ORIENT/EAST-MED CORRIDOR CAPITALISATION PLAN FOR THE TERRITORY OF SOUTH-WESTERN SLOVAKIA

D.T3.2.5

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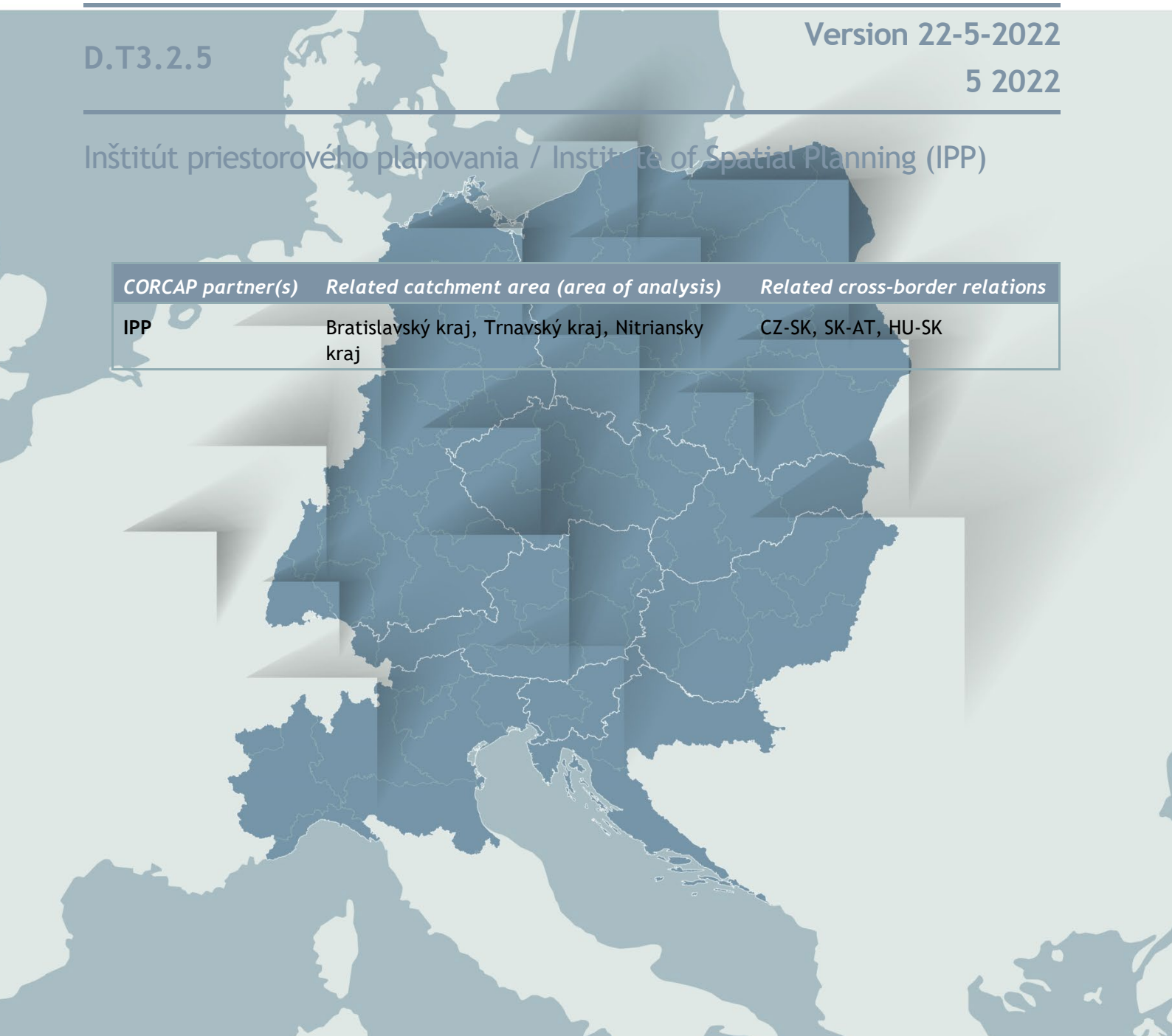
IPP	Bratislavský kraj, Trnavský kraj, Nitriansky kraj	CZ-SK, SK-AT, HU-SK



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1. INTRODUCTION

1.1. Introduction to the issue

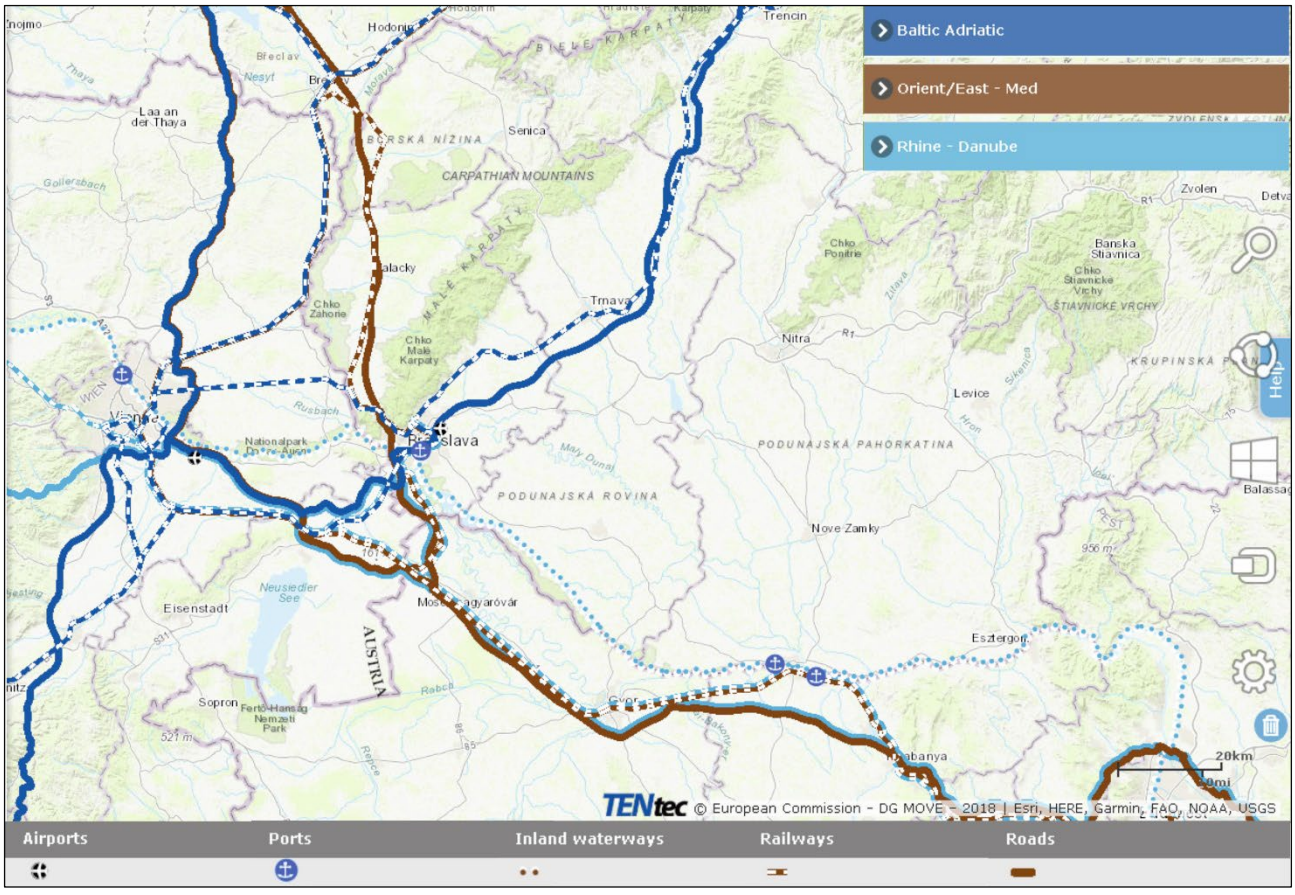
1.1.1. Starting points

The location of southwestern Slovakia, and especially the Bratislava region, is very convenient in terms of accessibility from Vienna, Budapest, and Brno. Bratislava is an important transport hub with several modes of transport.

The transport infrastructure of the Slovak Republic is part of three corridors of the basic TEN-T network (MDVRR SR 2016a):

- **Baltic - Adriatic Corridor**: Katowice - Žilina - Bratislava – Wien
- **Orient / Eastern Mediterranean Corridor**: Köln - Pardubice - Brno - Wien / Bratislava - Budapest - Arad - Timișoara - Craiova - Calafat - Vidin – Sofia
- **Rhine-Danube Corridor:** München / Nürnberg (DE) - Prague - Ostrava / Přerov (CZ) - Žilina - Košice - SK-UA border; Wels / Linz - Wien (AT) - Bratislava - Budapest (HU) – Vukovar (HR); Wien / Bratislava - Budapest - Arad - Brașov / Craiova - București - Constanța – Sulina

Figure 1. Existing TEN-T corridors in the South-Western Slovakia



Source: TENtec (2020 - adapted); Note: In the figure, solid lines show road corridors, dashed lines show railway corridors and dotted waterway lines.

The following key starting point was considered when creating the ORIENT-EAST MED Corridor Capitalization Plan (CCP) for the territory of southwestern Slovakia (hereinafter also referred to as the "capitalization plan" or the "capitalization plan" or the "CCP"):

A key goal of the EU - gradually reduce the carbon footprint in 2050 – 0 %, environmental protection

It follows that:

- substantial **reduction** of road freight transport, especially its long-distance component (over 250 - 300 km)
- **strengthening rail freight transport** over long and medium distances over 150 km
- **construction of new intermodal IHUB "(water -) rail - road "**
- **ensuring the connection of IHUB - logistics areas** - high-quality and fast-capacity connection between IHUBs and adjacent logistics centres
- **renewal of siding systems**
- interconnection of logistics centres for rail and water transport
- new IHUB transhipment technologies
- **development of shipping** - so far there are efforts by the EU, but also in general, to strengthen shipping, which means:
  - new propulsion units with reduction of marine exhaust fumes must be used
  - new transhipment technologies in port HUBs
  - strengthening the connected land transport infrastructure - railway, and road
- **development of air freight transport** - the smallest type of spare parts - only for special, fast, and especially small-volume shipments:
  - new transport technology, noise reduction, increased transport volumes

Other specific starting points in his work were:

1. The current transport network of the CENTROPE region is composed of:
   - main and arbitrary railway lines
   - motorway and expressway network

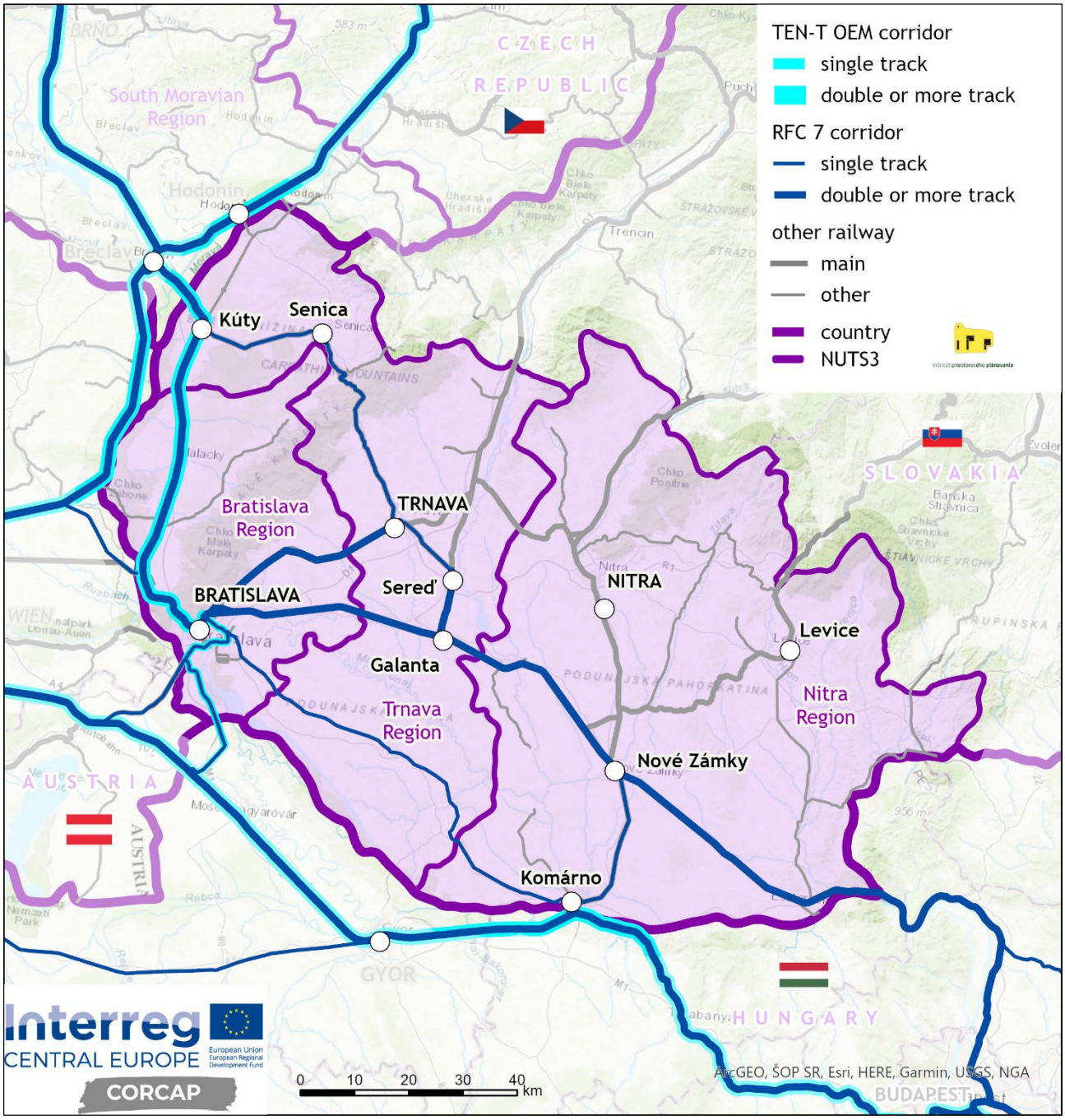
   The transport system is gradually expanding, especially the motorway network. The modernization of the railway network lags behind the overall demands and expected transport requirements.
2. The projected traffic intentions will be in a substantial change in modal split limiting individual car transport (reducing the carbon footprint), which means:
   - Strengthening all modes of public passenger transport, in particular rail passenger transport
   - Limiting car traffic, especially in radial directions to the central parts of Brno and Bratislava
   - The EU's intentions to reduce the carbon footprint will directly affect the transfer of freight transport from long-distance trucks to rail freight
3. The current transport of freight is expected to double by 2050/2070, while precise objectives in the development of intercontinental transport, particularly in the South-East Asia - Europe direction, are not known

4. It is necessary to prepare transport routes for long-distance freight transport throughout the region for the transport of freight in the amount of about 20-24 million tons/year in the main direction NW – SE. This will mean, considering the EU's intentions to limit car traffic, drawing attention to the railway arbitrary lines available today in order to ensure their increased throughput
5. The area of South Moravia and SW Slovakia are and will be increasingly important crossroads of long-distance transit (railway – highway – waterway) in all directions (NW-SE, N-S and E-W) with relatively balanced transport quantities of goods about 20 mil. tons/year in each main direction
6. The REGIONAL ANALYSIS OF CHALLENGES AND NEEDS FOR SOUTH-WEST SLOVAKIA document (CORCAP & IPP 2020) shows that the transit of the OEM corridor through the territory of the Slovak Republic should be assessed in the context of regions of the whole SW Slovakia, not just the Bratislava Region
7. It is neither an all-society intention nor a need for freight transport, especially long-distance transit freight transport, to pass through the built-up territory of the city of Bratislava

1.1.2. Characteristics of the Orient East-Med TEN-T corridor

The TEN-T Orient / East-Med (OEM) corridor passes through the territory of Slovakia through a part of the Trnava region (north-western part) and the territory of the Bratislava region towards the capital of the Slovak Republic, Bratislava. In Bratislava, OEM Corridor continues further through Petržalka to Hungary. On the Hungarian side of the territory, it continues towards the Hungarian town of Komárom, while this corridor also includes a port on the Slovak side in the town of Komárno (Nitra region).

Map 1. Definition of the area of interest of this study – South-western Slovakia



1.1.3. CORCAP project intervention logic

This Corridor Capitalization Plan (CCP) follows on from the analyses carried out in the first stage of the work on the CORCAP project, as well as the work carried out in the second stage, which was the elaboration of the Pilot Study that is described below. The first stage was implemented according to a uniform methodology designated by the partners for the part of the territory allocated to them, with the IPP focusing on the territory of the Bratislava Self-governing Region (BSK).

Based on the outputs of the first and second stages, this plan is prepared. The starting point of the plan is its logical framework, resp. its **intervention logic** designed on the basis of the knowledge gained during the elaboration of the Pilot Study.

Global goal

Slovak Spatial Development Perspective (Aurex 2012) assumes that the settlement system of the Slovak Republic will develop on the principle of the so-called concentrated decentralization. This means that around the most important settlement centres so-called **settlement core areas** will be formed, into which suburbanisation processes will move both part of the population still living in settlement centres, as well as inhabitants moving within the framework of natural urbanization processes to more "urbanistically" significant settlement structures. The quality of the settlement environment of the settlement structure thus formed is conditioned, as practice shows, by the efficient functioning of suburban public passenger transport, mainly road and rail. Although the new trend of domestic work (online) can be expected to ease the pressure on commuting by suburban public transport, the fact that the development of suburban, regional public rail transport will be strengthened is essential. The conclusions of the Regional Sustainable Mobility Plan of the Bratislava Region (SGS 2020) also prove this. **The expected increased load on the existing railway network in the Bratislava area will overwhelm its current untapped potential and will create a limit for freight rail transport passing through the Bratislava Railway Node.**

The requirements for the passage of rail freight through the TEN-T OEM means that it is necessary to look for ways to implement this requirement to ensure sufficient rail freight potential coming at a higher system level in such a way **that the quality of the settlement environment in the affected region is not compromised**.

Due to the fact that this is CCP an urban-transport project supported by EU funds the long-term goal is to improve the settlement system not only of the regions along the corridor itself, but also to contribute to ensuring the sustainability of the quality of the settlement environment of Europe as a whole by supporting appropriate modes of freight transport. In the context of the Slovak Republic, this means that **it is necessary to pay attention not only to the Bratislava Region, as it resulted from the assignment, but also to other regions that together form the settlement core areas of transnational significance in accordance with the Slovak Spatial Development Perspective (Aurex 2012).** As the resources allocated to this project are always limited, the area was extended by Trnava and Nitra Regions that together form the region of South-western (SW) Slovakia.

Ensuring the sustainability of a sufficient quality of the settlement environment in the territory of Southwest Slovakia requires, in addition to the reconstruction of the transport network, such changes in the settlement structure that will ensure the necessary degree of involvement of new transport facilities in the existing settlement structure.

Based on the above, we propose the following formulation of the **global objective** of the project:

„Contribute to ensuring the sustainability of a sufficient quality of the residential environment by supporting appropriate modes of freight transport ".

Strategic goal

The massive development of road freight transport is becoming a "nightmare" of road network operators. The number and weight of trucks are destroying roads, slowing down traffic and increasing road dangers.

The logical consequence of the above starting points was the following formulation of the **strategic goal**:

By 2050, increase the share of rail freight to min. 50%.

In this context, it is important to recall that this is mainly medium-distance and long-distance transport. At the same time, the project concept assumed that it is necessary to bring intermodal hubs (IHUB) closer to the logistics centres, when the so-called last mile of transportation would be done mainly by road. This would **significantly reduce the burden on the road network by road freight transport and make a significant contribution to ensuring its sustainability in the long term**.

Achieving the global goal of the project is conditioned by the completion of the system of civic and production infrastructure, which will enable **the organic involvement of IHUBs into the local settlement structure**. However, this is already an activity that is not directly included in the CCP, but its implementation is a necessary precondition for achieving the global goal of this plan. However, this plan includes support for ensuring the development of the necessary spatial planning tools, which should set out the principles of land use in the immediate vicinity of IHUBs.

Results

The CORCAP project in the territory of the Slovak Republic represents an urban-transport professional view of the possibilities of using rail freight transport to ensure the transport demands of the system of logistics centres in the territory of South-Western Slovakia. In order to achieve the above objectives, on the basis of the knowledge gained during the Pilot Action it is necessary to formulate:

- The concept of modernization and completion of the railway network
- The concept of building a network of intermodal hubs (IHUB)

Implementation of such a large-scale plan, which will affect not only the restructuring of production sectors (mainly secondary and tertiary) in the territory of Southwest Slovakia, could have a positive impact on a better use of the territory. However, for the implementation of these concepts, it will be necessary to create the necessary financial, economic, technical, and organizational conditions through the purposeful management of the entire design cycle of the subsequent activities of the CORCAP project incl. its CCP. Specifically, these are:

1. Ensuring planned and project preparation for connecting the network of logistics centres to the rail freight system in a sustainable way
2. Elaboration of the Monitoring and Information System of the Territorial-Technical Data for Continuous Monitoring of the CCP Implementation Process
3. Creation of a Coordination Platform of several central, regional allocation bodies, mainly from the sectors of transport, spatial planning, economic development as well as content-related business associations and chambers of commerce.

Before processing the KPK, the following stages of work took place:

1. Processing of the analysis of the current situation – 1st stage of processing the CORCAP project

The initial stage was processed by all project partners according to a unified structure. The acquired knowledge was the starting point for the 2nd stage. As for the conclusions of the Slovak analysis it was concluded that the problem is the passage of rail freight through the Bratislava Railway Node. This problem resulted from the solutions of the Regional Sustainable Urban Mobility Plan of the Bratislava Self-governing Region (SGS 2020). As a result of this finding, the area of interest expanded to include also the Trnava and Nitra Self-governing Regions (TTSK and NSK).

2. Processing of the Pilot Action - 2nd stage of processing of the CORCAP project

The pilot study was developed by each project partner separately according to its focus. IPP processed this part of the project together with the Czech partner from Brno (KORDIS) for the territory of the Czech-Slovak cross-border region.

The Pilot Action can be described as an urban-transport study, which consists of two parts.

The first (IPP & KORDIS 2022a) deals with the mapping of cross-border accessibility in the CE CENTROPE region until 2050 and its intention is to model the accessibility of individual modes of transport in the CE CENTROPE region, which includes areas located in the border areas of Slovakia, the Czech Republic, Hungary, and Austria. The aim of the study is to model the development of the TEN-T network in the addressed area, up to 2050 with an emphasis on the railway network.

The second (IPP & KORDIS 2022b) deals with the identification of sites attractive in terms of multimodal logistics and the development of development profiles in the South Moravian Region (SMR) and in the region of SW Slovakia. The purpose of this part of the study is to identify potentially the most suitable locations of intermodal hubs (IHUBs) in the area of interest, i. e. in the South Moravian, Bratislava, Trnava and Nitra Regions.

3. Elaboration, monitoring, and continuous updating of the Corridor Capitalization Plan (CCP) - (objectives, priorities, measures, action plans of individual stages of CCP implementation) - 3rd stage of CORCAP project elaboration

The activities of this 3rd stage of work are the subject of this document, i. e. the **Corridor Capitalization Plan** (CCP).

2. CORRIDOR CAPITALIZATION PLAN PROCESSING

2.1. Methods

The analytical part of the program followed up on the previous stages of work on the project, which were based on both the project assignment, consultations of key partners as well as the identified source documents and resources.

Among the key partners are CORCAP project partners as well as representatives of key organizations from the Slovak Republic. A special place among CORCAP project partners is occupied by colleagues from the Czech Republic, mainly from Brno, with whom the Pilot Action was jointly developed.

The project was coordinated by a team of main project partners, mainly through regular project seminars, which were also supported by the invitation of renowned external experts and interested managers from the EU institutions, as well as selected representatives of the relevant national and regional organizations.

2.1.1. Analysis of existing documents

A list of the main documents and sources is given in the table below.

Table 1. List of the main documents and sources

#	Name	Year	Contractor	Submitter
01	Predĺženie širokorozchodnej železničnej trate na území Slovenska s prepojením na územie Rakúska - ZÁMER - Extension of the broad-gauge railway line in the territory of Slovakia with connection to the territory of Austria - A Plan	October 2018	Breitspur Planungsgesellschaft mbH (BPG)	
02	European Silk Road	August 2018	The Vienna Institute for International Economic Studies - Mario Holzner (coordinator), Philipp Heimberger and Artem Kochnev	
03	Aktualizácia koncepcie rozvoja verejných prístavov 2010 (Verzia po zapracovaní pripomienok VP a.s. a MDPT SR - The Update of the Development Perspective of Public Ports 2010	July 2010	Deloitte (for MDPT SR)	
04	Orient East Med - Third Work Plan of the European Coordinator	April 2018	European Commission, Mathieu Grosch - European Coordinator	
05	Strategický plán rozvoja dopravy SR do roku 2030 - Fáza II - Strategic Transport Development Plan of the Slovak Republic until 2030 - Phase II	December 2016	MDVaRR SR	
06	Dopravné modelovanie - Traffic modelling			
061	Vyhodnotenie prieskumu železničnej osobnej dopravy - Rail Passenger Traffic Survey	October 2015	AF&partners, zastúpená AF-CITYPLAN s.r.o	MDVaRR SR
062	Prieskum autobusovej dopravy - Bus Traffic Survey	September 2015	AF&partners, zastúpená AF-CITYPLAN s.r.o	MDVaRR SR

#	Name	Year	Contractor	Submitter
063	Prieskum leteckej osobnej dopravy - Air Traffic Survey	September 2015	AF&partners, zastúpená AF-CITYPLAN s.r.o	MDVaRR SR
071	Územný plán regiónu BSK - smerná časť - Spatial plan of BSK Region - indicative part (2013)	2013	Aurex, s.r.o.	BSK
072	Územný plán regiónu BSK Zmeny a doplnky č. 1 - Spatial plan of Bratislava Self-governing Region as amended (2017)	2017	Aurex, s.r.o.	BSK
08	Program hospodárskeho rozvoja a sociálneho rozvoja Bratislavského samosprávneho kraja na roky 2014-2020 - Program of Economic Development and Social Development of the BSK Region for 2014-2020 - The Analytical Part	2015	Aurex, s.r.o.	BSK
09	Regionálna integrovaná územná stratégia Bratislavského kraja 2014-2020 - Regional Integrated Territorial Strategy of the Bratislava Region 2014-2020	2015	BSK & City of Bratislava	
10	Koncepcia územného rozvoja Slovenska (KURS) - Slovak Spatial Development Perspective	2012	Aurex, s.r.o.	MDVaRR SR
11	ŽSR, dopravný uzol Bratislava - štúdia realizovateľnosti - Transport Node Bratislava - Feasibility Study	2019	Združenie Uzol Bratislava: Reming consult, a.s., Sudop Praha a.s., Prodex s.r.o., Dopravoprojekt a.s.	Železnice Slovenskej republiky (Slovak Railways)
12	Dopravný model SR - Traffic Model of the Slovak Republic			
121	Prieskum nákladnej dopravy - Freight Transport Survey	October 2015	AF&partners, zastúpená AF-CITYPLAN s.r.o	MDVaRR SR
122	Záverečná správa - Final Report	March 2016	AF&partners, zastúpená AF-CITYPLAN s.r.o	MDVaRR SR
13	Územný plán hlavného mesta SR Bratislavy - Spatial plan of Bratislava the capital city of Slovakia	May 2007	City of Bratislava	

Source: IPP (2020): Regional Analysis of Challenges and Needs for Bratislava Region - D.T1.2.5.

2.1.2. Processing procedure

The main objective of the international initiative bringing together specialists in the field of transport and spatial planning from Germany, the Czech Republic, Hungary, and Slovakia, is to strengthen the cooperation of stakeholders in the field of freight (but also passenger) transport and logistics along the Hamburg / Rostock-Dresden-Prague-Vienna / Bratislava-Budapest axis and the inclusion of the TEN-T Orient/East-Med Corridor in the regional development strategies. The interests of Slovakia or individual key players from Slovakia (such as the Ministry of Transport and Construction of the Slovak Republic, Bratislava self-governing region and others) is represented by the Institute of Spatial Planning (hereinafter referred to as IPP).

Main outputs for the territory of Slovakia:

- REGIONAL ANALYSIS OF NEEDS AND CHALLENGES FOR BRATISLAVA REGION (IPP 2020) for efficient and environmentally friendly freight transport and identification of OEM potentials for the development corridors of regional importance (emphasis placed on the node functions of the Bratislava Region and the impact of territorial ties with the Vienna Region and on the Slovak side with the territories of Trnava and Nitra Regions)
- Pilot Action for the Development of Attractive Multimodal Logistics Locations composed of three separate outputs (documents):
    - TECHNICAL FRAMEWORK FOR CROSS-BORDER ACCESSIBILITY ANALYSES IN THE CENTROPE AREA (IPP & KORDIS 2022c)
    - MAPPING OF CROSS-BORDER ACCESSIBILITY IN THE CENTROPE AREA UNTIL 2050 (IPP & KORDIS 2022a) included GIS assessment of regional accessibility in CE CENTROPE territory according to different modes of transport and analysis of transport development scenarios up to 2050-2070
    - IDENTIFICATION OF ATTRACTIVE MULTIMODAL LOGISTICS LOCATIONS AND ELABORATION OF PROFILES FOR DEVELOPMENT IN THE REGION OF SOUTH MORAVIA AND SW SLOVAKIA (IPP & KORDIS 2022b)
- CORRIDOR CAPITALISATION PLAN (CCP) FOR THE REGION OF SW SLOVAKIA and the Recommendations for the implementation of the Corridor Capitalisation Plan for SW Slovakia (this document)
- WEB MAP APPLICATION accessible at https://ipp-oz.sk/corcap

2.1.3. Consultation with the institutions concerned

Involvement of stakeholders in the design of the Pilot Action:

- **Regional Offices** – Bratislava, Trnava and Nitra (Self-Governing) Region, South Moravian Region
- **National authorities** – Ministry of Transport and Construction of the Slovak Republic
- **Municipality the Capital City of the Slovak Republic Bratislava**
- **Transport and logistics experts:**
    - AROS - Association of Railway Carriers of Slovakia
    - ŽSR (Railways of the Slovak Republic)
    - Verejné prístavy (Public ports)

- Masaryk University Brno

Three meetings of local stakeholders took place through online meetings. A total of 15 experts from 7 organisations were actively involved.

Individual consultations were carried out with selected institutions (Bratislava Region and Ministry of Transport and Construction of the Slovak Republic).

Draft documents were sent to the stakeholders. Their comments and recommendations have been incorporated into the current document.

2.1.4. Use of geographical information systems

Geographical information systems (GIS) were used in all above-mentioned IPP CORCAP studies. Specifically, it is an ArcGIS Desktop product from ESRI. In all documents it was used for the creation of cartographic outputs (maps). In the framework of the two documents of the Pilot Action the software was also used as a tool for calculating the accessibility indicators. To do this, Network Analyst extension was required. By means of its online platform (ArcGIS Online) and server component (ArcGIS for Server) the software was also used for publication of geodata on the Web Map Application (WMA).

3. GOALS AND OBJECTIVES

Based on the knowledge gained in the work on the pilot study, priority axes and the measures to be taken in order to meet the objectives of the project - as defined in its intervention logic - have been formulated. It is both a **long-term (global) objective**: 'To contribute to ensuring the sustainability of a sufficient quality of the settlement environment by promoting appropriate modes of freight transport', as well as the **strategic objective**: 'Increase the share of rail freight transport to at least 50 % by 2050'.

Regarding the **long-term objective**, the prepared Pilot Action presented possible variants of the solution of the development of freight transport not only in Bratislava Region (BSK), as the original assignment was defined based on the previously defined corridor passage through the territory of the Slovak Republic. It was extended to the area of three regions, namely Bratislava (BSK), Trnava (TTSK) and Nitra Regions (NSK), which together form the region of **Southwest/South-western Slovakia**. This has made it possible to integrate other parts of the railway infrastructure into the corridor. These parts are important for the development of settlement structures of the Southwest Slovakia. The rightness of this extension is also evidenced by the fact that, **based** also **on the design of the Pilot Action, the definition of the corridor passing through the territory Slovakia was modified**. The Pilot Action also included in the solution a long-term international project plan in which the ŽSR (Railways of the Slovak Republic) participates - to extend the BGL (broad-gauge railway line) from Ukraine to Austria through the territory of southern Slovakia. This is a significant investment that could increase the economic development potential of some regions lagging behind for now, especially in the southern part of Central Slovakia.

Regarding the **strategic objective**, it should be stressed that this is a very ambitious objective of a strategic nature. It is justified by the trend of sustainable development strongly supported by the Institutions of the European Union. The level of development of transport networks in the last 30 years, which focused mainly on the development of automotive transport, has reached limits in terms of the impact on the quality of several important factors of the settlement environment, and this, especially for freight transport, makes it necessary to exploit the development potential of rail freight transport. This appears to be effective as it is a sufficiently developed railway infrastructure that needs to be modernised, with investments in its modernisation likely to be significantly lower than the further development of freight transport through the expansion of road infrastructure. On the contrary, the use of the reserve potential of rail transport will relieve some of the burden of mainly long-distance freight transport on the motorway network.

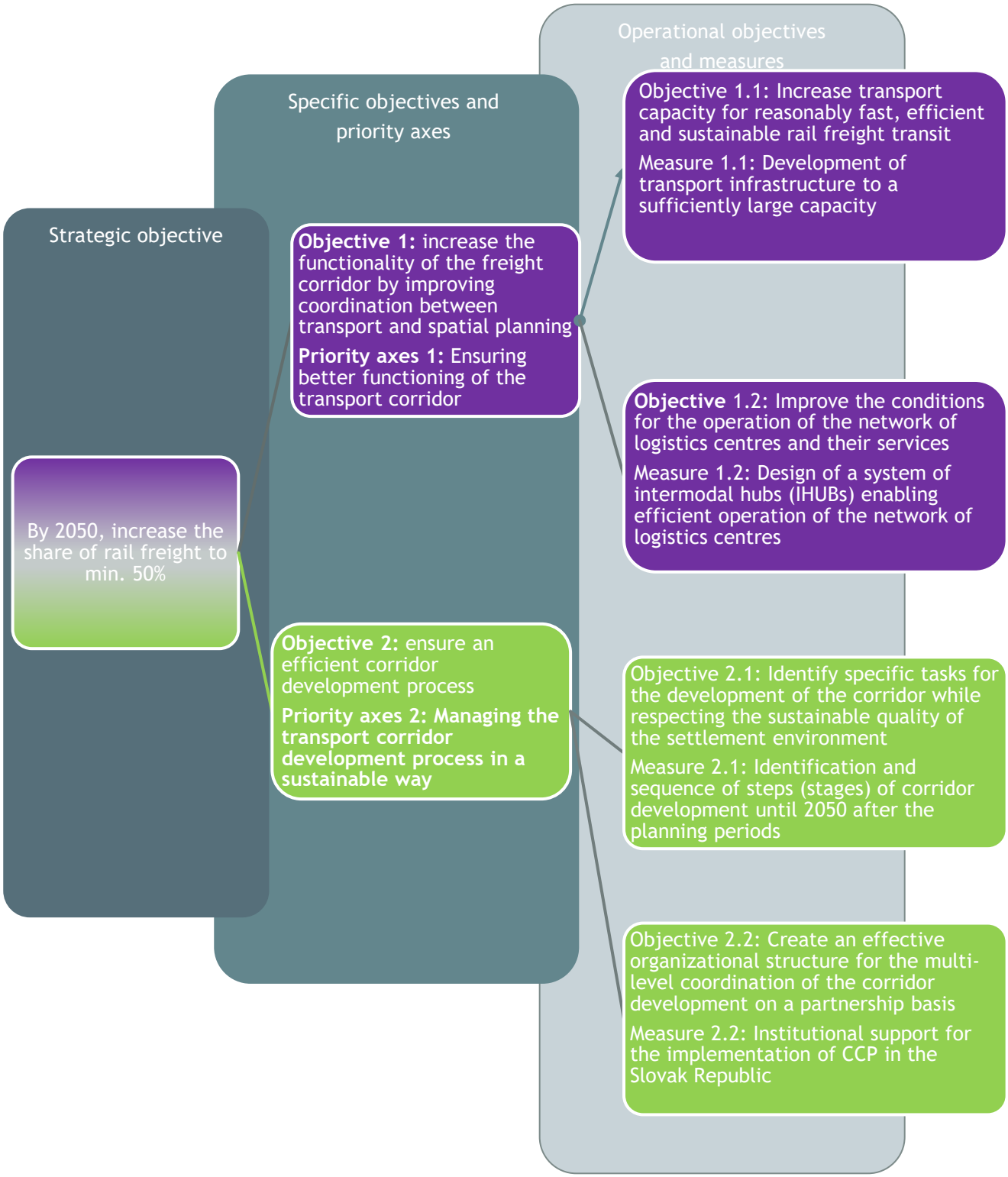
In order to achieve the strategic objective, it is necessary to implement at least two groups of activities, which will pursue two long-term objectives whose task is to:

- Increase the functionality of the freight corridor by means of improving the coordination between transport and spatial planning - Specific Objective 1
- Ensure an effective corridor development process - Specific objective 2

To achieve these long-term goals, 2 priority activity axes are defined according to the following Figure.

At the same time, operational objectives are defined for each of the long-term objectives, the achievement of which will be monitored in the various implementation phases in close coordination with the programming periods of EU regional policy. These operational objectives will be implemented through activities grouped according to the measures set out in the following figure.

Figure 2. Linking of objectives, priority axes and measures



4. PRIORITIES AND MEASURES

4.1. Priority axis 1: Ensuring better functioning of the transport corridor

The current routing of the TEN-T OEM Corridor through the city of Bratislava in the near future is limited by a massive increase in passenger rail transport due to the intensive process of suburbanization. This leads to the need of expanding and improving the integrated regional passenger transport system. It is therefore necessary to extend and intensify the existing rail transport system. This requires the development of a new concept of long-term spatial planning. The following variants and subvariants have been established.

For the **Scenario 2030:**

- Variant 0 **-** represents a situation where no additional investments - other than projects already approved - are made in the development of railway infrastructure. It is clear from the analyses that there will be a lack of permeability on several lines when remaining at this state
- **Variant 1** - This variant comprises partial adding of new rail freight capacities through the line 128 (116 & 133) Kúty – Senica – Trnava – Galanta

For the **Scenario 2040**:

- **The Tangential Variant** (via the freight railway bypass CZ - Kúty - Senica - Trnava - Galanta - Nové Zámky - Komárno / Štúrovo to Hungary), which requires the reconstruction of existing railway lines, including the building of second tracks
- Subvariant Tangential - Tangential variant including the intention of extending the broad-gauge line from Ukraine through southern Slovakia to the Port of Vienna

For the **Scenario 2050**:

- **Radial Variant** (through the city of Bratislava), which requires massive investments in the existing railway system in Bratislava, including a new tunnel under the Carpathians, new railway lines within existing buildings with costly measures to avoid strong negative impacts on the environment
- Subvariant Radial - Radial variant including the intention of extending the broad-gauge line from Ukraine through southern Slovakia to the Port of Vienna

For the **Scenario 2070:**

- **Tangential-Radial Variant** – its objective should be a combination of Tangential and Radial Variant

Promoting this concept of long-term development of rail freight requires the use of many spatial planning tools, procedures, and projects at all hierarchical levels of our public administration system. The Corridor Capitalisation Plan (CCP) will propose a project cycle management system for the implementation of these spatial planning activities.

This activity should take place continuously and should continue beyond the completion of the CORCAP project. It should be based on a specific working group, which should be set up for the purpose of communicating between levels of hierarchical spatial planning in order to find the most appropriate solution to the conflict of interest between the different stakeholders. A draft of the necessary management plan will be drawn up.

4.1.1. Measure 1.1: Develop a Proposal for Sufficiently Large Capacity, Appropriately Fast, Efficient, and Sustainable Transit of Rail Freight through the TEN-T ORIENT EAST-MED Corridor

Objective 1:	Increase In the Functionality of the Freight Corridor by Means of Improving Coordination Between Transport and Spatial Planning
Priority axis 1:	Ensuring Better Functionality of the Transport Corridor
Objective 1.1:	Increase in Transport Capacity of Reasonably Fast, Efficient, and Sustainable Transit of Rail Freight Transport
Measure 1.1:	Development Of Transport Infrastructure for Sufficiently Large Capacity, Reasonably Fast, Efficient, and Sustainable Transit of Rail Freight Transport
Expected output:	Modernised and completed rail network
Financial need:	4,250,000,000 €
Activities/projects:	Reconstruction, Modernisation, and Construction of Railway Lines According to the Variants Preparatory and project work
Holders:	MDV SR (Ministry of Transport and Construction of the Slovak Republic), regions of South-western Slovakia (BSK, TTSK and NSK), ŽSR (Railways of the Slovak Republic), municipalities affected
Sources of funding:	Public (EU, state, region) and private resources on the basis of partnership
Key projects:	Construction of the Bratislava-Lamač – (Bratislava)-Vinohrady Railway Tunnel Investments (by Means of Reconstruction and Modernisation) into the Radial Railway Lines Leading to/from the Bratislava Railway Node Increase in Capacity (by Means of Reconstruction and Modernization) of the Alternative Line for the Rail Freight Transport - the Line 128 (116) - and its Doubling in the Section Kúty - Senica until 2030, and in the Section Senica – Sereď until 2050 Construction of High-Speed Railway Line – HSL (HU - Bratislava – Kúty – CZ) and Construction of Broad-Gauge Line - BGL (Haniska – Šahy – Nové Zámky – Bratislava – AT)

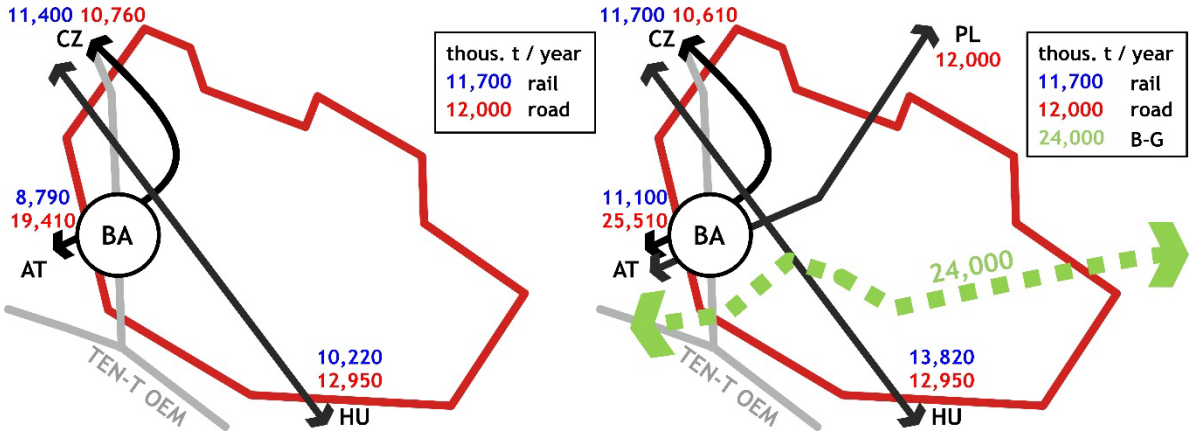
Socio-economic point of view

The socio-economic situation is complex, dynamic, and largely unpredictable, especially regarding the development of tonnage, which should be transported along the TEN-T Orient-East Med Corridor. It can be assumed that the goods flow between the Far East, the Middle East, and the Southern Balkans (where the corridor begins/ends) will increase. The transport route through the Suez Canal, as well as the individual routes of the so-called Silk Road are prospective from the point of view of future developments. However, there is a lack of accurate estimates.

For the time being, the volume of goods originating and ending in the countries along the corridor is unclear. This project and its successors should analyse its socio-economic aspects in more detail. From the point of view of the Slovak Republic, in terms of the quantity of goods transferred, the transport corridor is the weakest in the south direction. This state is also reflected in the volume of the planned investments. In the opposite direction, the corridor is heading to the ports in the north of Germany (Bremen, Hamburg, Rostock) with intensive freight transport. In Břeclav/Brno important connections towards Ostrava and Poland (Silesia, ports in the north of Poland) or further east (Baltics, Belarus, and Russia) join in.

Information on the quantities of goods transported is given in the following figures.

Figure 3. Estimated weight by rail and road freight transport in 2050 - non-investment status (left) & investment status (right)



Note: the arrows show the directions of transit traffic in thousands of tonnes / year

Indicators to be observed:

- Public-administrative division of the territory:
  - self-governing regions – NUTS3
  - districts – LAU1
  - municipalities, resp. city parts of Bratislava – LAU2
- inhabitants
- labour market
- economic indicators

Territorial-technical point of view

Recent studies dealing with the development of rail transport in the Bratislava Region and whole territory of SW Slovakia have stated that it is necessary to transfer part of the transported goods from roads to rail and also that the development of regional rail passenger transport will make such a difference to the existing transport capacities that there will be no spare capacity for the already anticipated volumes of freight transport. It should be stressed that there is an increasing need to improve the railway infrastructure, not only in terms of capacity, but also in terms of its qualitative characteristics.

In this context, it has to be said that the central location of the Slovak Republic in Central Europe creates a prerequisite for extensive transit through its territory, but the level of investment potential is limited, given the size of the Slovak Republic. Therefore, it is necessary to assume extensive investment support from a higher hierarchical level of territorial development management.

Indicators to be observed

- Settlements and their structure:
  - landuse
- Transport networks:
  - rail network:
    - segments
    - facilities
  - road network
  - ports
  - airports

Cultural and historical point of view

The cultural and historical characteristics of the relevant part of the territory of the Slovak Republic must be respected, and their limiting influences will prevail.

Indicators to be observed:

- Protection of the country's monuments and cultural values

Ecological point of view

The situation is similar while assessing the effects of environmental factors. It should be noted that the gradual transfer of part of the volume of goods from road transport to rail and - where appropriate - ship transport, represents a benefit, i. e. a lower burden to the environment. This trend has been supported by the EU authorities for a long time.

Indicators to be observed:

- Nature protection

Clarification of the specification of the transit transport solution in the TEN-T Orient/East-Med corridor

The factor that led to the clarification of the task was the absence of inputs determining the future planned volumes of the transported goods from the position of the super-system. This fact led us to focus on a procedure in which we analysed the permeability of the different parts of the railway infrastructure and - by means of expert estimation simulated the trends in the transport of goods by different types of transport.

At the same time, we assumed that the planned changes to transport infrastructure approved in the binding planning documents would be implemented in the period up to 2030. This effectively means that the intentions defined by us will only be implemented in the next draft period, which in our case represents the period by 2050.

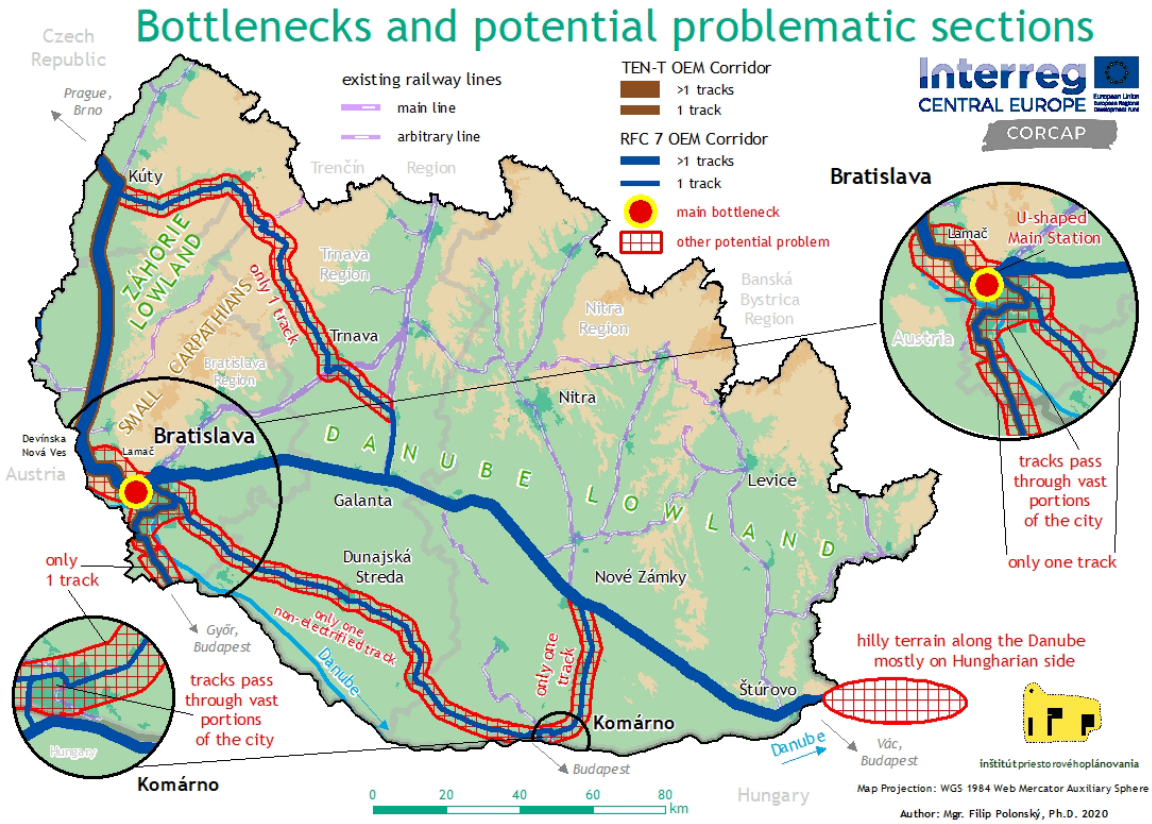
We have also considered the fact that there may be a situation where there may be insufficient investments and the existing transport infrastructure will change only in terms of approved and agreed projects. For this reason, Variants 0 (one for 2030 and the other for 2050) were assessed, which in turn made it possible to define the extent to which the available potentials of individual sections of the rail network were exceeded.

Such a range of work, with limited resources of our work team, was possible only under the condition of effective use of modern information tools and methods, both GIS and other evaluation methods, which we collectively call a system for the support of spatial decision-making.

Problems Identification

Another problem arises in the eastern parts of Bratislava city, as the railway to Rajka (Hungary) passes through the residential districts of Ružinov and Petržalka.

Map 2. Bottlenecks and potential problematic sections in SW Slovakia



Resource: RFC7 (2020), https://ipp-oz.sk/corcap

In the case of line 120 (130) Bratislava – Nové Zámky – Štúrovo – HU along the Danube, a natural barrier is represented by a hilly terrain between Štúrovo and Vác (Hungary). This results in lower speed of passing trains. Therefore, as an alternative, a track connecting Nové Zámky with the towns of Komárno and Komárom is to be considered. However, a problem arises while passing through large parts of Komárno. This is therefore a similar situation to the above case of Bratislava.

The main limitation for the use of three alternative lines (1. Nové Zámky – Komárno, 2. Kúty – Trnava – Galanta and 3. Bratislava – Dunajská Streda – Komárno) is the fact that they currently have only one track and, moreover, the third of these lines is not electrified (see Map above).

VARIANT 0 – DO NOTHING (EXCL. ALREADY APPROVED)

Variant 0 (do nothing) uses existing railway lines in the direction to/from and through Bratislava

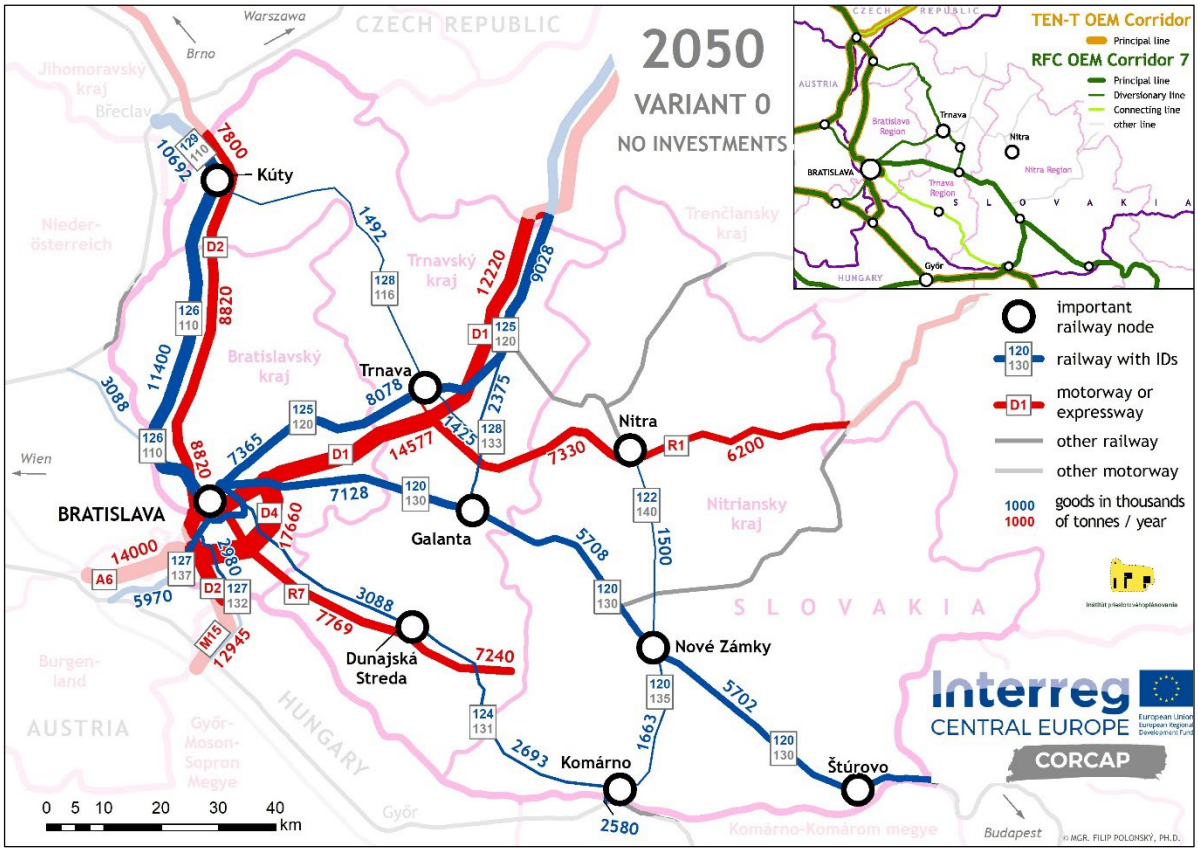
Objective description

The entire railway infrastructure concerned and analysed is almost without investment activity. The natural development of traffic flows as well as the utilisation rate of individual lines were examined. The existing arrangement of the railway infrastructure is naturally of radial nature to/from the Bratislava Railway Node.

- there will be no new investment construction in the future period, except for the necessary operational maintenance ensuring safe and smooth transport
- without interfering into the natural growth of cargo, without limiting and interfering with the sharing of the modal split between rail and road freight
- included are only those investment actions that are already under construction, or their implementation was already agreed

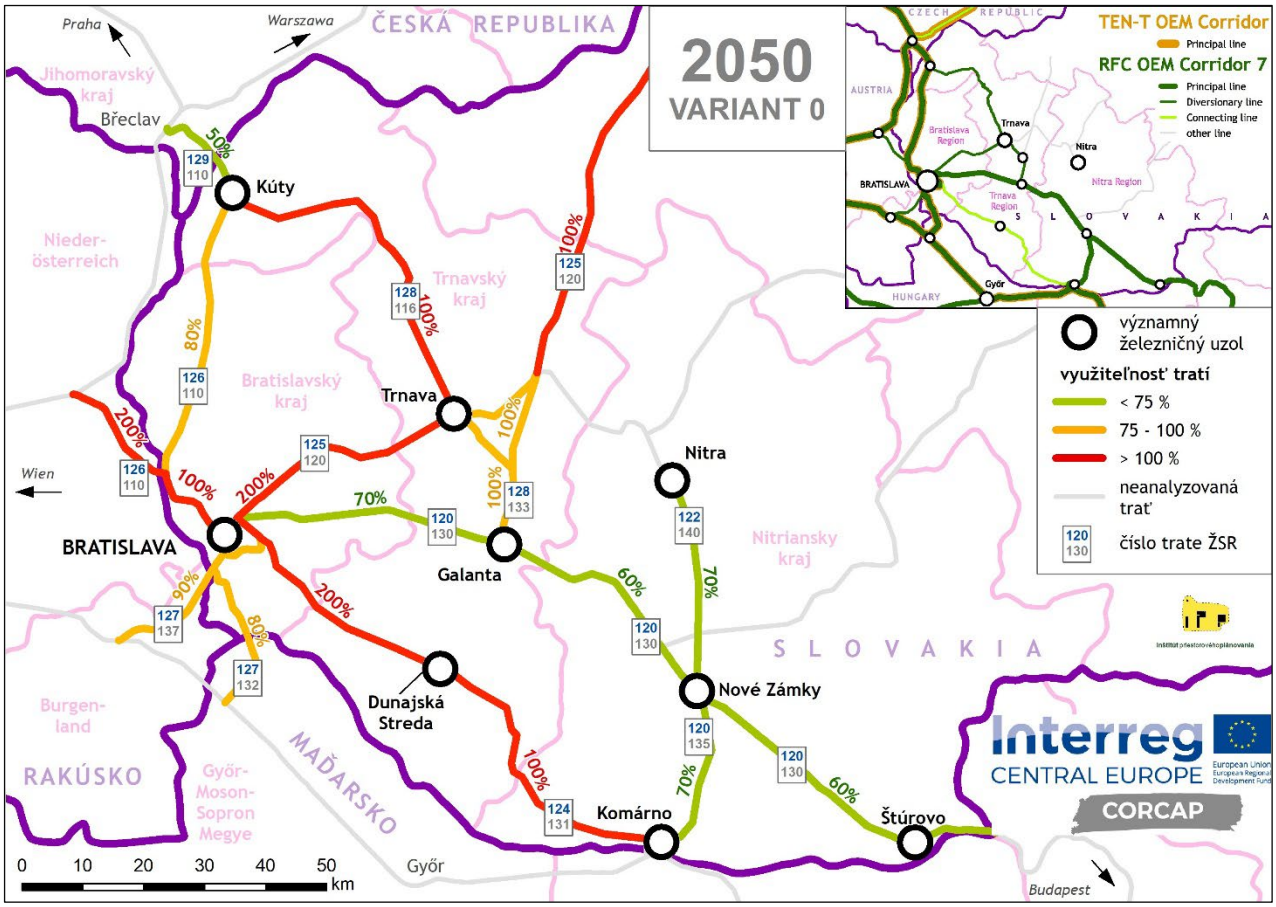
The decisive track section in the whole area is the crossing through the **territory of the Bratislava Railway Node,** in particular the connection from Devínska Nová Ves to Bratislava main station – track 126 (110)[1] and then in the direction to Pezinok – Trnava by track 125 (120). These sections are expected to be used as much as possible for suburban passenger and long-distance transport in the near future.

Map 3. Rail and motorway network load forecast (density of trains/lorries in mil. t/year) for Variant 0 by 2050



[1] Non-public (public) timetable line number

Map 4. Utilization of rail tracks (%) - year 2050, non-investment Variant 0

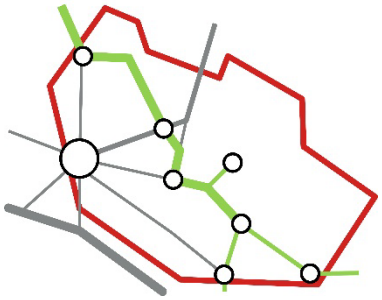


For **Variant 0**, it can be stated that the outlook freight flows will be very significantly restricted to the area of the Bratislava Railway Node. At this state, there is no additional alternative route of sufficient quality and capacity.

Crucial activities are focused on maintaining the continuity of traffic with the as much traffic permeability of tracks and facilities throughout the railway infrastructure as possible.

The funds in Variant 0 will be concentrated only on keeping the operation in sufficient continuity and in the maximum possible capacity. No new investment actions or larger-scale reconstruction works are carried out.

TANGENTIAL VARIANT



Objective description

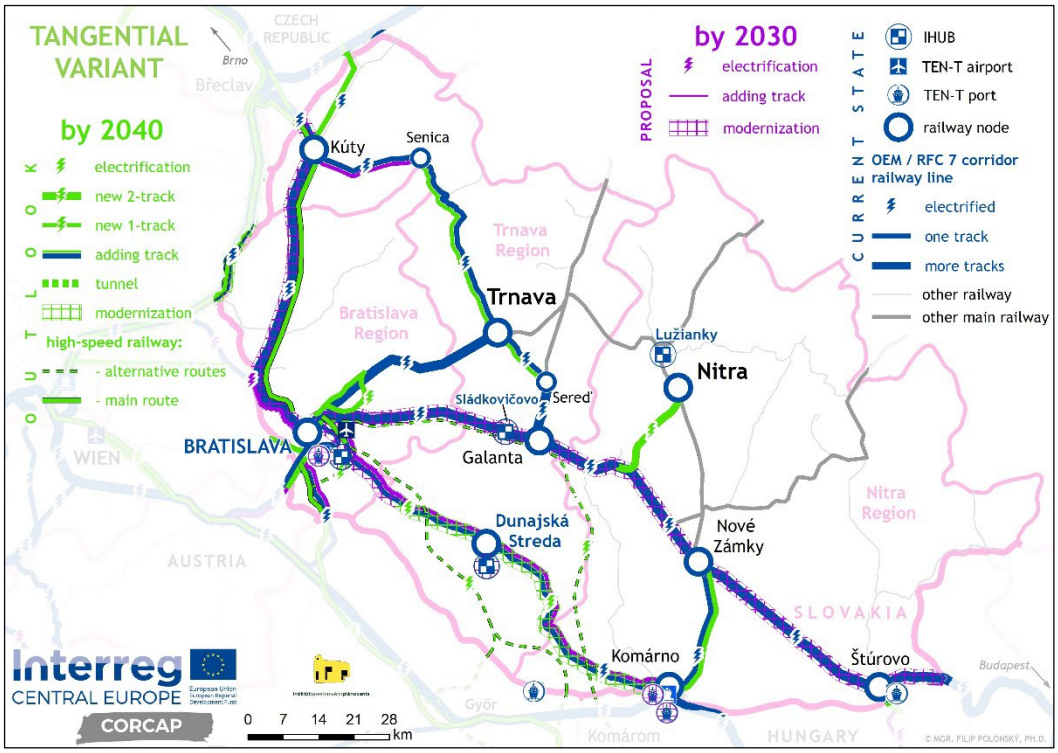
Proposal of the **Tangential Variant** of the railway network development is based on the basic assumption that the railway tracks in the Bratislava Railway Node will be gradually fully utilized for the needs of passenger rail transport of all kinds, or, in addition, the high-speed line corridor will be located here. This assumption was defined by the Regional Sustainable Mobility Plan of the Bratislava Region (SGS 2020).

The basis of the **Tangential Variant** is the routing of transit rail freight along the perimeter line CZ/SK - Kúty – Senica – Trnava – Galanta – Nové Zámky – Štúrovo – SK/HU. If this variant is to be used, track 128 (116) would have to be upgraded to be capable of carrying out the required loads of cargo. This variant seems more appropriate from the point of view of the substantial segregation of long-distance freight transport, especially from passenger transport, which will require a maximum share of capacity for its needs in the Bratislava area.

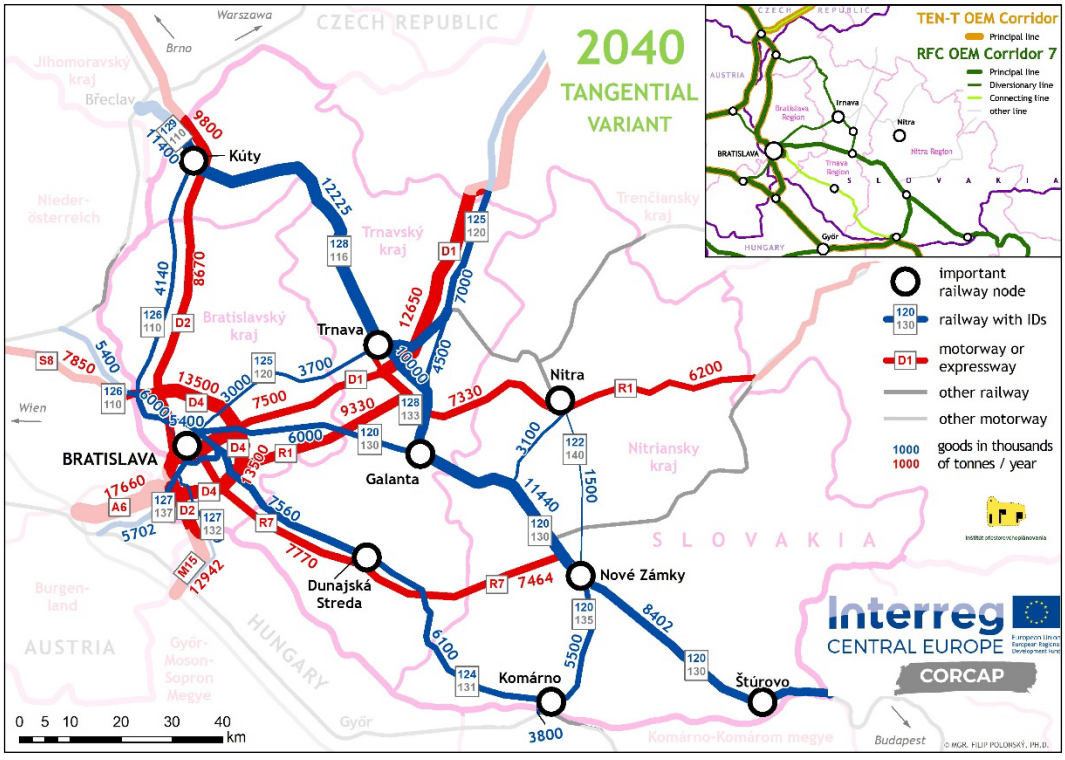
The decisive **investment/construction** of the **Tangential Variant** is the completion of the second track, modernization, and improvement of the track 128 (116) Kúty – Senica – Trnava, as well as track 128 (133) Trnava – Sered'.

Other important constructions, that are necessary to ensure the full functionality of the **Tangential Variant** are part of the Pilot Action document (IPP & KORDIS 2022a).

Map 5. Necessary investments in railway infrastructure for implementation of the Tangential Variant by 2040

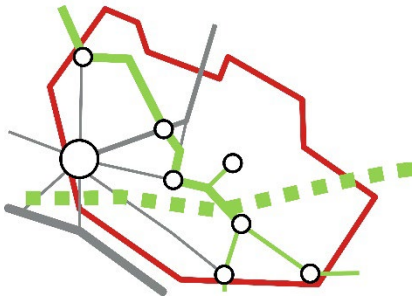


Map 6. Rail and motorway network load forecast (density of trains/lorries in mil. t/year) for Tangential Variant by 2040

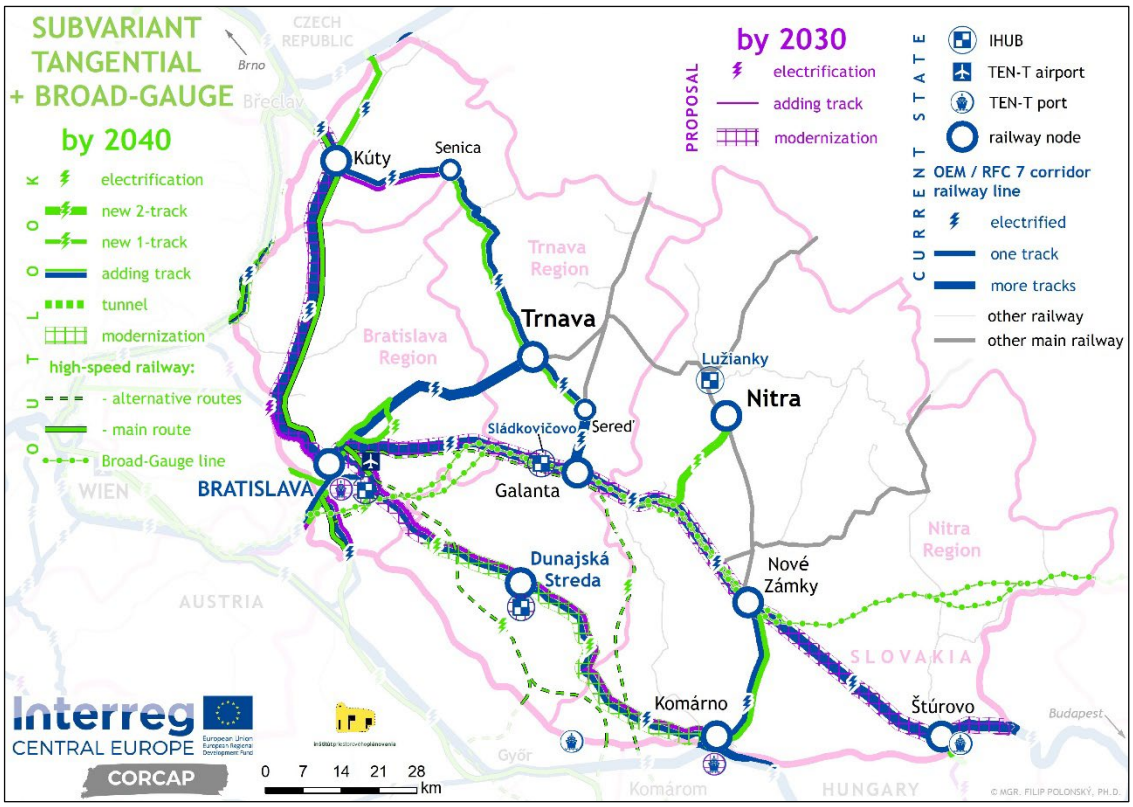


SUBVARIANT TANGENTIAL + BGL

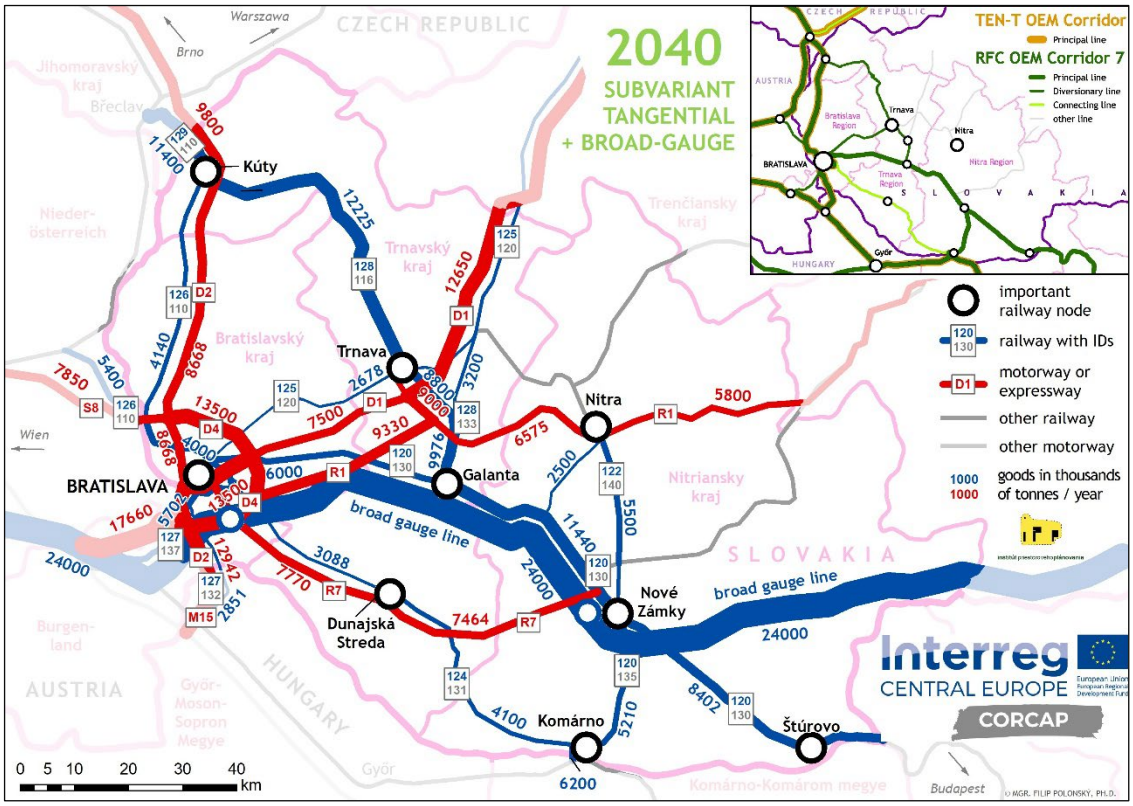
Subvariant Tangential + BGL represents development incorporating the operation of the broad-gauge line (BGL), on which load up to 24,000 mil.t/year in two-way operation is assumed.



Map 7. Necessary investments in railway infrastructure and rail & motorway network load forecast (density of trains/lorries in mil. t/year) when implementing the Subvariant Tangential + BGL by 2040



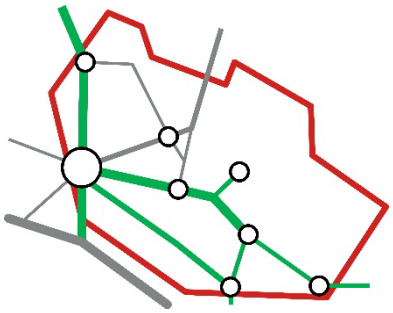
Map 8. Rail and motorway network load forecast (density of trains/lorries in mil. t/year) for Tangential Variant by 2040



Source: Institute of Spatial Planning

Projected investment costs as well as the SWOT Analysis of the Tangential Variant are part of the Tables in the Annexes of this document.

RADIAL VARIANT



Objective description

The basis of the **Radial Variant** is the routing of the rail freight transport on track 126 (110) in the direction to Bratislava and the provision of a bypass of key node - Bratislava main station - by means of a tunnel through the Small Carpathians between Bratislava-Lamač and Bratislava-Vinohrady and further along existing tracks in the direction of Galanta – Nové Zámky – Štúrovo – SK/HU; and in the direction Bratislava-Petržalka - Kittsee (AT)/ Rajka (HU).

The **Radial Variant** uses modernized tracks in radial directions to/from Bratislava. Due to the fact that the largest transport flows are directed to the Bratislava railway node, it is necessary to significantly increase its throughput by implementing a new line through the massif of the Little Carpathians by rail tunnel. The new tunnel will then also create more suitable conditions for future high-speed railway (HSL) through the territory of Bratislava.

The **Radial Variant** with the new railway tunnel creates significantly better possibilities for the development of not only freight, but also passenger rail (especially long-distance) transport including the HSL.

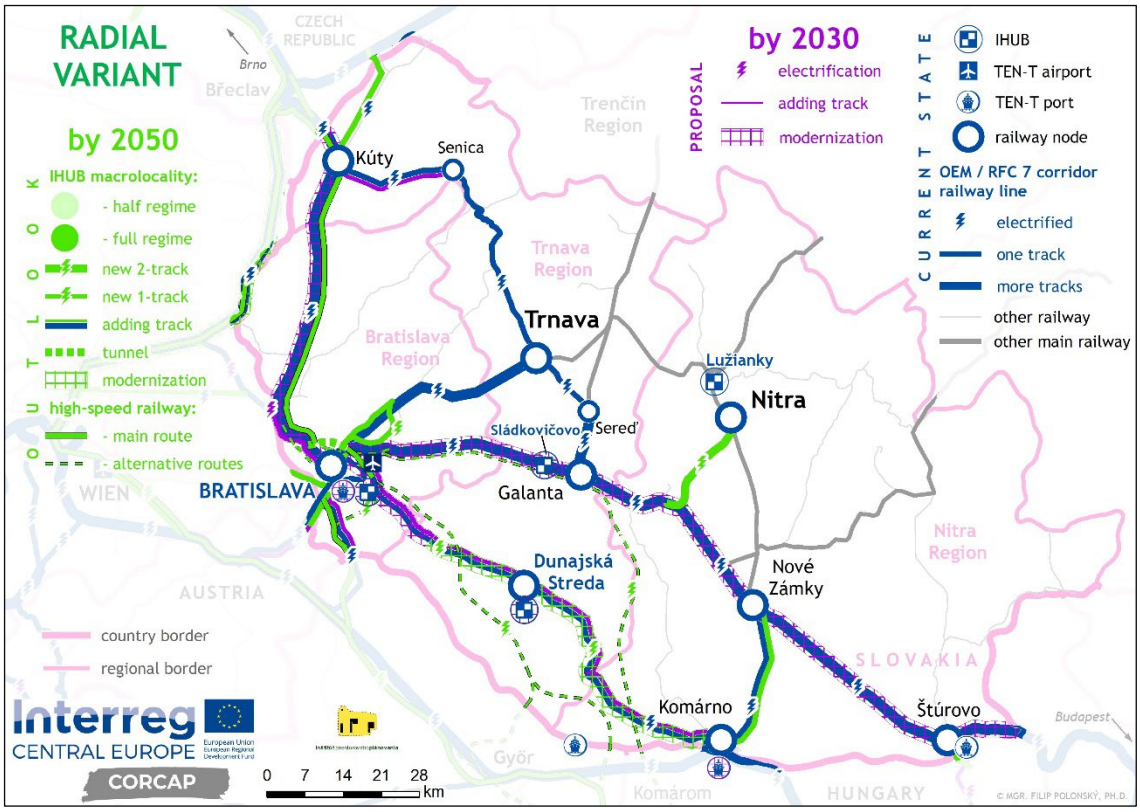
Main investment actions:

- realization of the Bratislava-Lamač – (Bratislava)-Vinohrady railway tunnel
- investment to the radial-lead railway lines in the direction to and from Bratislava Railway Node
- increase in capacity of track 128 (116), construction of second track in the Kúty - Senica section, as an alternative line for rail freight transport, which will not be needed in full capacity as required in the Tangential Variant

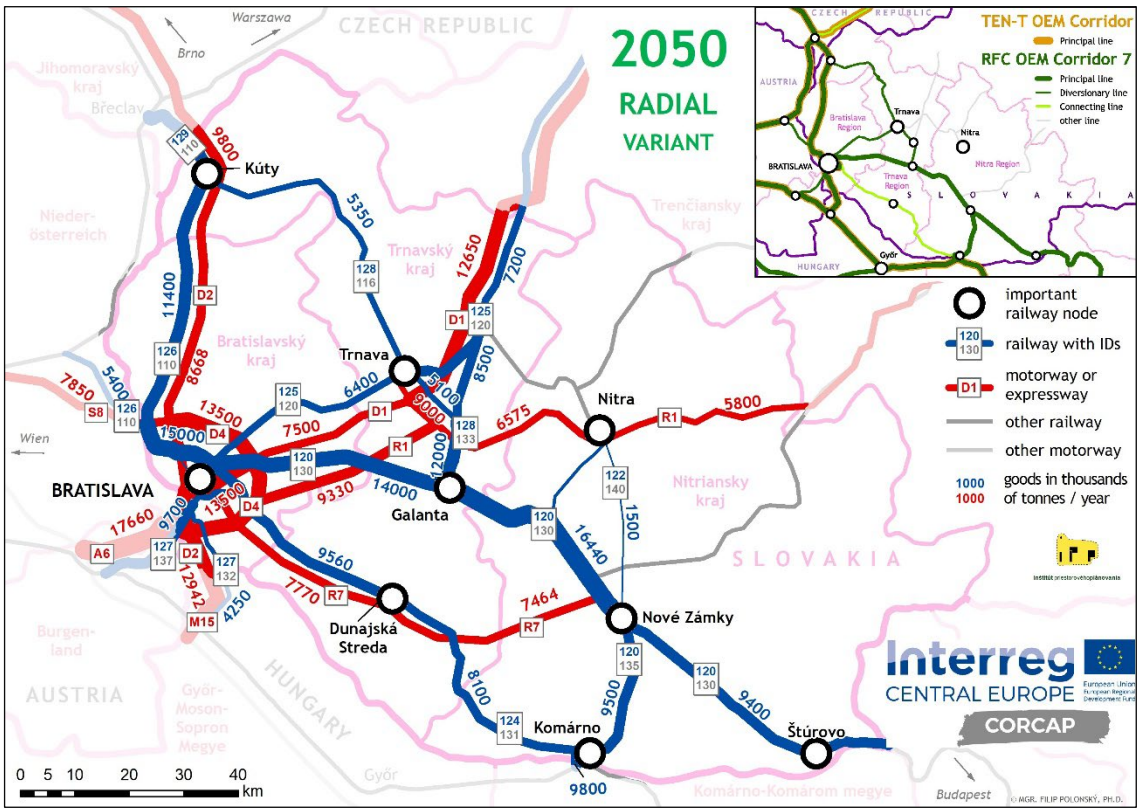
The direct routing of the respective railway lines, and in particular the location of the railway tunnel in the Bratislava-Lamač – Bratislava-Vinohrady section, will need to be examined and subsequently determined in the future Urban Spatial Plan of Bratislava.

Other important constructions, that are necessary to ensure the full functionality of the **Radial Variant** are part of the Pilot Action document (IPP & KORDIS 2022a).

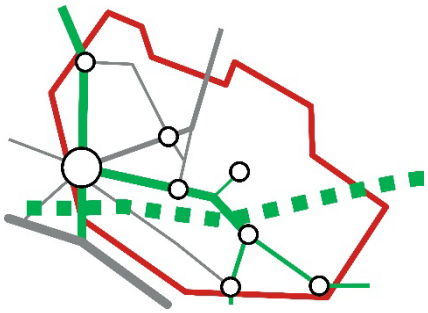
Map 9. Necessary investments in railway infrastructure for implementation of the Radial Variant by 2050



Map 10. Rail and motorway network load forecast (density of trains/lorries in mil. t/year) for Radial Variant by 2050

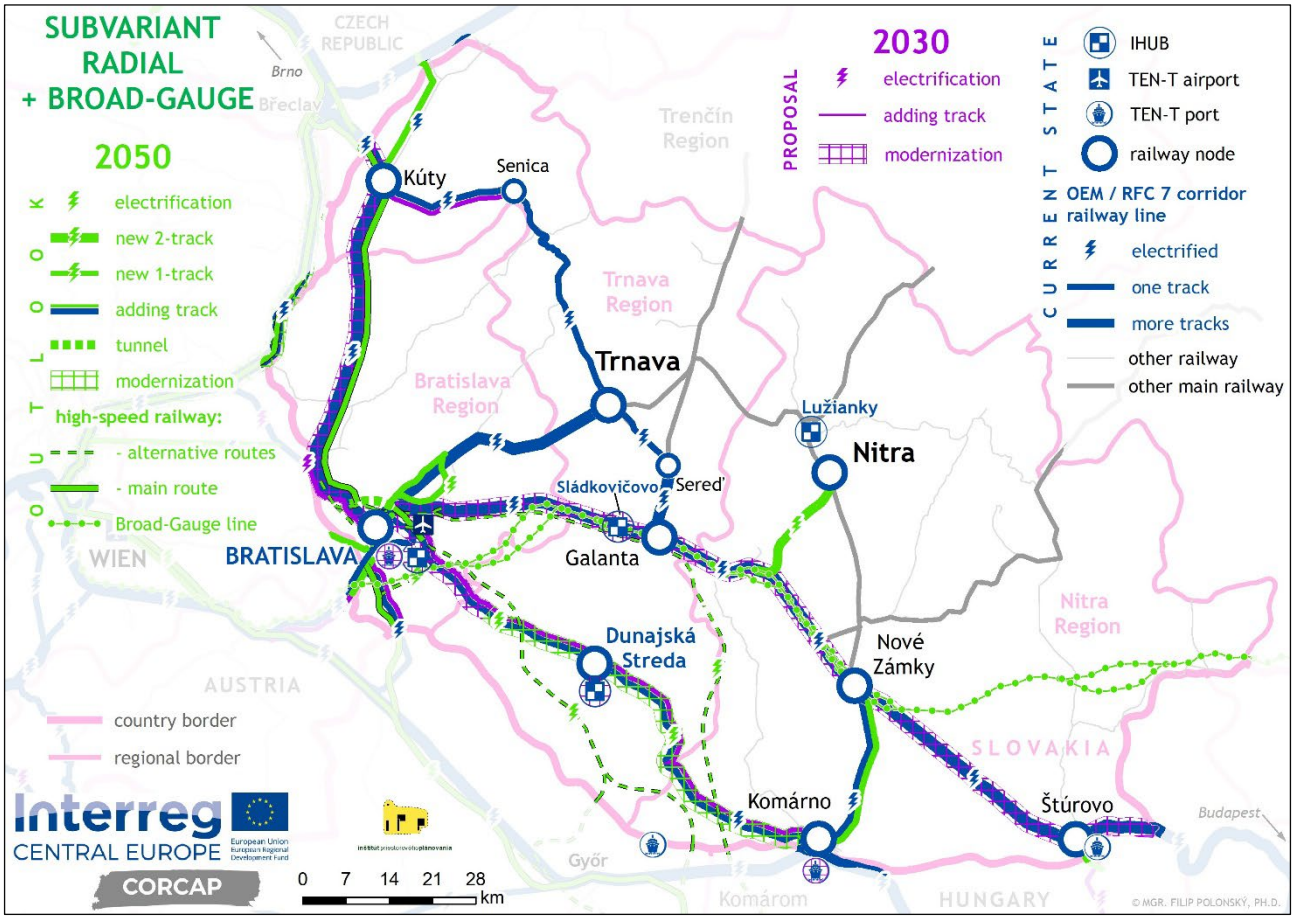


SUBVARIANT RADIAL + BGL



Subvariant Radial + BGL represents a combination of the Radial variant with the addition of a new BGL (east-west) route. This subvariant creates greater possibilities and flexibility in the Bratislava Railway Hub, incl. possible involvement of the port in Bratislava.

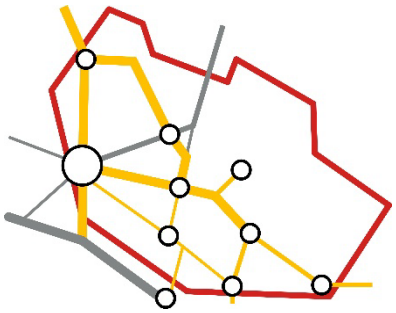
Map 11. Necessary investments in railway infrastructure to fulfil the Subvariant Radial + BGL by 2050



The investment needs for the implementation of the BGL are expressed separately for all studied variants in the relevant tables. The investment represents a separate BGL in the section Košice – SW Slovakia, including the relevant necessary premises. As part of this investment, it is envisaged to build a transhipment facility in Nové Zámky, which has a significant position in both **Tangential** and **Tangential-Radial Variants**.

Projected investment costs as well as the **SWOT Analysis** of the **Radial Variant** are part of the Tables in the Annexes of this document.

TANGENCIAL-RADIAL VARIANT



Objective characteristics

The basis of the **Tangential-Radial Variant** is the management of rail freight transport along line 126 (110) in the direction to Bratislava and the provision of the bypass of the key place (Bratislava hl. st.) by a new railway line, tunnel through the massif of the Little Carpathians in the direction Bratislava-Lamač – railway tunnel – (Bratislava-)Vinohrady and further along the existing lines in the direction of Galanta – Nové Zámky – Štúrovo – HU.

The **Tangential-Radial Variant** will benefit as far as possible from both of the above variants, with the necessary investment funds also being saved in this way of operation.

The **Tangential-Radial Variant** creates, with a new railway tunnel, significantly better possibilities for the development of rail not only rail freight transport but also rail passenger transport, especially long-distance and HSL.

Part of the variant is also a **broad-gauge line** (BGL), which will have a significant impact on the importance of the IHUB in the Nové Zámky, which will be given particular strategic importance to the whole SW region of Slovakia, but also to the northern part of Hungary.

Main investment actions:

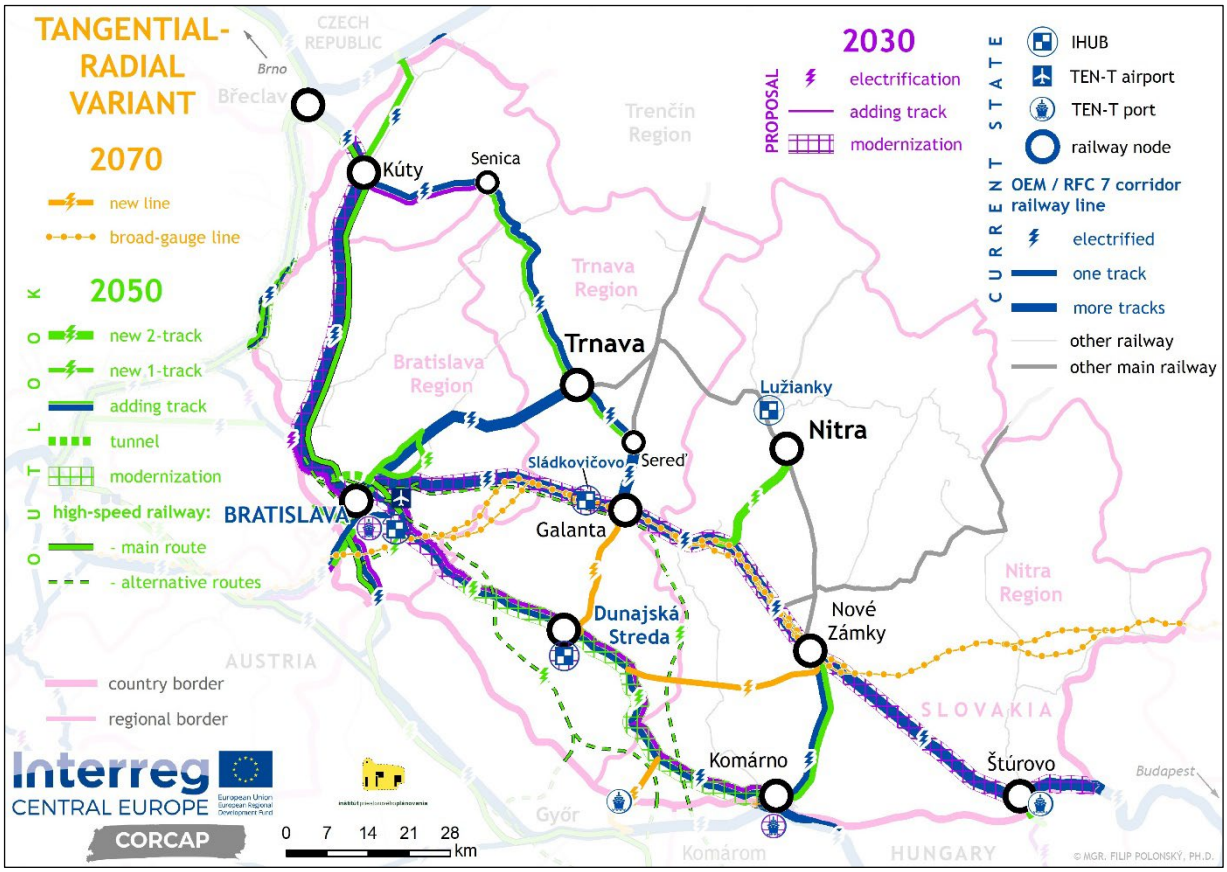
- Realization of the railway tunnel in Bratislava Railway Node via the Little Carpathians
- Investment-reinforced radially-lead railway lines to/from Bratislava Railway Node

In addition, **other projects** will need to be considered by 2070:

- New rail line connections - interconnection of Galanta, Dunajská Streda and Győr, respectively Dunajská Streda and Nové Zámky
- Use of new transport and transport technologies
- Broad-gauge line – BGL (if not built by 2050)
- High-speed line – HSL - for both passenger and freight rail transport (in case it is not built by 2050)

Projected investment costs as well as the **SWOT Analysis** of the **Tangential-Radial Variant** are part of the Tables in the Annexes of this document.

Map 12. Necessary investments in railway infrastructure for the implementation of Tangential-Radial Variant by 2070



High-speed line (HSL)

The route of the HSL through the area of the Bratislava Railway Node is at the stage of conceptual considerations only. The elaborated feasibility study of the reconstruction of Bratislava Railway Node (ŽSR 2019) counted with time horizon of 2030 and did not deal with the problem of HSL. Currently there is only a search study of the possible rail connection of the capitals of the V4 political grouping (Budapest, Bratislava, Prague, and Warsaw together with the connection of Vienna - TRENECON 2020).

HSL routing options in Bratislava are an urban-political decision, as there are several possibilities for locating the railway lines, including the location of the main station and the station for HSL.

The own route of HSL through the territory of Bratislava will be the subject of new Spatial Plan of the Municipality of Bratislava, the processing of which is already being prepared.

The valid Spatial Plan proposes a separate railway tunnel through the massif of the Little Carpathians, which would solve the limiting rail link between ŽST Bratislava-Lamač – Bratislava hl.st. – Bratislava-Vinohrady. This tunnel could be used not only for the needs of HSL and other passenger transport, but also for the needs of rail freight transport according to the Tangential-Radial Variant described above.

The Tangential-Radial Variant fully utilizes the capacity possibilities of radial lines in the direction to Bratislava, but the new tunnel connection through the massif of the Little Carpathians creates a significantly shortened tangential route in comparison with the proposed fully Tangential Variant through the railway line 128 (116) Kúty – Senica – Trnava.

4.1.2. Measure 1.2: In Accordance with Measure 1.1, Draw Up a Proposal for the Development of a Rail Network Enabling the Efficient Operation of the Network of Current and Potential Logistics Centres and the Transport Services Provided by Them

Goal 1:	Increase in the Functionality of the Freight Corridor by Means of Improving Coordination Between Transport and Spatial Planning
Priority axis 1:	Ensuring Better Functionality of the Transport Corridor
Goal 1.2:	Improve the Conditions for the Functioning of the Network of Current and Potential Logistics Centres and Transport Services Provided by them
Measure 1.2:	Design of the Intermodal Hub (IHUB) System Enabling Efficient Operation of the Network of Logistics Centres
Expected result:	Built Network of Intermodal Hubs (IHUB)
Financial need:	140,000,000 €
Activities/projects:	Establishment of Intermodal Hubs (IHUBs) of International, National, Regional, and Local Importance
Holders:	MDV SR (Ministry of Transport and Construction of the Slovak Republic), Regions of South-western Slovakia (BSK, TTSK and NSK), ŽSR (Railways of the Slovak Republic), municipalities affected
Sources of funding:	Public (EU, state, region) and private resources on the basis of a partnership
Key projects:	Establishment of Intermodal Hub (IHUB) Facility on the Territory of the Bratislava Region (IHUB Senec, IHUB Dunajská Lužná), Trnava Region (IHUB Senica, IHUB Trnava – Sereď / IHUB Sládkovičovo – Galanta) and Nitra Region (IHUB Nitra, IHUB Komárno).

Current situation in the transport of goods

In the context of the creation of intermodal/multimodal hubs (IHUBs) on the existing rail network, the status quo should be presented. The current state of IHUBs was analysed on the basis of real performances of the goods transhipped based on the existing statistics of the national carrier ZSSK-CARGO, together with the performance of other carriers operating on the railway network in SW Slovakia Region.

In the future, the share of so-called 'third' carriers is expected to increase, which also means an increase in the total volume of freight transport.

At present, the transport of goods is very unevenly divided within the territory of SW Slovakia (BSK, TTSK and NSK), as documented by the following Table.

Table 2. Performance in the transport of goods by region (2019)

region	mil.t/year	%
Bratislava Region (BSK)	2.515	66
Trnava Region (TTSK)	0.421	11
Nitra Region (NSK)	0.876	23
total	3.812	100

More than 60 % of all goods go to/from Bratislava Region. Alarming is the situation inside the region, where 90.2 % of transport of all goods has the city of Bratislava. This situation significantly limits the optimal urbanization growth of Bratislava as a city with complex amenities and satisfactory transport service. According to the adopted documents - Regional Sustainable Mobility Plan (SGS 2020) and Feasibility Study (ŽSR 2019), functionality and permeability of railway infrastructure in the long term (to 2070), 3 possible scenarios for its development were proposed:

- **Tangential Variant** – prefers strengthening of tangential tracks in the direction Kúty – Senica – Trnava – Galanta – Nové Zámky – HU
- **Radial Variant** – uses modernized lines 126 (110)[2], 125 (120) and 120 (130) or 120 (135) for the transport of goods in the direction to Bratislava, but for passing through the territory of the Bratislava Railway Node it is necessary to carry out a railway tunnel through the Little Carpathians
- Combined **Tangential-Radial Variant** built on the combination of previous variants with the fact that demanding investment activities will be at later stages of development

For all observed variants of possible development, prognostic estimates of future performances in intermodal transhipments were processed, which were defined and selected on the basis of a multicritical evaluation and are described in more detail.

42 locations were selected throughout the territory of SW SK, which were located in the territory to suit the modal split anticipation as well as transport distances (long-distance, regional, and local transport of goods).

[2] Non-public (public) timetable line number

In the freight transport process, we can distinguish at least 3 levels of logistics centres (cargo-terminals):

Transcontinental Cargo HUB (TCCH) – localization in overseas ports of continental Europe, such as Hamburg, Rotterdam, or Athens. Out of these, containers are dispatched by rail and road to the whole of continental Europe. Their range is about 1,500 km. The main task of these TCCH is to transfer containers from ships to land modes of transport. Of these TCCH, transregional and regional cargo hubs (RCH) located in various parts of Europe are continuously being supplied. In the case of the implementation of the broad-gauge railway from Ukraine, Nové Zámky in SW Slovakia could acquire a quality level of TCCH, and for neighbouring states (HU and AT) this is a potential opportunity.

Transregional and regional cargo HUB (RCH) – its function is the transhipment of containers from long-distance vehicles, especially trains, but now also trucks for the main European distribution of goods to various parts of Europe. These RCH can also carry out supplies across EU national borders. Their range is about 150 to 200 km. The location of these logistics facilities must be in line with the needs of each region. RCH must also include equipment for handling piece (classic) consignments, which means folding piece goods from railway wagons to lorries, in most cases in medium tonnage of up to 12 tonnes. Local logistics centres as well as larger customers are directly supplied from RCH.

Local Logistics Centre (LLC) – has the function of direct distribution of goods from long-distance transportations to individual customers. The range is about 30-50 km. It is assumed that the goods will be imported into LLCs in most quantities by containers and then reallocated to smaller shipments and shipped directly to individual customers by trucks with tonnes of up to 12 tons. In this type of distribution, it is also necessary to count on a large number of small and medium trucks.

Logistics centres must be hierarchically divided into multiple levels:

- **Transregional level** where long-haul consignments are distributed from distances greater than 300 km (foreign import – export)
- **Regional leve**l – locations for distribution of consignments up to distances of 50-100 km
- **Local level**, for distribution of consignments in both small and smaller means of transport (smaller and medium tonnage trucks) up to a distance of 50 km

When analysing the urbanisation possibilities of SW Slovakia, for the operation of this area by this mode of transport, it would be advisable to situate them essentially at the railway stations on the main lines.

Detailed localization of IHUBs in SW Slovakia

During the primary assessment, 26 locations (macrolocalities), which have the potential to become a IHUB with links to possible logistics centres were identified:

- 5 in Bratislava Region (nr. 1 – 5)
- 9 Trnava Region (nr. 6 – 14)
- 12 in Nitra Region (nr. 15 – 26)

Table 3. Primary assessment - 26 MACROLOCALITIES

#	name of macrolocality
1	Bratislava-East
2	Dunajská Lužná - Nové Košariská
3	Malacky - Veľké Leváre
4	Senec
5	Zohor - Devínska Nová Ves
6	Dunajská Streda
7	Galanta - Sládkovičovo
8	Kúty - Sekule
9	Leopoldov
10	Piešťany
11	Senica
12	Skalica
13	Trnava - Sereď
14	Veľký Meder
15	Hurbanovo
16	Komárno
17	Levice
18	Nitra-North
19	Nové Zámky
20	Šaľa - Trnovec nad Váhom
21	Šahy
22	Štúrovo
23	Topoľčany
24	Tvrdošovce
25	Želiezovce
26	Zlaté Moravce

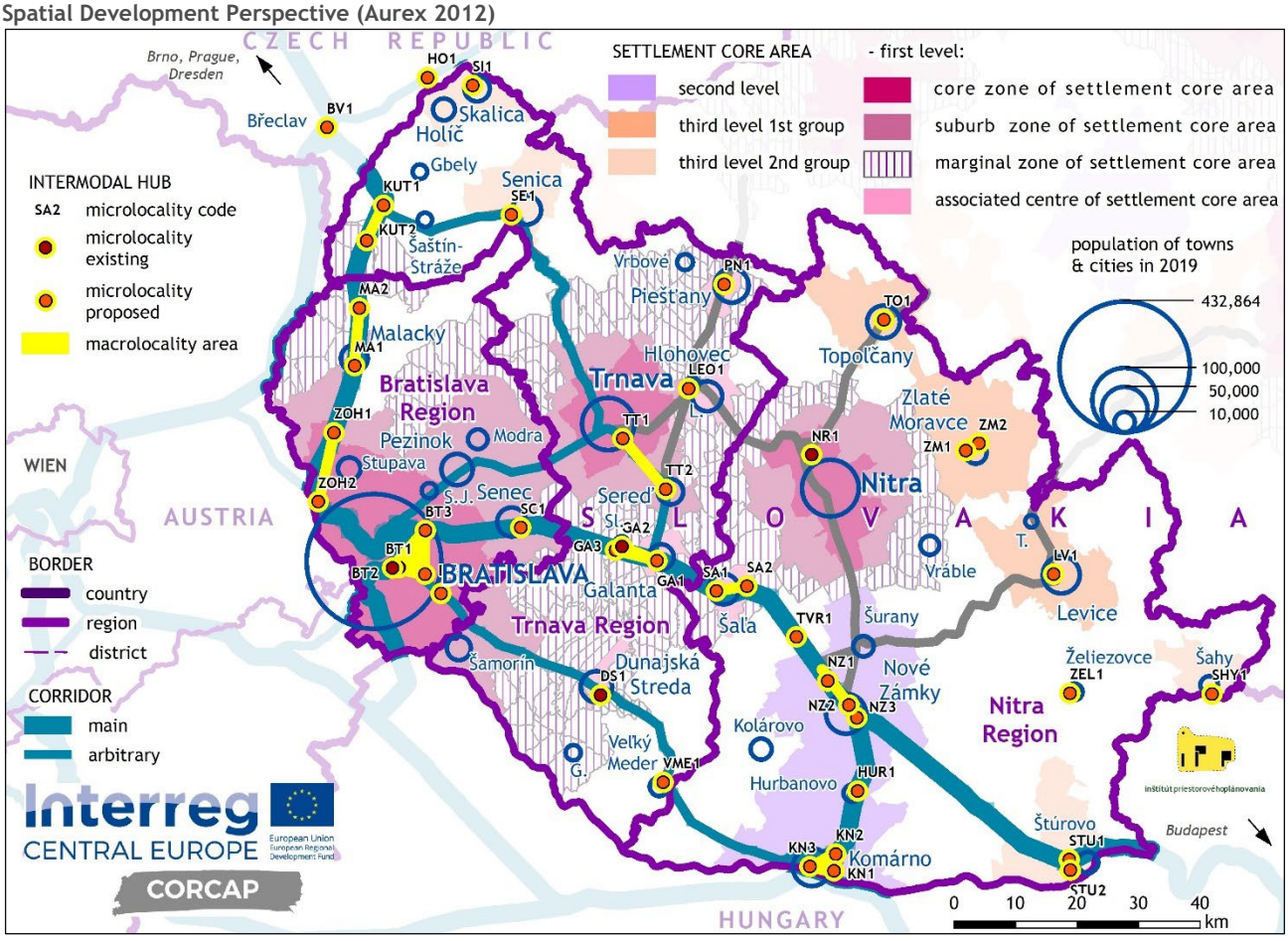
In the framework of the subsequent assessment of the suitability of individual sites for further development, account was taken on facts resulting from the development of turnover of goods in t/year in individual locations, which were obtained from ZSSK-CARGO for the period 2015–2020. These quantities of goods represent a type of goods flows through the borders of Slovakia.

In this respect, it should be noted that in case of the implementation of the broad-gauge line from Ukraine to Austria, there will be an extremely strong export flow in the east-west direction in SW Slovakia, which will be significantly stronger (about 90-100 %) than the anticipated traditional product flows (SZ-JV and north-south).

It was also necessary to add the goods flows of so-called "third" carriers, which currently account for about 35 % of the cargo volume with a constantly increasing tendency. In the outlook, it was assumed that a group of so-called 'third' carriers would carry up to 60 % of the expected quantities.

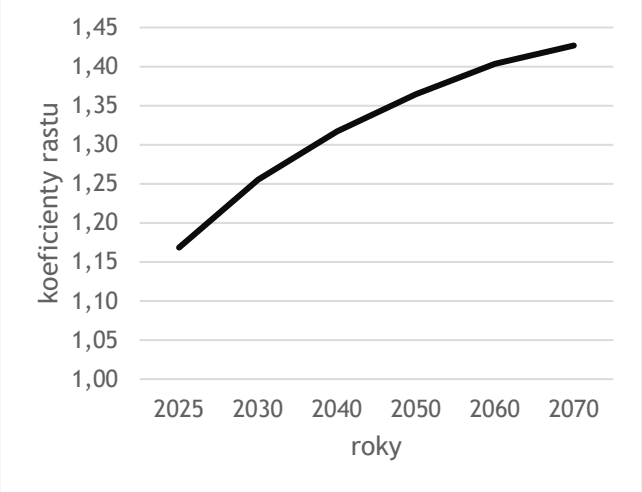
The system arrangement of IHUBs (macrolocalities and microlocalites) and their operational functions are expressed in the following map. The distribution of IHUBs respects the transport infrastructure as well as the geomorphology of the territory of South-western Slovakia.

Map 13. Potential macrolocalities and microlocalities of IHUBs in the SMR Region and in SW Slovakia based on the Slovak Spatial Development Perspective (Aurex 2012)



It was possible to draw up a general growth coefficient for the long-term increase in rail freight transport without specifying the type of goods. General growth coefficient were considered.

Figure 4. Curve of projected growth in rail freight transport



Note: Rail freight growth factors - average of all commodities

The growth coefficient for the long-term estimate of the general growth of rail freight transport by 2050-2070 is drawn up on the assumption that road freight transport will not be limited. The forthcoming EU guideline for limiting greenhouse gas generation with a target of 0 % CO2 emissions by 2050 will have very serious consequences for the development of road, in particular long-distance, freight transport.

The projected trends in the growth of freight transport as well as the modal split between road freight and rail freight transport are shown in the following table, considering that this is a forecast for a very distant period, when the real sizes of freight transport can be significantly affected by the changing social, political, health, demographic, state-law, economic, technological, urbanistic, and other structures.

Table 4. Projected freight growth coefficients

	2020	2030	2050	2070
road freight transport	1.00	1.19	1.33	1.28
rail freight transport	1.00	1.26	1.36	1.47

Table 5. Modal split in %

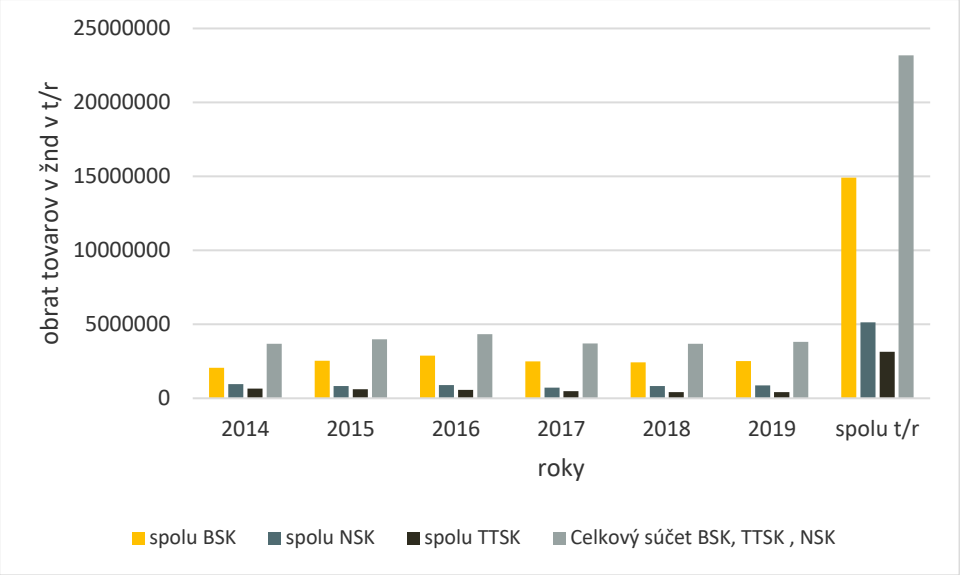
	2020	2030	2050	2070
road freight transport	74.60	68.00	50.00	40.00
rail freight transport	25.40	32.00	50.00	60.00

On the basis of the above data and the results of the primary assessment of the suitability of individual sites for the location of the intermodal IHUBs, it was possible to calculate the expected quantities of goods transhipped in individual locations.

Table 6. Development of imports and exports in rail freight transport in SW Slovakia (t/year)

region	2014	2015	2016	2017	2018	2019	total	%
Bratislava Region (BSK)								
Import	640,880	432,406	623,480	460,298	479,163	412,476	3,048,703	13.1%
Export	1,409,987	2,106,616	2,260,918	2,037,890	1,952,726	2,102,572	11,870,710	51.2%
Total BSK	2,050,867	2,539,022	2,884,398	2,498,189	2,431,890	2,515,048	14,919,413	64.3%
Nitra Region (NSK)								0,0%
Import	318,528	295,477	297,662	138,687	190,784	185,698	1,426,836	6.2%
Export	646,298	536,373	594,287	587,813	643,541	690,315	3,698,628	15.9%
Total NSK	964,826	831,850	891,949	726,500	834,325	876,014	5,125,465	22.1%
Trnava Region (TTSK)								0,0%
Import	186,314	274,661	245,574	246,805	199,123	203,058	1,355,535	5.8%
Export	471,605	346,846	315,481	224,916	215,833	218,266	1,792,947	7.7%
Total TTSK	657,919	621,508	561,054	471,721	414,956	421,324	3,148,483	13.6%
SW Slovakia	3,673,612	3,992,380	4,337,402	3,696,410	3,681,171	3,812,386	23,193,361	100.0%

Figure 5. Development of imports and exports in rail freight transport per region of SW Slovakia



In the course of the work, the relationship between the amount of goods and the size of GDP in individual regions of SW Slovakia were examined.

Table 7. Imports and exports by region

year	2015	2016	2017	2018	2019
Bratislava Region					
Import	640,880	432,406	623,480	460,298	479,163
Export	1,409,987	2,106,616	2,260,918	2,037,890	1,952,726
Total	2,050,867	2,539,022	2,884,398	2,498,189	2,431,890
GDP total (mil. EUR annually)	22,749	23,365	24,254	25,640	26,380
GDP per 1,000 EUR / inhabitant	36,164	36,646	37,520	39,126	39,704
Cargo / GDP (mil. t / mil. EUR annually)	90	109	119	97	92
Nitra Region					
Import	318,528	295,477	297,662	138,687	190,784
Export	646,298	536,373	594,287	587,813	643,541
Total	964,826	831,850	891,949	726,500	834,325
GDP total (mil. EUR annually)	8,340	8,588	9,032	9,129	9,940
GDP per 1,000 EUR / inhabitant	12,201	12,598	13,290	13,474	14,721
Cargo / GDP (mil. t / mil. EUR annually)	116	97	99	80	84
Trnava Region					
Import	186,314	274,661	245,574	246,805	199,123
Export	471,605	346,846	315,481	224,916	215,833
Total	657,919	621,508	561,054	471,721	414,956
GDP total (mil. EUR annually)	8,760	9,089	9,375	9,991	10,841
GDP per 1,000 EUR / inhabitant	15,669	16,217	16,689	17,747	19,207
Cargo / GDP (mil. t / mil. EUR annually)	**75**	**68**	**60**	**47**	**38**

Source: ZSSK-CARGO

From the assessment above it may be concluded that in 2015-2019 Bratislava and Nitra Regions had approximately the same value of the turnover of goods on rail freight transport (Cargo / GDP), on average 101 and 95 mil. t / mil. EUR annually. Trnava Region had a significantly lower value of GDP / t of turnover of goods on rail freight transport in the range of 58 EUR / t of transported goods.

The size of GDP / capita could be compared. In this assessment, on average in 2015-2019, Bratislava Region (EUR 37,832 / inhabitant) significantly exceeds the other two regions (EUR 17,106 and 13,257 EUR / inhabitant).

From the above comparisons, the strength of the economic and territorial environment can be gradually derived as a basic prerequisite for localization of IHUB in the territory of SW Slovakia. It is clear that the maximum pressure will be concentrated in Bratislava Region. Given the geographical shape and interdependence of the Bratislava and Trnava Regions, it is right to expect that these IHUBs will be built approximately evenly throughout the studied territory.

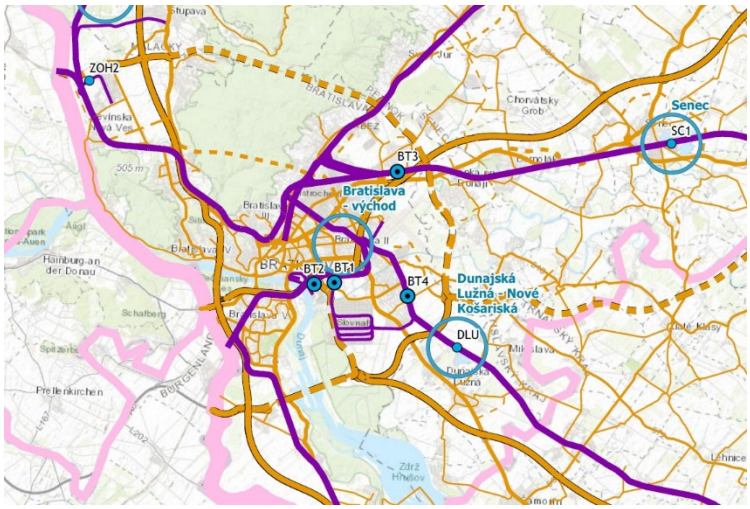
BRATISLAVA REGION

The forecast of the turnover of goods in **Bratislava Region** for the years 2030, 2050 and 2070 was based on the **primary assessment** of the suitability of individual locations, the current modal split between the different IHUBs and the anticipated urban development. It is assumed that due to the spatial possibilities, IHUBs in broader Bratislava area will be developed at the expense of inner-city IHUBs such as Bratislava predmestie, Bratislava-Nové Mesto, ÚNS Bratislava, and Bratislava-Pálenisko (port). The last mentioned continues to have a positive trend in view of the possibility of transhipment for water transport.

Table 8. Distribution of freight transport between selected macrolocalities in Bratislava Region

nr.	macrolocality	increase in goods volumes (%)				volumes of goods in t/year			
		2021	2030	2050	2070	2021	2030	2050	2070
1	**Bratislava-East**	90	75	60	50	3,043,560	4,533,637	4,139,242	3,976,919
2	**Dunajská Lužná (Nové Košariská)**	0	7	10	14	0	423,139	689,874	1,113,537
3	**Malacky - Veľké Leváre**	6	5	8	10	202,904	302,242	551,899	795,384
5	**Senec**	0	5	8	9	0	302,242	551,899	715,845
6	**Devínska Nová Ves - Zohor**	4	8	14	17	135,269	483,588	965,823	1,352,152
	Bratislava Region in total	100	100	100	100	3,381,734	6,044,849	6,898,737	7,953,838

Figure 6. Shift of the IHUBs from the urbanized areas of Bratislava to the outskirts



IHUBs in BSK

The proposal does not foresee the expansion of the transhipment capacities in the territory of the city but rather their transfer to the suburban area, as defined by the possibilities of these locations:

- **Bratislava-East** - There are two functional IHUBs in the territory of the city of Bratislava. They supply all the needs of the city and also carry out a connection to water transport on the Danube: Bratislava-Pálenisko (port) - currently its use is low, up to 15-20% of possible transhipment capacity; and the Terminal ÚNS (Central Freight Station). In the future it is expected that industrial and storage areas will move from the urban areas of housing, sport, and greenery to the outskirts. This intention will require the establishment of new IHUBs and logistics areas in the suburban zone of Bratislava (Vajnory, Podunajské Biskupice, Dunajská Lužná or Senec)
- **Dunajská Lužná - Nové Košariská** – currently abandoned area of the former concrete and gravel works with direct connection to railway line 124 (131), with sufficient tracks. R7 expressway and D4 motorway are only 5 and 7 km away.
- **Malacky - Veľké Leváre** - direct link to the railway line 126 (110), developing Malacky-South industrial zone is within easy reach. It is necessary to complete the road connection between railway and the industrial zone, possibly also to the D2 motorway. From this location it is possible to supply the western part of Bratislava at a distance of about 30 km.
- **Senec** - direct link to the railway line 125 (120), functional and still developing logistics park Senec is within range of about 7 km. In the railway station Senec it will be necessary to create suitable space for IHUB. It is necessary to complete the road connection between the potential IHUB and the logistics zone. From this location it is also possible to supply the eastern part of Bratislava at a distance of about 20 km.
- **Devínska Nová Ves - Zohor** - direct link to the railway line 126 (110), Volkswagen plant in Devínska Nová Ves and Lozorno Logistics Park are within easy reach. It is necessary to complete the road connection to the D2 motorway. From this position it is possible to supply the western part of Bratislava at a distance of about 10-20 km.

TRNAVA REGION

The forecast of the turnover of goods in **Trnava Region** for the years 2030, 2050 and 2070 was based on the **primary assessment** of the suitability of individual locations, the current modal split between the different IHUBs and the anticipated urban development. It is assumed that, due to the existing and anticipated economic activities and the geographical shape of Trnava Region, the development of IHUBs will be divided between the district towns of Senica, Galanta and Dunajská Streda and the regional city of Trnava.

Table 9. Distribution of freight transport between selected macrolocalities in Trnava Region

nr.	macrolocality	increase in goods volumes (%)				volumes of goods in t/year			
		2020	2030	2050	2070	2020	2030	2050	2070
1	Dunajská Streda (IHUB)	4,9	5	5	5	34,969	46,899	39,356	41,980
2	Galanta - Sládkovičovo	11,5	12	13	14	82,070	112,558	102,326	117,544
3	Kúty - Sekule	0,2	0.5	0.5	1	1,427	4,690	3,936	8,396
4	Leopoldov	2,0	2.5	2.5	3	14,273	23,450	19,678	25,188
5	Piešťany	0,0	0	0	0	0	0	0	0
6	Senica	47,7	45	45	43	340,414	42,209	354,204	361,026
7	Skalica	0,3	0	0	0	2,141	0	0	0
8	Trnava - Sereď	33,4	35	34	34	238,361	328,295	267,621	285,463
9	Veľký Meder	0,0	0	0	0	0	0	0	0
	Trnava Region in total	100,0	100	100	100	713,656	937,985	787,121	839,595

IHUBs in Trnava Region

Due to the territorial extent and segmentation of Trnava Region several possible sites for the establishment of IHUBs were selected. Priority was given to the relationship railway - road. The most important IHUBs are located in Senica and Trnava. Other IHUBs will have rather a local significance.

- **Senica** - an important site located on the railway line 128 (116). It has the potential of possible service area of two related districts – Senica and Skalica. This location is especially suitable for its relatively separate location from the rest of Slovakia and its proximity to the Czech Republic. In order to create better capacities for rail freight transport, a gradual reconstruction of line 128 (116) over its entire length will be necessary. The storage room should be located in the area near the existing Senica railway station.
- **Trnava – Sereď:**
  - **Trnava** – direct connection to the railway lines 125 (120) and 128 (133). The IHUB will serve the logistics centres in the background of the automotive PSA Peugeot plant in Trnava/Zavar and also for the Trnava district's own needs
  - **Sereď** - direct connection to the railway line 128 (133), this IHUB is oriented for servicing the surrounding logistics centres Galanta, Gáň and Sereď. Ample space in Sereď railway station makes it possible to consider this site to be suitable for the needs of freight transport
- **Dunajská Streda** - functional IHUB of METRANS with direct links to the railway line 124 (131), I/63 first class road and the future R7 expressway. It is fully operational. Due to its size, it will have sufficient capacity in the long term for possible future development. The railway section Bratislava - Dunajská Streda is used primarily for suburban passenger transport at peak times.

This intermodal IHUB is used predominantly by private trains of the third carriers. By 2025 it is expected that the track in its entire length up to Komárno will be doubled and electrified.

- **Sládkovičovo - Galanta -** direct connection to the railway line 120 (130), this IHUB is oriented for servicing the surrounding logistics centres Galanta, Gáň and Sereď. The existing IHUB located in the town of Sládkovičovo is currently not fully functional.
- **Kúty - Sekule -** this location on the railway line 126 (110) was selected as a reserve for possible future logistics operations.
- **Leopoldov -** location on the railway lines 125 (120) and 128 (133), this IHUB is oriented for servicing broader area, although even this site is considered as a reserve for the future.
- **Piešťany -** the location on the railway line 125 (120) was selected as a reserve for possible future logistics operations.
- **Veľký Meder -** location on the railway line 124 (131) was selected as a reserve for possible future logistics operations.
- **Skalica -** this location on railway line 129 (114) was selected as a reserve for possible future logistics operations.

NITRA REGION

Table 10. Distribution of freight transport between selected macrolocalities in Nitra Region

nr.	macrolocality	increase in goods volumes (%)				volumes of goods in t/year			
		2021	2030	2050	2070	2021	2030	2050	2070
1	Hurbanovo	0.0	0	0	0	0	0	0	0
2	Komárno	2.1	2.3	2.4	2.8	24,449	33,434	45,207	56,257
3A	Levice	1.8	2.1	2.2	3	21,229	30,527	41,439	60,275
3B	Nové Zámky - terminal BGL	0.0	0	3	5	0	0	720,000	1,250,000
4	Nové Zámky (excl. BGL)	19.9	21	21.5	22	232,342	305,270	404,976	442,020
5	Nitra-North (TIP Lužianky)	7.5	9	9	9.5	87,257	130,830	169,525	190,872
6	Šaľa - Trnovec nad Váhom	63.9	60	58.5	56.5	747,561	872,200	1,101,911	1,135,188
7	Šahy	0.0	0	0		0	0	0	0
8	Štúrovo	0.7	0.4	0.9	0.5	8,193	5,815	16,952	10,046
9	Topoľčany	0.7	0.9	1	1.2	7,958	13,083	18,836	24,110
10	Tvrdošovce	0.0	0	0	0	0	0	0	0
11	Želiezovce	0.0	0.5	0.5	0.5	0	7,268	9,418	10,046
12	Zlaté Moravce	3.6	3.8	4	4	41546,	55240,	75,344	80,367
	Nitra Region in total	100	100	103	105	1,170,314	1,453,667	1,883,608	2,009,182
	Broad-gauge line (BGL) - expected capacity					,	,	24,000,000	,

IHUBs in Nitra Region

- **Komárno** - potentially trimodal IHUB in close proximity to the Danube. The site is connected to roads I/63 and I/64 with overlap to Hungary. There will be a need to modernize the lines 124 (131) and 120 (135). In case of the construction of the broad-gauge line (BGL), the IHUB will be even of greater importance.
- **Levice** – site lying on the railway lines 121 (150), and 119 (152) that will need reconstructions. It is well connected to the first-class road I/75 and future R7 expressway. The construction of the IHUB will certainly support the development of this region
- **Nitra-north (Lužianky Terminal)** - This existing IHUB is of great importance for the supply of industrial areas in Nitra as well as the city of Nitra and its surroundings. In the long term, a new railway link is to be built between Nitra and Trnovec n. V. with direct connection to the line 120 (130) Bratislava – Galanta – Nové Zámky – Štúrovo
- **Nové Zámky** - a significant distribution point connected to the future upgraded line 120 (130) and also the extended R7 expressway in the near future. In the case of the construction of broad-gauge line (BGL), Nové Zámky node will become an extremely important IHUB of national importance and also with direct links to the northern part of Hungary, including Budapest. Assuming that 5 % of the transported goods by means of BGL will be transhipped for the needs of Southwest Slovakia, in Nové Zámky it will be a volume of about 1.250 mil.t annually.
- **Šaľa - Trnovec n. V.** - the site has a unique position in the region because special goods are supplied by the DUSLO Šaľa plant. The site is directly connected to line 120 (130) that is to be upgraded in the near future

- **Zlaté Moravce** – building of IHUB in this locality will support the economic growth of the region. However, it will require the modernisation of all adjacent railway lines as well as a feeder for the R1 expressway
- Other locations – **Štúrovo**, **Šahy**, **Hurbanovo**, **Topoľčany**, **Tvrdošovce**, and **Želiezovce** – have been selected as reserves for possible future logistics operations

Variant-based construction of IHUBs in the SW Slovakia

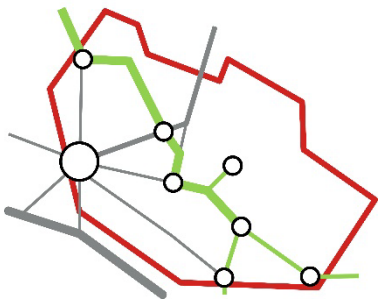
IHUBs have direct transport links to existing and future logistics sites. In the following text the IHUBs are shown in maps according to the proposed variants of transport infrastructure development. This evaluation also includes the expected IHUB construction in stages.

A **list of the proposed IHUBs and their relationship to the logistics centres (sites)** is part of the tables in the Annexes (Chapter 8.4).

When comparing the ranges of individual variants, it can be concluded that the **Tangential Variant** is significantly different from the **Radial** and **Tangential-Radial** (combined) **Variant**. The **Radial Variant** also includes a railway tunnel in Bratislava through the massif of the Little Carpathians. Based on the analysis carried out and calculation of the forecast of transport performances, it was possible to determine the expected quantities of goods transhipped in sites of proposed IHUBs in SW Slovakia. The anticipated loads of the IHUBs will vary according to the selected variant of railway infrastructure development.

On individual situations, it is possible to monitor the gradual importance of the functionality of railway lines and related IHUBs and their temporal development in **2040**, **2050** and **2070**.

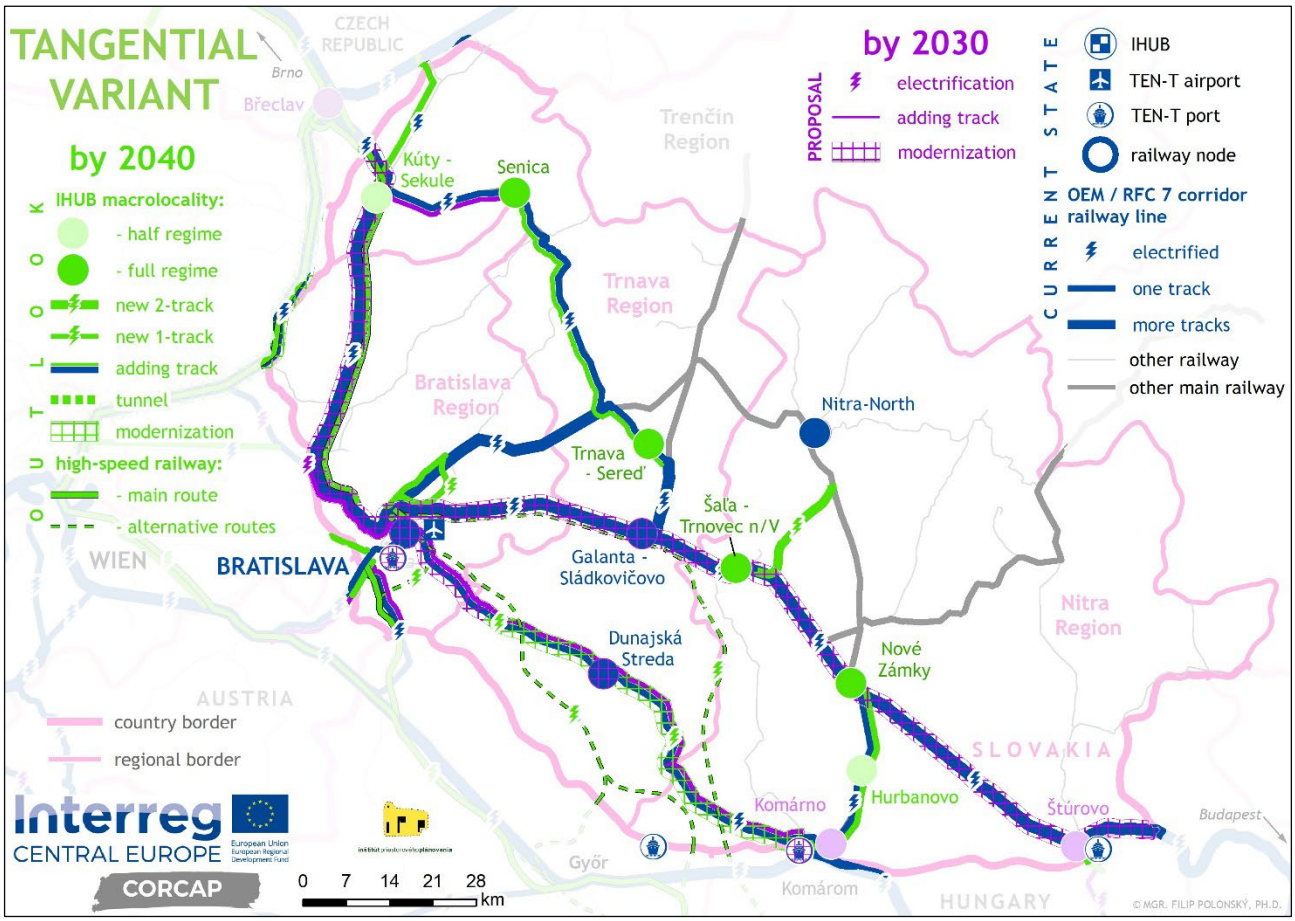
Tangential Variant of IHUBs development



In line with this variant the development of IHUBs will be concentrated along the prioritised tangential railway lines 128 (116 and 133), 120 (130 and 135). Along these lines potential IHUBs were localised in Senica, Trnava - Sereď, Galanta - Sládkovičovo, Nové Zámky (direct link to broad-gauge line), Komárno (port on the Danube), and Štúrovo (port on the Danube).

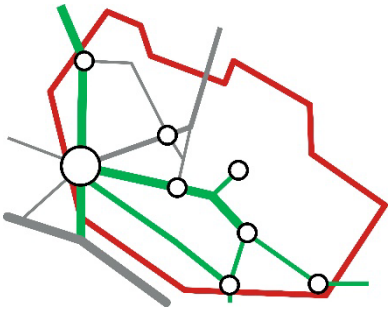
The tangential variant presupposes the creation of suitable transport conditions on the tangential railway bypass (outside the territory of the Bratislava Railway Hub) also with related IHUBs. In this variant, the north-western area of Trnava Region (the territory of the districts of Senica and Skalica) is strongly supported. This variant foresees the concentration of interlaced operations into IHUBs on these lines.

Map 14. Railway lines and IHUBs development in the Tangential Variant by 2040 in SW Slovakia



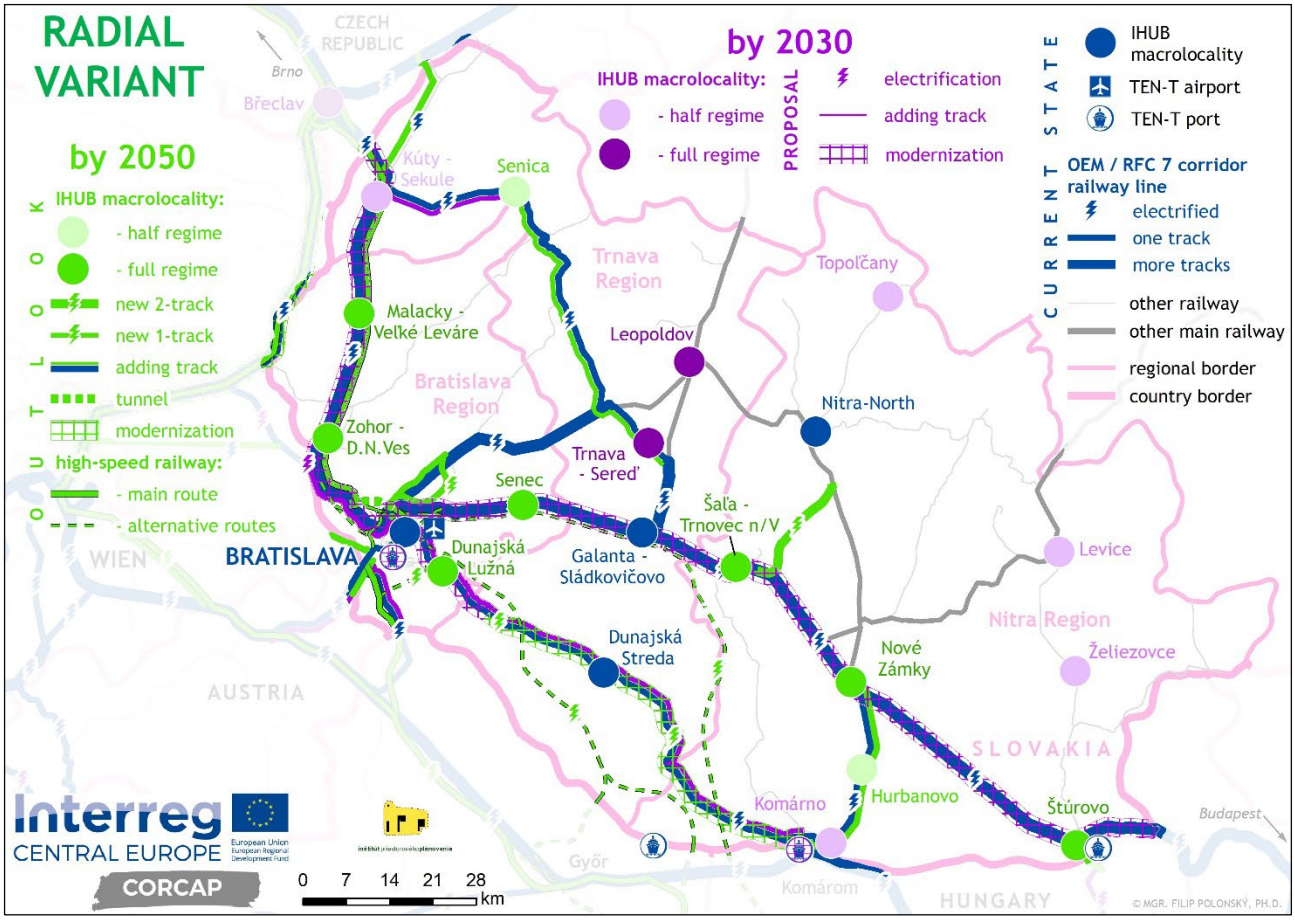
The functional state of operation on the Tangential Variant in 2040 presumes complete modernization of above-mentioned lines, which means their increased throughput and transport speeds. This should make this direction very attractive especially for long-distance transit freight transport.

Radial Variant of IHUBs development



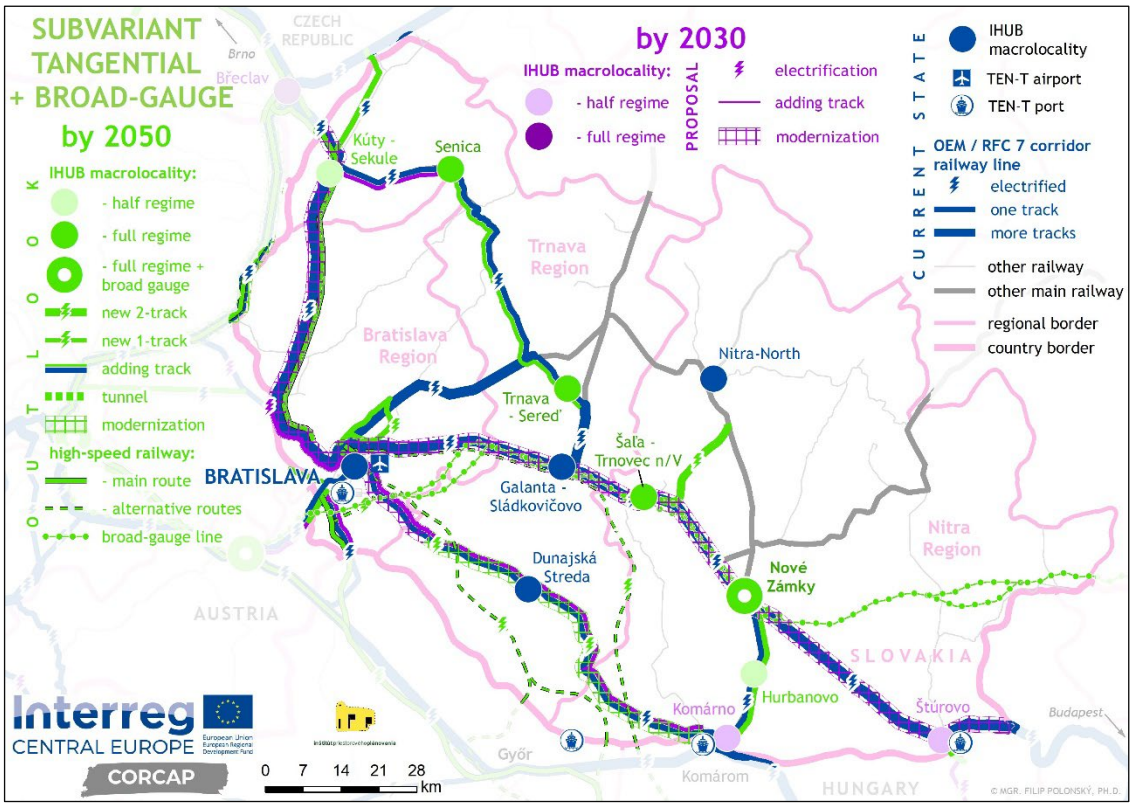
In **Radial Variant** the emphasis will be placed on the development of IHUBs related to the radial lines 126 (110), 120 (130), and 124 (131). The basic element of the variant is the modernization of the above-mentioned lines and the construction of a tunnel between Bratislava-Lamač and Bratislava-Vinohrady stations. On the following maps, their localization in SW Slovakia is depicted.

Map 15. Railway lines and IHUBs development in Radial Variant by 2050 in SW Slovakia

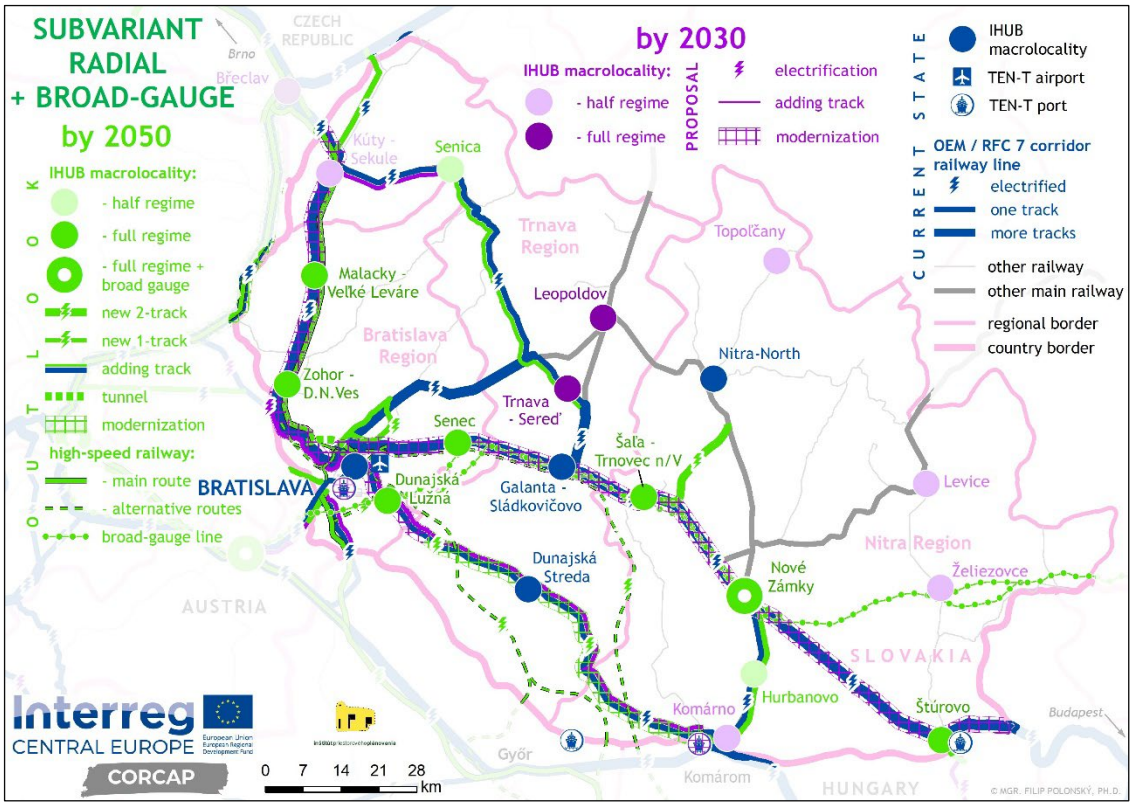


The following maps show the **Subvariant Tangential + BGL** and **Subvariant Radial + BGL** which means the situation when including the broad-gauge line (BGL) project.

Map 16. Railway lines and IHUBs development in the Subvariant Tangential + BGL in SW Slovakia



Map 17. Railway lines and IHUBs development in the Subvariant Radial + BGL in SW Slovakia

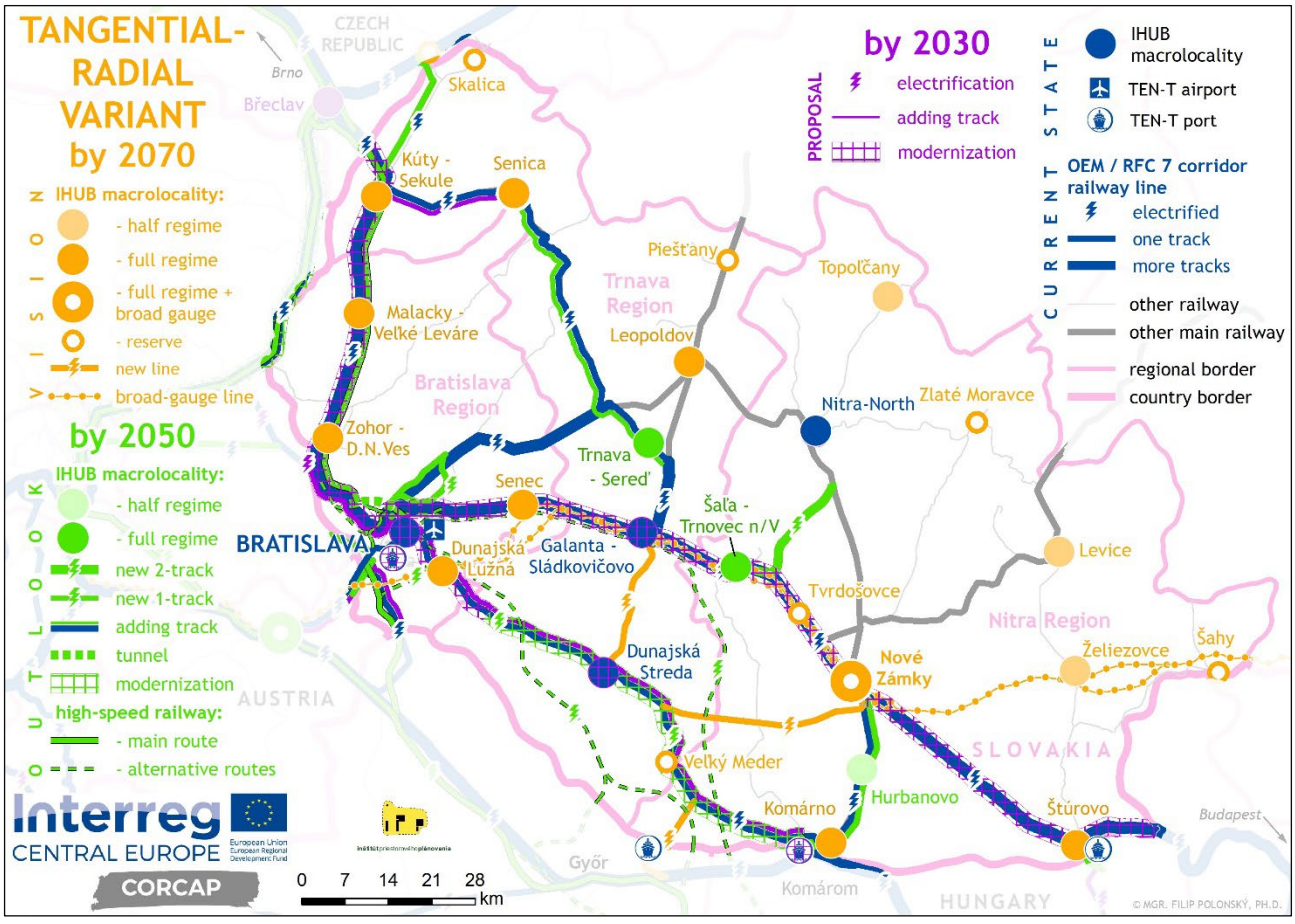


Development of IHUBs in the Tangential-Radial Variant

The Tangential-Radial Variant of the development of railway infrastructure combines the main elements and advantages of both previous presented variants. This combined variant will offer sufficient variability of individual sections of railway infrastructure in SW Slovakia.

The stage and hierarchisation of the future IHUBs will also be adapted to the real state of railway operation on the Tangential-Radial Variant. The necessity of the construction of individual IHUBs will also be strongly supported by the state and development of the regional economy concerned.

Map 18. Railway lines and IHUBs development in the Tangential-Radial Variant by 2070 in SW Slovakia

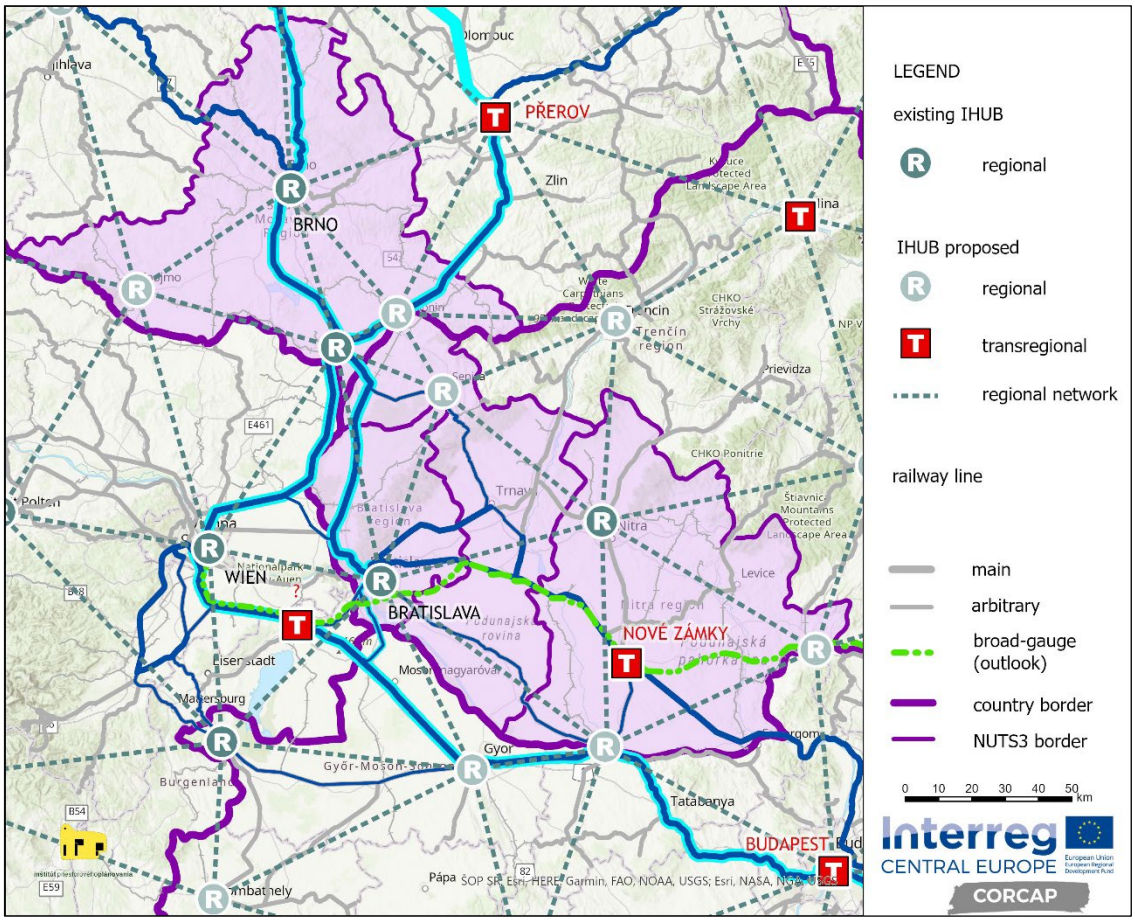


Intermodal Networks

Before building of IHUBs, we recommend keeping in mind the problem of **density** (dispersion or distribution optimalisation) and **hierarchy**. The following map just illustrates the possible arrangement of IHUB in terms of their proximity and hierarchy. However, the **recommendatory nature of such an arrangement should be emphasized**. However, similar considerations must always be placed in a broader, Central European, context and should be part of further studies in cross-border cooperation.

For the territory of the **SW Slovakia**, we propose to respect the structure of **local IHUB** - range up to 50 km, **Regional IHUB** - range 50-150 km, and **Transregional IHUB** – range over 150 km. It seems appropriate to build/use regional IHUBs in the macrolocalities **Bratislava-East**, and **Nitra-North**, where existing hubs are already located. These two should be complemented by the IHUBs in **Senica**, and **Komárno**, and in the far view also **Šahy**. The map also shows the project of extending the **broad-gauge line** (BGL) from Eastern Slovakia, through southern and SW Slovakia to Parndorf and Vienna. In case of its construction, it is envisaged that **Nové Zámky** and **Parndorf** (in Austria) should become new IHUBs of transregional/international importance. In combination with port (**Komárno** or **Vienna** / **Bratislava**) one of these has potential serving as a Transcontinental IHUB.

Map 19. Possible arrangement of a network of IHUBs in a wider area



4.2. Priority axis 2: Ensure an Effective Corridor Development Process

4.2.1. Measure 2.1: Identification and Sequence of Steps (Stages) of the Development of the Corridor by 2050 After the Planning Periods

Goal 2:	Ensure an Efficient and Sustainable Corridor Development Process
Priority axis 2:	Managing the Transport Corridor Development Process in a Sustainable Way
Objective 2.1:	Identify Specific Tasks for the Development of the Corridor while Respecting the Sustainable Quality of the Settlement Environment
Measure 2.1:	Identification and Sequence of Steps (Stages) of the Development of the Corridor by 2050 after the Planning Periods
Expected result:	Upgraded and Updated Spatial Plans, Programming Documents, Project Documentation for Zoning Permit, Project Documentation for Building Permit, Implementation and Documentation of Actual Design, EIA Documentation, Monitoring and Information Systems, Territorial Documents
Financial need:	450,000,000 €
Activity/projects:	Project work and building of monitoring and information systems
Holders:	MDV SR, Regions of South-western Slovakia (BSK, TTSK and NSK), ŽSR (Railways of the Slovak Republic), municipalities affected
Sources of funding:	Public (EU, state, region) and private resources on the basis of a partnership
Key projects:	Railway Infrastructure and IHUBs of International, National, Regional, and Local Importance

Impact on the settlement structure from the point of view of completing the network of logistics centres

In general, the settlement structure is such a purposeful arrangement of the territory that people can live in full. There should be a certain degree of harmony between the various factors of the settlement environment, corresponding to the state of knowledge, technical maturity, cultural awareness, and compliance with the biosphere. The term noosphere is also used to indicate such an environment.

As its strategic objective, this plan has chosen to increase the share of rail freight to 50 % of its total volume by 2050.

It is a challenging nationwide goal, the achievement of which requires not only a well-thought-out concept, but also responsible and disciplined management of the whole process, or all key stakeholders involved.

There are a number of pitfalls in formulating and, consequently, fulfilling such long-term forecasts, the biggest of which is the fact that today's children will be at the heart of the 2050 generation. We are not even talking about 2070 anymore. What do we know about the values that this generation will prefer? Will it be those values that are given to them today as a role model in the pedagogical process? We do not know. On the other hand, there are factors with a longer-term effect of action, and they certainly include transport.

In our opinion, the concept of freight transport built on container transport is one of the factors that can be assumed to be valid in the middle of this century with a high degree of probability. The advantage of this concept is that the available infrastructure is still available, is largely still state-owned and, moreover, the state has not yet got rid of it, although a future in which a new government grouping will try to enrich itself at the expense of society as a whole cannot be ruled out.

The concept proposed in this project is multivariant with not mutually disjointed variants, but rather three interdependent investment steps, which should ensure the efficient “passability” of the TEN-T corridor goods flows.

The selection of sites for IHUBs was based on a number of criteria, among which, in addition to the existing railway stations, their potential location to the settlement centres in terms of Slovak Spatial Development Perspective (Aurex 2012) was their potential location, as well as their location to the existing logistics centres, the construction of which has expanded significantly in the last decade. The relationship between IHUBs and current logistics centres is set out in the Table that is part of the Annexes of this document (Chapter 8.4).

The relationship to the development of the settlement structure according to the approved Slovak Spatial Development Perspective (Aurex 2012) was shown in the Map 13 used in the description of measure 2.1, which focuses on supporting project works for the realization of railway infrastructure development in accordance with the CORCAP project proposal. The map presents the spatial relationship of existing and proposed IHUBs to the existing and anticipated settlement structure in SW Slovakia. The focus is mainly on the existing railway infrastructure. The modernisation of these facilities is envisaged and, according to the on-site survey carried out, as well as from the available map documents, it can be assumed that the efficient use of railway stations that have been identified as potential IHUBs will minimise further land takes.

From an urban point of view at the **local level**, since existing railway stations with their place in existing urban structures will be used, it can be expected that it will increase their centre-forming potential, especially regarding the location of civic amenities. Of course, the selection of sites also considered the areas of logistics centres already implemented in the territory. For the most part, these new logistics centres are implemented outside the existing built-up area "on a green field" and represent land takes of the Agricultural Land Fund.

From an urban point of view at **regional level**, the criterion of the nationwide development of the territory of SW Slovakia was considered, in the contact with the existing railway infrastructure when identifying individual locations. The Map 19. shows the principle of selecting individual sites in the form of a triangulation network, which also considers the significance of individual IHUBs so that this network is available from the largest territory of SW Slovakia.

As has already been mentioned, from an urban point of view at **national level**, the concept of the proposal is based on facts that within the existing railway infrastructure of the Bratislava Railway Node, the available potential for freight transport is exhausted, as it is expected to be used for passenger transport. This is true also for the crossing of the Little Carpathian Mountains located directly in Bratislava in the immediate vicinity of the city centre. The problem is complex as Bratislava is located immediately near the national borders with Austria and Hungary. Although it is possible to divert long-distance freight transport outside the territory of Bratislava, as proposed by the **Tangential Variant**, it is necessary to strengthen the railway infrastructure in the territory by building a new tunnel under the massif of the Little Carpathians. This investment could also serve for the implementation of the upcoming high-speed line from Hungary to the Czech Republic.

A particular issue from an urban point of view at **international level** is the project of extending the broad-gauge line from Ukraine through the south and SW of Slovakia to Austria. The construction of such a new railway line would significantly change the importance of rail freight transport not only in the territory of SW Slovakia but would also be important for the development of socially and economically weaker regions of southern Slovakia, as well as for the territories of neighbouring countries. The project envisages the construction of a large logistics centre in the area of Nové Zámky, where there is a good connection to the OEM corridor, as well as to the ports on the Danube on the territory of the Slovak Republic and Austria.

Given the tense political situation, we would like to stress that this is an international project, the implementation of which - from the point of view of spatial planning - is considered in the long run.

Spatial planning plays an important role in the implementation of this task, as a conceptual and coordinating tool, which has a significant impact not only on the construction process, but mainly on the process of such development of landuse, which continuously ensures the desired quality of the settlement environment. Ensuring the quality of the settlement environment, i. e. that part of the territory where all those environmental factors necessary for the establishment (for its habitability) are fulfilled, is a permanent process which has a significant impact on the quality of life not only of humans, but of the whole community of living organisms involved in the life of society.

The professional competencies of the CORCAP project research team are in line with its focus in the field of urbanism and transport engineering. Although these are expertise with a very wide scope related to socioeconomic, territorial, territorial, cultural-historical, and natural sciences, the management of the process of carrying out the task in question also requires other professions, from specialists in individual sciences to managers of individual areas of support for the implementation of the project (lobbying, finance, public support, etc.). This means that further process of realising the project objectives will require completion of the proposed CCP priority axes and their measures.

Within this priority axis, we will focus both on the description of the activities of further addressing the role in the field of spatial planning and on the design of the necessary institutional support.

Identification of task security steps (stages) by 2050

The time scale of implementation of the project objectives is about 30 years. Due to the nature of the management of spatial planning processes, this long-term time interval must be divided into stages. In this context, it has to be said that spatial planning is divided into two basic instruments in the conditions of the Slovak Republic, namely **spatial planning**, and **regional policy**. **Spatial planning** focuses on the landuse and construction process and **regional policy** on the investment process. Both of these planning tools have a common **objective of ensuring the necessary quality of the settlement environment**. Both of these activities are present at all stages of the organisation of the state (from the municipality, through the region, to the whole state).

While **regional policy** relies on 'national economic' planning or planning for the development of individual sectors of society under market economy conditions in the form of concepts, strategies, policies, programmes and action plans, **spatial planning**, on the one hand, projects regional policy outputs into the territory, while identifying potential problems in ensuring the quality of the settlement environment and proposing steps to address them.

Regional policy is currently based on EU regional policy, which has a 7-year implementation rhythm. Thus, approximately 4 to 5 planning periods fall into the approximately 30-year planning period of the CORCAP project implementation. Spatial planning, unlike regional policy, does not have such a precisely defined planning rhythm, but the legislation obliges public-sector-contracting entities to check the timeliness of the spatial planning documents each 4 years.

With a certain degree of generalisation, we can say that the planning periods of both regional policy and spatial planning are implemented by the method of project cycle management, as well as EU regional policy. It is based on the notion that territories are developing after a 'spiral', where the same territory always reaches a new quality level at the end of the planning cycle, which corresponds to the current needs and trends of the development of the society.

Generally, project cycle management assumes the following stages:

1. Program processing
2. Identification of projects
3. Refinancing of projects
4. Implementation of projects
5. Monitoring of fulfilment of the programme objectives
6. Evaluation of fulfilment of the programme objectives

In the context of its support for EU regional policy, we can conclude that regional policy is, in principle, implemented by this planning procedure.

In the case of spatial planning, these are essentially the same steps, but their naming varies:

1. Processing of the (urban/regional) spatial plan
2. Implementation of territorial/area management
3. Realization of the construction management – before the construction process
4. Realization of the building acceptation management – after realization of the construction
5. Monitoring and information support for the implementation of the concept of spatial plan
6. Evaluation of the fulfilment of the spatial plan concept and preparatory activities for new planning cycle

The two spatial planning processes intersect and complement each other and seek to coordinate an otherwise highly chaotic construction process so that the necessary quality of the settlement environment is continuously ensured. Of course, this can never be ideally ensured because life is complex, dynamic, and often unpredictable, but that is why spatial planning tools are essential.

If we look at the process of development of the territory in terms of its content, as we have already indicated above, we divide it into components, points of views, factors, and their indicators.

As far as the individual components of the environment are concerned, these are, in fact, individual spheres of the earth, concentrating on those located in the immediate vicinity of its surface, the territory. Their interaction in relation to the different parts of the territory which are defined by a system of borders, national, public-administrations and ownership, their quality in relation to the type and method of use being determined by the system of its characteristics. These properties are evaluated from the point of view of individual aspects of the settlement environment or factors, which are measured and evaluated according to a set of indicators and evaluation criteria. We will not deal with the identification of individual components, views, and factors in detail, as they are described thoroughly in the professional literature as well as in legislation in the form of laws, notices, directives, and standards. A particular problem by managing the development of the territory is a 'community-wide agreement' on landuse. Especially in the case of intensively built-up territory or larger territorial units, reaching an agreement on the use of the land and consequently the realization of the agreed investment will not be circumvented without legislatively agreed procedures. Finding an agreement between the actors, including the public, is a complicated time-consuming and costly process that requires professional, information and institutional support.

4.2.2. Measure 2.2: Institutional support for the implementation of the CCP in the Region of SW Slovakia

Goal 2:	Ensure an efficient and sustainable corridor development process
Priority axis 2:	Managing the transport corridor development process in a sustainable way
Objective 2.2:	Create an effective organisational structure for multi-level coordination of corridor development on a partnership-based basis
Measure 2.2:	Institutional support for the implementation of the CCP in the territory of SW Slovakia
Expected result:	Technical Secretariat, Information System, Steering Committee, Coordination Platform + WEB portal
Financial need:	45,000,000 €
Activities/projects:	Logistical support (seminars, meetings, planning and decision-making activities)
	Publicity
	Institutional support
Holders:	MDV SR, Regions of South-western Slovakia (BSK, TTSK and NSK), ŽSR (Railways of the Slovak Republic), eligible municipalities
Sources of funding:	public (EU, state, region) and private resources on the basis of a partnership
Key projects:	Creation, Operation and Maintenance of Monitoring and Information System + WEB Portal and Annual Conferences

Institutional support for the implementation of CCP in the territory of SW Slovakia

In view of the complexity, scale, and anticipated changes, we propose that supporting instruments as well as institutions be created to support the realisation of the objectives of this project:

1. Working Group on the implementation of the CORCAP project in Slovakia
2. Joint information and monitoring system of CORCAP

The working group should consist of the following elements:

- The Steering Committee of the Working Group, which should be composed of representatives of the participating organisations as well as contact persons appointed by them from the public, business, and non-governmental sectors. The Steering Board shall prepare documents for the work of the Working Group, in particular the establishment of an investment programme setting out its priorities and a proposal on how to secure funds for the various activities of the investment programme. The Steering Board should meet at least once a year to discuss the activity report, approve the budget and negotiate tasks for individual members. The Steering Committee should be headed by a renowned figure (preferably a government trustee)
- Working Group Secretariat – expert group, which would continuously coordinate the whole process, prepare an annual report, organise professional events as well as an annual conference (seminar)
- Working Group action subgroups – expert working groups of a cross-cutting and sector-oriented nature that would actively participate in the solution of sub-tasks
- The common information and monitoring system should be implemented in the form of a distributed database and geodatabase and should have its coordinator and members

The Working Group should have its donors, budget, and information security.

Steering Committee

The members of the Steering Committee should be institutions and organisations of public administration, business, and civic public which, by virtue of their legally defined competences, have an immediate impact on the proposed investments, as well as other entities wishing to exercise their interests and requirements related to the proposals for activities contained in the KPK, namely:

- Ministries responsible for the following sectors:
  - transport
  - territorial planning
  - regional policy
  - economy
  - agriculture
  - environment
- Self-governing regions – Bratislava, Trnava and Nitra Regions
- Municipalities, representatives of municipalities where the construction of an IHUB is envisaged
- Chambers of Commerce and Business Associations
- Representatives of civic groups living in the territory concerned

Secretariat of the Steering Committee

The Secretariat of the Steering Committee should manage and coordinate the entire process of implementation of the CCP. The ideal situation would be for it to function as an agency to provide all the activities necessary to ensure the tasks arising from the implementation of the CCP. These are the following groups of activity:

- Information and monitoring support for the implementation of the CCP
- organisation and provision of planned preparation of individual sub-investments
- organization and provision of construction
- the performance of the tasks set out by the Steering Committee, as well as by processing and publishing the activity reports of the Secretariat
- ensuring publicity

Action groups

These are legal and natural persons carrying out individual project tasks of the CCP on the basis of public procurement.

Supporting payment agency

The paying agency's position in relation to the fulfilment of the tasks arising from the CPC goes beyond this project but clarifying the rules for financing projects resulting from the CCP is crucial for its further implementation. We recommend building on the principles of public-private partnership as much as possible.

5. ENVIRONMENTAL ASSESSMENT

When completing and reconstructing the transport network, it is also necessary to consider the environmental values of the territory and to support low-emission transport systems, also in the context of the slowdown in the consequences of climate change.

5.1. SWOT analysis of freight transport options in the SW region of Slovakia

Rail freight transport

Strengths:

- Use of an environmentally sound transport system

Weaknesses

- Transport is an important source of pollution of several environmental compartments (air, water, soil and)

Opportunities

- Preparing transport systems for the transition to low-carbon modes and zero-emission vehicles, promoting electrification of lines and the use of renewable energy sources, the use of low-emission fuels

Threats

- Transport noise is another major problem for a healthy environment
- By tracing transport corridors, conflicting phenomena may arise with natural areas included in the network of protected areas or disruption of migrant corridors may occur

5.2. Environmental assessment according to the development scenarios

Development scenario up to 2030 - Variant 0 — APPROVED PLANNED STATUS

This option includes those objectives proposed in the existing territorial/spatial plans of settlements and regions. In terms of environmental impacts, the use of existing transport corridors is envisaged. It should be noted that the existing valid spatial planning documentation has undergone Environmental Impact Assessment process. Due to the nature of the variant, negative phenomena affecting the environment are expected to have a predominantly temporary impact. More significant impacts on the ground cover and the rock environment can be expected when extending the track and tunnel structures.

Development scenario 2030 - Variant 1 - Preparatory phase

The variant includes the extension of the railway section Bratislava hl. st. – Devínska Nová Ves, building of new railway branch near Komárno, and extending the tracks on several sections. Investments in the adjacent intermodal transport infrastructure in Bratislava, Dunajská Streda and Sládkovičovo, the Danube ports in Bratislava and Komárno are necessary.

The anticipated negative environmental impacts will relate to - as in the previous variant - the land take and the rock bedrock. Among other things there may be a conflict with the Danube's aquatic ecosystems when expanding or building parts of ports on the Danube and the railway branch near the Danube.

In the outlook period 2030 to 2070, the possibilities of operation of variant solutions were explored to ensure sufficient capacity for the transport of rail freight transport in the direction of NW-SE. The key point that rail freight transport has to bypass is the Bratislava main station (Bratislava hl. st.) and the connecting sections of the railway lines. Three variants and two subvariants were examined.

Development scenario 2040 - TANGENTIAL VARIANT

The basis of the Tangential Variant is the move of transit rail freight transport to the perimeter line Kúty – Senica – Trnava – Galanta – Nové Zámky – Štúrovo – HU.

The variant contains several railway sections proposed to be extended by adding additional tracks or electrification of existing sections. Within existing sections or their electrification, it is possible to expect predominantly temporary negative environmental impacts such as noise, dustiness, landscaping, etc.

Due to environmental values, new sections appear more problematic:

- New line Bratislava – Vajnory – Pezinok – potential threat to wetland habitats and water migration corridors formed by a network of water channels
- The new line Trnovec nad Váhom (on line 120 [130]) – Nitra, a double track with track parameters of 120 (130) line – the line passes through the agricultural landscape, which means the assumption of new land takes of agricultural land and loss some of the highest quality production land
- The new railway tunnel under the Little Carpathians Bratislava-Lamač – (Bratislava-) Vinohrady – it is a difficult construction that will affect the rock cover. In view of the negative environmental impacts, inlets into tunnels and joins to the existing lines appear to be problematic. It is the territory of the Little Carpathians Protected Landscape Area where the southeast and southwest slopes of the belong to important migratory routes of animals.
- High-speed line (HSL) for passenger and freight rail transport – perspective line with extensive corridors and multiple routing options. A number of negative environmental impacts can be foreseen, such as land takes, landscaping, conflicts with a network of protected areas and animal migration routes. The variants of the prospective solution of the HSL will have to be assessed by means of the Environmental Impact Assessment process according to the current legislation, as it is

likely to be a transport structure whose social contribution exceeds the possible negatives resulting from its implementation.

Development scenario 2040 - SUBVARIANT TANGENTIAL + BGL

The subvariant contains the Tangential Variant complemented by broad-gauge line (BGL). It is a specialized monorail track for rail freight transport with a new logistics centre in the area of Nové Zámky. This variant assumes similar negative effects as for the Tangential Variant. Variants of the (BGL) pass through the territory of all three regions of the SW Slovakia, and therefore it is possible to assume several conflicting phenomena with elements of nature protection and the interests of soil protection. The traffic burden is also expected to increase, which may lead to excessive noise and disruption of the animal regime in natural areas close to the route.

Development scenario 2050 - RADIAL VARIANT

The basis of the radial variant is to conduct rail freight transport along line 126 (110) in the direction to Bratislava and to secure the bypass of the key place (Bratislava hl. st.) by a new railway route, a tunnel through the massif of the Little Carpathians in the direction Bratislava-Lamač – railway tunnel – Bratislava-Vinohrady and further along the existing lines in the direction of Galanta – Nové Zámky – Štúrovo – HU and Bratislava-Petržalka – AT/HU.

Like the previous one, the variant contains several railway sections proposed to be extended by adding additional tracks or electrification of existing sections. Within existing sections or their electrification, it is again possible to expect predominantly temporary negative environmental impacts such as noise, dustiness, landscaping, etc.

The variant contains similar new constructions as in the Tangential Variant and it is therefore possible to assume identical negative effects.

Development scenario 2050 - SUBVARIANT RADIAL + BGL

Subvariant Radial + BGL represents a combination of Radial Variant with the addition of a new route of BGL (east-west). Environmental impacts are assumed to be the same as in previous variants.

Development scenario 2070 - TANGENTIAL-RADIAL VARIANT

In a more distant view, we are considering combining the Tangential and Radial variants into the so-called **Tangential-Radial Variant**. In addition, other projects will need to be considered in 2070:

- New railway-line connections - the interconnection of Galanta, Dunajská Streda and Győr, or Dunajská Streda and Nové Zámky – especially for new sections, there may be conflicts with natural areas, which may have an even higher ecological value by 2070
- Use of new transport technologies – regardless of the economic situation, priority will have to be given to the most suitable solutions to the environment at given time period
- Bridges over the Danube for the railway in Komárno (second bridge to the east of the city, or alternatively a railway bypass in the north of the city) and Medveďov with adjacent sections of railway lines – negative impacts are expected, especially on the adjacent water communities around the Danube
- Broad-gauge line (BGL, in case it is not built by 2050) - a number of conflict phenomena with nature conservation elements and soil protection interests can be assumed
- High-speed line (HSL) for both passenger and freight rail transport (in case it is not built by 2050) - a number of negative environmental impacts can be foreseen, such as land takes, landscaping, conflicts with the protected area system and animal migration routes

Finally, it should be added that any development plan, or activity of those variants will have to go through its own Environmental Impact Assessment process. Given that these are solutions set for the period 2030 to 2070, the evaluation process may be completely different over different time periods, but it is not expected to be omitted. It is necessary to consider the impacts on the environmental values of the territory, but also the social value of individual transport infrastructure proposals since the construction of mainly railway infrastructure and its possible use is progressing very slowly in the Slovak part of the territory. When building transport infrastructure, it is necessary to make use of the latest available technical possibilities and environmentally friendly knowledge and to avoid past mistakes where railway lines that could serve as an environmentally more suitable alternative to other modes of transport were cancelled or eliminated.

6. CHARACTERISTICS OF THE FRAMEWORK FOR THE PROGRESSIVE IMPLEMENTATION OF THE PROJECT OBJECTIVES

Achieving the strategic goal of the CORCAP project on the territory of the Slovak Republic is an ambitious task, in which it is necessary to involve all the affected components of the company, which represents a complex, large-scale, dynamically evolving, and intelligent system. To steer its development so that in 2050 at least 50% of freight transport is carried out by rail requires a creative partnership of state and public administration bodies, business entities and their groupings, as well as civic interest groups. A necessary condition is also broad support of the population or its spatially separated communities, with which each has its idea of creating a high-quality settlement environment in its closer but also more distant surroundings.

In an environment of a pluralistic democratic society, it is essential for the solution to such a task to be conditional on ensuring sustained political, technical, and mass media support, while support must be provided at all systemic levels of corporate governance, i. e. national, regional, and local. Furthermore, given the nature of the project, coordination of support is also essential in terms of cross-border interregional and even Pan-European (possibly non-European) cooperation.

In the previous text, we said that the **implementation procedure by 2050** would be carried out in 4 periods of the EU's seven-year planning periods, namely:

- 2021-2027 – this would implement already approved projects of **Variant 1 (Preparatory Phase)**
- 2028 – 2034 – this would implement the rest projects of **Variant 1 (Preparatory Phase)** and prepare projects for the **Tangential Variant**
- 2035 – 2041 – this would implement projects of the **Tangential Variant** and prepare projects for the **Radial Variant**
- 2042 - 2048 - this would implement projects of the **Radial Variant** and prepare projects of the **Tangential-Radial Variant**
- 2050 + this would implement projects of the **Tangential-Radial Variant**

A more detailed description of the individual planning periods will be described below, in the form of the abovementioned spatial planning and regional policy procedures.

6.1. Logical framework of the whole project

	PROJECT SUMMARY	INDICATORS	MEANS OF VERIFICATION	RISKS / ASSUMPTIONS
Goal	Ensure sufficient quality of the settlement environment	Quality indicators of the settlement environment	Urban statistics	
Outcomes	Complete and modernize the railway infrastructure in the territory of SW Slovakia so that at least 50 % of the goods will be transported by rail	Total range of transported goods % of freight transport by rail	Transport statistics	Integrate completed railway infrastructure into the settlement structures
Outputs	Modernised rail network Completed network of IHUBs Integrated network of logistics centres into the settlement structure	Related Indicators of rail-transport statistics	Rail transport statistics	Complete settlement structures with related civic amenities, processing, and technical infrastructure
Activities	Process planning documents Ensure territorial and financial preparation of projects Ensure project preparation and resources for construction Carry out construction Monitor the sequence of construction Continuously evaluate the process of implementation of the planning documents	Professional legislation of the construction process and its monitoring and evaluation (laws, standards, and statistics) Checking the effectiveness of spending Monitoring the acceptance of the implementation of the programme by civil society	Planning and programming capacities Project capacities Financial resources Building realization resources Information and monitoring systems Related research and development in the fields of urbanism, regional policy, transport engineering and related disciplines	Create institutional support for the implementation of planning documents and programmes Political support Establishing the necessary public, private and civil partnerships
				Ensure the necessary legislative and financial support

6.2. Logical framework of the first implementation phase of the project 2021-2027

	PROJECT SUMMARY	INDICATORS	MEANS OF VERIFICATION	RISKS / ASSUMPTIONS
Goal	Ensure sufficient quality of the settlement environment	Indicators of the quality of the settlement environment	Urban statistics	
Outcomes	Realization of the already prepared railway infrastructure constructions of the Variant 1	Total range of transported goods % of freight transport by rail	Transport statistics	Integrate completed railway infrastructure into the settlement structures
Outputs	Updated Programmes of the economic development and social development of regions and municipalities Updated regional and municipal spatial plans Processed Project documentation of (re)construction of lines 128 (116 & 133), and 120 (135) and IHUBs of the Variant 1 for zoning permit and building permit Processed relevant Environmental Impacts Assessments Realized possible land purchases Processed territorially technical documents	Related Indicators of rail-transport statistics	Rail transport statistics	Negotiated and approved Programmes of the economic development and social development of regions and municipalities and regional and municipal spatial plans Issued zoning permits and building permits for the construction of the Variant 1
Activities	Ensure the processing of planning and programming documents Ensure territorial and financial preparation of projects, including the creation of partnerships for individual constructions Ensure project preparation and resources for construction Ensure the necessary preparation of the implementation of constructions (creation of databases on the conditions of the territory), including information for the mass media and civil society Monitor the preparatory process of construction Continuously evaluate the process of processing of planning documents and its impact on the quality of the settlement environment Realized possible land purchases	Professional legislation of the construction process and its monitoring and evaluation (laws, standards, and statistics Checking the effectiveness of spending Monitoring the acceptance of the implementation of the programme by civil society	Planning and programming capacities Project capacities Financial resources Building realization resources Information and monitoring systems	Political support at all levels of relevant public administration (EU, state, counties, municipalities) Creation of the necessary partnerships of the public, private and civil sectors for the implementation of individual parts of the CCP
				Create an institutional framework for the implementation of the CCP

6.3. Logical framework of the second implementation phase of the project 2028-2034

	PROJECT SUMMARY	INDICATORS	MEANS OF VERIFICATION	RISKS / ASSUMPTIONS
Goal	Ensure sufficient quality of the settlement environment	Quality indicators of the settlement environment	Urban statistics	
Outcomes	Realization of the rest of the railway infrastructure constructions of the Variant 1 Project preparation of the Tangential Variant	Total range of transported costs% of freight transport by rail	Transport statistics	Integrate completed railway infrastructure into the settlement structures
Outputs	(Re)constructions of railway lines and IHUBs Updated Programmes of the economic development and social development of regions and municipalities Updated regional and municipal spatial plans Processed Project documentation of (re)constructions of lines and IHUBs of the Variant 1 for zoning permit and building permit Processed relevant Environmental Impacts Assessments Realized possible land purchases Updated territorial documents	Related Indicators of rail-transport statistics	Rail transport statistics	Negotiated and approved Programmes of the economic development and social development of regions and municipalities and regional and municipal spatial plans Issued zoning permits and building permits for the construction of the Variant 1
Activities	Ensure the processing of planning and programming documents Ensure territorial and financial preparation of projects Ensure project preparation and resources for construction Ensure the necessary preparation of the realization of buildings Monitor the preparatory process of construction Continuously evaluate the process of processing planning documents and preparation of the next stages of construction Ensuring the construction of relevant lines and IHUBs, as well as their commissioning	Professional legislation of the construction process and its monitoring and evaluation (laws, standards, and statistics) Checking the effectiveness of spending Monitoring the acceptance of the implementation of the programme by civil society	Planning and programming capacities Project capacities Financial resources Building realization resources Information and monitoring systems	Create institutional support for the implementation of planning documents and programmes Political support Establishing the necessary public, private and civil partnerships
				Ensure the necessary legislative and financial support

6.4. Logical framework of the third implementation phase of the project 2035-2041

	PROJECT SUMMARY	INDICATORS	MEANS OF VERIFICATION	RISKS / ASSUMPTIONS
Goal	Ensure sufficient quality of the settlement environment	Quality indicators of the settlement environment	Urban statistics	
Outcomes	Realization of the already prepared railway infrastructure constructions of the Tangential Variant Project preparation of the Radial Variant	Total range of transported costs % of freight transport by rail	Transport statistics	Integrate completed railway infrastructure into the settlement structures
Outputs	(Re)constructions of railway lines and intermodal transhipments carried out Updated Programmes of the economic development and social development of regions and municipalities Updated regional and municipal spatial plans Processed Project documentation of (re)construction of lines and IHUBs of the Tangential Variant for zoning permit and building permit Processed relevant Environmental Impacts Assessments Realized possible land purchases Updated territorial documents	Related Indicators of rail-transport statistics	Rail transport statistics	Negotiated and approved Programmes of the economic development and social development of regions and municipalities and regional and municipal spatial plans Issued zoning permits and building permits for the construction of the Tangential Variant
Activities	Ensure the processing of planning and programming documents Ensure territorial and financial preparation of projects Ensure project preparation and resources for construction Ensure the necessary preparation of the realization of buildings Monitor the preparatory process of construction Continuously evaluate the process of processing planning documents and preparation of the next stages of construction Ensuring the construction of relevant lines and IHUBs, as well as their commissioning	Professional legislation of the construction process and its monitoring and evaluation (laws, standards, and statistics) Checking the effectiveness of spending Monitoring the acceptance of the implementation of the programme by civil society	Planning and programming capacities Project capacities Financial resources Building realization resources Information and monitoring systems	Create institutional support for the implementation of planning documents and programmes Political support Establishing the necessary public, private and civil partnerships
				Ensure the necessary legislative and financial support

6.5. Logical framework of the fourth implementation phase of the project 2042-2048

	PROJECT SUMMARY	INDICATORS	MEANS OF VERIFICATION	RISKS / ASSUMPTIONS
Goal	Ensure sufficient quality of the settlement environment	Quality indicators of the settlement environment	Urban statistics	
Outcomes	Realization of the railway infrastructure constructions of the Radial Variant Project preparation of the Tangential-Radial Variant	Total range of transported costs% of freight transport by rail	Transport statistics	Integrate completed railway infrastructure into the settlement structures
Outputs	(Re)constructions of railway lines and IHUBs Updated Programmes of the economic development and social development of regions and municipalities Updated regional and municipal spatial plans Processed Project documentation of reconstruction and construction of lines and IHUBs of the Radial Variant for zoning permit and building permit Processed relevant Environmental Impacts Assessments Realized possible land purchases Updated territorial documents	Related Indicators of rail-transport statistics	Rail transport statistics	Negotiated and approved Programmes of the economic development and social development of regions and municipalities and regional and municipal spatial plans Issued zoning permits and building permits for the construction of Radial Variant
Activities	Ensure the processing of planning and programming documents Ensure territorial and financial preparation of projects Ensure project preparation and resources for construction Ensure the necessary preparation of the realization of buildings Monitor the preparatory process of construction Continuously evaluate the process of processing planning documents and preparation of the next stages of construction Ensuring the construction of relevant lines and HUBS, as well as their commissioning	Professional legislation of the construction process and its monitoring and evaluation (laws, standards, and statistics Checking the effectiveness of spending Monitoring the acceptance of the implementation of the programme by civil society	Planning and programming capacities Project capacities Financial resources Building realization resources Information and monitoring systems	Create institutional support for the implementation of planning documents and programmes Political support Establishing the necessary public, private and civil partnerships
				Ensure the necessary legislative and financial support

7. CONCLUSIONS AND RECOMMENDATIONS

7.1. Conclusions and recommendations in the field of spatial planning and urbanism

The region of South-western Slovakia incl. its settlement structure is at the stage of strong **suburbanization process of Bratislava**, the settlement core area of national importance of. Its nodal regions extends not only to the territory of the whole SW Slovakia (Bratislava, Trnava, and Nitra Regions), but also spills over the border to encompass the territories of Austria and Hungary in the near vicinity of city of Bratislava.

This raises problems in the provision of transport services and requires the adoption of adequate measures at the level of interstate, national, regional, and municipal level.

In addition to serving its own territory and especially its centres and their centre-of-gravity settlements, Bratislava is a node of historical crossroads of international transport corridors. The territory of Bratislava can provide these transit tasks only at the cost of massive investments in transport infrastructure.

The transport urban study carried out within the framework of the CORCAP project by the Institute of Spatial Planning, represents the strategy framework for providing mainly freight rail transport in the territory of South-western Slovakia. Only in this territorial context it is possible to comprehensively ensure the passage of the TEN-T Orient East-Med Corridor through the territory of SW Slovakia.

In the last 30 years, the system of the superior transport network of road transport in the Bratislava area - and along the urbanization axes defined by Slovak Spatial Development Perspective (Aurex 2012) - is gradually being built. Practice shows that without a massive expansion of rail transport capacities, as well as a comprehensive expansion of its logistics security, transport problems, are not solvable in the territory.

Although the CORCAP project deals with the issue of rail freight transport, the current task is also the gradual provision of high-speed railway lines in the Bratislava area and its connection to the metropolises of other V4 countries.

The conclusions of the Regional Plan of Sustainable Mobility of Bratislava Region (SGS 2020) have shown that the available rail infrastructure is not able to meet the demands of rail freight transport within the Bratislava due to the massive development of passenger regional rail transport within the Bratislava agglomeration. Thich also creates problems for ensuring transport requirements for the smooth transport of goods within the TEN-T OEM.

For this reason, it is necessary to look for new solutions, both by rebuilding and supplementing the network of railway transport infrastructure in the Bratislava area, as well as by involving other railway lines in SW Slovakia. These lines includes sections between CZ - Kúty – Senica – Trnava – Nové Zámky – Komárno/Štúrovo – HU, which should mainly serve to ensure transit transport within the TEN-T OEM.

In line with the requirements agreed at Pan-European level, it is necessary to consider shifting at least 50 % of freight to rail by 2050. This is an extremely demanding task, which will require the establishment of a system of multimodal hubs (IHUBs), especially at the premises of existing and prospective logistics centres.

The greatest potential for the construction of the IHUBs of rail and automotive transport is held by the existing railway stations, on the territory of which there are so-called load districts, which need to be gradually activated and rebuilt.

These potential investments/investment plans are not included in the relevant spatial planning documentation for the time being.

Recommendations

- The scenarios outlined in Subchapter 4.1 should be further developed, evaluated, and specified so that the objectives and measures outlined in this CCP are implemented:

> Complete the network of railway lines in the area of SW Slovakia, mainly by means of their reconstruction, modernization, and extension

> Build a network of multimodal hubs (IHUBs), based on the extension and modernisation of selected railway stations near existing and prospective logistics centres

> Existing and prospective logistics centres are appropriately connected to the IHUBs in order to create an efficient transport and urban complex

- It is necessary to process the necessary spatial planning documents, namely relevant urban studies, and spatial transport 'generels' in the territory of individual regions and relevant municipalities of SW Slovakia
- In the long run it is necessary to establish and develop spatial and technical documentation to ensure the functionality of the TEN-T OEM
- Furthermore, it is necessary to project the identified investment plans into the spatial plans at all system levels – Slovak Spatial Development Perspective (Aurex 2012), regional spatial plans, urban spatial plans of municipalities or zones

7.2. Conclusions and recommendations in the field of regional policy

The implementation of the TEN-T OEM development raises questions related to the need to ensure massive investments in the transport infrastructure of virtually all modes of transport in the territory of SW Slovakia. It is mainly the reconstruction of the lines in the axis CZ - Kúty – Senica – Trnava – Nové Zámky – Komárno/Štúrovo - HU, a new railway tunnel in Bratislava and other related investments. We recommend paying particular attention to the project of extending the broad-gauge line (BGL) from Košice/Haniska to the south of Slovakia to the area of Nové Zámky – Bratislava to the border with Austria.

For the time being, the system of national instruments for the implementation of regional policy does not include activities related to ensuring the continuity of the flow of goods under the TEN-T OEM, in particular investments in railway infrastructure.

An essential part is also the need to coordinate the efforts of entities on the territory of SW Slovakia, national authorities, but also foreign entities.

Recommendations

- To process regional policy strategies aimed at securing TEN-T OEM at the level of SW Slovakia, or to innovate existing strategy documents, and then to process feasibility studies of individual parts of railway transport infrastructure at the level of regions and municipalities concerned and to integrate them into Programmes of economic development and social development of regions and municipalities, as well as other regional policy instruments
- At the same time, it is necessary to ensure the implementation of the project preparation of those identified project objectives where there is a high probability of implementation in the next period (by 2030). These are mainly projects related to the railway infrastructure

7.3. Transport and mobility conclusions and recommendations

The strategic objective in the field of transport is to achieve a substantial reduction in CO_2 emissions from transport, which can only be achieved by fundamentally changing the modal split ratio in favour of rail transport, reaching at least 50 % of its share, with the current targeted reduction of road car transport, both in passenger and freight transport.

The starting point is the permeability of the Bratislava Railway Node, or the further development of its freight transport system. The point is that its existing reserves are increasingly beginning to be used by passenger transport within the framework of the integrated regional transport system.

Within the framework of the international modal split, it is necessary to effectively involve the railway network of the SW Slovakia in the created transport corridors between the territories of EU countries and the Far East.

Application in the territory of SW Slovakia

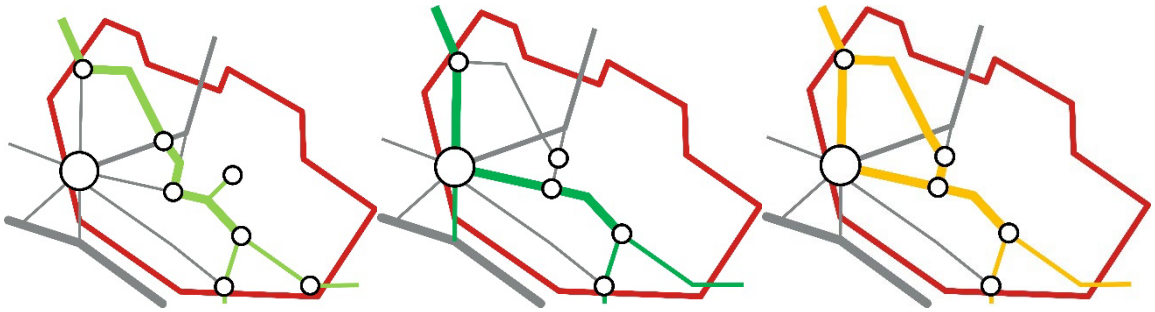
- Realization and equipment of transit railway lines in SW Slovakia:
    - line 128 (116, part of 133) Kúty – Trnava - Galanta
    - line 120 (130) Bratislava – Nové Zámky - Štúrovo
    - line 124 (131) Bratislava – Dunajská Streda - Komárno
    - broad-gauge line (BGL) UA - Haniska – Nové Zámky – AT

On the basis of the analyses of possible movement of cargo in SW Slovakia, these **variant solutions** for possible **network development** have been established for the region of SW Slovakia:

- **Scenario 2030**
    - **Variant 0** represents a situation where no additional investments are made in the development of railway infrastructure, except the already approved projects. It is clear from the analyses that staying at the current state will result in a lack of permeability on several railway lines
    - **Variant 1 (Preparatory Phase)** includes the possibility of adding new rail freight capacities via the 128 (116) track between Kúty and Senica
- **Scenario 2040**
    - The basis of the **Tangential Variant** is the routing of transit rail freight transport using bypass outside the Bratislava Region, through the territory of Trnava Region. This variant seems more appropriate from the point of view of the substantial segregation of long-distance freight transport from passenger transport passing through the territory of Bratislava. The **key project** is **construction of second track** and **improving the railway line 128 (116, partly 133) Kúty - Senica - Trnava - Sereď - Galanta**
- **Scenario 2050**
    - The basis of the **Radial Variant** is the focus on the Bratislava Railway Node, in particular the routing of rail freight transport using the line 126 (110) and the provision of a bypass of key point - Bratislava main railway station. The **key investment** of this variant is the **construction of railway tunnel Bratislava-Lamač - Bratislava-Rača**

- It is also meaningful to consider the intention to extend the broad-gauge line from Ukraine to Austria through the south of Slovakia. This is considered in the Subvariant Tangential + BGL and Subvariant Radial + BGL.

- Scenario 2070
  - Tangential-Radial Variant – its aim should be to complete the transport infrastructure projects defined both in the Tangential and Radial Variants.



In addition, also other projects necessary to ensure the continuity of freight transport in the outlook were identified:

- Modernizations of key railway lines 126 (110) and 120 (130), 120 (135) Nové Zámky – Komárno – Komárom, and 124 (131) Bratislava – Dunajská Streda – Komárno
- New railway line Trnovec nad Váhom – Nitra, which will "make accessible" the regional city of Nitra and the entire industrial region of Upper Nitra Region by rail transport
- Road transport - D4 motorway tunnel through Little Carpathians with connection to the motorway network in Austria and expressway R7 Holice – Nové Zámky
- Modernization of ports in Bratislava and Komárno and increasing the quality of IHUBs in Bratislava, Dunajská Streda and Sládkovičovo.

Recommendations

- In the first (implementation) phase by **2030**, implement activities aimed at effective connections of logistics centres to IHUBs around Bratislava, while at the same time implementing the strengthening of the tangential route for ensuring mainly transit transport
- In the second vision phase by **2040**, fully develop activities aimed at implementing the Tangential Variant in the axis of the Czech Republic – Kúty – Senica – Trnava – Nové Zámky – Komárno/Štúrovo – HU, while creating conditions for strengthening the permeability of the Bratislava Railway Node, including the high-speed railway
- In the third long-term vision phase by **2050**, build new Carpathian tunnel - in Bratislava - to enable the development of the Radial Variant
- In the **outlook phase by 2070**, the integrated Radial-Tangential Variant in the space of SW Slovakia will be completed in the form of a network of interconnected IHUBs with effective connections to the railway networks of the surrounding countries
- Pay particular attention to the possibility of extension of the BGL from Košice (Haniska) through the south and SW of Slovakia to Austria

- Furthermore, we recommend monitoring and gradually elaborating and further working out 3 possible variants of the development of railway infrastructure in the SW Slovakia region in order to achieve the required increase in traffic throughput on monitored railway lines and facilities

Variants for the development of railway infrastructure:

Recommendations at regional level

- Develop spatial technical documents mapping related factors of the settlement environment quality by means of a database development for better identification of necessary projects
- Include key projects defined in this study into the regional planning documents in the field of spatial planning, regional policy, and transport
- We recommend the development of rail freight infrastructure for the SW Slovakia region in three stages:
  - By **2030** to focus on **Variant 1 (Preparatory Phase)** aimed at effectively connecting Bratislava as well as preparing the **Tangential Variant**
  - By **2040** to focus on the completion of the **Tangential Variant**
  - By **2050** to focus on the construction of a new tunnel under Little Carpathians in Bratislava, that will allow the development of the **Radial Variant**
  - Completion of **Tangential-Radial Variant** by **2070**

Recommendations at local level

- Within the individual regions of the SW Slovakia, we recommend focusing on the preparation and implementation of railway infrastructure projects
- Increasing the attractiveness of rail freight transport will have a positive impact on the social and economic development of the municipalities. This development process has to be supported by preparation or updating of the relevant planning documents
- At the stage of preparation of these investments, it is necessary to pre-process the urban spatial plans of affected regions and municipalities, in terms of infrastructure development, but also IHUBs and logistics centres

7.4. Conclusions and recommendations in the institutional and organisational field

For the implementation of such a demanding objective as to ensure at least 50 % of freight transport by rail by 2050, there is no adequate communication and institutional platform enabling effective coordination of the activities of public, professional and private sector stakeholders.

Following the creation of a communication platform, the necessary legislative preconditions are not yet created to create a legislative framework motivating the relevant actors (mainly of a private nature) to transfer mainly long-distance transport from road to rail.

In the sphere of transport infrastructure, attention must be focused on:

- specifically, to achieve the required throughput of railway lines that have been examined in the territory of SW Slovakia - railway lines 120 (130 and 135), 124 (131), 125 (120), 126 (110), and 128 (116 and 133)
- a separate set of measures requires the long-term development of the Bratislava Railway Node, also with the location of the high-speed railway route and station
- in the structure of the motorways, the completion of the D4 motorway is necessary also with connection to the expressway in Austria (incl. D4 tunnel)

The decisive track section in this whole area is the crossings through the territory of the Bratislava Railway Node, especially the connection from Devínska Nová Ves to Bratislava hl.st., line 126 (110) and direction Pezinok – Trnava, line 130 (120). In the future, these line sections are expected to be used as much as possible for passenger transport both suburban as well as long-distance. This must be the topic and target of the new Urban Spatial Plan of Bratislava City, but also Regional Spatial Plan of the Bratislava Region.

It will also be necessary to prepare and locate the BGL, including the solutions of the economic and spatial impacts.

Recommendations

We propose the creation of a coordination platform for securing tasks related to the solution of ten-T OEM transition through the territory of the Slovak Republic. This should be cross-cutting in nature, with the involvement of relevant sectors at all relevant system levels of governance ('multi-governance approach'). Adequate information support should be established for the effective functioning of such a planning and implementation platform.

7.5. Conclusions and recommendations on funding

Identified potential investments estimated at EUR approx. **10 milliards by 2070** are not comprehensively reflected in the financial instruments of the State for the time being. At the same time, financial instruments are not yet created to motivate transport companies to move most of the goods transported to the railway.

Recommendations

- In this context, we recommend considering the possibilities of using the principles of partnership, i. e. private equity participation, while considering the possibilities of using EU financial instruments such as the ESI, the EIB and the CEF
- At the same time, we recommend creating, in the context of the EU legal environment, an adequate set of tax, customs, technical and environmental measures to support the development of efficient and environmentally friendly transport in Slovakia

LIST OF ABBREVIATIONS

- AT - Austria (Österreich)
- BA – Bratislava
- BGL – Broad-gauge line
- BSK – Bratislava Self-Governing Region
- **CCP - Corridor Capitalization Plan**
- CE CENTROPE – the part of the CENTROPE region defined for the purpose of this study
- CENTROPE - Euroregion that extends to four Central European countries, the Czech Republic, Hungary, Austria, and Slovakia
- CZ – Czech Republic (Česká republika)
- DE – Germany (Deutschalnd)
- EIA – environmental impact assessment
- HSL – High-speed railway line
- HU – Hungary (Magyarország)
- **IHUB - intermodal/multimodal hub**
- IPP – Institute of Spatial Planning
- MDV SR - Ministry of Transport and Construction of the Slovak Republic
- MDVRR SR - Ministry of Transport, Construction and Regional Development of the Slovak Republic
- NSK – Nitra Self-Governing Region
- OEM – Orient/East-Med Corridor
- SR – Slovak Republic
- TEN-T – Trans-European Transport Networks
- TTSK – Trnava Self-Governing Region
- UA – Ukraine (Україна)
- ZSSK – Slovak Railway Company
- ŽSR – Railways of the Slovak Republic
- ŽST – railway station

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8. ANNEXES

8.1. Regional analysis of challenges and needs for efficient and environmentally friendly freight transport in the territory of South-western Slovakia

- Standalone document REGIONAL ANALYSIS OF NEEDS AND CHALLENGES FOR BRATISLAVA REGION (IPP 2020)

8.2. Pilot Action

Pilot Action for the Development of Attractive Multimodal Logistics Locations is composed of three separate outputs (documents):

1. TECHNICAL FRAMEWORK FOR CROSS-BORDER ACCESSIBILITY ANALYSES IN THE CENTROPE AREA (IPP & KORDIS 2022c)
2. MAPPING OF CROSS-BORDER ACCESSIBILITY IN THE CENTROPE AREA UNTIL 2050 (IPP & KORDIS 2022a)
3. IDENTIFICATION OF ATTRACTIVE MULTIMODAL LOGISTICS LOCATIONS AND ELABORATION OF PROFILES FOR DEVELOPMENT IN THE REGION OF SOUTH MORAVIA AND SW SLOVAKIA (IPP & KORDIS 2022b)

8.3. Web Mapping Application

Documentation of individual variants of rail infrastructure development is stored in the geographical information system (GIS) of the Slovak part of the CORCAP project on the server of the Institute of Spatial Planning. Contains the Web mapping application (WMA) aimed at describing the properties of each IHUB locality. It is open to professional and general public at https://ipp-oz.sk/corcap.

The authors of the project consider the further operation and development of this web portal to be an important step for the implementation of the project results in practice. This is mainly because it is a long-term project, the realization of which will involve several sectors of the Slovak economy. This requires the creation of a coordination centre, of which an information concentrator is an important component. An important component of this information node is information of a geographical nature (so-called geodata or spatial data) necessary mainly for the area of territorial or spatial planning.

In accordance with the Building Act, the relevant spatial planning instrument is a territorial and technical basis, as a special instrument of so-called spatial planning documents. It is a tool whose function is continuous monitoring (monitoring) of all relevant factors influencing the quality of the settlement environment.

8.4. Tables

8.4.1. Indicative investment costs for railway infrastructure by variant

section	length in km	mil. EUR		
		Tangential (TAN) 2040	Radial (RAD) 2050	Tangential-Radial (TAN-RAD) 2070
Štúrovo - Nové Zámky	86	86	86	86
Nové Zámky - Palárikovo	15	15	15	15
Palárikovo - Galanta	50	50	50	50
Galanta - Bratislava-Vajnory	67	67	100	100
Komárno zr.st. - Nové Zámky	45	90	90	90
Komárom HU - Komárno	4	13	13	13
Levice - Úľany nad Žitavou	142	0	0	0
Šurany - Palárikovo	17	9	17	17
Lužianky - Nitra	13	0	13	13
Nitra - Šurany	39	0	39	39
Šurany - Nové Zámky	13	26	26	26
Lužianky - Leopoldov	37	73	73	73
Komárno - Dunajská Streda	74	221	221	221
Dunajská Streda - Bratislava-Nové Mesto	57	343	687	687
Nové Mesto n. V. - Leopoldov	97	193	386	386
Leopoldov - Trnava	25	101	101	101
Bratislava-Rača - Pezinok	23	68	338	338
Pezinok - Trnava	40	121	605	605
Bratislava hl.st - Devínska Nová Ves	13	153	242	242
Zohor - Kúty	72	287	287	287
Kúty - Lanžhot CZ	28	166	166	166
Devínska Nová Ves - Marchegg AT	7	87	87	87
Plavecký Mikuláš - Zohor	49	0	0	0
Zohor - Záhorská Ves	20	0	0	0
Bratislava východ - Bratislava ÚNS	7	28	71	42
Bratislava ÚNS – Bratislava-Petržalka	16	31	31	31
Bratislava-Petržalka - Rusovce	15	60	60	60
Rusovce - Rajka HU	26	26	77	77
Bratislava-Petržalka - Kittsee AT	33	33	99	66
Sereď - Galanta	19	19	115	115

section	length in km	mil. EUR		
		Tangential (TAN) 2040	Radial (RAD) 2050	Tangential-Radial (TAN-RAD) 2070
Leopoldov - Sereď	26	26	155	155
Sereď - Trnava	21	63	0	42
Trnava - Kúty	93	1,118	373	373
Broad gauge line (BGl)	373	5,223	5,223	5,156
Carpathian tunnel (Bratislava-Lamač - Bratislava-Vinohrady)	10	0	289	289
Nitra - Trnovec nad Váhom	29	633	173	633
Total Investment with BGL		9,429	10,308	10,681
Total Investment without BGL		4,206	5,085	5,525

8.4.2. SWOT analysis - variants comparison

	Variant 0	TAN 2040	RAD 2050	TAN-RAD 2070
Strengths				
• There is no need for investment funds to build new routes	x			
• Larger areas are protected from the impact of freight transport	x			
• Freight transport of all kinds (source, destination, and transit) is routed outside the Bratislava Railway Node (especially outside the section Devínska Nová Ves – hl.st BA – BA-Vinohrady)		x	x	x
• Increased protection of Bratislava environment from adverse effects of transport		x	x	x
• Rail transport (freight) will not limit the urban growth of the city		x		x
• The modernisation and increase in capacity of the railway line in the direction Kúty – Senica - Trnava in the direction of the NW-SE will achieve an increase in the flexibility of the railway network		x	x	x
• The construction of a railway tunnel in Bratislava Railway Node through the massif of the Little Carpathians will achieve high flexibility of rail transport in this area			x	x
• Creating conditions for HSL tracing through Bratislava Railway Node			x	x
• Line 120 (130) with its Nové Zámky station, in the case of realization of BGL, will gain special strategic importance for the whole region of SW Slovakia and northern Hungary, which will bring a strong economic impetus to this region		x	x	x
Weaknesses				
• Transport of cargo of all kinds (source, destination, and transit) is routed through Bratislava Railway Node (especially outside the section Devínska Nová Ves – hl.st BA – BA-Vinohrady)	x			
• Poor flexibility of the rail network, insufficient capacity of a strong rail route in the direction of NW-SE	x			
• The transport of cargo in the main direction NW-SE and north-south is very strongly limited in the area of Bratislava Railway Node	x			
• The need for new rail investments in the SW Slovakia region outside the metropolitan area around Bratislava		x		x
• The impact of freight transport will directly affect the new area over 100km		x		x

	Variant 0	TAN 2040	RAD 2050	TAN-RAD 2070
Opportunities				
• They are not	x			
• In its implementation, a number of less developed regions will be given more suitable conditions for their future subsequent economic development risks variant		x	x	x
• Enabling HSL routing with station located in Bratislava			x	x
Threats				
• Increased impact on Bratislava´s urban and natural environment from adverse effects of transport	x			
• Rail transport (freight) will hamper urban growth of the city	x			
• The impact on the environment of Bratislava will gradually deteriorate	x			
• Impossibility of solving full-fledged passenger rail transport in the metropolitan area around Bratislava	x			
• There will be economic losses due to the failure to transport people to work in Bratislava	x			
• Some environmental impact on Bratislava´s natural environment			x	
• Some environmental impact on Trnava Region´s natural environment		x		x

8.4.3. Intermodal hubs (HUB) and logistics centres

line	railway sections	related IHUBs	variant	start of IHUBs operation			related logistics centres
				2030	2050	2070	
126 (110)	Kúty - Bratislava		RAD, TAN-RAD	fully	fully	fully	
		Zohor		partly	fully	fully	Zohor, Lozorno
		Malacky		partly	fully	fully	Malacky, Lozorno
		Kúty		partly	partly	fully	
125 (120)	Bratislava - Trnava - Žilina		RAD, TAN-RAD	fully	fully	fully	
		Trnava		fully	fully	fully	Zavar (PSA factory)
		Leopoldov		partly	fully	fully	Leopoldov
		Piešťany		no	no	partly	
120 (130)	Bratislava - Galanta - Nové Zámky-Štúrovo		RAD, TAN-RAD	fully	fully	fully	
		Senec		partly	fully	fully	Senec/Viničné
		Galanta, Sládkovičovo		partly	fully	fully	Gáň,
		Trnovec n.V., Šaľa		partly	fully	fully	Šaľa (Duslo factory)
		Nové Zámky		partly	fully	fully	BGL Nové Zámky
		Štúrovo		partly	fully	fully	
128 (116)	Kúty – Trnava		TAN	partly	fully	fully	
		Kúty		no	partly	fully	
		Senica		partly	fully	fully	Senica
		Trnava		fully	fully	fully	Zavar (PSA factory)
128 (133)	Galanta – Sereď – Trnava		TAN	fully	fully	fully	
		Sereď		partly	fully	fully	Sereď
124 (131)	Bratislava - Dunajská Streda - Komárno		RAD, TAN-RAD	partly	fully	fully	
		Dunajská Streda		fully	fully	fully	Dunajská Streda

		Komárno		partly	fully	fully	Komárno
		Dunajská Lužná		partly	fully	fully	Dunajská Lužná
120 (135)	Komárno - Nové Zámky		TAN	fully	partly	fully	
		Nové Zámky		partly	fully	fully	BGL Nové Zámky
		Hurbanovo		no	partly	fully	Hurbanovo
		Komárno		partly	partly	fully	Komárno
new	Železničný tunel BA - Small Carpathians		RAD	no	fully	fully	
new	Galanta - Dunajská Streda - Győr (HU)		TAN, TAN-RAD	no	partly	fully	
		Galanta, Sládkovičovo		partly	fully	fully	Gáň
		Dunajská Streda		fully	fully	fully	Dunajská Streda
	BGL		TAN-RAD	no	fully	fully	
	HSL		RAD	no	partly	fully	

Notes: T - tangential variant; R - radial variant; TR - tangential-radial variant; partly - partial improvement of throughput, (partial doubling, particles. modifications at stations...); fully - substantial improvement, multiplication of rail transport capacity

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