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Danube Transnational Programme

DIONYSUS

Integrating Danube Region into Smart & Sustainable Multi-modal & Intermodal Transport Chains

D_T2.2.1: Status-quo & Mid-Term Perspective_Danube Ports Infrastructure]

Report

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1 Executive summary

Feasible and high performing hinterland connections are vital for enhancing port activities and connectivity with the mainland corridors and main production and/or consumption areas of interest.

In order to assess the rail, road and maritime connectivity of the DR ports, an analysis of the status-quo and mid-term perspective of road/rail/maritime infrastructure in Danube ports will be executed.

A 3-pillar connectivity assessment i.e.

(1) Rail connectivity

(2) Road connectivity and

(3) Maritime connectivity

will be carried out to assess ports connectivity to/from the main national and European transport corridors and main production and/or consumption areas, as follows:

(1) existing and status of the rail infrastructure connection and existing/possible services on the rail (specifications: categories of goods, frequency, transport time, quantity, type of train, time to the destinations, constraints and bottlenecks; and customers identification.

(2) existing and status of the road infrastructure connection and existing/ possible services by road (specifications: categories of goods, frequency, transport time, quantity, type of trucks, transport time to the destinations, constraints, and bottlenecks); and

(3) existing and status of the maritime infrastructure connections.

Next, an analysis of rail/road/maritime service level connectivity of Danube ports, based on the service level of the hinterland and maritime connections of the ports will be carried out.

Specific attention will be paid to transport time and costs, size of the shipment, permitted load on various segments of hinterland infrastructure connections.

2 Methodology

In order to assess the rail, road and maritime connectivity of the Danube Region ports, an analysis of the:
(i) **status-quo** and
(ii) **mid-term perspective**
of road/rail/maritime infrastructure in the Danube Region ports will be executed.
A **3-pillar connectivity assessment** approach:
(1) Rail connectivity
(2) Road connectivity and
(3) Maritime connectivity
will be carried out to assess Danube Region ports connectivity to/from:

- the main national and European transport corridors
- the main production and/or consumption areas

Contributing PPs are required to provide the following information:
(1) Rail connectivity assessment:
✓ Structure of the rail network, access to the port, number of lines in the port, distance from the port to the rail infrastructure (if the port is not connected by rail);
✓ Technical and interoperability characteristics of the existing rail infrastructure and bottlenecks;
✓ Existing loading and unloading equipment in the port for the transhipment from IWT to/from rail;
✓ Existing loading and unloading capacity for rail and type of goods;
✓ Freight security issues;
✓ Other useful and relevant information regarding the port's connectivity by rail
(2) Road connectivity assessment:
✓ Structure of the road network, access to the port, type of roads, number of lanes, capacity, road infrastructure administrator;
✓ Technical characteristics of the existing road infrastructure: maximum speed, maximum permitted load, quality of the road, bottlenecks (bridges, junctions, etc.);
✓ Existing loading and unloading equipment in the port for the transhipment from IWT to/from road;
✓ Existing loading and unloading capacity for road and for the type of goods;
✓ Parking capacity in the port for trucks and specific conditions and facilities for drivers;
✓ Freight security issues;
✓ Other useful and relevant information regarding the port's connectivity by road.
(3) Maritime connectivity assessment:
✓ Port capacity regarding size of the vessels and capacity of port operation for the main categories of goods;
✓ Existing loading and unloading equipment in the port for the transhipment from IWT to/from sea;
✓ Existing loading and unloading capacity for maritime vessels and for what categories of goods;
✓ Freight security issues;
✓ Other useful and relevant information regarding the port's connectivity by sea.

The 3-pillar connectivity assessment will be performed to the **Danube Region ports** selected previously in the D_T1.1.1: Report on the selected Core & Comprehensive Network Sections and Nodes of the transport corridors on the Danube Region, based on the consultation with the PPs involved in DIONYSUS Project, as follows:

- ✓ AT: Ennshafen and Vienna
- ✓ SK: Bratislava and Komarno
- ✓ HU: Budapest, Dunaújváros and Baja
- ✓ HR: Vukovar
- ✓ BG: Lom and Ruse
- ✓ RO: Constanta.
- ✓ UA: Reni and Izmail

The information required for the:

- 1st pillar of connectivity assessment, namely: Rail connectivity assessment and
- 2nd pillar of connectivity assessment, namely: Road connectivity assessment

are referring to the rail and road sections identified in the D_T1.1.2: Transport Infrastructure Status-quo, as follows:

Country	Ports	Rail sections	Road sections
AT	Enns Vienna	Linz-Wien Meidling	A1 Linz-Steinhäusl A4 Ostautobahn
SK	Bratislava Komarno	Bratislava – Kúty Bratislava – Leopoldov Bratislava - Petržalka Bratislava – Dunajská Streda - Komárno	Brodské – Čunovo Bratislava Žilina
HU	Budapest Dunaujvaros Baja	Dombóvár – Pusztaszabolcs Budapest Kelenföld – Budapest Ferencváros Budapest Ferencváros – Cegléd	Nagytétény – Némedisződ Budapest – Kecskemét Bátaszék – Budapest
HR	Vukovar	Vinkovci – Vukovar	Bregana – Zagreb – Slavonski Brod - Bajakovo
RO	Constanta	Constanta – Bucharest – Arad – Curtici Bucharest – Galati port Bucharest – Craiova – Drobeta Turnu Severin – Arad – Curtici Bucharest – Giurgiu port Craiova – Calafat port Bucharest – Paşcani – Siret	Constanta – Bucureşti – Oradea – Borş Bucharest – Galati Bucharest – Craiova – Drobeta Turnu Severin – Timişoara - Cenad Bucureşti – Giurgiu Craiova – Calafat Bucharest – Pascani – Siret
BG	Lom Ruse	Mezdra – Vidin Ruse – Gornya Oryahovitsa Ruse – Kaspichan	Vidin – Kulata Ruse – Makaza Ruse – Varna

Country	Ports	Rail sections	Road sections
UA	Reni Izmail	Odesa – Izmail Reni – Galati Reni – Etulia	Odesa – Izmail – Reni

Table 1: Transport infrastructure assets analysed in the report

The information required for the:

- 3rd pillar of connectivity assessment, namely: Maritime connectivity assessment

are referring only to the maritime and river-maritime Danube Region ports mentioned in the list above, as follows:

✓ RO: Constanta.
✓ UA: Reni and Izmail

3 Abbreviations

Abbreviation	*Explanation*
ŽSR	Železnice Slovenskej republiky / Railways of the Slovak Republic
ÚNS	Ústredná nákladná stanica / Centra Freight Station
SPaP, a. s	Slovenská plavba a prístavy, a.s – dominant port operator

4 Austria: Ports' Infrastructure Connectivity Assessment

4.1 Port of Enns

4.1.1 Status-quo Assessment

4.1.1.1 Rail Infrastructure Connectivity

Ennshafen port is located on river km 2112 in the mouth of river Enns to the Danube at the border between the federal states of Upper Austria and Lower Austria. With 352 ha Ennshafen port is the largest connected industrial area on the upper Danube, it is a combination of business park areas and port areas in close connection. The Ennshafen port offers optimal trimodal transportation logistics for export and connects the entire region with international transportation network. Roundabout 62 companies with together ca. 2600 employees represent the whole conglomerate at present. Ennshafen is one of two TEN-T-core ports (Rhine-Danube corridor waterway) in Austria.
It benefits from a central location in Austria and indeed Europe, with direct access to the Trans-European Transport Network. It guarantees ideal conditions thanks to an efficient infrastructure, roads, quays, and railway systems.
The following description does not refer to the railways which are physically connecting the port gate with the rest of the railway network as they are assessed in deliverable D.T2.2.1, but to the major and important railway sections of different corridors passing close enough to the ports analysed in previous section to have an impact to those ports.

Figure 6.1: Location of the ports of Enns and Vienna

Vienna						
	Railway					
	Option	*Section*	*Type*	*Corridor*	*Network*	*Status*
Enns	1	Linz Ebelsberg – Amstetten	High speed	Rhine - Danube	Core Network	Completed
		Amstetten – Sarling	High speed	Rhine - Danube	Core Network	To be upgraded
		Sarling - Gross Sierning	High speed	Rhine - Danube	Core Network	Completed
		Gross Sierning - St. Poelten	High speed	Rhine - Danube	Core Network	Completed
		St. Poelten - St. Poelten (east)	High speed	Rhine - Danube	Core Network	Completed
		St. Poelten (east) - Bahnhof Tullnerfeld	High speed	Rhine - Danube	Core Network	Completed
		Bahnhof Tullnerfeld - Wien Handersdorf	High speed	Rhine - Danube	Core Network	Completed
		Bahnhof Tullnerfeld - Wien Handersdorf (part 2)	High speed	Rhine - Danube	Core Network	Completed
		Wien Handersdorf (part 2) - Wien Meidling	High speed	Rhine - Danube	Core Network	Completed
		Wien Meidling - Wien Inzersdorf	Conventional	Baltic-Adriatic Rhine - Danube	Core Network	Completed
		Wien Inzersdorf – Kledering	Conventional	Rhine - Danube	Core Network	Completed
		Kledering - Wien Freudenau Hafen (part 2)	Conventional	Baltic-Adriatic	Core Network	Completed
		Kledering - Wien Freudenau Hafen (part 1)	Conventional	Baltic-Adriatic	Core Network	Completed

Table 6.1: Railway sections between Enns and Vienna

All sections belong to the core TEN-T network and have been completed, except one from Amstetten to Sarling which is to be upgraded. Railway corridor network belongs to the following two 2 TEN-T corridors: Baltic-Adriatic and Rhine-Danube.

Western Line

The fast and comfortable way to get from Vienna to Salzburg: The Western Line is one of the most important traffic arteries in Austria. The upgrade is delivering improvements for passengers and freight traffic.

Figure 6.2: Western line[1]

[1] Source: ÖBB

Railway section – Linz-Wien Meidling

Section	Parameter	Value	Unit	Reference in Regulation 1315/2013
Linz Ebelsberg - Amstetten	Length	56,68	km	n/a
	Electrification	100	% of km	§12 except for isolated networks
	Track gauge 1435mm	100	% of km	§13 as priority for RR infrastructure development
	Line speed >= 100km/h	100	% of km	§39 requirement for core network
	Axle load (>=22.5t)	100	% of km	
	Train length (740m)	100	% of km	

Table 6.2: Linz-Ebelsberg-Amstetten railway section parameters

Section	Parameter	Value	Unit	Reference in Regulation 1315/2013
Amstetten - Wien Meidling	Length	124	km	n/a
	Electrification	100	% of km	§12 except for isolated networks
	Track gauge 1435mm	100	% of km	§13 as priority for RR infrastructure development
	Line speed >= 100km/h	100	% of km	§39 requirement for core network
	Axle load (>=22.5t)	100	% of km	
	Train length (740m)	100	% of km	

Table 6.3: Amstetten – Wien Meidling railway section parameters

Connections of Ennshafen Port and loading/unloading equipment

Overview of basic port's features are given in the below table.

Parameters	Explanation / Value
Port land owner (State, Region, Municipality, Private, Other)	region + private

Parameters	Explanation / Value
Port authority name	Ennshafen OÖ GmbH + Ennshafen NÖ GmbH
Number of operators (concessionaires, lessors)	10
Total port area (ha)	352
Maximum draught (m) - natural or dredged	2,7
Total number of terminals	7
Heavy lift and out-of-gauge handling capacity (Yes/No)	yes
Ability to handle full block train along the quay (Yes/No)	yes
Ability to handle full block train in the port area (Yes/No)	yes
Transhipment equipment for intermodal transport (Yes/No)	yes
Total quay length (vertical + sloped) (m)	2780
Vertical quay length (m)	2780
Sloped quay length (m)	0
Undeveloped quay length (m)	1900
Max number of vessels handled at the same time	16
Max capacity of anchorage or waiting area for barges (number)	34
Storage capacity (m2)	n.a.
Storage capacity for liquid cargos (m3)	3000 (LPG) + 6000 (biodiesel+biooil)
Storage capacity (TEU)	8000
Storage capacity (CEU - car equivalent unit, for Ro-Ro terminals)	600
Bunkering facilities within the port area (Yes/No)	yes
Shore-side power supply for vessels (Yes/No)	yes
Road conneection (Yes/No)	yes
Rail connection (Yes/No)	yes
Number of quay cranes of lifting capacity Q < 10 tons	6

Parameters	Explanation / Value
Number of quay cranes of lifting capacity 10 < Q < 16 tons	3
Number of quay cranes of lifting capacity 16 < Q < 50 tons	8
Number of quay cranes of lifting capacity Q > 50 tons	0
Total number of quay cranes	17

Table 6.4: Basic features of Ennshafen Port

Ennshafen OÖ GmbH – a company owned by the federal district of Upper Austria - is the owner of the port and do all the administration of the port; Ennshafen port has the PPP-principle as a core part of his strategy, therefore it only builds the basic infrastructure, the suprastructure is invested by private companies, who have got special contracts with EHOÖ (license contracts, shipment contracts…); as well the core parts of the port (quays) are part of a greater mixed area, were a lot of other private companies are owners of ground, buildings and facilities.
In Lower Austria the port company Ennshafen NÖ GmbH is owned by the federal district and has got a quite similar structure like in Upper Austria.

Hinterland connections

The whole port area has six road entrances, each with double lines. There are also two main rail entrances accessing the port area from two different sides. Within the port area, there is a system of internal rail network with about 30 km total length.
The Ennshafen Port is the main trimodal transport hub for the west to east and east to west arriving international cargo in the Rhine-Main-Danube waterway region and south to north and north to south arriving international cargo in the North Sea-Adriatic region by the railways. With its 6 road entrances, there is possibility of direct accesses to motorways and main roads that can boost international logistics operations and local businesses.
The Ennshafen Port has the access to the most important seaports through the river Danube. It is connected with the A1 west expressway (Wien-St. Pölten-Linz-Salzburg), A9 (Graz-Wels-Passau), B1 federal highway (Wien-Amstetten-Linz-Salzburg) and B309 (Enns-Steyr) federal highway, what allows outstanding access to the international road network. The railway connections are directly derived from one of the most important Austrian lines – the West Railway (both normal line and high-speed line).

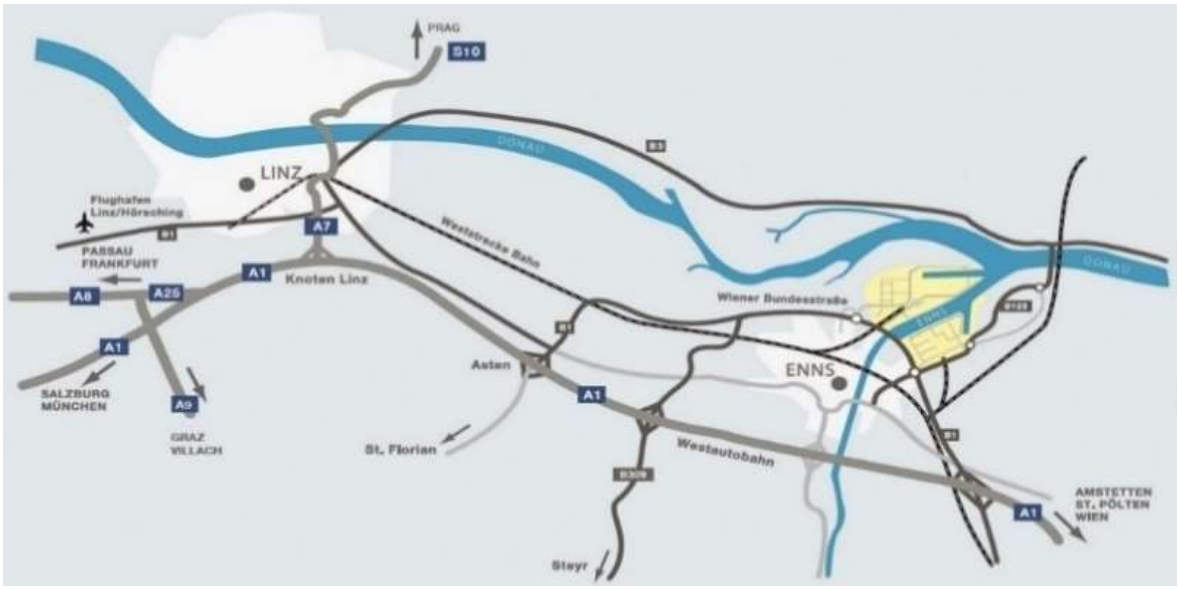

Figure 6.3: Trimodal infrastructure Ennshafen port

- Direct connection to the highway (A1 west expressway)
- Direct railway connection (west railway)
- Strategically favorable position on the Rhine-Main-Danube-waterway
- TEN-T Core Node
- Trimodal cargo handling
- Access to the neutral infrastructure

Port infrastructure

Port Area: total 352 ha; 110 ha are owned by the port authorities (Ennshafen OÖ GmbH und Ennshafen NÖ GmbH) and 242 ha are owned by other private companies; actual in total about 50 ha are not covered with assets or other investments

- 2 basins (basin west-upper Austria, basin east-lower Austria) and several quays along the river side Enns
- Port service time 7/24 – 168h/w
- Cargo handling: over 1 mil t/a
- Container terminal: about 400.000 TEU/a with 4 gantry cranes (trimodal)
- Waterside terminals: 7 for block trains
- Heavy lift and out of gauge handling capacity is possible
- Total length of vertical quays 2780 m
- Max. number of vessels processed at the same time: 16
- Max. number of barges can be processed in waiting areas / undeveloped quays: 34
- Mooring area: 42.000 m^2
- 6 road entrances, with double lines and two main rail entrances access
- 17 km rail tracks (rail network within the port area), many different users and owners
- Storage area with different dedication is available
- Special storage capacity for liquid cargo: 3000 m^2 for LPG, 6000 m^3 for biodiesel and bio-oils, 600 units for cars (equivalent) near the RO-RO ramp
- Bunkering station vessel/barge
- Tank stop for trucks for LNG
- Shore side power supply and waste reception

- Maximum draught: the figure of 2,7 m everywhere in the port has to be fulfilled; there are a lot of spaces with more depth

Quay number	Length	Electricity and water supply	Operator	Details
11-12	370 m	yes	Danubia Speicherei, Fixkraft	Cargo handling and stuffing, Agricultural trade, foodstuff
13	Charging platform	no	Fixkraft	Charging platform
14	230 m	yes	Donausäge Rumplmayr	Saw mill, woodworking
1	200 m	yes	Fuchshuber Agrarhandel	Agricultural trade
4	275 m	yes	Neumüller	Iron and steel trade
16		no	Primagaz	LPG
18-19	630 m	no	Container Terminal Enns	Container
20	192 m	yes	Rauch Recycling	Recovered paper trade, transhipment, stuffing
21	360 m	yes	Available for rent	
6-7	300 m	yes	For public use	
-	-	-	Bunkerstation	Bunker service
-	-	-	Lithos	Processing and trade of industrial minerals
-	-	no	RoRo Terminal	vehicles and agricultural machines can drive straight on and off vessels, with no need for additional facilities

Table 6.5: Overview quay numbers of Ennshafen Port

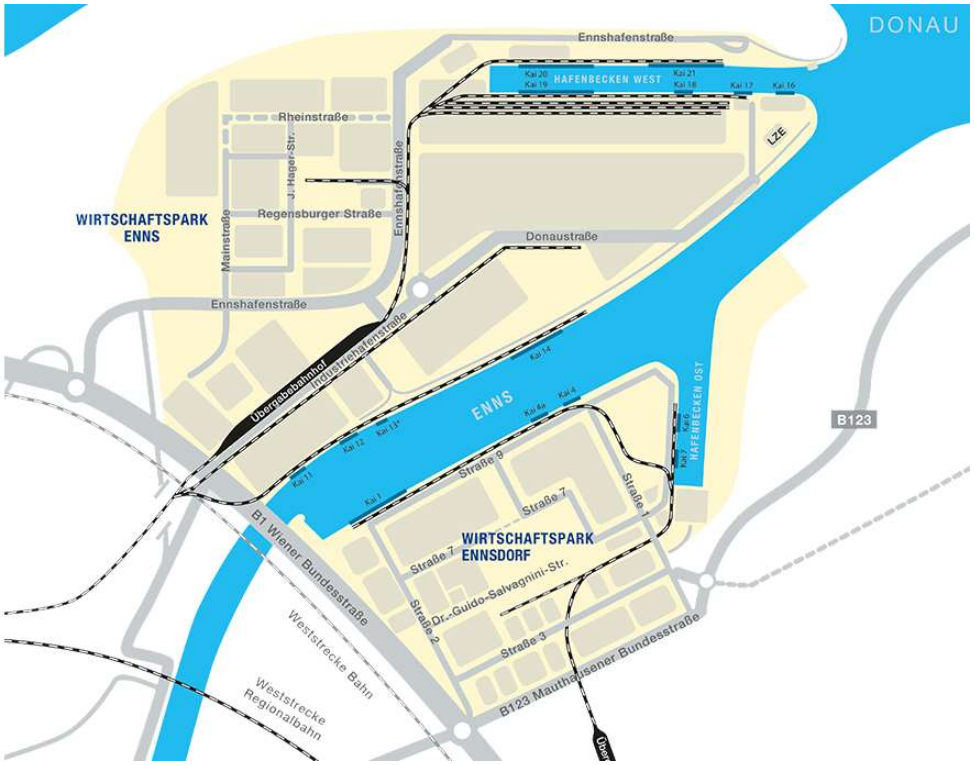

Figure 6.4: Quay/basin layout in Ennshafen port

4.1.1.2 Road Infrastructure Connectivity

This following description does not refer to the roads which are physically connecting the port gate with the rest of the road network as they are assessed in deliverable D.T2.2.1, but to the major and important road sections of different corridors passing close enough to the ports analyzed in previous section to have an impact to those ports.

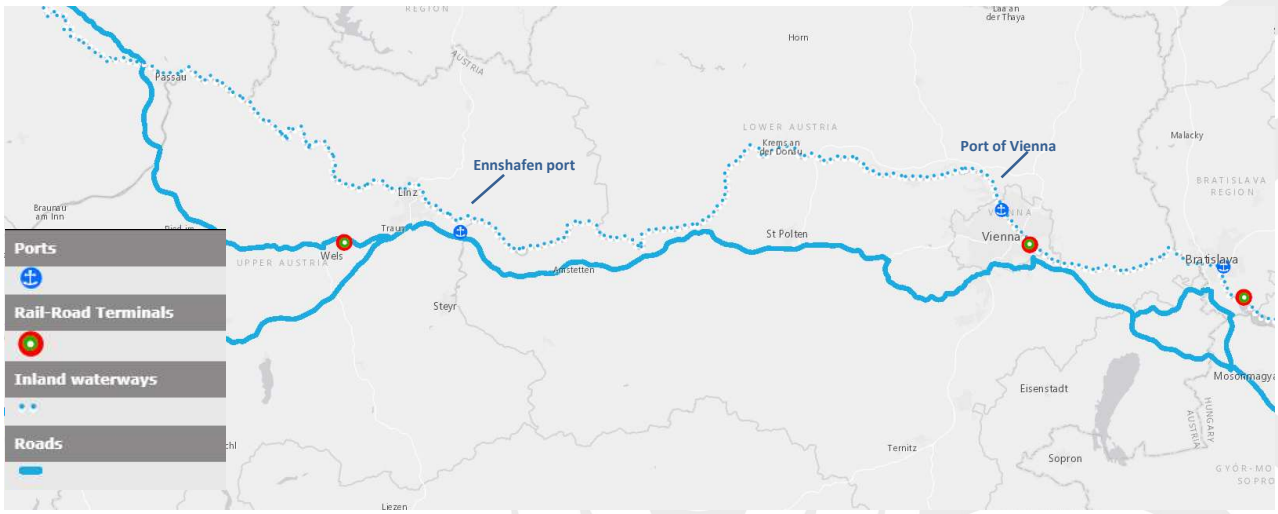

Figure 6.5: Birds view of roads relevant for IWT in Austria

Since the A1 is the most important west-east connection in the Austrian road network, Asfinag has continuously expanded sections to six lanes. The goal was a six-lane expansion between the Steinhäusl node and the Voralpenkreuz node. With the completion of the renovation and widening of the section from Matzleinsdorf (km 85.9) to Pöchlarn (km 91.0), this project was completed at the end of April 2018. The Westautobahn (A1) connects the federal capital Vienna with Salzburg, where it meets the A8 from Germany at Walserberg. It is one of the most important motorways in Austria and provides the west-east connection.

Road section Motorway A1 Linz – Steinhäusl

Ennshafen Port is connected to the most important west east Motorway A1 in Austrians road network.

Category / Section	Parameter	Value	Unit
Motorway A1 /Linz - Steinhäusl	Length	138,014	km
	Number of lanes (total, in both directions)	6	lanes
	Maximum speed allowed	130	km/h
	Axle load for trucks allowed	40.	t/axle

Table 6.6: Motorway A1 Linz-Steinhäusl road section parameters

All other items regarding "road connections of Port of Vienna as well as loading/unloading equipment and infrastructure characteristics" are described in above chapter 6.1.1.1.

4.1.2 Mid-Term Perspective Assessment

4.1.2.1 Rail Infrastructure Connectivity

The infrastructure and their surroundings of the two investigated ports in Austria are well developed now. Nevertheless, an interesting list of planned projects are in the pipeline to further improve the status-quo. Most of these projects deal with investments regarding future demands regarding alternative fuelling of cargo business, fulfilment of Green Deal approaches by modernisation of infrastructure and optimization of existing status both for railway and waterway transport. This project list is not finished, some projects are in detailed investigation now and will be developed or changed to upcoming new demands of decarbonizing and market developments. For both ports Ennshafen and Port of Vienna so far are no real gaps known, which are not covered by the project lists „on-going" or „planned" (DIONYSUS D.T1.1.3). May by that there will come out some interesting topics during elaboration of the Port Development Plan (work package within DIONYSUS) in next year 2022 or during the next years when dealing with items like CO2-neutrality or other energy related aspects of new developments regarding greening of transport (EU-targets for 2030 / 2040 / 2050).

So far no real additional „gaps" are known for both port sides Enns and Vienna. One topic which has been described in project DAPhNE is „the connection of the Danube region in or near Austria" with the developments of BRI (belt and road initiative / broad gauge railway ....) – some discussions are under development. May by that there will come out some interesting topics during elaboration of the Port Development Plan (work package within DIONYSUS) in next year 2022 or during the next years when dealing with items like CO2-neutrality or other energy related aspects of new developments regarding greening of transport (EU-targets for 2030 / 2040 / 2050).

4.1.2.2 Road Infrastructure Connectivity

The infrastructure and their surroundings of the two investigated ports in Austria are well developed now. Nevertheless, an interesting list of planned projects are in the pipeline to further improve the status-quo. Most of these projects deal with investments regarding future demands regarding alternative fuelling of cargo business, fulfilment of Green Deal approaches by modernisation of infrastructure and optimization of existing status both for railway and waterway transport. This project list is not finished, some projects are in detailed investigation now and will be developed or changed to upcoming new demands of decarbonizing and market developments. For both ports Ennshafen and Port of Vienna so far are no real gaps known, which are not covered by the project lists „on-going" or „planned" (DIONYSUS D.T1.1.3). May by that there will come out some interesting topics during elaboration of the Port Development Plan (work package within DIONYSUS) in next year 2022 or during the next years when dealing with items like CO2-neutrality or other energy related aspects of new developments regarding greening of transport (EU-targets for 2030 / 2040 / 2050).
So far no real additional „gaps" are known for both port sides Enns and Vienna. One topic which has been described in project DAPhNE is „the connection of the Danube region in or near Austria" with the developments of BRI (belt and road initiative / broad gauge railway ….) – some discussions are under development. May by that there will come out some interesting topics during elaboration of the Port Development Plan (work package within DIONYSUS) in next year 2022 or during the next years when dealing with items like CO2-neutrality or other energy related aspects of new developments regarding greening of transport (EU-targets for 2030 / 2040 / 2050).

4.2 Port of Vienna

4.2.1 Status-quo Assessment

4.2.1.1 Rail Infrastructure Connectivity

The Port of Vienna functions as a trimodal hub covering rail, road and river links. This hub is located at the western bank of the Danube River.
The Port of Vienna has freight rail tracks in use and provides transportation connections to Austrian railway network and therefore to other freight centers. Port location is accessed by rail through connection to shunting stations Donaukaibahnhof (3 km, through Donauuferbahn) and Kledering (8km, through Winterhafenbrücke) and the main Austrian railway network, all providing 3 railway accesses to the port with minimum three railway tracks.
Port of Vienna is already the largest port on the Danube in Eastern Austria and its diverse logistical capabilities and capacities continue to be enlarged. Although it is 2.000 km from the Black Sea and 1.500 km from the North Sea, it has the great advantage of being the largest trimodal logistics centre in Austria, bringing together road, rail and water transportation and making it the ideal place for the transportation of goods and for container storage, trade and management.
Port of Vienna is located on river km 1920 of the Danube, covering both left and right bank. Port has three different basins on three nearby locations: Freudenau, Albern and Lobau. In addition, Port of Vienna has a passenger terminal.
The following description does not refer to the railways which are physically connecting the port gate with the rest of the railway network as they are assessed in deliverable D.T2.2.1, but to the major and important railway sections of different corridors passing close enough to the ports analysed in previous section to have an impact to those ports.

Figure 6.6: Location of the ports of Enns and Vienna

TEN-T Connection with Port of Vienna, as the next Core Node downstream port, is achieved directly over inland waterways corridors, railways corridors and road corridors. One railway corridor connects Ennshafen Port and Port of Vienna with 13 sections (table below).

Vienna						
	Railway					
	Option	*Section*	*Type*	*Corridor*	*Network*	*Status*
Enns	1	Linz Ebelsberg – Amstetten	High speed	Rhine - Danube	Core Network	Completed
		Amstetten – Sarling	High speed	Rhine - Danube	Core Network	To be upgraded
		Sarling - Gross Sierning	High speed	Rhine - Danube	Core Network	Completed
		Gross Sierning - St. Poelten	High speed	Rhine - Danube	Core Network	Completed
		St. Poelten - St. Poelten (east)	High speed	Rhine - Danube	Core Network	Completed
		St. Poelten (east) - Bahnhof Tullnerfeld	High speed	Rhine - Danube	Core Network	Completed
		Bahnhof Tullnerfeld - Wien Handersdorf	High speed	Rhine - Danube	Core Network	Completed
		Bahnhof Tullnerfeld - Wien Handersdorf (part 2)	High speed	Rhine - Danube	Core Network	Completed
		Wien Handersdorf (part 2) - Wien Meidling	High speed	Rhine - Danube	Core Network	Completed
		Wien Meidling - Wien Inzersdorf	Conventional	Baltic-Adriatic Rhine - Danube	Core Network	Completed
		Wien Inzersdorf – Kledering	Conventional	Rhine - Danube	Core Network	Completed
		Kledering - Wien Freudenau Hafen (part 2)	Conventional	Baltic-Adriatic	Core Network	Completed
		Kledering - Wien Freudenau Hafen (part 1)	Conventional	Baltic-Adriatic	Core Network	Completed

Table 6.7: Railway sections between Enns and Vienna

All sections belong to the core TEN-T network and have been completed, except one from Amstetten to Sarling which is to be upgraded. Railway corridor network belongs to the following two 2 TEN-T corridors: Baltic-Adriatic and Rhine-Danube.

Western Line

The fast and comfortable way to get from Vienna to Salzburg: The Western Line is one of the most important traffic arteries in Austria. The upgrade is delivering improvements for passengers and freight traffic.

Figure 6.7: Western line[2]

Railway section – Linz-Wien Meidling

Section	Parameter	Value	Unit	Reference in Regulation 1315/2013
Linz Ebelsberg - Amstetten	Length	56,68	km	n/a
	Electrification	100	% of km	§12 except for isolated networks
	Track gauge 1435mm	100	% of km	§13 as priority for RR infrastructure development
	Line speed >= 100km/h	100	% of km	§39 requirement for core network
	Axle load (>=22.5t)	100	% of km	
	Train length (740m)	100	% of km	

Table 6.8: Linz-Ebelsberg-Amstetten railway section parameters

Section	Parameter	Value	Unit	Reference in Regulation 1315/2013
Amstetten - Wien Meidling	Length	124	km	n/a

[2] Source: ÖBB

Section	Parameter	Value	Unit	Reference in Regulation 1315/2013
	Electrification	100	% of km	§12 except for isolated networks
	Track gauge 1435mm	100	% of km	§13 as priority for RR infrastructure development
	Line speed >= 100km/h	100	% of km	§39 requirement for core network
	Axle load (>=22.5t)	100	% of km	
	Train length (740m)	100	% of km	

Table 6.9: Amstetten – Wien Meidling railway section parameters

Connections of Port of Vienna and loading/unloading equipment

Overview of basic port's features are given in the below table.

Parameters	Explanation / Value
Port land owner (State, Region, Municipality, Private, Other)	City of Vienna – Wien Holding – Hafen Wien GmbH
Port authority name	Hafen Wien GmbH
Number of operators (concessionaires, lessors)	3 (Hafen Wien, Wiencont, Tsped)
Total port area (ha)	350 ha
Maximum draught (m) - natural or dredged	2,7 m
Total number of terminals	3
Heavy lift and out-of-gauge handling capacity (Yes/No)	Yes
Ability to handle full block train along the quay (Yes/No)	Yes
Ability to handle full block train in the port area (Yes/No)	Yes
Transhipment equipment for intermodal transport (Yes/No)	Yes
Total quay length (vertical + sloped) (m)	18 km of quays and river banks, but 5 km of quay walls are operational (used for transport operations)
Vertical quay length (m)	Vertical quays are with a total length of 10.500 metre

Parameters	Explanation / Value
Sloped quay length (m)	Sloped quays with a total length of 7.600 metres
Undeveloped quay length (m)	n/a
Max number of vessels handled at the same time	Depends ont he business case, approx. 11
Max capacity of anchorage or waiting area for barges (number)	71
Storage capacity (m2)	n/a
Storage capacity for liquid cargos (m3)	0
Storage capacity (TEU)	7000
Storage capacity (CEU - car equivalent unit, for Ro-Ro terminals)	7000
Bunkering facilities within the port area (Yes/No)	Yes
Shore-side power supply for vessels (Yes/No)	Yes
Road conneection (Yes/No)	Yes
Rail connection (Yes/No)	Yes
Number of quay cranes of lifting capacity Q < 10 tons	n/a
Number of quay cranes of lifting capacity 10 < Q < 16 tons	n/a
Number of quay cranes of lifting capacity 16 < Q < 50 tons	n/a
Number of quay cranes of lifting capacity Q > 50 tons	n/a
Total number of quay cranes	n/a

Table 6.10: Basic features of the Port of Vienna

Hafen Wien GmbH is a member of Wien Holding, the Vienna Economic Chamber (Wirtschaftskammer Wien) has a 5 percent share in the company. Hafen Wien GmbH is the owner of the port facilities comprising real estate, buildings and wharf equipment and operates the harbours in Freudenau, Albern and Lobau. Hafen Wien is a multifunctional service company offering decades of experience and also the latest technologies. Thanks to its optimum rail, road and water links and the proximity to Vienna International Airport in Schwechat, it provides an important and practical interface for international trade and transportation.
Hafen Wien operates the largest free port in Austria. There are modern warehouses and well trained and equipped staff for the storage and handling of customs and domestic goods as well as a customs office for rapid clearance. The site is guarded round the clock and feeder roads are exempt from the night driving ban in Vienna. The three harbours on the Danube in Vienna are notable for their modern handling facilities, excellent infrastructure and dependable, well trained workers, ensuring

the reliable and rapid handling of all goods, be they building materials, containers, general cargo or bulk goods.

Hinterland connections

The Port of Vienna functions as a trimodal hub covering rail, road and river links. This hub is located at the western bank of the Danube River. Connection via road between Port of Vienna and other freight terminals includes B14 Freudenauer Hafenstraße along the port, A4 Ost Autobahn (East Highway connection), S1 Wiener Außenring Schnellstraße; East and South and 3 km of A23 Südosttangente; North and West. Total number of road entrances to port is four (including a passenger terminal), with eight road lanes in total.

The Port of Vienna has freight rail tracks in use and provides transportation connections to Austrian railway network and therefore to other freight centers. Port location is accessed by rail through connection to shunting stations Donaukaibahnhof (3 km, through Donauuferbahn) and Kledering (8km, through Winterhafenbrücke) and the main Austrian railway network, all providing 3 railway accesses to the port with minimum three railway tracks.

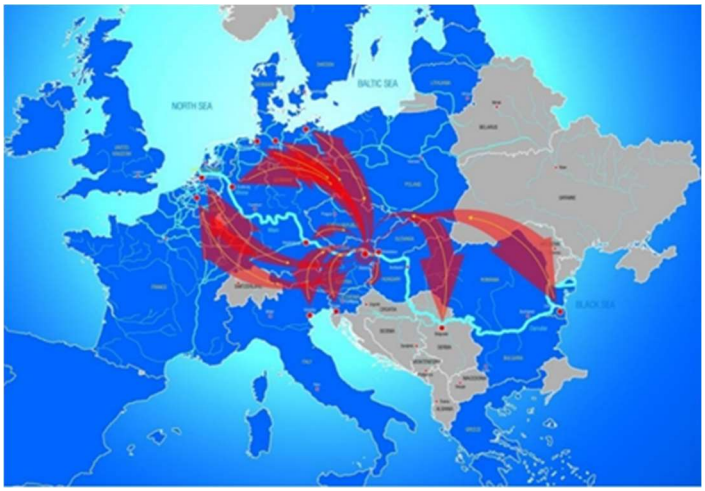

Figure 6.8: Connections of the Port of Vienna with the rest of Europe

Hinterland of the port of Vienna is mostly related to the so called Vienna Region - including the three federal states Vienna, Lower Austria and Burgenland.

Figure 6.9: Vienna Region *(Source: www.viennaregion.at)*

The central geographical location, its focus on advanced technologies and its top-ranked quality of life are three of the factors which catapult the Vienna Region into its ranking as Central Europe's

leading economic region and as one of the EU's foremost economic areas. 45 percent of Austria's gross domestic product is generated in the Vienna Region.

Port infrastructure

The port area covers roughly 350 hectares of port land, in three cargo locations, accompanied by the area belonging to the passenger terminal and a marina for leisure and sport vessels.
Information on any port land available for the development of port-related activities was not available at the time of writing of this report. Nevertheless, based on the development projects that include the land reclamation from the waterfront areas within the port, it can be concluded that the port has no available space for development as it has to reclaim the space from the areas currently occupied by water surface of the port basins.
As mentioned earlier, the port has 3 port basins, providing for the maximum draft of 2,7 meters. Cargo handling capacity was not available at the time of writing this report, except in TEU/year, which reached 450.000 TEU/year.

Location Freudenau (rkm 1920.1)

Freudenau port is the centre of the cargo handling facilities on the Danube in Vienna.

Figure 6.10: Port of Vienna – location Freudenau *(Source: www.hafen-wien.com)*

It contains the handling amenities for bulk goods and raw materials, the container terminal, a car terminal, warehouses and depots, distribution centres for brand articles, the largest free port in Austria with a customs office and its own police station and the offices of Hafen Wien. It is also a haven and winter harbour. Following facilities are located in Freudenau:

- Management and general administrative headquarters
- Free port / customs office
- Warehouse and brand article distribution centre
- Car terminal
- Cargo handling terminal
- Container terminal

- Police station
- Haven and winter harbour

Location Albern (rkm 1918.3)

Albern port handles building materials, agricultural and steel products. There are five large grain silos on the site with a capacity of 90,000 tons, making Albern the most important grain handling location in Eastern Austria. Following facilities exist in the Albern harbour:

- Building materials terminal
- Grain handling and storage
- Heavy goods handling
- Automatic weighbridge

Figure 6.11: Port of Vienna – location Albern *(Source: www.hafen-wien.com)*

Location Lobau (rkm 1916.4)

On this location, the storage and handling of mineral oil production is provided. Every year around 1,000 tankers dock in the seven berths in the oil terminal and around one million tons of mineral oil products are handled there. The oil terminal is connected by pipelines to the central Lobau fuel depot and the oil refinery in Schwechat.

There is also a rail freight station connecting to the railway network. The terminal stations have online measuring systems and automatic loading systems. The pump and loading stations are on floating pontoons.

Figure 6.12: Port of Vienna – location Lobau *(Source: www.hafen-wien.com)*

4.2.1.2 Road Infrastructure Connectivity

The Port of Vienna functions as a trimodal hub covering rail, road and river links. This hub is located at the western bank of the Danube River.
Connection via road between Port of Vienna and other freight terminals includes B14 Freudenauer Hafenstraße along the port, A4 Ost Autobahn (East Highway connection), S1 Wiener Außenring Schnellstraße; East and South and 3 km of A23 Südosttangente; North and West. Total number of road entrances to port is four (including a passenger terminal), with eight road lanes in total.
The following description does not refer to the roads which are physically connecting the port gate with the rest of the road network as they are assessed in deliverable D.T2.2.1, but to the major and important road sections of different corridors passing close enough to the ports analyzed in previous section to have an impact to those ports.

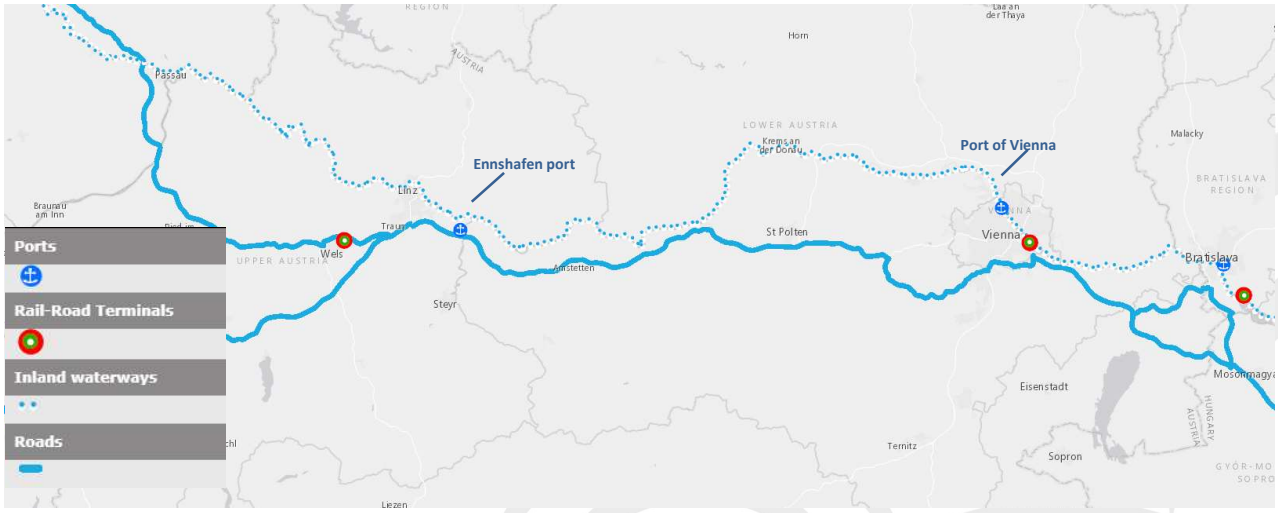

Figure 6.13: Birdsview of roads relevant for IWT in Austria

Since the A1 is the most important west-east connection in the Austrian road network, Asfinag has continuously expanded sections to six lanes. The goal was a six-lane expansion between the Steinhäusl node and the Voralpenkreuz node. With the completion of the renovation and widening of the section from Matzleinsdorf (km 85.9) to Pöchlarn (km 91.0), this project was completed at the end of April 2018. The Westautobahn (A1) connects the federal capital Vienna with Salzburg, where

it meets the A8 from Germany at Walserberg. It is one of the most important motorways in Austria and provides the west-east connection.

Road section Motorway A1 Linz – Steinhäusl

Ennshafen Port is connected to the most important west east Motorway A1 in Austrians road network.

Category / Section	Parameter	Value	Unit
Motorway A1 /Linz - Steinhäusl	Length	138,014	km
	Number of lanes (total, in both directions)	6	lanes
	Maximum speed allowed	130	km/h
	Axle load for trucks allowed	40.	t/axle

Table 6.11: Motorway A1 Linz-Steinhäusl road section parameters

Road section Motorway A4 Ostautobahn

Beside the described A4 Ostautobahn, there are also A3 Südostautobahn and A2 Südautoabahn that are in the greater area of Vienna but in larger distance to the Port of Vienna and are not core parts of the Corridor.

Category / Section	Parameter	Value	Unit
A4 Ostautobahn	Length	66	km
	Number of lanes (total, in both directions)	4	lanes
	Maximum speed allowed	130	km/h
	Axle load for trucks allowed	n.a.	t/axle

Table 6.12: Motorway A4 Ostautobahn road section parameters

Connection via road between Port of Vienna and other freight terminals includes B14 Freudenauer Hafenstraße along the port, A4 Ost Autobahn (East Highway connection), S1 Wiener Außenring Schnellstraße; East and South and 3 km of A23 Südosttangente; North and West. Total number of road entrances to port is four (including a passenger terminal), with eight road lanes in total.
The Port of Vienna has freight rail tracks in use and provides transportation connections to Austrian railway network and therefore to other freight centers. Port location is accessed by rail through connection to shunting stations Donaukaibahnhof (3 km, through Donauuferbahn) and Kledering (8km, through Winterhafenbrücke) and the main Austrian railway network, all providing 3 railway accesses to the port with minimum three railway tracks.
All other items regarding “road connections of Port of Vienna as well as loading/unloading equipment and infrastructure characteristics” are described in above chapter 6.2.1.1.

4.2.2 Mid-Term Perspective Assessment

4.2.2.1 Rail Infrastructure Connectivity

The infrastructure and their surroundings of the two investigated ports in Austria are well developed now. Nevertheless, an interesting list of planned projects are in the pipeline to further improve the status-quo. Most of these projects deal with investments regarding future demands regarding alternative fuelling of cargobusiness, fulfilment of Green Deal approaches by modernisation of infrastructure and optimization of existing status both for railway and waterway transport. This project list is not finished, some projects are in detailed investigation now and will be developed or changed to upcoming new demands of decarbonizing and market developments. For both ports Ennshafen and Port of Vienna so far are no real gaps known, which are not covered by the project lists „on-going“ or „planned“ (DIONYSUS D.T1.1.3). May by that there will come out some interesting topics during elaboration of the Port Development Plan (work package within DIONYSUS) in next year 2022 or during the next years when dealing with items like CO2-neutrality or other energy related aspects of new developments regarding greening of transport (EU-targets for 2030 / 2040 / 2050).
So far no real additional „gaps“ are known for both port sides Enns and Vienna. One topic which has been described in project DAPhNE is „the connection of the Danube region in or near Austria“ with the developments of BRI (belt and road initiative / broad gauge railway ….) – some discussions are under development. May by that there will come out some interesting topics during elaboration of the Port Development Plan (work package within DIONYSUS) in next year 2022 or during the next years when dealing with items like CO2-neutrality or other energy related aspects of new developments regarding greening of transport (EU-targets for 2030 / 2040 / 2050).

4.2.2.2 Road Infrastructure Connectivity

The infrastructure and their surroundings of the two investigated ports in Austria are well developed now. Nevertheless, an interesting list of planned projects are in the pipeline to further improve the status-quo. Most of these projects deal with investments regarding future demands regarding alternative fuelling of cargo business, fulfilment of Green Deal approaches by modernisation of infrastructure and optimization of existing status both for railway and waterway transport. This project list is not finished, some projects are in detailed investigation now and will be developed or changed to upcoming new demands of decarbonizing and market developments. For both ports Ennshafen and Port of Vienna so far are no real gaps known, which are not covered by the project lists „on-going“ or „planned“ (DIONYSUS D.T1.1.3). May by that there will come out some interesting topics during elaboration of the Port Development Plan (work package within DIONYSUS) in next year 2022 or during the next years when dealing with items like CO2-neutrality or other energy related aspects of new developments regarding greening of transport (EU-targets for 2030 / 2040 / 2050).
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5 Slovakia: Ports' Infrastructure Connectivity Assessment

5.1 Port of Bratislava

5.1.1 Status-quo Assessment

5.1.1.1 Rail Infrastructure Connectivity

Railway track, which is located in the port, is owned by dominant port operator, not the port authority. It is connected to ŽSR railway at railway station Bratislava ÚNS (Central Freight Station). ŽSR / Železnice Slovenskej republiky (Railways of the Slovak Republic) is state-owned railway infrastructure company of Slovakia. The construction length of all siding tracks is 28 828,6 meters, including 69 turnouts. The siding is predominantly electrified, with the siding and track no. 101, 102, 103, 104 and 105 are under the traction line. The total length of traction line is 5 500 m, the other part of siding is not electrified.

The railway infrastructure of the Port can be divided into the following integral parts:

- connecting rail between the Port area and Bratislava ÚNS (Central Freight Station)
- a track group 100, which represents an entry / exit group to / from the port,
- railroad groups in Winter port: the main flow of the Danube, the North and South basin,
- railroad groups in the Winter port.

Port infrastructure coverage of the port is good, but in many segments, it is required to modernize it. The connection to the public railway transport network as well as the connection to roads outside the Port Bratislava is shown in the following figure:

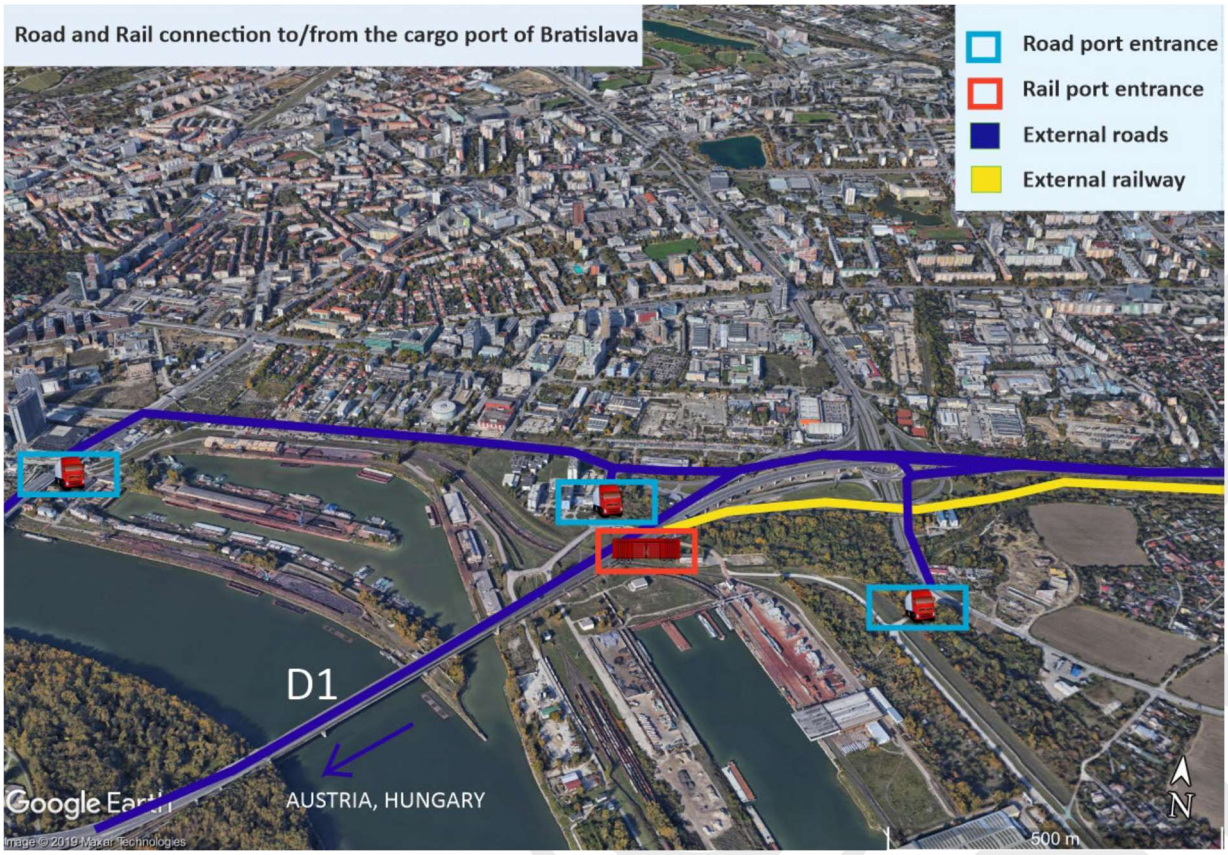

Figure 7.1: Connection of Bratislava Port to the Public Transport Network

The capacity of adjacent road and railway infrastructure of the cargo port is to trans-ship 8-10 million tonnes per year. The majority of transport operations are realized by railway transport (the 2nd biggest railway siding in the Slovak Republic) and less by road transport.
The current trans-shipment capacity is 2 million tonnes per year, and thus the transport capacity is approximately 20-25%.
The strategic objective is to increase trans-shipment port operations, concentrated in the basin Pálenisko However, it should not exceed 50% of the utilisation of installed transport capacity during the monitoring period. In accordance with the European Union requirements, the use of railway and water transport will be preferred.

Zimný prístav	Quay 1	Quay 2	Quay 3	Quay 4	Total per port
Road access [%]	91,67%	100,00%	69,23%	100,00%	90,22%
Railway access [%]	100,00%	28,57%	23,08%	100,00%	62,91%
Number of railtracks	2	2	3	3	-
Train length [m]	750	750	750	750	-
Load per axis [t]	20	20	20	20	-
Number of roads	1	1	1	1	-
Open storage size [sqm]	10 760	4 800	5 200	12 960	33720
Sheltered storage size [sqm]		400	7 250	10 540	18190
Silos size [cbm]	0	0	0	0	0

Table7.1: Availability of Infrastructure in Winter port

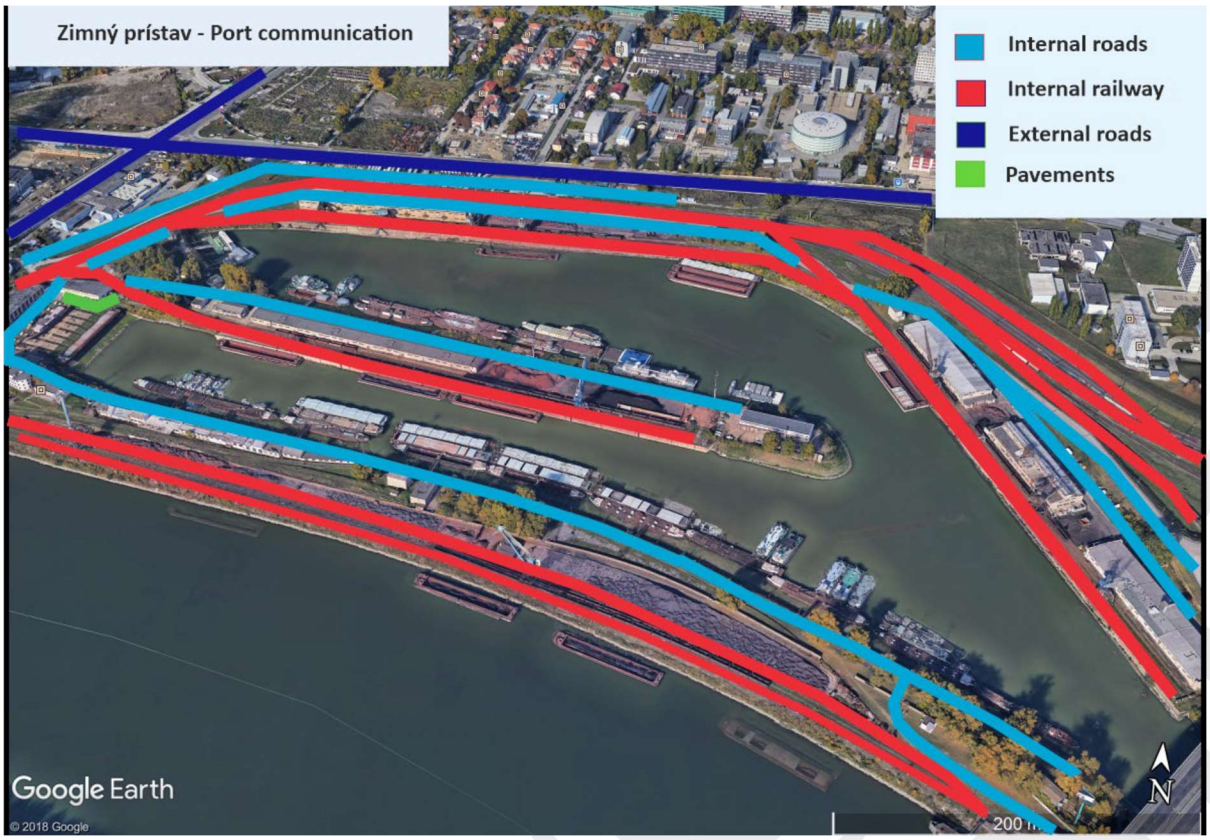

Figure7.2: Availability of Infrastructure in Winter port

Pálenisko basin	Quay 6	Quay 7	Quay 8	Quay 9	Total per basin
Road access [%]	100,00%	87,50%	100,00%	100,00%	96,88%
Railway access [%]	44,44%	87,50%	66,67%	0,00%	49,65%
Number of railtracks	3	3	1	0	-
Train length [m]	750	750	750	0	-
Load per axis [t]	20	20	20	0	-
Number of roads	1	1	1	1	-
Open storage size [sqm]	19 800	0	5 700	0	25500
Sheltered storage size [sqm]	0	26 000	0	0	26000
Silos size [cbm]	0	0	0	0	0

Table7.2: Availability of Infrastructure in Pálenisko basin

Figure7.3: Availability of Infrastructure in Pálenisko basin

Quay No.	Open Storage Size [sqm]	Sheltered Storage Size [sqm]	Number of Rail on Quays
1.	10760	0	2
2.	4800	4000	2
3.	5200	7250	3
4.	12960	10540	3
5.	0	0	0
6.	19800	0	3
7.	23500	30600	3
8.	5700	0	1
9.	0	0	0
10.	0	0	0
11.	0	0	0
12.	0	0	0
TOTAL	**82720**	**52390**	**17**

Table7.3: Capacity of Storage Areas and Railway Infrastructure

Parameter	Description	Value	Units
NT	Maximum number of trains per day	7	No.
TRL	Maximum capacity per train	2 440	t
WD	Number of working days per year	300	days
Annual rail capacity	**NT x TRL x WD**	**5 124 000**	t/years

Table7.4: Rail Infrastructure Capacity for Bulk Cargo

Parameter	Description	Value	Units
NT	Maximum number of trains per day	3	No.
TRL	Maximum capacity per train	80	TEU
WD	Number of working days per year	300	days
Annual rail capacity	**TEUs = NT x TRL x WD**	**72 236,8**	TEUs/year

Table7.5: Rail Infrastructure Capacity for Containers

Cargo with specific security measures in place is represented by mineral oils that are transhiped in Mineral Oil Transfer Station. Transfer station is supplied from pipeline and transhipments is provided towards vessels. Neither road nor railway transport is involved.

Section	Lenght (m)	Gauge (mm)	Max. speed (km/h)	Lowest reduced speed (km/h)	Average permitted line speed (km/h)	Minimum time without stops	Tracks	AC/DC
Bratislava - Kúty	64568	1 435	140	80/30	115	31,2	2	AC
Bratislava - Leopoldov	63 505	1 435	160	30	145	26,2	2	DC
Bratislava - Petržalka	16892	1435	n/a	n/a	n/a	n/a	2	AC
Bratislava - Dunajská Streda - Komárno	94860	1435	80	40	75	74,3	1	/

Table7.6: Priority rail section

5.1.1.2 Road Infrastructure Connectivity

In the Winter port, asphalt and concrete road communications were built in 1965-1973. In Pálenisko, road communications were continuously built between 1983-1984 and 1990-1993. The current shape of road traffic is inadequate, since premise did not generate sufficient funds for the owner and maintenance was performed only in necessary / emergency cases.

Parameter	Description	Value	Units
NV	Maximum number of trucks per day	120	No.
TL	Maximum permissible mass of the combination (track and semi-trailer)	40	t
WD	Number of working days per year	300	days
Annual road capacity	**NV x TL x WD**	**1 440 000**	t/years

Table7.7: Road Infrastructure Capacity for Bulk Cargo

Parameter	Description	Value	Units
NV	Maximum number of trucks per day	120	No.
TL	Maximum load per truck	2	TEU
WD	Number of working days per year	300	days
Annual road capacity	**TEUs = NV x TL x WD**	**72 000**	TEUs/year

Table7.8: Road Infrastructure Capacity for Containers

In the port of Bratislava, it is possible to use the same transshipment facilities for transshipment of bulk cargo in the rail - water and road – water mode, but currently the transshipment is performed only in the water - rail mode. Maximum speed in the port is limited to 50 km/h.

Priority road sections

- Brodské – Čunovo

The Orient / East-Med Road Corridor copies national motorway D2, that connects the Brodská border crossing (Czech Republic) with the Čunovo border crossing (Hungary), passing through Kúty, Malacky and Bratislava. At the level crossing Bratislava - Pečňa it is fed to the D1. The D2 motorway is completed along its entire length in full profile, only the construction of the Stupava - South junction with the D4 and the exit in Čunovo is planned. Its total length is 80 km and consists of 2x2 lines. The construction of the motorway took place in the years 1969 – 2007

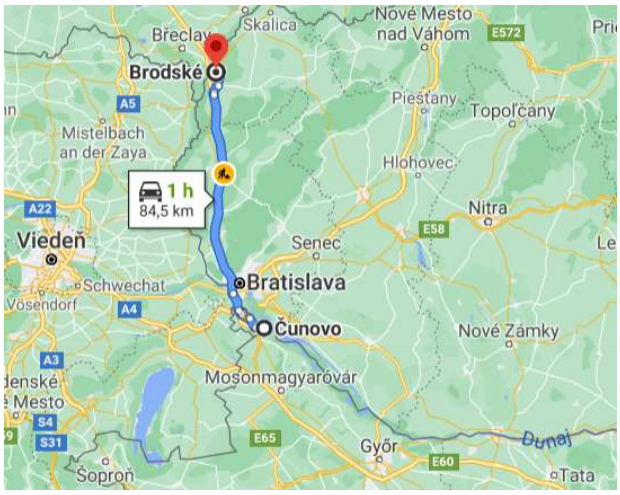

Figure7.4: Brodské – Čunovo motorway

- Bratislava – Žilina

The Orient / East-Med Road Corridor copies national motorway D2, that connects the Brodská border crossing (Czech Republic) with the Čunovo border crossing (Hungary), passing through Kúty, Malacky and Bratislava. At the level crossing Bratislava - Pečňa it is fed to the D1. The D2 motorway is completed along its entire length in full profile, only the construction of the Stupava - South junction with the D4 and the exit in Čunovo is planned. Its total length is 80 km and consists of 2x2 lines. The construction of the motorway took place in the years 1969 – 2007

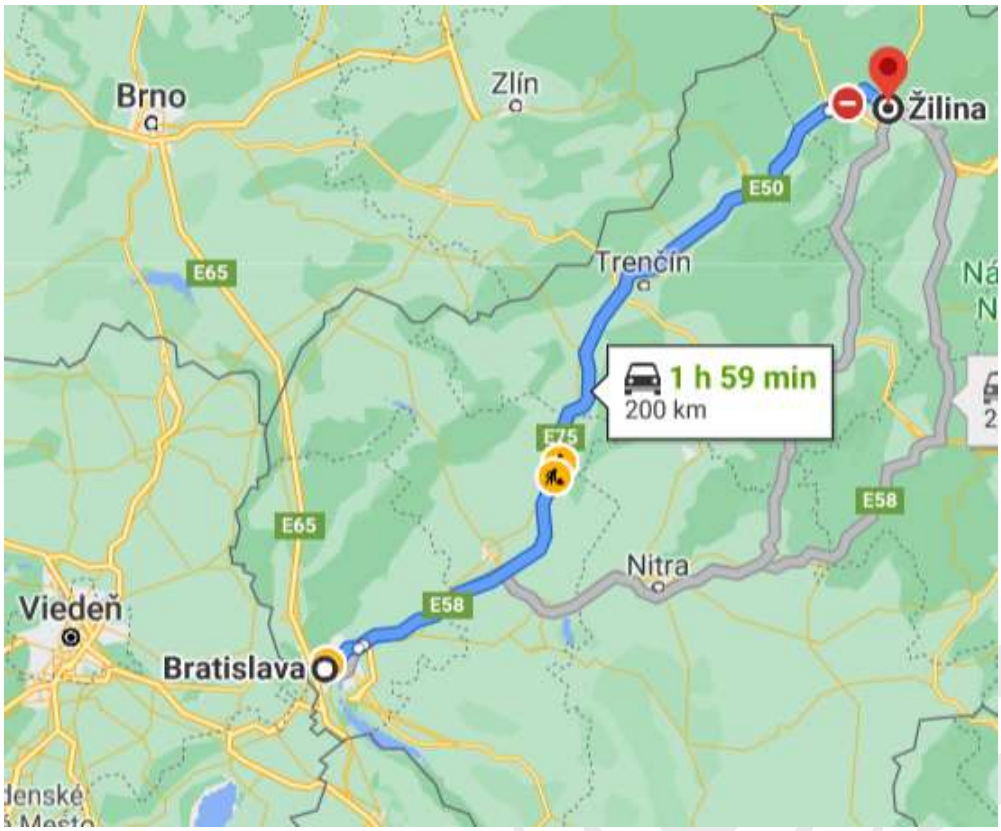

Figure7.5: Bratislava – Žilina motorway

5.1.2 Mid-Term Perspective Assessment

5.1.2.1 Rail Infrastructure Connectivity

Since 2020, it has been planned to gradually attenuate the trasshipment of goods in the basin of Winter ports and thus allow the development of passenger water transport in this location. The development of the port and the adjacent area Pálenisko was elaborated in the techno-economic study "Commodity centre of freight transport Bratislava ". It deals with the suggestion to create a specific distribution centre zone, with the location of combined transport facilities and with the construction of a road, railway and water transport hub including a communication connection to air transport. Based on this study, it is suggested to interconnect the basin Pálenisko and Central Freight Station with sidings to the group of sorting-supply tracks and connecting track to the railway station Bratislava Central Freight Station.
In terms of making the operations in the port more effective and protecting the town centre, the following constructions are suggested for the water transport development:

- new transshipment locations,
- extension of the operational railway areas and extension of railway sorting tracks,
- construction of the sidings on the riverside and extension of the railway track in the basin Pálenisko,
- reconstruction of the existing sidings system of the basin Pálenisko to Central Freight Station,

Reconstruction of Railway Tracks ŽSR
Strategic projects of railway infrastructure development are focused on the Investment Program for Railway Modernization of ŽSR International Corridors IV, V, VI and on the program of railway renewal. The plan, which is coordinated with the Corridor Modernization Program, ensures the envisaged technical parameters of the lines under the AGC and AGTC agreements. As part of the renovation, Corridor IV Kúty-Bratislava-Štúrovo is being modernized to speeds up to 160 km / h, Corridor V to speeds up to 160 km / h in the Bratislava-Žilina section and up to 120 km / h in the Žilina-Košice section.

5.1.2.2 Road Infrastructure Connectivity

In terms of making the operations in the port more effective and protecting the town centre, the following constructions are suggested for the water transport development:

- new road interconnection from the port to the extended Bajkalska route,
- intra-area roads,
- parking place for LGVs at RO-RO location,
- new transshipment locations.

Bratislava Bypass: D4 Highway and R7 Motorway
The objective of the D4 Highway and R7 Motorway projects is to build the southern part of the zero bypass of Bratislava and part of the southern network of motorways that would connect the west and east of Slovakia. The D4 highway and the R7 motorway with a total length of more than 59 kilometers will serve as the outer bypass of the capital. The overall scheme includes the construction of 14 intersections and 122 bridge structures, including a new bridge over the Danube and a viaduct close to refinery Slovnaft. The contractual deadline for the completion of D4 and R7 is 2020. The critical parts of the project from Dunajská Lužná towards Bratislava could be completed in 2021.

Figure7.6: D4 motorway - R7 expressway - Bratislava bypass

5.2 Port of Komarno

5.2.1 Status-quo Assessment

5.2.1.1 Rail Infrastructure Connectivity

Currently, the Public Port of Komárno is linked to the railway network by a siding, at track no. 131 Komárno Bratislava and no. 135 Komárno – Nové Zámky. These are standard gauge tracks, not electrified. The entrance is located on the western edge of the port near the Bratislava Gate – Bastion No. I near the intersection of the streets Dunajské nábrežie and Hviezdna. The total length of the rails at the VP Komárno area is 13.85 km. The lengths of the individual parts of the railway siding together with rail indications are summarized below:

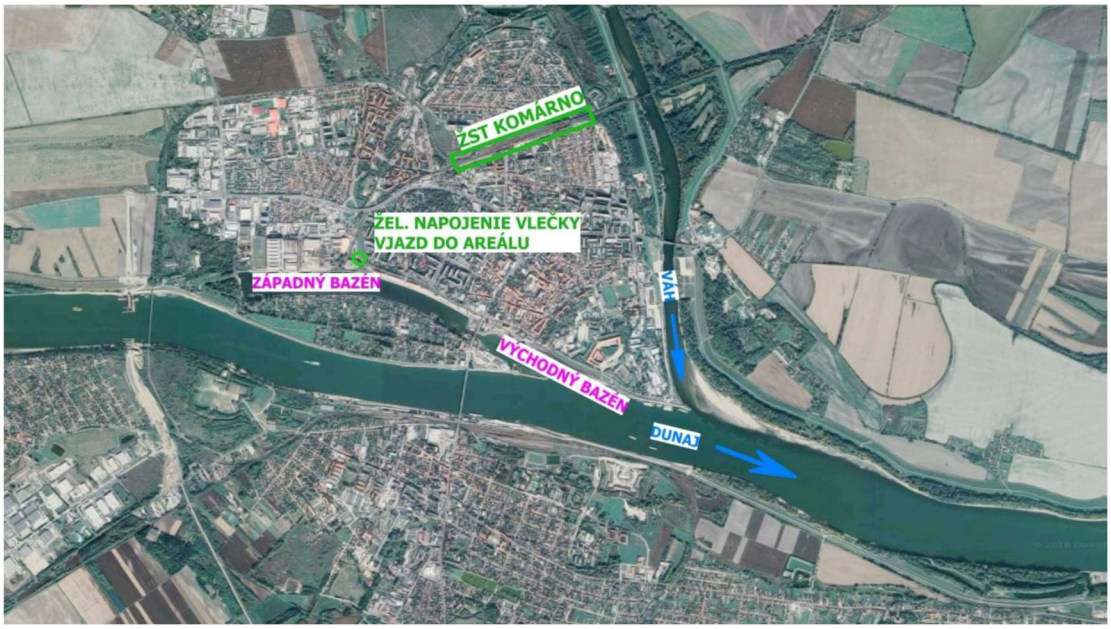

Figure7.7: Connection of the VP Komárno Area to the Railway Network

rail no.	length (m)	rail no.	length (m)
1	1 145	15	598
3	1 006	17	566
3a	238	19	526
5	679	21	986
7	635	23	628
9	1 422	2	1 663
11	1 377	4	1 719
13	657		
total length of rails (km)			13,85

Table7.9: Rail Lengths in the Port Area – Current Condition

The railway line at the Komárno railway station is of class D with maximum unit train load of 2,200 tonnes. It follows that the unit train can contain a maximum of 55 carriages at carrying capacity of 40–50 tonnes/carriage. The siding in the area is maintained by the SPaP, a. s. company, while the siding is operated and unit trains outfitted by the Železničná spoločnosť Cargo Slovakia, a. s. company (ZSSK Cargo) (Railway Company Cargo Slovakia). At present, regular handover of unit trains for transport (if a port is needed) takes place from 9 December 2018, 3 times a week (Mon, Wed, Fri).

For operational reasons, there is no restriction on trans-shipment due to the capacity of the railway connection. The railway connection is of good quality and operationally satisfactory.

Parameter	Description	Value	Units	Remarks
NT	Maximum number of trains per day	1,5	number	*This should be based on the availability of rail infrastructure and the operational modalities*
TRL	Maximum capacity per train	1 600	t	*This should be based on operators' experience. Our calculations contains that train capacity is equal to the capacity of 1 boat i.e. 1600 tonnes, although the railway line in the Komárno railway station is classified as Class D with a maximum load of 2200 tonnes. It follows that a one train contains max. 55 wagons with load capacity of 40 - 50 tons / wagon.*
WD	Number of working days per year	213	days	
Annual rail capacity	Cap. = NT x TRL x WD	510 000	t/year	

Table7.10: Rail Capacity Port of Komárno

To calculate the maximum capacity, we count on utilising all of the functioning cranes at the port. According to the dominant port operator, only 2 cranes (type Crane GANZ 16t/32t) out of a total of 8 are currently fully operational. The rest are either non-functional in the long term or with no revision.

5.2.1.2 Road Infrastructure Connectivity

Komárno is located on the intersection of the I/63 and I/64 roads of class I., enabling the connection of the district City of Komárno with the regional City of Nitra (road I/64), the capital city of SR Bratislava (I/63), and creating a connection to Hungary onto the M1 road (approx. 10 km from the City of Komárno). The rest of the network in the addressed territory constitutes of class II. and class III. roads and local thoroughfares. Directly in the City of Komárno, there is the Komárno – Komárom road border crossing point on road I/64. Operation on the crossing point is continuous. The border crossing point is between the states of Slovakia and Hungary, which belong into the Schengen Area, thereby setting the operation mode. Freight transport over the bridge across the Danube River is limited to 20 tonnes. Freight transport across the River Vah is limited to 25 tonnes. Maximum speed in the port is limited to 50 km/h.
Transport connection of the City of Komárno with the rest of the territory of SR and the neighbouring states is secured by routes:

- In the east–west direction, it is route I/63 in the route of Bratislava – Komárno – Štúrovo, state border. Route I/63 in the stretch of Bratislava – Veľký Meder is part of the E575 European route, which starts in Bratislava, ends in Győr, and is approx. 100 kilometres long. Within Slovakia, it starts in Bratislava at the D1 crossroads (E 58, E 75, and E 571) with road no. 63 of class I. and continues through the cities of Šamorín, Dunajská Streda, and Veľký Meder, and from thereon along route I/13 to the Medveďov border crossing point. Route I/63 as E 575 does not go through the City of Komárno.
- In the north–south direction, it is route I/64 in the route of the state border of SR/HR – Komárno – Nové Zámky – Nitra – Topoľčany – borders of NR/TN (Nitra region and Trenčín region), with connection to the D1 motorway.
- In the western part of the city, route II/573 of class II disconnects from route I/63 and connects to route II/563 in Kolárovo.
- On the outskirts of the City of Komárno, there are two routes of class III. Road III/1462 of class III and road III/1463 of class III.

Parameter	Description	Value	Units	Remarks
SA	Storage capacity	6 500	t	*This should be provided by operators according to their experience*
WD	Number of working days per year	212,5	days	*This number of days may differ from the number of berth(???)*
CTT	Time that the quantity remains to the yard.	3	days	*This is the time that the cargo remains in the yard. It depends on the type of cargo and the operational modalities and has to be discussed with the operators. Definitely it differs significantly between loaded and empty containers.*
Annual stacking capacity	Cap. = (SA x WD)/CTT	**460 417**	t/year	

Table7.11: Stacking Capacity port of Komárno

Parameter	Description	Value	Units	Remarks
NV	Maximum number of trucks per day	60	number	*This should be based on operators' experience. It depends on the appointment system for trucks, waiting time, loading/unloading time etc.*
TL	Maximum load per truck	40	t	
WD	Number of working days per year	212,5	days	
Annual road capacity	Cap. = NV x TL x WD	**510 000**	t/year	

Table7.12: Road Capacity port of Komárno

5.2.2 Mid-Term Perspective Assessment

5.2.2.1 Rail Infrastructure Connectivity

Reconstruction of the railway network of ŽSR

Strategic projects aimed at the development of the railway infrastructure focus on the Investment programme of modernisation of ŽSR network comprising the international corridors IV,V,VI and the renovation of lines. The project, which is coordinated with the corridor modernisation programme, ensures the planned technical parameters of lines according to AGC and AGTC agreements. The modernisation includes the continuous modernisation of corridor IV, i.e. Kúty-Bratislava-Štúrovo, allowing for speeds of 160 km/h, corridor V allowing for speeds of 160 km/h between Bratislava and Žilina and 120 km/h between Žilina and Košice.

5.2.2.2 Road Infrastructure Connectivity

New cross-border bridge between Komárom and Komárno

This is an inland waterway project supporting the development of and modernisation of the Rhine–Danube corridor by means of connecting the Komárom port in Hungary and the Komárno port in Slovakia. Today, the 100 year-old Alžbetin most connects the city centres of Komárno in Slovakia and Komárom in Hungary at the respective sides of the Slovakia-Hungary border, albeit with very limited weight limits of 20 t. The proposed bridge should carry a road connecting motorway number 1 in Hungary with road I/63 in Slovakia. The planned bridge is situated 170 m from the railway bridge (upstream) and 2.8 km from Alžbetin most. The construction of the new road bridge over the river Danube between Komárno and Komárom is already in progress, co-financed (85%) from the CEF instrument.

Figure7.8: Komárno - Komárom, a new road bridge over the Danube – visualization (photo: http://www.stavbymostov.sk)

6 Hungary: Ports' Infrastructure Connectivity Assessment

6.1 Port of Budapest

6.1.1 Status-quo Assessment

Freeport of Budapest is located in Csepel Island, the south part of the capital of Hungary. Csepel is the 21st district of Budapest. The address of MAHART Freeport Plc, the port land and infrastructure owner organization, is 1211 Budapest, Weiss Manfréd (formerly: Szabadkikötő) Road 5. The port is located in the Danube-Mainland Rhine waterway on the Danube section crossing the continent northwest to south-east in the inland waterways of Europe, at the 1.640 km of riverbank.
There are important international corridors (TEN-T corridors) going through Hungary both east-west and north-south directions.

6.1.1.1 Rail Infrastructure Connectivity

The Freeport and Csepel Island are linked into the national railway networks by the Gubacsi bridge located on the north-eastern part of the island. On railway, Hungary has 9 border crossing points towers Slovakia, 6 to Austria, 1 to Slovenia, 3 to Croatia, 2 to Serbia, 5 to Romania and 2 to Ukraine. Besides there are 16 organizer stations in the country.

6.1.1.2 Road Infrastructure Connectivity

As regards road connection, Freeport is accessible on highways M1 from Austria, M7 from Croatia, Slovenia, M6 from the south, M5 from Serbia, Romania and M3 from the east, using the ring-road, M0 as well. Trucks can approach the port from the highways via either M0 – M51 – Ócsai Road/Grassalkovics Road/Helsinki Road (on the Pest side by the river) – Gubacsi bridge, or M0 – II. Ráckóczi Ferenc Road (through Csepel downtown) – Weiss Manfréd Road, or from the city through Kvassay Jenő Bridge.

6.1.2 Mid-Term Perspective Assessment

6.1.2.1 Rail Infrastructure Connectivity

Gubacsi railway bridge - a new single-track railway bridge will be built 15 metres north of the existing bridge. The new bridge will be without piers and will be an arched bridge to accommodate the needs of the planned rowing course project. (Remote electrification have to be provided). In this case, it is not possible to use or modify existing plans and permits. A new environmental impact assessment and new permitting process will be required.

6.1.2.2 Road Infrastructure Connectivity

The construction of the **New Danube Bridge** (in the area of Galvani Street) has the priority objective of promoting traffic calming in the city centre and the development of South Budapest as an area with significant potential, including large areas of brownfield sites.
As a result of the development, a 30% reduction in traffic is expected on Lánchíd, Erzsébet Bridge and Szabadság híd and a 10% reduction on Petőfi Bridge, which can be complemented by additional traffic calming measures under the responsibility of the Municipality of Budapest, thus allowing the bridge to relieve the city centre of up to 50 000 cars per day.
The planned technical parameters of the bridge:
- Length: 529 m

- Navigation: 180 m wide navigation clearance below the embankment opening, 9.5 m high navigation clearance above the maximum navigable water level
- Traffic lane: 2x 3.5 m wide traffic lane on both sides of the bridge, 2x 3.5 m wide bus/train lane, design speed 50 km/h
- Pedestrian lane: 2x 1.5m wide pedestrian lane on both sides of the bridge
- Cycle lane: 2x 2,6 m wide cycle lanes on both sides of the bridge

<u>Csepel backbone infrastructure – Phase II.:</u>
The entire section of the backbone road will be designed by BKK Zrt. and the construction is expected to be carried out by NIF Zrt. The primary design criterion is that 40-tonne trucks should not approach the industrial and logistics areas of Csepel and the M0 ring road via the Rákóczi Ferenc II road, but via an unpopulated route. Preparatory work is currently underway, with the plan expected to be completed by 2023 and construction to start in 2024. The aim is to make transport more liveable for Csepel residents, and some 12 transport interchanges and an intelligent transport system will be developed. BKK Zrt. has requested the Ministry of Innovation and Technology to include the development of the Csepel Spine Road among the national economic priority projects.
Source: [Folytatódik a Csepeli Gerincút tervezése]

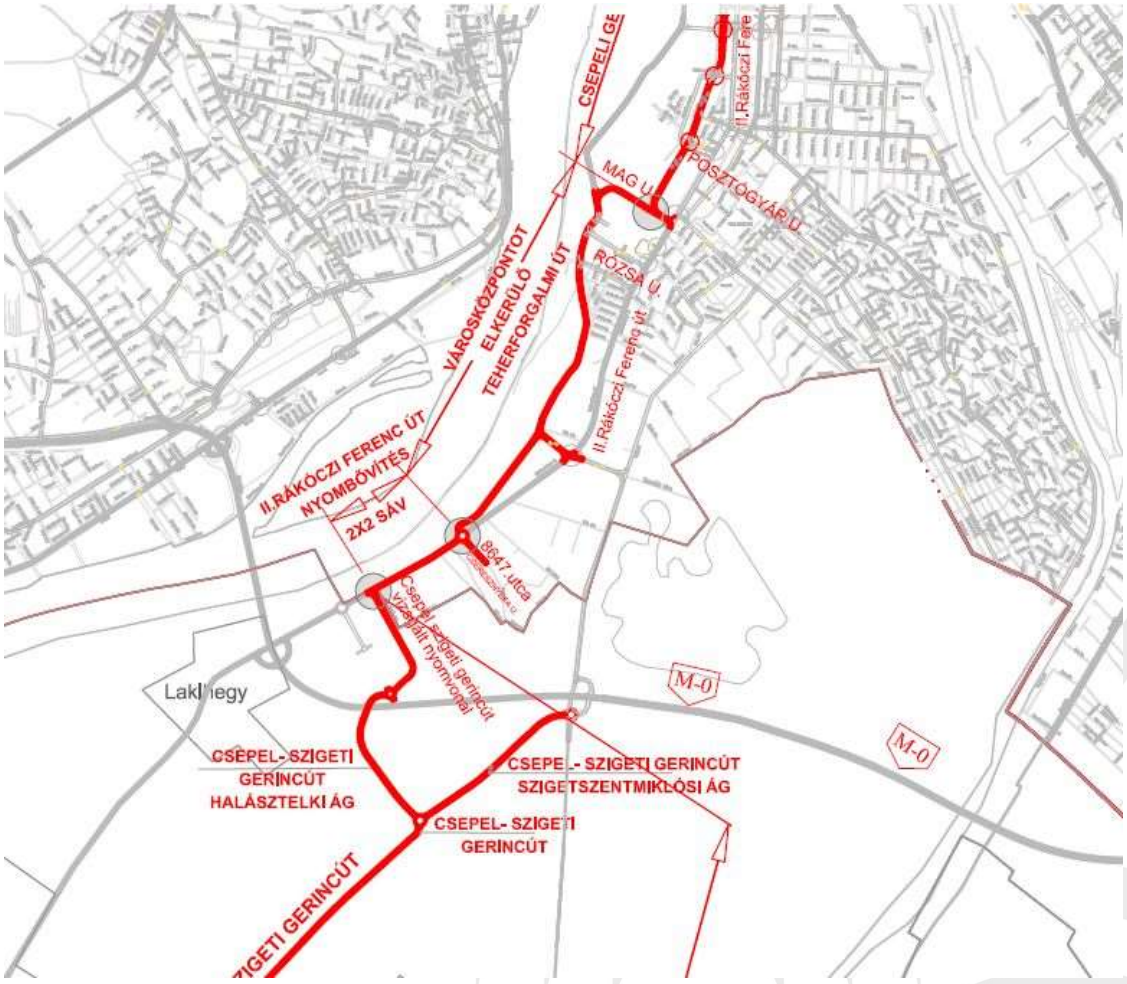

Figure 8.1: Csepel backbone infrastructure – Phase II. plans

6.2 Port of Dunaújváros

6.2.1 Status-quo Assessment

The port is located on the right bank of the Danube, in the bay between 1580-1579 rkm, on the Szalki island. The closest port from north is Port of Adony, between 1597 rkm and 1598 rkm on the right bank, and from south is Port of Dunavecse, on the left bank of the Danube at the 1572 rkm.

Figure 8.2: Port of Dunaújváros area map

6.2.1.1 Rail Infrastructure Connectivity

It can be reached by train on line number 42 connecting Pusztaszabolcs and Dunaújváros. Railway No. 42 is a single-track railway line along the right bank of the Danube (Pusztaszabolcs-Dunaújváros-Paks railway line), electrified only as far as Dunaújváros, with a total length of 79 km. The line between Pusztaszabolcs and Dunaújváros has been in operation since 1951 and was extended to Paks in 1976.

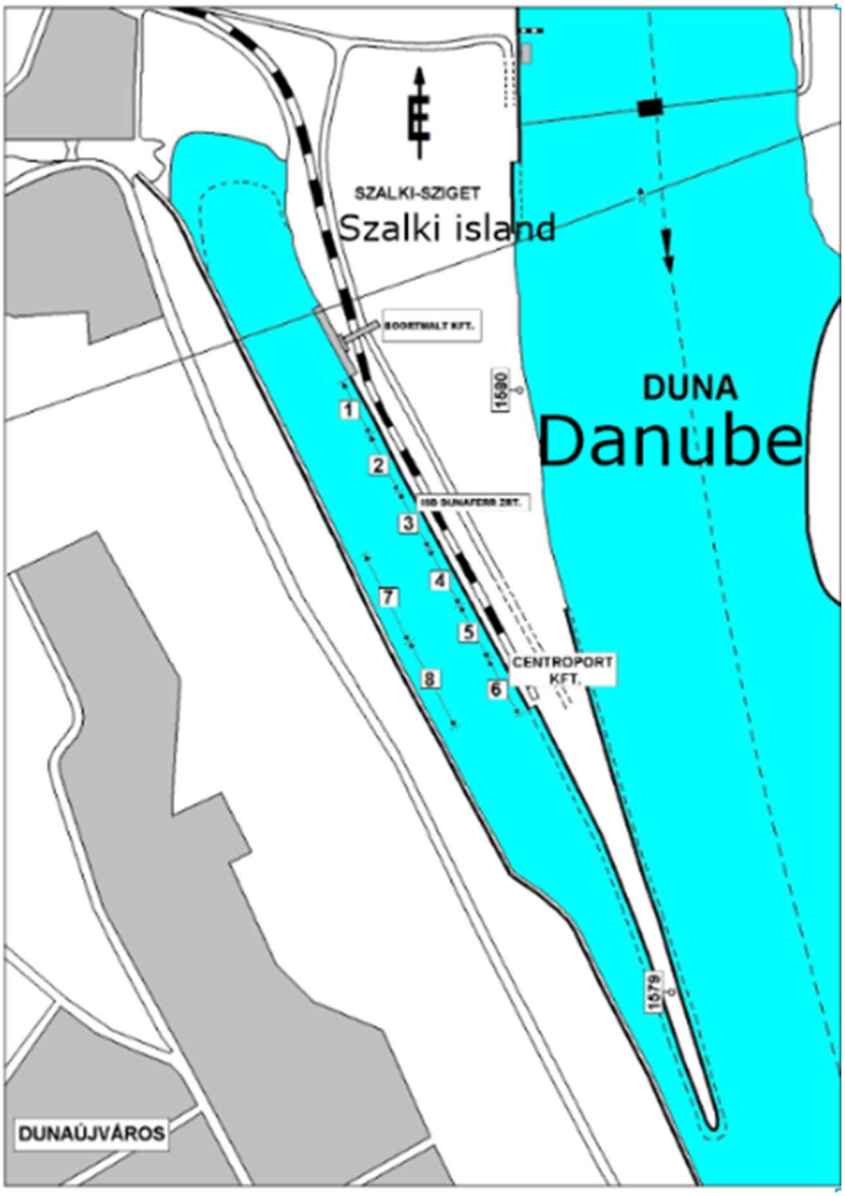

Figure 8.3: Port of Dunaújváros map

6.2.1.2 Road Infrastructure Connectivity

On the road, it is affected by the M6 motorway and the constantly expanding M8 motorway, and it is also connected to important cities such as Székesfehérvár, via main road number 6. The M6 motorway runs south along the right bank of the Danube, connecting Budapest with Pécs, the capital of Baranya. The section between Budapest and Dunaújváros was opened in 2006 and the section between Dunaújváros and Bóly in 2010. Its current total length is 193 km. The main road 6 is a Hungarian first-class main road connecting Budapest with the southernmost region of Hungary, South Transdanubia (Dél-Dunántúl), with a total length of 262 km. The M8 motorway is currently a planned 2x2-lane (+ parking lane) motorway, with some sections under design and pre-construction, and a smaller part of the motorway will include the existing 2x2-lane sections of the existing Highway 8. The road will help to connect the country east-west, with two intended end points at Balatonfőkajár and Abony.

6.2.2 Mid-Term Perspective Assessment

6.2.2.1 Rail Infrastructure Connectivity

The situation of the line is exceptional, mainly because of the Danube Railway and the Paks nuclear power plant. Dunaújváros station is in a prominent position among the stations of the major rural cities in terms of the volume of freight traffic. Although there are no major upgrades planned for the line, current track conditions are stable.

6.2.2.2 Road Infrastructure Connectivity

Development of the M8 between M7 - Dunaújváros and Dunavecse - Kecskemét:
The preparation of the M8 motorway between the M7 motorway - Dunaújváros (M6) junction and the Dunavecse - Kecskemét (M5) section is underway, which can be upgraded to a 2x2-lane motorway with a 20 m wide crown width and a dividing lane. This will also fulfil the planned function of the Pentele Bridge in Dunaújváros, connecting the east-west parts of the country.

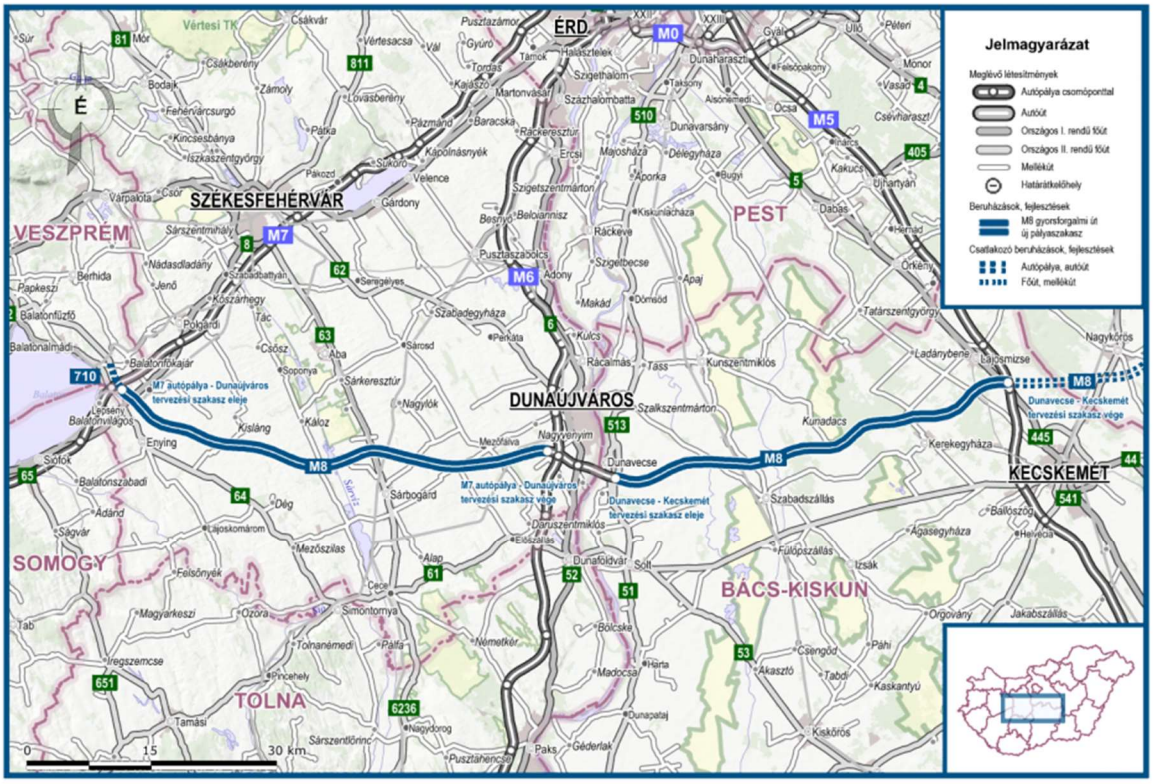

Figure 8.4: Development of the M8 between M7 – Dunaújváros and Dunavecse – Kecskemét plans

Source: [M8 nyomvonalán M7 – Dunaújváros és Dunavecse – Kecskemét közötti szakasz fejlesztése | Nif Zrt.]

6.3 Port of Baja

6.3.1 Status-quo Assessment

Baja is situated in the heart of Europe, 30 km-s from the south Hungarian border to Serbia.

6.3.1.1 Rail Infrastructure Connectivity

Baja railway station and Baja-Dunafürdő stop can be reached by the unelectrified, single-track Bátaszék-Baja-Kiskunhalas railway line 154.
The abolition of the Baja-Regőce-Zombor railway line and the Hungarian sections of the Baja-Bezdan-Zombor railway line (Baja-Gara and Baja-Hercegszántó) was ordered by the transport policy concept of 1968. Between the railway station and the Danube, it was to be branched off into the planned, but never built Dunapataj-Kalocsa-Baja railway line.

6.3.1.2 Road Infrastructure Connectivity

It can be reached from Budapest on the main road 51, from Kecskemét on the main road 54 and from Szeged and Bátaszék on the main road 55. The residential area is relieved by main roads 511 and 551. The Danube bridge (Türr István Bridge) on the main road 55 was built in 1909.

6.3.2 Mid-Term Perspective Assessment

6.3.2.1 Rail Infrastructure Connectivity

Szeged-Szabadka-Baja railway line:
The project aims to develop a railway line between Serbia and Hungary, with a length of almost 100 kilometres, providing a direct link between important cities in the border regions of the two countries.
The infrastructure of the historic railway line is now severely degraded. The new modern railway line planned for the missing section between Szeged and Subotica will provide the opportunity for direct rail transport between the cities and improve border traffic between the two countries.
The rehabilitation of the Subotica-Baja railway section will contribute to strengthening the economic links of the Baška border region. The new track will allow speeds of up to 160 km/h.
Source: 2022-re elkészülhet a Szeged-Szabadka vasútvonal | Magyar Építők (magyarepitok.hu)

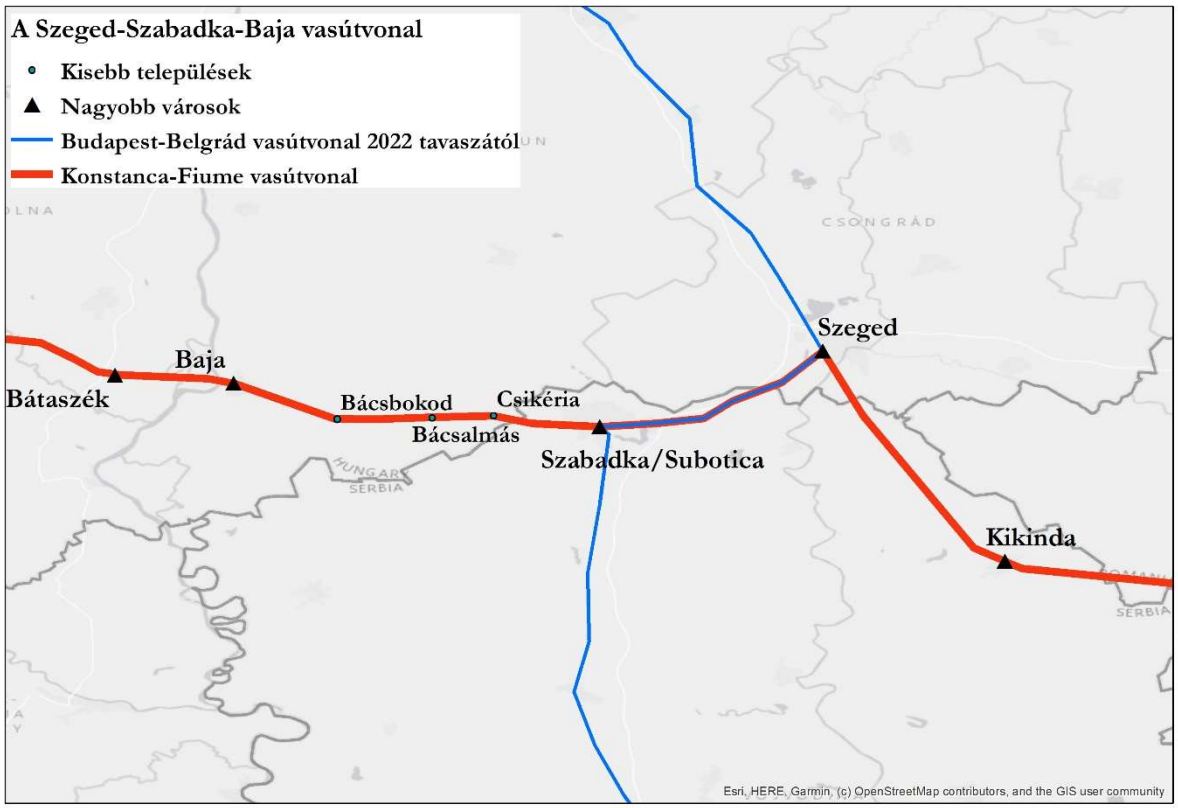

Figure 8.5: Szeged-Szabadka-Baja railway line plans

Source: Colourful Cooperation | Lépések az álom felé – hogy egyszer mi is úgy éljünk, mint Nyugat-Európában (visithusrb.com)

6.3.2.2 Road Infrastructure Connectivity

Development of main road No. 51 between M9 motorway - Baja, with the construction of a bypass road between Sükösd and Érsekcsanád:

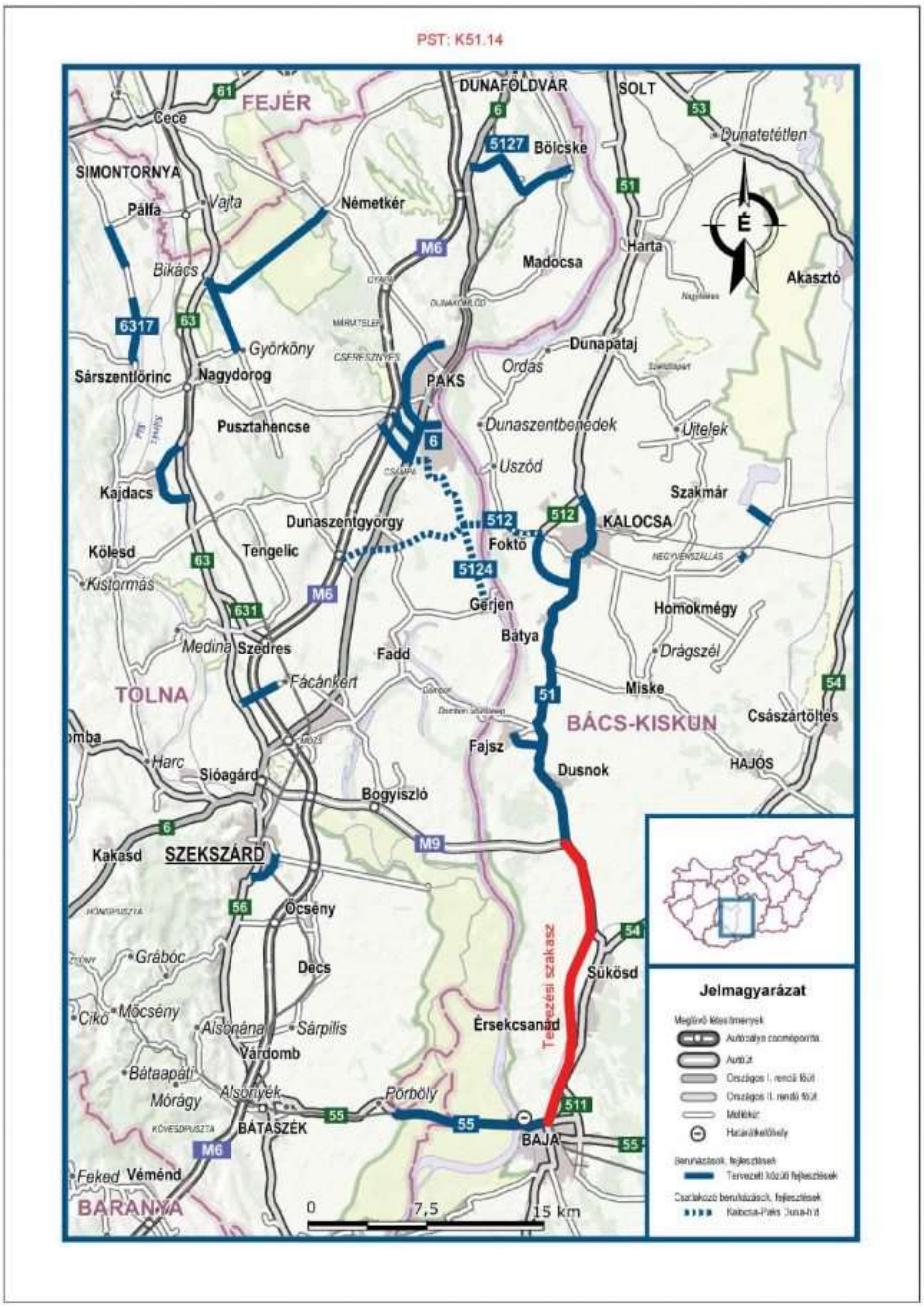

Figure 8.6: Development of main road No. 51 between M9 motorway - Baja, with the construction of a bypass road between Sükösd and Érsekcsanád plans

Reinforcement of the section of motorway 51 from the M9 motorway junction to the junction of motorways 55 - 551 to 115 kN axle load. Implementation of a 2 x 1 lane main road on a new route bypassing the municipalities of Sükösd and Érsekcsanád based on the agreed preparatory study.
Source: [51. sz. főút fejlesztése M9 gyorsforgalmi út – Baja között, Sükösd és Érsekcsanád elkerülő út építésével | Nif Zrt.]

Development of the section of the main road No 55 between Baja and Pörböly, with the construction of a parallel cycle path:

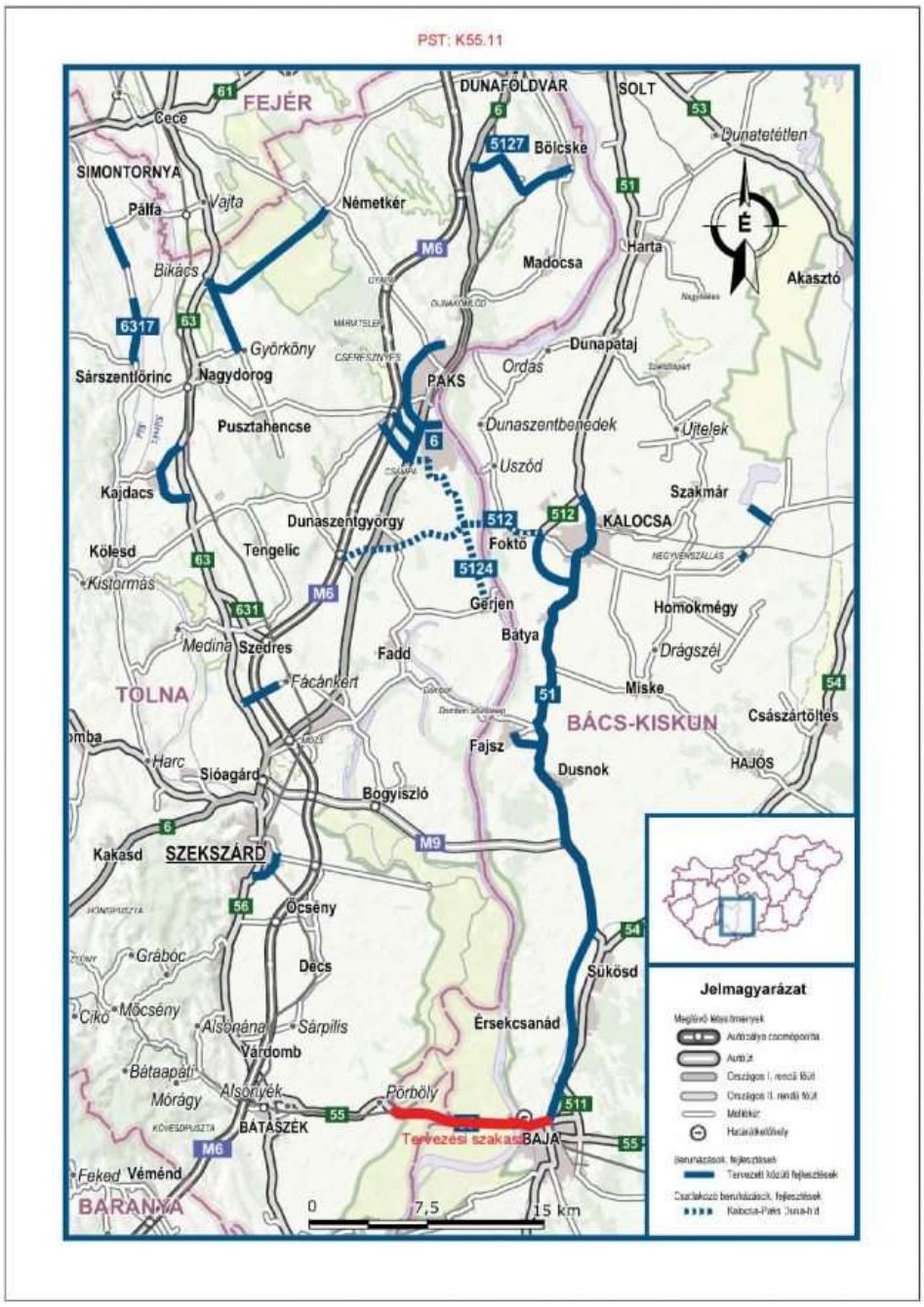

Figure 8.7: Development of the section of the main road No 55 between Baja and Pörböly, with the construction of a parallel cycle path plans

Reinforcement of the existing track of the main road No. 55 from the junction of roads No. 51 and 551 in Baja to the railway crossing in front of Pörböly, currently 9.6 km long, to a 115 kN axle load, and the renovation of the Türr István Danube Bridge in Baja without a permit.
Source: 55. sz. főút Baja – Pörböly közötti szakasz fejlesztése, párhuzamos kerékpárút építéssel | Nif Zrt.

Preparation of the Baja - Zombor - main road No 51 Baja-Hercegszántó - border section (EU ID: HUSRB/1602/21/0061):
For the southern bypass section of Baja, an Environmental Impact Assessment will be prepared, for the section of the main road 51 Baja - Hercegszántó - border the task is to prepare a Feasibility Study, Environmental Impact Assessment and permit plan.
The authorisation plan includes the reinforcement of the pavement of the main road No 51 for an axle load of 11.5 tonnes, the design of a new route for the bypass of Nagybaracska and the design of a cycle path parallel to the main road.
Project name: Development of the cross-border road linking Baja and Zombor (Sombor)
Project code: HUSRB/1602/21/0061
Project acronym: SO-BAJA2
The total project cost is EUR 3.122.670,00 gross, of which the project cost for the Hungarian section is EUR 492.151,00 gross.

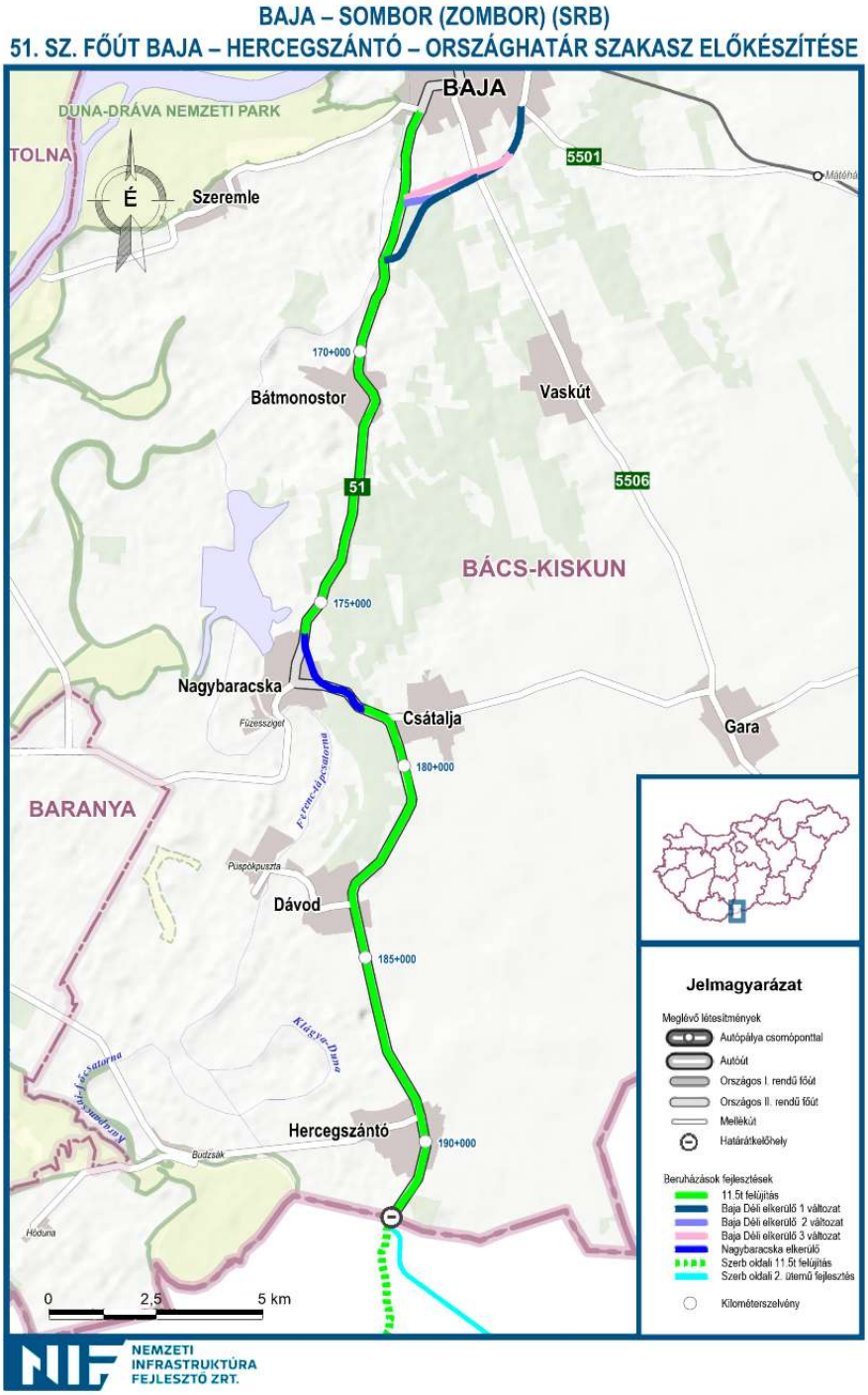

Figure 8.8: Preparation of the Baja - Zombor - main road No 51 Baja-Hercegszántó - border section plans

7 Croatia: Ports' Infrastructure Connectivity Assessment

7.1 Port of Vukovar

7.1.1 Status-quo Assessment

7.1.1.1 Rail Infrastructure Connectivity

Within the territory of the Republic of Croatia, international Corridor named as RH1. TEN-T core network (Paneuropean Corridor X), Salzburg –Thessaloniki, according to the Decision of the Classification of the Railway Lines of the Government of the Republic of Croatia (OG no. 03/14) presents railway of international significant. Furthermore, the corridor has great role in connection to Inland Waterway transport, especially for the Port of Vukovar. Railway M601 (Vinkovci - Vukovar) classified as international railway taht connect Port of Vukovar with the corridor RH1.
The M601 Vinkovci -Vukovar railway serves as a railway connecting the RH1 and the only Croatian inland port of the basic TEN-T network on the Danube, Vukovar. This line is important for freight traffic and must meet the minimum technical criteria in terms of axle load and useful length of receiving and dispatching tracks, therefore the line is currently in the process of reconstruction and modernization.
The M601 railway is used for cargo traffic, as well as for passenger traffic in the total length of 18,71 km. In its total length the railway is a single-track unelectrified railway and has allowed axle load up to 20 tons per axle. Current speed that trains can be driven is from 20 up to 50 km/h, while maximum length of the train composition is from 416 up to 784 m.
The port has direct connection from the port area to the M601 railway. In the port area total length of the railway track along the quay is 800m, while total length of railway track is around 3.000 m. Three railway tracks in total length of 1.630 m are used for unloading and loading cargo. Equipment use for unloading/loading operation are two gantry cranes with a load capacity of 5/6 t, a port gantry crane with a capacity of 63 t, which has the special feature that it allows handling of heavy loads, as well as general and bulk cargo, as well as 20-foot and 40-foot containers. It also has forklifts with a capacity of 2 to 20 tons (a total of 8 forklifts), two loaders, a diesel locomotive.
Unloading/loading capacity for rail is not strictly defined, except that capacity of the equipment, which is defined above in the text, as well as annually capacity of the port with possibility up to 2 million of tons. Maximum length of complete block-train which can be handled for loading/unloading is 400m.

7.1.1.2 Road Infrastructure Connectivity

A3 motorway (Bregana - Zagreb – Lipovac) as a part of TEN-T core network is also located on the X. Pan-European Transport Corridor (Austria - Slovenia - Croatia - Serbia - Macedonia - Greece, including Bulgaria and Turkey), which makes the shortest and most convenient connection western and southeastern Europe with the Middle East i.e., Asia. In the European network, the road has a sign E-70. Within Croatia, the route of this motorway stretches west-east direction and belongs to Posavina road rrute (Bregana - Zagreb - Lipovac), and in the network of motorways of the Republic of Croatia is marked as A3.
The length of the highway is 307km and it is designed as a four-lane for fast and heavy motor traffic with the possibility of expanding to six lanes because enough space is left to the edge of the canal and fence, while the installations are far enough away from the fence, as well as the choice of road overpass openings. Speed limit on the highway is limited on 130 km/h, while vehicle with permissible load over 3,5 tons is 90 km/h and for a bus speed is limited on 100 km/h. Maximum permissible axle load of the vehicle is as follow:

- Single free axle up to 10t
- Single drive axel up to 11,5t
- Double axles of trailers and semi-trailers up to 18t
- Triple axles of trailers and semi-trailers up to 27t
- Multiple axles of trailers and semi-trailers (four or more axles) up to 9t per axle
- Double axles of motor vehicles - the sum of the axle loads per double axel must not exceed 18t, or 19 t if the drive axle is equipped with twin wheels and air suspension or suspension which is recognized as equivalent within the EU or if each drive axle is equipped with twin wheels, and the maximum permissible mass of each axle does not exceed 9.5 t.

Port of Vukovar has access to A3 motorway via public state road D55 (Borovo – Vinkovci – Županja) which is two-line and two-way direction road, while distance from port to A3 motorway is km. Speed limit within inhabited places is 50 km/h and 70 km/h where is explicitly permitted, while outside inhabited places speed limit is 90 km/h. On the route from the port of Vukovar to A3 motorway three inhabited places are located, but road passe through two inhabited places, while the third one which is City of Vinkovci is passed by bypass road.

Croatian Motorways, Ltd (Hrvatske autoceste d.o.o.), is a limited liability company for operation, construction, and maintenance of motorways. The company is 100% owned by the Republic of Croatia and was registered and started its business activity in 2001.

As regards public state roads, Hrvatske ceste d.o.o. is a limited liability company in charge for management, construction, and maintenance of state roads. The company is state-owned and has full ownership by the Republic of Croatia.

Parking space for truck is under concession of port operator and it is also used for the custom services. Official total space of parking space for trucks is 26, but as an exemption it can be parked more than 26 trucks.

7.1.2 Mid-Term Perspective Assessment

7.1.2.1 Rail Infrastructure Connectivity

The M601 railway is currently under reconstruction and reconstruction is co-financed from EU funds within part of Operational programme Competitiveness and Cohesion 2014-2020. Construction works has been started by the beginning of the 2020 year with the deadline of 24 months, while end of construction works is expected by the beginning of the 2022 year.

Upgrading and electrification of the railway line from Vinkovci to Vukovar, 18.71 km long, sections important for international traffic, will enable an increase in the volume of railway traffic and transhipment of goods in the port of Vukovar and better connection of railway passenger transport of Vukovar-Srijem County with main transport corridors and other counties, and will have a particularly positive impact on the comfort and safety of travel as part of daily passenger migrations.

With the modernization, the Vinkovci - Vukovar section will be capable of train speeds of a maximum of 120 km/h, which will reduce travel time by about 50 percent and the journey in passenger transport will last 20 minutes, and in freight 30 minutes. Electrification of the section will ensure more economically and energy-efficient and environmentally sustainable railway transport. The capacity of the section will be increased and the access to the port of Vukovar will be improved, which will make it, located on the TEN-T corridor Rhine - Danube, well connected with Corridor RH1, the former X. Pan-European Corridor. The modernization of the railway from Vinkovci to Vukovar will contribute to the economic development of the local community and the recovery of the eastern part of Slavonia.

The project of upgrading and electrification of the railway Vinkovci - Vukovar includes:

- complete reconstruction and reconstruction of the existing single-track railway,
- reconstruction of the two railway stations, as well as two stops,

performing all necessary works on the construction, traffic management, signaling and safety and power subsystem.

7.1.2.2 Road Infrastructure Connectivity

Planning of construction and maintenance of motorways, according to the Law on Roads, is carried out through the following program planning documents:

- in the long run, through the Strategy for the Development of Public Roads adopted by the Croatian Parliament
- in the medium term, through four-year programs for the construction and maintenance of public roads adopted by the Government of the Republic of Croatia at the proposal of the Ministry of Maritime Affairs, Transport, and Infrastructure
- annually, through construction and maintenance plans adopted by Hrvatske autoceste d.o.o. with the consent of the Government of the Republic of Croatia.

As regards public state roads, scope of activities is as it follows:

- operative activities required to ensure technical and technological coherence of the public roads system; in line with strategic objectives; supported by research in spatial planning, traffic and civil engineering, and economic analyses,
- strategic planning of public road network; project development for state road schemes; development of designs with preliminary surveys and site investigation; motorway location survey report required for a location permit,
- protection of environment from impacts of traffic on state roads,
- monitoring of traffic loads and traffic flows on state roads,
- maintaining a road data bank for public roads,
- preparation of technical documents for four-year rolling plans of construction and maintenance of state, county, and local roads,
- construction, reconstruction, and maintenance of state roads
- land acquisition in construction, reconstruction, and maintenance of state roads

financing of construction, reconstruction, and maintenance of state roads.

8 Bulgaria: Ports' Infrastructure Connectivity Assessment

8.1 Port of Lom

8.1.1 Status-quo Assessment

Port of Lom is a Bulgarian river port of national importance. It is specialized in the handling of general and bulk cargo, passengers, and ship supply.

8.1.1.1 Rail Infrastructure Connectivity

The Port of Lom is not situated on the main railway network, but it is connected to it. The connection to the main railway network is done via the Lom-Brusartsi railway section.
There are 12 km. of electrified railway, passing through the territory of the Lom municipality. The railway station in the city of Lom has 17 tracks. They connect it with the port complex and allow for loading and unloading activities.
There is also a railway network within the territory of the port. The length of the rail tracks within the port of Lom is 7176 m. The port can handle full block trains along the quay, as well as in the port area. There are 18 cranes in the Port of Lom, 8 of which with a maximum lifting capacity of 20 tons.
Regarding the railway **Mezdra-Vidin**, it is the closest main railway to the city of Lom. It is a single-track railway with the exception of a small part between the village of Ruska Byala and Vratsa. The railway is fully electrified with a standard track gauge of 1435 mm. The maximum axle load is the standard 22.5 tonnes. According to the latest available information (2019-2020) for the maximum allowed speed a freight train can reach on the national railway system, the Mezdra-Vidin section allows 80 km/h. In some parts the speed is limited to 60 km/h.

8.1.1.2 Road Infrastructure Connectivity

In addition to the railway network, the Port of Lom is also connected to the national road network. Although there are no motorways and first-class roads passing through the municipality of Lom, there is a second-class road (II-81), which connects Lom with the Bulgarian capital Sofia. Its length is 149 km. The II-81 crosses the European road E79 at the city of Montana.
Another road from the National Road Network, which pass through the municipality of Lom, is II-11 – Vidin-Lom-Kozloduy. Its length is 216.9 km, which makes it the second longest second-class road in Bulgaria. It passes through the center of the city of Lom.
The street network within the city consists of 82.5% asphalt-covered roads, 4.5% cobblestone-covered roads, roads with pavement – 7.6% and non-paved (dirt-covered) roads – 5.4%.
The majority of the roads, which connect the city of Lom to the neighboring settlements, are two-lane roads (one in each direction). The road entry into the territory of the port and the parking area were renovated and expanded in 2018.
The main road in the area near Lom is **Vidin-Kulata**, also known as Republican road I-1, part of European road E79. It is a first-class road, which starts at Vidin and reaches the Greek border at the Kulata border checkpoint. This road does not pass through Lom, but the city is connected to it via the II-81 second-class road. Some parts of the road are interconnected with the Hemus and Struma motorways, therefore the maximum speed allowed in those parts is 140 km/h. Otherwise, the allowed speed in the other sections is 120 km/h. With the exception of the motorway interconnection, the road has two lanes – one in each direction. The maximum load per axle for trucks is 24 tones and it applies for trucks with three axles.
The roads, situated on the territory of the Lom municipality, are public-municipal property and they are managed by the mayor of the municipality who organises, assigns, manages and controls all

activities related to the construction, repair, maintenance and management of the municipal roads. The mayor must consult with the Road Infrastructure Agency all projects, related to building or connecting municipal roads to the main republican road network.
There are certain limits, which a vehicle must observe when using the national road network. The vehicle must have a height of maximum 4 m., a width of maximum 2.55 m. and a length of maximum 12 m for sole vehicle, 16.50 m for tractor with semitrailer and 18.75 m for truck with one or more trailers. If the vehicle does not stay within any one of the above-mentioned restrictions, it will have to be labeled as "oversized" and move in accordance to special rules. Vehicles with gross mass exceeding 10 t must travel with on-board device for speed limitation.

8.1.2 Mid-Term Perspective Assessment

8.1.2.1 Rail Infrastructure Connectivity

Main railway line № 7 Mezdra – Vidin from the National railway network is single, electrified (including the continuation of the line to the Danube Bridge 2 towards Romania) and with normal track gauge (1435 mm). Its length is almost 192 km. The deviations Brusartsi – Lom connects the port with the Bulgarian railway network.
Currently the following projects related to port of Lom development of rail infrastructure are ongoing:

Preparation for modernisation of Medkovets - Mezdra section (4205)
Section length (km): 85.57
The railway section Mezdra - Medkovets is part of the VII main railway line Mezdra - Vidin. The total length of the railway is 85,568 km, according to the conceptual design for the section Ruska Byala - Medkovets and the existing route in the section Mezdra - Ruska Byala.

Development and expansion of the port of Lom in order to create conditions for the construction of a multimodal terminal
Location - Port of Lom
Duration: 12/2023 – 12/2027
The project is included in the Programme Transport connectivity, financed by ERDF, but in one common project with port of Varna, so the given budget is for the overall project. Main activities are related to reconstruction and modernization of the port of Lom in order to create conditions for the construction of a multimodal terminal.

Reconstruction of ports of national importance
Duration: 12/2023 – 12/2027
The project is included in the Programme Transport connectivity, financed by ERDF, as main objectives are reconstruction of ports of national importance - reconstruction of Lom terminal, reconstruction of port facilities for ballast operations.

8.1.2.2 Road Infrastructure Connectivity

According to the Integrated Development Plan of the Lom Municipality 2021-2027, there are certain infrastructure projects, which are either at a project stage or at an implementation stage. One of them (already at an implementation stage) is the reconstruction and expansion of the E79 road.
Another project, which is in the pre-investment planning period, is the construction of a tunnel through the Petrohan Pass, which would greatly improve the connectivity in the area.

8.2 Port of Ruse

8.2.1 Status-quo Assessment

Port of Ruse is a multimodal transport node and provides suitable connection between three modes of transport – water, rail and road transport. The port is directly connected to the national rail and road network of Bulgaria.

8.2.1.1 Rail Infrastructure Connectivity

Ruse-east, Ruse-west and Svishtov (terminals of the Port of Ruse) have rail entrances, while Somovit has railway connection that is not in operation at the moment. Total length of rails tracks in the terminals is 8759 m. The port can handle full block trains along the quay, as well as in the port area.
The Port of Ruse has portal cranes, as well as other lifting equipment, for loading/unloading of bulk, general and other types of cargo – forklifts, bucket loaders, front loaders etc. In terms of loading capacity, Ruse-east has the biggest capacity with regards to heavy-lift cargo – 60 tons is the maximum weight of a unit. The floating crane working in Ruse area, owned by the Agency for Exploration and Maintenance of the Danube River, has lifting capacity of 100 tons.
The **Ruse-Gorna Oryahovitsa** railway is part of the core TEN-T network. The length of the railway section is 84 km. It is a single-tracked, fully electrified railway and has a standard track gauge of 1435 mm. The maximum axle load falls within the standard - 22.5 tonnes. According to the latest available information (2019-2020), the maximum allowed speed for freight trains doesn't go over 70 km/h. In fact, for the most parts, it is kept at 60 km/h along the railway.
The **Ruse–Kaspichan** section is the first part of the Ruse – Varna railway, which is part of the comprehensive TEN-T network. The railway itself is divided into two main sub-sections – Ruse-Samuil and Samuil-Kaspichan with 10 train stations along the way. It is a single-track railway with a total length of the track of 142 km, fully electrified and with a standard track gauge of 1435 mm. The maximum axle load is within the 22.5-ton standard. The allowed speed varies between 60 and 70 km/h.

8.2.1.2 Road Infrastructure Connectivity

The road entrances to the port are 8, where Ruse-east and Ruse-west have two entrances each.
On the Ro-Ro terminal, located in Ruse-east, there are two parking areas with capacity of 160 trucks (80 trucks each). Now, due to low activity of the ro-ro, parking areas are used as storages for agricultural and other machinery and equipment. There are parking areas for about 40 more trucks outside those 160 to the Ro-Ro terminal.
The access of road transport in Ruse-east is carried out only through the checkpoint located at the eastern end. The lack of waiting space for vehicles forces them to occupy a large part of the road connection to the terminal and this creates serious problems. It is planned a site for waiting of the cars to be built in the port terminal Ruse-east in the area east of the fuel depot.
The **Ruse-Makaza** road, also known as Republican road I-5, is part of European road E85. In fact, I-5 follows the E85 road from Ruse to Haskovo. It is a first-class road. Since the road is essentially an "express highway", the maximum allowed speed is 120 km/h. There is one lane in each direction – two overall. The maximum load per axle for trucks is 24 tons per axle.
The **Ruse-Varna** road, also known as Republic road I-2, is one of the major roads in Northeastern Bulgaria. It connects the city of Ruse with Varna and is part of the European road E70. Between Ruse and Shumen the road has been expanded to a 3-lane single carriageway. From Shumen to Varna, it is a 2-lane road. When the road reaches the village of Belokopitovo, it starts running parallel to the Hemus motorway and intersects it on two occasions. Since the road is an express highway, the maximum allowed speed is 120 km/h. The maximum load per axle for trucks is 24 tons per axle.

The roads, situated on the territory of the Ruse municipality, are public-municipal property and they are managed by the mayor of the municipality, just like in Lom.

8.2.2 Mid-Term Perspective Assessment

8.2.2.1 Rail Infrastructure Connectivity

The poor operational condition of some sections of the national railway network does not allow reaching the desired speed. The technical parameters of the railway network do not meet the requirements for a safe and comfortable transport.
Work needs to be done on improving the condition of the Ruse – Gorna Oryahovitsa railway, because in this respect the Ruse railway station is of great strategic importance for the implementation of combined transport on the European transport corridors №7 and №9.
One of the planned projects related to railway infrastructure development is:

Development of railway junction Ruse
Duration: 10/2021 – 11/2023
NRIC is going to contract a project for elaboration of detailed design and spatial plans for project preparation - Development of railway junction Ruse, as part of biggest project, where the railway junctions of Varna and Gorna Oryahovitsa are included as well.
The objective is preparation of project maturity, needed for execution of investment part, which is not part of the plans for period 2021-2027.

8.2.2.2 Road Infrastructure Connectivity

Various activities, related to the removal of certain limitations of the Bulgaria road network, need to be carried out. The completion of the Ruse-Veliko Tarnovo motorway, which will supersede the I-5 road at least in the section between those two cities, is of essential importance for improving the connectivity and development of cross-border connections in the region.
It is also necessary to build the northern Danube road Vidin - Lom - Svishtov - Ruse - Silistra, which will improve transport accessibility to the coastal industrial zones and will therefore increase the investors' interest in them. Currently, the connection of most Danube ports with the main roads of the country is done via second-class roads, most of which are in bad condition. This requires urgent repairs and modernization, with the aim of removing the bottlenecks and increase the bearing capacity of their pavement.
The following projects are planned to be executed in the period 2023-2027:
Construction of highway Ruse - Veliko Tarnovo
Section length (km): 133 km
Project category: Connectivity and integration
The Ruse-Veliko Tarnovo section is part of European transport corridor 9. The implementation of the project will contribute to the construction of the Rhine-Danube and Orient / Eastern Mediterranean trans-European Transport Corridors in the North-South direction. The project envisages the implementation of the following main activities: 1. Preparation of a technical project; 2. Execution of construction and installation works; 3. Implementation of consulting services and construction supervision. With the implementation of the project, a highway with an approximate length of 133 km and gauge A27 will be built. The route is divided into 3 sections: Ruse-Byala; bypass of Byala; Byala - Veliko Tarnovo. Project readiness – ready technical design, incomplete land acquisition procedures.

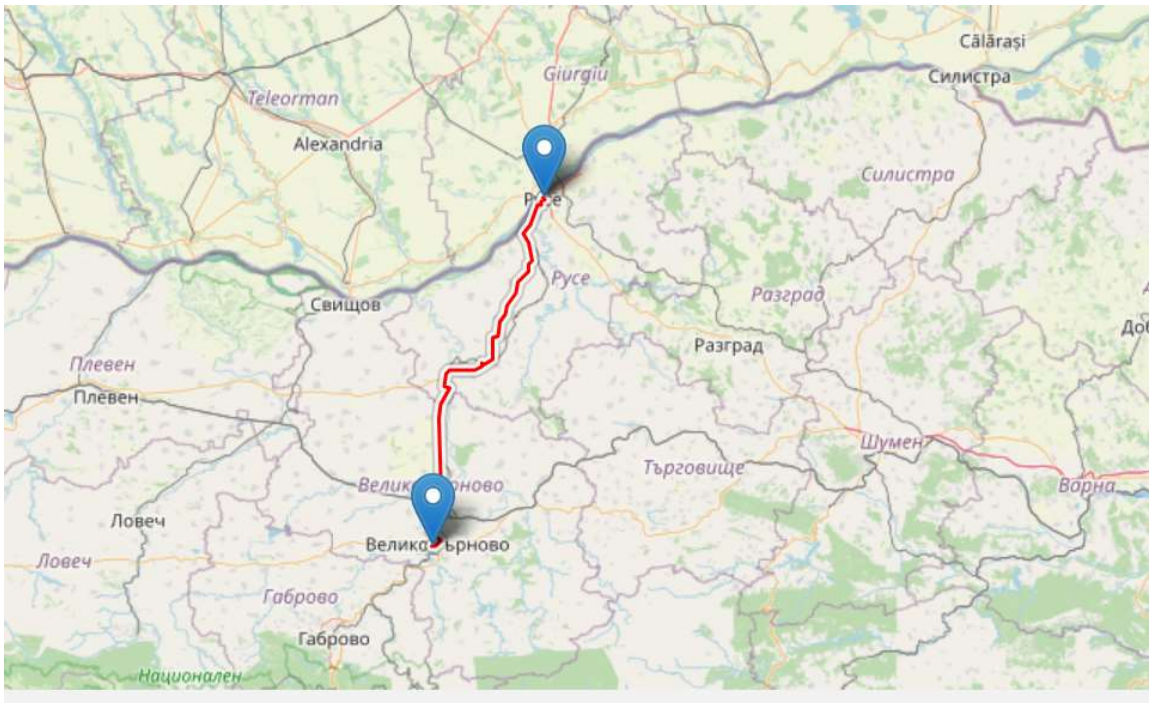

Figure 10.1: Construction of highway Ruse - Veliko Tarnovo

<u>Detour of the town of Gabrovo, including a tunnel under Shipka Peak</u>
Section length (km): 133 km
Project category: Connectivity and integration
Duration: 12/2021-12/2025
The project is a continuation of road Ruse – Veliko Tarnovo, part of European corridor 9. The road construction has an approximate length of 10.5 km and gauge G10.50. The project also envisages the construction of a tunnel under Shipka Peak with an approximate length of 3.2 km. The project will facilitate the traffic and will provide direct connection from the Danube region to the central and south part of Bulgaria, with options for connections with other motorways, being part of European transport corridors.

Figure 10.2: Detour of the town of Gabrovo, including a tunnel under Shipka Peak

Reconstruction of ports of national importance (newly included project)

Location – Port of Ruse

Duration: 12/2023 – 12/2027

The project is included in the Programme Transport connectivity, financed by ERDF, as main objectives are reconstruction of ports of national importance - construction of facilities against flooding of Ruse-West terminal, reconstruction of port facilities for ballast operations.

9 Romania: Ports' Infrastructure Connectivity Assessment

9.1 Port of Constanta

9.1.1 Status-quo Assessment

9.1.1.1 Rail Infrastructure Connectivity

The railway network of the Port of Constantza is in excellent connection with the national and European railway network system, the Port of Constantza being a starting and terminus point for the Pan-European Transport Corridor no. IV. Round-the-clock train services carry high volumes of cargo to the most important economic areas of Romania and Eastern Europe, the Port of Constantza being also an important transport node of TRACECA Corridor, providing the connection between Europe, Caucasus and Central Asia.
Each and every port terminal has direct access to the railway system, ensuring a safe and efficient transport of cargoes. Every day shuttle trains provide fast transport of containers to the national destinations for just-in-time delivery. The total length of railways in the port amounts to 300 km.

9.1.1.2 Road Infrastructure Connectivity

The ten gates of the Port of Constantza are very well connected with the national and European road network. The connection with the Pan-European Transport Corridor no. IV has a strategic importance, linking the Port of Constantza with the landlocked countries from Central and Eastern Europe.
The construction of the A2 motorway between Bucharest and Constanta began in the communist era. The first section Fetesti-Cernavoda (about 18km) opened in 1987.
The total length of roads in the port amounts to 100 km. The A2 motorway, nicknamed The Sun's Motorway ("Autostrada Soarelui" in Romanian), is linking Bucharest to city port Constanta and has a lenght of 203 km.

9.1.1.3 Maritime Infrastructure Connectivity

The Port of Constantza is connected to the Pan European Corridor VII - Danube - that links two of the main trade poles of Europe: Rotterdam and Constantza, creating a navigable inland waterway from the North Sea to the Black Sea. The length of the navigable river is 2,414 km from the Romanian terminus Sulina to Kelheim in Germany, where it connects to the Main-Danube Canal, the Romanian sector having a length of 1,075 km. The Danube-Black Sea Canal links the Port of Constantza to the Rhine-Main-Danube Corridor, offering the most efficient and ecological transport alternative within the hinterland and at the same time a 4,000 km shortening of the sea trade routes coming from Far East and Australia through the Suez Canal.
According to European Union and United Nations standards The Danube-Black Sea Canal has a class VI rating and is an 'F' class inland canal. The 64.4 km long and 90 m wide canal has a water depth of 7 m and 17,5 m clearance under the bridges and the daily running of the waterway is in the responsibility of the National Company "Navigable Canals Administration".

9.1.2 Mid-Term Perspective Assessment

The development strategy of the Port of Constantza implemented by the National Company "Administration of Maritime Ports" SA Constantza, currently includes a series of projects on the road, rail and maritime infrastructure field:

9.1.2.1 Rail Infrastructure Connectivity

Doubling the railway in the Agigea Lock - Constanta Ferry Boat and systemizing the connection point in Agigea Lock
Estimated value of the investment: 13 mEUR
Project execution time: 36 months
Project Objectives: The project will result in reduced waiting times of the trains. It is to be noted that the doubling of the access railway line at the Constanta Ferry-Boat station has been analysed within the Feasibility Study "Development of the railway capacity in Constanta South Agigea Port" (Object I.c.2"). However, in the above-mentioned study the works were not included in Phase I of the works but being proposed to be implemented "as soon as all the financing conditions will be met".

Development of rail capacity in the C.F. Constanta Port Ferry-boat Terminal
Estimated value of the investment: EUR 9,64 mEUR
Project execution time: 36 months
Projects Objective: The project will lead to a reduction in waiting times for train sets, the optimum take-up of freight traffic in the area and the elimination of operating, reception and handling malfunctions. It will be considered that in the feasibility study, "The development of railway capacity at C.F. Constantza Port Ferry-boat Terminal" is to be analyzed the separation of the maneuvering areas for the LFI Kronospan device and the future line device of JETFLY for direct access of trains to the lines of the C.F. station, construction of a maneuver group (the group of lines that will be formed as a C.F. triage for the future Mol IIIS) between the Kronospan line and the drawing line of the C.F. station for the accumulation of wagons for the purpose of the introduction to the front and the construction of 3 delivery receipt lines.
Project Stage: The specifications for the elaboration of the F.S. are being prepared, the financing of about 2 million lei being provided from own sources of the N.C. M.P.A. S.A. (BVC 2021-2022) to ensure the maturity of the project at the time of approval of POT 2021-2027.

Development of rail capacity in the river-sea sector of the Port of Constanta - phase II
Estimated value of the investment: 9 mEUR
Project execution time: 36 months
Project Status: The specification for the elaboration of the F.S. is being prepared, the financing of about 1,45 million lei is provided from the own sources of the N.C. M.P.A. S.A. (BVC 2021-2022) to ensure the maturity of the project at the time of approval of POT 2021-2027

9.1.2.2 Road Infrastructure Connectivity

1. The extension to four lanes of the road between Gate 7 and the intersection of the objective "Road bridge at km 0 + 540 of the Danube Canal - Black Sea" with the road that connects Gate 9 and Gate 8 to the northern part of Constantza Port
Estimated start date: 2021
Estimated end date: 2024
Estimated cost: 22.5 mEUR
Funding source: POIM 2014 - 2020
Project description:
The main objective of the project is to widen the road to four lanes between the terminal point of the Constantza bypass and the Access Gate no. 7 from the Port of Constantza to ensure a good flow of traffic to the northern part of the Port of Constantza.
The following works will be done in addition to widening the road to four lanes of the existing road between the bypass of Constantza and Gate no. 7 to ensure a good flow of traffic:
-Passing over the railway lines at the crossing point bypassing the city of Constanta;
-Parking space for trucks on Gate 7 positioned in the direction of entering the port;

-Relocation of the fence;
-Repair of the works of some sections of the port surveillance road;
-Relocation works / protection of utility networks.

Figure 11.1: The extension to four lanes of the road between Gate 7 and the intersection of the objective "Road bridge at km 0 + 540 of the Danube Canal - Black Sea" with the road that connects Gate 9 and Gate 8 to the northern part of Constantza Port

2. Extension to four lanes of the existing road between Gate 10 Bis and Gate 10
Estimated start date: 2021
Estimated end date: 2024
Estimated cost: 60 million lei
Funding source: POIM 2014 – 2020 - approved
Project description:
- ensuring the continuity of traffic running on 4 lanes on the new road bridge at Km 0 + 540 of the Black Sea-Danube Canal and inside the port of Constantza de Sud after access, on the new access gate 10 bis to the junction with the current access from gate 10.
Works:
The 4-lane road between Gate 10 bis and the area behind the Gate 10: 800 m; Diversion works of the main utility networks, which are located on the site of the future road; Arranging the connection of the new road extended to 4 lanes with the access / exit areas from Gate 10bis: 1700 m2.

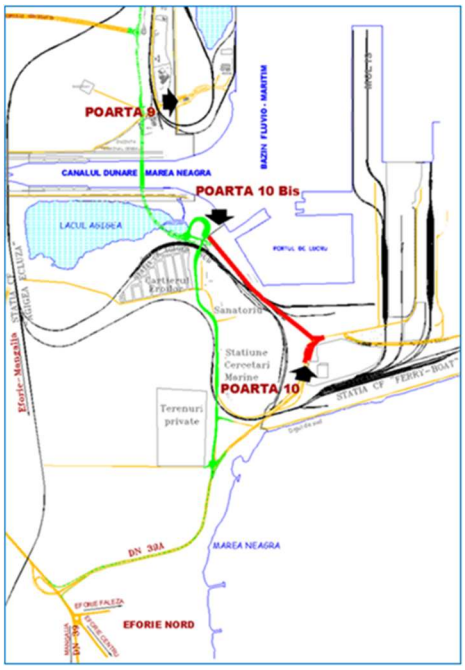

Figure 11.2: Extension to four lanes of the existing road between Gate 10 Bis and Gate 10

3. Review and update of the Master Plan for road and access infrastructure in the port of Constantza (MP infrastructure)

Figure 11.3: Review and update of the Master Plan for road and access infrastructure in the port of Constantza (MP infrastructure)

Estimated start date: 2021

Estimated end date: 2022
Estimated cost: 630,000 euros
Source of funding: MPAC's own sources
Project description:
The expertise, analyzes and studies that will be performed for the identification and sizing of works, including the elaboration of traffic studies, as well as the staging of rehabilitation, modernization and extension of road and access infrastructure will be correlated with the implementation of projects for the development of both port infrastructure and private investment to increase the capacity of existing terminals or build new ones.

4. Implementation of the Master Plan for road and access infrastructure in the port of Constantza (rehabilitation, modernization, extension), including road bridge to the artificial island

Figure 11.4: Implementation of the Master Plan for road and access infrastructure in the port of Constantza (rehabilitation, modernization, extension), including road bridge to the artificial island

Estimated start date: 2022
Estimated end date: 2026
Estimated cost: 70-100 million euros
Funding source: Operational Program 2021-2027
Project description:
Rehabilitation, modernization and expansion of road and access infrastructure will be correlated with the implementation of projects for the development of both port infrastructure and private investment to increase the capacity of existing terminals or the construction of new ones.

9.1.2.3 Maritime Infrastructure Connectivity

1. Barge terminal - Stage II
Estimated start date: 2022
Estimated end date: 2025
Estimated cost: 37.3 mEUR
Funding source: Operational Program 2021-2027

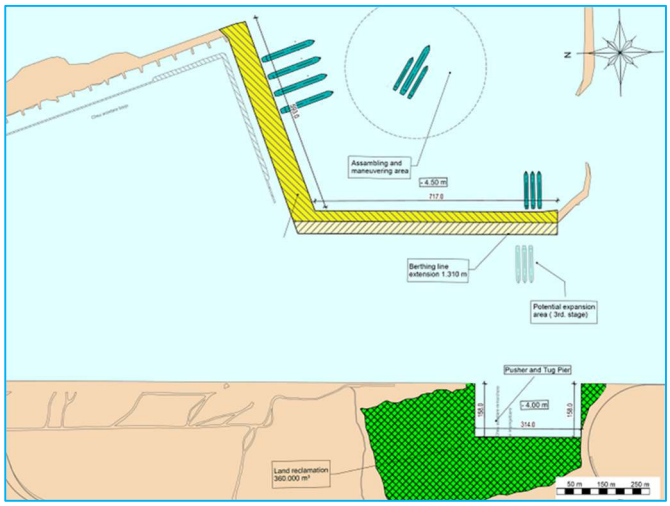

Figure 11.5: Barge terminal - Stage II

Project description:

- Extension of the barge terminal to avoid congestion of the river basin.
- Covering the demand for inland waterway traffic
- Providing facilities dedicated exclusively to pushers in the waiting area of the barge, including reserved spaces.
- Building new berths

2. Quay near the entrance of the Danube-Black Sea Canal (towards the working port)
Estimated start date: 2022

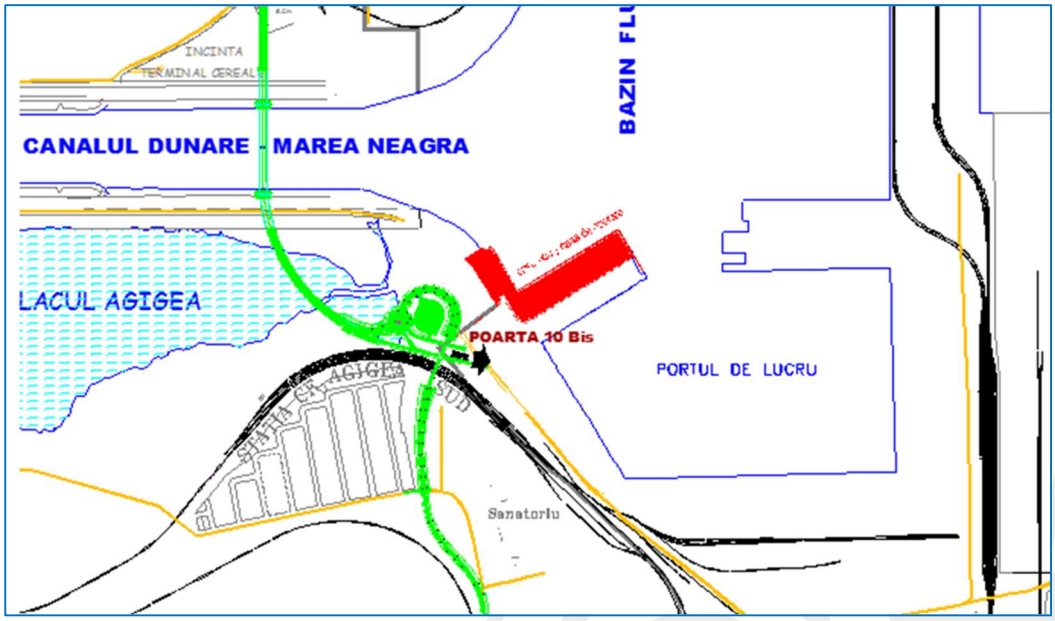

Figure 11.6: Quay near the entrance of the Danube-Black Sea Canal (towards the working port)

Estimated end date: 2026
Estimated cost: 17 mEUR
Funding source: Operational Program 2021-2027
Project description:

By creating the new access to the Port of Constantza Sud - Agigea through Gate 10 bis, close to berths DPL2 and DPL1, the development of new port areas, including new berths in this area can become attractive and arouse the interest of new investors to carry out activities and operation of goods near the entrance to the Danube-Black Sea Canal.
Works:
Extending the quay in the NE direction, towards the entrance of the Danube - Black Sea Canal, by building a new quay.
Construction of work platforms and storage spaces behind the quay.
Providing exclusive access routes from the road bridge to the new terminal.

3. Rehabilitation of the deep water breakwater in the port of Constantza
Estimated start date: 2022
Estimated end date: 2025
Estimated cost: 23.6 mEUR
Funding source: Operational Program 2021-2027
Project description:
- Major repairs to the deepwater breakwater and its cross section to prevent future storms
- Securing the inland waters of Constantza Port
- Maintain safe navigation conditions

4. Rehabilitation of the northern breakwater of the port of Constantza
Estimated start date: 2022
Estimated end date: 2025
Estimated cost: 25 million euros
Funding source: Operational Program 2021-2027
Project description:
- Major repairs to the northern breakwater and its cross section to prevent future storms
- Securing the inland waters of Constantza Port
- Maintain safe navigation conditions

5. Dredging in the Port of Constantza, the Midia area and the Port of Mangalia (including the widening of the access mouth)

Figure 11.7: Dredging in the Port of Constantza, the Midia area and the Port of Mangalia (including the widening of the access mouth)

Estimated start date: 2022
Estimated end date: 2024
Estimated cost: 100 mEUR
Funding source: Operational Program 2021-2027
Project description: Dredging works

Completion of infrastructure works, access roads and utilities, for the development of specialized terminals in the port of Constanta South – Piers IIIsS and IV S
Estimated start date: 2022
Estimated end date: 2026
Estimated cost: 500 mEUR
Funding source: European Funds
Project description:
Preparation of Feasibility Study / DALI documentation and funding application - estimated value of approximately 2.5 million
New port territory:
155 ha - operational platform
36 ha - logistics area
12 deep depth berths (-16.5 m) + 5 deep depth berths (-19 m)
- dedicated to specialized terminals

Figure 11.8: Dredging in the Port of Constantza, the Midia area and the Port of Mangalia (including the widening of the access mouth)

10 Ukraine: Ports' Infrastructure Connectivity Assessment

10.1 Port of Reni

10.1.1 Status-quo Assessment

The seaport of Reni is an important transport hub in Ukraine, which closely links sea, river, rail and motor roads. The optimal route from the Danube`s European countries to the Caucasus, Iran, the short route of delivery of goods from Turkey, Greece to the Baltic countries, Russia, Scandinavia passes through the port of Reni. Reni is located on the map of three international transport corridors: VII Danube Pan-European, IX International land, and the international highway E-87 as well as the international cooperation programs TRACEKA and the trans European transport network TEN-T.

Figure 14.1: Scheme of the sea port Reni

10.1.1.1 Rail Infrastructure Connectivity

Sea port Reni has an extensive railway network with a total length of 13.4 km. The railway tracks are adjacent to the railway of the Reni station and have a railway connection with Reni-Galati, Reni-Chisinau, Reni - railway stations of Ukraine.

Figure 14.2: Scheme of road and rail links of the port of Reni

The administration of public railway transport is State Administration of Railway Transport of Ukraine "Ukrzaliznytsia" (hereinafter - Ukrzaliznytsia), which was established in December 1991. The management sphere of Ukrzaliznytsia covers the railways of Donetsk, Lviv, Odessa, Pivdenna (Southern), Pivdenno-Zakhidna (Southwestern) and Pridniprovska (Near-Dnipro) Railways, and also other enterprises and organizations of integrated industrial-engineering complex, that enables freight and passengers transportation.
Ukrzaliznytsia accomplishes centralized management of the transportation process in inland and interstate communication regulates railway industrial and economic activity.
The width of railway gauge in the port of Reni is 1520mm.
Ukraine has a separate section of the railway near the port of Reni and the Bolgrad station - on the route from the Moldavian station Basarabeasca to the Romanian Galati.
After dismantling in 1997 the section of the Artsyz - Basarabeasca road connecting Odessa, Ilyichevsk, Belgorod-Dnestrovsky with the port of Reni, freight rail traffic stopped.
In 1999, sections of the railway in Ukraine at the Reni and Bolgrad stations were transferred to Ukrzaliznytsia and are currently isolated from the rest of the Ukrainian railway network.
The increase in tariffs, including for transit along the Moldovan section of the railway, has led to the fact that only two or three freight trains depart from the side of Basarabeasca to the Reni station per day. And, only one train is formed a day in the amount of 35-40 wagons, for the Romanian Galati.
The railway supply of the ports of Giurgulesti and Cahul is carried out either by the Moldovan railway in Cahul, or by transit through the Ukrainian section of the railway in Reni along the main route Bassrabeasca - Reni - Galati. There is also a certain volume of transit cargo to Romania.
The combined track between Galati and Giurgiulesti with a railway track gauge of 1435 mm is not used, trains run on a track of 1520 mm. The railway track with a width of the Ukrainian standard - 1520 mm, enters the Romanian city of Galati and reaches the Arcelor Mital metallurgical plant.
The main cargo delivered by rail: iron ore, oil products, agricultural products (grain group).
The Reni-Etulia railway is a Ukrainian section of the railway connected with the Moldavian railway. It provides cargo transportation to the seaport of Reni (see Fig. 4). The main cargo delivered by rail (mainly transit cargo through Moldova to the port of Reni): iron ore, fertilizers, agricultural products (grain group).
There are 6 port operators in the Reni seaport, which have the equipment necessary for unloading grain cargo. Loading and unloading capacities in the port allow unloading 120-150 wagons per day.
3 port operators on three railway fronts are loading 50-60 wagons per day of grain and chemical cargo in bulk.

Unloading up to 100 wagons of iron ore raw materials is carried out at the fronts of unloading of wagons.
Up to 60 wagons - chemical goods are unloaded at a specialized complex.
Up to 100 wagons - chemical goods are unloaded according to the direct option: special wagon – ship.
Up to 100 wagons - oil cargo are unloaded at specialized terminals by three port operators.
100 wagons - in big bags are unloaded at the 2nd and 3rd fronts by three port operators, by portal cranes.
There are no cargo security problems. Cargo security is carried out by officers of the maritime security service.
Check-in of goods is carried out through 4 specially equipped railway posts. Port operators have railway scales for weighing, as well as parking and storage areas for railway wagons.

10.1.1.2 Road Infrastructure Connectivity

The main highway of the Ukrainian part of the Danube River is the M-15 Odessa-Izmail-Reni highway (to Bucharest), which coincides with a part of the European route E87 (Odessa - Constanta - Izmir - Antalya), see fig. 2, which is part of the European Black Sea Economic Community corridor.
The M-15 motorway is of strategic importance for the economic development of southern Ukraine, it connects 5 ports on the Black Sea and serves as a transport corridor for heavy vehicles going to the international border crossing point of Giurgiulesti. The highway M-15 Odessa - Reni is located in the Odessa region (partly passes through the village of Palanca in the Republic of Moldova). The highway starts in Odessa, passes through the village of Palanka in Moldova (but the road belongs to Ukraine), Monashi, Sarata, Tatarbunary, Izmail Reni and ends at the Reni checkpoint, which leads to Constanta in Romania. The length of the Odessa - Reni (Bucharest) highway is 289.4 km.
M-15 highway has 2 lanes, the maximum permissible speed is 90 km, the permissible axle load of a truck is 10 tons. M-15 motorway runs along the fence of the port of Reni, about 2 km from the port of Izmail and from the Ukrainian terminal of the Orlovka-Isakcha international ferry crossing, see Figures NN 2,5.
Administrator of the road infrastructure of the M-15 highway is a State Agency for Motor Roads of Ukraine - "Ukravtodor" (hereinafter - Ukravtodor).
A section M-15 motorway with a length of almost 80 kilometers, near Reni and Izmail ports, was renovated during 2016-2018.
The length of motor roads in the port of Reni is 6.2 km. The port's roads are connected with the M-15 Bucharest - Reni - Odessa highway, as well as the Reni - Chisinau highway.
In the Reni seaport, cars are unloaded per year:
- 20-30 thousand vehicles - grain cargo, 6 port operators, to special warehouses and silos;
- 200 vehicles - loading / unloading with oil products to specialized areas by 3 port operators at special terminals.
Ro-Ro terminal has an adjoining outdoor parking area of 19150 m^2 and guarded parking lot for cars with an area of 12000 m^2
In the seaport of Reni, all cargo movements are recorded by video support and special systems that are equipped on vehicles and depend on the cost and value of the cargo. Control is carried out by the Marine Security Department around the clock. There are no cases of major theft. To eliminate fires in the port, there is a fire safety squad.

10.1.1.3 Maritime Infrastructure Connectivity

The area of the Reni port territory is 94.36 hectares. The port infrastructure consists of three cargo areas, a ferry complex and an oil section. The maximum depths at the berths are 3.5–12 m (7.5 m on average), which allows handling any type of cargo.
Total length of berths - 3936 m;
The maximum number of vessels serviced at the same time - 11;

Maximum capacity of anchorage or waiting area for barges - 42 units;
Storage capacity - 204900 m^2;
The capacity of storage facilities for liquid cargo is 100,000 m^3;
Storage capacity for containers - 250 units;
Storage capacity for Ro-Ro machines - 250 units.
The design annual cargo turnover of the port is 14.5 million tons.
Portal cranes for handling heavy and oversized cargo were purchased by the port in 1986. Currently, the following cranes are used: Albatross type with lifting capacity -10t, Sokol type with lifting capacity 16-20t, Condor type with lifting capacity 32-40 tons. Reni port also has one Kato truck crane with a lifting capacity of 50 tons, as well as an overhead crane with a lifting capacity of 250 tons, and floating cranes - with lifting capacity from 5 to 100 tons, auto and electric loaders with lifting capacity from 1.5 to 10 tons, special tractors, roll trailers, grain all-weather pneumatic loader, wagon unloader. Most of the transshipment technologies in the port are at the end of their life cycle.
Port of Reni has 37 specialized berths, of which 31 are cargo ones, for handling general, liquid, timber, heavy, container, packaged cargo, bulk cargo, wheeled vehicles and passenger ships. The total length of berths in the port is 3,927 m. The berths are located along the left bank of the river. Danube, as well as in the backwater of the port.
The port also has 2 specialized berths. The first berth in the backwater at berth No. 22 is equipped with a crane with a lifting capacity of 250 tons and serves for heavy and oversized cargo. The length of the berth is 125 m and the depth at the wall is 3.5 m.
Berth No. 2 can handle Ro-Ro vessels up to 80 m long with a depth of 3.5 m at the berth. The Ro-Ro terminal and the adjoining 19.150 m^2 outdoor parking lot have not been used since the Ruse (Bulgaria) -Reni line ceased operations.
It is possible to transship petroleum products (diesel fuel and gasoline) in export, transit and import modes. Transshipment of oil products is carried out at 3 port terminals - by 4 port operators, the total volume of one-time storage is 110 thousand tons. The work is ensured according to the standards of modern overload technology in accordance with the requirements of environmental, industrial and technical safety. The capacity for transshipment of oil products is up to 500 tons / hour.
Oil and liquid chemicals (transported from the Caucasus through the ports of Georgia) are served at a special terminal located in the backwater, with tanks with a capacity of 60,000 tons and an annual capacity of 1.5 million tons.
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Oil and liquid chemicals (transported from the Caucasus through the ports of Georgia) are served at a special terminal located in the backwater, with tanks with a capacity of 60,000 tons and an annual capacity of 1.5 million tons.
There are no cargo security problems. Cargo security is carried out by officers of the maritime security service.

10.1.2 Mid-Term Perspective Assessment

The medium-term prospects of the port of Reni (until 2031) are determined on the basis of clause 2 of article 18 of the Law on Seaports of Ukraine and the Strategy for the development of seaports of Ukraine for the period up to 2038, approved by the Cabinet of the Ministry of Ukraine from 23.12.

No. 1634-r. The plans for entering the reals of the national transport strategy of Ukraine for the period up to 2030, detailed schemes of the cabins of the city of Ukraine dated 04/07/2021. No. 321-r. Investment proposals of SE "USPA" are presented on the website- http://investinports.com.

10.1.2.1 Rail Infrastructure Connectivity

The following issues are being considered:

- restoration of the section of the Berezino-Basarabeasca railway;
- construction of the Reni-Izmail railway,

but, for the medium term, no construction work is planned.

10.1.2.2 Road Infrastructure Connectivity

The State Agency for Motor Roads of Ukraine "Ukravtodor" (hereinafter-Ukravotor) is considering the option of building a new section of the international highway M-15 Odessa-Reni with a bridge over the Dniester estuary. The length of the projected section of the road is six kilometers, but the bridge across the Dniester estuary will shorten the road from Odessa to Belgorod-Dnestrovsky by 40 kilometers.
There are no plans to build highways in the medium term.

10.1.2.3 Maritime Infrastructure Connectivity

For the medium term (until 2031), is planned:
Construction of transport and logistics infrastructure facilities for container handling and organization of intermodal transportation in the rear of berths №№36,37
Expected result: increase of capacities for processing and temporary storage of cargoes to 0.1 million tons per year.

Figure 14.3: Construction of transport and logistics infrastructure facilities for container handling and organization of intermodal transportation in the rear of berths №№36,37

Construction of a transshipment complex of grain and containerized cargo (until 2026)
Expected result: increase of cargo processing capacities to 0.5 million tons per year.

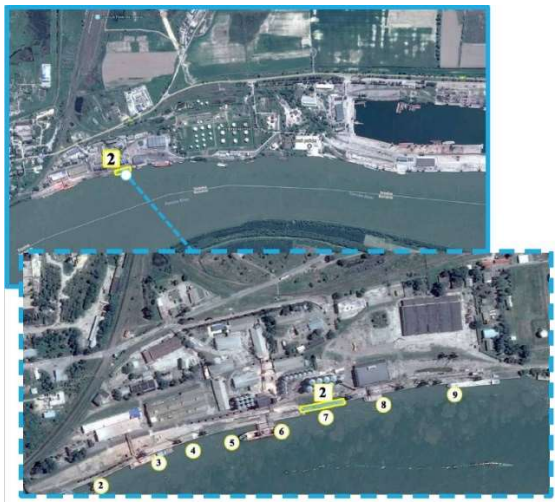

Figure 14.4: Construction of a transshipment complex of grain and containerized cargo(until 2026)

Construction of a complex of temporary warehouses

Expected result: increase of cargo handling capacity to 0.65 million tons per year.

Figure 14.5: **Construction of a complex of temporary warehouses**

Construction of a grain complex for grain transshipment

Expected result: increase of capacities for processing and storage of cargoes to 0.2 million tons per year.

Figure 14.6: Construction of a grain complex for grain transshipment

10.2 Port of Izmail

10.2.1 Status-quo Assessment

State Enterprise "Izmail Merchant Sea Port" is a diversified enterprise handling a wide range of bulk cargo (iron ore, coal, construction and other bulk cargo) and general cargo (rolled metal, cargo in packages, big bags and containers). The capacities of the enterprise allow to process up to 8.5 million tons of cargo per year and accept for cargo operations vessels with a draft of up to 7 m, a length of 150 m and a width of up to 30 m. The draft of vessels entering the port is limited by the passage depths of the Sulinsky Canal and the Bystroe Canal on the Ukrainian section of the Danube River.
The seaport of Izmail is an important transport hub in Ukraine, which closely links sea, river, rail and motor roads. The optimal route from the Danube European countries to the Caucasus, Iran, the short route of delivery of goods from Turkey, Greece to the Baltic countries, Russia, Scandinavia passes through the port of Izmail. Izmail is located on the map of three international transport corridors: VII Danube Pan-European, IX International land, and the international highway E-87 as well as the international cooperation programs TRACEKA and the trans European transport network TEN-T.

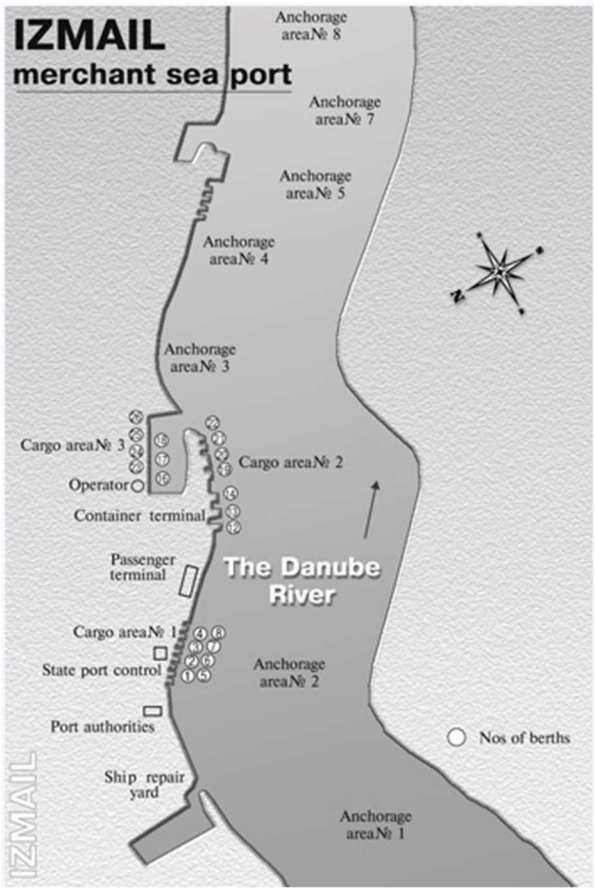

Figure 14.7**: Scheme of the seaport of Izmail**

10.2.1.1 Rail Infrastructure Connectivity

The total length of the railway from Odessa to Izmail is 287 kilometers, makes it technically possible to provide an average route speed, taking into account stops and restrictions, not less than 70 km / h. Station Artsyz, see fig. 4a, currently - a junction on the line towards Izmail. There is a revolving locomotive depot, in which mainline and shunting diesel locomotives are based, serving an almost 200-kilometer section of the non-electrified railway from Belgorod-Dnestrovsky to Izmail with a dead-end branch to Berezino.

The locomotive depot serves all diesel locomotives operating on the non-electrified section between Belgorod-Dnestrovsky and Izmail. This is about 10-12 mainline diesel locomotives and the same number of shunting ones.

In Soviet times, freight trains went through the Artsiz station towards the ports of Izmail and Reni, now it is mainly intermediate in the direction of cargo transportation towards the port of Izmail.

In 1997, a section of the railway between Basarabeasca and Berezino was dismantled, the volume of traffic dropped sharply and the local locomotive depot became only "turnover". Currently, the station is served by only one passenger train - "Kiev - Izmail". The restoration of the railway to Basarabeasca will open up a number of economic and geopolitical advantages for Ukraine and Moldova.

From Odessa to Belgorod-Dnestrovsky the railway is electrified, then to Izmail the trains are driven by diesel locomotives assigned to the locomotive depot at the Odessa-Sortirovochnaya station, but undergoing maintenance in the turnaround depot at Artsyz station.

Port of Izmail has 24 internal railways.

Maximum intensity of wagon processing per day - 448 units.

Carriage turnover - 163520 units per year.
Wagons loaded with cargo enter the port through 4 railway posts with installed ramps to check the integrity of the cargo.
There are no cargo security problems. Cargo security is carried out by officers of the maritime security service.
Check-in of goods is carried out through 4 specially equipped railway posts. Port operators have railway scales for weighing, as well as parking and parking areas for railway wagons.

Figure 14.8 (a)**: Scheme of rail and road communications**

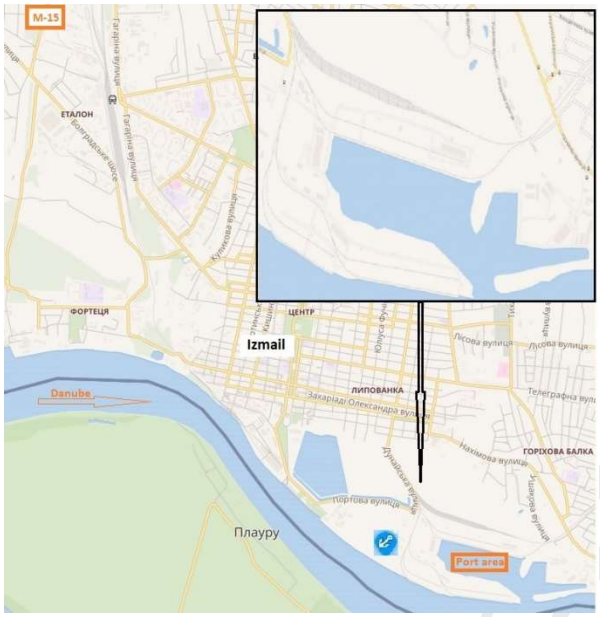

Figure 14.8 (b)**: Scheme of rail and road communications**

10.2.1.2 Road Infrastructure Connectivity

The port of Izmail is adjacent to the highways leading to the international highway M-15 Odessa-Reni-Bucharest, see fig. 5. Motorway M-15 Odessa - Izmail - Reni - Bucharest is in good technical condition and requires only routine maintenance. The international highway E58 runs through Ukraine, around the Black Sea and on to the Russian Federation.
The main road of the Ukrainian part of the Danube River is the M-15 Odessa-Izmail-Reni highway (to Bucharest), which coincides with a part of the European route E87 (Odessa - Constanta - Izmir - Antalya), see Fig. 2, which is part of the European "Black Sea Economic Community corridor".
The M-15 motorway is of strategic importance for the economic development of southern Ukraine, it connects 5 ports on the Black Sea and serves as a transport corridor for heavy vehicles going to the international border crossing point of Giurgiulesti. The M-15 Odessa - Reni highway is located in the Odessa region (partly through the village of Palanca in the Republic of Moldova). The highway starts in Odessa, passes through the village of Palanka in Moldova (but the road belongs to Ukraine), Monashi, Sarata, Tatarbunary, Izmail, Reni (former P33 highway) and ends at the Reni checkpoint, which leads to Constanta in Romania.
The length of the Odessa-Reni (Bucharest) highway - 289.4 km.
M-15 highway with a length of almost 80 kilometers was repaired during 2016-2018.
M-15 motorway runs about 2 km from the port of Izmail and from the Ukrainian terminal of the Orlovka - Isakcha international ferry crossing, see Fig. No. 2,5.
M-15 motorway has 2 lanes, the maximum permissible speed is 90 km, the permissible axle load of a truck is 10 tons. Distance by road Odessa-Izmail - 192 km.
Goods safety on the railway is ensured by the control and escort of goods by the police and security companies;
Automobile transportation - video maintenance and special systems that are equipped on vehicles. It all depends on the value of the cargo.
In the seaport of Izmail, all movement of goods is recorded by video support, by the department of the maritime security service around the clock. There are no cases of major theft. To extinguish fires in the port, there is a fire safety squad.

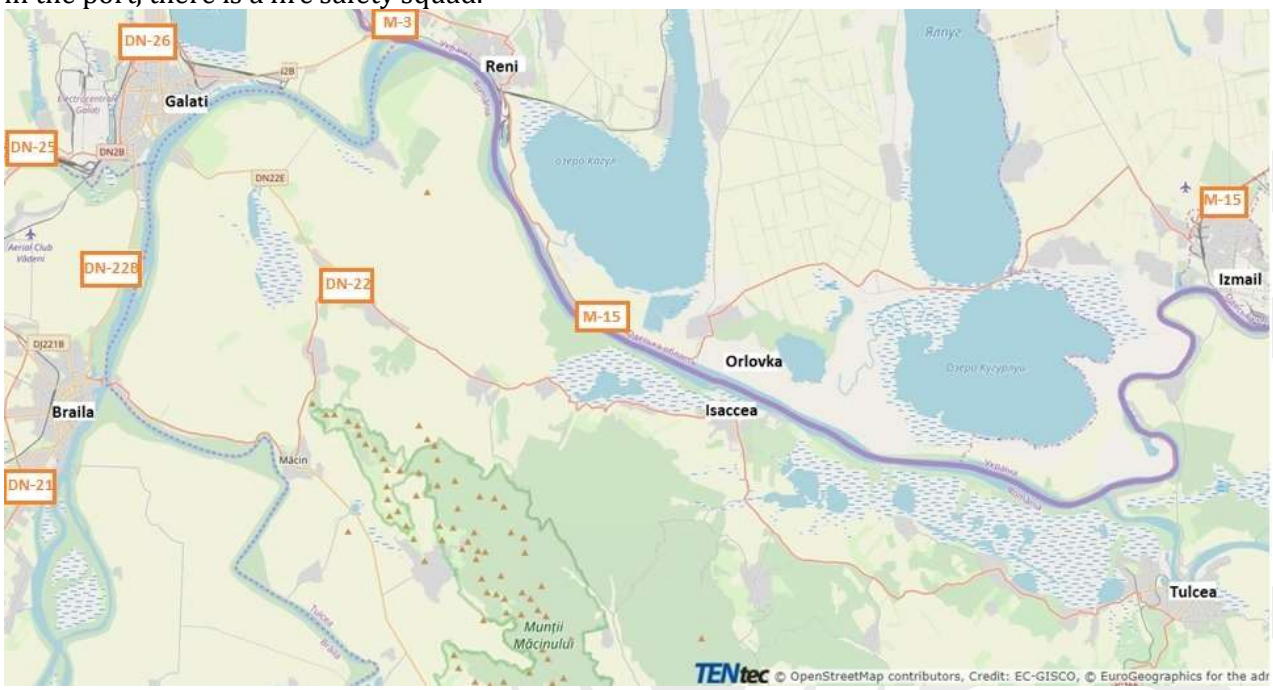

Figure 14.9**: Road map**

10.2.1.3 Maritime Infrastructure Connectivity

The total area of the port - 81.99 hectares.
The total length of the berths - 40.86 m.
The maximum number of ships serviced at the same time - 25 units.
Maximum capacity of anchorage or holding area for barges (quantity) up to 40 units.
Warehouse capacity - 233,000 m^2.
Warehouse capacity for containers - 816 units.
The total number of portal cranes - 33 units.
The seaport of Izmail has 24 berths and 5 bank protections with an adjacent territory for storing cargo at 85 km of the Danube River, where vehicles are handled around the clock. Depths at berths range from 0.4 to 7.5 meters. The main cargo flow of the Izmail seaport is export and transit of bulk cargo (coal, ore cargo), bulk (grain and food) and bulk (oil products, gases).
The total length of berths in the port is 3860.25 m. The berths are located along the left bank of the river. Danube, as well as in the backwater of the port. Three loading and unloading areas of the port specialize in transshipment of general cargo, large containers and bulk cargo.
Crane equipment. The port berths are equipped with modern handling equipment: gantry cranes: Albatross with lifting capacity -10 t, Sokol with lifting capacity - 16-20 t, Condor with lifting capacity - 32-40 t, floating cranes with lifting capacity up to 100 t, there is a container loader with a lifting capacity of 40 tons, auto and electric loaders of various carrying capacities, etc. For auxiliary operations - tractors, bulldozers, tractors and other equipment. There is a special container complex.
The open storage area of Izmail port is 20,100 m^2. The total area of covered cargo warehouses is about 25,200 m^2. The covered warehouse of the port consists of 8 multi-purpose warehouses located in the rear zone of cargo berths No. 1, 4-8 of the port's VPK-1 and berths No. 25-26 of the port's VPK-3.
The main nomenclature of cargo is grain and food, chemical fertilizers, oil products, bulk and bulk cargo. The port accepts seagoing vessels with a draft of 7.2 m (passable draft of the Sulinsky Canal).
The port can operate with an intensity of up to 23,288 tons per day.
The actual intensity of the port is up to 40,000 tons per day.
The maximum possible number of processed vessels is 6070 units for a year.
Gross intensity of processing of vessels with bulk cargoes – 5000 tons per day.
The maximum deadweight of vessels handled at berths is up to 6,000 tons.
In the port it is possible: to make bunkering of vessels with liquid fuel and water; replenish provisions; to receive material and technical supply; to make repairs of the case and mechanisms, and also to carry out docking.
The port of Izmail has its own port fleet, which includes tow boats, boats, floating cranes, non-self-propelled dry cargo barges, bunkers, pontoons, special purpose vessels.
The cargo arriving at the port is fully protected from theft, theft, and harmful environmental influences.

10.2.2 Mid-Term Perspective Assessment

Currently, the possibility of transferring to the concession of the State Enterprise Izmail Merchant Sea Port, which is now engaged in stevedoring activities, is being considered.
Investment proposals of SE "USPA" are presented on the website - http://investinports.com

10.2.2.1 Rail Infrastructure Connectivity

Reconstruction of the railway track No 31 VPK-3 (until 2026)
Expected result: Increase of number of supplied wagons and acceleration of cargo operations.

Figure 14.10: Reconstruction of the railway track No 31 VPK-3

"Odessa-Reni Multimodal Corridor" concept presupposes connecting the transit capabilities of Ukraine to the 9th transport corridor TEN-T Rhine-Danube. To connect to the European railway network on the Odessa-Reni multimodal corridor, concept is offer to build a new section of 36 km railroad, with a total length of about 280 km, modernize the existing line to EU standards, and build three new rail and motorway bridges. But, there is no approved plans for mid-term period concerning construction of new rail roads and motorways at the moment.

10.2.2.2 Road Infrastructure Connectivity

Construction of the coastal complex of the Izmail-Tulcea car ferry.

Expected results:

- opening of steady movement of freight and passenger flows across the Danube
- increase of cargo processing volumes by 500 thousand tons per year

Figure 14.11: Construction of the coastal complex of the Izmail-Tulcea car ferry.

10.2.2.3 Maritime Infrastructure Connectivity

Construction of a complex of facilities for transshipment and storage of general and bulk cargo on the section of 85 km of the Danube.

Expected results:

- increasing the volume of cargo processing to 200 thousand tons per year;
- increase of calls number by 100 units per year.

Figure 14.12: Construction of a complex of facilities for transshipment and storage of general and bulk cargo on the section of 85 km of the Danube.

Construction of complex for processing mineral fertilizers on 8th berth and the rear zone on the territory of the production and transshipment complex No 1 SE "Izmail State Merchant Sea Port".

Expected results:

- increase of cargo`s volume processing to 100 thousand tons per year;
- increase a number of calls per year by 100 units.

Figure 14.13: Construction of complex for processing mineral fertilizers on 8th berth and the rear zone on the territory of the production and transshipment complex No 1 SE "Izmail State Merchant Sea Port".

Construction of a modern marina for small vessels

Expected results:

- increase of number of calls of passenger boats and yachts to 104 per year;
- increase of number of passengers of the Izmail Sea Station by 1250 people.

Figure 14.14: Construction of modern marina for small vessels

Construction of a transshipment complex for bulk cargo in the southern part of the bucket 90 km (two berths, No 27-28)

Expected results:

- increase of cargo processing capacities by 2 million tons;
- increase of ship calls to 100 units.

Figure 14.15: Construction of a transshipment complex for bulk cargo in the southern part of the bucket 90 km (two berths, No 27-28)

Full development of Deep-water navigation (hereinafter GSH) Danube - Black Sea

Expected results:

- one of the elements of the program for the creation of a national network of international transport corridors and its integration into the transport system of the countries of Europe, Asia, the Baltic and Black Sea regions;
- to optimize the throughput of the domestic part of the Danube Delta;
- reduce costs and improve the quality of services when passing vessels in the Danube - Black Sea traffic;
- competitive tariffs, is the possibility of two-way traffic of vessels around the clock throughout the year. The ship traffic safety management system meets the international standards of the European Union and other international norms;
- alternative way for the Danube`s European Union countries for the case of emergency;
- an immense expansion of logistics schemes for the movement of freight flows along the "East - West" vector;

- the resumption of navigation on the Ukrainian section of the Danube may become one of the most powerful real measures of the European integration course declared by Ukraine.

Figure 14.16: Full development of Deep-water navigation (hereinafter GSH) Danube - Black Sea

11 Conclusions

The most important conclusion resulted from the inputs sent by the Contributing Partners is that in all Danube Region countries the connections (rail/road/maritime) of the ports with their hinterland are vital for their development and the responsible authorities are aware about this fact and all of them initiated development projects, whose main goals are to develop more and more these connections in order to ensure the conditions for private companies to offer fast, reliable and trustworthy services related to the transport of cargo and passengers.

Thus, the ports activities will be enhanced and the importance of the ports within the EU transport corridors will be increased. The cooperation among the main transport modes (IWT/rail/road) will be developed more in order to offer complex and satisfactory services to customers.

The most important role for reaching this aim is the development of the infrastructure and many important projects and not only planned in the Danube Region countries to be implemented on mid-term but also many projects are already in force and the works are ongoing, allowing the transport and logistics companies to prepare themselves in due time to use the new built infrastructure in the most appropriate and effective way.

The planned rail development projects and road development projects took into consideration more and more the connections with the ports as a very important argument towards their prioritisation, knowing that the transport of goods and of the passengers from/to port areas (hinterland) will lead to a more effective and efficient way for the usage od the rails/roads and will improve the RoI (Return of Investment) factor.

More than that, the improvement of the connectivity will attract more and more customers and the development of other investment projects (industrial/warehousing/logistic centres & services/etc.).

Many of the ongoing and planned projects are made with the help of the EU funds in connection with the funds ensured by the national budgets of the Danube Region countries, helping the countries located on the Danube Region (Central & East-European countries) to reach a superior development level, reducing the economic difference comparing with the developed countries of the EU.

12 References

Slovakia:

- **Strategic development plan for the public port of Komárno – Master Plan (2020)**
- **Master Plan II Port Bratislava (2020)**