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Western Balkans Investment Framework

Infrastructure Project Facility

Technical Assistance 10 (IPF10)

AA-010071-001

WB21-SRB-TRA-01

Corridor X: Reconstruction of the existing and construction of the second track on the bypass railway line (Belgrade marshalling yard) Ostružnica- Batajnica

Feasibility Study, ESIA and Preliminary Design

ESIA Scoping Report

October 2023

IPF 10 PLANET CONSORTIUM

The Infrastructure Project Facility (IPF) is a technical assistance instrument of the Western Balkans Investment Framework (WBIF) which is a joint initiative of the European Union, International Financial institutions, bilateral donors and the governments of the Western Balkans which supports socio-economic development and EU accession across the Western Balkans through the provision of finance and technical assistance for strategic infrastructure investments. This technical assistance operation is financed with EU funds.

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LEAD IFI	EIB
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Abbreviations

Abbreviation	Meaning
AADT	Annual Average Daily Traffic
AC	Alternating Current
AQ	Air Quality
AWB	Alpine-Western Balkan
BAU	Business As Usual
BCR	Benefit Cost Ratio
BMY	Belgrade Marshalling Yard
BoQ	Bill Of Quantities
BoE	Beneficiaries of Expropriation
BRJ	Belgrade Railway Junction
CAPEX	Capital Expenditure
CAQI	Common Air Quality Index
CBA	Cost-Benefit Analysis
CD	Conceptual Design
CEN	European Committee for Standardization
CENELEC	European Committee For Electro Technical Standardization
CER	Community of European Railway
CF	Conversion Factors
CFD	Central Feedback Desk
CIA	Cumulative Impact Assessment
CoE	Council of Europe
COLPOFER	Collaboration of Railway Police and Security Services
CNVMP	Construction Noise and Vibration Management Plan
CTC	Centralized Traffic Control
DMP	Dust Management Plan
EC	European Commission
EIA	Environmental Impact Assessment
EIB	European Investment Bank
EIU	Economist Intelligence Unit
ENPV	Economic Net Present Value
ERR	Economic Internal Rate of Return
ERTMS	European Rail Traffic Management System
ESIA	Environmental and Social Impact Assessment
ESMP	Environmental and Social Management Plan
ETCS	European Train Control System
EU	European Union
EUNIS	European Nature Information System
EQS	Environmental Quality Standards
FDR	Financial Discount Rate
FNPV	Financial Net Present Value
FRR	Financial Internal Rate of Return
FS	Feasibility Study
FTA	Fault-Tree Analysis
GDP	Gross Domestic Product

Abbreviation	Meaning
GHG	Greenhouse Gas
GIS	Geographic Information System
GM	Grievance Mechanism
GSM-R	Global System of Mobile Communications – Railway
HGV	Heavy Goods Vehicle
IBA	Important Bird Area
IEC	International Electro Technical Commission
IFI	International Financing Institution
IPA	Instrument for Pre-accession
IPA	Important Plant Areas
IPF	Infrastructure Project Facility
IPF10	Infrastructure Project Facility -Technical Assistance10, 10th (current) contract
IR	Inception Report
IRI	International Roughness Index
ISO	International Organization for Standardization
ISD	Inter-Station Dependence
ITU	International Telecommunication Union
JASPERS	Joint Assistance to Support Projects in European Regions
JŽ	Jugoslav Railways
kph	kilometres per hour
LGAD	Local Grievance Admission Desks
LWR	Long Welded Rail
MCA	Multi Criteria Analysis
MCTI	Ministry of Construction, Transport and Infrastructure
MEI	Ministry of European Integration
NARS	National Assembly of the Republic of Serbia
NPAA	National Programme for the Adoption of the Acquis of the European Union
NTS	Non-Technical Summary
NPV	Net Present Value
O&M	Operation And Maintenance
OCL	Overhead Contact Line
OHS	Occupational Health And Safety
PAP	Project-Affected People
PAS	Public Announcement System
PBA	Prime Butterfly Areas
PD	Preliminary Design
PIS	Passenger Information System
PIP	Project Implementation Plan
PM	Particulate matter
RAP	Resettlement Action Plan
RHMZ	Republic Hydrometeorological Institute
RFC	Rail Freight Corridor
RNE	Rail Net Europe
RoW	Right of Way
RS	Republic of Serbia
SC	Steering Committee

Abbreviation	Meaning
SCADA	Supervisory Control And Data Acquisition
SDR	Social Discount Rate
SER/SRB	Serbia
SEP	Stakeholder Engagement Plan
SFRY	Socialist Federal Republic of Yugoslavia
SoFPAS	Study of Flood Prone Areas in Serbia
SORS	Statistical Office of the Republic of Serbia
SRI	Serbian Railways Infrastructure
TA	Technical Assistance
TAC	Track Access Charges
TEN-T	Trans-European Transport Networks
TOC	Train Operation Cost
ToR	Terms of Reference
TSI	Technical Specifications for Interoperability
TSPn	Traction Subsection Post with neutral section
TTW	Tank-To-Wheel
UIC	International Union of Railways
USGS	US Geological Survey
VOC	Vehicle Operating Cost
VoT	Value of Time
WBIF	Western Balkans Investment Framework
WFD	Water Framework Directive
WOP	Without-The-Project (scenario)
WP	With-The-Project (scenario)
WTT	Well-To-Tank (emissions)

1. EXECUTIVE SUMMARY

1.1. Introduction

The Project focuses on the preparation of the Feasibility Study for the reconstruction and modernization of the Batajnica – Ostruznica railway Line. The modernized railway line should meet the requirements defined by the international agreements.

The reconstruction and modernization of the line are defined as a priority for the future development of the Serbian railway network, due to the high importance of the railway line, as well as its low technical characteristics which affect freight transport.

The main objective of the project is to modernize of the existing railway line in compliance with TEN-T standards, making it a reliable and competitive mode of transport and increasing freight traffic demand. Furthermore, the objective shall be achieved in a cost effective and sustainable way in compliance with strategic plans at national, regional and local level, as well as with internationally agreed Technical Specifications for Interoperability and with the technical requirements for the core TEN-T.

The description of the baseline and of potential environmental & social impacts and mitigation measures and monitoring mechanism are provided in this Scoping Report. These will be further detailed at the ESIA main stage.

1.2. Legal framework

Operations and activities for which potential financing from the European Investment Bank (EIB) is sought fall under the application of their respective applicable Environmental and Social Standards.

The EIB Environmental and Social Standards provide an operational translation of the policies and principles contained in the 2022 EIB Statement of Environmental and Social Principles and Standards. They are grouped across 11 thematic areas covering the full scope of environmental, climate and social impacts and issues. The project will comply with Serbian national requirements including applicable EU Laws and Directives.

1.2.1. Serbian context

The Serbian legislative framework will be applied for the environmental and social aspects of the project such as Environmental Protection, Water, Waste, Nature Protection, Noise Protection, Air Quality and Cultural Heritage, Safety and Health, Labor Relations, Employment, Social Protection, Property and Expropriation as supplemented to meet the requirements of EIB.

The Environmental Impact Assessment procedure in the Republic of Serbia as governed by the Law on Environmental Impact Assessment is harmonized with the European EIA Directive (85/337/EEC, 97/11/EC, 2003/35/EC and COM 2009/378 as codified by the Directive 2011/92/EU and as amended by the Directive 2014/52/EU).

The EIA Law defines the procedures of impact assessment for the activities that may have significant effects on the environment, the contents of the Environmental Impact Assessment (EIA) Study, the required engagement of authorities and organizations concerned, citizen engagement, trans boundary exchange of information for projects that may have trans boundary impacts, supervision, and other issues of relevance to impact assessment.

Impact assessment is carried out for the future projects and those under implementation, changes in technology, reconstruction, capacity enhancement, closure, and decommissioning activities and for removal of projects that may have significant impact on the environment.

The EIA is applicable to the industry, mining, energy production, transport, tourism, agriculture, forestry, water management, waste management and utility services sectors, as well as for all the projects that are planned in areas of protected natural resources of special value and within the protected zones of immobile cultural resources.

The Decree on Determining the List of Projects for which an Impact Assessment is mandatory and the list of projects for which an Environmental Impact Assessment may be Required ("Official Gazette of the RS", No. 114/08) determines the List I Projects (for which an Environmental Impact Assessment is mandatory) and List II Projects (for which an environmental impact assessment may be required). According to its characteristics, the project in question is classified in List I, under item 7. Construction of: 1) Main railway lines including ancillary facilities (bridges and stations etc.).

1.2.2. International legislative framework

The most relevant Directive is the EIA Directive 2011/92/EC as amended by Directive 2014/52/EU. According to the Directive 2011/92 EC, the proposed Project falls into Annex I, Category 7 (a) “Construction of lines for long-distance railway traffic and of airports with a basic runway length of 2100 m or more".

The project is aligned with the requirements deriving from EU Directives (Water Framework Directive, Floods Directive, Groundwater Directive etc.) international agreements and conventions related to environmental and social issues such as the Bern, CITES, ESPOO, ILO, UNESCO conventions etc.

Serbia adopted a third revised version of the National Programme for the Adoption of the Acquis of the European Union (NPAA). NPAA is the most significant and most comprehensive document in the process of European integration of Serbia, since in addition to harmonising the complete domestic legislation with the EU acquis, it also requires the strengthening of administrative capacities during accession negotiations with the EU, as well as long-term financial planning and responsible budget planning.

The Project proposal falls under category “A” of the EIB (those for which an EIA is mandatory (Annex 1 of the Directive).

1.3. Project description

The Ostružnica-Batajnica Section according to railway categorization (Regulation on the categorization of railways belonging to the public railway infrastructure, "Official Gazette of RS", No. 92/2020 and 6/2021) belongs to the main lines with the corresponding number 111 Beograd Ranžirna "A" - Ostružnica – Batajnica.

According to the European Agreement on Main International Railway Lines (AGC, AGTC), the section belongs to the international railway network “C-E”, designated as E-70/85. It is also part of the Pan-European Corridor X in Serbia that starts from the state borders with Croatia (branch Xa) and Hungary (branch Xb) and continues to the state borders with Bulgaria (branch Xc) and North Macedonia (branch Xd).

Although it is slightly longer than 20 km, the section between Ostruznica and Batajnica is a key part of the railway network of Serbia as well as the Belgrade railway junction. At the moment, a conceptual design with a feasibility study for the section of Corridor X from the Croatian border to Belgrade is being developed. Also, the same activities are carried out on the section from Resnik to Nis, and there is also a project for reconstruction of the Belgrade junction from the Central station to the east, towards Pancevo and the Romanian border. Bearing in mind that the high-speed railway between Belgrade and Novi Sad is in the operational phase, and that the section from Novi Sad to the Hungarian border is under construction, it is clear that the reconstruction and modernization of this section is necessary for the functioning of the entire railway/transportation system.

Also, one of the goals of the modernization of this section is to remove freight traffic from the centre of Belgrade and reduce the risk of potential accidents during the transportation of dangerous materials.

The Ostružnica – Batajnica section was constructed in the 1970s. This section is a single-track electrified line (AC 25KV/50Hz) with a length of 22.36 km used for railway freight traffic. Given that the bypass railway line is part of the Belgrade Railway Junction (BRJ) and Pan-European Corridor X, it serves national and international freight transit, which is the primary type of traffic to/from the Belgrade Marshalling Yard (BMY), but there are also regional cargo transport services utilising the line.

Detailed regulation plan is under preparation in parallel with conceptual design and will include strategic SEA.

The railway section is mostly located on level terrain on smaller embankments, except in the area where the line crosses Sava River and is elevated on the ramp embankments on both sides of the shores. The railway line mostly passes through agricultural land and to a smaller extent through settlements.

The maximum allowed train weight on the railway line Ostružnica – Batajnica corresponds to load model D4 (22.5 t/axle and 8 t/m). The structure gauge corresponds to category GB.

Between Ostružnica and Batajnica there are 12 curves.

The railway line is mostly a level line with small longitudinal inclinations. The maximum longitudinal track inclination on this section is 6‰. At points of longitudinal inclination change, where the difference between adjacent inclinations is more than 2‰, the rounding of track elevation is performed with vertical circular 10,000 m radius of the arc. Longitudinal inclinations in stations are in horizontal position (0‰).

Continuous welded rail is installed on the entire length of the railway line except for the switches in stations. Rail type 49E1, beech impregnated sleepers fastened with solid fastening device K, or elastic fastening device SKL-2 on ribbed base plates, and gravel ballast bed were installed but a tampon layer was not installed.

1.4. Considered project alternatives

The Options Analysis focuses on the strategic options for the implementation of the project, namely, the alternative options which present substantial differences as per the design speed, capacity and cost. During this phase, three main alternative options have been examined at the level of Conceptual Design, i.e.:

- Option 0 - The Base case scenario (Without the project, WOP)
- Option I – Reconstruction of Single-track railway line (With-the-project 1, WP1)
- Option II – Reconstruction of railway line and construction of second track (With-the-project 2, WP2).

Further analysis of the preferred option will be performed during the development of the Preliminary Design (PD). At that phase, more detailed technical solutions, such as securing of the level crossings, structural solutions, architectural solutions, number of lines in the stations, equipment, etc., will be examined and the optimal solutions will be selected.

All options refer to the section under study, of which the starting point is at km 3+300 and the ending point is just before the entrance of the Batajnica station (km 25+658). The Batajnica Station and the station tracks are reconstructed within the project for Reconstruction and modernization of railway section Belgrade – Stara Pazova, as part of the overall rail infrastructure project Belgrade – Budapest.

1.5. Key elements of E&S Baseline

This section describes the main components of the physical and natural baseline environment in the area affected by the implementation of the proposed Project. The characterization of the existing environment and identification of sensitivities along the proposed railway alignment have involved a comprehensive desk review of a wide range of existing data sources and baseline field walk surveys.

1.5.1. Environmental baseline

Belgrade and its surroundings are characterized by a moderate continental climate with local varieties. Summers are usually dry and hot, and winters are cold. July and August are characterized by high temperatures and low rainfall. The warm period often continues in September and October. The average annual air temperature in Belgrade is 11.9°C. The average annual amount of precipitation for the observed period 2000-2020 ranged from the lowest 367.7 mm of water column to the highest 1095.1 mm of water column. The lowest average annual air temperature for the observed period 2000-2020 is 7.2°C, and the highest average annual temperature for the same period is 19.8°C. Absolute maximum temperatures in this area reached the value of 43.6°C, and absolute minimum temperatures reached -15.5°C. Belgrade has a higher average annual temperature of 0.4 to 1.0 °C compared to the values from period 1961-1990. The amount of precipitation during the year indicates the characteristics of the continental type, where the maximum is in the summer and the minimum in the winter months. An average of 139 days with precipitation was measured in Belgrade, of which 33.7 days with snow (19.4%). Snow days are distributed from October to May (28-43 days).

- Typical winds for Belgrade are southeast and west, with southeast winds throughout the year, with a maximum in September and winter, a minimum in June and July, while the wind from west blows most often in the summer months. Wind from the southeast is known as košava. Its average speed is 5-11 m/sec. The insolation of the Belgrade area averages 2,025.1 hours per year (which represents only 45.48% of the potential/ possible insolation), with the maximum values reaching in the period from May to August. The total number of cloudy days per year averages 103.8, and most of them are in winter period of the year. The average number of clear days in a year is 67.

-The current Rulebook on Technical Norms for Construction (Official Gazette of the SFRY 31/81), as well as its later amendments in the Official Gazettes of the SFRY No. 49/82, 29/83, 21/88 and 52/90, apply only to buildings in seismic areas, and are given here as a recommendation for ancillary facilities. The basic degree of seismicity of the oleate, which refers to the return period of the earthquake of 200 and 500 years, and the subject area, i.e. the observed area of the railway is located in zone VII of the MSK-1964 scale). The probability of events for both periods is 63%.

-The upper layers of the terrain along the Batajnica-Surčin-Ostružnica railway line are built of Quaternary sediments, with the exception of the extreme southeastern parts of the route in the Ostružnica area where flysch sediments of Turon?-Senon age ($K_2^{2,3}$) are registered, within which rhythmic sedimentation of sandstones, clayey solid layers and marlstones occurs. Quaternary deposits are represented by sediments of the lower and middle Pleistocene to which belong the layers with Corbicula fluminalis (ja-m/r), loess formations of the upper Pleistocene (l – w), while within the Holocene deposits, whose distribution is connected to the alluvial plains of the Sava and the Danube, terraced river sediments (t), facies flood (ap), proluvial sediments (pr), fluvial facies (islands, beaches) (a) and recent marsh sediments (b) have been registered. Loess deposits (l –w), built of sandy clay siltstones, are morphologically the most prominent parts of the Quaternary, formed as a result of aeolian terrestrial processes, with an average thickness of 30–40 m. They are porous with many CaCO3 concretions, the so-called "Loess dolls".

- Low areas of alluvial and terrace plateaus of the Sava and Danube, altitude 71–77 m above sea level, were formed on the left valley side of the Sava River, in southern Srem, then on the right valley side of the Sava near Umka and in Makiš, as well as on the left valley side of the Danube (in southern Banat), and less on the right side and in the urban zone and the wider zone of the Veliko Selo. Numerous fossil forms of fluvial relief are present in the alluvial plain of the Sava and Danube, caused by the meandering of these watercourses, but also by the anthropogenic impact of draining the former smaller streams and ponds due to the construction of a network of canals in this area. the analysis of the lithological and chronostratigraphic column determined that they participate in the geological material of the wider zone of the research area technogenic materials and sediments of Quaternary age represented by: alluvial, aeolian, alluvial-marsh and alluvial-lake complexes.

- The regulations in the field of noise protection of the Republic of Serbia during the previous few years have been harmonized with the relevant EU directives. Accordingly, maps of the noise of the settlement or the existing railway line that relates to the section Batajnica – Ostružnica have not yet been made. There are noise monitoring stations in Belgrade, measuring noise level in urban areas of the city under the responsibility of the City Institute for Public Health. Having in mind the route of the railway through Belgrade, as well as the distance from the measuring stations, the data obtained from them cannot be considered as relevant for the preparation of this document. For that reason, the basic noise level in the observed area can be estimated only on the basis of field insights. The dominant source of traffic noise in the observed corridor is sections of highways, national and regional roads that intersect the observed corridor. Industrial plants are also emerging as a source of noise pollution. The amount of noise that will be emitted into the environment depends on the type of production process, as well as the machines that participate in it. As superstructure on the Batajnica-Ostružnica line is in a very bad condition, the contact of the rail and the wheel during driving produces additional noise of significant intensity (shocks, creaks, etc.).

Under the ESIA, it will be necessary to determine potential endangered zones and noise receptors in the vicinity of the designed railway, and based on that, noise measurements will be performed by an accredited laboratory.

- The assessment of vibration and ground-borne effects during the Environmental and Social Impact Assessment (ESIA) stage will be conducted in two phases. In the first phase, the procedure would involve the utilization of the VIBRA-1 software for the modelling and calculations related to railway vibration and ground-borne noise. The resulting deliverable will be a comparison of expected vibration and ground-borne noise levels along the railway line, with the thresholds defined by DIN 4150-2, DIN 4150-3 and BEKS-1999. Since there are no prior measurements for vibration and ground-borne noise in the area, measurements will be conducted during phase 2. Measurements will be carried out in the areas identified during phase 1, particularly in locations where exceedances have been observed.

- Belgrade Waterworks consists of five production plants where water is purified: Makiš, Bele Vode, Banovo Brdo, Bežanija and Vinča, and then it enters the distribution network, which in addition to the central city zone includes the outskirts of suburban municipalities. The total annual water production is approximately 250 million m3, which corresponds to an average annual flow of delivered water of about 6,400 l/s. In the total balance of the Belgrade water supply system, groundwater is represented with 60% and the waters of the Sava and Danube with 40%. Today, the Belgrade groundwater source was formed as a long series of 99 wells with horizontal drains and about fifty drilled wells. Sanitary protection zones of groundwater sources are set in order to protect the source from intentional or accidental pollution and other influences that may adversely affect the abundance of the source and the natural composition of the water at the source. The area of the Ostružnica railway station is located on the border of the wider zone of sanitary protection of groundwater and surface water supply sources of the city of Belgrade, and the route of the existing railway crosses the wider and narrow zone of sanitary protection. ESIA will identify potential impacts and protection measures in accordance with national legislation, European directives, as well as the opinion of relevant water management institutions.

- The main features of the wider area of the subject location from the aspect of hydrological characteristics are the river flow of the Sava River and its tributaries: Osturžnička River, Železnička River and Galovica Canal. The Sava River, in the part of its flow through Belgrade, is between 230 and 600 meters wide and 3 to 20 meters deep. The average annual flow near Belgrade is 1,172 m3/s, and the average annual river temperature is 13.1 ° C. The Sava riverbed is characterized by the existence of elongated islands in the direction of the river - Ada Ciganlija (310 ha) and Ada Medjica. The right arm of the Sava has been turned into the Sava Lake and has been used for many years for water supply, sports and recreational and other activities of the people of Belgrade. By the Decree on the categorization of watercourses (Official Gazette of the SRS, No. 5/1968), the

Sava River has been classified in the II category throughout its entire course through the Republic of Serbia (from the border with Croatia to the confluence with the Danube).

- In the Quaternary sediments of the study area, an intergranular structural type of porosity was formed, within which it is possible to distinguish the interganular aquifer type in alluvial, terrace and other layers of intergranular porosity. When it comes to the intergranular aquifer type in alluvial deposits, the sandy-gravel complex of alluvial sediments is characterized by values of the filtration coefficient of the order of 10−1 to 10−2 cm/s (Filipović et al., 2005). From the hydrogeological aspects, the layers with the Corbicula fluminalis represent the most important aquifer horizon of the research area. The exploitation capacity of the groundwater source is about 5 m3/s, with the water intake system consisting of 40 tubular wells and 99 wells with horizontal drains. The structure of the alluvial aquifer includes gravels, gravelly sands, sandy gravels and sands, which sporadically intermittently alternate towards the terrain surface. The lower zone with favorable filtration properties built of coarse - grained material and the upper zone with weaker filtration properties built of fine - grained sediments can be distinguished. In the coastal zone of the aquifer of the Belgrade groundwaters source, the velocity of the grounndwaters is 23 m/day in the zone of the radius of action of the wells type reni, while outside the influence of this zone it is 0.9 m/day.

- Since the railway crosses the bridge near Ostružnica on the Sava River, it is necessary to consider the risk of flooding. The current flood protection system on the right bank of the Sava consists of an embankment line built from the confluence of the Sava and the Danube. The height of flood protection facilities in the area of the city of Belgrade is 77.5 meters above sea level and was defined in 1976 by water bodies, so many buildings were built accordingly. This level of security enables the protection of the city from 100-year floods, with an additional lintel height of 1.2-1.5 meters (mobile temporary flood protection). During the floods of 2006 and 2014, the part around the Ostružnica Bridge was defended by physical barriers (sandbags). Sandbags were also placed on the Sava embankment, but the floods did not endanger any bank of the Sava on either side of the bridge. The existing Reney wells in Makiš and along the Sava River have a dual function: supplying drinking water (after treatment in the WTP Bele Vode) and preventing floods by lowering groundwater levels.

- Air quality: The basic parameters were measured, as well as their maximum allowable concentrations. The colour display is usually used so that citizens can easily find out which of several categories the air quality is currently in: whether it is excellent, good, acceptable, polluted or very polluted/ dangerous (Figure 1)

Averaging period	Pollutant	Limit µg/m³	Excellent	Good	Acceptable	Polluted	Very polluted
1h	SO_2	350	0 – 50	50.1-100	100.01-350	350.01-500	> 500.01
1h	NO_2	150	0 – 50	50.01-100	100.01-150	150.01-400	>400.01
1h	PM_{10}	90	0 - 25	25.01-50	50-.01-90	90.01-180.0	>180.01
1h	$PM_{2.5}$	55	0-15	15.01-30	30.01-55	55.01-110	>110.01
1h	CO	25000	0 - 5	5.00001-10	10.00001-25	25.00001-50	>50.00001
1h	O_3	180	0 - 60	60.1-120	120.1-180	180-240	>240.1

Figure 1. Air quality index CAQI

This is an official assessment of air quality in Serbia that applies the standards present in practice in the EU due to the fact that the EU Air Quality Directive has been transposed and integrated into national legislation. Taking into account the results of 2019 for Belgrade stations, the annual limit value for NO2 was exceeded, the exceedance of the daily limit value occurred 10 days, while the hourly values were exceeded more than 18 times. The annual limit value of suspended PM10 particles was also exceeded and the exceedance of the

daily limit values occurred in all measuring points for 169 days. Exceedances in the limits of suspended particles PM2.5 on an annual level occurred at the measuring station in Belgrade.

Further results will be presented at the next stage of ESIA preparation.

- The Republic of Serbia is one of the countries that is considered to be significantly affected by global climate change. Estimates in a milder variant, according to the SRES B2 scenario for this area by the end of this century, predict that the increase in annual air temperature may be as high as 4°C. According to the same scenario, some areas of the Republic of Serbia will have 20% less precipitation during the summer. In the most unfavourable variant, the amount of reduction of summer precipitation can exceed 50% of the current norm. The city of Belgrade significantly contributes to the effects that cause climate change, and also suffers from the consequences of climate change. The danger of the effects of climate change in Belgrade includes:

- increase in summer temperatures with increased risks of heat waves, both in terms of their duration and in terms of the extreme temperature reached;
- increased risk of intense rainfall that could lead to flooding;
- increased likelihood of droughts.

- Biodiversity:The studied area is characterized by a high degree of urbanization. The railway passes through settlements and agricultural land for the most part. Part of the railway crosses the Sava River, which is part of the ecological network of Serbia.

This report takes into account official regulation of the Republic of Serbia, regarding protected species. Pursuant to the Law on Nature Protection, wild species which are endangered or can become endangered, which have a special significance from the genetic, ecological, ecosystem, scientific, health, economic or other aspect, are protected as strictly protected or protected wild species. There are 1760 strictly protected and 853 protected wild species of plants, animals and fungi in Serbia (The Rulebook on proclamation and protection of strictly protected and protected wild species of plants, animals and fungi, “The Official Gazette of the Republic of Serbia”, No. 5/2011 and 47/2011). A special form of protection relates to the species that can be endangered due to exaggerated and uncontrolled collection from nature.

Protection of Species is regulated by Rulebook on the proclamation and protection of strictly protected and protected wild species of plants, animals and fungi (“The Official Gazette of the Republic of Serbia”, No. 5/2010, 47/2011-134, 32/2016-59, 98/2016-97). Articles 4 and 6 of this Rulebook define following: Article 4 - The protection of strictly protected wild species is carried out by prohibiting the use, destruction and undertaking of all activities that may endanger wild species and their habitats, as well as by taking measures and activities on population management, prescribed by this Rulebook and special law. This is more closely defined in Article 74 of the Law on nature protection. Article 6 - The protection of protected wild species is carried out by restricting their use, prohibiting the destruction and undertaking of other activities that damage species and their habitats, as well as by taking measures and activities on population management prescribed by this Rulebook and special law. This is more closely defined in Article 76 and 77 of the Law on nature protection.

The use of some species of mammals, birds and fish has been regulated by other acts, such as the Law on Game and Hunting (“The Official Gazette of the Republic of Serbia”, No. 18/2010) and the Law on Protection and Sustainable Use of Fish Stocks (“The Official Gazette of the Republic of Serbia”, No. 36/2009).

In the area of Belgrade, which includes about 200 km of river along the banks of the Sava and Danube rivers, there are 16 islands. The existing rail Ostružnica-Belgrade crosses Sava River, it presents international ecological corridors, and it is located within area of influence (200 m). In accordance with the Decree on the Ecological Network ("Official Gazette of RS", No. 102/2010), the Ecological Network of the Republic of Serbia involves 101 ecologically significant areas with a total area of 1,849,201.77 ha, which represents 20.93% of

the country's territory. The ecological network of Serbia consists of protected areas, areas important for plants (Important Plant Areas, IPA), birds (Important Bird Areas, IBA) and butterflies (Prime Butterfly Areas, PBA), Ramsar sites, Emerald Areas (according to the Council of Europe Convention on the Conservation of European Wildlife and Natural Habitats), as well as certain coastal watercourses that represent ecological corridors of international importance because enable connection to the ecological networks of neighbouring countries.

1.5.2. Socioeconomic and cultural baseline information

Socioeconomic and cultural baseline have been prepared to generally reflect the characteristics of the population of the project area and cultural heritage in terms of potentially negative impacts of the Project:

-Serbia is divided into 29 districts, plus the City of Belgrade. The railway line Ostružnica - Batajnica, which is covered by this Project, runs its entire length through the territory of the city of Belgrade, e.i. through the city municipalities of Zemun, Surčin and Čukarica. The main settlements affected by the project are Batajnica, Dobanovci and Ostružnica.

- The first results of the 2022 Census of population indicate that 6.690.887 inhabitants live in the Republic of Serbia. When compared with the 2011 Census, the total number of inhabitants fell by 495.975, i.e., by 6.9%. A decreased in the number of inhabitants was recorded in all the regions (about 10%), except for the Belgrade region where the number of inhabitants grew by about 1.6%. In the city municipalities of Zemun and Surčin, the population will continue to grow in the future due to positive migration trends.

- While the centers of city Municipalities of Zemun, Surčin and Čukarica are urbanized and economically developed, the settlements nearby the Project area are more suburban and rural (Batajnica, Dobanovci, Ostružnica), which means that they are economically less developed settlements. The structure of their economy is mainly based on agriculture as a carrier of development. The City Municipalities of Zemun and Čukarica have around 4 (four) times more enterprises compared to Surčin.

- Despite adopted law solutions many women in Serbia are facing inequality. Considering that agriculture is the main economic activity in the affected settlements, it is important data that in Serbia women are the holders of 19.4% of farm holdings, and they are the managers (main decisionmakers) in only 15.3% of farms. Looking at the level of the municipalities affected by the Project, the most unfavourable situation is in the Municipality of Surčin, where out of 1,310 farm holders, as many as 1,098 are male, while only 212 are female.

- In the Republic of Serbia poverty remains significant and relatively high (the share of persons at risk of poverty is 21.2% in 2021). The poverty risk threshold for households with two adults and one child younger than 14 was RSD 43,315 (cc EUR 370), while for four-member households with two adults and two children younger than 14 it was RSD 50,533 (cc EUR 430). In the municipalities affected by the Project, it is pronounced that there is a higher degree of the poverty risk in Surčin (15.9%) in comparison to Zemun (11%) and Čukarica (8.3%).

-The share of social protection beneficiaries in the total population of the municipality is relatively high and ranges from 5.2% in the municipality of Zemun to 9.9% in the municipality of Surčin. The percentage of the children using children's allowance is the lowest in the Municipality of Čukarica: 5.3% and in the Municipality of Surčin it is the highest, with 7.8% users.

- The Municipality of Surčin is the only local unit affected by the project without a single secondary school. Zemun and Čukarica have 10 and 8 secondary schools.

- From 2014 to 2018, Serbia created around 240.000 new jobs. The unemployment rate declined from close to 20% in 2014 to below 11% in 2019. The unemployment rate in the Municipality of Surčin is 26 unemployed in 1,000 inhabitants, followed by the Municipality of Čukarica (34 in 1,000 inhabitants) and finally the Municipality of Zemun (36 in 1,000 inhabitants). PAPs' employment shall be one of the criteria factored in during the ESIA stage in identifying more drivers of vulnerability.

- In the Republic of Serbia there are no regional or ethical disparities and in the municipalities in the Area of Influence. Nationality is more or less uniform. However, Roma are one of the most vulnerable groups in Western Balkans, including the Republic of Serbia and are usually exposed to several risks and adverse impacts. The presence of Roma settlements and substandard dwellings are likely expected in all three affected municipalities. In comparison to the number of inhabitants in each municipality, Roma population has the highest percentage presence in Zemun (3.3%) and Surčin (3.2%), while there their number is almost twice smaller in Čukarica (1.74%).

- Dependency on livelihood and cultivated land from the social aspect is considered significant and impacts from economic displacement, severance of land plots and diversifications of income and livelihood will be considered through the next stage of the ESIA.

- Based on current data, no negative impacts on the immovable cultural heritage are expected.

1.6. Environmental and Social Evaluation of options

Environmental options:

- Option 0 - The Base case Option

In the Without-the-project alternative, the situation will remain the same, namely:

- The section from Batajnica to Ostružnica is a single-track railway.
- The condition of the infrastructure on the railway section is not satisfactory.
- The speed of freight trains is about 30 km/h.
- Transport of hazardous substances will continue to go through the centre of Belgrade.

No incremental environmental impacts are anticipated in the base case option.

- Option I – Single track railway line

This option envisages the reconstruction of the existing single-track railway, which is expected to contribute to mild soil degradation in the narrower zone around the railway embankment. Also, the reconstruction of the existing line will lead to insignificant air pollution with dust caused by the operation of machines. This option will contribute to the improvement of freight traffic flow due to the higher average speed enabled by the modernisation interventions. Due to the improvement of the condition of the railway and the planned installation of noise barriers, noise levels will be reduced despite the increased volume of traffic.

- Option II – Double track railway line

This option envisages the reconstruction of the existing track and the construction of a second track. Therefore, a slightly larger zone of degraded land can be envisaged compared to Option I. Also, due to the construction works, an increase in dust and noise emissions can be assumed. The construction of the second track and the reconstruction of the existing one will significantly increase the capacity and train flows along the railway line, but the modern superstructure will reduce the noise level due to the great improvement of the operating conditions. The project also envisages the use of noise barriers that will contribute to the general improvement from the point of view of the population living in the immediate vicinity.

Social options:

- Option 0 - The Base case Option

The Without-the-project scenario implies minor social impacts mainly related to Community Health and Safety in all zones of maintenance work. Of particular importance is the interaction between the Ostružnica Rail Station and Ostružnica settlement adjacent to the station. The settlement has approximately 17 dwellings and

is dependent on one road for access and egress from the settlement in length of 200m, as shown in the picture below.

In addition, in this scenario, the situation will remain the same in terms of operations. This would mean that transport safety levels for both rail and road traffic will remain low due to the basic protection at level crossings.

Figure 2. Access road to/from Ostružnica settlement [1]

- Option I – Single track railway line

The first With-the-project option referring to the reconstruction of the existing single track railway line in order to reach a speed of up to 120 kph may impact privately owned land in the areas of local realignments. This would likely induce only economic displacement impacts, as the entire Batajnica-Ostružnica section crosses a predominantly agricultural area.

In accordance with the preliminary analysis of existing data based on typical cross section, the embankment expansion zone due to the reconstruction of the railway will lead to the need for additional expropriation area of about 2.5 ha. The expropriation zone was established on the basis of standard transverse profiles. The height of the embankment is assumed based on the configuration of the terrain and the existing railway. In places where the embankment is lower than expected, the expropriation zone will be rationalized.

The architectural interventions in this option for the Surčin Station building will not require land acquisition as the station is already located on a large land parcel owned by SRI, i.e. the Republic of Serbia. This land will also likely host the electric traction substation building next to it.

For the Ostružnica Station building, dismantling works of the existing structure will cause community health and safety to the settlement adjacent to the station building (shown in Figure 2).

[1] IPF10 team

The reconstruction of the railway including de-levelling of an existing level crossing and the modernisation of the signalling system will contribute to enhanced traffic safety at railway crossings.

- Option II – Double track railway line

The second With-the-project option is to reconstruct the existing track – as described above - and to build a second track planned on the right side of the existing track from Ostružnica station and as left track in Batajnica station. The construction of the new track will likely require acquisition of private land; based on the preliminary analysis of existing data and the typical cross section, the planned expropriation area for this option is approximately 10ha.

The section from Ostružnica Station towards Surčin up to and over the Ostružnica rail bridge, and the Makis magistral road up to the Sava River and up to Surčin and Batajnica Station will have its physical footprint exclusively within the existing Right of Way (RoW). Informal occupants have not been observed at this high level, early assessment. No informal settlements have been observed, no evident vulnerabilities nor "red flags".

The construction of the second track requires the reconstruction of both Ostružnica and Surčin stations. Also, new tracks will be needed to be added to Surčin station, which will overall impact community health and safety during construction. Risks from on and off-site construction works are the prevalent source of social risks to be considered given the adjacence of arterial roads.

Apart from the renewal and reconstruction of station buildings, this option will probably show the need to extend the existing buildings or build new ones to accommodate the electrical facilities. Based on the defined function of each station, the requirements for buildings will be set, including those for other types of buildings necessary in stations, as appropriate at the level of conceptual design.

Based on current information and data, impacts on cultural heritage are not expected, however, a detailed analysis will be conducted to establish chance and find mitigation measures.

1.7. Key E&S impacts

Environmental impacts

Regarding environmental parameters, no red flags have been identified concerning the reconstruction and modernization of the railway line.

Landscape

Most of the area is covered by cultivated land: arable land, sown crops and fields as well as areas under uncultivated land. For the entire of its length, it follows the alignment of the existing railway. This reduces the magnitude of change and impact on surrounding receptors. In these locations, the Project is not expected to be at odds with the existing landscape character.

The construction phase will result in the demolition of a number of residential properties and other above ground structures, and the earthworks will result in a significant perceptual change to the landform within the affected area.

A more in-depth assessment of the existing situation (baseline), analysing the existing landscape and visual amenity context of the receiving environment and human receptors will be carried out at the ESIA stage.

Air

A number of on-site construction activities will contribute to the increase of dust and PM10 such as site clearance and preparation.

In addition to impacts on local air quality due to on-site construction activities, exhaust emissions from construction vehicles and plant may have an impact on local air quality adjacent to site access routes.

Across demolition, earthworks, and construction receptors sensitive to dust soiling and negative ecological effects additional risk. The Contractor will be required to apply the proposed guidance and control measures during construction, to avoid the risk of a significant air quality effect. With the application of the mitigation measures described in the ESMP of the ESIA, the generation of dust and PM10 during construction will not result in any significant air quality effect. Residual effects are negligible (not significant).

The primary effect of the Project during operation is expected to be modal shift of vehicles from road-based journeys to rail-based journeys, leading to a reduction in car, bus, and Heavy-Duty Vehicles (HDVs) journeys and therefore emissions, particularly concerning PM10 and NO2 along local road links.

Specific numbers of vehicles and plant associated with the construction phase have not yet been determined. Therefore, a qualitative assessment of the impact of construction vehicles and plant on local air quality will be undertaken at the ESIA stage.

Climate change

The most dominant climate change impact in the wider area is floods, especially in the vicinity of the Sava River. In the major flood of 2014, the railway Batajnica-Ostružnica was not affected. Other climate change incidents will be temperature increase, precipitation decrease (in terms of frequency), precipitation increase (in terms of intensity), fires.

The ESIA will assess material climate change resilience/adaptation issues and confirmation of climate adaptation measures considered, including the design of railway maintenance, e.g. structures, geotechnics, drainage, and provisions for dealing with extreme weather events (cold, heat, flooding).

Noise and vibration

The noise and vibration parameter is scoped in for both phases. With the appropriate mitigation measures (noise barriers, window facades, or other), any impacts will be dealt with as in all such linear projects.

Construction activities inevitably lead to some degree of noise disturbance at locations near the construction activities. It is however a temporary source of noise.

"CNOSSOS-EU - Common Noise Assessment Methods" will be used for calculation of noise generated by the rail traffic. This method complies with the Directives 2002/49/EC with all amendments[2] and 2015/996/EU. Noise predictions will be undertaken for a study area of 300m either side of the railway to represent a typical daytime/night-time operation (see section 5.1.3). Main core phases can be site preparation, earthworks, bridge construction and rail track construction. It is expected that once good practice measures are implemented most activities will not give raise to significant effects.

For the estimation of the noise impacts during operation, noise modelling will be carried out, while sensitive receptors will be identified. The most important source of operational vibration are wheel and rail vibrations induced during contact when trains are passing. Finally, re-radiated noise refers to noise that is experienced within a building due to radiation from vibration building elements (e.g. floors, walls and ceilings). Levels will be calculated for freight services. The ESIA will assess the potential noise and vibration impacts from both the construction and operational phases of the Project.

Waste

[2] Regulation (EC) No 1137/2008, Commission Directive (EU) 2015/996, Regulation (EU) 2019/1010, Regulation (EU) 2019/1243, Commission Directive (EU) 2020/367, Commission Delegated Directive (EU) 2021/1226

The ESIA will assess the potential impacts from waste and wastewater generation during construction and will be scoped in operational phase. The assessment of impacts will be based mainly on the consumption of material resources (from primary, recycled or secondary, and renewable sources, and including products offering sustainability benefits) including the generation and use of arisings recovered during construction phase of the Project and the generation of waste from the construction phase of the Project. During operation, there is expected to be minimal waste and therefore this has been scoped out of the ESIA.

Geology and Soils

These parameters will be scoped in. At this project stage, there are no data that can assist in the accurate assessment of impacts, while a preliminary justification of impacts is presented below.

Potential impacts on topsoil maybe provoked from the Leaks/Spills from HGVs, Machinery and Hazardous material storage. Accelerated degradation may lead to a reduction in the quality of topsoil. The construction activities will be limited in time and physical extent and therefore the soil function in the area of project will not be altered. The tracks on these sections would need to be dismantled, and the land may need to be decontaminated.

The groundcover surrounding the project alignment is generally comprised of covered agricultural land, with residential areas. The extent of topsoil fertility must be assessed. The construction phase of the project will be limited in time and physical extent. Regarding areas that will be temporarily used for construction, these can be restored to agricultural use.

The limited time and scope of construction activities, as well as good implementation of measures can result in an impact of insignificant magnitude.

In the exploitation phase, possible impacts on the quality of the upper layer of soil and soil erosion, which with the implementation of mitigation measures can be insignificant.

The ESIA will assess the potential impact on land and geology based on soil and topographic data, data from existing published sources and geotechnical and soil investigations undertaken as part of the project. According to existing data, erosion is weak.

Waters

The risk of pollution of surface water bodies due to increased sedimentation and runoff is a possible impact that may arise from land clearing, excavation, drainage of excavations, construction of earth embankments and construction materials such as aggregates and topsoil stock. Temporarily increased sedimentation within of the watercourse is probably also a consequence of the construction of the bridge pillars with the watercourse channel. Runoff with a high sediment load can have harmful effects on neighbouring water bodies through increasing turbidity and po suffocation of vegetation and be substrates.

Increased risks of pollution from releases or spills of fuel or other harmful substances associated with temporary works may also migrate to local surface water receptors. It is necessary to perform surface water measurements under ESIA so that the magnitude and significance of this impact can be assessed.

The ESIA will focus on the potential impacts of Project activities on water quality for key receptors both during construction and operation.

The study area for the characterization and assessment of surface waters is defined according to potential receptors that may be influenced by the Project and the surface water basin within which the Project is located. Field of study usually includes surface waters up to 0.5 km from the Project that may be affected directly to the proposed works. All information related to the quality and quantity of groundwater in the corridor zone will be based on the data from the existing piezometers within the sanitary protection zones.

Biodiversity

The studied area is characterized by a high degree of urbanization. The railway passes through settlements and agricultural land for the most part. Part of the railway crosses the Sava River, which is part of the ecological network of Serbia. The habitats along the railway corridor can be divided in two main categories: natural and anthropogenic habitats. The whole observed area is under strong anthropogenic pressures for centuries. The potential natural vegetation is degraded by urbanization and forest cutting to form arable land. Anthropogenic habitats are dominant.

All target species surveys will be undertaken in accordance with best practice survey guidance. The findings of the survey work will be analysed and presented in the ESIA chapters: Identification, mapping, and description of the natural, semi-natural and artificial habitats along the corridor. The classification of the present habitat types follows EUNIS version 2012 (amended 2019), and the digitalization will be performed. Also, for habitat selection and determination, the following lists will be used: EU Habitat Directive Annex I and Bern Convention Res. No. 4. Fauna and flora species that are a priority for conservation, including species listed by the EU Habitats Directive and Birds Directive, Bern Convention, IUCN Red List of Threatened, will be determined.

Social impacts

Within the social changes and broader social impacts groups no imminent early substantial unmanageable risk signs i.e., red flag cases have been identified towards the future development phases of the Project. The major concern is the impact stemming from involuntary land acquisition and resettlement, at offline sections.

The assessment has been conducted against political, financial, administrative, health and well-being, quality of the living environment, economic impacts, cultural impacts, family and community impact, institutional, political and equity impacts including gender relations. This conclusion remains valid as long as the project activities are subjected to the in-depth social assessment and commensurate mitigation measures and adhere to the underlining principles of E&S governance of the Project.

The impacts to humans and their wellbeing in the brownfield part of the route takes a much less significant breadth and severity on one hand, but might induce alteration to the daily routine and life habits in addition to availability (connectivity and coverage of the new transport system), accessibility (access to employment, health care, education, or other activities), temporal constraints of individuals and activities relevant to individual characteristics of people and affordability (the financial costs put on an individual or household and the extent to which persons can afford to travel when and where they want).

Stakeholder engagement

Operations and activities for which potential financing from the European Investment Bank (EIB) is sought fall under the application of their respective applicable Environmental and Social Standards.

The EIB Environmental and Social Standards from 2 February 2022 provide an operational translation of the policies and principles contained in EIB Statement of Environmental and Social Principles and Standards from 2013 republished in 2018 and are grouped across 11 thematic areas covering the full range of impacts and issues related to environment, climate and society.

In response to the commitment to comply with EIB SEP is being developed as an essential component in project planning, implementation and operation. The SEP is developed and is part of an iterative process in communicating with stakeholders who may be affected by or might be interested in the Project throughout its life cycle.

To allow uptake of Stakeholders concerns, grievances but also positive feedback during all of the Project stages a fully functional system introduced by the promoter that affords all stakeholders, in particular impacted individuals and communities, the ability to provide feedback, channel their concerns and, thereby, access

information and, where relevant, seek recourse and remedy. The scope of such a mechanism concerns the entire operation, yet it is not intended to serve employer-workforce relations, as a separate grievance structure relevant to workplace grievances is exclusively dedicated to this purpose.

The specific nature of the Project required a broad engagement with various project stakeholders with main discussions between sector specific institutional Stakeholders. The preparation of the Project was affected by the unparalleled constrains the global COVID-19 pandemic imposed to travels and face-to-face meetings.

The specific stakeholder engagement activities that have taken place during Project preparation include:

- Communication and meetings in the rail sector;
- Review of project preparation status with representatives from the SRI and including safeguard documentation;
- Multiple meetings and communication exchange with the SRI discussing the Project design, investment priority needs;
- Meeting with Institute for Nature Conservation of Vojvodina Province, Novi Sad
- Written communication with Cultural Heritage Institute of Serbia and Sremska Mitrovica.
- Several Biodiversity experts and stakeholders, Biologists, Ornithologists, Terminologists, Ichthyologists, Hunting associations have been informed about Project.

Given the importance of the Project as recognized by the Government active stakeholder engagement will be conducted once the project implementation starts and their feedback will be incorporated into the design of project activities. At this point the main considerations relate to safe public spaces by adequacy of lightning in stations and at access routes. To date there were no protests from the stakeholders regarding the investment.

After the adoption of the Scoping Report, the following steps will be taken concerning the public disclosure and further consultations:

- Posting the Summary of the Scoping Report on the website of Serbian Railways Infrastructure (SRI) for 30 days;
- Informing in project interested state bodies and local authorities by letter about the posted Summary of the Scoping Report and invite them:
  - to comment on the posted Summary of the Scoping Report and, if necessary, organizing meetings and further consultations with their representatives;
  - to share information about potentially interested non-governmental organizations they cooperate with, in order to invite them on the public consultations.
- Organizing meetings with interested citizens and NGO sector representatives in local self-governments affected by the Project with the aim to establish direct communication with them concerning the Project's goals, planned activities, potential risks and mitigation measures.
- All involved stakeholders will be duly and accurately informed about the planned measures and timelines for solving their concerns and suggestions.

2. INTRODUCTION

2.1. Project Developer

The Beneficiary of the Project is the Ministry of Construction, Transport and Infrastructure of Serbia (MCTI), with the Serbian Railways Infrastructure JSC (SRI) as the end recipient. The main activity of SRI includes:

- the management of public railway infrastructure including maintenance of public railway infrastructure, organization and control of railway traffic,
- the provision of access and use of public railway infrastructure to all interested railway undertakings, as well as to legal entities and individuals performing transport for their own purposes, and
- the protection of public railway infrastructure.

2.1.1. Project Rationale

The overall objective of this project is the modernization of railway infrastructure on the Pan-European Corridor X and enhance the capacity, safety and quality of services. The focus is on those railway lines that contribute to economic growth and enhance connectivity between the main urban centers and with neighboring countries.

This project should ensure a modern, high-performance double-track railway line for freight traffic with the highest speed as economically justified. That will enhance railways' competitiveness and interconnectedness of transport modes on Corridor X and improve the protection of the environment.

Investing in the Serbian transport infrastructure is considered as being the basis for developing the transport system in the country and ensuring interoperability with neighboring countries in line with EU standards. As such, this project is included in the General Transport Masterplan for 2009-2027, a comprehensive plan of future investments in transport infrastructure.

2.2. Project History

The Pan-European Corridor X runs between Salzburg in Austria, and Thessaloniki in Greece. The corridor passes through Austria, Slovenia, Croatia, Serbia, North Macedonia, and Greece, and has four branches: Xa, Xb, Xc, and Xd. Part of the corridor in Serbia starts from the state borders with Croatia (branch Xa) and Hungary (branch Xb) and continues to the state borders with Bulgaria (branch Xc) and North Macedonia (branch Xd).

Belgrade is located on the very crossing of Corridor X and Corridor VII (Danube), which is the basis for multimodal transport junction development.

During a period of 125 years of designing and research about 40 different junction solutions were examined. The existing Belgrade Railway Junction (BRJ) is the result of adopted solutions and possibilities of their realization due to the fast city development. The Batajnica-Ostružnica-Resnik rail line was built in 1967 (the Ostružnica – Batajnica section was constructed in the 1970s).

The proposal for the junction solution is based on the following main goals and principles:

- Enabling total passing through the Belgrade railway junction on main line (Corridor X) and other lines in the junction
- Removing railway infrastructure from riverbanks, Sava amphitheatre (which is done) and Topcider Valley (which is done) to the extent possible
- Separating passenger and freight traffic within the city area
- Adopting a clearly defined system of two or more passing through stations on each bank of the Sava River
- Designing the shortest possible lines in the city area and adjusting them for intercity and suburban train traffic
- Eliminating existing level crossings with city roads
- Eliminating the level crossing of railway lines

- Planning the construction of double tracks on each line in the junction
- Concentrating all marshalling work on one gravity marshalling yard located as close as possible to the freight traffic centre in order to increase safety level and traffic capacity
- Concentrating local work with goods on the minimum number of freight stations in the most important industrial zones of the city (currently two locations are proposed: Makis and Batajnica; Karaburma is foreseen for the suburban passenger traffic)
- Connecting industrial tracks with significant industrial companies with railway network
- Concentrating all the work with parcel load on one place in the junction
- Planning an intermodal container terminal at appropriate place in the junction
- Positioning maintenance depots and workshops in the vicinity of marshalling yard for freight vehicles and on designated sites for passenger trains;
- Assuming a high level of automatization and signal and safety devices and telecommunication devices on the lines and stations;
- Realising a programme of environmental protection and improvement.

In the envisaged solution for the BRJ, the following components form the basis of the freight subsystem:

- Belgrade Marshalling Yard (BMY);
- Container terminal in Makis, branded as ZIT , to function as terminal for operations with containers and their storage, wagons and truck loads and unloads;
- Batajnica Intermodal Terminal to function as terminal that will be part of the future logistics centre in Belgrade for operation with intermodal containers and their storage, wagons and truck loads and unloads;

Industrial sidings operation is performed by several stations within the junction. The main depot of the railway junction is located near the marshalling yard in Makis.

According to the adopted solution and having the building of Belgrade Marshalling Yard in Makis finished in 1970, and the railway lines constructed, the basis of the freight subsystem of the Belgrade Railway Junction was established. This allowed for the whole marshalling work in the junction to be concentrated into only one station.

The positioning of the goods station near the marshalling yard provides rational exploitation of the existing capacities and construction in phases. By constructing these capacities, the conditions for separating freight and passenger traffic in Belgrade city centre were created. At the moment, the new container terminal in the marshalling yard in Makis (ZIT company) and the intermodal terminal in Batajnica are under construction.

The examined rail section between Ostružnica and Batajnica station is a single-track electrified line (AC 25KV/50Hz) with a length of 22.36 km (from km 3+300 to 25+658) used for freight traffic. This bypass railway line is part of Belgrade Railway Junction and Pan-European Corridor X. Besides freight transit, which is the primary type of traffic to/from the BMY, there is also regional cargo transport on the line.

2.3. The Project's Environmental and Social Impact Assessment (ESIA) Process

The Consultant's overall approach to ESIA follows Serbian regulations and in line with the requirements of the European EIA Directive, applicable international standards, and EIB standards.

The specific objectives of the ESIA areas are listed as follows:

- Present the main characteristics of the baseline regarding environmental and social parameters
- Ensure that key potential significant positive,adverse and cumulative environmental and social impacts are identified,
- Capitalize on positive aspects and benefits,
- Mitigate negative impacts and avoid serious and irreversible damage to the environment and people,

- Prepare environmental and social management and monitoring plant to help ensure the stated above,
- Ensure that environmental and social factors are considered in the decision- making process of construction of the railway alignment,
- Inform the public about the proposed Project and ensure stakeholder participation and involvement.

A description of the steps of the ESIA process is given in the following table, while, as indicated, the project phase is currently scoping. The Alternatives Assessment phase with the aim of identifying the advantages and disadvantages of all project alternatives has been completed.

Table 1. ESIA process steps

Step	Description
Scoping	Scoping identifies the key issues to be addressed in the ESIA. Scoping, as presented in this report, will ensure that the process is focused on the potentially significant environmental and social impacts which may arise from the Project. It will consider the results of consultations undertaken to date on the Project. Ultimately scoping defines the scope of work of the ESIA, including stakeholder engagement.
Baseline studies	For the key issues identified in scoping, available information on the existing environmental and social conditions (also referred to as baseline conditions) will be gathered.
Impact assessment and mitigation measures	This stage focuses on predicting environmental and social changes from the baseline as a result of the Project's activities (considering the entire lifecycle of the Project). Each impact will then be evaluated to determine its significance for the environment and society. Where necessary measures will be proposed to mitigate significant impacts.
Environmental and social management plans	The various mitigation measures will be presented in an Environmental and Social Management Plan (ESMP), describing how measures will be implemented throughout the different Project phases. The ESMP will provide general details (considering the project stage) for the responsibilities for implementation, the timing and monitoring and audit plans to ensure all the mitigation commitments are met. It will also identify any requirements for training and other capacity building.
Stakeholder Engagement and Consultation	. After the adoption of the Scoping Report, the Summary of the Scoping Report will be posted on the website of the Railway Infrastructure of Serbia (SRI) for 30 days. Immediately after posting the Summary, interested state bodies and local authorities will be invited to comment on the posted Summary and to propose the inclusion of potentially interested non-governmental organizations with which they cooperate, in order to invite them to public consultations. A further step would be to organize meetings in local self-governments affected by the project with interested citizens, representatives of the NGO sector and state authorities with the aim of establishing direct communication with them regarding the Project's goals, planned activities, potential risks and mitigation measures.

2.4. Approach to Scoping

In line with the requirements set out in the ToR, the Consultant will undertake the Environmental and Social Scoping Study (ESSS) at this phase. This document will aim at:

- Providing an overview description of the Project,
- Describing the existing environmental and socioeconomic baseline,
- Identifying potential environmental and socioeconomic issues at a preliminary level associated with the proposed Project,
- Obtaining early input from key stakeholders in the identification of potential impacts and mitigation measures, and
- Identifying key data gaps and defining a proposed Terms of Reference (ToR) for a ESIA study including program for consultation with stakeholders.

2.5. Scoping Report Structure

The remainder of this report is structured as follows:

Table 2. Structure of the scoping report

Chapters	Context
Chapter 3 – Legal Framework	Regulations and Guidelines provides a brief overview of the relevant and International ESIA regulatory framework and international best practice with regards to scoping
Chapter 4 - Project Description	Describes the main components of the Project and the main construction and operation activities
Chapter 5 – Environmental and Social Baseline	Baseline Conditions: provides an overview of the baseline environmental, socioeconomic and cultural heritage characteristics of the Study Area
Chapter 6 – Project Alternatives	Description of Selected Options: summarizes the alternatives railway alignments and proposes the “base case” route
Chapter 7 - Potential Impacts and Mitigation Measures	Summarizes potential significant environmental, socioeconomic and cultural heritage impacts and provides an indication of potential mitigation and management measures
Chapter 8 - Stakeholder Engagement	Presents the proposals for consultation with identified external stakeholders i.e. individuals or groups who are affected or likely to be affected (directly or indirectly) by the Project (“affected parties”) or may have an interest in the Project (“other interested parties”) during scoping. The section also summarizes the consultation activities undertaken earlier in the ESIA process
Chapter 9 – Management and Monitoring arrangements	Preliminary guidelines and arrangements on management and monitoring
Chapter 10 - Terms of Reference of the ESIA	Presents the proposed terms of reference, the structure of the detailed ESIA and a tentative schedule of the ESIA activities

2.6. Project Consultants

The IPF10 team for this particular sub-project under WBIF, namely PLANET consortium (composed of PLANET (GR) / DETECON (GE) / ENVIROPLAN (GR) / SYSTEMA (GR) / TYPSA (ES)), was contracted in January 2021 as the executing agent for the mentioned sub-project.

3. LEGAL FRAMEWORK

The environmental regulations applicable to this project are numerous and diverse. Therefore, only the key requirements associated with the project have been chosen to be presented in this section. However, a full and detailed list of legislation associated with the project will be developed as part of the project management systems for construction and operation. The Environmental Impact Assessment (EIA) procedure in the Republic of Serbia as governed by the Law on Environmental Impact Assessment, which is harmonized with European EIA Directive (85/337/EEC, 97/11/EC, 2003/35/EC and COM 2009/378 as codified by the Directive 2011/92/EU and as amended by the Directive 2014/52/EU).

3.1. Overview of the Main Relevant National Legislation

The legal, legislative and institutional framework for environment and society i.e. social considerations in Serbia is founded on the Constitution of Serbia, which stipulates the right to a healthy environment and the duty of all, in line with the law, to protect and enhance the environment. Health and environment are also supported by many governmental strategies, international agreements and the Millennium Development Goals. Environmental legislation in Serbia has over 100 laws and regulations. Currently, the majority of these are harmonized with EU directives and other legislation. The Constitution of Republic of Serbia was proclaimed on November 8th, 2006. According to Article 74 of the Constitution:

- Everyone shall have the right to live in healthy environment and the right to timely and full information about the state of environment.
- Everyone, especially the Republic of Serbia and autonomous provinces, shall be accountable for the protection of environment.
- Everyone shall be obliged to preserve and improve the environment.

Article 58 of the Constitution guarantees of peaceful tenure of a person's own property and other property rights acquired by law. The Article indicates that right of property may be revoked or restricted only in public interest established by law and with compensation which cannot be less than market value.

Article 16 of the Constitution states that the foreign policy of the Republic of Serbia shall be based on generally accepted principles and rules of international law. Generally accepted rules of international law and ratified international treaties shall be applied directly if they are dully signed and ratified by the Government of Serbia. The following table presents the key national laws and regulations applicable to the reduce the potential environmental and social impacts that may arise from the construction and operational activities of the Project.

Table 3. Main national legislation regarding environmental and social parameters

Laws and regulations	Official gazette Republic of Serbia	Relevance
Law on Environment	135/04, 36/09, 72/09, 43/11, 14/16, 76/18 and 95/18	The Law on Environmental Protection is the framework national environmental law. The law is currently the main legislation relating to environment protection in Serbia and is harmonized with the Council Directive 2003/105/EC, which amends Council Directive 96/82/EC on the control of major-accident hazards involving dangerous substances (Seveso II Directive). The main objectives of Law on Environmental Protection are: Conservation and improvement of the environment; and Control and mitigation of pollution of the environment. The main focuses of Law on Environmental Protection are: Declaration of ecologically critical areas and restriction on the operations and processes, which can or cannot be carried out/ initiated in the ecologically critical areas; Environmental Approval; Promulgation of standards for quality of air, water, noise and soil for different areas for different purposes; Promulgation of a standard limit for discharging and emitting waste; and Formulation and declaration of environmental guidelines.
Law on Environmental Impact Assessment	135/04 and 36/09	This Law regulates EIA process, EIA content, Interested Authorities and organizations participation and public participation, international notification for projects that can have important impacts on other environment and inception and other important issues for EIA.
Law on Strategic Impact Assessment	135/04 and 88/10	The Law on Strategic Impact Assessment regulates the conditions, manner and procedure for assessing the impact of certain plans and programs, on the environment.
Law on Air Protection	36/09, 10/13 and 26/21	The Law on Air Protection regulates the management of air quality and determines the measures, manner of organization and control of the implementation of protection and improvement of air quality as a natural value of general interest that enjoys special protection.
Law on Nature Conservation	36/09, 88/10, 91/10, 14/16, 95/18 and 71/21	This law creates the following objectives: 1) protection, preservation and improvement of biological (genetic, spices and ecosystem), geological and landscape diversity; 2) harmonization of human activities, economic and social development plans, programs, bases and projects with sustainable use of renewable and non-renewable natural resources and long-term preservation of natural ecosystems and natural balance; 3) sustainable use and / or management of natural resources and goods, ensuring their function while preserving natural values and balance of natural ecosystems; 4) timely prevention of human activities and activities that may lead to permanent impoverishment of biological, geological and landscape diversity, as well as disturbances with negative consequences in nature; 5) determining and monitoring the state of nature; 6) improvement of the condition of disturbed parts of nature and landscapes. The Law on Nature Conservation adopted EU Habitats Directive and the Birds Directive. The Decree on Ecological Network ("Official Gazette of RS", No. 102/10) identifies ecological network areas in Serbia and sets the management, financing, monitoring and protection requirements. Serbian Legal Framework on Habitats and Species:

Laws and regulations	Official gazette Republic of Serbia	Relevance
		Regulation on the criteria for separation of habitat types, sensitive, vulnerable, rare, and for the protection of priority habitat types and protection measures for their preservation (Official Gazette of No. 35 /10), Regulation on cross-border trade and trade in protected species (Official Gazette No. 6/14), Regulation on special technical and technological solutions that enable undisturbed and safe communication of wild animals (Official Gazette of No. 72/10), Regulation on control of use and trade of wild flora and fauna (Official Gazette of No. 69/11) Regulation on the proclamation and protection of strictly protected and protected wild species of plants, animals and fungi (Official Gazette of No. 98/16)
Law on Waste Management	36/09, 88/10, 14/16 and 95/18	The Law on Waste Management is harmonized with all relevant EU directives. The Law regulate: types and classification of waste; waste management planning; waste management entities; responsibilities and obligations in waste management; organization of waste management; managing special waste streams; conditions and procedure for permit issuance; transboundary movement of waste; reporting on waste and database; financing of waste management; supervision, and other issues relevant for waste management. The Law on Waste Management has transposed the European Waste Framework Directive (2008/98/EC as last amended by 851/2018/EC), the European Directive on Landfills (1999/31/EC, as amended) through transposition in the Serbian Law on Waste Management and/or Regulation on waste landfilling in combination with the Regulation on Categories, Testing and Classification of Waste, the European Directive on Packaging and Packaging Waste (1994/62/EC, as amended transposition in the Serbian Law on Packaging and Packaging Waste. The European Directive on Waste Electric and Electronical Equipment (WEEE) (2012/19/EU, as amended) has experienced transposition though the Serbian Law on Packaging and Packaging Waste in combination with the Rulebook on the List of Electric and Electronic Products, Measures of Prohibition and Restriction of Use of Electric and Electronic Equipment Containing Hazardous Substances, Methods and Procedures of Managing Waste from Electric and Electronic Products. In April 2016, IZS the Board of Directors of IZS adopted a Hazardous waste Manual governing management, disposal, deposit and selling of materials characterized as hazardous. The Manual is aligned with the National Strategy on Waste Management, the Law on waste Management and the applicable secondary laws. The Manual in particular treats management of PCB containing waste, absorbents, filter material and oil, wooden sleepers, asbestos containing waste. Serbia has ratified the: Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and pesticides in International Trade (Official Gazette of RS, International Agreements, No. 38/09) the Stockholm Convention on Persistent Organic Pollutants (Official Gazette of RS–International Agreements, No. 42/09) the Basel Convention on Transboundary Movement of Hazardous Wastes and their Disposal Official Journal of FRY, International Treaties, No. 2/99, the Aarhus Convention (”Official Gazette of RS- International Treaties”, No. 38/09) the Protocol on Pollutant Release and Transfer Register to the Aarhus Convention” (”Official Gazette of RS - International Treaties”, No. 8/1)
Law on Chemicals	36/09, 88/10, 92/11, 93/12 and 25/15	The Law on Chemicals regulates the integrated management of chemicals, their classification, packaging and labeling, register of chemicals and trade of chemicals. It transposed EU legislation in the field of chemicals related to POPs Regulation 1907/2006/EC

Laws and regulations	Official gazette Republic of Serbia	Relevance
		on registration, evaluation and authorization on chemicals (REACH) – partially harmonized, Regulation 757/2010 amending Regulation 850/2004, Directive 2004/42/EC on limitation of emissions of volatile organic compounds (VOC) from the use of organic solvents in certain paints, varnishes and vehicle refinishing products, Regulation 689/2008/EC export and import of dangerous chemicals on banned and severely restricted chemicals as well as Directive 67/548/EEC on classification, labeling and packaging of substances, Directive 1999/45/EC on classification, labeling and packaging of preparations Regulation 1272/2008/EC on classification, labeling and packaging of substances and mixtures in accordance with GHS and Regulation 440/2008/EC on test methods pursuant to REACH.
Law on Water	30/10, 93/12, 101/16, 95/18 and 95/18 – other law	The Law on Water which incorporates the EU Water Framework Directive, covers water regimes, water management areas, responsibilities for water management (including sub-law water management legislation), water management activities, limitation of owners' and beneficiaries' rights, water cooperatives, financing of water management activities, and administrative inspection to enforce the Law. The legislation provides for various water management sub-laws on water resource conditions, water resource compliance and water resource permits.
Law on Environmental Noise	96/21	The Law on Protection against Environmental Noise, transposes EU Directive 2002/49/EC relating to the assessment and management of environmental noise. The Law has the following main goals: establishment, maintenance and improvement of the system of noise protection on Serbian territory; and determination and realization of measures in the field of noise protection that avoid, prevent or decrease the harmful effects of noise on human health and the environment. The limit levels of noise are covered by the Regulation on permitted level of noise in the environment. The permitted noise levels are defined by the Decree on environmental noise indicators, limits values, assessment methods of the noise indicators, the nuisance and the harmful effects (Off. Gazette of RS No. 75/10). This Decree stipulates the noise levels, which must not be exceeded. Annex 2 of the Decree states that the defined noise limits are applied to the all-encompassing noise generated by all noise sources at the site. Noise levels in open spaces (limits as defined in Serbian legislation)

<table>
<tr><th>Laws and regulations</th><th>Official gazette Republic of Serbia</th><th>Relevance</th></tr>
<tr><td></td><td></td><td>
<table>
<tr><th>Zone</th><th>Purpose of the area</th><th colspan="2">Noise Level [dB(A)]</th></tr>
<tr><th></th><th></th><th>Daytime and evening</th><th>Night-time</th></tr>
<tr><td>1</td><td>Recreation areas, health institution areas, cultural and historical sites, large parks</td><td>50</td><td>40</td></tr>
<tr><td>2</td><td>Tourist areas, schools, camps</td><td>50</td><td>45</td></tr>
<tr><td>3</td><td>Residential areas</td><td>55</td><td>45</td></tr>
<tr><td>4</td><td>Commercial and residential areas, children playgrounds</td><td>60</td><td>50</td></tr>
<tr><td>5</td><td>City centre, workshop area, commercial area, administrative area with apartments, zones along highway, regional roads and city streets</td><td>65</td><td>55</td></tr>
<tr><td>6</td><td>Industrial areas, warehouse, and service areas, transport terminals with no residential buildings</td><td colspan="2">Noise level at the boundary of this zone shall not exceed the limit value defined for the zone it borders</td></tr>
</table>
</td></tr>
<tr><td>Law on safe transport of hazardous goods</td><td>104/16, 83/18, 95/18 and 10/19</td><td>Law on transport of hazardous materials regulates conditions for performing domestic and international transport of dangerous goods in road, rail and inland waterway transport on the territory of the Republic of Serbia. Furthermore, it sets requirements in relation to packaging, mobile pressure equipment (e.g. tanks), means of transport intended for transport of dangerous goods, conditions for body designation which examine and control packaging, mobile pressure equipment, and vehicles for transport of dangerous goods. This Law also defines competencies of state bodies and organizations in transport of dangerous goods, conditions and obligations to fulfill the participants in the transport of dangerous goods, supervision, as well as other issues related to the transport of dangerous goods.</td></tr>
<tr><td>Law on mining and geological explorations</td><td>101/15, 95/18 and 40/21</td><td>The Law on mining and geological explorations regulate measures and activities of the mineral policy and the manner of implementation thereof, conditions and manner of execution of geological explorations of mineral and other geological resources, researching of geological environment, as well as geological explorations for the purpose of spatial and urban planning, designing, construction of buildings and remediation of site, manner of classification of resources and reserves of mineral raw materials and ground waters, exploitations of reserves of mineral raw materials and geothermal resources, construction, use and maintenance of mining facilities, plants, machines and equipment, execution of mining works, mining waste management, remediation and recultivation of abandoned mining facilities, as well as inspection over the implementation of the present Law. The Geological Institute of Serbia is established by the same Law as an individual organization with the capacity of a legal entity that carries out the basic geological explorations and other geological explorations as well as the works of applied geological explorations of importance for the Republic of Serbia, in accordance with this Law.</td></tr>
<tr><td>Law on Railway</td><td>41/18</td><td>This law regulates the management of railway infrastructure, the performance of railway transport activities, and the licensing of railway undertakings. Access to railway infrastructure, service facilities and services, principles and procedures for determining and calculating prices of access to public railway infrastructure and prices of services related to railway transport,</td></tr>
</table>

Laws and regulations	Official gazette Republic of Serbia	Relevance
		public railway infrastructure capacity allocation, industrial railways and industrial tracks, competencies of the Railway Directorate, passenger rights and public passenger transport services by rail of general economic interest.
Planning and construction law	72/09, 81/09 (Corrigendum), 64/10 (CC), 24/11, 121/12, 42/13 (CC), 50/13 (CC), 98/13 (CC), 132/14 145/14, 83/18, 31/19, 37/19 (CC), 9/20 and 52/21	The planning and construction law it governs the following issues: the conditions and modalities of spatial planning and development, the development of general and detailed regulation plans, the development and use of construction land and the construction of facilities, predominant use of land when the land has multiple uses, public use of land and other issues of significance in the development of space, landscaping and use of construction land and the construction of facilities. It prescribe procedure for: issuance of site conditions; issuance of building permit; notice of works; issuance of occupancy permit; attainment of conditions for design, i.e. connection of a facility to the infrastructure network; obtaining legal instruments and other documents issued by the holders of public authorities required for the construction of facilities, i.e. for the issuance of site location conditions, building permit and occupancy permit within their competence, as well as for the provision of conditions for connection to the infrastructure network and for the registration of title to the built facility and for designating a house number (unified procedure).
Law on Expropriation	53/95, 23/01, 20/09, 55/13-CC ruling and 106/16 – authentic interpretation	The Law on Expropriation enables government institutions to acquire property for projects that are deemed to be of public interest, while protecting the interests of all persons with legal title, whose assets are to be expropriated. The Law on expropriation does not use the term "involuntary resettlement", but instead uses the term "expropriation" and is based on the Governments eminent domain power. The Law in conjuction with the project Resettlement Action Plan will guide land acquisition and resettlement needed for the Project.
Law on Special Procedures for the Implementation of the Project of Construction and Reconstruction of line Infrastructure Structures of Particular Importance to The Republic of Serbia	9/20	The law provides inter alia particular conditions to the Law on expropriation governing land acquisition for construction of line infrastructure objects in the road, rail, water, and air sector with the potential to beneficially impact the overall development of the Republic of Serbia. The law is infused with the intention of efficiency cutting across the permitting and land acquisition procedure. This Law shall apply to projects of construction and reconstruction of line infrastructure structures of particular importance to the Republic of Serbia. Construction and reconstruction of public line transport infrastructure (road, rail, water, and air) are deemed as Projects of particular importance to The Republic of Serbia. The decision on recognition i.e. implementation of each such Project as a Project of particular importance to the Republic of Serbia is passed by the Government. The Law identifies projects of construction and reconstruction of the line infrastructure structures of particular importance to the Republic of Serbia and governs the process of determining the public interest for complete and incomplete expropriation and temporary occupation of immovable property required for development purposes. The Law sets the range of potential Beneficiaries of Expropriation (BoE), defines the specific expropriation procedure, permitting and approval procedures to create an enabling environment for efficient implementation of Projects to particular importance to the Republic of Serbia. In terms of this Law, Projects of particular importance to the Republic of Serbia are projects of construction and reconstruction of line infrastructure structures that have an impact on an overall development of the Republic of Serbia, balanced regional and local economic development, international, regional and interior territorial connection, improvement of connectivity, prevention of the degradation of the parts of the territory of the Republic of Serbia, ensuring and improving population's subsistence, social development, and environmental protection thereby enhancing an overall living standard of the citizens of the Republic of Serbia. Procedures of rehabilitation, maintenance, renovation, modernization and other works on line infrastructure structure shall be subject to the provisions of the law governing that type of line infrastructure structure unless otherwise stipulated by this Law. The novelty of the Law is for cases during construction in which the scope of work needs to be conducted outside the area of the already acquired land, such land shall be acquired through a negotiated settlement between the owner and the

Laws and regulations	Official gazette Republic of Serbia	Relevance
		beneficiary of expropriation. Unless differently regulated by this law the Law on Expropriation shall govern the Land acquisition process.
Building legalization law	96/15, 83/18, 81/20 – CC ruling	Building legalization law regulates the conditions, procedure and manner for legalizing buildings, parts of buildings, auxiliary buildings and other buildings constructed without a building or construction permit. The custom of constructing buildings (houses, shops, even apartment buildings), or adding auxiliary buildings to existing, legal building (garage, additional floors on houses or rooms) without a construction permit became quite usual during the past 30 years. The governments over the years always maintained the intention to legalize all illegally constructed buildings, if constructed on own land and/or with consent of the owner, but most of the buildings have not yet been legalized. It is without any doubt that if the Project will have any resettlement impact, some of the assets will be buildings without building permits so provisions of this law can be important, but in those cases, the Resettlement Policy Framework, in terms of eligibility, shall prevail if more stringent. This law now imposes restrictions to title transfer for structures constructed without building permits. In line with Article 28, all structures subject to the formal process of legalization shall within 6 months be registered as such by the relevant cadastral authority together with the note that any commercial transaction in terms of transfer of title is forbidden.
Law on Extra-Judicial Proceedings	"Official Gazette of SRS", No. 25/82 and 48/88, amended "Official Gazette of the RS" No 46/95, 18/05, 85/12, 45/13, 55/14, 6/15 and 106/15- other law	The Law on Extra-Judicial Proceedings defines the rules by which courts decide on personal, family, property-related and other rights and legal interests, which are resolved in extra-judicial proceedings, pursuant to the Law. In accordance with this Law, the court in extra-judicial proceedings determines compensation for an expropriated property after it establishes the important facts and approves a decision which defines the type and amount of compensation. According to this Law, participants may conclude an Agreement about type and amount of compensation, and the court will then base its decision on their agreement, if the court finds that the agreement is not contrary to mandatory regulations.
Law on Administrative procedures	18/16 and 95/18	The law defines the rules and procedures to be applied by government authorities when deciding on rights, obligations or legal interests of individuals, legal persons or other parties, within the framework of administrative procedures. Decisions by administration bodies are approved in form of a decree, after completing the procedure as prescribed by this Law. The party has the right to appeal against the decision approved in first instance. This Law administratively governs the expropriation process.
Law on State Survey and Cadaster	72/09, 18/10, 65/13, 15/15, 47/17, 113/17, 27/18, 41/18- other law and 9/20 – other law	The Law on State Survey and Cadastre regulates the professional activities and affairs of the state administration related to land, buildings and other structures survey, real estate cadastre, records and registration of property, registration of possession, registration of illegal buildings and buildings legalized according to provision of the latest Building Legalization Law of RS, utilities cadastre, basic geodetic works, address register, topographic and cartographic activities, valuation of real estate, geodetic and cadastral information system.
Labour Law	32/13, 75/14, 13/17- CC ruling, 113/17 and 95/18 – authentic interpretation	The Labor Law is the main legislation that guides labor practices in Serbia. It provides for the minimum rights of employees such as the right to corresponding salary/wage, safety and health at work, health-care protection, personal integrity protection, personal dignity, and other rights in the event of illness, reduction or loss of work ability and old age, including unemployment financial benefits during temporary unemployment, as well as the right to other forms of protection, in conformity with the law and bylaw, i.e. the employment contract. An employed woman is entitled to special protection during pregnancy and childbirth. Special protection is also guaranteed to employees under 18 years of age and an employed person with a disability. The terms and conditions provided by this Law also includes ban to direct or indirect discrimination regarding employment conditions and choice of candidates for performing a specific job, conditions of labor and all the rights deriving from the employment relationship, education, vocational training and specialization, job promotion and termination of employment contracts on the

Laws and regulations	Official gazette Republic of Serbia	Relevance
		grounds of differences by virtue of sex, birth, language, race, color of the skin, age, pregnancy, health condition, and/or disablement, ethnic origin, religion, marital status, family obligations, sexual orientation, political or other belief, social background, financial status, membership in political organizations, trade unions, or any other personal characteristic. The Labour Law guarantees the employee's right to corresponding earnings, compensations and refund of expanses, entitlement to training and professional development, provision of safety and health at work, health-care protection, personal integrity protection, personal dignity, and other rights in the event of illness, reduction or loss of work ability and old age, including financial benefits of temporary unemployment, as well as the right to other forms of protection. The provisions of the Labor Law apply to all employees who work in the territory of the Republic of Serbia for a national or foreign legal or natural person (i.e. employer), as well as to employees assigned to work abroad by an employer, unless otherwise specified by the law. The LL is also applicable to the employees in the field of transport, employed foreign nationals and stateless persons working for an employer in the territory of the Republic of Serbia (Labor Law - Article 2). The Labour Legal framework is aligned with EU Requirements as Serbia is signatory to 8 core ILO conventions.
Law on Occupational Safety and Health organized	101/05, 91/15 and 113/17 -other law	The Law on Occupational Safety and Health organized governs the occupational safety and health system in Serbia. By harmonizing this law with the ratified International Labor Organization conventions and EU Framework Directive 89/391/EEC, as well as special directives derived from the Framework Directive, all guidelines originating from them have been accepted in a form adjusted to national conditions. Apart from this Law, the regulatory framework of the occupational safety and health system is integrated by several sub-acts. The Rulebook on preventive measures for occupational health and safety and prevention and containment of contagious diseases epidemic ("Official Gazette RS" No 94/20) governs preventive measures employers need to introduce at workplaces and applies to all persons at workplaces in cases an epidemic has been declared. The provisions of this are further elaborated in numerous by-laws, for regulating the specific implementation procedures. A total of 8 legal acts and 55 rulebooks related to the area of occupational health and safety are ensuring implementation of the Law, and providing targeted OH&S procedures for e.g. working on temporary and movable construction sites, deep drilling and exploitation of raw minerals, exposure to asbestos, working in an environment at risk from explosive atmosphere, mitigation measures from hazardous risk of electricity, working in quarries, clay, sand and pebble extraction sites, rail traffic, noise, vibration emissions exposure etc. preventive measures during manual cargo movement.
Law on Road Traffic Safety	41/09, 53/10, 101/11, 32/13 - CC ruling, 55/14, 96/15 - odher law, 9/16 - CC ruling, 24/18, 41/18, 41/18 - odher law, 87/18, 23/19 and 128/20 - odher law	Regulates traffic signalization, security provisions for temporary closure or changes of traffic on roads (horizontal and vertical signalling, light signalling, telecommunication devices, etc.), driver permits for all sort of vehicles, technical review for vehicles in traffic etc. It also regulates traffic signalization on parts of road where obstacles or damage occur or where the works are carried out.

Laws and regulations	Official gazette Republic of Serbia	Relevance
Law on Cultural property	71/94, 52/11 – other law, 92/11 – other law, 6/20 and 35/21- other law	The Law on Cultural property regulates the system of the protection and use of cultural property and define conditions for the implementation of activities relating to the protection of cultural property. Depending on its physical, artistic, cultural and historical features, cultural property in Serbia include: cultural monuments, spatial cultural-historical units, archaeological sites and landmarks – immovable cultural property; works of art and history, archival material, film material and old and rare books – movable cultural property. Depending on its importance, cultural property in Serbia is also classified into: cultural property, cultural property of great importance and cultural property of exceptional importance. This Law define chance find procedure. According to Article 28 of subject law, a person who digs out of earth or takes from water property under prior protection outside of organized research shall immediately, within 24 hours at the latest, inform thereof a competent cultural property protection institution and the ministry responsible for interior affairs.

3.2. National EIA procedure

Environmental impact assessment is a preventive measure of environmental protection based on processing demands, preparation of assessments and consultations with the participation of the public and analysis of alternative measures, aiming to collect data and predict harmful effects of certain projects on the environment and human health, flora and fauna, land, water, air, climate and landscape, material and cultural heritage and the interaction of these factors, as well as determine and propose measures for adverse effects to be prevented, reduced or eliminated, bearing in mind the feasibility of these projects.

Law on Environmental Impact Assessment (EIA) ("Official Gazette of the RS ", No. 135/04 and 36/09) regulates EIA process, EIA content, Interested Authorities and organizations participation and public participation, international notification for projects that can have important impacts on other environment and inception and other important issues for EIA.

The impact assessment includes projects in the field of: industry, mining, energy, transport, tourism, forestry, agriculture, water management, waste management, utilities and projects planned in a protected natural asset or special purpose area defined by the Decree on making the list of projects which require environmental impact assessment and list of projects which may require environmental impact assessment ("Official Gazette of the RS", No. 114/08).

The process of environmental impact assessment of the modernization project of the existing railway is initiated by the owner of the project, which is "Serbian Railway Infrastructure" AD, with the competent authority for environmental protection. If the request is submitted by another person on behalf of the project - it must have the appropriate authorization issued to the project holder with the number of the request, the date of issue and the signature of the authorized person of the project owner. Facilities whose construction permit is issued by the republic authority, the impact assessment procedure is carried out by the Ministry of Environmental Protection.

Facilities whose construction permit is issued by the Autonomous Region, the impact assessment procedure is carried out by the Provincial Secretariat for Spatial Planning, Construction and Environmental Protection. For projects for which a building permit is issued by the local self-government, the impact assessment procedure is carried out by the local self-government in charge of environmental issues. The Ministry of Environmental Protection is responsible for all projects that may have a trans boundary impact.

The process of environmental impact assessment for railway infrastructure projects consists of the following phases:

- Phase I - Deciding on the need for impact assessment,
- Phase II - Determining the scope and content of the impact assessment.

The process of impact assessment commences with the submission of Request as follows:

- Request for deciding on the need to assess the impact of the project on the environment for reconstruction projects and/or construction of railway lines including associated buildings and equipment i.e. projects that are on the list of projects that may be required to have Environmental impact assessment - List II Regulation (Infrastructure Projects)
- Request for determining the scope and content of the environmental impact assessment for the following projects: main railway lines, including associated facilities (bridges, stations), i.e. for projects that are on the list of projects for which the impact assessment is mandatory - List I Regulations as well as projects that are on the List II for which the competent authority has decided to require assessment of the impact on the environment.

The scope and content of the Request for deciding on the need to assess the impact of the project on the environment and the Request for determining the scope and content of the project impact assessment on the environment are defined by the Law on Impact Assessment and the Ordinance on the content of and the content of the study on environmental impact assessment ("Official Gazette of RS", No. 69/05).

The request for determining necessity of assessment shall be accompanied by the following documents:

- A copy of the current planning document (location information), that is - verified planning design or act on planning requirements for construction of project concerned (location requirements);
- conceptual design or preliminary design, or the excerpt from the preliminary design,
- graphical representation of micro- and macro-design;
- requirements and approvals of other competent authorities and organizations obtained in accordance with the law;
- Proof of payment for the administrative fee;
- other evidence at the request of the competent authority.
- In addition to the requirements for determining the scope and content of the EIA assessment shall be accompanied by the following documents:
- A copy of the current planning document (location information), and verified planning design or act on planning conditions for construction of the concerned project (location conditions);
- conceptual design or preliminary design, or the excerpt from the preliminary design,
- graphical representation of micro- and macro-location;
- requirements and approvals of other competent authorities and organizations obtained in accordance with the law;
- Proof of payment for the administrative fee;
- other evidence at the request of the competent authority.

The Rulebook on the content of the Environmental Impact Assessment Study defines the content of the study, including a qualitative and quantitative presentation of possible changes in the environment during the project, regular work, in case of an accident and assessment of whether the changes are temporary or permanent. The decision on defining the scope and content of the study made by the competent authority in charge of environmental issues specifies in detail the content of the study on environmental impact assessment.

The Law explicitly stipulates that the implementation of the project cannot be undertaken without the implementation of the environmental impact assessment procedure and obtained consent to the Environmental Impact Assessment Study, or decision that there is no need for the EIA Study.

- Phase III - Procedure for granting approval for the Environmental Impact Assessment Study

Since the Environmental Impact Assessment Study is an integral part of the technical documentation required to obtain a building permit, it is usually made at a very early design stage at the level of the preliminary or main design, i.e. project for a building permit. More specifically:

- At the request of the project holder, the competent authority shall issue a decision on granting approval to the EIA Study or on rejecting the request for granting approval to the EIA Study, based on the conducted procedure and the report of the Technical Commission.
- The competent authority establishes a technical evaluation committee for the Environmental Impact Assessment Study. The Technical Commission evaluates the EIA study in accordance with the Law on Environmental Impact Assessment and the Rules of Procedure of the Technical Commission for the Evaluation of the Environmental Impact Assessment Study.
- Public participation is ensured at all stages of the environmental impact assessment process: the decision-making process on the need for impact assessment, the procedure for determining the scope and content of the EIA Study and the procedure for giving approval to the Environmental Impact Assessment Study. The competent authority is obliged to inform the interested authorities and organizations and the public about the submitted request, provide insight in submitting the request and documentation that is attached to the request and provide public insight, organize the presentation and conduct a public discussion on the Environmental Impact Assessment Study.

The following Figure presents the EIA Procedure in Serbia through flowchart and the stakeholder engagement required by the law in each phase of the EIA managed by the Ministry of Environmental Protection.

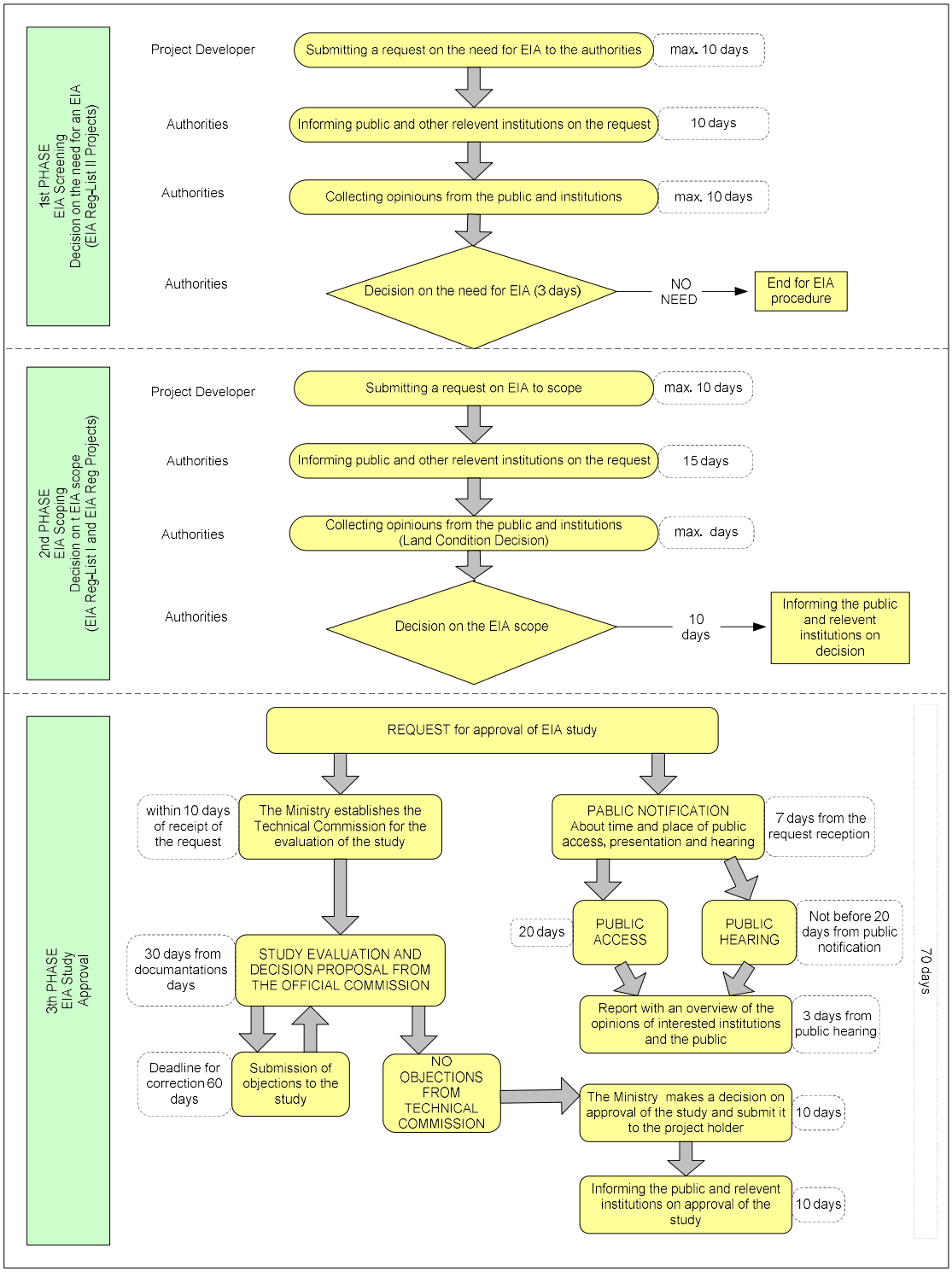


Figure 3. The EIA Procedure in Serbia [3]

The Ministry of Environmental Protection is responsible for the environmental impact assessment procedure and approves the EIA, in accordance with the Law on Environmental Impact Assessment.

The Decree on Determining the List of Projects for which an Impact Assessment is mandatory and the list of projects for which an Environmental Impact Assessment may be Required ("Official Gazette of the RS", No.

[3] Law on EIA

114/08) determines the List I Projects (for which an Environmental Impact Assessment is mandatory) and List II Projects (for which an environmental impact assessment may be required). According to its characteristics, the project in question is classified in List I, under item 7. Construction of: 1) Main railway lines including ancillary facilities (bridges and stations).

The Law on Environmental Impact Assessment ("Official Gazette of RS", No. 135/04 and 36/09) regulates the environmental impact assessment procedure, the content of the environmental impact assessment study, the participation of interested bodies and organizations and the public, cross-border notification for projects that may have significant environmental impacts, supervision and other environmental impact assessments.

An overview of the relevant laws governing the permitting process is provided in the table below.

Table 4. Relevant laws related to permitting process

Law	OfG.	Relevance for this ESIA
Law on Planning and Construction	72/09, 81/09, 64/10, 24/11, 121/12, 42/13, 50/13, 98/13, 132/14, 145/14, 83/18, 31/19, 37/19, 9/20 and 52/21	Art. 27-33, 53a-57 and 99- Defines Location Condition Issuance Art. 133-140 - Defines the Issuance of Building Permit Art. 148 - Defines Construction Works Application Submission Art. 154-159- Defines The Issuance Of Use Permit
Law on Environmental Impact Assessment	135/04 and 36/09	Article 5 - The obligation to obtain an approval for the impact assessment Art. 16-28 - Deciding on approval of the Impact Assessment

The following permits will be required for the ESIA phase: Location conditions for the preliminary design and the decision to approve the impact assessment. ESIA approval is required to issue a building permit.

3.3. Overview of the Main Relevant International Regulatory Framework

3.3.1. The EU EIA Directive

The Environmental Impact Assessment (EIA) was introduced for the first time in Europe in 1985 by the EIA Directive (85/337/EEC) and represents a key instrument for European Union environmental policy. The EIA Directive of 1985 has been amended three times:

- Directive 97/11/EC brought the EIA Directive in line with the UN ECE Espoo Convention on EIAs in a Trans boundary Context. The 1997 Directive widened the scope of the EIA Directive by increasing the types of projects covered and the number of projects requiring mandatory environmental impact assessment (Annex I). It also provided for new screening arrangements, including new screening criteria (included in Annex III) for Annex II projects, and established minimum information requirements;
- Directive 2003/35/EC sought to align EIA Directive provisions with the Aarhus Convention on public participation in decision-making and access to justice in environmental matters; and

Directive 2009/31/EC amended Annexes I and II of the EIA Directive, by adding projects related to the transport, capture and storage of carbon dioxide (CO2).

On January 28th 2012, Directive 2011/92/EU on the effects of public and private projects on the environment was published in the Official Journal. Directive 2011/92/EU codifies Council Directive 85/337/EEC on the assessment of the effects of certain public and private projects on the environment (EIA Directive) and its associated amendments. Directive 2011/92/EU fully preserves the content of the acts being codified and does no more than bring them together with only such formal amendments as are required by the codification exercise itself.

The scope of this Directive is to ensure that plans, programmes, and projects likely to have significant effects on the environment undergo an Environmental Assessment prior to their approval or authorization. While Annex I contain a list of projects for which the EIA is mandatory, Annex II defines those categories of projects whose ESIA is optional and at the discretion of the community member states.

According to the Directive 2011/92 EC, the proposed Project falls into Annex I, Category 7 (a) “Construction of lines for long-distance railway traffic and of airports with a basic runway length of 2100 m or more".

The EU Directive on Environmental Impact Assessment (Directive 2011/92 EC as amended by EIA Directive (Directive 2014/52/EU of the European Parliament and of the Council of 16 April 2014 amending Directive 2011/92/EU on the assessment of the effects of certain public and private projects on the environment)) 2014/52/EU) defines the requirements for assessment of potential adverse effects on the environment of some public and private projects that are expected to have significant impact on the environment. The EIA is conducted prior to the issue of the construction permit and approval for project implementation. The environmental impact may be the impact on human beings or on biological diversity, on the quality of soil, water, air or other natural resources, on the climate and contribution on the climate change, or on the historical and cultural heritage, as well as on the interaction between these elements. Cumulative impacts will be considered, while alternatives description will involve the baseline scenario and the “zero” alternative description. The public and other parties are to be consulted on the EIA as the consultation with the public is a key feature of environmental assessment procedures.

3.3.2. Other Most Relevant EU Directives

Other relevant EU Directives that will be taken into account are the following (the last amendments of the mentioned directives should be used):

- Water Framework Directive establishing a framework for Community action in the field of water policy (2000/60/EC)
- Directive on the assessment and management of flood risks (2007/60/EC) - Floods Directive
- Directive 2008/105/EC on environmental quality standards in the field of water policy(amending and subsequently repealing Council Directives 82/176/EEC, 83/513/EEC, 84/156/EEC, 84/491/EEC, 86/280/EEC and amending Directive 2000/60/EC) establishes, among others: (1) limits on concentrations in surface waters of 33 priority substances and 8 other pollutants (Annex I); (2) the possibility of applying Environmental Quality Standards (EQS) for sediment and biota, instead of those for water; (3) the possibility of designating mixing zones adjacent to discharge points where concentrations of the substances in Annex I might be expected to exceed their EQS; and (4) a requirement for Member States to establish an inventory of emissions, discharges and losses of the substances in Annex I.
- Directive 2006/11/EC on Dangerous Substances lays down rules for protection against, and prevention of, pollution resulting from the discharge of certain substances into the aquatic environment of the Community.
- Groundwater Directive 2006/118/EC established a regime which sets groundwater quality standards and introduces measures to prevent or limit inputs of pollutants into groundwater.
- Directive 2012/18/EU on the control of major-accident hazards involving dangerous substances (amending and subsequently repealing Council Directive 96/82/EC), obliges Member States to ensure that operators have a policy in place to prevent major accidents.
- Environmental Noise Directive 2002/49/EC defines a common approach intended to avoid, prevent or reduce on a prioritized basis the harmful effects, including annoyance, due to exposure to environmental noise, including, among other, assessment methods for the noise indicators.
- Directive 2000/14/EC on the approximation of laws of the Member States relating to noise applies to equipment for use outdoors listed in Articles 12 and 13 and defined in Annex I of this Directive.
- Directive 2008/50/EC 16 on ambient air quality and cleaner air for Europe;
- Directive 2008/98/EC 18 on waste (Waste Framework Directive)
- Habitats Directive 92/43/EEC aims to contribute towards ensuring biodiversity through the conservation of natural habitats and of wild fauna and flora in the territory of the Member States.
- Birds Directive 2009/147/EC relates to the conservation of all species of naturally occurring birds in the wild state in the territory of the Member States.
- Directive 89/391/EEC – Occupational Health and Safety

- Regulation (EU) 2018/1999 of the European Parliament and of the Council on the Governance of the Energy Union and Climate Action ('European Climate Law')

3.3.3. Relevant International Multilateral Agreements

Most of the International Conventions with regard to the Environment, Public Participation and Labour issues have been transposed in the Serbian national legislation such as:

- Bern Convention for the Protection of flora, wild fauna and nature environment of Europe, signed in 1995 and ratified by the GoA in 1999, ratified by the law 8294/1998.
- CITES Convention on International Trade in Endangered Species of Wild Fauna and Flora, ratified by the GoA in 2003.
- Convention of Biological Diversity (CBD) Rio de Janeiro, signed in 1996 and ratified by the GoA in 2004.
- Convention on Access to Information, Public Participation in Decision-Making and Access to Justice in Environmental Matters (Aarhus, 1998), ratified by the law no.8672/2000.
- United Nations Convention to Combat Desertification (UNCCD) was ratified in 1999.
- Convention on the Conservation of Migratory Species of Wild Animals (CMS or the Bonn Convention) ratified by the GoA in 2002.
- ESPOO Convention (Finland) "On Environmental Impact Assessment in a Trans boundary Context.", ratified by the law no 9478/2006.
- United Nations Framework Convention on Climate Change (UNFCCC) ratified by the law no. 2/97.
- Kyoto protocol to the United Nations Framework Convention on climate change 1998 ratified by Serbian government 2007.
- Paris Agreement, United Nations 2015, ratified by the law no. 4/17.
- Protocol on Strategic Environmental Assessment ratified by Serbian government at the end of 2004,
- The European Landscape Convention, Florence, 2000, ratified 2011.
- International Convention on the Elimination of all forms of Racial Discrimination, New York, 7.03.1966
- Convention on Elimination of all forms of Discriminations Against Women, New York, 03.09.1981, ratified by Republic of Serbia in 2001.
- Council of Europe Convention on Preventing and Combating Violence Against Women and Domestic Violence, Istanbul, 11.05.2011, in force in Republic of Serbia from 01.08.2014.
- National Convention on Economic, Social and Cultural Rights New York, 16.12. 1966, ratified by Republic of Serbia in 1990.
- International Labour Organization Convention No. 155: Occupational Safety and Health, 1981, ratified 1992.
- UNESCO Convention for the Safeguarding of the Intangible Cultural Heritage, 2003, ratified in May 2010.
- EUROPEAN Convention "For the Protection of Archaeological Heritage", ratified in 2009.

The IFIs recognise the responsibility of clients and their business activities to respect human rights. This responsibility involves respecting human rights, avoiding infringement on the human rights of others, and addressing adverse human rights impacts that their business activities may cause, or to which they may contribute. The term "social" refers to those issues which pertain to project-affected people (PAPs) and their communities and workers and related to socioeconomic status, vulnerability, gender identity, human rights, sexual orientation, cultural heritage, labour and working conditions, health and safety and participation in decision making.

The social standard IFIs Policy is guided by provisions of several fundamental treaties and conventions: The International Bill of Human Rights, International Labour Organization (ILO) Conventions, the European Convention on Human Rights, UNESCO World Heritage Convention etc.

In addition to the above, Serbia has adopted or embedded in its regulations the principles of many international treaties and standards that provide base for EIB Policy SIA regulation.

3.3.4. Serbia's Progress for the EU Acquis

The Serbian government adopted in March 2018 a third revised version of the National Programme for the Adoption of the Acquis of the European Union (NPAA). NPAA is the most significant and most comprehensive document in the process of European integration of Serbia, since in addition to harmonizing the complete domestic legislation with the EU acquis, it also requires the strengthening of administrative capacities during accession negotiations with the EU, as well as long-term financial planning and responsible budget planning . Part of the analysis other report is presented below.

Following intensive preparatory work, Serbia submitted its negotiating position for chapter 27 in January 2020 to the Council. Some 4 years after its creation, Serbia's green fund has yet to become fully operational. Its 2019 financial allocations were not fully used. Its 2020 budget was reduced by 25% to address needs arisen from the COVID -19 crisis. Income generated from environmental fees is not earmarked for environmental purposes. This leads to a diversion of funds for other purposes. Serbia needs an effective institutional set-up to manage environmental investments, which need to increase much faster than previously. The investment plan needs to be turned into an investment programme, targeting projects with the highest environmental impact. Investment decisions need to be based on feasibility studies and technical designs in line with EU best practices and transparent competitive procurement procedures, ensuring best value for money.

In the area of horizontal legislation, Serbia has a high level of alignment with the EU acquis. Overall, Serbia needs to improve its administrative capacities at central and local level, including inspectorates, to draft legislation, give adequate time for legislative consultations and carry out qualitative public consultations, particularly at local level. Legislation on environmental impact assessment needs to be further aligned and its implementation strengthened. The non-compliance of environment impact assessment (EIA) legislation with other laws, especially with the law on planning and construction according to which the impact assessment is carried out after the issuance of the construction permit, needs to be urgently addressed. Strategic environmental assessments need to be carried out for plans and programmes from all relevant policy areas, not only the environment. Some progress can be reported on the implementation of the INSPIRE Directive. Strengthening the capacities of the judiciary and the environmental inspectorate and establishing a track record on implementing the Environmental Crime Directive remain priorities. Serbia needs to improve the implementation of the polluter pays principle, for example by strengthening capacities at local level to collect environmental fees.

The Labour Law ("Official Gazette of the Republic of Serbia", No 24/05, 61/05, 54/09, 32/13, 75/14 and 13/17-CC) is a general law and applies to employees and employers, unless otherwise established by a specific law. If there are no specific laws, the Labour Law has direct and full application, and if there are specific regulations, the Labour Law has partial and subsidiary application. The Labour Law is partly harmonised with the relevant EU regulations.

The basic regulation in the area of occupational safety and health is the Law on Safety and Health at Work ("Official Gazette of the RS", No 101/05 and 91/15) which contains basic provisions and principles of Council safety and health of workers at work. The Law imposes rights, obligations and responsibilities of employers and employees for the implementation of measures ensuring safe and healthy working conditions at work. The system of occupational safety and health was improved in 2015 by the adoption of the Law amending the Law on Health and Safety at Work in November 2015, implementing further harmonisation with Directive 89/391/EEC Acting in accordance with the National Programme for the adoption of the EU acquis, Occupational Safety and Health Administration is preparing proposals of regulations which transpose specific EU Directives in this area into national legislation.

There are further alignment with EU regulations which are under the NATIONAL PROGRAMME FOR THE ADOPTION OF THE ACQUIS -Third Revision

In the field of air quality, Serbia has a good level of alignment with the EU acquis. However, Serbia needs to speed up implementation of legislation and air quality plans. While an air quality monitoring network is in place and is being extended, and real-time data are available, the monitoring of air quality still needs to be considerably strengthened.

Regarding waste management, Serbia has a good level of alignment with the EU acquis, however the implementation remains at an early stage. Serbia also developed a national waste management strategy and a national sludge management strategy, which are currently in the adoption process. The by-law on treatment of the equipment and waste containing PCB, currently in the adoption procedure, will fully transpose the relevant EU directive. Serbia proceeded with the permanent disposal of historic hazardous waste. Additional economic instruments for special waste streams need to be developed. The proportion of recycled waste in overall waste management is still low, e.g. 3% for municipal waste. Serbia needs to redouble efforts to close its non-compliant landfills and invest in waste reduction, separation, and recycling. The remediation of the Belgrade landfill and the construction of a waste to energy facility are expected to start in 2020.

The level of alignment with the EU acquis on water quality is moderate. Work on an action plan for implementing the water management strategy has not progressed. Untreated sewage and wastewaters are still the main source of water pollution. Non-compliance with water quality standards remains a big concern in some areas, such as that on arsenic. Serbia needs to make significant efforts to align further its legislation with the EU acquis, and to strengthen administrative capacity, for monitoring, enforcement, and inter-institutional coordination. Work on the river basin management plan is progressing slowly. Improving local governance, for operating and maintaining water and wastewater facilities, remains a priority. Work on adequate water fees and tariffs is at an early stage. Lack of human and financial resources and data availability hinder the development of flood hazard and flood risk maps for all relevant areas.

Alignment with the EU acquis in the field of nature protection, with the Habitats and Birds Directive, remains moderate. Serbia has still not addressed gaps in transposition, allowing hunting of non-huntable birds, especially the goshawk and the turtle dove. Serbia needs to fully incorporate EU standards on prohibited means of capturing and killing wild animals throughout its entire legislation, including in legislation on hunting.

Progress on establishing Natura 2000 sites is slow. Institutional and human resource capacities at national and local level remain weak, as regards enforcement, and wildlife trade. Any further development of hydropower should be in line with EU environmental legislation, including environmental impact assessments with proper public consultations, nature protection and water management legislation.

Serbia's level of alignment with EU rules on noise is good, but their implementation remains at an early stage. Serbia needs to build administrative capacity for drafting strategic noise maps and action plans.

Regarding climate change, Serbia has some level of preparation, but implementation is at a very early stage. Developments during the reporting period largely came to a standstill, reflecting a lack of political consensus about the urgency to act. Serbia has still not adopted the climate law it had prepared in 2018.

The adoption and implementation of a climate strategy and action plan, which is consistent with the EU 2030 framework for climate and energy policies, and which addresses adaptation to climate change, is paramount for Serbia's future low carbon development. Serbia needs to do more to integrate climate action into other sectors. Serbia needs to considerably strengthen its administrative and technical capacity, so it can implement, monitor and report on climate acquis. Awareness-raising activities need to be stepped up. Serbia needs to invest much more into the transition towards green energy, including upgrading outdated infrastructure in order to reduce pollution.

3.4. EIB E&S Policy

Currently EIB is a potential financier for the implementation of the Project. Therefore, their Environmental and Social Policy is presented here below.

The new EIB Group Environmental and Social Policy lays out the Group's vision to 2030, namely, to actively contribute to sustainable development and inclusive growth. The new EIB Group Environmental and Social Policy, which lays out the Group's vision to 2030, namely, to actively contribute to sustainable development and inclusive growth; and this is reflected in its environmental and social safeguards, through the EIB Statement on Environmental and Social Principles and Standards. Such procedures, principles and standards are translated into the routine practices of the EIB in the Environmental and Social Practices Handbook.

Standard 1 – Environmental and Social Impacts and Risks

Standard 2 – Stakeholder Engagement

Standard 3 – Resource Efficiency and Pollution Prevention 5. Cultural Heritage

Standard 4 – Biodiversity and Ecosystems 7. Rights and Interests of Vulnerable Groups

Standard 5 – Climate Change

Standard 6 – Involuntary Resettlement

Standard 7 – Vulnerable Groups, Indigenous Peoples and Gender

Standard 8 – Labour Rights

Standard 9 – Health, Safety and Security

Standard 10 – Cultural Heritage

Standard 11 – Intermediated Finance

The Project is included in the 'Category A' for which an ESIA is mandatory to be prepared.

3.5. GAP Analysis

The international and national processes are aligned regarding the requirements for assessment of environmental impact. However, the international ESIA is a more integrated process and needs to encompass the requirements associated with regulatory mechanisms such as those which are part of the local "planning process" and are outside the formal environmental impact assessment process. For example, issues associated with local grievances arising from land purchase for the project are managed locally by local regulatory authorities. In the ESIA process, these local issues must also be encompassed in the integrated impact assessment. The table below summarises the similarities and differences between the ESIA and Serbian EIA process.

Table 5. Relation with the local EIA procedure

Activity	ESIA	EIA	Comments
Screening Study	Yes	Yes	Due to nature and scale of the proposed project and the clear requirement under international standards and national legislation the project is a Category A /List I project and a formal screening study was not produced for this project. The procedure started from the scoping study.

Activity	ESIA	EIA	Comments
Categorisation	Yes	Yes	Formal categorization in accordance with banking standards and national legislation indicates that the proposed project is a Category A / List I project and requires a full impact assessment.
Stakeholder Engagement Plan	Yes	Yes	A formal stakeholder engagement plan is not required under national legislation. However, stakeholder consultation is part of the EIA process.
Scoping Study	Yes	Yes	Due to the requirements of the ToR, an International Scoping Study was created for this project. The local scope study has not yet been submitted to the local regulatory authorities because there is no legislative basis for it yet (Location conditions).
Consideration of alternatives	Yes	Yes	Both the impact assessment process for investment and national regulatory requirements, require the consideration of other feasible approaches, including alternatives' locations, technologies, scales and 'no project' options.
Environmental Impact Assessment	Yes	Yes	The environmental impact assessment requirements are generally aligned. The standards adopted in the environmental assessment undertaken for the ESIA should be in line with European and other international best practice. The requirements under the national EIA regulatory process need to ensure compliance with national legislation and not the regulatory requirements outside of the country.
Environmental impacts assessment in cases of accidents	Yes	Yes	The Serbian EIA legislation requires quite detailed analysis of environmental impacts in case of accidents which includes specification of hazardous substances used, emergency preparedness and response, remediation measures, etc.
Socio-Economic Impact Assessment	Yes	Limited	The impact assessment for investment requirements requires an integrated approach including full deliberation of the socio-economic effects. The national regulatory requirements for impact assessment are primarily focused on environmental requirements with other requirements encompassed in other regulatory (e.g. 'planning') mechanisms. A formal socio-economic impact assessment is not required under national legislation. However, the local national legislation does require assessment of effects where impacts are associated with impacts to human health.

Activity	ESIA	EIA	Comments
Resettlement Action Plan (one of the gap is that the EIB standards also over PAPs who do not have a formal property or lease title, and live informally in the affected area)	Yes	No	Resettlement Action Plans are not part of the EIA. The only documents prepared are part of construction plans; the Expropriation study Is simply a database of land impacted and formal owners without tackling socioeconomic issues.
Climate change vulnerability assessment	Yes	Limited	A formal climate change impact assessment is not required under national legislation. However, local national legislation requires an impact assessment where impacts are linked to impacts on meteorological parameters and climate characteristics.
Environmental and Social Management Plan (ESMP)	Yes	No	ESMP is not typically included as a requirement according to local legislation. It is required for Category A projects according to EIB E&S standards. ESMP describes the roles, the responsibilities, the key commitments and general measures, which should be implemented. The Approved Study is the base document for the preparation of ESMP.
Non-Technical Summary (NTS)	Yes	Yes	NTS is required for investment requirements for use as a disclosure document. It is recognized as good practice to produce an NTS to provide readily accessible summary of the project key features, an assessment of its effects, the proposed mitigation measures and a summary of the residual impacts.
Public Consultation & Disclosure	Yes	Yes	The public consultation process for both investment and national regulatory purposes is required. Given the length of the railway and that this project involves the construction of new railway part, the project is categorized in Category A, requiring the full ESIA disclosure package to be publicly disclosed for a minimum of 30-60 days.
Management of Grievances and Objections	Yes	No	A Grievance Mechanism is not a formal requirement under the national regulatory requirements. However, grievances are reported under the consultation process and are encompassed under other regulatory mechanisms (e.g. the local 'planning' process).

4. PROJECT DESCRIPTION

The Ostružnica-Batajnica Section according to railway categorization (Regulation on the categorization of railways belonging to the public railway infrastructure, "Official Gazette of RS", No. 92/2020 and 6/2021) belongs to the main lines with the corresponding number 111 Beograd Ranžirna "A" - Ostružnica – Batajnica.

According to the European Agreement on Main International Railway Lines (AGC, AGTC), the section belongs to the international railway network “C-E”, designated as E-70/85. It is also part of the Pan-European Corridor X in Serbia that starts from the state borders with Croatia (branch Xa) and Hungary (branch Xb) and continues to the state borders with Bulgaria (branch Xc) and North Macedonia (branch Xd).

The Ostružnica – Batajnica section was constructed in the 1970s. This section is a single-track electrified line (AC 25KV/50Hz) with a length of 22.36 km used for railway freight traffic. Given that the bypass railway line is part of the Belgrade Railway Junction (BRJ) and Pan-European Corridor X, it serves national and international freight transit, which is the primary type of traffic to/from the Belgrade Marshalling Yard (BMY), but there are also regional cargo transport services utilising the line.

The railway section is mostly located on level terrain on smaller embankments, except in the area where the line crosses Sava River and is elevated on the ramp embankments on both sides of the shores. The railway line mostly passes through agricultural land and to a smaller extent through settlements.

The maximum allowed train weight on the railway line Ostružnica – Batajnica corresponds to load model D4 (22.5 t/axle and 8 t/m). The structure gauge corresponds to category GB.

The railway line has curves with horizontal transitional arcs in the shape of a modified parabola. The smallest arcs radii are 300 m, while other arcs are of various radii up to 4,000 m. The lengths of horizontal transitional arcs are also of different sizes, from 50 to 120 m. On this railway line, there are also curves into the station Ostružnica, which are without transitional arcs (L=0), with 1,500 m radius.

The characteristics of all 12 curves along the section are outlined in the table below.

Table 6. Technical characteristics of rail section curves

No. of curve	Radius of curve (m)	Transition curve length		Cant (mm)	Design speed (kph)
		L_1 (m)	L_2 (m)		
1	1,500	0	0	0	50
2	800	100	100	130	120
3	1,500	60	60	90	120
4	2,000	50	50	50	120
5	2,000	50	50	50	120
6	1,000	80	80	100	120
7	1,000	120	120	100	120
8	1,000	80	80	100	120
9	4,000	50	50	25	120
10	4,000	50	50	25	120
11	300	60	60	90	60
12	300	60	60	0	50

The railway line is mostly a level line with small longitudinal inclinations. The maximum longitudinal track inclination on this section is 6‰. At points of longitudinal inclination change, where the difference between adjacent inclinations is more than 2‰, the rounding of track elevation is performed with vertical circular 10,000 m radius of the arc. Longitudinal inclinations in stations are in horizontal position (0‰).

Continuous welded rail is installed on the entire length of the railway line except for the switches in stations. Rail type 49E1, beech impregnated sleepers fastened with solid fastening device K, or elastic fastening device SKL-2 on ribbed base plates, and gravel ballast bed were installed but a tampon layer was not installed.

4.1. Existing State Analysis

There has been no railway overhaul since Ostružnica – Batajnica section was constructed, except for the replacement of some wooden sleepers. Currently, because of its poor condition, the section is a bottleneck for cargo trains operating within the BRJ.

According to the information collected by the design team, fastening devices (type 'K') are corroded and not oiled. Ballast is made of crushed limestone, covered with mud. It is required to add crushed stone material on some parts of the railway line. Also, the track geometry is very poor on the connection points of the tracks. It is impossible to mechanically adjust the track because the wooden railway sleepers are rotten to a large degree.

Based on railway line inspections, from the total installed wooden sleepers, more than 35% are rotten (there are groups of 15-20 pieces of wooden sleepers that are rotten). Also, the rails were made in 1963, and they are worn out within the allowed limits, the fastening equipment is corroded and is not oiled, the ballast is covered in mud in some parts, and it has irregular formation, and the continuous welded rail is cut because of the broken insulation systems and rail burst.

The base formation is of variable width from 5 to 7 m. The shoulders are narrow in places, low and have inlets. In 16 places, the poor condition of the lower structure, unstable and deformed slopes of the embankment and landslides are noticeable - in Ostružnica station, an active landslide causes damage to the transformer.

The "Without-the-project" scenario implies maintaining of the existing conditions of the line. For that purpose, the design of a new line is considered not necessary, but the required maintenance works will provide the existing speed on the railway section without any further deterioration or major damage.

This option involves the maintenance of the existing line with the necessary repairs and replacements to keep the existing condition of the rail section and the relevant technical structures. Only the capital maintenance and emergency interventions are assumed to be conducted, when and if there is a need, according to national and international good practices to preserve business-as-usual conditions and to avoid further reduction of train speed or even closure of the line due to damages.

Three (3) railway stations are located on this railway section: Ostružnica, Surčin and Batajnica. This project is considering only Ostružnica and Surčin stations and their adjustment to EU railway standards. As already mentioned, Batajnica station is out of this project scope since it is currently under reconstruction as part of the overall upgrade of the Belgrade-Budapest railway connection.

The buildings in the stations were built in the second half of the 1980s according to the design of the second track from 1984. So far, the existing technical documentation for station buildings has not been found and it will be necessary to measure the dimensions of the existing buildings to be covered by the architecture design.

Surčin station is in good condition, there are only minor repairs needed on the access stairs and sidewalks. On the other hand, Ostružnica station needs reconstruction of structural elements. Next to each station there is an electric traction substation (ETS) building. At Ostružnica this is not in good condition and has a serious damage because of the landslide. The existing building shall be demolished and a new one should be built. The existing buildings accommodate the train dispatcher and the railway station chief. Next to the buildings, besides the ETS units, there are relay buildings and warehouses for tools and materials.

The existing building of Traction Subsection Post with neutral section (TSPn) in Surčin at km 13+480 does not meet the requirements for the double track line. A new building should be built at the same location.

- Ostružnica station

The railway station Ostružnica lies in km 3+532 of railway line Beograd ranžirna „park A" -Ostružnica-Batajnica. Regarding traffic management, the traffic of the trains of consecutive and opposite direction is managed in the station. Ostružnica station is:

- an interstation at Beograd ranžirna „park A" - Batajnica railway line,
- a staffed Centralized Traffic Control (CTC) station (the line is included in CTC management system),
- a divergence station for Ostružnica-Rasputnica B railway line, and
- a subordinate official place of the Belgrade Marshalling Yard.

In terms of transport service, the Ostružnica station is open for freight wagon load transport, except for explosive materials, goods from I and Ia RID classes and flammable liquids. The station is closed for passenger service, luggage, and small shipments, and for loading and unloading of live animals.

The Ostružnica station is entirely located at horizontal level and it has four station tracks. Their purpose and useful length are given in Table 7.

Table 7. Purpose and useful length of Ostružnica station

Track number	Purpose	Useful length [m]
1	Handling track	785
2	Irregular running through track	785
3	Main running through track	880
4	Irregular running through track	970

Figure 4. Graphical view of current Ostružnica station layout [4]

- Surčin station

The Surčin Station is:

- a staffed CTC station since the railway line Beograd ranžirna „A"– Ostružnica – Batajnica is included in the CTC management system,
- a subordinate official place of the Batajnica station,
- an interstation of the line Belgrade ranžirna „A" – Ostružnica – Batajnica,
- the first station of the industrial railway line Surčin – Jakovo.

The station building of the Surčin station is located on the right side of the line, at km 14+635 of the line Beograd ranžirna "A" - Ostružnica - Batajnica. In terms of transport service, the Surčin station is open for freight transport (loading and unloading cargo), while it is not open for passenger transport.

The railway station area is defined by home signals:

- The home signal from the direction of Ostružnica station is Bu-92 built in km 13+865 of the line Beograd ranžirna „A" – Ostružnica – Batajnica.
- The home signal from the direction of Batajnica station built in km 15+565 of the line Beograd ranžirna „A" – Ostružnica – Batajnica.

The station plateau of the Surčin station is horizontal.

[4] IPF10 team

The Surčin station comprises five station tracks and one dead-end track with a useful length of 60 m. The useful length and purpose of the station tracks are shown in the following table.

Table 8. Purposes and useful lengths of station tracks in Surčin station

No	Track	Useful length [m]
1	Handling track	657
2	Reception – departure track	691
3	Main running through track	733
4	Reception – departure track	678
5	Handling track	651

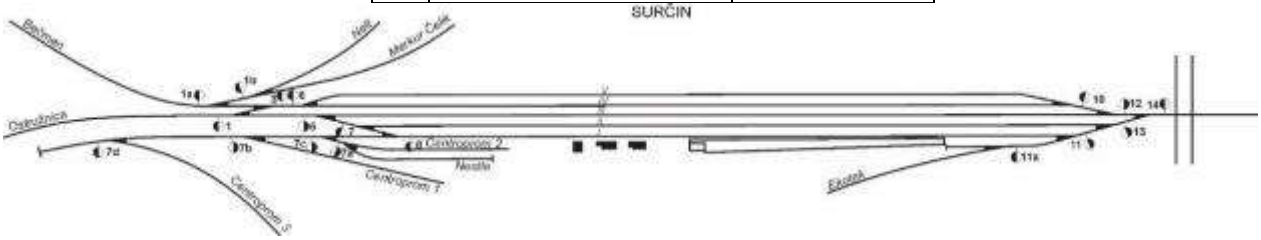


Figure 5. Graphical view of current Surčin station layout [5]

- Level crosings

There are currently five level crossings along the Ostružnica – Batajnica section; three of them are passive ones, provided only with traffic signs and two are active crossings which are provided with light signals and half-barriers. In the station Ostružnica there is one level crossing only for Serbian Railway Infrastructure use.

Active level crossings render higher safety level than passive level crossings because the former provide an information of the train approaching (barrier or half-barrier starts lowing and light signal flashing). Passive level crossings do not provide this information. The passive crossings are only equipped with a warning sign or other type of protection equipment which do not show when it is not safe for a vehicle to cross.

The present level crossings at railway section Ostružnica – Batajnica are shown in the table below.

Table 9. Data related to the existing level crossings at section Ostružnica – Batajnica

No	Km position	Road category	Between stations	Type of arranging p.p.	Type of protection
1	15+245	IIB no.319	Surčin - Batajnica	Asphalt	Light signalling & half-barriers
2	17+504	Non-categorised	Surčin - Batajnica	RCC plates	Light signalling & half-barriers
3	18+704	Non-categorised	Surčin - Batajnica	RCC plates	Traffic sign
4	21+637	Non-categorised	Surčin - Batajnica	RCC plates	Traffic sign
5	25+015	Non-categorised	Surčin - Batajnica	RCC plates	Traffic sign

- Bridges and Culverts

All Structures on the route are neglected and unmaintained. According to the first indicators, damages are visible on all parts of the equipment of bridge structures (bearings, expansion joints, fences, etc.). The anti-corrosion protection on steel parts of the structure is violated. The protective layers of concrete structures have been degraded. Cracks in the concrete mass are also noticeable.

- Signalling and Telecommunication System

[5] IPF10 team

Traffic control on the Ostružnica – Batajnica railway line is regulated with electro relay devices of the type SpDrS-64 JŽ manufactured by "SIEMENS – EI", with control of the inter-station distance on the principle of axle counters. All station tracks are isolated, and their occupancy is controlled from the control desk in the office of the railway station dispatcher. The station control desk is built of mosaic fields on which, according to the geographical position on the field, the track situation is schematically shown with all signals, points, derailers, as well as spatial signals between the station and neighbouring official posts.

The connection between the station dispatchers in Surčin and Batajnica stations and train drivers on trains is realized through RDV (Radio dispatching connection). Also, telephones are placed in telephone cabinets marked with a capital letter "T" at each spatial signal and road crossing. In the station dispatcher office of Batajnica station, there is a fixed radio station system TC 9.

- Energy system

The section of the Ostružnica - Batajnica railway is single-track, electrified in 1970 with single-phase system 25kV, 50Hz. Since then, it has been invested in regular maintenance of power plants, and in 2012 the fourth and the fifth track at the Surčin station were electrified.

4.1.1. Proposed interventions for Ostružnica – Batajnica Railway line

This section describes the proposed works and interventions for the modernisation of the Ostružnica – Batajnica railway line at the level of Conceptual Design. The design solution foresees the reconstruction of the existing track and the construction of a second track. More details will be presented in ESIA based on Preliminary design.

- Formation

The width of formation of the open railway line, which ensures the safety space, working paths and accommodation of electrical engineering and other equipment shall be designed according to the Rulebook and number of tracks. Formation's cross fall is two-way with inclination of 5%.

The drainage of the track bed includes collecting and controlled running of storm water through lined and earth canals, while the drainage of plateaus is performed by drains system.

Topsoil shall be stripped in 30–50 cm layer, and exact thickness of the topsoil will be determined on site. After topsoil stripping, the foundation soil will be compacted.

On terrains with lower bearing capacity, it is envisaged to place geocomposite on the formation.

Required values of compactness:

- Ev_2 = 45 MN/m2 Ev_d = 30 MN/m^2 on formation
- Ev_2 = 80 MN/m2 Ev_d = 40 MN/m^2 on the top surface of transition layer
- Ev_2 = 120 MN/m2 Ev_d = 50 MN/m^2 on the top surface of protective layer

Slopes are envisaged to be topsoiled and grassed on the entire section.

- Permanent way

For tracks of the open railway line and stations, appropriate type of rails and switches is applied, in accordance with the design speed and purpose of the track, on concrete sleepers with elastic rail fastenings in category I ballast:

- Rail type: 60E1 (main running line), 49E1 (other tracks)
- Switches: 60(49) E1-300-6° (100≤V≤140kph in straight, 50kph in turn)
- Concrete sleeper length 2.60 m
- Ballast shoulder width is 0.50 m.

- Ballast slope inclination is 1:1.5
- Ballast thickness under sleeper min 30cm, on bridges min 35cm
- Rails and switches welded into Long Welded Rail (LWR).

Following the designed structure of the superstructure on the open railway line, the design shall be prepared for superstructure on bridge structures, longer than 40m, which are the subject matter of the present design, with the following characteristics:

- Running rail type: 60E1
- Concrete sleepers with even top surface, 2.60m long, at 60cm distance between centre lines 60cm
- Ballast of I category crushed stone
- Ballast thickness under sleeper in front of and behind bridges min 30 cm
- Ballast thickness under sleeper on bridge structures min 35 cm
- Rails welded into Long Welded Rail.

For the purposes of protection against harmful effects of train derailment, the design envisages guard rails type 60E1 with elastic rail fastenings, which are to be placed on bridge structures and at 10.4m in front of and behind the bridge. Concrete sleepers with even top surface are envisaged, onto which running and guard rails shall be mounted via double steel base plates.

This design also includes the design of superstructure on bridge structures and on 10.4m length in front of and behind the bridge structures (from the beginning to the end of guard rail).

Conceptual Design envisages to reconstruct the existing track and build a second track for speed up to 120 kph.

There are twelve curves along the section and, similarly to Option I, it is not possible and/or justified to realign and increase their radius to achieve higher speed.

The second track for is planned on the right side of the existing track from Ostružnica station and as left track in Batajnica station. This means that the existing track shall be moved in some of the curves of the railway line.

The reconstruction of the existing and construction of the second track shall be for D4 category (22.5t/axle and 8t/m) and is foreseen through the replacement of the superstructure (rails, switches, sleepers, fastenings and ballast), the rehabilitation of the substructure (construction of transition layer and protective layer) and the consolidation of the level crossings.

In terms of station tracks, for Ostružnica station, the number of tracks will be kept as in the current situation, while two new tracks will be added to the Surčin station.

Ostružnica station has four tracks with length of more than 750 m. There are 13 switches in the station. The 5 switches on the main track are 49E1-300-6^{o} type and 8 switches on the side tracks are 49E1-200-6^{o} type.

Surčin station will have seven tracks and two tracks will have length of more than 750 m. There are 20 switches in the station. The 10 switches on the main track are 49E1-300-6^{o} type and 10 switches on the side tracks are 49E1-200-6^{o} type.

Track and switches will be welded in long rail track.

- Ostružnica station

According to Conceptual Design, the Ostružnica–Batajnica rail section after modernization becomes a double-track line. Ostružnica station, in terms of transport, remains as a freight station, closed for transport operations with passengers. Also, after modernization, restrictions remain on the loading and unloading of explosives and goods from classes I and Ia of the RID.

The modernization assumes the extension of the second station track, which becomes main running through track for all the trains toward Surčin and Batajnica.

Trains from Beograd ranžirna station, toward Surčin, would run straight through track II. The connection from this direction with tracks III and IV is not planned, since, regarding the role and nearness of the Beograd ranžirna station, all overtakes of the trains operating from this direction should not be performed in Ostružnica station.

Trains from Surčin station, toward Beograd ranžirna park A, would normally run straight through track III. Considering the new technical characteristics of the Beograd ranžirna A–Ostružnica–Batajnica, after the modernization, possible overtaking of trains from the direction of Surčin and toward Beograd ranžirna park A, should be conducted in Surčin station. In that way, the need for the introduction of an additional connection between the tracks III and IV, at outbound side of the Ostružnica station, is eliminated.

- Surčin station

Surčin station remains a freight station in terms of transport, without passenger operations and there will be seven (7) tracks. The purpose and useful length of these tracks are shown in Table 10.

Table 10. Purpose and useful length of station tracks in Surčin (Option II)

No	Track	Useful length [m]
1	Handling track	617
2	Reception – departure track	705
3	Main running through track	789
4	Main running through track	898
5	Reception – departure track	690
6	Handling track	599
7	Locomotive track	599

- Buildings

Conceptual design envisaged reconstruction of both stations, due to the construction of the second track proposed under this option.

The reconstruction for both station buildings will be planned based on the existing condition, characteristics of the location, and the traffic and technological needs and requirements of a modern railway line, following the regulations and standards for the appropriate type of buildings/ structures.

Depending on the current condition of the buildings, a specific plan of action will be proposed. Energy-related measures for the rehabilitation of buildings are envisaged as well.

Materials will be selected in accordance with the technological requirements, applicable regulations, and standards for this type of buildings.

Depending on the condition and purposes of buildings, all the required appropriate installations will be planned (water supply, sewerage, electricity, heating, ventilation, air-conditioning, etc.).

The following designs will be prepared for the above buildings:

- Architectural Designs
- Structural Designs
- Designs of installations (water supply, sewerage, electricity, heating, ventilation, air-conditioning).

- Level crossings

There are five level crossings along the railway section Ostružnica – Batajnica; three of them are passive (traffic signs) and two are active crossings (light signals and half-barriers).

The level crossing at km 15+245 presents an intersection of the railway line section Ostružnica-Batajnica with the state road IIB no.319. This road comprises the connection between the settlements of Dobanovci and Surčin. By the current design solution, it is proposed to de-level this crossing.

At the level crossings at km 17+504, km 18+704 and km 21+637, it is proposed to keep the existing type of protection. The level crossing at km 25+015 will be cancelled, according to the Batajnica Terminal project.

Once the level crossing optimisation is completed, proper road safety inspection also needs to be conducted by an authorised road safety inspector based on which appropriate measures need to be designed. Road safety audit will be done for preliminary design of the grade separated railway crossing. Both the road safety inspection and the road safety audit will be done during the design phase in accordance with the relevant local legislation in force in Serbia related to road safety audit and inspection, but also in accordance with Directive 2008/96/EC of the European Parliament and of the Council of 19 November 2008 on road infrastructure safety management.

- Bridges and Culverts

Underpass at km 4+407

The underpass at km 4+407 is steel structure on concrete columns. The underpass has two spans.

Rehabilitation and strengthening of the load bearing structure are planned for this underpass. Strengthening of structure will be in accordance with the currently valid regulations in the Republic of Serbia (Eurocode).

Given that the second track will be constructed, the strengthening of this structure will be done because the structure has sufficient width for two tracks.

All equipment of the bridge will be replaced (bearings, expansion joints, fences, drainage system, new waterproofing, etc.). Also, all damage to the reinforced concrete columns will be repaired. Finally, the embankment in the area of the bridge will be repaired, while landscaping in the bridge zone is also envisaged.

Underpass at km 4+577

The underpass at km 4+577 is reinforced concrete structure. In a structural sense, it represents a series of simple beams. The underpass has three spans on reinforced concrete columns.

Bridge at km 5+213

The bridge in Ostružnica over Sava River was designed before 1964. According to that and the fact that it has already been reconstructed previously, the design must be developed in compliance with Eurocode. Horizontal forces according to new Rulebook will cause in the existing piers significantly higher influences.

At present, it is unknown whether the bombing damaged columns and foundations and whether these damages were accurately recorded during the 2000 reconstruction design and whether such damage was progressive. The main columns are based on caissons and the inundation on wooden piles. The condition of the wooden piles is not known, but it can be assumed that it is bad.

Therefore, it is necessary to build a completely new bridge for the double-track railway.

Underpass at km 12+496

The underpass at km 12+496 is a steel structure on concrete columns. The underpass has one span. It has an insufficient height of opening above the road. With this in mind, it is necessary to make a completely new structure. It will also be needed to lower the level of the road.

The designing of structure will be in accordance with the currently valid regulations in the Republic of Serbia (Eurocode).

Railway – road crossing at km 15+245

For this rail-road crossing, it is envisaged to develop an overpass. The main span of overpass will be 15m long to potentially bridge two tracks.

The designing of structure will be in accordance with the currently valid regulations in the Republic of Serbia (Eurocode).

The total width of the bridge is 11.20m

Culverts

Having in mind that the condition of the existing culverts is bad, as they are buried, overgrown and unmaintained, it is planned to replace all of them on the entire route. For culverts of larger dimensions, box reinforced concrete culverts are envisaged, while for culverts with lower throughput, prefabricated tubular culverts are adopted.

Drainage

The existing railway is mostly located on flat terrain without high embankments, except where it crosses the Sava River and runs across flood embankments on both riverbanks. The railway mainly passes through agricultural land. The base embankment of the subgrade has a variable width of 5-7 m, and the berms are narrow and low in some places.

Currently, the main drainage elements are earth and concrete drains and concrete culverts used by reclamation canals of the Galovica and Petrač systems.

In some sections, the poor condition of the substructure, instability and deformation of the embankment are noticeable, and in Ostružnica station an active landslide presents a risk for the power substation. Along the route, vegetation and shrubs intrude into the railway alignment, and drains and culverts are filled with waste.

The condition of all drainage elements is poor, and drainage systems at railway stations and stops have deteriorated or do not exist, and it is therefore necessary, in both options, to take into account the full replacement of existing drainage systems, i.e. the construction of new systems with new drainage elements.

the axial distance between the tracks on the open alignment should be at least 4 m, and in stations and at crossovers, the distance should be 4.75 m. In both options, concrete drains are proposed on both sides, which would in the event of the addition of a new track, take in a minimal increase of water.

For determining the size of the openings of culverts/bridges, which will be designed in the PD for technical structures, at the intersection of the alignment with the reclamation canals of the Galovica and Petrač systems, the data from the competent Galovica water management company are relevant and should be contained in the Location Conditions. The data from the Republic Water Directorate and Plovput are relevant for determining the finished level of the bridge over the Sava River.

4.2. Conceptual Design

The development of the Conceptual Design for the Alternative Options is based on orthophoto maps provided by the Ministry of Construction, Transport and Infrastructure. Those maps were prepared during 2020.

The Conceptual Design description has been prepared for the different fields, components and options. The basis for the development of the Conceptual Design is the existing technical documentation obtained so far. The existing documentation for the track design was obtained and used for the preparation of the CD of the single-track and double-track railway line.

At this stage, the existing technical documentation for the buildings at stations has not been found and the assessment of the necessary works for the existing buildings was done according to the collected data after the site visit.

4.2.1. Rulebooks

The Conceptual Design for the proposed solutions complies with the following Design Regulations and Standards:

- Law on Planning and Construction (Official Gazette of the RS, No. 72/2009, 145/2014, 83/2018, 31/2019, 37/2019, - other law, 9/2020 and 52/2021),
- Law on Spatial Plan of the Republic of Serbia, 2010 - 2020 (Official Gazette of the RS, No. 88/2010),
- Railways Act (Official Gazette of the RS, No. 41/2018),
- Law on Railway Safety (Official Gazette of the RS, No. 41/2018),
- Law on Railway System Interoperability (Official Gazette of the RS, No. 41/2018),
- Rulebook on railway infrastructure elements (Official Gazette of the RS, No. 10/2014),
- Rulebook on technical requirements and maintenance of track permanent way (Official Gazette of the RS, No. 39/2016 and 74/2016),
- Rulebook on technical requirements and maintenance of track substructure (Official Gazette of the RS, No. 39/2016 and 74/2016),
- Rulebook for civil structures (Official Gazette of the RS, No. 89/2019, 52/2020 and 122/2020),

The preparation of the design is also in line with all other applicable laws, regulations and standards governing the scope of the design, fire safety, occupational safety regulations, TSI, standards and UIC leaflets.

This design addresses any needs for local realignments including potential amendment of the transition curves and the need for reconstruction of existing structures and buildings. The line design provides layout plans at scale 1:2500, longitudinal profile, typical cross sections, and schematic layout of the tracks in stations and of installations.

The design of the alternative Options provides the necessary engineering and design characteristics, the environmental and social effects and the financial and operating characteristics for the evaluation of the alternative options and the selection of the preferred one. Also, it provides inputs (investment and maintenance costs) for the evaluation of the options through the simplified CBA and MCA.

5. ENVIRONMENTAL AND SOCIAL BASELINE

This section describes the main components of the physical and natural baseline environment in the area affected by the implementation of the proposed Project. The characterization of the existing environment and identification of sensitivities along the proposed railway alignment have involved a comprehensive desk review of a wide range of existing data sources.

5.1. Environmental baseline

The area of influence for the environmental parameters has been determined as an area of 500 m left and right from the railway axis with possibility, if needed, to extend to cover social or environmental (migratory routs) impacts that will be determined in detail in the next stage of E&S assessment. Due to lack of primary data (i.e. air, noise, surface measurements), the fact that no field surveys were carried out and the preliminary stage of the study, information was provided for all environmental parameters to the possible extent. Efforts have been done so that the information provided herein is adequate for meeting the environmental performance requirements of international lenders and will satisfy public disclosure and consultation requirements, focused the impact assessment and informed management measures and mitigation commensurate to this stage of the Project.

All areas of influence for each parameter are presented in the impacts section, since each parameter has different sensitivity, i.e.at each side of the railway for biodiversity 500 m, landscape 1km, floods 1km, surface waters 0,5 km, groundwater 0,5 km, air and noise 0,2 km, vibration 0,1 km) and they will be considered at the baseline description for the ESIA.

5.1.1. Climate

Belgrade and its surroundings are characterized by a moderate continental climate with local varieties. Summers are usually dry and hot, and winters are cold. The beginning of the year is characterized by very cold weather, while during the spring months (especially in May and June) in early summer there are frequent local showers and thunderstorms. July and August are characterized by high temperatures and low rainfall. The warm period often continues in September and October. Cold and humid air penetrates from the west and northwest, causing a more significant drop in temperature. From the northeast, cold air penetrates from the Carpathian region in the winter period of the year, which causes windy and dry weather. Air currents from the south of the Balkan Peninsula cause the temperature to rise. The average annual air temperature in Belgrade is 11.9°C, and on the outskirts of the city and in higher localities it is around 11.0°C.

Plain terrains, hills and mountainous terrains of the wider area of Belgrade represent somewhat different topoclimatic zones, with variations in air temperature of 1-3°C, with temperatures in the part of the Pannonian Basin always lower by 1-2°C on average.

The following table shows the values of individual climatic factors that are present in the area of Belgrade.

Table 11. Average values of air temperature, relative humidity and precipitation by years for the meteorological station "Belgrade Observatory" in the period 2000-2020 [6]

Year	Temperature (°C)			Humidity (%)				Precipitation (mm)
	Max	Min	Average	7	14	21	Av.	Sum
2000	19.4	9.7	14.55	75	48	65	62	367.7
2001	17.5	8.7	13.1	78	58	74	70	893.1
2002	18.6	9.6	14.1	75	53	69	66	594.4
2003	17.8	8.5	13.15	75	53	68	66	547.9
2004	17.0	8.7	12.85	79	60	74	71	832.2

[6] "Climatology Yearbook" RHMZ

Year	Temperature (°C)			Humidity (%)				Precipitation (mm)
	Max	Min	Average	7	14	21	Av.	Sum
2005	16.3	8.1	12.2	80	60	75	72	788.2
2006	17.4	8.8	13.1	78	56	72	69	749.3
2007	18.7	9.7	14.2	73	52	67	64	839.0
2008	18.9	9.9	14.4	74	52	67	65	586.9
2009	18.4	9.7	14.05	76	56	71	68	804.4
2010	17.6	9.2	13.4	79	58	73	70	865.5
2011	17.9	9.0	13.45	75	54	69	66	499.1
2012	19.0	9.6	14.3	71	50	64	62	564.2
2013	18.4	9.7	14.05	76	55	70	67	607.3
2014	18.6	10.3	14.45	79	58	73	70	1095.1
2015	18.8	10.0	14.4	76	56	69	67	684.4
2016	18.0	7.3	12.65	77	55	71	68	759.6
2017	18.6	7.2	12.9	74	52	66	64	508.8
2018	19.3	10.5	14.9	77	56	69	67	603.3
2019	19.8	10.4	15.1	76	54	69	66	716.5
2020	18.8	9.9	14.35	82	59	82	74	654.3

The average annual amount of precipitation for the observed period 2000-2020 ranged from the lowest 367.7 mm of water column to the highest 1095.1 mm of water column. The lowest average annual air temperature for the observed period 2000-2020 is 7.2°C, and the highest average annual temperature for the same period is 19.8°C. Absolute maximum temperatures in this area reached the value of 43.6°C, and absolute minimum temperatures reached -15.5°C.

Ice days, when the highest air temperature was less than or equal to 0°C, were recorded in January, February, November and December, and can also occur in March and April. The average number of days with frost per year on the territory of Belgrade is 72. The number of ice days, especially in the long run, is a limiting factor for the plant world, especially for ground flora and young plants.

The amount of precipitation during the year indicates the characteristics of the continental type, where the maximum is in the summer and the minimum in the winter months. Although Belgrade is quite deep in the continent, some characteristics of the maritime type can be noticed in it, so that Belgrade has two maximums and two minimums of precipitation during the year. Table 12 shows the average monthly precipitation for Belgrade.

Table 12. Average monthly precipitation in the area of Belgrade [7]

Month	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	Total
Average monthly precipitation (mm)	49.3	44.4	49.5	58.8	70.7	90.4	66.5	51.2	51.4	40.3	54.3	57.5	684.3

An average of 139 days with precipitation was measured in Belgrade, of which 33.7 days with snow (19.4%). Snow days are distributed from October to May (28-43 days). The highest number of days with snowfall is in January, but the frequency of heavy precipitation (greater than 30 cm) is higher in February. The same is the case with March compared to November, which may be important for the conservation of moisture that plants have at their disposal at the beginning of the vegetation period. Table 13 presents the number of days with snow, with snow cover as well as the average number of days with precipitation.

[7] "Climatology Yearbook" RHMZ

Table 13. Average number of days with precipitation in the area of Belgrade [8]

Month	Average number of days with precipitation ≥ 0.1mm	Average number of days with precipitation ≥ 10.0mm	Number of days with snow	Number of days with snow cover
I	13.3	1.7	10.5	15.5
II	12.2	1.1	7.5	10.1
III	11.8	1.4	4.3	3.8
IV	12.7	1.8	0.4	0.1
V	13.5	2.2	-	-
VI	13.8	3.0	-	-
VII	9.9	1.9	-	-
VIII	8.9	1.4	-	-
IX	9.0	1.4	-	-
X	8.2	1.4	0.2	0.1
XI	12.1	1.7	2.5	2.4
XII	13.7	1.5	8.3	10.7
Annual	139.1	20.5	33.7	42.7

In the period April-August, the average values of relative humidity (Table 14) are lower than optimal, which indicates dry air in that period and increased conditions for evaporation from free water, soil and plants. During this period, the amount of moisture in the soil is intensively reduced and conditions are created for increased precipitation infiltration.

Table 14. Average relative humidity in the area of Belgrade [9]

Month	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
Average relative humidity (%)	78.3	73.3	65.3	61.6	63.4	65.3	63.0	64.1	68.3	70.4	76.2	79.8

5.1.2. Air quality

Monitoring of air quality (AQ) indicators in the Republic of Serbia is performed by the Environmental Protection Agency. Obligations and tasks of the Environmental Protection Agency in air quality management are defined in more detail by the Law on Air Protection ("Official Gazette of RS" No. 36/09 and 10/13). The annual report on the state of air quality in the Republic of Serbia derives from the obligation of the Agency based on Article 67 of the Law on Air Protection. The following table shows the CAQI (Common Air Quality Index) of the basic parameters being measured, as well as their maximum allowable concentrations.

Table 15. Air quality index CAQI

[8] "Climatology Yearbook" RHMZ
[9] "Climatology Yearbook" RHMZ

Averaging period	Pollutant	Limit µg/m³	Excellent	Good	Acceptable	Polluted	Very polluted
1h	SO_2	350	0 – 50	50.1-100	100.01-350	350.01-500	> 500.01
1h	NO_2	150	0 – 50	50.01-100	100.01-150	150.01-400	>400.01
1h	PM_{10}	90	0 - 25	25.01-50	50-.01-90	90.01-180.0	>180.01
1h	$PM_{2.5}$	55	0-15	15.01-30	30.01-55	55.01-110	>110.01
1h	CO	25000	0 - 5	5.00001-10	10.00001-25	25.00001-50	>50.00001
1h	O_3	180	0 - 60	60.1-120	120.1-180	180-240	>240.1

The color display is usually used so that citizens can easily find out which of several categories the air quality is currently in: whether it is excellent, good, acceptable, polluted or very polluted/ dangerous. The concentration of multiple pollutants is measured and they have specific thresholds and ranges for the colours that determine the category of contamination. As part of air quality monitoring, and in accordance with the criteria prescribed by the Law on Air Protection, SEPA performs AQ assessment in zones and agglomerations. This is an official assessment of air quality in Serbia that applies the standards present in practice in the EU due to the fact that the EU Air Quality Directive has been transposed and integrated into national legislation.

Table 16. Air quality standards for health protection, as presented in the Air Quality Directives and applied by SEPA in the assessment of AQ in the Republic of Serbia

Pollutant	Averaging period	Legal nature and concentration	Comments
SO_2	1h	Limit 350 µg/m³	Not more than 24 hours per year
		Alarm threshold 500 µg/m³	It is measured for three consecutive hours in an area of 100 km² or in the entire zone
	1 day	Limit 125 µg/m³	Not more than 3 days per year
NO_2	1 h	Limit 200 µg/m³	Not more than 18 hours per year
		Alarm threshold 400 µg/m³	It is measured for three consecutive hours in an area of 100 km² or in the entire zone
PM_{10}	1 day	Limit 50 µg/m³	Not more than 35 days per year
	Calendar year	Limit 40 µg/m³	
$PM_{2.5}$	Calendar year	Limit 25 µg/m³	
CO	Max. daily 8-hour average value	Limit 10 µg/m³	
O_3	Max. daily 8-hour average value	Target value 120 µg/m³	No more than 25 days a year arranged for three years
		Information threshold 180 µg/m³	
	1 h	Information threshold 240 µg/m³	

The network of stations for automatic air quality monitoring, AMSKV, is recognized, in accordance with the Law on Air Protection, as a state network for air quality monitoring at national level.

As a source of air pollution in the investigated corridor, there are some industrial plants that represent the source of emissions of harmful pollutants into the atmosphere, as well as individual pollution caused by the combustion of solid and liquid fuels and other substances.

Taking into account the results of 2021 [10] measurements for Belgrade stations, the annual limit value for NO2 was exceeded, the exceedance of the daily limit value occurred 28 days, while the hourly values were exceeded more than 24 times. The annual limit value of suspended PM10 particles was also exceeded and the

[10] RHMZ, Annual report on air quality 2021

exceedance of the daily limit values occurred in all measuring points for 133 days. Exceedances in the limits of suspended particles PM2.5 on an annual level occurred at the measuring station in Belgrade. Further results will be presented at the next stage of ESIA preparation.

5.1.3. Noise and vibrations

Noise

The Regulation on noise indicators, limit values, assessment methods for indicators of noise, disturbance, and harmful effects of noise in the environment ("Official Gazette of RS", No. 75/10) defines the highest permissible levels of external noise, as shown in the table below.

Table 17. Maximum allowed noise levels

Zone	Purpose of space	Maximum permissible level of external noise dB(A)	
		Day and Evening	Night
1	Areas for rest and recreation, hospital zones and convalescent homes, cultural and historical sites, large parks	50	40
2	Tourist areas, small and rural settlements, camps and school zones	50	45
3	Purely residential areas	55	45
4	Business-residential areas, commercial-residential areas, children's playgrounds	60	50
5	City center, craft, trade, administrative zone with apartments, zones along highways and railways	65	55
6	Industrial, storage and service areas and transport terminals without housing	At this area borders, noise must not exceed the limit value of the neighboring area	

The regulations in the field of noise protection of the Republic of Serbia during the previous few years have been harmonized with the relevant EU directives. Accordingly, maps of the noise of the settlement or the existing railway line that relates to the section Batajnica – Ostružnica have not yet been made.

There are noise monitoring stations in Belgrade, measuring noise level in urban areas of the city under the responsibility of the City Institute for Public Health. Having in mind the route of the railway through Belgrade, as well as the distance from the measuring stations, the data obtained from them cannot be considered as relevant for the preparation of this document. For that reason, the basic noise level in the observed area can be estimated only on the basis of field insights. The dominant source of traffic noise in the observed corridor is sections of highways, national and regional roads that intersect the observed corridor. Industrial plants are also emerging as a source of noise pollution. The amount of noise that will be emitted into the environment depends on the type of production process, as well as the machines that participate in it. As superstructure on the Batajnica – Ostružnica line is in a very bad condition, the contact of the rail and the wheel during driving produces additional noise of significant intensity (shocks, creaks, etc.).

Under the ESIA, it will be necessary to determine potential endangered zones and noise receptors in the vicinity of the designed railway, and based on that, noise measurements will be performed by an accredited laboratory.

Vibrations

The analysis of the observed corridor determined that in the current state, the source of vibrations can be railway traffic and/or road traffic (from the existing roads in the corridor).

The national laws do not stipulate the permissible values for vibrations and low frequency noise. Provisions from the German standard DIN 4150-2 (Structural Vibration - Human Exposure to Vibration in Buildings), the German standard DIN 4150-3 (Structural Vibration - Human Exposure to Vibration in Buildings), and the Swiss

Directive of the Federal Office for the Environment (BEKS 1999 - Assessment of vibration and structure-born noise from railway traffic) will be used as the criteria for assessment.

The guideline values of short-term and long-term vibrations from the aspect of the impact on the buildings structure, according to the DIN 4150-3 standard are shown in Table 18.

Table 18 Guideline values of short-term and long-term vibrations for the assessment of the impact on building structures according to DIN 4150-3 [PPV mm/s]

No.	Type of structure	Short-term vibration				Long-term vibration
		PPV at the foundation at horizontal and vertical plane			PPV at horizontal plane of highest floor	PPV at horizontal plane of highest floor
		1 Hz – 10 Hz	10 Hz – 50 Hz	50 Hz – 100 Hz	all frequencies	all frequencies
1.	Building used for commercial purposes, industrial buildings and buildings of similar design	20	20 to 40	40 to 50	40	10
2.	Dwellings and buildings of similar design and/or occupancy	5	5 to 15	15 to 20	15	5
3.	Structures that, because of their sensitivity to vibration, do not correspond to those listed in lines 1 and 2 and are of great intrinsic value	3	3 to 8	8 to 10	8	2.5

The BEKS standard assessed the impact of low frequency noise to the built-up area from the railway traffic, and specified noise levels for newly built railway and separately for the upgraded. Permissible levels of low frequency noise by zone, period of day and class of railway line are shown in Table 19.

Table 19 Guidance values for ground-borne indoor noise according to BEKS (1999)

Built-up area	Newly built railway line		Modernized railway line*	
	Day (600-2200)	Night (2200-600)	Day (600-2200)	Night (2200-600)
	Leq (16h)	Leq (1h)	Leq (16h)	Leq (1h)
	[dB(A)]	[dB(A)]	[dB(A)]	[dB(A)]
Residential areas, public interest areas of public interest (schools, hospitals)	35	25	40	30
Mixed areas, town centers, agriculture areas, residential areas already exposed	40	30	45	35

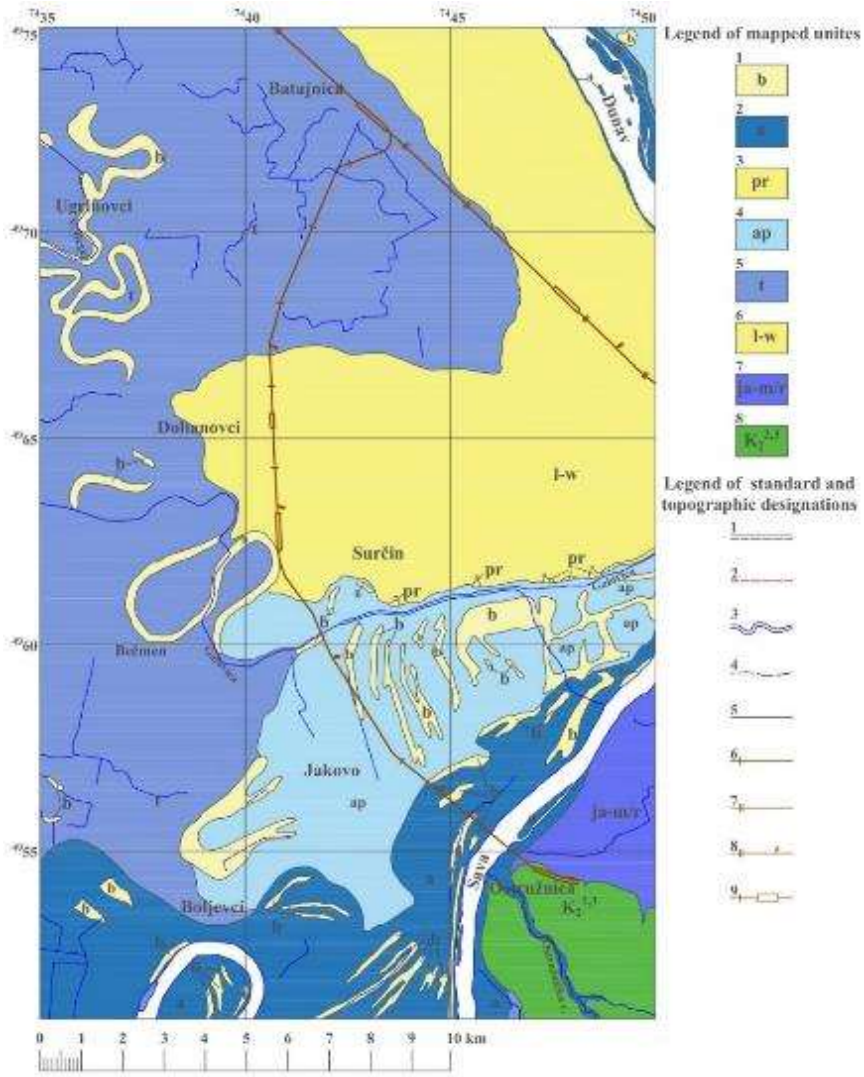
* Alteration or refurbishment of existing tracks, change in operating condition

The assessment of vibration and ground-borne effects during the Environmental and Social Impact Assessment (ESIA) stage will be conducted in two phases. In the first phase, the procedure would involve the utilization of the VIBRA-1 software for the modelling and calculations related to railway vibration and ground-borne noise. The resulting deliverable will be a comparison of expected vibration and ground-borne noise levels along the railway line, with the thresholds defined by DIN 4150-2, DIN 4150-3 and BEKS-1999. Since there are no prior measurements for vibration and ground-borne noise in the area, measurements will be conducted during phase 2. Measurements will be carried out in the areas identified during phase 1, particularly in locations where exceedances have been observed.

5.1.4. Geology and soil

The upper layers of the terrain along the Batajnica-Surčin-Ostružnica railway line are built of Quaternary sediments, with the exception of the extreme southeastern parts of the route in the Ostružnica area where flysch sediments of Turon?-Senon age ($K_2^{2,3}$) are registered, within which rhythmic sedimentation of sandstones, clayey solid layers and marlstones occurs. Conglomerates and marlstones are less represented. Quaternary deposits are represented by sediments of the lower and middle Pleistocene to which belong the

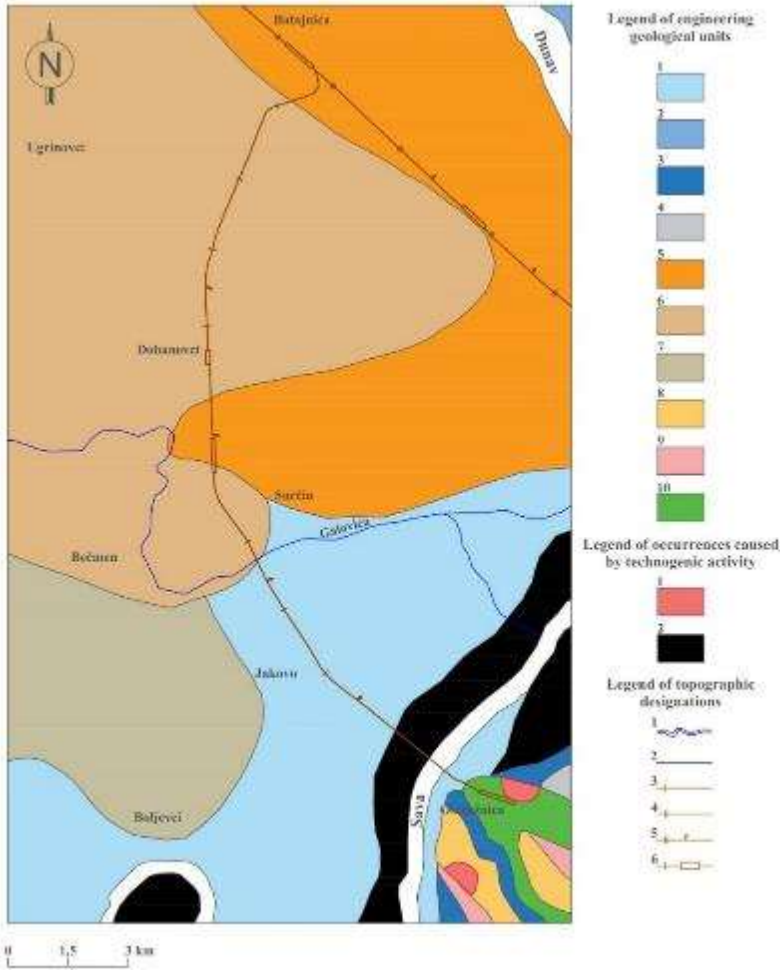
layers with *Corbicula fluminalis* (ja-m/r), loess formations of the upper Pleistocene (l – w), while within the Holocene deposits, whose distribution is connected to the alluvial plains of the Sava and the Danube, terraced river sediments (t), facies flood (ap), proluvial sediments (pr), fluvial facies (islands, beaches) (a) and recent marsh sediments (b) have been registered. Coarse-grained sands and gravels from *Corbicula fluminalis* (ja-m/r), with an average thickness of 15–40 m, were registered on the left and right banks of the Sava, whose genealogical origin is related to river-lake or river sedimentation processes. Loess deposits (l –w), built of sandy clay siltstones, are morphologically the most prominent parts of the Quaternary, formed as a result of aeolian terrestrial processes, with an average thickness of 30–40 m. They are porous with many $CaCO_3$ concretions, the so-called "Loess dolls", yellow in color, with a significant content of dust fraction. The basic characteristics of proluvial deposits (pr) are manifested by unsorted material with noticeable gradational stratification from the root of the cone to the peripheral areas, whose distribution is associated with steep loess slopes around Surčin. Sands and clayey sands (a) are registered directly along the Sava watercourse, whose thicknesses are in the range of 5–10 m, while sands and siltstones (b) are formed in arc depressions, with marsh water and marsh vegetation, formed in the alluvial plain of the Sava, whose directions correspond to the direction of the eponymous watercourse, representing the old meanders of the former riverbed of the Sava (Markovic et al., 1985a). Figure 6 shows the distribution of lithological members of the research area, respectively *Figure 7* shows the engineering geological map along the route of the railway Batajnica-Surčin-Ostružnica.



* *Legend of mapped units: 1 – Sands and siltstones (b); 2 – Sands and clayey sands (a); 3 – Sands and loess clays (pr); 4 – Sands and siltstone sands (ap); 5 – Loess clays, sandy clays, and clayey sands (t); 6 – Loess-sands and sandy siltstones (l – w); 7 – Sands and*

gravels with Corbicula fluminalis (ja-m/r); 8 – Flysch sediments ($K_2^{2,3}$). Legend of standard and topographic designations: 1 – Normal boundary: determined and covered; 2 – Fault; 3 – Larger river; 4 – Drying river; 5 – Channel; 6 – Normal railway; 7 – Normal railway - double; 8 – Normal electric railway - double; 9 – Railway station.

Figure 6. Geological map along the route of the railway Batajnica-Surčin-Ostružnica.[11]



** Legend of topographic designations: 1 - Larger river; 2 - Channel; 3 – Normal railway; 4 – Normal railway - double; 5 – Normal electric railway - double; 6 – Railway station.*

Figure 7. Engineering geological map along the route of the railway Batajnica-Surčin-Ostružnica, modified [12]

Legend of engineering geological units: 1 – Basic characteristics: Environment of great facial diversity, heterogeneous in terms of composition and uneven engineering geological properties, which is conditioned by the degree of dynamic development of alluvial environment, ie individual members in the complex, hydration of the environment, as well as activity of fluvial erosion and torrents; Complexes: Complexes of loose and soft Quaternary deposits; Deformability: Predominantly large deformabilities; Genetic affiliation: Slope and slope-fluvial deposits; Lithogenetic species: Alluvial sedimentary complex, facially unbroken; Lithogenetic description: Sands, gravels and sandy clays; 2 – Basic properties: Environment of great facial diversity, heterogeneous in terms of composition and uneven engineering-geological properties, which is conditioned by the degree of dynamic development of the alluvial environment, the relationship of individual members in the complex, hydration of the environment, and the activity of fluvial erosion and torrents; Complexes: Complexes of loose and soft Quaternary deposits; Deformability: Predominantly large

[11] Marković et al., 1985b; modified by IPF10 team.
[12] Geological Information System of Serbia, modified by IPF10 team.

deformabilities; Genetic affiliation: Slope and slope-fluvial deposits; Lithogenetic species: Alluvial sediments – fluvial facies; Lithogenetic description: Sands and gravels; 3 – Basic characteristics: Unevenness in terms of the composition of the complex is very noticeable, as the unevenness of occasional or constant activity of erosion and torrents, the water content of the environment is mostly constant; Complexes - Complexes of scattered and soft Quaternary deposits; Deformability: Predominantly large deformabilities; Genetic affiliation: Slope and slope-fluvial deposits; Lithogenetic species: Alluvial-proluvial sediments; Lithogenetic description: Gravels, sands, sandy and silty clays; 4 – Basic properties: Unevenness in terms of the composition of the complex is very pronounced, as the unevenness of occasional or constant activity of erosion and torrents; the water content of the environment is mostly constant; Complexes: Complexes of loose and soft Quaternary deposits; Deformability: Predominantly large deformabilities; Genetic affiliation: Slope and slope-fluvial deposits; Lithogenetic species: Proluvial sediments - cones of sediments in formation; Lithogenetic description: Gravels, sands and sandy clays; 5 – Basic characteristics: Granulometrically very homogeneous medium that is subject to changes and deformations under the influence of water and overload, loess flat stable, unstable loess sections; Complexes: Complexes of loose and soft Quaternary deposits; Deformability: Predominantly large deformabilities; Genetic affiliation: Aeolian and Aeolian-aquatic deposits; Lithogenetic species: Loess; Lithogenetic description: Clayey-sandy dusts; 6 – Basic characteristics: Environment of uneven compressibility, periodically very hydrated in the upper zone, subject to changes and minor deformations under load, lesoid-marsh and saline soils are mostly high compressibility; Complexes: Complexes of loose and soft Quaternary deposits; Deformability: Predominantly large deformabilities; Genetic affiliation: Aeolian and Aeolian-aquatic deposits; Lithogenetic species: Lesoid sediments; Lyogenetic description: Dusty-sandy clays and dusts; 7 – Basic properties: Medium of uneven compressibility, periodically very hydrated in the upper zone, subject to changes and minor deformations under load; lesoid-marsh and slatina soils are mostly of high compressibility; Complexes: Complexes of loose and soft Quaternary deposits; Deformability: Predominantly large deformabilities; Genetic affiliation: Aeolian and Aeolian-aquatic deposits; Lithogenetic species: Lesoid-marsh and terrace sediments; Lithogenetic description: Dusty-sandy clays, silty dusts and sands; 8 – Basic properties: Environment that is extremely heterogeneous in terms of composition and engineering geological properties, with very uneven quantitative and qualitative participation and relations of individual members of the complex; uneven composition and occasional waterlogging in the upper zone are the main cause of the occurrence and development of large-scale landslides, as well as sporadic development of erosion; Complexes: Heterogeneous complexes of lake deposits; Deformability: Medium to high deformability; Genetic affiliation: Clay-clastic and carbonate sediments; Lithogenetic species: Distinctly heterogeneous complex of lake sediments; Lithogenetic description: Sands, clays, marls, marlstones, gravels, sandstones, conglomerates, agglomerates, limestones, tuffs, coals; 9 – Basic properties: Limestones, as the predominant member of the complex, affect the favorable terrain in terms of instability; they are mostly cavernous, cracked and watered in the deeper zone; Complexes: Heterogeneous complexes of lake deposits; Deformability: Medium to high deformability; Genetic affiliation: Clay-clastic and carbonate sediments; Lithogenetic species: Limestones; Lithogenetic description: Subordinate sands and clays, clayey solid layers and marlstones; 10 – Basic characteristics: Layered and extremely anisotropic rock mass, both in terms of composition and in terms of cracks and other engineering geological properties, deeply decomposed, with the formation of deluvium which is periodically wetted and the development of sliding and dredging, leaching and torrents; Complexes: Complexes of less solid to very solid sedimentary rocks; Deformability: Medium to low deformability; Genetic affiliation: Predominantly bonded clastic rocks; Lithogenetic species: Flysch and flysch-like rock complex; Lithogenetic description: Sandstones, siltstones, clayey solid layers, marlstones, conglomerates, marly limestones.

European landslide susceptibility ELSUS V2 map shows the landslide susceptibility zonation for individual climate-physiographic zones across Europe at a spatial resolution of 200 × 200 m.

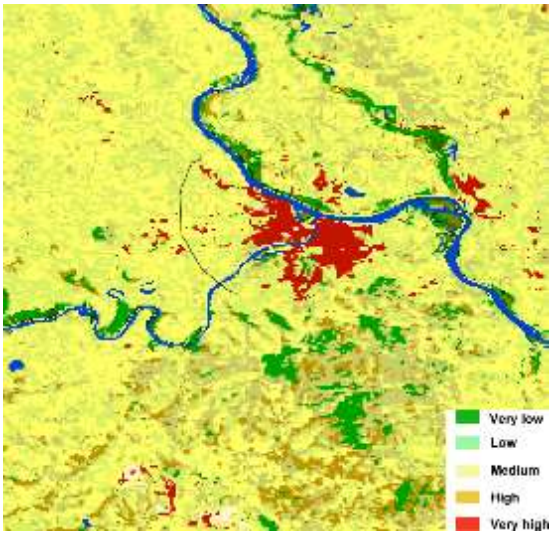


Figure 8. ELSUS V2 landslide susceptibility map for the project area

As seen from Figure 8 and Figure 10, landslide risk is medium along whole Ostružnica - Batajnica railway section. This result may be overstated, especially when having in mind terrain elevation (Figure 10) and results of the previous Serbia- wide analysis (Figure 9).

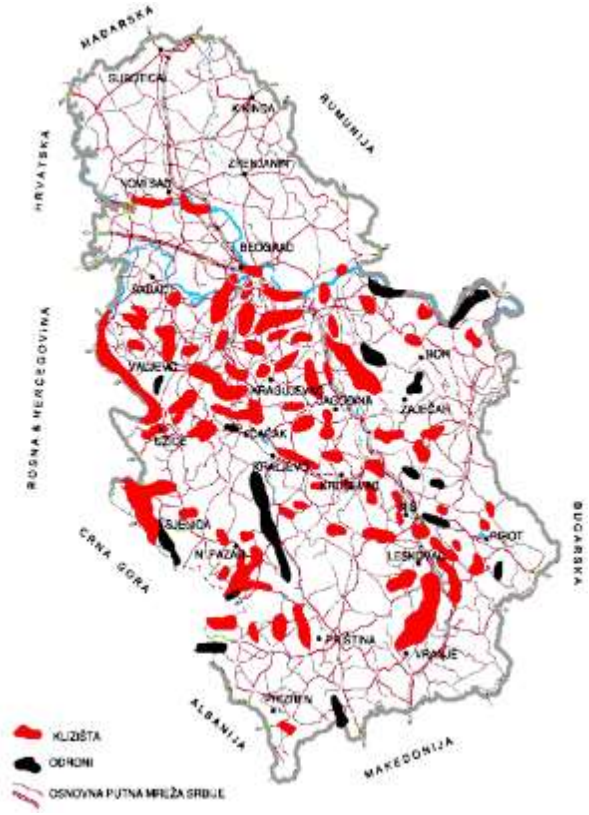


Figure 9. Map of rockfalls (black shede) and landslides (red shade) in Serbia [13]

[13] Abolmasov, 2014

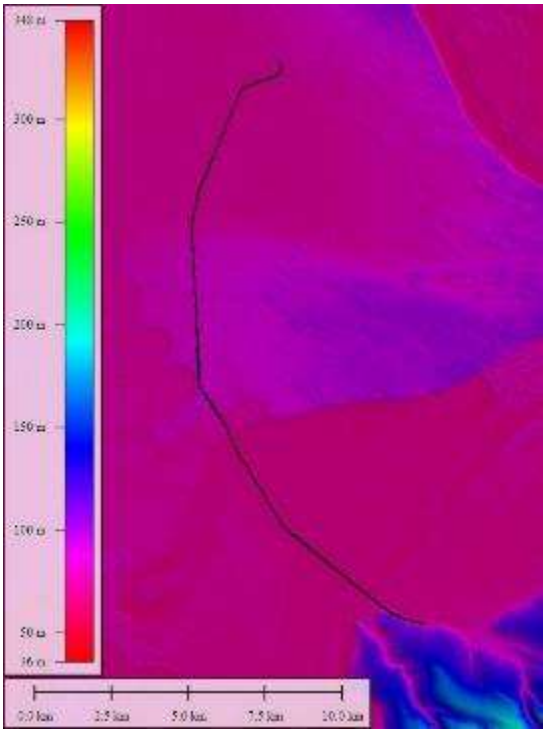
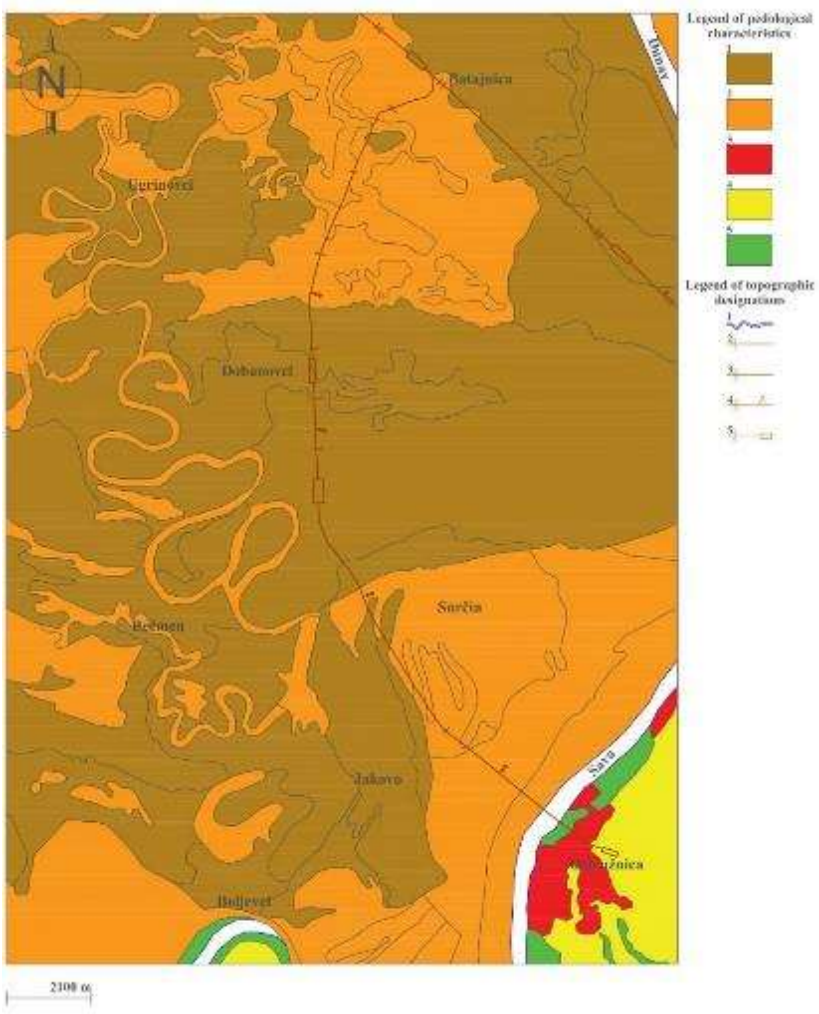


Figure 10. Elevation map for the project area with railway route (yellow line)- ASTER GDEM v3 Worldwide Elevation Date- 1 arc second resolution

Results of BEWARE project (https://geoliss.mre.gov.rs/beware/) also substantiate the assumption of absence of future landslide emergence along the railway route.

There are no information from rail maintenance and/or repair originating from the landslides or rockfalls from the Serbian Railways Infrastructure.

Figure 11 shows a map of the basic pedological characteristics of the research area, which shows specific types of land along the route of the railway Batajnica-Surčin-Ostružnica, with unique physical, chemical and mineral properties.



Legend of pedological characteristics: 1 - Terrestrial soils; 2 - Semiterrestic soils; 3 – Artificial surfaces; 4 – Agricultural land; 5 – Semi-natural forest land. Legend of topographic designations: 1 – Larger river; 2 – Normal railway; 3 – Normal railway - double; 4 – Normal electric railway - double; 5 – Railway station.

Figure 11. Map of the pedological characteristics along the route of the railway Batajnica-Surčin-Ostružnica [14] (modified)

5.1.5. Tectonics and Seismicity

According to the archives of the US Geological Survey (USGS), the first strong earthquake registered on the territory of Serbia dates back to 1456 and was of magnitude 10 on the Mercalli scale. The next earthquakes in Serbia, registered in that archive in 1739 and 1740, were of the same magnitude. The strongest earthquake in Serbia was recorded in Lazarevac in 1922. This earthquake had a magnitude of 6.0 on the Richter scale. The next one registered in Serbia was the earthquake at Rudnik in 1927, of 5.9 on the Richter scale. On Kopaonik, in Bruce, in 1978, an earthquake of 5.7 on the Richter scale occurred. According to the USGS, earthquakes were recorded in 1980 (5.8 on the Richter scale), 1983 (5.1), 1984 (4.7) and 1998 near Ljig. The last earthquake above 5 degrees that is remembered happened in 2010 near Kraljevo, on November 3, its intensity was 5.5 degrees.

The current Rulebook on Technical Norms for Construction (Official Gazette of the SFRY 31/81), as well as its later amendments in the Official Gazettes of the SFRY No. 49/82, 29/83, 21/88 and 52/90, apply only to buildings in seismic areas, and are given here as a recommendation for ancillary facilities.

[14] Republic Geodetic Authority of Serbia, modified by IPF10 team

The basic degree of seismicity of the oleate, which refers to the return period of the earthquake of 200 and 500 years, and the subject area, i.e. the observed area of the railway is located in zone VII of the MSK-1964 scale (Figure 12). The probability of events for both periods is 63%.

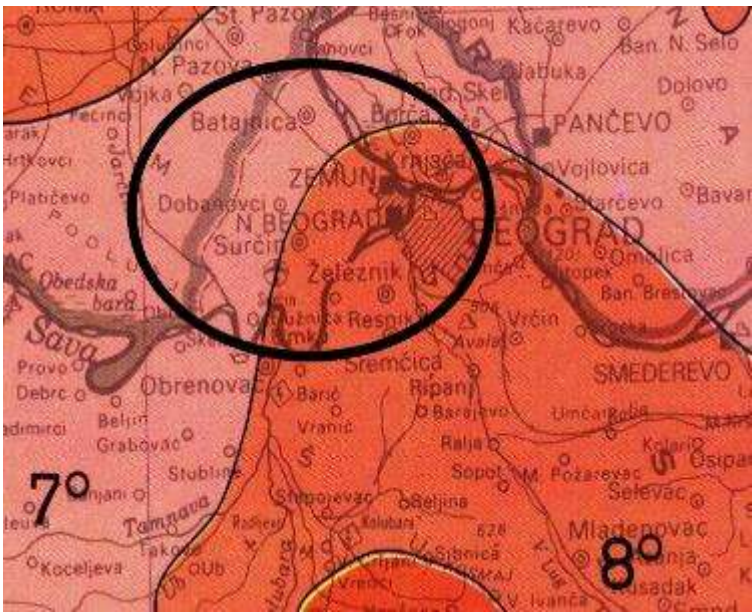


Figure 12. Seismological map for the return period of 200 and 500 years [15]

According to the latest regional research of the Republic Seismological Institute of Serbia, seismic parameters for the territory of the Republic of Serbia have been determined. According to the seismic hazard map for the expected maximum horizontal acceleration on the base rock - Acc (g) and the expected maximum earthquake intensity - Imax in units of the European Macroseismic Scale (EMS-98), within the return period of 95, 475 and 975 earthquakes can be expected of maximum intensity and acceleration are shown in Table 19.

Table 20. Seismic parameters

Seismic parameters	Return period (years)		
	95	475	975
Acc(g) max	0.06	0.1	0.1
I_{max}(EMS-98)	VI-VII	VII-VIII	VII-VIII

5.1.6. Groundwaters

In the Quaternary sediments of the study area, an intergranular structural type of porosity was formed, within which it is possible to distinguish the interganular aquifer type in alluvial, terrace and other layers of intergranular porosity. When it comes to the intergranular aquifer type in alluvial deposits, the sandy-gravel complex of alluvial sediments is characterized by values of the filtration coefficient of the order of 10^{-1} to 10^{-2} cm/s [16]. From the hydrogeological aspects, the layers with the *Corbicula fluminalis* represent the most important aquifer horizon of the research area [17]. Lower values of the filtration coefficient from 10^{-3} to 10^{-5} cm/s are characteristic for the sandy-clayey-silty complex of alluvial sediments. The thickness of alluvial deposits can be over 30 m, which is in the area of Makiš in the range of 15–30 m. The reservoir of groundwater in the alluvial sediments of the Sava is above 1 m^3/s, and in the alluvial sediments of the Danube up to 1 m^3/s

[15] Republic Seismological Institute
[16] Filipović et al., 2005
[17] Marković et al., 1985a

[18]. The Belgrade groundwater source stretches for more than 50 km along the banks of the Sava River [19], with the city of Belgrade mostly using water from the alluvial sediments of the Sava (~ 70%). The exploitation capacity of the groundwater source is about 5 m^3/s, with the water intake system consisting of 40 tubular wells and 99 wells with horizontal drains. The structure of the alluvial aquifer includes gravels, gravelly sands, sandy gravels and sands, which sporadically intermittently alternate towards the terrain surface. The lower zone with favorable filtration properties built of coarse - grained material and the upper zone with weaker filtration properties built of fine - grained sediments can be distinguished. The lateral drains of the well are pressed into the deposits of the lower aquifer zone. In the larger area of the groundwater source, lenses and interlayers of silt, clay and sandy clays appear in some places [20], which indicates the content of iron minerals, bearing in mind that the iron content is significantly present in the groundwaters of Belgrade. The average effective grain diameter of alluvial sediments (d_{10}) is of the order of 0.3 mm, while the average grain diameter (d_{50}) is of the order of 2 mm, and the above characteristics do not qualify the aquifer, in general, for the installation of drains , for which the condition $d_{50} \geq 3$ mm applies[21]. In the coastal zone of the aquifer of the Belgrade groundwaters source, the velocity of the grounndwaters is 23 m/day in the zone of the radius of action of the wells type reni, while outside the influence of this zone it is 0.9 m/day. Beneath the Pleistocene strata with the *Corbicula fluminalis*, exploratory drilling at depths of 20 m to 40 m revealed the development of Sarmatian limestones (M_3^1), which were also registered on the right bank of the Sava [22]. In the lower part of the Sarmatian deposit (M_3^1), sandy clays, marlstones with sand interbeds and gray clays are distributed, while in the higher horizons limestones, organogenic limestones and dolomitic limestones are present. Real springs, ie stronger springs (Bele Vode, etc.), appear at the contact of the upper and lower Sarmatian horizons, so that the existing gravitational springs enable the arrangement of Sarmatian horizons in the field [23]. The average thickness of limestone in New Belgrade is about 30 m, with the yield of Miocene limestone wells being about 27 L/s [24].

Table 21. Groundwater level on profile Obrenovac, alaska koliba – 232A [25]

GROUNDWATER LEVEL HAVG (cm)													YERLY VALUE	
Obrenovac	MONTHS													
	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	H_{MIN}	H_{MAX}
2017.	-	346	302	322	281	-	428	455	477	452	436	359	-	-
2018.	282	270	243	138	245	345	361	414	450	479	475	448	493	120
2019.	382	395	335	-	402	408	368	427	445	420	382	409	-	-
2020.	408	364	352	322	271	211	318	405	451	471	441	405	484	175
2021.	324	247	258	282	286	290	384	438	471	469	434	357	493	230

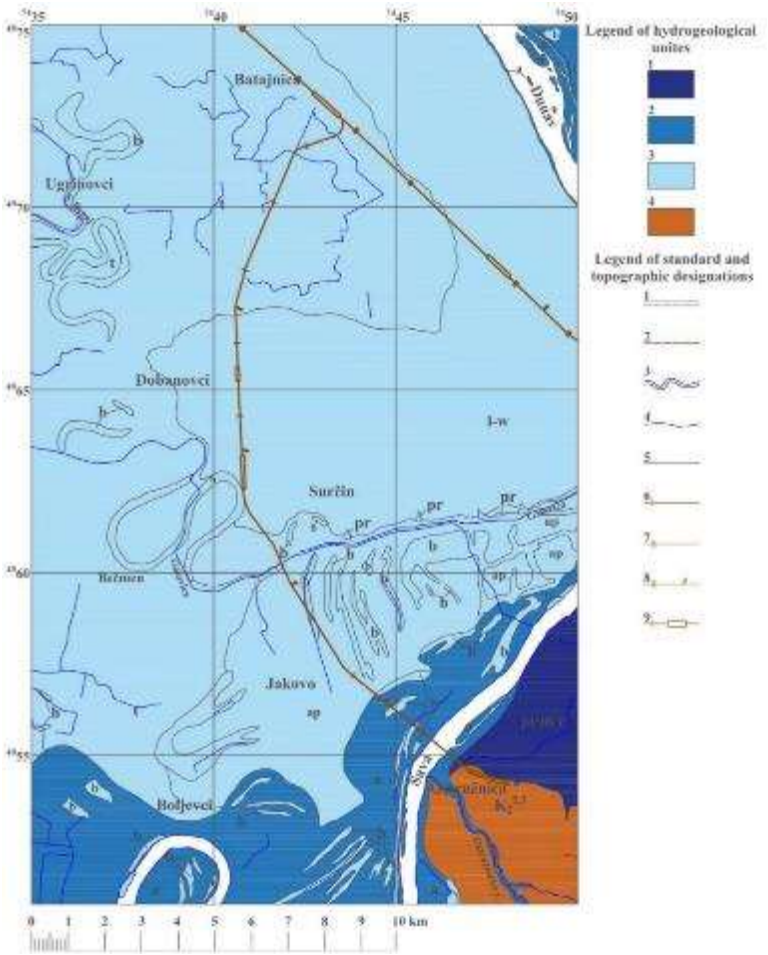
*the "0" elevation of the piezometer: 74.27 (m.a.s.l.); elevation of the terrain: 73.51 (m.a.s.l.)

The regime of alluvial aquifer is influenced by oscillations of surface flow levels, as a result of pronounced hydraulic connection with groundwaters, whose changes are reflected in the level of alluvial aquifer, but also in the physical and chemical properties of groundwaters.

[18] Filipović et al., 2005
[19] Dimkić & Pušić, 2012
[20] Pušić & Dimkić, 2012
[21] Dimkić & Pušić, 2012
[22] Vranješ, 2012
[23] Marković et al., 1985a
[24] Vranješ, 2012
[25] Republic Hydrometeorological Institute of Serbia, Hydrological yearbook, Groundwaters 2017–2021, https://www.hidmet.gov.rs/latin/hidrologija/podzemne/podzemne_godisnjaci.php

The amplitude of temperature fluctuations ranges from 1–3°C. In terms of physical properties, alluvial groundwaters are mostly odorless, tasteless and colorless, with the appearance of shades of yellow-brown and brown color associated with parts of the aquifer in the zones of peat, swamps, etc., when groundwaters can acquire an unpleasant odor, which may be affected by elevated temperatures during the summer months. Groundwaters temperature is in the range of 10–12°C, and can be up to 14°C during the summer months when the depths to groundwater levels are 1–2 m. The total dissolved solids is mostly up to 0.5 g/L, while in terms of hardness of groundwaters they are characterized by moderate hardness, which is in the range of 10–30 °dH. In the ionic composition, the most represented are HCO_3^- ions, while among the cations, Ca^{2+} ions predominate, less often Na^+ and Mg^{2+}. In addition to the basic components of the ionic composition, the presence of ions NH_4^+, NO_3^-, etc. is possible, as well as colloids: SiO_2, Fe_2O_3, Al_2O_3, etc., and heavy metals: Pb, Zn, Cu, Ni, etc. Also, the emphasized content of Mn and Fe is possible, which conditions the previous technological preparation (demanganization and deferrization). Kurlov's formula for groundwaters in Makiš field is as follows: $M_{0.30}\frac{HCO_{83}^{3}SO_{9}^{4}Cl_8}{Ca_{60}Mg_{27}Na+K_{12}}$. Terrace sediments are characterized by values of the filtration coefficient of 10^{-2} cm/s, while in relation to the intergranular aquifer type in alluvial deposits, it is characterized by pronounced clayiness. Replenishment is mainly achieved as a result of precipitation infiltration within the boundaries of aquifer. Depth to groundwaters is 3–5 m. Compared to the regime of alluvial aquifer, the regime of aquifer of terrace deposits is more stable, considering that the influence of watercourses is also disabled. The annual amplitude of fluctuations in groundwater levels is 1–2 m, while the amplitude of temperature fluctuations is in the interval of 1–2°C, and is the result of seasonal changes. Due to the limited nature of groundwater reserves, water supply to large consumers is not possible. From the aspect of physical and chemical properties, groundwaters are tasteless, odorless and colorless, with a temperature of 10–12°C, moderate hardness, mineralization below 1 g/L, most often HCO_3^- - Ca^{2+}, Na^+ type, with possible elevated Mn content and Fe. Intergranular aquifer type in other intergranular porosity deposits was developed within loess and similar deposits, which due to insignificant thicknesses, limited distribution, occasional existence of the aquifer zone, etc., affect the formation of significant reserves of groundwaters in the existing conditions. However, in these parts of the terrain, there may be an infiltration zone or a secondary zone of outflow of groundwaters from the primary types of aquifers [26]. Represented types of aquifers in research areas are shown in Figure 13.

[26] Filipović et al., 2005



Legend of standard and topographic designations: 1 – Normal boundary: determined and covered; 2 – Fault; 3 – Larger river; 4 – Drying river; 5 – Channel; 6 – Normal railway; 7 – Normal railway - double; 8 – Normal electric railway - double; 9 – Railway station.

Figure 13. Hydrogeological map along the route of the railway Batajnica-Surčin-Ostružnica [27] (modified).

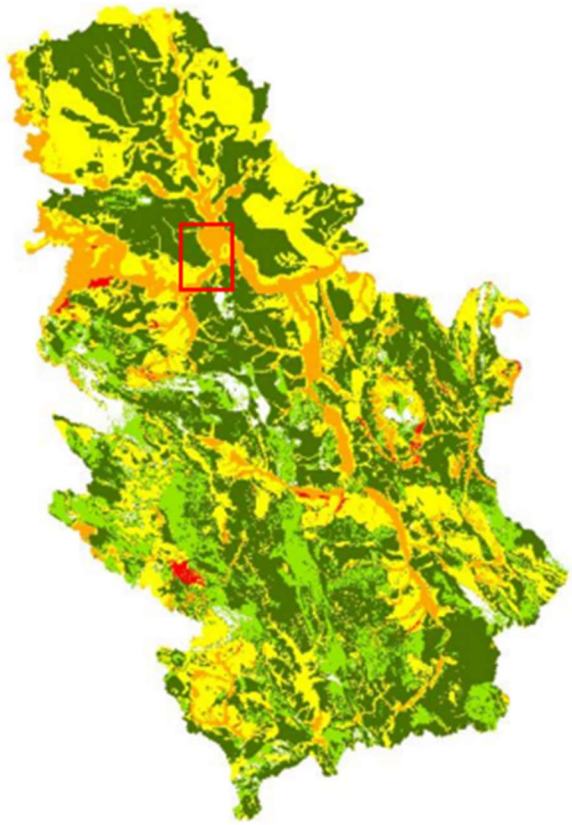
The following types of porosity are distinguished on the hydrogeological map: 1 – **Intergranular type of porosity, very high potential** (ja-m/r - Sands and gravels with Corbicula fluminalis); 2 – **Intergranular type of porosity, high potential** (a - Sands and clayey sand) 3 – **Intergranular type of porosity, low potential**: (b - Sands and siltstones; pr - Sands and loess clays; ap - Sands and siltstone sands; t - Loess clays, sandy clays and clayey sands; l – w - Loess-sands and sandy siltstones) 4 – **Conditionally-anhydrous parts of the terrain** ($K_2^{2,3}$ - Flysch: sandstones and clayey solid layers).

Regarding the hydrogeological conditions of groundwaters protection of the research area, the endangerment of alluvial groundwaters is particularly pronounced, whose physical properties and chemical composition may change as a result of anthropogenic factors, having in mind the existing roads, economic activity, population, absence of communal reception systems and wastewater treatment, etc., with the fact that such hotspots also tend to spread. Successful protection of alluvial aquifer of groundwaters would mean protection of larger dimensions in catchment areas of intergranular structural type of porosity, primarily surface waters protection, given that the metamorphosis of the qualitative status of alluvial groundwaters threatens the water supply of Belgrade [28].

[27] Marković et al., 1985b; modified by IPF10 team
[28] Filipović et al., 2005

Maps of groundwater vulnerability from pollution show a view of the ability of the subsurface environment to protect groundwater, primarily its quality. The main purpose of creating a map of groundwater vulnerability is the classification and separation of areas with different levels of groundwater vulnerability due to pollution. Separated areas, i.e. vulnerability classes, are shown in different colours, symbolizing different levels of vulnerability. On Figure 14 is presented a groundwater vulnerability map of Serbia, from which it can be seen that the research area is within the zone of high to medium vulnerability.

Elements used in the creation of the groundwater threat map of Serbia are influence of terrain slope on infiltration, the influence of soil type and vegetation cover on the threat of groundwater, the thickness of the upper layer, aquifer (i.e. geological hydrogeological characteristics of the terrain), level of groundwater, i.e. to the depth of the groundwater level).



Vulnerability of groundwaters	Vulnerability index
Very low level of threat	< 30
Low level of threat	31–40
Medium level of threat	41–55
Medium high level of threat	55–70
High level of threat	71–80
Very high level of threat	> 81

Figure 14. Groundwater Vulnerability Map [29]

5.1.6.1. Sanitary protection zones

Groundwater represents the most important water resource in the central part of the Great Morava basin, which is used for water supply.

[29] Milanović, S., Stevanović, Z., Đurić, D., Petrović, T., Milovanović, M., Mandić, M. (2011). Project: Monitoring of groundwater resources Srbije. Subproject: Creation of a map of the risk of groundwater in Serbia. https://geoliss.mre.gov.rs/prez/KartaUgrPodVodWeb/index.html

Groundwater protection conditions are very unfavourable in alluvial sand-gravel deposits, as a result of a pronounced hydraulic connection with surface waters, dense population, agricultural activity that implies the use of herbicides, pesticides and other substances, and as a consequence of the absence of appropriate sewage systems or the result of the presence of industrial facilities, main roads, etc.

The current situation in terms of groundwater protection can be characterized as bad, and it refers to all structures in which only the first sanitary protection zone exists, while the second and third sanitary protection zones are usually not even defined or are not respected.

Based on the Rulebook on the method of determining and maintaining sanitary protection zones of water supply sources ("Official Gazette of RS", No. 92/2008), the method of determining and maintaining sanitary protection zones of the area where the source is located, which in terms of quantity and quality can be used or used for the public supply of drinking water. To protect the water in the spring, this ordinance establishes: zone of immediate sanitary protection (zone I), narrower zone of sanitary protection (zone II) and wider zone of sanitary protection (zone III). The project passes through the II and III zones of sanitary protection.

Zone I of the groundwater source is formed in the area of the source immediately around the water intake facility and is separated by a fence that cannot be closer than 3 to 10 m from the surrounding water intake facility.

Zone II of the groundwater source in the porous medium of the intergranular type, when the underground water has a free level and when the aquifer is covered with a protective protective layer that reduces the influence of pollutants from the surface of the terrain, zone II includes the area from which the water reaches the water catchment facility for at least 50 days. In a porous medium of the intergranular type, when the groundwater is under pressure and when the aquifer is covered with a protective protective layer that reduces the impact of pollutants from the surface of the terrain, the extension of zone II cannot be shorter than 50 m from the water intake facility.

Zone III of the groundwater source in the porous medium of the intergranular type. When the underground water has a free level and when the aquifer is covered with a protective protective layer that reduces the impact of pollutants from the surface of the terrain, zone III includes the area from which the water reaches the water catchment facility for at least 200 days. In a porous medium of the intergranular type, when the underground water is under pressure and when the aquifer is covered with a protective protective layer that reduces the impact of pollutants from the surface of the terrain, the extension of zone III cannot be shorter than 500 m from the water intake facility.

Below are presented the main restrictions of activities within sanitary protection zones according to "Official Gazette of RS", no. 92/2008.

In zone I, buildings and facilities cannot be built or used, land cannot be used or carry out other activities, if this endangers the qulity of the water at the source, namely:

- construction or use of buildings and facilities, use of land or other activities from Article 28 of this rulebook;
- installation of devices, storage of equipment and performance of activities that are not in operation of water supply;
- movement of vehicles that are in the function of water supply outside of those prepared for it traffic road, access to motorized vehicles that are not in the function of water supply, use of motor-driven vessels, maintenance of water sports and bathing of people and animals;
- livestock feeding;
- fish farming for commercial fishing.

In zone II, it is not possible to build or use buildings and facilities, use land or carry out other activities, if this endangers the quality of the water at the source, namely:

- construction or use of buildings and facilities, use of land or other activities from Article 27 of this rulebook;
- housing construction;
- use of chemical fertilizers, liquid and solid manure;
- use of pesticides, herbicides and insecticides;
- breeding, movement and grazing of livestock;
- camping, fairs and other gatherings of people;
- construction and use of sports facilities;
- construction and use of catering and other facilities for the accommodation of guests;
- deepening of the bed and extraction of gravel and sand;
- establishment of new cemeteries and expansion of existing cemeteries.

In zone III, buildings and facilities cannot be built or used, land cannot be used or carry out other activities, if this endangers the quality of the water at the source:

- permanent underground and above-ground storage of dangerous substances and substances that cannot be mixed directly or indirectly into waters;
- production, transportation and manipulation of hazardous substances and non-hazardous substances may be introduced directly or indirectly into the waters;
- commercial storage of oil and oil derivatives;
- discharge of waste water and water used for industrial cooling plants;
- construction of traffic roads without channels for drainage of storm water;
- exploitation of oil, gas, radioactive substances, coal and mineral raw materials;
- uncontrolled depositing of communal waste, damaged vehicles, old tires and other substances and materials from which polluting substances can be released by washing or leakage;
- uncontrolled deforestation;
- construction and use of the airport;
- surface and subsurface works, soil blasting, penetration into the layer covering the underground water and removal of the layer covering the aquifer, unless these works are not in operation of water supply;
- maintenance of car and motorcycle races.

5.1.7. Surface waters

The hydrographic network of the research area, across the Sava and Danube drainage basin, belongs to the Black Sea drainage basin. The Sava and Danube are navigable rivers of international importance [30]. The Danube is the second largest river in Europe, connecting Belgrade with the Black and North Seas, while the Sava is the longest river on the Balkan Peninsula and is the main drainage basin of Southeast Europe, and one of the most important Danube drainage sub-basins, covering 12% of the Danube drainage basin with a total own drainage basin of 97713.20 km^2 [31]. The course of the Sava is winding, meandering type, with numerous oxbow lakes. The largest island in the Sava is Ada Ciganlija [32]. Over 1200 exploration wells have been drilled in the alluvial plain of the Sava for the purpose of expanding the Belgrade water source [33]. The maximum depth of the Danube in the area of Belgrade is 17 m, while the maximum width is 1000 m [34]. The Galovica drainage system

[30] Marković et al., 1985a
[31] Presburger Ulniković et al., 2020
[32] Marković et al., 1985a
[33] Vranješ, 2012
[34] Marković et al., 1985a

is located in the research area. It covers an area of about 100000 ha, with 11 pumping stations and 2575 constructed facilities, and a canal network density of 30–40 m/ha. The length of the main canal Galovica is 40 km and it is a recipient of internal excess water from the terrain of southeastern Srem, and municipal wastewater and water of the processing complex and agro-industry [35]. The eastern boundary of the drainage system is the Danube, the southeastern boundary is the Sava, where excess water drainage takes place by pumping stations into the Sava River, or gravity at low water levels of the Sava [36].

Data from the hydrological station Belgrade for a five-year period, were used to analyze the regime of hydrological elements, flows and water levels of the Sava river. The amplitudes of fluctuations water levels during the year are expressed, with the highest values recorded in early spring (March-April-May), after snow melting and spring rains, while the minimum values are characteristic for the end of summer and the beginning of autumn (August-September), when the water level or flow begins to decrease. Data on the flow for the Sava River at the hydrological station Belgrade are missing and will be requested from Republic Hydrometeorological Institute of Serbia and presented within the ESIA.

Table 22. Overview of average monthly water level (Havg) values for the Sava River for the period from 2018–2022* [37]

FLOW (Q)						
YEAR		2018	2019	2020	2021	2022
		H_{AVG} (cm)				
MONTHS	1	392	226	211	337	295
	2	362	296	259	447	251
	3	417	309	305	305	218
	4	473	282	196	287	283
	5	307	387	205	345	256
	6	261	450	282	297	219
	7	243	215	279	247	168
	8	176	186	232	229	155
	9	174	171	203	203	186
	10	154	162	307	182	212
	11	185	245	252	198	205
	12	200	260	240	276	315
YEARLY MIN. H_{MIN} (cm)		132	143	165	160	140
DATE		20. 10.	27. 09.	27. 09.	09. 10.	19. 08.
YEARLY MAX. H_{MAX} (cm)		523	567	427	513	385
DATE		25. 03.	08. 06.	27. 06.	15. 02.	21. 12.
YEARLY AVERAGE VALUE H_{AVG} (cm)		279	266	248	279	230

* Hydrological station Belgrade (distance from the confluence: 0.8 km, basin area: 95719 km^2, elevation "0": 68.28 m.a.s.l.)

According to the Regulation on the categorization of watercourses ("Official Gazette of the SRS, no. 5/1968), the Sava River, along its entire course through the Republic of Serbia (from the border with Croatia to the confluence with the Danube), is classified in category II. According to the Regulation on Water Classification ("Official Gazette of SRS, No. 5/1968), class II includes waters that are suitable for swimming; recreation and

[35] Domazet et al., 2007
[36] Gregorić et al., 2009
[37] Republic Hydrometeorological Institute of Serbia, Hydrological yearbook, surface waters 2017–2021, https://www.hidmet.gov.rs/

water sports, for growing less noble fish species (cyprinids), as well as water that, with normal processing methods (coagulation, filtration and disinfection), can be used for supplying drinking water to the settlements and in the food industry.

The following table presents the official classification of water, according to the Decree on Water Classification (Official Gazette of the SRS, No. 5/1968).

Table 23. Water classification, division into classes and subclasses

Class	Class characteristics
Class I	This class includes water which, in its natural state or after disinfection, can be used or utilized to supply settlements with drinking water, in the food industry and for the breeding of noble species of fish (salmonids).
Class II	This class includes waters suitable for bathing, recreation and water sports, for the breeding of less noble species of fish (cyprinids), as well as waters which, in addition to normal treatment methods (coagulation, filtration and disinfection), can be used to supply water to beverages and in the food industry. Class II waters are divided into subclasses Subclass IIa — which includes waters that, in addition to normal treatment methods (coagulation, filtration and disinfection), can be used to supply settlements with drinking water, for bathing and in the food industry. Subclass IIb — which includes waters that can be exploited or used for water sports, recreation, for breeding less noble species of fish (cyprinids) and for watering livestock.
Class III	This class includes water which may be used or used for irrigation and in industry other than the food industry.
Class IV	This class includes waters that can be used or utilized only after special treatment.

Monitoring of the quality of the Sava River is carried out at a total of three stations, of which Ostružnica is the closest to the location in question, and at it monthly monitoring of general parameters, oxygen regime, nutrients, salinity, metals, microbiological parameters and priority and priority hazardous substances is carried out.

The following text on the status of surface waters of Serbia provides an overview of the state of water quality of water bodies covered by monitoring in the period 2017–2019.

Quality elements for assessment of ecological status/potential, for each category of surface water, are divided into three groups: (1) biological elements (2) hydromorphological elements that support biological elements and (3) physicochemical and chemical elements that support biological elements. Physical-chemical and chemical elements that support biological elements include: a) General physico-chemical quality elements and b) Specific non-priority polluting substances that are discharged into the water body in significant quantities.

The assessment of ecological status/potential is shown in colours in accordance with the recommendations of the Water Framework Directive of the European Parliament and of the Council (WFD) (Water Framework Directive (WFD 2000/60/EC))

Table 24. Assessments of the ecological status of surface waters

Assessment of status	Color	
high	blue	
good	green	
moderate	yellow	
poor	orange	
bad	red	

To determine the status of the water body, in addition to the assessment of the ecological status, an assessment of the chemical status is also carried out. Environmental quality standards EQS (Environmental

Quality Standards) are used to assess the chemical status of the water body. The chemical status of surface waters is determined in relation to the limit values of priority and priority hazardous substances. Chemical status of water of bodies is evaluated as "achieved good status" when not a single one is exceeded prescribed threshold value, or "good status not achieved" in the case when it is exceeded at least one prescribed limit value.

Table 25. Assessments of the ecological potential of surface waters

Assessment of potential	Color	
Good and better	green	
Moderate	yellow	
Poor	orange	
Bad	red	

The results of the examination of the ecological potential in the period 2017–2019 are shown in Table 26.

Table 26. Assessment of the ecological potential of watercourses in the period 2017–2019 [38]

Watercourse	Name of the station	Year of examination	Biological elements of quality			Physico-chemical elements of quality	specific pollutants	Evaluation of ecological status/potential	Reliability level assessment
			Phytobenthos	Watery macroinvertebrates	Fish				
Sava	Ostružnica	2017–2019							high

The chemical status of surface waters is determined by checking whether the environmental quality standards (EQS) for priority and priority hazardous substances are met. The chemical status of water bodies is evaluated based on the monitoring results and is expressed as "good status" and "good status not achieved", in case at least one limit value prescribed by the Regulation (Regulation on limit values of priority and priority hazardous substances that pollute surface waters) is exceeded of water and deadlines for reaching them (Official Gazette of RS No. 24/2014)) and is displayed in appropriate colors in the manner shown in Table 27.

Table 27. Assessment of the chemical status of surface waters [39]

Status rating	color	
good	blue	
good status not achieved	red	

The assessment of the chemical status is carried out with a mandatory indication of the level of reliability. Level reliability of the assessment was carried out on the basis of the criteria given in the Rulebook (Rulebook on parameters of ecological and chemical status of surface waters and parameters of chemical status and quantitative status of groundwater (Official Gazette of the RS No. 74/2011)).

[38] Čađo et al., 2021.
[39] Čađo et al., 2021.

Table 28. Chemical status of water bodies of surface watercourses in the period 2017–2019 [40]

Watercourse	Profile (measuring point)	Year of examination	Chemical status	Reason for not achieving good status	Annual/multi-year average concentration (µg/l)	Maximum measured concentration (µg/l)	Reliability level assessment
Sava	Ostružnica	2017–2019		Benzo(a)perylene	0.00072	-	average

Table 29. Assessment of the ecological status of watercourses based on physical and chemical elements of quality in the period 2017–2019 [41]

Watercourse	Name of the station	Dissolved oxygen (mg l^{-1}) (C 10)	pH value (C 80)	Ammonium ion (NH_4-N) (mg l^{-1}) (C 80)	Nitrites (NO_2-N) (mg l^{-1}) (C 80)	Nitrates (NO_3-N) (mg l^{-1}) (C 80)	Total nitrogen (mg l^{-1}) (C 80)	Orthophosphates (mg l^{-1}) (C 80)	Total phosphorus (mg l^{-1}) (C 80)	Chlorides (mg l^{-1}) (C 80)	BOD5 (mg l^{-1}) (C 80)	Total Organic Carbon (TOC) (mg l^{-1}) (C 80)	Assessment of ecological status
Sava	Ostružnica	7.19	8.06	0.18	0.013	0.76	1.6	0.062	0.113	30.1	2.40	3.9	

Table 30. Ecological status in relation to the content of the specific pollutants in the period 2017–2019 [42]

Watercourse	Profile (measuring point)	Ecological status in relation to the content of specific polluting substances	
		Assessment of status	Cause of failure to achieve good status (C80)
Sava	Ostružnica		

Table 31 shows the results of physico-chemical analyzes of the Danube and Sava waters during the autumn and winter periods, from which it is evident that oscillations of appropriate values of physico-chemical parameters are observed during different seasonal cycles, while on the other hand concentrations of individual parameters remain unchanged. According to the Decree on Limit Values of Pollutants in Surface and Groundwater and Sediment and Deadlines for Reaching Them (Official Gazzete, 2012), the values of chlorides, sulfates and total dissolved salts of the Danube and Sava waters for autumn and winter are within the prescribed limits for I class, which corresponds to the excellent ecological status. Taking into account the concentrations of suspended solids, the values correspond to the limit values prescribed for I and II class, which corresponds to excellent and good ecological status, within the monitoring period. The nitrite content for the month of February 2020 for the Danube is within the limit values for class II, ie for the remaining

[40] Čađo et al., 2021.
[41] Čađo et al., 2021.
[42] Čađo et al., 2021.

months of monitoring the nitrite concentrations for the Danube and Sava watercourses are within the limit values for class I. Values of chemical oxygen consumption indicate excellent ecological status of the Danube, ie for the Sava watercourse the measured concentrations from November 2019 indicate good ecological status, while in February 2020 the concentrations of chemical oxygen consumption indicate excellent ecological status.

*Table 31. Results of physico-chemical analyzes of the Danube and Sava waters** [43]

Examined parameters	Danube		Sava	
	November, 2019	February, 2020	November, 2019	February, 2020
Temperature (°C)				
Water temperature	13.37	6.22	15.50	6.85
Air temperature	15.50	2.33	13.50	3.50
Oxygen parameters, carbonates, alkalinity and acidity				
Dissolved oxygen (mg/L)	8.82	12.33	8.80	94.50
Percentage of water saturation with oxygen (%)	84.33	99.33	88.00	11.50
Alkalinity (mmol/L)	3.44	3.99	4.02	3.91
Total hardness (mg/L)	215.00	233.17	250.00	242.00
Dissolved carbon dioxide (mg/L)	2.13	2.82	2.20	6.90
Carbonates (mg/L)	0.00	0.00	0.00	0.00
Bicarbonates (mg/L)	210.00	243.33	245.00	238.50
Total alkalinity (mg/L)	172.17	199.67	201.00	195.50
Particles, pH, electrical conductivity, dissolved ions				
Turbidity (NTU)	4.85	13.13	14.65	14.50
Suspended substances (mg/L)	4.00	5.50	4.00	4.00
pH	7.94	7.95	7.94	7.90
Electrical conductivity (µS/cm)	444.50	470.67	509.50	472.00
Total dissolved salts (mg/L)	247.67	273.33	291.00	274.00
Phosphorus, nitrogen and their compounds (mg/L)				
Orthophosphates	0.08	0.06	0.05	0.05
Ammonium	0.23	0.29	0.09	0.19
Nitrites	0.01	0.02	0.01	0.01
Nitrates	0.57	1.10	0.65	0.85
Cations and anions (mg/L)				
Calcium	60.17	66.17	75.50	64.00
Magnesium	15.67	16.50	15.00	20.00
Chlorides	24.62	30.03	44.10	34.55
Sulfates	27.33	23.00	24.50	19.50
Organic determinants (mg/L)				
Chemical oxygen demand**	4.58	2.88	5.10	3.70
Biological oxygen demand	2.20	1.58	2.60	2.03

*Concentrations of physical-chemical and chemical parameters are presented as average values, where the sampling locations correspond to the part of the flow near Ostružnica (Sava watercourse) and the part of the flow near Zemun (Danube watercourse); **Permanganate method.

5.1.8. Drinking water supply

Belgrade Waterworks consists of five production plants where water is purified: Makiš, Bele Vode, Banovo Brdo, Bežanija and Vinča, and then it enters the distribution network, which in addition to the central city zone includes the outskirts of suburban municipalities. The total annual water production is approximately 250

[43] Presburger Ulniković et al., 2020

million m^3, which corresponds to an average annual flow of delivered water of about 6,400 l/s. In the total balance of the Belgrade water supply system, groundwater is represented with 60% and the waters of the Sava and Danube with 40%.

Today, the Belgrade groundwater source was formed as a long series of 99 wells with horizontal drains and about fifty drilled wells. Wells were built on the banks of the Sava River and Sava Lake. Despite the fact that the city is located on two large rivers, the water supply system relies on over 99% of the waters of the Sava River. Sava water is used directly as a raw material at the:

- Makiš (Makiš includes water catchment on Sava ("Sava" water catchment and alternative water catchment from the reservoir of Sava Lake), pumping station, pressure pipeline and water treatment plant with tank and clean water pumping station. After the process of physical and chemical treatment, purified water at Makiš is pumped into the city, and since November 2005, also into the clean water pool at Bele Vode (average for the entire period is 190 l/s).
- Vinča and
- Bele Vode plants (Raw water is brought from the Sava River to the collection well via two pipes, at the ends of which there are suction baskets. The suction baskets are located about 30 m from the shore, submerged at a depth of 1 m from the bottom of the river Sava. The Šabacka pumping station (with a maximum capacity of 570 l/s) pumps crude Sava water from the collection well to the Bela Voda processing plant for further processing.

The second system consists of groundwater treatment. The water affected by the wells is further delivered to the groundwater treatment plants:

- Bežanija - water treatment consists of the following processes: aeration, retention – deposition, filtration, disinfection;
- Banovo Brdo - In addition to 37 reni wells located on the right bank of the Sava River and which belong to the "Banovo brdo" plant, a part of the raw water is pumped out from the reni well on the left side of the Sava river, through a pipeline that passes under the river; water treatment consists of the following processes: aeration, retention – deposition, filtration, disinfection, and
- Bele Vode - water from five reni wells and 15 tubular wells is processed; water treatment consists of the following processes: aeration, retention – deposition, filtration, disinfection.

A very modest amount of water is captured and treated by the Danube River at the Vinča plant.

5.1.9. Fluvial floods

The projection of the future development of floods concerning their intensity, timing and frequency is considered to be a challenging and uncertainty afflicted task. This can be traced back to various factors. The origin of floods can be very diverse: long and persistent rainfall events, storm precipitation, and rain on snow events. Another crucial factor is the terrain characteristics: mountains and lowlands, small and big catchments, geological conditions, soil properties. Moreover, there is great human influence on the surface which can contribute to flood development: agriculture, forestry, soil sealing, and river regulation. Despite these factors, which influence flood intensity, timing and frequency, an increase in future flood risk and intensity is expected mainly in small and mountain catchments. Just the beginning of the railway route, near Batajnica, belongs to the Danube river basin, as seen on the figure bellow. The rest of the route belongs to the Sava river basin.

Figure 15. River basins and main river network in Serbia [44]

Flood Risk Management Plan in the Sava River Basin (International Sava River Basin Commission, 2019) is developed according to the requirements of the Protocol on Flood Protection to the Framework Agreement on the Sava River Basin, and it is aligned to the possible extent, with the requirements of the EU Floods Directive, which sets legal basis for reduction and management of flood risks to human health, environment, cultural heritage and economic activity.

On the lower Sava River section in Serbia, levees on both banks are not continuous. Levees on the left bank mainly provide protection from the high waters of 100-years return period, with protection elevation of 1,2 meters. In this area is the natural reserve “Obedska Bara”, which is a Ramsar site. With its flooding area of almost 12.000 ha and retention capacity of over 250 million m^3, it naturally regulates Sava River high waters.

[44] Republic Hydrometeorological Institute of Serbia

Water and Climate Adaptation Plan for the Sava River Basin- WATCAP (World Bank, 2015) provided the most comprehensive analysis related to the modeling of climate change impact to flood risk management planning at the Sava River Basin level. Based on climatological analysis, in general, temperature is expected to increase over the Sava River Basin area in all seasons (the most pronounced increase can be observed for summer and winter). On the other hand, precipitation is expected to decrease in spring, summer and autumn (with the most pronounced decrease in summer), whereas an increase in the winter is expected, especially in north-western part of the basin. Rainfall, which is very variable in the basin and appears to be changing in terms of seasonal distribution, brings uncertainty into hydrological trends within the basin. Therefore, options for reducing the impact pressures associated with rising mean temperatures and variable rainfall should be identified through careful planning and promotion of adaptation measures rather than coping with such changes. Also, WATCAP concluded that the climate change will increase the peak discharges mainly in the head part of the Sava River Basin. The peak discharges will increase at the end of the 21st century for the 100-year return period i.e. from 3% at Sremska Mitrovica up to 55% at Čatež (Slovenia). The impact of climate change on the water level forecasts with 100-year return period floods is quite high in the head part of the watershed, i.e. more than 2 m. Downstream it initially strongly decreases then it gradually increases up to 1,8 m and finally it drops to 0,1 m at Sremska Mitrovica, which is around 80km downstream from railway crossing of Sava. There is clear evidence that reforestation has decreased the mean discharges in Slovenia by up to 35% and consequently such actions will decrease flood discharges and mitigate the impact of climate change on floods in the Sava River Basin. By climate change projections made by WATCAP, the flood risk is extremely large for some parts of the Sava River Basin where the current 100-year return period floods will become a 10-year return period floods in 2100.

Results of the several projects (Danube Floodrisk Project, IPA 2014-2020 Flood recovery Serbia IPA 2014-2020 Flood recovery Serbia, SoFPAS in Serbia (Study of Flood Prone Areas in Serbia - Phase 1)) are vulnerability and flood risk maps.

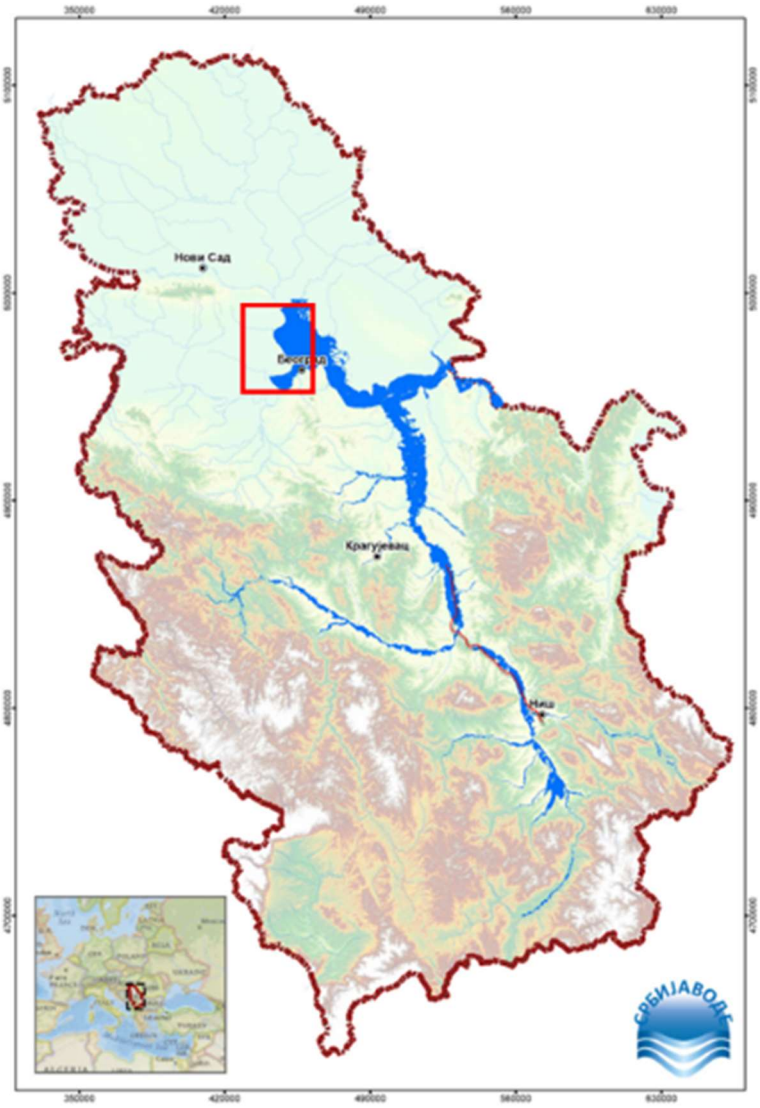


Figure 16. SoFPAS in Serbia-Study of Flood Prone Areas in Serbia - Phase 1- Q100

5.1.10. Climate change

Most of the Serbia has Cfb climate [45] (Köppen climate classification). Nevertheless, Ostružnica- Batajnica railway route is located within Cfa climate (humid subtropical climate, also known as warm temperate climate is characterized by hot and humid summers, and cool to mild winters). Second National Communication of the Republic of Serbia under UNFCCC also states that "According to the Köppen climate classification, most of Serbia has a moderately warm rainy climate with warm summers, whilst mountainous have a snowy climate."

July is the warmest month and autumn is warmer than spring. January is the coldest month, with average monthly temperature of -6° C in mountainous area, up to 0° C in flat areas of the country.

Serbia has a continental precipitation regime, with heavier rainfall in the warmer half of the year, except for the southeastern areas, which have the most rainfall in autumn. June is the rainiest month, with an average of 13% of the total annual rainfall. The least rainy months are February and October. Annual rainfall for the entire country is 896 mm.

[45] Climate Regionalization of Serbia According to Köppen Climate Classification, https://doi.org/10.2298/IJGI1702103M

It generally snows from November to March, and sometimes in April and October, except in the mountains above 1,000m. January has the most days with snow cover, on average 30-40% of the total number of days with snow cover.

Northwest and west winds are typical of the warm season, while easterly and southeasterly winds (the Košava) blow during the coldest period of the year. In the mountainous area in southwest Serbia, southwest winds prevail.

Annual sums of sunshine duration range from 1,800 to 2,100 hours.

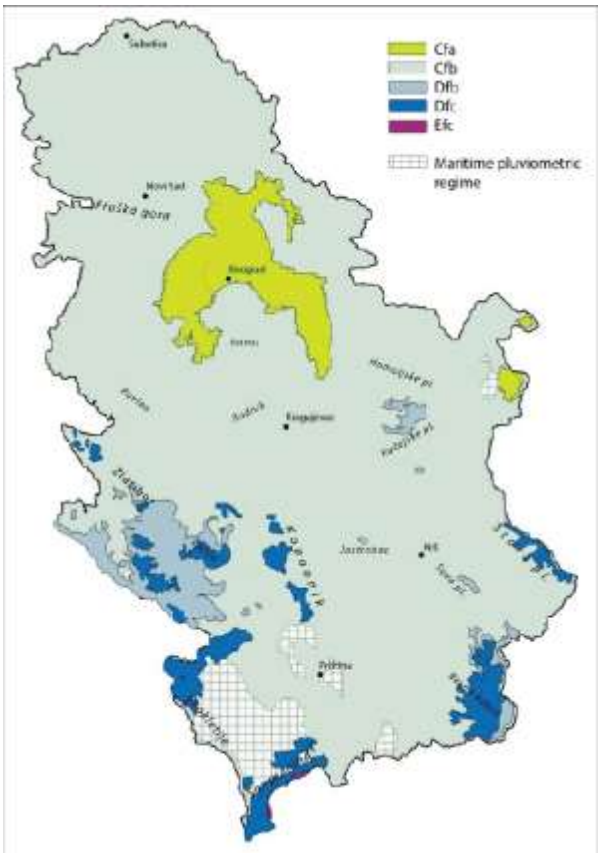


Figure 17. Köppen climate classification for Serbia (railway route marked red)

Meteorological data were analysed for the meteorological station in Belgrade that is a part of the Republic Hydrometeorological Service of Serbia along with the data from Meteoblue (https://www.meteoblue.com).

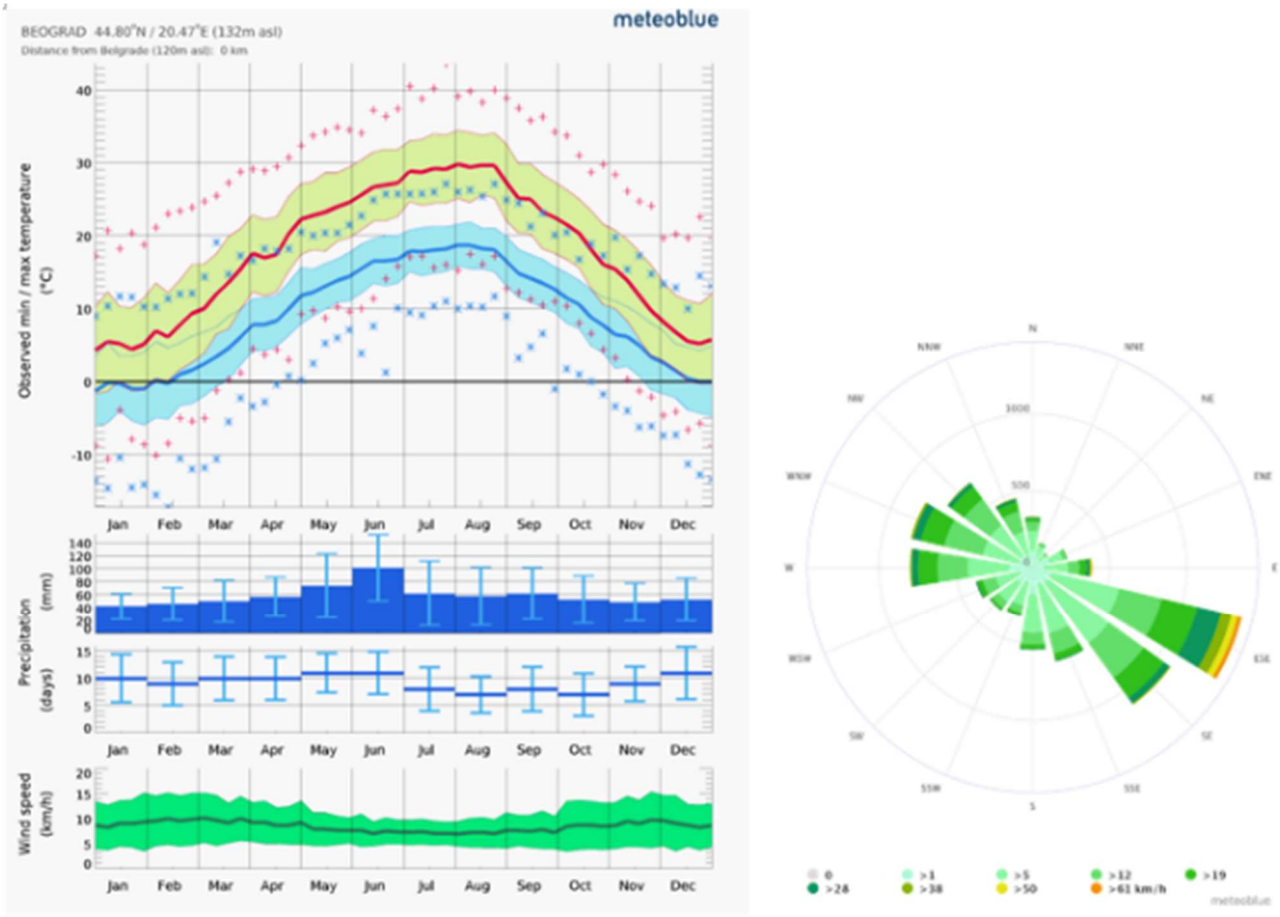


Figure 18. Observed min/max temperature, precipitation and wind speed (left) and wind rose (right)- Belgrade

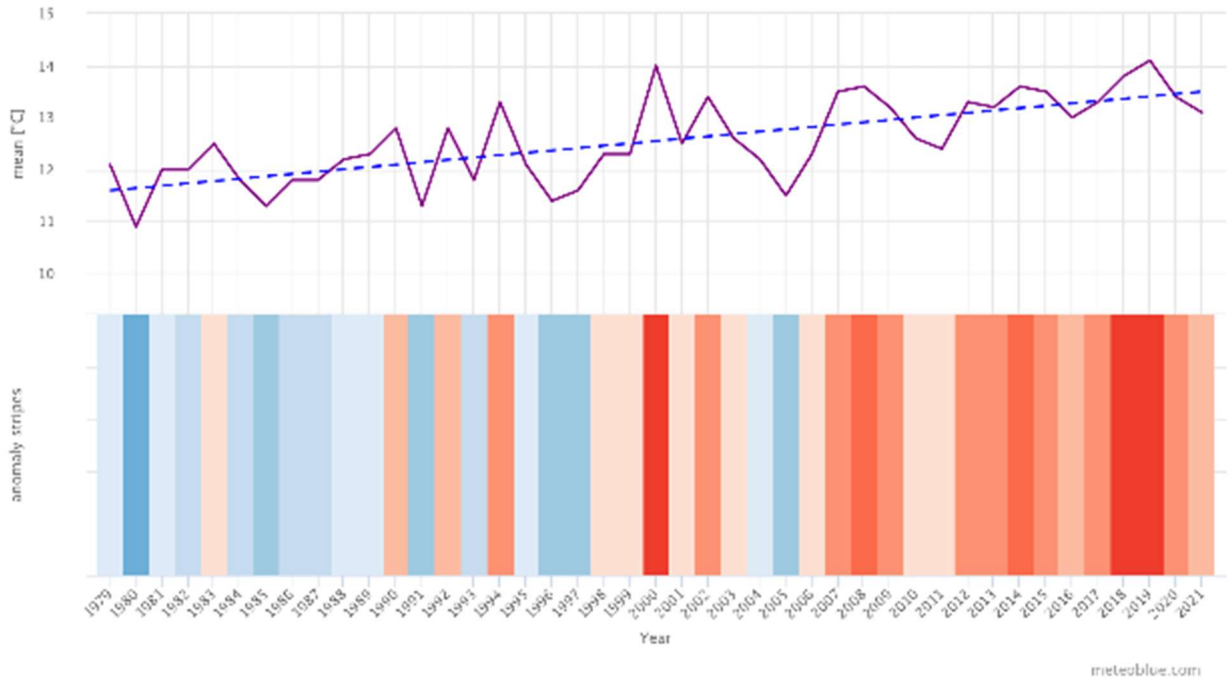


Figure 19. Mean yearly temperature, trend (dash blue line) and anomaly (purple line) for period 1979- 2021- Belgrade

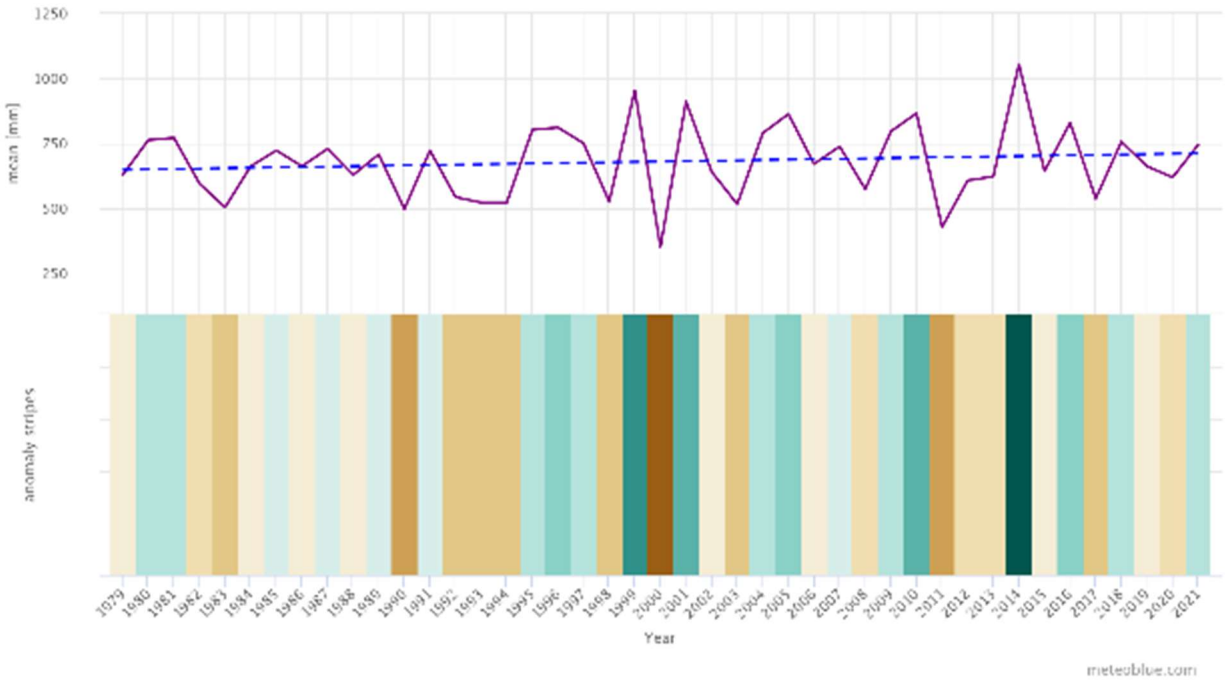


Figure 20. Mean yearly precipitation, trend (dash blue line) and anomaly (purple line) for period 1979- 2021- Belgrade

Table 32. Extreme values of climate elements- Belgrade

Maximum temperature	43.6 °C	**Minimum temperature**	-26.2 °C
Date of maximum temperature	24.07.2007.	**Date of minimum temperature**	8.01.1947. and 10.01.1893.
Maximum precipitation	109.8 mm	**Maximum snow**	80 cm
Date of maximum precipitation	15.05.2014.	**Date of maximum snow**	02.03.1962.

Serbia is positioned on the 111 (of 181) place in the World Risk Index Report 2021 (Institute for the Environment and Human security of the United Nations University) with the World Risk Index of 5.42 (low). Exposure is assessed as medium, mainly because all Western Balkan states must cope with elevated risks of natural hazards/ extreme weather. Susceptibility is also medium, due to the economic conditions in Serbia. ThinkHazard assesses that in Serbia risk of river floods, urban floods and wildfires is high, while earthquakes, landslides, water scarcity and extreme heat carry medium risk. The results for Belgrade are exactly the same, apart for the landslides, for which the risk is assessed as low.

In line with the EIB document „Assessing climate change risks at the country level: the EIB scoring model" (EIB Working Paper 2021/03, May 2023), Serbia is, among other 180 countries, assessed for the climate physical and transitional risks. Physical risk cover the direct effect of climate change on assets and productivity. It can be acute if caused by extreme weather events and hazards such as floods, landslides, extreme temperatures, storms and hurricanes, droughts or wildfires, or chronic, if related to a more gradual effect of global warming, so to longer-term shifts in climate patterns, for instance global temperature change. Transition risk refers to the climate risk resulting from mitigation policies as economies move towards a greener, less polluting society. Such policies, stemming from deals like the Paris Agreement in 2015, lead to changes in the energy system and have impacts throughout the economy. Climate policies are the main driver of the related risks, as they formalize the need toadjust and prescribe the speed of the transition. As the carbon-intensive country, due to the heavy reliance on coal in the energy sector, Serbia transition risks are expected to be higher.

The physical risk score includes the risk of natural disasters (acute risk) as well as more gradual changes (chronic risk), both calculated as the sum of damage, costs and losses as a share of a country's GDP. The

adaptation component, which takes into account the ability and willingness of the country to respond to climate risk (i.e. fiscal space, stability, governance and level of development) can partially offset the impact. The impact net of adaptation provides a measure of the average (yearly) burden a country incurs due to climate change-related impacts.

The transition risk score takes into account the exposure of a country to risks stemming from the transition to a low or net-zero carbon future, including total greenhouse gas emissions, and the revenues deriving from fossil fuels. These risks are then adjusted in line with countries' climate strategies, comprising the deployment of renewable energy, energy efficiency improvements and the level of climate ambition as indicated in their nationally determined contribution plans. The transition risk is strictly related to the climate policies which have been put in place to help countries achieve carbon neutrality, in line with the Paris Agreement goals. These climate policies affect the cost of doing business and the returns on domestic assets, increasing the likelihood of carbon-intensive assets becoming stranded.

Results of the Country Risk Climate Scores are presented in Figure 21.

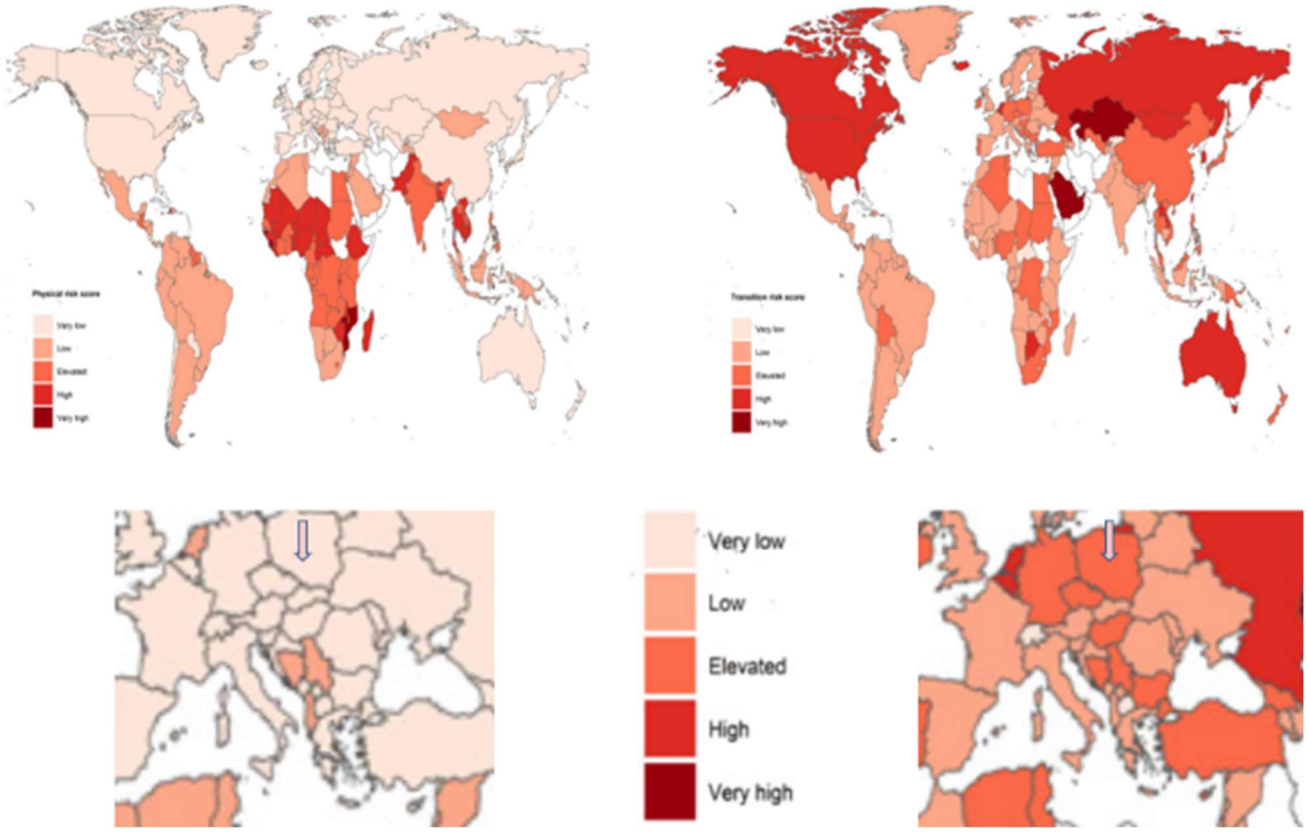


Figure 21. Physical (left) and transition (right) risk country scores in the world

As already experienced, Serbia, along with Bosna& Herzegovina, has elevated levels of physical risks compared to most of Europe. Fact that climate risk scoring results in low physical risk is, having in mind information from „Disaster risk assessment in the Republic of Serbia"(Ministry of Internal Affairs, 2019), „Observed climate changes in Serbia and projections of the future climate based on different scenarios of future emissions" (UNDP, 2018) and Serbian NAP document, maybe understatement, both for acute and chronic risks. Again, mentioned high dependence on coal in Serbia will probably result in high transition risk compared to „elevated"scoring given in EIB scoring model.

5.1.10.1. Methodology used for climate resilience assessment

Climate change vulnerability and resilience assessment is going to be prepared in line with the Technical guidance on the climate proofing of infrastructure in the period 2021-2027 (European Commission, 2021). Short overview of the process is given below.

Climate change adaptation measures for infrastructure projects center around ensuring a suitable level of resilience to the impacts of climate change, which includes acute events such as more intense floods, cloudbursts, droughts, heatwaves, wildfires, storms and landslides and hurricanes, as well as chronic events such as projected sea-level rise and changes in average precipitation, soil moisture and air humidity. In addition to factoring in the climate resilience of the project, there must be measures to ensure that the project does not increase the vulnerability of neighboring economic and social structures.

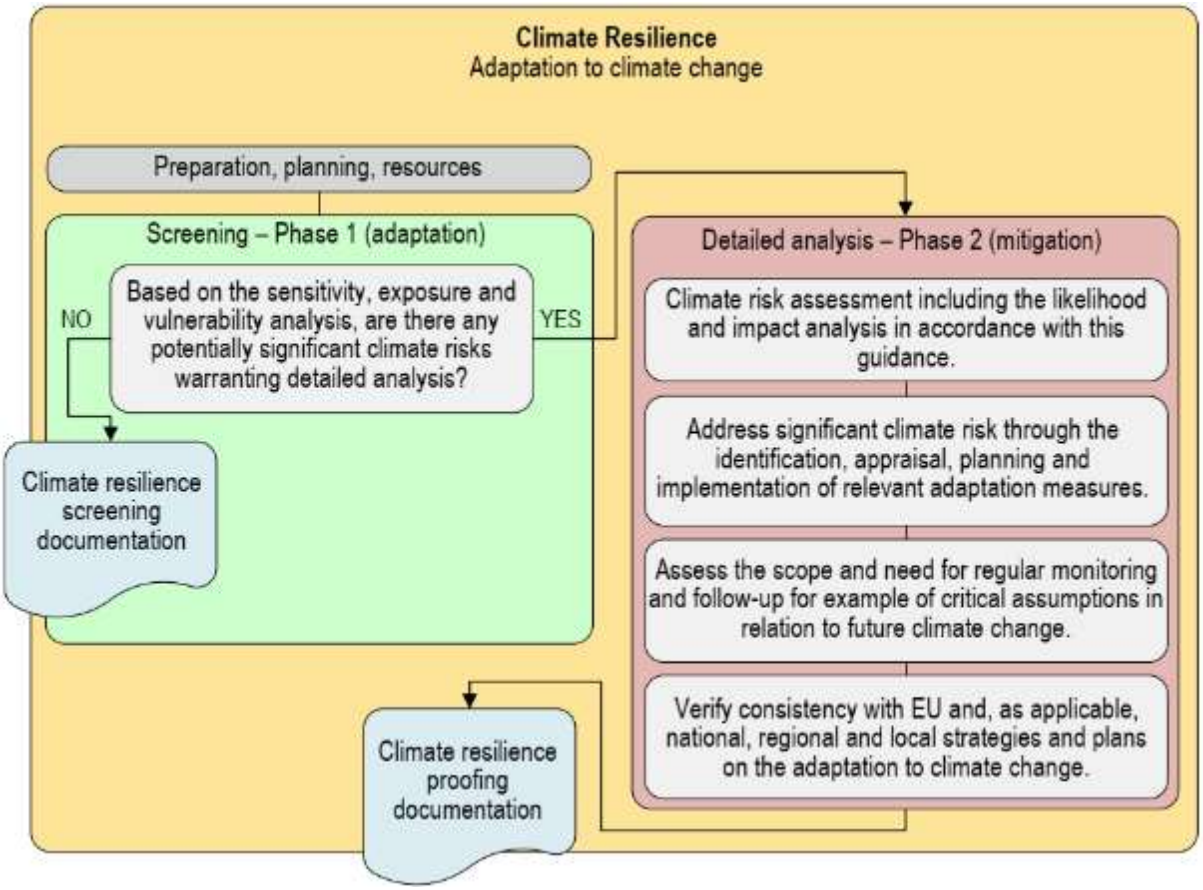


Figure 22. Overview of the climate adaptation-related process for climate proofing

Analysing the vulnerability of a project to climate change is a first step in identifying the right adaptation measures to take and it represents the first, screening phase. The analysis is broken down into three steps, comprising of a sensitivity analysis, an assessment of current and future exposure, and then a combination of the two for the vulnerability assessment.

The aim of the vulnerability analysis is to identify the relevant climate hazards for the given specific project type at the planned location. The vulnerability of a project is a combination of two aspects: how sensitive the project's components are to climate hazards in general (sensitivity) and the probability of these hazards occurring at the project location now and in the future (exposure). The aim of the sensitivity analysis is to identify which climate hazards are relevant to the specific type of project, irrespective of its location. Climate change indicators and climate change impact indicators (hazards) are overviewed in numerous documents (i.e. https://www.eea.europa.eu/ims, Climate change, impacts and vulnerability in Europe 2016- EEA, Extreme

weather and climate in Europe- EEA, 2015). The exposure analysis can be split in two parts: exposure to the current climate and exposure to the future climate.

The vulnerability assessment aims to identify potential significant hazards and related risk and it forms the basis for the decision to continue to the risk assessment phase. Typically it unveils the most relevant hazards for the risk assessment (these can be considered as the vulnerabilities ranked as 'high' and possibly 'medium', depending on the scale). If the vulnerability assessment concludes that all vulnerabilities are ranked as low or insignificant in a justified manner, no further (climate) risk assessment might be needed (this concludes the screening and phase 1).

Detailed analysis, phase 2 of the assessment process, provides a structured method of analysing climate hazards and their impacts to provide information for decision-making. This process works by assessing the likelihoods and severities of the impacts associated with the hazards identified in the vulnerability assessment (or initial screening of relevant hazards), and assessing the significance of the risk to the success of the project. Compared to the vulnerability analysis, the risk assessment more readily facilitates identification of longer cause-effect chains linking climate hazards to how the project performs across several dimensions (technical, environmental, social/inclusion/accessibility and financial, etc.) and looks at interactions between factors. Hence, a risk assessment may identify issues that are not picked up by the vulnerability assessment. Likelihood analysis of the risk assessment looks at how likely the identified climate hazards are to occur within a given timescale, e.g. the lifetime of the project. Impact assessment of the risk assessment looks at the consequences if the climate hazard identified occurs. This should be assessed on a scale of impact per hazard. This is also referred to as severity or magnitude. Having assessed the likelihood and the impact of each hazard, the significance level of each potential risk can be estimated by combining the two factors. If the risk assessment concludes that there are significant climate risks to the project, the risks will be managed and reduced to an acceptable level. For each significant risk identified, targeted adaptation measures will be assessed.

5.1.10.2. Expected changes in temperatures and precipitation- Serbia-wide

The data presented in the document Observed climate changes in Serbia and projections of the future climate based on different scenarios of future emissions (UNDP, 2018) represent the most likely value from the set (ensemble) of solutions obtained using daily values of temperatures and precipitation from nine regional climate models that can be downloaded from the EURO-CORDEX database. The reference period with respect to which the change in future climatic conditions is analysed is 1986-2005 and the analysed future periods are: 2016-2035 (near future), 2046- 2065 (mid-century) and 2081-2100 (end of century). The analyses were performed according to two selected greenhouse gas emission scenarios: RCP4.5 (stabilization scenario, which anticipates the stabilisation of emissions from 2040) and RCP8.5 (constant growth scenario), which are assumed to cover the likely range of possible future outcomes.

Over the future periods, an increase in temperature is expected in both scenarios compared to the 1986-2005 reference period. A more intense increase in temperature is anticipated according to RCP8.5, which is expected due to the more intense emissions of greenhouse gases and their impact on the energy balance in the climate system. In this scenario, the mean annual temperature, on average for the territory of Serbia, will increase by 1°C in the near future compared to the reference period, in the period attributed to the mid-21st century, it will rise to 2°C, and, by the end of the century, the average annual temperature will be higher by as much as 4.3°C compared to the reference period. The stabilisation scenario, RCP4.5, shows a slightly less increase in mean annual temperature by about 0.5°C compared to RCP8.5 during the first two analysed periods. In this scenario, by the end of the 21st century, the increase in the average annual temperature in the territory of Serbia will reach a much lower value than the value obtained under the RCP8.5 scenario, which is 2°C higher than the value of the reference period. Seasonal analyses and changes in mean maximum and minimum temperatures have shown that in the future climate the temperature increase during the colder part of the year may be slightly less than the temperature increase during the warmer part of the year, but

during the second half of the century according to the RCP8.5 the warming of the colder part of the year becomes more intense and catches up with the warming up of the warmer part. The increase in maximum temperatures are slightly higher than the increase in minimum temperatures. The largest increase will be in the RCP8.5 scenario of the mean maximum temperature during the June- August period for the period at the end of the 21st century, with an average value of as much as 4.7°C higher than the 1986-2005 reference period. A spatial analysis of changes in temperatures over future periods indicates an increase in warming from north to south. The selected results obtained from the analysis of future temperature changes are shown in the next figure.

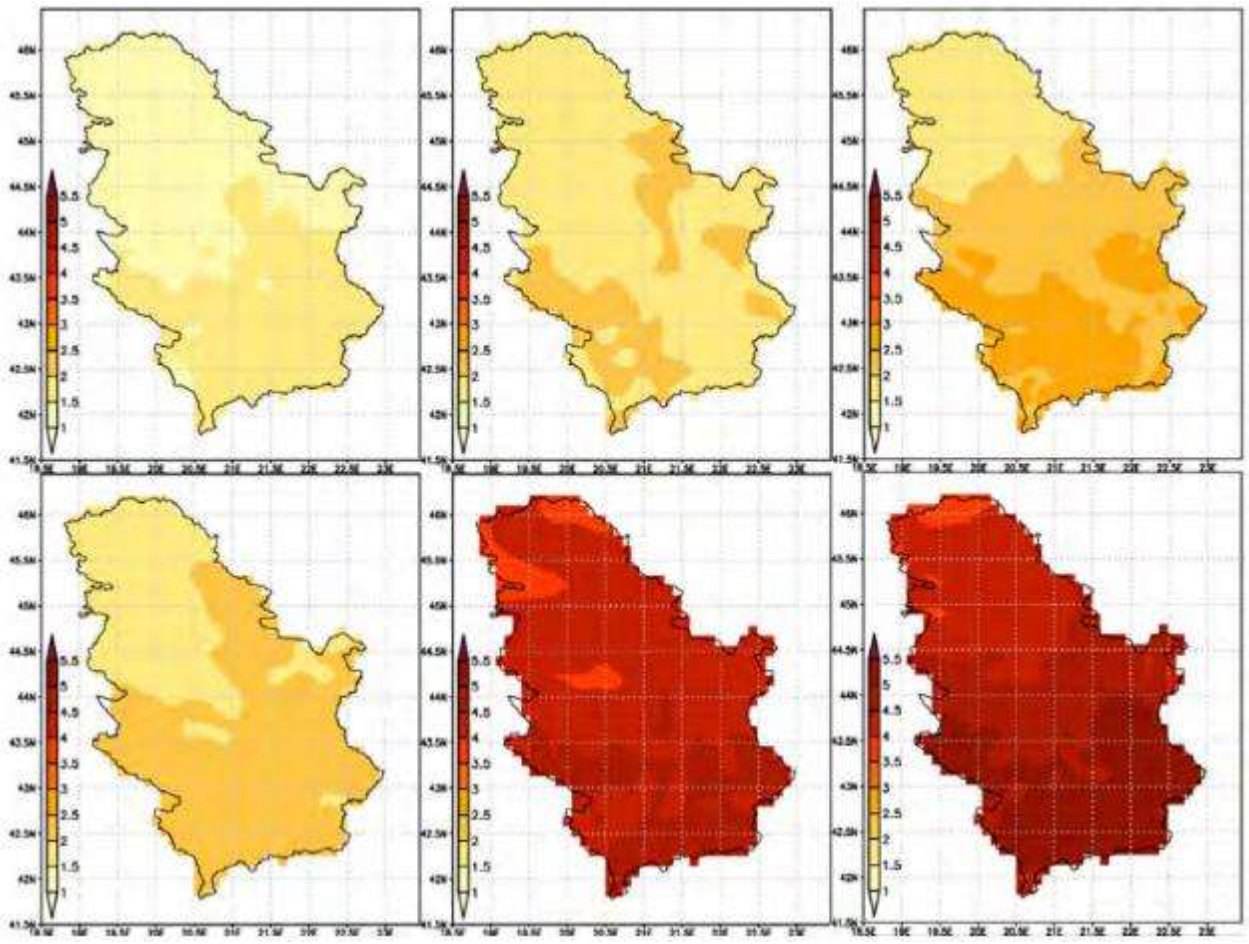


Figure 23. Anomaly of the mean annual temperature (°C) for the 2046-2065 period (left panel) and for the 2081-2100 period (central panel) relative to the values for the 1986-2005 reference period; anomaly of the mean maximum temperature (°C) obtained for the June-August 2081-2100 period compared to the mean maximum temperature values of this period for 1986- 2005 (right panel); the results obtained according to the RCP4.5 scenario are shown in the top panels and the results obtained according to the RCP8.5 are shown in the bottom panels. Source: Climate changes observed in Serbia and future climate projections based on different scenarios of future emissions

The number of frost and ice days will progressively decrease in the future due to the temperature increase. Their trend of change is more pronounced at higher altitudes. In the near future, there will be almost 10 days less frosty days on average annually in the territory of Serbia compared to the values of the 1986-2005 reference period. During the mid-21st century climatic period, according to the RCP8.5, there will be almost one month less frosty days and according to the RCP4.5 there will be about half a month less of them. Although the climate will begin to stabilise according to RCP4.5, by the end of the 21st century there will be on average one month less frosty days, while according to RCP8.5 the average decrease in the territory of Serbia is expected to be almost two months, in which case frost days will become a rare event in Serbia. Ice days in the case of the RCP8.5 scenario will only be possible in the highest mountain areas. The number of hot and tropical

days will continue to increase in the future climate conditions. In the climate of the near future, relative to the reference period, changes indicate an extension of summer season conditions by almost half a month, and in the second half of the 21st century, an extension of almost a month may occur, after which the change will stabilise according to the RCP4.5 scenario, while according to RCP8.5, by the end of the century, summer conditions will be on average nearly two months longer than during 1986-2005 period. By the end of the 21st century, the expected increase in the average annual number of tropical days will be in the range between 20, according to RCP4.5, up to almost 50 days in the RCP8.5 scenario. The analysis of the spatial distribution of the results has shown that tropical days will become a relatively regular event in mountainous areas as well. Heat waves will become more intense and more frequent during future climate periods. Extreme heat waves in the future climate will occur on average at least 2-3 times a year, while during the 1986-2005 reference period these were very rare events. According to the RCP8.5 scenario, by the end of the 21st century, their average occurrence in the territory of Serbia will be as high as 7 occurrences during the year, and in some areas even more than 10. The analysis has shown that in this case, for over two months annually the thermal conditions on the territory of Serbia will be like during the rare occurrences of extreme heat waves in the current climate, but with record high temperatures that have not yet been observed in these regions.

The future changes in mean annual accumulated precipitation, averaged for the territory of Serbia, will not have a pronounced trend in the future periods, as is the case with temperature. However, in the second half of the 21st century, according to the RCP8.5 scenario, the average annual precipitation will start to decrease and in the period at the end of the 21st century, central and especially southern Serbia will experience the largest precipitation decrease, even exceeding 10% with respect to the 1986-2005 reference period. The spatial distribution of change in precipitation shows declining trend towards the south. Precipitation decrease during the June-August period has already been observed and it will continue during future periods according to both scenarios. In the period at the end of the 21st century, according to RCP8.5, the average precipitation decrease in the territory of Serbia will be 20.5%, with a much larger decrease in the southern regions, of as much as 40%. The selected results obtained from the analysis of future precipitation changes are shown in the next figure.

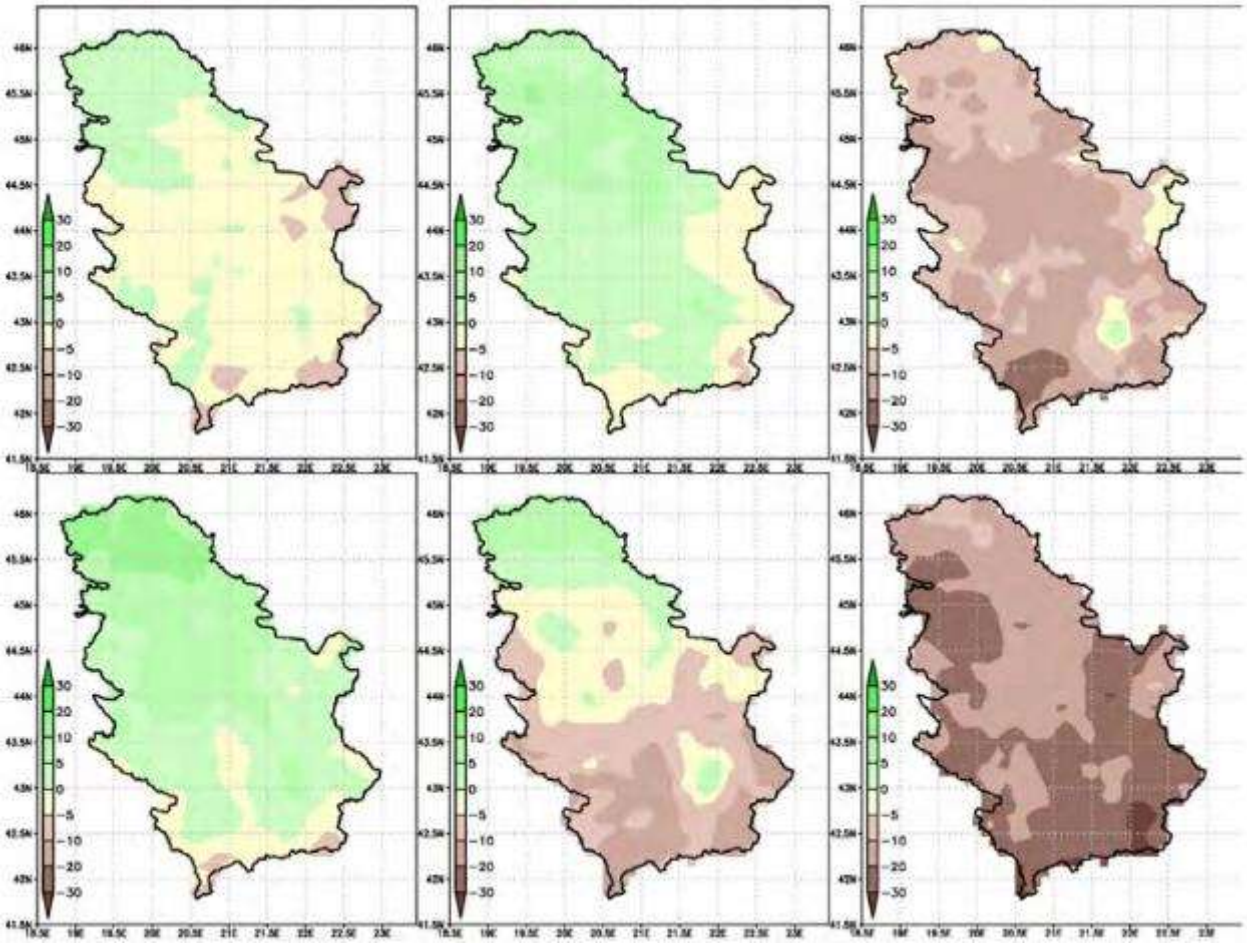


Figure 24. The anomaly of the mean annual precipitation sum (%) for the 2046-2065 period (left panel) and for the 2081-2100 period (central panel) relative to the values for the 1986-2005 reference period; anomaly of mean precipitation sum (%) for the June-August season for the 2081-2100 period compared to the mean seasonal value for the 1986-2005 period (right panel); the results obtained according to the RCP4.5 scenario are shown in the top panels, while the results obtained according to the RCP8.5 are shown in the bottom panels. Source: Climate changes observed in Serbia and future climate projections based on different scenarios of future emissions

The changes in precipitation indices indicate a further intensification of the already observed changes in the precipitation distribution intensity towards more frequent heavy precipitation events and higher precipitation accumulations during intense precipitation events. An interesting result was obtained in the analysis of the change in the percentage share of precipitation falling during heavy precipitation days: the change in the amount of precipitation during extreme precipitation events in future climatological periods will progressively increase as a result of more frequent extreme precipitation events but also more intense precipitation.

By the end of the 21st century, according to RCP4.5, as much as 40% more precipitation, accumulated during year, will occur during the days when precipitation is extremely high compared to the precipitation events of the 1986-2005 reference period. According to RCP8.5, these accumulations will increase by 60%.

5.1.10.3. Site-specific climate projections

Under the "Advancing medium and long-term adaptation planning in the Republic of Serbia (NAP project)", a Digital Climate Atlas of Serbia (web platform) has been established. Digital Climate Atlas of Serbia is based on the data provided by CORDEX the World Climate Research Programme initiative, Copernicus Climate Change Service that provides climate monitoring products for Europe based on surface in-situ observations by the Republic Hydrometeorological Service of Serbia, as well as geospatial information system of the Republic of

Serbia. Digital Climate Atlas considers only two possible climate scenarios- RCP4.5 (with mitigation) and RCP 8.5 (without mitigation). In order to ensure resilience of the new infrastructure (infrastructural projects have a lifespan of 30+ years, usually extending well over half a century) and having in mind results of global climate mitigation efforts, conservative approach is taken and scenario RCP8.5 is used within mid century (2041- 2070) time boundaries, as the most realistic (within available RCP and time horizon options of Serbian Digital Climate Atlas). For some climate indexes, combinations RCP4.5-mid century (as stated in Technical guidance on the climate proofing of infrastructure in the period 2021-2027 (European Commission, 2021)) and RCP8.5-end of the century are going to be shown for the comparison's sake. Reference period 1986-2005 is used instead of 1971-2000 because it, by subjective opinion, better and more uniformly reflects changes of decade-by-decade climate impacts that are experienced in Serbia.

Projections of precipitation from EUROCORDEX show a less clear difference between RCP4.5 and RCP8.5 than are apparent for temperature changes (Extreme weather and climate in Europe- EEA, 2015).

5.1.10.4. Wildfires

The Fire Weather Index (FWI) is a meteorologically based index (European Forest Fire Information System EFFIS classification) used worldwide to estimate fire danger. It consists of different components that account for the effects of fuel moisture and wind on fire behavior and spread. The higher the FWI is, the more favorable the meteorological conditions to trigger a wildfire are. Using an elaborated climate scenario (RCP4.5) and end-of-century time horizon (2080-2100), average danger over fire season (June-September) is obtained from the Copernicus Climate Change Service (C3S). For Belgrade region FWI is 33 for the multi-model worst case and 22.7 for the multi-model mean. Obtained FWI values indicate moderate fire danger along the corridor of the Batajnica- Ostružnica railway. On the other hand, ThinkHazard (https://thinkhazard.org) identifies Belgrade region with high hazard level for wildfires. These statements should be taken with the reservation since around 90% of the railway route crosses agricultural land.

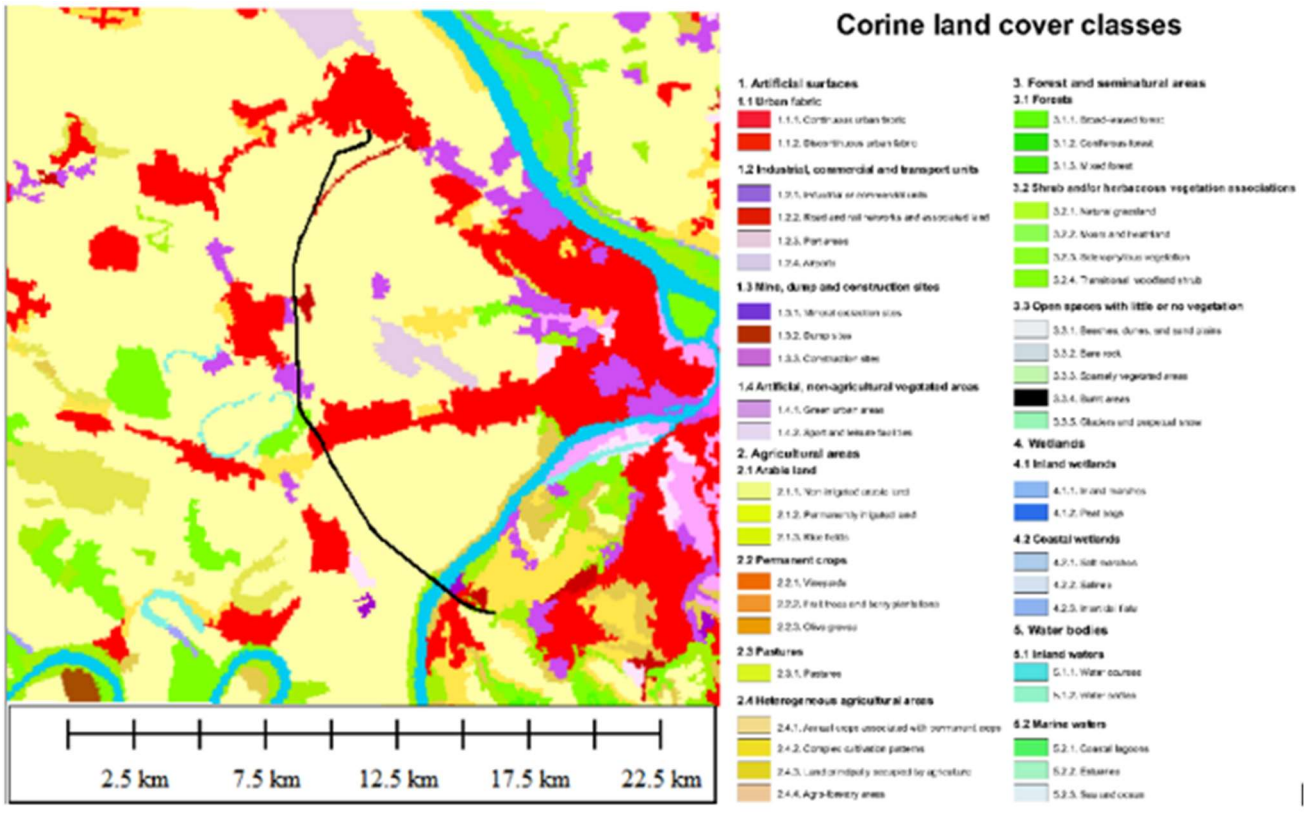


Figure 25. LANDSAT 2018 maps with 100m resolution- railway route marked black

LANDSAT satellite imagery from 2018. with 100m resolution (Figure 25). Identifies land cover in the project area. Ostružnica- Batajnica railway passes through the area dominated by the vegetation of annual crops, with occasional pass-through of urban centers (red shade).

Spatial Plan of the Republic of Serbia 2021-2035 in thematic map number 19 gives overview of natural hazards (Figure 26). Project region is prone to floods. This information are generally in line with the results obtained in previous documents.

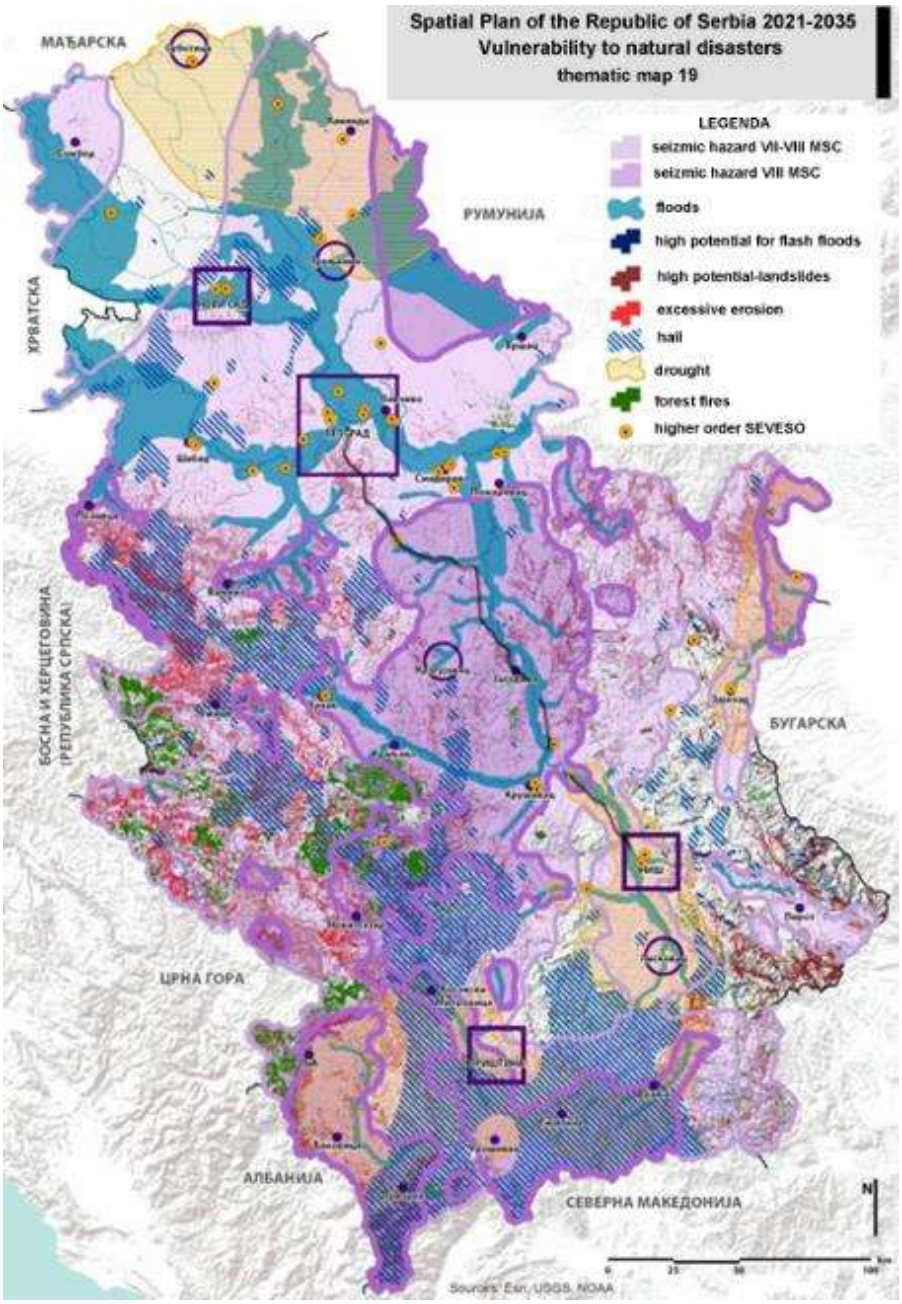


Figure 26. Map of natural hazards in Serbia [46]

[46] Spatial Plan of the Republic of Serbia 2021–2035

5.1.11. Landscape

The railway goes along the Srem plateau for the most part. The terrain is extremely flat and the modernization and reconstruction of the railway itself will not have a special impact on the landscape.

The planned modernization and reconstruction of the railway line will be for the most part within the framework of the railway land, along with the already existing railway line, and therefore there is a reserved space for the development of this form of traffic.

Most of the area is covered by cultivated land: arable land, sown crops and fields as well as areas under uncultivated land. The railway passes through a part of the Srem loess plateau.

Along the railway are the inhabited places of Dobanovci, Surčin, Ostružnica, and between them there is agricultural arable land. the railway crosses two watercourses: the artificial Galovica canal as well as over the Sava River, which is the natural border between the two parts of the railway, as well as two types of terrain: the flat Srem part and the hilly Šumadija part.

5.1.12. Ecological resources and biodiversity

The studied area is characterized by a high degree of urbanization. The railway passes through settlements and agricultural land for the most part. Part of the railway crosses the Sava River, which is part of the ecological network of Serbia.

This report takes into account official regulation of the Republic of Serbia, regarding protected species. Pursuant to the Law on Nature Protection, wild species which are endangered or can become endangered, which have a special significance from the genetic, ecological, ecosystem, scientific, health, economic or other aspect, are protected as strictly protected or protected wild species. There are 1760 strictly protected and 853 protected wild species of plants, animals, and fungi in Serbia (The Rulebook on proclamation and protection of strictly protected and protected wild species of plants, animals and fungi, “The Official Gazette of the Republic of Serbia”, No. 5/2011 and 47/2011). A special form of protection relates to the species that can be endangered due to exaggerated and uncontrolled collection from nature.

Protection of Species is regulated by Rulebook on the proclamation and protection of strictly protected and protected wild species of plants, animals and fungi (“The Official Gazette of the Republic of Serbia”, No. 5/2010, 47/2011-134, 32/2016-59, 98/2016-97). Articles 4 and 6 of this Rulebook define following: Article 4 - The protection of strictly protected wild species is carried out by prohibiting the use, destruction and undertaking of all activities that may endanger wild species and their habitats, as well as by taking measures and activities on population management, prescribed by this Rulebook and special law. This is more closely defined in Article 74 of the Law on nature protection. Article 6 - The protection of protected wild species is carried out by restricting their use, prohibiting the destruction and undertaking of other activities that damage species and their habitats, as well as by taking measures and activities on population management prescribed by this Rulebook and special law. This is more closely defined in Article 76 and 77 of the Law on nature protection.

The use of some species of mammals, birds and fish has been regulated by other acts, such as the Law on Game and Hunting (“The Official Gazette of the Republic of Serbia”, No. 18/2010) and the Law on Protection and Sustainable Use of Fish Stocks (“The Official Gazette of the Republic of Serbia”, No. 36/2009).

In the area of Belgrade, which includes about 200 km of river along the banks of the Sava and Danube rivers, there are 16 islands. The existing rail Ostružnica-Belgrade crosses Sava River, it presents international ecological corridors, and it is located within area of influence (200 m). In accordance with the Decree on the Ecological Network ("Official Gazette of RS", No. 102/2010), the Ecological Network of the Republic of Serbia

involves 101 ecologically significant areas with a total area of 1,849,201.77 ha, which represents 20.93% of the country's territory. The ecological network of Serbia consists of protected areas, areas important for plants (Important Plant Areas, IPA), birds (Important Bird Areas, IBA) and butterflies (Prime Butterfly Areas, PBA), Ramsar sites, Emerald Areas (according to the Council of Europe Convention on the Conservation of European Wildlife and Natural Habitats), as well as certain coastal watercourses that represent ecological corridors of international importance because enable connection to the ecological networks of neighbouring countries.

- In this project phase the data on flora, fauna, habitats and ecological network are presented on the basis of desk research and field investigation. Field investigation was realized on June and July 2022. During the field research, the corridor has been visited during summer season. The field survey encompasses 200 m of the corridor at both sides of the railway corridor axis in order to predict possible effect of the railway construction on habitats, flora and fauna. Flora and habitats were investigated by visual method. Methods for fauna investigation were observation, listening, catching, collection of increments and taking photos.

For habitat selection and determination, the following lists have been used as reference: EUNIS classification, EU Habitat Directive Annex I, Bern Convention Res. No. 4. For fauna and flora species, the following reference lists have been considered: IUCN, Habitats Directive-Annex II, Habitats Directive-Annex IV, Bern convention, Bonn convention and CITES convention, Law on Nature protection of the Republic of Serbia, RULE BOOK on criteria for distinguishing endangered, rare, and sensitive habitat types and for the protection of priority habitat types, as well as protective measures for their conservation and a list of habitat types (prescribed byThe Ministry of Environmental Protection of the Republic of Serbia (Official Gazette of RS ", No. 36/09)). The main aim of the field survey is listing of plants, animals and important habitat types in order to predict possible effect of the reconstruction on biodiversity.

- The habitats along the railway corridor can be divided in two main categories: natural and anthropogenic habitats. The whole observed area is under strong anthropogenic pressures for centuries. The potential natural vegetation is degraded by urbanization and forest cutting to form arable land. Anthropogenic habitats are dominant.

Natural habitats

- Populo-Salicetum albae (forests of willow and poplar)

Reference to EUNIS Habitats: G1.1 - Riparian and gallery woodland, with dominant Alnus, Betula, Populus or Salix

Reference to EU HD Annex I: 92A0 - Salix alba and Populus alba galleries

Reference to CoE BC Res. No. 4 1996: G1. 1 - Salix alba and Populus alba galleries

These forests are situated along Sava River, under the railway bridge near Ostružnica. *Salix alba* (white willow), *Populus alba* (silver poplar) and *Populus nigra* (black poplar) are the most abundant species. *Ulmus effusa* (European white elm) is also recorded in the tree layer. *Frangula alnus* (alder buckthorn), *Rubus caesius* (European dewberry), *Amorpha fruticsa* (desert false indigo) are recorded in the shrub layer. In addition to these species, the following herbaceous species were recorded: *Urtica dioica* (common nettle), *Carex riparia* (Pond sedge), *Stellaria media* (chickweed), *Solanum dulcamara* (bittersweet), *Bidens tripartitus* (three-lobe beggartick) etc. Native floristic diversity is low which is caused by strong anthropopressure. Namely, an elite settlement was built next to this habitat (Figure 1). This caused the development of a large number of invasive plants that influence on loss of autochthonous plant diversity. *Amaranthus retroflexus* L. (redroot pigweed), *Robinia pseudoacacia* (black locust), *Reynouria japonica* (Japanese knotweed), *Ailanthus altissima* (tree of heaven), *Acer negundo* (box elder), *Amorpha fruticosa*(indigo bush), *Ambrosia artemisifolia* (common ragweed), *Paspalum distichum* (knotgrass), *Sorghum halepnse* (Johnson grass) and *Vitis riparia* (winter grape) are invasive plants that form the numerous and stable populations within this habitat.

Figure 27. Elite settlement in forests of willow and poplar under the railway bridge near Ostružnica [47]

According to national RULE BOOK on habitats (Official Gazette of RS ", No. 36/09) these habitats belong to the group of priority habitat types. Forests of willow and poplar are marked as"fragile habitats (A)". These habitats belong to the mentioned type due to functional instability and sensitivity to degradation.

- Carpino betuli-Quercetum roboris (forest of common oak and European hornbeam)

Reference to EUNIS Habitats: G1.2234 - Getic oak-elm-ash forests

Reference to EU HD Annex I: 9160 (91F0) - Riparian mixed forests of *Quercus robur, Ulmuslaevis and Ulmus minor, Fraxinus excelsior or Fraxinus angustifolia,* along the great rivers

Reference to CoE BC Res. No. 4 1996: G1. 22 - Mixed *Quercus - Ulmus - Fraxinus* woodland of great rivers

This habitat is located within IBA Obedska bara which is crossed by current rail (Figure 2). *Quercus robur* (common oak) and *Carpinus betulus* (common hornbeam) are edificatory species, and *Quercus robur* is dominant species in these forests. Additionally, species *Fraxinus angustifolia* (narrow-leaved ash), *Acer campestre* (field maple) and *Ulmus minor* (field elm) are also present in tree layer. *Crataegus monogyna* (common hawthorn), *Crataegus oxycantha* (red hawthorn), *Corylus avellana* (common hazel), *Cornus mas (*Cornelian cherry), *Cornus sanguine* (common dogwood), *Ligustrum vulgare* (Common Privet), *Euonymus europaeus* (European spindle), *Rubus caesius* (European dewberry), *Rosa arvensis* (field rose) etc. are shrub species recorded within the forest of common oak and European hornbeam. *Asarum europaeum* (European wild ginger), *Glechoma hederacea* (ground-ivy), *Ranunculus ficaria* (lesser celandine), *Ranunculus repens* (creeping buttercup), *Carex sylvatica* (European woodland sedge), *Carex remota* (remote sedge), *Geum urbanum* (wood avens), *Circeal utetiana* (broad-leaved enchanter's nightshade), *Vinca minor* (Periwinkle), *Ajuga retans* (bugle), *Rumex sanguineus* (wood dock), *Viola hirta* (hairy violet), *Viola silvestris* (early dog-violet), *Hedera helix* (European ivy) are herbaceous species recorded in this community.

[47] IPF10 team

Figure 28. Forest of common oak and European hornbeam [48]

According to national RULE BOOK on habitats (Official Gazette of RS ", No. 36/09) these habitats belong to the group of priority habitat types. Forests of common oak and European hornbeam are marked as"fragile habitats (B)". This means that the regeneration ofthese habitat types isweak and slow.

- Species-rich hedgerows of native species

Reference to EUNIS Habitats: FA.3 – Species-rich hedgerows of native species

Reference to EU HD Annex I: none

Reference to CoE BC Res. No. 4 1996: none

Along the railway, different shrubs form a hedgerow (Figure 29). The autochthonous plants are dominant in floristic composition of the hedgerow, such as *Prunus spinosa* (blackthorn), *Rosa canina* (dog rose), *Cornus sanguine* (common dogwood), *Acer campestre* (field maple), *Crataegus monogyna* (common hawthorn), *Acer tataricum* (Tatar maple). These species were recorded in autumn aspect. Also, among these native species, some alochthonous species are recorded: *Robinia pseudoaccacia* (black locust), *Acer negundo* (boxelder maple).

[48] IPF 10 team

Figure 29. Hedgerow along the railway in the near of Ostružnica [49]

Anthropogenic habitats

- Intensive unmixedcrops

Reference to EUNIS Habitats: I1.1 Intensive unmixedcrops

Reference to EU HD Annex I: none

Reference to CoE BC Res. No. 4 1996: none

The agricultural habitats are dominant habitat type along the existing railway. The dominant agricultural crop is corn (Figure 30). After corn, the important agricultural crops are wheat, sunflowers (Figure 31), rapeseeds and sugar beets. Since these habitats are intensive used by human, in their surrounding the presence of ruderal and invasive plants was noticed.

Figure 30. Corn field along railway [50]

[49] IPF 10 team
[50] IPF 10 team

Figure 31. Sunflower field along railway[51]

- Residential buildings of villages and urban peripheries

Reference to EUNIS Habitats: J1.2 Residential buildings of villages and urban peripheries

Reference to EU HD Annex I: none

Reference to CoE BC Res. No. 4 1996: none

Figure 32. Surčin [52]

[51] IPF 10 team
[52] IPF 10 team

Figure 33. Jakovo [53]

Along the part of the railway that passes through the settlements Surčin (Figure 32), Jakovo (Figure 33), Batajnica, Ostružnica. At these localities ruderal and invasive plants have high presence degree in the floristic structure, also.

- Rail networks

Reference to EUNIS Habitats: J4.3 – Rail networks

Reference to EU HD Annex I: none

Reference to CoE BC Res. No. 4 1996: none

Figure 34. Railway tracks colonized by nitrophilous plants [54]

[53] IPF 10 team
[54] IPF 10 team

This type of habitat refers to railway tracks which can be colonized by nitrophilous herbaceous ruderal or invasive plant species (Figure 34) such as *Setaria glauca* (green bristlegrass), *Chenopodium album* L. (white goosefoot), *Conium maculatum* L. (hemlock), *Artemisia vulgaris* L. (common mugwort), *Cichorium intybus* (common chicory), *Senecio vulgaris* (groundsel), *Dactilys glomerata* (cock's-foot) etc.

- Flora

Along corridor, numerous native plant species are recorded. Some of them are presented in the text above. Also, considering the artificial habitats are dominant along the corridor, a large number of ruderal plants are recorded along corridor. These species inhabit nitrified habitats. Some of them are: Chenopodium album L. (white goosefoot), Atriplex hastata L. (Hastate Orach), Urtica dioica L. (common nettle), Parietaria officinalis L. (eastern pellitory-of-the-wall), Conium maculatum L. (hemlock), Artemisia vulgaris L. (common mugwort), Arctium lappa L. (greater burdock), Cichorium intybus (common chicory), Daucus carota (Wild carrot), Setaria glauca (green bristlegrass), Sambucus ebulus (danewort), Bidens tripartitus (three-lobe beggartick), Senecio vulgaris (groundsel), Dactilys glomerata (cock's-foot), Setaria glauca (green bristlegrass) etc.

Given the strong anthropogenic impact, the presence of a large number of invasive plant species is recorded, too. Some of them are: Xanthium orientale subsp. italicum (Italian cockleburr), Amaranthus retroflexus L. (redroot pigweed), Bidens frondosa (double tooth), Robiniapseudoacacia (black locust) (Figure 35), Reynouria japonica (Japanese knotweed), Ailanthus altissima (tree of heaven), Acer negundo (box elder), Amorpha fruticosa (indigo bush) (Figure 35), Celtis occidentalis (common hackberry), Fraxinus pennsylvanica (green ash), Galinsga parviflora (quick weed), Oxalis stricta (yellow woodsorrel), Erigeron canadensis (Canadian horseweed), Ambrosia artemisifolia (common ragweed), Paspalum distichum (knotgrass), Sorghum halepnse (Johnson grass), Datura stramonium (thorn apple), Asclepias syriaca (common milkweed) (Figure 36), Phytolacca americana (American pokeweed), Vitis riparia (winter grape), Iva xanthifolia (giant sumpweed) etc. Many of them, form dens and stable populations along whole corridor.

Figure 35. Numerous populations of Robiniapseudoacacia (black locust) and Amorpha fruticosa (indigo bush) along corridor [55]

[55] IPF 10 team

Figure 36. Invasive plants Asclepias syriaca (common milkweed) [56]

- **Fauna**

Fauna of project area is diversified. Special attention in this report was paid to ornithofauna and mammalian fauna, especially because existing rail is crossing fragment of IBA Obedska bara, where species of interest for the protection is evidenced. According to research by ornithologists, around 70 species of birds nest in Belgrade, and the presence of individuals of 140 different species was recorded during different seasons.

Key locality for birds species, despite Sava river, is artificial pond Tvrdenjava(former name was Military lake "Vojno jezero), on the road from Surčin to Jakovo. Around this lake, there are green area which serve for recreation, but also it is evidenced vegetation characteristic for flooded areas, which enable creation of suitable habitats for birds. This area is nominated and accepted in 2019 as IBA site (BirdLife International (2022) Important Bird Areas factsheet: Obedska bara. Downloaded from http://www.birdlife.org on 03/02/2022), which belongs to IBA Obedska bara as fragment. However, this new IBA site is not part of official ecological network in the Republic of Serbia, according to the Decree on ecological network ("Official Gazette of RS", 102/2010).

The area around watercourse is very important for breeding and feeding of birds, especially Anas sp., Oxyura sp., Anser sp., but also different other species of birds are evidenced, such as: Accipiter sp., Falco sp., Strigiformes, Corvuscorax, Cygnus sp. etc.

Although most of the data about mammal species originated from relevant literature, some of them were also confirmed from own field studies conducted throughout the 2022. and previous studies and researches (projects) as well.Thus, for the purposes of some previous researches, the presence of species such as: hedgehog (Erinaceus roumanicus), european mole (Talpa europaea), field vole (Microtus arvalis)- dead specimen, european hare (Lepus europaeus), roe deer (Capreolus capreolus) and golden jackal (Canis aureus) were recorded in the subject area. During field research in 2022, roe deer, red fox (Vulpes vulpes) and jackal were observed, and european mole – dead specimen as well.

- The ecological network along railway corridor

Protected areas, Important Plant Areas (IPA), Prime Butterfly Areas (PBA), Ramsar sites and Emerald Areas are not identified within area of influence.

[56] IPF 10 team

However, Sava River presents international ecological corridors, and it is located within area of influence. Railway crosses Sava River. Part of IBA Obedska bara, consisted of forest and artificial pondTvrdenjava, is not part of ecological network (according to Decree on ecological network ("Official Gazette of RS", 102/2010). IBA Obedska bara in whole is positioned in the alluvial plane of the Sava river (46-95 river km) in southern Srem, Vojvodina Province. It covers area of 48,265 ha. It is largest alluvial area in whole Serbia (around 12000 ha) and it represents an authentic mosaic of forest, meadows, swamp and pond habitats. More than 30 aquatic, forest and meadow plant communities were described. Along the borders of IBA more than 20 settlements are situated and two inside of IBA (Kupinovo and Obrež) which belongs to six municipalities (Surčin, Obrenovac, Vladimirci, Šabac, Ruma and Pećinci).Obedska bara is protected as Special nature reserve, according to Serbian regulation. Despite the fact that the main part of protected area and IBA Obedska bara is not in the vicinity of the rail, there is one small part of IBA Obedska bara around forest and artificial pond Tvrdenjava, which is crossed by current rail. In term of that, any activity regarding reconstruction of the rail will have impact on this IBA site and species.

In Table below are listed bird species of interest for protection, evidenced in IBA Obedska bara:

Table 33. Bird species of interest for protection, evidenced in IBA Obedska bara

Species	Current IUCN Red List Category	National regulation P/SP (protected/strictly protected)		Season
Black Stork *Ciconia nigra*	LC	SP	1-II; 2-II; 3-II; 5-I	breeding
Glossy Ibis *Plegadis falcinellus*	LC	SP	1-II; 2-II; 5-I	breeding
Black-crowned Night-heron *Nycticorax nycticorax*	LC	SP	1-II; 5-I	breeding
Little Egret *Egretta garzetta*	LC	SP	1-II; 3-III; 5-I	breeding
Pygmy Cormorant *Microcarbo pygmaeus*	LC	SP	1-II; 2-II; 5-I	resident
Lesser Spotted Eagle *Clanga pomarina*	LC	SP	1-II; 2-II; 3-II; 5-I	breeding
Black Kite *Milvus migrans*	LC	SP	1-II; 2-II; 3-II; 5-I	breeding
Middle Spotted Woodpecker *Leiopicus medius*	LC	SP	1-II; 5-I	resident
Eurasian Golden Oriole *Oriolus oriolus*	LC	SP	1-II	breeding

Legend:

•1-II – The Law on verification of the Convention on the Conservation of European Wildlife and

Natural Habitats – "Official Gazette of RS – International contracts" No. 102/2007 (Bern Convention - Appendix II – Strictly protected wild fauna species)

• 2-II – The Law on verification of the Convention on the Conservation of Migratory Species of Wild Animals

– "Official Gazette of RS – International contracts" No. 102/2007 (Bonn Convention –Annex II – Migratory species that should be object of the Contract,

• 3-II – The Law on verification of the Convention on International Trade in Endangered Species of Wild

Fauna and Flora – "Official Gazette of RS – International contracts" No. 11/2011 (CITES Convention –

Appendix II – Species which currently may not be threatened by danger of extinction, but can be threatened if the trade with such a specimen is not subjected to strict rules and species that has to be subjected to regulations in order to establish an efficient control of trade in specimens which belong to individual species from this appendix; Appendix III – Species which is identified by any Party as subject to the regulations within its jurisdiction, in order to prevent or limit exploitation, as well as the species for which trade can be regulated onlyin cooperation with the other Parties)

• 5-I – The Directive on Conservation of Wild Birds - Council Directive 79/409/EEC

(Directive on Birds - Addendum I – Species with special measures of conservation;

5.2. Social baseline

Elements of the baseline have been chosen to depict the Project area's sensitivity in terms of potential adverse social impacts and the possibility that the intervention would create, reinforce or deepen inequity and/or social conflict, or that the attitudes and actions of key stakeholders may jeopardize the achievement of the development objective.

The description of social baseline conditions has considered a wide range of data and information gathered from various sources, including desk-based studies and literature reviews and data from stakeholders (in site deeper investigations were not conducted at this stage of the Project, but the social expert visited affected area and took the necessary photos).

The adverse impacts of the project are potentially contained within a moderate range of risks revolving around the following:

- Personal and property rights;
- Social and human rights issues;
- Economic Impacts;
- Health impacts;
- Impacts on the infrastructure;
- Community Health and Safety;
- Labour and working conditions.

Due to the very early stage of the Project, the Consultant tried to present data as much as possible focused on the Project area. If this was not possible, data in the wider region or national level were presented.

5.2.1. Methodology applied for all receptors

The spatial scope of the Social Area of Influence (AoI) includes the following areas:

The Primary AoI: The primary area of influence encompasses a corridor of 8 m in rural areas and 6m in urban, measured from the centre of the outer rail, and 14 m of air rights above land required for the standard gauge (on each side). This corridor is potentially expected to experience land acquisition impacts in addition to other environmental and social impacts. This applies only to land acquisition and resettlement impacts.

The Secondary AoI: Area of potential socioeconomic impacts directly associated with the Project activities encompasses a corridor of 2 km left and right. The impacts to account for heritage features observed encompass a corridor of 6 km left and right as a buffer to account for refinement in the design and impacts beyond the RoW.

Area of Indirect Impacts: Area of potential socioeconomic impacts indirectly induced by the Project activities.

5.2.2. Limitations and assumptions

Gaps in contemporary data have been identified. However, given the Secondary area of Influence and the fact that consistency within the influenced area is known, it is asserted that the information provided herein is adequate for meeting the environmental and social performance requirements of international lenders and will satisfy public disclosure and consultation requirements, focused the impact assessment and informed management measures and mitigation commensurate to this stage of the Project.

Wherever in the baseline gaps are identified, additional work shall be undertaken in the next phase to close out the acknowledged data gaps. However, absence of granular data at this stage has not affected the ability to scope in all issues of high sensitivity with a very conservative approach.

5.2.3. Administrative Structure

Based on the Nomenclature of Statistical Territorial Units ("Official Gazette of the RS, No 109/09 and 46/10), and in accordance with the Law on Territorial Organization ("Official Gazette of the RS, No. 129/07) key and basic units of local-government are 145 municipalities, while there are 29 administrative districts and two autonomous provinces.[57] Serbia consists of administrative districts which are not units of local self-government but are established for the purpose of state administration outside the headquarters of ministries. Administrative districts are established by the RS Government decree, which also included the areas and seats of administrative districts.

Serbia is divided into 29 districts, plus the City of Belgrade. The City of Belgrade is not part of any district but has a special status very similar to that of a district. The project is routed through the City of Belgrade.

The city of Belgrade has the status of a special territorial unit in Serbia with its own local self-government. Belgrade occupies over 3% of the territory of Serbia, 21% of the total number of Serbian citizens live there and it is the economic center of the entire country. The main bearer of economic power is the city itself, while territorially the largest part of its region consists of suburban and agricultural areas. The territory of Belgrade is divided into 17 municipalities, which have their own local authorities, and 157 settlements.[58]

The railway line Ostružnica - Batajnica, which is covered by this Project, runs its entire length through the territory of the city of Belgrade, that is, the city municipalities of Zemun, Surčin and Čukarica. Three (3) railway stations (Batajnica, Surčin and Ostružnica) are located in local settlements on this railway section.

For the purpose of outreach and stakeholder engagement, city municipality offices play a pivotal role in serving as the main focal point of communication. Each of the affected city municipalities have registered local community (settlements) offices, which are often points of contact for the community but also perform some administrative responsibilities.

[57] Law on the Territorial Organization of the Republic of Serbia ("Sl. glasnik RS", no. 129/2007, 18/2016, 47/2018 and 9/2020) https://www.paragraf.rs/propisi/zakon_o_teritorijalnoj_organizaciji_republike_srbije.html

[58] Statistical Office of the Republic of Serbia

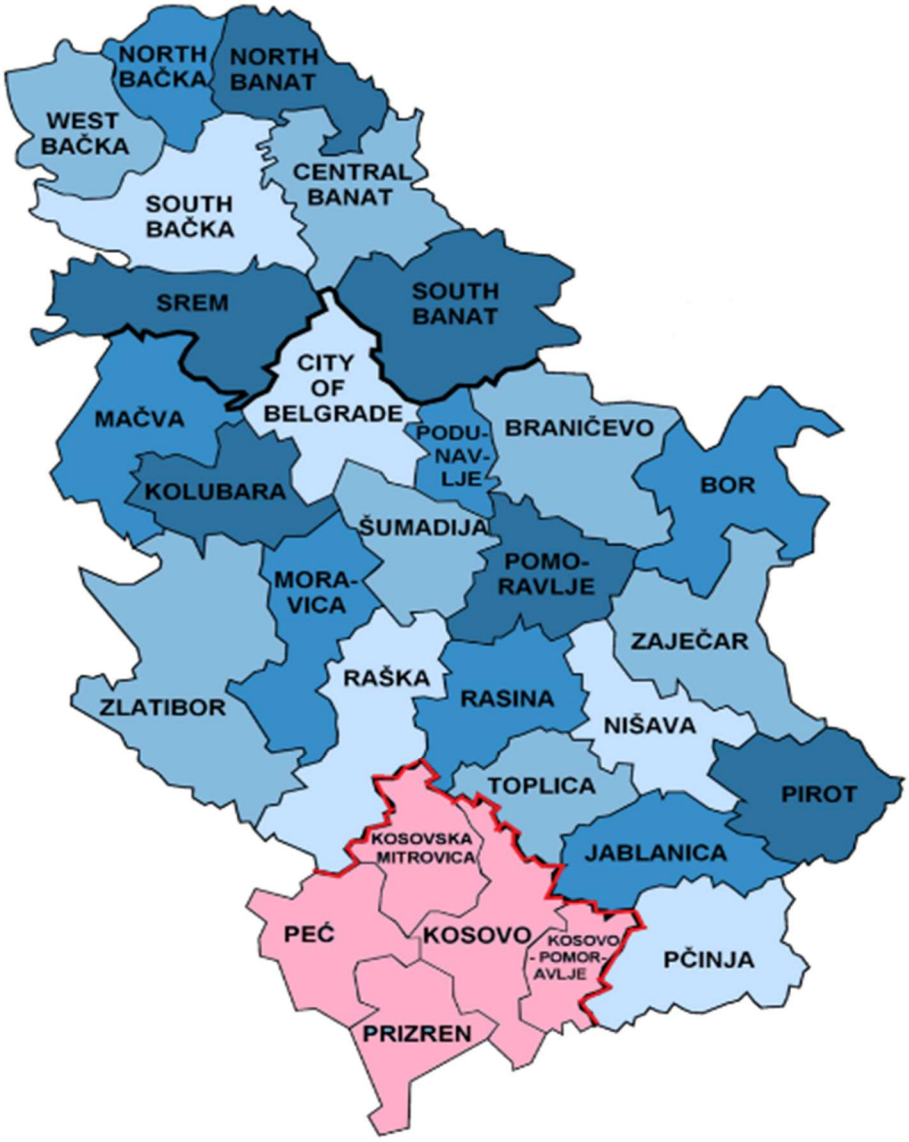


Figure 37. Administrative districts of Serbia

Figure 38. Belgrade Region and City municipalities (affected municipalities marked)

Figure 39. Route of the Batajnica - Ostružnica railway [59]

5.2.4. Demography

Population censuses are the main source of statistical data on the total number, territorial distribution and major characteristics of individuals and households in the Republic of Serbia. Inter-census data rely on statistical estimation methodologies. The first results of the Republic of Serbia 2022 Census contain basic data on the total number of persons enumerated, the number of inhabitants, households and apartments, as of September 30, 2022.

The first results of the 2022 Census are subject to changes during statistical data processing. The final results of the 2022 Census will be published successively, from April 2023 to June 2024.

The first results of the 2022 Census of Population, Households and Dwellings indicate that 6.690.887 inhabitants live in the Republic of Serbia. Data on 2.520.854 households and 3.628.175 dwellings were also collected through the Census.[60]

When compared with the 2011 Census, the total number of inhabitants fell by 495.975, i.e., by 6.9%. A decreased in the number of inhabitants was recorded in all the regions (about 10%), except for the Belgrade region where the number of inhabitants grew by about 1.6%.

[59] IPF10 team

[60] Statistical Office of the Republic of Serbia: First results of the 2022 Census of Population, Households and Dwellings

The population of the Belgrade metropolitan area is 1.685.563, according to the 2022 Census.[61] The number of populations is estimated in the inter-censual period for every year, including the census year. Thus, in 2021 the population of the Republic of Serbia is estimated to 6.834.326 (M-3.327.001; F-3.507.325). The rate of population growth to the previous year (6.899.126: M – 3.360.306, F-3.360.306) is negative and amounts to 64.800 inhabitants.

According to available statistics, in 2021 the rate of natural increase (per 1000 inhabitants) was negative – 11.0‰, that of live births 9.1‰ and of mortality 20.0‰. The average life expectancy of male and female population in the Republic of Serbia in 2021 was 72.72 years (male 69.96 and female 75.74).

When we compare the average life expectancy of Serbian inhabitants in the past 10 years, we may see that life expectancy was at its lowest in 2021. However, if we look only at three municipalities as the special subject of this analysis (see the Table below), we can conclude that in the past ten years there has been an increase in life expectancy, namely in the Municipality of Zemun from the age of 74.40 to 75.07; in the Municipality of Surčin from 74.00 to 75.15, and in the Municipality of Čukarica from 75.50 to 73.45.

Table 34. Life expectancy (2011 vs 2021)

State/City/ Municipality	2011			2021		
	Total	Men	Women	Total	Men	Women
Republic of Serbia	74.20	71.60	76.80	72.72	69.96	75.64
Belgrade	75.30	72.60	77.80	73.79	70.96	76.73
Zemun	74.40	71.60	77.10	75.07	71.87	78.14
Surčin	74.00	70.70	77.30	75.15	72.35	78.24
Čukarica	75.50	73.00	77.80	75.92	73.45	78.29

According to the data in the table below, in the city municipalities of Zemun and Surčin, the population will continue to grow in the future due to positive migration trends. A negative migration balance is expected only in the city municipality of Čukarica.

Table 35. Municipalities crossed by the Project and their demographics.

State/City/ Municipalities	Area (km2) 2022	Estimation of population in 2021	Population density Number of inhabitants/km2	(Internal migration– incoming/outgoing) 2021.
Republic of Serbia	88.499	6.834.326	89	135.194 / 135.194
Belgrade Region	3.234	1.688.667	522	51.206 / 47.293
Zemun	150	177.263	1.182	5.397 / 3.612
Surčin	288	47.218	164	1.160 / 891
Čukarica	157	175.056	1.115	4.178 / 4.387

[61] Statistical Office of the Republic of Serbia: First results of the 2022 Census of Population, Households and Dwellings

The Municipality of Zemun takes up the area of 150 km^2 and, according to the assessed number of the population from 2021, there are 177,263 inhabitants living in its territory, namely 83,840 men and 93,423 women. The average age of the inhabitants is 41.9 (40.1 in men and 43.6 in women). According to the 2011 census, in the territory of the Municipality of Zemun there were 168,170 inhabitants, out of whom 48,600 belonged to the city **settlement of Batajnica.**

This is a city municipality cut by the railroad which, according to the Project, is the subject of reconstruction plus construction of another railroad line. Batajnica is situated in the extreme northwest of Belgrade region. It was merged to Belgrade in 1972 and until that time it had been a village belonging to the adjoining District of Srem. In the past decades it is a typically plain village of Pannonian type, with mainly agricultural population. Batajnica became a mixed-type settlement with a multiple increase in the population.

In the city settlement of Batajnica, according to the 2011 census, there are 12,877 households, with the average household with 3.36 members.

The Municipality of Surčin, which is situated in the west of Belgrade, takes up the area of 288 km², out of which the agricultural land accounts for as many as 2/3 (198.16 km²) of the total area of the municipality. The average household consists of 3.36 members. The Municipality of Surčin is composed of seven settlements (cadastre municipalities) – Bečmen, Boljevci**,** Jakovo, Petrovčić, Progar, Dobanovci and Surčin with 47,218 inhabitants, i.e., 23,596 men and 23,622 women, according to the assessed number of inhabitants from 2021. The average age of the inhabitants in this municipality is 41.4 years (40.6 in men and 42.3 in women). The inhabitants of the settlements of **Dobanovci and Surčin** are potentially most directly affected by the Project.

Since it was formed in 2004, Surčin is the youngest municipality in Belgrade. In the territory of the Municipality of Surčin there is the most important facility of traffic and economic infrastructure in this part of Serbia – International Airport "Nikola Tesla", which is connected with the City of Belgrade by Highway E-70. Therefore, the City Municipality of Surčin has an exceptionally favourable traffic position, which is one of its greatest development potentials.

The Municipality of Čukarica has the area of 157 km² and, according to the assessed number of populations from 2021, in its territory there are 175,056 inhabitants, namely 82,378 men and 92,678 women. The average age of the inhabitants in the Municipality of Čukarica is 43.0 years, where men live on average 3.3 years shorter than women (41.3), and the average life expectancy in women is 44.6 years.

On its western side, the Municipality of Čukarica borders with the City Municipality of Surčin. When we compare the assessed number of populations from 2021 with the 2011 population census, we can conclude that in the territory of this Municipality there has been a decrease in the number of inhabitants of 6.145.

In 2011, there were 181.231 inhabitants in this Municipality, out of whom 4,218 lived in the suburb **settlement of Ostružnica** that is directly affected by the Project. If we divide the household members by gender, we could see that there are 2,112 men and 2,106 women living in Ostružnica. In the suburb settlement of Ostružnica there is a total of 1,428 households, out of which 265 households have only one member, while the average household consists of 2.95 members.

Ostružnica is a relatively isolated settlement due to its poor connection with the urban part of Belgrade. To corroborate this fact, it should be emphasized that the city transport was established as late as the year of 2000.

Settlements that cross the Project route are listed in the following table, including information on the number of inhabitants corresponding to the state determined by the 2002 and 2011 censuses and whether the given settlements currently have railway stations.

Based on the data presented in the table, it can be seen that in the period of nine years there was an increase in the total number of inhabitants in Zemun municipality by 15.339.

Speaking of other two Municipalities – Surčin (and the settlement of Dobanovci) and Čukarica (and the settlement of Ostružnica), it can be seen that there has also been an increase in the population: in the Municipality of Surčin by 5,005 inhabitants (256 in the settlement of Dobanovci), and in the Municipality of Čukarica by 12,723 inhabitants (289 inhabitants in the settlement of Ostružnica).

Table 36. Settlements crossed by the Project route

City/Municipality (Crossed by alignment)	Settlement (Crossed by alignment)	Population (Number)		Station (YES/NO)
		2002	2011	
Zemun	Zemun (Batajnica)[62]	152.831 (*)	168.170 (*)	No
Surčin	Surčin (Dobanovci)	38.814 (8.247)	43.819 (8.503)	Yes
Čukarica	Čukarica (Ostružnica)	168.508 (3.929)	181.231 (4.218)	Yes

5.2.5. Migrations

In 2021, in the Republic of Serbia there were 135.194 persons who changed residence, i.e., moved permanently from one place (settlement) to another [63].

In the period 2017-2021, the regions of Belgrade and Vojvodina realized a positive migration balance. In Belgrade region, there is an average of 6,000 migrating persons on a yearly basis, while there are about i.e., 800 migrating persons living in Vojvodina region. In the period from 2017 to 2021, in the region of Šumadija and West Serbia there is a constantly larger number of outgoing than incoming persons, which means that this region loses on average about 3,800 inhabitants per year only on the basis of the mechanical component (internal migrations). In the period from 2017, the region of South and East Serbia also had a negative value of the migration balance, which is about 3,000 on a yearly basis, thus leading to the reduction in the population of this region.

The average age of the persons who changed their place of residence is 34.7 years (35 in men and 34.5 in women). At the level of the Republic of Serbia, the number of women changing their place of residence is on average higher than that of men, and they mostly belong to the age group 25-34 (35,386: W – 21,564, M – 13.822).

In 2021, in the Republic of Serbia the largest number of persons moved from one municipality/town/city to another within the same region (36.3%), and the smallest number of persons moved from settlement to another within the same municipality/town/city (28.1%). Out of a total of 25 regions in the Republic of Serbia, the largest number of migratory movements occurred in the territory of Belgrade region – 51,206 (37.9%) incoming and 47,293 (35.0%) outgoing persons.

From the data in the Table below, it can be seen that the Municipality of Zemun has a positive trend of internal migrations, the Municipality of Surčin has a slightly positive trend, while the Municipality of Čukarica has a slightly negative trend of internal migrations.

[62] No data are available about the settlement of Batajnica.
[63] Statistical Office of the Republic of Serbia: Internal migration, 2021.

Table 37. Internal migration – 2021 [64]

State/City/Municipality	Incoming			Outgoing		
	Total	Men	Women	Total	Men	Women
Republic of Serbia	135.194	60.356	74.838	135.194	60.356	74.838
Belgrade region	51.206	23.824	27.382	47.293	22.347	24.946
Zemun	5.397	2.500	2.897	3.612	1.703	1.909
Čukarica	4.178	1.975	2.203	4.387	2.055	2.332
Surčin	1.160	525	635	891	411	480

5.2.6. Gender and Age

Unlike the territory of the City of Belgrade, and overall, the city Municipalities of Zemun and Čukarica, with the existing conditions for acquiring a higher level of education and for performing jobs related to the urban way of life, the Municipality of Surčin with the settlement of Dobanovci, as well as the settlement of Ostružnica situated within the Municipality of Čukarica, are suburb settlements with a significant share of agricultural activities in the economy of the inhabitants.

Partly as a consequence of the above-mentioned, in the city Municipality of Surčin and the settlements of Dobanovci and Ostružnica, there is a slightly larger number of male than female inhabitants. On the other hand, the City of Belgrade and the city Municipalities of Zemun and Čukarica have the majority of female population, as shown in the Table below.

Table 38. Distribution of Population per Gender in 2011

City and Municipalities	Sex	Population
City of Belgrade	m	785.826
	w	873.614
Zemun (Batajnica)	m	80.138
	w	88.032
Surčin (Dobanovci)	m	21.872 (4.338)
	w	21.947 (4.165)
Čukarica (Ostružnica)	m	85.903 (2.112)
	w	95.328 (2.106)

Table 39. Population per age cluster and gender in 2021 (estimate)

City and Municipalities	Children 0-6	Children 7-14	Children 15-18	Youth 15 -29	Active Labour contingent 15 – 64
Belgrade region	124.060 W – 59.978 M – 64.082	135.623 W – 66.062 M – 69.561	62.618 W – 30.418 M – 32.200	260.106 W– 129.466 M –130.640	1.090.864 W – 564.850 M – 526.044
Zemun	13.394 W – 6.430 M – 6.964	15.069 W –7.516 M –7.553	6.962 W – 3.356 M – 3.606	27.616 W – 13.580 M – 14.036	115.067 W – 59.140 M – 55.927
Surčin	3.478	4.193	2.052	7.966	31.071

[64] Statistical Office of the Republic of Serbia

[65] No data are available about the settlement of Batajnica.

	W – 1.704 M – 1.774	W – 2.053 M – 2.140	W – 1.017 M – 1.035	W – 3.950 M – 4.016	W – 15.239 M – 15.832
Čukarica	11.496 W – 5.516 M – 5.980	13.662 W – 6.613 M – 7.049	6.542 W – 3.186 M – 3.356	27.311 W – 13.645 M – 13.666	114.350 W – 59.448 M – 54.902

Speaking of the average age groups of population in the three relevant municipalities, there are no significant deviations from the average at the level of entire Serbia, and no differences among these municipalities, which indicates that the age of the inhabitants, generally speaking, will not affect the Project itself.

From the Table below it can be seen that out of three Belgrade municipalities affected by the Project, the Municipality of Surčin has the highest percentage of inhabitants not living in city settlements. In 2011, in Surčin there were 39% rural and suburb population older than the age of 15, while in Zemun there were 6.3%.

Table 40. Urban and other population in 2011 older than 15 years

State/City/ Municipality	Total population	Urban population	Other population
Republic of Serbia	6.161.584	3.652.252	2.509.332
Belgrade region	1.426.720	1.159.454	267.256
Zemun	143.174	134.040	9.133
Čukarica	154.854	130.149	24.705
Surčin	36.800	22.389	14.411

5.2.7. Employment and Economy

According to the data of the Statistical Office of the Republic of Serbia (Q4 2022), the number of the employed in the Republic of Serbia was 2,888,700, while there were 291,100 unemployed persons. The employment rate for this period was 50.1% and the unemployment rate was 9.2%.

Mostly due to the consequences of the COVID-19 pandemic, in Q4 2022, in comparison to Q4 2021, the total population of the age of 15 and over was reduced by 68,500 persons, whereas the non-working population was reduced by 14,200 persons, and the contingent active population was reduced by 54,300. This is the main reason why on the year-to-year basis the number dropped both of the employed (by 28,700) and the unemployed (by 25,600).

The employment rate of the population of the age of 15 and over was 50.1%, namely 57.2% men and 43.5% women.

In the same period, the unemployment rate of the population of the age of 15 and over was 9.2%, namely 9.5% men and 8.8% women.

Looking by the regions, the unemployment rate was at its lowest in Belgrade region (7.7%), followed by Vojvodina region (8.1%) and the region of Šumadija and West Serbia (9.8%). The worst situation in the labour market was recorded in the region of South and East Serbia, which is proved by the unemployment rate that was the highest in this region (11.6%).

In terms of the territory, on a year-to-year basis, employment increased only in Belgrade region (12.600), where the highest employment rate was recorded (54.3%). It is followed by the region of Šumadija and West Serbia (50.2%) and the region of Vojvodina (50.1%). The employment rate was at its lowest in the region of South and East Serbia (44.9%).

As for the city municipalities in whose territory the Project is implemented, the unemployment rate in the Municipality of Surčin is 26 unemployed in 1,000 inhabitants, followed by the Municipality of Čukarica (34 in 1,000 inhabitants) and finally the Municipality of Zemun (36 in 1,000 inhabitants).

Table 41. Unemployment in affected municipalities 2021 [66]

State/City/ Municipalities	Registered unemployed	Registered men unemployed	Registered female unemployed	Unemployment rate in 1,000 inhabitants	Unemployment rate 2022
Republic of Serbia	477.564	209.975	267.589	70	9,2 %
Belgrade region	59.059	22.591	36.468	35	7.7%
Zemun	6.354	2.264	4.090	36	/
Surčin	1.227	512	715	26	/
Čukarica	6.032	2.379	3.653	34	/

According to the data of the Statistical Office of the Republic of Serbia, the average earnings (gross) calculated for January 2023 in Serbia amounted to RSD 114.228 (cc EUR 970), while the average earnings without taxes and contributions (net) accounted to RSD 82.769 (cc EUR 705).

In comparison with the same month of the previous year, the average gross earnings and the average net earnings for January 2023, they are nominally higher by 16,7% and actually by 0,8%. As compared to December 2022, the average gross earnings calculated for January 2023 were nominally lower by 0,9%, and by 2,3%, while the average net earnings were nominally lower by 1.7% and actually by 3,1%.[67]

When we compare the average (net) earnings in the Municipality of Zemun (RSD 96.643) and in the Municipality of Čukarica (RSD 99.249), we can see that they are higher than the Republic average, while the average earnings in the Municipality of Surčin (RSD 74.252) are below the given average in January 2023.

Table 42. Employment and salaries in affected municipalities 2022.

Municipalities	Registered employees 2022 [68]	Registered employees relevant to permanent residence 2022	Average net salary (RSD) 2022	Unemployed 2022 [69]
Republic of Serbia	2.310.035	2.310.035	74.933	427.152
Belgrade region	810.343	677.869	94.808	50.726
Zemun	67.563	68.855	87.698	5.509
Surčin	18.426	16.843	66.688	1.108
Čukarica	46.036	71.315	90.833	4.949

In the Republic of Serbia, according to the data of the National Employment Service for December 2022, there are 427,152 unemployed persons, out of whom 239,448 are women. Out of the total number of the unemployed in the country, 50,726 live in Belgrade region, out of whom 31,651 are women.

[66] Statistical Office of the Republic of Serbia: Municipalities and regions of the Republic of Serbia, 2022.
[67] Statistical Office of the Republic of Serbia
[68] Statistical Office of the Republic of Serbia
[69] National employment service: Unemployment in the Republic of Serbia 2022. https://www.nsz.gov.rs/filemanager/Files/Dokumenta/Statisti%C4%8Dki%20bilteni/2022/Bilten%20NSZ%20-%20%20Decembar%202022.pdf

At the municipality level, in Zemun, out of 5,509 unemployed persons, 3,557 are female. In the Municipality of Surčin, out of 1,108 unemployed persons, 646 are female, while in the Municipality of Čukarica, out of 4,949 unemployed persons, as many as 3,002 are female.

While the centers of city Municipalities of Zemun, Surčin and Čukarica are urbanized and economically developed, the settlements nearby the Project area are more suburban and rural (Batajnica, Dobanovci, Ostružnica), which means that they are economically less developed settlements. The structure of their economy is mainly based on agriculture as a carrier of development.

The revitalization of economic activities, especially in the industrial sector, remains slow due to unfinished restructuring and transition processes, a lack of investment, etc. The existing industrial structure is still insufficiently competitive. The SME sector will be one of the bases for economic development and job creation.

5.2.8. Entrepreneurship

The difference in intensity of economic activities measured by the indicators of the number of active entrepreneurs and the number of deleted or closed entrepreneurs is evident in the city municipalities along the route of the railway corridor. The City Municipalities of Zemun and Čukarica have around 4 (four) times more enterprises compared to Surčin.

However, when we compare the data from 2021 and 2022, we can conclude that all three municipalities recorded an increase in the number of active entrepreneurs, which speaks about the encouraging business environment and economic trends.

The data in the table are more indicative, since the dynamics of opening and closing of entrepreneurial activities is high.

Table 43. Active business of entrepreneurs

City/municipality	Enterprises 2022	Active entrepreneurs 2021	Deleted/closed entrepreneurs 2021[70]	Newly founded entrepreneurs
Republic of Serbia	39.7058	286.312	22.932	34.161
Belgrade Region	94.796	81.715	5.225	8.395
Zemun	9.009	8.355	484	834
Surčin	2.270	1.713	65	245
Čukarica	8.800	8.279	502	759

5.2.9. Agriculture

Agriculture plays an important role in the economy of Serbia. It is the fourth largest sector of the national economy, accounting for 17.4% of employment and 5.4% of total exports.

On the other hand, very small and fragmented land holdings, an ageing and declining farm labour force, limited associability, low efficiency and productivity, low use of technology, high labour intensity, outdated production management practices, low financial liquidity and capital availability for investment (especially for smallholders) characterize agriculture in Serbia, especially in the South and Southeast. Cereals, vegetable oils and edible fruit have historically driven growth in agricultural production and exports, with Vojvodina's (the Norther Region) larger producers benefiting the most. Only one percent of the farms in Serbia have 50 hectares or more of land and most of them are in Vojvodina, while farmers who own less than 5 hectares of land account for 78 % of all holdings and 25% of the total cultivated area in Serbia and are concentrated mostly

[70] DevInfo, Serbia.

in the Southern and Eastern Serbia. Agricultural sector growth, however, is influenced by regional disparities in sector performance and composition of crops.

In Serbia, women are the holders of 19.4% of farm holdings, and they are the managers (main decisionmakers) in only 15.3% of farms. The share of women among managers decreases as the size of the farm increases. Women represent 19.2% of the managers of the smallest farms (up to 2 ha), while in the category of the largest farms (over 100 ha), they represent only 5.8 %. Out of a total of 1.337 million people undertaking permanent or occasional activity in agriculture, 561.020 (42%) are women. The share of women in the number of persons carrying out agricultural activity is lower than the share of men (42% and 58%, respectively), and it is even lower in terms of the total number of annual working units (AWU or hours of effective work) – 38% of total AWU is carried out by women.

Municipal records are available only from 2012 when a total of 631.552 agricultural farms were registered in Serbia. This is one quarter of the total number of households in Serbia. The total number of agriculturally active population by municipalities through which the railway passes is given in the following table.

Table 44. Agriculturally Active Population in the Study Area

City/municipality	Population Total 2021	Number of agriculturally active population 2018	Number of agricultural holdings 2018	Used agricultural land 2018
Republic of Serbia	6.834.326	Total: 1.336.940 M-774.919; W-562.020	564.541	3.475.894
Belgrade region	1.688.667	Total: 71.656 M - 42.614; W - 29.041	30.033	145.533
Zemun	177.263	Total: 2.149 M - 1.215; W - 936	768	5.089
Surčin	47.218	Total: 3.119 M - 2.049; W -1.070	1.318	12.946
Čukarica	17.5056	Total: 2.084 M – 1273; W - 812	1.003	3.837

The total number of agriculturally active population in the wider corridor of the railway is 7.352 i.e., 4.7% of the economically active population. The highest agriculturally active population in the Project area is in the municipality of Surčin and Zemun, while in the municipality of Čukarica is the smallest.

Table 45. Total population in agricultural holdings in Serbia in 2018, with ownership rights by gender

City/municipality	Total population of holdings	Men	Women	Farm holders M/W
Republic of Serbia	1.336.940	774.919	562.020	450.974/108.322
Belgrade region	71.656	42.614	29.041	25.280/4.651
Zemun	2.149	1.215	936	657/105
Surčin	3.119	2.049	1.070	1.098/212
Čukarica	2.084	1.273	812	825/172

Data on family farm holders most impressively reflect the subordinate position of women in agricultural areas in Serbia. Out of a total of 564.541 family farms with a registered holder (1.336.940 persons), only 108.322 of the households are registered to women.

Looking at the level of the municipalities affected by the Project, the most unfavourable situation is in the Municipality of Surčin, where out of 1,310 farm holders, as many as 1,098 are male, while only 212 are female. In the Municipality of Čukarica, the situation is slightly better - out of 996 farm holders, 825 are male, and 172 female. In the territory of the Municipality of Zemun, out of 761 farm holders, 657 are male and 105 female.

However, the presented data confirm the absolute property deprivation of women in agricultural areas. Even where women are farm holders, in most cases, it is the result of the fact that they are widows whose sons have moved away and are not living on the farm or single mothers who are farmers.

5.2.10. Poverty including household consumption and social protection

In recent years, Serbia enjoyed solid growth (mainly driven by services and, to a lesser extent, industry and agriculture) and low inflation before 2022. Growth led to improved employment rates and increased earnings, particularly wage growth in the private sector. All the above resulted in notable progress in poverty reduction and shared prosperity. The government's massive fiscal package of about 13% of GDP in 2020, including wage subsidies for all sectors and an universal cash transfer, helped to cushion the immediate impacts of the COVID-19 pandemic on the population and the economy. In 2021, Serbia's economic growth of 7.5% and improved labour market conditions contributed to poverty reduction.

However, in the Republic of Serbia, poverty remains significant and relatively high (the share of persons at risk of poverty is 21.2% in 2021). The rate of poverty risk according to the most common status on the labour market (lasting longer than six months) indicates that the unemployed are in the worst position. Employment significantly reduces the risk of poverty, but the quality of employment remains a key factor in ending poverty. Education is a determining factor in a person's economic status and ability to generate income, so it is not surprising that people with less education are at higher risk of poverty.

In 2021, the poverty risk rate was 21.2% and, in comparison to 2020, it was lower by 0.5 percentage points. The rate of the poverty risk or social exclusion was 28.5% and, as compared to 2020, it was lower by 1.3 percentage points. The poverty risk rate is the percentage of people whose available equivalent earnings are lower than the poverty risk threshold, with these earnings amounting on average to RSD 24,064 (cc EUR 205) per month for one-member households in 2021. This rate does not show how many persons are actually poor, but how many of them have lower earnings that the poverty risk threshold.

The poverty risk threshold for households with two adults and one child younger than 14 was RSD 43,315 (cc EUR 370), while for four-member households with two adults and two children younger than 14 it was RSD 50,533 (cc EUR 430).

From the age perspective, persons between 18 and 24 years old were most exposed to the poverty risk – 27.7%, as well as those in the age group 65 plus – 22.7%. The lowest the poverty risk rate was recorded among perrons between 25 and 54 years old – 19.1%.

The poverty risk rate by the most frequent activity showed that for persons 18 years old or over there were 48.6% unemployed persons exposed to the poverty risk. Self-employed persons had a higher poverty risk rate than those working for an employer, i.e., 14.5% as compared to 5.4%. For pensioners, this rate was 19.9%.[71]

Table 46. Poverty assessment through poverty mapping 2013 [72]

State/City/ Municipalities	Risk of poverty rate (%)	Risk of poverty Municipality ranking (1- 147)	Gini coefficient (interval from 0 to 100)	Relative poverty risk gap[73] (%)
Republic of Serbia	25.7[74]	/	36.8	8.8
Belgrade region	10.5	/	33.2	3.2
Zemun	11	9	32	3.2

[71] Statistical Office of the Republic of Serbia, Poverty and Social Inequality, 2021.
[72] The World Bank and the Statistical Office of the Republic of Serbia – Map of poverty in Serbia
[73] The relative poverty risk gap shows the deficit of asets of all those under the poverty risk threshold in comparison to sam the poverty risk threshold itself and points to the gravity of the status of those belonging to this group of citizens.
[74] DevInfo, Serbia.

Surčin	15.9	17	31.8	4.8
Čukarica	8.3	6	31.8	2.4

In 2021, the average monthly earnings – monetary and in kind – per household in the Republic of Serbia were RSD 71,733 (cc EUR 613.1, while the expenditures for the personal spendings of households were RSD 71,902 (cc EUR 614.5). In comparison to 2019, the average monthly earnings – monetary and in kind – are by 7.3% higher, while the expenditures for the personal spendings of households are nominally higher by 7.2%.

The average monthly earnings – monetary and in kind – per household in city areas were RSD 73,931 (nominally higher by 7.0% in comparison to 2019), while in the households in other regions they were RSD 68,157 (nominally higher by 7.8% in comparison to 2019).

The expenditures for the personal spendings of households in city regions were RSD 74,238 (nominally higher by 7.0% in comparison to 2019), while in the households in other regions they were RSD 68,100 (nominally higher by 7.4% in comparison to 2019).

Predictions at the municipality level suggest that, within regions, there are municipalities with significantly different incidences of poverty. For instance, the regional poverty estimate for Belgrade is 10.5%, but this can obscure the fact that within the Belgrade region, relative poverty rates vary between 4.8% and nearly 27%.[75]

In the municipalities affected by the Project, it is pronounced that there is a higher degree of the poverty risk in Surčin (15.9%) in comparison to Zemun (11%) and Čukarica (8.3%).

This matter should be particularly considered during a deeper analysis of individual cases of persons affected by the Project in SEP stage.

[75] Poverty map of Serbia, https://socijalnoukljucivanje.gov.rs/wp-content/uploads/2016/11/Poverty-Map-of-Serbia-final.pdf

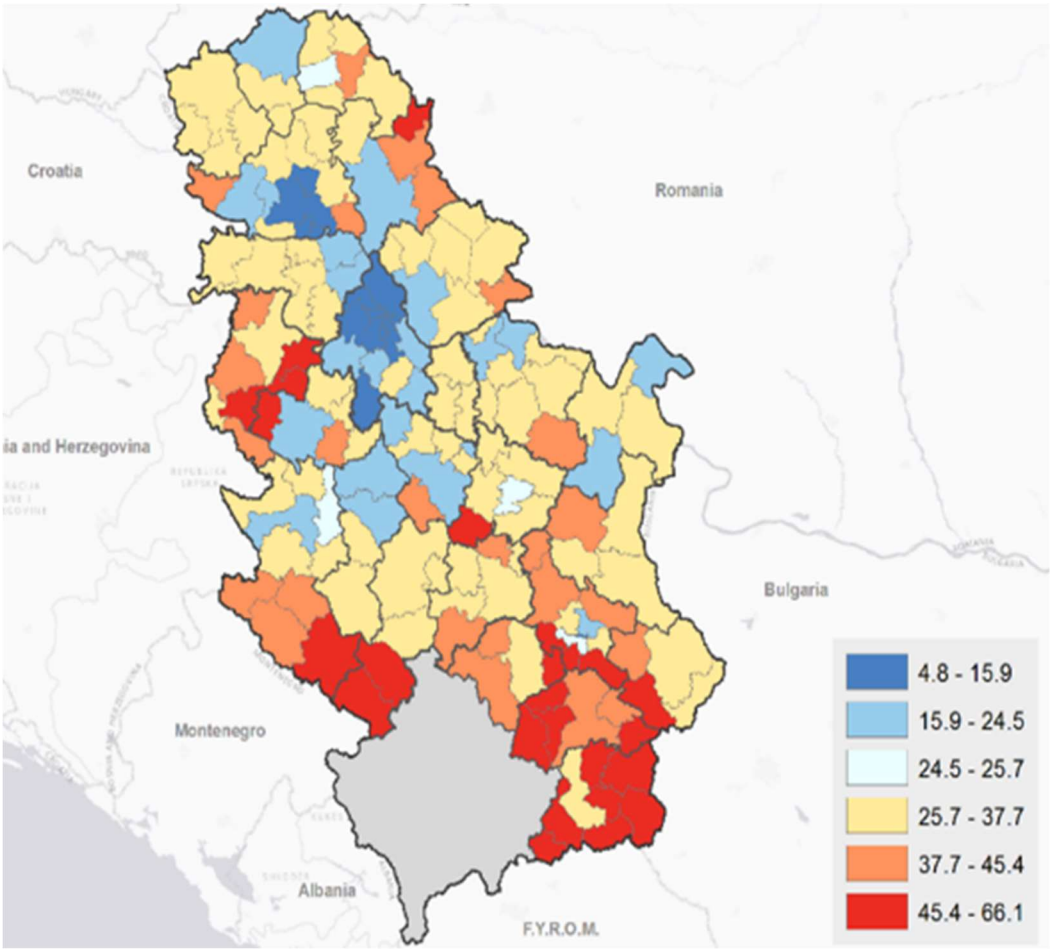


Figure 40. Poverty Map of Serbia, 2011: at risk of poverty rates (percent) [76]

The share of social protection beneficiaries in the total population of the municipality is relatively high and ranges from 5.2% in the municipality of Zemun to 9.9% in the municipality of Surčin. There are differences between municipalities in the indicator of child allowance.

While the percentage of the children using children's allowance is the lowest in the Municipality of Čukarica: 5.3%, in the Municipality of Surčin it is the highest, with 7.8% users. The percentage of beneficiaries of the increased allowance for the care and assistance of another person is almost uniform among the municipalities.

The following table provides data on beneficiaries of social protection, financial assistance, child allowance and allowance for care and assistance of the sick person.

Table 47. Social protection in 2021.

State/City/ Municipalities	Share of social protection beneficiaries relevant to the total population (%)	Share of social monetary support beneficiaries relevant to the total population (%)	Share of child support beneficiaries relevant to total children contingent (age 0-17) (%)	Share of beneficiaries of the increased allowance for care and assistance of another person in the total population (%)
Republic of Serbia	10	2.8	13.9	0.5

[76] World Bank and SORS staff estimates using the 2011 Population Census and 2013 SILC data. Risk of poverty is defined using the EU standard of 60 percent of median per adult equivalent income.

Belgrade Region	6.9	0.9	5.2	0.4
Zemun	5.2	0.8	6	0.5
Surčin	9.9	1.9	7.8	0.4
Čukarica	9.8	1.3	5.3	0.4

5.2.11. Public Services

To assess and present the baseline for Public Services two most prominent indicators have been selected, i.e., access to education and health.

Table 48. Accessibility of Education services in 2020/21

State/ City/ Municipalities	Number of facilities for pre-school children	Number of users of pre-school facilities	Number of primary schools	Number of school children with completed primary school	Number of secondary schools	Number of students with completed grammar or secondary school	Enrolled students/students who graduated (colleges, academies, faculties) .
Republic of Serbia	2.825	216.570	3.242	64.270	518	16.182/35.608	242.550/41.395
Belgrade Region	714	71.466	290	15.039	115	4.919/8.436	140.117/22.973
Zemun	84	7.476	19	1.560	10	413/1.171	8.268/1.204
Surčin	17	1.504	8	395	/	/	/
Čukarica	45	7.000	18	1.717	8	329/241	3.475/471

Table 49. Access to healthcare services in 2021

State/City/ Municipalities	Total number of doctors	Number of inhabitants per one doctor
Republic of Serbia	20.186	339
Belgrade Region	5.944	284
Zemun	567	313
Surčin	/	/
Čukarica	177	989

The Ministry of Trade, Tourism and Telecommunications of the Republic of Serbia conducted research in 2018 and by interpreting the data, it concluded that as many as 73% citizens used the Internet. Still, it is important to emphasize that only 49% inhabitants are actually digitally literate.

During 2018, 72.1% households in Serbia had a computer, according to the research by the Statistical Office of the Republic of Serbia.

The greatest difference in the possession of computers is observed by the monthly earnings criterion. Almost 90% inhabitants who have computers earn more than EUR 600 per month.

Table 50. Population 15 years old or more by computer literacy

[77] No data available

State/City/ Municipality	Computer-literate persons		Persons who are partly familiar with computer work		Computer-illiterate persons	
	Total: 2.108.144		Total: 910.586		Total: 3.142.854	
Republic of Serbia	M:1.062.125	W:1.046.019	M:463.780	W:446.806	M:1.445.963	W:1.696.891
Belgrade Region	M: 294.865	W:315.594	M:95.980	W:102.631	M: 237.143	W: 305.353
Zemun	M:32.247	W:33.945	M:10.734	W:10.842	M: 24.221	W:31.184
Surčin	M: 6.451	W: 6.297	M: 3.233	W: 2.796	M: 8.613	W: 9.410
Čukarica	M:38.205	W:40.305	M:10.700	W:11.834	M: 23.447	W:30.363

Differences in educational attainments are much more prominent when the adult populations of urban and rural areas are compared. Data from the population census indicate a less favourable education structure of the population in rural areas with a higher share of persons without any school, particularly among women (these are mainly older women).

On the other hand, the share of persons with higher and university education is much lower among the rural than among the urban population.

Table 51. Inhabitants 15 years old or older by computer literacy (urban and other settlements)

State/City/ Municipalities	Computer-literate persons		Persons who are partly familiar with computer work		Computer-illiterate persons	
	Urban settlements	Other settlements	Urban settlements	Other settlements	Urban settlements	Other settlements
Republic of Serbia	1.610.356	497.788	55.1913	358.673	1.489.983	1.652.871
Belgrade Region	610.459	75.144	15.6091	42.520	392.904	149592
Zemun	63.252	2.940	19..988	1588	50.800	4.605
Surčin	8.357	4.391	3.753	2.456	10.459	7.564
Čukarica	69.081	9.429	18.527	4.007	42.541	11.269

5.2.12. Cultural heritage

Republic of Serbia is known for its ample cultural heritage and archaeological sites.

The Central Catalogue of the immovable cultural properties of the Republic of Serbia includes (according to the types): monuments of culture, archaeological sites, landmarks, and spatial cultural-historical units.

This form of the Central Catalogue has been established after the Law on the protection of cultural heritage was enforced in 1977. According to that law, the immovable cultural properties were divided into four types. They were divided according to the importance to the cultural properties of the great importance and the cultural properties of the exceptional importance.

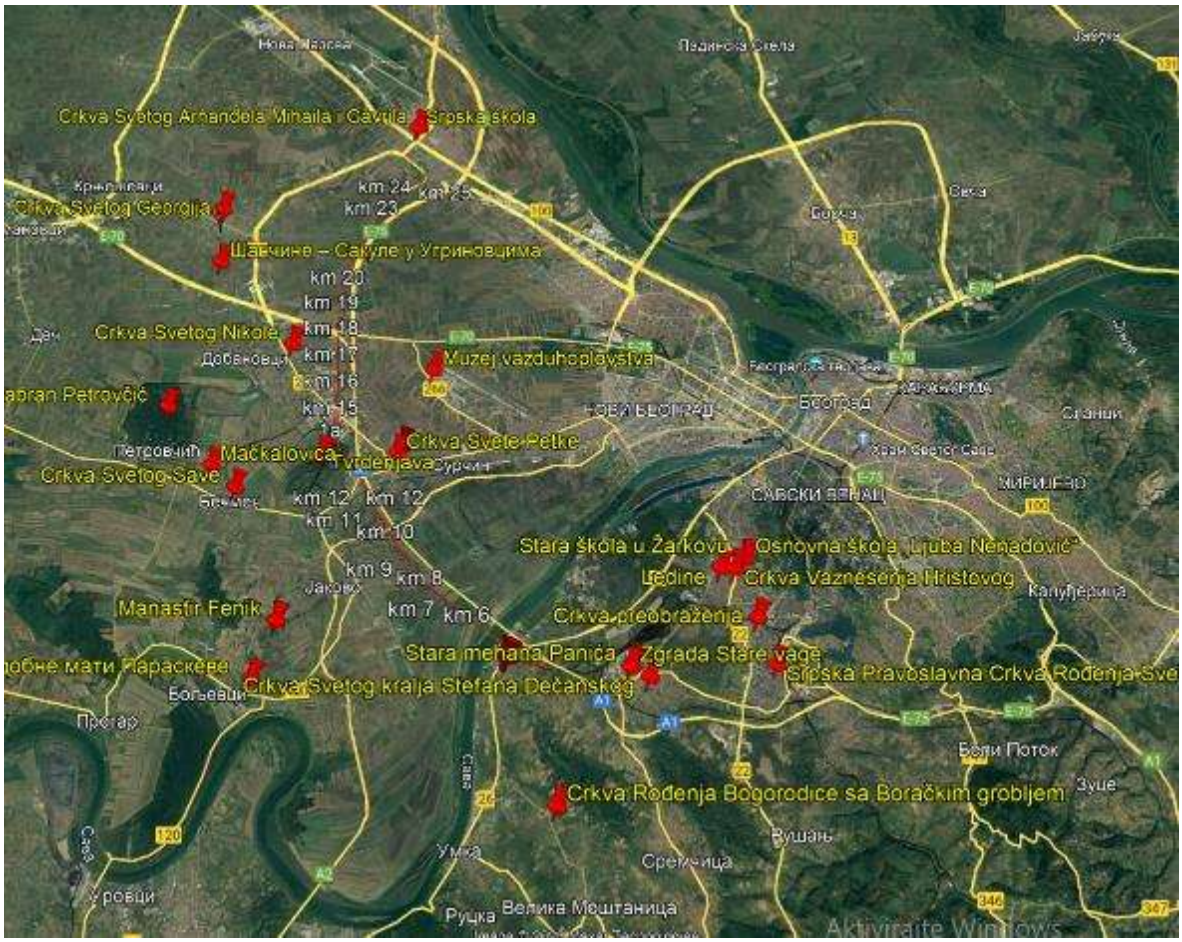
The Republic Institute for the Protection of Cultural Monuments of Serbia - Belgrade takes care of the unique application of criteria when proposing to declare the immovable cultural properties, as well when determining the immovable cultural properties of great importance and cultural properties of exceptional importance.[78]

In the Central Catalogue there are currently 2.624 registered immovable cultural properties, out of which 2.256 monuments of culture, 93 spatial cultural-historical units, 196 archaeological sites and 79 landmarks. There are 782 classified immovable cultural properties, out of which 200 are of exceptional importance, and 582 of great importance.

Among immovable cultural properties of exceptional importance there are 155 monuments of culture, 11 spatial cultural-historical units, 18 archaeological sites and 16 landmarks. Among cultural properties of great importance, there are 512 monuments of culture, 28 spatial cultural-historical units, 25 archaeological sites and 17 landmarks.

Based on data from the Information System of Immovable Cultural Property, the Republic Institute for the Protection of Cultural Monuments - Belgrade there has been carried out an identification of cultural property and archaeological sites located in the **secondary area of influence and beyond.** The most important ones and at a relatively close distance to the railway are mentioned below per municipality.

By inspecting the central register of cultural goods on the border of the spatial plan, in the area of the local self-government units: Zemun, Surčin and Čukarica there are following immovable cultural goods of exceptional importance for the Republic of Serbia, which are under the jurisdiction of the Republic Institute for the Protection of Cultural Monuments:



[78] Institute for the Protection of Cultural Monuments of Serbia, Belgrade

Figure 41. Map of Immovable Cultural Heritage at Section Ostružnica – Batajnica [79]

Table 52. Archaeological sites within the Secondary area of Influence and beyond

Municipalities	Archaeological site	Distance from axis
Surčin	Zabran Petrovčić in Dobanovc	5.948 m
Čukarica	Ledine in Žarkovo	6.328 m

The following table presents a list of registered Cultural Heritage Sites/Immovable properties in vicinity of the railway line.

Table 53. Cultural goods of great importance (Monuments of culture)

Municipalities	Cultural Heritage Sites	Distance from axis
Surčin	Fenek Monastery	5.041 m

List of registered Cultural Heritage Sites /Immovable Properties:

Table 54. Cultural goods (Monuments of culture)

Municipalities	Cultural Heritage Sites	Distance from axis
Čukarica	Saint Nicholas Church in Ostružnica	650 m
Čukarica	Janić's shops	713 m
Čukarica	Janić's inn	707 m
Zemun	Saint George Church in Ugrinovci	5.152 m
Surčin	Saint Petka Church	1.171 m
Zemun	Saint Archangels Michael and Gabriel Church in Batajnica	1.395 m
Surčin	Saint Nicholas Church in Dobanovci	1.676 m
Surčin	Aviation Museum	3.136 m
Surčin	Saint Sava Church in Bečmen	3.971 m
Čukarica	Church of the Nativity of the Virgin with the Soldiers' cemetery in Velika Moštanica	4.563 m
Surčin	Saint Paraskeva Church in Boljevci	6.439 m
Čukarica	Old school building in Žarkovo	6.745 m
Čukarica	Primary school „Ljuba Nenadović"	6.916 m
Surčin	Saint John the Forerunner Church in Petrovčić	8.000 m

Table 55. Goods which have already been protected

Municipalities	Category	Type/Name	Distance from axis
Surčin	Archaeological site	Tvrdenjava in Dobanovci	1.013 m
Zemun	Example of city architecture	Serbian school in Batajnica	1.407 m
Surčin	Example of folk construction, village cemeteries and individual tombstones	Porch (kotobanja) of the Kovačević family	1.513m
Čukarica	Example of folk construction, village cemeteries and individual tombstones	Building Stare vage in Železnik	2.316 m
Čukarica	Example of folk construction, village cemeteries and individual tombstones	Old Panić's inn	2.316 m

[79] IPF10 team

Čukarica	Example of sacral architecture	Holy King Stefan Dečanski Church	2.919 m
Surčin	Archaeological site	Mačkalovica in Bečmen	4.322 m
Surčin	Compounds	Protected surroundings of the cultural good of great importance – Fenek Monastery	5.041m
Zemun	Archaeological site	Šančine, Sakule in Ugrinovci	5.440 m
Čukarica	Example of sacral architecture	Church of the Ascension of Christ	6.352m
Čukarica	Example of sacral architecture	Church of the Transfiguration	6.453 m

Based on current data, no negative impacts on the immovable cultural heritage are expected.

The deeper impact to Cultural Heritage will be subject to assessment during the next stage of the Project.

5.2.13. Gender and gender equality

The estimated number of population in the Republic of Serbia in 2021 was 6.834.326 [80]. Observed by sex, 51.3% were women (3.507.325) and 48.7% were men (3.327.001) [81].

The Republic of Serbia is a signatory of several important and binding international documents, which guarantee the equality of women and men and prohibit gender-based discrimination.

Among these documents, the most important are:

- the United Nations - Universal Declaration of Human Rights and the Convention on the Elimination of All Forms of Discrimination against Women (CEDAW)
- the Council of Europe - European Conventions for the Protection of Human Rights and Fundamental Freedoms, the European Social Charter and the Council of Europe Convention on preventing and combating violence against women and domestic violence
- the European Union (EU Charter of Fundamental Rights) [82].

According to the Constitution of the Serbia any discrimination, direct or indirect, on any basis, especially on the basis of gender, is prohibited. The Labour Law treat rights of men and women equally, including right of equal pay. Additionally, a working woman has the right of absence from work due to pregnancy and childbirth, maternity leave, and absence from work for childcare, for a total of 365 days. This length of maternity leave is usually used in full, making it one of the lengthiest in the world.

The right of employment is also proclaimed equal, but because of maternity leave provisions young women in certain cases will be discriminated in employment possibility, although it is illegal to ask questions about maternity plans during job interviews. This particularly applies to employment in small and medium private enterprises.

Despite mentioned principles and law solutions many women in Serbia face challenges combining paid work and childcare responsibilities. This could be an additional cause for Serbia's low fertility rate, which is one of the lowest in European countries. The employment rate of women in Serbia (38.3%) is significantly lower than the EU-27 average (58.5%). Of all the employed in the transport sector in Serbia, 20 percent are female.

[80] According to the final results of the 2022 Census, there are a total of 6,647,003 inhabitants in Serbia, 3,231,978 men and 3,415,025 women: Statistical Office of the Republic of Serbia.
[81] Statistical Office of the Republic of Serbia
[82] Statistical Office of the Republic of Serbia

According to the data from the research of the time use, which was conducted from April 2021 to April 2022, it can be concluded that women on average, on a daily basis, spend slightly more than four hours (4:09) doing unpaid jobs, while men spend two hours (2:03) doing unpaid jobs, or twice less than women.

The data also show that an inhabitant of the Republic of Serbia spends three hours on average doing paid jobs (3:08). However, women spend slightly less than two and a half hours (2:23) on average doing paid jobs in comparison to men, who spend an hour and a half more than women (3:57), or almost four hours in total, doing paid jobs. The Table below show the average time spent in certain activities by men and women in Serbia respectively.

Table 56. Average time spent in the activities by type of the day and gender, the Republic of Serbia, 2021/2022 (in hours and minutes) [83]

The Republic of Serbia	Weekdays			Weekend			All days		
	W	M	Total	W	M	Total	W	M	Total
Paid job	02:57	04:43	03:48	00:58	02:00	01:28	02:23	03:57	03:08
Unpaid job	04:02	01:56	03:01	04:26	02:22	03:26	04:09	02:03	03:08
Learning	00:31	00:31	00:31	00:13	00:10	00:12	00:26	00:25	00:25
Personal needs	11:20	11:06	11:13	12:08	12:03	12:06	11:34	11:22	11:28
Spare time	05:08	05:43	05:25	06:15	07:23	06:48	05:27	06:11	05:49
Other activities	00:01	00:01	00:01	00:01	00:01	00:01	00:01	00:01	00:01

The most prominent inequalities are in the domains of money, time and power, indicating lower economic standard of women, carrying out disproportionately unpaid household work and care for family, and insufficient participation in decision making in positions of political, economic and social power.

According to various research findings, the pandemic caused by the COVID-19 virus has shown how gender inequalities are deeply rooted in social structures. The circumstances led to a great burden of the pandemic being borne by women, that during the state of emergency and partial lockdown, a large number of women whose position in the labour market was generally uncertain and vulnerable, lost their jobs and earnings, for example female agricultural workers who were unable to sell their products, women in catering business, the personal service sector etc. The research also shows that women had to bear additional burdens both in the family and in the household, in their care for children (particularly when kindergartens and schools were closed), in their support to digital forms of participation in the educational process and learning. Women also had to take the larger burden in the care for older members of their households or persons who need help, which in the significant period, due to the risk of infection, could not be organized outside households [84].

The data of the censuses of 2002 and 2011 indicate small changes in the household structure according to the number of members and sex of the head of household. As regards people living in one-person households, the proportion of women is considerably higher, while men are prevalent as heads of households in all multi-person households. As regards people living in one-person households, the proportion of women is higher and most expressive for those aged 65+. According to the 2011 Census data, women make up three quarters among people aged 65 and over and living in one-person households. Among “single” persons aged 30 to 49, the proportion of men equals 63%.

The labour market participation is much lower for women than for men, as indicated by activity, employment, unemployment, and inactivity rates. There is also prominent gender segregation on the labour market, with

[83] Statistical Office of the Republic of Serbia

[84] Statistical Office of the Republic of Serbia, Gender Equality Index in the Republic of Serbia, 2021.

women concentrating more in the sectors related to social services and men in the sectors of manufacturing, construction, and ICT. Transport sector is one of the sectors with strong gender segregation[85].

The 2011 Census data indicate also notable differences between women and men regarding the categories of population that is economically active and the categories of economically inactive population. So, men account for 58% of the total number of persons that are economically active, while women account for 57% of economically inactive population.

As in countries across the region, women and men also have different specializations in university, which contributes to the segregation seen in the labour market and the differences in labour market outcomes. Women constitute 89% of graduates in education, 75% in health, and 74% in humanities and the arts. However, they make up only 35% of graduates in engineering, manufacturing, and construction.

Women make majority in many academic fields such as Healthcare (71%), Arts (68%), and Science (66%), while men are more represented in: Engineering, manufacturing and construction (57%), Information and communications technology/ICT (66%) and Services (56%).

In 2019, more women (57%) than men (43%) became holders of PhD degrees. Men are dominant among the members of the Serbian Academy of Science and Art (SANU). In 2020, over 90% of all members are men. The largest participation of women is in the Department of Language and Literature and the Department of Historical Sciences.

Among employed in the field of R&D, in 2018 women are dominant with a 51% share. Almost the same proportion is among scientific researchers, i.e., women make 51.4%. The largest participation of women researchers is in medical sciences, 58.6%, and the smallest participation is in engineering and technology (40%).

The employment rate of women is 41.9%, which is by 14.7% less than the employment rate of men (56.6%). As for married men and women, the gender gap is considerably smaller — the employment rate of married women equals 66% and is higher than the employment rate of married men, which equals 62%. The greatest gender gap on the labour market concerning employment is noted in the age category 55-64 years in which the employment rate of women is 40.5% and the employment rate of men is 60.8%. The employment rate of women aged 25 to 54 is lesser for 10.8%. than the employment rate of men in the same age category (69.1% vs. 79.9%).

Bearing in mind the reasons why men and women work less than full-time, category with the highest stake of women is “Looking after children or disabled persons” (87%), while men most frequently mentioned “Could not find a full-time job” (62%), as the reason for working less than full-time [86].

The gender pay gap for 2018 equalled 8.8%, which means that women were paid by 8.8% less than men. Serbia is among the countries with the lowest gender pay gap in Europe. However, if earnings are observed according to educational attainment or occupations, the difference in earnings between women and men is significantly higher than the average gender pay gap, most often in favour of men. The proportion of women with low salaries and wages in the total number of employed women (18.0%) is slightly higher than the proportion of men with low wages in the total number of employed men (17.8%) [87].

[85] Statistical Office of the Republic of Serbia, Labor Force Survey 2021.
[86] Statistical Office of the Republic of Serbia, 2020.
[87] Statistical Office of the Republic of Serbia, 2020.

As the Project addresses rail services, it is interesting that of all the employed in the transport sector in Serbia, 20% are female, and 80% are male. The statistics are similar in individual railway companies. For example, in 2021, SRI employed 19% of women in its workforce.

SRI has adopted the Code of Equality by decision number 4 / 2018-1159-275 of 12.12.2018, with the aim of preventing discrimination and promoting gender equality in the business environment. The Code of Equality was adopted with the participation of representative unions and in accordance with the National Strategy for Gender Equality for the period 2016-2020. and the Joint Recommendations of the Community of European Railways and Infrastructure Companies and the European Federation of Transport Workers. The Code of Equality also defined the Plan of Measures for Ensuring Gender Equality.

In May 2018 the Joint Recommendations of CER and the European Federation of Transport Workers (ETF) have been disclosed for better representation and integration of women in the railway sector[88]. In November 2018, at the meeting in Brussels, the SRI signed the "Declaration on Gender Equality in the Transport Sector" of the European Railways (CER).

Women and men have equal right to own and inherit assets. Despite the policy efforts women ownership over assets still lags behind. The Municipalities crossed by the rail alignment have the following overall ownership ratio.

Looking at the level of the municipalities affected by the Project, the most unfavourable situation is in the Municipality of Surčin, where out of 1.310 farm holders, as many as 1.098 are male, while only 212 are female, In the Municipality of Čukarica, the situation is slightly better, and out of 996 farm holders, 825 are male, and 172 females. In the territory of the Municipality of Zemun, out of 761 farm holders, 657 are male and 105 female (Table 58).

Table 57. Women ownership per Municipality - 2018.

State/City/Municipalities	Women owners of immovable assets (%)
Republic of Serbia	30%
Belgrade	37%
Zemun	43%
Surčin	34%
Čukarica	39%

A site-specific Resettlement Action Plan will take into consideration this assessment as a baseline for further vulnerability assessment of women impacted by land acquisition and resetlement.

5.2.14. Vulnerable and disadvantaged group

The initial screening against drivers of vulnerability in this region has identified the following potentially vulnerable groups: retired, elderly and people with disabilities and chronic disease, single parent headed households, people with low literacy and ICT knowledge, economically marginalized and disadvantaged groups, persons living below the poverty line and women.

The map of confessions has been changing historically. According to the Census data from 2011, regarding religious affiliation, among the entire population in Serbia there are 84.6% Orthodox Christians, 5% Catholics,

[88] https://infrazs.rs/2018/05/zajednicke-preporuke-organizacija-cer-i-etf-za-bolju-zastupljenost-i-integraciju-zena-u-zeleznickom-sektoru/

3.1% Muslims, 1.1% atheists, 1% Protestants around 3% do not declare themselves confessionally and around 2% are believers in other confessions.

Table 58. Population by religion (2011)

State/City/ Municipalities	Total	Orthodox	Catholic	Protestant	Islam	Atheist	Undeclared
Republic of Serbia	7.186.862	6.079.396	356.957	71.284	222.828	80.053	220.735
Belgrade Region	1.659.440	1475168	13.720	3.128	31.914	40.657	54.871
Zemun	168.170	144.544	2.392	271	7028	3.713	6.599
Surčin	43.819	37.997	532	1.171	1.237	235	1.218
Čukarica	181.231	163.778	1284	145	3219	3.465	5.238

Table 59. Population by mother tongue (2011)

State/City/Municipalities	Total	Serbian	Hungarian	Roma	Albanian	Macedonian	Croatian	Slovak	Russian
Republic of Serbia	7.186.862	6.330.919	243.146	100.668	10.040	12.706	19.223	49.796	3.179
Belgrade Region	1.659.440	1.574.693	1.330	18.985	3.832	4.772	3.014	1.792	1.442
Zemun	168.170	156.189	127	5.025	1.291	353	404	126	124
Surčin	43.819	39.478	13	1.032	272	60	82	1.158	21
Čukarica	181.231	172.779	128	2.541	197	523	293	61	130

In the Republic of Serbia there are no regional or ethical disparities and in the municipalities in the Area of Influence. Nationality is more or less uniform.

The Serbs make up the majority in all observed areas with a share of 87-91%. The share of Roma in all three municipalities is 1,7-3.3%.

Other listed ethnic groups (see the Table below) are present in Zemun, Surčin and Čukarica, but none of them accounts for 1% of the population in the relevant Municipalities (except for Slovaks in Surčin, accounting for 2.86%).

The situation is similar with religious views. The Orthodox are the majority in all three municipalities.

The following table indicates the ethnicity data by municipalities and cities crossed by the Project.

Table 60. Ethnicity - data by municipalities and cities crossed (2011)

State/City/ Municipalities	Total	Serbs	Albanians	Hungarians	Macedonians	Roma[89]	Russians	Slovaks	Croats
Republic of Serbia	7.186.862	5.988.150	5.809	253.899	22.755	147.604	3.247	52.750	57.900
Male	3.499.176	2.918.647	3.358	119.640	9.942	75.042	953	25.057	23.865
Female	3.687.686	3.069.503	2.451	134.259	12.813	72.562	2294	27693	34.035
Belgrade Region	1.659.440	1.505.448	1.252	1.810	6.970	27.325	1.301	2.104	7.752
Male	785.826	713.075	732	595	3.086	13.758	335	910	2.393
Female	873.614	792.373	520	1.215	3.884	13.567	966	1.194	5.359
Zemun	168.170	147.810	165	205	557	5.599	107	170	1.411
Male	80.138	70576	92	83	235	2.784	24	62	518
Female	88.032	77234	73	122	322	2.815	83	108	893
Surčin	43.819	37.866	12	34	95	1.415	14	1.254	373
Male	21.872	18818	5	17	42	720	3	631	166
Female	21.947	19048	7	17	53	695	11	623	207
Čukarica	181.231	166.258	108	164	794	3.163	120	75	713
Male	85903	78898	61	52	356	1566	30	25	178
Female	95328	87360	47	112	438	1597	90	50	535

Roma are one of the most vulnerable groups in Western Balkans, including the Republic of Serbia and are usually exposed to several risks and adverse impacts at once. It is known that they are more sensitive to those risks and impacts, having been subject to pre-existing discrimination, financial, socio-economic, cultural and/or gender inequalities, of their geographical location, their dependence on the environment and/or limited or no access to justice and decision-making; and have a weaker adaptive capacity for coping with those risks and recovering from those impacts, due to limited access to necessary assets and/or resources. As a result, they risk being disproportionately affected by project-related risks and adverse impacts.

The 2011 Census identified 147,604 members of Roma national minority (72.562 women and 75.042 men). In 2011, the largest number of Roma was registered in the region of South and East Serbia (38.7%), followed by Vojvodina (28.7%), Belgrade region (18.6%) and the region of Šumadija and West Serbia (14.0%).

Therefore, Roma are not concentrated in one of several larger regions and groups, but they are dispersed in all the regions of the Republic of Serbia, with a pronounced uneven layout within certain regions. In that respect, such extremely polarized layout of Roma is present with Belgrade region, particularly having in mind that 80.7% of total Belgrade's population of Roma are concentrated in city settlements [90].

[89] Accoring to the final results of the 2022 Census data (announced in April 28, 2023), there are 131.936 Roma in the Republic of Serbia.

[90] Statistical Office of the Republic of Serbia, Roma in Serbia, https://pod2.stat.gov.rs/ObjavljenePublikacije/Popis2011/Romi.pdf

According to the 2011 census, the largest number of Roma population, or 27.325 Roma, live in Belgrade. Belgrade is territorially divided into city municipalities and most Roma live ion the Municipalities of **Zemun** (5.599), Palilula (5.007), **Čukarica** (3.163), New Belgrade (3.020), Voždovac (1.169), Zvezdara (1.644), Obrenovac (1,547), **Surčin** (1.415) and Mladenovac (1.022).

According to the census, 100.688 Roma men and women speak the Roma language as their first (native) language[91]. Despite being categorized among protected minority languages by the Republic of Serbia, pursuant to Article 3 of the European Charter on Regional and Minority Languages, the Roma language is not in official used in any local self-government.

The map showing the share of Roma in the Republic of Serbia is presented below:

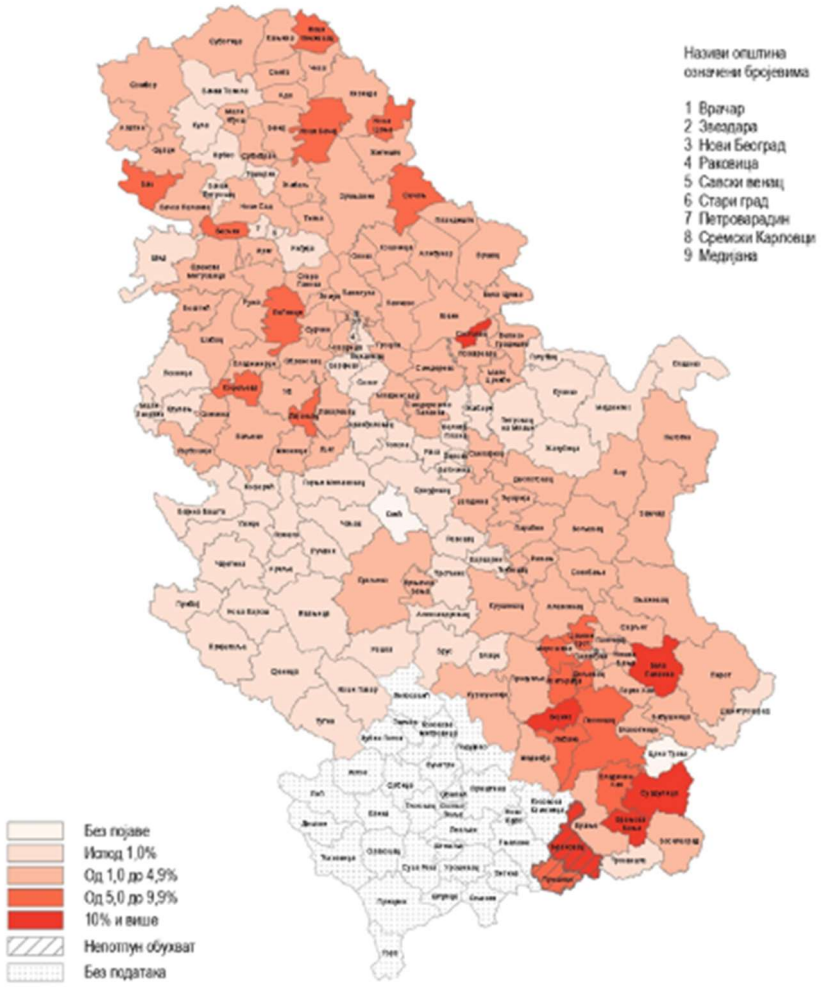


Figure 42. The Share of Roma in settlements crossed by the alignment

Among the Roma, the so-called Ethnic mimicry, which makes it impossible to obtain relatively reliable data on the actual number of members of this ethnic group.

The most vulnerable are the inhabitants of Roma enclaves, in which, in addition to Roma, some other groups of extremely poor people live. There are also so-called Pockets of Roma households in which members of two or more households live in a cramped space (a basement in a building, an improvised roof over a head, a worn-out bus, etc.), most often in a kinship relationship.

[91] Statistical Office of the Republic of Serbia

It is very important that during field visits and preparation of the ESIA and subsequent RAPs, Roma communities are registered and that support programs for these citizens are activated in cooperation with municipal centers for social work and non-governmental organizations. These programs should be aimed in particular at pre-school and school-age children (use of mobile kindergartens, organized translation to school, learning assistance, etc.), high school youth and women.

The assumption is that Roma women use rail transport as the cheapest form of transport to neighbouring settlements in search of most often daily employment such as housework, cleaning services in companies, work in agriculture, etc.

There are no data on the housing ownership. Serbia's government was supported in developing a Geographic Information System (GIS) on substandard Roma settlements. Through the IPA 2014 funded" Technical assistance for improvement of socio-economic living conditions of Roma population" that started in March 2019, the GIS database is to be updated. Official information is provided on 08.02.2017. from the last conducted census, according to which there are 594 substandard Roma settlements, with 20.477 dwellings and with 48.223 persons living in those dwellings. According to the responsible officials, census is not providing data on legal aspects of ownership, but their estimation is that "most probably most of the objects are illegal".

Regarding equity of access to services, and according to a UNDP 2011 survey, 22% of the Roma population do not have access to an improved water source (compared to 1% of the total population), and 39% do not have access to improved sanitation (compared to 5% of the total population).

In 2009, a strategy for the improvement of the Roma's position in Serbia was adopted. It is built around four priority areas for action: education, housing, employment and health.

The presence of Roma settlements and substandard dwellings are likely expected in all three affected municipalities. In comparison to the number of inhabitants in each municipality, Roma population has the highest percentage presence in Zemun (3.3%) and Surčin (3.2%), while there their number is almost twice smaller in Čukarica (1.74%).

A more detailed baseline regarding the status of Roma population in the area affected by the Project shall be developed during the ESIA phase.

5.2.15. Labour and informal employment

In comparison to 2021, when the informal employment rate was 13.2% (M - 12.5; F – 14.1), the informal employment rate in the Republic of Serbia, at the level of all activities in Q4 2022, was 12.8%. The informal employment rate in the domain of agriculture was 50.1%, while in the activities outside agriculture this rate was 6.5%.

Within total employment, there was a decrease in informal employment, while formal employment remained almost unchanged. The total number of informally employed was during one year decreased by 29.100, while the number of informally employed in agriculture is lower by 16.600, and outside agriculture by 12.500.

The incidence of informal employment is highest among the youngest age group (15-19 years), 76% of whom are employed informally. The incidence of informal employment tends to decrease with age. This can be attributed to the low level of professional experience in the youngest age group. Informal employment rates tend to rise again for older workers, with 50% of employees over 55 being informally employed. Broken down by age group, young men and older women are over-represented in informal employment.

From 2014 to 2018, Serbia created around 240.000 net new jobs. The unemployment rate declined from close to 20% in 2014 to below 11% in 2019 (among people aged 15-64), and the employment rate now surpasses pre-crisis levels. Many of the new jobs have been fulltime wage jobs in the formal private sector. Recent labour market improvements have also benefited women, older workers, and youth. Job creation was the strongest

in services and industry. Earnings increased alongside the number of jobs, as real wages in the private sector grew by more than 6% in 2014–17 and by more than 4% in 2018.

Despite recent labour market improvements, many people in Serbia are not working or searching for a job. Among people aged 15-64, Serbia's activity rate (67.8%) and employment rate (58.8%) remain far below those of neighbouring EU countries. Inactivity and unemployment are even worse among poor households: only 22.4% of the working-age poor are employed, compared to 53.0% of working-age non-poor. As a result of inactivity and unemployment, the average male and female worker in Serbia loses about 20 years and 25 years, respectively, of their potential productive lifetimes (ages 15–64).

Many job seekers are long-term unemployed: 75% of unemployed workers wait more than one year to find a job. Serbia is underutilizing its full potential workforce while firms demand more workers with the right skills. With a declining working-age population due to aging and outmigration, it is important that Serbia uses its available workforce effectively.

When broken down by region, the largest number of informally employed workers is in Vojvodina, and the smallest number is in Belgrade. The highest share of informally employed workers of the total number of workers is in West Serbia and Šumadija (33.7%), followed by South and East Serbia (27.7%), Vojvodina (21.2%), and Belgrade (11.9%). These differences can, to large extent, be explained by the higher share of agricultural workers in these regions, and their higher propensity to work in the informal sector.

Desktop data were not available in more detail for the Project area. Gaps shall be closed during the ESIA stage through field studies, as indicated in the section Assumptions and limitations. PAP employment shall be one of the criteria factored in during the ESIA stage in identifying more drivers of vulnerability. The employment status will also be elaborated during the Socio-economic survey.

5.2.16. Land use

The area covered by the railway modernization and reconstruction project consists mostly of agricultural land, forest, water and construction land for other purposes, while a smaller part is construction land for the needs of railway traffic infrastructure. Agricultural land is dominated by arable land intended for crop and vegetable production.

The technical solutions of the project are defined in a way that ensures the modernization and reconstruction of the existing rail and construction of the second track on the bypass railway line (Belgrade marshalling yard) Ostružnica- Batajnica, i.e., to keep the existing corridors in which the spatial entities and contents are formed, with the minimum necessary occupation of new land.

The modernization and reconstruction of the railway will not affect the permanent degradation of the land, considering that the railway and the railway land are already present in the occupation of the space.

The railway also passes through populated areas, passing by work zones and residential buildings.

Dependency on livelihood and cultivated land from the social aspect is considered significant and impacts from economic displacement, severance of land plots and diversifications of income and livelihood will be considered through the next stage of the ESIA.

5.2.17. Transport and Infrastructure

5.2.17.1. Roads

To understand potential interference with existing accessibility and connectivity, the table below cover the road network of various grades and quality in the Republic of Serbia.

Table 61. Length of road network in impacted municipalities 2021 [92]

Municipalities	Total (km)	Modern pavement (km)	Category I State Roads (km)	Category II State Roads (km)	Municipal Roads: (km)
Republic of Serbia	44.794,1	30.409,7	3.884,8	9620,5	31.288,8
Belgrade Region	5.750,3	3.708,0	190,6	454,0	5.105,7
Zemun	/	365,7	/	18,0	347,7
Surčin	/	171,4	/	34,6	136,8
Čukarica	/	291,8	18,4	10,4	263,0

The Republic of Serbia adopted the Law on Roads in 2018. This law introduces road safety inspections and audit processes and describes in detail the responsibilities and organisation of these activities. Serbia estimates the costs of road crashes (fatalities, severe and slight injuries) by multiplying the number of road fatalities by EUR 470.000. On that basis, the total costs of road crashes in Serbia in 2017 amount to EUR 272.1 million, or 0.7% of Serbia's GDP. The longer-term trend for road deaths in Serbia has shown significant progress. Between 2000 and 2018, the number of annual road fatalities fell by 48% [93].

5.2.17.2. Rail

Serbia links via rail with almost all of its neighbouring countries.

The overall length of tracks was reduced from 3.819 km in 2014 to 3.752 in 2019 and the number of departed passengers from 6.3 million in 2014 to 4.8 million in 2018. As one example, an average of 39% of scheduled passenger and 37% of scheduled freight trains were cancelled during the period 2016-2018. The Railway transport is dominant for transport of agriculture and energy products, automobiles and components, construction materials, chemicals, equipment, food, metals, minerals, paper, and pulp.

The current design state of the railway lines enables operation of rolling stock from 12 t/axle to 22.5 t/axle, with the latter maximum load capacity possible on only 1.886 km, which is an obstacle to growth of rail freight traffic. Services are greatly hampered by the current severe regime of continuous speed restrictions across the network. The average speed is low at 38 km/h, and the network has many slow and dangerous spots.

Serbia's derailment rate is far above peer countries. In 2018, the level crossing accident rate in Serbia was 3.45 per million train-km, compared with only 1.14 in Bulgaria, 0.5 in Croatia, and 0.09 in Germany.

Passenger services currently do not have an efficient multimodal interface, and stations, which have not been renovated for decades, do not play an important role in the transport environment. While newly procured coachesare designed for people with disabilities, train stations are not adjusted for people with special needs or for vulnerable groups like women.

5.2.18. Utilities

5.2.18.1. Water supply sources

In the Republic of Serbia, groundwater is mainly used for drinking water, and surface water for other water uses. Groundwater provides 63% of the raw water used for drinking water supply, whereas it represents only 12% of the overall water abstracted in Serbia.Its quality is considered good, although there is some chemical contamination due to the uncontrolled use of various pesticides. Surface water accounts for 27% of the drinking water supply and 88% of all water uses. Almost no effective sanitary protection zones have been implemented at water intakes (for both surface and ground waters).

Local governments are responsible for water and wastewater service provision through 152 public utility companies. These utility companies are founded by municipalities but remain state owned. The water sector

[92] Municipalities of Serbia Statistical Office 2021.
[93] Road Safetu Annual Report, 2019, Serbia, https://www.itf-oecd.org/sites/default/files/serbia-road-safety.pdf

is concentrated: 7 regional public utilities (including Belgrade waterworks) provide service to several large municipalities covering 31% of the population.

According to the law on communal services, municipalities, cities, and the city of Belgrade have sole responsibility for establishing and organizing the provision of water and wastewater services.

In Belgrade's water supply system, quality control is performed at two levels – in the course of water production and in the Water Sanitary Control Unit. Water quality control is performed by the applicable Rulebook on Proper Drinking Water Hygiene (Official Gazette of the Federal Republic of Yugoslavia, No. 42/98), which has been harmonized with the Directives of the European Union and the Recommendations of the World Health Organization.

The area of water supply networks in the impacted Municipalities is observed in the table below.

Table 62. Length of water supply 2021 [94]

Area / Municipalities	Length of the water supply network km
Republic of Serbia	48.873
Belgrade Region	7.187
Zemun	No data available
Surčin	No data available
Čukarica	No data available

According to the 2017 data, 84.8% households in the Republic of Serbia had access to drinking water. In the territory of Belgrade, this percentage is higher – 94.3% households had direct access to drinking water.

In absolute numbers, according to the 2021 data, 2,160,943 households in the Republic of Serbia had access to drinking water, out of which 573,901 households in Belgrade.

5.2.18.2. Sewerage network

According to the 2017 data, 60.6% households in the Republic of Serbia had sewerage. In the territory of Belgrade, that percentage was 88.5%.

In absolute numbers, according to the 2021 data, 1,594,484 households in the Republic of Serbia had sewerage, out of which 540,903 households in Belgrade.

The public sewage network in 202 was by 2% longer as compared to 2020, while in 2021 there were by 1.1% more new connections to the sewage network than in the previous year [95].

Belgrade's sewerage network is made of:

- 1,439 km of the sewerage pipe network and 212 km of collectors, which amounts to the total of 1,651 km of the sewerage network;
- 53,394 sewerage connectors through which citizens use their sewerage installations;
- 32,750 gutters classified into three categories by the priority in terms of cleaning; and
- 37 pumping stations with the installed capacity of 53.3 m3/s [96].

All used waters flow into the Danube and the Sava Rivers through 29 sewerage drains.

[94] DevInfo, 2021.
[95] https://srda.rs/kolicina-otpadnih-voda-iz-naselja-veca-za-27/
[96] https://www.beograd.rs/lat/gradska-vlast/2144-jkp-beogradski-vodovod-i-kanalizacija_3

According to the General Project, Belgrade's sewerage network is divided into five sewerage systems: Central, Batajnica, Banat, Boleč and Ostružnica, within which the construction is planed of wastewater treatment facilities. There is no sewerage network to the largest extent in the parts of city Municipalities of **Surčin, Zemun, Čukarica**, Rakovica, Voždovac, Zvezdara and Palilula.

A wastewater treatment facility is planned to be built in Batajnica for the purpose of purifying wastewaters from about 132,000 inhabitants, as well as a facility in Ostružnica, with the system planned for about 34,000 people[97].

[97] Belgrade Waterworks and Sewerage, https://www.bvk.rs/direktno-sa-slavine-voda-se-pije-u-beogradu-becu-i-budimpesti/

6. PROJECT ALTERNATIVES

6.1. Description of The Options

Two strategic options were developed during the inception period of the project.

- Option 0 - The Base case scenario (Without the project, WOP)
- Option I – Reconstruction of Single-track railway line (With-the-project 1, WP1) option refers to the reconstruction of the existing single-track railway line in order to reach a speed of up to 120 kph. In this Option, small/ local realignments are required close to Batajnica station due to the planned intermodal terminal. The track layout will remain the same for both stations (Ostružnica and Surčin), while the reconstruction of Ostružnica station buildings is envisaged in this option.
- Option II – Reconstruction of railway line and construction of second track (With-the-project 2, WP2). the second "With-the-project" option is to reconstruct the existing track – as described above - and to build a second track for speed up to 120 kph. The second track is planned on the right side of the existing track from Ostružnica station and as left track in Batajnica station. Hence, the construction of the second track requires small realignments of the entire line as well as the reconstruction of both Ostružnica and Surčin stations (tracks and buildings).

6.1.1. The No Project Scenario

Project Scenario in the "do nothing" alternative, the situation will remain the same. This would mean the following:

- The section from Ostružnica to Batajnica is currently a single-track one.
- The current condition of the railway infrastructure on the Ostružnica to Batajnica line is not satisfactory,
- The electrical equipment is technologically obsolete.
- The speed of freight trains is less than 50 km/h.
- There is a major level crossing on the line, which poses danger to road users, as well as for the safety of both rail and road traffic.
- Sava river bridge remains the same with questionable condition.
- No modal shift from road to rail, and more traffic on the road would result in more pollutant emissions, GHG emissions, congestion, and accidents.
- the impossibility of increasing the capacity of the line will negatively affect the traffic growth

The goal of the railway infrastructure modernization on Corridor X through Serbia is the reconstruction of the existing lines and the extension of the second track on the sections where single-track lines were built. This task is one of the state priorities in the construction of traffic infrastructure on the territory of the Republic of Serbia. The modernized railway should meet the requirements defined by international agreements (AGC, AGTC, SEECP, TEN-T). The reconstructed and modernized freight traffic should be equipped with modern ERTMS devices (ETCS-L 2, GSM-R) and should have other characteristics in accordance with the requirements of interoperability (TSI).

Furthermore, the "do nothing" alternative would ignore the obligations of the Republic of Serbia as a candidate for EU membership, which address the need for a sound, high quality, and integrated transportation network to effectively connect the European market. For all the above reasons, it was considered that the choice of this alternative was not prudent and not considered further within the selection of the alignment.

6.1.2. Option I

- Permanent way

Option I envisages the reconstruction of the existing single track railway line with design speed up to 120 kph. The total length of the line is 22.36 km.

As there are three curves where it is not possible to achieve a speed of 120 kph, according to the current characteristics of the alignment, and thus these will be kept in the proposed solution.

The first curve is in Ostružnica station. The radius of curve is 1500 m but without transition curves and cants. According to that, the maximum allowed speed is limited to 50 kph.

In the second curve (allowed speed 60 kph), it is possible to design a realignment and increase the radius of the existing curve, but to achieve this, it is necessary to expropriate additional land. This is not justified because this curve is before the Batajnica station where the running speed of trains is limited to 50 kph, anyway.

In the third curve (allowed speed 50 kph) from km 23+500 to km 25+658, it is impossible to increase the radius of the curve because it is just in front of the Batajnica station and there is not enough space for a realignment that would secure increase of speed. In addition, in this curve, minor realignments are foreseen due to the planned connection with the future intermodal terminal (under construction). According to the existing radius of the curve and the proposed switch (6^o-R300) in the Design for executing works for intermodal terminal, the design speed in this curve will be up to 50 kph.

The reconstruction of the existing line shall be for D4 category (22.5t/axle and 8t/m) and is foreseen through the replacement of the superstructure (rails, switches, sleepers, fastenings and ballast) and rehabilitation of the substructure (construction of transition layer and protective layer) and consolidation of level crossings.

In terms of station tracks, for both rail stations of the section (Ostružnica and Surčin), the number of tracks will be kept as in the current situation. Ostružnica station has four tracks, all of which have a length of more than 750 m. There are 13 switches in the station. The 5 switches on the main track are 49E1-300-6^o type and 8 switches on the side tracks are 49E1-200-6^o type. Surčin station has five tracks. Only one track has length of more than 750 m. There are 15 switches in the station; 4 switches on the main track are 49E1-300-6^o type and 11 switches on the side tracks are 49E1-200-6^o type. Track and switches will be welded in long rail track.

- Stations

Ostružnica station

According to Option I, the Ostružnica–Batajnica rail section, after modernization and repair, will remain single-track line, and Ostružnica station will remain unchanged. This means that the number of tracks is the same and that connection with the industry track is preserved. In that case, the technology of the Ostružnica station remains unchanged

Surčin station

According to Option I, the railway line Ostružnica - Batajnica after modernization and repair will remain single-track line, and Surčin station will remain unchanged, so the track diagram is the same as for the existing condition. This means that the number of tracks is the same and that all connections that exist with the surrounding industry are preserved. In that case, the technology of the Surčin station remains unchanged.

Station buildings

Option I proposes reconstruction of Ostružnica station only.

- Level crossings

There are five level crossings along the railway section Ostružnica – Batajnica; three of them are passive (traffic signs) and two are active crossings (light signals and half-barriers).

The level crossing at km 15+245 presents an intersection of the railway line section Ostružnica-Batajnica with the state road IIB no.319. This road comprises the connection between the settlements of Dobanovci and Surčin. By the current design solution, it is proposed to de-level this crossing. At the level crossings at km 17+504, km 18+704 and km 21+637, it is proposed to keep the existing type of protection. The level crossing at km 25+015 will be cancelled, according to the Batajnica Terminal project.

In Option I, the level crossings will be reconstructed within current geometry and dimensions

- Bridges and Culverts

Option I implies single-track traffic and repair of damage with possible strengthening of structures if the statical calculation shows that there is a need for it

Two variants have been considered for Option I regarding Ostruznica bridge:

- The main variant for Option I implies rehabilitation and, if necessary, strengthening of the bridge structure for the reception of single-track rail traffic. Prior to the calculation of the impact from the horizontal forces according to the new rulebook, it is necessary to perform a detailed inspection of the bridge. In the event that it is possible to repair/ strengthen the foundations and columns, and that they can bear the forces according to the new calculation, it is planned to repair and strengthen the structure and replace the equipment of the bridge. There is a possibility that the existing columns will not be able to receive horizontal forces and that their strengthening will require a significant amount of work and resources.
- The alternative variant, Option I-b, foresees that the existing bridge is demolished because it does not meet the hydrotechnical requirements and in its place a new bridge will be built with columns that can accommodate a double-track railway line in the future and with the superstructure of the bridge to accommodate the single-track line.

6.1.3. Option II

- Permanent way

Option II envisages to reconstruct the existing track and build a second track for speed up to 120 kph.

The second track for Option II is planned on the right side of the existing track from Ostružnica station and as left track in Batajnica station. This means that the existing track shall be moved in some of the curves of the railway line.

The reconstruction of the existing and construction of the second track shall be for D4 category (22.5t/axle and 8t/m) and is foreseen through the replacement of the superstructure (rails, switches, sleepers, fastenings and ballast), the rehabilitation of the substructure (construction of transition layer and protective layer) and the consolidation of the level crossings.

In terms of station tracks, for Ostružnica station, the number of tracks will be kept as in the current situation, while two new tracks will be added to the Surčin station.

Ostružnica station has four tracks with length of more than 750 m. There are 13 switches in the station. The 5 switches on the main track are 49E1-300-6^{o} type and 8 switches on the side tracks are 49E1-200-6^{o} type.

Surčin station will have seven tracks and two tracks will have length of more than 750 m. There are 20 switches in the station. The 10 switches on the main track are 49E1-300-6^{o} type and 10 switches on the side tracks are 49E1-200-6^{o} type.

Track and switches will be welded in long rail track.

- Stations

Ostružnica station

According to Option II, the Ostružnica–Batajnica rail section after modernization becomes a double-track line. Ostružnica station, in terms of transport, remains as a freight station, closed for transport operations with

passengers. Also, after modernization, restrictions remain on the loading and unloading of explosives and goods from classes I and Ia of the RID.

The modernization assumes the extension of the second station track, which becomes main running through track for all the trains toward Surčin and Batajnica, so the new switch 12a has to provide connection of the main running through track from opposite direction with the station track II. Also, in order to maintain the functionality of the station track IV, it is necessary to provide connection of the tracks III and IV with the main running through track of double-track line toward Surčin station

Surčin station

According to Option II, the railway line Ostružnica - Batajnica after modernization becomes a double-track railway line. Surčin station remains a freight station in terms of transport, without passenger operations. The track diagram of the station is slightly different as there will be seven (7) tracks.

Station buildings

Option II proposes reconstruction of both stations, due to the construction of the second track proposed under this option.

- Level crossings

There are five level crossings along the railway section Ostružnica – Batajnica; three of them are passive (traffic signs) and two are active crossings (light signals and half-barriers).

The level crossing at km 15+245 presents an intersection of the railway line section Ostružnica-Batajnica with the state road IIB no.319. This road comprises the connection between the settlements of Dobanovci and Surčin. By the current design solution, it is proposed to de-level this crossing. At the level crossings at km 17+504, km 18+704 and km 21+637, it is proposed to keep the existing type of protection. The level crossing at km 25+015 will be cancelled, according to the Batajnica Terminal project.

in Option II, the reconstruction of level crossings needs to be done according to double-track railway, which implies wider level crossings.

- Bridges and Culverts

Option II implies two tracks, i.e. widening of the existing structures for the acceptance of the additional track. The analysis of possible solutions determined that some bridge structures have sufficient width to accommodate the second track, and that some must be demolished.

The only difference between the two options is the bridge in Ostružnica across the Sava River. All other technical structures (underpasses, overpasses, culverts) will be reconstructed/ strengthened as described in Option I, in order to be possible to accommodate a double-track rail line in the future.

Hence, Option II envisages a double-track railway, i.e. the construction of a second superstructure on the existing columns of all bridges. For the bridge over Sava River, given the condition of the bridge, columns and foundations, as well as the previous reconstruction after the bombing, it is not advisable to strengthen the columns to accommodate the second track. Also, as mentioned in Option I, according to the hydrotechnical report, it is necessary to raise the level of the bridge.

For this option, it is necessary to build a completely new bridge for the double-track railway.

6.2. MCA

The assessment of the alternative strategic options and selection of the preferred one for the upgrade of the Ostružnica – Batajnica railway line primarily deal with the question of how the overall project objectives are to be achieved. The evaluation process aims at the identification of the most cost-efficient and sustainable

strategic option to achieve the Project's main goal, that is, to complete, modernise and develop in a sustainable way Corridor X within the Serbian railway transport system, and eventually to achieve the required EU and TEN-T capacity levels and quality standards with minimal or no derogations.

Other objectives to be achieved, even partially, include the enhanced rail and road transport safety in terms of train operations, pedestrian and vehicle crossings, flood risks, etc., as well as the increased attractiveness of the line to potential users to increase rail freight traffic particularly through modal shift from road to rail. However, these objectives should be met by imposing the minimum environmental and social impact.

The primary step of this process is the identification of the options to be compared. Chapter 5 of this report provides the details for each alternative strategic option, their characteristics and differences. These options essentially represent the strategic decision of either reconstructing the existing single-track line or doubling and upgrading the railway line.

6.2.1. Evaluation Criteria

Given that the specific technical and technological solutions for the rail line upgrade will be defined in the next stages of the project, this assessment is carried out at a higher level between the two key Alternative Options I and II, i.e. single-track or double-track rail line.

To this end, a simplified Multi-Criteria Analysis (MCA) method is employed, whereby the selected criteria are mostly related to the future capacity needs and subsequent traffic impact, as well as the associated economic, environmental and social impacts. The approach at this strategic level does not include criteria weights, quantification of performance for each criterion and scoring/ ranking of each option. The evaluation criteria are based on the findings of the previous analyses and estimations (i.e. traffic demand and capacity analyses, technical descriptions, environmental and social assessment, financial and economic analyses), but the overall assessment of the alternative options is conducted qualitatively by considering the comparative advantages, drawbacks and limitations of each option.

The established criteria, linked to the project's objectives, are divided in the following categories:

Table 63: Criteria categories for simplified Multi-Criteria Analysis

No.	Criteria Category	Objective - Criterion
1	Transport criteria	Freight modal shift from road to rail
		Rail line utilization rate
2	Financial criteria	Investment capital cost
		Financial performance indicators
3	Economic criteria	Economic performance indicators
4	Engineering - Technical criteria	Constructability
		Earthworks
		Design and licencing period
5	Environmental and Social criteria	Air quality and Climate change impact - mitigation
		Surface and groundwater, Soil, Noise and vibrations
		Biodiversity and protected areas
		Social impact (land acquisition, expropriations, safety, severance)

Other objectives such as the completion of the TEN-T network in the region and the compliance with TEN-T and EU regulations (TSI) are expected to be fulfilled by all the alternative options, so their inclusion as criteria is not considered useful to this comparative assessment.

It is noted again that not all criteria are quantifiable; it is though possible to qualitatively assess how well a particular option is expected to perform in relation to the criterion, at least in a comparative ranking order.

A basic principle of the strategic options analysis and the final selection of the preferred option is the assumption that the required financing for all the development options of this rail reconstruction project will be available at the completion of the assessment. The goal is to clearly demonstrate the relative merits of the options and eventually recommend the preferred one.

6.2.2. Transport criteria

The objectives of the project include the increase of traffic due to the increase of the attractiveness of the rail transport as opposed to road transport, and the diversion of road users to rail transport, as well as the efficient operation of the rail network by meeting the forecasted freight demand. This can be achieved by the improvement of the operational conditions and the lift of current speed and capacity constraints along the existing railway line.

The modal shift from road to rail, i.e. the share of tonnes transported by road in the Without-the-project scenario which are transported by rail in the With-the-project scenarios, is expected to have a positive impact on the entire transport network and the society, such as reduction of travel time, improvement of provided services on the entire network, reduction of emissions and accidents, etc. Based on the transport demand analysis, the projected modal shift is directly linked to the expected time savings after the railway line modernization. Since these savings are assumed identical in all scenarios, the modal shift due to travel time improvement is the same for all cases examined and thus no option renders a comparative advantage among the three.

The critical indicator for meeting the transport objectives of the project is the lift of the current capacity limitations on the examined rail section. As described in the transport demand analysis, the existing conditions allow for only 39 trains per day, with a potential of maximum 56 trains in ideal operation and maintenance conditions for the Without-the-project scenario. Options I and I-b foresee a maximum daily service of 58 trains for the single-track rail line, while in Option II there are practically no capacity constraints in the double-track line (maximum of 328 trains per day). The rail line utilization rate is estimated at 22% for the last year of appraisal (2054), while for Options I and I-b the respective rates are above 100% after year 2042.

6.2.3. Financial criteria

The key financial parameters of the project comprise the capital cost for the proposed investments, the operation and maintenance costs as well as the expected revenues. The cost estimates for the proposed interventions in each alternative option are presented in detail in **Error! Reference source not found.**; Option I entails the lowest investment cost (app. 58.2 million EUR), while the total cost for Option I-b is about 34% higher (app. 78.2 million EUR) and for Option II it is almost double (app. 116 million EUR).

Nonetheless, the financial analysis outputs for the alternative scenarios show that none of the options yields viable financial indicators, demonstrating negative net present value (FNPV) and return on the proposed investment (FRR) in all cases examined.

6.2.4. Economic criteria

The economic performance indicators of the project demonstrate the socio-economic feasibility of the proposed investment, including direct and indirect benefits to the users of the infrastructure and to the wider area through the positive environmental and social impact stemming from the modal shift from road to rail.

The economic analysis outputs for the proposed interventions in each alternative option are economically feasible. When comparing the three options, the highest ENPV is estimated for Option II, mainly due to the unrestricted operation of rail traffic and highest number of diverted road users to the rail mode.

Given the capacity constraints in Option I, the resulting modal shift from road to rail is eventually lower, yielding thus inferior economic indicators than Option II. Option I-b performs even worse than Option I since

the higher investment and maintenance costs are not compensated by additional rail demand on the upgraded corridor due to the operation under capacity constraints.

6.2.5. Engineering - Technical criteria

Under the category of engineering - technical criteria, the comparative evaluation of the three options is conducted based on the constructability of the proposed interventions, the necessary technical works, and the required design and licensing period for each option. Given that the upgrade of the railway line (either single-track or double-track) will be conducted

The most significant difference – in terms of technical difficulty and time - among the alternative scenarios is the implementation of a new railway bridge over the Sava River to replace the existing one. This feature influences considerably the assessed design, complexity and constructability level of each option. All other technical structures along the rail section (bridges, culverts, over/underpasses, etc.) will be either repaired/ reconstructed or rebuilt, while one level crossing will be de-levelled in all implementation options.

In terms of the ease of construction, this is considered relatively low for Option I since the reconstruction of the railway line remains on the same alignment as the existing infrastructure, with only minor realignments near the new intermodal station at Batajnica. Option I-b alignment is also almost identical to the existing situation, but the introduction of the new bridge over Sava River increases the complexity of the technical structures in this scenario. Option II foresees the construction of a second track with realignment of the existing track infrastructure and superstructure to fit the new double-track in the existing RoW, the addition or extension of tracks at stations Ostružnica and Surčin, as well as the construction of the new Sava Bridge. The constructability of this option is thus the highest of all scenarios.

The above differences also affect the technical works needed for each option, especially the volume of earthworks, since the second track (in Option II) and the new higher bridge over Sava River (in Options I-b and II) require additional embankments compared to the current situation.

For the same reasons, the design and licensing period required for Options I-b and II is longer than for Option I. The new bridge over Sava River adds notably to the complexity of the project preparation phase including the necessary designs, additional land acquisition and building permit procedures, etc. Option II also entails the design and licensing for additional track along the line and at stations. Nonetheless, the time, land and processes required for the implementation of all other structures will be the same in the three alternative scenarios.

6.2.6. Environmental and social criteria

The environmental and social criteria category comprises the following criteria, which aim to capture the most important environmental and social aspects of the project:

- Air quality and Climate change impact
- Impact on surface and groundwater - soil
- Noise and vibrations
- Impact on biodiversity and protected areas
- Social impact (land acquisition, expropriations, safety, severance)

All criteria are of equal importance referring to the entire life-cycle of the project, that is, to the assumed construction and operation period.

Air Quality – Climate Change

During the construction phase, there will be an increase of human exposure to dust and particulate matter stemming from construction works, either for the reconstruction of the existing line (Options I and I-b) or the

construction of the second track (Option II). Minor impact is also expected from the brake and rail wear and the regular maintenance works during the operational phase of the upgraded rail line. However, these emissions represent a small portion of total GHG and other air pollutants emissions during the project life cycle. The residual effects of emissions from construction vehicles and plant on local air quality are considered to be negligible, following the enforcement of the mitigation techniques.

The primary effect of the project during operation in terms of air quality improvement is expected to be the modal shift from road-based trips to rail-based trips, leading to reduced HGV trips and therefore emissions of GHG and other air pollutants, particularly concerning particulate matter and NO2, on the local and regional road network. Emissions from road-based travel occur at the source (i.e. diesel combustion within vehicle engine), while the electrified rail network draws power from the national grid. Due to the increased rail operations, there will be an increase in rail electricity consumption and hence to the emissions related to energy production.

According to the traffic demand and carbon footprint analysis, Option II is expected to cause the highest shift of road freight vehicles to the rail mode, yielding thus a net reduction of app. 835 thousand tons of CO_2e. Options I and I-b result into much lower savings in terms of GHG emissions over the entire study period (app. 246 and 242 thousand tons CO_2e, respectively), for the period of 30 years (up to 2054).

Surface and groundwater - Soil

The anticipated impacts on soil, surface water and groundwater are similar among the alternative options. During the (re)construction of the railway substructure, soil subsidence may occur, which might generate changes in the groundwater regime. During the earthworks and the construction of bridges, overpasses and culverts, there are potential changes in the morphology of the terrain, which could cause changes in the speed and flow of surface waters. In the operation phase, pollution may be caused only due to the infrastructure maintenance works by the use of various means for cleaning switches and other railway facilities.

In particular for Options I-b and II, the construction of a new bridge over the Sava River near Ostružnica could cause the change of the groundwater regime during the construction of the pillars for the bridge.

In terms of impacts to the soil, the (re)construction of the track will lead to land degradation in a narrow zone, with potential impact on sites designated for material disposal. In the operation phase, no significant negative impacts are expected since the railway line is electrified and there will be no deposition of exhaust gases on the land caused by internal combustion of fuel.

Noise and vibrations

During the (re)construction of the railway line, an increase in noise and vibration emissions can be expected in all alternative scenarios. Although the line is already in operation in a suburban environment, additional impacts would occur in the construction phase, such as frequent noise, movement of machinery, terrain preparation, increased vibrations due to subsidence and changes in the physical characteristics of the area around the railway. The impacts could show the effect particularly in sensitive areas, such as IBA sites and ecological corridors.

In the operation phase, it is possible additional noise and vibrations along the entire length of the line to occur, due to the increased volume of rail freight traffic.

More detailed and precise remarks, avoidance and mitigation measures proposals, can be given after the insight into the Preliminary Design, with details about the re-arrangement of the area, degree and frequency of construction activities, spatial domain of activities etc.

Biodiversity and protected areas

In the construction phase, it is typically expected to have negative impact on the local biodiversity and protected areas. There will be disturbance of fauna and flora species from the project's activities (i.e. noise, waste disposal, lights, etc.) during construction works, especially to sensitive areas such as nesting places, river, riparian vegetation (IBA site and Ecological corridor of Sava River). Also, the works might disturb the usual behaviour patterns of certain species, or even contribute to spread of allochthonous, especially invasive, plant species. The preliminary assumption is that there will be no underlying danger that could eventually cause the endangerment of existing conservational status of natural values and biodiversity components after the construction would be completed.

Since this is a railway line already in operation, the impacts after the start of operations of the upgraded rail section may be more intense due to the increase rail traffic flows. These effects are typical for this environment and may include:

- disturbance to fauna from the noise emissions from traffic,
- accidental fauna kill, especially bird and mammals, under the ecological corridor,
- exposure to artificial light causing nocturnal animals to suspend normal foraging and reproductive behaviour.,
- habitat fragmentation and separation,
- interruption of daily or seasonal movements for some terrestrial animals,
- impact on migratory routes for reptiles, amphibians, birds and mammals,
- direct mortality of species.

Social Criteria

The overall social impact of each option within the project area elements is mainly related to the total area of expropriations and/or land acquisitions, the degree of severance, safety issues, etc.

During construction, there will be the usual occupational health and safety (OHS) risks, especially when works are ongoing while the rail line is in operation. The detailed construction plan and the necessary traffic closures will foresee the mitigation methods for such risks. During operation, the level of safety for the adjacent settlements and human activities is expected to increase through the de-levelling of level crossings, the installation of modern signalling/ telecommunication systems and the protection of the railway line to avoid trespassing in all examined scenarios.

There are no severance impacts anticipated from the line upgrade since the alignment in all alternative options will more or less remain within the existing corridor running through a pre-disturbed human environment. There may be a need to extend the RoW in width in order to accommodate for any changes in the ballast/ superstructure, the de-levelling of existing level crossings and the implementation of all technical structures (bridges, culverts, etc.) planned in all options. Especially in Option II, the construction of a second track and the new bridge over Sava River will cause the widening and local realignments of the current corridor.

In terms of expropriations, the construction of a new track in Option II will likely require acquisition of private land. Based on the preliminary analysis of existing data, the planned expropriation area for this option is approximately 10ha. For Options I and I-b, the additional land area to be expropriated is estimated at about 2.5ha.

6.2.7. Overall performance of each Option

The objective of railway infrastructure modernization along Corridor X through Serbia is the reconstruction of the existing lines and the extension of the second track in sections where single-track lines were built. This goal is one of the state priorities in the construction of transport infrastructure within the territory of the Republic of Serbia. The modernized railway should meet the requirements defined by international

agreements (AGC, AGTC, SEECP, TEN-T), equipped with modern ERTMS (ETCS-L 2, GSM-R) and with other characteristics in line with the requirements of interoperability (TSI).

Furthermore, the Without-the-project alternative would ignore the national obligations as a candidate for EU membership, which address the need for a sound, high-quality, integrated transport network to effectively connect the European market. For all the above reasons, it was considered that the choice of the WOP alternative is not reasonable and cannot be considered as a viable option.

Among the With-the-project options, the overall performance of each Option is presented in the following table in a comparative assessment matrix.

Table 64: Comparative assessment matrix for the alternative options

Criteria Category	Criteria	Criteria Ranking			Category Ranking		
		Option I	Option I-b	Option II	Option I	Option I-b	Option II
Traffic Criteria	Utilization rate	3	3	1	3	3	1
Financial Criteria	Investment Cost	1	2	3	1	2	3
	FNPV(C)@4%	1	2	3			
Economic Criteria	ENPV@3%	2	2	2	2	2	2
Engineering Criteria	Constructability	1	2	2	1	2	2
	Technical works/ Earthworks	1	2	3			
	Design and licencing period	1	2	2			
Environmental & Social Criteria	Air Quality – Climate change	2	2	1	2	2	2
	Surface and groundwater - Soil	2	2	2			
	Noise and vibrations	2	2	2			
	Biodiversity & protected areas	2	2	2			
	Social Criteria	1	1	2			
Total Score					9	11	10
Final Ranking					*1st*	*3rd*	*2nd*

6.2.8. MCA conclusion

Despite the minor differences in the overall performance ranking of the alternative options, particularly between Options I and II, the inadequacy of a single-track railway line to serve the rail freight demand projected within the reference period of this analysis, inevitably makes Option I (and I-b) not capable of achieving the project key objectives and ensuring seamless freight transport operations along Corridor X without any capacity issues in the future.

Consequently, Option II is the selected option for the implementation of the project and the fulfilment of its key objectives for the development of transport Corridor X.

6.2.9. Quantitative and Qualitative Risk Assessment

The risk analysis typically includes the identification of adverse events that the project might face and the estimation of their severity and likelihood of occurrence. For the elaboration of a quantitative (probabilistic) risk analysis, relevant data of previous projects should be available (e.g. number of similar projects with budget or time overruns etc.) and since such data are not available, only a qualitative risk analysis could be elaborated.

The sensitivity analysis results, including the identification of any critical parameters and/or switching values, contribute to the preliminary assessment of risks for the project implementation.

More specifically, since this analysis is based on the conceptual design, there is moderate probability for increases in the investment cost during the next design stages (preliminary and detailed design); however, a ≥50% increase of the initially estimated costs, i.e. of the estimated quantities and/or the applied unit rates, is not considered very probable for the next phases of the project preparation. Similarly, the overall traffic level is linked mostly to the GDP level of Serbia and the neighbourhood countries. The estimation of the future GDP is based on recent, official macroeconomic projections of international institutions, also taking into account the short-term impact of COVID-19 outbreak on the expansion of the economy. Hence, a decrease of ≥50% in the assumed growth rates is not considered probable.

Another project failure could be that the project diverges from the final implementation schedule. Such a risk, although probable, could not lead to major decreases in its long-term socioeconomic feasibility since the economic indicators are remarkably high in the first place.

Considering the above test results and the particularities of the project, indicative risks have been identified and outlined in the following matrix, together with a rough assessment of the overall risk level (based on probability and severity levels) and the proposed mitigation measures for the project promoter. The residual risk after the adoption of the proposed mitigation measures and actions is estimated to be low.

Table 65: Risk assessment matrix and mitigation measures

Risk description	Probability	Severity	Risk Level	Mitigation measures	Residual Risk Level
Construction The project implementation includes technical challenges, e.g. replacement of existing tracks and construction of second track under rail operations, demolition/ construction/ repair of bridges, overpasses and other technical structures. Works will require the employment of technical expertise and capacity, as well as proper coordination and supervision of activities.	Likely	Moderate	High	Thorough project preparation incl. detailed construction plan; Contracting of experienced management/ supervision services; Further training of SRI staff	Medium
Operation - Maintenance Maintenance is a key issue for the long- and short-term sustainability of the investment. Regular maintenance is essential to maintain the upgraded line in its design parameters. Considering that in Serbia the maintenance was performed poorly in the past, specific attention has to be paid to this issue in the future. It is important that the promoter is now aware that failure to ensure this would lead again to speed restrictions which in turn would reduce the estimated benefits of the project.	Likely	Minor	Moderate	Definition of annual budget for periodic and heavy maintenance of the line; increase of budget, if necessary, in the context of a wider network maintenance programme	Low
Demand reaction Traffic demand risks are inherent to any transport infrastructure project, for both the baseline scenario assumptions and the With-the-project scenarios forecasts. The risk level also relates to factors such as the improved level of service and	Unlikely	Moderate	Moderate	Definition/ realisation of a broader reform programme for more service improvements, enhanced regional cooperation among Corridor X countries,	Low

Risk description	Probability	Severity	Risk Level	Mitigation measures	Residual Risk Level
efficiency gains for freight users, which in turn depend on the operators' capability to exploit the potential provided by the improved infrastructure for enhancing the level of service and reliability provided.				competitive timetables, etc.	
Land acquisition Land acquisition may be an issue as the project includes 23km of track doubling and other technical works, particularly the new bridge of Sava River, which may require additional land adjacent to the line. The preliminary assessment of essential expropriations does not show any major issues, but the risk level will also depend on the detail of provisions in Location Conditions, project implementation plan and tender documents to account for land acquisition and required legal procedures.	Unlikely	Minor	Low	Well-organised preparatory works for the project implementation including phased occupation of necessary sites along the line and timely finalisation of land acquisition procedures.	Low

7. POTENTIAL IMPACTS AND MITIGATION MEASURES

7.1. Introduction

7.1.1. Generic Methodology

For the current Project, the methodology that was chosen for the evaluation of environmental impacts took into consideration rated qualitative criteria. The selection of a quantitative evaluation was avoided, since it is more sensitive to subjectivity, and it does not give a holistic overview of the entire situation.

The following sections describe some of the general principles that underpin the assessment approach, while physical, biological, socio economic and cultural environment will be assessed related with the project development.

The methodology that will be used to predict and assess potential environmental impacts includes:

- Collection of baseline environmental and social data by research and survey
- Review of existing literature, documents and reports from various organizations (governmental agencies, universities, institutes) and other similar projects
- Interviews with individuals and representatives of interest groups
- Consultation meetings with relevant Project stakeholders to identify key concerns and to obtain further data where necessary
- Review of relevant statistical and cartographic databases and various census data
- Area of Influence to be defined for each of the potential impacts
- Site visits and field investigations along the railway corridor
- Identification of receptors
- Characterization of the potential impacts and evaluation of their significance

7.1.2. Characterization of Impacts

The parameters that were taken into consideration for the evaluation of environmental impacts include (i) landscape and morphology, (ii) geology (iii) soils, (iv) seismicity, (v) climate change, (vi) air, (vii) noise, (viii) surface waters, (ix) groundwaters and (x) biodiversity and protected areas, while the parameters for the evaluation of social impacts include (i) labor standards and terms of employment (ii) community impacts such as public health, safety, security, gender equality, impacts on indigenous peoples and cultural heritage, land acquisition or potential reduction in people's livelihoods as a result of project activities (iii) occupational Health and Safety, (iv) impacts on vulnerable groups/gender, involuntary resettlement, and affordability of basic services . It also includes disproportionate impacts on vulnerable groups/gender, involuntary resettlement, and affordability of basic services.

In determining the type of environmental and social impact, the ESIA report will be guided by the following indicators:

- The nature of impact. Identification what changes the impact brings, are they an improvement or degradation to the benchmark conditions. In this respect they are classified as: Positive or Negative.
- Vulnerability of receptors assess the recipient of impact itself, its rarity, vulnerability and adaptability to impact and change. In this respect, they can be low, moderate and high.
- The spatial dimension and geographic 'reach' of the impact. This considers the proportion of communities potentially affected by the change. By this virtue impacts are categorized as local, regional, national and trans-boundary.
- Time dimension. This is the timeframe over which an impact will be experienced; this may include temporary, short-term, long-term and permanent impacts.
- Reversibility (long term reversible, short term reversible or irreversible);

- Magnitude. This is the degree of change at a household or community level to livelihoods and quality of life i.e. extent of impact. In this respect they can be major, moderate, minor, negligible and none.

During the planning phase, all potential impacts should be assessed by its probability. In the respect of the likelihood of occurrence, potential impacts should be determined as: very unlikely (the impact is very unlikely to occur under normal operating conditions but may occur in exceptional circumstances), unlikely (the impact in unlikely but may occur at some time under normal operating conditions), likely (likely to occur under normal operating conditions), very likely (the impact will almost certainly occur) and certain (impact will occur).

The significance of environmental and social impacts is evaluated considering the magnitude of the impact and the vulnerability of affected receptors as well as all other above-mentioned dimensions. To assess the significance of the impacts, the impact is reflected within the local setting as articulated in the view of the local population and the environment. Socioeconomic and environmental impacts, significance of the impact is evaluated by the consideration of the impact magnitude and the importance placed on the impact by stakeholders.

The figure below depicts the process the assessment should follow.

Figure 43. Process of impacts identification and management

The table below should show how the significance of impacts should be designated and determined according to mentioned characterization indicators of impacts.

Table 66. Nature of impacts

NATURE OF IMPACT NEGATIVE /POSITIVE					
			Vulnerability of Receptors		
			Low: Minimal areas of vulnerabilities; consequently, with a high ability to adapt to changes brought by the project.	Moderate: Few areas of vulnerability; but still retaining an ability to at least in part adapt to change brought by the project.	High: Profound or multiple levels of vulnerability that undermine the ability to adapt to changes brought by the project
Magnitude of Impact	Negligible	Change remains within the range commonly experienced within the households or community.	Negligible	Negligible	Negligible
	Minor	Perceptible difference from baseline conditions. Tendency is that impact is local, rare and affects a small proportion of receptors and is of a short duration.	Negligible	Minor	Moderate
	Moderate	Clearly evident difference from baseline conditions. Tendency is that impact affects a substantial area or number of people and/or is of Moderate duration. Frequency may be occasional, and impact may be regional in scale	Minor	Moderate	Major
	Major	Change dominates over baseline conditions. Affects the majority of the area or population in the area of influence and/or persists over many years. The impact may be experienced often and national in scale.	Moderate	Major	Major

7.1.3. Cumulative Impacts

Cumulative impacts are those that result from the incremental impact of a project when added to other existing, planned, and/or reasonably predictable future projects and developments. Cumulative impacts are limited to those impacts generally recognized as important on the basis of scientific concerns and/or concerns from Affected Communities and Stakeholders. Cumulative impacts are those that result from the successive, incremental, and/or combined effects of an action, projects, or activity when added to other existing, planned, and/or reasonably anticipated projects and activities. Areas and communities can be potentially impacted by cumulative impacts from further planned development of the project or other sources of similar impacts in the geographical area, any existing project or condition, and other project-related developments that can realistically be expected. However, the assessment does not include potential impacts that would occur without the Project or independently of the Project.

The assessment of cumulative impacts considers the combination of multiple impacts that may result when the Project is considered alongside other existing or proposed projects in the same geographic area or similar development timetable. However, considering the nature and magnitude of the Project, the extend of the impacts it will have on both social and environmental component and the necessary mitigation measures it will include, it is likely that all possible cumulative impacts will be merged, examined, and assessed in the ESIA process. Cumulative impacts will be assessed as appropriate in the proper stages of ESIA report, while in the current report a brief presentation is carried out at the end of this chapter.

7.1.4. Residual Impacts

Residual impacts are impacts that remain in the case where proposed mitigation measures are implemented. It should be noted that effectiveness of mitigation measures could vary for different impact subjects and receptors. Negative residual impacts overall assessed as being either of minor or negligible significance will be environmentally and/or socially acceptable. For negative residual impacts assessed as being either major or moderate significance measures will be planned and implemented that compensate/offset for residual risks and impacts (these measures do not eliminate the identified adverse risks and impacts, but they seek to offset it with an-at least- comparable positive one). Evaluation of the significance of residual impacts will be done based on expert judgment and separately for each type of impact.

7.1.5. Uncertainties

Any uncertainties related with impact prediction or the sensitivity of receptors due to the absence and inconclusiveness of data or due to other limitations are explicitly stated. Where applicable, the ESIA report will make recommendations concerning measures that should be put in place with monitoring or environmental or social management plans to deal with the uncertainty so that they may be addressed.

7.2. Impacts and mitigation measures during construction

7.2.1. Landscape

Potential impacts	Indicative mitigation measures
■ Visual impacts from the establishment of construction areas along the alignment, the presence of buildings, machinery, construction yards, new buildings, fences and structures, noise barrier. ■ Loss of existing vegetation to facilitate the construction of both the online and offline section of the project ■ Demolition of properties along the project ■ Temporary visual awareness of construction activities associated with construction, bridges, underpasses, overpasses etc.	■ Upon completion, areas used as construction compounds will be returned to their original use and state ■ Specific attention will have to be given to Sections where the infrastructure will be dismantled. ■ Where topsoil is to be stripped and stored on site temporarily for reuse, the stockpile mounds will be stored at a maximum height of 2m, to minimize visual effects. ■ Vegetation planting, subject to land use, and availability of suitable land area. ■ Implementation of a 5-year Landscape Management Plan ■ Restricted hours of working will be proposed within built up areas,

7.2.2. Geology and soil

Potential impacts	Indicative mitigation measures
■ Potential Impacts on Topsoil from Leaks / Spills from HGVs, Machinery and Hazardous Material Storage ■ Soil erosion from construction activities ■ Loss of fertile topsoil	■ Careful construction and thorough quality control processes ■ Provision of spill kits to contain leaks / spills; ■ Program to ensure good driver behaviour / maintenance of vehicles ■ An Emergency Response Plan will be produced prior to construction (including a Spill Management Plan), ■ Slope stabilisation – including mulching (straw mulching), brushwood mulching, erosion control blankets, soil binders (e.g. polyacrylamide) and gravelling; ■ Retaining walls – to retain loose materials on slopes where it would not naturally be held, for example on near vertical or vertical slopes; ■ Sediment traps and basins – which will intercept and retain sediment-laden runoff; ■ Drainage channels – which will divert run-off water; ■ Treatment systems – to remove material contained within the run-off water; ■ Limited temporary land take of agricultural land is proposed during construction ■ Land where the existing infrastructure has been dismantled may need to be decontaminated.

7.2.3. Resources and waste

Potential impacts	Indicative mitigation measures
■ Release of greenhouse gas emissions (through transportation). ■ Water consumption. ■ Ecological impacts ■ Visual, impacts in ecology, waters and air from demolition waste, excavated material, and construction work site waste.	■ Ensure that the specification of recycled and secondary content in imported materials (such as earthwork, stone and aggregate, cement and asphalt), is set out during detailed design. ■ Maximise the use of off-site construction and pre-fabrication methods to encourage a process of assembly rather than construction. ■ Capture and communicate actions already undertaken (or planned) within the design for deconstruction and disassembly, to encourage reuse and recycling at assets' end of life. Items that can be readily reused include the following: ballast (can be washed and sold for construction), sleepers, rails, small steel components, switches and crossings (can be refurbished and used on lower track categories). ■ The Contractor will be required to develop and implement a Waste Management Plan, to drive performance in the highest tiers of Waste Hierarchy, thereby maximise reuse and recycling ■ Where on-site reuse (or other forms of recovery) cannot be achieved, the arisings should be sent to licenced off-site reuse, recycling or recovery facilities. ■ Hazardous waste (e.g. impregnated sleepers) needs to be identified and treated

7.2.4. Climate change

Potential impacts	Indicative mitigation measures
■ The construction activities may affect the climate through increase of CO_2	■ Design optimisation to reflect the carbon reduction hierarchy ■ Reduce the requirement for construction materials and excavation;

concentration by diminution of vegetation from earthworks for construction purposes (work camps, any eventual access road, vegetation clearing alongside the working strip both sides of the railway line) ■ Drying out and cracking of ground and access road surfaces leading to slower vehicle movements and repair work, resulting in construction delays. ■ Deformation and melting of materials. ■ Overheating of machinery leading to delay. ■ GHG emissions from exhaust of machinery.	■ Specify materials and products with reduced embodied GHG emissions including through material substitution, recycled or secondary content and from renewable sources; ■ Designing, specifying and constructing the Project with a view to maximising the potential for reuse and recycling of materials/elements at the end-of-life stage; and ■ Specifying high efficiency mechanical and electrical equipment. ■ Planting specifications and maintenance regimes for the public realm will be important in reducing the impact of long periods of drought and waterlogging on ground conditions. ■ All long-term topsoil material stockpiles will be located outside the active construction site and away from drainage ditches. ■ River crossings, beds and banks will be restored to their original state, and banks and adjacent upland areas will be stabilised immediately after final grading; the watercourse crossings will be designed to avoid affecting the stability and long-term performance of riverbanks and flood defences. ■ Not carry out landscaping or excavation work near watercourses during high water periods or during heavy rains. ■ Drainage from higher areas will be diverted around stockpile areas to prevent erosion. As required, sediment controls will be installed downstream of stockpile areas to collect any run-off. ■ Restore ditches damaged by machinery (damage to the gradient, shoulder construction of the embankments, etc.). ■ The Contractor will ensure all dirt and debris are cleaned on sites without delay (approved by the Construction Supervision Officer).

7.2.5. Air pollution

Potential impacts	Indicative mitigation measures
■ Impacts from generate dust, particulate matter, exhaust emissions from the construction works ■ Change in human exposure to dust generated by rail and brake wear as a result of railway alignment	■ A Dust Management Plan (DMP), including measures to control other emissions, in addition to the dust and PM10 mitigation measures given in this report, will be developed ■ A Construction Traffic Management Plan will be produced to manage the sustainable delivery of goods and materials. ■ Construction compounds are required to be located away from sensitive receptors ■ Where practicable, erect solid screens or barriers around dusty activities or the site boundary that are at least as high as any stockpiles on site. ■ Remove materials that have a potential to produce dust from site as soon as possible, unless being re-used on site. If they are being re-used on-site cover appropriately. ■ Ensure all vehicle operators switch off engines when stationary - no idling vehicles. ■ Avoid the use of diesel- or petrol-powered generators and use mains electricity or battery powered equipment where practicable. ■ Ensure an adequate water supply on the site for enabling effective dust or particulate matter suppression ■ Avoid explosive blasting, using appropriate manual or mechanical alternatives.

	■ Re-vegetate earthworks and exposed areas/soil stockpiles to stabilise surfaces as soon as practicable

7.2.6. Noise pollution & vibrations

Potential impacts	Indicative mitigation measures
■ Impacts resulting from noise, vibration, and ground-borne noise caused by construction activities.	■ A CNVMP (Construction Noise and Vibration Management Plan) will include measures to mitigate the negative impacts of railway construction on noise and vibration. ■ Awareness / training sessions for construction workers will include noise and vibration minimisation / mitigation measures. ■ Active community consultation and positive relations with local residents will be maintained to respond to alleviating concerns and resolve any potential noise complaints. Grievance mechanism will be in place and adequately communicated to local residents for complaints to be lodged if noise nuisance is experienced. ■ All construction equipment and vehicles will comply with the requirements of EU Directive 2000/14/EC (must have CE marking). ■ All construction equipment and vehicles will be maintained in good working conditions, applying maintenance procedures. ■ Noisy construction equipment, and the equipment that makes a lot of vibration will be located as far as possible from sensitive receptors / residential areas. If not possible, noisy construction works and/or the work that makes a lot of vibration will be organized in such a way that the exposure time is as short as possible (schedule and resource planning). ■ Noisy construction equipment must be fitted with noise muffling devices that will reduce sound levels. ■ Machines will be shut down or throttled down to a minimum when not in operation. ■ Simultaneous use of equipment that generate a lot of noise and/or vibration will be reduced as much as possible. ■ Internal construction access roads will be kept well maintained. ■ External construction access road should avoid passing near residential and other sensitive buildings, where is possible. ■ Speed limits for vehicles will be applied on the internal and external construction access roads. ■ Reversing alarms that do not have a tonal component (i.e. broadband) will be used, if applicable; ■ Low or non-vibratory piling equipment such as rotary or bored piling will be used. ■ The requirement for vibratory compaction and using static force compaction, such as smooth-wheeled or sheepsfoot rollers, will be reduced. ■ Selection of demolition methods not involving vibration impact, where is possible

7.2.7. Surface waters

Potential impacts	Indicative mitigation measures

■ Increased pollution risks to surface water bodies from increased sedimentation and disposal or spillage of fuels or other harmful substances that may be discharged, spilled directly or migrate to local surface water receptors. ■ Increased risks to surface waters from discharge of foul effluent from construction compounds / construction workers accommodation and increased water demand associated with construction compounds / construction workers accommodation. ■ Increased flood risk associated with temporary works within areas of fluvial flood risk and within watercourses and increased flood risk associated with surface water discharges during construction ■ Impacts to watercourse flow and connectivity ■ Earthworks required for installation of abutments and piers may initiate the bank erosion resulting in significant sediment run-off and deterioration of the surface water quality and even affect the streambed hydro morphology.	■ Provide sediment barriers between earthworks and the watercourse to prevent sediment from washing into the river. ■ Use of silt fences, silt traps, filter bunds, settlement basins and/or proprietary units such as a 'siltbuster' to treat sediment laden water generated on site before discharge should also be implemented. ■ Fuels and potentially hazardous construction materials should be stored in bunded areas with external cut-off drainage and fuel ■ Fuelling and maintenance of construction vehicles and plant (including washdown) should be done on hard standing or on haul roads, with appropriate cut-off drainage and located away from watercourses. ■ No surface water runoff from construction working areas or sites that may contain fuels or other harmful substances should be discharged to surface water receptors unless first subject to robust pre-treatment. ■ Limit the clearance of vegetation on the channel banks. ■ Until the beginning of the in-water works, preserve at least 20m depth of bankside vegetation from the channel bank to protect bank stability. ■ Avoid works to watercourses during high flow events and during heavy rainfall to reduce the risk of fine sediment release, watercourse erosion and increased flood risk. ■ Hydraulic connectivity must be maintained ■ If watercourse diversion is required, maintain a temporary channel to maintain flow and connectivity whilst the permanent channel is prepared. ■ Avoid undertaking works within or adjacent to the watercourses as far as practicable. ■ Minimise the required construction zone adjacent to and within watercourses to reduce the impacts of flow constriction and loss of fluvial floodplain storage and conveyance. ■ Implement a construction-stage drainage strategy for construction compounds, construction workers accommodation and other large areas of impermeable surface to capture and attenuate runoff prior to discharge.

7.2.8. Groundwaters

Potential impacts	Indicative mitigation measures
■ Potential Impacts on Groundwater Quality from Leaks / Spills from HGVs, Machinery and Hazardous Material Storage ■ Impacts on flow and recharge ■ Dewatering and changing the groundwater regime	■ Long term and seasonal groundwater monitoring should be undertaken prior to construction to allow for baseline conditions to be understood and monitor changes (such as those to turbidity and groundwater levels) ■ Action would be needed to address the degradation of groundwater quality during construction such as adjustments to drilling duration or speed.

7.2.9. Biodiversity and Natural Habitats

Potential impacts	Indicative mitigation measures
■ Disturbance impacts to fauna and flora species of nature conservation interest from the project's activities (e.g. noise, more significant human pressure to previously inaccessible areas) during construction and pre-commissioning works with particular reference to sensitive fragile habitats. Spread of allochthonous, especially invasive plant species. ■ Habitat fragmentation and separation of habitats may cause the interruption of daily or seasonal movements for some terrestrial animals, disturbing the usual behavior patterns of certain species. Most detected species are common and widespread and often occupy man-made, altered, or habitats under anthropogenic impacts so their conservation status would not be affected significantly by the mentioned impact. ■ Obstructions of the migratory routes for reptiles, amphibians, and mammals. Direct mortality of species.	■ Appropriate design of bridges and culverts to allow for animal passage, the introduction of animal passages where necessary. Current consultations with the Institute for Natural Conservation of Vojvodina province concluded on the necessity of two bridges and ten underpasses while ongoing communication with other stakeholders is established to confirm the conclusion above. ■ Maximum use and upgrade of the existing network of roads and avoid construction of new temporary ones to minimize loss and fragmentation of existing vegetation. ■ Approach roads should be planned in such a way that they do not endanger the protected row of sycamore trees. Construction facilities must be sited on unused land of no particular ecological value. ■ To avoid any disturbance to species during the breeding season and subsequent breeding failure, vegetation clearance works should start before the breeding season (spring). ■ Develop appropriate measures against the spread of invasive species. Pay attention that alien and especially invasive species are not used for greening. ■ Management of dust, air emissions, aqueous discharges, and waste to minimize impacts on flora, fauna, and ecosystems. ■ Restrict construction during certain periods/seasons. ■ Maintenance, refuelling, and cleaning of construction machines must be scheduled in locations distant from watercourses and which will be defined before the start of work. ■ Wastes as well as any other product containing hazardous chemical substances (i.e. fuel) will not be discharged in the surface waters and will not be stored in the proximity of freshwater features. ■ Restrict activities at sites where rare and endangered species are reported. ■ Make the pre-construction/pre-clearance site survey and placement of the protective fences on selected locations to reduce construction road kill and/or move the specimens out of the working corridor. ■ Pits and excavations should be filled in as soon as possible following work. ■ Monitor impacts on flora and fauna - Environmental Monitoring Plan.

7.2.10. Social Aspects

The Proposed Scheme has the potential to affect land use through loss of land, severance of land and severance of access. There is also the potential for a wide range of socioeconomic impacts including effects on economic investment and access to employment. The assessment of population and human health will be undertaken to understand the potential effects on local communities and human populations of the Project. Consistent with the socioeconomics and land use, health effects associated with the are described according to the administrative boundaries of the impacted municipalities as outlined below.

Impact area	Potential impacts	Indicative Mitigation measures
Impact to Archaeological sites and cultural resources (Chance find) outside of known sites	■ Impacts to cultural heritage by chance finds during earthworks	■ Cultural Heritage Management Plan ■ Chance finds procedures in place and embedded into contracts for construction works

Impact area	Potential impacts	Indicative Mitigation measures
		■ Archaeological supervision in place ■ Reconnaissance of terrain prior to earthworks
Labour and working condition risks	■ Non-compliance with the HR requirements of the Project ■ Shadowed and unpaid work ■ Child Labor ■ Inadequate workforce accommodation ■ Gender Based Discrimination ■ SEA/SH risks	■ Implement HR policies ■ Require Contractor to sign statements of adherence to National Labour laws as supplemented to meet the requirements of ESS2 ■ Adopt Project general HR Procedure ■ Adopt Labour relation management Plan ■ Establish a workers grievance mechanism ■ Adopt equitable and gender observant recruitment policy including ■ SRI to adopt overarching HR policy ■ Adopt Camp management Plan and apply camp operation procedures in line with EIB requirements
OHS risk	■ Risk from working at hights ■ Risk from working with electrical circuits ■ Emergencies and Epidemic Diseases due to increased workforce and COVID-19 pandemic ■ Risk from operation of machinery and equipment ■ Inadequate resources, equipment, procedures, training ■ Communicable diseases ■ Risks from operation of the existing line while the new line is constructed (whether this will be the case is not yet know but risk have ben scoped in)	■ Implement OHS management Plan ■ Regular unannounced site inspections ■ Implement Prevention plan ■ Planning and segregating construction and operation traffic either using one-way traffic routes, establishment of speed limits, and on-site trained flag-people ■ Alternatively plan for rail line closure during certain period of construction should be adopted
Community health and safety risks	■ Risk during creation of access routes ■ Disruption of traffic and pedestrian routes ■ Noise and vibration from equipment ■ Spills /Releases ■ Direct mortality – e.g. as a result of increased collision risk with the railway and electrocution power lines	■ Notification to residents and businesses of works ■ Noise controls detailed within the ESMP be adhered to ■ Setup of site boundary/installation of security and lighting ■ Implement Traffic Management Plan ■ Notification to municipalities and local residents where interface/access is impacted

Impact area	Potential impacts	Indicative Mitigation measures
	■ Disruption of mobility ■ Railway traffic disruption on the existing line ■ Temporary influx of workers ■ Social tension	■ Proper maintenance of equipment. Inspection prior to operation. ■ Apply appropriate spill control measures as per Fuel Supply, Handling and Distribution procedure and Chemical and Hazardous Materials procedure ■ Implement Stakeholder Engagements Plan and Grievance mechanism ■ Apply appropriate spill control measures per Spill Prevention and Response procedure ■ To maintain safety works will primarely take place on the period when no traffic is scheduled, ■ A detailed program of work should be developed and implemented in line SRI operating procedures.
Private and public property	■ Physical and economic displacement and land restrictions ■ Damages to property and assets Loss of private and public lands ■ Loss of business lands Temporary land allocation ■ Damage to land and property impacts	■ Develop site specific resettlement instrument RAP/LARP) ■ Implement RAP /LARP ■ Monitoring and evaluation

7.3. Impacts and mitigation during operation and maintenance

Impacts and mitigation measures on natural environments during maintenance phase are quite similar with those during construction phase. The following table summarizes the general impacts and mitigation measures related to operation phase and maintenance phase. More localized analysis will be carried out under the ESIA at the next stage.

7.3.1. Landscape

Potential impacts	Indicative mitigation measures
■ Permanent change to the nature of the landscape directly within the footprint of the project ■ Permanent modifications to existing landform (cuttings and embankments) ■ Addition of a number of permanent built structures within the landscape including bridges, overpasses and underpasses, fencing, noise barriers	■ Regular maintenance of vegetation. ■ The appropriate design and colours for the fencing. ■ Using as much as possible low and/or transparent noise barriers

■ Increased visual awareness of disturbance from freight train movements within the view	

7.3.2. Geology and soil

Potential impacts	Indicative mitigation measures
■ Impact on topsoil quality and soil erosion ■ Soil stability and risk of landslides ■ Seismic activity	■ Maintain sediment traps and basins, drainage channels and treatment systems; and ■ Maintain slope (cuttings and embankment). ■ An Emergency Response Plan will be produced prior to operation. ■ Revegetation and/or maintenance of vegetation to increase the stability of potentially loose materials and surfaces which may develop during the operational phase of the Project ■ Maintenance and thorough quality control processes including inspections for maintenance depots; ■ Leak/ spill management;

7.3.3. Resources and waste

Potential impacts	Indicative mitigation measures
■ Waste that will be generated during the railway operation will be primarily food, paper and packaging waste ■ Track maintenance waste and ancillary infrastructure waste can be expected along the route and their quantities will depend on the maintenance activity.	■ Implementation by the SRI of the waste management hierarchy ■ Waste containers for use by the track maintenance personnel and railway station tenants will be provided and waste will be segregated; ■ Hazardous waste from the track maintenance will be segregated and temporarily stored inside a properly equipped space.

7.3.4. Climate change

Potential impacts	Indicative mitigation measures
Adaptation to climate change ■ Flooding of underpasses ■ Scour of structures, weakening and degrading materials. ■ Drainage infrastructure overwhelmed leading to surface water flooding. ■ Flooding of railway tracks resulting in disruption to service. ■ Waterlogging and erosion leading to destabilisation. ■ Increase in expansion of materials leading to structural damage.	■ Implement energy efficient lighting throughout the Project; ■ Use energy meters to monitor energy requirements; ■ Implement efficient water fittings. ■ Rail tracks will be designed and materials will be selected to withstand temperature increases ■ Technical buildings will have air conditioning systems to eliminate the effect of condensation due to temperature differences or very cold/hot air. ■ Permanent and temporary loads that will be taken into account for designing cross passages will also include temperature and shrinkage. ■ Consideration of design foundation and ground movements in regard to their resilience to flooding or heavy rainfall events. ■ Drainage ditches will be the best quality without any casting defects and beads and showing no cracks or other faults and be in firm and homogenous condition

■ Drying out and cracking of substrate leading to damage to foundations and destabilisation of structure Climate change mitigation ■ Lower GHG emissions due to the railtrack improvement and consequent efficient transport	■ Drainage infrastructure will include an allowance for climate change. ■ The design of drainage will minimise the need for drain cleaning, the possibility of clogging and the consequent flooding of the track work subgrade. ■ Drainage infrastructure will be inspected regularly to identify any deterioration, and additional inspections following extreme weather events and/or persistent high temperatures. ■ Necessary training will be given regarding correct usage of the equipment.

7.3.5. Air pollution

Potential impacts	Indicative mitigation measures
■ Modal shift of passenger and freight movements from road-based travel (car or bus movements for passenger and freight respectively) to rail-based travel.	

7.3.6. Noise pollution and vibrations

Potential impacts	Indicative mitigation measures
■ Annoyance and complaints from noise and vibration	■ Cuttings: The Project benefits from cuttings at some sensitive locations. ■ Between source and receptor: ▪ Installing noise barriers (protective walls) ▪ Insulation of house windows and facade . ▪ Using maintenance strategies for track Considering the use of track support systems such as Resilient track fasteners, Ballast mats, resiliently supported ties, Floating slabs, construction of trenches.

7.3.7. Surface waters

Potential impacts	Indicative mitigation measures
■ Polluted surface water runoff that may be discharged to surface water bodies. ■ Increased wastewater discharge and increased water demand associated with railway stations. ■ Increased flood risk associated with proposed drainage systems. ■ Increased flood risk caused by displacement of flood water storage or crossing of watercourses that may impact flood flow conveyance.	■ Provision of a new drainage system that will drain the track corridor (embedded in Project design). ■ Maintain existing drainage and treatment at high-risk areas ■ Collect waste products such as oil from maintenance stations and dispose off site in agreement with the necessary requirements ■ Regular inspection and maintenance of drainage systems to remove blockages (embedded in Project operation). ■ Consider climate change effects on capacity of drainage system. ■ Detailed assessment and, if required, provision of attenuation to reduce rate and volume of increased runoff from impermeable surfaces. ■ Further consideration to potential impacts to fluvial floodplain storage and conveyance in high risk areas, and provision of appropriate mitigation such as flood relief culverts beneath embankments or reprofiling of low-vulnerability land to provide compensation, ■ Further consideration of the potential effects of climate change to flood flows and the extent/depth of the floodplain.

■ Impacts to hydrology, hydro morphology and flow dynamics associated with any crossing or realignment of watercourses.	■ Maintain the stability, profile, hydraulic connectivity and hydraulic capacity of all watercourses crossed by the Project and in particular those with bridge piers within the watercourse. ■ Provision of erosion control upstream and downstream of all watercourse crossings to prevent scour and impact to watercourse hydro morphology and geomorphology (e.g. rock armour and concrete scour mattress). ■ Set back bridge piers from within watercourse to remove any impacts on flow conveyance ■ Provision of low flow channels through proposed culverts to maintain constant baseflow.

7.3.8. Groundwaters

Potential impacts	Indicative mitigation measures
■ Potential effects on groundwater quality, flow and recharge	■ Operational Maintenance Plan will be produced and will include maintenance and repair plans. ■ The implementation of the mitigation measures defined above for soils and surface water will serve to protect groundwater during the operational phase.

7.3.9. Biodiversity and Natural Habitats

Potential impacts	Indicative mitigation measures
■ Impact to fauna from the noise emissions from traffic. ■ Accidental fauna kill, especially bird and mammals corridors under the ecological network. ■ Exposure to artificial light can cause nocturnal animals to suspend normal foraging and reproductive behavior.	■ Develop and implement during the operation phase a Monitoring Plan of terrestrial fauna to timely recognize negative impacts and trends related to the highway operation and define additional and appropriate mitigation measures. ■ Mitigation measures for noise as mentioned above. ■ Restore pre-construction conditions as far as possible (e.g. re-vegetation of the working strip) and maintain vegetation - Vegetation/Landscape Restoration Plan. ■ Preservation of vegetation along the railway. ■ Pay attention that alien and especially invasive species are not used for the maintenance of the corridor. ■ Regular control and maintenance of drainage structures shall be conducted to check their permeability. ■ Appropriate maintenance of bridges and culverts to allow for animal passage. ■ Construct and maintain an impenetrable and resistant fence along the railway. If the road is fenced off due to safety issues as a stand-alone measure to prevent mortality of large animals, then it should be designed and installed as a gap-free, permanent fence with small mesh holes. The fence should lead the animals towards safe crossing points. ■ Avoid installing lighting near potentially vulnerable sites, unless required for human safety or other road safety requirements; If artificial lighting is required adjacent to important habitat sites, then design lighting or install shades to emit down and away from the natural area.

7.3.10. Social Aspects

The social aspects for the operation phase are summarised below.

Impact area	Potential impacts	Indicative Mitigation measures
General Operational Safety	Safety issue potentially affecting crew is the threat of serious injury or the potential loss of life due to train collisions with other trains or with road vehicles, as well as the possibility of derailment due to these or other operational causes	■ Implementation of rail operational safety procedures aimed at reducing the likelihood of train collisions such as a positive train control (PTC) system. ■ Rail design and application of TSI and EU CSM process
Derailments	The risk form derailment remains reasonably common although those leading to significant injury or loss of life are increasingly rare	■ Implementation of rail operational safety procedures aimed at reducing the likelihood
Railway staff risks	Despite the high level of safety achieved for rail users, railways have traditionally been a relatively high-risk industry for staff both in terms of injuries and fatalities. Track workers are especially vulnerable due to their exposure to moving trains and high voltage electricity, the use of heavy plant and equipment, exposure to poor environmental conditions and frequent need for working anti-social hours.	■ Implement OHS Standards
Transport of dangerous goods	Dangerous goods are frequently transported in bulk or packaged form by rail, representing a potential risk of release to the environment in the event of accidents on a number of other causes.	■ Implementation of a system for the proper screening, acceptance, and transport monitoring of dangerous good. ■ Preparation of spill prevention and control, and emergency preparedness and response plans, ■ Routing and timing of hazardous materials transport to minimize risk to the community ■ Limiting train speed in developed areas ■ Dissemination of emergency preparedness and response information to the potentially affected communities
Pedestrian Safety	Trespassers on rail lines and facilities may incur risks from moving trains, electrical lines and equipment, and hazardous substances, among other issues (accidents related to electric circuits have been reported and identified by SRI) 26	■ SRI to continue the activity ongoing for the past couple of years targeting elementary schools raising awareness to risks from rail and the electrical power line since education is seen as one of the most constituting mitigation measures ■ Posting of clear and prominent warning signage at potential points of entry to track areas (e.g., stations and level crossings); · Installation of fencing or other barriers at station ends and other locations to prevent access to tracks by unauthorized persons; · Local education, especially to young people, regarding the dangers of trespassing; · Designing stations to ensure the authorized route is safe, clearly indicated, and easy to use; · ■ Use of closed-circuit television to monitor rail stations and other areas where trespassing occurs frequently, with a voice alarm system to detect trespassers

Impact area	Potential impacts	Indicative Mitigation measures
Stations	Personnel should be trained in herbicide application, including applicable certification or equivalent training where such certifications are not required;	■ Regular inspection and maintenance of the rail lines and facilities to ensure track stability and integrity in accordance with national and international track safety standards; Implementation of an overall safety management program that is equivalent to internationally recognized railway safety programs ■ Build awareness and Safety culture as the interaction between the requirements of the Safety management system and how people make sense of them, based on their attitudes, values and beliefs, and what they actually do, as seen in decisions and behaviours. ■ Introduce good reporting practices for safety occurrence notification, recommendation and remedy including consultation and publication of the reports and find ing as a capacity enhancement measure to the community on health and safety
Right-of-Way Maintenance	Regular maintenance of vegetation within railroad rights-of-way is necessary to avoid interference with train operations and track maintenance; Maintenance of Rolling Stock Occupational hazards typically associated with locomotive and railcar maintenance activities may include physical, chemical, and biological hazards as well as confined space entry hazards	■ Personnel should be trained in herbicide application, including applicable certification or equivalent training where such certifications are not required;
Station	Surčin and Ostružnica stations remain operational for freight traffic	■ Stakeholder consultation and engagement on all aspects

8. STAKEHOLDER ENGAGEMENT

8.1. Introduction

Consultation and engagement with stakeholders is an integral part of the Environmental and Social Impact Assessment (ESIA) process. The Project Promoter will include communication with stakeholders and their engagement in all phases of the Project: planning, construction and operation phases.

The Stakeholder Engagement Plan (SEP) will contain a plan for stakeholder engagement, including identification of stakeholders (i.e. state and local bodies and organizations who have a role in the Project or people who could be affected by the Project activities or NGOs interested in the Project) and disclosure of information, consultation, and handling of suggestions, comments and concerns. The SEP will be updated constantly while the Project progresses.

The purpose of the SEP is to provide a basis for a constructive relationship between the Project Promoter and the affected stakeholders by ensuring relevant and understandable information exchange and by providing to all the Project Affected Persons (PAPs) opportunities to express their views and receive responses.

The SEP also stipulates for stakeholders how their concerns are to be considered in compliance with a grievance procedure. The nature and frequency of stakeholder engagement is defined by the risks and impacts that the Project will have.

The EIB's document Environmental and Social Standards (ESS) provides an operational guidebook of the policies and principles described in the EIB Statement of Environmental and Social Principles and Standards. Devided in eleven thematic areas, ESS covers the full scope of environmental, climate and social standards mandatory for projects financed by EIB.

According to ESS, stakeholder engagement is an inclusive and iterative process that involves, in varying degrees, stakeholder analysis and engagement planning, timely disclosure and dissemination of/access to information, public consultations and stakeholder participation, and a mechanism ensuring access to grievance and remedy.

8.2. Stakeholder Engagement Phases

To accomplish the objectives of stakeholder engagement, the Project Promoter will develop a plan for engagement with stakeholders throughout the Project life-cycle that will focus on short and long-term goals of stakeholder engagement. The Project Promoter will also determine logistics and procedures for the stakeholder engagement.

The main objectives of stakeholder engagements are to:

- Ensure that adequate and timely information is provided to persons affected or likely to be affected by the Project or that may have an interest in the Project or that have influence over the Project, but also to provide to these groups such forums and opportunities to voice their concerns and opinions;
- Ensure that comments and concerns are received in a timely manner so that they can be considered during the decision making process;
- Establish effective communication and cooperation facilitating affected community support in general, and
- Establish an effective grievance and mediation mechanisms with the main goal to intervene in a dispute in order to resolve and close out and minimize the number of cases referred to judicial authorities.

This SEP describes the approach in engaging with stakeholders, to be maintained throughout the Project cycle i.e. for, pre-construction including land acquisition, (re)construction activities and operation. These stages are described in the following table.

Phase	Objectives	Status
Alternative's assessment	To identify environmental, social and cultural heritage sensitivities that should be taken into consideration in selecting the preferred route.	Completed
Scoping disclosure and consultation	To provide further details on the Project and an opportunity for stakeholders to send feedback on the scope, approach and key issues that will be addressed during the ESIA as well as the plans for future engagement activities. The Scoping Report (dated August 2023) was prepared in English but main features shall be translated to Serbian and will be circulated for comments to key stakeholders during August/September 2023. Consultation will be organized with (i) representatives of affected municipalities (Zemun, Surčin and Čukarica) and city of Belgrade (including Local Settlements – Batajnica, Dobanovci and Ostružnica) through which the alignment is planned to pass and (ii) relevant government agencies.	Planned
SEP and RAP disclosure and consultation	To provide details on the Project and an opportunity for stakeholders to provide feedback on the approach and key issues that will be addressed during the land acquisition process.	Planned
ESIA disclosure	To present the draft ESIA report and invite stakeholders to comment on the document. Information on the project impacts will be presented along with the mitigation measures designed to minimize or enhance positive ones. This will allow the project to maintain the relationships developed during the previous stages and ensure all stakeholder issues have been identified and taken on board by the Project.	Planned
Ongoing Project stakeholder engagement	During all Project phases (construction, operation and maintenance) to continue engaging with stakeholders throughout the project lifecycle. The methodology for this will be developed and finalized using the information compiled during the ESIA process.	Planned

The SEP will identify all key stakeholders, directly and indirectly affected as well as other interested parties. The SEP will also ensure that disadvantaged or vulnerable individuals or groups, relevant to the Project, are identified, that their sensitivities, concerns, and barriers to project information are assessed and that they fully understand project activities and benefits and to participate in consultation processes.

Vulnerabilities identified in the baseline will help developing the SEP.

The vulnerability may stem from person's origin, gender, age, health condition, economic deficiency and financial insecurity, disadvantaged status in the community, dependence on other individuals or natural resources, etc. Engagement with the vulnerable groups and individuals often requires the application of specific measures and assistance aimed at the facilitation of their participation in the project-related decision making so that their awareness of and input to the overall process are commensurate to those of the other stakeholders.

The specific nature of the Project required a broad engagement with various stakeholders. By this moment, the concrete stakeholder engagement activities that have taken place include:

- Communication and meetings in the rail sector;
- Review of project preparation status and the Project design with representatives of the SRI;
- Collection and analysis of relevant documentation related to the population census and protected cultural heritage in the area affected by the Project;
- Collecting and analysis of available maps, social studies, research and media reports related with the affected area, related population and cultural heritage;
- Visiting and photoshooting of the existing railway, nearby area and potentially affected facilities;
- Communication with a number of experts engaged in the Project.

The listed activities have made arrangement for adequate communication, disclosure of documents and information sharing. More details on the Stakeholder Engagement practices adopted for the Project will be referred in the SEP.

8.3. List of stakeholders

At this stage of the Project, there have been identified the following stakeholders:

- Serbian Railway Infrastructure
- The European Investment Bank
- Ministry of Construction, Transport and Infrastructure
- Ministry of Environmental Protection and relevant departments within.
- Institute for Protection of Cultural Heritage of Republic of Serbia
- Srbija Cargo
- Private Cargo operators
- Srbija Voz
- PWC Srbijavode
- PE Roads of Serbia
- The municipalities Zemun, Surčin and Čukarica, local public services/facilities, local representatives of NGOs, representative of the local communities etc.
- City of Belgrade
- Nature Conservation Institute of Vojvodina Province.

Deeper analysis and further steps in the preparation of the SEP document will enable the preparation of a detailed table with stakeholders, their role and level of influence on the Project.

8.4. Grievance Mechanism

The implementing agency SRI has an existing centralized grievance system in place within the Media Centre, which is currently dealing with the grievances arising from the on-going projects.

The existing Grievance Mechanism is expected to be tailored to this Project level grievance mechanism (GM) free of charge.

The GM will be expected to consist of a Central Feedback Desk (CFD) to be established and administered by the Media Center of SRI with Sub-Project specific Local Grievance Admission Desks (LGAD) (collectively referred to as Grievance Mechanism (GM)). The LGAD will comprise representatives from the key three stakeholder groups i.e, SRI representative, Municipality representative and representative of the PAPs. SRI shall be responsible for overall grievance administration.

The LGAD shall serve mainly as local admission point for uptake of grievances and acknowledgment of grievance receipt. The grievance system (registration, sorting, processing, acknowledgement, follow-up, verification,action and feedback) is embodied in the GM. SRI will make sure that the relevant staff are fully trained and has relevant information and expertise to provide consultations and receive feedback.

The project will utilize the existing system (online, written and phone complaints channels) to ensure that all project-related information is disseminated and complaints and responses are disaggregated and reported.

Details on further Grievance admission points in particular LGD and the grievance administration processes, timelines, investigation activities and closure conditions including the 2nd tier resolution instance shall be published in the SEP.

Stakeholders are encouraged to send all grievances, concerns and queries to the SRI contact points below:

Table 67. Grievance mechanism

Name:	
Title:	
Address:	
E mail:	
Telephone:	

9. TERMS OF REFERENCE FOR ESIA

9.1. Introduction

A key outcome of the scoping process is the definition of the Terms of Reference (or ToR) of the ESIA study. The findings of the ESIA study will be presented in the ESIA report, which will be prepared in compliance with Serbian national laws and regulations and in accordance with IFIs Policy Requirements and Good International Standards. The Consultant has selected the more stringent IFIs standards as the international standards benchmark for the ESIA report.

This chapter provides the proposed Terms of Reference for the ESIA and is structured as follows:

- Next steps required to complete the ESIA process
- Proposed baseline studies
- Proposed structure of the ESIA Report.

9.2. ESIA objectives

The Consultant recognizes that comprehensive planning and management of environmental and socio-economic issues are essential to the execution of any successful project and, therefore, intends to fully integrate environmental and socio-economic considerations into the life cycle of the proposed Project.

The purpose of the ESIA is to assess the potential impacts of the Project and Project related activities on the environment (including biophysical and socio-economic resources) and, where applicable, to design mitigation or enhancement measures to avoid, remove or reduce negative impacts to the environment and to enhance positive and mitigate negative environmental and socio-economic impacts.

9.3. ESIA Steps

Following on from the scoping phase of the Project, the ESIA will:

- Conduct additional consultation and further refine the scope of the ESIA as necessary;
- Collect additional baseline data through desktop research and field studies to complete a comprehensive description of the environmental, social and cultural heritage conditions;
- Identify and assess environmental, socio-economic and cultural heritage impacts;
- Develop mitigation and enhancement measures and elaborate an Environmental and Management Plan (ESMP) including an approach for monitoring;
- Develop a Resettlement Action Plan
- Report findings in a comprehensive ESIA report. A Final draft ESIA Report will be submitted addressing IFI's and Beneficiary's comments.

9.4. Methodology and Key Aspects Included

9.4.1. Project Description

A Project Description will be provided as early as possible that describes all Project activities that could impact on environmental and social components within the Project area of influence. The Project Description will be prepared by the Project engineering team in association with the ESIA team. The Project Description will be as detailed as possible to identify the environmental and social aspects resulting from Project's activities.

9.4.2. Analysis of Alternatives

An Analysis of Alternatives to the Project will include consideration of alternatives within Project design. This should also include the 'no-action' or 'no-go' alternative for the Project.

9.4.3. Baseline Conditions

9.4.3.1. Desktop research

Desktop studies will include additional research to identify existing documentation that contains information relevant to key resources present in the Project environment. Potential sources include publicly available literature with relevance to the Project site and general area.

Desktop research will be continued for the description of meteorological, air, noise, waters, soils and biodiversity parameters. Updated data will be provided for meteorological data for the stations encountered along the corridor, analytical data will be presented for air, noise, wates and soil results of the national monitoring system while more data will be obtained for a better evaluation of habitats. More detailed description of the other environmental parameters will be provided, while an Annex with species with specific protection status in terms of biodiversity will be prepared.

Project route studies will provide additional information on various individual socio-economic impacts. Further and more detailed desktop studies of impacted settlements, land use and asset inventory of resettled Project Affected Persons will provide necessary information of overall and individual socio-economic impacts of the Project affected area. Additionally, as per this Scoping report outlined guidelines, more detailed baseline information will be acquired on impacts on vulnerable persons and groups, usual daily migration routes of population in the wider area, short- and long-term potential impacts of the Project on economic and agricultural activity, potential impacts on facilities and services provided to local settlements and tangible and intangible cultural heritage that could be influenced by the Project. The ESIA desktop study will also provide for more detailed gaps between National legislation and EIB Policy Requirements and ways to bridge the gaps.

9.4.3.2. Field surveys, measurements and assessments

The Project team will carry out stakeholders' meetings to collect environmental and socioeconomic information with the aim to complete the environmental and socioeconomic profile of the Project area. These gathered information and data will also help the project team to assess the situation of physical and biological environments, social infrastructure with regard to specific habitats and landscapes, settlements and to develop the profiles of natural and semi natural sites, municipalities and settlements. Information on alternative living options due to economic displacement will be investigated. Field visits will focus on areas that have the highest biological, educational/recreational and socio-economic, vulnerability and archaeological potential.

Based on the information gathered, the ESIA team will report the findings in the ESIA Report. This will provide sufficient information to undertake the following tasks.

- Identify the key environmental and socio-economic conditions in areas potentially affected by the Project and highlight those that may be vulnerable to aspects of the Project;
- Describe their characteristics (nature, condition, quality, extent, etc.); and
- Provide sufficient data to inform judgments about the importance, value and sensitivity/ vulnerability of resources and receptors to allow the prediction and evaluation of potential impacts.

The ESIA team will determine the impact assessment and indicative mitigation measures based on the results of data collected.

9.4.3.3. Environmental

More specifically, during the ESIA stage, the following have to be planned:

- Vibration and noise: noise measurements after defining the sensitive receptors and noise and vibration modelling to predict the impacts in the operation phase
- Climate change: assessment for the project's climate resilience (GHG emissions calculations, characteristics for floods, temperature and precipitation changes)

- Biodiversity: Identification, mapping, and description of the natural, semi-natural and artificial habitats along the corridor. The classification of the present habitat types follows EUNIS version 2012 (amended 2019), and the digitalization will be performed. Also, for habitat selection and determination, the following lists will be used: EU Habitat Directive Annex I and Bern Convention Res. No. 4. Fauna and flora species that are a priority for conservation, including species listed by the EU Habitats Directive and Birds Directive, Bern Convention, IUCN Red List of Threatened, will be determined.

9.4.3.4. Social

A social impact assessment will be carried out as part of the Environmental and Social Impact Assessment. The social impact assessment will cover the Socio-cultural environment (include both present and projected where appropriate): Population; land use; planned development activities; settlement and community structures; employment; distribution of income, goods, and services; recreation; public health; and historical, archaeological and cultural resources.

A detailed Social Survey should have to be undertaken at the ESIA stage, with the aim to provide sufficient information for the physical and/or economical resettlement purposes.

Precise and complete data will be available only after completion of main design, expropriation study and census. Given the constraints of data available, the fact that the technical options and solutions are still fluid and therefore undiscovered and yet unidentified impacts might differ at later stage. These impacts will be subject to stringent provisions of the social mitigation measures.

More precisely, regarding social issues, the following will also be applied

- Any earlier social assessments in the area and the initial findings and baseline should be used to update any needed social assessment and provide a clear scoping statement of the anticipated impacts arising from the Project. This updated social assessment will describe current social and economic impacts on directly- and indirectly-affected communities. This socio-economic information will provide a baseline for evaluation of impacts and mitigation measures to reduce negative impacts and to enhance positive impacts and opportunities. Data will be obtained from a combination of secondary sources and suitable primary data, such as personal interviews and household or community surveys as relevant. The assessment will verify and update as needed: where likely impacts are identified; social and economic baselines; social and economic impacts; mitigation of adverse impacts and enhancement of positive impacts, and identification of community development opportunities
- Define the Area of Social Influence for the area covered including associated facilities,
- Develop a demographic profile of the study area's communities that may be influenced by the proposed construction works and operation of the Project,
- Map of sufficient detail showing the project site and the area that may be affected by the project's direct, indirect, and cumulative impacts (i.e. area of influence) Socio-economic and environmental characterization, which includes presenting concise information on the main socio-environmental factors that will be affected by the project. This information, whenever possible, should be based on qualitative and quantitative data.
- Identify tangible (social infrastructure) and intangible (human and social capital, community cohesion, community values and connection to place) community assets and provide a general understanding of the local social environment within the study area

The Consultant shall ensure that any specialized anthropological and sociological experts contributing to the Social Assessment will address issues relevant to the EIB requirements (this effort shall be linked to the RAP s).

- Socio-Economic Conditions: Identify and map nearby human settlements in the proposed railway corridor, paying special attention to communities or people potentially affected, if any. For such it will be necessary to collect socio-economic data as may be necessary to assess potential impacts on their income, livelihood status etc. Demographic data would include population (size, gender and age distribution); cultural characteristics (religion, ethnic composition, languages spoken, etc.); population migration over the last few years, livelihood and economic activities; literacy rates and levels of education; community organizations and social networks; public health and safety;

- Infrastructure: For each settlement potentially affected, describe the infrastructure such as level crossings, Public health, education infrastructure as appropriate if it is to be used or adversely affected:
- Poverty and Social Risks- For each settlement potentially affected, analyze the level of poverty and vulnerability including social risks such as prevalence of sexual and gender-based violence (SGBV), high-risk behaviours among youth, child and forced labour in the construction sector, community cohesiveness etc.;
- Cultural, archaeological, spiritual structures, and historic resources: identify all cultural, archaeological, ceremonial and historic resources in the impact zone/within the area of influence.
- Religious Groups and Ethnic/Other Minorities -Information on marginalized and vulnerable groups living in settlements along the railway, including indigenous communities, ethnic or other minority groups or other traditional cultural groups, if any.
- Vulnerable or disadvantaged groups (if any) and if relevant, social data should be disaggregated accordingly to the extent it is technically and financially feasible. To the extent possible demographic data should report on HHs with members with disabilities legacy issues on land take for the project and associated facilities.
- Legacy issues related to land use, property rights etc.
- Land acquisition and resettlement through development of section specific Resettlement Action Plans and or Livelihood Restoration Plans.

9.4.4. Impact Assessment Criteria

The prediction of the scale and significance of environmental impacts will be assessed against the established baseline conditions. The assessment criteria will be based on international requirements and good practice involving a ranking system to classify magnitude and significance of impacts. All activities for the Project will be assessed in terms of the significance of the impact on the receiving environment, for example, air quality, freshwater quality, freshwater ecology, and the significance of the impact of local society, including livelihoods, health, culture and employment. The major characteristics of impacts are:

- Magnitude - the level of change because of the impact.
- Duration and frequency - how long the impact will last - short term (1-5 years), medium term (6-15 years) and long term (more than 15 years).
- Spatial extent - whether the impact is local or wide ranging (regional).
- Quantitative assessments will be undertaken as necessary as part of the ESIA.

9.4.5. Mitigation Measures and Recommendations

Mitigation measures are actions taken to avoid or minimise negative environmental or social impacts. The mitigation hierarchy will be followed: avoid, minimise, restore or remedy, offset, compensate. Additional mitigation will be implemented to reduce significant impacts to an acceptable level, this is referred to as the 'residual impact'. The mitigation hierarchy should be followed: avoid, minimise, restore or remedy, offset, compensate. Mitigation measures should be clearly identified and linked to the Environmental and Social Management Plan (ESMP).

9.4.6. Monitoring and Follow-Up

Once the ESIA has been completed, monitoring and follow-up actions should be completed to:

- Continue the collection of baseline data throughout construction and operation;
- Evaluate the success of mitigation measures, or compliance with Project standards or requirements;
- Assess whether there are impacts occurring that were not previously predicted; and
- In some cases, it may be appropriate to involve local communities in monitoring efforts through participatory monitoring. In all cases, the collection of monitoring data and the dissemination of monitoring results should be transparent and made available to interested Project stakeholders.

Monitoring recommendations outlined in the ESIA will be carried through to the ESMP.

9.4.7. Residual Impacts

Those impacts that remain once mitigation has been put in place will be described as residual impacts.

9.4.8. Cumulative Impacts

Cumulative impacts are changes to the environment that are caused by an action in combination with other past, present and future human actions. The assessment of these effects is called a cumulative impact assessment (CIA). Assessment of cumulative impacts assessments will be included in the ESIA and may include considerations of interactions between the associated facilities.

9.4.9. Environmental and Social Management Plan (ESMP)

An Environmental and Social Management Plan (ESMP) summarises the mitigation and monitoring measures that should be employed during construction and operation for the Project. The ESMP will summarise the Developer's commitments to address, mitigate and monitor risks and impacts identified as part of the ESIA, through avoidance, minimisation and compensation/offset.

The ESMP will also ensure that all relevant stages of the project are structured to meet applicable laws and regulatory requirements. Where relevant, the ESMP will also cover management of third party and supply chain issues. The ESMP will:

- Include a monitoring plan aimed at tracking actions specified in the ESMP;
- Performance indicators linked to significant environmental and social impacts;
- Any regulatory monitoring and reporting requirements
- Specify the roles and responsibilities for implementation of the actions contained therein as well as for regular update of the ESMP.
- Specify any training or capacity-building required to ensure that personnel tasked with implementing the ESMP have the necessary awareness and skills to execute these functions effectively.

9.5. Proposed Structure of The ESIA Report

The ESIA will include the following:

- Review of relevant local, regional, and national environmental and social laws and regulatory requirements of the jurisdictions in which the Project will operate, including those laws implementing Serbia's obligations under international law. The ESIA will review the Project's compliance to relevant requirements, alongside the status of any material permits or authorisations needed.
- Project description, including alternatives considered and discussed with stakeholders (including potentially affected communities) and information on related operations and activities.
- Analysis of the physical, biological, and socio-economic environment likely to be affected by the Project for both the construction and operational phases. The baseline assessment will consider the interrelationship between relevant factors, as well as the exposure, vulnerability, and resilience of these factors to natural and manmade risks.
- Analysis of the likely impacts of the Project on the physical, biological, and socio-economic environment, which should identify and characterize its potential E&S beneficial and adverse impacts. It will be structured to include all relevant stages of the Project's lifecycle, e.g. pre-construction, construction, operation and maintenance, closure and residual E&S impacts. The level of analysis and reporting will be commensurate with the risk magnitude of the issues identified while mitigation measures will be proposed using the mitigation hierarchy.

The summary headings in the ESIA report are provided in the table below.

Section	Summary of Contents
Non-Technical Summary	Provides a Non-Technical Summary (NTS) for the ESIA.
Introduction	

Section	Summary of Contents
	Under this introductory chapter the Project background and key stakeholders, its purpose and objectives along with the ESIA process and the purposes of the ESIA report is provided;
Project Description	This chapter discusses the Project area along with the Project elements (components, activities and land use issues);
Legal framework	Under this chapter are discussed the requirements of the EIB, national requirements on the different stages of the ESIA process. A detailed comparison between them is provided and after a gap analysis, the applicable regulations/standards are selected;
ESIA Methodology	This chapter provides the approach and methodology for Project impacts' evaluation; the methodology used for options comparison is also discussed;
Baseline information: Noise and vibration, air quality, climate change, geology, soils and hydrogeology, landscape and visual, surface waters, ecology, socioeconomic environment	This chapter provides a description of the baseline information. For each topic the used material and methods are provided;
Impacts and mitigations	This chapter describes the main sources of impacts and the potential impacts that may raise from the project development, as well as the suggested strategies and measures to avoid/reduce any eventual significant impact
Monitoring programe	This chapter provides for the environmental parameters that are regularly monitored by the National Environmental Agency and other institutions and agencies, as well as on the environmental and social parameters that should be monitored during the Project's implementation;
Main findings	This chapter gives the main findings of the ESIA report regarding any negative or positive environmental and socioeconomic effect of the proposed project.
Stakeholder Engagement Plan (SEP)	Develop guidelines for engagement of relevant stakeholders at certain stages of ESIA process
Environmental and Social Management Plans (ESMP)	Develop an Environmental and Social Management Plan as a part of the ESIA.

9.6. Timeline for the ESIA

In the table below is presented timeline for ESIA. Dates are related to the preparation of spatial plan and obtaining of location conditions.

Table 68. ESIA timeline

Activity	Aditional information	duration	
Environmenta & Social Impact Assessment	start = start of DRP	July 2023	May 2025
ESIA Scoping Report		August 2024	October 2024
Stakeholders Engagement	start with DRP	July 2023	May 2025
Baseline surveys - 1st phase	together with DRP	September 2023	December 2023
Baseline surveys - additional	end 2 months after Scoping	September 2024	December 2024
Elaboration of ESIA	min 9 months	May 2024	February 2025
Submission of Draft ESIA/EIA report	6 months after LCs	February 2025	February 2025
Review of Draft ESIA/EIA report/ Public Consultation	start = end of submission of ESIA	February 2025	April 2025
Finalisation of ESIA/EIA	start = end of Review	April 2025	May 2025

Submission of ESIA/EIA report		May 2025	May 2025