Central Slovakia	R2 – Tornaľa – Šaca (R2g)	The section of the corridor along the Slaná watercourse passes a large flood area Q100 and Q1000 with flow rates up to 1.5m/s. The corridor crosses the Bodva watercourse, a large flood area with a flow rate up to 2.5m/s. Conflict with Q100 and Q1000 at the Ida watercourse crossing.
OPC9 – Completion of the North-South road axis in Central Slovakia – south B	R3 – Tvrdošín – Sedliacka Dubová (R3a)	The corridor crosses the Studený potok (Cold Creek), conflict with Q100 and Q1000, flow rate up to 4m/s. At Oravica, the corridor passes the edge of Q100 and Q1000 also with a high flow rate up to 4m/s.
	R3 – Šahy – Zvolen (R3d)	North of Krupina conflict with Q100 and Q1000 in the Krupinica river. Flow rate sporadically very high up to 4m/s. North of Dobrá Niva conflict with Q100 and Q1000 in the Neresnica river. Medium flow rate up to 2.5m/s. Crossing the Hron river, Q100 flow rate up to 4m/s. The corridor runs through a 600m wide flood area.
OPŽ4 – Upgrade of Žilina – Košice – Čierna nad Tisou core route	Track Žilina – Košice (4)	Entire section along the Hornád river is very problematic. Significant part of the corridor is in conflict with Q100 and Q1000, and flow rates sporadically amount to 4m/s.
	Track Košice – Čierna nad Tisou (6)	The Borša – Čerhov section runs through a flood area with a low flow rate. At the crossing of the Olšava, Torysa and Hornád rivers, south of Košice, the corridor is in conflict with a large flood area Q100 and Q1000 where the flow rate is up to 4m/s.

Considering the greater strength of storms in the warm part of the year, a more frequent occurrence of strong wind, windstorms and tornadoes related to storms is expected which, in case of floods, may cause bigger overflows and higher flow rates.

A special issue might be side erosion of rivers and relocation of their beds, as well as underflooding of inundation alluvial plains which will put higher requirements on foundation methods of embankments and bridges when overpowering water currents.

An important factor which is often connected with floods and intensifies their negative impact is landslide. Landslide may occur in areas with slope deformations in period of longer rainfalls and torrential downpours (see the following evaluation in chapter IV.3.8).

IV.3.8 IMPACTS ON ROCK ENVIRONMENT AND RAW MATERIALS, GEOLOGICAL RISKS

Respective measures were assessed in terms of potential impacts on slope deformations, extraction of raw materials as an indirect impact of SPRD SR 2030 implementation and conflicts with raw material deposits and old mine works. Within impacts on rock environment, raw materials and geological hazards locally significant risks of slope deformations and conflicts with raw material deposits and old mine work may be expected.

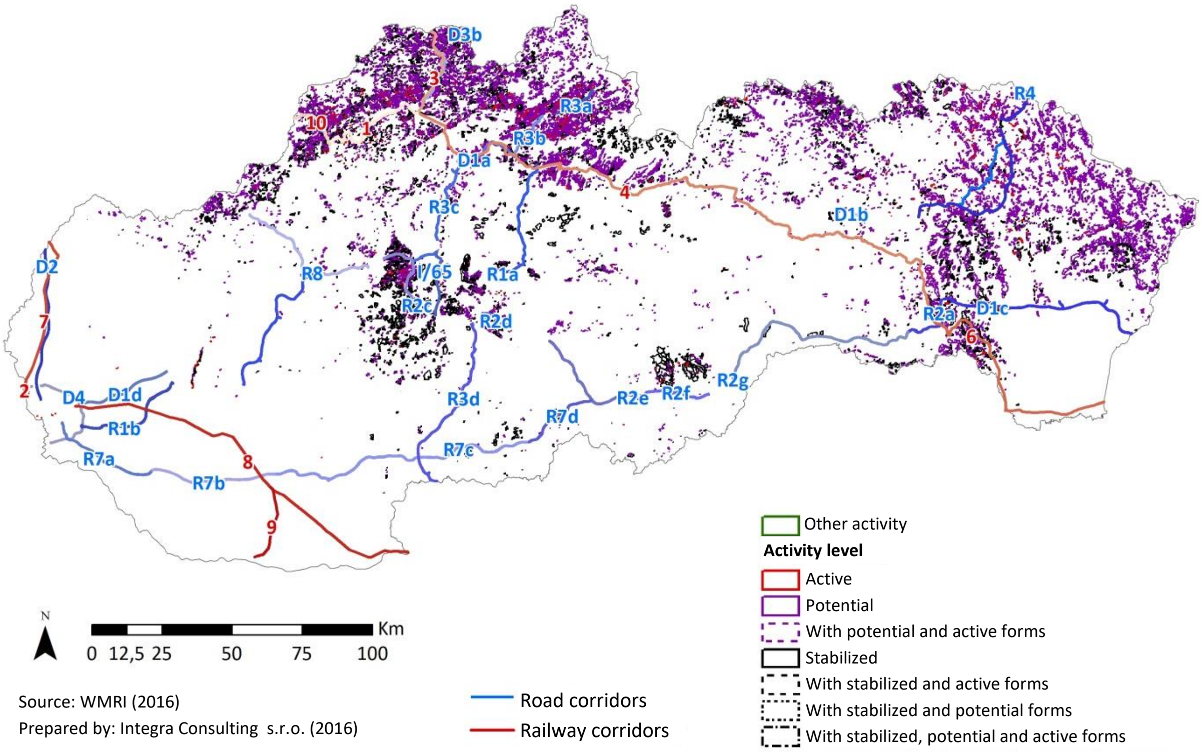


Fig. IV-33 Risk areas of slope deformations affected by construction of proposed routes of the transport infrastructure

The draft SPTD SR 2030 contains the following measures with potentially significant risks for or impacts on rock environment and raw materials:

- OPC5 – Completion of the west-east priority axis (Rhine–Danube corridor, Czech and Slovak branch)
- OPC6 – Completion of the north-south connection to Poland and the Czech Republic
- OPC8 – Completion of the west-east road axis in Central Slovakia
- OPŽ1 – Completion of upgrade to major TEN-T routes, in an advanced stage of preparation: Púchov – Žilina, Žilina – Čadca – state border, Devínska N. Ves – Marchegg
- OPŽ4 – Upgrade of Žilina – Košice – Čierna nad Tisou core route
- OPŽ8 – Modernization of TEN-T rail track Púchov – Horní Lideč

Tab. IV-13 Measures with potentially significant risks or impacts

Number and name of measure –	Considered transport corridors	Potentially significant risks for or impacts on mineral deposits and raw materials
OPC5 – Completion of the	D1 – Turany – Hubová (D1a)	The route runs through the area of intramountain basins and high core mountains. There are sections with large slope deformations along the

west-east priority axis (Rhine–Danube corridor, Czech and Slovak branch)		route. These are mostly slopes with springs and wetlands around the Váh river and its feeders. The level of landslide activity is usually potential, landslides are active between Sučany and Turany.
	D1 – Bidovce – SK/UA border (D1c)	There are sections with slope deformations along the route with potentially active landslides. Slopes are dry or with wetlands. Eastern part of the corridor is located in relatively stable environment. There are deposits of non-metallic minerals and energy fuels. At the end of the route is an old mine works (dumps, shafts).
	R6 – state border SR/ČR – Púchov (R6)	The route runs through the area of the flysch uplands. There are sections with large slope deformations along the route. These are mostly slopes with springs and wetlands around the Biela voda river and its feeders. The level of landslide activity is usually potential, some landslides are active between Lúky and Záriečie municipalities.
OPC6 – Completion of the north-south connection to Poland and the Czech Republic	D3 – Žilina Brodno – Oščadnica – Čadca Bukov, 2nd profile (D3a)	The route of the corridor runs through the area of the flysch uplands. There are sections with large slope deformations along the route. These are mostly slopes with springs and wetlands around the Kysuce river and its feeders. Several deposits of raw materials are located in this area.
	D3 – Skalité – SK/PL national border, profile 2 (D3b)	The route runs through the area of the flysch uplands with large slope deformations which may result in potential landslides. These are mostly slopes with springs and wetlands along the Čierňanka river.
	R5 – Svrčinovec – SK/CZ national border (R5)	The route runs through the area of the flysch uplands with large slope deformations which may result in potential landslides. These are mostly slopes with springs and wetlands along the Šľahorov Creek.
OPC8 – Completion of the west-east road axis in Central Slovakia	R2 – Nováky – Žiar nad Hronom (R2c)	The corridor runs mostly through the area of intramountain basins. This is the area with large slope deformations. Fine-grained, compact soils and also mixed, rockfalls and eluvia. Large number of active landslides south of Handlová. The old mine works (coal access shaft) and a deposit of nonmetallic raw materials are located in the corridor.
OPŽ1 – Completion of upgrade to major TEN-T routes, in an advanced stage of preparation: Púchov – Žilina, Žilina – Čadca – state border, Devínska N. Ves – Marchegg	Track CR/SR – Čadca – Krásno nad Kysucou (3)	The route of the corridor runs through the area of the flysch uplands. There are sections with large slope deformations along the route and these may result in potential landslides. These are mostly slopes with springs and wetlands around the Kysuce river and its feeders. Several deposits of raw materials are located in this area.
OPŽ4 – Upgrade of Žilina – Košice – Čierna nad Tisou core route	Track Košice – Čierna nad Tisou (6)	The extent of landslides is larger in the area of the Slanské Hills where problematic sites were successfully stabilized in the past and the relocation near the railway station Slanec will not be proposed due to initiation hazard.
OPŽ8 – Modernization of TEN-T rail track	Track Púchov – Horní Lideč (10)	The route runs through the area of the flysch uplands. There are sections with large slope deformations along the route. These are mostly slopes with springs and wetlands around the Biela voda river and its feeders. The level

Púchov – Horní Lideč		of landslide activity is usually potential, some landslides are active between Lúky and Záriečie municipalities.

Indirect impact of SPTD SR 2030 implementation will be raw material extraction for construction and related opening of borrow-pits and increased extraction in existing quarries, as well as depositing of excessive material from earth-works.

In the overall context it can be stated that draft SPTD SR 2030 creates certain locally significant risks of bank deformations, conflicts with raw material deposits and old mine works, which must be solved within connecting project work – especially in corridor studies, feasibility studies, territorial plans and detailed project proposals.

As a part of these detailed studies, what needs to be taken into consideration is also the risk of cumulative impact with extreme rain phenomena and floods. Bank erosion debris get wet to an extreme extent and at extreme speed and they not only become heavier but the water inside them works as a lubricant reducing mutual friction of erosion debris. The level of water soaked in respective soil layers differs and the bedrock under layers soaked with more water sets in motion due to gravitation. Normally waterlogged parts of banks or parts where springs and spring areas are directly located slide very often because they are supplied with water from below as well, i.e. doubly soaked. In case of floods, landslides often occur at the same places as before. It is thus obvious that some parts of banks tend to slide. In case of floods, landslides not only on the rocky subsoil but landslides occur also in eroded layers; in case of bedrock, landslides occur only rarely and on small areas, i.e. bedrock does not contribute to landslides.

IV.3.9 IMPACTS ON SOIL

The draft SPTD SR 2030 contains the following measures with potentially significant risks for or impacts on soil identified:

- OPC8 – Completion of the west-east road axis in Central Slovakia
- OPC10 – Development of road network in the Bratislava agglomeration
- OPC12 – Modernization and development of other motorway and expressway networks, if reasonable
- OPŽ5 – Upgrade of the Kúty state border – Bratislava – Štúrovo/Komárno state border corridor

Tab. IV-14 Measures with potentially significant risks for or impacts on soil types

Number and name of measure	Considered transport corridors	Potentially significant risks for or impacts on soil types

OPC8 – Completion of the west-east road axis in Central Slovakia	R2 – Ožďany – Figa (R2f)	Soil types classified in quality group 4 including phaeozems and pararendzina soil types, protected forests and special purpose forests are in the corridor.
OPC10 – Development of road network in the Bratislava agglomeration	D1 – Bratislava – Trnava, extension to 6 lanes (D1d)	In the corridor, the best quality soil types of quality grade 1-4, especially in the section Senec – Blatné, black soil types and phaeozems are located. Commercial forests may be slightly affected.
OPC12 – Modernization and development of other motorway and expressway networks, if reasonable	R1 – Most pri Bratislave – Vlčkovce (R1b)	In the corridor, best quality soil types of quality grade 1 – 4 including black soil types and locally also phaeozems are located.
	R7- Bratislava – Dunajská Streda (R7a)	In the corridor, best quality soil types of quality grade 1 – 4 including black soil types and locally also phaeozems are located. Special purpose forests and partially protected forests will be affected.
	R7 – Dunajská Streda – Nové Zámky (R7b)	In the corridor, quality soil types of quality grade 1-4 including phaeozems and locally also black soil types are located. To a lesser extent the corridor stretches to protected forests.
OPŽ5 – Upgrade of the Kúty state border – Bratislava – Štúrovo/Komárno state border corridor	Track Bratislava Vajnory (outside) – Štúrovo state border SR/MR (8)	In the corridor, quality soil types of quality grade 1 – 4 including black soil types and locally also phaeozems are located. Commercial forests and protection forests will be slightly affected.
	Track Bratislava – Nové Zámky – Štúrovo/Komárno (9)	In the corridor, quality soil types of quality grade 1 – 4 including black soil types and phaeozems are located. Commercial forests and protected forests will be slightly affected.

Implementation of most of the designed traffic structures as measures to safeguard accessibility of Slovak regions using road infrastructure and construction of new corridors will be naturally associated with permanent or temporary acquisition of land. In this regard, protection of the best quality soil needs to be secured, as well as to avoid risk to ecological features of soil. More detailed proposals of individual measures should be designed so that land acquisition impacts are minimized (especially black soil and phaeozems), risks of soil quality deterioration during road construction and activities are limited, as well as limited interference into protected and special forests.

IV.3.10 IMPACTS ON CULTURAL HERITAGE

No measures were found in the draft SPTD SR 2030 with potentially significant risks for or impacts on cultural heritage identified. New proposed or considered corridors are not located on areas delineated as conservation zones (CZ), conservation reserves (CR) or objects in the UNESCO list of cultural heritage.

In order to avoid these territorial conflicts, an analysis was processed in GIS by means of overlapping data layer containing information on the territory where the proposed or considered corridors of SPRD

SR 2030 will be routed with the map of municipalities on the territory of which some of the mentioned cultural heritage protection categories are located (see figure IV-34 below). Potential conflicts identified in this way would then be evaluated in detail using texts and maps for respective CZ and CR (Conservation Reserve Protection Principles, Conservation Zone Protection Principles) from the database of the Monument Board of the Slovak Republic in terms of the risk of negative impact of corridor implementation on potentially affected protected areas.

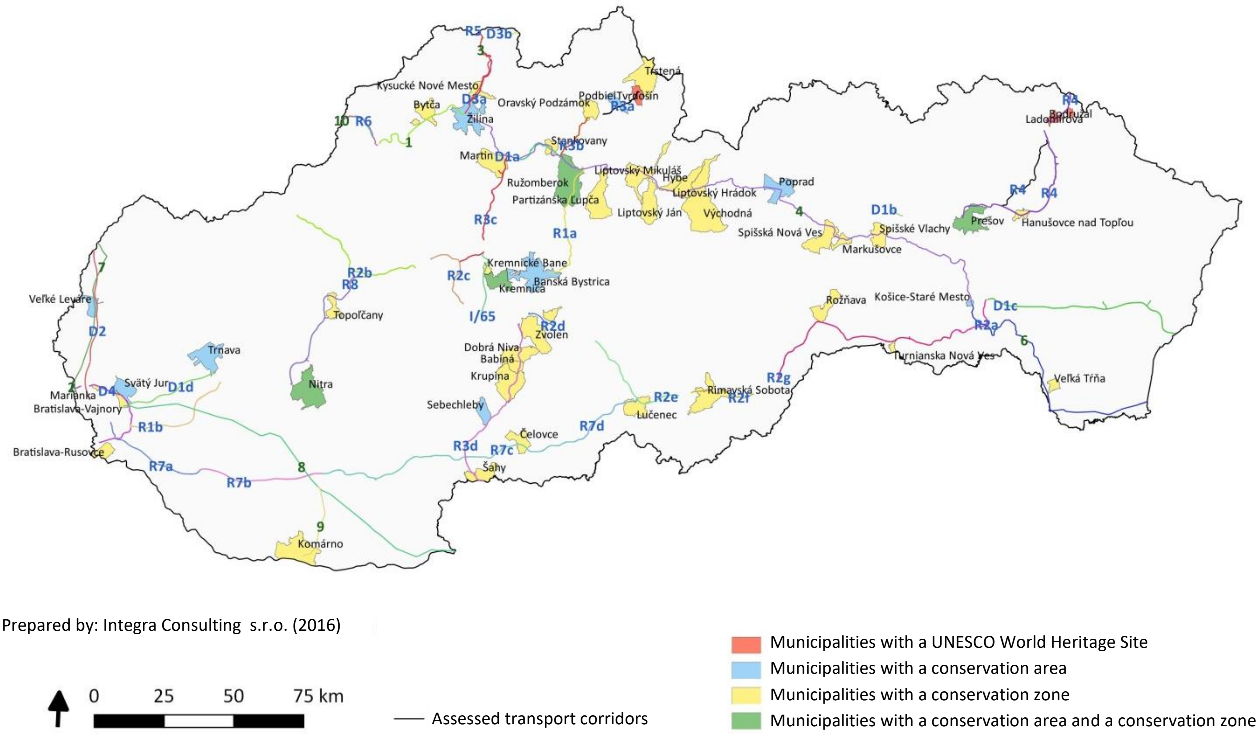


Fig. IV-34 Municipalities with monument protected areas potentially affected by construction of proposed routes of the transport infrastructure

Partial risk of the conflict between considered constructions and values protected as monuments were identified within measures of OPC7 – Completion of the North-South Connection in Eastern Slovakia. In case of one of the options of R4 corridor routing that are considered at present, a long-distance visual angle as specified in the Conservation Area Protection Principles of Hanušovce nad Topľou CZ (long-distance visual angle from the south-west) may be interfered near Hanušovce nad Topľou.

The risk of disturbance of long-distance face angle of PZ Hanušovice nad Topľou

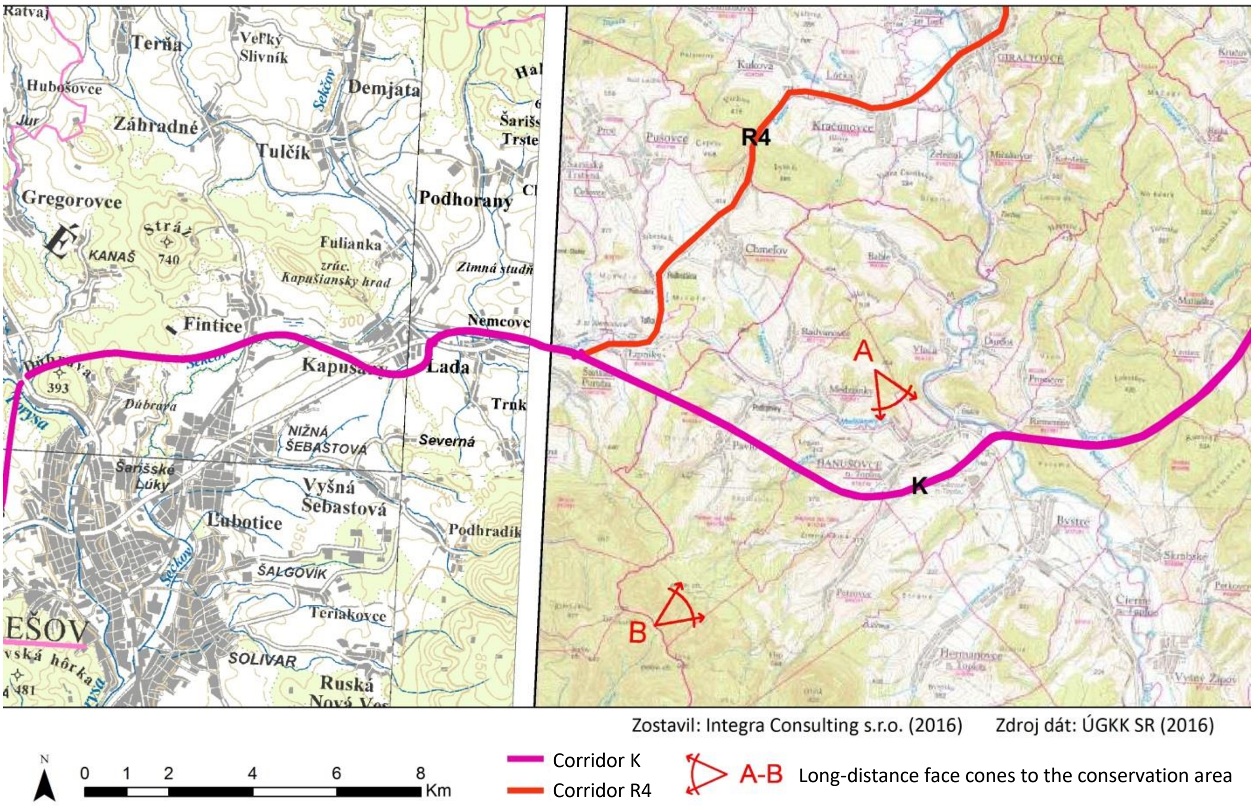


Fig. IV-35 Potential interference with the long-distance visual angle specified in the Conservation Area Protection Principles of Hanušovce nad Topľou CZ (long-distance visual angle B from the south-west) by R4 in the route K.

In addition to potential impacts arising from potential territorial conflicts of the proposed and considered corridors, impacts of changes in traffic intensity on conservation areas and especially conservation reserves were considered. With respect to the nature of intended strategy measures, negligible impact (no significant changes in traffic intensity) or positive impacts (in case of measures diverting road transport from historical centres) was identified in most of examined cases. In this respect, the risk of negative development was identified only in case of the conservation reserve Prešov where the transport model predicates increased intensity of freight transport on the route crossing the centre of the town or the territory of CR (see figure IV-36 below). It can be expected that increased intensity of transport will cause local increase in emissions (e.g. NO_x) and vibrations with potential negative impacts on construction and technical conditions of monuments and historic sites.

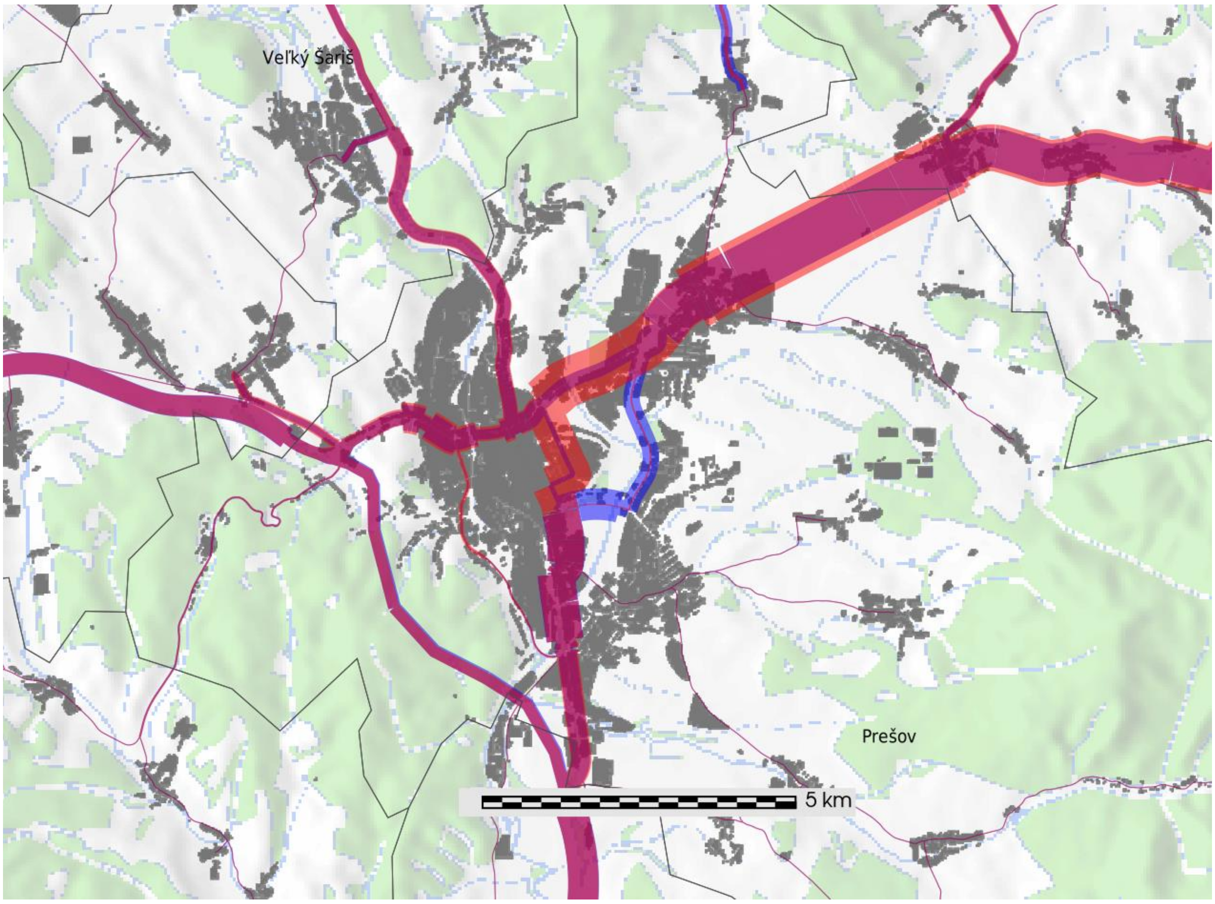


Fig. IV-36 Expected change in intensity of transport due to road freight transport (24-hour average). Increased intensity of transport is marked in orange in the proposed 2030 scenario compared to BAU 2030 scenario in the centre of Prešov, including its historical centre.

Cumulative impacts

As indicated in findings of evaluation, the risk of negative impacts (including cumulative impacts of different corridors) of the Strategy implementation on the cultural heritage is minor, slightly positive impacts will prevail especially due to measures reducing intensity of the road transport in centres of towns where most monuments and historic sites are located.

IV.3.11 IMPACTS ON WASTE PRODUCTION

Act No. 223/2001 Coll. on Waste defines waste management, such as collection, transport, recovery and disposal of waste, including care of disposal. In terms of waste production according to statistical classification of economic activities, the Transportation and Storage section ranked 9th in 2014 with the share of 1.4% (in 2010, the share in the total volume of waste was 1.35%, in 2011, it was 1.10%, in 2012, the share was 1.63% and in 2013, it was 1.82%).

The issue of waste arising from transport is a problem negatively affecting the environment. Waste in transport arises especially out of the change of the vehicle fleet, during construction and modernization of transport infrastructure and during transport itself.

In terms of transport infrastructure construction, the problem is especially in production of bulk construction waste. The biggest volume of waste produced in course of transport infrastructure construction project implementation is represented by soil from tunnel excavation and drifting unless the soil is used in construction, and bulk construction waste. Construction and demolition wastes are produced when buildings are furnished and maintained, when completed constructions are changed and constructions removed.

Then, during operation, waste will be produced during road maintenance and repairs. Increased amount of municipal waste may be expected at change terminals, airports, fuel stations, water ports and the like.

Waste from road transport, especially the need to use car wrecks (end-of-life vehicles) for recycling, represent crucial waste production from transport operation. Pursuant to the Waste Act and a new Waste Act a vehicle is a vehicle of M1 or N1 category, as well as a three-wheel vehicle except for motorized tricycles. An old vehicle is the vehicle which became waste. An average number of processed end-of-life vehicles in the period between 2010 and 2013 was about 36,000 pieces. In 2014, 29,175 pieces of end-of-life vehicles were processed in the territory of the Slovak Republic, which is a decrease of almost 21% compared to 2013 (36,858 pieces of end-of-life vehicles processed).

SR meets mandatory limits and deadlines for the degree of reuse of parts of old vehicles, waste recovery from old vehicle processing and old vehicle recycling pursuant to Government Ordinance No. 153/2004 Coll. laying down mandatory limits and deadlines for the degree of reuse of parts of end-of-life vehicles, of recovery of waste from the treatment of end-of-life vehicles and of recycling of end-of-life vehicles. In 2013, the degree of the overall reuse and recovery of end-of-life vehicles amounted to 94%, and the degree of reuse and recovery of end-of-life vehicles amounted to 93%.

In addition to a number of car wrecks, the main ecological risks include especially potential leakage of operational fluids as dangerous waste themselves such as oil, greases, non-freezing liquids (ethanol, tensides), brake fluids (glycols and organic solvents), cooling liquids (ethylene glycol), sodium azide (source of propulsive gas in an airbag), heavy metals and the like.

In addition to car wrecks, the Slovak Republic annually produces a lot of used (waste) tyres, showing an increasing trend in recent years. In 2013, production of this waste exceeded 30,000 tons. This year, municipal waste was subject to check for waste tyres for the first time, resulting in about 2,200 tons of waste tyres.

Material recovery prevails in waste tyre handling in the long term. In 2013, the level of waste tyre recycling amounted to 72% and 11% of waste tyres were recovered in terms of energy.

Exhausted accumulators are dangerous as well. Ecological failure rate of primary cells and accumulators stems from toxic components (Hg, Pb, Ni, Cd, etc.). Directive of the European Parliament and the Council 2006/66/ES on batteries and accumulators and waste batteries and accumulators repealing Directive 91/157/EEC on batteries provides that EU member states should achieve minimum thresholds for collection of portable batteries and accumulators amounting to 25% by 26 September 2012 and 45% by 26 September 2016. In 2014, the share collected amounted to 66%, an increase of 17% compared to 2013 *(State of the Environment Report of the Slovak Republic 2014 (Ministry of Environment of SR, SEA, 2015))* and, at the same time, the objectives set for collection of waste portable batteries and accumulators in the given year were met.

Material resources and impacts related to their use

Effective use of raw material resources and reduction of raw material extraction and transport impacts during project implementation are another aspects related to transport infrastructure development. The issue of maximum use of materials obtained in construction is important in terms of efficient use of resources. This applies to primary materials from excavations of cuts and tunnels and construction waste, e.g. from demolition of buildings or technical infrastructure objects.

A large quantity of usable waste is produced in the course of upgrading railway infrastructure as well as tramway track infrastructure when removing ballast bed. Effective use of obtained materials may also reduce an impact on other parts of environment where spoil heaps are created otherwise having a negative impact on the terrain, acquisition of land and habitat liquidation.

Assessment of impacts

The Strategy fails to deal with specific technical solutions and technologies of the construction of respective transport measures and thus it was impossible to assess effects of respective measure implementation in terms of impacts on waste production or use of secondary raw materials.

It can be expected that, in general, implementation of the concept will increase waste production especially in connection with intended construction of new corridors and modernization of sections of existing roads and road extension – the key problem in terms of the Strategy will be in increased volumes of excavation soil from construction of new corridors of the road network including motorway feeders and bypasses.

If measures are implemented which will increase road transport, unfavourable development of waste production may be expected in connection with continuous tendency of increasing individual road transport (IRT) in towns and cities, i.e. increased number of end-of-life vehicle, waste tyres and exhausted accumulators.

When the precautionary principle is observed with legislative conditions of waste management and measures proposed to prevent, exclude or minimize negative impacts on waste production and handling as proposed in Chapter V, no significant negative impact may be expected in following steps of the Strategy implementation in the field of waste management.

Higher production of waste, relating to construction and operation of transport infrastructure, must be solved within the valid legal regulations for waste management. At the same time, the Strategy should discuss possibilities how to support measures to reduce waste production mainly from construction and road transport activity and include the reduction of material demands or preferred re-use and recycling of waste in the measures focused on new construction, modernization and/or safeguarding of maintenance of transport infrastructure.

IV.4 ASSESSMENT OF THE LAND PASSABILITY FOR TRANSPORT CORRIDORS

This chapter provides results of the land passability analysis for considered transport corridors. It is the synthesis of identification of potential conflicts between considered transport constructions and various values of environment, or the analysis of the land resistance to large transport constructions. This method is suitable especially to compare different options of the particular transport connection but it can also be used to obtain summary information on likely effects of the transport corridor implementation.

The evaluation below represents first and basic information on the resistance of lands against intended transport corridors. This information requires further supplementation and detailing depending on exact routes, i.e. in the next stage of the project preparation.

IV.4.1 BASIC CONCEPT OF METHODOLOGY[67]

1. Analytical part – ensures delineation of all important landscape elements on the map

[67] The methodology was taken and modified from: Anděl P., Gorčicová I., Petržílka L., Andělová H. et Krupková D. (2006): Evaluation of Land Passability for Line Structures – Technical Specifications of Czech Ministry of Transport no.182, 64 pp.

2. Categorization part – converts respective steps in the unified value scale
3. Synthetic part – models an overall quality of the assessed territory
4. Assessment – defines basic conclusions for transport corridors

1. Analytical part

The objective of the analytical part is to gather necessary data on the state of respective components of the environment in the concerned territory and present them in the map. The results are shown in respective analytical maps. Terms and categories from the given subject disciplines and legislation are used for description so that the result has a generally valid character and is not affected by the attitude of the processor. Analytical maps with comments are the basic support material for other papers and comparisons in the future.

2. Categorization part

The categorization part is a key step of the entire methodology. The objective of the categorization is to convert data in analytical maps from very different fields to a small number of clearly defined categories representing potential relation of the given component to the prepared construction. This part assesses either passability of the territory for the given construction or resistance of the territory against the construction.

Defining a model resistance quantity (k) of the landscape element

Resistance of the landscape element is a model quantity expressing potential non-passability of the component for the line construction. This quantity takes any value from the interval /0; 1/ where limit values represent:

Tab. IV-15 Resistance (k)

(k)	Resistance	Characteristics
1.0	very high	the construction is practically not feasible at the given element
0.0	very low	the construction is feasible at the given element without any special restrictions

For practical purposes, it is appropriate to group the components of similar resistance in several basic categories which may be easily defined and graphically distinguished in maps. The Table below provides general definitions of 5 basic categories and their colour code.

Tab. IV-16 Basic characteristics of the used categories

Resistance Category	Resistance (k)	Description	Characteristics	Colour Code
K1	1.0–0.81	highly sensitive territory	The territory is not passable for the construction, this category includes only localities with the highest degree of protection or having completely	Red

			unique value. Inclusion in this category should always be backed by legal regulation.	
K2	0.8–0.61	compromise territory, high value	The territory is passable only in exceptional cases and with special, often very broad-reaching minimizing and compensating measures.	Orange
K3	0.6–0.41	compromise territory, medium value	The territory of relatively significant conflicts with relevant phenomena, labelled as a compromise territory, allows finding suitable optimisation solutions.	Yellow
K4	0.4–0.21	compromise territory, low value	The territory of less significant conflicts, relatively passable. The component is present but its resistance is very low.	Light Green
K5	0.2–0.0	free territory	The territory where the plan may be permitted without restrictions in terms of the given factor. Mostly the area where the assessed component is not present.	Dark Green

Conversion key

A conversion key is the basic tool for categorization which will include each assessed component in the relevant category and assign a particular resistance value to the component.

The conversion key is prepared on the basis of general legislative categorizations and respected local conditions.

Tab. IV-17 Conversion table of component resistance – inclusion in basic categories.

Component of environment	K1 0.81–1.0	K2 0,61–0,8	K3 0.41–0.6	K4 0.21–0.4	K5 0.0–0.2
Settlement and built-up areas	residential and combined settlements	sports and leisure areas, “critical protection zone of settlements”	production or warehouse areas, utilities and services, zone of settlement’s well-being factors		
Surface water	water reservoirs	significant rivers and water bodies	minor rivers	flood area	
Underground water and water resources	OPVZ degree I	OPVZ degree II	CHOPAV		
Special protection nature areas	NNR NR, NNH, NH, NP, PLA zone I and II	protection zones SPA, PLA zone III	PLA zone IV or protection zone of NP and PLA		
ILE		lakes, bog, registered ILE	forests, watercourses, ponds, valley floodplains		
Component		all bio-centres	local TSES,	interaction elements	

Component of environment	K1 0.81–1.0	K2 0,61–0,8	K3 0.41–0.6	K4 0.21–0.4	K5 0.0–0.2
parts of TSES		and bio-corridors transregional and regional	protection zones SRCBOR		
Natura 2000		protected bird areas (PBA), areas of European importance (AEI)			
Special protected species		exceptionally valuable localities of transregional importance (stabilized occurrence of critically endangered species)	important flora and fauna localities, exceptionally valuable biocenosis (occurrence of heavily endangered species)	flora and fauna localities of minor importance (occurrence of endangered species)	
Protected trees	protected trees including protection zone				
Rock environment		extraction areas	protected deposit area	undermined territory, landslide territory, possible reserves	
Agricultural land		Soils of quality class I under BPEJ classification	Soils of quality class II under BPEJ classification	Soils of quality class III under BPEJ classification	quality class IV and V under BPEJ classification
Forests – non-productive functions		protective forests, special purpose forests	Commercial forests		
Forests – productive functions		forest with high and above-average production potential	forest with average and below-average production potential	forest with low and very low production potential	
Cultural and archaeological sites	all registered cult. and historical sites, preserved sites of cultural heritage	protective zones of culture sites, zones of cultural heritage	confirmed areas of archaeological findings	expected areas of archaeological findings	
Landscape character		nature park	natural landscape – C	landscape harmonic – B	landscape anthropogenic – A

Component of environment	K1 0.81–1.0	K2 0,61–0,8	K3 0.41–0.6	K4 0.21–0.4	K5 0.0–0.2
Proposed development areas according to the Land Use Plan		proposed residential and combined settlement zone	proposed sports and leisure areas	proposed production and storage areas, utilities and services	

If a component can be assessed in various categories (e.g. a forest can be an important landscape element and a forest stand at the same time), such a component will be included in the synthesis only once (in one category).

Tab. IV-18 Overview of maps acquired and included in the analysis, with resistance values assigned

Environmental component	Compartment	Assigned resistance value
Settlement and built-up areas (Corine 2012)	Residential and combined settlements	0.9
	Sports and leisure areas	0.7
	Production and storage areas, utilities and services	0.5
Surface water	Significant river courses and water bodies	0.5
	Minor river courses	0.3
Ground water and water resources	1st protection zone of water resource, mineral springs	0.9
	2nd and 3rd protection zone of water resource	0.7
	PWMA and WCB	
Special protection of nature territories (NNR NR, NNH, NH, NP, PLA)	Degree of protection V	0.9
	Degree of protection IV	0.7
	Degree of protection III	0.5
	Degree of protection II	0.3
	Degree of protection I	0.1
TSES	SrBc, SrBcor, RBc, RBcor	0.7
Other protected areas	NATURA 2000, Ramsar, biosphere reserves, UNESCO	0.7
Protected trees	Protected trees	0.9
Rock environment	Extraction areas	0.7

3. Synthetic Part

This synthetic part aims to create a single map showing the total permeability of the territory concerned in terms of all assessed components. The synthetic part represents a certain modified type of multi-criteria assessment intended to categorize the territory of interest based on the general feasibility of construction, taking into account all assessed components. Since the term "overall environmental quality" is difficult to define (yet justified), synthetic maps should be seen as a certain modelling experiment that can be carried out by a range of various methodological procedures.

Selected Models of Synthesis

(a) Maximum resistance model

Only the K1 resistance value will be projected at all times in the final synthetic map from individual categorization maps for every point of the territory. This is a primary modelling approach that is applicable in environmental terms, because the final value of a specific element cannot be covered up by low values in other components of the environment.

(b) Mean resistance model

This model is based on the principle that a mean resistance value for each point of the territory will be projected at all times in the final synthetic map from individual categorization maps. This model is applicable especially in cases where a more refined differentiation of the territory is required.
Calculation algorithm:
S = MEAN (k1, k2, ...kn)
S ...resultant value (or category) of mean resistance
MEAN... mean value from the set
ki ... resistance of the i-th component (based on K1 to K5 categories)
n ... number of categorized components (number of categorization maps)
Disadvantage: The most valuable sites will be suppressed when values are averaged in this model.

(c) Combinations of models (a) and (b)

A combination of these two models, i.e. overlapping final maps from models (a) and (b), will eliminate the suppression of the most valuable sites with such a weight that their existence precludes routing in the given territory regardless of other components.

Work flow

Considering the high number of landscape elements to be assessed for every construction, and for the sake of practical clarity, synthesis of categorization maps is not done concurrently, but in steps that follow a practical hierarchy of environmentally protected elements. The process of synthesis and the synthetic map can be divided into the following parts:

a) Partial synthesis. Several thematic maps are combined into a single map. For example, a "Nature" synthetic map is developed by partial synthesis of categorization maps: the territorial system of ecological stability, special protection areas, important landscape elements, sites of special protected species, etc. Any combination of the two categorization maps is partial synthesis. These partial synthetic maps can then be used as the basis for more advanced syntheses.

b) Resultant synthesis. Resultant synthesis is a final synthesis from partial synthetic maps that includes the results from all categorization maps. It is a model of the overall environmental quality of the area under review.

IV.4.2 EVALUATION OF THE PLANNED TRANSPORT CORRIDORS

OPC5 – Completion of the West-East priority axis (Rhine–Danube corridor, Czecho-Slovak branch)

D1 – Turany – Hubová (D1a) – The western part of the corridor runs through a territory with low mean resistance, but with the occurrence of elements of maximum resistance (a built-up area in the Sučany municipality). The eastern part of the corridor runs through a territory of medium value, with accumulated important elements that allow the identification of suitable optimization solutions.

D1 – Behárovce – Branisko (D1b) – The corridor is routed through a territory without any elements of maximum resistance.

D1 – Bidovce – the Slovak/Ukrainian border (D1c) – The corridor runs through a free territory or through a territory of less significant conflicts, with occurrences of elements with medium and high value, however these elements are not accumulated. Elements of maximum resistance involve built-up areas in municipalities.

R6 – the Slovak/Czech border – Púchov (R6) – The corridor runs through a free territory or through a territory of less significant conflicts, with occurrences of elements of medium and high value, however these elements are not accumulated. Elements of maximum resistance are located mostly in parallel with the corridor and involve built-up areas in municipalities.

OPC6 – Completion of the north-south connection to Poland and the Czech Republic

D3 – Žilina Brodno – Oščadnica – Čadca Bukov (D3a) – A territory of relatively significant conflicts with relevant phenomena, labelled as a compromise territory, allows the identification of suitable optimization solutions. Elements of medium importance are accumulated here. Elements of maximum resistance involve settlements, protected trees can also be found in a wider area around the corridor.

D3 – Skalité – Slovak/Polish border (D3b) – The corridor runs through a free territory, partly through a territory of less significant conflicts. There are also elements of medium resistance, but they are not accumulated. Elements of maximum resistance are located mostly in parallel with the corridor and involve settlements.

R5 – Svrčinovec – Slovak/Czech border (R5) – As a compromise, the corridor runs through less valuable territory. There are elements of low and medium resistance, with no elements of maximum resistance.

OPC7 – Completion of the north-south connection in Eastern Slovakia

R2 – Šaca – Košické Oľšany (R2a) – The corridor runs through a free territory, the only resistant elements are water courses.

R4 – the Polish/Slovak border – Prešov northern bypass (R4) – A territory of medium and high value. The territory is passable with special, often very broad-reaching minimizing and compensating measures. There is an accumulation of resistant elements, with occurrences of elements of maximum resistance.

OPC8 – Completion of the west-east road axis in Central Slovakia

R2 – D1 Junction – Nováky (R2b) – The territory is free; the only resistant elements are water courses.

R2 – Nováky – Žiar nad Hronom (R2c) – The territory is free; the only resistant elements are water courses. The corridor bypasses elements of maximum resistance.

R2 – Zvolen West – Zvolen East (R2d) – A territory of relatively significant conflicts with relevant phenomena, labelled as a compromise territory, allows the identification of suitable optimization solutions. There are elements of maximum resistance involving mineral springs.

R2 – Kriváň – Ožďany (R2e) – The territory is free, local compromise, less valuable. Resistant elements include water courses.

R2 – Ožďany – Figa (R2f) – The territory is free; resistant elements include water courses and PBA.

R2 – Tornaľa – Šaca (R2g) – A territory of relatively significant conflicts with relevant phenomena, labelled as a compromise territory, allows the identification of suitable optimization solutions.

OPC9 – Completion of the north-south road axis in Central Slovakia

R3 Tvrdošín — Sedliacka Dubová (R3a) – The territory is a compromise, with up to medium value. A territory of relatively significant conflicts with relevant phenomena that allows the identification of suitable optimization solutions. There are elements of maximum resistance in the territory.

R3 – Oravský Podzámok – D1 Junction (R3b) – A territory of significant conflicts with relevant phenomena, labelled as a compromise territory, allows the identification of suitable optimization solutions. Elements of maximum resistance (settlements) are located within the Dolný Kubín municipality.

R3 – Martin – Šahy (R3c) – The southern part of the corridor in particular represents a territory of significant conflicts with relevant phenomena. There is an accumulation of multiple elements with various degrees of resistance. The territory can be described as a compromise that allows the identification of suitable optimization solutions. There is no fundamental conflict with elements of maximum resistance.

R3 – Šahy – Zvolen (R3d) – The majority of the territory is free. Protected areas are accumulated at some locations, resulting in higher resistance in the territory. In general, the territory can be described as a compromise that allows the location of suitable optimization solutions.

R1 – Banská Bystrica – D1 (R1a) – The central part of the corridor in particular runs through a territory of significant conflicts with relevant phenomena. There is an accumulation of multiple elements with various degrees of resistance. The territory can be described as a compromise that allows the identification of suitable optimization solutions. The conflict with elements of maximum resistance involves settlements within the territory.

OPC10 – Road network development in the Bratislava Agglomeration

D1 – Bratislava – Trnava, extension to 6 lanes (D1d) – The territory is free; local areas of less significant conflicts. There are also elements of medium and high value, but they are not accumulated. The corridor bypasses elements of maximum resistance.

D4 – Bratislava Jarovce – the Slovak/Austrian border (D4) – The northern part of the corridor is a territory of significant conflicts, with accumulation of resistant elements. The territory can be described as a compromise that allows the identification of suitable optimization solutions. There is no fundamental conflict with elements of maximum resistance. The resistance of the territory of low passability is good in general.

OPC12 – Modernization and development of other motorway and expressway networks, if reasonable

D2 – Bratislava Lamač – the Slovak/Czech border, increasing the capacity of the motorway (D2) – The corridor runs alongside resistant elements and does not interfere with them directly. The territory is thus a compromise with relatively good passability.

R1 – Most pri Bratislave – Vlčkovce (R1b) – A territory with a higher number of more or less resistant elements, however, these elements are not accumulated. The territory is thus a compromise with relatively good passability.

R7- Bratislava – Dunajská Streda (R7a) – Resistant elements are accumulated in the eastern part of the territory. This is a territory of significant conflicts, but it is a compromise and allows the location of suitable optimization solutions. The rest of the territory is free and well passable.

R7 – Dunajská Streda – Nové Zámky (R7b) – The territory is free, there is no accumulation of resistant elements and no conflict with elements of maximum resistance. Elements of maximum resistance within the territory involve protected areas.

R7 – Nové Zámky – Veľký Krtíš (R7c) – The territory is free, there is no accumulation of resistant elements and no conflict with elements of maximum resistance. The majority of the territory is free of any elements.

R7 – Veľký Krtíš – Lučenec (R7d) – The territory is free, there is no accumulation of resistant elements and no conflict with elements of maximum resistance. The majority of the territory is free of any elements.

R8 – Nitra – R2 intersection (R8) – The territory is free, there is no accumulation of resistant elements and no conflict with elements of maximum resistance. The majority of the territory is free of any elements.

OPŽ1 – Completion of the upgrade in major TEN-T routes, in an advanced stage of preparatory work: Púchov – Žilina, Žilina – Čadca – national border, Devínska N. Ves – Marchegg

Púchov – Žilina corridor (1) – A territory of less significant conflicts, relatively passable. The passability of the territory is affected mainly by water courses and settlements.

Devínska Nová Ves – the Slovak/Austrian border corridor (2) – A territory of less significant conflicts, relatively passable. The passability of the territory is affected mainly by protected areas.

The Czech/Slovak border – Čadca – Krásno nad Kysucou corridor (3) – A territory of relatively significant conflicts with relevant phenomena, labelled as a compromise territory, allows the location of suitable optimization solutions. Elements of medium importance are accumulated here. Elements of maximum resistance involve settlements, protected trees can also be found in a wider area around the corridor.

OPŽ4 – Upgrade of Žilina – Košice – Čierna nad Tisou core route

Žilina – Košice corridor (4) – A large territory with accumulation of resistant elements at several locations. There are conflicts with elements of maximum resistance at several locations. Since this is an existing corridor, only an optimization solution can be found.

Košice – Čierna nad Tisou corridor (6) – Elements of higher resistance are accumulated in the eastern part of the territory. Apart from that, the territory is well passable. The elements of high resistance include settlement territories.

OPŽ5 – Upgrade of the Kúty state border – Bratislava – Štúrovo/Komárno state border corridor

The Czech/Slovak state border – Kúty – Devínska Nová Ves corridor (7) – The corridor runs through a significant element of maximum resistance (built-up areas of the town of Malacky). The rest of the territory is a compromise, with relatively good passability.

Bratislava Vajnory – Štúrovo corridor (8) – A territory of less significant conflicts, relatively passable. The passability of the territory is affected mainly by water courses, protected areas and settlements.

Bratislava – Nové Zámky – Štúrovo/Komárno corridor (9) – A territory of less significant conflicts, relatively passable. The passability of the territory is affected mainly by water courses, protected areas and settlements.

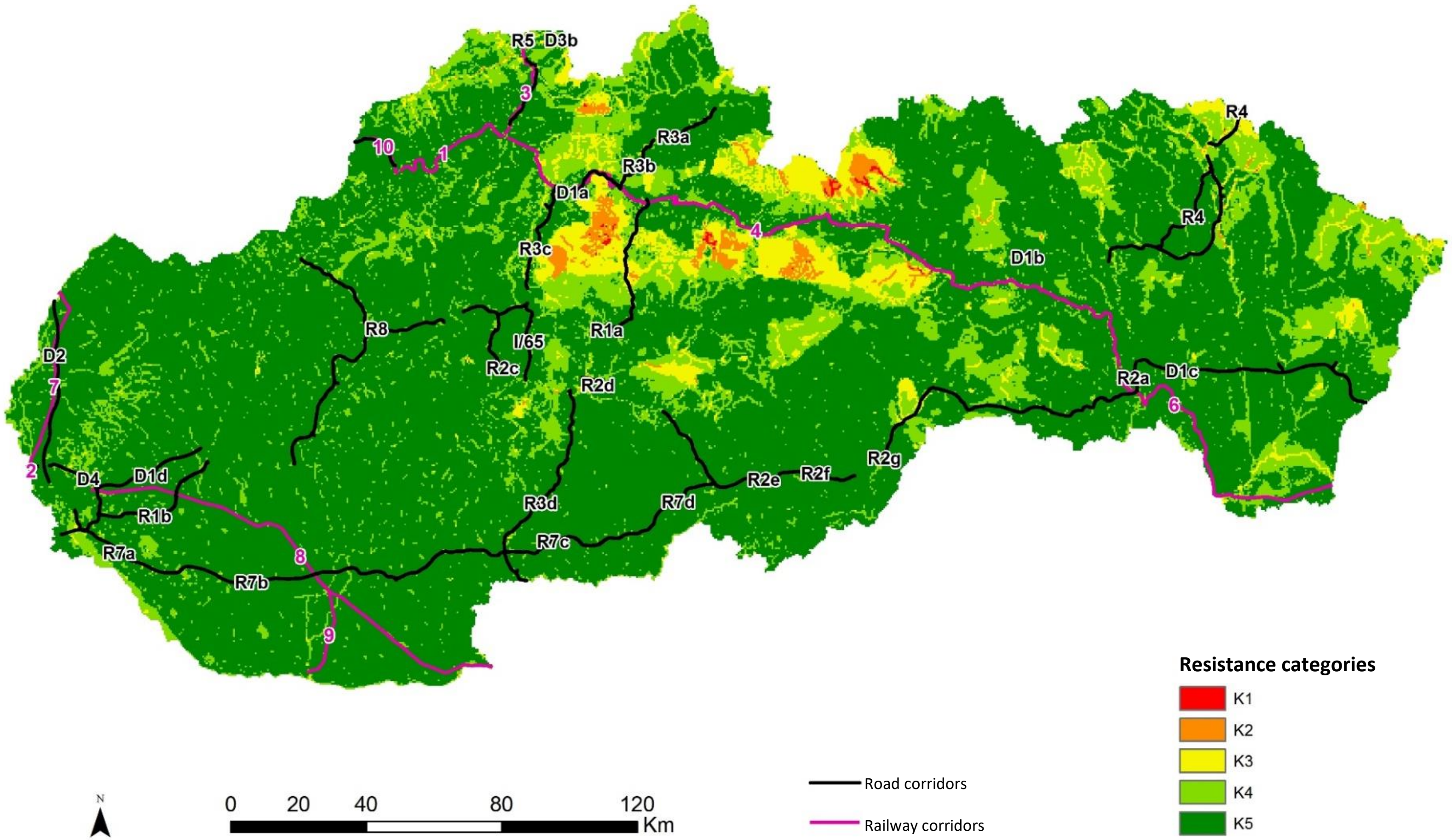


Fig. IV-37 Identification of potential conflicts of transport corridors with mean territorial resistance

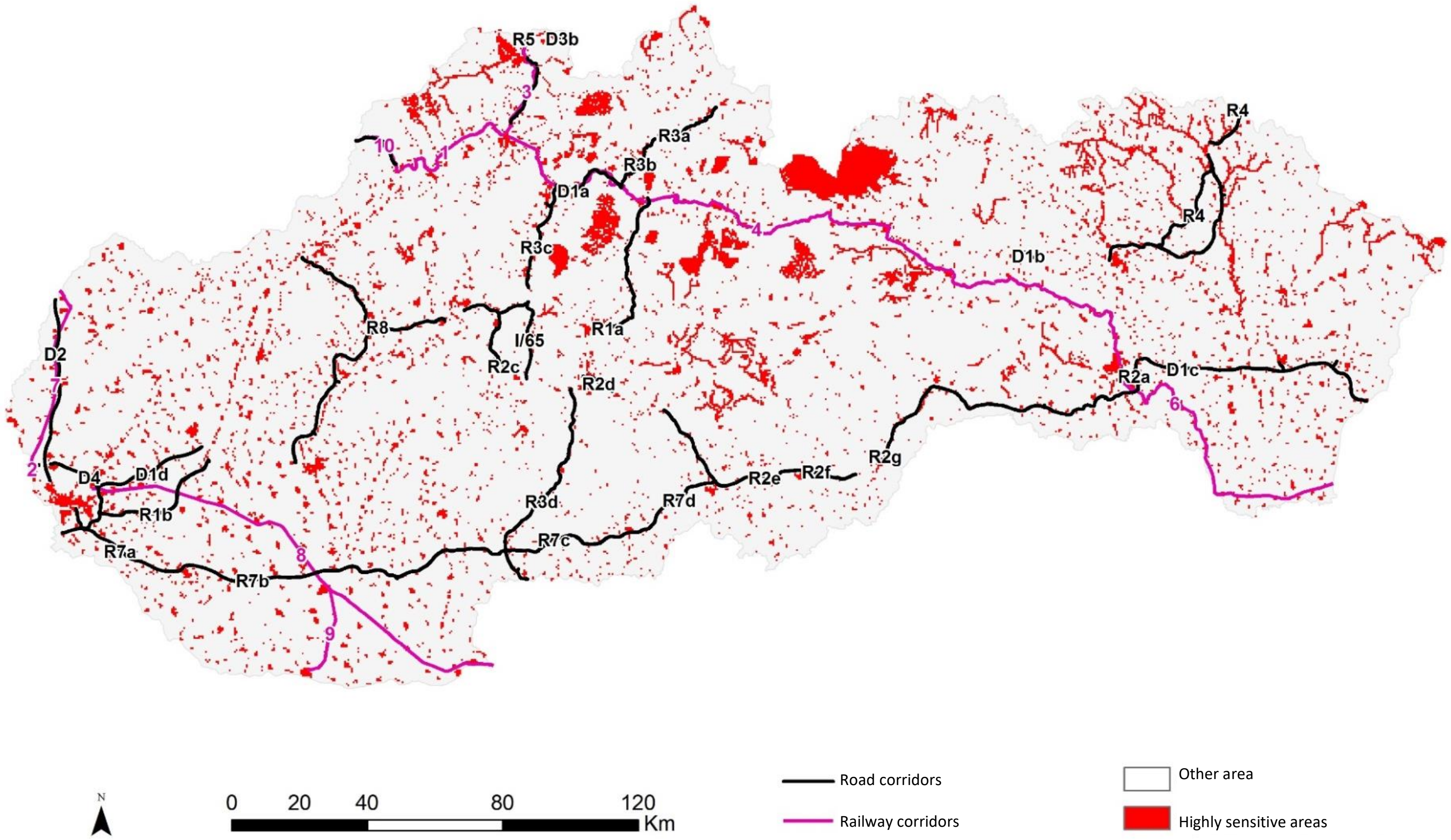


Fig. IV-38 Identification of potential conflicts of transport corridors with high sensitivity territories

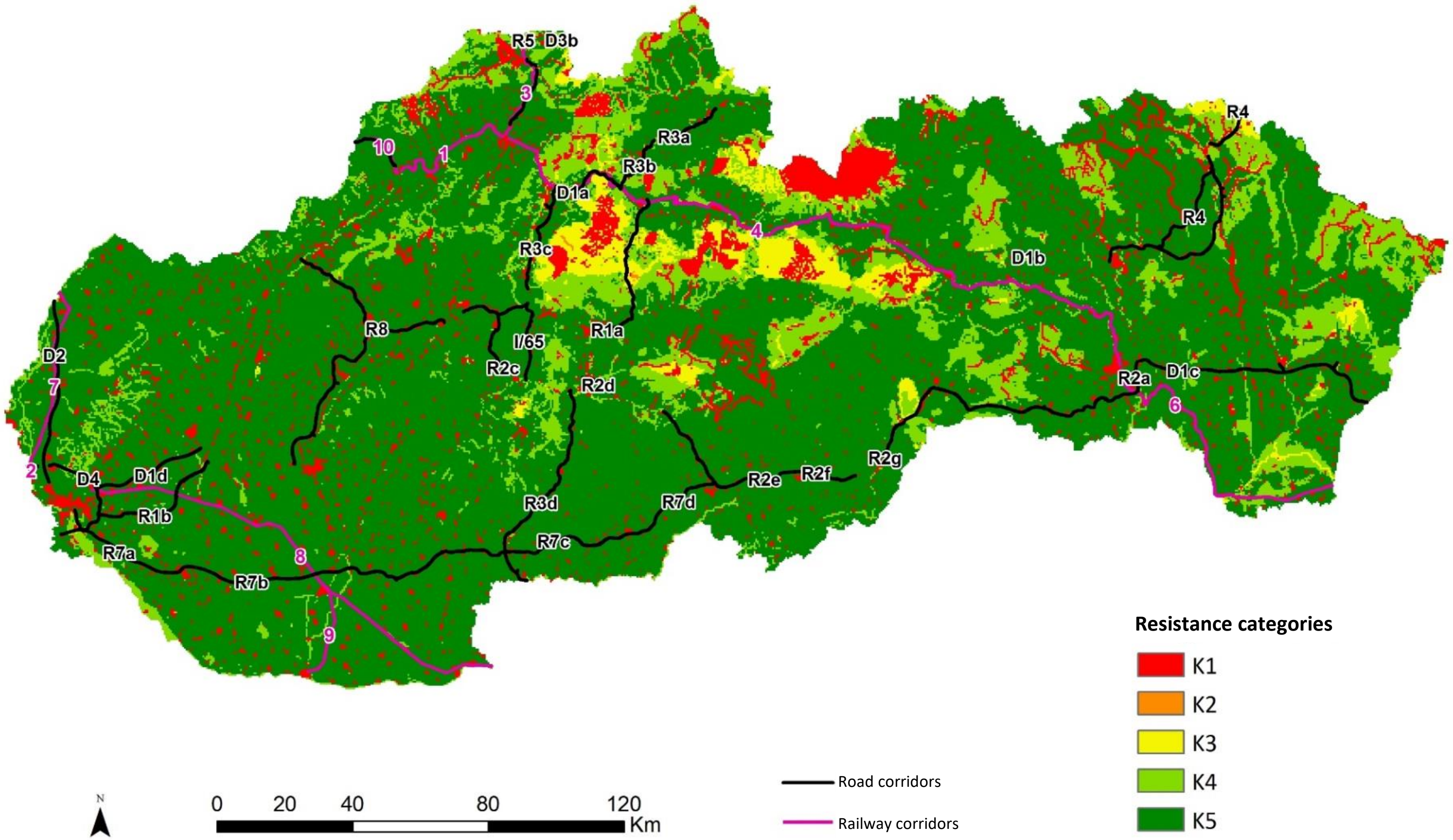


Fig. IV-39 Identification of potential conflicts of transport corridors with territorial resistance

V. MEASURES PROPOSED TO PREVENT, ELIMINATE, MINIMIZE AND COMPENSATE FOR ENVIRONMENTAL AND HEALTH IMPACTS

The draft SPTD SR 2030 does not address the territorial routing of transport corridors or specific transport plans that will be discussed in independent routing studies and land-use plans. The draft SPTD SR 2030 urges that the steps mentioned below are strictly required in the process of the preparation of different project plans, especially in phase 1 of the design stage. Conceptual preparation involves the following tools:

1.1 Forecasts, surveys, land-use plans

1.2 Concept studies (studies of possibilities and opportunities) – optional designs

1.3 Feasibility studies (FS)

1.4 Territory-technical study, background material for building plan documentation

In this regard, our primary recommendation is to thoroughly apply the process of strategic environmental assessment as required in Art. 4 (1) of Act No. 24/2006 in the process of preparing land-use plans containing transport plans subject to the EIA.

It is proposed to use the recommendation given in the right column of the table below for concept studies and feasibility studies and in the territory-technical studies.

Table V-1 Measures to mitigate negative and to enhance positive environmental impacts

Recommendation to be considered in SPTD SR 2030	A recommendation to be taken into account in concept studies, feasibility studies and territorial-technical studies.
Measures to mitigate the impact on air	
A. To ensure the monitoring of road transport emissions in regions with the highest share of areas with potential deterioration of the emissions situation compared to the zero variant from the concept, i.e. in the Bratislava Region and Žilina Region. It is suggested to conduct an annual traffic census on arterial roads in these regions. It will be used to update transport models and regional transport emission balance. If the trend in road transport emissions increases or the gap in transport emission trends gets wider in these regions compared to other regions of the Slovak Republic, it is recommended to update the transport strategies for these regions in order to reduce the burden on the	1. In the case of the Košice eastern motorway bypass, an increase in the transport emission burden is indicated in municipalities along the new route (Rozhanovce, Košické Oľšany, Sady nad Torysou, Košická Polianka, Vyšná Hutka, Nižná Hutka, Kokšov-Bakša, Valaliky), and it is not sufficiently counter-balanced by redirecting a sufficient amount of transit traffic from Košice. It is recommended to design technical and organizational measures to increase the attractiveness of the new route for traffic transiting from Košice and to thoroughly review possible emission conflicts with residential areas, if the traffic load increases on this route due to such technical and organizational measures. 2. In terms of the measures taken for "OPC8 – Completion of the west-east road axis in Central Slovakia", several transport structures are designed

population due to exceeded emission concentration limits.	close to residential areas so there is a realistic risk that they will not satisfy the desired function of a settlement bypass at the given transport route in terms of emissions. As regards this corridor, we deem it necessary to review other territorial routing options for these structures in order to minimize conflicts with residential areas and roads running in their vicinity. 3. For the corridor "D2 – Bratislava Lamač – the Slovak/Czech border, increasing capacity of the motorway", it is recommended to review in detail in the EIA the impact on all settlements along the D2 based on the expected traffic loads arising from the transport models, including the cumulative effects of the designed nearby construction of the D4 in the case of Stupava. 4. Within the "R1 Most pri Bratislave – Vlčkovce" corridor we recommend a detailed evaluation of the impact on the emission situation while using the results of the regional transport model. It is necessary to carry out a more detailed assessment of the traffic load of the proposed R1 and the surrounding roads, i.e. to evaluate whether a new transport emission contribution along a new route is to be positively compensated for by a reduction of transport intensities on the currently used roads. There is a reasonable concern that the corridor induces new traffic into the residential areas along the route, however, potential emission contributions in other places in the region shall be non-detectable. 5. In the case of the "R7 Nové Zámky – Čaka" corridor, we recommend verification of the possibility to adjust the territorial routing in the Čaka – Horné Semerovce section with regard to the conflict with residential areas. 6. In the case of the "R7 Veľký Krtíš — Lučenec" project we recommend verification of the possibility of routing a longer distance from the current road and settlements. 7. In the case of the "R8 Nitra — R2 intersection" project we recommend acceleration of preparation

	due to evaluated significant positive impacts on air without identified risks.
Measures to mitigate the impacts on greenhouse gas emissions	
B. It is recommended to supplement the following measures to reduce greenhouse gas emissions in the draft SPTD SR 2030: Legislative measures • A measure motivating citizens to accelerate the replacement of the vehicle fleet (in the form of financial support), • A measure to motivate the accelerated replacement of the vehicle fleet in the private sector (in the form of tax instruments), including exemption of freight vehicles fuelled by CNG from toll payment, • Improvement of the functionality and tightening of the conditions of the system of regular checks of the condition of vehicles (completeness of exhaust systems) Information measure • Information support of car sharing, • Information support of eco-driving, Road transport • Support of the construction of town and municipality bypasses in order to enhance traffic flow and thus reduce fuel consumption • Introduction of low-emission zones in big cities • Support for use of alternative drives with low production of greenhouse gases (hybrid and electric cars) Rail transport • Support of railway electrification • Support of the competitiveness of railway in freight transport (increase of traffic flow, elimination of bottlenecks, setting competitive prices compared to road traffic)	-

• support renewal of vehicles in the fleet which are currently considerably outdated in Slovakia – similar to the whole of Europe Air transport • Support of low-carbon fuels in air transport	
Measures to mitigate the impact of noise and vibrations	
C. When processing the strategic noise charts and action plans it is recommended to apply the transport model created within the processing of SPTD SR 2030 and to build on the modelled intensities for the current scenario of the transport network development by 2030. This will enable the consideration of prospective traffic intensities and preparation of long-term measures to reduce the current predicted noise load on inhabitants.	8. When performing any kind of construction, its technical solution needs to be assessed in detail in relation to the location of the construction (accurate surveying including the surrounding terrain morphology) and to the residential area – preferably by a noise study which could be supported by noise measurement. The study can focus both on the common assessment of impacts of the new construction and even better in the context of roads. The noise study shall include (if necessary) a proposal of anti-noise measures – it can be compared to the proposal of anti-noise measures which are part of the action plans.
Measures to mitigate the impacts on inhabitants and health	
D. We recommend re-formulation of strategic objective No. 5 as follows: "Reduction of negative environmental and negative socioeconomic transport impacts..." so that positive transport impacts on society could be applied.	9. When implementing SPTD SR 2030 at the project level (EIA), not only standard aspects of impacts on human health (usually taking into account exposure of inhabitants to changes in the air and noise load) need to be assessed, but also social relations in the given settlement, and further stages of the project and land documentation shall prevent the creation of fragmented urban settlements and safeguard natural and historic social contacts.
Measures to mitigate the impact on nature and landscape	
E. Include the following in Chapter 5.3.1.3 Process of preparation and realization of development project including related activities: "In the course of the preparation of individual infrastructure projects, select routes in consideration of the protected areas, Natura 2000 areas and valuable landscape features, and assess the territorial routing in the SEA process at the level of land-use plans".	10. The projects at the level of concept studies or feasibility studies should also include measures that enable animal migration based on the results of a survey of the existence of vertebrates and migration paths." 11. With the following corridors, identify a route and technical solution without any significant negative impact on the land of Natura 2000 and the national systems of protected areas:

F. Include the following in Chapter 5.3.1.7 Regular monitoring of noise and air quality and implementation of measures reducing the negative environmenal impacts of transport: "Monitoring vertebrate mortality on roads and railways, mapping of animal migration corridors, completion of measures to avoid collisions and measures to enable migration using the current infrastructure (ecoducts, wide areas under bridges and water gates with dry banks, fences and barriers against amphibians together with passages)"

G. Furthermore, we recommend preparing the following studies as a basis for the SPTD SR 2030 implementation and update:
   - Studies of migration routes of big predators for the whole Slovak Republic. The study conclusions should be respected in the planning of the territorial routing of constructions and of measures to mitigate the negative impact.
   - Studies of the necessity and convenience of making individual waterways navigable. In addition to an analysis of the demand for water transport and the available capacities of parallel modes of transport, mainly railways, and an economic analysis of the financial investment and benefits, the study should include an analysis of the provided ecosystem services, the value of which will be reduced by building waterways.

- OPC5
  - D1 Turany — Hubová (D1a)
  - D1 Bidovce — the Slovak/Ukrainian border (D1c)
- OPC7:
  - R2 Šaca — Košické Oľšany (R2a)
  - R4 Polish/Slovak — Prešov northern bypass (R4)
- OPC8
  - R2 Kriváň — Ožďany (R2e)
  - R2 Ožďany — Figa (R2f)
  - R2 Tornaľa — Šaca (R2g)
- OPC9
  - R3 Tvrdošín — Sedliacka Dubová (R3a)
  - **R3 Oravský Podzámok — D1 intersection (R3b)**
  - R3 Martin — Šahy (R3c)
  - R3 Šahy — Zvolen (R3d)
- OPC9
  - **R1 Banská Bystrica — D1 (R1a)**
- OPC10
  - **D4 (Jarovce) Ivanka – Slovak/Austrian state border.**
- OPC12
  - D2 Bratislava Lamač — the Slovak/Czech border (D2)
  - **R1 Most pri Bratislave — Vlčkovce (R1b)**
  - R7 Dunajská Streda — Nové Zámky (R7b)
  - R7 Nové Zámky — Veľký Krtíš (R7c)
  - R7 Veľký Krtíš — Lučenec (R7d)
- OPL2
  - Measures at the M. R. Štefánik airport in Bratislava
- OPV1
  - Ensuring navigability of the Danube along the entire river length
- OPV5

In the case of corridors in **bold ,** available information suggests a high risk of significant negative impacts on the routes expected at present. However, this risk needs to be examined in more detail and finally evaluated on the basis of the exact routes and technical solutions of constructions, and if necessary, to look for other options of traffic connection, or proceed pursuant to Art. 6.4 of the Habitat Directive in the case of impacts on the Natura 2000 system land, or pursuant to Act No. 543/2002 Coll. on Nature and Landscape Protection (permission for the activity in degree of protection one to five or exceptions from

	protection conditions) in the case of the national system of the protected areas.
Surface and ground water	
H. Fulfilment of the objectives and measures in the field of water transport shall be carried out in compliance with the environmental objectives of the Water Plan of the Slovak Republic or Water Framework Directive. With regard to the significance of the potential negative impacts on water transport projects, the implementation must be preceded by a comprehensive feasibility study which would assess the impact on the achievement of the objectives of the Water Plan of the Slovak Republic or Water Framework Directive, and propose measures for the elimination or minimization of negative impacts on water quality and water management.	12. When planning the transport infrastructure projects, it is necessary to consider the requirements of the Water Framework Directive, plans of management of partial water basins and the Water Act. Based on the aforementioned analysis and in terms of the impacts of the transport infrastructure on water conditions, the most significant objectives include protection of water management areas (including mineral and thermal water) and the preservation of good ecological potential when building water transport structures. 13. In further degrees of preparation of individual transport plans we recommend paying increased attention to the evaluation of the impacts on water conditions with an emphasis on: • crossing of protected water management areas; • crossing of protected zones of water resources and resources of natural curative and natural mineral water; • crossing of water course basins; • hydro-morphological changes of water courses. 14. When proposing the transport infrastructure, respect the conditions of water protection defined in the specified protected water management areas, protection zones of water resources and protection zones of natural medicinal and natural mineral water resources. 15. Separate category of impacts is possible collision with protected water management areas, water supply sources and their protective zones and sources of natural curing and mineral waters, as well as their protection zones. These impacts must be solved in particular during placement of constructions and their technical solution. In the context of the preparation and implementation of projects affecting territory protected under the Water Act, the optimal protection level shall be provided for. The project implementation shall respect the concerned protection zones and the mode on the territories

	protected under the Water Act and measures applied in PWMA. In the case of the following projects, search for the route and technical solution without a significant negative impact on the subject to protection within the protected water management areas or the protection zones of water resources: • OPC5: - D1 Turany — Hubová - R6 Slovak/Czech border — Mestečko - R6 Mestečko — Púchov • OPC6: - D3 Žilina Brodno — Kysucké Nové Mesto - D3 Kysucké Nové Mesto – Oščadnica - D3 Oščadnica — Čadca Bukov - D3 Skalité — the Slovak/Polish border - R5 Svrčinovec — the Slovak/Czech border • OPC8: - R2 Mníchova Lehota — Ruskovce - R2 Zvolen West — Zvolen East - R2 Kriváň — Lovinobaňa - R2 Gombasek — Rožňava - R2 Rožňava — Jablonov nad Turňou • OPC9: - R3 Martin — Rakovo - R3 Rakovo— Horná Štubňa - R3 Horná Štubňa — Šášovské Podhradie (Horná Štubňa – Ráztočno) - R3 Zvolen — Šahy - R1 Slovenská Ľupča — Korytnica - R1 Korytnica — Ružomberok • OPC10 - D4 Bratislava Jarovce – Ivanka pri Dunaji North - D4 BA, Ivanka pri Dunaji North – BA, Rača intersection • OPC12 - R7 Dunajská Streda — Nové Zámky - R7 Čaka — Veľký Krtíš In the case of the project within the OPC8 measure, it is necessary to locate in advance the route which shall respect the interests of the protection of mineral and curative springs at the Sliač location as much as possible, and within further stages of the project preparation it shall solve possible negative

	impacts that affect the curative water of the Sliač spa. 16. When implementing the infrastructure measures and their activities, observe the following recommendations: • The diffusion pollution is recognized on bigger lay-by and parking areas next to the areas of road surfaces. Within the construction and upgrade of the transport sections and service infrastructure (park and ride), it is recommended to construct storm sewers, retention and sedimentation tanks with load-bearing walls to trap floating substances, especially oil, in order to minimize pollution diffusion. • Consistently prefer the use of inert materials and mechanical cleaning to chemical spreading for winter maintenance of roads. • Implement technical barriers along the roads as much as possible and assert measures for thorough checks of vehicle condition to restrict traffic accidents on roads. • Implement technical measures decelerating water effluent from the basin of water courses on road infrastructure constructions. Drainage of storm water from paved surfaces into receiving bodies accelerates water effluent from the countryside and worsens the course of flood situations. To major extent, negative impact can be mitigated by disposal of rainwater through seepage. Transport construction body can reduce the flow-through profile, thus representing an obstacle to the discharge of big waters, which must be respected during placement of constructions and while choosing the technical solution. • Ground water quality can be influenced by leakage of dangerous substances. When dealing with disposal of rainwater by seepage, measures must be taken to limit infiltration of dangerous substances to ground waters. • Propose or implement measures for water protection and effective water consumption for water abstractions for operation.
Measures to mitigate the future risks related to climate change	
-	17. Generally, flood areas must safeguard the stability of the body and objects for the safe passage of Q100

	and, at transport connections with significant meaning for the transport service, also with Q1000. The extent of the stability of the body and of bridge structures must be secured depending on the modelled flow rate speed. It is necessary to avoid subsurface erosion of supports and pillars by foundation on deep piles or, in the case of area foundations, use bed reinforcement under the bridge. 18. Future hazards may also occur with gradually changing climate conditions in our location. Therefore, partial technical proposals need to pay increased attention to potential local external cloudburst storms which cannot be predicted well, yet they represent the biggest danger for the long-term life of the road in the concerned area.
Measures to mitigate the impacts on the mineral deposits and raw materials, geological risks	
-	19. As a part of preparation and construction, it is necessary to carry out measures to secure the stability of the mineral deposits. These measures shall be proposed based on the detailed engineering-geological and hydrogeological research in further degrees of the construction project documentation which will be performed in accordance with Act No. 569/2007 Coll. on Geological works (Geological Act), as amended. A special issue might be side erosion of rivers and relocation of their beds, as well as underflooding of inundation alluvial plains which will put higher requirements on the foundation methods of embankments and bridges in overpowering water currents. When proposing particular transport plans, it is necessary to monitor not only the current rock but also the possibility of its weathering after opening the cuts and subsequent tendency to slides. 20. As a part of preventive measures, it is necessary to carry out a survey of old mine works and secure their reconstruction, if necessary. 21. Similarly, it shall be necessary to provide for the protection of raw material deposits. If, in the public interest, it is necessary to place a construction or facility not related to quarrying reserved deposits in a protected mineral estate, it is necessary to make the

	least disturbance of mineral resources as possible. Prevention or complication of quarrying of reserved mineral deposits mentioned in Art. 3 par. 1 subpar. a) to d) of Act No. 44/1988 Coll. (Mining Act) is allowed only in specifically reasoned cases, if it is an especially important construction or facility or if the construction or the facility complicates or prevents quarrying of only a small amount of the reserved deposit stock.
Measures to mitigate the impact on soils	
-	22. Strategically and economically significant investments, approved by the Resolution of the Government of the Slovak Republic (also including motorways and expressways), represent a reason for possible occupation of specially protected agricultural soils in the justified range. It is, however, necessary for the competent authorities of state administration in the section of agricultural soil protection to thoroughly adhere to the principles of agricultural soil protection defined by the Soil Protection Act. When placing the transport constructions as a part of the land-use plan and the respective SEA processes, as well as with the considered detailed localization options and respective EIA processes, the following must be ensured: • Agricultural soil protection classified according to the code of the quality soil-ecological group in the first to fourth qualitative group provided in Annex No. 3 of the Soil Protection Act. The primary objective is to minimize the occupation of black soil and phaeozem; • Thorough assessment of other options for placing constructions on agricultural land beyond built-up municipality areas with regard to the protection of the best quality agricultural land pursuant to Art. 12 par. 2 subpar. a), b) of the Soil Protection Act; • Evaluation of impacts on agricultural land occupation for every alternative of the construction placement; • Consideration of the possible need to handle contaminated soil.
Measures to mitigate the impacts on cultural heritage	
-	23. Systematically, take into account the Principles of the Monument Area Protection of all potentially affected

	monument zones and historic reserves when preparing the project for individual intentions (including respect of protection of determined long-distance panorama viewpoints or viewpoint angles). In terms of individual considered plans it is possible to recommend the following measures for prevention of a negative impact: • In the context of preparation of the R4 implementation in the surroundings of Hanušovce nad Topľou, plan the detailed territorial routing regarding the minimization of the visual impact on PZ Hanušovce nad Topľou (long-distance viewpoint angle from the south-west). • In the context of preparation of the R3 implementation in the Zvolen – Šahy section, verify the possible impact on nearby monument zones (MZ). Plan the detailed territorial routing regarding the minimization of the visual impact on the MZ Babiná countryside. Consider planting shading greenery to reduce the visual impact of the construction on RHZ Babiná. • Consider the Principles of Protection of HR Kremnica and HZ “Territory of mine works in the surroundings of Kremnica" within the project preparation of constructions at I/65. • Immediate solution of the measures for taking the (freight) car transport from the centre of Prešov, dealing with the road bypass of the city.
Waste production	
I. We recommend adding to the strategy objectives the issue of the minimization of waste production and environmentally friendly waste management, waste recycling, secondary use, minimization of special and dangerous waste. J. The strategy should discuss the possibilities of supporting measures of waste production decrease, mainly from construction and operation of water transport, service infrastructure of water	24. In the course of preparation and construction of the transport infrastructure, include and thoroughly apply the measures to minimize production of building waste especially excavation earth, and maximize the possible use (re-use and recycling) of materials at construction. When considering the variant solution, take the amount of the assumed waste production into account.

and air transport, including the lowering of material demands or preferring waste re-use and recycling, into measures focused on new constructions, modernization and/or safeguarding of maintenance of transport infrastructure.	25. Systematically include the view of preferring re-use and recycling waste at construction and operation in the project planning and preparation. 26. Include measures to minimize waste origination and for environmental-friendly waste disposal (collection, management) during operation in preparation of projects concerning upgrade of ports and construction of the air terminal units.
General requirements	
K. Include the requirement for adhering to the principles of so called green procurement when granting contracts in the field of transport infrastructure. L. Elaborate Indicators for meeting global strategic and specific objectives of the strategy. M. Focus the specific objective ŠHC3 "*Systematically reduce socio-economic and environmental impacts of transportation*" not only on the reduction of negative impacts on greenhouse emissions, noise, soil occupation and accidents but also on further determinants of health, nature and landscape, water units and climate change related risks. In this regard the measure OPS7 *"Regular monitoring of noise and air quality and implementation of measures reducing the negative impacts of transport on the environment"* should be supplemented.	

VI. REASONS FOR THE SELECTION OF THE CONSIDERED ALTERNATIVES TAKING INTO ACCOUNT THE OBJECTIVES AND GEOGRAPHIC ASPECT OF THE STRATEGIC DOCUMENT AND DESCRIPTION OF THE WAY OF EVALUATION INCLUDING DIFFICULTIES WITH THE PROVISION OF THE REQUIRED INFORMATION, E.G. TECHNICAL DEFICIENCIES OR UNCERTAINTIES

The strategy was processed and submitted for evaluation in one variant. As a reference zero variant for evaluation, the situation without the strategy implementation was applied. It corresponds to the transport model in the variant BAU 2030, i.e. construction of only those projects which are undisputable and which shall be implemented disregarding the adopted strategies.

SPTD SR 2030 is a strategy on a national level which deals with the main transport measures with national significance such as the network of motorway and expressways, the main railway routes, the main water ways and the principle measures in the public passenger transport. They cover measures on class I roads and airports on a general level only. The strategy does not deal with measures at regional and local level.

SPTD SR 2030 does not propose territorial routing of transport corridors, nor does it deal with it. For evaluation purposes, the routes assumed in the transport model or in the land-use plans or projects were used. This is, however, not a part of the strategy. The strategy is independent of the territorial routing of the proposed measures.

The analytical part of SPTD SR 2030 collected a great amount of data for individual transport modes and the transport sector as a whole and, based on a thorough analysis, key transport problems in the Slovak Republic were determined. Another significant and good-quality input into the strategy and into the SEA evaluation is a newly created transport model of the Slovak Republic which enables further analyses and testing of measures proposed for solving transport issues. In this regard it shall be notified that it is the first transport model of the Slovak Republic which shall be further developed and specified, and thus it obviously cannot avoid certain imperfections. This could, to a certain extent, influence the results of the SEA evaluation especially due to the impacts on air, greenhouse emissions and noise.

The SPTD SR 2030 level means the objectives and measures, the output means the strategic principles based on which the strategy is met. The strategy does not contain individual projects or territorial routes of transport corridors. Measures are defined in a rather general way, which is in compliance with the strategic level of the document. At the same time, however, there are restrictions in regard to the SEA evaluation, especially impacts on nature and landscape, soil, water, rock environment and cultural heritage for which territorial conflicts with transport infrastructure are the most significant. This, however, cannot be evaluated without the territorial projection of transport corridors. It is impossible to unambiguously derive the impacts from the routes which are currently designed in projects or land-use plans since the strategy is independent of them. Moreover, for the line of corridors there are several parallel variants available, not even e.g. issued planning permission, which means the construction will finally be implemented in the given version. The resulting impacts at implementation of those measures may thus differ from those which were identified in the assessment and need to be perceived as risks that should be eliminated while planning the routes and technical solution.

SPTD SR 2030 does not specify the particular projects to be implemented by 2030. Furthermore, not all measures could be implemented to the full extent both due to financial reasons and regarding the various levels of the project preparation. The modelled design scenario which served as a basis for the impact assessment on air, greenhouse emissions and noise, was formulated based on strategic principles, the expected volume of funds and project preparation as probable. Based on the implementation plan which shall subsequently be processed, this scenario may be changed. Eventual changes shall not significantly influence the total evaluation result; changes on a local level may occur.

The impacts on air and greenhouse emissions and on health are to a certain extent dependent on the replacement of the vehicle fleet and the willingness of inhabitants to use public and eventually non-motor driven transport instead of individual car transport. This, however, depends on a set of factors from which only a part can be influenced by the SPTD SR 2030 position, e.g. the buying power of inhabitants, the social climate in relation to public transport, availability of public transport on a local level, the option of working from home etc.

A significant uncertainty of the evaluation which cannot be quantified includes the technical progress in development of car engines and more intense use of electromobility. By 2030, this upgrade of the vehicle fleet shall probably result in a greater relative decrease of emissions than the expected emission change caused by the implementation of the assessed concept. Potential negative impacts evaluated in the submitted documentation will thus not occur in reality. Overall, a low significant potential negative impact of the strategy is identified only when compared to the strategy zero variant (BAU 2030 scenario), not compared to the current situation.

Evaluation of impacts on air stems from the comparison of results of the transport model for the BAU 2030 scenario and design scenario. The result of assessment of the concept impacts thus depends on whether the infrastructure measures estimated in the transport model shall be implemented in reality. In this regard, it is possible to identify future infrastructure measures which are key for the validity of conclusions of the air impact assessment. These particularly include transport structures with the potential to influence the emission situation along significant road corridors and in the centres of cities which are currently strongly exposed in terms of emissions. In connection to the above-stated assessment of impacts and considering the size of the affected population, the parts of the proposed measures can be considered as a priority from the aspect of air protection (the provided parts include both the BAU 2030 scenario and the proposed variant):

- The corridor R3 Oravský Podzámok – D1 intersection, part of the D1 on the northern Ružomberok by-pass (relieving the town and smaller municipalities along the route of the current I/18 road),
- south-west and northern Prešov bypass (emission relief of Prešov city centre with above-limit concentrations of suspended particles),
- The I/50 – D1 link at the Bidovce – Budimír section (redirecting some transit transport from Košice);

If some of the mentioned infrastructure measures are not implemented in reality, it is necessary to perform an update of the air impact assessment or its relevant part.

VII. THE PROPOSAL FOR MONITORING THE ENVIRONMENTAL IMPACTS INCLUDING IMPACTS ON HEALTH

Air

In order to monitor the strategy impacts and to avoid eventual emission risks, we propose annual evaluation of the balance and trend of regional emissions from road transport in the Bratislava and Žilina Region. The justification is in the recommendation in point 1) of Chapter V.

Moreover, it is recommended to expand emission monitoring in the places of assumed significant influence of transport on the emission situation. It includes the following locations and pollutants:

Table VII-1 Proposal for extension of emission monitoring

Site	Pollutants	Justification
Ružomberok, Riadok	benzo(a)pyrene	high existing traffic load, poorly ventilated valley
Prešov, Arm. gen. L. Svobodu	benzo(a)pyrene	city centre with traffic overload (no bypass), highly exposed population (dense built-up town areas)
Krásno nad Kysucou, Nám. mieru	suspended particles PM_{25}, benzo(a)pyrene	Čadca – Žilina is a road corridor with indicated significant impact of transport and possible worsened impact of the concept, while the biggest change of the transport emission density is expected within this corridor in Krásno nad Kysucou

Greenhouse gas emissions

It is recommended to mutually compare and coordinate methodologies for the calculation of greenhouse emissions from transport used in Slovakia for reporting within the EU and UNFCCC and methodologies for the calculation of greenhouse gas emissions of transport projects used by the European Investment Bank[68]. This comparative analysis aims to describe eventual deviations between various calculation methods and the setting calculation methodology for future use with the SPTD SR 2030 update and the related planning processes.

Noise

Noise monitoring shall be carried out in the selected locations which are potentially problematic in terms of noise load. It is suitable to detect noise in these locations by occasional to regular measurement which is gradually supplemented by noise studies considering solutions and development of the respective site. Measurement can be, e.g. supplemented also by questionnaire investigation in the concerned locations which shall supplement and extend the noise data characterizing the population in terms of their health

[68] European Investment Bank. 2012. Methodologies for the Assessment of Project GHG Emissions and Emission Variations, Version 10.1.

condition and approach to noise. Noise monitoring from transport activity shall be performed by means of 24 hourly noise measurements in the external environment, periodically every two or three years, in the respective year always in spring and autumn, under standard conditions. Every measurement includes finding out the traffic intensity and composition.

Moreover, monitoring of the noise situation is performed for the purpose of strategic noise charts and action plans. The situation is solved by the Regulation of the Government of the Slovak Republic No. 43/2005 Coll., laying down details on strategic noise charts and anti-noise protection action plans. The noise monitoring system on roads crucial for the submitted strategic assessment should respect the current system of monitoring, supplement it and finally serve both for the creation of analytical data and especially the proposal of effective anti-noise measures.

The range of the conducted monitoring shall respect Annex No. 1 of the quoted Regulation of the Government of the Slovak Republic No. 43/2005 Coll.

In terms of locations crucial for the submitted assessment, based on the conducted model calculation, equivalent levels of acoustic pressure [dB(A)] were calculated on the assumed edge of the roads of the selected crucial locations in which a high value of the acoustic pressure level was calculated with a value of 85 [dB] and concurrently there are large residential areas in the wider context of the territory (within 100 meters of the road). At least in those places, in relation to the implementation of the road constructions (or reconstructions of existing roads), it is required to conduct detailed noise studies, if necessary, supplemented by noise measurement and based on the detected particular situation, to implement sufficiently effective proposals of anti-noise measures (e.g. technologies of structural layers of road surfaces reducing noise or anti-noise screens). When proposing the anti-noise solution, it is necessary to verify the solution of the section in the documents of the Strategic Noise Mapping (phase II was conducted in 2011) or with action plans processed by individual regions in the period of yrs. 2012 and 2013 (action plans are processed based on the data from the strategic 2011 noise charts, thus not considering the changes performed in 2012 and 2013), since these materials were processed in a period when the particular solution of the respective construction was unknown, and the changes in the traffic load due to construction were also unknown.

The selection of locations for noise monitoring shall be adjusted based on the particular territorial routing of new constructions. After the construction implementation and taking the proposed measures, it is recommended to carry out verification of the effect of the measures again by noise measurement. Depending on the traffic load on the respective road (e.g. with regard to the time development of load), noise measurement can be repeated and the efficiency of the anti-noise measure can be re-evaluated. Critical sites where noise monitoring is proposed are identified in Chapter IV.3.3.

Population and health

Tab. VII-2 Proposal of Health Impact Indicators

Health protection objectives	Proposed indicators
To reduce the number of fatalities and injuries from traffic accidents	Determination of the ratio of pedestrians and cyclists in injuries or fatalities.
Protection or improvement of air quality	Evaluation of pollution concentrations of PM, N_2O, B(a)P in towns (in collaboration with SHMI).
Observation of noise limit and its reduction	See monitoring of noise impacts above.
Improvement of a healthy lifestyle.	Cardio-vascular disease death rate, in collaboration with NCZI.
Support an equal and fair approach to health and social care	Monitoring the range of first-aid ambulances, or arrival times in individual regions or catchment areas.
Work opportunities in the traffic sector	Statistics of people employed in the traffic sector.
Economic status of inhabitants	Average salary of employees in the traffic sector.
Improve traffic-related physical and mental health and well-being (stated partially under other objectives)	Number of km of bike paths

Nature and Landscape

We recommend monitoring the following indicators of the impacts of strategy implementation to achieve the objectives in the field of nature protection:

- the area of land occupancy in protected areas of individual types, or the occupation of land as per the protection level when implementing infrastructure measures;
- the area of occupancy of habitats of national and European significance;
- measures implemented to compensate for negative impacts.

Surface and ground water

Ultimately, the implementation of measures can have a negative impact on water management and water quality parameters, even using the proposed measures of water protection stated in the project proposal and measures of the stated EIA process requirements can have a negative impact. Due to this, we recommend, for projects implemented to fulfil the strategy, to monitor and evaluate the following qualitative and quantitative indicators:

- cases of destruction of individual water sources;
- cases of breach of measures of the PWMA mode and OP of water sources;
- increase of chloride content in the recipient;
- ratio of the contribution of traffic to emergency water deterioration;

Climate Change

Due to insecurity, we recommend systematically monitoring the road damage caused by changes in rainfall, wind and other climatic relations. Preferentially, the focus should be on small water gates which will have to be designed for more intense flash rainfall and more extreme rapid flow in small waterways. The results of such monitoring could be used for systematization of the overview of the extent and number of potential risks.

We also recommend monitoring the incidence and extent of frost and ice creation. In the case of the gradual rise of the extent and frequency of these phenomena due to climate change, we recommend that the entire Slovak railway system creates a warning system for the potential occurrence of extreme frost and/or ice creation. Such a warning system should be able to make operative decisions about the risks of potentially stranded trains and passengers thereof on the tracks, and whether the track traffic should be safeguarded by diesel locomotives or substitute bus transport (if possible).

Waste / waste management

Due to environmental objectives in the area of waste management, we recommend monitoring the indicators of waste production from construction and modernization of transport infrastructure, and the extent of use of material gained during construction and modernization of transport infrastructure.

Due to the nature of the strategy, the monitoring of the impact on other environmental elements is not recommended. Any negative impacts have to be solved by procedures under Act No. 24/2006 Coll.

VIII. POTENTIALLY SIGNIFICANT CROSS-BORDER ENVIRONMENTAL IMPACTS INCLUDING HEALTH IMPACTS

Air

No significant negative or positive cross-border air impacts were identified with any of the measures or the entire strategy. Cross-border impact might occur only slightly in the immediate vicinity of the borders, namely along the transport routes which are currently in existence. Transport intensity along these routes will change only slightly, thus without any significant impact on the pollution situation.

This concerns the following routes:
OPC5: D1 Bidovce — border SR/UR, R6 state border SR/CZ – Púchov,
OPC6: D3 Skalité — state border SR/PR, 2. profile, R5 Svrčinovec — state border SR/CZ,
OPC7: R4 state border PR/SR — Prešov northern bypass,
OPC10: D4 Bratislava Jarovce – state border SR/Austria

Noise

In terms of the mode of action, the cross-border impacts on the noise situation can be divided into the following:

- direct impacts – the spread of noise from actions on the road itself
- indirect impacts – increased noise due to activities on the road abroad, where the increase is caused by a more efficient international transport connection

A wide range of factors influence the noise level arising from vehicles, namely:

- traffic intensity
- the technical parameters of the road, railway
- the vertical alignment of the road/railway
- the method of use of the surrounding area, including the location of noise-limiting technical features
- participation of heavy lorries in the traffic flow;
- average vehicle/train speed
- traffic flow

Direct impacts

As stated above, direct impacts on the noise situation are caused by traffic activity on the Slovak side and the subsequent spread of noise over the border, where the subject matter of protection (of residential buildings) will be affected.
In order to assess the possible impact, a map of noise spread from the discussed roads can be drafted (or a map for the BAU 2030 scenario and the proposed option), marking critical sites in which an acoustic pressure level above 85 [dB] was calculated, and also in the wider context of an area (up to 100 meters

from the road) where there are numerous residential buildings (red section lining of critical sites for the proposed option, blue for BAU 2030). The following sites are close to the state border:

- the newly built D4 corridor and a parallel rail track from Devínska Nova Ves to the Austrian state border

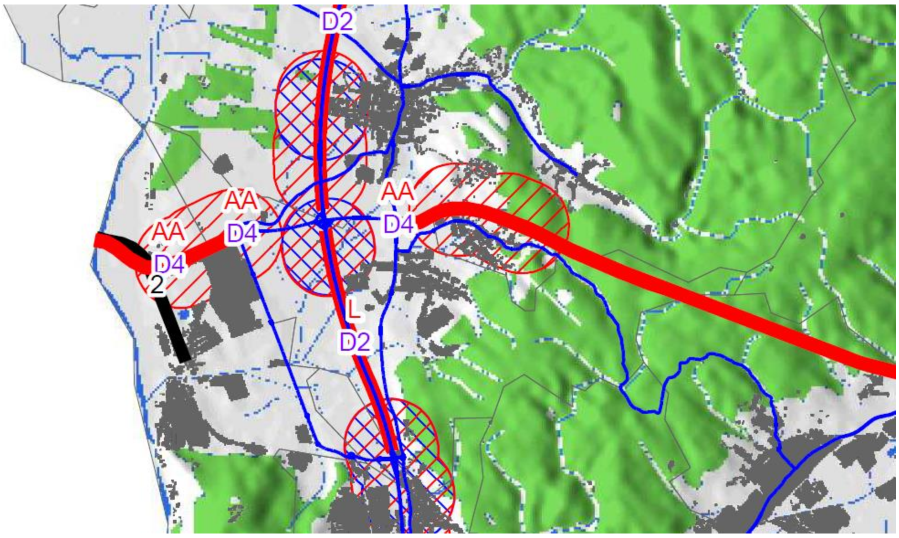


Fig. VIII-1 Critical noise corridors: The newly built D4 corridor and a parallel rail track from Devínska Nova Ves to the Austrian state border

- the change of the current D2 road west of Petržalka

  The changes are caused by the implementation of the evaluated measures, where the current D2 Motorway section will be so attractive for drivers that, according to traffic predictions, increased traffic activity is to be expected in this section.

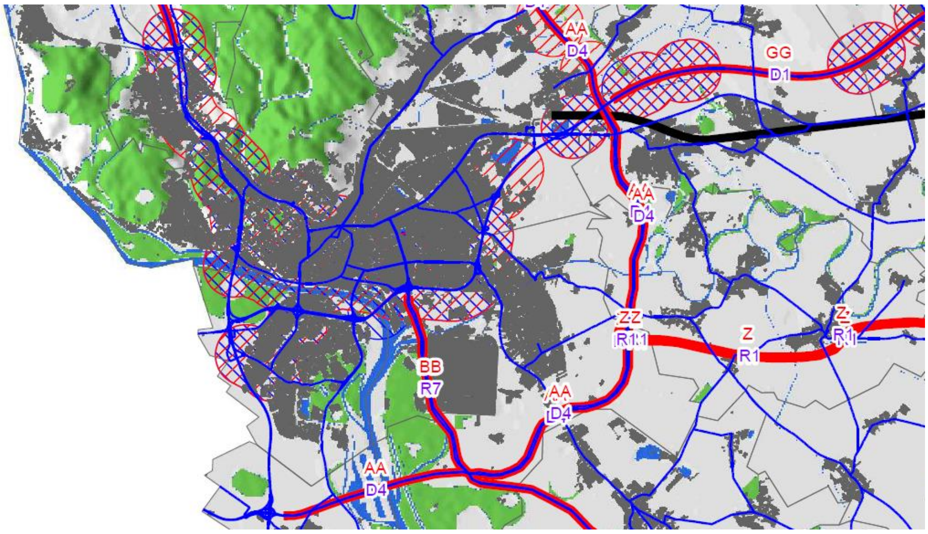


Fig. VIII-2 Critical noise corridors: change of the current D2 road west of Petržalka

- R5 section around Skalité, close to the Slovak-Czech-Polish tri-border

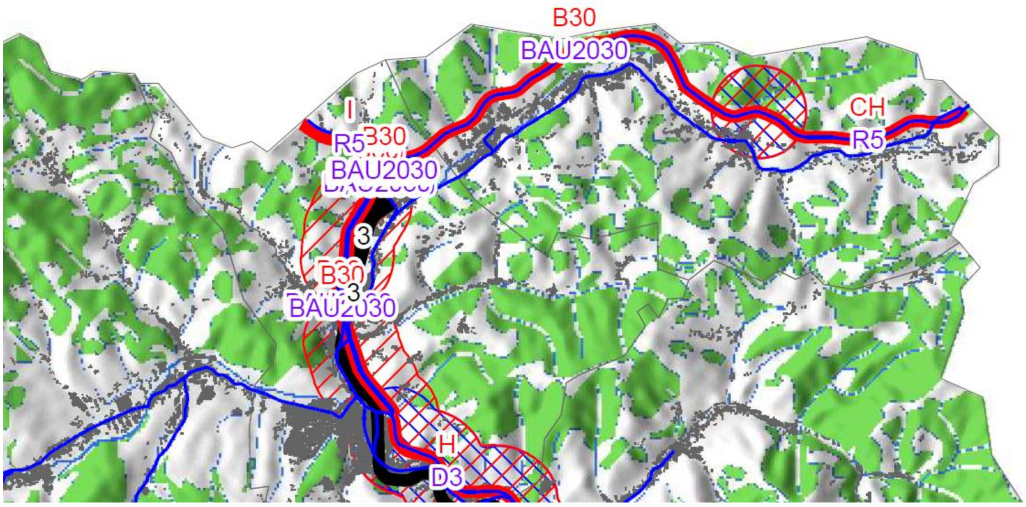


Fig. VIII-3 Critical noise corridors: R5 section around Skalité, close to the Slovak-Czech-Polish tri-border

There is a low probability of significant impacts. Even though new connections with surrounding states will be implemented, there are no expected impacts of road activity on the noise situation at other sites.

Indirect impacts

Due to the optimum connection of the new transport network to the neighbouring states, such sections will be more attractive for drivers, there will be a higher number of train connections or higher use of water ways and ports. It is due to this transport intensification that roads and tracks in the neighbouring states will also see an increase in traffic. For the purpose of strategy evaluation, traffic data of the connected road section were not available; design preparation of structures is of various levels, and the readiness of the connected sections may vary.

The evaluation makes it apparent that the design preparation of the new traffic sections will require the processing of a noise study for particular solutions for new structures which will, among others, evaluate the impact on the noise situation in the affected area on the Slovak side of the border. Depending on the results of the noise assessment, it will be possible to predict the potential impact on the noise situation beyond the state border and, in a potential negotiation with counterparties, to verify whether the noise barrier measures installed beyond the state border will provide sufficient protection for the necessary sites even after the increase of traffic caused by the construction of new transport sections.

According to the assessment, almost all sections will see increased transport frequency at the borders. An increase of noise emissions arises from the expected traffic increase, where the proposed option differs from BAU 2030 by a decrease of personal transport (apparently due to better use of public and bike transport); however, it will see an increase of truck transport. Although the overall context expects a decrease of transport activity, such a decrease is caused by a smaller number of cars (emitting less noise than trucks which emit more noise, and which should increase in numbers).

The most important sites where, as a result of the strategy implementation, an increase of noise emissions at the road edge by more than 5dB is expected when compared with BAU 2030:

- Bratislava D2 → Rajka (Hungary)
- Devínska Nová Ves D4 →Austria
- Tvrdošín R3 →Jablonka (Poland)

A number of other sites may see an increase of noise emissions up to 5dB. The resulting impact on territories of neighbouring states will also depend on other factors, mainly the ground configuration, the nature of structures, the distance from residential areas, and noise measures.

Population and health

With the free movement of people among one of the fundamental EU attributes, health impact is always of an international nature. However, these impacts are not taken into consideration within the SEA process. Environmental determinants may change in a relatively small area of expected corridors of new roads and at the reconstruction sites of the current network.

Nature and Landscape

Potential cross-border impacts are associated with increased transport intensity at the connected sections in neighbouring countries, a decrease of migration passability (if the expected migration corridors lead through Slovak territory), or the construction of subsequent connection sections (subject to international agreements).

Tab. VIII-1 Measures and corridors with potential cross-border impacts

ID and name of the measure	Considered corridor	Natura 2000	Protected nature areas (national system)
OPC5 – Completion of the west-east priority axis (Rhine–Danube corridor, Czech and Slovak branch)	R6 – SK/CZ state border – Púchov (R6)	Czech Republic: The route will slightly limit southward migration from EVL Beskydy, however, the connection section in Czech territory is more important in this respect. On the Slovak side, migration has already been greatly limited due to the existing road, railroad and developed area).	Czech Republic: The route will slightly impact migration passability of the land between CHKO Beskydy and CHKO Biele Karpaty; however, the connection section in Czech territory is more important in this respect.
OPC6 – Completion of the north-south connection to Poland and the Czech Republic	D3 – Skalité – SK/PL national border, profile 2 (D3b)	Poland: On the Polish side, the road continues along SCI and SPA Beskid Zywiecki for a distance of 200 m. A potential impact is traffic increase in this section and the resulting number of collisions and interference; however, these impacts are not of a significant nature.	Poland, Czech Republic: On the Polish side, the road continues along Zywiecki Park Krajobrazowy for a distance of 200 m. A potential impact is traffic increase in this section and the resulting number of collisions and interference; however, these impacts are not of a significant nature.

ID and name of the measure	Considered corridor	Natura 2000	Protected nature areas (national system)
			The road will contribute to a gradual deterioration of migration passability in the area of the Slovak/Polish/Czech border region.
	R5 – Svrčinovec – SK/CZ national border (R5)	Czech Republic, Poland: Limitation of migration passability between EVL Beskydy (Czech Republic) and SCI Beskid Zywiecki (Poland).	Czech Republic, Poland: Limitation of migration passability between CHKO Beskydy (Czech Republic) and Zywiecki Park Krajobrazowy (Poland).
OPC7 – Completion of the north-south connection in Eastern Slovakia	R4 PL/SK national border — Prešov Northern Bypass (R4)	Poland: • SPA Beskid Niski • SCI Ostoja Jaśliska • SCI Ostoja Magurska Increase in transport intensity on the connected route on the Polish territory, deterioration of migration passability.	Poland: Jaśliska Landscape Park. The existing road in Polish territory crosses the park. A slight increase of traffic intensity and deterioration of migration passability may occur.
OPC9 – Completion of the north-south road axis in Central Slovakia	R3 – Šahy – Zvolen (R3d)	Hungary: • SCI and SPA Ipoly Völgye • SPA Börzsöny and Visegrádi-hegység • SCI Börzsöny Connected routes in Hungary run through Natura 2000 territories. The impact will be an increase of traffic intensity in this section associated with the disturbance of animals and increased risk of collision with cars thereof.	Hungary: On the Hungarian side, the existing road crosses Duna-Ipoly National Park. The impact will be an increase of traffic intensity in this section associated with the disturbance of animals and increased risk of collision with cars thereof.
OPC10 – Development of road network in the Bratislava agglomeration	D4 – Bratislava Jarovce – SR/Austria state border (D4)	Austria: In Devínska Nova Ves, the route runs close to SCI and SPA March-Thaya-Auen in Austria. The planned structure would impact this territory, more significantly on the Austrian side which, if led above land, would most probably have a significant impact, while a tunnel solution depends on the particular design. This road, including the selection of the option, is the subject of an agreement between Slovakia and Austria.	
OPV1 – Implement technical measures to improve navigability of the Danube waterway		Austria: A part of the Danube along the Austrian border is a part of SCI AT1204000 Donau-Auen Östlich von Wien, and to a smaller extent a part of its	Austria: Danube-Auen National Park. The impacts depend on particular measures which must respect the protection of this area. Considering that the National park

ID and name of the measure	Considered corridor	Natura 2000	Protected nature areas (national system)
		namesake, SPA AT1204V00. Impacts on these areas depend on the particular technical measures and need to be solved within a feasibility study and assessment of individual projects.	starts at the confluence with the Morava River, such measures will probably not impact it directly.
		Hungary: SCI and SPA HUFH30004 Szigetköz and SCI HUDI20034 Duna és ártere are on the Hungarian side of the Danube. All navigability measures must also respect these territories.	Hungary: The Danube is a borderline river; maintenance of the waterway must be solved in collaboration with the Hungarian party and it must respect the domestic protected areas (Duna-Ipoly National park).
OPV3 – Modernization of public ports in Slovakia and subsequent regular maintenance		Hungary: The Danube waterway is, on the Hungarian side, part of SCI HUDI20034 Duna és ártere. Significant impacts are not probable, water pollution risks need to be eliminated at project level.	
OPV5 – Cooperate with the watercourse authority to maintain waterways and navigable objects on monitored waterways in SR to ensure year-round navigability		Hungary: SCI and SPA HUFH30004 Szigetköz and SCI HUDI20034 Duna és ártere are on the Hungarian side of the Danube. All navigability measures must also respect these territories.	Hungary: The Danube is a borderline river; maintenance of the waterway must be solved in collaboration with the Hungarian party and it must respect the domestic protected areas (Duna-Ipoly National park).
OPŽ1 – Completion of upgrade to major TEN-T routes, in an advanced stage of preparation: Púchov – Žilina, Žilina – Čadca – national border, Devínska N. Ves – Marchegg		Austria: On the Austrian side close to Devínska Nova Ves, the route comes to the site of the existing track to SCI and SPA March-Thaya-Auen. Impacts depend on the implementation of the section on the Austrian side.	

Surface and ground water

Significant cross-border impacts are in the case of measures on the waterway. Understandably, all measures implemented where the Danube marks the border will have cross-border impacts. Technical measures to safeguard the required parameters of the Danube fairway and modernization of public ports, associated with an increase of river traffic, may be demonstrated by a change in the qualitative and quantitative conditions of the waterway, which can be revealed even further downstream including the part of the river situated in Slovak territory.

When implementing technical measures to adjust the fairway parameters of waterways, especially towards changes in hydrological conditions around the river (effects on groundwater level, adverse impact on river flow rates – changes of river currents, changes in alluvial conditions, changes in water level mixture) and adverse effects on surface water quality. Particular impacts will depend on particular measures resulting from the feasibility study.

Road transport projects present only an insignificant risk of potential increase in rainwater outflow, which can cause migration pollution of surface water and deterioration of flood conditions. This relates mostly to the Danube and waterways in CHVO Beskydy and Javorníky.

No cross-border impacts have been identified in relation to other environmental elements.

IX. NON-TECHNICAL SUMMARY OF PROVIDED INFORMATION

This The Environmental Report has been prepared under Act No. 24/2006 on Environmental Impact Assessment and on the Amendment and Supplements to Certain Acts, as amended. The report presents the conclusions of the proposed strategic document, "the Strategic Plan of Transport Development in the Slovak Republic until the Year 2030" on the environment and human health.

IX.1 CONTENTS OF THE STRATEGIC PLAN OF TRANSPORT DEVELOPMENT IN THE SLOVAK REPUBLIC UNTIL THE YEAR 2030

The Strategic Plan of Transport Development in the Slovak Republic up to 2030 is a long-term strategic document that sets an effective direction for transport sector development and a method for realizing its development vision. It is an output of Phase II of the preparation of the strategy for transport development in the Slovak Republic up to 2030 and represents the fulfilment of conditions stipulated ex ante. The funding of developmental activities by European funds in the period between 2016 – 2020 is thus, in this document or its approval by the EC, directly dependent.

Key issues of the transport sector were identified based on extensive analytical activities. The analytical part was focused on both individual transport modes, divided into road, railway, public passenger, water and civil aviation transport, and on issues through the individual transport modes, which limit multimodal functionality in passenger and freight transport.

The vision of transport sector development until 2030 is a "sustainable integrated multimodal transport system meeting the economic, social and environmental needs of society and contributing to the full integration of the Slovak Republic within the European Economic Area".

Global strategic objectives were set in analogy to the above-stated vision for the Slovak transport sector. They reflect trends and requirements stipulated by EU and national strategic, i.e. analytical documents.

- Strategic Global Objective 1 (SGO 1): Secure equivalent availability of urban units and industrial zones supporting economic growth and social inclusion in all Slovak regions (both from a national and European view) using a non-discriminatory approach to infrastructure and services.
- Strategic Global Objective 2 (SGO 2): The long-term sustainable development of the Slovak transport system with an emphasis on the generation and effective utilization of funds in connection with the real needs of users.
- Strategic Global Objective 3 (SGO 3): Increased competitiveness in personal and freight transport (the opposite poles of road transport) by setting the relevant operational, organizational and infrastructural parameters leading to an effective integrated multi-modal transport system supporting the economic and social needs of the Slovak Republic.

- Strategic Global Objective 4 (SGO 4): Increased safety and security of transport leading to a permanent guarantee of safe mobility through safe infrastructure, introducing new technologies/procedures while using preventive and control mechanisms.
- Strategic Global Objective 5 (SGO 5): Decreasing environmental and socioeconomic impact of transport (including climate change) by environment monitoring, effective planning/realization of infrastructure and reducing conventionally fuelled transport means, i.e. use of alternative fuels.

Sector Strategy Performance Measures

Measures to perform the strategy were identified based on global trends, international treaties and the obligations of the Slovak Republic and issues identified in the analytic part of the strategy preparation. Each comprises a set of activities, initiatives or projects integrated based on the nature of the objective, i.e. issue to be solved. Consistent with other parts of this strategic document, measures are also divided in terms of infrastructure, organization, operation, and individual transport modes.

The set of measures as a whole represents a tool for achieving the global strategic objectives, specific objectives and the development vision for the transport sector up to 2030.

Except for purely conceptual and system measures and strategic principles of the transport system management in Slovakia, the SPTD SR 2030 proposal also contains a wide range of generally formulated measures which, however, assume construction of transport corridors with potentially significant impacts on the environment. Such measures are briefly presented in the Table and Figures below. The strategy, however, does not include a geographical cross-section of measures and is independent from their local management and technical solutions. The selection of routes and the solution is assumed in subsequent steps.

Tab. IX-1 Identified infrastructural measures with a potentially significant impact on the environment

Identified infrastructural measures with a potentially significant impact on the environment	Considered corridors are analyzed in this SEA evaluation – markings on map
OPC5 – Completion of the west-east priority axis (Rhine–Danube corridor, Czech and Slovak branch)	D1a, D1b, D1c,R6
OPC6 – Completion of the north-south connection to Poland and the Czech Republic	D3a, D3b, R5
OPC7 – Completion of the north-south connection in Eastern Slovakia	R2a, R4
OPC8 – Completion of the west-east road axis in Central Slovakia	R2b, R2c, R2d, R2e, R2f, R2g
OPC9 – Completion of the north-south road axis in Central Slovakia	R3a, R3b, R3c, R3d, R1a
OPC10 – Development of road network in the Bratislava agglomeration	D1d, D4, I/65
OPC12 – Modernization and development of other motorway and expressway networks, if reasonable	D2, R1b, R7a, R7b, R7c, R7d,R8
OPŽ1 – Completion of upgrade to major TEN-T routes, in an advanced stage of preparation: Púchov – Žilina, Žilina – Čadca – state border, Devínska N. Ves – Marchegg	1, 2, 3

OPŽ4 – Upgrade of Žilina – Košice – Čierna nad Tisou core route	4, 6
OPŽ5 – Upgrade of the Kúty state border – Bratislava – Štúrovo/Komárno state border corridor	7, 8, 9
OPŽ8 – Modernization of TEN-T: Púchov – Horní Lideč track	10

Referential scheme of planned infrastructural measures with potentially significant impact on the environment on the national level

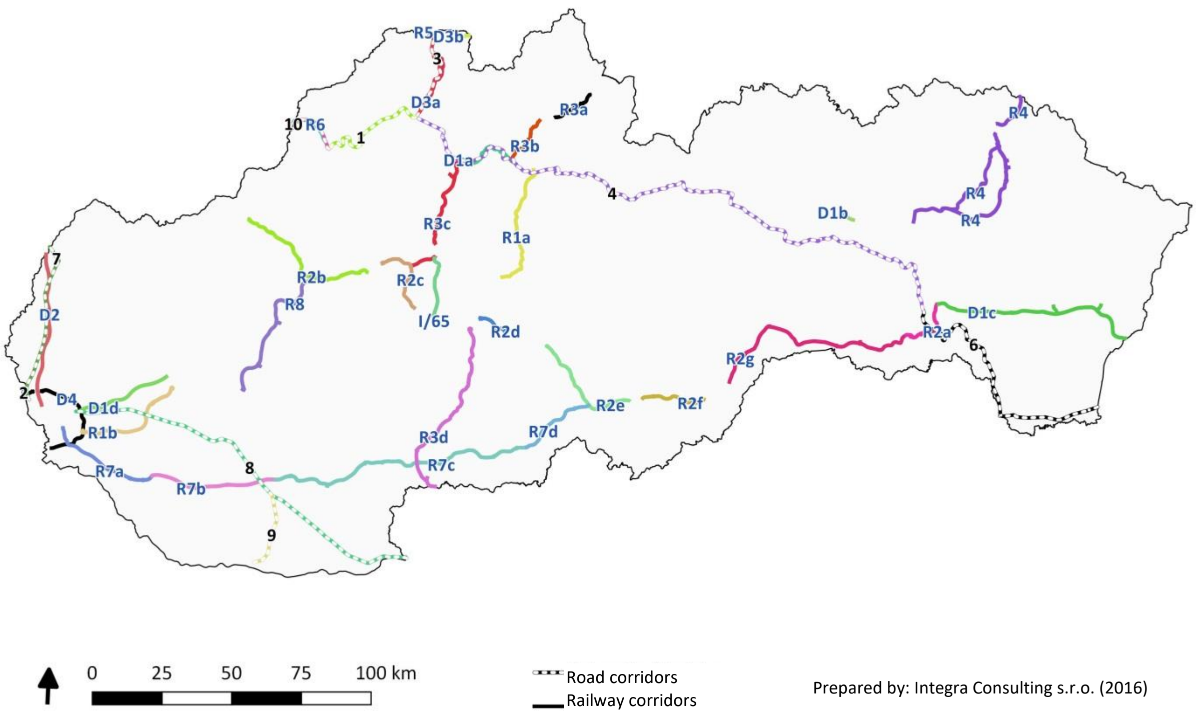


Fig. IX-1 Considered infrastructural corridors with a potentially significant impact on the environment

IX.2 SUMMARY OF THE EVALUATION PROCESS OF THE STRATEGIC PLAN IMPACTS ON THE ENVIRONMENT AND HEALTH

The SEA process was started with the publishing of the Strategic Document Announcement in March 2016. The Announcement was published on March 3, 2016 on the MoENv SR website, www.enviroportal.sk, on the MTCRD SR website, www.mindop.sk, and MTCRD SR also published information on the submission of the Announcement using mass media on March 4, 2016 in Pravda newspaper. On the publishing of the Announcement, the public and affected bodies could express their opinions until March 19, 2016. A total of 19 opinions from both affected bodies and the public were delivered pertaining to the Announcement. Združenie Slatinka Association expressed its opinion as an NGO and non-profit organization. Then, MTCRD SR, together with MoEnv SR, prepared a draft of the Assessment Extent which was discussed with the affected bodies and public at a public meeting on April 5, 2016. The assessment extent was published by

MT in cooperation with MoEnv SR on April 12, 2016, with a statutory 10-day term for submission of opinions.

There was regular communication of SEA authors with MTCRD SR and the SPTD SR 2030 author, especially in relation to available documents and input information necessary for the SEA evaluation. On July 18, 2016, a work meeting at MTCRD SR took place where the proposed SEA evaluation procedure was discussed with representatives of JASPERS and the affected bodies. In collaboration with MTCRD SR, the available documents were collected for the evaluation of impacts on partial environmental topics. Furthermore, two consultations about the strategic document took place, on March 18, 2016 requested by Bc. Anton Andel representing Slovak Railway Worker Union, and on April 26, 2016 requested by the member of parliament RNDr. Anna Zemanová.

The results of the analytical part of SPTD SR 2030 and the proposed vision, objectives and measures were given to the SEA authors in June 2016, the strategy draft on July 20, 2016, and the final proposal of the evaluation strategy was submitted on August 5, 2016. The SEA author also received outputs from the transport model for the current condition (Base 2014), the option of development without implementation of the strategy (BAU 2030), the proposed option SPTD SR 2030, and the option for the completed transport network IDEAL 2130. This data was used mostly to calculate changes to the emission of pollutants, greenhouse gases and noise.

IX.3 MAIN FINDINGS

Effects on air

The primary impact of the strategy on air shall be caused by the change of emissions of pollutants from the means of transport. With regard to the quite dominant emissions and emission share of car transport in total transport emissions, the impact shall be determined by the changes in the car transport sector, other transportation modes shall be meaningless from that point of view.

The air quality may be potentially affected especially by several pollutants, typical representatives in emissions from car transport. It is mostly NO_X, suspended PM_{10} and $PM_{2.5}$ particles (exhaust emissions, brake pad/road/tire friction, resuspension from the road surface) and polycyclic aromatic hydrocarbons (e.g. benzo(a)pyrene). While the spectrum of emitted substances is wider, the above number represents pollutants that are emitted from transport in significant amounts and/or are representatives of such air concentration which currently exceed or are approaching the pollution limits.

Primarily potential impacts of the strategy can be reflected in the change of emission concentrations along the transport routes in relation to the change of the traffic intensity. In Slovakia, such change will be significantly heterogenic, i.e. it is possible to delineate areas where both an increase and decrease of pollutant concentration can be expected. The strategy will not cause a potential change along only those road sections which are subject to the proposed measures. A change of part of the road network often causes a change of traffic intensity and, along with it, a related impact on air in other areas which are not subject to such measures.

Secondary impacts of the strategy can be perceived in the potential regional impact of the cumulative influence of the proposed measures on the share of the secondary aerosol in the total emission concentration. Automotive transport is a significant and from the national point of view probably the most significant source of precursors of the secondary particles. Thus, a total change of traffic intensity in large municipal areas will affect a total "background" concentration of suspended $PM_{2.5}$ particles in the area.

The cumulative impacts of the strategy shall consist in co-effect of individual conceptual measures. They can be significant, especially in the case of new infrastructural measures in frequented transport corridors in valleys with deteriorated dispersion conditions. In such cases, the transport release of current routes leading through built-up municipal areas can be expected. However, a new source of pollution will be created by the new road from a relatively short distance from the current road, in connection to spatial limitations of this topography. In most cases such infrastructural measures are caused by the requirements for higher road capacity, thus such corridors can see an increase of the amount of transport emissions close to residential areas.

In regard to the time horizon of the scope of the assessed strategy, the potential impacts on air are mid-term or long-term.

Overall, the proposed strategy will be, in terms of impact on air compared to the zero variant, of low significant negative impact induced especially by a mild increase of freight transport. This negative impact within the Slovak Republic will be partially compensated by reduction of personal individual car transport. Compared to BAU 2030, a change of production of emissions of the proposed option will be 2-9%, depending on the particular evaluated substance.

The strategy impact on air quality will be strongly heterogeneous. Possible worsening of emission conditions due to implementation of the strategy can be expected in the Bratislava and Žilina Region. The following Figure represents a summary map which combines the risk sites of all 4 evaluated pollutants (PM_{10}, $PM_{2.5}$, B(a)P and NO_x).

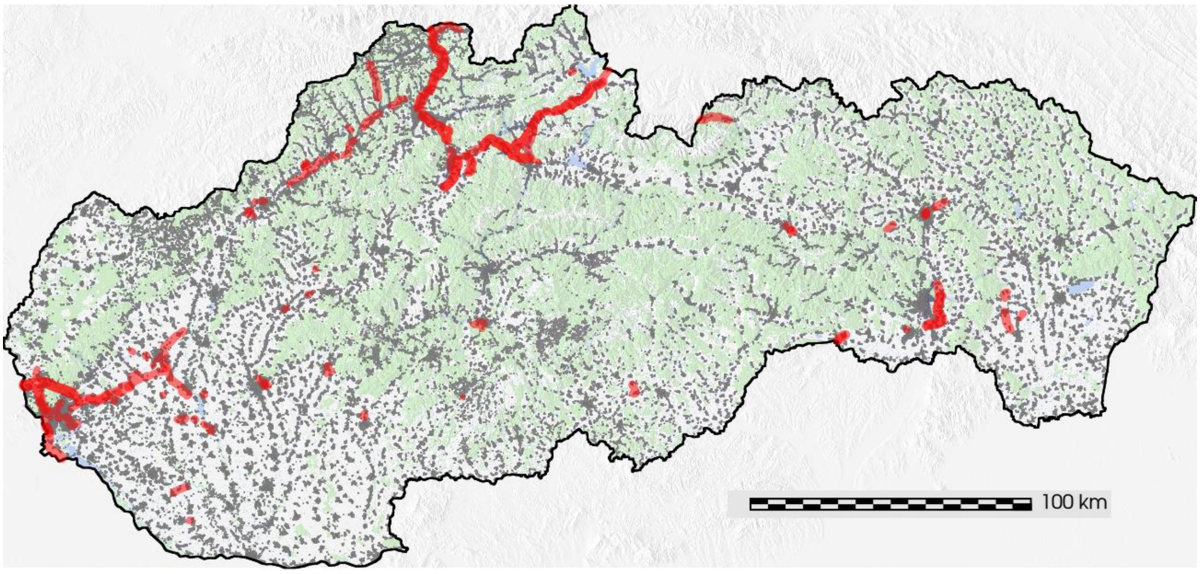


Fig. IX-2 Summary map of potential risk sites in terms of strategy implementation

In connection with the prepared infrastructural measures, the transport model will bring increases in car transport and related potential negative impacts in the following transport routes:

- Bratislava – Trnava – Leopoldov, and Bratislava – Trnava – Sládkovičovo
- Žilina – Čadca – Czech state border
- Žilina – Martin – Ružomberok
- Dolný Kubín – Polish state border
- eastern Košice highway bypass

Other epicentres of potentially most significant negative impacts of the strategy will be of local character or will be compensated by reduction of the negative emission impact of transport along other roads.

The increase of emissions given by transport intensity will probably be compensated for by the support of transport means using alternative fuel, approached by OPS7 and technical development**. By 2030, the gradual modernization of carpooling will probably cause a higher relative decrease of emissions rather than the stated 9 per cent increase of national emissions due to the strategy. Thus, in absolute values, transport emissions of the proposed option should drop in the real-case scenario, or stay at the same level in the worst-case scenario. Thus, there will probably be no identified potential negative impacts in reality.** The potential negative impacts evaluated in the submitted documentation can be concluded only when compared to strategy option 0 (BAU 2030).

Impacts on greenhouse gas emissions

Based on the transport model for the design part of SPTD SR 2030, the emission analysis of greenhouse gases (GHG) on the transport network of the Slovak Republic was elaborated. Emissions were calculated for model scenarios of BASE 2014, BAU 2030, and for the proposed 2030 option.

Transport measures stated in the SPTD SR 2030 proposal for the road and rail networks will bring a saving of 220.13 Gg of CO_2 by 2030, when compared to the scenario without the implementation of the measures. This forms a relatively significant 2.2% reduction of total emissions of greenhouse gases from the road and railway transport in Slovakia. When emission production in the proposed scenario is compared with the emissions as per the individual reference years, used in relevant EU objectives for the decrease of greenhouse gases from transport, we can see a significant increase of greenhouse gas production. This results from a total increase of transport intensity which is expected both without implementation of the strategy (BAU 2030) and if implemented (proposed scenario SPTD SR 2030).

SPTD SR 2030 is a positive contribution to reach the objective of a "Decrease of total GHG emissions by 2020 by 13% vs. 2005 as defined by the EU in the 2020 Climatic-Energy Package", and the objective of a "Decrease of total GHG emissions by 2050 by 80-95%" as determined in the Plan of Transition to a Competitive Low-Carbon Economy by 2050. These objective refer to the total reduction of production of greenhouse gas emissions from all sectors of the national economy. Implementation of the measures proposed in SPTD SR 2030 will slightly decrease the expected increase of greenhouse gas emissions from the transport sector, which has a negative impact on the total decrease of GHG production in Slovakia.

The biggest impact on the decrease of production will be made by a change in car pooling and an increased proportion of electric and hybrid vehicles. The size of the proportional increase of these vehicles, however, depends on the intensity of support for their use. A further decrease of GHG production could bring an increase of the ratio of vehicles running on CNG. Such factors are, however, very hard to predict from the SPTD SR 2030 proposal.

Impacts on the noise situation

The noise situation is influenced by the means of transport used on the assessed roads. The dominant impact is expected from the activities of car and rail transport. Water transport, bicycle transport, etc. will only have a minor impact on the noise situation. The impact is evaluated using noise emissions around transport routes or by the evaluation of changes that will occur in such emissions on the implementation of the proposed measures (comparison with BAU 2030), i.e. measures that will cause a change in transport intensity in the transport network. In Slovakia, the assessed changes can be described as significantly heterogenic, i.e. it is possible to delineate areas where both an increase and decrease of noise load can be expected, and vice versa, where a decrease of load around a road is expected.

Tab. IX-2 Selected low-risk sites (i.e. sites with deterioration when compared with BAU 2030)

Corridor	Risk sites
D1a	around Šútovo, Hubová – Švošov
D4	around Devínska Nova Ves, Záhorska Bystrica, Marianka, Rača, Vajnory
D1c	around Košicky Klečenov
R5/D3a	around Čadca – Podzávoz, Svrčinovec
D2	around Dúbravka
R3a	around Dlha nad Oravou, Kriva, Podbiel
R3b	around Dolný Kubín
R3c	around Turčianske Teplice

The surroundings of current roads (changes caused by the redistribution of traffic)	D1 Bratislava around Trnávka
	D2 around Dúbravka
	II/507 around Pruské (close to Ilava)
	I/18 around Žilina – Mojšova Lúčka, Strečno

The sections stated above can see the impacts of the implementation of the measures in the form of the most significant increase in noise emissions. For assessment of the detailed extent of threats one needs to assess a particular technical proposal of solutions for the given road section, and also to propose a specific and efficient noise protection method for this solution.

Noise emissions are always connected with the place of their creation or with the relatively (hundreds of meters at most) close vicinity of the source. The general aim of the proposed solutions is to make Slovakia passable, to shift transport from individual to mass transport, measures to achieve better traffic flow, etc. Depending on the particular technical solution, we can assume whether, as a total impact on the situation in the given area, the implementation of the proposed measures will accumulate adverse impacts on the noise situation. Upon their completion, the measures aim to decrease the noise threat, both the direct and cumulative impacts on the noise situation. Accumulation can be regarded as both the decrease and increase of noise from one source to another (e.g. a shift of type and route of transport from a current urban road to a newly built bypass). In the entire context, completion of the proposed measures, including noise measures, expects improvement of both the transport and noise situation around the main traffic arteries.

Impact on population and health

SPTD SR 2030 discusses the transport impact on health mainly in the field of safety, air and noise; somewhat less with other elements of environment and health protection.

Considering the impacts of air influence on people's health, it is necessary to conclude that, even though SPTD SR 2030 dedicates considerable space to air quality, people's exposure to transport pollutants is one of the most difficult issues to solve in transport development. The assessed strategy in many places submits proposals for construction or completion or reconstruction of the road network which in the model shows the increased health risk for citizens living in the surroundings of the linear source. Even though the rise of concentration is not always high in percentage, such an impact cannot be trivialized and it is necessary, as a prevention, to adjust vehicle travel so that no increase of pollutants occurs, especially $PM_{2,5}$ and N_2O. Another measure (at certain sites that create conflict in terms of terrain, e.g. narrow valleys) which is necessary: bypasses should be located far enough from urban areas and transport around urban areas should be as environmentally compatible as possible.

Considering the noise impact on human health, it is necessary to highlight the unsatisfactory conditions of noise exposure in Slovakia, mainly in certain agglomerations and large towns where noise is the dominant harmful pollutant for health, affecting also the well-being of inhabitants. The application of Slovak Government Directive no. 549/2007 Coll., defining a reference period for which allowed noise levels are determined and determining land categories where such limit values are applicable, will enable the improvement of health protection by a reduction of exposure to transport noise, provided that SPTD SR 2030 is implemented. Limitation of people's exposure is technically feasible and health risks can also be reduced in cardiovascular diseases and neurotic and learning disorders, which reduce quality of life.

As regards the social and economic impacts of SPTD SR 2030 on human health, the strategy has the potential to increase the number of workplaces which can partly eliminate the negative impacts on health risk perception associated with new sources of pollution and noise. Transport services create job opportunities. When implementing SPTD SR 2030, it is also necessary to take into consideration the social context of the construction or the implementation of long-term measures and their impacts on society – human health, and enhanced inter-sector collaboration by the ministries of labour and healthcare.

Impacts on Nature and Landscape

Transport development has inevitable impacts on nature and landscape. Some of the infrastructural measures identified potentially significant risks or impacts on nature protection interests, mainly the locations of Natura 2000 and the national system of protected areas, as well as the locations of wetlands protected according to the Ramsar Convention, territorial ecologic stability system, migration passability, land fragmentation, valuable nature elements, protected species, and biodiversity. Since the subject matter of the strategy is neither the leading of corridors nor exact infrastructure routes and technical implementation, many routes will be subject to changes, thus the final impacts may differ from their identification in the SEA. Moreover, not all of the assessed corridors will be implemented to their full extent (min. by 2030). Thus, in the assessment the identified impacts need to be perceived as risks that need to be eliminated while planning the routes and technical solution. In a number of cases it will apparently not be possible to avoid significant impacts. However, this can be assessed only from the determination and detailed assessment of individual projects and their potential alternatives.

With respect to possible measures there is a risk of significant negative impacts on the territory of Natura 2000 and the national system of protected areas:

Tab. IX-3 Measures with a potentially significant impact on protected areas

Measure	Corridor
OPC5	D1 and D1 – Turany – Hubová (D1a)
	D1 – Bidovce – SK/UA border (D1c)
OPC7	R2 – Šaca – Košické Oľšany (R2a)
	R4 PL/SK national border — Prešov Northern Bypass (R4)
OPC8	R2 – Kriváň – Ožďany (R2e)
	R2 – Ožďany – Figa (R2f)
	R2 – Tornaľa – Šaca (R2g)
OPC9	R3 – Tvrdošín – Sedliacka Dubová (R3a)
	R3 – Oravský Podzámok – D1 crossroads(R3b)
	R3 – Martin – Šahy (R3c)
	R3 – Šahy – Zvolen (R3d)

	R1 – Banská Bystrica – D1 (R1a)
OPC10	**D4 (Jarovce) Ivanka – Slovak/Austrian state border.**
OPC12	D2 – Bratislava Lamač – SK/CZ national border (D2)
	R1 – Bridge close to Bratislava – Vlčkovce (R1b)
	R7 – Dunajská Streda – Nové Zámky (R7b)
	R7 – Nové Zámky – Veľký Krtíš (R7c)
	R7 – Veľký Krtíš – Lučenec (R7d)
OPL2	Measures at the M. R. Štefánik airport in Bratislava
OPŽ1	Route CZ/SK national border – Čadca – Krásno nad Kysucou
OPŽ4	Route Žilina – Košice
	Route Košice – Čierna nad Tisou
OPŽ5	Route CZ/SK state border – Kúty – Devínska Nová Ves
	Route Bratislava – Štúrovo/Komárno SK/HU state border
OPV1	Ensuring navigability of the Danube along the whole river
OPV5	Complete measure

In case of corridors in **bold,** available information suggests high risk of significant negative impacts on the routes presently expected. However, this risk needs to be examined in more detail and finally evaluated on the basis of exact routes and the technical solutions of constructions, and if necessary, to look for other options of traffic connection, or proceed pursuant to Art. 6.4 of the Habitat Directive in the case of impacts on areas of the Natura 2000 system, or pursuant to Act no. 543/2002 Coll. on Nature and Landscape Protection (permission for the activity in degree of protection one to five or exceptions from protection conditions) in the case of the national system of protected areas.

Impacts on surface and ground waters

The most significant impacts on surface water are to be expected in water transport. Negative impacts on hydromorphological changes in water bodies for example as a result of capacity enhancement of the riverbed by means of dredging can be generally expected. With increased water transport the risk occurs of direct pollution of surface water due to fluid leakage and waste water production. The sector of water transport is considered to be the biggest source of potentially negative impact on water management. Negative impacts of lower significance (small significance) were identified mainly for the road transport sector.

Water quality risks during the implementation of measures are associated mainly with the new construction and enlargement of road structures. Construction and operation of line structures (roads, railways) can have an adverse impact on the drainage situation in the land, or on ground water quality and flow, especially if they are designed in a cut, embankment or tunnel. Moreover, during own construction surface waters in the surroundings of constructions can be influenced by flush of earth.

During operation, the most significant risk is PAH pollution (polyaromatic hydrocarbons), or POP, VOC (volatile organic substances), as well as excessive ingress of chloride into water from winter maintenance using salt. The risk of water quality deterioration during operations is connected to the discharge of rainwater, less with air pollution (using so-called atmospheric deposition). Less frequent, but more severe for water quality could be accidental leakage of crude oil substances (in case of accidents when transporting chemicals, leaks during fuel handling, etc.).

Connection to Water Framework Directive

The position of water transport projects is controversial on the general level with respect to WFD requirements. On one hand, water transport is considered to be “the most ecological” and on the other hand, together with development of waterworks in watercourses and anti-flood measures, it was one of the main driving forces giving rise to anthropogenic interventions in river systems and hydrological changes in particular. From this point of view, there is assessment of a conflict between the objectives of SPTD SR 2030 and the environmental objectives of water protection as stated in the Slovakia Water Plan in accordance with the Framework Water Directive.

Impacts on Future Climate Change Related Risks

No significant changes in the averages of global radiation, speed and direction of wind are expected within climatic conditions; Considering the greater strength of storms in the warm part of the year, a more frequent occurrence of strong wind, storms and tornadoes related to storms is expected which, in case of floods, may cause bigger overflow and higher flow rates. A special issue might be side erosion of rivers and relocation of their beds, as well as underflooding of inundation alluvial plains which will put higher requirements on the foundation methods of embankments and bridges in overpowering water currents. OPC7, OPC8, OPC9 and OPŽ4 also identified a possible conflict with flood areas.

Impacts on the rock environment and raw materials, geological risks

SPTD SR 2030 creates certain locally significant risks of bank deformation, conflicts with raw material beds and old mine works, which must be solved within the connecting project work – especially in corridor studies, feasibility studies, territorial plans and detailed project proposals. As part of a detailed study, it is also necessary to take into consideration the risk of the cumulative impact of extreme rain phenomena and floods. In particular, OPC5, OPC6, OPC8, OPŽ1, OPŽ4, and OPŽ8 were identified as high risk.

Impacts on soil

Implementation of most of the designed traffic structures as measures to safeguard the accessibility of Slovak regions using road infrastructure and construction of new corridors will be naturally associated with permanent and temporary occupation of land. In this regard, protection of the best quality soil needs to be secured, as well as to avoid a risk to the ecological features of soil. More detailed proposals of individual measures should be designed so that land occupation impacts are minimized (especially black soil and phaeozem), risks of soil quality deterioration during road construction and operation are limited, as well as limited interference into protection and special forests. In particular, OPC8, OPC10, OPC12, and OPŽ5 were identified as high risk.

Impacts on cultural heritage

The draft SPTD SR 2030 did not identify potentially significant risks for or impacts on cultural heritage. New proposed or considered corridors are not located on areas delineated as conservation zones (CZ), conservation reserves (CR) or objects in the UNESCO list of cultural heritage. In terms of the transport load impact on protected objects, the strategy will have slightly positive impacts, mainly due to measures that decrease the intensity of car transport in town centres.

Options and Insecurities

The strategic plan was submitted and assessed as Option 0 (the condition that would happen if no strategic plan is carried out) and in the proposed option.

Due to limited funds, the extent of the measures and the level of preparation of the individual projects, it will be not possible to implement all of the measures fully by 2030. Selection of projects for implementation will be determined definitively in the next steps. Thus, the proposal scenario, which was assessed mainly in terms of the total impact on air and noise, might partially change. In terms of total evaluation, these changes should not be of a significant nature.

The main limitation of the impact assessment is the strategy orientation itself. It is a general plan, aiming to determine the territorial route and technical solution of traffic structures. Thus, the plan impacts in a range of environmental elements could only be assessed as expected risks and opportunities, however, not as clearly identified impacts.

For this reason, measures were proposed to avoid or mitigate negative impacts. Such measures are directed at the level of individual strategy as well as at subsequent preparation steps of traffic plans and also towards the considered transport corridors.

IX.4 RECOMMENDED MEASURES PROPOSED TO PREVENT, ELIMINATE, MINIMISE AND COMPENSATE ENVIRONMENTAL AND HEALTH IMPACTS

The draft SPTD SR 2030 does not address the territorial routing of transport corridors or specific transport plans that will be discussed in independent routing studies and land-use plans. The draft SPTD SR 2030 urges that the steps mentioned below are strictly required in the process of the preparation of different project plans, especially in phase 1 of the pre-implementation stage Conceptual preparation involves the following tools:

- 1.1 Forecasts, surveys, land-use plans
- 1.2 Concept studies (studies of possibilities and opportunities) – optional designs
- 1.3 Feasibility studies (FS)
- 1.4 territory-technical study, background material for the building plan

In this regard, our primary recommendation is to thoroughly apply the process of strategic environmental assessment as required in Art. 4 (1) of Act No. 24/2006 in the process of preparing land-use plans containing transport plans subject to the EIA.

Recommendations to be considered in SPTD SR 2030

A. To ensure the monitoring of road transport emissions in the regions with the highest share of areas with potential deterioration of emission status compared to the zero option from the strategy, i.e. in the Bratislava Region and Žilina Region.

B. We recommend completing SPTD SR 2030 with measures to lower greenhouse gas emissions.

C. When processing the strategic noise charts and action plans it is recommended to apply the transport model created within the processing of SPTD SR 2030 and to build on the modelled intensities for the current scenario of the transport network development by 2030. This will enable consideration of prospective traffic intensities and preparation of long-term measures to lower the current and predicted noise load on inhabitants.

D. We recommend re-formulation of strategic objective No. 5 as follows: ”a Decrease of **negative** environmental and negative socioeconomic transport impacts...“ so that positive transport impacts on society could be applied.

E. Include the following in Chapter 5.3.1.3 Process of preparation and realization of development project including related activities: ”In the course of preparation of individual infrastructural projects, select routes in consideration of protected areas, Natura 2000 areas and valuable landscape features, and assess the land routing in the SEA at the level of land use plans“.

F. Include the following in Chapter 5.3.1.7 Regular monitoring of noise and air quality and implementation of measures reducing the negative environmenal impacts of transport: ”Monitoring vertebrate mortality on roads and railways, mapping of animal migration corridors, completion of measures to avoid collisions and measures to enable migration to current infrastructure (ecoducts, wide area under bridges and water gates with dry banks, fences and barriers against amphibians together with passages)“

G. Furthermore, we recommend preparing the following studies as a basis for the SPTD SR 2030 implementation and update:
   - Studies of migration routes of big predators for the whole Slovak Republic. The study conclusions should be respected in the planning of the territorial routing of constructions and of measures to mitigate the negative impact.
   - Studies of the necessity and convenience of making individual waterways navigable. In addition to an analysis of the demand for water transport and the available capacity of parallel modes of

transport, mainly railways, and an economic analysis of the financial investment and benefits, the study should include an analysis of the provided ecosystem services, the value of which will be reduced by building waterways.

H. Fulfilment of the objectives and measures in the field of water transport shall be carried out in compliance with the environmental objectives of the Water Plan of the Slovak Republic or Water Framework Directive. With consideration to the significance of the potential negative impacts on water transport projects, the implementation must be preceded by a comprehensive feasibility study which would assess the impact on the achievement of objectives of the Slovakia Water Plan or the Framework Water Directive, and propose measures for the elimination/minimization of the negative impact on water quality and water management.

I. We recommend adding to the strategy objectives the issues of minimization of waste production and environmentally friendly waste management, waste recycling, secondary use, minimization of special and dangerous waste.

J. The strategy should discuss the possibilities of how to support measures of waste production decrease, mainly from the construction and operation of water transport, service infrastructure of water and air transport, including lowering of material demands or preferring waste re-use and recycling, into measures focused on the new construction, modernization and/or safeguard of maintenance of transport infrastructure.

K. Include the requirement for adhering to the principles of so called green procurement when granting contracts in the field of transport infrastructure.

L. Elaborate Indicators for meeting global strategic and specific objectives of the strategy.

M. Focus the specific objective ŠHC3 *"Systematically reduce socio-economic and environmental impacts of transportation"* not only on the reduction of negative impacts on greenhouse emissions, noise, soil occupation and accidents but also on further determinants of health, nature and landscape, water units and climate change related risks. In this regard the measure OPS7 *"Regular monitoring of noise and air quality and implementation of measures reducing the negative impacts of transport on the environment"* should be supplemented.

Recommendation to be taken into account in concept studies, feasibility studies and territorial-technical studies.

1. A detailed assessment of impacts on the pollution situation, or potential verification of options with consideration of the impact on air, are recommended especially in the following measures and corridors:
   - Košice highway bypass
   - OPC8 – Completion of the west-east road axis in Central Slovakia

- increase of capacity of motorway 2 – Bratislava Lamač – state border SK/CZ, incl. accumulation of D4 impacts at Stupava
- R1 – Most pri Bratislave – Vlčkovce
- R7 – Nové Zámky – Čaka
- R7 – Veľký Krtíš – Lučenec
- R8 – Nitra – crossroads R2

2. In order to eliminate the negative noise impact when performing any kind of construction, the technical solution needs to be closely assessed in relation to the location of the structure and the residential area – preferentially by a noise study which could be supported by noise measurement.

3. When implementing SPTD SR 2030 at the project level (EIA), not only standard aspects of impacts on human health (usually taking into account people's exposure to changes in air and noise load) need to be assessed, but also social relations at the given site, and further stages of project and land documentation need to avoid the creation of fragmented urban sites and to safeguard natural and historic social contacts.

4. Projects at the level of concept studies or feasibility studies should also include measures that enable animal migration based on the results of a survey of the existence of vertebrates and migration paths.

5. In the case of measures with a potentially significant negative impact on the objectives of nature protection (Tab. IX.3), find a route and technical solution without any significant negative impact on the land of Natura 2000 and the national systems of protected areas.

6. When planning the transport infrastructure projects, it is necessary to consider the requirements of the Water Framework Directive, plans of management of partial water basins and the Water Act. Based on the aforementioned analysis and in terms of the impacts of the transport infrastructure on water conditions, the most significant objectives include protection of water management areas (including mineral and thermal water) and the preservation of good ecological potential when building water transport structures.

7. In further degrees of preparation of individual transport plans we recommend paying increased attention to the evaluation of the impacts on water conditions with an emphasis on:
   - crossing of protected water management areas;
   - crossing of protected zones of water resources and resources of natural curative and natural mineral water;
   - crossing of water course basins;
   - hydro-morphological changes of water courses.

8. When proposing the transport infrastructure, respect the conditions of water protection defined in the specified protected water management areas, protection zones of water resources and protection zones of natural medicinal and natural mineral water resources.

9. A separate category of impacts is the possible collision with protected water management areas, water supply sources and their protective zones and sources of natural curative and mineral waters, as well as their protection zones. These impacts must be solved in particular during the placement of constructions and their technical solutions.

10. When implementing measures under OPC8 it is essential to respect the interests of protection of the mineral and curative springs at Sliač as much as possible, and within the further stages of project preparation, to solve the negative impacts that affect the curative water of the Sliač spa.

11. When implementing infrastructural measures and their activities, observe the recommendations for water protection against pollution.

12. Generally, flood areas must have safeguarded the stability of the body and objects for a safe passage of Q100 and, at transport connections with significant meaning for transport services, also with Q1000. The extent of the stability of the body and bridge structures must be secured depending on the modelled flow rate speed. It is necessary to avoid subsurface erosion of supports and pillars by foundation on deep piles or, in the case of area foundations, use bed reinforcement under the bridge.

13. Future hazards may also occur with gradually changing climatic conditions. Therefore, partial technical proposals need to pay increased attention to potential local extreme flash storms which cannot be predicted accurately, yet they pose the highest danger for the long-term lifetime of the structure in the discussed area.

14. As a part of preparation and construction, it is necessary to carry out measures to secure the stability of the rock environment, based on a detailed engineering-geologic and hydrogeologic survey.

15. As a part of the preventive measures, it is essential to carry out a survey of old mining works and secure their maintenance, if necessary.

16. Similarly, it shall be necessary to provide for the protection of raw material deposits.

17. When placing the transport structure as a part of the land use plan and the respective SEA processes, as well as with considered detailed localization options and respective EIA processes, the following must be secured:
    - Agricultural soil protection classified according to the code of the quality soil-ecological group in the first to fourth qualitative group provided in Annex No. 3 of the Soil Protection Act. The primary objective is to minimize the occupation of black soil and phaeozem;
    - Thorough assessment of other options of where to place the structures on agricultural land beyond the built-up municipality area, taking into consideration the protection of the best quality agricultural land as per Sect. 12, art. 2(a, b) of the Soil Protection Act;

- Evaluate the impacts on the occupation of agricultural land for each and every option of where to place the structure;
- Take into account the potential need to handle contaminated soil.

18. Systematically, take into account the Principles of Monument Area Protection of all potentially affected monument zones and reserves when preparing the project for individual intentions (including respect of protection of determined panorama viewpoints or viewpoint angles).

19. Immediate solution of the measures for taking the (freight) car transport from the centre of Prešov, dealing with the road bypass of the city.

20. In the course of preparation and construction of the transport infrastructure, include and thoroughly apply the measures to minimize production of building waste especially excavation earth, and maximize the possible use (re-use and recycling) of materials at construction.

Detailed recommendations are stated in Chapter V.

X. INFORMATION ON ECONOMIC DEMAND (IF ENABLED BY THE NATURE AND EXTENT OF THE STRATEGIC DOCUMENT)

The following strategic principles have been defined in SPTD SR 2030 (part 5.3.1.1) in relation to the set-up of funding principles for the transport sector:

Strategic principal No. 1: To set sustainable funding for the transport sector is a fundamental prerequisite of its further sustainable development. The initial step must be the preparation of a detailed, realistic plan of sustainable funding for the transport system in the Slovak Republic, taking into account both current and new options for funding (while using the principles of structured funding).

Strategic principal No. 2: The priority objective of the plan of sustainable funding for the transport sector must be the setting of parameters to secure the sustainability of the existing transport structure. This should be represented mostly by secured financial cover for the operation, maintenance and repairs (including settlement of current internal maintenance debts of the transport sector), provided that national funds are stabilized. New investment constructions must not disturb these requirements, even at the cost of a slower pace.

Strategic principal No. 3: Financial income from payment for the use of transport infrastructure should be primarily reallocated to individual administration subjects in order to perform maintenance and repairs of the infrastructure that generates the above stated income. A secondary criterion should be the purposeful reallocation of potential excess in order to contribute to the redemption of the internal maintenance debt.

Strategic principal No. 4: In consideration of budget possibilities of the Slovak Republic and the investment needs related to the development of the transport infrastructure, which forms a part of TEN-T networks, it is necessary to negotiate co-funding from the European Union even for the following period.

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Annex No. 2 – Reasonable assessment of the impacts of SPTD SR 2030 in the territory of the Natura 2000 system

Annex No. 3 – Evaluation of the requirements of the assessment´s scope

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ANNEX 1

Assessment of impacts of the strategy´s aims on partial environmental topics

ANNEX 2

Reasonable assessment of the impacts of SPTD SR 2030 in the territory of the Natura 2000 system

ANNEX 3

Evaluation of the requirements of the assessment´s scope

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