Republic of Serbia
Ministry of European Integration

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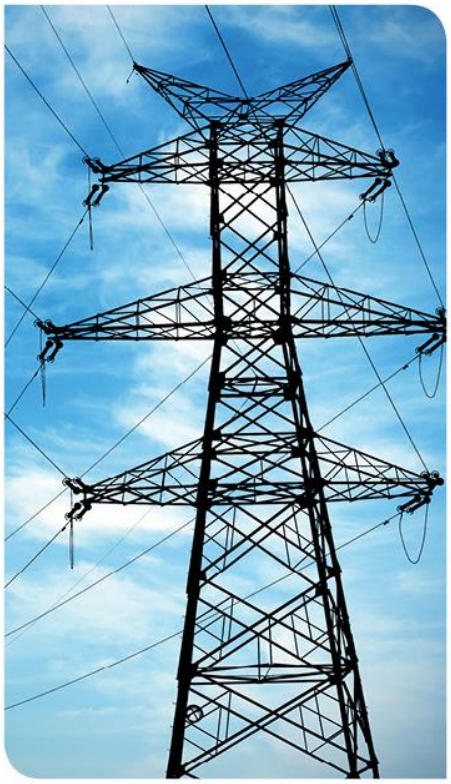



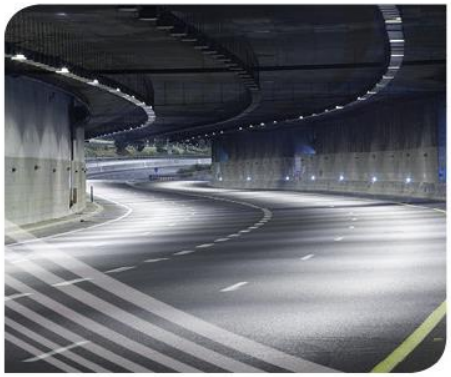

SCOPING REPORT

Reconstruction and modernization of the railway line Belgrade – Niš up to speed of 200 km/h

Preparation for Feasibility Study, ESIA and Preliminary Design

May 2022

EU PPF
PROJECT PREPARATION FACILITY

DOCUMENT CONTROL SHEET

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LIST OF ABBREVIATIONS AND ACRONYMS

AoI	Area of Influence
BoE	Beneficiary of Expropriation
CITES	Convention on International Trade in Endangered Species
CDF	Central Feedback Desk
CHIA	Cultural Heritage Impact Assessment
CHMP	Cultural Heritage Management Plan
CLO	Chief Liasion Officer
EBRD	European Bank for Reconstruction and Development
EC	European Commission
EIA	Environmental Impact Assessment
EIB	European Investment Bank
ERTMS	European Rail Traffic Management System
E&S	Environmental and Social
ESA	Environmental and Social Advisor
ESIA	Environmental and Social Impact Assessment
ESS	EIB Environemntal and Social Standards (2 February 2022)
ESMP	Environmental and Social Management Plan
ESMMP	Environmental and Social Management and Monitoring Plan
ETCS – L2	European Train Control System – Level 2
EU	European Union
EUD	European Union Delegation
EUNIS	European nature information system
GHG	Greenhouse gas
HR	Human Resources
IFI	International Financing Institution
ILO	International Labour Organization
IPPC	International Plant Protection Convention

IUCN	International Union for Conservation of Nature
JASPERS	Joint Assistance to Support Projects in European Regions
LRP	Livelihood Restoration Plan
LGAD	Local Grievance Admmision Desk
MCA	Multi Criterial Analysis
MCDA	Multi criteria decision analysis
MEI	Ministry of European Integration
MoCTI	Ministry of Construction, Transport, and Infrastructure
MoM	Minutes of Meeting
NGO	Non Governmnetal Organizations
NPAA	National Programm for the Adoption of the Acquis
OESMS	Operational Environmental and Social Management System
OHS	Occupational Health and Safety
PD	Preliminary Design
PFS	Pre-feasibility study
PPF9	Preparation Project Facilities 9
PRs	EBRD Performance Requirements
PPPPN	Spatial Plan of the Area of Special Purpose
RAP	Resettlement Action Plan
RoW	Right of Way
RPF	Resettlement Policy Framework
SEA/SH	Sexual Explotiation and Abuse/Sexual Harassement
SEECP	South-East European Cooperation Process
SEETO	South-East Europe Transport Observatory
SEP	Stakeholder Engagement Plan
SRI	Serbian Railways Infrastructure
TEN-T	Trans-European Transport Network
TMP	Traffic Management Plan
ToR	Terms of Reference

TSI	Technical Specifications for Interoperability
UNESCO	United Nations Educational, Scientific and Cultural Organization

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1. EXECUTIVE SUMMARY

1.1. Introduction

The project focuses on the preparation of the Preliminary Feasibility Study for the Reconstruction and modernization of the railway line Belgrade – Niš up to speed of 200 km/h. The modernized railway line should meet the requirements defined by the international agreements. The reconstructed and modernized railway for mixed passengers and freight traffic should be equipped with modern ERTMS devices and other characteristics in accordance with the requirements of interoperability.

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 regular passenger and freight transport.

Under the scope of this study, and in compliance with the environmental and social requirements of the IFIs, a brief scoping report, a Resettlement Policy Framework (RPF) and a Stakeholder Engagement Plan (SEP) have been prepared. These reflect the stakeholders' activities at the current project stage and indicate the main environmental and social elements of the project area of influence as well as any concerns identified. These reports have been prepared guided by and in compliance with the EBRD Performance Requirements (PR) and the EIB Environmental and Social Standards (ESS).

The analytical description of the baseline and of the impacts, mitigation measures and monitoring mechanism are described in the Scoping Report. These will be further detailed at the ESIA main stage. The Stakeholder Engagement process will continue as an iterative process, comprehensive and commensurate to the risks, impacts and level of interest of the stakeholders identified in the coming phases of the Project.

1.2. Legal Framework

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

The Environmental and Social Policy of EBRD (2019)[1] is one of the Bank's three good governance policies and a key document that guides the EBRD's commitment to promoting "environmentally sound and sustainable development" in the full range of its investment and technical cooperation activities. It sets out the ways in which the EBRD implements this commitment in practice and on the EBRD-supported projects.

The EIB Environmental and Social Standards[2] 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.

National Legislation

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 EBRD and 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.

[1] https://www.ebrd.com/news/publications/policies/environmental-and-social-policy-esp.html
[2] https://www.eib.org/attachments/publications/eib_environmental_and_social_standards_en.pdf, applicable to all Projects as of 1 March 2022

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, tunnels and stations).

International Regulatory Framework

The most relevant Directive is the EIA Directive Directive 2011/92/EU as amended by the 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

EBRD Environment and Social Policy EBRD’s document “Environment and Social Policy” (the Policy) and related Performance Requirements (PRs) detail the commitments of the Bank to promote environmentally sound and sustainable development across the full range of its activities. EBRD categorizes proposed projects as A / B / C based on environmental and social criteria to: (i) reflect the level of potential environmental and social impacts and issues associated with the proposed Project; and (ii) determine the nature and level of environmental and social investigations, information disclosure and stakeholder engagement required for each project, taking into account the nature, location, sensitivity and scale of the project, and the nature and magnitude of its possible environmental and social impacts.

The Project proposal falls under category “A” of the EBRD screening categorization as it is listed in Appendix 1, item 6. "Construction of motorways, express roads and lines for long-distance railway traffic; airports with a basic runway length of 2,100 meters or more; new roads of four or more lanes, or realignment and/or widening of existing roads to provide four or more lanes, where such new roads, or realigned and/or widened sections of road would be 10 km or more in a continuous length” of the EBRD’s 2019 Policy document. As such, the Project requires a special, formalized and participatory assessment process in compliance to the EBRD’s comprehensive set of specific Performance Requirements (PRs) that it is expected to meet, covering key areas of environmental and social impacts and issues.

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

1.3. 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.

Environmental baseline

The climate in the project area is continental to moderate-continental, and the amount of precipitation is usually up to 500-600 mm / year, while the air humidity is moderate. It is characterized by relatively colder winters, warmer autumns than spring and moderately warm summers. More specifically, low annual precipitation dominates, while the summer precipitation is characterized by strong evaporation due to high temperatures, with frequent occurrence of summer storms and showers. Winds are a very important factor causing differences in temperature, bringing precipitation or drought. Although the wind frequency is high especially in this area, its speed is low.

Landscape characteristics that include the analysed corridor is an important element for understanding the overall relationship between the planned object and the environment. The analysis of the terrain determined is based on different landscapes with visual characteristics that make up:

- The valley of the Velika Morava and the hills on the left bank of the Velika Morava; Bagrdan Strait; the Juzna Morava valley;
- Contact of hills and plain terrain which is mainly anthropogenically altered arable land;
- Constructed parts of the route where it passes through populated areas (Beograd, Sopot, Mladenovac, Smederevska Palaka, Velika Plana, Markovac, Lapovo, Begrdan, Jagodina, Paracin, Cicevac, Korman, Adrovac, Aleksinac, Grejac, Trupale, Nis) including the E-75 highway corridor; and other infrastructure facilities.

Throughout the research area, formations of different geological ages are represented. These are **t**he old Proterozoic sediments, which are most represented in Nis, Paracin, Aleksinac and Krusevac, the **m**esozoic sediments, the neogene sediments (these are dacites, andesites and quartzlates, while Miocene deposits are characteristic of this area) and the Quaternary sediments. Alluvial sediments stand out due to the large number of rivers in the study area.
In order to determine the seismicity of the terrain, maps of the Republic Seismological Institute of Serbia. The observed area is in the zone of seventh-eighth degree and eighth degrees of seismic scale MSC. The first part of the route of the existing line is in the zone of seven-eight degrees of seismic scale, and while most of the route is in the zone eighth of seismic scale.

In the area through which the railway passes, classes of fluvial and fluviogleic soils are characteristic, with azonal soil types standing out, differently developed and differently fertile. The main soil types are: alluvium, alluvium in cultivation, alluvial meadow land. For the area covered by the route of the Belgrade-Nis railway, it is characteristic that erosion is particularly pronounced in the coastal part of the Velika Morava River, where due to high waters certain parts of the coast fall off and the riverbed changes from time to time. This phenomenon is partially mitigated by the protection and landscaping of the coast. Due to the great erosion in its basin, Juzna Morava is rich in a huge amount of material that settles in the riverbed.

The network of stations for automatic air quality monitoring is, in accordance with the Law on Air Protection, recognized as a state network for air quality monitoring at the level of the Republic of Serbia. Taking into account the route of Belgrade-Niš railway, the relevant stations for automatic air quality monitoring are located in Belgrade, Ćuprija, Niš, while in the wider area and far from the railway are the stations of Kragujevac and Kruševac are located.

The nearest areas in which noise is measured are Kruševac, and the center of Niš, under the responsibility of the local Public Health Institutes, while they are not considered relevant for the section in question. There are also 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 the noise baseline..

The hydrographic network is quite dense in the plain terrain through which the existing railway passes and includes larger rivers: the Velika and Juzna Morava and their tributaries.

Based on the Decree on the categorization of watercourses (Official Gazette of the SRS, No. 5/68), the river Velika Morava belongs to the IIa subclass of watercourses, and the river Juzna Morava belongs to IIa and IIb subclasses of watercourses. Class II 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.

On the territory of central Serbia, the largest part of groundwater reserves is located in the areas of alluvial springs, primarily in the valley of the Velika Morava. The filtration characteristics of the sand-gravel layer along the entire length of the alluvium are favourable, and the water supply sources are mainly formed in the area of lower Pomoravlje. The use of groundwater is organized mainly through wells for the needs of individual households, while larger quantities for water supply are provided from the sandy sediments of the Neogene.

The catchment area of Velika Morava is rich in the occurrence of mineral and thermal waters, which is conditioned by the diverse lithostratigraphic composition and complex structural relations and the Great Moravian Neogene basin abounds in significant hydrogeothermal potentials. The route of the railway passes through the wider protection zone of the underground spring "Gorunja" in Paracin, however the section Gilje-Paracin is already constructed and Belgrade-Nis line will use the existing section..It passes near the wider protection zone of the underground spring "Garevine" in Lapovo, while Lapovo spring is on the opposite side of the E75 motorway with the distance of around

1 km. In this section of the railway, the protection measures prescribed by the Rulebook on the manner of determining and maintaining the sanitary protection zones of water supply sources ("Official Gazette of RS", No. 92/08) are applied, in order to avoid any side effects. Mladenovac and Smederevska Palanka springs are more than 1 km from the alignment.

Based on the hydrogeological properties of individual lithological environments as well as on the basis of structural types of porosity, the following types can be distinguished in this area: phreatic (compacted) type issued, artesian, fissure, karst, fissure-karst, and in some parts of the terrain complex type issued, as well as arid terrains. In some parts of the terrain, it is difficult to draw sharp boundaries between these issues. Also, there is the appearance of mineral waters on these terrains. The phreatic (compacted) type has a fairly large distribution within the study area. It was formed mainly within the alluvial, deluvial and terrace sediments of Quaternary age (Q); within the Pliocene (Pl1, Pl, Q) sediments, as well as within the Tertiary formations of the Middle and Upper Miocene age (M2; M3).

According to their origin, the habitats along the area of the railway corridor can be divided in two main categories: natural and anthropogenic habitats. Natural habitats include: forests, shrublands, grasslands, and water habitats. According to the literature data, along the corridor, several types of oak forest are identified: Quercetum frainetto – cerris, Quercetum petraeae – cerris, Querco- Carpinetum moesiacum and *Quercus robur* forest. As anthropogenic influence is very strong along the whole area, the natural vegetation along all three proposed variants of railway corridor is reduced to small fragments. Anthropogenic influence is very strong and ubiquitous in the whole area. Urbanization (settlements and roads construction), land reclamation, regulation of watercourses, expansion of arable land, the presence of herbicides and other pollutants led to degradation of natural vegetation. All this conditioned domination of anthropogenic habitats along railway corridor. Anthropogenic habitats include: agricultural land, grasslands and urban areas. Given the constant anthropogenic influence within these sites, domination of ruderal and invasive plants in their surrounding is expected.

Along the corridor, 37 protected areas are identified within the wider zone (5 km from each of the corridor), as it is indicated in the following table. Three protected areas are identified within the area of influence in the area of the railway corridor, 500 m each side of the line. This is a zone in which it is possible to expect impacts from the railway construction and operation on biodiversity.

Table 1 Protected areas in the wider area of the corridor

Name of protected area	National category	IUCN category	Distance from the railway corridor (km)
1. Rogot	Natural monument	III	0.1
2. Miljakovačka Forest	Natural monument	III	>0.32
3. Brzansko Moravište	The Special nature reserve	IV	0.35
4. Park Učiteljske škole Jagodina	Natural monument	III	0.6
5. Bajfordova Forest	Natural monument	III	>0.8
6. Forest Košutnjak	Natural monument	III	>0.9 km
7. Topčiderski Park	Natural monument	III	0.97
8. Bukav na Dedinju	Natural monument	III	1
9. Dud Zapis U Medoševcu	Natural monument	Not reported	1
10. Dva Stabla Himalajskog Borovca	Natural monument	Not reported	1
11. Stablo Kedra	Natural monument	Not reported	1
12. Stablo ginka	Natural monument	Not reported	1
13. Gradski Park Đurđevo Brdo	Natural monument	III	1.1
14. Avala	Outstanding Natural Landscapes	V	1.70 and 1.75
15. Arboretum of the Faculty of Forestry	Natural monument	III	2.2
16. Botanical Garden "Jevremovac"	Natural monument	III	2.8
17. Pionirski Park	Natural monument	III	2
18. Čempres Na Dedinju	Natural monument	III	2
19. Dve Magnolije u Botičevoj	Natural monument	III	2
20. Dve Tise Saborne Crkve	Natural monument	III	2
21. Ginko na Vračaru	Natural monument	III	2
22. Hrast Na CvetnomTrgu	Natural monument	III	2
23. Hrast sladun na Koporinskoj Kosi	Natural monument	III	2
24. Novoselski Brest zapis	Natural monument	Not reported	2
25. Platan Na Vračaru	Natural monument	III	2

Name of protected area	National category	IUCN category	Distance from the railway corridor (km)
26. Tisa u Botićevoj	Natural monument	III	2
27. Tisa u Požeškoj ulici	Natural monument	III	2
28. Akademski Park	Natural monument	III	2.9
29. Kesten na Dorćolu	Natural monument	III	3
30. Kosmaj	Outstanding Natural Landscapes	V	3
31. Veliko Ratno Ostrvo	Outstanding Natural Landscapes	IV	3
32. Zvezdarska Forest	Natural monument	III	3.4
33. Lipovička forest–Dugi Rt	Natural monument	III	4.8
34. Lalinačka Slatina	Natural monument	IV	4.8
35. Hrast Koče Kapetana - (Zapis)	Natural monument	III	5
36. Hrast u ulici Mije Kovačevića	Natural monument	III	5
37. Rajkovićev hrast	Natural monument	Not reported	5

On the territory of Belgrade, all proposed variants by the project overlap with the existing corridor, while in the wider zone of corridor (up to 5km) several protected areas are situated.

The Natural monument "Rogot" is situated in close vicinity of the railway corridor. This protected area is located in the central part of Serbia, 3 km from the Batočina village. The last remnants of the *Quercus robur* forest have been preserved in this area. In the past, these forests were widespread in Serbia, and today they have fragmentary distribution. During the next stage, field investigations will end up, among others, in the preparation of habitat maps, where the distribution of *Quercus robur* forests will be indicated.

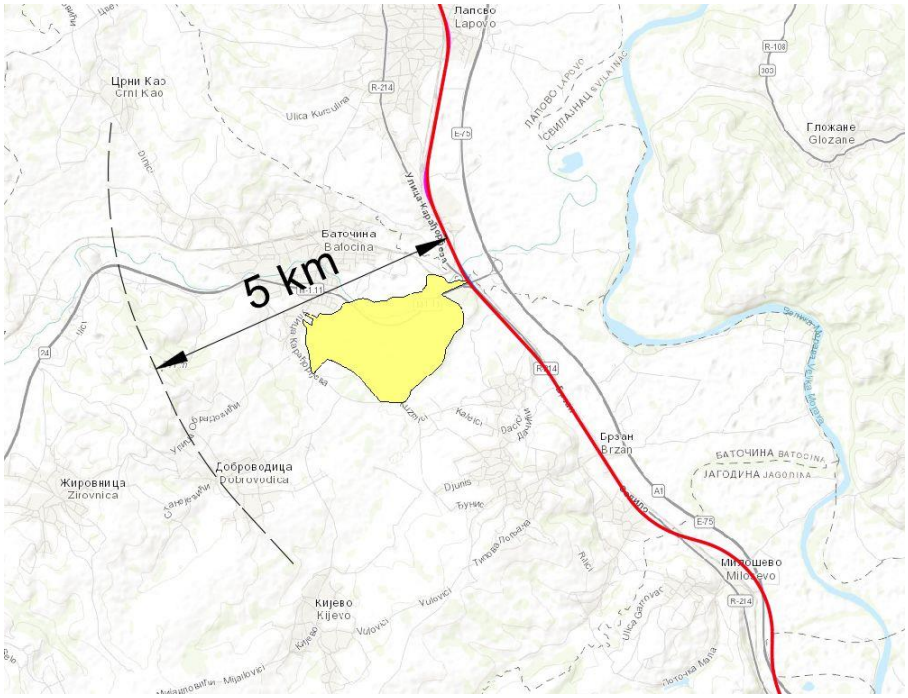

Figure 1 Rogot in relation with the proposed variants (approximately 1km)

The Special nature reserve "Brzansko moravište" is situated in the vicinity of the railway corridor. This reserve is located in Pomoravlje region, along the Velika Morava river flow between the villages of Brzan and Miloševo near Batočina village.

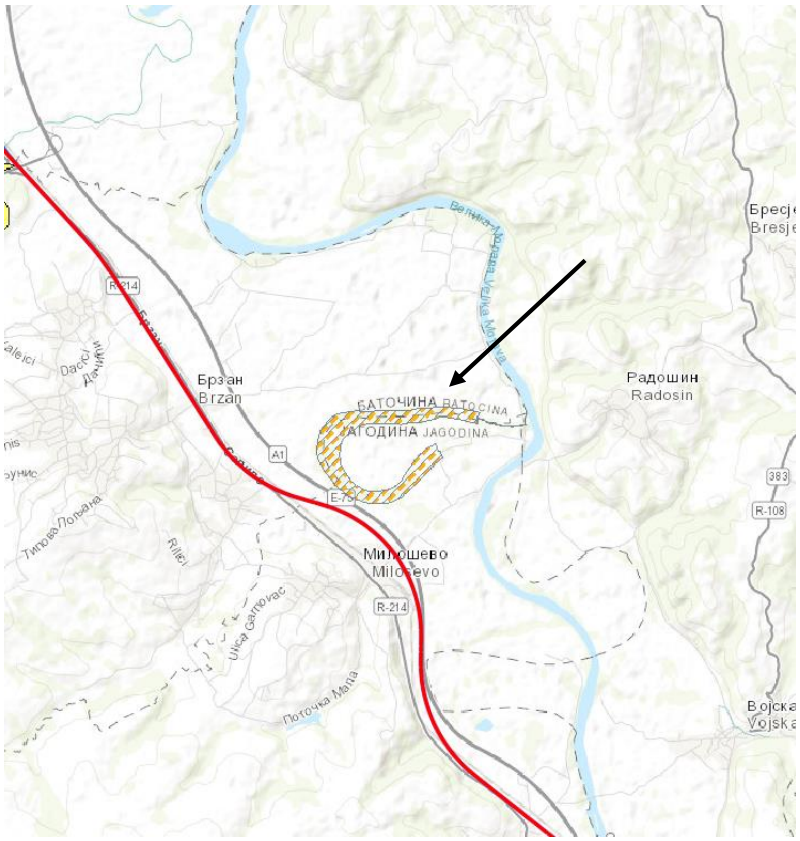

Figure 2 Brzansko Moraviste in relation with the proposed variants (in a distance of 0,35km)

4 IBAs are recorded along the corridor. Two of them are identified within the area of influence of the railway corridor: Gornje Pomoravlje and Dobrić-Nisava. Gornje Pmoravlje IBA is located in Central Serbia in the Valley of Velika Morava River in the vicinity of Paraćin. The habitats of this area are presented by remnants of *Salix* sp., *Populus* sp., *Alnus* sp., *Fraxinus* sp. and *Quercus* sp. forests. The following table indicates the two IBA crossed as well as two IBAs in the wider area. It is important to emphasize that Gornje Pomoravlje and Ušće Save u Dunav present Key Biodiversity Areas

(https://www.keybiodiversityareas.org/site/factsheet/27501; https://www.keybiodiversityareas.org/site/factsheet/27497).

A description of the 4 IBAs is given further below.

Table 2 Important bird areas identified along the corridor

Name	Area	IBA criteria	Distance	Decree on ecological network
Ušće Save u Dunav	9,926 ha	A1, A4, B1b, B2a, B3a, B3b, C2, C3, C4, C6 (2019)	3 km	Yes RS040
Donje Pomoravlje	8,244 ha	B1b, C6 (2019)	1,7 km	YES RS049
GornjePomoravlje	4,265 ha	B1b, C6 (2019)	cross	YES RS044
Dobrić-Nišava	35,389 ha	B1b, B2a (2019)	cross	RS048

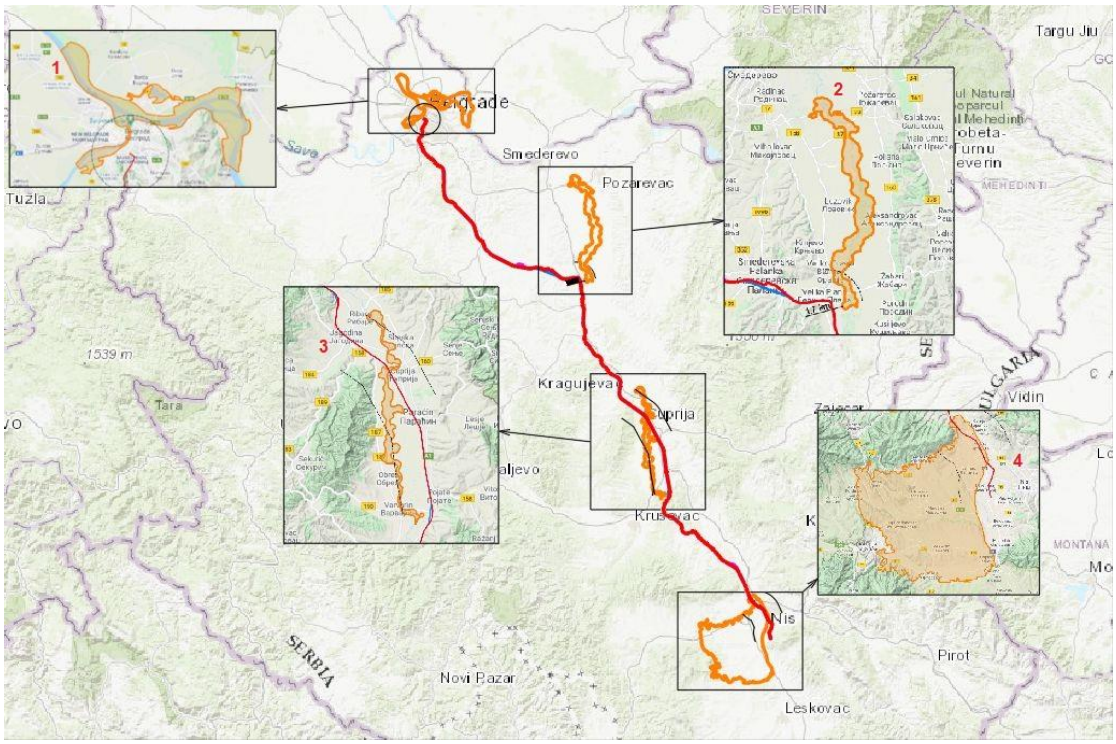

Figure 3 IBAs along the corridor

Within the affected zone of the railway corridor, two ecological corridors are identified: Velika Morava River and Južna Morava River. These corridors have international importance and present ecological pathways and connections that enable the movement of individuals of populations and the genes flow between protected areas and ecologically important areas, according to the Decree on ecological network According to Law on nature protection, Article 130, The ecological network will be established and become part of the European ecological network Natura 2000 by the day of the accession of the Republic of Serbia to the European Union.

The railway corridor crosses Mojsinje Mountain[3] and Stalać Gorge. This area used to be in the process of official protection, and the proposed protected area category was Landscape of outstanding natural features. However, Mojsine Mountains have been withdrawn from the protection process (although the Institute for nature conservation of Serbia website states that they are in the protection process), but WWF has initiated a revitalization procedure, which makes this area an area of interest for protection. Mojsinjske Mountains and Stalać Gorge is situated between Zapadna Morava River and Juzna Morava River. A mosaic of preserved natural habitats of *Quercus* sp. and *Fagus* sp. forests is one of the main values of this area. This area has been included in the evaluation of the separate ESIA for Stalac Djunis section, while the Project team proposed in the study that the Contractor should prepare a Biodiversity Management Plan.

One IPA is identified along the corridor: Lalinačke slatine. However, this area is outside of the area of influence, because it is 4.8 km away from the corridor. Ramsar sites and Emerald Areas are not identified within the area of influence.

[3] The Institute for national conversation of Serbia (INC) currently recognized Mojsinjske Mountains as national resource. According to INC national resource is defined as registrated natural resources are areas, species and movable natural specimen of importance for protection, for which no protection procedure has been initiated or implemented. In 2013, the Institute prepared a study for protection of outstanding natural resources of Mojsinje Mountains which was not recognized by the competent authorities in Serbia. With the preparation of the study procedure it was considered that this area is part of the national ecological network and therefore could be seen to be marked on maps. In the meantime, the protection procedure has not been initiated and the area has remained registered as natural resource. During 2021, the WWF raised the issue of protection of the Mojsinje Mountains, starting from local self-governments to relevant institutions and ministries. To date, the status of this area has not changed. The subject might evelove differently in the future. The Consultant will pay special attention to the evolution of its status in continuous consultation with the institutions. So far, this area remains unprotected by national regulations, but that every next step should be very carefully planned.

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 subvert the achievement of the development objective. The Social baseline has been created observing both greenfield and brownfield portions of the Project

Serbia constitues of 29 administrative districts which are not units of local self-governments but are established for purpose of state administration outside the headquarters of the state administration. Administrative districts are established by the RS Government decree, which also included the areas and seats of administrative districts. The Railroute passes through 4 Districts. Beogradski, Sumadijski, Pomoravski and Nisavski . and crosses the main cities and Municipalities.

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. The number of population is estimated in the inter-censual period for every year, including the census year. Thus, in 2019 the population of the Republic of Serbia is estimated to 6 945 235. In almost all municipalities through which the Belgrade-Nis railway corridor passes, the decline in population will continue in the future.The decline in natural growth will continue in large cities (Belgrade and Nis). It is estimated that the City of Belgrade will increase the number of inhabitants thanks to the positive migration balance, and among the municipalities the increase in the number of inhabitants due to the effect of the positive migration balance is expected only in the municipality of Jagodina. It is estimated that the Republic of Serbia will reduce the number of inhabitants even in the projection with a positive migration balance. The City of Nis, the third largest city in the Republic of Serbia, is also expected to have a declining population, with a positive migration balance.

Less than a half of the population of the Republic of Serbia is economically active (41.3%), whereby the share of male labor force (57.2%) prevails over the female (42.8%). The number of unemployed per thousand inhabitants was higher than the national average (68) in 2020 in all municipalities through which the railway corridor passes, except for the City of Belgrade (significantly below average) and the municipality of Svilajnac (slightly below average). All municipalities on the route had an average salary below the national average (551 EUR), except for employees in the City of Belgrade.

Regarding *migration*, in 2018, 122 193 persons internally migrated within the Republic of Serbia. The average age of persons who changed residence was 34.2 years (34.8 for men and 33.6 for women). The capital (Belgrade) region and northern Vojvodina region had a positive migration balance in 2018. In 2018 most of the persons moved from one municipality/city to another within the same area (39.1%), and at least from one to another settlement within the same municipality/city (23.6%). The largest number of migration movements was recorded in the territory of the Belgrade area, 50 982 (41.8%) immigrants and 44 004 (36.0%) emigrants. The South and East regions of Serbia, had a negative population trend and a deprivation of 3236 persons compared to the same period in 2017.This confirms that despite rural development measures the rural areas still struggle with depopulation.

Economic growth has disproportionately benefited rural and low-income households. In Serbia, the income of the poorest 40 percent grew by an annualized average of 3.9 percent between 2013 and 2017, higher than the income growth of 1.5 percent for the whole population. Previously rural areas had been particularly hurt following the global financial crisis. Between 2013 and 2017, with economic and jobs recovery, the poverty headcount ratio decreased by 9.6 percentage points in thinly populated areas, 6.0 and 2.9 percentage points in intermediate and densely populated areas, respectively. However, thinly populated areas continue to house more than half of the country's poor.

In 2019, in the Republic of Serbia, the average monthly income in money and in kind per household member (all households) amounted to RSD 24 955, which is an increase of 4.2% when compared to 2018 (RSD 23 960). In 2019 households in urban area on average disposed of RSD 26 897monthly per household member (RSD 25810 in 2018), and households in other area disposed of RSD 22108 per household member (RSD 21250 in 2018). Of the total budget available, 96.6% makes income in money and 3.4% makes income in kind. For households in urban area, money income makes 99.5% and income in kind makes 0.5%, while for households from other area this ratio is 91.5% to 8.5%.

Poverty remains significant, both in absolute terms (the share of persons whose consumption is below the threshold needed to meet their existential needs - 7.3% in 2016), and relatively high (the share of persons at risk of poverty is 25.5% in 2016). The at-risk-of-poverty rate by most common status in the labor market (lasting more than six months) indicates that the unemployed are in the worst position (48.0%, i.e. almost every other unemployed is at risk of poverty). Employment significantly reduces the risk of poverty, but the quality of employment remains a key factor in ending poverty (the self-employed have a significantly higher at-risk-of-poverty rate than employees at the employer,

32.4% vs. 9.0%). Retirees are in the most favorable position, after employees with employers, with a risk of poverty which is approximately at the level of total employees (15.4%).

Education is a decisive factor for a person's economic status and ability to generate income, and it is therefore not surprising that lower-educated people are above average at risk of poverty. The highest at-risk-of-poverty rate in 2016 - 2018 period was in the population with primary education and lower than primary school (39.1%), and the lowest in the at-risk-of-poverty population with high school or university education (10.3%). This distribution of the population at risk of poverty by level of education clearly indicates that education is important, since the labor market rewards highly educated people. The Poverty Risk Rate is higher than the national average (24.7%) in all municipalities except Belgrade area (10.5%), Lapovo (23.9%) and Cuprija (24.9%). The Gini coefficient is relatively uniformly high in all municipalities (between 32 and 36), and the relative risk of poverty is again in most municipalities (except Belgrade area and the municipalities of Lapovo and Cuprija) above the national average.

The share of *social protection* beneficiaries in the total population in all municipalities is relatively high and ranges from 6.8% in the City of Belgrade to almost 20 percent in the municipalities of Cuprija and Paracin. There are quite large differences between municipalities in the percentage of beneficiaries of cash social assistance. In the City of Belgrade, one percent of citizens receive it, and in the City of Nis, as many as five percent.

The 2011 Serbia census identified 164,884 or 2.68 % of *illiterate residents* in Serbia. In the Republic of Serbia, 51% of persons aged 15 and over are computer illiterate, that is, 34.2% of persons are computer literate, while 14.8% are partially computer literate (May 2019). 2011 research show that 18.5% of rural women did not complete high school education because pressures by the family to stay and work in the household or on the farm, 26% because of the attitude of the family that women do not need to attain higher education levels, 18% because of a lack of financial resources, and 10% because of early marriage and family care. Differences in educational attainments are much more prominent when adult population of urban and rural areas are compared.

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 archeological sites and 17 landmarks, while none of them is likely to directly be impacted. However, the area of impact is unlikely to directly impact cultural heritage and sites of cultural importance. Impacts to cultural heritage and archeological sites have been scoped in and will be analyzed in details at the Level of ESIA.

This conclusion relies on secondary publicly data available. The Rail station in Lapovo which is a site under prior protection as a valued structure of industrial architecture. For this site a Management Plan has been commissioned outside the scope of the Project and is under preparation. Conditions for management of this site will be required by the Institute for protection of Cultural heritage. The Church of St. Jovan i Stevanac near Cicevac is a cultural heritage of significant importance. While not under direct impact, its location within densely forested area should be taken into account and considered in details during the ESIA

Assessment of impacts to CH is constrained to the registered and known sites of tangible cultural heritage sites, while chance finds as per nature are not covered, and will be part of the mitigation strategy through the ESIA and ESMP. Emphasis in the next phase shall be given to impacts from access roads, borrow and deposit areas. In cases of suspected elevated risks, the ESIA shall prepare the Cultural Heritage Impact Assessment and a commensurate Cultural Heritage Management Plan to be developed as a self-standing document.

The CHMP will be prepared to define the avoidance, minimization and mitigation measures necessary to prevent those adverse impacts on known and unknown CH sites, as a result of project activities are prevented or, if not possible, reduced to as little as reasonably practicable during the construction phase. The objective of the CHMP is to ensure that work related to cultural heritage management is in accordance with the EBRD and EIB requirements, legislation of the Republic of Serbia, international conventions ratified by the Republic of Serbia, ESMMP, CHIA Project and best international practices to avoid, minimize or mitigate potential adverse impacts on CH

According to the Institute for protection of Cultural Heritage of Republic of Serbia (relevant to this project stage) recognisance of potential archaeological sites has been conducted in earlier years for other development projects or as part of planned archaeological investigations. These are within the Secondary Area of Influence but also some in the wider area of impact, but have been scoped in for the corridor of the proposed Ralline corridor: Archaeological locality Staro selo Staro i Novo selo Municipality Velika Plana, Archaeological site Lapovo (Municipality of Lapovo - in the area of the railway station Lapovo), Archaeological site Bagrdan, Archaeological site Bukovicka česma Bukovče (Municipality of Jagodina), Archaeological site Transkop (Municipality of Paracin), Archaeological site of Gornji Ljubeš (Municipality of Aleksinac), Archaeological site Prcilovica (Municipality of Aleskinac), Archeologically site Bankovac (Municipality of Aleksinac), Archaeological site Civlak (City of Nis).

The Section Stalac Djunis has not been observed separately as the impacts have already been under assessment through the Environmental and Social Impact Assessment Reconstruction and modernization of the Existing Railway Track and Construction of a Second Track on the Line Belgrade – Niš, Section Stalać – Đunis (IPA 2011-WBIF-Infrastructure Project -Serbia Transport WB8-SER-TRA-14 Europe Aid/131160/C/SER/MULTI/3C) and have formed part of the baseline under the CH section.

The Constitution of the Serbia proclaims principles of gender equality. Despite principles however, many women in Serbia face challenges combining paid work and child care responsibilities. This could be an additional cause for Serbia's low fertility rate, which is one of the lowest in European countries, and average in the region at 1.46 percent in 2014. 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 and 80 percent are male. Measured by the European Institute for Gender Equality (EIGE) Gender Equality Index, according to 2016 data, the value of Index for Serbia was 56, which was significantly behind the EU-28 average of 66.

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. The labor market participation is much lower for women than for men, as indicated by activity, employment, unemployment and inactivity rates. Vulnerability of women in particular when it comes to the share of ownership has been scoped in.

Vulnerable and disadvantaged groups, have been identified and their drivers of vulnerability scoped in, based on initial screening vulnerable groups, that could be affected by the Project include: retired, elderly and people with disabilities and chronical disease; single parent headed households, male and female; people with low literacy and ICT knowledge; economically marginalized and disadvantaged groups; persons living below the poverty line; women. Since the project location is not yet finally set the granular profile within detected vulnerable groups is not known at this moment.

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. The 2011 Census, has identified less than 150,000 Roma living in Serbia. Estimates of the actual number of Roma range between 300,000 and 600,000. 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. Among the Roma population, 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. 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 neighboring settlements in search of most often daily employment such as housework, cleaning services in companies, work in agriculture, etc.

Finally, regarding labor and informal employment, the incidence of informal employment is the highest among the youngest age group (15-19 years), of whom 76% are employed informally. Incidence of informal employment tends to decrease with age. This can be accounted to the low level of professional experience of 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. The Labor Inspectorate reports that 52.375 informal employment cases have been confirmed during the inspections conducted between 2017 and 2019 following which a total of 45.207 was transformed to formal employment.

Recent labor market improvements have also benefited women, older workers, and the 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 percent in 2014–17 and by more than 4 percent in 2018. Despite recent labor market improvements, many people in Serbia are not working or searching for a job. The highest share of informally employed workers of the total number of workers is in the wider project area in South and East Serbia (27.7%), followed by 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 sectors.

Of those informally employed the vast majority can be found in the agricultural sector (59.5% of all informally employed), followed by construction (7.1%). In other sectors, the share of informal work is less than 20%. The construction industry has a 34.9% share of informal employment in total sector employment and a 7.1% share of

sectorial informal employment in total informal employment. For this indicator data are not available at the level of project area. The risk from informal employment is scoped in and will be in details analyzed during the ESIA stage.

1.4. Environmental and Social Evaluation of options

Environmental evaluation

The criteria that were initially screened were biodiversity and protected areas, waters, floods, and noise. The results showed that all criteria have some similar scores for all variants. The MCA also took into consideration the criterion of reduction of external costs due to modal shift, placing it in the environmental and social category, which has been calculated by the design and CBA team.

Waters

All three proposed variants cross the same rivers and streams at different crossings. The table below shows all the water recipients crossed.

Table 3 Overview of the rivers crossed by the three variants

Section	
Belgrade - Velika Plana	**Velika Plana- Niš**
River crossings: Ralja, Resava, Bojanac, Mali Lug and Jasenica, Kubrušnica, Topčiderska and Lug.	**River crossings:** Gibavica Rečica, Rača, Lepenica, Grabovik, Konvanluk, Osaonica, St.Belica, Belica, Lugomir, Velika Morava, Crnica, Jovanovačka river, Akalavica, Toplik, Ražanjska river, Bučina, South Morava, Pločnik, Zmijarnik, Ribarska river, Srezovač river, Radevač river, Turija, Dašnička river, Juzna Morava, Bare, Nišava. **Stream crossings:** Grabovački , Kijevski , Ludi , Kameniti , Zmijič bara, Suvi , Mijatovački , Bačijski , Burdeljski , Slatinski , Suvajski , Planski , Vinogradski , Pajin , Krnji , Jabučki , Vretenjski , Livadski , Hajdučki , Kukin , Suvi , Suhotnički , Drenovački . **Next to the railway there are:** Žarkov stream, Simin stream.

From the rivers and streams above, there have been excluded for the evaluation those ones that all variants cross at the same point, since they may follow the existing alignment. Therefore, taking into account the lack of data on the quality of rivers and streams and the very early stage of design, this criterion can be assumed that has an equal result in the evaluation of the alternatives.

Biodiversity

For the evaluation of three proposed variants, the following impacts on biodiversity were taken into consideration in this preliminary analysis:

- direct impact on flora and habitats (occupation, degradation, modification, devastation of habitats and loss of vegetation types and plant species);
- direct impact on fauna (habitat loss, disturbance to animals, casualties during the construction and collisions during the operational phase;
- Indirect impacts (habitat modification and fragmentation, behavioural disturbances, changes in ecological preferences).

The existing railway line between Belgrade and Niš was taken as the baseline route, with present and long lasting impacts. Planned deviations from the existing route in three proposed variants, along with expected activities during constructional and operational phases are seen as a main sources for environmental (biodiversity) impacts, and thus were the main targeted sites for assessment.

From the starting point (Belgrade railway station "Center") all three variants follow the existing railway mainly underground in urban area. . On the area of Belgrade, all three proposed variants pass by several protected areas (Natural Monuments "Košutnjak Forest" (less than 1 km, will be appropriately determined and further analysed in

the High-level E&S Assessment), “Miljakovačka forest”, “Bajfordova Forest” and “Topčiderski Park” (Table in the baseline with Protected areas in the wider area of the corridor) in a distance of maximum 1km.In the area between the city suburban settlements Resnik, Rušanj, Pinosava and Ripanj, three proposed variants deviate from the existing route, cutting the curves. Landscape mosaic consists of forest patches and agricultural land with considerable human activities presented.

Between the Ripanj village (Belgrade city municipality of Voždovac) and Belgrade city municipality of Sopot, all three variants mostly go separated, out of existing route, with partly overlapping of variants II and III. In the Sopot suburban area, all three variants confluence in existing railroad, continuing in southeast direction. There are no specific advantages between the proposed variants since all three crosses the landscape mosaic consisting of forest patches and arable land.

In the vicinity of Ratari village (railway station „Kusadak“), Variants I and II stay together on the new alinement while, Variant III follows the existing route.

In the Smederevska Palanka city area, a little bit eastern from the previous site, variants II and III stay together, following the existing route. Variant I separates and makes the deviation from the existing route south from the city, occupying the fertile soil and arable land. The variants II and III are more acceptable since they do not occupy and fragment the new areas, similar to a previous site.

In the area of city of Ćicevac, variants II and III together follow the existing route, while variant I separates and go through the plain west from the settlement. South from Ćićevac, both lines (all three variants) meet and follow the existing route further. The advantage of routes II and III is in fact that they occupy the same space as the existing route, while variant I would occupy the fertile soil and fragments the area.

In the area of Mojsinjske Mountains (between the Zapadna Morava and Južna Morava river flows), all three variants separate from the existing route and go to the hilly area of Mojsinjske Mountains , where the tunnel is planned. On the exit of tunnel, Variants I and II proceed overlapped, while Variant III separates again. Both lines go almost parallel, but Variant I is positioned deeper in the forested hill. After the hill, both lines meet in the flat alluvial valley of Juzna Morava river, following the existing route. The advantage of Variants II and III is seen through the less occupation of forested soil and less fragmentation of quite wide forested area of Mojsinjske Mountains.

Down the railroad to the ending point (City of Niš), the three variants mostly follow the existing railroad, with deviations on some sites in order to cut the curves.

It is not expected that reconstruction of pillars of old bridges will have barrier effect. During construction work, erosion of riversides and the riparian zone, as well as erosion of the river bottom might cause disturbances of animals and destruction of their habitats. However, during the construction of new pillars of bridges, there has to be taken into account the possibility that ecological connectivity of a water body might be affected, eg. by impeding the flows of water, nutrients and sediment or creating obstructions for species movement (particularly migratory species). The impact might also be on surrounding riparian zones and flood plains, which often provide valuable biodiversity habitat and ecosystem services for human beings. In this case, mitigation measures will be proposed to minimize negative effects during construction and operational phases.

It should be noted that the mentioned impacts would manifest their effects mainly during the construction phase, causing possible disturbances or temporary interruptions of the ecological corridors functioning. Also, with adequate mitigation measures applied, during the operational phase it should be expected that permeability and functionality of ecological corridors would be almost fully re-established.

Mainly Variant I deviates, occupying the arable land. After assessing the three proposed variants for the railroad in respect to biodiversity values and possible impacts during the construction and operational phases, it could be concluded that Variants II and III have a slight advantage over the Variant I, because both of them generally follow the existing route, while Variant I more often deviates, occupying the forested and arable lands, causing the direct and indirect impacts on flora, vegetation and fauna.

Based on the presentation done in the baseline, where all protected areas in a zone of 5km left and right from the axis were presented with their respective distance from the railway corridor, an evaluation of the Variants is indicated below. The figures that accompany the protected areas in the baseline section present all three Variants.

Table 4 Overview of the impacts of the three variants

Variant	No. of crossed PA	No.of PA in wider area (up 5 km from both side of corridor)	No. of IPA	No. of IBA	No. of PBA	No. of IFA	No. of EMERALD	No. of Ecological corridor	Vegetation type / Ecosystems	Impact
I	-	37	1	4	2	-	-	2	Natural habitats: forests, shrublands, grasslands, and wet habitats Anthropogenic habitats: arable land, ruderal grasslands and urban areas	Moderate
II	-	37	1	4	2	-	-	2	Natural habitats: forests, shrublands, grasslands, and wet habitats Anthropogenic habitats: arable land, ruderal grasslands and urban areas	Moderate
III	-	37	1	4	2	-	-	2	Natural habitats: forests, shrublands, grasslands, and wet habitats Anthropogenic habitats: arable land, ruderal grasslands and urban areas	Moderate

Ramsar sites and Emerald Areas are not identified within the affected zone. This criterion has an equal result for all variants.

Climate change – floods

By viewing the map of affected areas by the flood of 2014, the conclusion is that the adjacent areas of Velika Morava primarily and of Juzna Morava secondarily are flood prone.

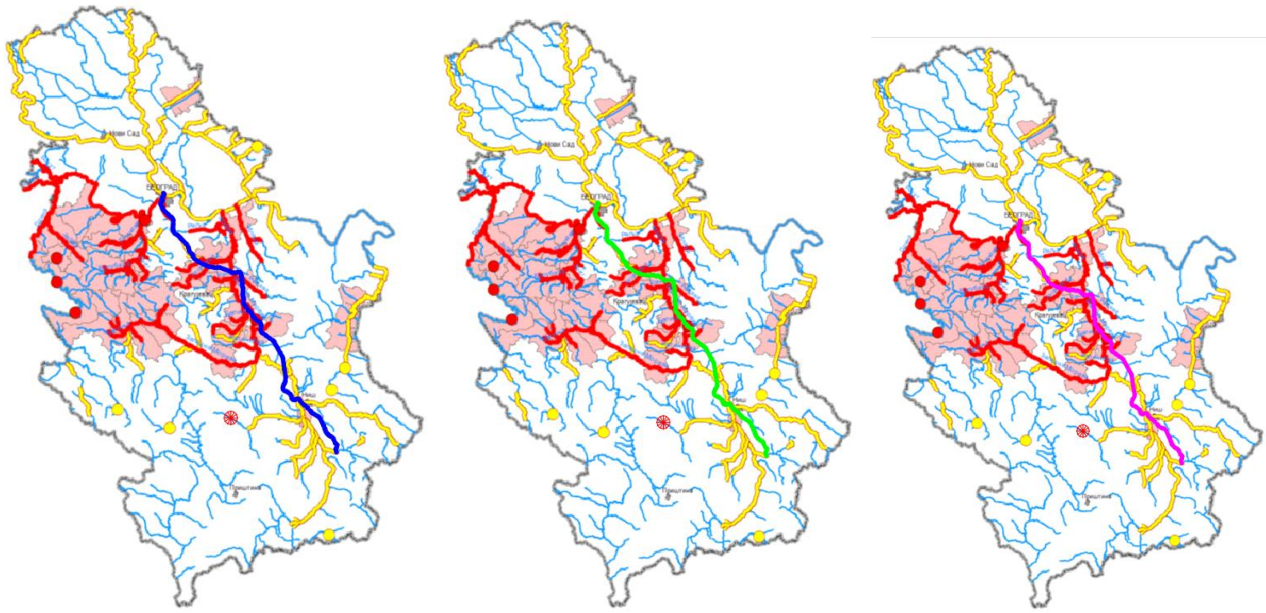

Figure 4 Overview of the three Variants regarding floods (flood of 2014) (with Blue Variant I, with Green Variant II and with purple Variant III)

More significant problem can be identified in the areas of Smederevska Palanka, Paracin, Cuprija and Jagodina, while all three variants pass through these areas. Since flood risk maps are not currently available, taking into account that all three variants cross or are close to the aforementioned areas while they all cross the two main rivers with the flood prone areas, at this very preliminary stage, a conclusion can be made that due to the small variations of the three variants, the criterion has an equal result for all variants.

Noise

The comparison of noise effects was performed by comparing the position of all three proposed variants in relation to the nearest populated places. Bearing in mind that for the most part all three variants go along the same corridor, we observed only the places where the railway corridors differ. The largest cities through which the railway passes directly were taken into consideration. The following table presents the magnitude of noise impact per affected

settlement. Settlements that indicatively selected are those that where the Variants differ when passing by as well as those which are major ones along the corridor in order to assess the impact.

The Variant which is closer/closest to/crosses a settlement and is considered as new is presented as HIGH, the Variant which passes to a more rarely populated area or it is on existing line which is being rehabilitated is presented as MEDIUM and the variant which is in existing line and is being rehabilitated, while other types of activities with noise impact occur or passes far from populated areas is presented as LOW.

HIGH =1, MEDIUM =2, LOW = 3

Table 5 Overview of noise impact for the three variants

Location	**Variant I**	**Variant II**	**Variant III**
Ralja	2	2	2
Mladenovac	2	2	2
Ratari	1	1	1
Smederevska Palanka	2	2	2
Velika Plana	2	2	2
Novo Lanište	2	3	3
Jagodina	2	2	2
Ćićevac	2	2	2
Žitkovac	1	1	2
Sum	16	17	18
Average	1,8	1,9	2,0

From the evaluation above, the three Variants have very minor differences, since for the majority of their length they follow the existing line. Variant III is slightly more favorable, while Variant I is the least.

Social evaluation

The level of technical details available at this stage allowed the assessment of social considerations and comparison between the Variants by comparison of indicators for the selected social criterions. Given the lack of granularity of the design at this stage the assessment had been achieved by a combination of high-level assessments at areas/location where reconstruction is envisaged on the existing rail alignment and a in depth analysis excluding the assessment of associated facilities, such as deposit areas and borrow pits, as these have not yet been advised by the design solutions. Notwithstanding, given the nature of the Proposed project the analysis has integrated criteria's and evaluated alternatives with a conservative approach.

This approach requires all of the identified impacts assessed in course and for the benefit of comparison of alternatives will be revisited during the ESIA Stage to specifically identify the magnitude and scope of impacts. This in particular refers to impacts stemming from permanent land acquisition, resettlement and loss of access to assets. The social criteria were selected to cater to the most prominent social challenges and adverse impacts, so the analysis does not fall short even in cases where social impacts cannot be assigned monetary values. The decision has been coupled with and guided by the underlining mitigation hierarchy and core social standards and principles imposed by the national requirements, EBRD and EIB respectively. All of the proposed alternatives have been screened and results compared by utilizing the following social criteria and comparison of results.

- Displacement including economical (this includes loss of access to assets),
- Area of land affected
- Impacts on cultural heritage (i.e. identified CH sites are tangible, movable or immovable objects (sites, structures, buildings, groups of buildings, natural assets and landscapes with archaeological, historical, architectural, religious, aesthetic, paleontological and other cultural values)

The three different Variants were examined against land physical displacement impacts affecting private properties with and without formal title (informal- constructed without permits). The preferred alignment, Variant II, has been further adapted to avoid displacement impacts to the extent feasible at this stage (fine tuning).

The results below have derived by overlapping the available drawings (made available in .dwg and Google earth) with the official Georeferenced database of Serbia (Geosrbija) cross-referenced with the Orthophoto image.

The Project has adopted an adaptive design management model, and shall explore other viable and feasible adaptations within the option to avoid physical displacement impacts to the extent feasible (figures below present the best estimate at this stage):

Table 6 Involuntary resettlement affecting private property in the Primary Area of Influence.

Option Analysed	Impacted Residential Structures and Households (HH)[4] (No) A=B+C	Impacted[5] residential structures (With formal title /permit) (No) B	Impacted residential structures (Without formal title/Permit) (No) C	Impacted auxiliary structures (fences, barns, tool sheds etc) (No) D
Belgrade – Nis Variant I (within 8 m offset)	196	140	56	197
Belgrade – Nis Variant I (within 12 m)	243	179	64	197
Belgrade – Nis Variant II (within 8 m offset)	178	137	41	154
Beograd- Nis Variant II fine tuning (within 12 m offset)	165	101	64	25
Beograd – Nis Variant II fine tuning (within 8 m offset)	110	66	44	22
Beograd – Nis Variant III (within 8 m offset)	133	101	32	36
Beograd- Nis Variant III (within 12 m offset)	139	101	38	26

These data presented are indicative only and the final data and numbers will be confirmed in the RAP.

The Section of the Railway Beograd-Nis, from Stalać to Djunis has been subjected to a separate Environmental and Social Impacts assessment in 2016. Also, a Resettlement Action Plan covering impacts stemming from involuntary land acquisition and resettlement is currently ongoing based on a detailed Expropriation Design (opposed to the remaining stretch where assessment of impacts within the Primary Area of Influence has been assessed based on high level design details). The figures above also include inventory of land and assets for the section Stalać to Djunis.

For construction purposes, the Stalać to Đunis section has been divided into two LOTs. LOT 1 refers to the construction of one tunnel, approx. 3.3 km long and access roads, while LOT 2 refers to all other works on the section and is the subject of the RAP. The Project will be built in accordance with the FIDIC Yellow Book (design and build contract), which means that SRI will select a Contractor to develop a detailed design and do the construction works. At the time of developing the RAP, it has been established that a total of 23 privately owned structures will definitely need to be acquired, of which only 2 (two) are permanently inhabited (one with operational business space on the ground floor) and one occasionally inhabited (weekend house). Two business structures (one of which is partly residential) and 15 nonresidential structures are affected, as well as three structures in ruins.

A total of five structures owned by SRI, which are in use (5 apartments and two houses), will need to be demolished (inhabited/used by 7 households). In addition, the Project requires the demolition of three structures which are

[4] The exact number of households is not known at this stage. For the purposes of the assessment the methodology that at least one household is impacted per each structure has been applied. During the Census and Socio-economic survey, the precise number of affected HH will be identified.

[5] Cadastral data identified some land parcels host more than 1 structure. Whether all of these are permanent dwellings could not have been identified from secondary data. Currently the estimate has included only structures clearly identified as residential. The detailed inventory of losses shall be identified during preparation of the RAP(s).

uninhabited and in ruins, a football field, as well as 2 structures owned by the municipality Ćićevac[6]. According to the preliminary Expropriation study for the Section Stalac unis, a number of additional structures have been identified as potentially affected by expropriation. Following extensive field work and analyses of the route, it was determined that most, if not all of these structures may be avoided by a minor change in the expropriation line. At the time of developing the RAP, a request was submitted to the responsible company preparing the updated Expropriation study to consider proposed changes in the expropriation line to avoid these structures.

Economic displacement impacts for section other than Stalac -Djunis could not have been quantified at this stage. The very rough estimates of impact to the area of land impacted as provided by the designers varies between 386 and 453 Ha. Only at the level of the Design for Expropriation will the exact area be known including whether individual plots are affected in their total area or just parts of it. Detailed figures for all impacts will be established in the RAP(s). Auxiliary structures affected were not quantified.

1.5. 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

The landscape parameter is scoped in for both phases.

The Project, passes by the Velika and Južna Morava valleys, populated areas including the E-75 highway corridor and the canyon of Južna Morava. For most 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 per section.

Air

This parameter will be scoped in in both phases.

A number of on-site construction activities will contribute to the increase of dust and PM_{10} 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 PM_{10} during construction will not result in any significant air quality effect. Residual effects are considered to be 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 PM_{10} and NO_2 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 for each Section at the ESIA stage.

Climate change

[6] The data have been taken from the draft Resettlement Action Plan for Stalac Djunis dated April 1, 2022 provided by the RAP Consultant.

The climate change parameter is scoped in for both phases.

The most dominant climate change impact in the wider area is floods, especially in the vicinity of the Velika and Južna Morava rivers. In the major flood of 2014, the railway parts of Paraćin-Ćićevac, Velika Plana - Smederevska Palanka and Jagodina were affected. Other climate change incidents will be temperature increase, precipitation decrease (in terms of frequency), precipitation increase (in terms of intensity), wildfires and landslides. Further analysis is given in the vulnerability assessment of the PFS.

The key steps of the ESIA for GHG emissions will be to quantify expected changes to GHGs in future years and to explore opportunities for mitigation in the Project design. 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.

Several settlements are and will be bisected, where with the appropriate mitigation measures (noise barriers, window facades), 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. The noise levels generated by construction have the potential to impact upon nearby noise-sensitive receptors. Noise levels at any one location will vary as different combinations of plant machinery are used throughout construction activities, while the specific locations of these activities will also change. Assumptions will be made on the likely phases during the construction period and the type, location and number of plant items operating in each of them.

Noise predictions will be undertaken for a study area of 300m either side of the railway to represent a typical daytime operation. Main core phases can be site preparation, earthworks, bridge construction, tunnel boring machine and rail track construction. It is expected that once good practice measures are implemented the majority of activities will not give raise to significant effects.

Regarding vibration during construction, a desktop assessment will be undertaken in order to determine impacts along the route due to vibration levels arising during the construction phase. This involves assessing annoyance from human receptors and also damage to building structures.

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 passenger and freight services. The ESIA per Section will assess the potential noise and vibration impacts from both the construction and operational phases of the Project.

Waste

The ESIA will assess the potential impacts from waste and wastewater generation during construction will be scoped in. During operation, impacts from waste and wastewater generation have been scoped out.

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. Key design information collated and analyzed will include:

- The type and volume of materials to be consumed by the Project, including details of any recycled materials content.
- The type and volume of waste to be generated by the Project, with details of planned recovery and / or disposal method (for example on-site re-use, off site recycling, disposal to landfill). Special reference to hazardous waste has to be made regarding impregnated wooden sleepers.
- The cut and fill balance.
- Details of any materials to be specified, where sustainability credentials (particularly those that improve resource efficiency) afford performance beyond expected industry standards.

Implementation of the mitigation measures provided in this assessment are expected to reduce the adverse effects on material resource consumption and generation and disposal of waste and align the Project to EBRD Performance

Requirement 3: Resource Efficiency and Pollution Prevention Control. With the application of mitigation, the effects for materials and waste have the potential to be reduced and be not Significant.

During operation, there is anticipated to be minimal waste and therefore this has been scoped out of the ESIA.

Geology and Soils

These parameters will be scoped in, for both construction and operation phases.

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. Currently there are no data for topsoil quality and geological characteristics. 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, areas of hardstanding associated with residential areas and areas of woodland. The extent of topsoil fertility has to 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 extent of construction activities as well as the good implementation of measures can result in an impact of slight magnitude.

Regarding the operation phase, possible impacts on topsoil quality and soil erosion which with the implementation of mitigation measures can end up being of slight magnitude.

The ESIA will assess potential impact on soils and geology based onsoil and topographical data, data from existing published sources and geotechnical and soil investigations undertaken as part of the design work. From the existing data, erosion is highly pronounced close to the two main rivers of Velika and Juzna Morava.

Groundwaters

This parameter will be scoped in, for both construction and operation phases.

The ESIA will assess potential impact on groundwater quality and on any groundwater take on local users. Baseline data will be collected from existing published sources and geotechnical investigations undertaken as part of the design work.

The study area considered for the purpose of the assessment consists of the area within the expropriation corridor. It is also defined by the potential receptors that maybe affected by the Project according to potential groundwater flow paths that might extend away from the project alignment towards surface waters and groundwater aquifers. The study area typically encompasses groundwater aquifers up to 1km from the Project that have the potential to be affected directly by the Project.

The sensitivity of groundwater aquifers is not known, as well as the depth of the groundwater table of the aquifers. Most of the railway line runs over groundwater bodies of shallow intergranular porosity as it is presented in the relevant section of baseline.

The results of geotechnical investigations that will feed the ESIA per section will assist in the better assessment of impacts. Potential impacts will be provoked in groundwaters from leaks/spills from HGVs, machinery and hazardous material storage. Accelerated degradation may lead to a reduction in the quality of the groundwater by reducing the content of organic matter, contamination, salination and acidification. The project alignment crosses groundwater aquifers which are used for the supply of drinking water. The majority of the project alignment will run in parallel with the existing railway and will include bridges, tunnels, overpasses and underpasses.

The construction phase of the Project will be limited in time and physical extent. However, there is potential for large impacts, if the construction activities affect the quality of the groundwater resource as a potable water supply. This will be better clarified at the scoping report of the ESIA per Section.

Waters

The water parameter is scoped in for both phases.

Pollution risk to surface water bodies from increased sedimentation and spillages is a possible impact that may derive from land clearance, excavation, dewatering of excavations, tunnelling, construction of earth embankments and construction materials such as aggregate and stockpiles of topsoil. Temporary increased sedimentation within watercourses is also likely to occur as a result of the construction of bridge piers with the watercourse channel. Runoff

with high sediment load may have adverse impacts on adjacent water bodies through increasing turbidity and by smothering vegetation and be substrates.

Increased pollution risks from the discharge or spillage of fuels or other harmful substances associated with temporary works may also migrate to local surface water receptors. Currently, only the quality of the main rivers (Velika Morava, Juzna Morava and Nisava) is known, ie.all three rivers' quality vary from polluted to highly polluted, while the quality of smaller rivers and streams is not known. Surface water measurements are needed to be carried out at the ESIA per section so the magnitude and significance of this impact can be estimated.

The ESIA per Section will focus on the potential impacts of the Project's activities on water quality for key receptors (i.e. the Velika Morava River, the Juzna Morava River and their tributaries) both during construction and operation.

The study area for surface water characterization and assessment is defined according to potential receptors that maybe affected by the Project and the surface water catchment within which the Project is located. The study area typically encompasses surface water features up to 0.5km from the Project that have the potential to be affected directly by the proposed works.

Biodiversity

The biodiversity parameter is scoped in for both phases.

Habitat fragmentation caused by the physical presence of the railway track and the traffic of trains was found to have a large significance, particularly because of an abundant presence of habitats with a rich biodiversity. Along the railway, there are two ecological corridors which are part of the national ecological network of the Republic of Serbia. The physical presence of the railway tracks and the heavy traffic of trains during the day will considerably limit the free movement of animals across relatively long stretches of habitats that are rich in fauna and host important species (nationally and internationally protected species). The application of mitigation measures, particularly the construction of wildlife crossings at strategic sites, will certainly help to increase the permeability of the railway to wildlife. The impact would be distinguishable and measurable, although needed to be managed in appropriate way.

The decrease of animal populations would be due to the killing of animals by the traffic of trains as a result of increased collision and electrocution risk or by the fixed physical structures associated to the railway. Because of the richness of fauna all along the railway, and the high probability of accidents involving animals, the significance of the impact was found to be moderate to large. However, for habitats, flora and fauna, no proper assessment of impacts can be carried out if analytical field surveys are not done which will indicate the presence of flora and fauna species a full analysis of habitats.

To ensure conservation of the ecological network the Mojsinje Mountain and the Stalać Gorge on the Juzna Morava River, a Biodiversity Management Plan (BMP) should be prepared and implemented. It should include individual habitats or species management plans, including the IUCN Red List of Threatened Species. The BMP should encompass the necessary assessments of the area needed to fully comply with the EU Habitats and Birds Directives.

At this stage of the project, stakeholder consultation was carried out with the relevant biodiversity institutions in order to provide some valuable input to be taken into consideration. More precisely;

- Considering the barrier effect, pillars of the bridges in water bodies will not have such effect; however Belgrade-Niš railway itself represents a barrier for animals along its entire length. If the railway would be fenced, it will certainly have a barrier effect along its entire length, which should be regulated through mitigation measures, e.g. proposal for the construction of "green bridges".
- Regarding the impact of railway reconstruction on protected areas, sensitive areas, critical habitats, protected and strictly protected species, any open issues will be resolved and problems will be assessed through nature protection conditions according to the Law on Nature Protection (Articles 8 and 9 of the Law), which the investor is obliged to request from competent institutions (Institute for Nature Conservation of Serbia)..
- Project on potential NATURA 2000 sites in Serbia has been prepared. The results of the project will be submitted to the Ministry of Environmental Protection of the Republic of Serbia, during the next period, so the experts involved in the ESIAs per section should communicate with the Ministry about the availability and use of the database for this project.

- The Mojsinje Mountains[7] have been withdrawn from the protection process (although the website of Institute for nature conservation of Serbia states that they are in the protection process), but WWF has initiated a revitalization procedure, which makes this area an area of interest for protection.

  Taking into this consultation result, the consultation with the stakeholders should continue during the ESIA phase so the status of this area to be also then verified and better defined.

- Cumulative effect can be manifested after the reconstruction, ie construction of the railway and the period of exploitation, through possible intensification of urbanization and other human activities in the narrower and wider area around the route, which may result in additional habitat fragmentation, landscape change, pollution, increased noise level and further amplification of the barrier effect. Ultimately, these effects may, directly or indirectly, affect the population status of flora and fauna in the zones of influence.

- There are sites of special interest along the railway, such as snake hibernacles, or habitats within the IBA area where protected bird species nest / winter / feed, so these sites should be given special attention at later stages, detected them, determine on the map the areas where they are located and propose the necessary protection measures through the project, if necessary.

- There are no fish species of importance for protection in watercourses, but it is necessary to consult Law on Protection and Sustainable Use of Fish Stock, in order to avoid intensive works and disturbance, and to reduce the intensity of works, during spawning of fish species.

The ESIA per Section will assess the potential impacts of the Project's construction and operation activities on habitats, fauna and flora in the study area. The ESIA per Section will pay utmost care in assessing the project Biodiversity impact and will estimate via consultations and additional data to proceed to a screening for appropriate assessment for the 4 IBAs.

The baseline will provide a description of the habitats and fauna baseline and the wider ecological study area. The Area of Influence may extend up to a precautionary maximum distance of 500m of either side of the Project centreline (this could be less, i.e. 200m either side in areas where the existing line will be rehabilitated or constructed, while 500m in areas where appropriate assessment is needed), within which a level of acoustic impact will be experienced during construction and operation of the Project. This zone will be used to inform the scope of receptors requiring consideration through the assessment process (i.e. those potentially impacted) as well as providing the basis for predicting likely impact magnitudes.

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. Consistent with requirements of the EU Habitats Directive and Birds Directive, the assessment will also verify any natural protection areas that could be affected by the Project. Depending on the outcome of the assessment, there may also be a requirement to develop a specific Biodiversity Action Plan as a key mitigation strategy.

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, in particular at offline sections. However, during the scoping phase the result of the MCA i.e. Variant II has explored how the alignment can be refined with the aim to reduce/ minimize impacts on residential dwellings as much as possible.

As such, the technical details of a sub-option Variant II fine tuning has been explored bringing much of the alignment back on the existing route, within the ROW for the currently operation rail. The potential of the design to further avoid physical displacement impacts has thus clearly been presented with the detailed execution within the next stage of the Project i.e. within the Feasibility Study and the Preliminary Design. Avoidance of high sensitivity densely populated areas have been presented on an exemplary case basis in the chapter 7.2.2.

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

[7] Located in Stalac-Djunis section

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).

The adverse impacts have been observed against the below social receptors:

Community health and safety risk

Community health and Safety risk have been scoped in as risks during construction, reconstruction and operation. It is assessed that risks are constrained to the usual types of risks in similar Projects - such as 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, and other on and off-site risks. Given the scale of the Project and the reliance on vehicles to access the route, vehicle and road safety was identified as one of the biggest health and safety risks.

Labor and OHS risks

Labor and OHS Risks have been scoped in. The OHS risks associated with the activities are usual types of risks i.e. from working at heights, risk from working with electrical circuits, Risk from operation of machinery and equipment, inadequate resources, equipment, procedures, training. Also, construction works on the rail while the regular lines are operating poses significant impact. The ESIA and subsequent management plans will need to discuss and agree with the SRI in details the mitigation measures for construction works in the area of OHS. In the context of the COVID-19 outbreak, basic infection prevention measures can help the containment of the spread of the disease and protect the workers and the public but also develop response plans to cover minimising the virus spread. One of the prominent risks in the construction sector as also highlighted in the baseline section is the risk from shadowed and informal Labor. Risk from child and force labor is negligent given the country and Project context.

Land acquisition and involuntary resettlement

The most prominent impacts relate to the impacts from land acquisition and involuntary resettlement, loss of access to assets and loss of livelihood. The complexity of displacement has been duly appreciated and assessed through the option analysis. These impacts are scoped in and remedy carefully analysed, planned and delivered as it may negatively affect the economic and social well-being of affected people and provoke severe economic and social problems in the origin communities. Project-induced involuntary resettlement shall be minimised by analysing alternative project designs and locations.

However, total avoidance is not feasible and therefore the following impacts are anticipated: 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 and Loss of livelihood. Fragmentation of agricultural land is seen as a significant residual impact based on past large scale infrastructure development projects in Serbia.

As a result of the initial assessment of social impacts (both of formal and informal ownership) the potential and intention of the design to further avoid physical displacement impacts has clearly been presented with the detailed execution within the next stage of the Project i.e. within the Feasibility Study and the Preliminary Design.

Avoidance of highly sensitive densely populated areas are *without compromising the health, safety and well-being of affected people.* Unavoidable impacts shall be mitigated by implementation of the Resettlement Policy Framework (RPF) developed in pararell as a separate social management instrument for the Project. The entitlement Matrix and eligibility criteria have equally observed persons with or without legally recognizable claims to land and assets they hold. The compensation principles are based on replacement cost, with security of tenure for resettled persons protecting them from forced eviction.

A detailed socio-economic baseline assessment on people affected by the project, including impacts related to land acquisition and restrictions on land use will be part of the subsequent Feasibility and ESIA Phase once the Design is developed to the higher level of details. The assessment will identify impacts within a project's social context and the needs and rights of the affected people and develop appropriate actions to minimize and mitigate resettlement impacts. Areas of successful avoidance have already been identified and are presented in chapter 7.4.1, while results for structures affected for the improved Variant II fine tuning are presented in the following table. These data presented are indicative only and the final data and numbers will be confirmed in the RAP.

Table 7 Summarized social impacts regarding physical/ and or economic displacement within preferred option

Option Analysed	Impacted Residential Structures and Households (HH)[8] (No) A=B+C	Impacted[9] residential structures (With formal title /permit) (No) B	Impacted residential structures (Without formal title/Permit) (No) C	Impacted auxiliary structures (fences, barns, tool sheds etc) (No) D
Belgrade - Nis Variant II fine tuning (within 12 m offset)	165	101	64	25
Belgrade – Nis Variant II fine tuning (within 8 m)	110	66	44	22

The case for fine-tuning of the preferred alignment Variant II

Backgorund

While the fine-tuning of the preferred alignment will take place fully in the next phase, the social and technical teams have been working together to allow for a socially-adaptive design approach to be undertaken.

The exercise has been initiated during the final phase of the PFS and shall continue during the next phase. As a case study showing the approach forward, the integrated team, technical and social, engaged in examining the potential fine-tuning of the Variant II and sought to show how the minimization of the social impact of the preferred alignment will be further developed.

Human settlement on multiple points were identified for the sake of the exercise and the results show how the variant II social performance could be improved in the next phase with further investigation. The following paragraph shows how the approach will be implemented.

Vulnerable people

Impacts to vulnerable groups are scoped in and have been observed from the stakeholder engagement lens coupled with the risks stemming from land acquisition and involuntary resettlement as these groups will be represented in both the Project affected and other interested parties. Impacts to these groups are identified from the exposure to risks and adverse impacts and their sensitivity to those risks including their adaptive capacity. With the current baseline data and the subsequent in depth household surveys, outreach and communication strategies in line with the SEP, the Project will ensure that vulnerable groups are not disadvantaged in the resettlement process, are fully informed and aware of their rights, and are able to benefit equally from the resettlement opportunities and benefits.

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. The assumption is that Roma women use rail transport as the cheapest form of transport to neighboring settlements in search of most often daily employment such as housework, cleaning services in companies, and work in agriculture.

Women and men have equal right to own and inherit assets. Despite the policy efforts women ownership over assets still lags behind. However, the share of formal title women have over land which ranges from 19,2% (in rural areas and areas with a higher percentage of Roma population compared to other Municipalities crossed by the alignment) to 39,9% in developed urban areas of Belgrade (Savski Venac, Rakovica and Vozdovac) indicate that this is a driver of vulnerability in particular with the land acquisition needs of the Project. Further vulnerability assessment will be

[8] The exact number of households is not known at this stage. For the purposes of the assessment the methodology that at least one household is impacted per each structure has been applied. During the Census and Socio-economic survey, the precise number of affected HH will be identified.

9 Cadastral data identified some land parcels host more than 1 structure. Whether all of these are permanent dwellings could not have been identified from secondary data. Currently the estimate has included only structures clearly identified as residential. The detailed inventory of losses shall be identified during preparation of the RAP(s).

directed toward economic impacts relating from station/halts closure. These have been scoped in although the initial decision from the technical perspective aims to close some stations mainly on those lines operating at the speed of 200km/h. This would indicate that local and regional mobility would not be impacted. However, detailed assessment will follow under ESIAs for each section.

Cultural heritage

The Project for the most part closely follows the alignment of the existing railway. This reduces the magnitude of change and impact on surrounding receptors as the new railway would be seen in the context of the existing railway and its infrastructure (rather than as new, detracting features). In these locations, the Project is not expected to be at odds with the existing cultural heritage character. Where sections are offline (at a distance from the existing railway), the Project mainly passes in close proximity to other built forms, including settlements and other linear features, such as roads. However, this parameter has been scoped in although archaeological sites and cultural heritage sites are present in the broader Project area and direct impact to registered sites is unlikely. The baseline has presented the sites identified, while more granular information will be known at the next stage once the physical footprint of the Project is set and the design is informed with detailed conditions from the relevant cultural heritage authorities (at national Level and Nis). Risk to which potential cultural heritage sites unknown at this stage may be exposed to be Impacts to cultural heritage by chance finds during earthworks. One cultural heritage site is under prior protection – the Rail station in Lapovo which is counted as a valued structure of industrial architecture. For this site a Management Plan has been commissioned and is under preparation. However, this assessment is constrained to the registered and known sites of tangible cultural heritage sites, while chance finds as per nature are not covered, and will be part of the mitigation strategy through the ESIA and ESMP.

The Church of St. Jovan i Stevanac near Cicevac is a cultural heritage of significant importance. While not under direct impact, its location within densely forested area should be taken into account and considered in details during the ESIA. Emphasis shall be given to impacts from access roads, borrow and deposit areas. In cases of suspected elevated risks, the ESIA shall prepare the Cultural Heritage Impact Assessment and a commensurate Cultural Heritage Management Plan to be developed as a self-standing document. The CHMP will be prepared to define the avoidance, minimization and mitigation measures necessary to prevent that adverse impacts on known and unknown CH sites, as a result of project activities are prevented or, if not possible, reduced to as little as reasonably practicable during the construction phase. The objective of the CHMP is to ensure that work related to cultural heritage management is in accordance with the EBRD EIB requirements, legislation of the Republic of Serbia, international conventions ratified by the Republic of Serbia, ESMMP, CHIA Project and best international practices to avoid, minimize or mitigate potential adverse impacts on CH.

1.6. Basic considerations for environmental and social monitoring

The characterization of impacts chapter defines how important is the evaluation of mitigation measures implemented during the construction works and during the operational phase, and describes the monitoring sites, methods and frequency of the environmental and social parameters relevant for the project.

Table 8 Environmental Monitoring during construction

Environmental and Social parameters	Sites	Monitoring Method and Parameters	Frequency of monitoring
Landscape	Construction sites and areas in the vicinity, camps and ancillary areas, auxiliary roads, bridges, tunnels,	Visual assessment of landscape impact	At the beginning date of the construction phase and then every three months, paying attention to high rainfall events.
Change in Geology, geomorphology, erosion/slides and seismicity	Rocks to be cut, soils to be dredged and used for fillings, agricultural, soils of semi managed and managed lands to be directly affected by construction activities	Visual evaluation considering quality and soil/rock structure and proprieties, existence of calcareous water pockets, slope gradient, draining systems and vegetation cover. Geotechnical analyses for rock characteristics and possibility of transmit of vibrations, sensitivity to slides and collapse phenomenon in tunnel sites, sedimentation and permeability. Soil physical characteristics and structure in agricultural and managed lands, river/streams valley and channel slopes in sites that will be directly affected by construction works	Once prior starting the construction works. Seasonally during construction works
	Cut/fill slopes, river valleys and Hill/mountain slopes to be affected directly by construction works Soil disposal in construction sites Slopes and valleys, upper soils level, green cover and soil stability Topsoil stockpiles	Volumetric Survey on loss of surface soils by erosion or by changes in topography (cut/fills). Site observations and visual inspection of works on sites prone to erosion and slide Volumetric Surveys and inspection of works for slope rehabilitation and erosion control Site observations and visual inspection of disturbed areas for top soil erosion and of top soil stockpiles for erosion.	Once prior starting construction works At the end of the works for slopes stabilization and re-vegetation Monthly with selected areas inspected after heavy rainfall events at the discretion of the environmental manager
	River bodies and valley slopes, bridge sites, channel slopes etc.	-Sites where bridges will be constructed, defining of monitoring sites etc. -Site observations and visual inspection	Once prior starting construction works. Daily during works in sea/river/stream/channel bodies Monthly till the end of constructions in water bodies.
Soil pollution	Soils to be dredged, and all sites directly affected by railway construction and its facilities - dismantling of existing infrastructure, where the soil may need to be decontaminated etc. . Areas for spills and leaks which might impact top soil quality	Soil quality analysis Content of pesticides/herbicides, organic and inorganic elements (in accordance of land use and possible soil pollution sources), Contractor records, site observations and visual inspection of unannounced sampling for particle size distribution, soil reaction, etc.	One set of analyses, prior starting the construction Seasonally (4 times/year), sampling/analyzing and monitoring during construction phase.

Environmental and Social parameters	Sites	Monitoring Method and Parameters	Frequency of monitoring
	and ultimately groundwater recharge areas.		
Seismicity	Along the whole corridor with focus on sensitive sites to earthquakes, slopes, unstable rocks, tunnels, bridge.	Evaluation of seismic norms of construction according seismicity parameters and map	Once before starting the construction works Seasonally during construction works
Wastes	Waste storage areas Toilets in working campus Waste transport vehicles Accidental waste distribution	Contractor observation and records, site observations and visual inspection of areas for draining and temporal collection of spills and leaks which might impact on soil quality, surface and ground waters. Visual observation of sites sensitive to leakage, or solid waste distribution by wind activity. Visual observation of cleaning, maintenance and disinfection of temporary toilets, septic tanks, Contractor observation and records, on temporary disposal sites of solid waste, their selection, charging in equipment for solid waste transfer Checking of vehicles for wastewaters and solid transfer, to be sure that no accidental leakages or solid waste fall down, during the transport. Observe and record of the cleaning and disinfection of waste sites. Identification and proper treatment of hazardous waste	Daily
Air quality, dust and noise and vibrations	Territories close to inhabited areas and settlements, natural habitats and woodlands and surrounding sites All construction sites, camps and ancillary areas.	Inspection and visual observation for disturbance of gases and dust emissions from construction sites. Air monitoring procedures will be implemented at sensitive receptors that will be defined in the baseline of the ESIA per Section along the expressway Monitor complaints of affected population Complaints register Air, dust and noises and vibration (dB) monitoring procedures will be implemented at sensitive receptors as will be defined by pollution sources that will come up in ESIA findings Visual checking of gas emissions for signs of not appropriate emissions from vehicles and equipment. Air monitoring procedures will be implemented if disturbance will be identified by community or workers complaints. If it will be exceedance of gas discharges or dust and noise generation, from the levels provided by profound ESIA and Environmental Permit, the works should be stopped and restart only after restoring of situation described on above mentioned documentation. Noise monitoring with hand held analyser with application software	Daily – supervisions and visual observations Regular monitoring of air and noise 4 times/year, Unannounced inspection during material delivery Quarterly during construction works for air Increased frequency during dry season for air In the beginning and then bimonthly for noise
Climate change	Sites sensitive to floods, Exposed lands without green cover, woodland and forests, agricultural lands, settlements	Inspections and observations of draining channels, in respect of mitigation measures due to floods. Measure the flood level and assets affected, in case of floods, and if needed propose amelioration of flood control measures.	Days with heavy rain. Twice per year (Springtime and winter)

Environmental and Social parameters	Sites	Monitoring Method and Parameters	Frequency of monitoring
		Record of public disclaims on risk of floods. Visual evaluation of fires in the sensitive sites and record the forest resistance during high temperatures	
Surface waters	All construction sites close from bridges	Surface water monitoring of main rivers, through water analysis of water turbidity and suspended solids, pH, TSS, electrical conductivity, temperature, dissolved oxygen, oil and grease, heavy metals, chlorides, sulphates, ammonia, nitrites, nitrates, TOC. Sampling stations will be specified depending on the ESIA needs Visual checking of construction sites for drainage and bridges. Measurement and analysis of the status and quality of the biological, physico-chemical, hydro-morphological and chemical parameters and charastericstics of the surface water bodies,and monitoring vis-à-vis EU Water Framework Directive (2000/60/EC) requirements.	Seasonal/ 4 times/year, regular monitoring Daily, visual observation of surface waters and possible leakages. Additional analyses in case of accidental pollution
Groundwater	At all construction areas close to groundwater recharge areas (hydro-geological windows)	Visual checking of groundwater discharges during excavation works for contamination and ensuring that these are sealed efficiently. Visual observation of leakages etc. In all sites, over recharge areas, monitoring of microbiological, heavy metals and organic parameters in existing wells for extraction of groundwater, should be analysed. The chemical parameters, to be analysed should be referred to the possible pollution/contamination elements. Measurement and analysis of the status and quality of the chemical and quantitative status of ground water bodies,and monitoring vis-à-vis EU Water Framework Directive (2000/60/EC) requirements.	Daily, visual observation Seasonal monitoring of groundwater and analyses Additional analyses in cases when leakages or other accidental pollution is observed.
Biodiversity	All terrestrial natural habitats.	Field investigation and observation of all natural habitats, especially sensitive habitats. Check of: Number of accidents with fauna Number of fauna (using testimonies, photos of species or their tracks etc) in surroundings of construction sites, Number and species of plants cut Number of trees and bushes planted Registering of damaged species with specific status. Identification of migratory routes Percentage of completion of required measures, including: passages, barriers, surveys for reptiles, amphibians, mammals and bird nests. Photographs to compare habitats before and after restoration activities, and evaluation of rehabilitation with definitions of BMP/BAP, Pre / During / Post Construction Survey	Daily observation and record of construction woks in the territory of the ecological corridors Weekly observation for plants and wildlife, status of fences etc, to protect nests, etc. Seasonal inventory of registered flora/vegetation and wildlife with specific status.

Table 9 Environmental monitoring during operation

Environmental and Social receptors	Sites	Monitoring Method and Parameters	Frequency of monitoring
Landscape	Infrastructure and infrastructure facilities affect landscape directly and indirectly in the: ▪ Vicinity of tunnels and bridges and all major structures ▪ Sites close to the waste collectors nearby. ▪ Residential sensitivity areas. ▪ Sites exposed to torrential events and floods. ▪ All river and stream valleys.	Visual inspection: identification of erosion processes, poor and scarce vegetation cover, poor maintenance of structures.	At the end of construction activities and on yearly basis during spring time
Geology, geo-morphology, soil pollution and seismicity	River and stream valley, in surroundings of bridges, Slopes of cuttings, embankments, other areas prone to erosion	Soil monitoring Visual observation of landslides, erosion and de-vegetation in slopes prone to erosion Observation of vegetation status planted for soil stabilization Visual observation on changes in river flows and morphology, by bridges. Visual inspection of the railway for spills and leaks which might impact soil quality (and ultimately potentially groundwater), monitoring of particle size distribution, soil reaction, calcium carbonate content, organic matter content,	Seasonally (four times per year), Before operational activities and Periodically during operation: quarterly for the first year and then annually thereafter
Wastes	Sites close to the waste collectors of rail services etc.	Monitoring of waste management, waste vehicle routes and their frequency	Daily for waste management
Noise and vibration	Areas with sensitive residential receptors and passenger sensitive locations. These receptors will be identified in the baseline chapter of the ESIA per Section Regarding noise, areas where Lday exceeds 55dB and Lnight exceeds 45 dB	Monitoring of noise Measurement of vibration at sensitive receptors	Before operational activities and Periodically during operation: twice a year during year 1 and then once a year
Climate change	Sites prone to floods and heavy rains such as valleys	Observation and recording of effects during heavy intensive rains or floods, recording of maximal level of water	Once per year for pavement monitoring

Environmental and Social receptors	Sites	Monitoring Method and Parameters	Frequency of monitoring
			After every heavy rain or flood.
Surface waters	Railway line areas close to surface water bodies (bridges)	Surface water monitoring of main rivers, through water analysis of water turbidity and suspended solids, pH, TSS, electrical conductivity, temperature, dissolved oxygen, oil and grease, heavy metals, chlorides, sulphates, ammonia, nitrites, nitrates, TOC. Sampling stations will be specified depending on the ESIA needs Measurement and analysis of the status and quality of the biological, physico-chemical, hydro-morphological and chemical parameters and charastericstics of the surface water bodies,and monitoring vis-à-vis EU Water Framework Directive (2000/60/EC) requirements.	At the end of construction activities and on yearly basis
Groundwater	At all railway line areas close to groundwater recharge areas (hydro-geological windows)	Visual observation of leakages etc. Measurement and analysis of the status and quality of the chemical and quantitative status of ground water bodies,and monitoring vis-à-vis EU Water Framework Directive (2000/60/EC) requirements.	At the end of construction activities and on yearly basis
Biodiversity	All terrestrial natural sites. Natural barriers on air pollution, noises and dusts. Ecological corridors	Use of crossings/passages by wildlife, based on visual observation traces, food remains. Status of artificial bio-corridors (opened paths, vegetation, water levels, Check growth of shrubs, trees and low vegetation, in natural barriers, reforestation/afforestation areas, river and stream valleys etc. Railway mortality per species or species group	Quarterly If hot-spots of direct mortality are detected, modifications to passages and/or ecological corridors should be considered

Table 10 Social monitoring during construction

Social parameters	Sites	Monitoring Method and Parameters	Frequency of monitoring
Impact to Archaeological sites and cultural resources (Chance find)	Construction sites and areas in the vicinity, camps and ancillary areas, auxiliary roads, interchanges, bridges, tunnels,	Visual check Site inspection reports Reconnaissance by relevant authority and archaeological /cultural heritage supervision During the construction work, if archaeological or historical sites and objects are discovered the Contractor shall mark and secure new identified sites (with a protective railing or other means of protection) to avoid damage in the course of road construction and immediately notify the relevant Institute for the Protection of Cultural Monuments.	At the beginning date of the construction phase and then every three months, paying attention

Social parameters	Sites	Monitoring Method and Parameters	Frequency of monitoring
Increased risk of illicit behaviour and crime	Construction sites and areas in the vicinity, camps and ancillary areas	Grievance Records (number of grievances received originating in illicit behaviour and crime) Percentage of local employment compared to the overall workforce (records of the Contractors) Cultural Awareness Training records (as needed depending on the country of origin of Contractor's and specific experience in the region and Serbia in particular) Skill development training content for local labor Local Law enforcement reports	Prior to construction Monthly
Risk of social conflict	Construction sites and areas in the vicinity, camps and ancillary areas	Training records on the Code of Conduct, Project Orientation and Cultural Awareness Consultation records and proof of interactions of local CLOs with communities in the vicinity of the camp accommodation	Monthly
Burden on and competition for public services (e.g. electricity, water, etc.) worker accommodation facilities will include additional or separate supply systems.	Along the whole corridor with focus on the areas with new construction activities	Grievances records related with the pressure on the public services and infrastructure (number of grievances related to utility malfunction, disruption or suspension in relation to project attributable activities)	Monthly
SEA/SH	Construction sites, camps	Grievance records (number of SEA/SH grievances received)	(Monthly)
Impacts on local infrastructure	Construction sites and areas in the vicinity, camps and ancillary areas	Incident/accident records regarding local infrastructure Community engagement records Grievance records	Weekly
Impacts on the local road network	Construction sites and areas in the vicinity, camps and ancillary areas	Visual inspections approved TMPs Incident Reports number and type of traffic incidents/accidents Training Records – records Vehicle Inspection records and driver logs Grievance records	Daily
Employment	All Municipalities in the social AoI	Statistics on workforce from the social AoI Project-specific Human Resources Policy and relevant	Monthly
Permanent acquisition of lands	Construction sites and areas in the vicinity, camps and ancillary areas	Documentation associated with implementation of RAP Documentation associated with implementation of Livelihood Restoration Plan Grievances records	Monthly
Temporary land allocation	Construction sites and areas in the vicinity, camps and ancillary area	Protocols with land owners Grievances records	Monthly
Fragmentation of land	Construction sites and areas in the vicinity, camps and	Documentation associated with implementation of RAP Documentation associated with implementation of Livelihood Restoration Plan Grievances records	Monthly

Social parameters	Sites	Monitoring Method and Parameters	Frequency of monitoring
	ancillary area requiring permanent land acquisition		
Damage to crops during construction	All construction sites, camps and ancillary areas.	Inspection and visual observation for disturbance Grievance records	Daily – supervisions and visual observations Unannounced inspection during material delivery Monthly
Physical and economic displacement	All construction sites, camps and ancillary areas.	Implementation of RAP and LRP as relevant Grievance records Expropriation records	Weekly
Labour and working conditions risk	All construction sites, camps and ancillary areas.	HR Policy Workers Grievance Mechanism Labor inspectorate records Contractors self-monitoring report	Daily for OHS related risks and monthly form employment and benefits related risks
Equal employment opportunity and Non-discrimination	All construction sites, camps and ancillary areas	HR Policy Workers Grievance Mechanism Labor inspectorate records Contractors self-monitoring report Gender disaggregated employment records	Monthly
Labour Risks and Impacts Related to Subcontractor and Supply Chain Management (Including Child and Forced)	All construction sites, camps and ancillary areas	HR Policy Workers Grievance Mechanism Labor inspectorate records Contractors self-monitoring report Gender disaggregated employment records Workforce statistics	Monthly
Health and Safety Risks due to General Occupational Health and Safety Hazards	All construction sites, camps and ancillary areas	OHS Performance Reports including accident/incidents, corrective actions, trends, risks, Subcontractor & supply chain performance	Monthly
Health and Safety Risks due to Physical and Chemical Hazards	All construction sites, camps and ancillary areas	OHS Performance Reports including accident/incidents, corrective actions, trends, risks, Subcontractor & supply chain performance Training Records	Weekly
COVID-19 Related OHS and Labor risks	All construction sites, camps and ancillary areas	OHS Performance Reports including accident/incidents, corrective actions, trends, risks, Subcontractor & supply chain performance (Number of confirmed COVID-19 cases) Adherence to safety protocol record Training Records	Daily
Health and Safety Risks due to Emergencies	All construction sites, camps and ancillary areas	OHS Performance Reports including accident/incidents, corrective actions, trends, risks, Subcontractor & supply chain performance (Number of accident/incidents) Training Records	Weekly

Social parameters	Sites	Monitoring Method and Parameters	Frequency of monitoring
Community Health and Safety Risks due to Construction Traffic	All construction sites, camps and ancillary areas	OHS Performance Reports including accident/incidents, corrective actions, trends, risks, Subcontractor & supply chain performance (Number of accidents/incidents) Training Records	Daily records on construction traffic
Health and Safety Risks on Accommodation	Camps and other workers accommodation sites	OH&S Induction personnel working on site Statistics on workforce using accommodation facilities. Grievance records Task specific training (Project employees, subcontractors & suppliers) Camp management plan Contractors self-monitoring report on workers accommodation conditions Grievance mechanism (number of grievances related to workers accommodation)	Weekly
Increased risk of communicable diseases and	All construction sites, camps and ancillary areas	SEP engagement records Health trends Training Records on health topics, community awareness, code of conduct	Monthly
Increased traffic and rise in accidents	All construction sites, camps and ancillary areas	Grievance Records Traffic Accident Records Training Records on drivers TMP approved by local authorities Visual inspections of the traffic control devices Training Records of the road safety awareness trainings within community & schools,	Weekly
Security around the Project site	All construction sites, camps and ancillary areas	Training Records – community consultations Training Records - security personnel Incident Records - security incidents Grievance mechanism (number of grievance related to incidents with security personnel)	Weekly

Table 11 Social monitoring during operation

Social parameters	Sites	Monitoring Method and Parameters	Frequency of monitoring
Health and Safety Risks due to Motorway maintenance)	The Rail Beograd -Nis and Operational Project Facilities	OHS Management Plan (number of operation related incidents/accidents)	Annually
Local Employment	Train Stations and official rail places	Worker Contracts Training Records Grievance Records	Annually

Social parameters	Sites	Monitoring Method and Parameters	Frequency of monitoring
		Labour Audit Repots	
Level crossings safety	All Rail level crossings	Grievance Records (Number of grievances related to safety at TLC) Incident Records (Number of incidents and root cause reports) SRI records on RLC incidents Training Records (number of awareness campaigns and completed trainings including of number of participants)	Annually
Transport of dangerous goods	The Rail Beograd -Nis and Operational Project Facilities	Grievance Mechanism OHS Management Plan TMP Dangerous goods records (number of relevant permits and certificates issued)	Monthly

1.7. Stakeholder Engagement

Operations and activities for which potential financing from the European Investment Bank (EIB) and the European Bank for Reconstruction and Development (EBRD) is sought fall under the application of their respective applicable Environmental and Social Standards. The Environmental and Social Policy of EBRD (2019) is one of the Bank's three good governance policies and a key document that guides the EBRD's commitment to promoting "environmentally sound and sustainable development" in the full range of its investment and technical cooperation activities. It sets out the ways in which we implement this commitment in practice and on EBRD supported projects. The EIB Environmental and Social Standards provide an operational translation of the policies and principles contained in the 2009 EIB Statement of Environmental and Social Principles and Standards and are grouped across 10 thematic areas covering the full scope of environmental, climate and social impacts and issues. In response to the commitment to comply with EIB and EBRD standards this SEP has been 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 c oncerns, 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 Cultural Heritage Institute of Serbia and Nis.
- A number of Biodiversity experts and stakeholders, Biologists, Ornithologists, Theriologists, Ichthyologists, Hunting associations
- Representatives from 24 settlements/local communities crossed by the Project (Presidents, Vice Presidents or Secretaries of the Community Offices (the smallest administrative cell in the administrative division

While the project plans to conduct an active engagement with non-state stakeholders during implementation as soon as the preparation of subprojects starts, a gender in transport survey was conducted during preparation of the World Bank supported Rail Modernization Project and feedback received from female population will be used for the design of the project. Given the importance of the Project as recognized by the Government, a media campaign is conducted to inform the general public about the project. An active stakeholder engagement will be conducted following approaches provided in this SEP 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.

Media searches for the past two years were conducted including NGOs, and apart from criticism related to the current state of the railway, no opposition or negative media coverage was found.

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

2.2 Project rationale

2.2.1 Project inclusion in main strategic documents

The Strategy of transport development on the railway network of the Republic of Serbia is oriented towards a balanced and even development of infrastructure, with a view to create a system in which railway traffic will be operated in a safe, efficient and reliable manner. The construction, reconstruction and modernization of the infrastructure capacities relevant for the implementation of basic principles of development of sustainable transport in the future period should contribute to the realization of the goals related to the improvement of:

- traffic safety and reliability of infrastructure and timetable elements,
- the level and quality of rail infrastructure services,
- implementation of European rail interoperability standards,
- accessibility of railway infrastructure,
- environmental protection, development adjustment and keeping the infrastructure elements in line with environmental requirements,
- energy efficiency,
- railway contribution to regional development.

The main arterial routes of the Serbian railway network stretch along the Pan-European Corridor X. According to the national categorization of railway lines (Official Gazette of RS, No. 50/19), these arterial routes consist of:

- Main line 101: Beograd Centar – Stara Pazova – Šid – State Border – (Tovarnik),
- Main line 102: Beograd Centar – Rasputnica „G" – Rakovica – Mladenovac – Lapovo – Niš – Preševo – State Border – (Tabanovce),
- Main line 103: (Beograd Centar) – Rakovica – Jajinci – Mala Krsna – Velika Plana,
- Main line 105: (Beograd Centar) – Stara Pazova – Novi Sad – Subotica – State Border – (Kelebia),
- Main line 106: Niš – Dimitrovgrad – State Border – (Dragoman).

Figure 5 Main arterial routes of the Railway Network in Serbia

Prepared by the Authors of the Study

The railway route Belgrade – Niš represents one of the most important transport corridors in the Republic of Serbia and plays an important role in the concept of transport system development. It is a part of SEETO Corridor X and connects Central and Western Europe with Greece, Turkey and the Middle East, and also part of the indicative extension of the Core TEN-T rail network in the Western Balkans.

The largest and most dynamic urban center, Belgrade, with the support of the urban center of Nis, will be crucial from the point of view of the development of the overall economy. Smaller regional centers such as the Jagodina-Ćuprija-Paraćin will complete the development capacity on the Belgrade-Niš route.

The international significance of this route has been confirmed by:

- The Treaty establishing the Transport Community signed in 2017 in Trieste (Italy) and ratified by all partners (Council Decision (EU) 2019/392),
- Commission implementing decision on the compliance of the proposal to establish the Alpine-Western Balkan rail freight corridor (Commission Implementing Decision (EU) 2018/500),
- Commission delegated regulation on the adaptation of the indicative extension of the comprehensive TEN-T maps to Western Balkans countries (Commission Delegated Regulation (EU) 2016/758 amending Regulation (EU) No 1315/2013),
- Stabilization and Association Agreement with Protocol 4 regarding to the land transport, which entered into force in 2013 (Decision 2013/490/EU),
- Agreement on the Establishment of High-Performance Railway Networks in Southeast Europe, signed in Thessaloniki in 2006 within the Southeast European Cooperation Process (SEECP),
- Declaration of the Third Pan-European Transport Conference held in Helsinki in 1997,
- The European Agreement on Main International Railway Lines (AGC) and the European Agreement on Important International Combined Transport Lines and Related Installations (AGTC) done in Geneva in 1985 and 1991 proposed by the United Nations Economic Commission for Europe (UNECE).

Taking into account the importance of the railway route Belgrade – Niš, in the previous period, a number of documents were prepared discussing the plan for its reconstruction and modernization. Some of the most important documents that indicate the need for the modernization and reconstruction of the Belgrade – Niš railway route are:

- Final report of the CONNECTA technical assistance project (Strategic Framework for implementation of ITS on the TEN-T Core/Comprehensive Networks in WB6, Final Report 2018),
- Final report for the Western Balkans region prepared within the study program of the TEN-T corridor Orient / East-Med (Study on Orient / East-Med TEN-T CNC, 2nd Phase, Final Western Balkan Report 2017),
- Multi-annual SEETO development plan 2007-2011 (The Five-Year Plan for the Development of the South-East Europe Core Regional Transport Network for the period 2007-2011),
- Final report for the railway area prepared within the regional project REBIS-Transport (Final Report, Railway study REBIS-Transport 2003),
- National Programme for Public Railway Infrastructure 2017-2021, adopted by the National Assembly of the Republic of Serbia in 2016,
- Long-term and Medium-term Business Strategy and Development Plan for "Infrastructure of Serbian Railways" JSC 2017-2027, adopted by the Government of the Republic of Serbia in 2017,
- Development Plan for Railway, Road, Inland Waterways, Air, and Intermodal Transport in the Republic of Serbia 2015-2020, adopted by the Government of the Republic of Serbia in 2015,
- Master plan for railways prepared in 2014,
- Strategy of railway, road, inland waterway, air, and intermodal transport development from 2008 until 2015, adopted by the Government of the Republic of Serbia in 2007,
- General Transport Master Plan for the Republic of Serbia, prepared in 2009 within the European Union Agenda for the Balkans,
- Spatial Plan of the Republic of Serbia from 2010 to 2020 ("Official Gazette of RS", No. 88/2010).

The importance of the reconstruction and modernization of the railway route Belgrade – Niš is also transferred to the level of regional plans:

- Regional Spatial Plan of the Administrative Area of the City of Belgrade ("Official Gazette of the City of Belgrade", No. 10/2004, 38/2011 and 86/2018),
- Regional Spatial Plan of the area of Podunavlje and Braničevo Administrative Districts ("Official Gazette of RS", No. 8/15),
- Regional Spatial Plan of the Area of Šumadija, Pomoravlje, Raška and Rasina Administrative Districts ("Official Gazette of RS", No. 39/14), and

- Regional spatial plan of the Area of Nišava, Toplica and Pirot Administrative Districts ("Official Gazette of RS", No. 1/13).

The analysis of local spatial and urban plans along the route Belgrade - Niš shows their compliance with all documents of a hierarchically higher level regarding the allocation of railway corridor. Only in the area of the city of Niš was indicated the need for relocating part of the railway infrastructure from the city center (Spatial plan of the Administrative Area of the City of Niš 2021 and General urban plan of Niš 2010-2025). The relocation of railway infrastructure was adopted in 2016 by the General Regulation Plan of the railway bypass in the area of the city of Nis on the basis of the prepared Preliminary Design Study. Referring to the documents of a hierarchically higher level, local spatial plans mostly further regulate the requirements regarding the arrangement of the intersection of the railway and the public road, the connection of industrial tracks to the public railway network and the reconstruction of station facilities.

It should be noted that only Belgrade, through its spatial planning documentation, determined additional railways functionalities. With the strategic commitments of Belgrade (Master Plan for Development of Traffic Infrastructure from 2017 and Plan for General Regulation of Rail Systems in Belgrade from 2021), the suburban railway gained an important role in the public transport system and its development is planned with the idea of its further expansion and capacity increase. More specifically, plans for the development of the Mladenovac suburban line are of special interest for the railway route Belgrade - Niš.

Regarding the railway route Belgrade – Niš, the following spatial plans of the special purpose area have been made:

- Spatial Plan of the Special Purpose Area of the Infrastructure Corridor of the Railway Line Belgrade – Niš, adopted in 2020, which includes three sections: Velika Plana – Gilje, Paraćin – Stalać and Đunis – Niš. This Spatial Plan is to be amended.

  The Spatial Plan refers to six variants in order to perform a multi-criteria analysis and evaluate the pros and cons of each variant. The Plan was prepared in the same time with the Preliminary Design of the three sections Velika Plana – Gilje, Paraćin – Stalać and Đunis – Niš, for speeds up to 160 km / h. The Plan was adopted, while the Preliminary Design was not. The six variants mentioned in the Spatial Plan are not aligned with the alternatives evaluated in the Conceptual Design of the current project since they were based on speeds of 160km.h. The adopted variant from that Preliminary Design was used as a basis for the current project, which was further elaborated using at a speed of 200 km / h. The Spatial plan that has been adopted will have to change and adapt to the new alignment for the sections from Velika Plana to Nis. PPF9 will have to prepare an updated Spatial Plan for the Section Velika Plana-Nis and a Spatial Plan which is not currently prepared for the Section Belgrade-Velika Plana. Both of them will have a SEA.

  Regarding the already approved Spatial Plan, a SEA was prepared, dated February 2020. The planning solutions were evaluated, in relation to 10 goals of the Strategic Assessment (air quality protection, improving the quality of groundwaters and surface waters, Preservation of agricultural and forest land, biodiversity protection, preservation and improvement of landscape, preservation of natural resources, preservation of cultural goods, reduction of impacts to population, settlements and facilities, encouraging economic development and employment and protection from accidents) and 15 related indicators. The emphasis in the process of evaluating planning solutions was dedicated to the analysis of their impact to potentially the most sensitive environmental factors in a particular area, especially the impact of noise on the population and natural values of the area.

  Summarizing the influences of planning solutions on the goals of the project, it can be stated that the realization of railway planning will produce positive and negative impacts on planning area. Negative impacts are according to the criteria for multi-criteria evaluation of planning solutions are mostly characterized as small and local characters, ie they were not assessed as strategically important. It is predominantly about influences related to the possible increase in noise intensity, ie possible exposure of the population to these influences on the sections where the railway passes near settlements or residential buildings. On the other hand, it is possible to expect strategically significant positive impacts of each planning solution on the objectives of the SEA. The positive influences on stimulating the economic development of the whole stand out planning area through the traffic connection of this territory, which increases availability and create preconditions for investment and economic development

  Several mitigation measures have been proposed listed below

Table 12 Mitigation measures that derive from the SEA of the Spatial Plan for Special Purpose for Velika Plana-Nis

Parameters	Mitigation measures
Air pollution	• Preventing the formation and spread of dust from exposed parts of the route and construction sites; • Prevention of uncontrolled distribution of construction materials from the construction site by means of transport; • Compliance with emission standards when using construction machinery and means of transport.
Soils	• Vegetation treatment is carried out on the basis of prescribed instructions, correct application and disposal of empty packaging. • Physical methods of weed removal can be applied, which is a mandatory measure in the protected zones of all groundwater sources and in the immediate vicinity of these zones. • Ban on the use of chemicals and herbicides for soil maintenance (i.e. weed removal) in railway construction compounds, which are located within the immediate vicinity of water sources.
Groundwaters, surface waters and soils	• The use of a waterproof membrane at the bottom of the embankment is envisaged, so that polluted water does not penetrate underground • In front of possible outflows into canals separators with sedimentation tanks are planned and space is left for the installation of tertiary treatment, if the need arises in the future.; • During the reconstruction of the existing smaller bridges, protect watercourses from waste paint, metal chips, abrasives and eroded soil, as well as polluted gravel and stone from the lower track; • Determine temporary locations for storage of necessary construction and other materials and equipment, as well as temporary locations for the collection of municipal waste and their regular evacuation by the municipal service on whose territory it is located; • Determine temporary or permanent locations for disposal and disposal of rubble and other waste solid construction materials. • Disposal of all types of waste in watercourses and land, as well as permanent disposal of waste along the route and in the railway corridor is prohibited; • Servicing and maintenance of construction and other machines along the route in the railway corridor is prohibited; • Outside the immediate works zone, no existing area can be used as a permanent or temporary place for the disposal of materials, such as parking platforms and machine repairs.; • After the completion of construction works, all waste material is removed, and the land is revitalized and recultivated in order to return to the condition closest to the previous one..
Noise and vibration	When designing the modernization and reconstruction of the railway, • Reduce the number of interruptions on the surface of the rails (rail joints, switches and crossings). • The rails should be welded and form a long rail strip. • Increase the elasticity of the upper rail machine by using elastic fastening accessories. • Take care of the construction of the lower and upper rail system, maintenance of tread surfaces, • Use of various noise barriers, • The use of sound insulation materials during construction, as well as design that takes into account existing and future noise sources. During the operation of the railway, • Ensure a flat and smooth tread surface of the rails. • Maintenance plans need to anticipate and implement regular rail grinding.
Flood risk	• Provide a sufficient number of culverts of appropriate dimensions.
Fire risk	• Organize the implementation of preventive fire protection measures and constant duty with the required number persons professionally trained to implement fire protection measures and provide adequate equipment and devices for firefighting. • Develop a Fire Protection Plan for all entities classified in the second category of fire risk.
Landscape	• Limit the size of the construction site.

Parameters	Mitigation measures
	• Preserve the vegetation around the construction site as much as possible to serve as a visual shelter. • Adequately organize and maintain the construction site. • Arrange locations immediately after completion of works.
Biodiversity	• Planning activities that will not have a negative impact on the existence of underground and surface hydrographic network. • Precisely define areas that will be used as construction sites, • Provide protection of the surrounding area from earthworks and use of construction machinery. • Apply as much protection as possible to land with planting • Cutting of trees is carried out in accordance with the competence of the forest management. • Preservation of visual images of the landscape and its protection is achieved through a design solution which is characterized by symetry and uniformity. • Adequate greening of the embankment and cutting of autochthonous vegetation and remediation of degraded surface. • In case of accidental situations, the natural protection measures are adequately applied by informing the competent inspection services. • Increasing the area under the forest - afforestation and establishment of new forests, • Prohibition of waste disposal on sub-forest and forest lands, • Forest protection from fire. • The protection of the fauna is obligatory, • Application of international treaties and conventions ratified • Preserve the existence of a complex of autochthonous forests and prevent their eventual encroachment on significant habitats, as well as further degradation and fragmentation. • Drying of wetland areas in the alluvial flat of South Morava must be avoided or minimized; • Disposal of wastewater and fecal water without previous treatment in the rivers should be prohibited,
Cultural heritage	• There is no right to utilize property for purposes other than those of in accordance with its nature and significance, neither to demolish, and carry out works that may lead to damage to cultural monuments, nor to perform earthworks in the monuments themselves or their immediate surroundings. • All projects for technical protection and maintenance work must have conditions and approvals form competent protection institutions. • If immovable or movable remains of archeological origin are found during earthworks, the investor or the contractor is obliged to suspend further works and inform the Institute. • Unauthorized collection of archaeological material is prohibited. • An expert, archaeologist has the right to prescribe a protective archeological research when the need arises • Further earthworks and construction works and changes in the shape of the terrain are allowed only after the provided archaeological research, with an adequate presentation of the findings.

The spatial plan is considered acceptable from the aspect of possible impacts on the living environment, while respecting all protection and monitoring measures during the implementation of the spatial plan.

- Spatial Plan of the Special Purpose Area of the Infrastructure Corridor of the Railway Line Stalac – Đunis, adopted in 2017, which included the section of the same name on the railway route Belgrade – Niš.

The Spatial Plan adopted has proposed a railway alignment that coincides with the Preliminary Design that was carried out. The proposal of the Spatial Plan was adopted in all proposed by the project variants for a speed of 160km/h.

A SEA has been prepared for the specific Spatial Plan (2016). The main goal is to harmonize the planned corridor of the railway and the space through which it passes, by eliminating conflicts that are created by establishing a new infrastructure system in the area, taking into account any impacts on natural resources, socio-demographic and economic flows. This implies defining the basic principles of arrangement, protection and spatial development of the area and setting specific environmental objectives. Impacts have been identified and targeted mitigation measures have been proposed, as they are indicated below.

Table 13 Mitigation measures that derive from the SEA of the Spatial Plan for Special Purpose for Stalac-Djunis

Parameters	Mitigation measures
Air pollution	• Regular wetting of open parts of the road in dry and windy weather; • Prevention of uncontrolled distribution of construction materials from the construction site; • Compliance with emission standards when using construction machinery and means of transport;
Waste	• Increasing the number of households covered by the waste collection system, • Preventing the formation of illegal dumps • Treat waste in accordance with the relevant national legislation • Upon completion of construction works, all waste material should be removed. • Disposal is prohibited all types of waste into watercourses and land, as well as permanent disposal of waste along the route. • Determine the obligation to rehabilitate or recultivate all degraded areas. With the consent of the competent utilities, anticipate locations where unused geological will be permanently deposited construction and other materials created by the subject works.
Population	• Remove organic products from the impact zone, • Determination of sanitary protection zones of all water sources, namely: wider sanitary protection zones (zone III), narrower zones of sanitary protection (zone II) and zones of immediate sanitary protection (zone I) of the source as well as the regime of organization, arrangement and use of space. • Reconstruction and expansion of the sewerage network and construction of a WWTP • The intersection of railways with roads that must be leveled • The proposed plan envisages the crossing of roads and railways outside the level (underpasses and overpasses) thus security risks are eliminated. • The proposed plan will contribute to improving the security of conditions of traffic in the area.
Soils	• Vegetation treatment is carried out on the basis of prescribed instructions, correct application and disposal of empty packaging. • Physical methods of weed removal can be applied, which is a mandatory measure in the protected zones of all groundwater sources and in the immediate vicinity of these zones. • Ban on the use of chemicals and herbicides for soil maintenance (ie weed removal) in railway complexes, which are located within the immediate vicinity of water sources.
Groundwater, surface waters and soils	• Employees are provided with personal protective equipment at work according to the valid Rulebook on safety at work (goggles, face mask, protective footwear, clothing, respirator, raincoats, etc. and all in double the number of employees). • The working width depends on the type of track and can range from 3.7 to 6 m. • The weather forecast - wind direction and strength - must be taken into account. Also, hot and dry weather affects increased evaporation, which reduces the size of the drops when spraying and increases the risk of drift. • The best conditions for treatment are colder and wetter weather with wind speeds up to 2 m / s. • Treatment should not be carried out near orchards (especially stone fruits) and tree lines, as well as in sloping surfaces from which cultivated plants can be washed and damaged. During treatment, water protection zones should be respected and contamination of water (watercourses, wells, water sources), by treating them at least 20 m away from them and 300 m from forest springs. • Avoid spraying near sensitive crops and water if there is a risk of falling on them.

Parameters	Mitigation measures
	• If treatment must be carried out in their vicinity, the pressure and spray rate must be reduced. • As an alternative to chemical measures, physical weed removal methods can also be used involves manual removal, mowing of weeds and application of superheated water, i.e. water vapor. • In the Stalać Station, for the drainage of the station plateau and the pedestrian underpass, a pipeline is planned for sewerage system. • Rainwater will flow into Toplički stream via the existing outlet. If the further phases of design show the need for purification of collected rainwater, separator of light petroleum products will be planned, before pouring into the open recipient. • Sanitary wastewater from the station building would be collected in the first phase in a watertight septic tank the pit, which would be emptied if necessary by the vehicles of the competent communal house. At the station Stalać, if the joint drainage of fecal water with wastewater from the connected ones is maintained residential buildings, a waste treatment plant is planned before the inflow into the South Moravia. When the fecal sewerage of the settlement of Đunis is done, the connection is planned via septic tanks to the city sewer network • In order to protect the structure of the lower machine of the railway from atmospheric water, in places where it is necessary, plan drainage channels that receive drained water from the lower machine. • Provide drainage on the reconstructed railway tracks in the station, which will engage in reconstructed existing reinforced concrete culverts • Plan pipe collection and drainage of drained water from the tunnel, as well as water and others possibly spilled liquids from the track, which can occur when washing the device or the inner surface tunnel constructions or in cases of accidental situations. These waters are drained into the central drain channel. All collected water from the tunnel is taken to the reception and treatment plant. Purified the water is drained in a controlled manner to the recipient. At the point of intersection of the existing water supply installations with the planned railway, provide protection existing pipes, by placing them in protective pipes.
Anti-erosion protection measures	• Preventive measures include monitoring and observing the processes of vegetative degradation cover, regression of plant communities and their degradation. • Remediation of degraded and eroded terrains, in the successful recovery and afforestation of bare, degraded, and devastated forests, wherever necessary. • Afforestation by erosion endangered areas and basins, protection of slopes and embankments, establishment of surfaces and protective belts under permanent vegetation, terracing and leveling the terrain, grazing, construction of peripheral canals. • Construction - technical measures - protect rivers from sediments. • Regulatory-administrative measures, which include organized and systematic collection data on erosion processes. • Any intervention in the arrangement of a watercourse must be performed in accordance with the technical documentation for which water management conditions and consents have been obtained.
Noise and vibration	• When performing works, it is necessary to perform noisy construction works during normal work times where possible, • Reduction of noise at the source due to the traffic of railway vehicles can be achieved by choosing the appropriate one construction of the upper machine, maintenance of the tread surfaces of the rails and wheels of the vehicle, selection of the appropriate vehicle type or by reducing the speed of trains. • Measures to reduce noise levels during its spread include the use of various structures for noise protection, as well as planning the use of space near the railway. • Noise protection at the point of emission should be applied in cases when measures to reduce noise on source and noise propagation reductions do not give the expected results or cannot be applied. • Data noise protection measures include the use of sound insulation materials during construction, as well as design that takes into account existing and future noise sources. Economic protection measures must be accompanied by appropriate legislation and may include fees for vehicles whose noise is higher than prescribed, formation of fuel prices, establishment of funds whose funds intended for the implementation of noise protection measures, research and development, etc.

Parameters	Mitigation measures
	• The maximum height of the protective structure is limited to 4 meters on the ground, while on bridge structures limited to 2 meters. For each proposed construction for noise protection, it is necessary to perform a techno-economic analysis. • For buildings that are not justified to be protected with noise protection structure, replacing the existing carpentry with carpentry that has a higher sound insulation. As part of this measure, it is necessary to provide facades with appropriate sound insulation and closed system for injecting fresh air into the building.
Flood risk	• Hydrotechnical measures consist of passive protection measures (protection by line defense systems - embankments and regulatory works) and active protection measures (mitigation of flood waves in accumulation basins). • Organizational measures are primarily spatial and urban measures planning, which determines the ban on the construction of facilities and control of the construction of capital facilities in the zones which may be threatened by torrential floods. • Analytical flood protection strategy is proposed
Fire risk	• Organize the implementation of preventive fire protection measures and constant duty with the required number persons professionally trained to implement fire protection measures and provide adequate equipment and devices for firefighting. • Develop a Fire Protection Plan for all entities classified in the second category of fire risk.
Landscape	• Limit the size of the construction site. • Preserve the vegetation around the construction site as much as possible to serve as a visual shelter. • Adequately organize and maintain the construction site. • - Arrange locations immediately after completion of works.
Biodiversity	• Management of existing forests • Fight against entomological and pathological diseases - prognosis, diagnosis and application protection measures against plant diseases and pests, • Application of all measures of care and regular maintenance in all phases of plant growth, • Reclamation of degraded and poor quality forests; • Felling of trees after selection, marking and registration of trees • Increasing the area under forests - afforestation and establishment of new forests, • Prohibition of unplanned construction on forest complexes, • Prohibition of waste disposal in the area of forests and forest land, • Protection of coastal vegetation and aquatic ecosystems, • Protection of forests from fire • Preserve the existing diversity of habitats, as a base for relatively diverse mammal fauna • Preserve the existing complexes of autochthonous forests and prevent their eventual destruction, removal to a significant extent, as well as further degradation and fragmentation. • Preservation is especially important improvement of the so-called "high" forest stands. • Technical measures with the aim must be proposed allowing the unimpeded movement of animals or, if necessary, restricting the movement (eg fences) in accordance with the Rulebook on special technical and technological solutions that enable uninterrupted and safe communication of wild animals ("Official Gazette" RS No. 72/2010). • Dimensions and positions must be designed during the preparation of technical documentation for the construction of the railway passages, crossings and bio-corridors for amphibians, small and large mammals and reptiles, including special passages for the forest turtle (Testudo hermanni), which on the IUCN Red List of Species, has the status of almost endangered; • Drainage of wetlands in the alluvial plain of Južna Morava must be avoided or minimized; Preserve the mosaic appearance of the entire landscape, i.e. the complexes under pastures and meadows, borders, hedges, shrubs, tree lines and forests, because they formed a very specific mammal fauna, more or less closely dependent on their existence and conservation.

Parameters	Mitigation measures
	• Prevent or limit, at least on state land, the spread of agroecosystems and housing construction facilities. • Prevent or limit further construction of illegally constructed and communally unregulated ones weekend settlements, construction of small constitutions, dams and pipes for conducting or diverting water without proper ones conditions and permits. • The discharge of waste and fecal water without treatment into river flows should be prohibited
Protection of natural resources	• Planned activities that will not have a negative impact on existing underground and surface hydrographic networks. • Precisely defined corridor around the railway route that will be in the function of the construction site provides protection the surrounding area from extensive earthworks and the use of construction machinery. • Applying protection measures, soil, high greenery and more valuable specimens of dendoflora-individual trees as well as groups of trees in the immediate vicinity of the railway will be maximally protected. • Cutting of old specimens of dendroflora will be done with the consent of the competent forest administration. • Preservation of the visual image of the landscape and its protection is achieved through the design solution that is characterized by symmetry and uniformity in road design. Also, later in the final works, bio-technical protection measures will be applied - adequate greening of embankments and cuts with autochthonous plant species and remediation of degraded areas. In case of accident situations, adequate nature protection measures are applied with the obligation to inform competent inspection services. • If geological-archaeological or mineralogical-petrological sites are encountered during the works sites that are presumed to have the properties of a natural asset, the contractor is obliged to inform the Ministry responsible for environmental protection, ie to take all necessary measures to the natural good would not be damaged until the arrival of an authorized person.
Cultural heritage	• There is no right to utilize property for purposes other than those of in accordance with its nature and significance, neither to demolish, and carry out works that may lead to damage to cultural monuments, nor to perform earthworks in the monuments themselves or their immediate surroundings. • All projects for technical protection and maintenance work must have conditions and approvals form competent protection institutions. • If immovable or movable remains of archeological origin are found during earthworks, the investor or the contractor is obliged to suspend further works and inform the Institute. • Unauthorized collection of archaeological material is prohibited. • An expert, archaeologist has the right to prescribe a protective archeological research when the need arises • Further earthworks and construction works and changes in the shape of the terrain are allowed only after the provided archaeological research, with an adequate presentation of the findings.
Environmental protection belts from the impact of the infrastructure system	• belt I degree of pollution - with a very high ecological load on the environment, due to emissions air pollution, increased noise and soil pollution, coincides with the immediate protection zones roads; • belt of II degree of pollution - with high ecological load on the environment due to increased noise and soil pollution coincides with wider road protection zones; • belt of III degree of pollution - with low ecological load on the environment due to increased noise the width coincides with the protective rail belt. The width of public road protection belts will be harmonized with their categorization.

There are also prevention and protection measures against accidents, protection measures against non-ionizing radiation and protection measures for signaling, safety devices, telecommunication, and cables.

2.2.2 Project justification

The current condition of the railway infrastructure is not satisfactory due to the lack of permanent maintenance in the previous period, while electrical equipment is technologically outdated. The speeds in the timetable are lower than designed, with numerous reductions, i.e. "light driving" has been introduced on some sections. The commercial speed of passenger trains is on average around 50 km/h. The main goal of the modernization of the railway infrastructure 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 Scope of work includes parts of the Belgrade Railway Junction. I.e. Ostružnica – Resnik section, Belgrade Center - Rasputnica G section and Rasputnica G - Resnik section, as well as the section Trupale - Medjurovo in Nis Railway Node. The following documents include among others the Project analyzed in the document. More specifically:

- Strategy for development of railway, road, water, air and intermodal transport in the Republic of Serbia from 2008 to 2015,
- Plan for the development of railway, road, water, air and intermodal transport in the Republic of Serbia from 2015 to 2020,
- Spatial Plan of the Republic of Serbia from 2010,
- Draft Spatial Plan of the Republic of Serbia 2021-2035, which is currently putted on public view,
- Master plan for the development of railway traffic,
- Long-term and medium-term plans of business strategy and infrastructure development of Serbian Railways Infrastructure, for the period 2017 - 2027
- Annual Business Programs of the Serbian Railway Infrastructure.

The modernized railway line should meet the requirements defined by international agreements (AGC, AGTC, and SEECP). The reconstructed and modernized railway for mixed passenger and freight traffic should be equipped with modern ERTMS devices (ETCS-L2, GSM-R) and other characteristics in accordance with the requirements of interoperability (TSI). The reconstruction and modernization of the line are defined as a priority in the future development of the Serbian railway network, due to the high importance of the railway line, as well as low technical characteristics which affect regular passenger and freight transport.

The total Belgrade – Nis railway line is in the length of 228 km, which should be upgraded including the construction of a second track where needed, to a maximum speed of between 160 to 200 km/h with some smaller sections with lower speeds primarily in city areas.

By 2030, it is necessary to modernize Belgrade-Nis railway line, so that:

- Maximum permitted speed for passenger trains should be 160 km/h on the entire line and where investments are not too high 200 km/h (since the line runs mixed - passenger and freight traffic)
- The line should be equipped with modern ERTMS systems
- The length of the main tracks in all stations and crossings should be at least 740 m
- The clear cargo profile in the tunnels should be increased to GC
- In official places where it is planned to stop passenger trains, platforms of 55 cm height should be constructed

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2.3 Project history

The construction of Belgrade-Niš railway line has been an obligation of Serbia, as established at the Berlin Congress in 1878 (after Russian-Turkish war, 1877-1878, and so-called "The big Eastern crisis"). At the congress, the Great European Empires have acknowledged Serbian independence, but also established an obligation of railway line construction, in order to connect Austro-Hungarian and Turkish railways. The line was finished, and operations started in October 1884.

The significance of the line is reflected in the fact that the importance of the connection of Central and Western Europe with the Middle East, Asia and Greece by the corridor Vienna-Danube Valley-Budapest-Belgrade-Morava Valley-Nis and from there Nišava-Sofia Valley, i.e. south along the Vardar Valley to Thessaloniki was confirmed.

As from this brief historical overview can be seen, the railway was built as a significant traffic connection of international importance, and that importance has remained to this day.

Other studies that have been done in the past and refer to the specific project in terms of design are:

- General design for modernization and reconstruction of railway line Belgrade – Nis with Pre-Feasibility study and Preliminary EIA
- Preliminary design and Feasibility study for reconstruction of single railway line and structures on existing railway line Nis – Preševo – border with North Macedonia, section Nis – Brestovac
- Preliminary design and Feasibility study for construction of bypass railway line in Nis. Environmental Impact Assessment has been carried out in 2016.
- The Preliminary Design includes the construction and reconstruction of the existing single-track railway going from the station Nis marshalling yard, and the double-track railway from the station Trupale through new terminals Nis North, Pantelej and Vrezina, up to the place of joining the existing railway Nis-Dimitrovgrad in the Prosek settlement. The newly designed railway continues as a single-track one, up to the entrance into the station of Sićevo. In its first section, the line mainly follows the corridor of current railway, touches the airport area, goes through city municipalities of Crveni Krst and Pantelej, detaches after the point of the new Pantelej station and continues along the corridor of the E-80 route. In the vicinity of Prosek, it goes under the highway overpass and follows the route of the existing railway Nis-Dimitrovgrad to the point of reaching the Sićevo station. It was a separate project, EU funded. In the project description chapter of this report as well as in the relevant chapter of the PFS, it is described how the currently described project of the report is affected by Nis bypass.
- Preliminary design and Feasibility study for reconstruction and modernization existing tracks and construction of second track of railway line Belgrade – Nis, section Stalać – Djunis. EIA has been prepared for both national and IFIs requirements

  The project involves the construction of the new double-track railway line 17.7 km long for speeds up to 160 km/h, upgrade of the railway stations in Stalać and Đunis, construction of the overhead contact line, signaling safety and telecommunications installations and decommissioning of the existing single-track railway line. The rail corridor will encompass the two tracks, associated overhead line equipment, track drainage, electricity cables, cable ducting, line-side walkways and noise fence barriers, where required. The total length of new route will be approximately 5 km shorter than the existing alignment encompassing five tunnels, one gallery, two underpasses, six bridges (one bridge across the South Morava River), one viaduct and fourteen smaller structures (culverts). The length of the railway line through tunnels is 6.9 km which is about 40% of the proposed line. The project has an approved EIA while conclusions of the EIA for all environmental and social parameters are presented in the impact section of the scoping report.
- Detailed design for reconstruction and modernization of railway line Belgrade – Nis, section Gilje – Ćuprija

2.4 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 the EBRD Performance Requirements 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 and adverse 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 ESIA process steps is provided in the following table, while as indicated, the project stage is currently at the alternatives assessment and scoping.

Table 14 ESIA process steps

Step	Description
Alternatives Assessment	Assessment of alternatives with the aim to identify the advantages and disadvantages of all Project alternatives
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	During the ESIA stage the team will seek the views of interested parties so that these can be considered in the assessment and reflected in the proposals for mitigation.

2.5 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.

The Scoping Report has been prepared in accordance with international requirements as defined by the potential lender to the Project – the European Bank for Reconstruction and Development (EBRD) and the EIB (European Investment Bank). The level of depth of this scoping report is aligned with the design stage (conceptual).

2.6 Scoping Report Structure

The remainder of this report is structured as follows:

Table 15 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;

Chapters	Context
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

2.7 Project consultants

The PPF9 team for this particular sub-project, namely SAFEGE consortium (composed of Egis, EPEM, and KPMG), was contracted 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 16 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 Environmental Assessment	135/04 and 88/10	The Law on Strategic Environmental Impact Assessment regulates the conditions, manner and procedure for assessing the environmental impact assessment 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: Regulation on the criteria for separation of habitat types, 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),

Laws and regulations	Official gazette Republic of Serbia	Relevance
		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, and 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 Trans boundary 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 labelling, register of chemicals and trade of chemicals. It transposed EU legislation in the field of chemicals related to POPs Regulation 1907/2006/EC 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, labelling and packaging of substances, Directive 1999/45/EC on classification, labelling and packaging of preparations Regulation 1272/2008/EC on classification, labelling 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

<table>
<tr><th>Laws and regulations</th><th>Official gazette Republic of Serbia</th><th>Relevance</th></tr>
<tr><td></td><td></td><td>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.</td></tr>
<tr><td>Law on Environmental Noise Protection</td><td>36/09 and 88/10</td><td>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 and standards in the field of noise protection aimed to avoid, prevent or reduce the harmful effects of noise on human health and 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 (noise limits as defined in Serbian legislation)
<table>
<tr><th rowspan="2">Zone</th><th rowspan="2">Purpose of the area</th><th colspan="2">Noise Level [dB(A)]</th></tr>
<tr><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 fulfil 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>
</table>

Laws and regulations	Official gazette Republic of Serbia	Relevance
Law on Railway	41/18	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, 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 conjunction with the project Resettlement Policy Framework will guide potential 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

Laws and regulations	Official gazette Republic of Serbia	Relevance
		land, such land shall be acquired through a negotiated settlement between the owner and the 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 Cadaster regulates the professional activities and affairs of the state administration related to land, buildings and other structures survey, real estate cadaster, 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 cadaster, 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 workability 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 f 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 grounds of differences by virtue of sex, birth, language, race, colour 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.

Laws and regulations	Official gazette Republic of Serbia	Relevance
		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 Labour 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 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:

1. 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)
2. Request for determining the scope and content of the environmental impact assessment for the following projects: main railway lines, including associated facilities (bridges, tunnels, 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

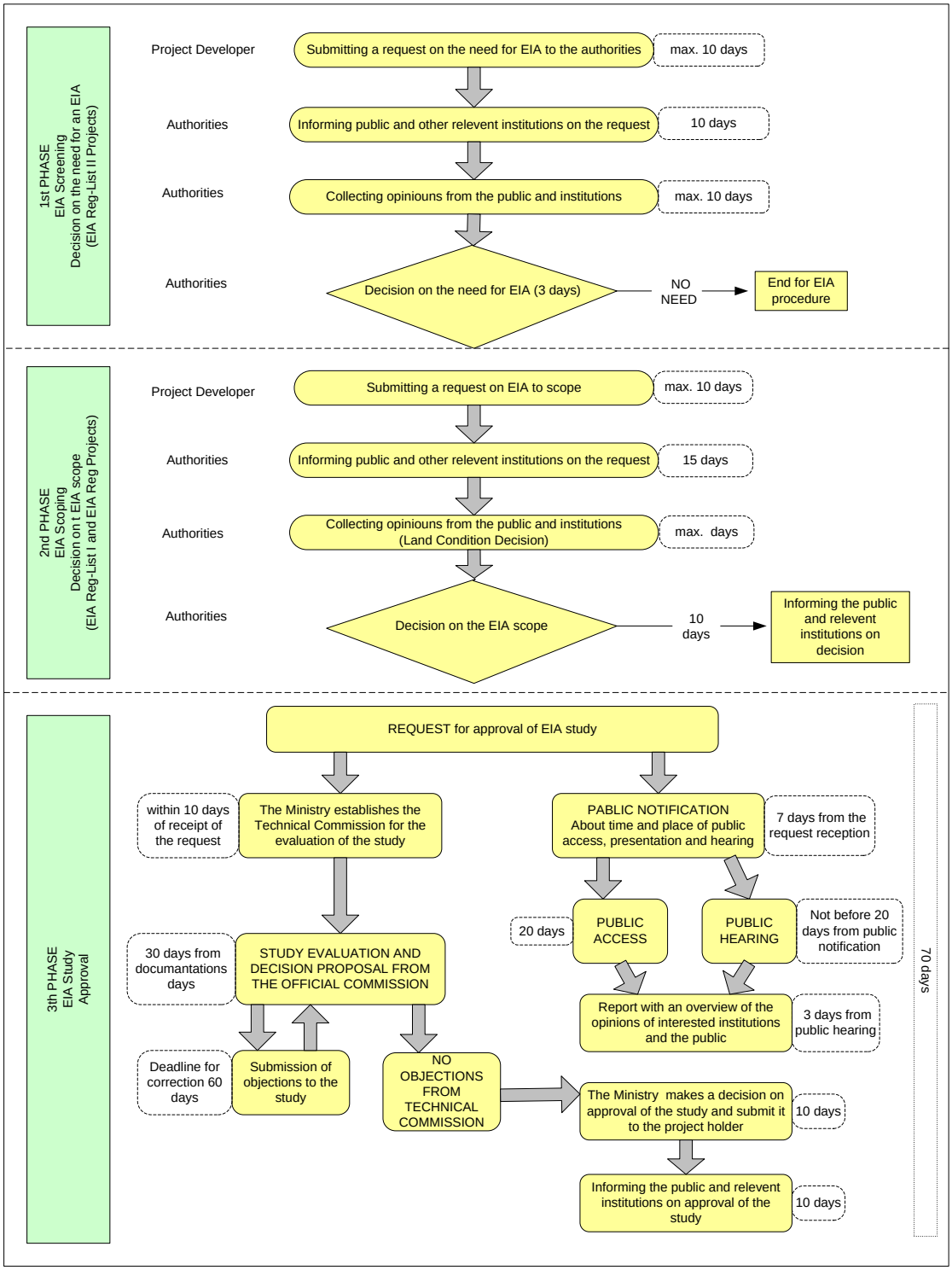


Figure 6 The EIA Procedure in Serbia

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. 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, tunnels 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 17 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[10)] 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 taken into account, 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:

- 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)

[10)] **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**

- 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[11] 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 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[12]. 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 Directive No 89/391/EEC of 21 June 1989 on the introduction of measures to encourage improvements in the 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

[11] Convention on the Elimination of all Forms of Discrimination Against Women (CEDAW); World Health Organisation (WHO) standards and guidelines ; International Labor Organization Convention on Construction Safety and Health No. 167; EC Directive 98/59/EC of 20 July 1998 on the approximation of the laws of the Member States relating to collective redundancies and collective dismissals; EEC Directive 89/391/EEC the Safety and Health at Work Directive is a European Union directive that sets out general principles for protection of workers' Occupational safety and health; ECDirective 2008/96/EC On Road Infrastructure Safety Management; EU Directive 2012/18/EUon the control of major-accident hazards.

12 (Serbia 2020 Report : Accompanying the Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions 2020 Communication on EU Enlargement Policy").

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, in particular for monitoring, enforcement and inter-institutional coordination. Work on the river basin management plan is progressing slowly. Improving local governance, in particular 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, in particular 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, in particular 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, in particular 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 IFIs Environmental and Social Policy

3.4.1 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.

EIBs environmental and social standards are listed below:

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.

3.4.2 EBRD Environmental and Social Policy

The EBRD is committed to promote "environmentally sound and sustainable development" in the full range of its investment and technical cooperation activities. This Policy outlines how the Bank will address the environmental and social impacts of its projects by defining the respective roles and responsibilities of both EBRD and its clients in designing, implementing and operating projects in line with this Policy.

In order to translate this objective into successful practical outcomes, the EBRD has adopted a comprehensive set of specific Performance Requirements (PRs) that clients are expected to meet, covering key areas of environmental and social impacts and issues. EBRD's document "Environment and Social Policy" (the Policy) and related Performance Requirements (PRs) detail the commitments of the Bank to promote environmentally sound and sustainable development across the full range of its activities.

EBRD categorizes proposed projects as A / B / C based on environmental and social criteria to: (i) reflect the level of potential environmental and social impacts and issues associated with the proposed project; and (ii) determine the nature and level of environmental and social investigations, information disclosure and stakeholder engagement required for each project, taking into account the nature, location, sensitivity and scale of the project, and the nature and magnitude of its possible environmental and social impacts and issues.

Projects categorized by EBRD as "A" require special, formalized and participatory assessment processes.

In general, a project funded by the EBRD has to meet following EBRD's PRs that are presented more analytically in the following table:

Table 18 EBRD's funding requirements

No	Name
PR 1	Assessment and Management of Environmental and Social Impacts and Issues
PR 2	Labour and working conditions
PR 3	Resource Efficiency and Pollution Prevention and Control
PR 4	Health and Safety
PR 5	Land Acquisition, Involuntary Resettlement and Economic Displacement
PR 6	Biodiversity Conservation and Sustainable Management of Living Natural Resources
PR 7	Indigenous Peoples
PR 8	Cultural Heritage
PR 9	Financial Intermediaries
PR 10	Information Disclosure and Stakeholder Engagement

This Project proposal falls under category "A" of the EBRD screening categorization as it is listed in Appendix 1, item 6. "Construction of motorways, express roads and lines for long-distance railway traffic; airports with a basic runway length of 2,100 metres or more; new roads of four or more lanes, or realignment and/or widening of existing roads to

provide four or more lanes, where such new roads, or realigned and/or widened sections of road would be 10 km or more in a continuous length" of the EBRD's ESP 2019 . As such, the Project requires a special, formalized and participatory assessment process in compliance to the EBRD's comprehensive set of specific Performance Requirements (PRs) that it is expected to meet, covering key areas of environmental and social impacts and issues.

The process should include:

- A comprehensive ESIA in compliance with PR 1 Environmental and Social Appraisal and Management and PR 10 Information Disclosure and Stakeholder Engagement;
- An examination of the technically and financially feasible alternatives and the rationale for the alternative selection;
- The ESIA (while addressing PR 2 and PR4) should identify the issues related to potential risks related to community health, safety and security, as well as labour and working conditions;
- The ESIA should identify the main issues regarding Pollution Prevention and Control (PR 3);
- An assessment of involuntary resettlement issues according to PR 5 Land Acquisition, Involuntary Resettlement and Economic Displacement;
- The sustainable use of the natural resources and the protection of biodiversity will have to be considered as instructed by PR 6;
- An assessment of impacts on cultural heritage according to PR 8 Cultural Heritage.
- PR 7 on indigenous people has been scoped out of the Project because no social and/or cultural group that is distinct from dominant groups within Serbian society is expected to be affected by the Project.
- PR 9 on financial intermediaries has been scoped out of the Project because no delegated responsibility for environmental and social assessment, risk management and monitoring or overall portfolio management is expected to be required for the Project.

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 19 Relation with the local EIA procedure

Activity	ESIA	EIA	Comments
Screening Study	X	X	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.
Categorisation	X	X	Formal categorisation 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	X		A formal stakeholder engagement plan is not required under national legislation. However, stakeholder consultation is part of the EIA process.
Scoping Study	X	X	Due to the requirements of the ToR, an International Scoping Study was not produced for this project. The local Scoping Study was submitted to the local regulatory authorities. The EIA Scoping Application and Decision are presented in Annex 4.
Consideration of alternatives	X	X	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.

Activity	ESIA	EIA	Comments
Environmental Impact Assessment	X	X	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	X	X	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	X	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.
Environmental and Social Management Plan (ESMP)	X		ESMP is not typically included as a requirement according to local legislation. It is required for Category A projects according to EBRD requirements and 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)	X	X	NTS is required for investment requirements for use as a disclosure document. It is recognised 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	X	X	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 categorised in Category A, requiring the full ESIA disclosure package to be publicly disclosed for a minimum of 120 days.
Management of Grievances and Objections	X		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

4.1 Existing State Analysis of Railway Arterial Route Belgrade – Niš

The length of the section Beograd Centar – Rasputnica „G" – Rakovica – Mladenovac – Lapovo – Niš – Preševo – State Border – (Tabanovce), Section Beograd Centar – Niš is 238.761 km, while the length of two-track sections is 137.691 kilometers, which represents 58% of the total length of the railway line to Niš. It was built in 1884 as a single-track railway, and from 1934 to 1993, a second track was added in stages in order to increase capacity.

The considered railway line mostly stretches through either hilly terrain or the plain terrain of the valleys of the rivers Velika Morava and Juzna Morava. The most demanding sections construction-wise are the single-track sections Resnik – Sopot Kosmajski and Stalac – Đunis. On the section Resnik – Sopot Kosmajski, the railway line runs through the landscape of low mountains Avala and Kosmaj, and has the characteristics of a hilly alignment. On this section, the minimum curve radius is 300 m, whereas the maximum gradient is 19.4 ‰. After Sopot Kosmajski, on the section of the single-track railway line to Velika Plana, the minimum curve radius is 500 m, whereas the maximum gradient is at the entrance to station Velika Plana and it amounts 8.0 ‰. On the section of the double-track railway line from Velika Plana to Stalać, the minimum curve radius is 350 m, whereas the maximum gradient is 6.4 ‰. On the section Stalać – Djunić, the railway line passes through the Stalać Gorge. Laying out the railway through the gorge resulted in the construction of short tangents and a large number of small curves with the minimum radius of 299 m. The maximum gradient on this part of the line is 6,5‰. After Đunis, on the double-track section to Trupale, the minimum curve radius is 500 m, whereas at the entrance to Niš, the minimum curve radius reduces to 295 m. The maximum gradient on this section amounts 7.3‰.

The following table presents structures on the main line 102 section Belgrade - Niš. There is a total of 9 tunnels, 130 bridges and bridge structures, 449 culverts and other smaller-sized structures. There are 126 level crossings. The key structures of the considered section on the territory of the Belgrade Railway Node are the Dedinje Tunnel (the right-hand tube of a length 3,061 m and the left-hand tube 3,086 m) and the viaduct (the right-hand track of a length 361 and the left-hand track of a length 362 m), which are located between stations Belgrade Center and Rakovica. Between stations Rakovica and Resnik there are two short galleries and the Kijevo Tunnel of a length 181 m. From the station Resnik to the station Velika Plana, the railway line features two steel bridges (both of a length exceeding 100 m) and three tunnels (Ripanj Tunnel of a length 1,614 m, Parcani Tunnel of a length 230 m, and Ralja Tunnel of a length 558 m). From Belgrade Center to Velika Plana, the railway line features 188 smaller-sized structures such as bridges, viaducts and culverts. On the section from Velika Plana to Niš, there are five bridges exceeding a length of 100 m and Stevanac Tunnel of a length 229. From Velika Plana to Stalać, the railway line features 48 smaller-sized bridges and viaducts and 183 culverts. On the single-track section of the railway line from Stalać to Đunis, there are 17 smaller-sized bridge structures and 53 culverts. From Đunis to Trupale, there are 33 smaller-sized bidge structures and 48 culverts. On the territory of the Niš Railway Node, from the station Trupale to the station Niš, there are 5 smaller-sized bridge structures and 5 culverts.

Table 20 Structures along the railway line 102, section Belgrade – Niš

Subsection	Tunnels and galleries	Bridges and bridge structures		Culverts
		Large	Small	
Beograd Centar - Resnik	5	2	2	25
Resnik - Velika Plana	3	2	16	135
Velika Plana - Paraćin		1	37	131
Paraćin - Stalać			11	52
Stalać - Đunis	1	1	17	53
Đunis - Trupale		3	33	48
Trupale - Niš			5	5
Ukupno	9	9	121	449

Prepared by Authors of the Study

Based on the Network Statement for the Year 2021, the highest permissible speed of trains on the line Beograd Centar - Mladenovac - Niš is 120 km/h, namely on the section Jagodina - Paraćin in a length of around 17,4 kilometres. On the largest part of the railway line Beograd Centar - Mladenovac – Niš, the highest permissible speed is 100 km/h, whereas on certain individual sections train speeds are in range 50 - 80 km/h. The lowest permissible speed of trains is at the entrance to the station Niš, and it is 30 km/h.

On the section Belgrade – Niš of the main railway 102, there are 31 stations, 27 stops, 4 passing points, 5 junctions and 1 service point categorized as divergent switch (Table 15). Most of the stations are mixed stations opened for work with passengers and freight. There are a total of 25 mixed stations. Stations intended exclusively for passenger service are: Beograd Centar, Rakovica, Klenje, Ripanj tunel, Kovacevac and Mala Plana. Beograd Centar is the central passenger station of the railway network in Serbia. Important stations which connect the line with the railway network are: Rakovica, Resnik, Velika Plana, Markovac, Lapovo, Paracin, Stalac, Trupale, Crveni Krst and Niš.

Table 21 Stations and other service points along the line 102, section Beograd – Niš

Section	Stations	Stops	Passing points	Junctions	Others
Beograd Centar - Resnik	2	2	-	3	-
Resnik - Velika Plana	12	3	2	-	-
Velika Plana - Paraćin	5	8	-	2	-
Paraćin - Đunis	4	4	2	-	-
Đunis - Trupale	5	10	-	-	-
Trupale - Niš	3	-	-	-	1
Total	31	27	4	5	1

Source: IŽS Network Statement 2021

4.2 Conceptual Design

The Conceptual Design for reconstruction, modernization and construction of double-track railway line for passenger and freight transport and speed of up to 200 km/h on the Belgrade Centre – Nis (Medjurovo) railway line has been developed based on analysis of the existing condition of the railway line, as well as analysis of relief and restrictions of the corridor.

Solutions have been defined for the following:

- alignment of the double-track railway line and stations,
- structures on the railway line: bridges, tunnels, underpasses, overpasses, culverts
- hydraulic engineering structures
- architectural structures
- grade separated crossings with roads,

4.2.1 Alignment

The alignment of the double-track railway line starts in Belgrade Centre passenger station at km 0+000 and ends in front of Medjurovo station (Rasputnica Most) that is part of the Niš railway node. Beside this line, the Ostružnica-Resnik section as the part of the Belagrade railway junctions and (Trupale)-Crveni Krst-Nis and Nis-Rasputnica Most (Medjurovo) as the part of the Nis junction are included in the estimation costs.

The ESIA for the Niš Railway Bypass will cover (i) the construction of a single-track bypass railway in the length of 22.4 km with the starting point in Nis Ranzirna, (ii) construction of Nis Sever, Pantelej and Vrezina Stations, (iii) construction of Prosek turnout point, and (iv) reconstruction of railways no. 3, 30, 17, 38 and 22.

It is planned that highest category international passenger trains will run at speed of 200 km/h, and other passenger trains will operate at speeds below 200 km/h, depending on the train category.

The design speed both, for passenger and freight trains is 100 km/h in the junctions.

Table 22 Proposed subsections on the Belgrade Centre – Nis (Medjurovo) railway line

No.	Subsections	Length [km]
1	Belgrade Centre - Resnik	11
2	Resnik - Ripanj	11

No.	Subsections	Length [km]
3	Ripanj - Ralja	16
4	Ralja - Velika Plana	48
5	Velika Plana - Lapovo	18
6	Lapovo - Gilje	31
7	Gilje - Paraćin	11
8	Paracin - Stalać	22
9	Stalać - Djunis	14
10	Djunis - Aleksinac	16
11	Aleksinac - Trupale	23
12	Trupale - Medjurovo	7
	Total:	228
13	Ostruznica – Batajnica	12
14	Crveni Krst-Nis	3
15	Nis-Rasputnica Most	4
	Total:	**19**

The Belgrade - Niš railway line is a double-track, electrified railway line. It consists of several sections that can be separated:

1. Two single-track sections:
   a) Belgrade - Mladenovac - Palanka - Velika Plana length 90.4 km,
   b) Belgrade - Jajinci - Mala Krsna Velika Plana length 99.7 km,
2. Double-track section Velika Plana - Stalać length 85.9 km,
3. Single-track section Stalać - Djunis length 18.7 km and
4. Double-track section Djunis - Trupale - Crveni Krst - Niš length 48.6 km

The section of the railway line from the station Trupale to the station Niš is part of the Niš railway node and is equipped with two parallel single-track lines, which enables separation towards Zaječar and Dimitrovgrad, as well as in the south, towards Medjurovo. The following figure is a schematic representation of the existing railway node of the city of Niš.

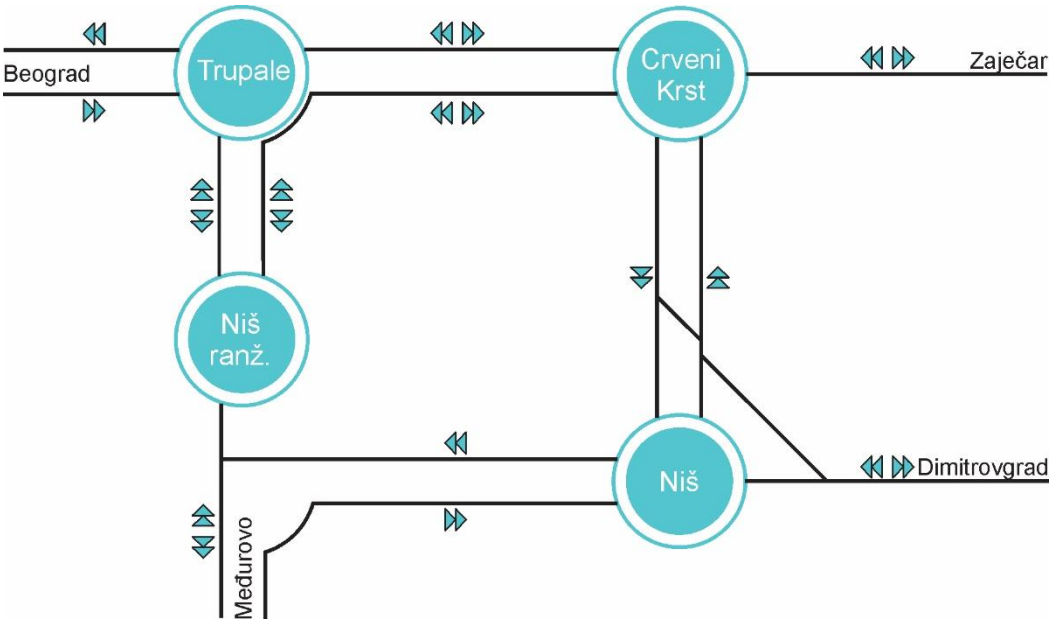


Figure 7 Schematic representation of the Niš railway node

Freight trains will operate at maximum speed of 100 km/h - 120 km/h.

Through Belgrade and Nis railway nodes, where the railway line passes through highly developed city areas and where international passenger trains of highest category will also stop, technical parameters of track alignment and stations for the speed of 100 km/h are applied.

Between the railway nodes, technical parameters of track alignment and stations for the speed of 160-200 km/h are applied (except 100-120 km/h in Velika Plana and Lapovo stations).

On the main running lines of the railway line between Belgrade Centre and Nis, stopping of trains is envisaged in the urban area of Belgrade where is the design speed less than 160 km/h. In other cases, here is design speed more than 160 km/h, up to 200 km/h, new passenger stations are envisaged instead of stops.

Trains supplying the industry located near the station, stop on tracks for unscheduled and occasional operations, which can also receive vehicle of the industry.

Finished level of the railway line and stations is within the prescribed limits. In stations to be subject to reconstruction, due care was taken of the existing buildings which shall be kept, and, on the open railway line, finished level is adjusted to the requirements for intersections with canals and roads, as well as to the requirements for quality drainage of the track bed in accordance with the characteristics of the terrain in the corridor.

4.2.2 Stations and official places

Number of stations / stopping points needed to serve the actual demand

There are a total of 59 official places on this line, of which 30 belong to stations, 2 are passing points and 27 belong to halts.

The selection of stations on the future, modernized line Belgrade - Niš, was done in accordance with the legitimate norms in the Republic of Serbia. According to the National program of public railway infrastructure, on new lines the distance between official places where the length of the track must be provided according to TSI (> 740 m) should be between 20 - 25 km.

Also, the selection of stations to be kept on the line, depends on parameters such as:

1. Passengers' flows,
2. Freight flows,
3. Train speed.
4. Specific technological jobs

Passenger and freight flows are the most important factors influencing the decision on whether a station should be kept in operation or not. Stations with these flows, especially if these flows are significant, should be in operational condition.

Having in mind that the Belgrade - Niš railway line is the main line and the most important railway route of the Republic of Serbia, it is expected that passenger trains, as well as freight trains will run on this section. Of the passenger trains, it is expected that the highest-ranking trains (international passenger trains) will run on the line. Their speed will be the highest and will run at 200 km/h on all sections that have geometric characteristics will allow it. The next category of passenger trains consists of lower-ranking trains, internal long-distance (regional) trains. Their maximum speed will be the same as with international trains, except that their commercial speed will be slightly lower because they will have more stops and waiting at stations.

The third category of passenger trains includes local trains, which will run at a slightly lower speed. It is expected that these trains will stop at all official places that will be selected on the future line Belgrade - Niš.

Halts that exist today, on the new line to Niš are being cancelled, due to lack of passengers. Namely, in agreement with the representatives of Srbija Voz, there is a request to leave some official places in function, so that those official places will be turned into stations with 4 tracks (there are three such official places - Lapovo Varoš, Lužane and Mezgraja).

Consider freight flows, it is also planned that freight trains will run on the future line Belgrade - Niš. Their speed will be limited to 90 km/h because it is not possible to determine in which official places these trains will stop and wait. Their stopping and waiting in official places depend on the timetable. They are of the lowest rank, but on the other hand they stop only for traffic reasons (to be overtaken by passenger trains that are much faster).

Train speed affects the number of official places. On lines with a lower maximum speed, it is expected that there will be a larger number of official places, to provide sufficient capacity and in order to achieve moderate waiting for trains to overtake.

Specific technological tasks significantly influence the selection of stations. In stations where specific technological tasks are performed, they must stay in operation, regardless of the requirements related to the number of pass engers or the quantity of transported goods. These stations include Lapovo passenger station and Lapovo Ranžirna (Marshalling) station, as well as stations Aleksinac and Adrovac.

The following table shows all official places on the Belgrade - Niš line, their role and a proposal whether to cancel or keep in operation. The column "service place" refers to the role that the observed official place has in today's conditions. The last column provides a comment and explanation as to why an official place was left in function, i.e. proposed for cancellation.

Table 23 Station selection

No	Name	Service place	Comment
1	Belgrade Centre	Station	
2	Rakovica	Station	
3	Kneževac	Halt	
4	Kijevo	Halt	
5	Resnik	Station	There are passenger flows and it is significant station
6	Pinosava	Passing point	It loses its role on the double-track line, and there are no flows to keep it as a station
7	Ripanj Kolonija	Halt	There are no flows, and possible future flows would be transferred to Ripanj (1.2 km from station Ripanj)
8	Ripanj	Station	There are small flows, but it is important as a station in local transport (7.3 km from Resnik) and takes over possible streams from Ripanj Kolonija and Klenje
9	Klenje	Station	There are no flows, and possible future flows would be transferred to Ripanj (3.4 km away from station Ripanj)
10	Ripanj Tunel	Station	There are no flows, and possible future flows would be transferred to Ralja (4.8 km away from station Ralja)
11	Ralja	Station	There are small flows and it takes over possible flows from the Ripanj Tunnel
12	Sopot Kosmajski	Station	There are small flows, it is important as a station in local transport
13	Vlaško Polje	Station	There are no flows

No	Name	Service place	Comment
14	Mladenovac	Station	There are large flows and it is significant station
15	Kovačevac	Station	No flows
16	Rabrovac	Halt	There are no flows, and possible future flows would be transferred to Kusadak (about 4.8 km away from station Kusadak)
17	Kusadak	Station	There are flows, an overtaking station and takes over possible flows from Rabrovac and Ratare
18	Ratare	Halt	There are no flows, and possible future flows would be transferred to Kusadak (4.6 km away from station Kusadak)
19	Glibovac	Passing point	It loses its role on the double-track line, and there are no flows to keep it as a station
20	Palanka	Station	Significant station with large flows
21	Mala Plana	Station	There are no flows, and possible future flows would be transferred to Velika Plana (about 4,9 km away from station Velika Plana)
22	Velika Plana	Station	Significant station
23	Staro Selo	Halt	There are no flows, and possible future flows would be transferred to Velika Plana (3.5 km away from station Velika Plana)
24	Novo Selo	Halt	There are no flows, and possible future flows would be transferred to Markovac (2.6 km away from station Markovac)
25	Markovac	Station	There are moderate flows and takes over any additional flows from Novo Selo
26	Lapovo Varoš	Halt	It will be in operation condition by request of Srbija Voz
27	Lapovo Ranžirna[13] (Marshalling)	Halt	There are no flows, and possible future flows would be transferred to Lapovo (1.6 km away from Lapovo). Stations Lapovo Ranzirna will stay only for the freight traffic
28	Lapovo	Station	Significant station
29	Brzan	Halt	There are no flows, and possible future flows would be transferred to Lapovo (about 4,5 km away from Lapovo)
30	Miloševo	Halt	There are no flows, and possible future flows would be transferred to Bagrdan (3,3 km away from Bagrdan)
31	Bagrdan	Station	There are moderate flows and takes over any additional flows from Miloševo
32	Lanište	Halt	There are no flows
33	Bukovče	Halt	There are no flows, and possible future flows would be transferred to Jagodina (3.8 km away from station Jagodina)
34	Jagodina	Station	Significant station
35	Gilje	Halt	In scope
36	Paraćin	Station	In scope
37	Sikirica/Ratari	Halt	There are no flows
38	Drenovac	Halt	There are no flows
39	Ćićevac	Stanica	There are flows
40	Lučina	Halt	There are no flows, and possible future flows would be transferred to Ćićevac or Stalać (2 km away from station Ćićevac and 2.7 km away from Stalać)
41	Stalać	Station	Out of scope (not closed)
42	Djunis	Station	Out of scope (not closed)
43	Vitkovac	Halt	There are no flows, and possible future flows would be transferred to Djunis (4.2 km away from station Djunis)
44	Donji Ljubeš	Halt	There are no flows
45	Gornji Ljubeš	Halt	There are no flows, and possible future flows would be transferred to Korman (2.1 km away from station Korman)

[13] Stations Lapovo ranžirna in this case is the halt. Marshaling station Lapovo ranžirna is out of scope for the passenger traffic

No	Name	Service place	Comment
46	Korman	Station	There are small flows, takes over additional flows from G. Ljubeš and Trnjani, taking over station
47	Trnjani	Halt	There are no flows, and possible future flows would be transferred to Korman (about 2.4 km away from station Korman)
48	Adrovac	Station	It will be kept in operational condition by request of Srbija Kargo
49	Aleksinac	Station	Significant station
50	Nozrina	Halt	Transfer flows to Aleksinac (about 3.3 km away from station Aleksinac)
51	Lužane	Halt	It will be kept in operational condition by request of Srbija Voz
52	Tešica	Halt	Transfer flows to Grejač (about 2.6 km away from Aleksinac)
53	Grejač	Station	There are freight flows, and takes over flows from Tešice and Supovački Most
54	Supovački Most	Halt	Transfer flows to Grejač (3.2 km away from station Grejač)
55	Mezgraja	Halt	It will be kept in operational condition by request of Srbija Voz
56	Vrtište	Halt	There are no flows, and possible future flows would be transferred to Trupale (about 2.3 km away of station Trupale)
57	Trupale	Station	Significant station
58	Crveni Krst	Station	Significant station
59	Niš	Station	Significant station

The following table shows which official place have been proposed to be cancelled and which to remain in operation. The table shows that 28 official places have been proposed for closing, namely 19 halts, seven stations and two passing points. Also, it was proposed that 21 official places remain in function, of which 18 are stations and three halts have been converted into stations: Lapovo Varoš, Lužane and Mezgraja.

No existing station has been closed if there are flows. Eventually, some halts have been closed, which may seem to have slightly more passengers, but these halts are with low passenger intensity, and their flows can be redirected to the next official place (station). Namely, halts are mostly located near stations, so redirection their passenger flows to neighboring stations is justified.

All official places (passing loops, stations, and halts) proposed for closure are in areas that are well covered by roads, so the alternative transport to the next official place exists (cars, busses, motorcycles or bicycles). The distances between the official places, given in the tables, refer to the railway line distance. Road distances have not been observed at this phase of Project. In the next phase of design, it is planned to perform an analysis of roads and road distances to the next official places, for which is planned to accept the passenger flows of proposed closed official places. Final decisions regarding closure of stations for local/regional train will be taken during the next stage of the project, in close collaboration with local communities and SRI.

Table 24 List of official places proposed for closing and for functioning

OUT of SCOPE	CLOSED		KEPT	
	name	function	name	function
Belgrade Centre	Pinosava	pl	Ripanj	s
Rakovica	Ripanj Kolonija	h	Ralja	s
Kneževac	Klenje	s	Sopot Kosmajski	s
Kijevo	Ripanj Tunel	s	Mladenovac	s
Resnik	Vlaško Polje	s	Kusadak	s
Gilje	Kovačevac	s	Palanka	s
Paraćin	Rabrovac	h	Velika Plana	s
Stalać	Ratare	h	Markovac	s
Djunis	Glibovac	pl	Lapovo Varoš	s
Crveni Krst	Mala Plana	s	Lapovo	s

OUT of SCOPE	CLOSED		KEPT	
	name	function	name	function
Niš	Staro Selo	h	Bagrdan	s
/	Novo Selo	h	Jagodina	s
/	Lapovo Ranžirna*	s	Paraćin	s
/	Brzan	h	Ćićevac	s
/	Miloševo	h	Korman	s
/	Lanište	s	Adrovac**	s
/	Bukovče	h	Aleksinac	s
/	Sikirica/Ratari	h	Lužane	h
/	Drenovac	h	Grejač	s
/	Lučina	h	Mezgraja	h
/	Vitkovac	h	Trupale	s
/	Donji Ljubeš	h	/	
/	Gornji Ljubeš	h	/	
/	Trnjani	h	/	/
/	Nozrina	h	/	/
/	Tešica	h	/	/
/	Supovački Most	h	/	/
/	Vrtište	h	/	/

Note: pl – passing loop, h – halt, s – station

Note: Lapovo ranžirna (marshalling yard) will stay in operational condition

Description of stations

The study proposed new conceptual solutions for 22 official points on this part of the line, including Resnik and Trupale stations as border stations of the Belgrade and Nis railway nodes. For Lapovo railway node, conceptual solutions are proposed for stations Lapovo Varoš and Lapovo as intermediate stations on the main line Belgrade - Niš and junction stations at which a line for marshalling yard Lapovo Ranžirna branch off. The reconstruction of marshalling yard Lapovo Ranžirna was not assumed as a part of this project and it keeps its existing track layout and its current role in freight services with dominant local character of work.

The official points Gilje and Ćuprija Junction remain at the level of the existing track layouts that were built as a part of the construction of double track railway section Gilje - Ćuprija – Paraćin in 2016. For the stations Stalać and Djunis, track layouts designed according to the Preliminary Design for Reconstruction and Modernization of the railway section Stalać - Djunis (prepared in 2018) are kept. Although the reconstruction of station layouts in the area of Belgrade and Nis railway nodes is not assumed as a part of this study, a conceptual framework for the reconstruction of main railway stations in Niš node is provided in order to facilitate the next design stage of the modernization project for railway line Belgrade - Niš.

A total number of 28 stations has been proposed on the line from Belgrade to Niš.

Table 25 Official place on the Belgrade Centre – Nis (Medjurovo) railway line

No.	Chainage	Official place	Distance from previous station [km]
1	0+000	Beograd Centar	0
2	5+950	Rakovica	6
3	11+300	Resnik	5
4	18+000	Ripanj	7
5	21+900	Ralja	4

No.	Chainage	Official place	Distance from previous station [km]
6	37+400	Sopot Kosmajski	25
7	48+900	Mladenovac	11
8	60+250	Kusadak	11
9	73+600	Smederevska Palanka	13
10	85+400	Velika Plana	12
11	95+200	Markovac	11
12	102+300	Lapovo Varos	7
13	104+400	Lapovo	2
14	116+000	Bagrdan	12
15	129+700	Jagodina	14
16	135+200	Gilje	5
17	147+150	Paracin	12
18	163+600	Cicevac	16
19	168+300	Stalac	5
20	181+900	Djunis	14
21	192+500	Korman	11
22	197+300	Adrovac	5
23	200+000	Aleksinac	3
24	204+700	Luzane	5
25	211+400	Grejac	7
26	215+600	Mezgraja	4
27	220+850	Trupale	5
28	227+600	Medjurovo	7
		Total:	**228**

More specifically:

Resnik

Resnik station remains an intermediate station on the main line Beograd - Niš and a junction station at which another main line Beograd - Bar branch off. The station keeps the role of the border station in the Belgrade railway node, at which the freight subsystem with the Belgrade marshalling yards and Ostružnica station branch off from the main line. Main tasks of the station are related to the traffic management, shunting work organization and the performance of passenger and wagonload services.

Ripanj

Ripanj station remains an intermediate station on the main line Beograd - Niš. Main tasks of the station are related to the traffic management and local passenger services.

Ralja

Main tasks of the Ralja station are related to local passenger services within the integrated public transport system in Belgrade. In addition to two main through tracks, it is necessary to design two arrival-departure tracks for commuter trains.

Sopot Kosmajski

Sopot Kosmajski station remains an intermediate station on the main line Beograd - Niš. Main tasks of the station are related to the traffic management and local passenger services. In addition, the station has to provide a service of an existing military spur track.

Mladenovac

Mladenovac station remains an intermediate station on the main line Beograd - Niš. Main tasks of the station are related to the traffic management, shunting work organization and the performance of passenger and wagonload services. The station remains opened for domestic and international passenger services and it keeps the role of the terminus station for commuter trains within the Belgrade integrated public transport system. For freight services, it remains opened for wagonload services at station loading tracks and private sidings.

Kusadak

Kusadak remains an intermediate station on the main line Beograd - Niš. Main tasks of the station are related to the traffic management and local passenger services.

Smederevska Palanka

Smederevska Palanka remains an intermediate station on the main line Beograd - Niš opened for domestic and international passenger services. For freight services, it remains opened for wagonload services at station loading tracks and private sidings.

Velika Plana

Velika Plana station remains an intermediate station on the main line Beograd - Niš and a junction station at which another main line Rakovica - Mala Krsna - Velika Plana branch off. Main tasks of the station are related to the traffic management, shunting work organization and the performance of passenger and wagonload services.

Markovac

Markovac station remains an intermediate station on the main line Beograd - Niš and a junction station at which another main line Markovac - Resavica branch off. Main tasks of the station are related to the traffic management and the station remains open for local passenger services.

Lapovo Varos

The existing junction Lapovo Varos change the role on the network and become an intermediate station on the main line Beograd - Niš. It remains the north border station in the Lapovo railway node at which the freight tracks to the marshalling yard Lapovo Ranžirna branch off the main line. Main tasks of the station are related to the traffic management and the station remains open for local passenger services.

Lapovo

Lapovo station remains an intermediate station on the main line Beograd - Nis and a junction station at which another main line Lapovo - Kraljevo branch off. The station remains the south border station in the Lapovo railway node branch off freight tracks directed to the marshalling yard Lapovo Ranžirna. Main tasks of the station are related to the traffic management. The station remains opened for domestic and international passenger services. Three platforms are proposed to be designed in the station. In the area of the railway station Lapovo, an archaeological site with settlements from the prehistoric period and the ancient period has been recorded. This archaeological site is located in the settlement and was partially damaged by construction works for the needs of the construction of the railway station, railway and surrounding infrastructure.

Bagrdan

Bagrdan station remains an intermediate station on the main line Beograd - Niš. Main tasks of the station are related to the traffic management and local passenger services.

Jagodina

Jagodina station remains an intermediate station on the main line Beograd - Niš. Main tasks of the station are related to the traffic management, shunting work organization and the performance of passenger and wagonload services. The station remains opened for domestic and international passenger services. For freight services, it remains opened for wagonload services at station loading tracks and private sidings.

Gilje

Gilje remains a halt on a two-track line with two main through tracks and it remains open for receiving and dispatching passengers in local traffic.

Ćuprija Junction

The Ćuprija Junction is not the subject of this study and keeps the current track layout designed according to the Main Project for Reconstruction and Modernization of the section Gilje - Ćuprija - Paraćin of the Belgrade - Niš railway made in 2007.

Paracin

Paraćin station remains an intermediate station on the main line Beograd - Niš and a junction station at which two lines branch off Rasputnica Ćuprija - Paraćin and Paraćin - Stari Popovac, respectively. Main tasks of the station are related to the traffic management, shunting work organization and the performance of passenger and wagonload services. The station remains opened for domestic and international passenger services. For freight services, it remains opened for wagonload services at station loading tracks and private sidings.

Ćićevac

Ćićevac station remains an intermediate station on the main line Beograd - Niš. Main tasks of the station are related to the traffic management and passenger services. In addition, the station services private sidings.

Stalać

Stalać station is not the subject of this study and keeps the track layout designed according to the Preliminary Design for Reconstruction and Modernization of the Existing Railway Track and Construction of the Second Track of the Railway Line Belgrade - Niš, the section Stalać - Đunis prepared in 2018.

Đunis

Đunis station is not the subject of this study and keeps the track layout designed according to the Preliminary Design for Reconstruction and Modernization of the Existing Railway Track and Construction of the Second Track of the Railway Line Belgrade - Niš, the section Stalać - Đunis prepared in 2018.

Korman

Korma remains an intermediate station on the main line Beograd - Niš. Main tasks of the station are related to the traffic management and local passenger services.

Adrovac

Adrovac station become the freight point under the supervision of the Aleksinac station open only for freight work. The service of this official place would be performed from the Aleksinac station.

Aleksinac

Aleksinac station remains an intermediate station on the main line Beograd - Niš opened for passenger and freight services in domestic and international traffic. For freight services, it remains opened for operations at station loading tracks and private sidings.

Lužane

Main tasks of Lužane are related to receiving and dispatching passengers within the local passenger services. In addition to two main through tracks, it is necessary to design two arrival-departure tracks for commuter trains.

Grejač

Grejač station remains an intermediate station on the main line Beograd - Niš. Main tasks of the station are related to the traffic management and local passenger services. In addition, the station remains opened for wagonload services.

Mezgraja

Main tasks of Mezgraja are related to receiving and dispatching passengers within the local passenger services. In addition to two main through tracks, it is necessary to design two arrival-departure tracks for commuter trains

Trupale

Trupale station remains an intermediate station on the main line Beograd - Niš and a junction station at which another main line Trupale - Niš Ranžirna - Međurovo branch off. Main tasks of the station are related to the traffic management and the station remains open for local passenger services.

Conceptual framework for the reconstruction of the railway station in Nis

The reconstruction of the Nis railway node has so far been partially considered through project documentation for the construction of a single-track bypass around Nis (made in 2016) and the reconstruction of the railway line Niš - Preševo – North Macedonia state border, Niš - Brestovac section (made in 2017). In order to prepare the basis for the next phase of the current project for modernization of the railway line Beograd - Niš, this part of the study summarizes recommendations for creating the reconstruction concept of the Niš railway node:

- Keep as much as possible current railway corridor and railway land, as well as railway capacities at existing locations and achieve their integration into the new technical - technological solution;
- Harmonize the development of railway infrastructure with the development of the city while achieving compatibility of railway, road and air transport;
- Conceptualize the organizational and functional solution of railway traffic based on the current location of stations Niš and Niš Ranžirna and their role within the railway node Niš;
- Separate freight and passenger traffic and move out freight trains from the central zone of the city;
- On main lines, enable direct traffic of passenger trains through the station Niš without changing the direction of train movement, as well as without changing the type of traction;
- Create a functional and rational solution of stations and connections with magistral lines;
- Keep existing and already planned private sidings.

The conceptual basis of the railway junction Niš consists of the existing stations Niš, Niš Ranžirna and Crveni Krst, which are characterized by the following technological requirements:

- Concentrate shunting work at the marshalling yard Nis Ranžirna which should process the entire car flow in the junction. Nis Ranžirna station should be the starting and ending point for all freight trains that do not transit the junction;
- Assign the role of the main passenger terminal for the city of Niš, either in long-distance and suburban transit services, to rail station Niš that is connected with the bus station. Passenger trains of all categories should have a stop at the Niš station;
- Keep the rail station Crveni Krst to serve the existing network of industrial tracks as a link between railway and industry.

Niš station

The main technological task of the Nis station is to regulate train movements on the main lines E-85 and E-70 and to perform operations in passenger traffic. All categories of passenger trains will stop at the Nis station: international trains, domestic passenger trains on longer distances, regional trains and suburban and city trains that run within the junction. Also, it is necessary to keep the possibility of servicing the existing industrial tracks in the station. The station will be open for loading and unloading of goods on private sidings.

The most important change in the station Niš, concerning the technological tasks of the station, is that that trains from / to Dimitrovgrad will no more change traction and direction of movement as a part of transit route through the station.

Station track capacities can be divided into two yards. The first one is passenger yard consisted of the main group with 5 arrival - departure tracks for receiving and dispatching passenger trains and an additional two group of sidings with 11 secondary tracks. The second one is local cargo yard consisted of the main group with 3 arrival - departure tracks for receiving and dispatching trains and 4 additional sidings with tracks used for freight handling, shunting work and stabling. In the next phase of the current project, it is necessary to evaluate the compliance of the existing track layouts with technological requirements, applicable standards and regulations.

Niš Ranžirna station

Niš Ranžirna station keeps the existing role of a marshalling yard with an international and local character of work. The international character of the station work reflects in servicing a large number of transit trains and the formation of international trains for Macedonia (Greece) and Bulgaria (Turkey). In the opposite direction, from the wagonload

flows coming from Macedonia (Greece) and Bulgaria (Turkey), the station assembles trains mostly for Belgrade marshalling yard and further destinations on the network.

The local character of the station work reflects in dismantling and assembling direct trains that run between technical freight stations on the national network, then in the formation of feeder trains for all lines as well as within the Niš node. In addition, the tasks of the technical passenger station (i.e. maintenance depot for passenger train units) will be performed in Nis Ranžirna station.

As a part of the new Niš railway node configuration, the bypass line should be built and used for transit passenger trains on the route Belgrade - Dimitrovgrad passing through the Nis Ranžirna station. This will completely enable the continuous flow of transit traffic through the Nis node. In this regard, it is necessary to provide at least one bypass (transit) track at the Nis Ranžirna station. The construction of the bypass is justified from the aspect of safety issues, driving time and separation of passenger and freight flows through the marshalling yard. In order to separate the bypass track from the main route Trupale - Niš Ranžirna in the area of the Niš Ranžirna station, it is necessary to assess the justification for the reconstruction of the switch zones within the station.

Crveni Krst station

The main technological task of this station is to regulate train movements on the main lines E-85 and E-70. In addition, Crveni Krst station is connected to the depot for towing trains, and the station will continue to serve private sidings in the industrial zone of Nis. Crveni Krst station remains open for handling wagonloads at private sidings. Due to the abovementioned tasks, it is expected that Crveni Krst station will provide intensive shunting work.

Niš Sever station

According to the design solution of the bypass railway line around the city of Nis, it is planned to construct a new station Niš Sever. The main technological task of this station is to regulate train traffic on the lines Belgrade - Mladenovac - Niš - Presevo - Macedonia state border, Niš Ranžirna - Crveni Krst and on the new bypass line around Niš. In passenger transport, the Niš Sever station will be open for servicing local trains on the line Belgrade – Niš. In freight transport, the station will be intended for the reception and dispatch of transit freight trains, and the servicing wagonloads.

The conceptual framework of railway node Niš is shown in the following figure. The figure indicates the parts that have been designed so far with the existing project documentation fitted in the current track layout situation.

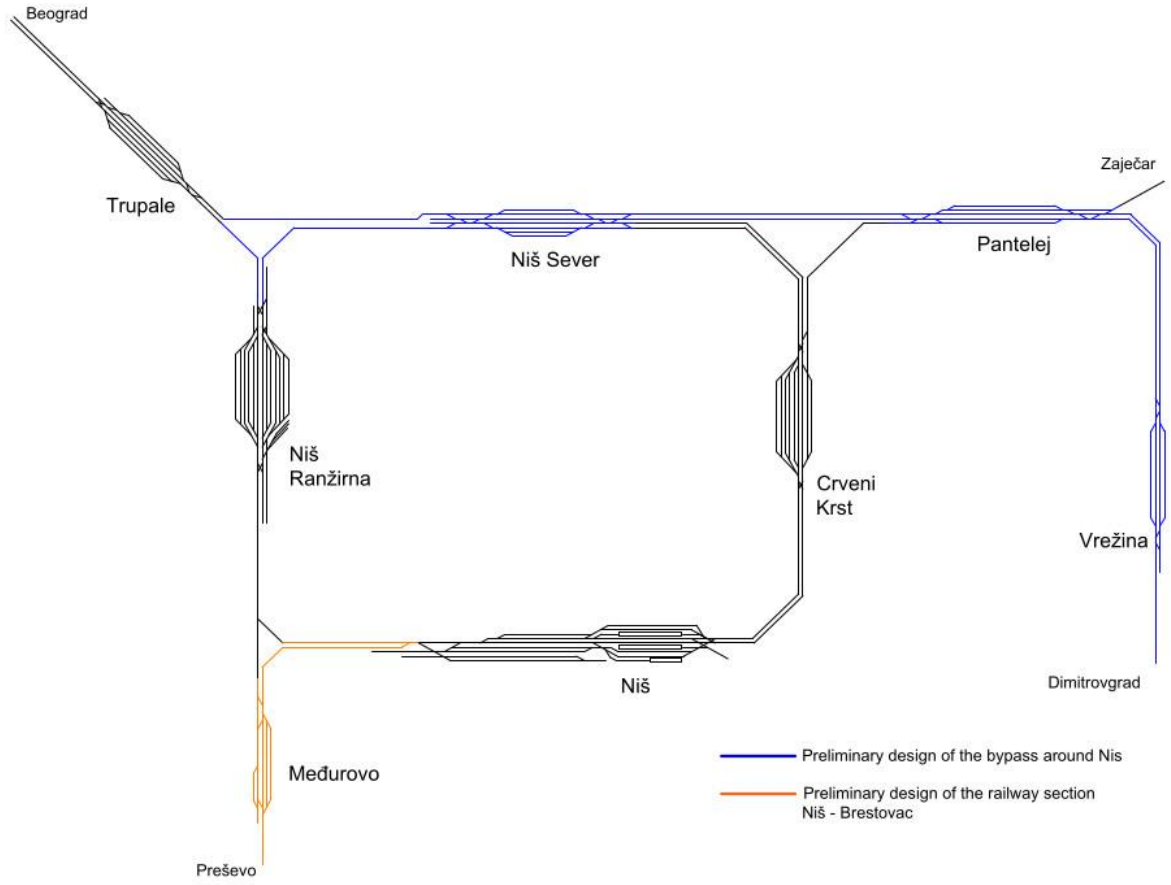


Figure 8 The conceptual framework of railway node Niš

Station buildings

Belgrade - Niš (Medjurovo) railway section consists of 28 stations that will be open for passenger services, except Lapovo Ranžirna (Marshalling) and Adrovac, which are operational purely for the freight traffic. Freight stations Adrovac will be served and supervised by station Aleksinac.

All stations will be open for passenger services, except Lapovo Ranzirna and Adrovac.

Modernization project includes reconstruction of existing stations and train stops and their adjustment to EU railway standards.

Architectural buildings and structures are concentrated in all stations along the railway line and they include the following groups of buildings and structures:

1. Station buildings with the landscaping of station complex
2. Subways with canopies, stairs, and lifts
3. Platforms and platform canopies
4. Buildings for signalling and interlocking and telecommunication facilities – SI and TC
5. Building for sectioning posts - SP
6. Building for sectioning posts with neutral section – SPN
7. Building for electric traction substation - ETS
8. Building for Electrical Engineering Operations EEO – overhead contact system section
9. Standardized buildings to accommodate TC equipment and landscaping

All buildings/structures are designed 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, standards, and TSI for the appropriate type of buildings/structures.

Depending on the current condition of the buildings, a specific plan of action is proposed for each of them. Each existing train station includes premises for the purposes of railway staff and the purposes of passengers. The design envisages program and structural interventions, to reactivate these buildings in line with new technological needs, with minimal changes in exterior and interior. Energy-related measures for the rehabilitation of buildings are envisaged as well. Most of the repairs are focusing on the roof, façade, door and windows, floors, suspended ceilings, etc. In case of rehabilitation of station building of cultural and/or historical value, renovation will be implemented in cooperation with the relevant authority (Institute for the Protection of Cultural Monuments of Serbia).

Some of the buildings already went through the process of reconstruction in the past (Lapovo, Jagodina, Paracin, etc.), so the scope of the current works is smaller.

Demolition of some auxiliary buildings (mostly toilets) is planned for the ones that are in poor condition.

In all stations for passenger services, given safety and service level, landscaped and equipped platforms with canopies are envisaged (paving, tactile paths, benches, trash cans). For the purposes of passenger access to the platforms, the design proposes subways with stairways and lifts for the elderly, children, and persons with special needs, and access to platforms is also enabled by ramps, as necessary.

Buildings to accommodate electrical devices and facilities are designed following the characteristics of the devices and operational requirements.

Materials have been 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 have been envisaged (water supply, sewerage, electricity, heating, ventilation, and air-conditioning, etc.).

Station complexes will be functionally landscaped and equipped (parking lots, paving, furniture, greenery), with access roads in accordance with the needs and urban planning.

Stopping trains and their waiting

Three categories of passenger trains will operate on the new line. The first category includes trains that will run at the maximum speed allowed by the geometry of the route (160/200 km/h). It is also assumed that these trains will stop only in Jagodina. The second category includes regional passenger trains in domestic railway transport. Their commercial speed will be slightly lower, as they have more frequent stops and engagements at stations. The third category consists of the so-called local trains that will have the most stops at all stations.

The waiting time of trains at stations is 2 minutes for trains of the highest rank (Jagodina station), trains of the second category are waiting at stations for 1 minutes, while other trains in stations are waiting for half a minute.

Usually, freight trains do not stop at stations. Their stopping and waiting depends on the timetable and are conditioned by traffic reasons (overtaking by higher speed trains).

The following figure shows the official places in which trains will stop.

Figure 9 Official places in which trans will stop: a) International trains, b) Regional trains, c) Local trains

Level crossings

There are a total of 116 level crossings on the Belgrade - Niš line. Of these 116 crossings, 23 crossings belong to sections that are not subject to this optional analysis (Belgrade - Resnik, Gilje - Paraćin, Stalać - Djunis and Trupale - Niš). The other 93 level crossings are located on the sections that are the subject of this optional analysis.

Of the considered 93 level crossings, 63 of them are with active signalization, and 30 with passive signalization. 27 level crossings are located in the station zone (between the enter signal of the station on one side to the enter signal of the station on the other side). Also, considering roads, most level crossings are at the intersection of the railway with local municipal roads.

Legislation in the Republic of Serbia does not allow the existence of level crossings on railway lines and sections of railway lines where the speed of trains is higher than 160 km/h. In addition, the Law does not leave room for the existence of level crossings in three other important situations:

1. When the level crossing implies the intersection of a road with more than two railway tracks
2. When the level crossing implies the intersection of the road with station tracks
3. When the level crossing implies the intersection of high rank road (Ib or IIa rank) with railway line.

So, level crossings belonging to one of the four above mentioned groups have been identified and proposed for deleveling. All other level crossings can be classified to one of the two other possible groups:

1. Level crossings with active signalizatopn
2. Level crossings with passive signalization

In this phase of design, all level crossings have been identified and if they belong to the group of crossings with passive signalization, a proposal was made to raise the level of security. It means that such a crossing needs to be equipped with automatic traffic safety device. If they belong to the group of level crossings with active signalization, it is proposed to keep them in that form.

In the next design phase, it is necessary, for each level crossing that belongs to one of the first four groups (for which the law provides deleveling), to examine whether the level crossing should be deleveled or closed. In case of closure, vehicle flows should be redirect to the next crossing (leveled or deleveled). Additionally, when level crossings are leveled, the possibility of deleveling or their closing should be considered.

Out of the crossings located on the section with 200 km/h, there are five crossings that are located at a short distance from the neighbouring level crossings (less than 1500 m) and can be closed and the flows can be redirected to the neighbouring crossings. In the next phase of design, an additional analysis of level crossings should be performed and the possibility of closing and redirecting flows to neighboring crossings should be examined for cases when this distance is greater than 1500 m.

Table 26 The number of level crossings and their solutions

	Overpassing - underpassing	Upgrade	No action	Close	Total
Level crossings	52	16	20	5	93

4.2.3 Formation

Width of formation of the open double-track railway line, which ensures the safety space, working paths and accommodation of electrical engineering and other equipment, is 12.5 m. Formation's cross fall is two-way with inclination of 5%.

Given the category of the railway line and the design speed of 200 km/h, design envisages fencing of the railway line. Protective wire fence is envisaged on the entire section.

On parts of the railway line where protection against noise is needed, design envisages mounting of noise protection barriers, 3.5 meters high, on the formation edge.

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

On terrains with lower bearing capacity, it is envisaged to place geocomposite on the formation in the width of 4m.

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

4.2.4 Drainage

The railway line drainage addresses the drainage and protection of the designed railway line against rainwater from the track bed and from hillside waters from the sections of the railway line which are in cut. The design also includes the drainage of water from the designed structures along the railway line. These are road deviations, overpasses and underpasses and bridges.

The design addresses the drainage and protection of the designed railway line from stormwater, the protection against hillside waters on sections of the railway line which are in cut and parts of the railway line which on the embankment when the terrain falls towards the railway line. Channels are envisaged on one or both sides, depending on the railway line finished level and the configuration of the surrounding terrain. On the sections of the railway where

the embankment is higher and where, in the transverse sense, the terrain "falls" from the railway line, no channels are envisaged.

Designed channels are earth or concrete. Concrete channels are 40 cm wide in the bottom in plan view and their minimum height is 25 cm, in order to prevent water from retaining at track foot, given the small available falls. The layout and levelling solution of the drainage channel is conditioned by the existing structures on the alignment, longitudinal and cross falls, relevant rains and catchment areas. The location of the channel is part of the railway line civil engineering design. The same applies to railway station drainage.

For drainage of track bed in railway stations, drainages are designed and fit into the railway line drainage system.

The collected water is discharged to the nearest recipient by the shortest route. Open infiltration ponds are envisaged, which represent green artificial depressions in the soil, with layers of broken rock and gravel at the bottom, which are occasionally filled up during heavy rains and completely emptied in dry weather. An alternative is absorbing wells and/or drainage fields.

The principle in locating the infiltration facility was to keep it at a minimum distance of 5 m from the edge of the slope of the railway embankment.

The drainage principle for the railway line in the zones of sanitary protection of water source areas is, like in the remaining part of the railway line, by channels, with the following additional elements:

- lineside channels are concrete on the entire height, with dimensions larger than the ones required for drainage of the track bed, so that it can retain the incident amount of fluid which could possible spilled from the tank wagons.
- the entire surface under the superstructure is separated by foil to the channel, so that the possibly spilt pollutant could safely end up in the channels.
- in front of the outflow into irrigation canals or absorbing well, separators with settling basins are envisaged, and space is reserved for installation of tertiary treatment, should the need for it arise in the future.
- at entry to the separator, a floodgate is envisaged, which will get down in case of incident.

4.2.5 Permanent way

For the purposes of protection against harmful effects of train derailment, 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 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).

After laying the new rails, preventive grinding is necessary to remove the initial roughness on the upper surface of the rail head and the layer with uneven carbon content, as well as irregularities resulting from the superposition of the tolerance during the laying of tracks (including lining and levelling).

In the course of operation of the railway line, flat and smooth-running surface of rails should be provided. When repairing the rails, it is necessary to remove all bulges and dents at the welding points. Maintenance plans should anticipate and implement regular grinding of the rails.

4.2.6. Fencing

Given the category of the railway line and the design speed of up to 200 km/h, design envisages that the railway line is fenced with a type of fence used for highways. The fence shall have multiple purposes: as it protects and deters against unauthorized access to railway facilities and equipment, it has an impact on safety because it prevents uncontrolled access for people and animals to the railway line. In general, fence is envisaged to be placed on both sides of the railway line, at 1.0m from the channel edge, i.e., from toe of embankment. On the outer side of the fence, a 5m space is reserved for service roads.

4.2.7 Structures

The Law on Railways ("Official Gazette of the RS", No 45/13 and 91/15), Article 58, stipulates that, in the infrastructure belt (25 m on both sides of the railway line from the centre lines of the end tracks), save in the zone of the belt in the inhabited place (6 m on both sides of the railway line from the centre lines of the end tracks), by way

of exception, buildings which are not in the function of railway traffic can be constructed, based on the issued approval of the infrastructure manager, which is issued in the form of a decision, and if the construction of these buildings is foreseen by urban plan of local self-government plan which prescribes their protection and implements at its own expense the prescribed protection measures for those buildings.

According to this Law, it is forbidden to build any structures except for the railway functions in the zone of 8 m from the last track axis (6 m in the urban zone) on both sides. Regarding the wider zone of 25 m from the last track axis on the both sides, it is for forbidden to build any structures except for railway function and, in some cases, for other purposes but no solid structures. It could be allowed by railways to build electrical and other installation in this zone. In the protective railway zone of 100 m on both sides from the last track axis, it is necessary to provide technical conditions from the railway authorities to build structures.

The Design of Expropriation will be done at the level of Preliminary Design, defines the engaged space required for construction of the project, in the way that, plots situated within the engaged space are defined within cadastral municipalities.

Bridges.

For the purpose of preparation of Preliminary Feasibility Study (PFS) for reconstruction and modernization of the line, determination was performed for cross-section types of bridges, overpasses and underpasses. Typical cross-sections of structures have been adopted depending on the spans and obstacles they bridge.

Typical cross section 1: The cross section is formed for two tracks. The total width of the bridge is 12.90 m. Such cross sections are usable for both integral and semi-integral bridges. They are used for smaller spans up to 10 m (15 m for variable height slabs).

Typical cross section 2: The cross section is formed for two tracks. The total width of the bridge is 12.90 m. In the places above the columns, the slab is solid without holes. Such cross sections are usable for spans up to 25 m

Typical cross section 3: The cross section is formed for two tracks. The total width of the bridge is 12.90 m.

Typical cross section Overpass: Based on the design basis, a typical cross-section of the overpass over the railway line was adopted. Such cross sections are suitable for integral and semi-integral structures. Total width the bridge is 11.20m.

Typical cross section Underpass: The cross section is formed for two tracks. The total width of the bridge is 12.90 m. Such cross sections are usable for both integral and semi-integral bridges. They are used for smaller spans up to 10 m (15 m for variable height slabs).

The proposed bridges lie in the following km positions, presented in the table

Table 27 Proposed bridges on the Belgrade Centre – Nis (Medjurovo) railway line

No.	Chainage	Length [m]	No.	Chainage	Length [m]
1	3+610	375	8	76+325	75
2	18+600	40	9	115+810	45
3	19+670	525	10	173+540	100
4	20+450	130	11	174+200	45
5	21+290	90	12	178+800	305
6	24+245	350	13	181+180	60
7	25+530	570	14	214+700	100

Underpasses, overpasses and culverts will be further elaborated in the Preliminary Design stage and be presented in the ESIA per Section.

Tunnels

Within the project of second railway track construction, i. e. converting the existing Belgrade – Nis single-track railway line into a double-track railway line, some new tunnels need to be built, and some of the existing ones need to be reconstructed.

There will be 18 tunnels on the Belgrade – Nis double-track railway line:

- 9 tunnels of up to 500 m,

- 3 tunnels from 500 to 1.000 m and
- 6 tunnels over 1.000 m.

The tunnels are more analytically presented below:

1. The first tunnel on the Belgrade – Nis railway line is the existing 3.070 m long "Dedinje" tunnel, from km. 0+300 to km. 3+370, which was built during the period from 1975 to 1979. The double-tube single-track tunnel is located between the Prokop station (Belgrade-Center) and Rakovica station and was built as part of the Belgrade railway junction. At the first section of about 200 m both tracks are in a single tunnel tube, after which they diverge into separate tunnel tubes, at a distance of 22 m from each other along most of the tunnel.

2. From km. 9+350 (entrance to tunnel no. 2) to km. 21+045 (exit from tunnel no. 5) there are 4 tunnels. Their lengths are 180, 880, 190 and 125 m respectively. All four tunnels should be constructed as single-tube double-track, which is recommended for short tunnels (up to 1.000 m long) on a double-track railway line.

3. At km. 26+320 of the existing railway line, tunnel no. 6 "Ripanj" is located, the length of which is 1614 m. This is an old Serbian-type railway tunnel, and, during reconstruction it is absolutely necessary to remove the entire existing stone lining, expand the clearance and perform new concrete lining of the single-track tunnel. Depending on the geological and hydrological conditions along the tunnel, a flat concrete baseplate or an invert would form the basis of the tunnel structure. The entire tunnel circumference should be secured from water penetration. As large volumes of groundwater have already been appearing in some tunnel sections, around the tunnel and in the tunnel itself, concrete slab under the track should only be applied if appropriate measures can ensure subgrade stability along the entire tunnel.

In parallel with the existing "Ripanj" tunnel, at an axial distance of 15 to 25 m, a new 1.755 m long tunnel tube for the second railway track should be constructed. A horseshoe-shaped tunnel clearance needs to be constructed, as to provide space for UIC GC structure gauge, an evacuation pedestrian path, structural and technical interventions. The entire tunnel circumference should be secured from water penetration. In this tunnel tube it would also be justified to envisage the track on a concrete slab instead of crushed-stone ballast. However, as large volumes of groundwater may appear along the tunnel, subgrade stability along the entire tunnel needs to be ensured by applying appropriate measures.

4. At km. 29+550 of the new route, a new tunnel is planned, namely 2.600 m long tunnel no. 7. The proposal is to build the tunnel as a double-tube single-track. Depending on the geological and hydrological conditions along the tunnel, a flat concrete baseplate or an invert would form the basis of the tunnel structure. The entire tunnel circumference should be secured from water penetration.

5. From km. 32+840 (entrance to tunnel no. 8) to km. 58+200 (exit from tunnel no. 11), from km. 172+690 (entrance to tunnel no. 13) to km. 174+150 (exit from tunnel no. 14) and from km. 184+275 (entrance to tunnel no. 17) to km. 187+740 (exit from tunnel no. 18) there are 4 tunnels, with a length of 480, 330, 465 and 160 m, 2 tunnels with a length of 690 and 435 m and 2 tunnels with a length of 615 and 160 m. All these tunnels should be constructed as single-tube double-track

From km. 170+885 (entrance to tunnel no. 12) to km. 178+660 (exit from tunnel no. 16) there are 3 tunnels. Their lengths are 1.450, 3.275 and 1.040 m. All three tunnels are proposed to be constructed as double-tube single-track. Given that after exiting tunnel no. 12 there is immediately a new bridge, the last tunnel section of about 200 m before the exit should be constructed as a single tube, into which the previously diverged two parallel tubes would join. Given that at 165 m before the entrance to tunnel no. 15, exit from tunnel no. 14 is located, the initial tunnel section of about 200 m from the entrance should be constructed as single-tube, and then the tracks would diverge into two spaced parallel tubes. For determining the distance and number of cross passages that shall be connecting the tunnel tubes, tunnels no. 15 and 16 should be considered as one tunnel, given that the distance between them is only 30 m, i. e. less than the length of a train. Considering that after exiting tunnel no. 16 there is immediately a new viaduct, the last tunnel section of about 200 m before the exit should be constructed as a single tube, into which the previously diverged two parallel tubes would join.

The following table shows the proposed tunnels.

Table 28 Proposed tunnels on the Belgrade Centre – Nis (Medjurovo) railway line

No.	Chainage	Length [m]	No.	Chainage	Length [m]

1	0+300 - 3+370	3070	10	57+295 - 57+760	465
2	9+350 - 9+530	180	11	58+040 - 58+200	160
3	12+150 - 13+030	880	12	170+885 – 172+335	1450
4	18+920 - 19+110	190	13	172+690 - 173+380	690
5	20+920 - 21+045	125	14	173+715 - 174+150	435
6	26+320 - 28+075	1755	15	174+315 - 177+590	3275
7	29+550 - 32+150	2600	16	177+620 - 178+660	1040
8	32+840 - 33+320	480	17	184+275 – 184+890	615
9	56+850 - 57+180	330	18	187+580 – 187+740	160

4.2.8 Crossings with road network

In accordance with the category of the railway line and the applicable regulations relating to reconstruction, modernization and construction of double-track railway line for the speed of up to 200 km/h, it is envisaged that all intersections of the railway line with roads must be grade separated, which requires cancellation of all existing road and pedestrian level crossings except in Belgrade and Nis railway nodes.

For all solutions for deviations and grade separations of roads, designs of pavement structure shall be developed.

4.2.9 Other design characteristics

Overhead Contact System

The reconstructed and modernized section Belgrade Centre is envisaged to be electrified with single-phase system, 25kV, 50Hz.

Electric Traction Substations and Sectioning Posts

Within the scope of reconstruction, modernization and construction of double-track railway line Belgrade Centre – Nis (Medjurovo) it is necessary to perform the reconstruction and modernization of the existing power supply substations and sectioning posts located on this section.

Remote Control of the Fixed Electric Traction Installations

Preliminary design shall contain the design of the temporary remote control centre located in the premises of the existing centre and local and remote control of motor-driven disconnectors. The design envisages equipment (and software) of temporary remote control centre for fixed electric traction installations.

Transformer Substations 25/0.23 kV from the Overhead Contact System

For back-up supply of signalling and interlocking devices, devices for control of motor-driven disconnectors and switch point heating, on the section Belgrade Centre - Nis (Medjurovo) transformer substations (TS) supplied from the overhead contact system are envisaged, whereof ratio is 25/0.23 kV, power: 5kVA, 50kVA and 100kVA.

Protection and Relocation of the Existing Technical and Utility Infrastructure

Within the scope of reconstruction, modernization and construction of double-track railway line Belgrade Centre - Nis (Medjurovo), it is necessary to perform verification of crossings and, as necessary, reconstruction of all overhead power lines whereof nominal voltage is 110kV-400kV, and which collide with the concerned railway line..

On the relevant section, there are collisions with power lines whereof nominal voltage is 35 kV, 20kV, 10 kV and 1 kV. Reconstruction of overhead 35 kV, 20 kV, 10 kV and 1kV lines at points of crossing with the railway line, implies, in principle, the replacement of existing towers in crossing spans with new terminal towers, at appropriate distance from the railway line, and cabling of overhead lines in crossing spans.

Signalling devices

All stations on the railway section Belgrade Centre-Niš of the railway line no.102 Belgrade Centre-Junction »G«-Rakovica-Mladenovac-Niš-Preševo-state border with North Macedonia are equipped with centralized relay interlocking devices for traffic management. . The signalling system has been in operation for more than 30 years, and its' maintenance is difficult due to the expiration of lifetime and lack of spare parts.

Telecommunication

Telecommuniacation systems in stations are old and capacity of these systems is not sufficient. Based on the considerations requirements from the ToR, the analysis to be carried out under Preliminary Design will include installation of the following:

- Copper cables
- Fiber optic cables
- Dispatcher and trackside telephone devices
- Radio-dispatching system
- GSM-R system
- Transport system
- Station telecommunication systems

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.

5.1.1 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 the area up to 5 km to cover biodiversity and other specific social impact 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 comensurate 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 500m, landscape 1km, floods 1km, surface waters 0,5km, groundwater 0,5 km, air and noise 0,3 km, vibration 0,1km) and they will be taken into account at the baseline description for ESIA per section.

5.1.2 Climate

The climate in the project area is continental to moderate-continental, and the amount of precipitation is usually up to 500-600 mm / year, while the air humidity is moderate. It is characterized by relatively colder winters, warmer autumns than spring and moderately warm summers. More specifically, low annual precipitation dominates, while the summer precipitation is characterized by strong evaporation due to high temperatures, with frequent occurrence of summer storms and showers. Winds are a very important factor causing differences in temperature, bringing precipitation or drought. Although the wind frequency is high especially in this area, its speed is low.

According to the map of climatic areas of Serbia (Ducić, V. et Radovanović, M., 2005), two main climate areas can be defined, A and B.

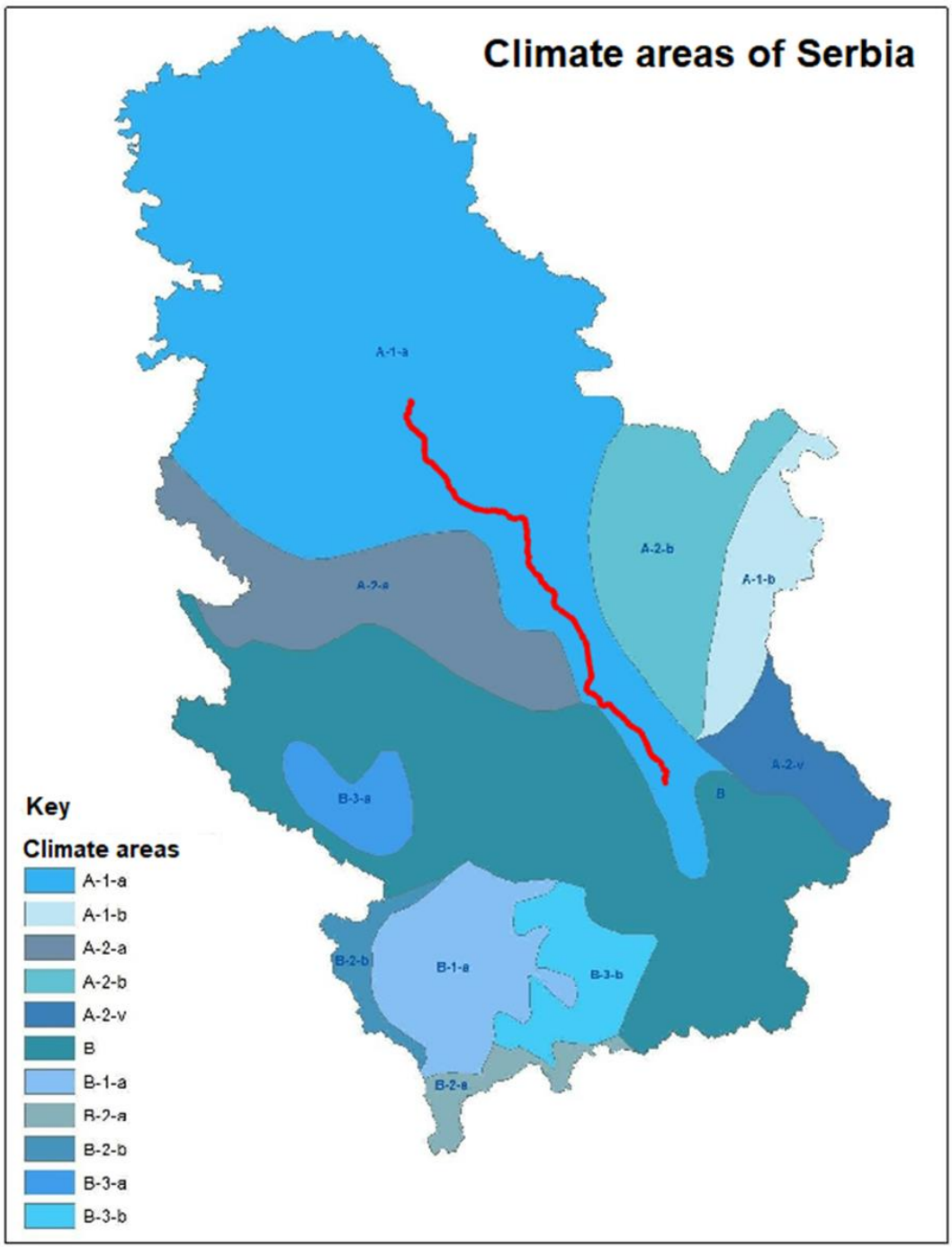


Figure 10 Climate areas of Serbia

Climate area (A) includes Vojvodina and the Peripanonian rim, Pomoravlje and eastern Serbia, up to Nisava River. This climate area has the characteristics of a continental climate. Five sub-areas have been singled out within it: A-1-a, A-1- b, A-2-a, A-2-b and A-2-c. Having in mind the route of the railway, sub-areas A-1-a is only crossed by the railway. Sub-area A-1-a - encompasses the plains of Vojvodina and the Peripanonian rim, as well as the Leskovac valley. Absolute extreme air temperatures in this subregion range from -32.6^{0}C to 42.3^{0}C. The annual temperature amplitude is above 22,^{0}C. The average winter temperature is above 10^{0}C, and in summer it is above 20^{0}C. Spring temperatures are slightly different from autumn temperatures. The average annual amount of precipitation in the lower regions is about 520 mm, and in some places over 650 mm. There is the least precipitation in winter, while spring precipitation is slightly higher than in autumn.

Data on air temperature characteristics were analysed for the period 2000-2020 for the climatological station "Belgrade-Observatory", for the meteorological station Smederevska Palanka, for the meteorological station Niš and for the meteorological station Ćuprija. Information on the meteorological stations is given in the following table, while the map that follows presents them in relation with the railway line.

Table 29 Meteorological stations data

Location	Coordinates		Altitude (m abole sea level)	Established (year)
Belgrade	20°28E	44°48N	132	1887
Smederevska Palanka	20°57E	44°22N	121	1901
Ćuprija	21°23E	43°56N	123	1896
Niš	21°54E	43°20N	202	1889

Figure 11 Map of meteorological stations network in relation with the railway line

Station: Belgrade

The lowest average annual air temperature for the observed period 2000-2020 is 7,8 ^{0}C, and the highest average annual temperature for the same period is 19.8 ^{0}C. The absolute maximum temperatures in this area reached the value of 40.5 ^{0}C in 2000 and the absolute minimum temperatures reached the value - 15.5 ^{0}C in 2012. The average annual amount of precipitation for the observed period from 2000-2020 ranged from the lowest 367.7mm of water column and the highest 1095.1 mm of water column.

The average annual humidity is about 67%. The average number of days with snow is 33.7, or 42.7 with snow cover. The highest number of days with fog is in the period from October to February, with the appearance of 21.7 days with fog during the year. The highest number of frosty days during the year occurs in the period from October to April, with the average number of frosty days occurring during the year being 62.2 days.

The wind frequencies in directions, silences average and wind speeds in m/s for the period 1981-2010 are given in the following table and figure.

	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	C
(‰)	25	38	31	28	25	97	105	121	44	32	22	65	99	106	66	55	42
(m/s)	2,3	2	2	1,9	2,4	3,1	3	2,9	2,2	1,8	1,7	2	2,2	2,3	2,3	2,3	

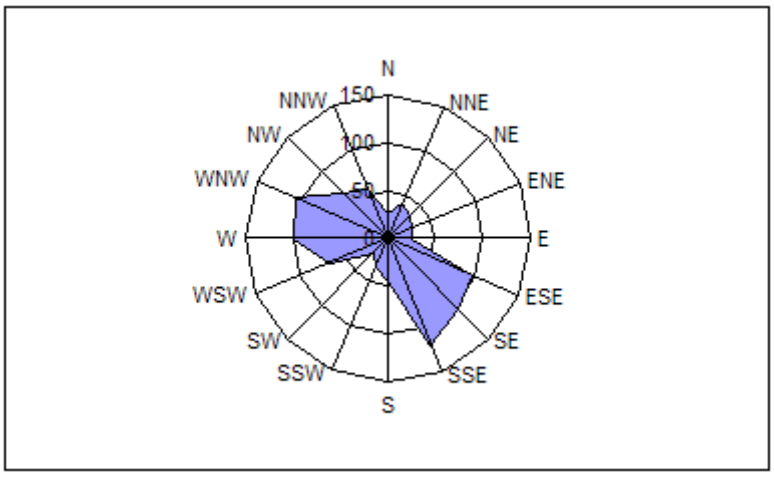


Figure 12 Wind data for the station of Belgrade

The most common wind direction for the city of Belgrade is Košava (south-east wind).

Station: Smederevska Palanka

The lowest average annual air temperature for the observed period 2000-2020 is 5.9 ^{0}C, and the highest average annual temperature for the same period is 19.8 ^{0}C. The absolute maximum temperatures in this area reached the value of 44.9 ^{0}C in 2007 and the absolute minimum temperatures reached the value - 22.9 ^{0}C in 2017. The average annual amount of precipitation for the observed period from 2000-2020 ranged from the lowest 378.0 mm of water column and the highest 1039.6 mm of water column.

Regarding humidity, the values of the average monthly relative air humidity range from the lowest values in the summer months to the highest in the winter months, something which is a characteristic of the continental climate. The annual flow of water vapor pressures is proportional to the annual flow of air temperature.

The average annual humidity is about 72%

The average number of days with snow is 31.9, or 41.6 with snow cover. The largest number of days with fog is in the period from October to February, with the appearance of 44.7 days with fog during the year. The highest number of frosty days during the year occurs in the period from October to April, with the average number of frosty days occurring during the year being 84.2 days.

The wind frequencies in directions, silences average and wind speeds in m/s for the period 1981-2010 are given in the following table and figure.

	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	C
(‰)	46	29	19	36	46	113	82	57	24	21	19	54	68	119	83	77	106
(m/s)	2,3	2	1,9	2,4	2,6	2,7	2,6	2,4	2,2	1,7	1,7	2	2,3	2,6	2,3	2,3	

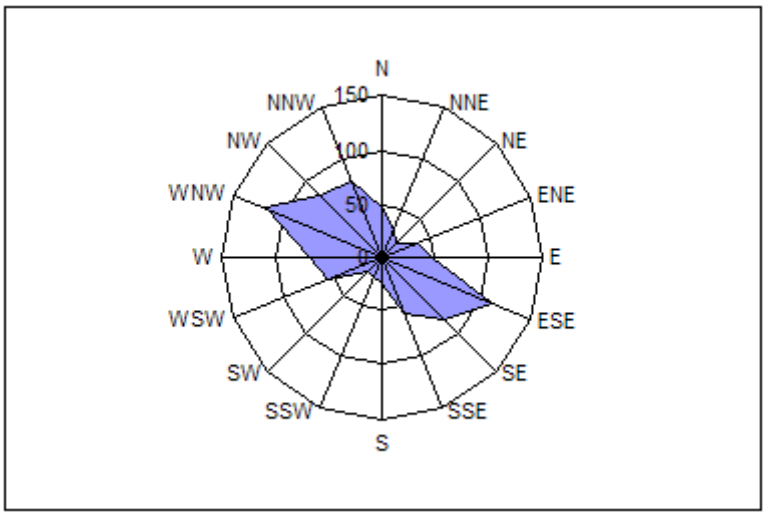


Figure 13 Wind data for the station of Smederevska Palanka

According to the wind data, it is concluded that this area is exposed to frequent air currents. The area is most often exposed to winds from the east and souththeast and winds from the west and northwest. The mean monthly wind speeds show that wind speeds have higher values in the winter months (February-March) and lower values in August.

Station: Ćuprija

The lowest average annual air temperature for the observed period 2000-2020 is 5.2 ^{0}C (2005), and the highest average annual temperature for the same period is 19.9 ^{0}C (2019). The absolute maximum temperatures in this area reached the value of 44.6 ^{0}C in 2007, and the absolute minimum temperatures reached the value - 24.3 ^{0}C in 2012. The average annual amount of precipitation for the observed period from 2000-2020 ranged from the lowest 463.4 mm of water column and the highest 910.0 mm of water column.

The average annual humidity is about 74%. The north-west wind blows most often, with the property of bringing the main amounts of precipitation under the influence of air currents from the Atlantic Ocean and the Adriatic Sea. The second most frequent is Košava (south-east wind). During the spring and summer, it blows like a dry and quite warm wind, with which precipitation rarely arrives even during the winter, although it brings dry snow and builds high debris, causing an increased feeling of cold. The third most important is the cold north wind.

The average number of days with snow is 34.4, or 46.8 with snow cover. The largest number of days with fog is in the period from October to February, with the appearance of 21.6 days with fog during the year. The highest number of frosty days during the year occurs in the period from October to April, with the average number of frosty days occurring during the year being 91.1 days.

Station: Niš

The lowest average annual air temperature for the observed period 2000-2020. year is 6.3 ^{0}C (2005) and the highest average annual for the same period is 20.2 ^{0}C (2019). The absolute maximum temperatures in this area reached the value of 44.2 ^{0}C, and the absolute minimum temperatures reached the value - 19.0 ^{0}C. The average annual amount of precipitation for the observed period from 2000-2020 ranged from the lowest 385.6 mm of water column, maximum 950.2 mm of water column.

The average annual humidity is about 69%. The average number of days with snow is 39.5, or 45 with snow cover. The largest number of days with fog is in the period from October to February, with the appearance of 13.7 days with fog during the year. The highest number of frosty days during the year occurs in the period from October to April, with the average number of frosty days occurring during the year being 79.7 days.

The wind frequencies in directions, silences average and wind speeds in m/s for the period 1981-2010 are given in the following table and figure.

	N	NNE	NE	ENE	E	ESE	SE	SSE	S	SSW	SW	WSW	W	WNW	NW	NNW	C
(‰)	24	20	32	117	67	33	15	16	23	19	17	24	27	50	105	98	313
(m/s)	1,4	1,8	2,1	2,1	2	1,7	1,6	2,2	2,6	2,1	1,9	1,3	1,4	1,9	2,8	2,3	

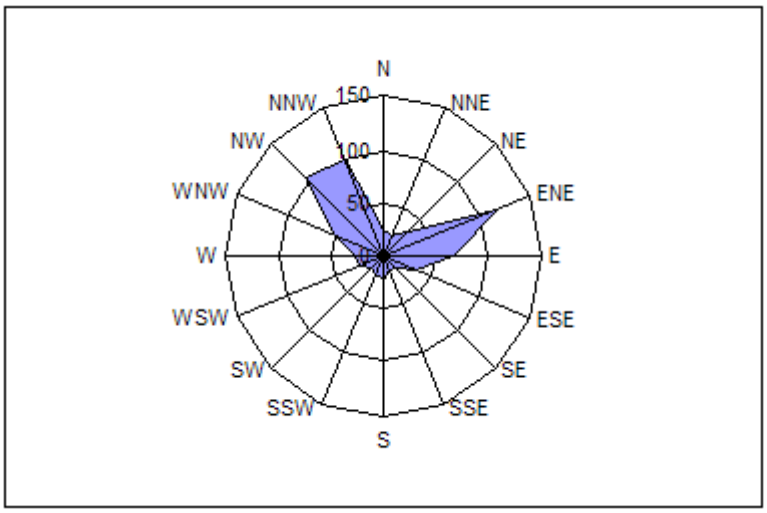


Figure 14 Wind data for the station of Nis

The dominant wind is from north – west, which is constant throughout the year. In the summer months, winds from the east and north are frequent.

The meteorological data for all stations for the period 2000-2020 can be summarized in the following figures.

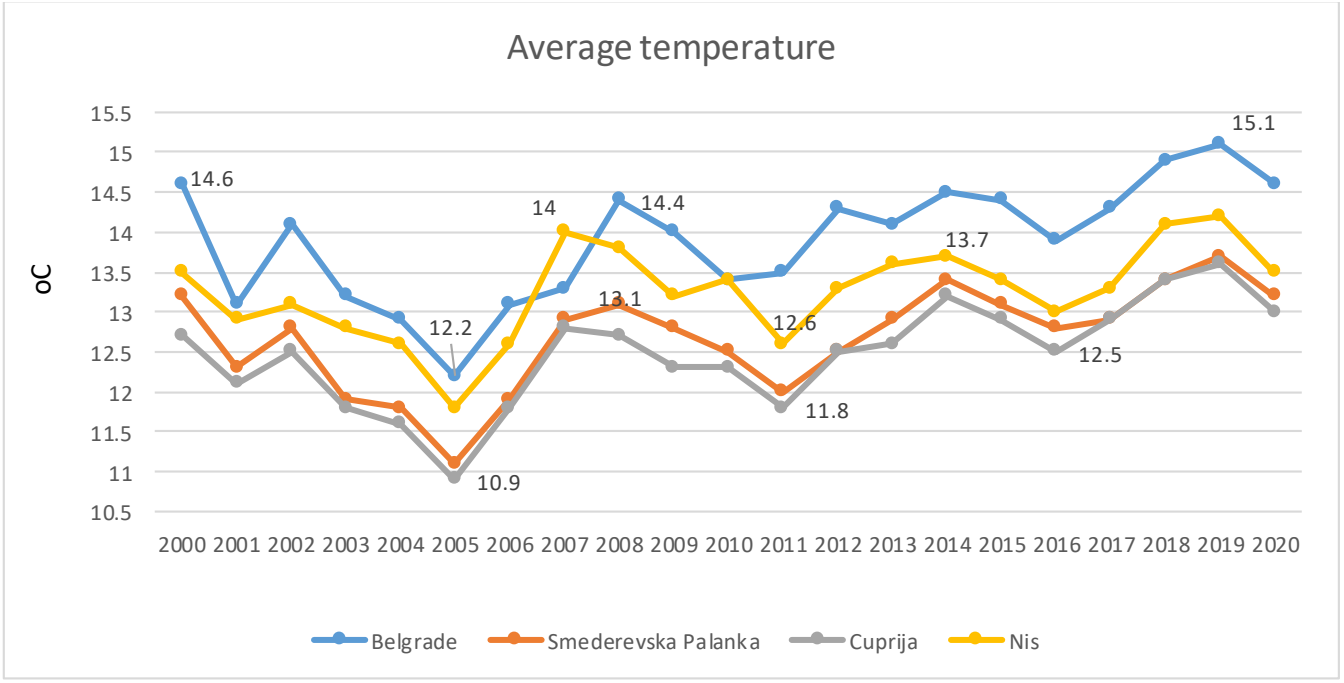


Figure 15 Average temperatures for the stations of the project area

From the figure above it can be concluded that 2005 was a year when lower average temperatures dominated in the project area, while 2002. 2008, 2014 and 2019 were years where an increasing tendency in higher temperatures was indicated.

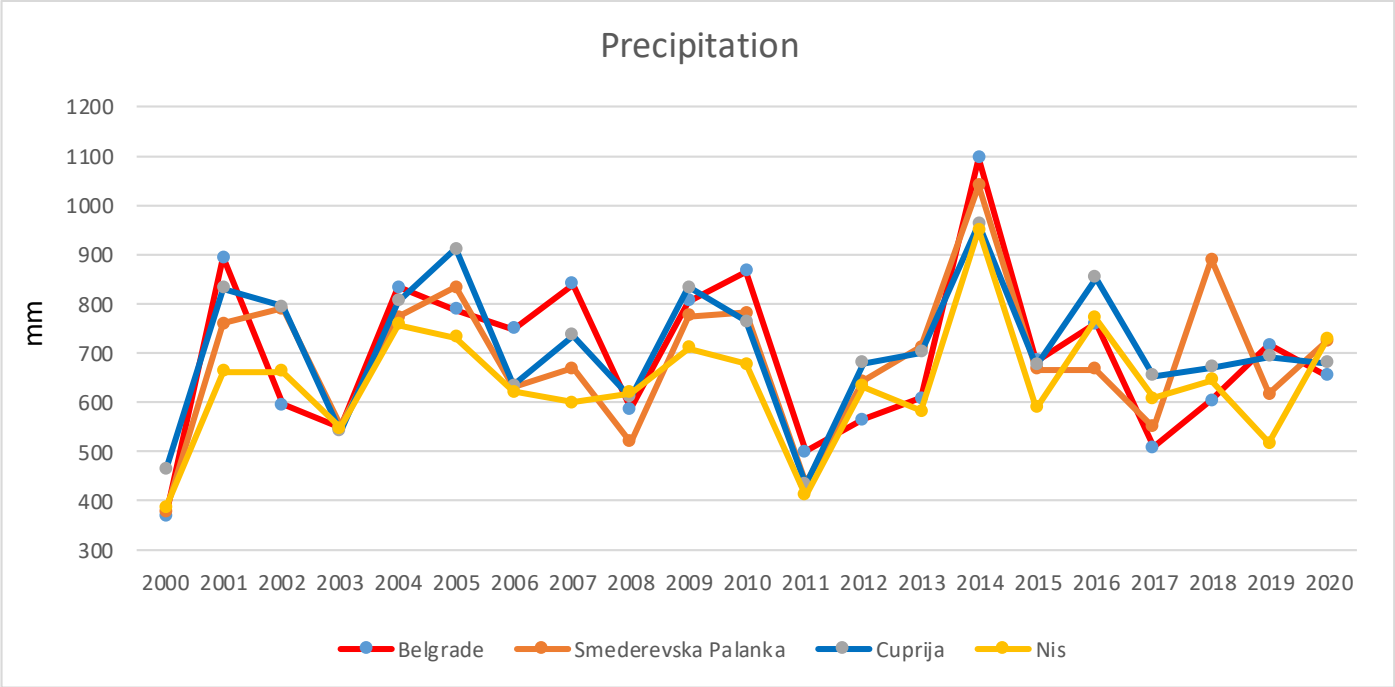


Figure 16 Average annual precipitation for the stations of the project area

From the figure above, it can be concluded that 2001 and 2014 were years with an increasing tendency of precipitation, while 2008, 2011 and 2017 were years with a decreasing tendency of precipitation in the project area.

The following table indicates the total number of days with snow, frost and fog at measuring stations.

Table 30 Total number of days with snow, frost and fog at measuring stations

Measuring station	TOTAL		frosty days	days with fog
	days with snow	days with snow cover		
Belgrade	33,7	42,7	62,2	21,7
Smederevska Palanka	31,9	41,6	84,2	44,7
Ćuprija	34,4	46,8	91,9	21,6
Niš	39,5	45,0	79,7	13,7

More analytical meteorological data will be provided for each section in the ESIA per section.

5.1.3 Landscape

Landscape characteristics of topographical units that include the analysed corridor are an important element for understanding the overall relationship between the planned object and the environment. The analysis of the terrain established that the sections are provided through areas with different landscape and visual characteristics, which make up:

- The valley of the Velika Morava and the hills on the left bank of the Velika Morava; Bagrdan Strait; the Juzna Morava valley;
- Contact of hills and plain terrain which is mainly anthropogenically altered arable land;
- Constructed parts of the route where it passes through populated areas (Beograd, Sopot, Mladenovac, Smederevska Palaka, Velika Plana, Markovac, Lapovo, Begrdan, Jagodina, Paracin, Cicevac, Korman,

Adrovac, Aleksinac, Grejac, Trupale, Nis) including the E-75 highway corridor; and other infrastructure facilities.

The terrain in the corridor of the existing railway route from Belgrade to Nis is slightly undulating, from the valley to the hilly terrain. The exception is the canyon of Juzna Morava, through which a part of the railway passes in the part from Stalać to Braljina. In the wider part of the existing corridor, the mountains starting from north are the Avala massif (511asl) and Kosmaj (628asl) which are interconnected by the hills of Babe, Raljska Koviona, Parcani, Oskoruša, Varovnica.

Going further south, on the left side of Velika and Juzna Morava rivers are Lepenica (396asl), Belica (707asl), Juhor (773asl), Temnić (867asl), Mojsinjska Mountain (489asl), Veliki Jastrebac (1492asl and Mali Jstrebac (946asl).

On the right side of Velika and Juzna Morava they stand out: Resava (389asl), Kučajske Mountains (1243asl), Ozren (1174asl), Devica (1186asl), Suva planina (1713als) and the smaller hills that connect them.

The hydrographic network is quite dense in the plain terrain through which the existing railway passes and includes larger rivers: the Velika and Juzna Morava and their tributaries. Watercourses are typically flat, with small gradients and predominantly large amounts of water. Rivers often change the places of their beds, with the application of larger amounts of alluvial deposits, landslides and meandering. With the distance from the lowlands, the gradients of watercourses increase, and their erosion-torrent activity also increases. The terrains are less forested, while most of the land is arable.

The corridor follows the course of the Topčider River, at a great extent the course of the river Veliki Lug, and the course of the rivers: Lug, Jasenica, Kubršnica, Jezava. From Velika Plana to Niš, the route of the existing railway mostly follows the course of Great, Juzna Morava and Nišava.

The observed area is predominantly lowland-agricultural areas and hilly (orchards and vineyards), and belongs to the type of land called alluvial land. The Belgrade - Nis railway, except for the section Resnik - Sopot and the section through the Stalac gorge is a of a valley character with several bridges over the Morava.

The presence of man and the lowland area have led to the spread of agricultural arable land between populated areas. The railway in populated areas is surrounded by gardens and yards in which there are characteristic garden and ornamental herbaceous and shrubby plant species, and woody vegetation is predominantly represented by different types of fruits and walnuts, while coniferous species are mostly present at train stations. Ruderal vegetation is present on the railway corridor and in its immediate vicinity, which is usually more lush along fences and hedges.

Along the route, most often in narrow belts where the railway crosses natural and artificial watercourses, the presence of more hydrophilic species with less frequent presence of aquatic macrophytes can be noted. Vegetation along watercourses, as well as on the entire line of the railway, is also greatly influenced by agricultural activities on the areas that extend almost to the watercourse, by the maintenance of the railway, as well as activities on maintenance of natural and artificial watercourses which are carried out in different locations.

From the desktop research at this stage, no protected landscapes or high value landscapes have been identified in a distance of sensitivity of 1km.

Regarding landscape and ESIA per Section, there will be defined the topographical and morphological characteristics along the section, while the main landscape remarks will be identified, including land use, habitat and cultural heritage elements.

5.1.4 Geology

The area from Belgrade to Nis along the existing route of the railway and its wider corridor includes parts of the following sheets (basic geological maps): Paracin, Krusevac, Aleksinac, Nis, Belgrade, Pancevo, Smederevo, Pozarevac and Lapovo.

Throughout the research area, formations of different geological ages are represented. These are

- The old Proterozoic sediments, which are most represented on the geological sheets of Nis, Paracin, Aleksinac and Krusevac. Sediments of Proterozoic-Paleozoic age consist mainly of serpentinites and various crystalline shales of a high degree of metamorphism. The presence of quartzite, gneiss, granite and migmatite has been also detected.
- Mesozoic sediments. The Mesozoic formations consist of sediments of Triassic, Jurassic and Cretaceous age. The diabase formation is of great importance, while flysch and limestone sediments are also characteristic.

- Neogene sediments. The Tertiary consists mainly of Neogene deposits, but Paleogene sediments also occur. These are dacites, andesites and quartzlates, while Miocene deposits are also characteristic of this area. It is a complex of conglomerates, sandstones, marls, sand clays and limestones.
- Youngest Quaternary sediments. The youngest creations are of Quaternary age, and they consist of river, lake, swamp and Aeolian sediments. Alluvial sediments stand out due to the large number of rivers in the study area.

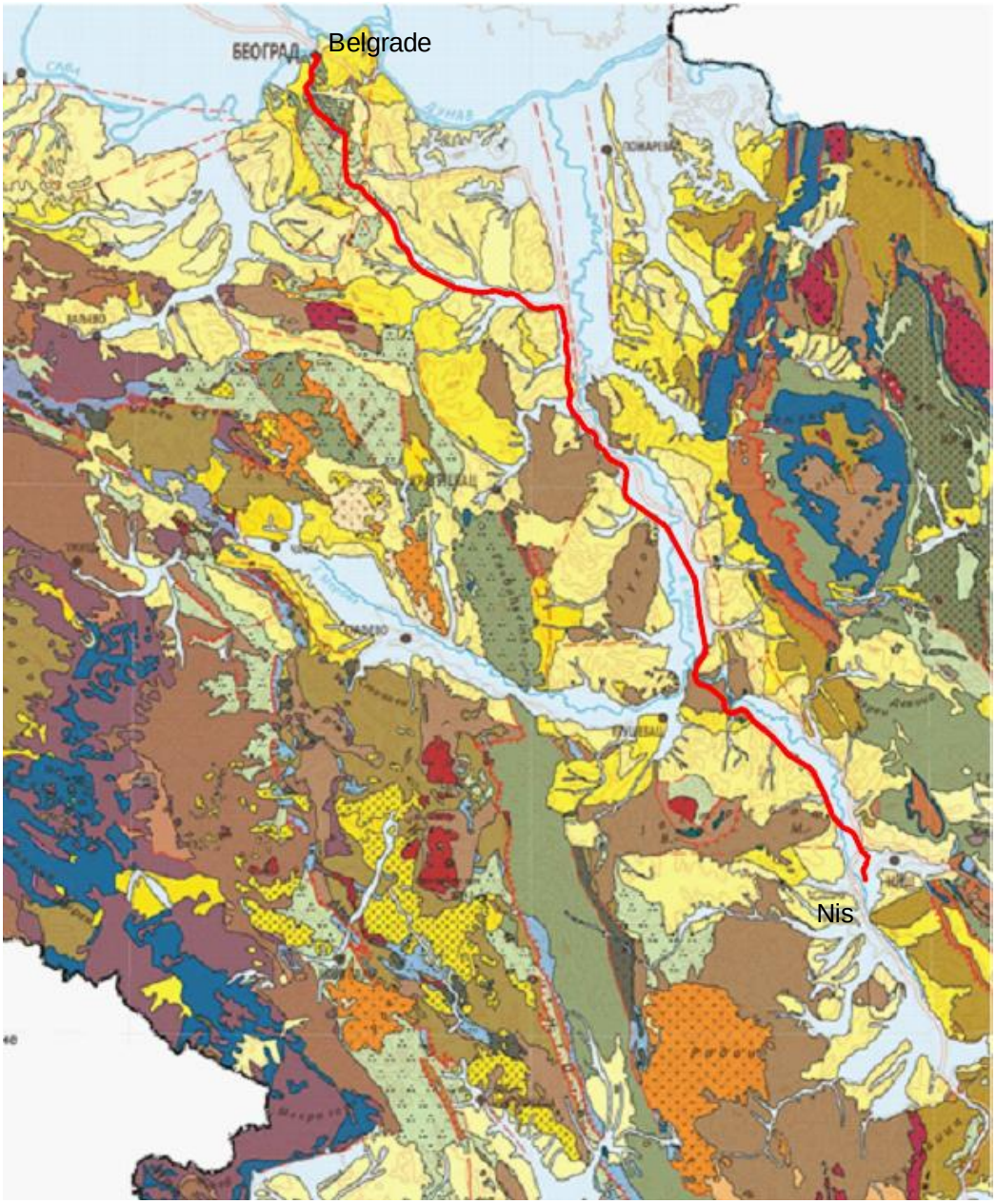


Figure 17 Geomorphological map of a wider area of research, at the location of the railway

Regarding geology and ESIA per Section, there will be indicated the main rock formations, geological and geoengineering as well as geotechnical characteristics that will derive from the geotechnical investigations.

5.1.5 Seismicity

In order to determine the seismicity of the terrain, maps of the Republic Seismological Institute of Serbia were used, based on probability, which corresponds to the return period of seismic action of 475 years. The observed area is in the zone of seventh-eighth degree and eighth degrees of seismic scale MSC. The first part of the route of the existing

line is in the zone of seven-eight degrees of seismic scale, and while most of the route is in the zone eighth of seismic scale. The figure below shows the seismic activity for the route of the Belgrade - Nis railway.

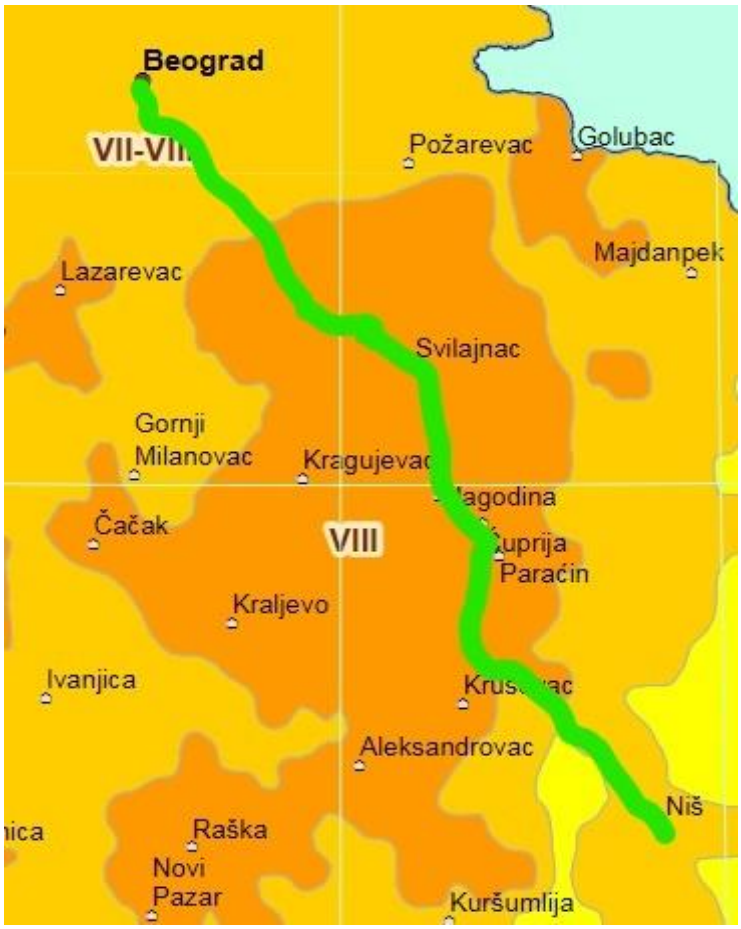


Figure 18 Map of seismic activity of the Republic of Serbia in the project area of the railway route

According to the archives of the US Geological Survey (USGS), the strongest earthquake in Serbia was recorded in Lazarevac in 1922. This earthquake had a magnitude of 6.0 on the Richter scale, while in Rudnik in 1927 an earthquake of 5.9 of the Richter scale occurred and in Kopaonik, in Brus, an earthquake of 5.7 on the Richter scale occurred in 1978. 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 happened in 2010 near Kraljevo, on November 3, its intensity was 5.5 degrees.

5.1.6 Soils

In the area through which the railway passes, classes of fluvial and fluviogleic soils are characteristic, with azonal soil types standing out, differently developed and differently fertile. The main soil types are alluvium, alluvium in cultivation and alluvial meadow land.

Within the corridor of the Belgrade-Nis railway, the influence of various factors of pedogenesis (geological background, climate, relief, living organisms, etc.) conditioned the appearance of different types of land formations. At this site, the railway route passes through the following land types:

1. Loess terraces and lake terraces below an altitude of 500 m. The production value of this soil varies a lot depending on the humus content, depth and mechanical composition of the substrate. The best groves are on wood and tertiary sediments, are excellent agricultural lands, especially for fruit growing and viticulture, while groves on basic eruptive rocks are good forest soils, and they are less suitable for agriculture. This type occupies 5% of the total length of the railway route.

2. Alluvial deposits (alluvial meadow soils). This is a very heterogeneous group of soils, which are formed as fresh sediment in the field of the river Velika Morava. By its nature, this sediment can vary from gravel, through sand to the finest clay particles. Sedimentation conditions change both during the year and during the longer evolution of the

river valley. Alluviums can be very fertile soil, can be of high quality for agriculture and are typical for the habitats of natural willow and poplar forests, or pediculate floodplain forests.

For the area covered by the route of the Belgrade-Nis railway, it is characteristic that erosion is particularly pronounced in the coastal part of the Velika Morava River, where due to high waters certain parts of the coast fall off and the riverbed changes from time to time. This phenomenon is partially mitigated by the protection and landscaping of the coast. Due to the great erosion in its basin, Juzna Morava is rich in a huge amount of material that settles in the riverbed.

Alluvial deposits in the valley of Velika and Juzna Morava have great agricultural value. Their morphological, physical and chemical properties provide favourable conditions for the development of agricultural crops. This land, within the boundaries of the analysed route, mostly belongs to the second class of agricultural land.

Most of the areas are occupied by arable land (arable land, sown crops and fields). These areas are more represented in the part of the railway from Velika Plana to Nis than in the part from Belgrade to Velika Plana.

The observed area is also characterized by areas under forests and landscaped areas under orchards and vineyards. They are evenly distributed throughout the area. Housing in the observed corridor is located mainly along the existing roads and railways. The highest concentration of the population is in the first part of the observed railway, in the zone of the city of Belgrade.

Based on data of the Spatial Plan of Special Purpose, the urban areas are of about 920 ha, the agricultural area of about 1440 ha and insignificant water surface of about 12 ha are allocated. The railway plot covers an area of about 657 ha is formed, which is about 20% of the total area of the project area. Changes in the corridor are optimal for the formation of railway land. The following table presents the different types of landscapes.

Table 31 Different land uses along the line

Purpose	Ha	%
Construction areas	923.23	27.9
Agriculture land	1438.92	43.4
Forests	281.02	8.5
Water surfaces	12.60	0.4
Railway plot	657.34	19.8
Total	3313.11	100

5.1.7 Air

Monitoring of air quality 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 32 Air quality index CAQI

Averaging period	Pollutant	Limit µg/m^3	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 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. The concentration of multiple pollutants is measured and they have specific thresholds and ranges for the colors 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 33 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/m^3	Not more than 24 hours per year
		Alarm threshold 500 µg/m^3	It is measured for three consecutive hours in an area of 100 km^2 or in the entire zone
	1 day	Limit 125 µg/m^3	Not more than 3 days per year
NO_2	1 h	Limit 200 µg/m^3	Not more than 18 hours per year
		Alarm threshold 400 µg/m^3	It is measured for three consecutive hours in an area of 100 km^2 or in the entire zone
PM_{10}	1 day	Limit 50 µg/m^3	Not more than 35 days per year
	Calendar year	Limit 40 µg/m^3	
$PM_{2.5}$	Calendar year	Limit 25 µg/m^3	
CO	Max. daily 8-hour average value	Limit 10 µg/m^3	
O_3	Max. daily 8-hour average value	Target value 120 µg/m^3	No more than 25 days a year arranged for three years
		Information threshold 180 µg/m^3	
	1 h	Information threshold 240 µg/m^3	

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

The Belgrade - Nis railway is electrified, so it has a minimal effect on air quality. 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.

The following figures show the locations of measuring stations for monitoring air quality and indicate the parameters that are measured. Taking into account the route of Belgrade-Niš railway, the relevant stations for automatic air quality monitoring are located in Belgrade, Ćuprija, Niš, while in the wider area and far from the railway, the stations of Kragujevac and Kruševac are located.

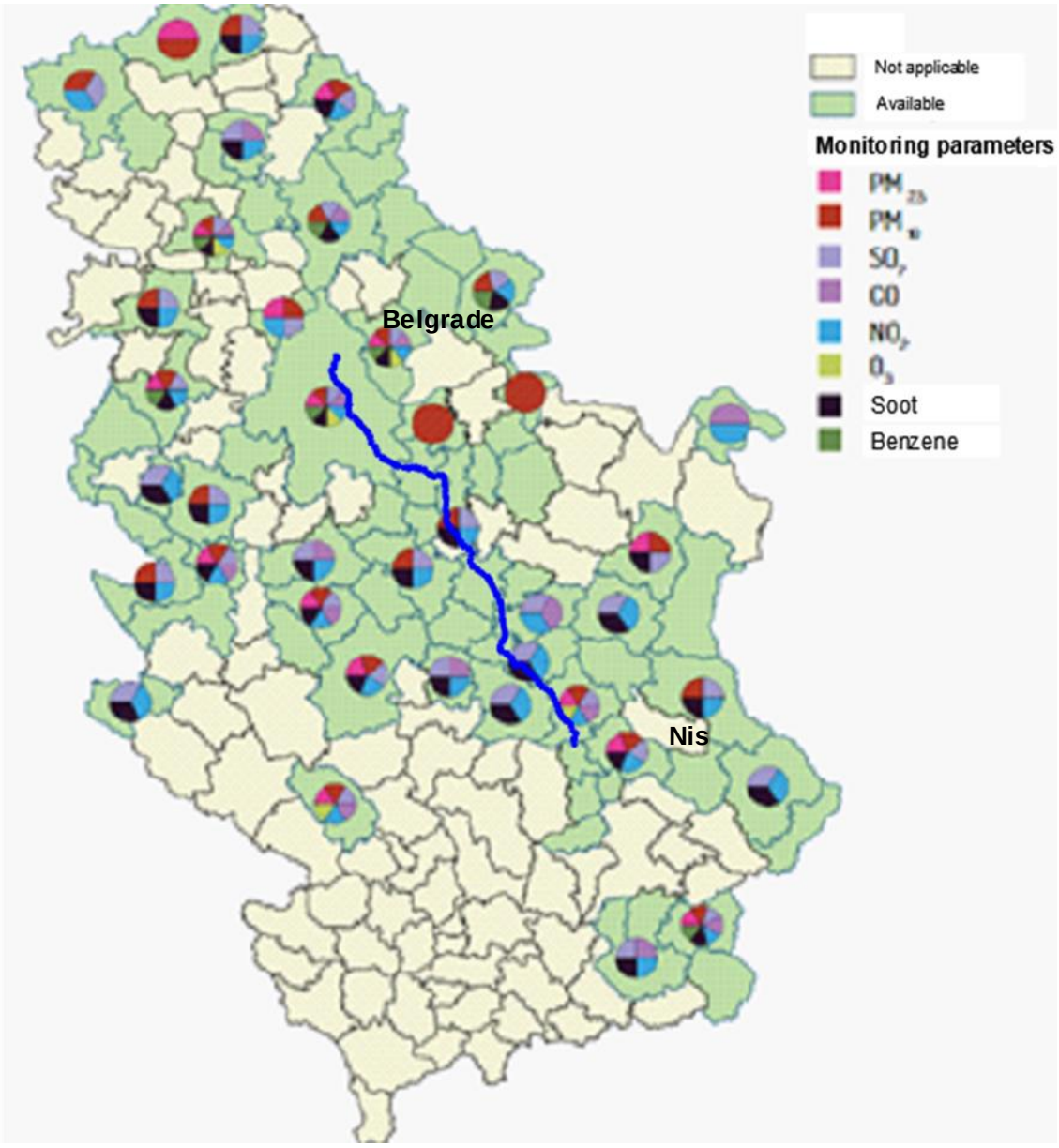


Figure 19 Locations of measuring stations for monitoring air quality and measured parameters

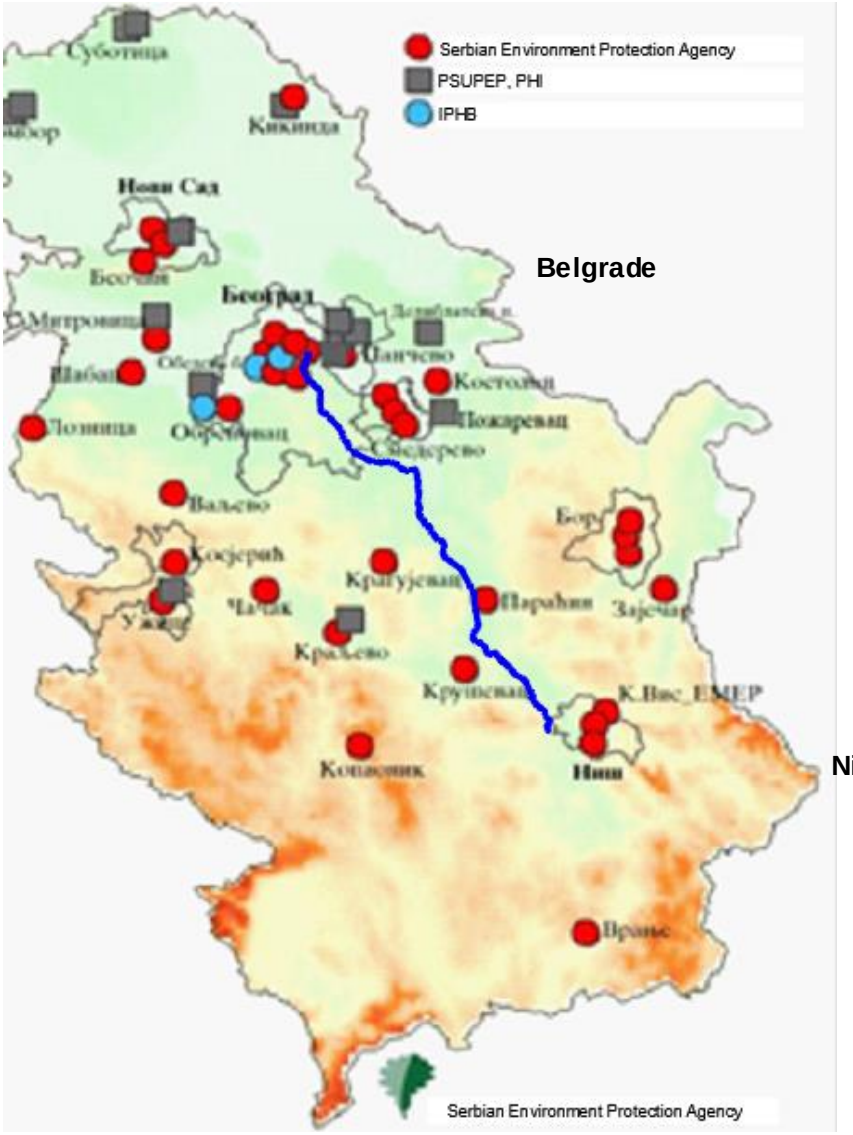


Figure 20 Networks of air quality stations of the Environmental Protection Agency, City Institute for Public Health of Belgrade

Taking into account the results of 2019 for Belgrade stations, the annual limit value for NO_2 was exceeded, the exceedances of the daily limit value were 10 days, while the hourly values were exceeded more than 18 times. The annual limit value of suspended PM_{10} particles was also exceeded and the exceedances of the daily limit values occurred in all measuring points for 169 days.

Exceedances in the limits of suspended particles $PM_{2.5}$ on an annual level occurred at the measuring station in Belgrade. Taking into account the results of 2020 for Nis stations, the annual limit value for NO_2 and SO_2 was lower than limits for all measuring stations. Nine days were recorded with concentrations of PM_{10} fraction of suspended particles above the limit value.

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

5.1.8 Climate change

5.1.8.1 General

Positive trend of number of catastrophic and unfavourable natural events especially reflects with the events depending on the meteorological conditions. A map of natural disaster risk is shown in the following figure (Dragicevic et al., 2011).

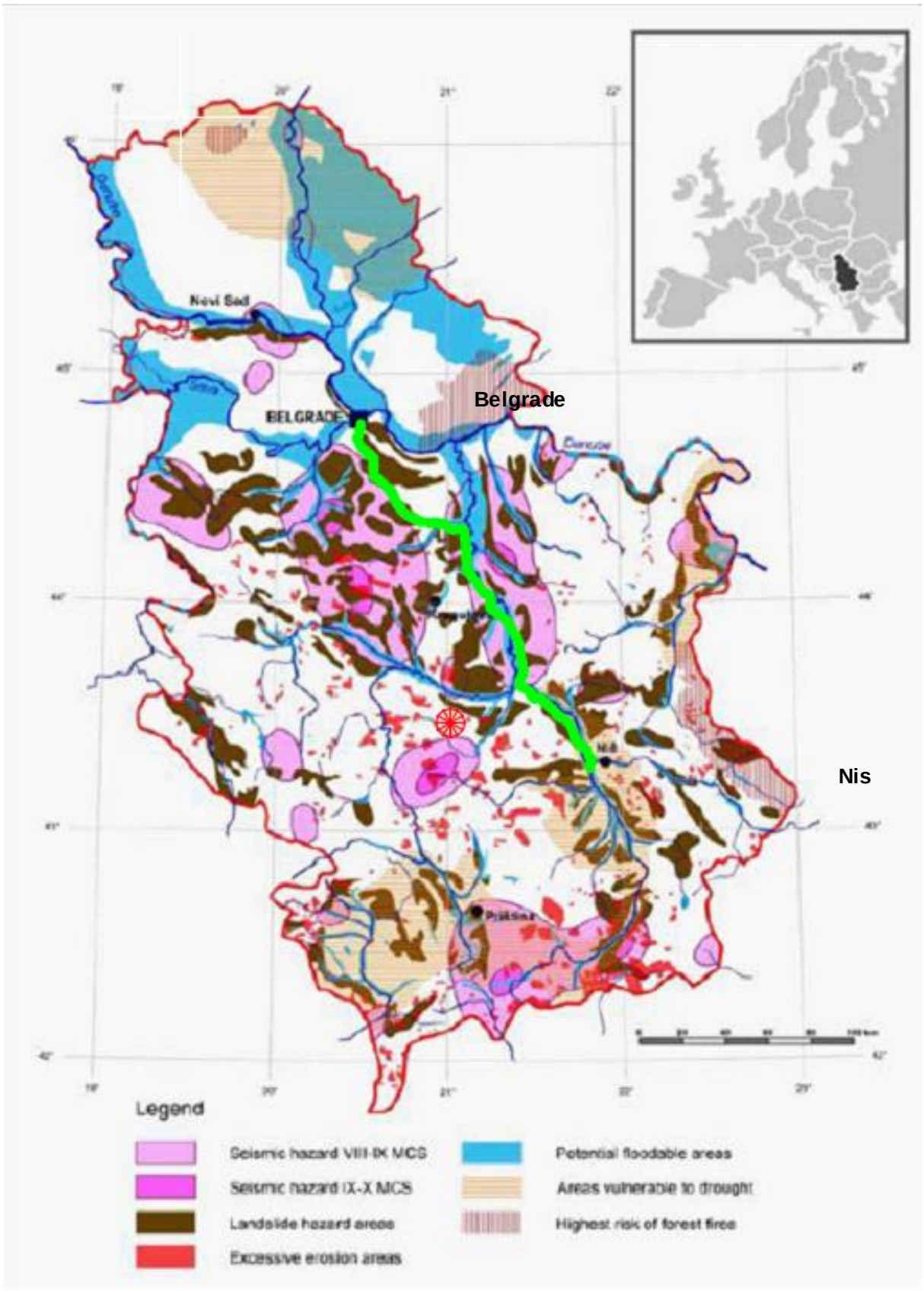


Figure 21 Integral vulnerability map of the natural hazards on the territory of Serbia (the railway line is given in green)

Source: Natural Hazard Assessment for Land-use Planning in Serbia (Dragicevic et al., 2011)

5.1.8.2 Expected changes in temperatures and precipitation

The analyses of future climate change are aligned with the latest, Fifth Assessment Report of the Intergovernmental Panel on Climate Change. The results presented here 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.

Future temperature changes

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 Figure 22.

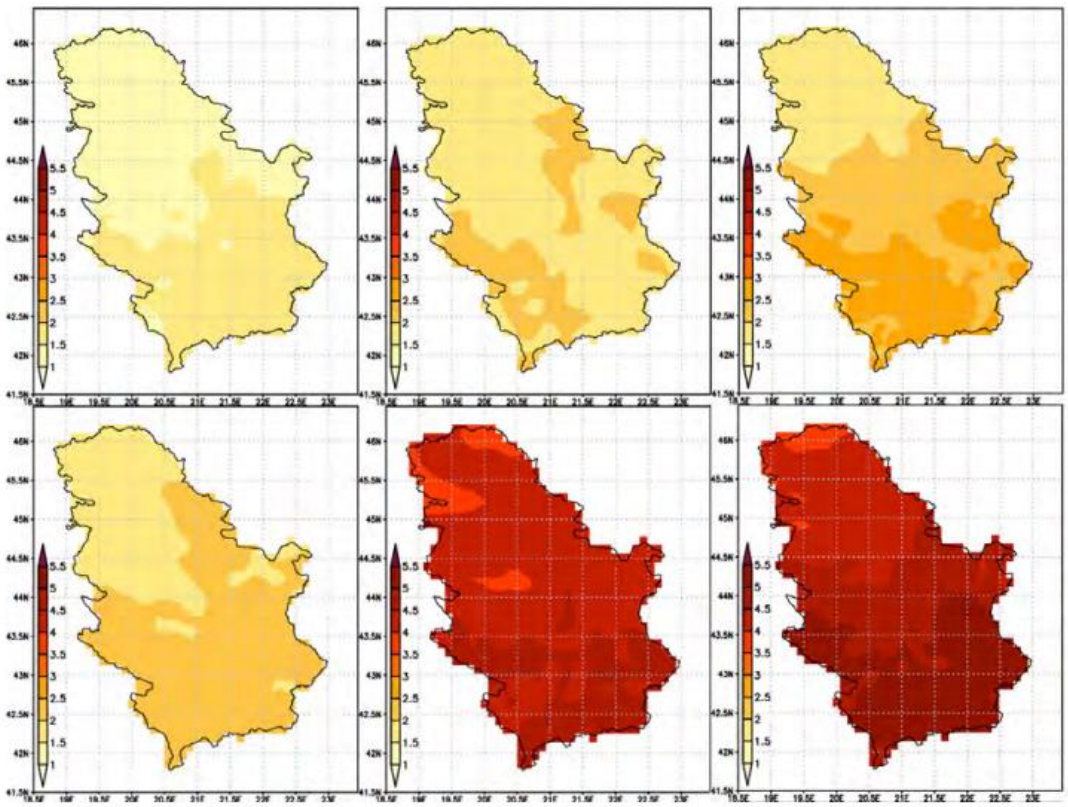


Figure 22 Anomaly of the mean annual temperature (°C) for the 2046-2065 period (left panel) and for the 2081-2100 period (central panel) relative to the values for the 1986-2005 reference period; anomaly of the mean maximum temperature (°C) obtained for the June-August 2081-2100 period compared to the 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. October 2018

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.

Future precipitation changes

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 Figure 23.

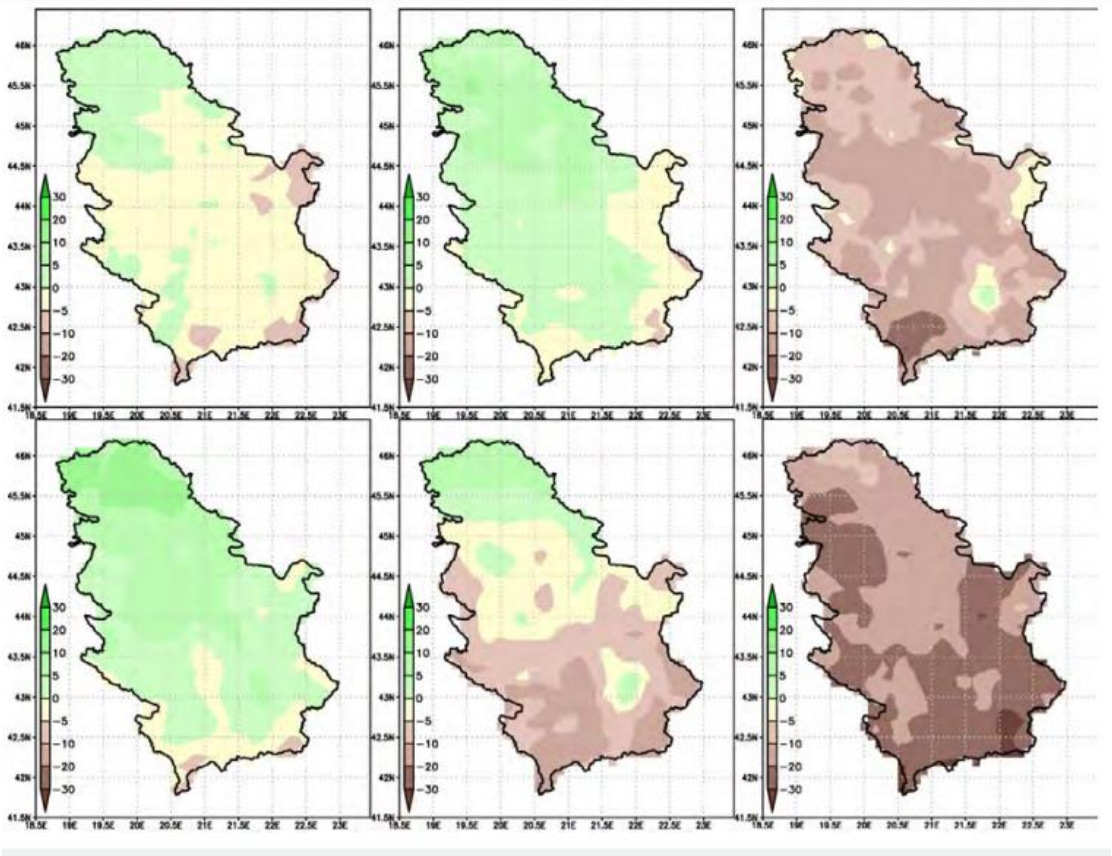


Figure 23 The anomaly of the mean annual precipitation sum (%) for the 2046-2065 period (left panel) and for the 2081-2100 period (central panel) relative to the values for the 1986-2005 reference period; anomaly of mean precipitation sum (%) for the June-August season for the 2081-2100 period compared 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. October 2018

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%.

Additional focus on the project area will be placed in the next phase of E&S Assessment.

5.1.8.3 Floods

In Serbia, 12.4% of its territory (10,968 km2) is potentially endangered by flooding. According to Gavrilovic (1981), among the largest flood areas are in the basins of river Velika Morava (2,240 km^2) and Danube (2,070 km^2). The main problems in the Velika Morava River basin are flash floods. According to Dragicevic et al. (2013), the potentially flooded area in Serbia with a 100-year return period is 15,198.07 km^2 (17.2% of total area). The locations of the most destructive torrential flood events in Serbia in the period 1915-2013 are presented in the following map.

The most important flood events in the wider region are presented below:

- Floods in 1948 The flood in the Juzna Morava basin was in 1948. It was caused by rains while flash floods brought a lot of sediment in river basin. As a result of flood, the Juzna Morava River destroyed all bridges.

- Floods in 1999 In the river basins of major tributaries of the Velika Morava great flash floods occurred in July 1999. As result of floods 8 people lost their lives, dozens of thousands of houses and hundreds of commerce buildings were damaged and 30 bridges in basins of the Velika Morava, the Jasenica, the Kubršnica and the Lepenica were destroyed (Milanovic and Milijasevic, 2008).
- Floods in 2010 In 2010, the floods occurred in several municipalities. Jagodina and Paraćin were threatened by the Velika Morava whereas nearly 300 ha of arable land were flooded.

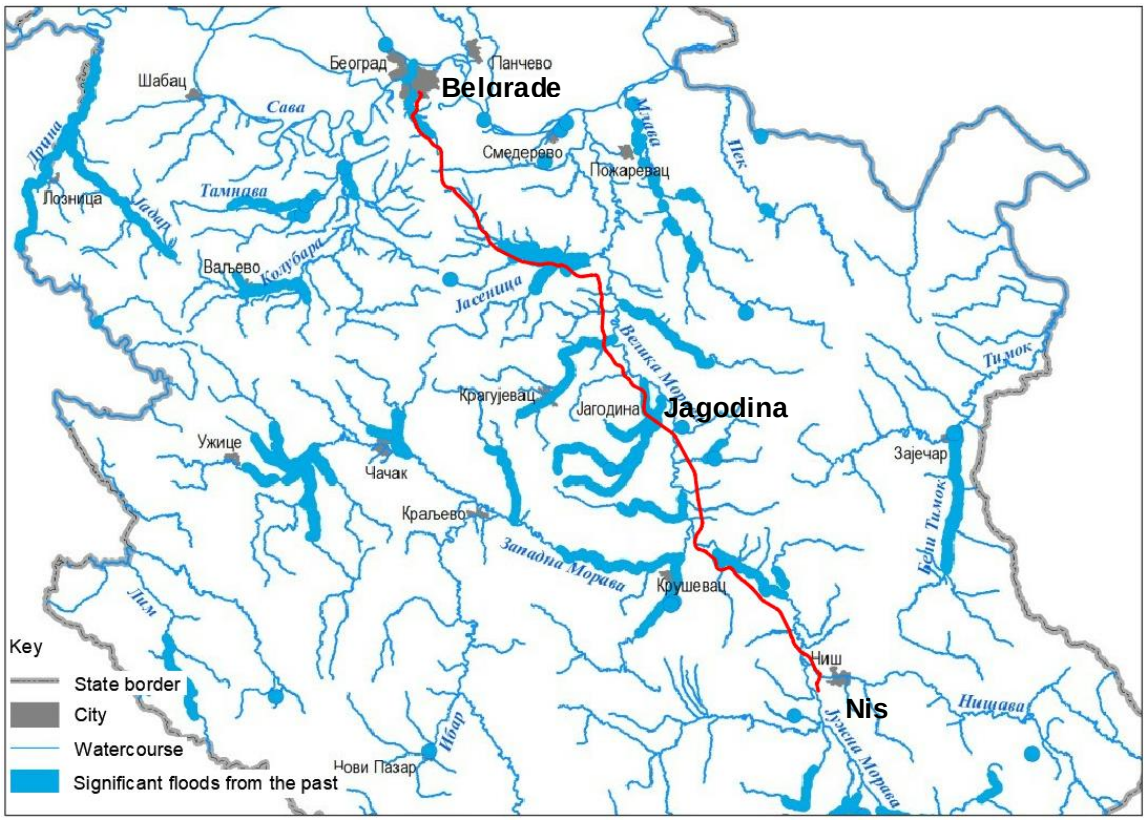


Figure 22 Map of significant floods from the past on the territory of RS in the period 1965-2011.

Source: Preliminary flood risk assessment, Ministry of Agriculture, Forestry and Water Management, 2012.

- Floods in 2014 catastrophic floods registered in Serbia in May 2014 caused enormous damages (figure below). During the third week of May 2014 Serbia was affected by heavy rains and the rains were caused by the field of low air pressure ("Yvette") formed above the Adriatic Sea. Record amount of rainfall was registered then: more than 200mm of rain fell in Western Serbia during only one week which equals the amount of rainfall for a three-month-period under standard conditions. Due to the heavy floods affecting several districts, on 15 May 2014 the Republic Headquarters for Emergencies held an extraordinary session when they passed a decision to recommend to the Government to declare a state of emergency on the entire territory of the Republic of Serbia in order to utilize the resources from the entire territory and direct them into the affected areas. In accordance with the Report on the natural disaster - flood which struck the Republic of Serbia and the measures taken to rescue people and defend the endangered places, among the most affected towns were Paraćin, Svilajnac, Jagodina and Smederevska Palanka. After consultation with SRI, the parts of the railway line Paraćin - Ćićevac, Velika Plana - Smederevska Palanka, Jagodina were affected by that flood.

  Following the 2014 floods, the Serbian Government approved a National Disaster Risk Management Program (financed by EU IPA II funds) to develop a long-term risk management system, including the generation of flood risk information. In this context, the Project prepared flood hazard and risk maps for 75 Areas of Potentially Significant Flood Risk (APSFR) previously identified in the river Morava (South, Great and Zapadna Morava). The project was funded by the EU and managed by the World Bank/GFDRR, who provided valuable support and insight.

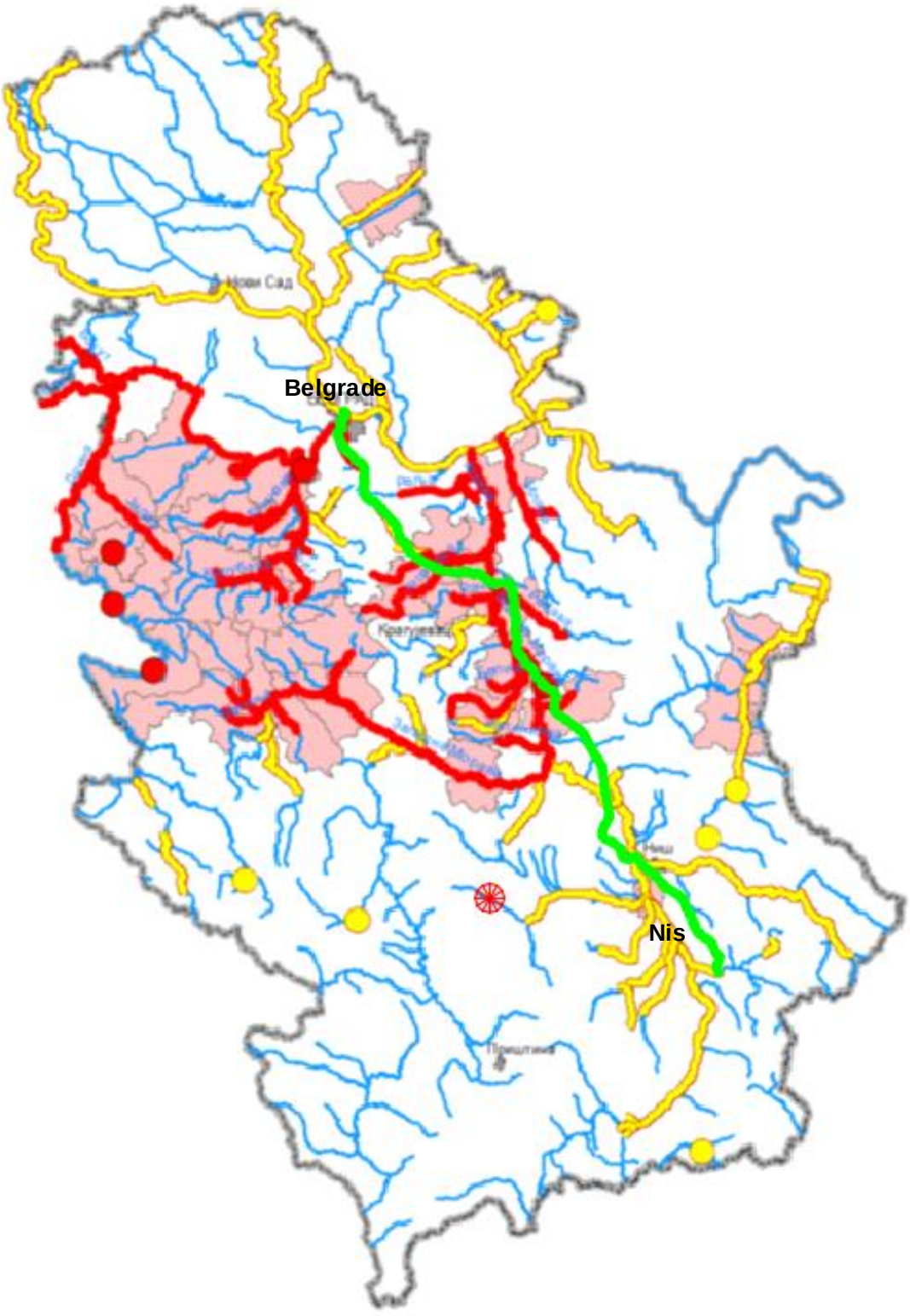


Figure 23 Important flood prone areas and areas affected by 2014 flooding

Existing defensive lines on the tributaries of the Velika Morava, through populated areas, do not have a sufficient degree of protection - catastrophic floods in May 2014 are a consequence of extremely large inflows, but also insufficient capacity of the riverbed in the bridge zone (Paracin on Crnica, Svilajnac on Resava, Smederevska Palanka on Kuburšnica and Jasenica).

Insufficient level of protection along Velika Morava is, on the left bank in the zone of Trešnjevica to the composition of West and South Morava (Paracin municipality), in Bagrdanski gorge from the mouth of the river Lepenica to the mouth of the river Belica and from the mouth of the river Jasenica to the settlement Trnovče (municipality Velika

Plana), and on the right bank from the Mijatovac bridge to the mouth of the river Resava (municipality of Svilajnac). Reconstruction of protection systems is also necessary on numerous tributaries of the Velika Morava, primarily in Smederevska Palanka on Jasenica and Kuburšnica, on Resava near Svilajnac and on Crnica near Paraćin.

In Juzna Morava and its tributaries, the protection system consists of defense lines (embankments and regulated riverbeds) which are continuously formed on both sides only in the zone of larger settlements on Nisava through Nis and on Moravica through Aleksinac,. On numerous tributaries of torrential character, protective systems consist of one-sided embankments and regulated riverbeds. The level of protection is adjusted to the importance of protected values in the protected area - in the zone of 100-year-old waters, outside the settlements of 50-year-old waters, while the regulated Nisava riverbed through Nis achieved a degree of protection of 500-year high waters. Flood events and recorded flooding of settlements, especially in 2010 and 2014, indicated the need to upgrade and reconstruct existing protection systems. In the coast of Juzna Morava, unprotected areas, in the lower course and close to the Project is Donji Ljubeš, Čokot and Donji Medjurovo. In the Juzna Morava basin, the largest number of active flood defenses are included, mostly multipurpose reservoirs, of which a smaller number has a reserved - inviolable space for receiving the flood wave. Only some reservoirs are primarily for flood protection.

Based on data of the Second National Communication of the Republic of Serbia under the United Nations Framework Convention on Climate Change, in order to assess the impact of climate change on water resources, the changes of river flow trends have been examined (data at 18 selected river monitoring stations in central Serbia). A negative trend was already observed, particularly from the period 1950-1960. The results indicate that the long-term average yearly hydrological trend is approximately -30%/100 years, but its spatial distribution varies.

Scenario results indicate that future discharge will decrease, especially for the period 2071-2100. The decreasing trend of average groundwater availability is generally expected to be lower than for surface water, especially for deep aquifers. It should be noted that there is a lack of long-term data sets for a detailed analysis on the climate change impacts and the availability of groundwater resources.

Analysis based on climate scenarios (scenario A1B the addressed future periods 2021-2050 and 2071-2100) applied on test areas (four locations) showed that a considerable decrease in the capacity of groundwater resources is to be expected. The data indicates the likelihood for considerable pressure on Serbia's water supply in the future. Besides the big cities, the most vulnerable areas are expected to be in the southeastern, eastern, central and northern part of the country. A deviation from average annual temperature by +1°C has an inversely proportional effect on average annual precipitation levels (about 7%), and on the average annual river discharge (about 20%). This means that in the near future, years with an average annual temperature 2°C higher than the average in the last 60 years, can be expected to result in 40-50% less water in Serbia's rivers, on average.

The figure below shows the significant possible future floods in the territory of Serbia.

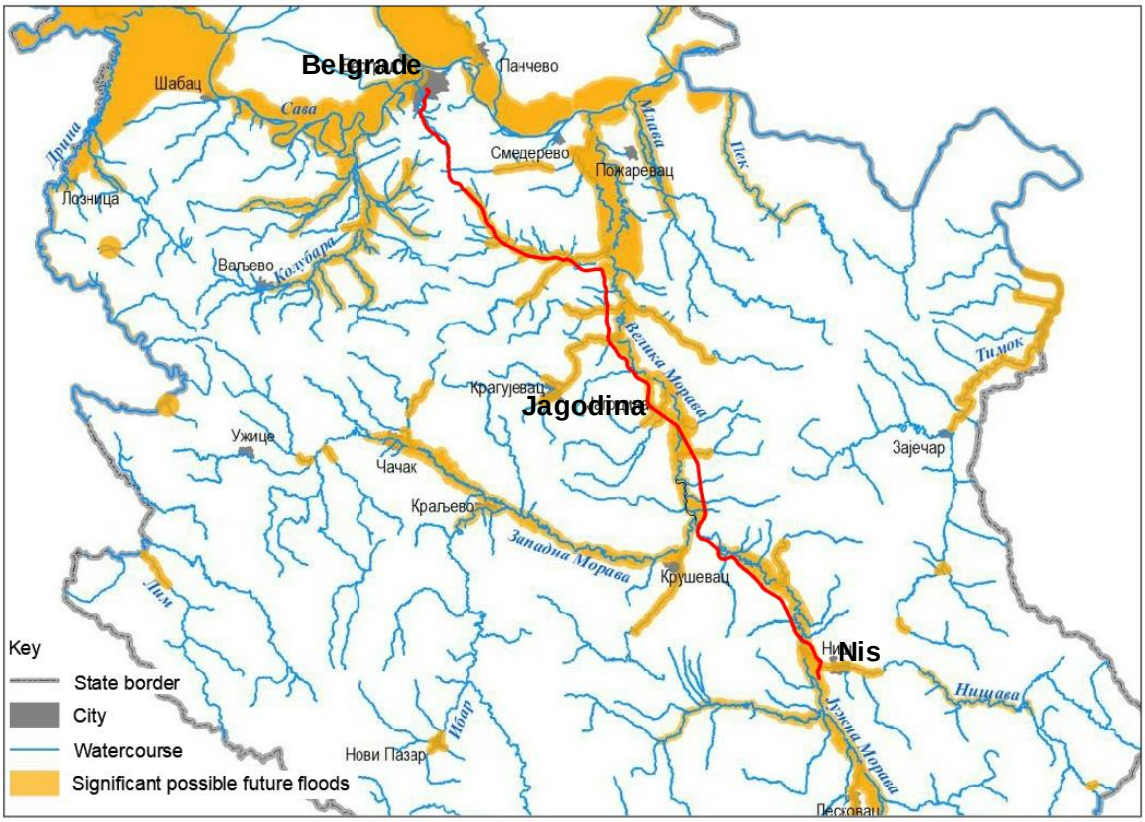


Figure 24 Map of significant possible future floods in the territory of RS

Source: Preliminary flood risk assessment, Ministry of Agriculture, Forestry and Water Management, 2012.

5.1.8.5 Landslides and escarpments on the slopes and inclinations

The area of Serbia is seriously exposed to risks from landslide. Estimates show that the highest number of landslides in Europe is located on the territory of Serbia. About 25% of Serbia is potentially at risk for landslides and rock falls (Lazic and Bozovic, 1995). Furthermore, one of the largest landslides on the continent, Duboko, is in Serbia. About 70% of landslides in Serbia are known and researched.

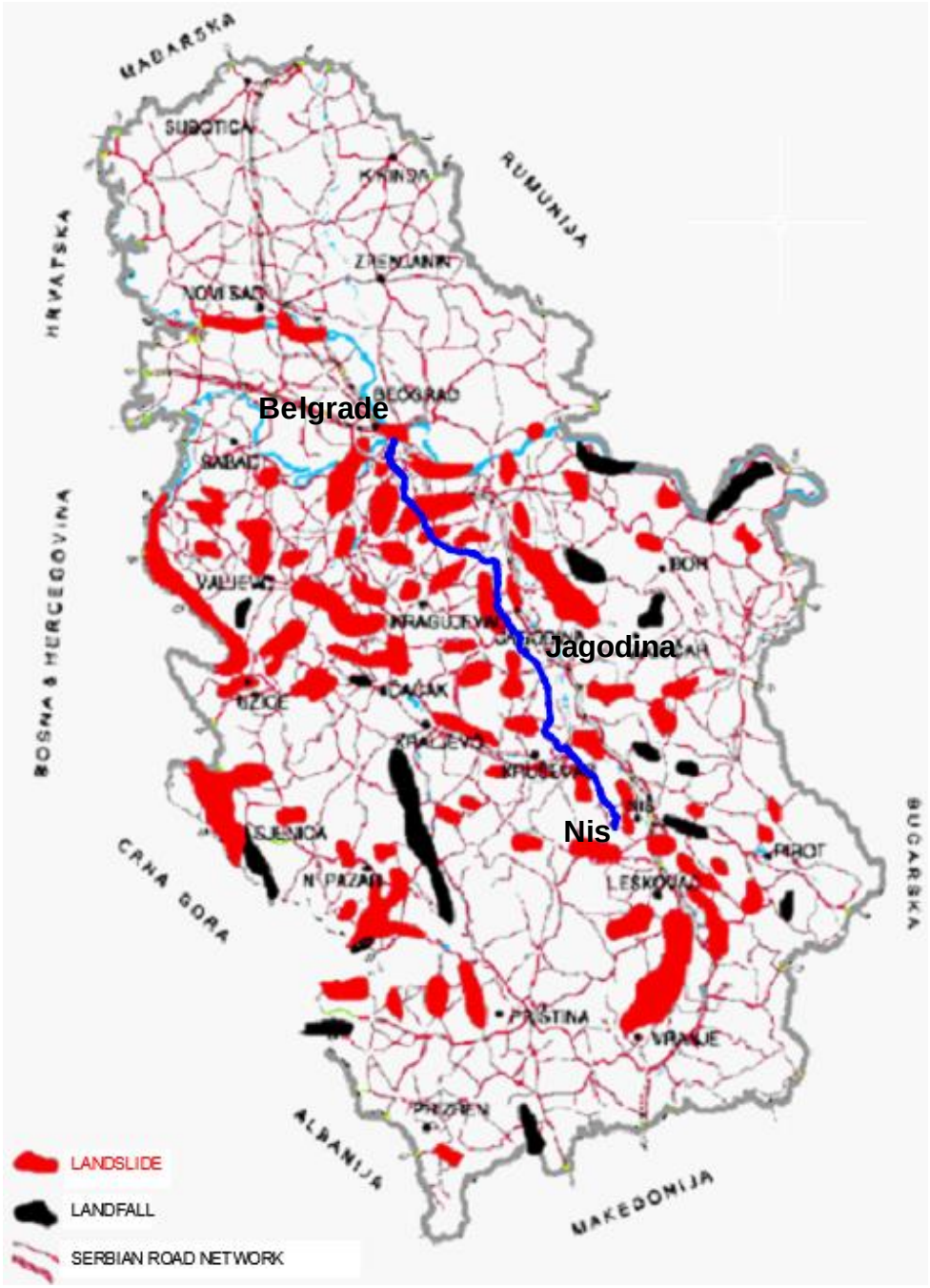


Figure 25 Map of rockfalls and landslides in Serbia

Source: Abolmasov, 2014

There are around 3,000 active and potentially active landslides in Serbia. Most of them cause the damage on local roads and highways and a few of them cause the damage on residential buildings. As far as Serbia is concerned, there are landslides in south-eastern part of Pannonian plain and in central parts. Landslides derived after floods in 2014 caused enormous losses to citizens and economy. Heavy rains in our country in May 2014 and afterwards left a large amount of water that eroded and destroyed ground, moving huge amount of eroded material. Torrential streams destroyed fields, roads, railways, houses and other objects. Broad landslides occurred after the floods.

Landslides that are located in the immediate vicinity of the route of the Belgrade-Nis railway are in the zones of municipalities: Mladenovac, Smederevska Palanka, Velika Plana, Jagodina, Aleksinac, Niš. In the mentioned municipalities, ie for certain local communities, which are located on the route or in the immediate vicinity of the observed route of the Belgrade-Nis railway, there are danger zones for this natural disaster, while there is no official landslide cadastre for this territory.

5.1.8.6 Hail

Hail which was falling on the territory of Central Serbia on 15 May 2015 around four o"clock devastated orchards and raspberry grounds. Hail the size of an egg was falling in the villages around Kragujevac, and the hailstorm cloud continued to move towards Paraćin affecting then the area of Ivanjica which is well known for production of fruits, especially raspberries.

5.1.8.7 Drought

Territory of the Republic of Serbia is located in a region of the world considered vulnerable to climate change. (IPCC, 2007). Droughts are most prevalent in the Vojvodina and Posavina (north of the country, where level of rainfall is low and where agricultural land is of the best quality) and in the eastern areas of Serbia. Gocic and Trajkovic identified three distinct drought sub–regions: R1, R2 and R3. Region R1 (red colour in the following map) includes the north and the northeast part of Serbia, region R2 (blue colour in the following map) includes the western part of Central Serbia and southwestern part of Serbia and region R3 (yellow colour in the following map) includes central, east, south and southeast part of Serbia. The R1 is characterized by the lowest amount of precipitations in the country and most intensive agriculture. The R2 is mostly forested with the average annual precipitations to 1000 mm, while the R3 is characterized by a moderate–precipitation regime with the average annual precipitations to 650 mm. The R2 had the monthly precipitations values above average, while R1 and R3 had the precipitations values under average in Serbia.

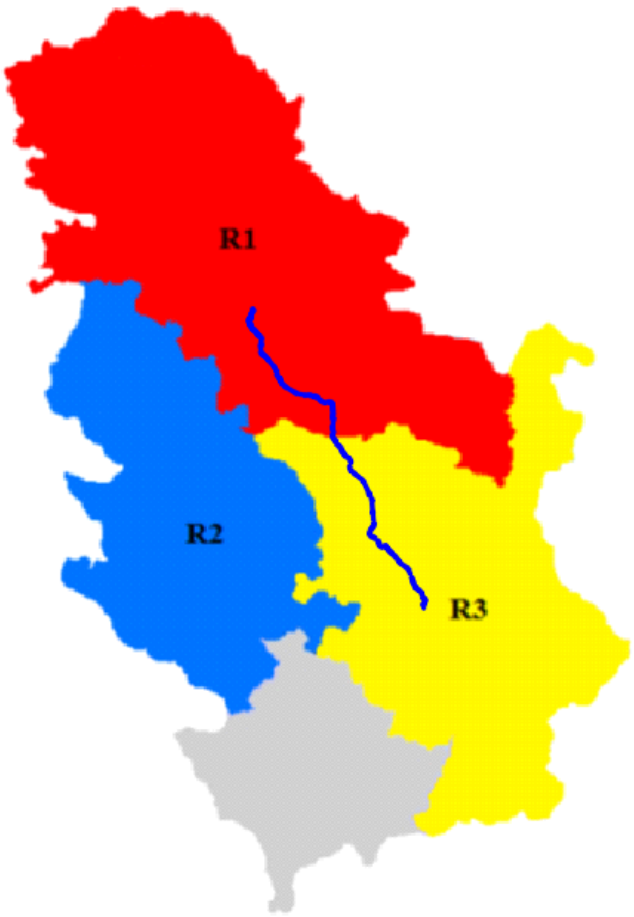


Figure 26 Drought–based regionalization in Serbia

Source: Report on natural disasters in the Western Balkans

Based on the SPI–12 (Standard Precipitation Index) values and defined categories of dry and wet conditions, the periods of drought were 1948–1953, 1958–1968, 1982–1985, 1988–1994, 2000–2003, and 2011–2012, whereas the periods with wet conditions were 1954–1957, 1969–1981, 1986–1987, 1995–1999, and 2004–2010 (Gocic and Trajkovic, 2014). Droughts that occurred in 2000 and 2003 had the same characteristics: lack of precipitations and high temperatures during growing season. According to SPI, these droughts fall under the category of extreme droughts (Ministry of Agriculture and Environmental Protection, 2015; Korak, 2012). Other droughts in the recent years occurred in 2007, 2011 and 2012 affecting Central Serbia.

Within the National risk assessment of meteorological hazards which is part of National Disasters risk assessment, mapping of the risk over territory is presented. The mapping is done in the way that risk is assessed for each district. District risk assessment was based on collected data on the consequences caused by drought and heat waves, as well as on the basis of an expert assessment based on the analysis of the area under agricultural crops and areas under forests, as well as on population density analysis. The mapping was done for most probable event (1 event in 2 to 20 years) and for the event with most negative consequences (1 event in 20 to 100 years). For the most probable event, highest risk is estimated for north-west part of the country (orange color), and the lowest risk is for west and south-east part (green color). In case of event with most negative consequences, for almost all municipalities risk is estimated as high (orange color).

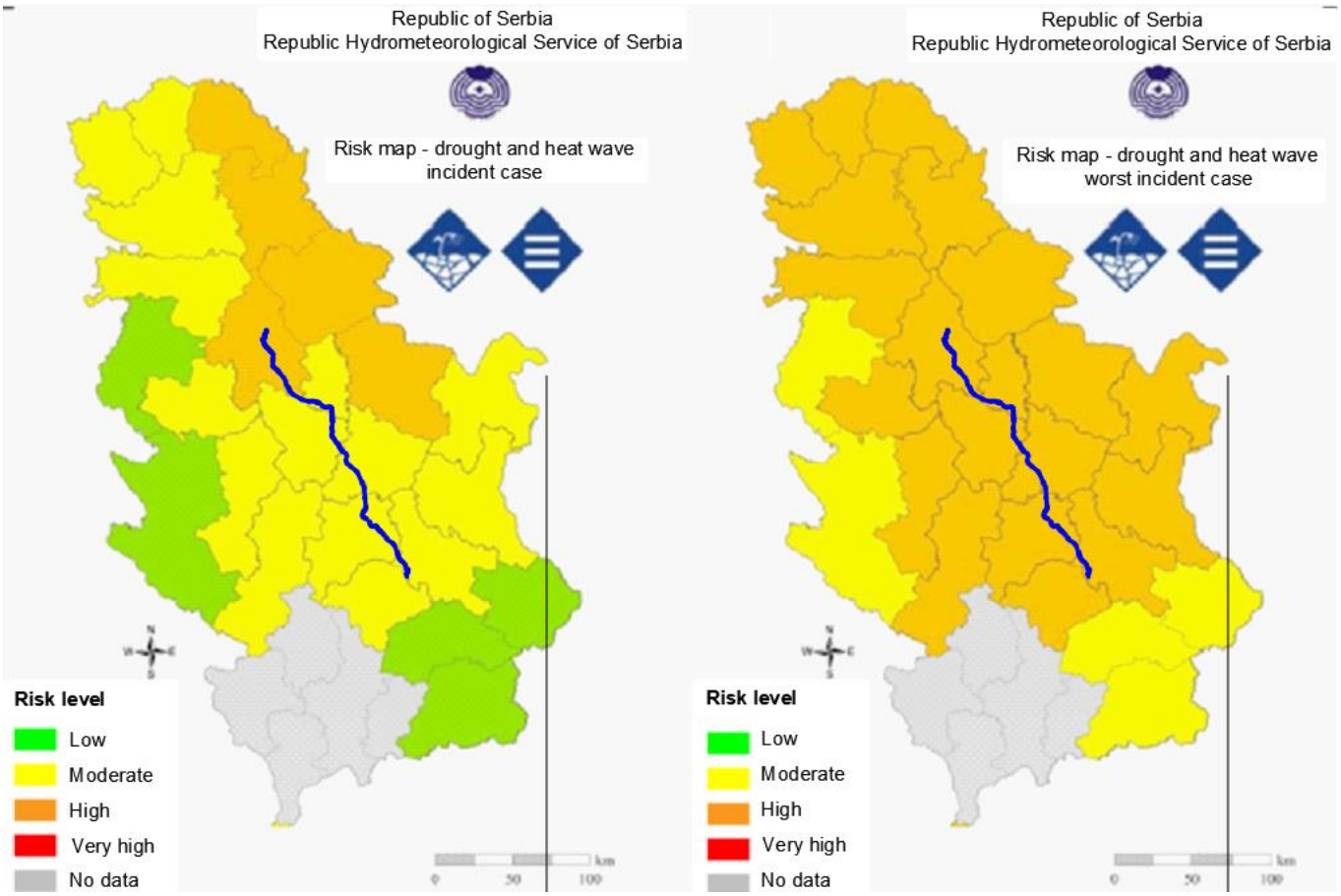


Figure 27 Risk maps for Serbia (polygons are districts), for drought and heatwaves, for most probable event (left) and for the event with most negative consequences (right), green: low risk; yellow: medium risk; orange: high risk; red: very high risk and grey: no data.

Source: National risk assessment of meteorological hazards (draft version), prepared by Republic Hydrometeorological Service of Serbia.

5.1.8.8 Wildfires

Very high air temperature and the absence of precipitation for a longer period cause drying of forests and represent very favourable meteorological conditions for the occurrence of forest fires. In addition to the great material damage they cause, fires can endanger human life and health. The following table shows the climatic areas presented in the climatic baseline section and the average number of fires and area burnt for the period 2006-2016. Those that are more emphatically presented reflect the climate subzones through which the route of Belgrade-Nis railway passes.

Table 34 Climatic areas and number of fires in Serbia (period 2006-2016)

Climate Area	Number of fires	%	Area (ha)	%
A-1-a	**167**	**8,9**	**1746,85**	**6,9**
A-1-b	37	2,0	339,32	1,3

A-2-a	217	11,6	820,12	3,2
A-2-b	209	11,2	2117,95	8,3
A-2-b	24	1,3	8154,01	32,1
B	1140	60,9	11386,30	44,8
B-1-a	2	0,1	8,20	0,0
B-2-a	33	1,8	348,55	1,4
B-2-b	4	0,2	195,80	0,8
B-3-a	33	1,8	249,11	1,0
B-3-b	5	0,3	43,06	0,2
	1871	100,0	25409,26	100,0

The following table indicates the risk of forest fire depending on the air temperature of the area.

Table 35 Fire hazard depending on air temperature

Air temperature	-10° C - 10° C	10° C - 20° C	20° C - 25° C	25° C - 30° C	30° C - 40° C
Risk of forest fire	SMALL	POSSIBLE	PRONOUNCED	VERY PRONOUNCED	HIGH

Based on the aforementioned values of potential fire hazards, it can be said that for the sub-area A-1 a pronounced risk of forest fires exists.

According to the Article 23 of the Law on Fire Protection ("Official Gazette of RS", No. 111/09, 20/15, 87/18, 87/18 - other law and 87/18 - other law) which refers to the categorization of fire risk, the railway infrastructure area is classified in the II category of fire risk, ie. with an increased risk of fire.

5.1.9 Noise

The Rulebook on Permissible Noise Levels in the Environment (Official Gazette of RS No. 54/92) defines the highest permissible levels of external noise, as shown in the table.

Table 36 Maximum allowed noise levels

Purpose of space	Maximum permissible level of external noise dB(A)	
	day	night
Areas for rest and recreation, hospital zones and convalescent homes, cultural and historical sites, large parks	50	40
Tourist areas, small and rural settlements, camps and school zones	50	45
Purely residential areas	55	45
Business-residential areas, commercial-residential areas, children's playgrounds	60	50
city center, craft, trade, administrative zone with apartments, zones along highways and highways	65	55
Industrial, storage and service areas and transport terminals without housing	At the border of the noise zone, the levels in the zone with which it borders must not be exceeded	

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 Belgrade - Niš have not yet been made.

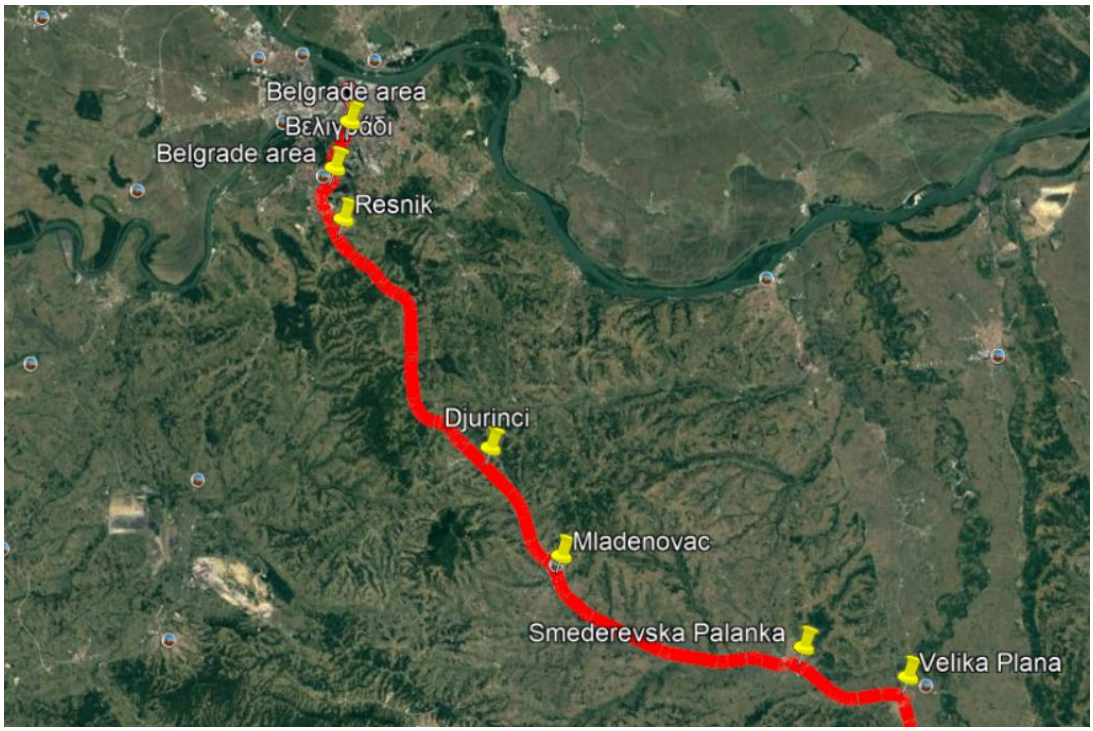
The nearest areas in which noise is measured are Kruševac, and the center of Niš, run by local Public Health Institutes, which are not considered relevant for the section in question. There are noise monitoring stations in Belgrade, measuring noise level in urban areas of the city under the responsibility 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.

More detailed data do not exist since measurements of noise levels in the communal environment have not been carried out so far. 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 are sections of highways, highways 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. According to existing experience, noise caused by the operation of the railway usually occurs at the point of contact between the rail and the wheel, during the discharge of exhaust gases from the diesel locomotive and at the ventilation openings above the tunnel.

As superstructure on the Belgrade - Nis 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 per Section and more precisely in its scoping phase, 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. Currently there are no existing noise barriers along the railway that could possibly minimize the noise impacts. Under this phase, certain locations can be proposed for noise measurements which include two types of areas, i.e populated areas where the existing line passes that will be upgraded and populated areas close to which new parts of the railway will pass. Therefore, starting from Belgrade to Nis, the following locations or wider areas can be indicated: various points in Belgrade area, Resnik, Djurinci, Mladenovac, Smederevska Palanka, Bresje, Velika Plana, Markovac, Lapovo, Brzan, Milosevo, Jagodina, Mijatovac, Cuprija, Paracin, Striza, Drenovac, Cicevac, Stalac, Drubarevo, Vitkovac, Donji Ljubes, Gornji Ljubes, Korman, Trnjane, Donji Adrovac, Zitkovac, Moravac, Grejac, Veliki Drenovac, Mezgraja, Vrtiste, Popovac and Devetni Maj. As mentioned above, these locations will be more defined under the scoping report prepared per Section. Indicatively the locations are placed in the following maps.



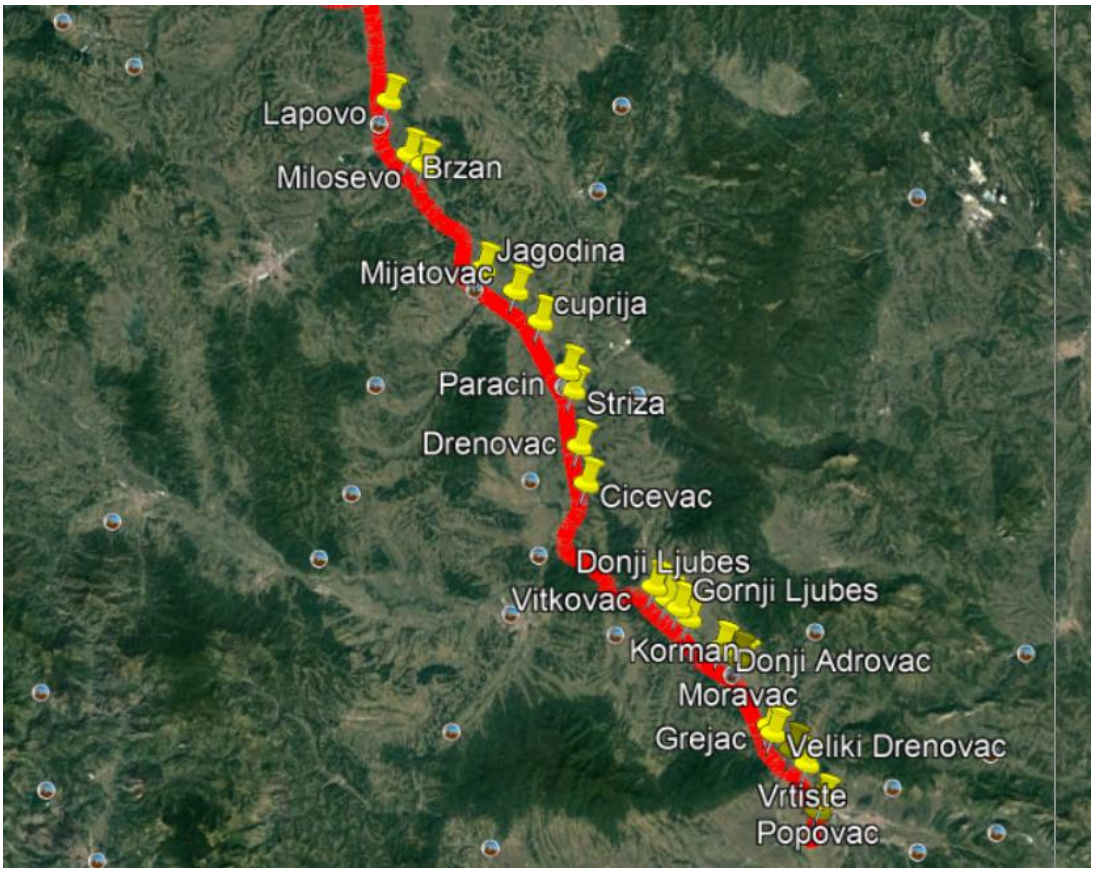


Figure 28 Indicative locations for noise measurements

Vibrations

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

Criteria for the impact of structural vibrations and noise on the environment, according to US DOT, FTA methodology, are based on maximum levels for certain types of buildings or human activities and are divided into three categories of land occupation:

Category 1. - High sensitivity facilities or activities. This category includes buildings where it is necessary to provide a low level of vibration for operations performed in the building and which can be much lower than the levels that cause disturbance to people. This group includes vibration-sensitive research and production, hospitals with vibration-sensitive equipment, and university research

Category 2. - Residential areas. This category covers land occupied by residential buildings and other buildings where people sleep (hotels and hospitals). No differentiation has been made between different types of residential areas, because structural vibrations and noise are felt from within, and tenants have virtually no way to reduce exposure to these phenomena.

Category 3. - Business areas. This category includes schools, churches and other institutions and quiet business premises where there are no vibration-sensitive appliances. This group also includes office buildings, but not industrial facilities with office space because they are primarily intended for industry.

Table 37 Permitted vibration levels according to land occupation categories

Land occupation category	Frequency vibration phenomena1.		Rare occurrences of vibration2.	
	VdB3.	**mm/s4.**	**VdB3**	**mm/s**
Category 1. - High sensitivity facilities or activities	**65**	**0.09**	**65**	**0.09**

Category 2. - Residential areas	**72**	**0.20**	**80**	**0.50**
Category 3. - Business areas	**75**	**0.28**	**83**	**0.71**

1. Frequency vibration phenomena are defined as more than 70 vibration phenomena.

2. Rare vibration occurrences are defined as less than 70 vibration occurrences.

3.Vibration level in VdB is:

LV = 20 · log10 [V/Vref] где је Vref = 5 x 10-5 mm/s,

4. Calculated from the values given in VdB.

Since no data exist for vibration, at the next stage, vibration measurements have to be carried out for the sensitive receptors identified per section.

Under the ESIA per Section and more precisely in its scoping phase, it will be necessary to determine vibration receptors in the vicinity of the designed railway, and based on that, vibration measurements will be performed by an accredited laboratory. Under this phase, certain locations can be proposed for vibration measurements. Therefore starting from Belgrade to Nis, the following locations or wider areas can be indicated: various points in Belgrade area, Djurinci, Mladenovac, Smederevska Palanka, Bresje, Velika Plana, Markovac, Lapovo, Brzan, Jagodina, Mijatovac, Cuprija, Paracin, Strıza, Sikirica, Drenovac, Cicevac, Stalac, Trubarevo, Donji Ljubes, Gornji Ljubes, Korman, Trnjane, Donji Adrovac, Moravac, Grejac, Veliki Drenovac, Mezgraja, Vrtiste, Popovac and Devetni Maj. The abovementioned locations are also indicatively presented in the maps above in the noise section. As mentioned above, these locations will be more defined under the scoping report of each per Section.

Receptors areas along the project for re-radiated noise impacts will be identified under the Scoping report per ESIA section within a width zone of 25m left and right from the axis.

5.1.10 Surface waters

5.1.10.1 Water courses

The hydrographic network is quite dense in the plain terrain through which the existing railway passes and includes larger rivers: the Velika and Juzna Morava and their tributaries.

The potential of surface waters in the investigated corridor of the Belgrade - Nis railway consists is as follows:

- The section of the Belgrade-Mladenovac-Velika Plana railway intersects the rivers: Ralja, Resava, Bojanac, M. Lug, Jasenica, Topčiderska, Lug, and Kubrušica.
- The section of the Velika Plana-Niš railway intersects the rivers: Grabovački stream, Gibavica Rečica, Rača, Grabovički stream, Lepenica, Kijevski stream, Grabovik, Konvanluk Ludi stream, Osaonica, St. Belica, Kameniti stream , Zmijič bara, Suvi stream , Belica, Lugomir, Mijatovač stream, Velika Morava, Crnica, Bačijski stream , Burdeljski stream , Slatinski streams , Suvajski stream , Planski stream, Jovanovačka river, Akalavica, Toplik, Vinograd stream, Pajin , Ražanjska river, Krnji stream, Jabučki stream, Vretenj stream, Bučina, Juzna Morava, Livadski stream, Hajdučki stream , Pločnik, Zmijarnik, Ribar river, Kukin stream , Žarkov stream , Simin stream, Srezovač river , Radevač river, Suvi stream , Suhotnič stream, Turija, Dašnička river , Drenovač stream, , Bare, Nišava.

These rivers belong to the Velika and Juzna Morava river basins, except for Topčider river, which belongs to the Sava river basin.

Figure 29 River basins and main river network

The following maps show the surface waters quantity monitoring stations in the Velika and Juzna Morava river basins.

Figure 30 Surface water station network - Velika Morava river basin

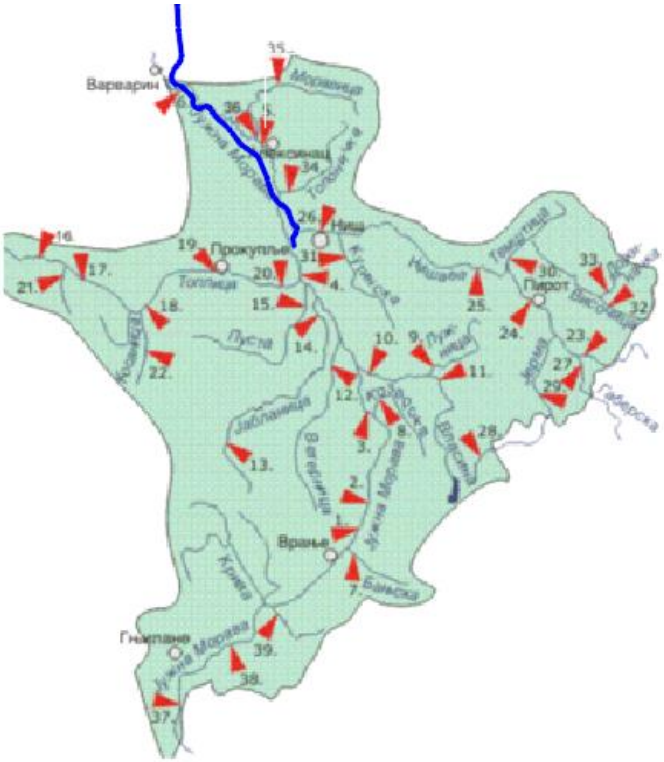


Figure 31 Surface water station network - Juzna Morava river basin

5.1.10.2 Water quality

Based on the Decree on the categorization of watercourses (Official Gazette of the SRS, No. 5/68), the river Velika Morava belongs to the IIa subclass of watercourses, and the river Juzna Morava belongs to IIa and IIb subclasses of watercourses. The water classification explanation is given in the following table.

Table 38 Water classification

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.

The following figure shows a map of measuring stations on the route Belgrade - Nis, for determining the quality of surface waters.

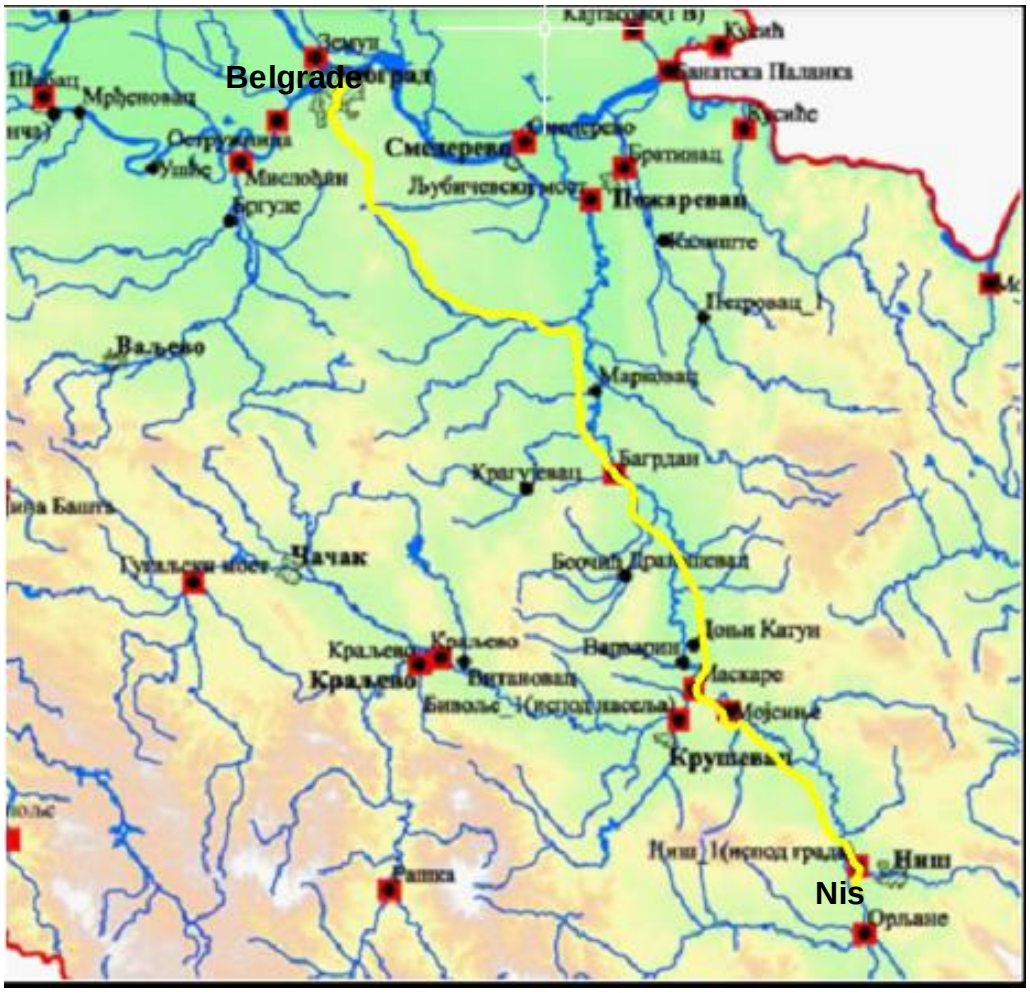


Figure 32 Network of supervisory and operational monitoring stations - watercourses on the route Belgrade Nis (Surface waters - watercourses)

Legend - Surface water status monitoring

Surveillance monitoring stations

Operational monitoring stations

Having in mind the watercourses on the route of the railway from Belgrade to Nis and the cities through which the railway passes, the measuring stations close to the route have been identified, while results of the basic surface water quality parameters for 2019 are presented in the tables below.

Table 39 Results of measurement of parameters on the Velika Morava watercourse, Bargdan station

Station	Bargdan					
Parameter	Water temperature ^0C	Suspended matter , mg/l	Dissolved oxygen (O_2), mg/l	pH	Dissolved CO_2, mg/l	Total alkalinity ($CaCO_3$), mg/l
Month						
I	2.4	-	13.04	8.11	5.0	209
II	5.6	34	10.94	8.04	4.4	166
III	10.0	23	9.84	7.98	4.8	138
IV	16.3	<4	8.48	8.19	1.3	221
V	16.9	16	8.79	7.98	3.1	168
VI	17.5	<4	8.43	8.08	1.8	168
VII	26.5	15	15.37	8.67	0.0	173
VIII	28.3	<4	12.92	8.87	0.0	138
IX	21.8	19	8.05	8.24	0.0	190
X	19.2	<4	8.97	8.09	2.2	194
XI	9.2	7	9.84	7.94	2.2	236
XII	6.0	<4	9.99	7.90	2.6	209

Table 40 Results of measurement of parameters on the South Morava watercourse, Mojsinje station

Station	Mojsinje					
Parameter	Water temperature ^0C	Suspended matter , mg/l	Dissolved oxygen (O_2), mg/l	pH	Dissolved CO_2, mg/l	Total alkalinity ($CaCO_3$), mg/l
Month						
I	3.5	5	11.82	8.00	1.3	207
II	4.0	29	12.52	8.00	1.3	147
III	17.1	<4	7.92	7.90	1.8	161
IV	15.7	<4	7.95	7.90	1.8	131
V	29.3	10	7.11	7.90	1.8	172
VI	23.8	5	6.87	7.80	2.2	166
VII	25.8	14	13.62	8.80	0.0	181
VIII	26.2	24	13.41	8.70	0.0	152
IX	21.6	8	8.60	8.30	0.0	190
X	16.1	<4	9.00	8.10	0.9	196
XI	13.0	<4	9.02	8.00	1.8	212
XII	4.9	5	11.28	7.90	1.8	207

Table 41 Results of measurement of parameters on the watercourse Nišava (Morava), station Niš

Station	Niš					
Parameter	Water temperature 0C	Suspended matter, mg/l	Dissolved oxygen (O2), mg/l	pH	Dissolved CO2, mg/l	Total alkalinity (CaCO3), mg/l
Month						
I	5.2	14	11.4	8.00	0.9	194
II	6.0	<4	11.8	8.00	1.3	190
III	16.0	<4	6.09	7.80	2.2	169
IV	16.1	19	8.04	7.90	1.8	151

V	19.9	7	6.60	7.80	2.2	199
VI	25.4	<4	4.69	7.70	2.6	177
VII	24.4	7	4.15	7.70	2.6	216
VIII	25.4	7	3.82	7.70	3.1	222
IX	21.4	5	3.22	7.60	3.5	252
X	17.1	13	3.39	7.70	2.2	250
XI	11.4	11	4.38	7.80	3.5	259
XII	7.7	<4	5.32	7.80	3.1	232

In order to analyse the existing water quality of the rivers Velika Morava, Juzna Morava and Nišava, the data of the Hydrometeorological Institute of the Republic of Serbia were used.

Velika Morava River

Water quality testing of the river Velika Morava was performed by the National Monitoring Network on the following areas (after each profile, the water quality class is given): Varvarin (III / IV), Bagrdan (-), Velika Plana (III / IV), Trnovče (III / IV), Ljubičevski Most (III / IV) and Šalinac (III / IV). There is a change in organoleptic indicators on almost all profiles, i.e. the colour of the water corresponded to class III.

The most polluted waters are in the immediate catchment area of the Velika Morava, which is the most densely populated, the lowest by altitude and the most industrially developed. These are the areas of the valleys of the Velika Morava, which are economically very attractive areas, while further environmental degradation can be expected.

The values of the percentage of water saturation with oxygen belong to III and IV class, while the suspended substances correspond to III and IV class and out of class. Elevated concentrations of sulfides, mineral oils (III / IV class), hexavalent chromium and manganese iron and tannins were registered on some profiles from harmful substances.

In recent years, Velika Morava has a tendency to further deteriorate water quality, because in its basin there are numerous settlements and industrial complexes. In addition, the water quality of the Velika Morava is greatly affected by its left tributaries, which come from Šumadija, and which are also highly polluted. One of the most polluted tributaries of the Velika Morava is the river Lepenica, the water quality of which is monitored at the Rogot site. Taking into account a five-year observed period, Lepenica river belong to the IV class of water quality or out-of-class flow. The smell of faeces was noticed in all examined samples, and elevated concentrations of iron and phenol were registered from dangerous substances. The measured values of ammonia, nitrate and nitrite nitrogen occasionally correspond to class III / IV.

Juzna Morava River

Tests of the water quality of the river Juzna Morava on the profiles Aleksinac and Mojsinje showed changes in organoleptic properties, i.e. the colour of the water of the river Juzna Morava corresponded to class III. By analysing the results, elevated values were observed in water saturation O_2, BOD_{-5}, suspended solids. The increased content of suspended solids and of BOD-5 is probably a consequence of inadequate treatment of industrial wastewater.

Nišava River

Nišava is a tributary of the Juzna Morava. In terms of quality, it belongs mainly to the III class of river waters, almost on the entire course from the Bulgarian border to the mouth, with a somehow greater degradation of water in the Nis valley, where there are 25 pollutants identified. The tributaries of the Nišava have similar water quality.

Regarding surface waters and ESIA per Section, there will be presented more details regarding the river basins and the rivers crossed, their quality and quantity characteristics, the pollution sources for the rivers to be identified and the km positions that the Project crosses the rivers and streams.

5.1.11 Groundwaters

5.1.11.1 General

On the territory of central Serbia, the largest part of groundwater reserves is located in the areas of alluvial springs, primarily in the valley of the Velika Morava. The filtration characteristics of the sand-gravel layer along the entire length of the alluvium are favourable, and the water supply sources are mainly formed in the area of lower Pomoravlje. The use of groundwater is organized mainly through wells for the needs of individual households, while larger quantities for water supply are provided from the sandy sediments of the Neogene. The catchment area of Velika Morava is rich in the occurrence of mineral and thermal waters, which is conditioned by the diverse lithostratigraphic

composition and complex structural relations and the Great Moravian Neogene basin abounds in significant hydrogeothermal potentials.

Based on the hydrogeological properties of individual lithological formations as well as on the structural types of porosity, the following types can be distinguished in this area: phreatic (compacted) type issued, artesian, fissure, karst, fissure-karst, and in some parts of the terrain complex type issued, as well as arid terrains. In some parts of the terrain, it is difficult to draw sharp boundaries between these issues. Also, there is the appearance of mineral waters on these terrains.

The phreatic (compacted) type has a fairly large distribution within the study area. It was formed mainly within the alluvial, deluvial and terrace sediments of Quaternary age (Q); within the Pliocene (Pl1, Pl, Q) sediments, as well as within the Tertiary formations of the Middle and Upper Miocene age (M2; M3).

5.1.11.2 Groundwater quality monitoring

Since the Environmental Protection Agency does not conduct testing of hydromorphological quality elements, namely it does not monitor the hydrological regime of water, the data of the Republic Hydrometeorological Institute (RHMZ) published in the annual reports of the Hydrological Yearbook are used in the analysis of water quality data. Groundwater levels and temperatures are measured at stations (piezometers) and groundwater samples are taken for quality testing.

The following figure is a map of measuring stations on the route Belgrade - Nis, which determine the quality of groundwater.

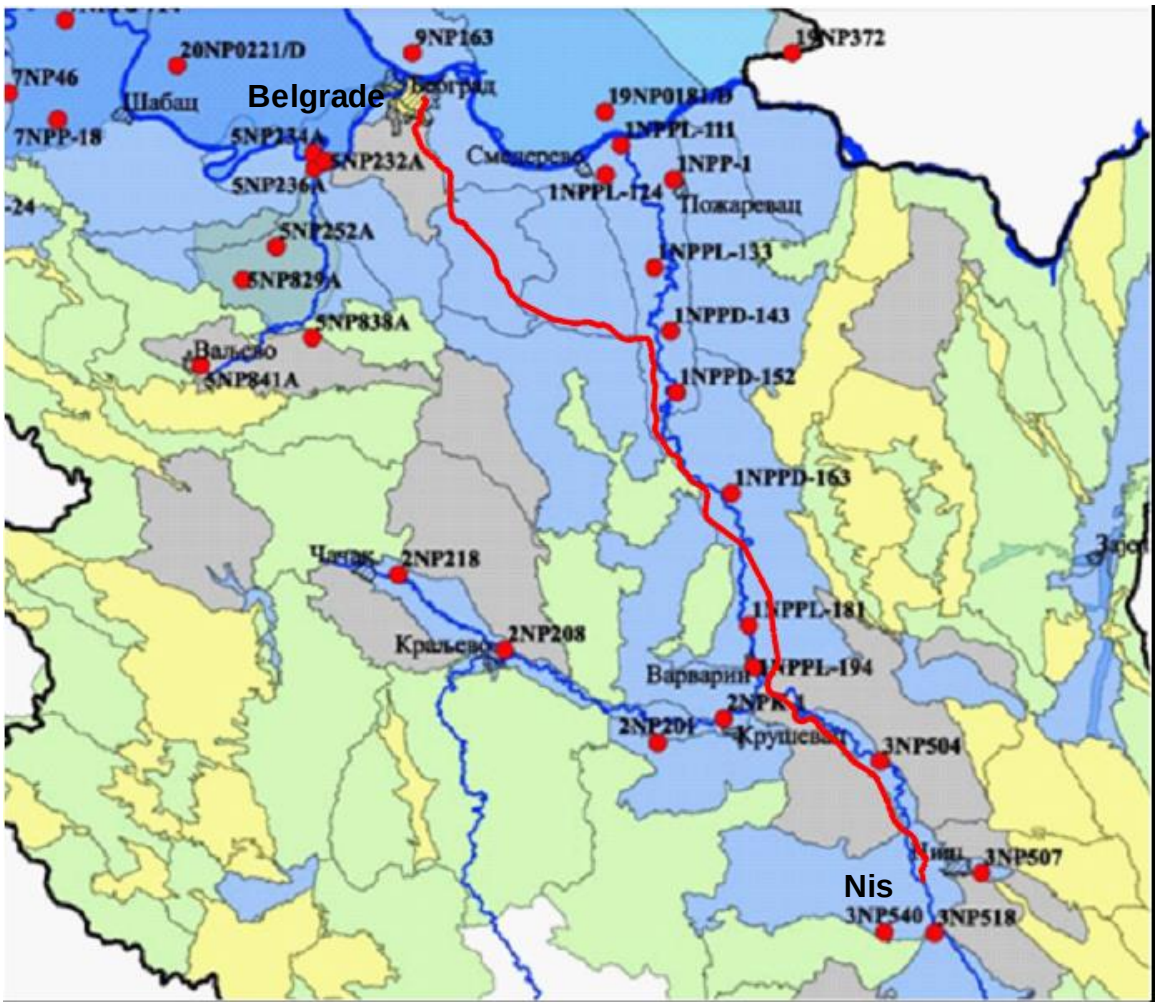
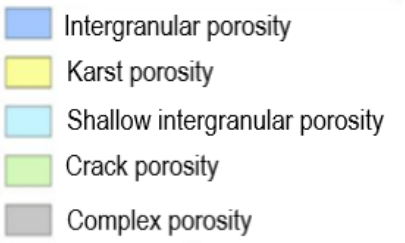


Figure 33 Network of groundwater quality stations on the route Belgrade - Nis

Legend

Piezometers

Single groundwater bodies / porosity type



Having in mind which river basins intersect the line from Belgrade to Nis and through which cities the railway line passes, certain measuring stations have been chosen and presented in the following table. The network of groundwater monitoring stations is presented, accompanied by the following data: ordinal number, name of the hydrological station where sampling is performed water, hydrological station code, name of groundwater body, water area and coordinates.

Table 42 List of stations for monitoring groundwater quality on the route of the Belgrade-Nis railway

No.	Name of the hydrological station where the sampling is performed	Hydrological station code	Name of groundwater body	Water basin	Coordinates	
1.	Borča-dubok	9NP163	Pančevački rit	Danube	4970273	7458430
2.	Velika Plana- -Žabari	1NPPD-143	Velika Morava aluvion - right bank	Morava	4911255	7513028
3.	Markovac-Svilajnac	1NPPD-152	Velika Morava aluvion - right bank	Morava	4898242	7514255
4.	Bukovače-Glogovac (close to Jagodina)	1NPPD-163	Velika Morava Neogene - South	Morava	4876850	7525825
5.	Obreže-Ratare (close to Paraćin)	1NPPL-181	Velika Morava Neogene - South	Morava	4848825	7529550
6.	Varvarin-Ćićevac	1NPPL-194	Levač	Morava	4839925	7530600
7.	Zitkovac brickyard near Aleksinac	3NP504	Velika Morava Neogene - North	Morava	4819990	7557351

More analytical data will be presented in the relevant ESIA.

5.1.11.3 Mineral springs

On the wider route of the exploration area, there are springs of mineral waters such as the one in the southeastern edge of Smederevska Palanka, known as "Palanački kiseljak". sources of acidic water in several places and along one fault zone in the valley of Jasenica, known as "Jasenički kiseljaci", thermo-mineral springs in the Ostrovicka valley (between the southern slopes of Svrljiške planine and Suva planina), while on Jastrebac within the cracks in the crystal shales are formed water of Lomnički kiseljak, Ribarska Banja and Kulinska Banja.

The water from Palanka is clear, odorless, with a refreshing sour taste and with significant amounts of gas. The water temperature is 12 ^{0}C and can vary up to 14 ^{0}C. Another and quite significant occurrence of acidic water is in the southwestern suburbs of Mladenovac, known as "Mladenovac Selters". Less mineralized water is also found in Koraćička Banja, west of Mladenovac. Mineral waters of "Palanački kiseljak" and "Mladenovac selters" are used for general consumption due to their satisfactory taste.

5.1.11.4 Water supply

Belgrade Waterworks consist mainly of five treatment plants: Makiš, Bele vode, Banovo brdo, Bežanija and Vinča. The total annual water production is approximately 250 million m^3. Out of the total balance of the Belgrade water supply system, groundwater is represented by 60% and the waters of the Sava and Danube by 40%. The distribution network is divided into five height zones. The first stretches from Batajnica to Kaludjerica, from Umka to Ovča and from Surčin to Visnjica. The second zone is mostly connected into one system, except for parts of the Barajevo system and the upper parts of Umka. The third zone consists of three subsystems: Košutnjak (Kanarevo brdo, Petlovo brdo and Košutnjak); Dedinjski (Dedinje, Topcider) Zvezdarski (Zvezdara, Kaludjerica, Mirijevo). The fourth zone extends to the part of southern Kumodraž and the fifth one to Kumodraž.

Mladenovac owns a water supply network that supplies water to the town of Mladenovac and the villages of Kovačevac, Vlaška, Granice and Rajkovac. The Mladenovac spring conglomeration consists of springs in Vlaška (Kokorin), Rajkovac, Serava, Mladenovac, Koraćica, Selters and Granice, as well as springs in Međulužje and Kovačevac (Brestovica) and single wells. A large number of springs are conditioned by small capacities on wells and rapid decay. A total of 85 exploitation and exploration wells exist, 42 of which are in use with a maximum capacity of 130 L / s. Local waterworks exist in Senaja, Šepšin, Dubona, Amerić, Koraćica, Velika Ivanča and Velika Krsna, which are managed by local communities or groups of citizens. For these water mains, water is taken from wells and from natural springs, while part of the households still use water from some wells, the quality of which does not correspond the water quality standards. The villages of Markovac, Pružatovac, Mala Vrbica, Međulužje, Jagnjilo and Rabrovac are supplied with water exclusively through wells.

Smederevska Palanka spring conglomeration is located at the localities of Rudina, Singer and Bulina voda. A total of 12 wells are in operation, which capture water from medium-grained to coarse-grained Neogene sands, while some wells also capture alluvial sands.

*Trnovce spring system (*Trnovče" spring is the most productive source of the intergranular type issued in Serbia) is used for the needs of water supply of Smederevska Palanka, while it is located within the municipality of Velika Plana and includes 18 exploration and exploitation wells, about 16 m deep, which capture water from the gravelly -sandy deposits of the river Velika Morava. The capacity of the spring is 120 L / s, 70 L / s of which is distributed by pipeline to Smederevska Palanka. Most households use water from wells in the surrounding villages of Smederevska Palanka.

Water supply is also ensured in the town *of Velika Plana*, the settlements of Veliko Orasje and in part of Staro Selo. The settlements of Kupusina and Radovanje have their own water supply systems, capturing water from two springs: "Feverish water" and spring located near the "Karaula" reservoir. The water supply of Velika Plana is carried out by two basic springs "Livade" with wells and "Trnovče" with eight wells, and by the Regional water supply system for water supply of Smederevska Palanka and Velika Plana, from the alluvium of Velika Morava.

Water intake of settlements in the wider area is performed through local water intakes. These include the Livade spring, the Batočina and Kragujevac Brzan springs - 300 l /s and the Trnovče-Miloševac spring with an area of 1200 l/s.

On the territory of the *municipality of Batočina*, there is a source for water supply in the area of the village of Jasik, in the alluvial plateau of the middle course of the Velika Morava. The Jasik spring has two exploitation wells, as well as a collection tank with a pressure pipeline. The town of Paraćin is supplied with water from the karst spring "Sveta Petka", located in the village of Izvor, about 16 km east of Paraćin. In the wider vicinity of Paraćin, there is a spring that includes four wells that capture Neogene releases, with a yield of about 35 l / s, while there is the spring of the Fisherman for the water supply of Jagodina. The exploitation reserves of groundwater of this source are estimated at 370 l / s, with the current reached capacity of 250 l / s. The "Strelishte" spring is formed on the left bank of the Velika Morava river for the water supply of Ćuprija. Potential areas for the exploitation of the Neogene are also pointed out in Paraćin-Ćuprija (forecast reserves with about 190 l / s). Water supply to consumers in the municipality of Aleksinac operates from several reservoirs with a total volume of 6,550 m^2. To maintain the bacteriological stability of water in the large distribution network, a system of water chlorination stations and chlorine stations has been established: Žitkovac, Trnjane, Moravac, A. Bujmir, Bobovište.

There are several springs of smaller capacity in the valley of Juzna Morava, with Mediana (Niš) with a capacity of 440 to 550 l / s being one of the most important springs. It is about 16 km away from Trupale, where the railway route ends.

The route of the railway passes through the wider protection zone of the underground spring "Gorunja" in Paracin, however the section Gilje-Paracin is already constructed and Belgrade-Nis line will use the existing section..It passes near the wider protection zone of the underground spring "Garevine" in Lapovo, while Lapovo spring is on the opposite side of the E75 motorway with the distance of around 1 km. In this section of the railway, the protection measures prescribed by the Rulebook on the manner of determining and maintaining the sanitary protection zones of water supply sources ("Official Gazette of RS", No. 92/08) are applied, in order to avoid any side effects. Mladenovac and Smederevska Palanka springs are more than 1 km from the alignment.

During the ESIA preparation per Section, more analytical research has to be done in identifying the groundwater sensitive areas, including the ones above, where Article 4.7 of the Water Framework Directive will be applied where relevant. Since currently there is no information on the depth of groundwater in the areas of tunnels, geotechnical investigations will be carried out under the Preliminary Design stage to provide the necessary information to assess whether the groundwater flows will be affected

5.1.12 Biodiversity

5.1.12.1 Introduction

Vegetation of Serbia is characterized by great diversity, which indicates great habitats diversity. According to Radović and Kozomara (2011) between 700 and 800 different types of plant communities have been recorded on the territory of Serbia. Climazonal vegetation of Serbia is forests of Hungarian oak (*Quercus frainetto*) and Austrian oak (*Quercus cerris*) -Quercetum frainetto-cerris. Quercetum frainetto-cerris is the most widespread forest in Serbia. However, it should be borne in mind that the large areas of these forests are degraded, along planned railway, and occupied with other habitat types. Highland and mountainous area of Serbia, as part of the Balkan Peninsula, is one of the 6 centers of European biodiversity (Stevanović and Vasić, 1995).

Republic of Serbia is characterized by a great diversity of vascular flora. 3730 autochthonous taxa of vascular flora have been recorded so far, assuming that their total number ranges between 3900 and 4000 (Tomović, 2007). From the total number of plant species 14.94% (547 taxa) are Balkan endemics and 1.5% (59 taxa) are local endemics (Radović and Kozomara,2011). 627 plant species are strictly protected, and 559 plants are protected by national Low ("The Official Gazette of the Republic of Serbia", No. 5/2010, 47/2011 and 32/2016 i 98/2016). Serbia is characterized by high species diversity, despite the fact that its territory covers only 1.9% of European continent. In table below, number of fauna species and subspecies is presented[14]:

Table 43 Species diversity in Serbia

Taxon	No. of species and subspecies in Serbia
Mammals	96
Birds	360
Reptiles	25
Amphibians	21
Fishes	98
Invertebrates	12000

According to this table, 16% of total number of fishes in Europe, 16% of reptiles and amphibians, 51% of birds and 38% of mammals of Europe are presented in Serbian fauna. Pursuant to the Law on Nature Conservation, 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 Articles 76 and 77 of the Law on Nature Protection.

Of the species included in the list of protected wild species (Annex 2 of the Rulebook), there is a total number of 97 wild plant, animal and fungi species, the use and trade of which is allowed. Of that number, 9 are animal species (2 reptile species, 3 amphibian species and 4 invertebrate species). 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).

[14] Biodiverzitet Srbije, stanje i perspektive, Zavod za zaštitu prirode Srbije, Beograd, 2012 ("Biodiversity of Serbia", Institute for Nature Conservation of the Republic of Serbia, Belgrade, 2012)

Table 44 Strictly protected and protected fauna species at the national level

Group of organisms	Mammalians	Birds	Reptiles	Amphibians	Fishes	Invertebrates	Total
Strictly protected species	50	307	18	18	30	609	1032
Protected species	30	35	2	3	34	154	258

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.

5.1.12.2 Methodology

In this report the data related to flora, fauna, habitats and protected areas are presented on the basis of research of the existing literature. Field investigations are planned for the next phase of the project. During the field research, the corridor will be visited several times during the year in accordance with aspects of the vegetation. Field surveys will encompass 500 m of the corridor at each side of the railway corridor axis, in protected areas. Field surveys will cover 500m distance at each side in order to predict possible effect of the railway construction on habitats, flora and fauna. Flora and habitats will be investigated by visual method. Methods for fauna investigation will be observation, listening, catching, collection of increments and taking photos. Either way , the methods for the field surveys will be further analyzed and identified under the ESIA per section.

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.

In order to adequately identify and study the Protected Areas in the wider region, a distance of approximately 5 km at both sides of the railway alignment of the corridor has been considered during the Scoping report, while a narrower zone has been defined for the ones directly affected. In the following project phases, the zones of research on the impact on protected areas will be reduced, in accordance with the conclusions that will be set in the conceptual design.

EBRD and EIB support a precautionary approach to the conservation and sustainable use of biodiversity through the implementation of applicable international law and conventions and relevant EU Directives. Detailed guidelines addressing this approach are provided in:

- Performance Requirement 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources of EBRD's ESP (2019) and
- Environmental and Social Practices Handbook (2013)

Special attention will be paid to the above guidelines during the biodiversity investigation.

5.1.12.3 Habitats along railway corridor

The habitat types listed in the text that follows have been singled out on the basis of a study of the existing literature. During the next stage, field investigations will be done. After performed field investigation, the list of habitats will be expanded and modified.

According to their origin, the habitats along the railway corridor can be divided in two main categories: natural and anthropogenic habitats.

Natural habitats

Natural habitats include: forests, shrublands, grasslands, and water habitats. As anthropogenic influence is very strong along the whole area, the natural vegetation along the railway corridor is reduced to small fragments.

According to the literature data, along the corridor, several types of oak forest are identified: Quercetum frainetto – cerris, Quercetum petraeae – cerris, Querco- Carpinetum moesiacum and *Quercus robur* forest.

Reference to EUNIS Habitats: G1.762 Helleno-Moesian Quercus frainetto forests (Quercetum frainetto - cerris)

Reference to EU HD Annex I: 91M0

Reference to CoE BC Res. none

These are thermophilous deciduous forests. In the typical Hungarian oak-Turkey oak forest, the following species are the most present: *Quercus frainetto, Q. cerris, Tilia argentea, Pyrus pyraster, Sorbus domestica, S.torminalis, Fraxinus ornus, Acer campestre*, *Acer tataricum, Cornus mas, Crataegus monogyna, Viburnum lantana, Rosa gallica, Lonicera carifolium, Tamus commuis.* In the ground floor, *Lathyrus niger, Danna cornubiens, Lychnis coronaria, Silene viridiflora, Tanacetum corymbosum, Hellebrus odorus, Trifolium alpestre, Campanula persicifolia, Veronica chamaedrys* are the most abundant species. However, along the railway corridor, these forests have been degraded in order to increase agricultural areas. Therefore, the floristic composition and structure of these forests is endangered. Species *Quercus frainetto* is especially endangered due to its higher quality of wood. The thermophilous species of Quercetum frainetto-cerris forests are suppressed by xerophilous shrubs and the most resistant trees, such as: *Fraxinus ornus, Carpinus orientalis, Acer tataricum, Cornus mas, Euonymus sp., Ligustrum vulgare, Rhamnus cathartica, Viburnum lanthanum, Rubus* spp. They are identified at Mojsinje Mountain. It can be expected small fragments of this forest along corridor where autochtonous vegetation is preserved. According to national Rulebook *on criteria for selection of habitat types, on habitat types, sensitive, endangered, rare and for the protection of priority habitat types and protection measures for their conservation* (Official Gazette of RS ", No. 36/09), these habitats belong to the group of "fragile habitats (B)/Rep" since they are fragile habitats that are poorly and slowly regenerating and also present representative habitat type in Serbia. According to EBRD PR6, Quercetum frainetto – cerris forests could be a potential Priority Biodiversity Feature (threatened habitats) to be further explored at the next stage of the ESIA process.

Reference to EUNIS Habitats: G1.762 Pannonian-Balkanic turkey oak –sessile oak forests (Quercetum petraeae - cerris)

Reference to EU HD Annex I: 91M0

Reference to CoE BC Res. none

Quercetum petraeae - cerris forest form a narrow belt up to an altitude of 500–600 m, at warm exposures. The forest of Turkey and Sessile oak identified at Mojsinje Mountain and on the area of Natural Monuments ""Miljakovačka forest". According to national *Rulebook on criteria for selection of habitat types, on habitat types, sensitive, endangered, rare and for the protection of priority habitat types and protection measures for their conservation* (Official Gazette of RS ", No. 36/09), these habitats belong to the group of "fragile habitats (B)" since they are fragile habitats that are poorly and slowly regenerating. According to EBRD PR6, Quercetum petraeae - cerris forests could be a potential Priority Biodiversity Feature (threatened habitats) to be further explored at the next stage of the ESIA process.

Reference to EUNIS Habitats: G.1A *Meso- and eutrophic Quercus, Carpinus, Fraxinus, Acer, Tilia, Ulmus and related woodland.* Querco - Carpinetum moesiacum is extrazonal vegetation.

Reference to EU HD Annex I: 9160

Reference to CoE BC Res. none

Querco - Carpinetum moesiacum is extrazonal vegetation. This forest has fragmentary distribution. Characteristic species of this community are: *Carpinus betulus, Quercus petraea, Prunus avium, Acer campestre, Corylus avellana, Euonymus europaeus, Cornus sanguinea*, *Tiliaargentea*, *Carex sylvatica*, *Pulmonaria officinalis* etc. This forest is identified at Mojsinje Mountain. According to national *Rulebook on criteria for selection of habitat types, on habitat types, sensitive, endangered, rare and for the protection of priority habitat types and protection measures for their preservatio* (Official Gazette of RS ", No. 36/09), these habitats belong to the group of "fragile habitats (B)" since they are fragile habitats that are poorly and slowly regenerating. According to EBRD PR6, these forests could be a potential Priority biodiversity feature (threatened habitats) to be further explored at the next stage of the ESIA process

Quercus robur forest is identified at the area of Natural monument "Rogot", located in the vicinity of Batočina village. The forest has been artificially raised by planting acorns, 40 years ago. This is the biggest *Quercus robur* forest in Serbia today. In the past, these forests were widespread in Serbia. Today, the community is rare in Serbia and is considered fragile. *Quercus robur*, *Fraxinus angustifolia, Ulmus effusa, U.minor, Populus alba, Carpinus betulus, Viburnum opulus, Cornus sanguinea, Genista elata, Rubus caesius, Carex remota, Convalaria majalis, Lysimachia numularia, Rumex sanguineus* etc. are some of the species recorded within this community. According to national *Rulebook on criteria for selection of habitat types, on habitat types, sensitive, endangered, rare and for the protection of priority habitat types and protection measures for their conervation* (Official Gazette of RS ", No. 36/09), this forest belongs to the group of "fragile habitats (A)/(B)" due to functional instability and sensitivity to degradation, while

regeneration of this habitat is poor and slow. According to EBRD PR6, *Quercus robur* forests could be a potential Priority Biodiversity Feature (threatened habitats) to be further explored at the next stage of the ESIA process.

Reference to EUNIS Habitats: G1.69 - Moesian Fagus forests

Reference to EU HD Annex I: 91W0 Moesian beech forests

Reference to CoE BC Res. G1.6 Beech woodland

Fagetum moesiacae submontanum occurs on cold exposures or sheltered, shaded coves with specific microclimate elements at Mojsinje Mountain. *Fagus moesiaca* is dominant species. Species *Sorbus torminalis, Tilia argentea, Carpinus betulus, Acer pseudoplatanus, Acer campestre, Acer platanoides, Prunus avium, Quercus petraea, Ulmus Montana, Samucus nigra, Corylus avellana, Asperula odorata, Cardamine bulbifera, Geranium robertianun* etc. are also determined within this association. This forest is identified at Mojsinje Mountain.

According to the national *Rulebook on criteria for selection of habitat types, on habitat types, sensitive, endangered, rare and for the protection of priority habitat types and protection measures for their conservation* (Official Gazette of RS ", No. 36/09), these habitats belong to the group of "fragile habitats (B)", since they are poorly and slowly regenerating and they are marked as habitat of endemics in Serbia. According to EBRD PR6, these forests could be a potential Priority Biodiversity Feature (threatened habitats) to be further explored at the next stage of the ESIA process.

Potential natural vegetation along Velika Morava River and South Morava River and other water streams in the area of railway corridor is *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

However, today willow and poplar forests are almost complete disturbed and represented only by small groups or individual trees *Salix alba,Salix purpurea*, *Salix fragilis* and *Populus alba*. Natural habitats along Velika Morava River and Juzna Morava River are degraded due to formation of arable land. Generally, these habitats are situated along rivers and in the lower parts of the alluvial plain, where there is a high level of groundwater. This habitat type is already identified along Stalać Gorge.

Salix alba and *Populus alba* galleries stand out among the habitats that have been identified in this phase of research. According to the national *Rulebook on criteria for selection of habitat types, on habitat types, sensitive, endangered, rare and for the protection of priority habitat types and protection measures for their conservation* (Official Gazette of RS", No. 36/09), these habitats belong to the group of "fragile habitats (A)" due to functional instability and sensitivity to degradation. *Salix alba* and *Populus alba* galleries are situated along rivers and they are very degraded in the area of railway corridor. According to EBRD PR6, *Salix alba* and *Populus alba* galleries could be a potential Priority Biodiversity Feature (threatened habitats) to be further explored at the next stage of the ESIA process.

The habitats on the river banks will be crossed by means of bridges. At the most sites, existing bridges will be reconstructed, and seven bridges will be built. During the reconstruction/construction of the bridges mentioned habitats directly affected by the works. The impact will be stronger in those locations where the construction of new bridges is planned. However, this impact can be considered as temporary (temporary severance of the corridor), because the impact on habitats will be limited to the time the construction works. The magnitude of the impact will not be the same in every locality. The magnitude of this impact will be evaluated during field investigation.

Reference to EUNIS Habitats: C3.2 - Water-fringing reedbeds and tall helophytes other than canes

Reference to EU HD Annex I: none

Reference to CoE BC Res. No. 4 1996: none (used for designation of Emerald sites)

This habitat has been recorded in the area of Special nature reserve "Brazansko moravište", as well as in the valleys of watercourses located in the corridor zone. Some of characteristic species are: *Schoenoplectus lacustris, Typha angustifolia, T. latifolia, Glyceria maxima, Carex acutiformis, Carex hirta, C. vulpina, Epilobiu palustre, Iris pseudacorus, Lythrum salicaria, Mentha longifolia, Ranunculus sceleratus, Ranunculus trichophyllus, Scutellaria galericulata, Veronica anagallis-aquatica* etc. According to the national *RULE BOOK on criteria for selection of habitat types, on habitat types, sensitive, endangered, rare and for the protection of priority habitat types and protection measures for their conservation* (Official Gazette of RS", No. 36/09), these habitats belong to the group of "fragile habitats (A)/Ret" due to functional instability and sensitivity to degradation and they are rare in Serbia. According to EBRD PR6, this habitat could be a potential Priority Biodiversity Feature (threatened habitats) to be further explored at the next stage of the ESIA process.

It is expected that natural meadows of secondary character will be recorded in the area of the proposed railway corridor. These habitats are developed by forest degradation, during regressive succession. Over the following phases, the types of these habitats will be determined and described.

Identification of the presence or absence of Critical Habitats, according to EBRD PR6 Criteria, within the project area of influence will be carried out after completing field investigation. Area of Influence will cover area of 500 m left and right from the railway axis with possibility to extend the area up to 5 km to cover biodiversity and other specific social impact that will be determined in detail in the next stage of E&S assessment.

Anthropogenic habitats

Anthropogenic influence is very strong and ubiquitous in the whole area. Urbanization (settlements and roads construction), land reclamation, regulation of watercourses, expansion of arable land, the presence of herbicides and other pollutants led to degradation of natural vegetation. All this conditioned domination of anthropogenic habitats along railway corridor. Anthropogenic habitats include: agricultural land, grasslands and urban areas. Given the constant anthropogenic influence within these sites, domination of ruderal and invasive plants in their surrounding is expected. The list of these habitats with a brief description can be found below:

Reference to EUNIS Habitats: I1.1 Intensive unmixed crops

Reference to EU HD Annex I: none

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

The arable land is dominant habitat along all the railway corridor. The agro-ecosystems along the corridor are represented by individual parcels of different types of agricultural crops. The dominant agricultural crop is corn. After corn, the important agricultural crops are wheat, barley and sunflower.

Reference to EUNIS Habitats: E5.1 Anthropogenic herb stands

Reference to EU HD Annex I: none

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

The ruderal vegetation is wide present throughout the corridor. Most of the grasslands in the area of the railway corridor are of anthropogenic origin. They occupy small areas since most of the agricultural land is usually permanently arable. Ruderal and weedy plant species are dominant within this habitat types. Some of them are: *Cynodon dactilon*, *Lolium perenne, Bromus spp*., *Hordeum vulgare, Sambucus ebulus, Anthemis arvensis, Artemisia vulgaris, Hyosciamus niger*, *Datura stramonium*, *Cichorium intybus, Xantium spinosum, Cirsium arvense, Dipsacus laciniatus, Chenopodium album, Arctium lappa* etc. Also, these habitats are suitable for the development of invasive plants.

Urban areas along the proposed railway corridor are very densely populated. There are several urban centers (Beograd, Mladenovac, Smederevska Palanka, Jagodina, Ćuprija, Paraćin and Niš), at both ends of the railway corridor, and villages and settlements along the corridor. The presence of isolated houses is also common. The urban habitats along railway corridor are:

Reference to EUNIS Habitats J1.1 Residential buildings of city and town centers;

Reference to EU HD Annex I: none

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

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

Reference to EUNIS Habitats: J1.4 Urban and suburban industrial and commercial sites still in active use

Reference to EU HD Annex I: none

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

Reference to EUNIS Habitats: J4.3 Rail networks

Reference to EU HD Annex I: none

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

Reference to EUNIS Habitats: J4.2 Road networks

Reference to EU HD Annex I: none

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

The primary characteristic of these habitat types is the presence of numerous allochthonous plants, essentially decorative trees and shrubs. Also, the most plant species are strictly adapted to urban environmental conditions. Ruderal plant species have dominant presence within all mentioned urbanized areas. These are common ruderal plants of urbanized areas, such as: *Chenopodium album, Atriplex hastata, Amaranthus retroflexus, Amaranthus sp. Urtica dioica, Parietaria officinalis, Conium maculatum, Artemisia vulgaris, Arctium lappa, Cichorium intybus, Daucus carota, Setaria glauca, Sambucus ebulus, Bidens tripartitus, Senecio vulgaris, Dactilys glomerata* etc. Urban environment is very suitable for plant invasions. In these areas the habitats are fragmented, climate conditions are specific, soil are nitrophilous. All these characteristics make urban areas congenial to the invasive plants colonization and spread. Some of them are: *Ailanthus altissima, Acer negundo, Amorpha fruticosa, Phytolacca americana, Robinia pseudoacacia, Erigeron annus, Echinocystis lobata, Syphiotrichum lanceolatum, Sorghum halepense.*

5.1.12.4 Flora along railway corridor

Overview of flora along the railway corridor is presented based on existing literature data. Native plant species that can be identified within all habitat types are: *Quercus frainetto, Q. cerris, Q. robur, Fraxinus angustifolia, Populus alba, Salix alba, Carpinus betulus, Viburnum opuslus, Cornus sanguine,* Euonymus europaeus, *Frangula alnus, Sorbus torminalis, Phragmites communis, Typha latifolia, T. angustifolia, T. laxmanii, Thymus serpyllum, Hypericum perforatum, Sparganium erectum, Achillea millefolium, Mentha longifolia, Iis pseudoacorus, Symphytum officinale, Althaea officinalis* etc.

The list of endemics, rare and protected plants will be established after completed field investigation. Given that ruderal communities are common along the railway corridor, a large number of species characteristic of this type of community have been noted, such as: *Sambucus ebulus, Lolium perrene, Prunus spinosa, Daucus carota, Dactylis glomerata, Dipsacus laciniatus, Urtica dioica, Artemisia vulgaris, Raphanus raphanistrum, Arctium lappa, Rubus sp., Bromus racemosus, Chenopodium album, Consolida regalis, Cichorium intybus, Cirsium arvense, Chelidonium majus* and others.

Considering strong anthropopressure in wide area of proposed railway corridor, it is expected presence of different invasive plants, such as: *Reynouria japonica*, *Ailanthus altissima, Acer negundo, Amorpha fruticosa, Ambrosia artemisifolia, Phytolacca americana, Robinia pseudoacacia, Erigeron annus, Echinocystis lobata, Datura stramonium, Paspalum distichum Iva xanthifolia, Syphiotrichum lanceolatum, Sorghum halepense* etc.

5.1.12.5 Fauna along railway corridor

Fauna of the region around the area of the railway is not well known.

There are data from sporadic fish surveys, which were conducted to determine fishing areas (according to the Law on Protection and Sustainable Use of Fish Stock -"Official Gazette of RS" no. 36/2009). There are data from the locality Velika Morava, which confirm presence of representatives of four families (Esocidae, Cyprinidae, Siluridae, Gobiidae). During the further investigation, species will be determined together with category of protection.

Some data related herpetofauna, for example, refer to the 1950s (Radovanović, 1951). At least seven species of herpetofauna evidenced in this area belong to the strictly protected or protected species in Serbia (*Bombina variegata, Bufo viridis, Rana dalmatina, Rana ridibunda, Hila arborea, Natrix natrix, Natrix tessellata*).

Regarding birds fauna, some date available dated from the beginning of twenty century (Matvejev, 1950). Especially are important habitats for nesting birds, such as *Ardeola ralloides*, *Nycticorax nycticorax, Ixobrichus minutus, Ardea purpurea, Ciconia ciconia, Anas querquedula, Porzana porzana,* etc. It is also important to mention the representatives of singer birds from the genera *Acrocephalus* and *Locustella* as characteristic species of wetlands. In addition, it is evidenced mix of different types of fauna, as a consequence of significant changes in habitats due to anthropogenic factors. Characteristic species that nest in such mosaic habitats are, for example: *Buteo buteo, Saxicola rubetra, Streptopelia turtur, Sylvia atricapilla, Columba palumbus, Locustella fluviatilis, Cuculus canorus, Hippolais icterina, Picus viridis, Parus palustris, Dendrocopos major*. Almost 100 bird species registered in the project area are protected by national law as strictly protected or protected species. In addition, following Convention on the Protection of European Wildlife and Natural Habitats (Law on Ratification of the Convention on the Protection of European Wildlife and Natural Habitats, "Official Gazette – International agreements no. 102/07), more than 70 species are found in Annex II to this Convention which implies their strict protection, while the other 36 species are listed in Annex III, which implies the possibility of controlled use of these species.

Mammals: Insectivores (*Eulipotyphla)* are represented by 6 species out of 9 presented in Serbia so far. There are still no documented findings for three species (Pygmy shrew - *Sorex minutus*, Water shrew - *Neomys fodiens* and Alpine shrew – *Sorex alpinus*). There are species that inhabit forests and forest-like habitats (Common shrew - *Sorex*

araneus and European mole - *Talpa europaea*), and habitats of ecotonic character (Hedgehog - *Erinaceus roumanicus*, Lesser shrew - *Crocidura suaveolens* and Bicolored shrew – *Crocidura leucodon*), as well as aquatic or highly humid habitats (Mediterranean water shrew - *Neomys anomalus*). Bats (*Chiroptera*) are very heterogeneous and numerous mammals. The newest data (Paunović, 2016) indicate presence of 21 species in the affected area. Second most numerous group are Rodents - *Rodentia* (17 species). They are mainly species of wide ecological spectrum that inhabit different types of habitats, from forest, steppe, to significantly anthropogenically modified habitats. There are 14 recorded species of Carnivores (*Carnivora*). Given the general ecological and trophic status of Carnivora, of the second and higher ranks, large populations of most of these species are not expected along the proposed route. On the other hand, in recent years there has been a significant increase of some species, more adaptable to changes in the environment. Such species are the Red fox (*Vulpes vulpes*), the European badger (*Meles meles*), and especially the Golden jackal (*Canis aureus*).

Fauna of the Even-toed ungulates (*Artiodactyla*) is typically represented by species that are characteristic for almost the entire territory of Serbia (Roe deer - *Capreolus capreolus* and Wild boar - *Sus scrofa*). These are species with relatively wide ecological niches in terms of the selection of habitats and food preferences, so present in the wider area of the projected route.

During the assessment process, with additional field researches and new obtained data, the number (list) of species would be eventually modified.

5.1.12.6 The ecological network along railway corridor

Along the corridor, 37 protected areas are identified within the wider zone (5 km at each side of the corridor), as it is indicated in the following table. Three protected areas are identified within the area of influence in the area of the railway corridor, 500 m each side of the line. This is a zone in which it is possible to expect impacts from the railway construction and operation on biodiversity.

Table 45 Protected areas in the wider area of the corridor

Name of protected area	National category	IUCN category	Distance from the railway corridor (km)	The reason of protection
1. Rogot	Natural monument	III	0.1	Conservation of the last remnants of the *Quercus robur* forest
2. Miljakovačka Forest	Natural monument	III	>0.32	Conservation f *Quercus cerris* and *Q. petraea* forests
3. Brzansko Moravište	The Special nature reserve	IV	0.35	Conservation of swamp which presents very rare habitat type in Serbia
4. Park Učiteljske škole Jagodina	Natural monument	III	0.6	Historical values
5. Bajfordova Forest	Natural monument	III	>0.8	Protection and conservation of natural and aesthetic-environmental values of the forest complex which has significant ecological and spatial functions in connecting the green corridors of Belgrade.
6. Forest Košutnjak	Natural monument	III	Less than0.9 km	Conservation of *Quercus* forests as habitats for different species
7. Topčiderski Park	Natural monument	III	0.97	Historical and great biological value. Botanical value is reflected in the plant diversity and age of trees. Many trees date back to the XIX Century.
8. Bukav na Dedinju	Natural monument	III	1	Tree is distinguished by impressive dimensions, strong and imposing habitus and great aesthetic value
9. Dud Zapis U Medoševcu	Natural monument	Not reported	1	It is protected due to its dimensions and age (160years old).
10. Dva Stabla Himalajskog Borovca	Natural monument	Not reported	1	Trees were planted in 1912 on a private property.

Name of protected area	National category	IUCN category	Distance from the railway corridor (km)	The reason of protection
11. Stablo Kedra	Natural monument	Not reported	1	Tree has impressive habitus.
12. Stablo ginka	Natural monument	Not reported	1	Tree has impressive habitus.
13. Gradski Park Đurđevo Brdo	Natural monument	III	1.1	Cultural values
14. Avala	Outstanding Natural Landscapes	V	1.70 and 1.75	Conservation of forest ecosystem as important habitats of different autochthonous species
15. Arboretum of the Faculty of Forestry	Natural monument	III	2.2	Diverse collection of dendroflora in the open, preservation and improvement of the gene pool of autochthonous, allochthonous and exotic dendroflora, as well as rare, endemic and relict species, intended for scientific research and education
16. Botanical Garden "Jevremovac"	Natural monument	III	2.8	Historical, scientific, educational and cultural values.
17. Pionirski Park	Natural monument	III	2	Cultural values
18. Čempres Na Dedinju	Natural monument	III	2	Protected as a rare specimen of an exotic conifer species
19. Dve Magnolije U Botičevoj	Natural monument	III	2	Trees have an impressive habitus
20. Dve Tise Saborne Crkve	Natural monument	III	2	Male and female trees are about 110 years old. The male tree is about 12 m high and the female about 8 m. Both trees enrich the space in front of the Cathedral, which is an immovable cultural asset of great importance for the Republic of Serbia.
21. Ginko na Vračaru	Natural monument	III	2	Tree has an impressive habitus

Name of protected area	National category	IUCN category	Distance from the railway corridor (km)	The reason of protection
22. Hrast Na CvetnomTrgu	Natural monument	III	2	One of the oldest protected tree, 200 years old.
23. Hrast sladun na Koporinskoj Kosi	Natural monument	III	2	Tree has an impressive habitus, it is 180 years old
24. Novoselski Brest zapis	Natural monument	Not reported	2	Protected because of its age (400 years old) and dimensions (18 m high; canopy dimensions 35 x 24 m)
25. Platan Na Vračaru	Natural monument	III	2	One of the most beautiful and largest in the central Belgrade municipality and is one of the horticultural heritage of the capital. It is about 150 years old.
26. Tisa U Botićevoj	Natural monument	III	2	Protected as rare and relict species
27. Tisa U Požeškoj ulici	Natural monument	III	2	Protected as rare and relict species
28. Akademski Park	Natural monument	III	2.9	Historical and cultural values. Park is one of the oldest parks in Belgrade.
29. Kesten na Dorćolu	Natural monument	III	3	Protected because significant dendrometric values
30. Kosmaj	Outstanding Natural Landscapes	V	3	Conservation of rare species, relicts and endemics
31. Veliko Ratno Ostrvo	Outstanding Natural Landscapes	IV	3	River Island-important natural habitat for autochthonous species
32. Zvezdarska Forest	Natural monument	III	3.4	Protection and conservation of natural and aesthetic-environmental values of the forest complex which has significant ecological and spatial functions in connecting the green corridors of Belgrade.

Table 46 Protected areas in the wider area of the corridor

Name of protected area	National category	IUCN category	Distance from the railway corridor (km)	The reason of protection
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5. Bajfordova Forest	Natural monument	III	>0.8	Protection and conservation of natural and aesthetic-environmental values of the forest complex which has significant ecological and spatial functions in connecting the green corridors of Belgrade.
6. Forest Košutnjak	Natural monument	III	Less than0.9 km	Conservation of *Quercus* forests as habitats for different species
7. Topčiderski Park	Natural monument	III	0.97	Historical and great biological value. Botanical value is reflected in the plant diversity and age of trees. Many trees date back to the XIX Century.
8. Bukav na Dedinju	Natural monument	III	1	Tree is distinguished by impressive dimensions, strong and imposing habitus and great aesthetic value
9. Dud Zapis U Medoševcu	Natural monument	Not reported	1	It is protected due to its dimensions and age (160years old).
10. Dva Stabla Himalajskog Borovca	Natural monument	Not reported	1	Trees were planted in 1912 on a private property.
11. Stablo Kedra	Natural monument	Not reported	1	Tree has impressive habitus.
12. Stablo ginka	Natural monument	Not reported	1	Tree has impressive habitus.
13. Gradski Park Đurđevo Brdo	Natural monument	III	1.1	Cultural values
14. Avala	Outstanding Natural Landscapes	V	1.70 and 1.75	Conservation of forest ecosystem as important habitats of different autochthonous species
15. Arboretum of the Faculty of Forestry	Natural monument	III	2.2	Diverse collection of dendroflora in the open, preservation and improvement of the gene pool of autochthonous, allochthonous and exotic dendroflora, as well as rare, endemic and relict species, intended for scientific research and education
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19. Dve Magnolije U Botičevoj	Natural monument	III	2	Trees have an impressive habitus
20. Dve Tise Saborne Crkve	Natural monument	III	2	Male and female trees are about 110 years old. The male tree is about 12 m high and the female about 8 m. Both trees enrich the space in front of the Cathedral, which is an immovable cultural asset of great importance for the Republic of Serbia.
21. Ginko na Vračaru	Natural monument	III	2	Tree has an impressive habitus

Name of protected area	National category	IUCN category	Distance from the railway corridor (km)	The reason of protection
22. Hrast Na CvetnomTrgu	Natural monument	III	2	One of the oldest protected tree, 200 years old.
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25. Platan Na Vračaru	Natural monument	III	2	One of the most beautiful and largest in the central Belgrade municipality and is one of the horticultural heritage of the capital. It is about 150 years old.
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28. Akademski Park	Natural monument	III	2.9	Historical and cultural values. Park is one of the oldest parks in Belgrade.
29. Kesten na Dorćolu	Natural monument	III	3	Protected because significant dendrometric values
30. Kosmaj	Outstanding Natural Landscapes	V	3	Conservation of rare species, relicts and endemics
31. Veliko Ratno Ostrvo	Outstanding Natural Landscapes	IV	3	River Island-important natural habitat for autochthonous species
32. Zvezdarska Forest	Natural monument	III	3.4	Protection and conservation of natural and aesthetic-environmental values of the forest complex which has significant ecological and spatial functions in connecting the green corridors of Belgrade.
33. Lipovička forest –Dugi Rt	Natural monument	III	4.8	Conservation of *Quercus* forests and numerous protected plant and animal species
34. Lalinačka Slatina	Natural monument	IV	4.8	Conservation of specific habitat –saltmarsh
35. Hrast Koče Kapetana - (Zapis)	Natural monument	III	5	One of the oldest protected tree (250 years old). Cultural values
36. Hrast u ulici Mije Kovačevića	Natural monument	III	5	Protected because significant dendrometric values
37. Rajkovićev hrast	Natural monument	Not reported	5	Protected as a rare speciment of once widespread oak forests

On the territory of Belgrade, all proposed variants by the project overlap with the existing corridor, while in the wider zone of corridor (up to 5km) several protected areas are situated, as it is presented in the following figures. The following two figures present the protected areas in the wider Belgrade area and outside of Belgrade along the corridor and the natural monuments respectively.

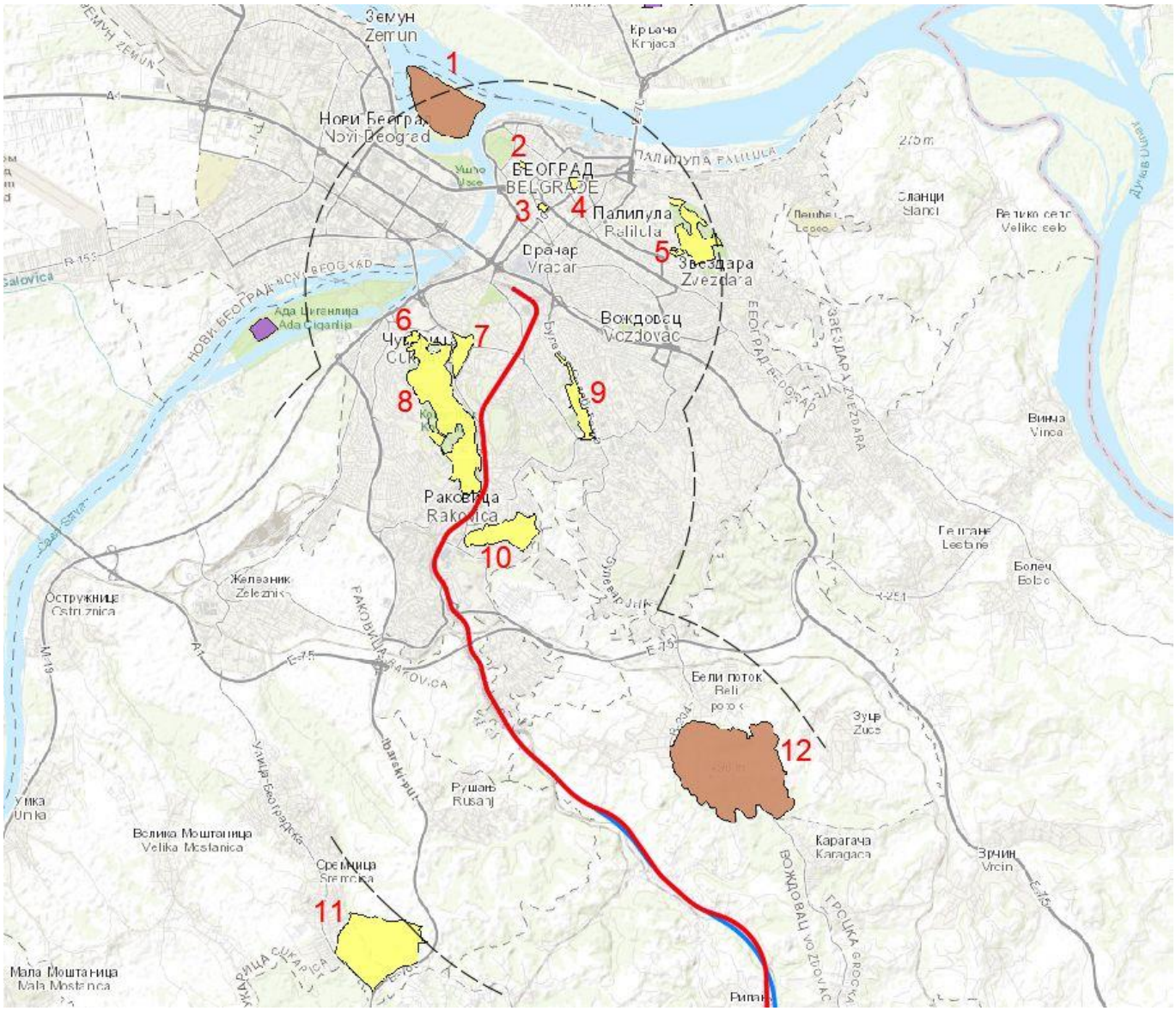

Figure 34 Protected areas along the three variants of the corridor in Belgrade area (with Blue Variant I, with Red Variant II and with purple Variant III):

Outstanding Natural Landscapes "Veliko ratno ostrvo" (3 km), 2-Natural Monument "Akademski Park" (2.9 km); 3- Natural Monument "Botanical Garden "Jevremovac"; 4 – Natural Monuments "Pionirski Park" (2 km); 5- Natural Monument "Zvezdarska forest" (3.4 km) 6 – Natural Monuments "Arboretum of the Faculty of Forestry" (2.2 km); 7 – Natural Monuments "Topčiderski Park" (0.97 km); 8 – Natural Monuments "Forest Košutnjak" (>0.9 km); 9- Natural Monuments "Bajfordova šuma" (>0.8 km); 10- Natural Monuments "Miljakovačka Forest" (>0.32 km); 11 – Outstanding Natural Landscapes "Avala" (1,7 – 1,75 km); 12 – Natural Monuments "Lipovačka Forest – Dugi rt" (4.8 km).

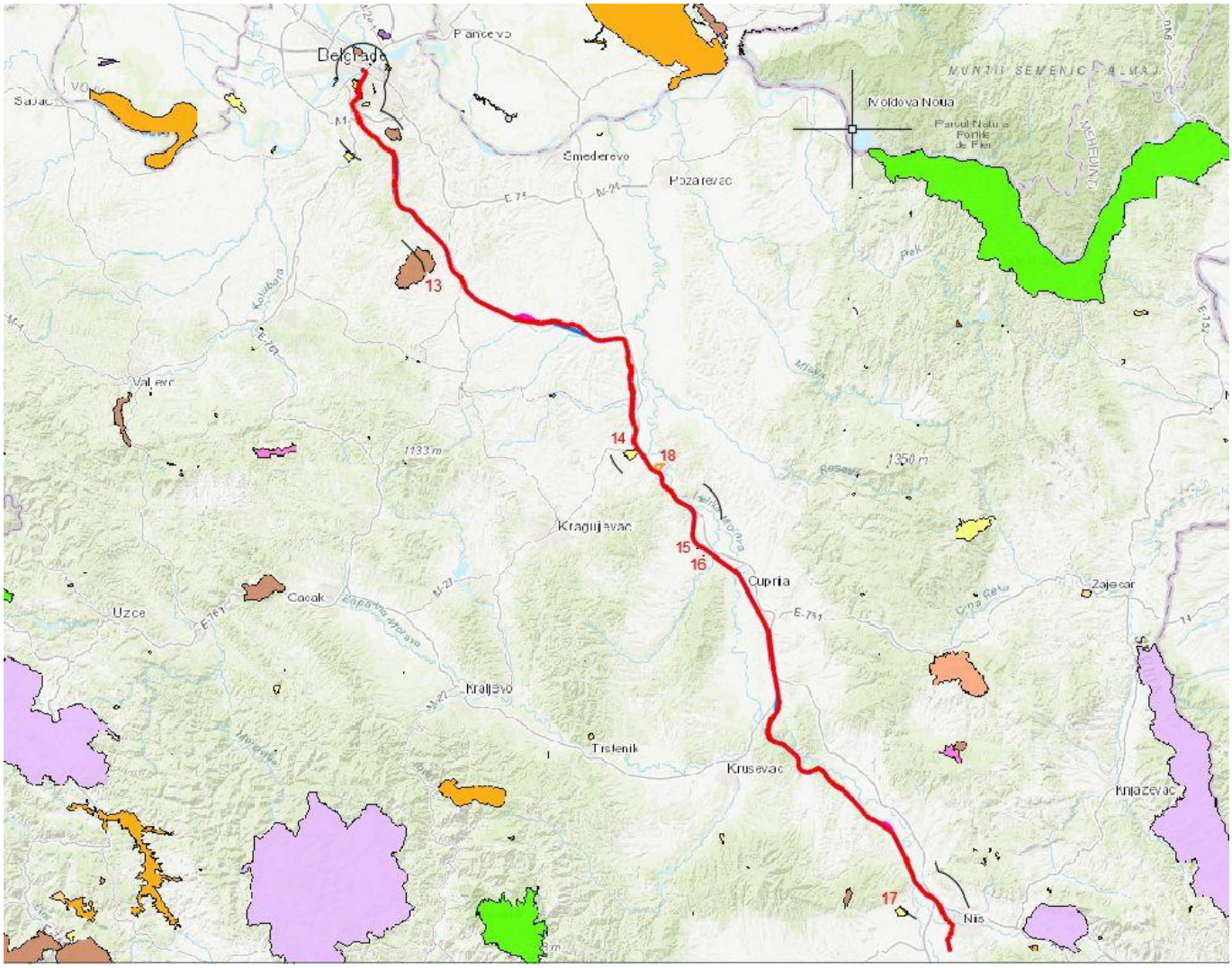

Figure 35 Protected areas along the three variants of the corridor outside the Belgrade area

13 - Outstanding Natural Landscapes "Kosmaj"(3 km); 14- Natural monument "Rogot" (0.1 km); 15 – Natural Monument "Park Učiteljske škole – Jagodina" (0.6 km); 16 – Natural Monument "Gradski Park Đurđevo Brdo" (1.1 km); 17 - Natural monument and IPA "Lalinačke slatine" (4.8 km); 18 - The Special nature reserve "Brzansko Moravište" (0.35 km)

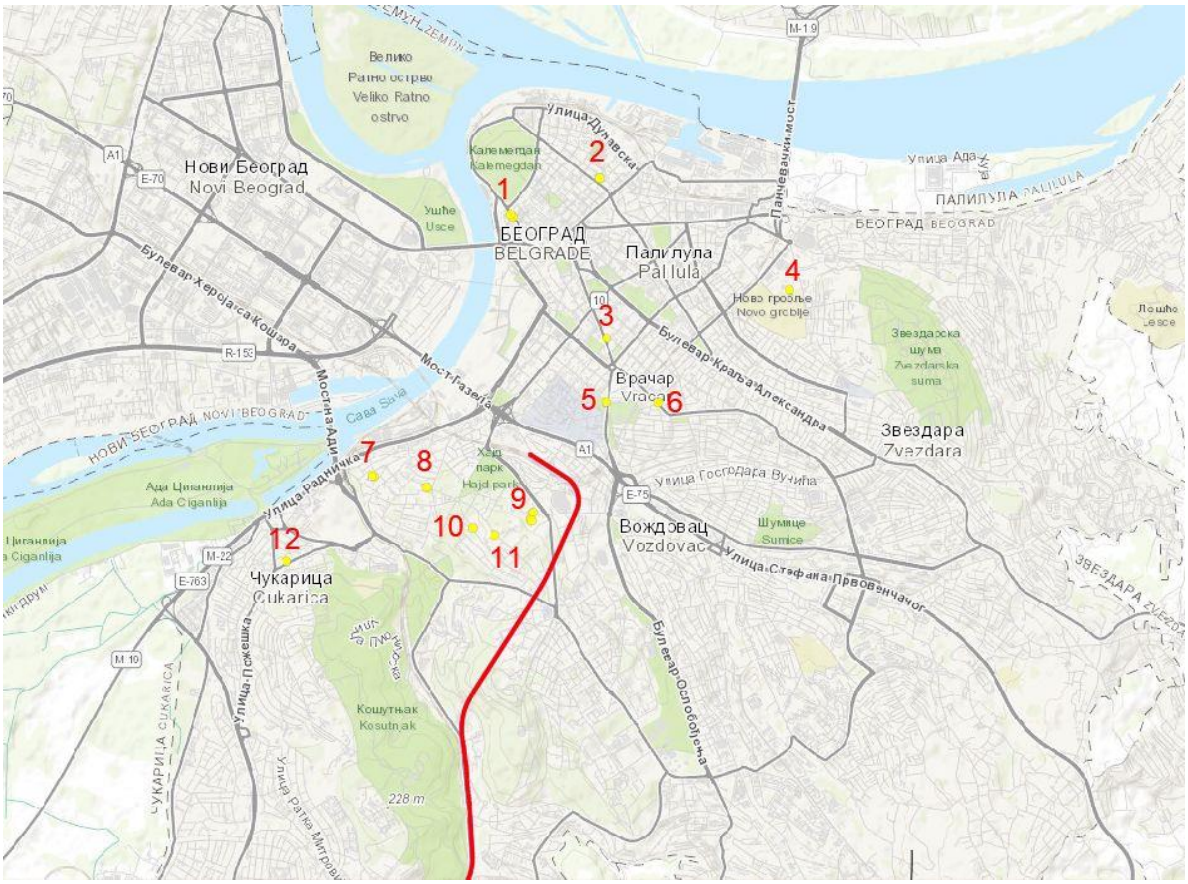

Figure 36 Protected trees (Natural Monuments) along the three variants of the corridor in Belgrade area:

1- “Dve Tise Saborne Crkve” (2 km); 2- “Kesten na Dorćolu”(3 km); 3-“Hrast na Cvetnom trgu”(2 km); 4-“ Hrast u ulici Mije Kovačevića” (5 km); 5- “Ginko na Vračaru” ”(2 km); 6- “Platan na Vračaru” (2 km); 7- “Dva stabla himalajskog borovca” (1 km); 8- “Stablo ginka” (1 km); 9- “Čempres na Dedinju”(2 km), “Tisa u Botićevoj” (2 km), “Dve magnolije u Botićevoj” (2 km); 10-“ Stablo kedra” (1 km); 11- “Bukva na Dedinju” (1 km); 12- Tisa u Požeškoj ulici (2 km);

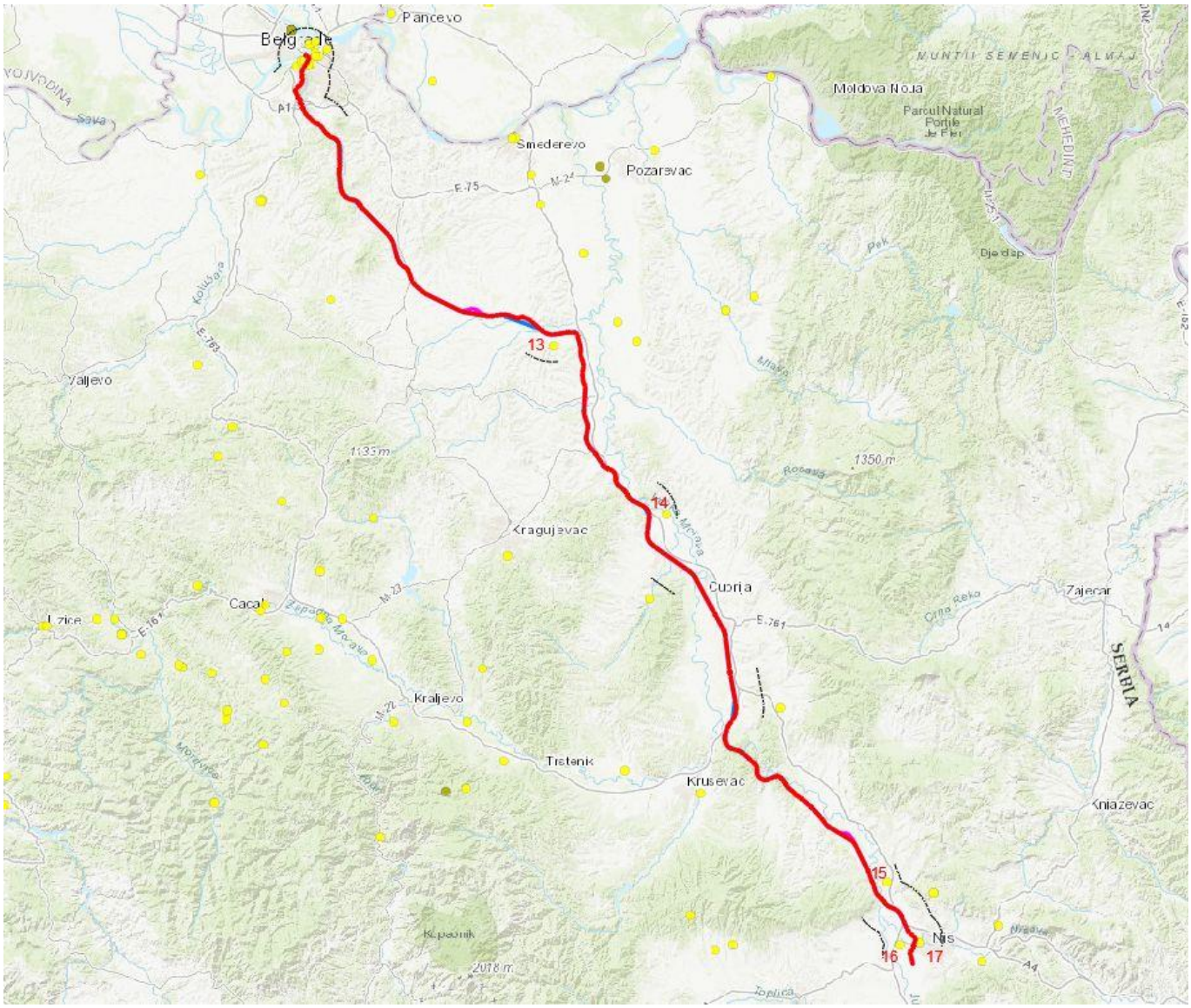

Figure 37 Protected trees (Natural Momuments) along the three variants of the corridor outside the Belgrade area:

13- "Hrast sladun na Koporinskoj kosi" (2 km); 14 –"Hrast Koče kapetana" (2 km); 15- "Rajkovićev hrast" (5 km); 16-" Novoselski brest zapis"; 17-" Dud zapis u Medosevcu" (1 km)

The Natural monument "Rogot" is situated in close vicinity of the railway corridor. This protected area is located in the central part of Serbia, 3 km from the Batočina village. The last remnants of the *Quercus robur* forest have been preserved in this area. In the past, these forests were widespread in Serbia, and today they have fragmentary distribution. During the next stage, field investigations will end up, among others, in the preparation of habitat maps, where the distribution of *Quercus robur* forests will be indicated.

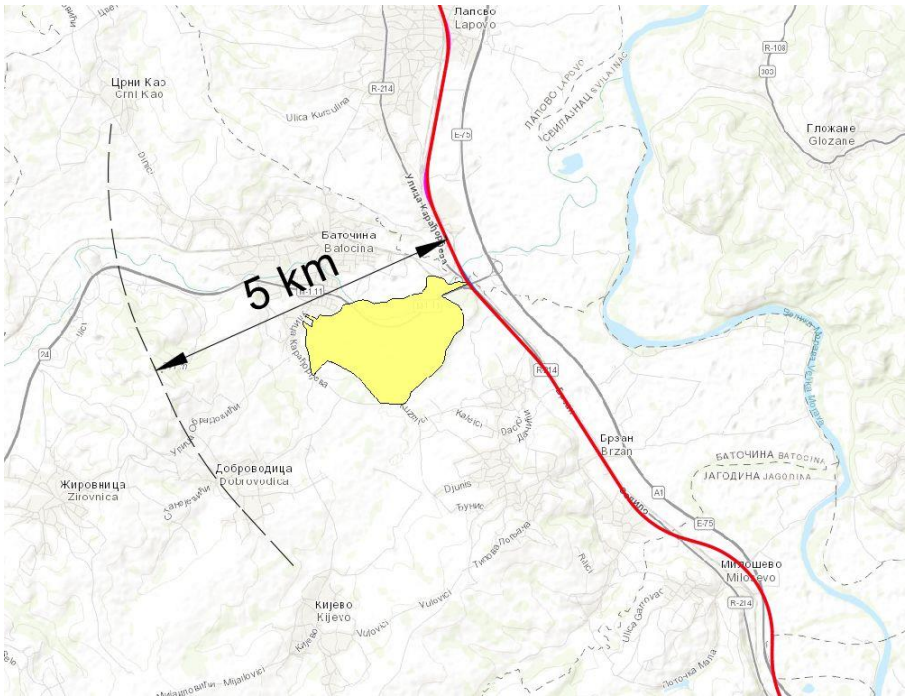

Figure 38 Rogot in relation with the proposed variants (approximately 0.1km)

The Special nature reserve "Brzansko moravište" is situated in the vicinity of the railway corridor. This reserve is located in Pomoravlje region, along the Velika Morava river flow between the villages of Brzan and Miloševo near Batočina village.

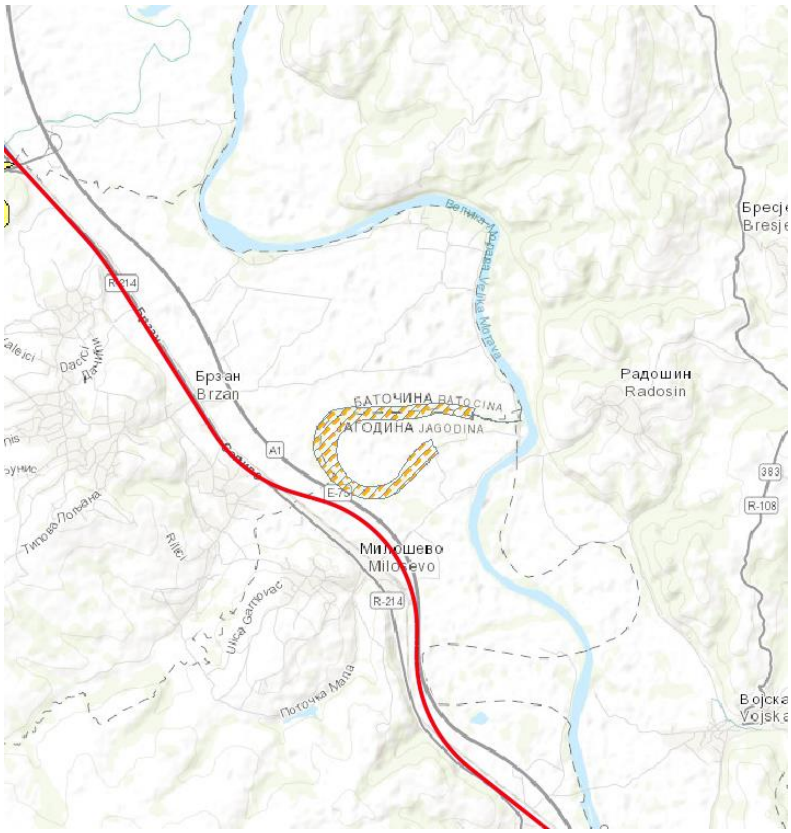

Figure 39 Brzansko Moraviste in relation with the proposed variants (in a distance of 0,35km)

Two Important Bird Areas (IBA) are identified within the area of influence of the railway corridor and are crossed: Gornje Pomoravlje and Dobrić-Nisava. Gornje Pmoravlje IBA is located in Central Serbia in the valley of Velika

Morava river in the vicinity of Paraćin. The habitats of this area are presented by remnants of *Salix* sp., *Populus* sp., *Alnus* sp., *Fraxinus* sp. and *Quercus* sp. forests. The following table indicates the two IBA crossed as well as the two IBAs in the wider area of the corridor. A description of the four IBAs is given further below.

Table 47 Important bird areas identified along the corridor

Name	Area	IBA criteria	Distance	Decree on ecological network
Ušće Save u Dunav	9,926 ha	A1, A4, B1b, B2a, B3a, B3b, C2, C3, C4, C6 (2019)	3 km	Yes RS040
Donje Pomoravlje	8,244 ha	B1b, C6 (2019)	1,7 km	YES RS049
GornjePomoravlje	4,265 ha	B1b, C6 (2019)	cross	YES RS044
Dobrić-Nišava	35,389 ha	B1b, B2a (2019)	cross	RS048

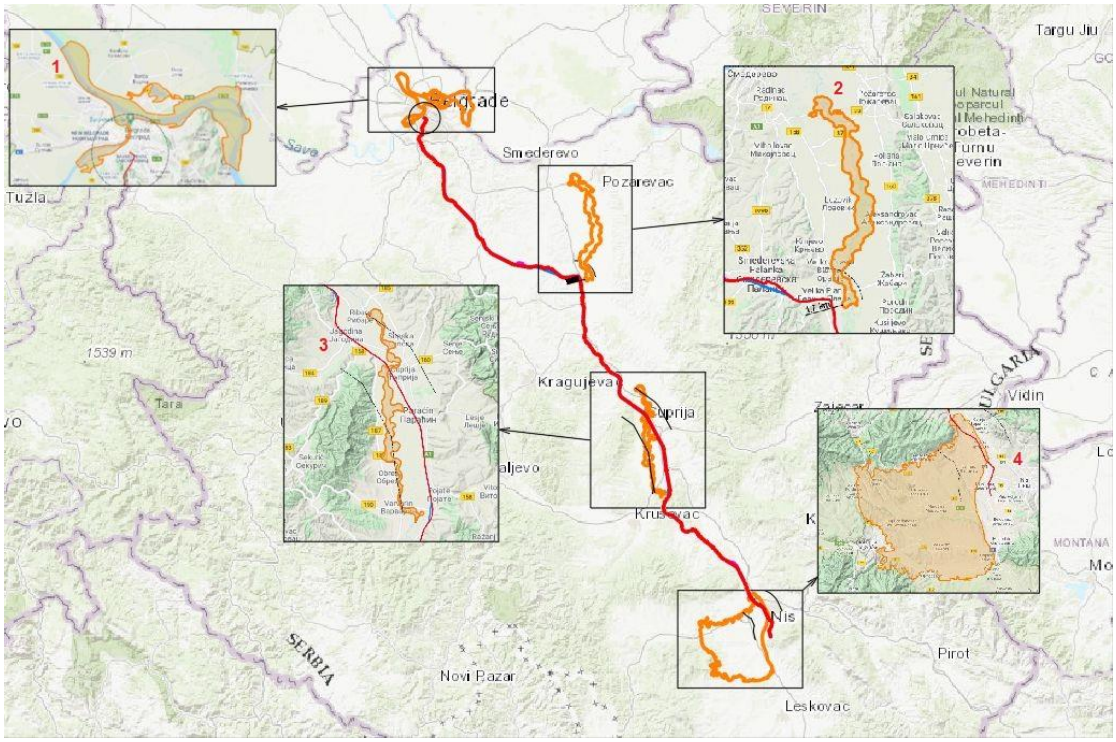

Figure 40 IBAs along the corridor

1-Ušće Save u Dunav; 2- Donje Pomoravlje; 3-Gornje Pomoravlje; 4-Dobrić Nišava

Regarding Usce Save u Dunav IBA, it comprises of 10 km of the Sava river and 39 km of the Danube within the cities of Belgrade and Pančevo. It connects several vast flood areas (Beljarica, Kožara, Veliko i Malo Ratnoostrvo) as well as river islands (Forkontumac, Čakljanac, Štefanac etc.). An important part of the area is also the fishpond "Mika Alas". The bordering forest is mainly comprised of industrial poplar species, with some patches of natural riparian forests (Bird Life International (2022) Downloaded from http://www.birdlife.org on 03/02/2022).

Table 48 Populations of IBA trigger species – Usce Save u Dunav

Species	Current IUCN Red List Category	Season	Year(s) of estimate	Population estimate	IBA Criteria Triggered
Common Pochard *Aythya ferina*	VU	winter	2013-2019	300-1,000 individuals	A1, B1b
Red-throated Loon *Gavia stellata*	LC	winter	2019	2-5 individuals	C6

Arctic Loon *Gavia arctica*	LC	winter	2019	2-5 individuals	C6
Pygmy Cormorant *Microcarbo pygmaeus*	LC	winter	2012	1,300-6,500 individuals	A4, B2a, B3a, C2, C6
Black-headed Gull *Larus ridibundus*	LC	winter	2013-2019	50,000-100,000 individuals	A4, B2a, B3a, C3
White-tailed Sea-eagle Haliaeetus albicilla	LC	resident	2019	10-14 breeding pairs	B2a, C6
A4iii Species group - waterbirds	n/a	winter	2019	52,000-110,000 individuals	B3b, C4

The Donje Pomoravlje IBA is an alluvial area in Central Serbia along Velika Morava river. It is more than 35 km long: from Staro Selo in the south to Dragovac in the north. The area is typical flat and periodically flooded riverine ecosystem composed from Velika Morava river flow, gravel pits, riparian forests and small fields of agricultural land. River flow have large number of meanders and gravel islands (Birdlife International (2022) Downloaded from http://www.birdlife.org on 03/02/2022).

Table 49 Population of IBA trigger species – Donje Pomoravlje

Species	Current IUCN Red List Category	Season	Year(s) of estimate	Population estimate	IBA Criteria Triggered
Common Tern *Sterna hirundo*	LC	breeding	2008-2013	max 20 breeding pairs	C6
Common Kingfisher *Alcedo atthis*	LC	resident	2013-2019	50-80 breeding pairs	B1b, C6

The IBA Gornje Pomoravlje is also an alluvial area in Central Serbia along Velika Morava river. It is more than 40 km far from Ćićevac and Stalać in the south to Krušar and Ribare in the north. The area is composed from several smaller units: Vidovačkiključ, Čepursko, Moravište, mouth of Crnica river and Supskirukavac. On the Velika Morava river there is huge amount of meanders, gravel islands, riparian woods and lot of active and old gravel pits. At the borders of IBA, more than 20 settlements are situated that belongs to five municipalities (Paraćin, Varvarin, Ćićevac, Ćuprija and Jagodina) (Birdlife International (2022) Downloaded from http://www.birdlife.org on 03/02/2022).

Table 50 Population of IBA trigger species – Gornje Pomoravlje

Species	Current IUCN Red List Category	Season	Year(s) of estimate	Population estimate	IBA Criteria Triggered
Common Tern *Sterna hirundo*	LC	breeding	2016-2019	max 20 breeding pairs	C6
Common Kingfisher *Alcedo atthis*	LC	resident	2010-2019	20-40 breeding pairs	B1b, C6
Collared Sand Martin *Riparia riparia*	LC	breeding	2017-2019	1,500-2,500 breeding pairs	B1b

Finally, Dobric-Nisava IBA is situated in Central Serbia between Mali Jastrebac Mountain on the north, Vidojevica Mountain. on the south and Niš city on the east. This mostly agricultural flat area is interspaced with hilly tops, villages, rivers, creeks, gravel pits and one lake (Oblačinskojezero). There are more than 40 villages inside the IBA borders that belong to six municipalities (Niš, Aleksinac, Merošina, Prokuplje, Žitorađa and Doljevac) (Birdlife International (2022) Downloaded from http://www.birdlife.org on 03/02/2022).

Table 51 Populations of IBA trigger species - Dobric-Nisava

Species	Current IUCN Red List Category	Season	Year(s) of estimate	Population estimate	IBA Criteria Triggered
Grey Partridge *Perdix perdix*	LC	resident	2016-2019	1,000-1,500 breeding pairs	B1b
Black-headed Bunting *Emberiza melanocephala*	LC	breeding	2016-2019	700-1,000 breeding pairs	B2a

Within the affected zone of the railway corridor, two ecological corridors are identified: Velika Morava River and Juzna Morava River. These corridors have international importance and present ecological pathways and connections that enable the movement of individuals of populations and the genes flow between protected areas and ecologically important areas, according to the Decree on ecological network According to Law on nature protection, Article 130, The ecological network will be established and become part of the European ecological network Natura 2000 by the day of the accession of the Republic of Serbia to the European Union.

The railway corridor crosses Mojsinje Mountain and Stalać Gorge. This area used to be in the process of official protection, and the proposed protected area category was Landscape of outstanding natural features. However, Mojsine Mountains have been withdrawn from the protection process (although the Institute for nature conservation of Serbia website states that they are in the protection process), but WWF has initiated a revitalization procedure, which makes this area an area of interest for protection. Mojsinjske Mountains and Stalać Gorge is situated between Zapadna Morava River and Juzna Morava River. A mosaic of preserved natural habitats of *Quercus* sp. and *Fagus* sp. forests is one of the main values of this area. This area has been included in the evaluation of the separate ESIA for Stalac Djunis section, while the Project team proposed in the study that the Contractor should prepare a Biodiversity Management Plan.

One IPA is identified along the corridor: Lalinačke slatine. However, this area is outside of the area of influence, because it is 4.8 km away from the corridor. Ramsar sites and Emerald Areas are not identified within the area of influence.

Legal acts regulating the field of nature protection prescribe prohibited or allowed activities that can be carried out in protected areas. The Acts on the Protection of Natural Monuments allow the "construction of new underground and aboveground installations or other infrastructure facilities, as well as works on the reconstruction of existing infrastructure according to the project made in accordance with previously obtained nature protection conditions", "construction of new or reconstruction of existing facilities and widening of roads" and "intervention on existing facilities and infrastructure elements".

Also, having in mind that the planned route of the railway does not pass directly through the protected areas the act on protection stipulates that works outside the protected areas which are reasonably assumed to have unfavorable and harmful consequences for the protected areas, are subject to the procedure of obtaining the conditions of nature protection".

According to the Law on Nature Protection of the Republic of Serbia ("Official Gazette RS", no. 36/2009, 88/2010, 91/2010 - corr., 14/2016, 95/2018 – other act and 71/2021). Article 10, Paragraph 7, appropriate assessment is carried out within the procedures for SEA and EIA. Law on nature protection defines appropriate assessment in Article 10. The essence is that the Appropriate Assessment Procedure is carried out by the Ministry, ie the body responsible for environmental protection of the Autonomous Province, for a strategy, plan, program, project, works or activities that alone or with another strategy, plan, program, project, works or activities may have significant negative impact on conservation objectives and negative impact on the integrity of the ecologically significant area, with previously obtained conditions of the Institute for nature conservation. The appropriate assessment procedure is carried out in accordance with the precautionary principle, based on the best available scientific evidence and methods in the preparation of the plan or project, before being submitted for approval, issuance of location conditions, location permit or other approval for implementation or execution.

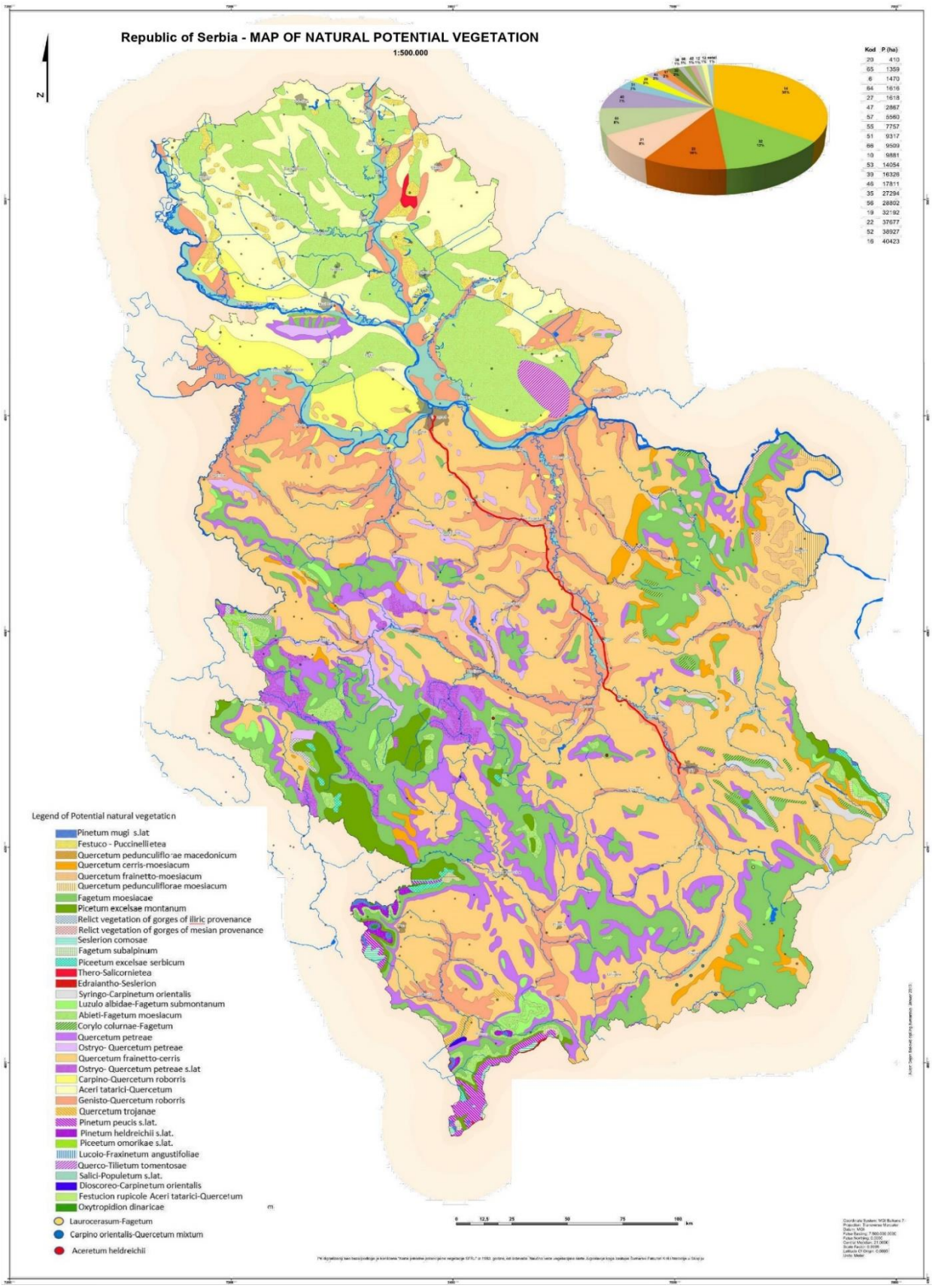

Figure 41 Potential natural vegetation of Serbia.

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 subvert the achievement of the development objective, or that the development objective, or means to achieve it, lack ownership among key stakeholders.

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.
- Data from stakeholders.

Field surveys and site investigations were not conducted at this stage.

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

- Personal and property rights,
- Social and human rights issues
- Economic Impacts
- Health impacts
- Community impacts
- Impacts on the infrastructure
- Community Health and Safety
- Labor and working conditions

Due to the very early stage of 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 centreline of the outer rail, and 14 m of air rights above as land required for the standard gauge. (on each side). This corridor is potentially expected to experience the 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 cutural heritage features observed encompasses a corridor of 6 km left and right to as a buffer to acount for refinement in the deign and impacts beyon the RoW

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

5.2.2 Limitation and assumptions

Gaps in contemporary data have been identified. However given the Secondary area of Infleunce and the fact that consistancy within a certain municipality is known (areas of great disparity within a Municapality are not impacted by the Project), 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 comensurate to this stage of the Project. 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 comensurate 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 have 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, as of December 29, 2007) key and basic units of local-governments are 147 municipalities, while there are 29 administrative districts and two autonomous provinces[15]. Serbia constitutes of administrative districts which are not units of local self-governments but are established for purpose of state administration outside the headquarters of the state administration. Administrative districts are established by the RS Government decree, which also included the areas and seats of administrative districts. Currently, there are five cities in Serbia with city municipalities: Belgrade, Niš, Kragujevac, Požarevac and Vranje comprise several city municipalities each, divided into "urban" and "suburban". The Project is routed through 4 Districts: Beogradski, Sumadijski, Pomoravski and Nisavski. The figure below covers the Primary , Secondary Area of Influence and the Area of Indirect impacts, while Belgrade and Nis are marked.

[15] Source: "Law on the Territorial Organization of RS"

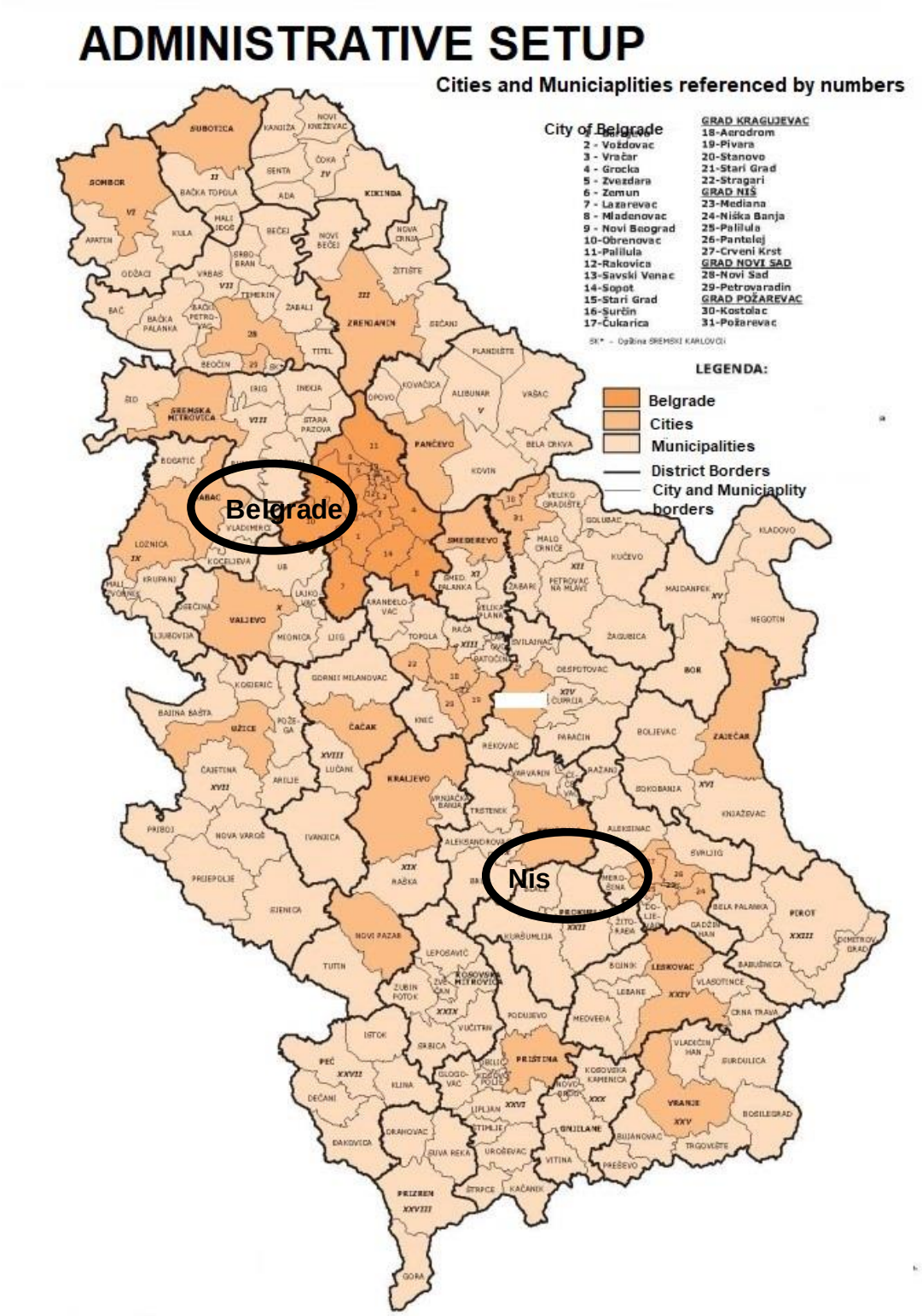

Figure 42 Municipalities crossed

For the purpose of outreach and stakeholder engagement, local municipal offices play a pivotal role to serve as main focal communication point as identified in the SEP. Each of the affected municipalities have registered ommunity offices (mesne zajednice i kancelarije) which are often focal points of contact for the community, but also perform administrative responsibilities (e.g. birth, marriage and death certificates, census etc).

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 estimate methodologies.

The number of populations is estimated in the inter-censual period for every year, including the census year. Thus, in 2019 the population of the Republic of Serbia is estimated to 6 945 235. The rate of population growth to the previous year is negative and amounts to -5.4 per 1000 inhabitants. According to vital statistics in 2019 the rate of natural increase was - 5.3‰, that of live births 9.3‰ and of mortality 14.6‰. The average life expectancy of male and female population in the Republic of Serbia has been extended over the last nine years by more than two years (from 71.6 years to 73.1 years for men and from 76.8 to 78.3 years for women)

Table 52 Municipalities crossed by the Project and their demographics

Municipalities	Area (km2)	Estimation of population in August 2021	Population density Number of inhabitants /km2	Estimation of population in August 2021 (without migration)	Estimation of population in August 2021 (with migration)
Serbia	88499	6899126 (2020)	89 (2020)	6136010	6824556
Belgrade area	3234	1694480	524	1473014	1982591
Velika Plana	345	37222	108	33163	31035
Lapovo	55	7009	127	5787	6369
Batočina	136	10707	79	9579	10346
Svilajnac	326	20706	64	18399	19462
Jagodina	470	68378	145	62273	72088
Ćuprija	287	27393	95	23775	24914
Paraćin	542	49596	92	44304	44471
Ćićevac	124	8406	68	7563	8035
Kruševac	854	119035	139	109895	112543
Aleksinac	707	46541	66	38832	37157
City of Niš	596	254723	427	220901	238369

According to the data in the table above, in almost all municipalities through which the Belgrade-Nis railway corridor passes, the decline in population will continue in the future (last two right hand columns). The decline in natural growth will continue in large cities (Belgrade and Nis). It is estimated that the City of Belgrade will increase the number of inhabitants thanks to the positive migration balance, and among the municipalities the increase in the number of inhabitants due to the effect of the positive migration balance is expected only in the municipality of Jagodina. It is estimated that the number of inhabitants will be reduced even in the projection with a positive migration balance. The City of Nis, the third largest city in the Republic of Serbia, is also expected to have a declining population, with a positive migration balance.

The settlements crossed by the Project route are listed below, include information of whether they currently have rail stations.

Table 53 Settlements crossed by the Project route

	District (Crossed by alignment)	City/Municipality (Crossed by alignment)	Settlement (Crossed by alignment)	Population (Number)	Station (YES/NO)
1.	City of Belgrade	Belgrade- Municipality Savski Venac	Savski Venac	39.122	Yes
2.	City of Belgrade	Belgrade- Municipality Rakovica	Rakovica	108.413	Yes
3.	City of Belgrade	Belgrade- Municipality Vozdovac	Resnik	167.331	Yes
4.	City of Belgrade	Belgrade- Municipality Vozdovac	Ripanj	11.088	Yes
5.	City of Belgrade	Belgrade- Municipality Vozdovac	Pinosava	3.151	No
6.	City of Belgrade	Belgrade- Municipality Vozdovac	Rusanj	4.821	No
7.	City of Belgrade	Belgrade- Municipality Vozdovac	Parcani	619	No
8.	City of Belgrade	Belgrade- Municipality Vozdovac	Ralja	2.933	Yes
9.	City of Belgrade	Belgrade- Municipality	Ropocevo	2.628	No
10.	City of Belgrade	Belgrade- Municipality	Popovic	307	No
11.	City of Belgrade	Belgrade- Municipality	Djurinci	973	No
12.	City of Belgrade	Belgrade- Municipality	Vlaska	293	No
13.	City of Belgrade	Belgrade- Municipality Mladenovac	Rajkovac	1.932	No

	District (Crossed by alignment)	City/Municipality (Crossed by alignment)	Settlement (Crossed by alignment)	Population (Number)	Station (YES/NO)
14.	City of Belgrade	Belgrade- Municipality Mladenovac	Mladenovac (Varos)	23.609	Yes
15.	City of Belgrade	Belgrade- Municipality Sopot	Sopot	20.367	Yes
16.	City of Belgrade	Belgrade- Municipality Sopot	Batasevo	No data	No
17.	City of Belgrade	Belgrade- Municipality Sopot	Kovacevac	4.208	No
18.	City of Belgrade	Belgrade- Municipality Mladenovac	Jagnjilo	1.931	No
19.	Podunavski	Municipality Smederevska Palanka	(Kusadak	4.886	Yes
20.	Podunavski	Municipality Smederevska Palanka	Rabrovac	1.243	No
21.	Podunavski	Municipality Smederevska Palanka	Ratari	1.773	No
22.	Podunavski	Municipality Smederevska Palanka	Glibovac	2.083	No
23.	Podunavski	Municipality Smederevska Palanka	Stara Carsija	Not available	No
24.	Podunavski	Municipality Smederevska Palanka	Donji Grad	Not avalable	No
25.	Podunavski	Municipality Velika Plana	Bresje	650	Yes
26.	Podunavski	Municipality Velika Plana	Stari Odbor	Not avalable	No
27.	Podunavski	Municipality Velika Plana	Prva Mesna Zajednica	Not avalable	No
28.	Podunavski	Municipality Velika Plana	Staro Selo	2733	No
29.	Podunavski	Municipality Velika Plana	Novo Selo	1229	No
30.	Podunavski	Municipality Velika Plana	Markovac	2915	Yes
31.	Sumadijski	Municipality Lapovo	Varosica	7143	Yes
32.	Sumadijski	Municipality Lapovo	Lapovo Selo	694	Yes
33.	Pomoravski	Municiaplity Batocina	Brzan	11760	No
34.	Pomoravski	City of Jagodina	Milosevo	1043	No
35.	Pomoravski	City of Jagodina	Bagrdan	809	Yes
36.	Pomoravski	City of Jagodina	Staro Laniste	460	No
37.	Pomoravski	City of Jagodina	Novo Laniste	618	No
38.	Pomoravski	City of Jagodina	Bukovce	844	No
39.	Pomoravski	City of Jagodina	Streliste	Not available	No
40.	Pomoravski	City of Jagodina	Vasariste	Not available	No
41.	Pomoravski	City of Jagodina	Centar	Not available	Yes
42.	Pomoravski	City of Jagodina	Pivara	Not available	No
43.	Pomoravski	Municipality of Cuprija	Mijatovac	1656	Yes
44.	Pomoravski	Municipality of Cuprija	Cernica	186	No
45.	Pomoravski	Municipality of Cuprija	Zirovnica	742	No
46.	Pomoravski	Municipality of Paracin	Vrapcane	Not available	Yes
47.	Pomoravski	Municipality of Paracin	11. Kongres	Not available	No
48.	Pomoravski	Municipality of Paracin	Striza	1880	No
49.	Pomoravski	Municipality of Paracin	-Ratare	544	No
50.	Pomoravski	Municipality of Paracin	Sikirica	921	No
51.	Pomoravski	Municipality of Paracin	Drenovac	1838	No
52.	Rasinski	Municipality of Cicevac	Pojate/Cicevac	846	Yes
53.	Rasinski	Municipality of Cicevac	Lucina	811	No
54.	Rasinski	Municipality of Cicevac	Stalac	693	Yes
55.	Rasinski	Municipality of Cicevac	Braljina	68	No
56.	Rasinski	Municipality of Cicevac	Mojsinje	17	No
57.	Rasinski	Municipality of Cicevac	Trubarevo	108	No
58.	Rasinski	City of Krusevac	Djunis	680	Yes
59.	Nisavski	Municipality of Aleskinac	Vitkvovac	312	No
60.	Nisavski	Municipality of Aleskinac	Donji Ljubes	498	No
61.	Nisavski	Municipality of Aleskinac	Srezovac	185	No
62.	Nisavski	Municipality of Aleskinac	Korman	689	Yes
63.	Nisavski	Municipality of Aleskinac	Trnjane	1274	No
64.	Nisavski	Municipality of Aleskinac	Donji Adrovac	741	Yes
65.	Nisavski	Municipality of Aleskinac	Prcilovica	2362	No
66.	Nisavski	Municipality of Aleskinac	Zitkovac	2624	Yes
67.	Nisavski	Municipality of Aleskinac	Moravac	1744	Yes
68.	Nisavski	Municipality of Aleskinac	Nozrina	699	No

	District (Crossed by alignment)	City/Municipality (Crossed by alignment)	Settlement (Crossed by alignment)	Population (Number)	Station (YES/NO)
69.	Nisavski	Municipality of Aleskinac	Luzane	826	Yes
70.	Nisavski	Municipality of Aleskinac	Tesica	1717	No
71.	Nisavski	Municipality of Aleskinac	Grejac	544	Yes
72.	Nisavski	Municipality of Aleskinac	Veliki Drenovac	438	No
73.	Nisavski	City of Nis /Crveni Krst	Mezgraja-	541	Yes
74.	Nisavski	City of Nis	Trupale	2.127	Yes
75.	Nisavski	City of Nis Crveni Krst	- Vrtiste	1112	No
76.	Nisavski	City of Nis/ Crveni Krst	Popovac	284	Yes
77.	Nisavski	City of Nis	Donje Medjurovo	1722	Yes

Table 54 Population per age cluster and gender in 2020 (estimate)

Area / Municipalities	Children ≤6	Children 7-14	Children 15-18	Youth (15 do 29)	Active Labor contingent (15 – 54)
Republic of Serbia	F- 218365 M- 232720	F-258948 M-274650	F-139165 M-147223	F-550945 M-581957	F-2.229.517 M-2. 228.759
City of Belgrade	F-60301 M-64358	F-65028 M-68373	F-30420 M-32253	F-131448 M-132172	F-569.169 M-529.461
Velika Plana	F- 957 M-1057	F- 1319 M- 1387	F- 824 M- 843	F- 3038 M- 3410	F- 11609 M- 12267
Lapovo	F- 160 M-175	F- 236 M-252	F- 131 M- 139	F- 575 … M-602	F- 2212 M- 2355
Batoćina	F- 275 M-294	F- 345 M-435	F-233 M-254	F- 920 M-987	F- 3328 M- 3562
Svilajnac	F-473 M-501	F- 691 M-597	F-413 M-470	F- 1676 M-1805	F- 6464 M-6381
Jagodina	F-1977 M-2169	F-2616 M-2769	F-1344 M-1480	F-5880 M-5884	F-21942 M-21611
Ćuprija	F-680 M-695	F-927 M-970	F-504 M-565	F-2090 M-2308	F-8589 M-8732
Paraćin	F-1432 M-1463	F-1840 M-1919	F-1033 M-1025	F-4042 M-4255	F-15812 M-15824
Ćićevac	F- 297 M- 220	F- 294 M-295	F- 59 M- 185	F- 623 M- 758	F- 2532 M- 2737
Kruševac	F-3253 M-3582	F- 4305 M-4695	F-2519 M-2622	F- 9438 M-10059	F- 37628 M-37767
Aleksinac	F- 1310 M-1332	F- 1689 M- 1693	F-959 M- 996	F- 3634 M- 3930	F- 14149 M-15159
City of Niš	F- 8274 M-8767	F- 9140 M- 9765	F-4688 M- 5076	F- 20488 M-21265	F- 84310 M- 81555

5.2.5 Employment and Economy

Less than a half of the population of the Republic of Serbia is economically active (41.3%), whereby the share of male labor force (57.2%) prevails over the female (42.8%). The share of persons who perform an occupation in the total population aged 15 and over, i.e., the employment rate is 37.4%, being higher in men (44.9%) than in women 30.5%). The highest percentage was recorded in Belgrade region (41.6%), and the lowest in Southern and Eastern Serbia (34.0%). In the Republic of Serbia, the unemployment rate, i.e., the share of unemployed persons in total economically active population is 22.4%. The unemployment rate in women (23.6%) is somewhat higher than in men (21.6%). The lowest unemployment rate has been recorded in Belgrade region (17.9%), and the highest in the Southern and Eastern Region of Srbije (27.3%). The rate of not economically active, representing the share of the not economically active population (aged 15 and over) in total population aged 15 and over, is 51.8% for the Republic of Serbia. Observed by sex, that rate is lower in men (42.8%) than in women 60.1%). The lowest unemployment rate has been recorded in Belgrade region (49.4%), and the highest in Region Southern and Eastern Serbia (53.3%).

The number of unemployed per thousand inhabitants higher than the national average (68) was in 2020 in all municipalities through which the railway corridor passes, except for the City of Belgrade (significantly below average)

and the municipality of Svilajnac (slightly below average), as it is indicated in the following table. All municipalities on the route had an average salary below the national average (551 EUR), except for employees in the City of Belgrade.

Table 55 Employment and Salaries in impacted municipalities16

Municipalities	Registered employed relevant to place of work**	Registered Employed relevant to permanent residence	Average net salary (RSD)	Unemployed*	Unemployed per 1000 residents
Serbia	2215475	2215475	60073	491347	68
Belgrade area	759044	646755	74311	64717	38
Velika Plana	8470	10122	51227	2553	69
Lapovo	1918	2116	47627	808	115
Batočina	2587	3094	47318	1613	150
Svilajnac	5799	5595	47417	1371	66
Jagodina	17923	19354	48897	8051	118
Ćuprija	7313	7293	49119	2640	96
Paraćin	11468	12562	49204	5946	120
Ćićevac	2389	2413	45731	815	97
Kruševac	33286	35153	50471	9989	84
Aleksinac	9244	11679	48465	5638	121
City of Niš	84630	85041	57009	24647	97

Entrepreneurship

Large differences in the intensity of economic activities of the measured indicators of the number of active companies and the number of active entrepreneurs is evident in the municipalities on the route of the railway corridor. The data in the table are more indicative, since the dynamics of opening and closing, especially of entrepreneurial activities, is very high.

It is assumed that the reason for this is poor experience in entrepreneurship, which has been developing more intensively only in the last 20 years, but also in a relatively discouraging business environment with a huge number of different tax and other para-fiscal levies burdening the financial business of entrepreneurs. These taxes differ among municipalities.

Table 56 Active enterprise and Entrepreneurs

Area / Municipalities	Enterprises	Entrepreneurs	Area / Municipalities	Enterprises	Entrepreneurs
Republic of Serbia	118719	270925	Ćuprija	331	1024
City of Belgrade	55945	77369	Paraćin	609	1850
Velika Plana	380	1408	Ćićevac	71	299
Lapovo	47	223	Kruševac	1189	4721
Batoćina	83	320	Aleksinac	197	1277

[16] Data from 2020. Since 2015 agricultural producers are included in the statistic

Area / Municipalities	Enterprises	Entrepreneurs	Area / Municipalities	Enterprises	Entrepreneurs
Svilajnac	247	945	City of Niš	Data not available	Data not available
Jagodina	730	2259			

Agriculture

Agriculture plays an important role in the economy of Serbia. Agriculture is the fourth largest sector, accounting for 17.4 percent of employment and 5.4 percent of total exports. Very small and fragmented land holdings, ageing and declining farm labor force, limited associability, low efficiency and productivity, low use of technology, high labor intensity, low financial liquidity and capital availability for investment (especially for smallholders) and outdated production management practices characterize agriculture in Serbia in the South and Southeast. Cereals, vegetable oils and edible fruit have historically driven growth of agricultural production and exports, with Vojvodina's 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 percent of all holdings and 25 percent of the total cultivated area in Serbia and are concentrated in the South and East Serb agricultural sector growth, however, is influenced by regional disparities in sector performance and composition of crops. Despite the fact that women are the holders of 19.4 percent of farm holdings, they are the managers45 (main decision-makers) in only 15.3 percent of farms. The share of women among managers decreases as the size of the farm increases. Women represent 19.2 percent 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 percent. Out of a total of 1.337 million people undertaking permanent or occasional activity in agriculture, 561 020 (42 percent) are women. The share of women in the number of persons carrying out agricultural activity is lower than the share of men (42 percent and 58 percent, respectively), and it is even lower in terms of the total number of annual working units (AWU or hours of effective work) – 38 percent 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. Only two territorial units (The Belgrade area and the City of Nis) have less than ten percent of agricultural households in the total number of households (5.5% and 9.3%), while most have more than one third of households in the category of registered agricultural holdings. Over forty percent have municipalities: Cicevac (50%), Batocina (47.4%), Aleksinac (43.2%), Svilajnac and Velika Plana (40.6% and 40, 8%).

Table 57 Registered agricultural households

Area / Municipalities	Total agricultural households (Smallholders,SMEs, large producers)	Total Number of households	Percentage of agricultural households relevant to total number of households
Republic of Serbia	631.552	2.487.866	25,4%
City of Belgrade	33.244	606.433	5,5%
Velika Plana	5.266	12.899	40,8%
Lapovo	710	2.455	28,9%
Batoćina	1.769	3.736	47,4%
Svilajnac	3.129	7.712	40,6%
Jagodina	6.369	24.908	25,6%
Ćuprija	3.115	10.489	29,7%
Paraćin	5.586	16.679	33,5%
Ćićevac	1.485	2.971	50,0%
Kruševac	12.664	40.947	30,9%
Aleksinac	7.349	17.016	43,2%
City of Niš	8.367	89.903	9,3%

Data on family farm holders most impressively reflect the subordinate position of women in rural areas in Serbia. Out of a total of 617,365 family farms with a registered holder, only 17.3% of households are registered to women and 84.1% to men. These data confirm the absolute property deprivation of women in rural areas. 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.

Gender disaggregated data in unpaid agricultural works from household members we see that these are mostly females (62.9% of the total employed on the farm). In some municipalities, that share exceeds 65 percent (Velika Plana - 66.1%; Cuprija 65.2%). In addition to unpaid work, this is also an indicator of the complete property and financial insecurity of women in agricultural households. In addition, these women, although engaged in agricultural work all their lives, cannot apply for funds intended to improve agricultural production and strengthen the economic

status of agricultural households. It is therefore not surprising that the migration rates of young women from rural areas in Serbia are significantly higher than those of men, which results in the closure of rural households.

Table 58 Active labor force, 2012

Area / Municipalities		Formal owner of agricultural households		Participation of family members in agricultural activities of the ag. household		
	Total	Female	Male	Total	Female	Male
Serbia	617365	106948	519419	797199	501487	295712
City of Belgrade	32670	4719	27951	40841	26019	14822
Velika Plana	5189	701	4488	5984	3922	2062
Lapovo	704	72	632	678	412	266
Batoćina	1700	253	1447	2062	1321	741
Svilajnac	2992	532	2460	3982	2552	1430
Jagodina	6198	1030	5166	8200	5199	3001
Ćuprija	3027	546	2481	3567	2324	1243
Paraćin	5485	715	4770	8289	5336	2953
Ćićevac	1461	261	1200	1890	1167	723
Kruševac	12088	2347	9741	18497	11348	7149
Aleksinac	7193	1378	5817	9287	5710	3577
City of Niš	8132	1143	6989	10470	6578	3894

Population in rural areas

122 193 persons internally migrated within the Republic of Serbia in 2018. The average age of people who changed residence was 34.2 years (34.8 for men and 33.6 for women). The capital (Belgrade) region and northern Vojvodina region had a positive migration balance in 2018. In 2018 most of the persons moved from one municipality/city to another within the same area (39.1%), and at least from one to another settlement within the same municipality/city (23.6%). The largest number of migration movements was recorded in the territory of the Belgrade area, 50 982 (41.8%) immigrants and 44 004 (36.0%) emigrants. The South and East regions of Serbia, had a negative population trend and a deprivation of 3236 persons compared to the same period in 2017.This confirms that despite rural development measures the rural areas still struggle with depopulation.

Economic growth has disproportionately benefited rural and low-income households. In Serbia, the income of the poorest 40 percent grew by an annualized average of 3.9 percent between 2013 and 2017, higher than the income growth of 1.5 percent for the whole population. Previously rural areas had been particularly hurt following the global financial crisis. Between 2013 and 2017, with economic and jobs recovery, the poverty headcount ratio decreased by 9.6 percentage points in thinly populated areas, 6.0 and 2.9 percentage points in intermediate and densely populated areas, respectively. However, thinly populated areas continue to house more than half of the country's poor.

Poverty including household consumption expenditure

The average monthly income in money and in kind per household member (all households) amounted to RSD 24 955 in 2019, which is an increase of 4.2% when compared to 2018 (RSD 23 960). In 2019 households in urban area on average disposed of RSD 26 897monthly per household member (RSD 25810 in 2018), and households in other area disposed of RSD 22108per household member (RSD 21250in 2018). Of the total budget available, 96.6% makes income in money and 3.4% makes income in kind. For households in urban area, money income makes 99.5% and income in kind makes 0.5%, while for households from other area this ratio is 91.5% to 8.5%.

The Statistical Office of the Republic of Serbia and the World Bank have developed a set of poverty maps for Serbia, which show variability in welfare across the country by combining two sources - the population census and a household survey - to estimate the poverty rates for small geographic areas, such as districts and municipalities. At-risk-of-poverty rates in Serbia: 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. The results show that a number of municipalities in the southern part of Serbia have high poverty incidence. The estimated AROPE (At risk of Poverty or Social Exclusion) rate ranges from 4.8 percent in Novi Beograd in the Belgrade Region, to 66.1 percent in Tutin in the region of Šumadija and Western Serbia. Even within the same region, such as Southern and Eastern Serbia, this rate ranges from more than 13 percent in Medijana (Nis) to more than 63 percent in Bojnik. Some areas with high AROP incidences also have many poor people, and a great number of poor people are in densely populated parts of the country

Poverty remains significant, both in absolute terms (the share of persons whose consumption is below the threshold needed to meet their existential needs - 7.3% in 2016), and relatively high (the share of persons at risk of poverty is 25.5% in 2016). The at-risk-of-poverty rate by most common status in the labor market (lasting more than six months)

indicates that the unemployed are in the worst position (48.0%, i.e. almost every other unemployed is at risk of poverty). Employment significantly reduces the risk of poverty, but the quality of employment remains a key factor in ending poverty (the self-employed have a significantly higher at-risk-of-poverty rate than employees at the employer, 32.4% vs. 9.0%). Retirees are in the most favorable position, after employees with employers, with a risk of poverty which is approximately at the level of total employees (15.4%). Education is a decisive factor for a person's economic status and ability to generate income, and it is therefore not surprising that lower-educated people are above average at risk of poverty. The highest at-risk-of-poverty rate in 2016 - 2018 period was in the population with primary education and lower than primary school (39.1%), and the lowest in the at-risk-of-poverty population with high school or university education (10.3%). This distribution of the population at risk of poverty by level of education clearly indicates that education is important, since the labor market rewards highly educated people.

Poverty assessment data using the poverty mapping method are given in the following table, for 2013, based on data from the World Bank and the Republic Statistical Office. Poverty Risk Rate is higher than the national average (24.7) in all municipalities except Belgrade area (10.5) and Lapovo (23.9) and Cuprija (24.9). The Gini coefficient is relatively uniformly high in all municipalities (between 32 and 36), and the relative risk of poverty is again in most municipalities (except Belgrade area and the municipalities of Lapovo and Cuprija) above the national average.

Table 59 Poverty Assessment through poverty mapping 2013

Municipalities	Risk of poverty rate	Risk of poverty Municiaplity ranking (1- 147)	Gini koeficijent (interval from 0 to 100)	Relatively poverty risk
Serbia	25,7		36,8	8,8
Belgrade area	10,5		33,2	3,2
Velika Plana	31,5	77	33,9	10,5
Lapovo	23,9	36	32	7,2
Batočina	36,1	104	34,8	12,5
Svilajnac	26,7	52	34,3	8,9
Jagodina	31,7	79	34,9	10,7
Cuprija	24,9	41	34	8
Paraćin	29,2	69	34,1	9,8
Ćićevac	30,3	73	32,8	9,8
Kruševac	29	67	35	9,7
Aleksinac	40,9	134	35,4	14,7
City of Niš	No data available	No data available	No data available	No data available

**Source: World Bank and Republical Statistical office Source: Devinfo, Profil, RSO, August 2021)*

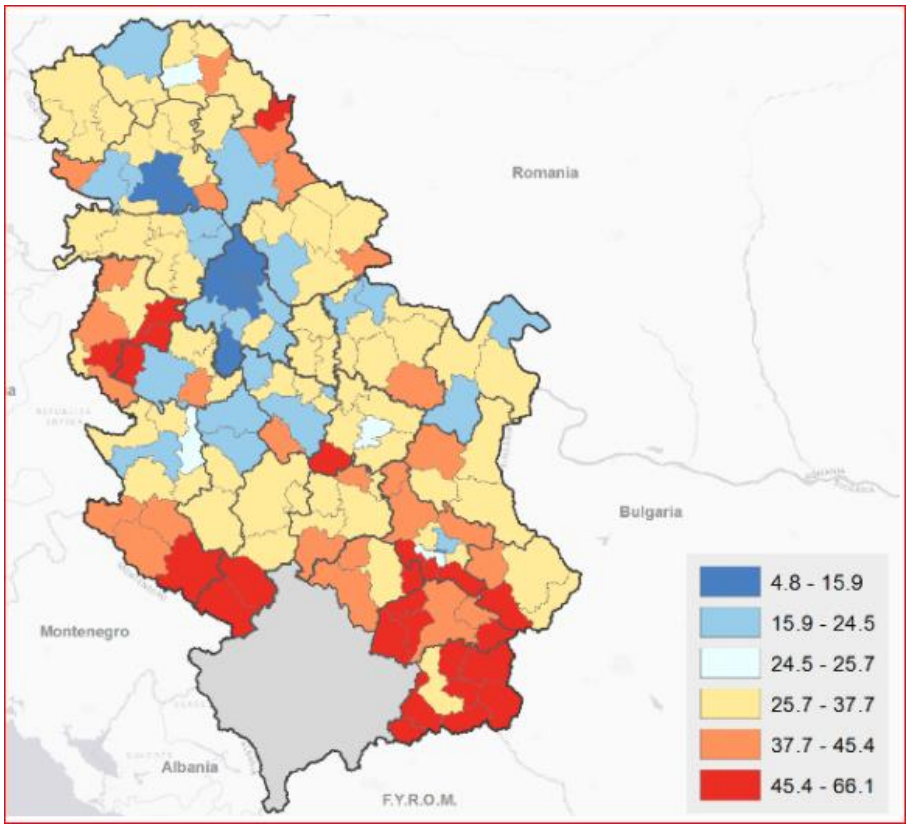

Figure 43 At-risk-of-poverty rates in Serbia per Municipality: World Bank and SORS staff estimates using the 2011 Population Census and 2013 SILC data. Risk of poverty is defined using the EU standard of 60 percent of median per adult equivalent income.

The following table provides data on beneficiaries of social protection, financial assistance, child allowance and allowance for care and assistance of the sick person. The share of social protection beneficiaries in the total population of the municipality is relatively high and ranges from 6.8% in the City of Belgrade to almost 20 percent in the municipalities of Cuprija and Paracin. There are quite large differences between municipalities in the percentage of beneficiaries of cash social assistance. In the City of Belgrade, one percent of citizens receives it, and in the City of Nis, as many as five percent. There are also large differences between municipalities in the indicator of child allowance (collectively standard and increased). In the City of Belgrade, almost every tenth child is entitled to child allowance, and in several municipalities, this share goes to more than one fifth (Cuprija, Cicevac, Jagodina, Krusevac, Aleksinac). The number of beneficiaries of the basic and increased care and assistance allowance is given in absolute numbers, but also shows large differences between municipalities.

Table 60 Social Protection

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 0-18)	Number of beneficiaries of third person support + care
City of Belgrade	6,8 %	1,0 %	9,1	2465 +7624
Velika Plana	16,0%	3,4%	9,6%	118 + 191
Lapovo	16,3%	2,1%	15,8%	21 + 40
Batoćina	11,7%	2,6%	13,3%	30 + 68
Svilajnac	12,1%	3,2%	12,0%	59 + 92
Jagodina	9,3%	3,0%	29,8%	160 + 387
Ćuprija	19,7%	3,1%	20,5%	69 + 140
Paraćin	19,8%	1,2%	12,2%	124 + 291
Ćićevac	9,0%	1,7%	22,9%	20 + 48
Kruševac	16,7%	3,3%	25,5%	261 + 603
Aleksinac	8,8%	7,8%	37,3%	116 + 324
City of Niš	15,1%	5,0%	14,1%	546 + 1362

Source: Devinfo, Profil, RSO, August 2021

5.2.6 Public Services

The 2011 Serbia census identified 164,884 or 2.68 % of illiterate residents in Serbia. The number was halved compared to the 2002 census. A total of 850,000 residents, or 14 percent of the population, have no formal education or only few elementary school grades. Incomplete elementary school education has 677,000 residents of Serbia, or 11 percent. In the Republic of Serbia, 51% of persons aged 15 and over are computer illiterate, that is, 34.2% of persons are computer literate, while 14.8% are partially computer literate (May 2019). 2011 research show that 18.5% of rural women did not complete high school education because pressures by the family to stay and work in the household or on the farm, 26% because of the attitude of the family that women do not need to attain higher education levels, 18% because of a lack of financial resources, and 10% because of early marriage and family care. Differences in educational attainments are much more prominent when adult population of urban and rural areas are compared. Data from population census indicate less favorable education structure of population in rural areas with higher share of persons without any school particularly among women (these are mainly older women). On the other hand, share of persons with higher and university education is much lower among rural than urban population.

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

The coverage of preschool education for children under the age of three is less than one third (except in the City of Belgrade. The coverage of older children in preschool institutions does not exceed 60 percent except in the City of Belgrade and the municipalities of Svijalnac and Cicevac. Data on education indicates a relatively high share of children in compulsory education who do not enroll in primary school or drop out before graduating.

Table 61 Accessibility of Education services[17]

Municipalities	Children age 0-3 (pre-school)	Children age 3 - 7(preschool)	Net rate of elementary education inclusion	Inclusion rate of High s school
City of Belgrade	45,3%	76.6%	94,8%	99,4%
Velika Plana	34,4%	59,8%	97,3%	No data
Lapovo	34,8%	54,9%	91,6%	No data
Batoćina	23,2%	40,2%	92,3%	No data
Svilajnac	25,4%	62,5%	97,7%	No data
Jagodina	17,6%	49,2%	94,%	No data
Ćuprija	17,8%	56,8%	87,5%	No data
Paraćin	12,6%	37.7%	91,6%	No data
Ćićevac	24,3%	67,8%	92,7%	No data
Kruševac	26,5%	55,6%	94,0%	No data
Aleksinac	16,8%	33,2%	91,8%	No data
City of Niš	27,9%	53,9%	96,5%	No data

There are no data available for the pupils age of 15 to 19 years of secondary education. High school students belong largely to daily migrants, as there is not a large selection of high schools in every municipal center. In medium-sized cities, there are, as a rule, two or three secondary schools. The capacity of boarding schools for high school students is very small (coverage is about 3 percent of the contingent). For these reasons, it should be taken into account that

[17] Source: Devinfo, Profil, RSO, August 2021)

high school students can represent a significant number of railway users within a radius of 30 to 50 km, during their daily education commute.

In terms of access to health, Belgrade area and the City of Nis have the most doctors per thousand inhabitants (3.5 and 4.8), since in addition to Medical Universities they have Clinical Centers and specialized hospitals. We assume that there is a daily migration of users of health services in other municipal centers and that some users undoubtedly use rail transport to obtain health services. Access to health care becomes even more important in the years burdened by the unprecedent impact of the global pandemic caused by the novel SARS-COV 19 virus.

Table 62 Access to Health services

Municipalities	Number of Medical Doctors per 1000 residents	Municipalities	Number of Medical Doctors per 1000 residents
City of Belgrade	3,5	Ćuprija	Data are inconclusive
Velika Plana	1,2	Paraćin	2,4
Lapovo	1,6	Ćićevac	1,4
Batoćina	1,6	Kruševac	2,9
Svilajnac	1,7	Aleksinac	2,1
Jagodina	2,6	City of Niš	4,8
Ćuprija	Data are inconclusive	Ćuprija	Data are inconclusive

5.2.7 Cultural Heritage

Serbia is known for its ample archaeological and cultural heritage sites. There are currently 2602 registered immovable cultural properties in the Central Catalogue, out of which 2237 monuments of culture, 92 spatial cultural-historical units, 194 archeological 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 archeological sites and 17 landmarks.

According to the Institute for protection of Cultural Heritage of Republic of Serbia (relevant to this project stage) reconnaissance of potential archaeological sites has been used to inform the baseline. The reconnaissance has been performed by the Institutes for Cultural heritage for earlier development projects and part of their regular activities.

Table 63 Archaeological sites within the Secondary area of Influence and beyond

Archaeological locality Staro selo Staro i Novo selo Municipality Velika Plana	The existing locations are under arable land and due to ploughing and heavy machinery work they constantly suffer pressures that affect the fragmentation of finds and structures in the lower layers. If there are archaeological sites here they were partially devastated by the construction of the railway in the past.
• Archaeological site Lapovo municipality of Lapovo - in the area of the railway station Lapovo	An archaeological site with settlements from the prehistoric period and the ancient period has been recorded. This archaeological site is located in the settlement and was partially damaged by construction works for the needs of the construction of the railway station and surrounding infrastructure.
Archaeological site Bagrdan Bagrdan Municipality of Jagodina	The existing location is under arable land and due to ploughing and heavy machinery constantly suffers from pressures that affect the fragmentation of finds and structures in the lower layers. If there is an archaeological site here it was devastated in the past partly by the road and partly by earlier railway constructions.
Archaeological site Bukovicka česma Bukovče	Protective excavations for the needs of railway modernization were performed in 1972 with 9 excavated archaeological probes. It is not known what percentage of the site is

Municipality of Jagodina	covered in relation to the area of the entire prehistoric settlement. The site is located under the road and railroad. -
Archaeological site Transkop municipality of Paracin	It- is located in the industrial zone andis partially devastated by direct construction activities and it is not possible to estimate how much of the site is still intact
Archaeological site of Gornji Ljubeš,Municipality of Aleksinac	Surface archaeological material was detected across the road from the village cemetery, which indicates the existence of an archaeological site. The site is currently under pasture and the finds and structures at depth are not exposed to damage. It was partially devastated by the construction of a railway and an asphalt road that passes through the settlement.
Archaeological site Prćilovica Municipality of Aleksinac	These are the remains of a Romancastrum with typical finds from the Roman period. It was partially devastated by construction works within the settlement mainly during construction of an asphalt road and a railway. The site is not visible today and its boundaries cannot be determined
Archaeological site Bankovac Municipality of Aleksinac - in the area of Bankovac, at the junction of the route of the railway and the river Turija	Numerous surface moving material can be seen which indicates the existence of an archaeological site. The site is currently under a private garden where vegetables are grown so the impact from cultivation of the land is very low. It was partially damaged by the construction of the railway and overpass across the river
Archaeological site Čivlak City of Nis	The existing site is located under arable land and exposed to ploughing and heavy machinery constantly suffers from pressures that affect the fragmentation of finds and structures in the lower layers. A protection study will be done for the reconnoitred archaeological sites.

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

Table 64 Preliminary list of registered Cultural Heritage Sites /Immovable Properties[18]

Ref	Distance from axis	Category	Type/Name	Location
1	0,4 km	Immovable cultural heritage of exceptional importance	Museum of 4th July 1941.	Beograd
2	0,5 km	Immovable cultural heritage of exceptional importance	Monastery Pokajnica	Velika Plana
3	0,5 km	Immovable cultural heritage of exceptional importance	Topčider	Beograd
4	0,6 km	Immovable cultural heritage of exceptional importance	Building of illegal party publications	Beograd
5	2,3 km	Immovable cultural heritage of exceptional importance	Monument to the unknown hero	Beograd
6	4,6 km	Immovable cultural heritage of exceptional importance	Karađorđeva crkva, Radovanjski lug	Velika Plana
7	6,5 km	Immovable cultural heritage of exceptional importance	Monument to Stefanu Lazareviću	Crkvine
8	0,5 km	Immovable cultural heritage of great importance	Doktorova kula	Beograd
9	0,7 km	Immovable cultural heritage of great importance	Karađorđev park, Spomenik i groblje oslobodilaca Beograda 1806. godine	Beograd
10	1,8 km	Immovable cultural heritage of great importance	Monastery Sv. Roman	Praskovče, put between Đunisa and Ražanj

[18] Source: Geosrbijahttps://a3.geosrbija.rs/kulturna_dobra

Ref	Distance from axis	Category	Type/Name	Location
11	3,7 km	Immovable cultural heritage of great importance	Trenches from Prvog srpskog ustanka	Deligrad
12	6,5 km	Immovable cultural heritage of great importance	Birth house of vojvode Stepe Stepanovića	Beograd
13	0,1 km	Immovable cultural heritage	Crkva Svetog Arhangela gavrila	Beograd
14	0,2 km	Immovable cultural heritage	Villa Stevke Milicevic	Beograd
15	0,2 km	Immovable cultural heritage	Heritage of Dragomira Glišica	Beograd
16	0,3 km	Immovable cultural heritage	National Library "Dr Vićentije Rakić"	Paraćin
17	0,3 km	Immovable cultural heritage	Vila Olge Mos	Beograd
18	0,5 km	Immovable cultural heritage	House of merchant Dušana Lazića	Beograd
19	0,6 km	Immovable cultural heritage	Zgrada Ministarstva socijalne politike i narodnog zdravlja	Beograd
20	0,7 km	Immovable cultural heritage	Crkva Svetih Petra i Pavla	Jagodina
21	0,7 km	Immovable cultural heritage	Dvorski kompleks na Dedinju	Beograd
22	1,6 km	Immovable cultural heritage	Russion monument Ororku, mesto Varvarinske bitke	Varvarin
23	0.6 km	Cultural heritage of great importance	Church of the Holy Archangels Michael and Gabriel (17th century)	Stalac
24	0.5 km	Cultural Heritage of Great Imporatnce	Church of Holy Spirit (14th-15th century)	Stalac
25	0.8 km	Cultural Heritage of Great Imporatnce	Church of St. Jovan (14th century)	Stevanac
26.	0.6 km	Cultural Heritage of Great Importance	Church of St. Mark	Stevanac/Jakovac
27.	0.3 km	Cultural Heritage of Great Importance	Church of St. Nicholas (14th century)	Braljina
28.	3 km	Archeological Site	Church of St. Sava (Middle Ages)	Braljina
29	1.0 km	Archaeological site	Medieval fortress Trubarevo	Trubarevo
30.	0.2 km	Cultural Heritage of Great Importance	Church of St. Panteleimon (Cemetery church)	Djunis Nikoljac
31	0.2 km	Cultural Heritage of Great Importance	Archaeological site (remains of the medieval church	Djunis Nikoljac
32.	2,3 km	Immovable cultural heritage	Hotel "Avala"	Beograd
33	3,1 km	Immovable cultural heritage	10 buildings in Aleksinac	Aleksinac
34	3,8 km	Immovable cultural heritage	Memorial Park Jajinci	Beograd
35	4,7 km	Immovable cultural heritage	House of Save Jeremića	Ražanj
36	4,7 km	Immovable cultural heritage	Church Svete Trojice	Gornji Adrovac
37	5,5 km	Immovable cultural heritage	Monastery Kastaljan	Kosmaj
38	0 km	Immovable cultural heritage	Railway station of Lapovo	Lapovo

The cultural heritage sites of the section Stalac Djunis have been also observed and information taken from the Environmental and Social Impact Assessment Reconstruction and modernization of the Existing Railway Track and Construction of a Second Track on the Line Belgrade – Niš, Section Stalać – Đunis (IPA 2011-WBIF-Infrastructure Project -Serbia Transport WB8-SER-TRA-14 EuropeAid/131160/C/SER/MULTI/3C). Below are the cultural heritage and archeological sites for section Stalac Djunis. The following maps present cultural heritage along the section Stalac Djunis and along the corridor.

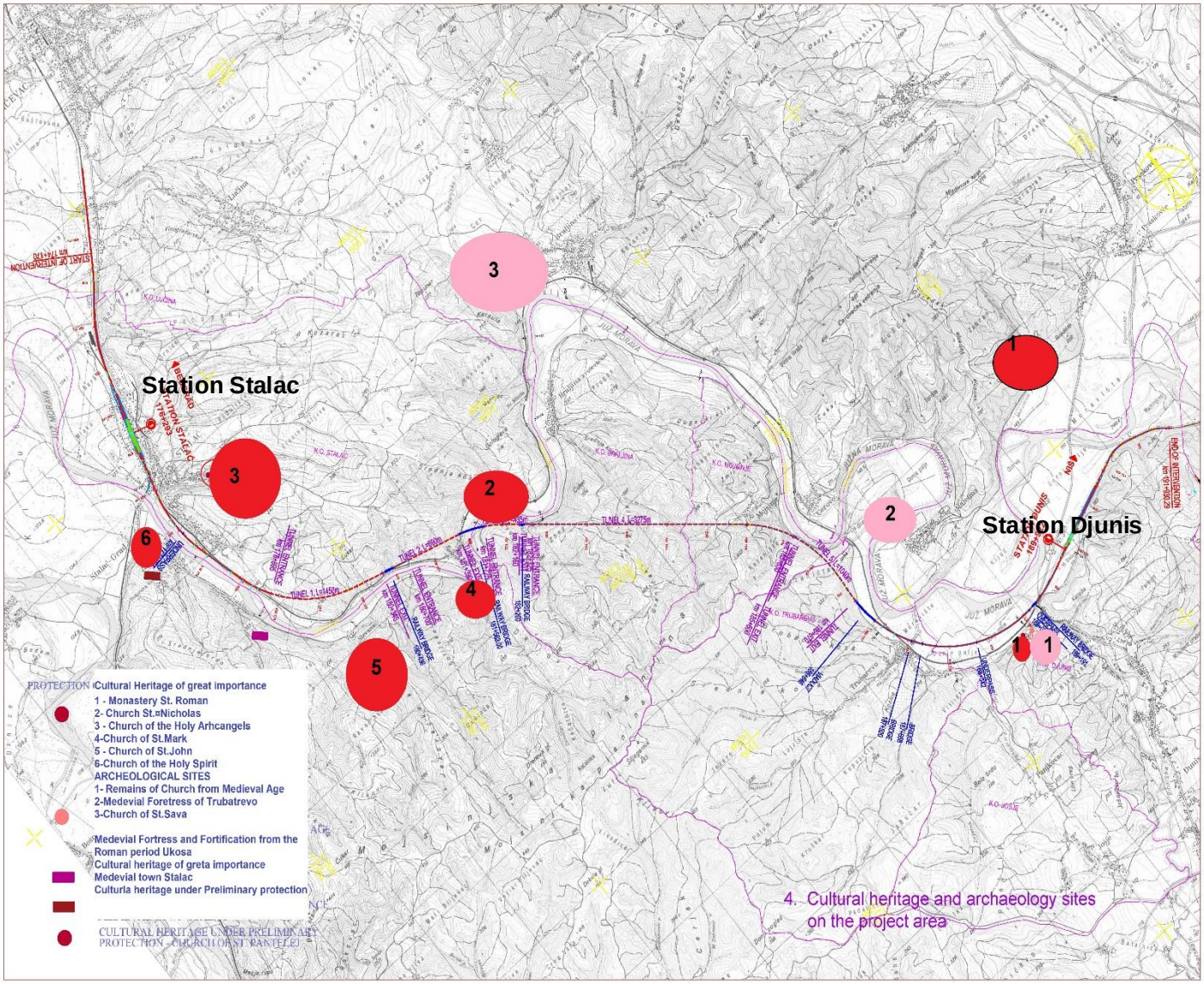

Figure 44 Map of Cultural Heritage at Section Stalac-Djunis

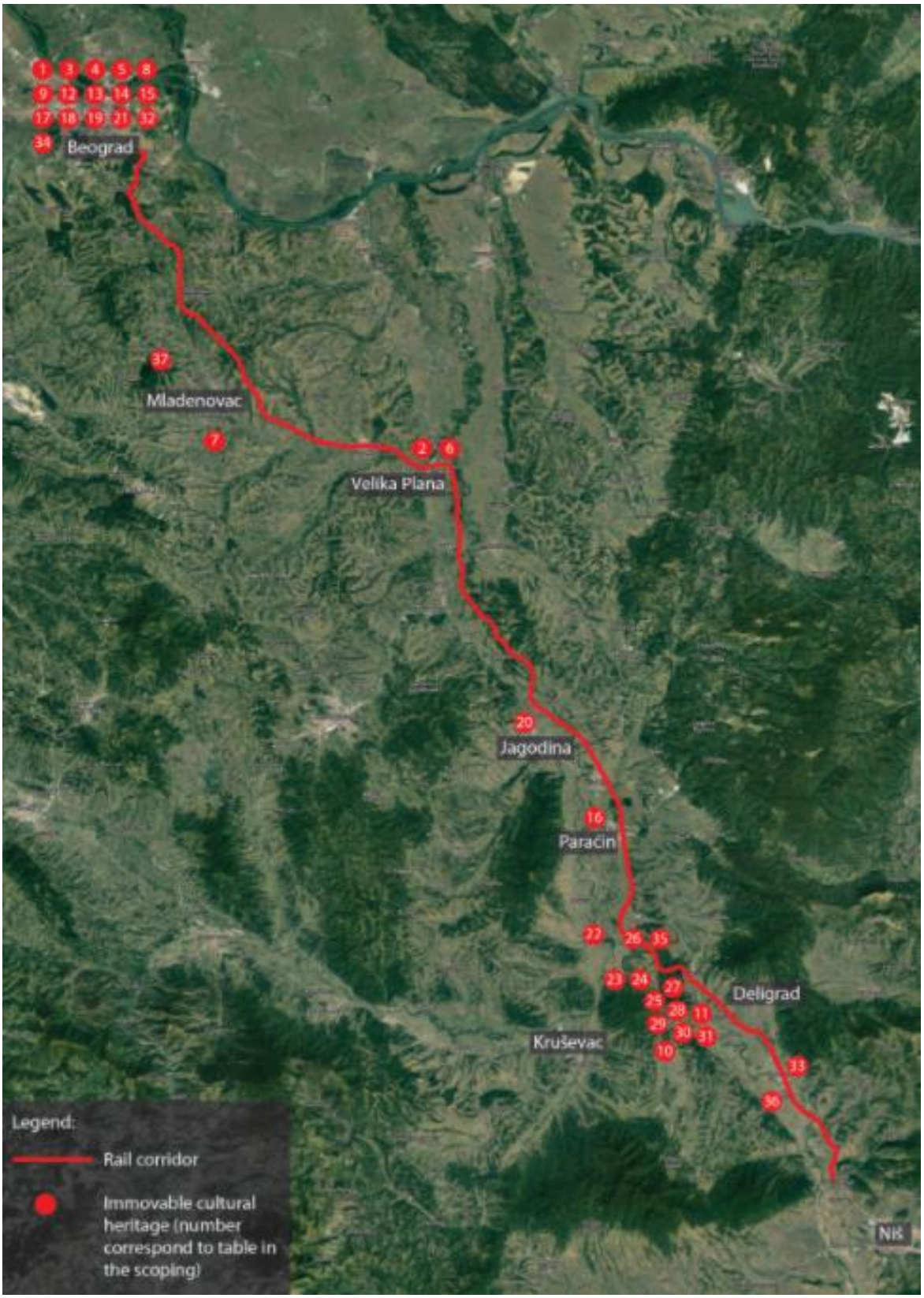

Figure 45 Cultural Heritage Map within the rail Corridor – Numbers correspond to the table above

The impact to Cultural Heritage will be subject to Cultural heritage management impact assessment as part of the ESIA at the next stage.

5.2.8 Gender and gender equality

Out of the total population of Serbia, 51.3% are female and 48.7% are male inhabitants. The Constitution of the Serbia proclaims principles of gender equality. Although the Constitution fails to mention gender pay equality, articles of The Labor Law treat rights of men and women equally, including right of equal pay. Additionally, according to provisions of this Law, a working woman has the right of absence from work due to pregnancy and childbirth, maternity leave, and absence from work for child care, 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 moderate private enterprises.

Despite principles however, many women in Serbia face challenges combining paid work and child care responsibilities. This could be an additional cause for Serbia's low fertility rate, which is one of the lowest in European countries, and average in the region at 1.46 percent in 2014. 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 and 80 percent are male.

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.

The labor 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 labor market, with 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.[19]

Serbia is characterized by high number of trips made by women and men, on weekdays and weekends as well. Serbia, the average number of trips is 3.8 per day, with 3.6 trips for men and 3.9 trips for women (in the context of this statistic trips are defined as one non-stop travel within one transportation mean). Both, men and women, make much more trips during the week than on weekends. Although the difference is not high, Serbian women still make more trips on weekdays and on weekends than men. Women are more prone to intermodal mobility behavior that is, combining two or more transport modalities in one trip. More than fifth of women and men in the sample (23% of women and 22% of men) combine different transport means during single trip every day, and 20% of women and 14% of men do that 4-5 times a week. Combining different transport means in a single trip could pose stress[20.]

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

As the Project addresses passenger rail services in a border sense, there would be scope for improved mobility for people in rural areas, people with disabilities, and/or the elderly to gain better access to public services, markets and jobs. It will be important to analyze the gender implications of the Project, as women's experiences with transport systems differ from those of men, particularly as related to decision-making, facilities planning, safety, reliability, affordability, and accessibility. With the World Bank's technical advice, the GoS has recently finalized country-wide Gender in Transport study. This study analyzes gendered mobility patterns of transport users, with a view to enhance transport service provision for men and women alike, and to create better access to employment opportunities for females and improve their workplace advancement. The Project could operationalize the study's recommendations insofar as scope of this Project is concerned is concerned.

The above study also focuses on the establishment of robust human resources (HR) systems and an HR strategy within all rail companies including SRI. Of all the employed in the transport sector in Serbia, 20 percent are female

19 Source: Statistical Office of Serbia, Labor Force Survey 2018

20 Reviewed version submitted by SeConS Development Initiative Group and Dornier **Consulting** International GmbH 2019

and 80 percent are male. The statistics are similar in individual railway companies for which data was obtained. For example, in 2021, SRI employed 19% of women in its workforce. Addressing gender gaps during overhauling of HR practices is an opportunity to enhance and diversify the supply of needed talent. The project in hand with ongoing activities and other projects supported by other IFIs and donors will operationalize the actions specific to human capital that will stem from the earlier-mentioned gender-sensitive Transport Strategy, related to the Jobs and strategic staffing under the strategy. The main recommendations the design can consider are related to adequate lightning in and around the station buildings, including access areas to main streets.

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 https://infrazs.rs/2018/05/zajednicke-preporuke-organizacija-cer-i-etf-za-bolju-zastupljenost-i-integraciju-zena-u-zeleznickom-sektoru/. 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).

No data on women use of the railway and GBVH on this section is found. The Customer satisfaction survey is regularly implemented but the results of this survey are not disaggregated by gender.

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:

Table 65 Women ownership per Municipality

Municipality	Women owners(%)	Municipality	Women owners (%)
Belgrade – Savski Venac	39,90	Cuprija	28,81
Belgrade- Rakovica	37,17	Paracin	25,18%
Belgrade - Vozdovac	37,06	Ćićevac	25,76
Sopot	23,42	Aleksinac	28,08
Mladenovac	19,20	Nis Crveni Krst	21,17%
Smedervska Palanka	20,16	Nis Palilula	19,41
Velika Plana	21,04		
Lapovo	21,52		
Batocina	20,54		
Jagodina	26,36		

Site specific Resettlement Action Plans will take into consideration this assessment as a baseline for further vulnerability assessment of women impacted by land acquisition and resettlement.

5.2.9 Roma

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, has identified less than 150,000 Roma

living in Serbia. Estimates of the actual number of Roma range between 300,000 and 600,000. 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. 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 neighboring 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". For the purpose of planning the Roadmap for Serbia, according to the available data, the baseline may be set to 51% of stated numbers: 10.443 illegal dwellings at 303 substandard settlements, with 24.594 persons. GIS data are not available in open format, as they contain personal data and protection by the data privacy act is established, while it is under the administration of a number of ministries which will provide access to details during the ESIA phase. The information on potential Roma dwellings in the Project area have been obtained through stakeholder engagement with key informants in the local communities. However, a more detailed baseline shall be developed during the ESIA phase.

The presence of Roma settlements and substandard dwellings are likely expected only in the Municipality of Mladenovac, Settlement Rajkovac as has been highlighted by one of the key informants from the Local community. There is a Roma Family (possible multigenerational) living adjacent to the existing rail. Other communities have not reported (at this stage) location with high sensitivity due to impacts to wellbeing of Roma in any aspect. The decision to scope aspects of particular vulnerability of Roma is also driven by their migratory nature.

Regarding equity of access to services, twenty-two percent of Roma settlements do not have access to water. 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) (UNDP 2012). 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. Some results have been achieved in the areas of education and health, but no real improvement has been achieved in employment and housing (MHMR 2010).

Table 66 % of Roma population in total population in 2011

Municipalities	%	Municipalities	%
Serbia	2,1%	Ćuprija	1,3%
City of Belgrade	1,7%	Paraćin	1,6%
Velika Plana	0,9%	Ćićevac	1,8%
Lapovo	0,7%	Kruševac	1,9%
Batoćina	0,5%	Aleksinac	3,7%
Svilajnac	1,4%	City of Niš	4,4%
Jagodina	1,1%	Ćuprija	1,3%

5.2.10 Ethnicity and Religion

By the ethnic composition 83.3% of the population are Serbs, 3.5% Hungarians, 2.1% Roma, 2% Bosniaks, 0.8% Croats, 0.7% Slovaks, 0.5% Montenegrians, 0.5 % Vlachs, 0.4% Romanians, 0.3% Yugoslavs, 0.3% Macedonians, 0.3% Muslims and around 5% other. Map of confessions has been changing historically. Currently, according to the Census in Serbia, in regard to religious affiliation, there are 84.6% Orthodox Christians, 5% Catholics, 3.1% Muslims, 1.1% atheists, 1% Protestants, 3.1% do not declare themselves confessionally, and about 2% other confessions. According to the Law on churches 8 religious communities enjoy legal status. The following table indicates the ethnicity data by municipalities and cities crossed.

Table 67 Ethnicity -data by municipalities and cities crossed

Municipalities	Total	Serbs	Albanians	Bosniak	Roma
R. of Serbia	7186862 / 100,0	5988150 / 83,32%	5809 / 0,08%	145278 / 2,02%	147604 / 2,05 %
Belgrade area	1659440 / 100,0	1505448 / 90,72%	1252 / 0,08	1596 / 0,10%	27325 / 1,65%
Velika Plana	40902 / 100,0	38761 / 94,8%	19 /0,05%	1 / 0,002%	380 / 0,9%
Lapovo	7837 / 100,0	7613 / 97,1%	5 / 0,06%	2 / 0,03 %	56 / 0,7%
Batočina	11760 / 100,0	11514 / 97,9%	7 /0,06	0 / 0	55 / 0,5 %
Svilajnac	23551 / 100,0	22048 / 93,6%	2 / 0,008%	0 / 0	324 / 1,4%
Jagodina	71852 / 100,0	68898 / 95,9%	40 /2,5%	5 / 0,007 %	764 / 1,1%
Ćuprija	30645 / 100,0	28268 / 92.2 %	2 / 0,006	7 / 0,02	412 / 1,3%
Paraćin	54242 / 100,0	51891 / 95,7%	18 / 0,03%	4 / 0,007%	853 /1,6%
Ćićevac	9478 / 100,0	9073 / 95,7%	4 / 0,04%	0 / 0	174 / 1,8%
Kruševac	128752 / 100,0	122529 / 95,2%	32 / 0,02%	2 / 0,002%	2461 / 1,9%
Aleksinac	51863 / 100,0	47563 / 91,7%	18 / 0,03%	8 / 0,02%	1937 / 3,7%
City of Niš	260237 / 100,0	243381 / 93,5%	97 / 0,04	44 / 0,02%	11449 / 4,4%

There are no regional ethical disparities and in the municipalities with the Area of Influence, the ethnicity is more or less uniform. Serbs constitutes the majority in all of the observed areas with a share of 90% and above. Only in the Nis area Municiaplity Crveni Krst, Serbs are represented with 70% to 89,9% (the map above shows only Municipal level datad). The share of Roma is presented separately in the figure below. Bosniaks are almost not represented in the studied municipalities and settlements as they have been recorded as below 1% and without statistical occurrence the situation is the same for Montenegrins, Croats, Slovaks, and Hungarians etc.

The map showing the share of Roma in Serbia is presented below:

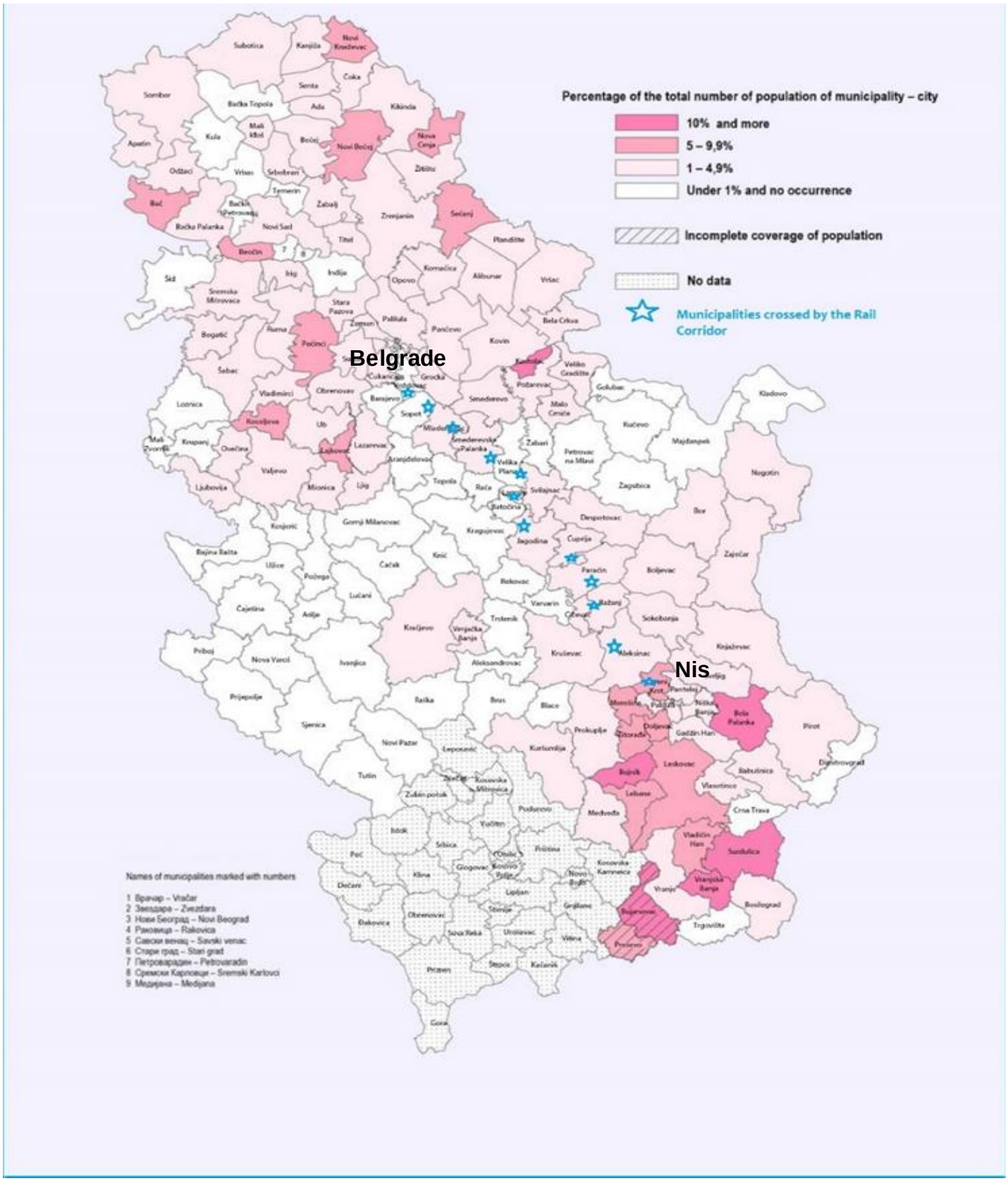

Figure 46 The Share of Roma in settlements crossed by the alignment

5.2.11 Labor and informal employment

The incidence of informal employment is the highest among the youngest age group (15-19 years), 76% of whom are employed informally. Incidence of informal employment tends to decrease with age. This can be accounted to the low level of professional experience of 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. The Labor Inspectorate reports that 52.375 informal employment cases have been confirmed during the inspections conducted between 2017 and 2019 following which a total of 45.207 was transformed to formal employment.

The labor market has recovered from post-crisis job losses. From 2014 to 2018, Serbia created around 240,000 net new jobs. The unemployment rate declined from close to 20 percent in 2014 to below 11 percent in 2019 (among people aged 15-64), and the employment rate now surpasses pre-crisis levels. Many of the new jobs have been full-time wage jobs in the formal private sector. Recent labor market improvements have also benefited women, older workers, and the 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 percent in 2014–17 and by more than 4 percent in 2018. Despite recent labor 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 percent) and employment rate (58.8 percent) remain far below those of neighboring EU countries. Inactivity and unemployment are even worse among poor households: only 22.4 percent of the working-age poor are employed, compared to 53.0 percent 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 his and her potential productive lifetime (ages 15–64). Many job seekers are long-term unemployed: 75 percent 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 located in Vojvodina, and the smallest number in Belgrade. The highest share of informally employed workers of the total number of workers is in West Serbia and Sumadija (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 sectors.

Of those informally employed the vast majority can be found in the agricultural sector (59.5% of all informally employed), followed by construction (7.1%). In other sectors, the share of informal work is less than 20%. The construction industry has a 34.9% share of informal employment in total sector employment and a 7.1% share of sectorial informal employment in total informal employment.

The poverty rate, measured as income per capita below the standardized upper-middle-income country poverty line of US$5.5/day in 2011 purchasing power parity (PPP), fell from 26.7 percent in 2013 to 20.8 percent in 2017. An increase of 1 percent in GDP was associated with about a 4 percent reduction in the poverty headcount rate, higher than the elasticities in neighboring Western Balkan countries. Consistent with the labor market recovery, increased labor income contributed the most to the observed reduction in poverty, followed by pensions. Household income increased and the poverty rate fell because of overall economic growth and its strong impact on households in the bottom of the income distribution.

Desktop data were not available in more details for the Project area. Gaps shall be closed during the ESIA stage through field studies as indicated in the section Assumptions and limitations. The 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

5.2.12 Land use (social aspects)

The project area comprises developed land with buildings, cultivated land (crops and gardens), meadows and pastures, and forest land. Developed land with buildings is present in the areas of settlements crossed by the alignment and in the the brownfield areas. Cultivated land is primarily used for growing maize, wheat, fodder and vegetables. The majority of farmland plots are small (up to 3 hectares). Most of the land has traditionally been with the families for many generations. Dependency of livelihood and to 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. State owned agricultural areas are sporadically present along the route. Land use is extremely important to be considered in cases of severance of land which will likely happen only in offline areas such as presented below in the area of settlement of Trupale, Municipality Crveni Krst in the City of Nis. Purple areas depict availability of public agricultural areas which may serve for

replacement land. The picture below shows cases of severance impacts from the alignment in offline sections are presented in the conclusion section.

Regarding land use and the Section of Stalac Djunis, during construction, land in the project area will be affected and occupied by haulage and access roads, excavated material disposal sites, concrete batching plants, worker compounds, and stock yards. The majority of land affected during construction will be forest land in hilly areas and developed land in Stalać and Đunis. However, the railway construction will permanently acquire about 1.7 ha of cultivated land: a minor part upon the exit from Stalać and the major part in the area between Trubarevo and Đunis. In the same areas, the construction activity will temporarily occupy an additional few hectares of cultivated land needed for siting of the facilities and mechanisation. Construction is expected to last up to 48 months, however, an average plot of land needed for the construction might be unavailable for farming for a period of few months. This means that one season's crops might be affected (depending on the season in which construction is carried out on a particular plot). The temporary land needs will have to be located and estimated prior to the start of construction works. It is expected to have a low level of impact on social aspects. It is expected that some changes in resource or its quality will occur but the impact is reversible. After completion of construction activities, the majority of the land will be returned into its previous condition. Due to minor loss of or alteration in a short-time period, the magnitude of this impact could be estimated as low and the impact significance is assessed as minor adverse.

5.2.13 Transport and Infrastructure

Road

To understand potential interference with existing accessibility and connectivity, the table below covering the road network of various grade and quality have been included. The road network has not included the access length to highways, while Belgrade has not provided data on the length of municipal roads to the Republic Statistical Office.

Table 68 Length of road network in impacted Municipalities[21]

Area / Municipalities	Total (km)	Modern pavement (km)	Category I State Roads (km)	Category II State Roads (km)	Municipal Roads (km)
Republic of Serbia	43839,516	29183,538	3864,522	9650,855	30324,139
City of Belgrade	5748,285	3075,785	190,615	452,01	5105,66
Velika Plana	171,411	150,171	9,951	55,78	105,68
Lapovo	97,812	92,912	0,381	8,651	88,78
Batoćina	95,306	78,636	14,338	5,228	75,74
Svilajnac	139,792	133,602	2,788	58,454	78,55
Jagodina	246,808	224,233	-	87,238	159,57
Ćuprija	228,525	110,925	-	63,125	165,4
Paraćin	223,381	185,309	21,661	53,15	153,57
Ćićevac	63,965	49,965	13,476	10,489	40,0
Kruševac	454,982	391,04	55,19	104,26	295,532
Aleksinac	277,126	248,615	-	109,526	167,6
City of Niš	339,723	339,51	9,845	83,868	246,01

Rail

Serbia links via rail with almost all of its neighboring countries. On rail transport, Serbia's state railways is organized as follows: MCTI is responsible for policy direction and funding of railways. The Railways Directorate (RD) is the railway market and safety regulator. Serbian Railways Infrastructure is an SOE for infrastructure management, responsible for construction, maintenance, and operation of the railway network. SerbiaTrain is an SOE responsible for the organization and delivery of rail passenger transport services. Serbia Cargo is an SOE responsible for the organization and delivery of rail freight services. Serbian Railways is a temporary organization with the remit of

[21] Source : Municipalities of Serbia Statistical Office, RZS 2020

generating revenue from various non-core railway assets and settling the court cases involving the former vertically integrated railway company."

. Work on ensuring the operational and financial sustainability of independent railway service/infrastructure operators is ongoing. SRI regularly updates its railway network statement. The new methodology for track access charges is currently under preparation. Further efforts are needed to ensure full compliance with both the acquis and Serbia's negotiating framework. Serbia continues to make good progress on rail market opening with nine private freight companies operating on the market in 2020 but further efforts are required to ensure full opening of the rail market, including on the issuance of train drivers' licenses and safety certificates for railway undertakings and mutual recognition of the rolling stock. In May 2018, Serbia adopted new laws on railways, railway safety and railway interoperability achieving a high level of alignment with EU legislation on establishing a single European railway area. Further improvements regarding training capacity, examination methods and licensing procedures are still pending as is the publication of the remaining technical specifications for interoperability. Sustainable and costed railway infrastructure maintenance plans need to be developed. The Directorate for Railways in its function as a regulatory body and safety authority needs to be further strengthened and its decisions implemented. Railway transport is decreasing in size and role. 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[22.] As one example, an average of 39 percent of scheduled passenger and 37 percent 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 wagons are designed for people with disabilities, train stations are not adjusted for people with special needs or for vulnerable groups like women.

There are a total of 116 level crossings on the Belgrade - Niš line. Of these 116 crossings, 23 crossings belong to sections that are not subject to this optional analysis (Belgrade - Resnik, Gilje - Paraćin, Stalać - Djunis and Trupale - Niš). The other 93 level crossings are located on the sections that are the subject of this optional analysis.

Of the considered 93 level crossings, 63 of them are with active signalization, and 30 with passive signalization.

[22] RZS, 2019: 329-330

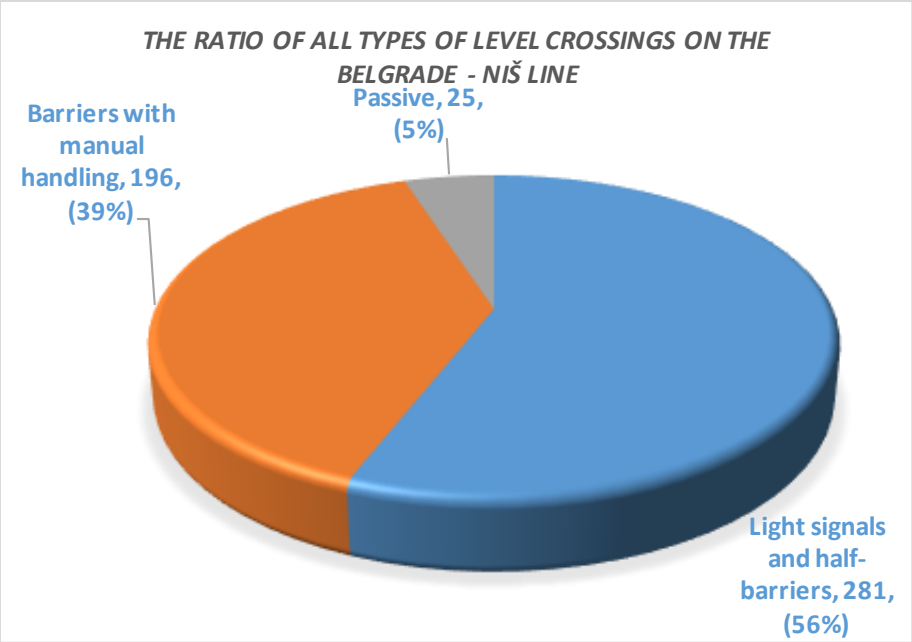

Figure 47 The ratio of all types of level crossings on the Belgrade - Niš line

The table here below shows the basic data of all level crossings on the line Belgrade - Niš.

Table 69 Basic data of all level crossings on the line Belgrade - Niš

No.	Name	Chainage	Relative distance [m]	No. tracks on LC	Competent station	Inter locking system	Angle	Station zone	Staffed	Road rank
1	PP4-3	14,604	-	2	Resnik	3	90	Y	N	Street
2	PP5-1	15,556	952	1	Resnik	1	90	N	N	Local
3	PP6-1	16,082	526	1	Resnik	1	55	N	N	Agricultural
4	PP7-1	17,472	1,390	1	Resnik	1	90	Y	N	Agricultural
5	PP8-1	18,408	936	1	Resnik	1	90	Y	N	Agricultural
6	PP9-1	19,454	1,046	1	Resnik	1	90	N	N	Agricultural
7	PP10-3	20,183	729	1	Ripanj	3	66	N	N	Local
8	PP11-3	21,858	1,675	2	Ripanj	3	90	Y	N	IIb (346)
10	PP13-3	25,396	3,538	1	Klenje	3	90	Y	N	Local
11	PP14-3	26,923	1,527	1	Klenje	3	71	N	N	Local
12	PP15-1	27,634	711	1	Ripanj tun.	1	90	N	N	Agricultural
13	PP16-1	28,478	844	1	Ripanj tun.	1	90	N	N	Agricultural
14	PP17-3	34,436	5,958	3	Ralja	3	90	Y	N	IIb (349)
15	PP18-1	38,260	3,824	1	Sopot Kosmajski	1	90	N	N	Agricultural
16	PP19-3	41,841	3,581	1	Sopot Kosmajski	3	90	Y	N	IIa (150)
17	PP20-3	45,144	3,303	1	Vlaško Polje	3	90	N	N	Local
18	PP21-3	47,286	2,142	1	Vlaško Polje	3	90	Y	N	Local
19	PP22-3	48,348	1,062	1	Vlaško Polje	3	90	Y	N	Local
20	PP23-3	49,919	1,571	1	Vlaško Polje	3	90	N	N	Local
21	PP24-3	51,813	1,894	1	Vlaško Polje	3	90	N	N	Local
22	PP25-1	55,032	3,219	1	Mladenovac	1	72	N	N	Local
23	PP26-1	56,592	1,560	1	Mladenovac	1	90	N	N	Agricultural
24	PP27-3	59,265	2,673	1	Kovačevac	3	90	Y	N	Local
25	PP28-3	62,912	3,647	1	Kovačevac	3	90	N	N	Local
26	PP29-1	64,866	1,954	1	Kusadak	1	90	N	N	Agricultural

No.	Name	Chainage	Relative distance [m]	No. tracks on LC	Competent station	Inter locking system	Angle	Station zone	Staffed	Road rank
27	PP30-1	65,781	915	1	Kusadak	1	90	N	N	Agricultural
28	PP31-3	67,080	1,299	1	Kusadak	3	90	Y	N	Local
29	PP32-1	69,542	2,462	1	Kusadak	1	90	N	N	Agricultural
30	PP33-1	70,260	718	1	Glibovac	1	90	N	N	Agricultural
31	PP34-1	74,561	4,301	1	Glibovac	1	90	Y	N	Agricultural
32	PP35-3	78,247	3,686	1	Palanka	3	90	Y	N	IIa (156)
33	PP36-3	79,362	1,115	1	Palanka	3	70	Y	N	IIa (147)
34	PP37-1	84,364	5,002	1	Mala Plana	1	90	N	N	Agricultural
35	PP38-3	85,099	735	1	Mala Plana	3	90	Y	N	Street
36	PP39-1	91,148	6,049	2	Velika Plana	1	90	Y	N	Street
37	PP40-3	91,928	780	2	Velika Plana	3	90	N	N	Local
38	PP41-1	93,035	1,107	2	Velika Plana	1	90	N	N	Local
39	PP42-3	94,060	1,025	2	Velika Plana	3	75	N	N	Local
40	PP43-1	94,923	863	2	Velika Plana	1	90	N	N	Local
41	PP44-1	96,921	1,998	2	Velika Plana	1	110	N	N	Local
42	PP45-3	97,711	790	2	Velika Plana	3	90	N	N	Local
43	PP46-1	98,617	906	2	Velika Plana	1	90	N	N	Local
44	PP47-3	99,939	1,322	2	Velika Plana	3	90	Y	N	Street
45	PP48-3	100,976	1,037	3	Velika Plana	3	90	Y	N	Ib (27)
46	PP49-1	102,927	1,951	2	Lapovo	1	90	N	N	Local
47	PP50-3	105,545	2,618	2	Lapovo	3	80	N	N	Street
48	PP51-1	111,392	5,847	2	Bagrdan	1	70	N	N	Local
49	PP52-1	112,206	814	2	Bagrdan	1	75	N	N	Local
50	PP53-3	114,196	1,990	2	Bagrdan	3	90	N	N	Local
51	PP54-1	115,327	1,131	2	Bagrdan	1	90	N	N	Local
52	PP55-3	116,995	1,668	2	Bagrdan	3	90	N	N	Local
53	PP56-4	120,532	3,537	5	Bagrdan	4	90	Y	Y	Local
54	PP57-3	120,909	377	2	Bagrdan	3	60	Y	N	Local
55	PP58-1	128,121	7,212	2	Bagrdan	1	90	N	N	Local
56	PP59-3	131,308	3,187	2	Jagodina	3	90	N	N	Local
57	PP60-4	134,879	3,571	2	Jagodina	4	90	Y	Y	IIa (185)
58	PP61-1	138,650	3,771	2	Jagodina	1	90	N	N	Local
59	PP62-3	155,570	16,920	3	Paraćin	3	75	Y	N	street
60	PP63-3	156,065	495	2	Paraćin	3	85	N	N	Street
61	PP64-1	157,386	1,321	2	Paraćin	1	90	N	N	Local
62	PP65-3	158,969	1,583	2	Paraćin	3	90	N	N	Street
63	PP66-3	162,516	3,547	2	Paraćin	3	90	N	N	Local
64	PP67-3	163,819	1,303	2	Paraćin	3	90	N	N	Local
65	PP68-3	164,596	777	2	Paraćin	3	90	N	N	Local
66	PP69-3	166,671	2,075	2	Paraćin	3	90	N	N	Street
67	PP70-3	168,193	1,522	2	Paraćin	3	90	N	N	Local
68	PP71-1	169,161	968	2	Ćićevac	1	90	N	N	Agricultural
69	PP72-3	171,810	2,649	2	Ćićevac	3	90	Y	N	IIa (220)
70	PP73-3	173,684	1,874	2	Stalać	3	90	N	N	Street
71	PP74-3	198,026	24,342	2	Djunis	3	90	N	N	Local
72	PP75-3	199,090	1,064	2	Djunis	3	90	N	N	Street
73	PP76-3	199,924	834	2	Djunis	3	90	N	N	Street
74	PP77-3	201,565	1,641	2	Korman	3	90	N	N	Agricultural

No.	Name	Chainage	Relative distance [m]	No. tracks on LC	Competent station	Inter locking system	Angle	Station zone	Staffed	Road rank
75	*PP78-3*	*201,978*	*413*	2	Korman	3	90	N	N	Street
76	*PP79-3*	*202,819*	*841*	2	Korman	3	90	N	N	Local
77	*PP80*	*203,893*	*1,074*	2	Korman	?	90	N	N	Local
78	*PP81-3*	*205,395*	*1,502*	2	Korman	3	90	Y	N	Local
79	*PP82-3*	*206,423*	*1,028*	2	Korman	3	90	Y	N	Local
80	*PP83-3*	*208,814*	*2,391*	2	Adrovac	3	90	N	N	Local
81	*PP84-3*	*212,914*	*4,100*	2	Aleksinac	3	90	N	N	Street
82	*PP85-3*	*213,746*	*832*	2	Aleksinac	3	90	Y	N	Street
83	*PP86-3*	*215,364*	*1,618*	2	Aleksinac	3	90	N	N	Street
84	*PP87-3*	*217,519*	*2,155*	2	Aleksinac	3	90	N	N	Street
85	*PP88-3*	*218,782*	*1,263*	2	Aleksinac	3	90	N	N	Local
86	*PP89-3*	*220,749*	*1,967*	2	Aleksinac	3	90	N	N	Local
87	*PP90-3*	*222,057*	*1,308*	2	Aleksinac	3	90	N	N	Local
88	*PP91-3*	*223,308*	*1,251*	2	Aleksinac	3	90	N	N	Local
89	*PP92-4*	*224,942*	*1,634*	5	Grejač	4	90	Y	Y	Street
90	*PP93-3*	*228,082*	*3,140*	2	Grejač	3	70	N	N	Local
91	*PP94-3*	*229,604*	*1,522*	2	Grejač	3	90	N	N	Local
92	*PP95-3*	*231,540*	*1,936*	2	Grejač	3	90	N	N	Local
93	*PP96-3*	*232,635*	*1,095*	2	Grejač	3	90	N	N	Local
94	*PP97-3*	*233,571*	*936*	2	Niš	3	90	N	N	Local

Legislation in the Republic of Serbia does not allow the existence of level crossings on railway lines and sections of railway lines where the speed of trains is higher than 160 km/h. In addition, the Law does not leave room for the existence of level crossings in three other important situations:

1. When the level crossing implies the intersection of a road with more than two railway tracks
2. When the level crossing implies the intersection of the road with station tracks
3. When the level crossing implies the intersection of high rank road (Ib or IIa rank) with railway line.

So, in all options, level crossings belonging to one of the four above mentioned groups have been identified and proposed for deleveling. All other level crossings can be classified to one of the two other possible groups:

1. Level crossings with active signalizaton
2. Level crossings with passive signalization

In this phase of design, all level crossings have been identified and if they belong to the group of crossings with passive signalization, a proposal was made to raise the level of security. It means that such a crossing needs to be equipped with automatic traffic safety device. If they belong to the group of level crossings with active signalization, it is proposed to keep them in that form.

In the next design phase, it is necessary, for each level crossing that belongs to one of the first four groups (for which the law provides deleveling), to examine whether the level crossing should be deleveled or closed. In case of closure, vehicle flows should be redirect to the next crossing (leveled or deleveled). Additionally, when level crossings are leveled, the possibility of deleveling or their closing should be considered.

From the attached Table 50, it can be seen that 27 level crossings are located in the station zone (between the enter signal of the station on one side to the enter signal of the station on the other side). Also, considering roads, most level crossings are at the intersection of the railway with local municipal roads (See figure below).

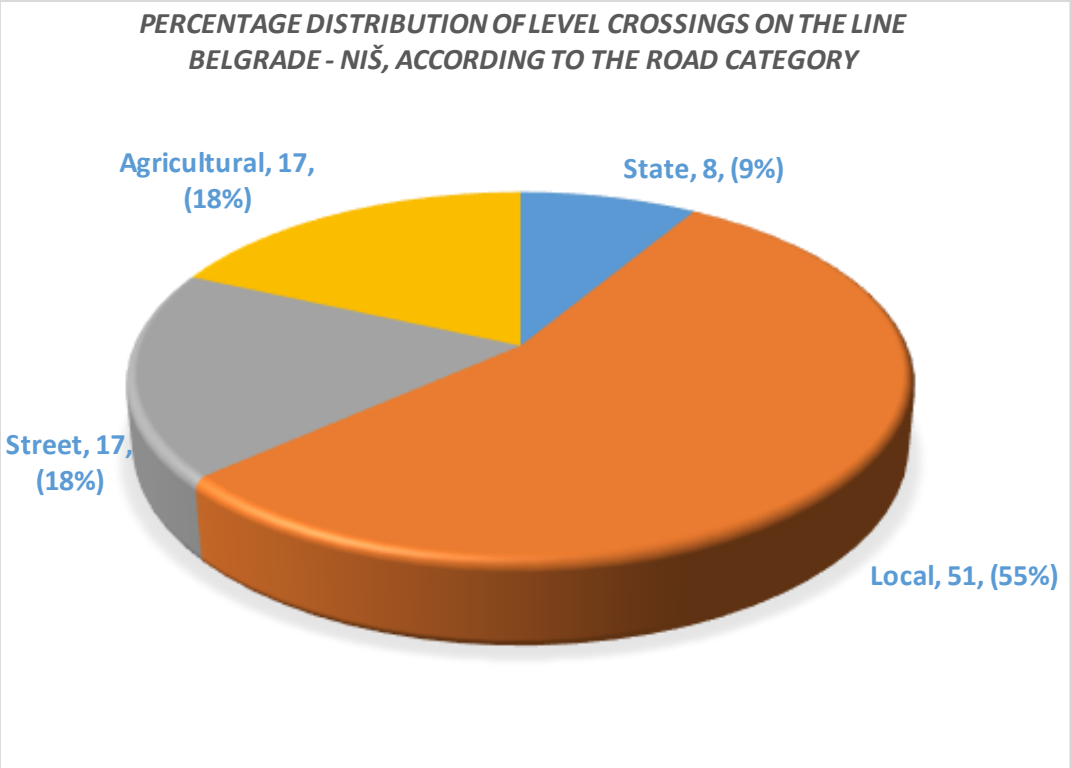

Figure 48 Percentage distribution of level crossings on the line Belgrade - Niš, according to the road category

During the Scoping phase consultation with local communities, almost all of them had requested that existing areas where the rail is currently crossed are kept subject to any safety requirements. In case the crossings turn into underpasses or overpasses, this needs to be consulted with the local communities given that they have requested adequacy of width for large agricultural machinery to be able to move from one side to the other.

Desktop data were not available in more details for the Project area. Gaps shall be closed during the ESIA stage through field studies as indicated in the section Assumptions and limitations. During the next Phase details of the use of these crossings, livelihood, dependency etc shall be examined.

5.2.14 Utilities

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.

Water supply sources. 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 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 is concentrated; 7 regional public utilities (including Belgrade waterworks) provide service to several large municipalities covering 31% of the population). One-hundred forty-five municipal public utilities serve 44% of the Self provision 25% Belgrade waterworks 22% 6 regional companies 9% 145 municipal companies 44% Overall, 150 utilities provide both water and sanitation services. In rural areas, inhabitants rely on self-provision (RSO 2012b). The area of water supply networks in the impacted Municipalities is observed in the table below.

Table 70 Length of water supply[23]

Area / Municipalities	in km	Area / Municipalities	in km
Republic of Serbia	46444	Ćuprija	68
City of Belgrade	5829	Paraćin	336
Velika Plana	633	Ćićevac	52
Lapovo	96	Kruševac	935
Batoćina	No data	Aleksinac	205
Svilajnac	298	City of Niš	1449
Jagodina	289		

The data in the tables on the number of households connected to the water supply and sewerage network are indicative, because the data on the number of households are from the 2011 Census, and the data on connections from 2017. Despite these discrepancies, we see that more than ten percent of the shares are not connected to the water supply network. Surprising data for the City of Nis in which almost half of households do not have a connection to the water supply network. When observing the affected Municipalities, we note that the access to water ranges between 53.6% and 96.7% of the total population. Affordability is not yet a constraint, but may become so for segments of the population. In 2012, the potential water bill for an average family was around 1.2% of their household income, and 1.9% of income for the bottom 40%

Data on the percentage of households connected to the sewerage network show that just over one third of households are safe when it comes to wastewater disposal. According to this indicator, the data for the City of Nis and the Municipality of Aleksinac are unexpectedly low. This indicates that a number of households are using open discharge options and are dependent on septic tanks. The ESIA will also map any such sensitive receptors, especially in the areas where river works are anticipated as much of these receptors are around river and canals. The Municipality of Aleskinac is one of such receptors.

Table 71 Households with Sewer connection in 2019

Area / Municipalities	Number of households connected to sewer networks	% of total number of households
Republic of Serbia	1572314	35,0%
City of Belgrade	540132	89,1%
Velika Plana	4305	33,4%
Lapovo	598	24,2%
Batočina	No data	
Svilajnac	4150	53,8%
Jagodina	14467	58,1%
Ćuprija	7105	67,7%
Paraćin	12500	74.9%
Ćićevac	152	5,1%
Kruševac	24983	61,0%
Aleksinac	4822	28,3%
City of Niš	34458	38,3%

[23] Source Devinfo 2019

6. PROJECT ALTERNATIVES

6.1 Methodology of Alternatives Assessment

The main objective of the project is to modernize the existing railway line in compliance with TEN-T standards, making it a reliable and competitive mode of transport and increasing passenger and 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. Given the category of the line, it should comply with internationally agreed Technical Specifications for Interoperability and with the technical requirements for the core TEN-T.

The main categories of criteria that were taken into consideration are the following:

- Compliance - regarding standards and transport strategies
- Financial - regarding investment, operational and maintenance costs,
- Demand - regarding cost effectiveness, travel time and accessibility
- Operation - regarding line capacity utilization, technological complexity, etc.
- Impact – regarding environment, climate change and social aspects
- Safety – regarding safety on rail-road crossings and impact on the transport safety system as a whole, and
- Risks - regarding design, approval, land expropriation, construction, etc.

Following the strategic objectives and main criteria from above, a number of sub-criteria have been proposed for consideration. The goal was to present any significant differential impacts between the options, so the initial number of defined sub-criteria was reduced by eliminating those criteria in which no significant difference between options was observed or assumed. List of all sub-criteria is shown in the following table.

Table 72 Assessed weights for criteria

Main criteria	Initial weight for main criteria [%]
Financial	22%
Demand	20%
Operation	13%
Social & Environmental	22%
Safety	12%
Risks	11%

It was found that some sub-criteria have a strong correlation with each other, while some are of the same nature and type, so it was suggested that set of sub-criteria can be further reduced by combining some of them. Also, some of criteria have been replaced by others that better reflect the individual impact of variants.

6.2 Description of the options

6.2.1 Initial Evaluation of alternatives

Five variants of the reconstruction and modernization of the Belgrade - Niš railway have been developed for the route of the two-track railway line through Mladenovac in the technical study which was carried out in May 2021. The main goal of the Technical study was to develop basic variants of railway line Belgrade - Niš, combining sections of different speed limits, from 100 km/h up to 200 km/h. The speed within the Belgrade railway node and within the Niš railway node is limited at 100 km/h in all variants due to the restrictions in densely populated parts of cities and limitations of the existing infrastructure. The technical parameters are shown in the following table.

Table 73 Main technical parameters for modernization of Belgrade - Niš railway line

	V [km/h]	R [m]
Minimum Curve radius	200	3000 (minimum 2500)
	160	2000 (minimum 1500)
	120	700
	100	500

Clearance	UIC GC		
Grades	Open track	Stations	Tunnels
	max 12,5 ‰	max 1,0 ‰	max 4,0 ‰

Track distance	Open track	Stations
	4,5 m (min. 4,2 m)	4,75 m
Length of side tracks	750 m (min. 650 m)	
Length of platforms	Stations	Stops
	220-400 m	110 m

Combination of speed limits along the railway line Belgrade - Niš, which were used during elaboration of variants, is presented in the table below:

Table 74 Speed limits on sections in all variants

Beograd Centar - Nis railway line				Variant I								Variant II								Variant III								Variant IV								Variant V							
Section	L	Subsection	L	Speed	Proposed speed								Speed	Proposed speed								Speed	Proposed speed								Speed	Proposed speed								Speed	Proposed speed						
					100 km/h		120 km/h		160 km/h		200 km/h			100 km/h		120 km/h		160 km/h		200 km/h			100 km/h		120 km/h		160 km/h		200 km/h			100 km/h		120 km/h		160 km/h		200 km/h			100 km/h		120 km/h		160 km/h		200 km/h	
	km		km		km	%	km	%	km	%	km	%		km	%	km	%	km	%	km	%		km	%	km	%	km	%	km	%		km	%	km	%	km	%	km	%		km	%	km	%	km	%	km	%
Beograd Centar - V. Plana	86	Beograd Centar - Rasp. G	4	100	4	100							100	4	100							100	4	100							100	4	100							100	4	100					
		Rasputnica G - Resnik	7		7	100								7	100								7	100								7	100								7	100					
		Total:	**11**		**11**	100								**11**	100								**11**	**100**								**11**	**100**								**11**	**100**					
		Resnik - Klenje	11	160					11	100			200							11	100	max length of 200							11	100	opt length of 200					5	45	6	55	min length of 200			2	18	4	36	5	45
		Klenje - Djurinci	16						16	100										16	100								16	100						7	44	9	56				2	13	5	31	9	56
		Djurinci - Velika Plana	48						48	100										48	100								48	100						13	27	35	73				9	19	15	31	23	48
		Total:	**75**						**75**	100										**75**	**100**								**75**	**100**						**25**	**33**	**50**	**67**				**13**		**24**		**37**	**49**
Velika Plana - Gilje	49	Velika Plana - Lapovo	18	200							18	100	160					18	100			max length of 200			1	6	4	22	13	72	opt length of 200	1	6	4	22			13	72	min length of 200			2	11	11	61	5	28
		Lapovo - Gilje	31								31	100						31	100							10	32	21	68						10	32	21	68						22	71	9	29
		Total:	**49**								**49**	**100**						**49**	**100**						**1**	**2**	**14**	**29**	**34**	**69**		**1**	**2**	**4**	**8**	**10**	**20**	**34**	**69**				**2**	**4**	**33**	**67**	**14**	**29**
Gilje - Djunis	47	Gilje - Paracin	11								11	100						11	100										11	100						11	100						11	100				
		Paracin - Stalac	22								22	100						22	100										22	100						1	5	21	95				2	9	20	91
		Stalac - Djunis	14								14	100						14	100										14	100						14	100						14	100		
		Total:	**47**								**47**	**100**						**47**	**100**										**47**	**100**						**26**	**55**	**21**	**45**						**27**	**57**	**20**	**43**
Djunis - Trupale	39	Djunis - Aleksinac	16								16	100						16	100										16	100						8	50	8	50						10	63	6	38
		Aleksinac - Trupale	23								23	100						23	100						3	13			20	87				3	13	6	26	14	61				3	13	12	52	8	35
		Total:	**39**								**39**	**100**						**39**	**100**						**3**	**8**			**36**	**92**				**3**	**8**	**14**	**36**	**22**	**56**				**3**	**8**	**22**	**56**	**14**	**36**
Trupale - Medjurovo	7		7	100	7	100							100	7	100							100	7	100							100	7	100							100	7	100					
Total:	**228**				**18**	**8**			**75**	**33**	**135**	**59**		**18**	**8**			**135**	**59**	**75**	**33**		**18**	**8**	**4**	**2**	**14**	**6**	**192**	**84**		**19**	**8**	**7**	**3**	**75**	**33**	**127**	**56**		**18**	**8**	**18**	**8**	**106**	**46**	**85**	**37**

Variant I was generated from the previous idea for modernization of the railway line where section Belgrade (Resnik) - Velika Plana would be upgraded to 160 kmh, while section Velika Plana - Niš (Trupale) would be constructed for 200 kmh. Variant II was just the opposite, section Belgrade (Resnik) - Velika Plana have been planned for 200 km/h, while Velika Plana - Niš (Trupale) was planned for 160 km/h. Therefore, both variants were introduced in the Technical study as a starting point for further development, as it was agreed at the initial meetings with the SRI.

Since both variants did not consider terrain conditions, technical characteristics, environmental, social and financial aspects in order to optimize costs and travel times, they were rejected from the beginning by the decision from the final beneficiary – SRI and MCTI. Therefore, the remaining three variants were proposed and accepted by the SRI and MCTI to be elaborated in the PFS with more details.

Additionally, the variants excluded did not consider already developed designs and executed works on the respective sections, which disabled a combination of sub-sections with different speeds. For the section Velika Plana - Niš in Variant I, there are already completed technical documentation for section Stalać - Djunis for 160 km/h and construction works is already tendered since last year, while section Gilje - Ćuprija has been already reconstructed for 160 km/h including the construction of the new bridge over Velika Morava river.

As a conclusion, it was decided to continue the further analysis of remaining variants III, IV and V that became variants I, II and III in the Pre-Feasibility Study.

6.2.2 Final Variants description

The Conceptual design of reconstruction and modernization for Belgrade-Nis railway line include possibilities of reconstrucition the existing single track line to double track from Resnik to Velika Plana and from Stalac to Djunis. On the other parts of the railway line the reconstruction and upgrade for the speed of 160-200 km/h is envisaged.

The speed at the Belgrade railway junction (section Belgrade Centre - Rasputnica (Junction) "G" - Resnik) and the Niš junction (section Trupale - Niš Ranžirna (Marshalling) - Medjurovo) is 100 km/h in all variants, due to the restrictions in densely populated parts of cities and limitations of the existing infrastructure.

The facts that have been taken into account are that the section Gilje - Ćuprija has already been built (including the new double track bridge over the Velika Morava River) and that the Preliminary design for the section Stalać - Djunis has been completed, in both cases for speeds up to 160 km/h.

The Niš - Brestovac section is currently under construction and Medjurovo station is included. Because of that, the Belgrade - Niš railway line ends in front of Medjurovo station in all three variants.

The planned works on station facilities per variant is given below.

Table 75 Planned works on station facilities per variant

No.	Chainage	Official place	Variant I			Variant II			Variant III		
			New	Exist.	No	New	Exist.	No	New	Exist.	No
1	0+000	Belgrade Centre			•			•			•
2	5+950	Rakovica			•			•			•
3	11+300	Resnik			•			•			•
4	18+000	Ripanj		•			•			•	
5	21+900	Ralja	•			•			•		
6	37+400	Sopot Kosmajski		•			•			•	
7	48+900	Mladenovac		•			•			•	
8	60+250	Kusadak		•			•			•	
9	73+600	Smederevska	•				•			•	
10	85+400	Velika Plana		•			•			•	
11	95+200	Markovac		•			•			•	
12	102+300	Lapovo Varoš		•			•			•	
13	104+400	Lapovo		•			•			•	
14	116+000	Bagrdan		•			•			•	
15	129+700	Jagodina		•			•			•	
16	135+200	Gilje		•			•			•	
17	147+150	Paraćin		•			•			•	
18	163+600	Ćićevac	•				•			•	
19	168+300	Stalać		•			•			•	
20	181+900	Djunis		•			•			•	
21	192+500	Korman		•			•			•	

No.	Chainage	Official place	Variant I			Variant II			Variant III		
			New	Exist.	No	New	Exist.	No	New	Exist.	No
22	197+300	Adrovac		●			●			●	
23	200+000	Aleksinac	●			●				●	
24	204+700	Lužane		●			●			●	
25	211+400	Grejač		●			●			●	
26	215+600	Mezgraja		●			●			●	
27	220+850	Trupale		●			●			●	
28	227+600	Medjurovo			●			●			●

Below, an analysis of the Variants is given.

Variant I

Variant I was chosen so that the largest part of the railway is designed for speeds up to 200 km/h, with an expected increase in investment costs. This speed is achieved on 84% of the line, being about 192 km out of the total length of 227,032 km.

At the Belgrade railway junction, the existing double track railway line is retained from the Belgrade Centre to Resnik station. The design speed on this section is 100 km/h except before and after Rakovica station where the speed is limited to 10 km/h due the switches construction problem.

Just after the Resnik station the alignment of the double-track railway line abandons the existing alignment because the characteristics of the existing curves that do not allow the speed more than 70-80 km/h and runs along a new corridor (involving new land take) close to the existing one but with curve radii that enable speed of 200 km/h.

On the Resnik-Mladenovac section, three railway stations are planned at new locations instead of the existing stations: Ripanj, Ralja and Sopot Kosmajski.

Mladenovac station is retained at its current position because of high density urban zone and impossibility to find an adequate new location. The design speed in the area of the station is limited to 100-120 km/h. After Mladenovac station the alignment abandons the existing line again all the way to Velika Plana station except in the zone of Kusadak station which is at the same position as the existing one.

Smederevska Palanka station for this Variant is at a new location (involving new land take), on the outskirts of the city in order to achieve the design speed up to 200 km/h due to narrow existing corridor through the city centre with several level crossings in that zone.

Velika Plana station remains in its existing location because of impossibility to find the new location without crossing over the Belgrade-Nis highway and far from the city. Another issue is to connect the existing railway line from Mala Krsna (single track line from Belgrade and Pozarevac).

From Velika Plana station to Lapovo Putnička (Passenger) station the existing corridor is retained, due to the existence of the marshalling yard between Lapovo Varoš and Lapovo Putnička (Passenger) station with micro displacement because of bigger curve radii.

Markovac station remains at the same position.

After Markovac station, the line remains in the same corridor as the existing line, except where radii of curves are increased to allow the speed to be 200 km/h, which would involve some land acquisition. This solution is adopted all the way to Jagodina station which remains in the same position as well as Bagrdan station, and onwards to Gilje within the same corridor. At places with bigger curve radii the new alignment has been moved from the existing one (involving new land take).

The Gilje - Paraćin section was reconstructed several years ago for the design speed of 160 km/h and is not taken into account.

From Paraćin to Stalać, the line remains in the same corridor, with increased radii of curves for the speed up to 200 km/h and therefore, in those zones, the new alignment has been moved from the existing one and some land should be acquired.

Ćićevac station is at its new position outside urban areas.

The Preliminary design for the Stalać – Djunis section for the speed up to 160 km/h is finished and the Tender for execution of works is currently underway. At the exit of Djunis station the radii of curve are increased, in comparison with the Preliminary design.

Beyond this point, the existing corridor is retained, but radii of curves are increased to achieve 200 km/h all the way to Trupale station (involving new land take).

Korman and Adrovac stations are planned at the existing locations, while Aleksinac station is at a new location outside urban area with possibility of connection the existing industrial tracks in the city.

Finally, from Trupale station to Medjurovo station, the design speed is up to 100 km/h, due to the fact that this section is part of the Niš railway node and passes through Popovac marshalling yard.

Variant II

In Variant II, the possibility of achieving speed up to 200 km/h on the entire line from Belgrade to Niš (except for lines in junctions) was deliberated, with the exception of parts of the line where it was estimated that increase of the design speed would lead to a significant increase in investment, mainly due to local restrictions (railway stations located in urban areas), and most stations remain at their existing locations. Thus, Variant II runs through the existing corridor but with increased radii of curve, to achieve speeds of 200 km/h or 160 km/h, depending on the terrain and estimated increase in costs. The increased radii of curve will therefore involve that new land-take will be needed. The total length of Variant II is 228,160 km. The speed of 200 km/h is achieved on 127 km, being 56% of the total length of the line.

The areas which are different from the other Variants are the ones below;

- Just after the Resnik station the alignment of the double-track railway line abandons the existing alignment because the characteristics of the existing curves that do not allow the speed more than 70-80 km/h and runs along a new corridor close to the existing one but with curve radii that enable speed of 200 km/h.
- Smederevska Palanka station is retained at its existing location and design speed is up to 120 km/h in the city area.
- After Markovac station, the line remains in the same corridor as the existing line, except where radii of curves are increased to allow the speed to be 200 km/h. This solution is adopted all the way to Jagodina station which remains in the same position as well as Bagrdan station, and onwards to Gilje within the same corridor. At places with bigger curve radii the new alignment has been moved from the existing one but closer to the existing Belgrade Nis highway from km 120 to km 124.
- Ćićevac station are retained at their existing locations, unlike Variant I and design speed through station is 160 km/h.

Variant III

Variant III was based on the premise of minimum investments with maximum effects, i.e., with the major part of the railway line designed for 200 km/h, incurring the least possible construction costs, while all stations remain at their existing locations, and the design speed being up to 120 km/h in those areas. The total length of Variant III is 228,841 km. The speed of 200 km/h is achieved on 85 km, being 37% of the total length of the line.

- Just after the Resnik station the alignment of the double-track railway line abandons the existing alignment because the characteristics of the existing curves that do not allow the speed more than 70-80 km/h and runs along a new corridor close to the existing one but with curve radii that enable speed of 200 km/h (involving new land take).
- Smederevska Palanka station is retained at their existing locations and design speed is up to 120 km/h in the city area.
- Velika Plana station remains in its existing location because of impossibility to find the new location without crossing over the Belgrade-Nis highway and far from the city. Another issue is to connect the existing railway line from Mala Krsna (single track line from Belgrade and Pozarevac).
- After Markovac station, the line remains in the same corridor as the existing line, except where radii of curves are increased to allow the speed to be 200 km/h, and involving some acquisition of land. This solution is adopted all the way to Jagodina station which remains in the same position as well as Bagrdan station, and onwards to Gilje within the same corridor. At places with bigger curve radii the new alignment has been moved from the existing one as in the Variant II.

- Ćićevac station are retained at their existing locations, unlike Variant I and design speed through station is 160 km/h.

6.2.3 Synopsis of the MCA

In agreement with JASPERS, mathematical model for MCA was abandoned, and therefore the weight coefficients of individual criteria were not considered in the final form of Option Analysis.

6.2.3.1 Compliance

After the criteria analysis, from the main group "Compliance" no sub-criteria were selected. The reason for that was that all the proposed variants fully meet all the requirements of this group of criteria. Hence, comparison according to any of criteria from the "Compliance" group would not single out any variant as the best one, i.e. there would be a very strong correlation among them.

6.2.3.2 Financial performance

For the main criterion "Financial" all sub-criteria have been jointed into a single criterion. This has been done since operational and maintenance costs, in this phase, could be assessed as a percent of the investment costs, and therefore very strong correlation between these two criteria exists. Because of its importance, the criterion could not be eliminated, hance the combined criterion *"Estimated total costs"* remained. The values of the variants according to this criterion are expressed in millions of Euros. According the *"Estimated total costs"* criterion, Variant I is more than 11% more expensive compared to variant II, and almost 20% compared to Variant III.

Apart from *"Estimated total costs"*, variants were compared regarding *"Cost-effectiveness"*, considering time savings by variant, per Euro spent. Since operations of the freight trains are very sensitive to interactions with other trains' paths at the line, without complete timetable, model could not obtain realistic travel time of freight trains. For that reason, travel time of freight trains for all variants was assessed at same value, 174.62 minutes.

Since actual railway line does not support high-speed trains' operations, for travel time savings calculation travel times of direct trains are compared with all direct and long distant trains after the realization of the project. Although Variant I provides the highest time savings, due to very high investment costs it is also the least effective. It can be concluded that Variant III dominates over the remaining variants, according to the cost-effectiveness indicator, although it requires the least investment costs.

Due to such a large difference in *"Estimated total costs"*, Variant I should be excluded from further consideration, as it would have to be best ranked according to each individual sub-criterion, in order to be the best in general. Also, comparing "Cost-effectiveness", advantage of the Variant I is not high enough, considering the difference in total costs, which are significantly higher for that variant.

6.2.3.3 Demand

Regarding main criterion "Demand", and sub-criterion *"Estimated travel time of inter-city trains"* was selected for variants' comparison since this sub-criterion is relevant for policy makers. All three variants meet the basic project requirement, that the travel time should be shorter than two hours, while in Variant II the travel time is shorter by 8 minutes, compared to Variant III. Since all the Variants have to be designed in accordance with TSI for people with reduced mobility, this sub-criterion was left out from comparation.

6.2.3.4 Operational Profile

In order to compare the "Operational" requirements, the *"Operational efficiency"* sub-criterion was introduced, which is based on the uniformity of the maximum speeds, designed for each of the variants. In order to properly evaluate the values according to this sub-criterion, the sum of additional acceleration and deceleration times for the inter-city (high-speed) and regional trains has been determined; local trains have a maximum speed lower than designed, so they were not considered. Variant II has 14 speed-break-points for high-speed trains, while additional accelerations and decelerations of regional trains do not exist at all, while in Variant III, there are as many as 19 speed-break-points for high-speed trains and additional 9 speed-break-points for regional trains. All this led to a total additional time for Variant III of 20,27 minutes, compared to 7,54 minutes for Variant II. The Variant I has the least additional time, only 5,45 minutes, even with two speed-break-points for regional trains.

6.2.3.5 Social & Environmental Profile

Social and environmental impacts are sublimated through several indicators that are suitable for detail analysis in this stage of the project. Regarding the social aspect, the most sensitive is the impacts from physical displacement (resettlement) while from the aspect of environmental protection, two indicators were analysed, namely:

- estimated noise and vibrations' impact the population and
- estimated CO_2 emissions.

Since all environmental and social parameters will be analysed in the subsection below, the only parameter that is analysed here is the CO_2 *emissions.*

CO_2 emissions, which would result from the forecasted amount of railway transport, were determined on the basis of average CO_2 emissions per passenger km, considering passenger transport, i.e. CO_2 emissions per net-tonne km, considering freight railway transport. Since required statistics were not kept in Serbia, data on CO_2 emissions were taken from Annual environmental statistics for passenger and freight transport in Great Britain, for 2019. In the next phase an attempt should be made, to provide detailed statistical data on the age structure and number of road vehicles by type of the fuel and engine, in order to obtain more accurate data on GHG emissions in Serbian road network and especially at Belgrade-Nis corridor. CO2 emissions by rail transport, and road transport are given in the following tables. The values are determined for each variant and for the without of project case (WOP), based on the forecasted passenger and tonne kilometers for the first operational year (2028).

The approach in which the total CO_2 emissions generated by railway transport will not provide correct relationship, because the total emission depends on the forecasted transport volume, which is directly dependent on the travel times savings. It would be more correct to observe the savings in CO_2 emissions, which result from the modal-shift from road to rail transport.

Regarding *"CO_2 emission"* sub-criterion, Variant II would produce 265 tonnes more CO_2 emission than Variant III, but here should be emphasized that this would be the result of fewer generated passengers, as Variant III would generate more than 7.5 million pkms less, in the first year of operation.

In contrast, considering "Reduction in total transport CO_2 emissions due to modal-shift", Variant II would reduce total CO_2 emission by more than 570 tonnes compared to Variant III.

6.2.3.6 Safety features

Regarding the safety feature of each variant, two sub-criteria were analysed. These are:

Safety 01. The Expected number of accidents at level crossings,

Safety 02. Reduction of road accidents due to modal shift to a safer mode

The Expected number of accidents at level crossings

The parameter was calculated for each variant based on the type of remaining level crossings for each of them. It was assumed that after the project implementation, the crossings with the highest expected number of accidents per year level will be de-levelled.

Level crossings located on sections of the railway line intended for 200 km/h trains, as well as crossings which according to the Legislation cannot exist on new railway lines (crossings with more than two tracks, intersection of higher rank roads with station tracks, etc.), have been proposed for denivelation. All other crossings must be provided with modern active signalization. This includes the implementation of modern systems for providing traffic, light signals, and half-barriers.

The question of the type of barriers (or half-barriers) is not defined at this phase of design. In the next phase of design, the answer on this question will be given.

An average number of accidents on active level crossings was determined regarding annual number of accidents on level crossings on the whole SRI network. It was calculated that an expected annual number of level crossings' accidents for Variant II is 1,15 while for Variant III it is 1,73 in average. Therefore, having in mind this criterion, Variant II shows better preferences.

The main reason for these results is the fact that Variant III assumes 18 level crossings more, compared with Variant II. It should be emphasized that the similar ratio, around 0,7, would be obtained if a comparation of the risk of collision would be made, where the risk of collision was calculated by using EXCEL tool, which members of EBRD consider relevant.

The Reduction of road accidents due to modal shift to a safer mode

The sub-criterion was calculated based on number of accidents on the whole road network of Serbia. Realized vehicle-kms were taken from Statistical notebook of Serbia, while data of total number of accidents involving casualties was taken from OECD data, since more detailed statistics was not available. The difference in the nature

of obtained data on road accidents is the reason why this criterion was not combined with the previous one. For further calculation, data for year 2019 were used.

Regarding *"Reduction of road accidents due to modal shift to a safer mode"* sub-criterion, Variant II should provide greater reduction of road accidents, 12162 accidents in the first operational year, compared with reduction of 12132 accidents if Variant III would be selected. This is due to the lower attraction of passengers from the road transport in Variant III, due to the longer travel times compared to Variant II.

Eliminating a level crossing also implies that the trains do not need to brake for safety reasons, so there could be some additional time saving if a level crossing is removed, depending on the location. This was assumed within the PFS but, as a conservative assumption, it was not considered as a benefit in the CBA.

6.2.3.7 Risks profile

Within the "Risks" main criterion, *"Duration of construction period"* was analysed, due to assumption that the risk of delay would be higher in a variant with longer construction period. Variant III has shorter construction period than Variant II for more than 100 days. Also, due to less complex technical parameters, the design time of Variant 3 is also shorter, so construction could start two months earlier.

6.2.3.8 Meeting the basic project objectives

The basic project objectives are reflected in the requirements for railway modernization. Primarily, a travel time of less than two hours is required. Also, the objective is to increase traffic safety, especially at level crossings.

According to the results obtained by simulation, travel time of high-speed trains is shorter than two hours, for all three variants. Also, for all variants, travel times of trains of other categories is longer than two hours. However, target travel time should be compared with the travel time of the fastest category.

Modernization of the line, considering all three variants, assumes the implementation of modern ERTMS system, with ETCS level 2, for traffic management. Except the fact that the application of this system enables an increase in traffic operations, the traffic management safety will be further increased by replacing worn-out signalling and interlocking equipment.

Finally, the modernization of the line will eliminate all passive level crossings, since the crossings on sections where the designed speed is higher than 160 kmph must be de-levelled or removed, while active safety is planned on all the remaining level crossings.

The conclusion is that all three proposed variants enable the project objectives to be met.

The assessed weights for the criteria are presented in the table below:

Table 76 Assessed weights for remaining main criteria

Main criteria	Initial weight for main criteria [%]
Financial	22%
Demand	20%
Operation	13%
Social & Environmental	22%
Safety	12%
Risks	11%

Based on the assessed weights for the main criteria group, the weighting coefficients for each sub-criterion has been calculated and presented in the following table.

Table 77 Weighting coefficients for selected sub-criteria

Main criteria	Main criterion weight	Sub-criteria	Sub-criterion weight	Relative sub-criterion weight
Financial	22%	Estimated total investment costs	53%	11,66%
		Estimated maintenance costs	47%	10,34%
Demand	20%	Cost effectiveness ratio per passenger	61%	12,20%
		Estimated average weighted travel time in minutes	39%	7,80%
Operation	13%	Capacity utilization index	100%	13,00%
Social & Environment	22%	Population to be resettled (or properties to be expropriated)	32%	7,04%
		Reduction of external costs due to modal shift	32%	7,04%
		Estimated of noise and vibrations' impact the population	36%	7,92%
Safety	12%	Number of level crossings to be de-levelled and/or eliminated	69%	8,28%

		Reduction of road accidents due to modal shift to a safer mode	31%	3,72%
Risks	11%	Probability of construction delays	100%	11%

The final set of criteria, based on the above-mentioned principles and assigned weights, are listed in the table below:

Table 78 Final set of selected criteria

Main criteria	Label	Sub-criteria	Type	Relative sub-criterion weight
Financial	C1	Estimated total costs (investments, O&M)	cost	15,00%
Demand	C2	Estimated travel time of inter-city trains, in minutes	cost	15,00%
Operation	C3	Operational efficiency	cost	10,00%
Social & Environment	C4	Population to be resettled	cost	10,00%
	C5	CO_2 emission, in tonnes	cost	10,00%
	C6	Estimated noise and vibrations' impact the population	benefit	10,00%
Safety	C7	Expected number of accidents at level crossings	cost	10,00%
	C8	Reduction of road accidents due to modal shift to a safer mode	benefit	10,00%
Risks	C9	Duration of construction period, in days	cost	10,00%

In order to compare the Operational requirements, the *"Operational efficiency"* sub-criterion was introduced, which is based on the uniformity of the maximum speeds, designed for each of the variants. In order to properly evaluate the values, according to this sub-criterion, the sum of additional acceleration and deceleration times for the inter-city (high-speed) and regional trains has been determined; local trains have a maximum speed lower than designed, so they are not considered.

Table 79 Numerical values / scoring for all variants by each sub-criterion

Scores	C1	C2	C3	C4	C5	C6	C7	C8	C8
Variant 1	*2192.195*	*96.13*	*5.45*	*196*	*1.8*	*72298.11*	*0.160*	*6313.54*	*1705*
Variant 2	1959.940	99.94	7.54	178	1.9	72085.30	1.151	6127.13	1523
Variant 3	1830.875	107.96	20.27	101	2.0	71709.11	1.727	5714.35	1400

The results of the MCA and the selection of preferred options is provided after the findings of the environmental and social evaluation of the alternatives. In agreement with JASPERS, mathematical model for MCA was abandoned, and therefore the weight coefficients of individual criteria were not considered in the final form of Option Analysis.

6.3 Findings of the Alternatives Environmental and Social Assessment

The criteria chosen were decided taken into consideration the design stage (conceptual stage and PFS), i.e. the limited information provided at this stage, and the IFIs requirements respecting both EBRD and EIB.

6.3.1 Environmental evaluation

The criteria that initially were screened were biodiversity and protected areas, waters, floods and noise. The results showed that all criteria have some similar scores for all variants, except for noise. The MCA also took into consideration the criterion of reduction of external costs due to modal shift, placing it in the environmental and social category, which has been calculated by the design and CBA team. So:

Waters

All three proposed variants cross the same rivers and streams at different crossings. The table below shows all the water recipients crossed.

Table 80 Overview of the rivers crossed by the three variants

Section	
Belgrade - Velika Plana	**Velika Plana- Niš**
River crossings: Ralja, Resava, Bojanac, Mali Lug and Jasenica, Kubrušnica, Topčiderska and Lug.	**River crossings:** Gibavica Rečica, Rača, Lepenica, Grabovik, Konvanluk, Osaonica, St.Belica, Belica, Lugomir, Velika Morava, Crnica, Jovanovačka river, Akalavica, Toplik, Ražanjska river , Bučina, South Morava, Pločnik, Zmijarnik, Ribarska river, Srezovač river, Radevač river, Turija, Dašnička river, Juzna Morava, Bare, Nišava. **Stream crossings:** Grabovački , Kijevski , Ludi , Kameniti , Zmijič bara, Suvi , Mijatovački , Bačijski , Burdeljski , Slatinski , Suvajski , Planski , Vinogradski , Pajin , Krnji , Jabučki , Vretenjski , Livadski , Hajdučki , Kukin , Suvi , Suhotnički , Drenovački . **Next to the railway there are:** Žarkov stream , Simin stream .

From the rivers and streams above, there have been excluded for the evaluation those ones that all variants cross at the same point, since they may follow the existing alignment. Below, there are presented the streams and rivers, which are crossed at different locations by the Variants. More precisely:

Location 1

Variant I crosses Kurbusnica in two places and Jasenica in one place on the newly built route. The other two Variants use the existing railway and cross Jasenica only on the existing route.

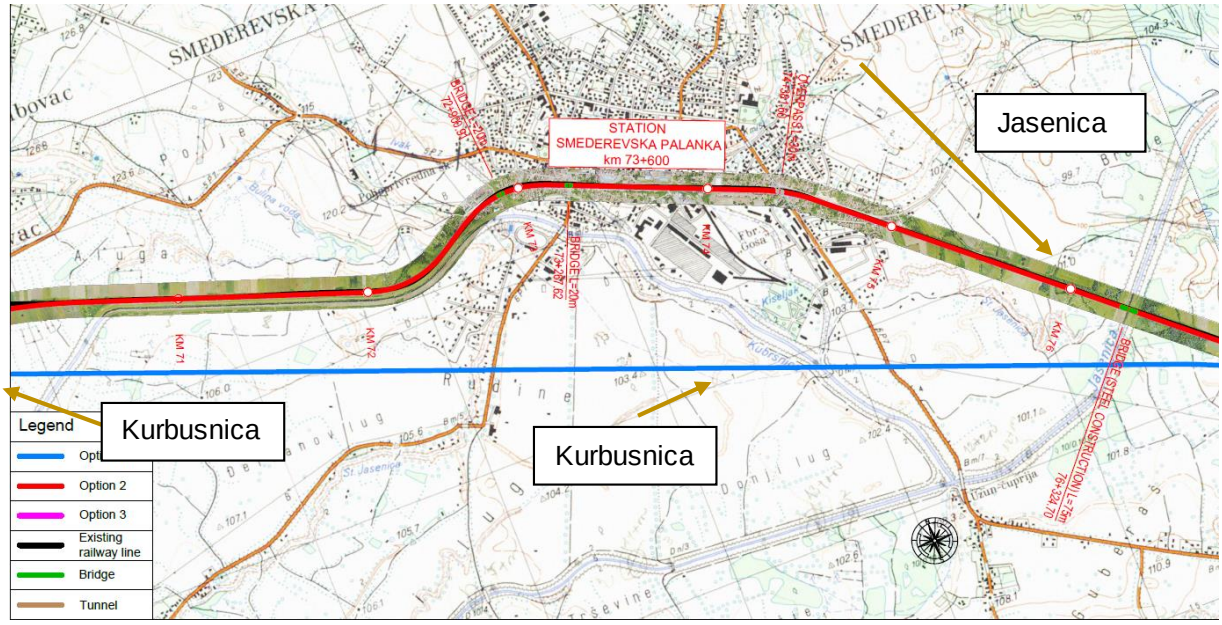

Figure 49 Variants close to the streams Kurbusnica and Jasenica (close to Smederevska Palanka)

Location 2

All three options cross the Grabovnik stream at a different location compared to the existing line.

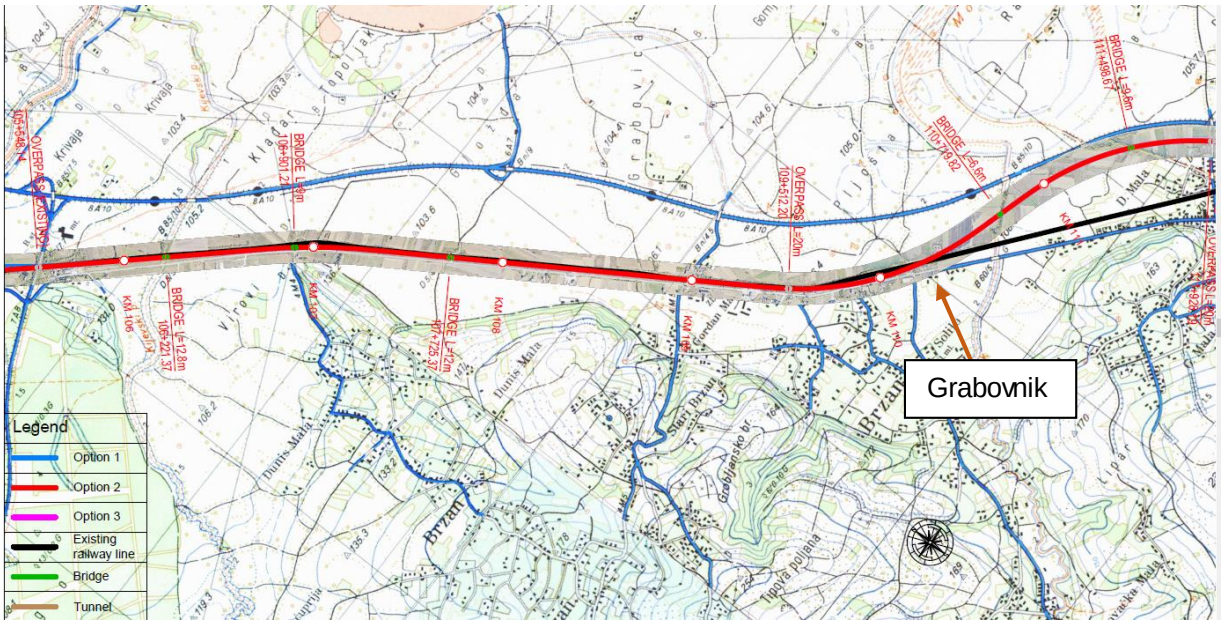

Figure 50 Variants close to the Grabovnik stream (before Brzan)

Location 3

All three variants use the newly built existing bridge over the Velika Morava, while the old (marked on the map as existing) railway was abolished.

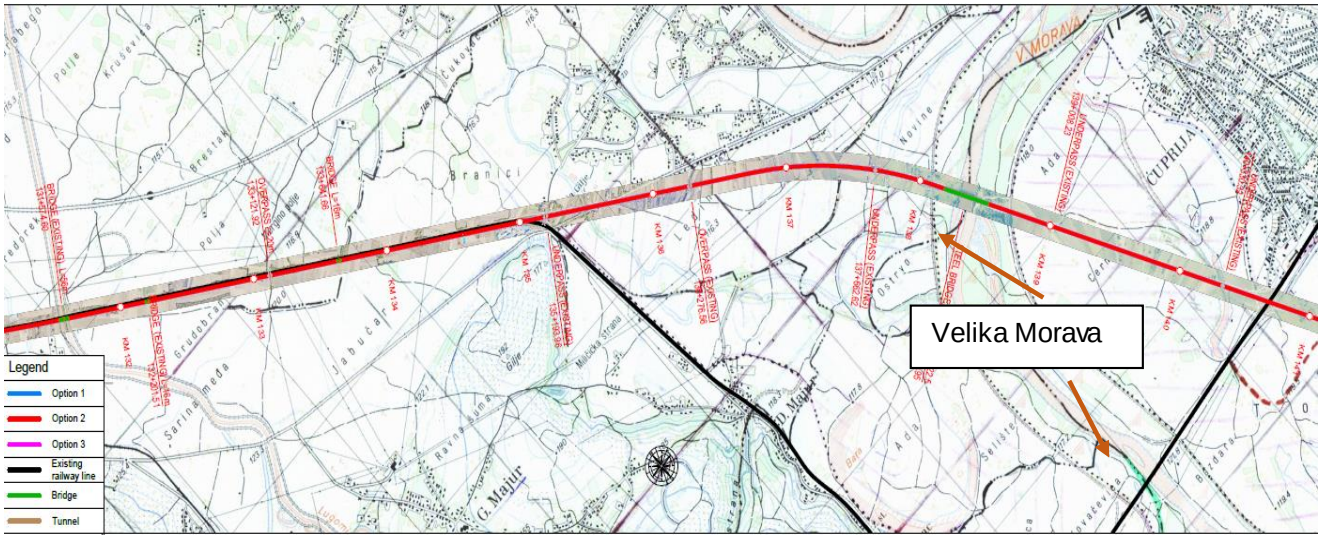

Figure 51 Variants close Velika Morava (before Cuprija)

Location 4

All the proposed variants cross the Juzna Morava while the existing railway follows the course of the river.

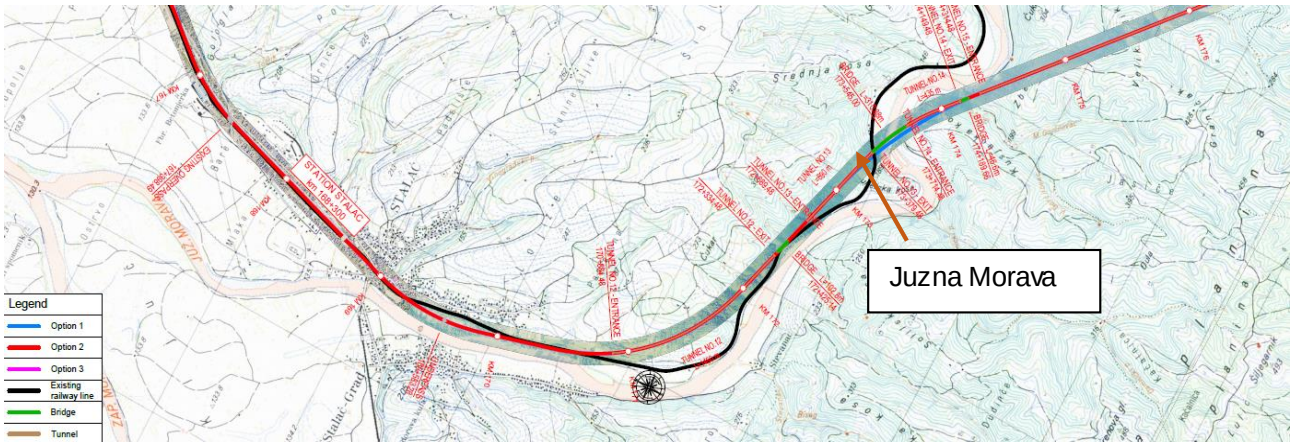

Figure 52 Variants close to Juzna Morava (close to station Djunis)

Location 5

Near Djunis, all variants cross the Ribarska river over the newly built route in the immediate vicinity of the existing route. The existing railway follows the course of the Juzna Morava through the Stalac gorge, crossing the river with existing bridge, while the proposed variants bypass the Juzna Morava.

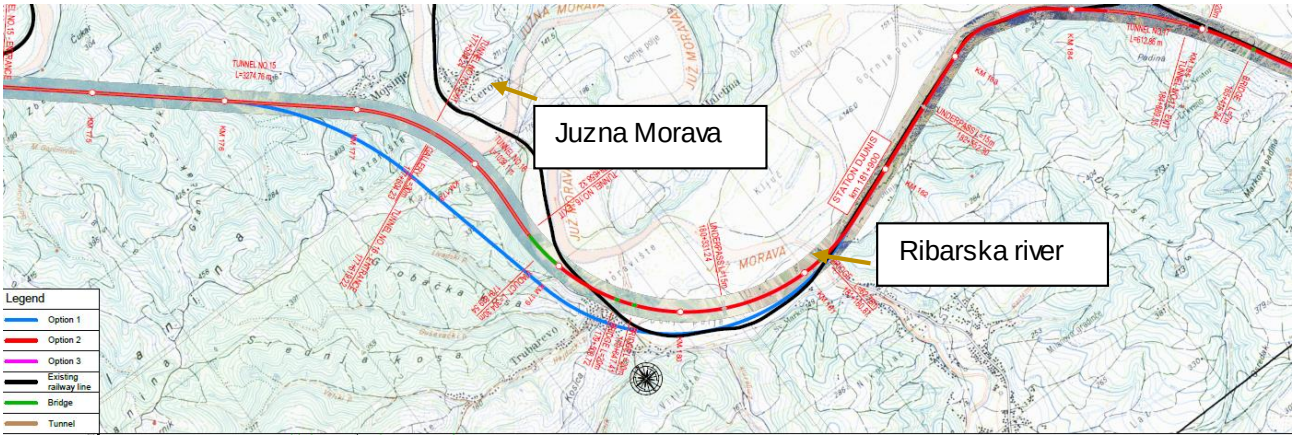

Figure 53 Variants close to Ribarska river and Juzna Morava river (after Stalac station)

Location 6

Variants I and II cross Suhotič stream while Variant III follows the existing line.

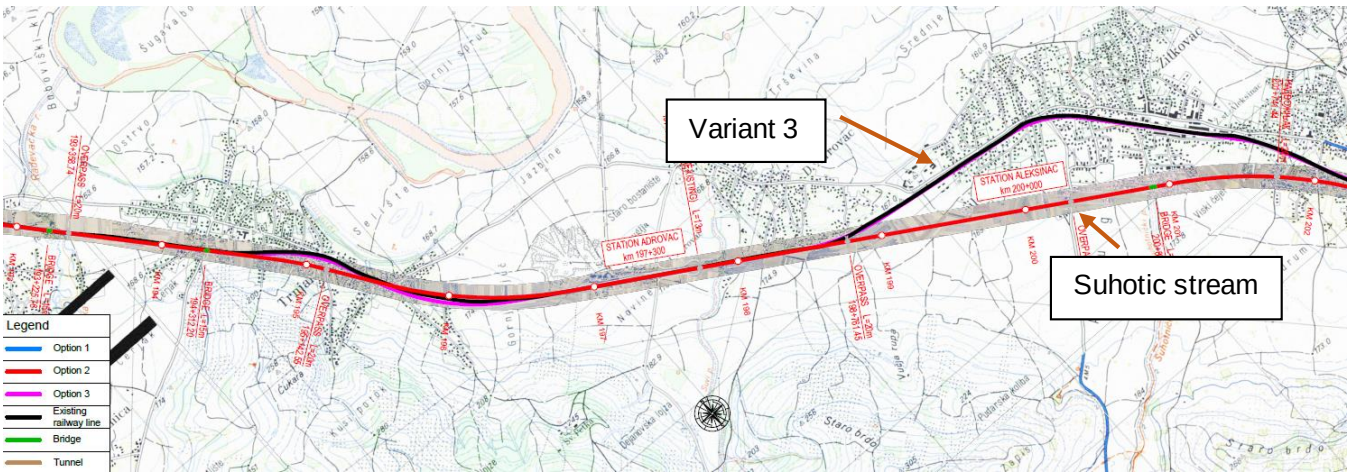

Figure 54 Variants close to Suhotic stream (close to Adrovac)

Location 7

All variants cross the Juzna Morava with a newly built bridge. Variants I and II cross Drenovač stream at the same place, while Variant III crosses a different place from Variants I and II. All variants cross Drenovač stream over the newly built bridge.

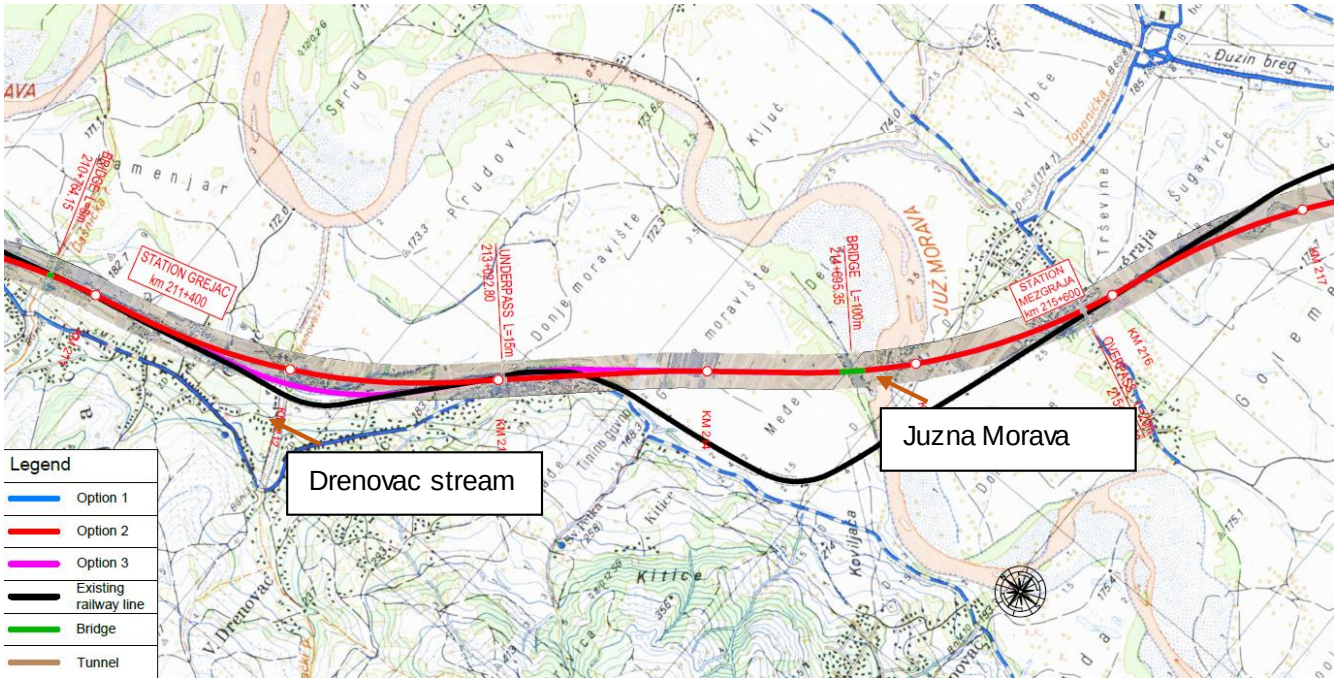

Figure 55 Variants close to Juzna Morava river and Drenovac stream (part between Station Grejac and station Mezoraja)

At this phase there are no surface water measurements carried out and therefore it is difficult to estimate the quality of the rivers and streams affected. There are data only for the three main rivers, Velika Morava, Juzna Morava and Nisava, the quality of which, taking into account the information presented in the surface waters section of the baseline, is not good. Compared to the above data, we can see that the construction of the railway would have an impact on Juzna Morava due to the construction of three new bridges, while the crossing of the Velika Morava and Nisava is carried out by the existing bridges.

Therefore, taking into account the lack of data on the quality of rivers and streams and the very early stage of design, this criterion can be assumed that has an equal result in the evaluation of the alternatives.

Biodiversity

For the evaluation of three proposed variants, the following impacts on biodiversity were taken into consideration in this preliminary analysis:

- direct impact on flora and habitats (occupation, degradation, modification, devastation of habitats and loss of vegetation types and plant species);
- direct impact on fauna (habitat loss, disturbance to animals, casualties during the construction and collisions during the operational phase;
- indirect impacts (habitat modification and fragmentation, behavioral disturbances, changes in ecological preferences).

The existing railway line between Belgrade and Niš was taken as the baseline route, with present and long lasting impacts. Planned deviations from the existing route in three proposed variants, along with expected activities during constructional and operational phases are seen as a main sources for environmental (biodiversity) impacts, and thus were the main targeted sites for assessment.

From the starting point (Belgrade railway station "Center") all three variants follow the existing railway mainly underground in urban area. . On the area of Belgrade, all three proposed variants pass by several protected areas (Natural Monuments "Košutnjak Forest", "Miljakovačka forest", "Bajfordova Forest" and "Topčiderski Park" (Table in the baseline with *Protected areas in the wider area of the corridor)*.In the area between the city suburban settlements Resnik, Rušanj, Pinosava and Ripanj, three proposed variants deviate from the existing route, cutting the curves. Landscape mosaic consists of forest patches and agricultural land with considerable human activities presented.

Between the Ripanj village (Belgrade city municipality of Voždovac) and Belgrade city municipality of Sopot, all three variants mostly go separated, out of existing route, with partly overlapping of variants II and III. In the Sopot suburban area, all three variants confluence in existing railroad, continuing in southeast direction. There are no specific advantages between the proposed variants since all three crosses the landscape mosaic consisting of forest patches and arable land.

In the vicinity of Ratari village (railway station „Kusadak"), variants II and III stay together, following the existing route. Variant III separates and makes the deviation, cutting the curve of the existing railway as almost straight line, occupying the fertile soil and arable land. The variants II and III are more acceptable since they do not occupy and fragment the new areas, particularly arable land.

In the Smederevska Palanka city area, a little bit eastern from the previous site, variants II and III stay together, following the existing route. Variant III separates and makes the deviation from the existing route south from the city, occupying the fertile soil and arable land. The variants II and III are more acceptable since they do not occupy and fragment the new areas, similar to a previous site.

In the area of city of Ćicevac, variants II and III together follow the existing route, while variant I separates and go through the plain west from the settlement. South from Ćićevac, both lines (all three variants) meet and follow the existing route further. The advantage of routes II and III is in fact that they occupy the same space as the existing route, while variant I would occupy the fertile soil and fragments the area.

In the area of Mojsinjske Mountains (between the Zapadna Morava and Juzna Morava river flows), all three variants separate from the existing route and go to the hilly area of Mojsinjske Mountains , where the tunnel is planned. On the exit of tunnel, Variants I and II proceed overlapped, while Variant III separates again. Both lines go almost parallel, but Variant I is positioned deeper in the forested hill. After the hill, both lines meet in the flat alluvial valley of Juzna Morava river, following the existing route. The advantage of Variants II and III is seen through the less occupation of forested soil and less fragmentation of quite wide forested area of Mojsinjske Mountains.

Down the railroad to the ending point (City of Niš), the three variants mostly follow the existing railroad, with deviations on some sites in order to cut the curves.

It is not expected that reconstruction of pillars of old bridges will have barrier effect. During construction work, erosion of riversides and the riparian zone, as well as erosion of the river bottom might cause disturbances of animals and destruction of their habitats. However, during the construction of new pillars of bridges, there has to be taken into account the possibility that ecological connectivity of a water body might be affected, eg. by impeding the flows of wat//er, nutrients and sediment or creating obstructions for species movement (particularly migratory species). The impact might also be on surrounding riparian zones and flood plains, which often provide valuable biodiversity habitat and ecosystem services for human beings. In this case, mitigation measures will be proposed to minimize negative effects during construction and operational phases.

It should be noted that the mentioned impacts would manifest their effects mainly during the construction phase, causing possible disturbances or temporary interruptions of the ecological corridors functioning. Also, with adequate mitigation measures applied, during the operational phase it should be expected that permeability and functionality of ecological corridors would be almost fully re-established.

Mainly Variant I deviates, occupying the arable land. After assessing the three proposed variants for the railroad in respect to biodiversity values and possible impacts during the construction and operational phases, it could be concluded that Variants II and III have a slight advantage over the Variant I, because both of them generally follow the existing route, while Variant I more often deviates, occupying the forested and arable lands, causing the direct and indirect impacts on flora, vegetation and fauna.

Based on the presentation done in the baseline, where all protected areas in a zone of 5km left and right from the axis were presented with their respective distance from the railway corridor, an evaluation of the Variants is indicated below. The figures that accompany the protected areas in the baseline section present all three Variants.

Table 81 Overview of the impacts of the three variants

Variant	No. of crossed PA	No.of PA in wider area (up 5 km from both side of corridor)	No. of IPA	No. of IBA	No. of PBA	No. of IFA	No. of EMERALD	No. of Ecological corridor	Vegetation type / Ecosystems	Impact
I	-	37	1	4	2	-	-	2	Natural habitats: forests, shrublands, grasslands, and wet habitats Anthropogenic habitats: arable land, ruderal grasslands and urban areas	Moderate
II	-	37	1	4	2	-	-	2	Natural habitats: forests, shrublands, grasslands, and wet habitats Anthropogenic habitats: arable land, ruderal grasslands and urban areas	Moderate
III	-	37	1	4	2	-	-	2	Natural habitats: forests, shrublands, grasslands, and wet habitats Anthropogenic habitats: arable land, ruderal grasslands and urban areas	Moderate

Ramsar sites and Emerald Areas are not identified within the affected zone. This criterion has an equal result for all variants.

Climate change – floods

More significant problem can be identified in the areas of Smederevska Palanka, Paracin, Cuprija and Jagodina, while all three variants pass through these areas.

Since flood risk maps are not currently available, taking into account that all three variants cross or are close to the aforementioned areas while they all cross the two main rivers with the flood prone areas, at this very primary stage, a conclusion can be made that due to the small variations of the three variants, the criterion has an equal result for all variants. Using information deriving from Geosrbija database, which reflects the major flood of 2014 in Serbia, it can be proved by the flood event close to Novo Laniste, which is indicated in the following figure, that the three Variants with their small deviations do not have any different results in terms of impacts from floods since they pass from the same flood zones, which are formed close to the two major rivers (Juzna and Velika Morava) The three Variants are indicated below as follows: with blue Variant I, while the other two Variants coincide where the red line lies).

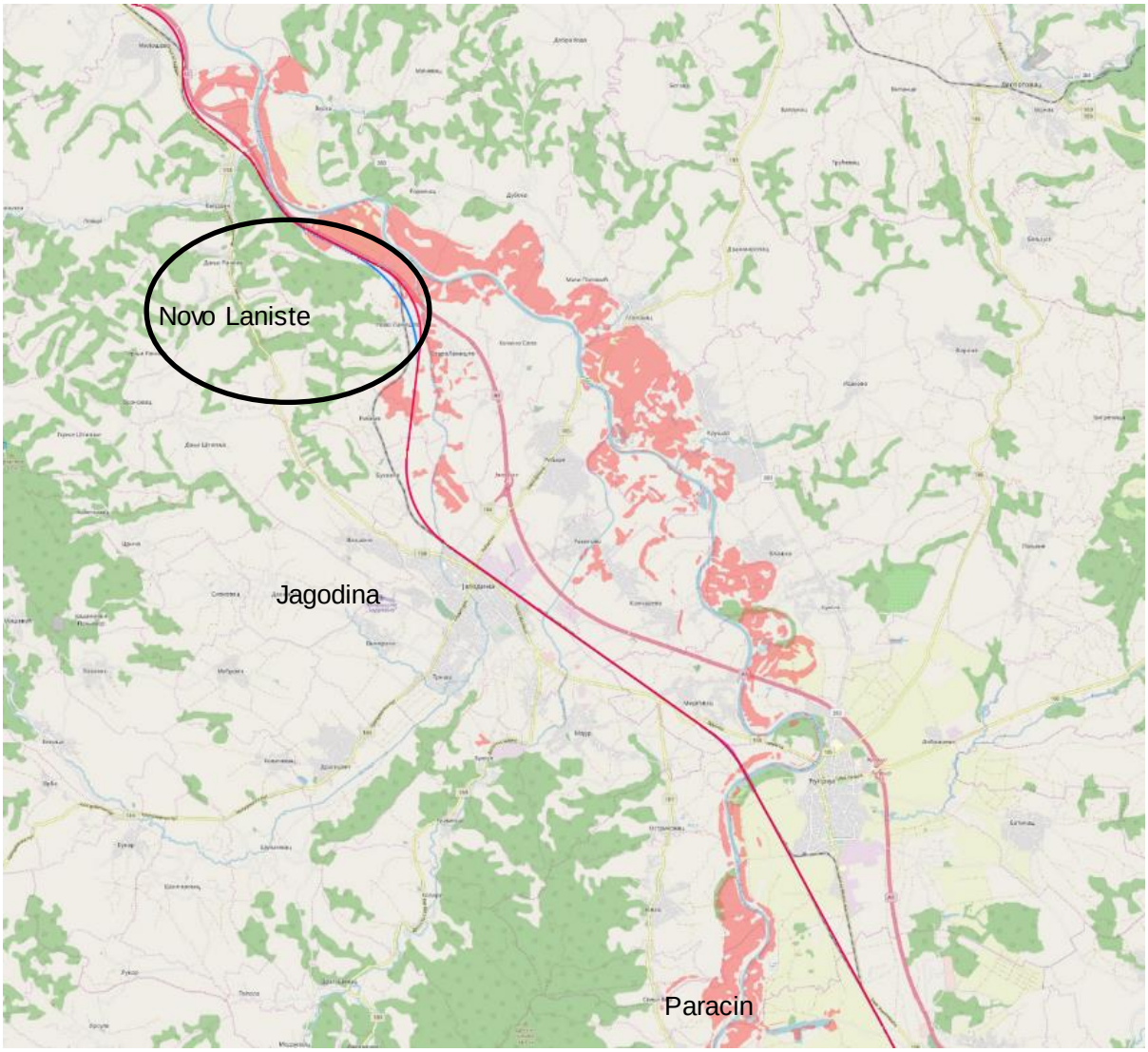

Figure 56 Flood event of 2014 close to Novo Laniste and the three Variants

Noise

The comparison of noise effects was performed by comparing the position of all three proposed variants in relation to the nearest populated places. Bearing in mind that for the most part all three variants go along the same corridor, we observed only the places where the railway corridors differ. The largest cities through which the railway passes directly were taken into consideration. The following table presents the magnitude of noise impact per affected settlement. Settlements that indicatively selected are those that where the Variants differ when passing by as well as those which are major ones along the corridor in order to assess the impact. The Variant which is closer/closest to/crosses a settlement and is considered as new is presented as HIGH, the Variant which passes to a more rarely

populated area or it is on existing line which is being rehabilitated is presented as MEDIUM and the variant which is in existing line and is being rehabilitated, while other types of activities with noise impact occur or passes far from populated areas is presented as LOW.

HIGH =1, MEDIUM =2, LOW = 3

Table 82 Overview of noise impact for the three variants

Location	Variant I	Variant II	Variant III
Ralja	2	2	2
Mladenovac	2	2	2
Ratari	1	1	1
Smederevska Palanka	2	2	2
Velika Plana	2	2	2
Novo Lanište	2	3	3
Jagodina	2	2	2
Ćićevac	2	2	2
Žitkovac	1	1	2
Sum	16	17	18
Average	1,8	1,9	2,0

From the evaluation above, the three Variants have very minor differences, since for majority of their length they follow the existing line. Variant I is slightly more favourable, while Variant III is the least. More specifically: the areas where the alignment provokes most impacts and the Variants differ are presented below. Variant I is indicated with blue colour, Variant II with red colour and Variant III with pink colour.

The three Variants pass by Ralja in a rarely populated area with a new alignment route which differs per Variant. Therefore, the impact is considered as medium since close to all Variants exist conglomerations of structures.

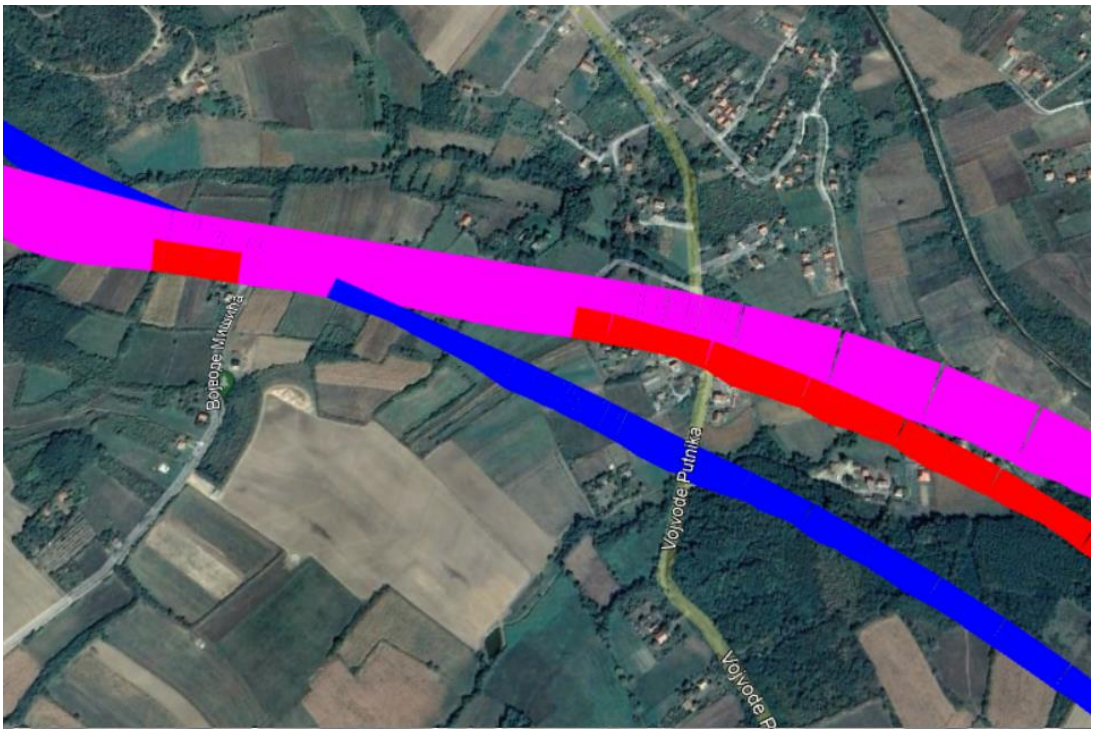

Figure 57 Comparison of the three variants regarding noise outside Ralja

As far as Ratari is concerned, Variants I and II pass by an agricultural area with no houses, resulting in low impact, while Variant III passes in a distance of 200m by a rarely populated area over the existing line which will be rehabilitated, provoking low level impacts.

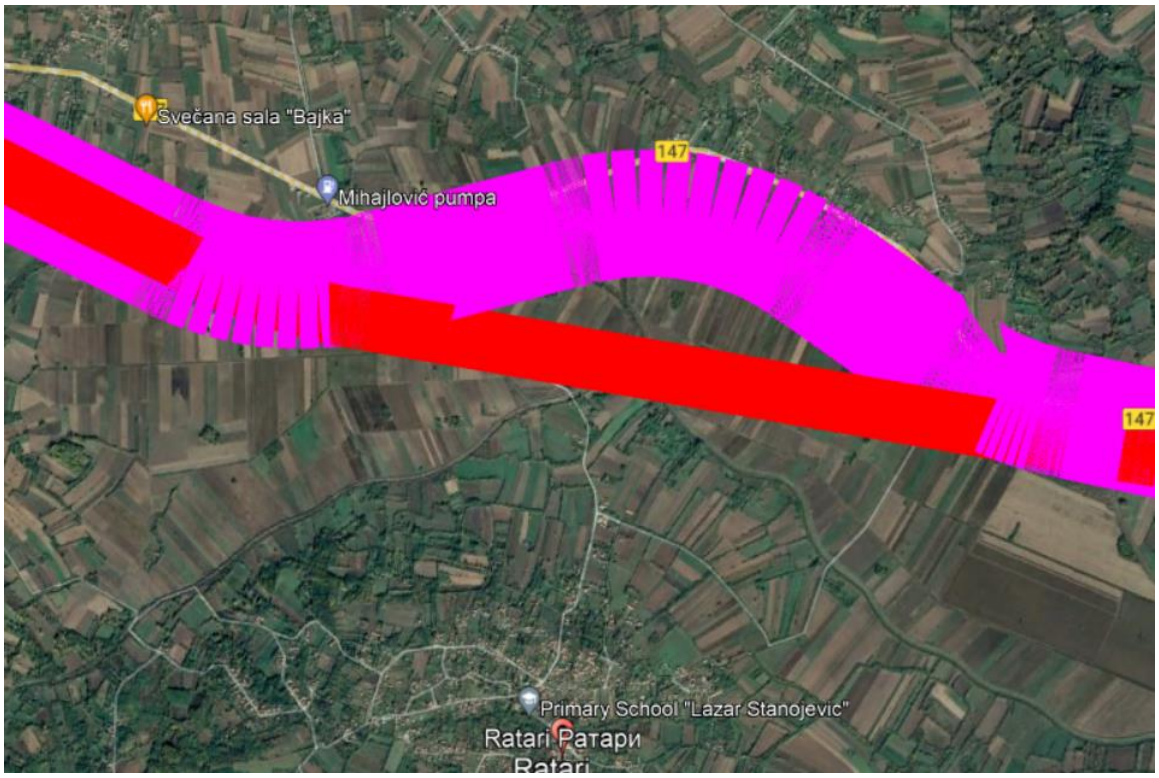

Figure 58 Comparison of the three variants regarding noise outside Ratari

As far as Smederevska Palanka is concerned, Variant I passes by a rarely populated area outside the city, provoking medium level impacts, while Variants II and III will be upgraded and follow the existing line crossing Smederevska Palanka, something which is going to increase the train frequency given the fact that better services will be provided. Medium level impacts are assumed to be provoked.

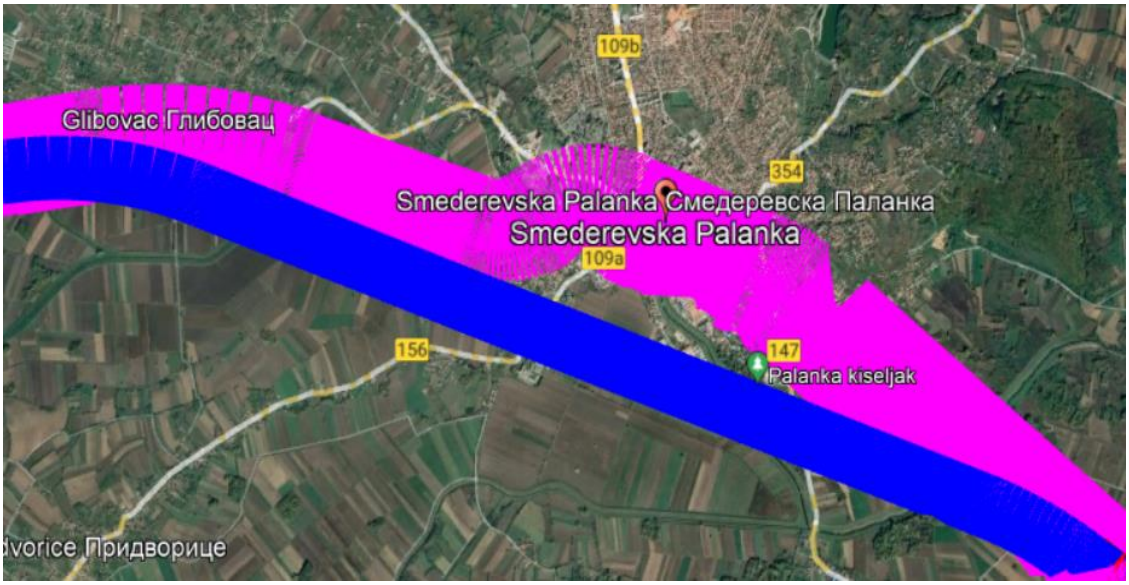

Figure 59 Comparison of the three variants regarding noise close to Smederevska Palanka

Regarding Novo Laniste, all three Variants do not use the existing line. Variant I passes by Novo Laniste at a distance of 150m, provoking medium level impacts. Variants II and III are far from populated areas in a distance of 300m, provoking low impacts.

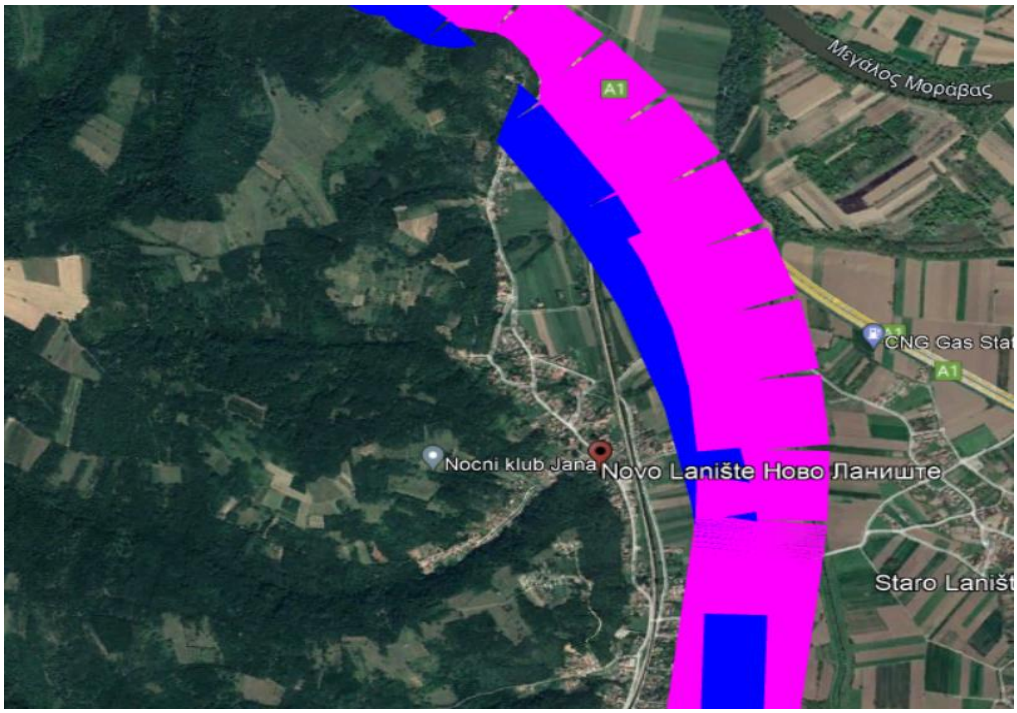

Figure 60 Comparison of the three variants regarding noise close to Novo Laniste

Regarding Cicevac, Variant I passes by a rarely populated area outside the city, provoking medium level impacts, while Variants II and III will be upgraded and follow the existing line crossing Cicevac, something which is going to increase the train frequency given the fact that better services will be provided. Medium level impacts are assumed to be provoked.

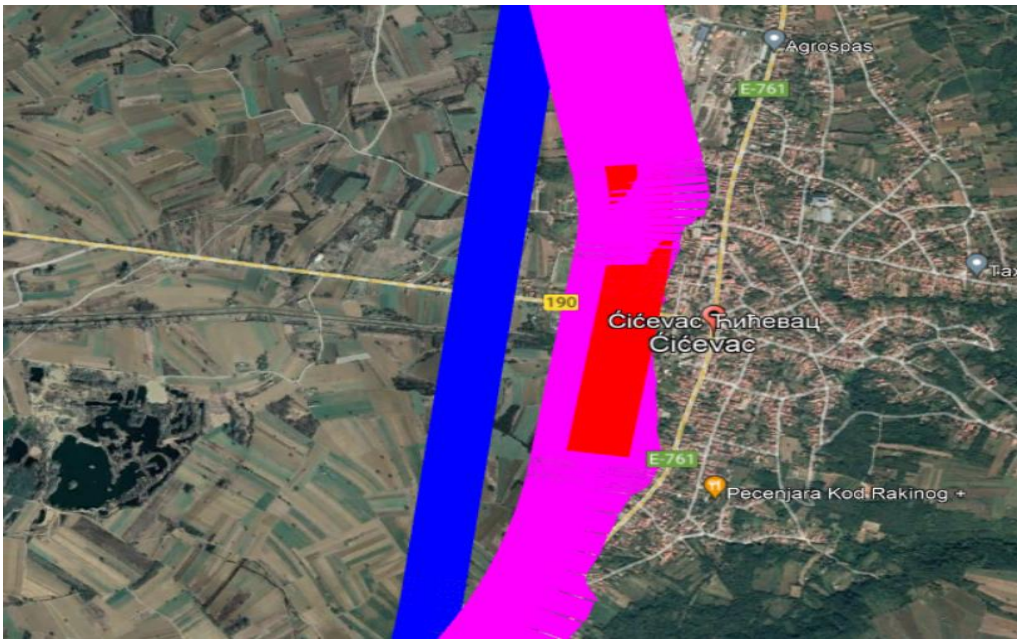

Figure 61 Comparison of the three variants regarding noise close to Cicevac

Regarding Zitkovac, Variants I and II pass by a populated area in the outskirts of the city, provoking high level impacts, while Variant III will be upgraded and follow the existing line crossing Cicevac, something which is going to increase the train frequency given the fact that better services will be provided. Medium level impacts are assumed to be provoked.

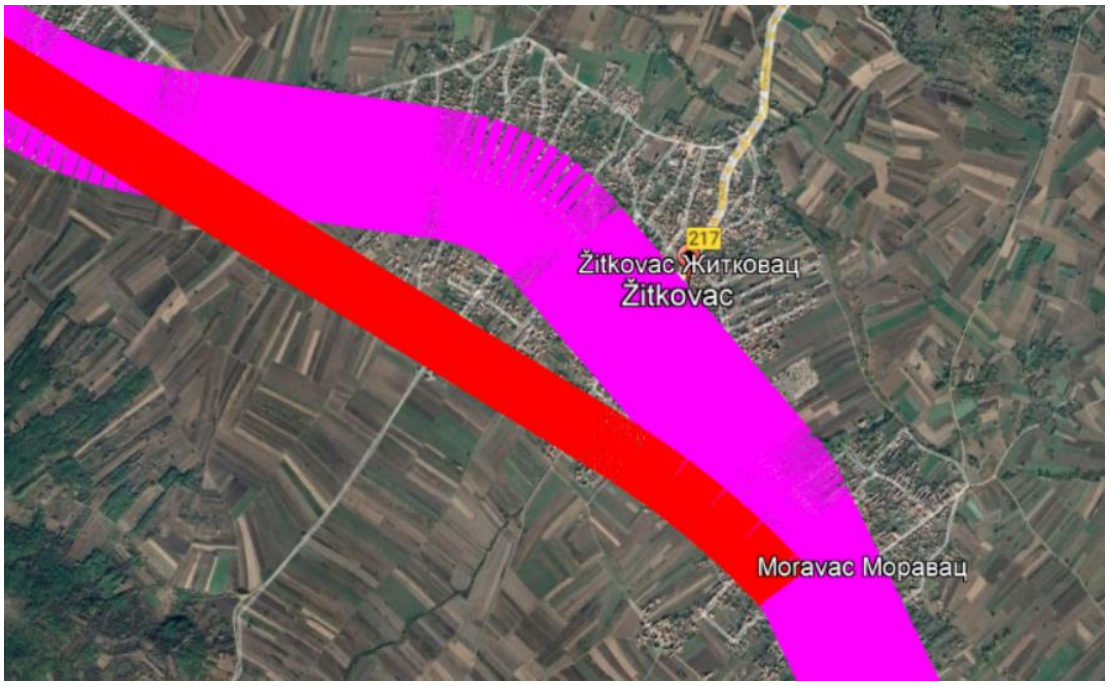

Figure 62 Comparison of the three variants regarding noise close to Zitkovac

6.3.2 Social evaluation

The existing railway line between Belgrade and Niš was taken as a referent route, which itself already presents and induces historic and long-lasting impacts. Communities bordering and adjacent to the 230 km long rail line had already adjusted their lifestyles, life habits and learned to live together with the impacts traffic on the route brings. Modernisation aspects of the Project in the process of reconstruction will bring evident benefits such as in noise reduction due to replacement of rails, contribute to a healthier environment by replacing wooden sleepers for years polluted by oil leakage, and impregnation. The modernization will bring better working conditions and employment opportunities. However, in exploring viable options the design has introduced deviations from the existing route in all of the three considered variants. These coupled with the necessity for land acquisition, expropriation and/or restrictions on land use, resulting in the temporary or permanent resettlement of people from their original places of residence or their economic activities or subsistence practices and aactivities during construction phases are seen as the prevalent sources for adverse social impacts. The Scoping report has isolated those sources of impacts which are likely to influence the greenfield areas of the Project.

The level of technical details available at this stage allowed the assessment of social considerations and comparison between the Variants by comparison of indicators for the selected social criterions. Given the lack of granularity of the design at this stage the assessment had been achieved by a combination of high-level assessments at areas/location where reconstruction is envisaged on the existing rail alignment and a in depth analysis excluding the assessment of associated facilities, such as deposit areas and borrow pits, as these ave not yet been advised by the design solutions. Notwithstanding, given the nature of the Proposed project the analysis has integrated criteria's and evaluated alternatives with a conservative approach. This approach requires all of the identified impacts assessed in course and for the benefit of comparison of alternatives will be revisited during the ESIA Stage to specifically identify the magnitude and scope of impacts. This in particular refers to impacts stemming from permanent land acquisition, resettlement and loss of access to assets. The social criteria were selected to cater to the most prominent social challenges and adverse impacts, so the analysis does not fall short even in cases where social impacts cannot be assigned monetary values. The decision has been coupled with and guided by the underlining mitigation hierarchy and core social standards and principles imposed by the national requirements, EBRD and EIB respectively.

All of the proposed alternatives have been screened and results compared by utilizing the following central social criteria and comparison of options resulting in respect to :

- Physical displacement – impacts to residential dwellings (results are presented in the following table)

Any additional impacts have been factored in such as: Impacts on cultural heritage (i.e. identified CH sites are tangible, movable or immovable objects (sites, structures, buildings, groups of buildings, natural assets and

landscapes with archaeological, historical, architectural, religious, aesthetic, paleontological and other cultural values) and number of affected bisected settlement. Regarding these impacts the Option analysed including Option II fine tuning have no particular adverse spikes when compared one to the other.

The impacts and social considerations throughout all three Variants are presented below. The preferred alignment, Variant II, has been further adapted to avoid displacement impacts to the extent feasible at this stage (fine tuning). With further mitigations possible as explained above depending on the scale of construction (single vs double vs offline sections).

Based on the high-level assessment results it appears that the Variant II fine tuning from the social impacts is most favourable when comparing the impact to residential structures. However, this will be further elaborated as the design advances and in application of the avoidance principle without compromising health and safety issues of Project Affected Person.

Below are the results which have derived from overlapping the available drawings (made available in dwg and Google earth) with an offset within the Primary Area of Influence (8-12m from the axes of the outer rail) with the official Georeferenced database of Serbia (Geosrbija) cross-referenced with the Orthophoto image.

The Project has adopted an adaptive design management model, and shall explore other viable and feasible adaptations within the option to avoid physical displacement impacts to the extent feasible (figures below present the best estimate at this stage based on the level of technical details and the detail of the design):

Table 83 Overview of the three variants regarding social impacts.

Option Analysed	Impacted Residential Structures and Households (HH)[24] (No) A=B+C	Impacted[25] residential structures (With formal title /permit) (No) B	Impacted residential structures (Without formal title/Permit) (No) C	Impacted auxiliary structures (fences, barns, tool sheds etc) (No) D
Belgrade – Nis Variant I (within 8 m)	196	140	56	197
Belgrade – Nis Variant II (within 8 m)	178	137	41	154
Belgrade- Nis Variant II fine tuning (within 12 m offset)	165	101	64	25
Belgrade – Nis Variant II fine tuning (within 8 m)	110	66	44	22
Belgrade – Nis Variant III (within 8 m)	133	101	32	36

These data presented are indicative only and the final data and numbers will be confirmed in the RAP.

Economic displacement could not have been quantified at this stage. The very rough estimates of impact to the area of land impacted as provided by the designers varies between 386 and 453 Ha. Only at the level of the Design for Expropriation will the exact area be known including whether individual plots are affected in their total area or just partially and the viability of remaining area. Detailed figures for all impacts will be established in the RAP(s).

The Section of the Railway Beograd-Nis, from Stalać to Djunis has been subjected to a separate Environmental and Social Impacts assessment in 2016. Also, a Resettlement Action Plan covering impacts stemming from involuntary land acquisition and resettlement is currently ongoing based on a detailed Expropriation Design (opposed to the remaining stretch where assessment of impacts within the Primary Area of Influence has been assessed based on high level design details). The figures above also include inventory of land and assets for the section Stalać to Djunis

For construction purposes, the Stalać to Đunis section has been divided into two LOTs. LOT 1 refers to the construction of one tunnel, approx. 3.3 km long and access roads, while LOT 2 refers to all other works on the section and is the subject of the RAP. The Project will be built in accordance with the FIDIC Yellow Book (design and build

[24] The exact number of households is not known at this stage. For the purposes of the assessment the methodology that at least one household is impacted per each structure has been applied. During the Census and Socio-economic survey, the precise number of affected HH will be identified.

[25] Cadastral data identified some land parcels host more than 1 structure. Whether all of these are permanent dwellings could not have been identified from secondary data. Currently the estimate has included only structures clearly identified as residential. The detailed inventory of losses shall be identified during preparation of the RAP(s).

contract), which means that SRI will select a Contractor to develop a detailed design and do the construction works. At the time of developing the RAP, it has been established that a total of 23 privately owned structures will definitely need to be acquired, of which only 2 (two) are permanently inhabited (one with operational business space on the ground floor) and one occasionally inhabited (weekend house). Two business structures (one of which is partly residential) and 15 nonresidential structures are affected, as well as three structures in ruins.

A total of five structures owned by SRI, which are in use (5 apartments and two houses), will need to be demolished (inhabited/used by 7 households). In addition, the Project requires the demolition of three structures which are uninhabited and in ruins, a football field, as well as 2 structures owned by the municipality Ćićevac. According to the preliminary Expropriation study for the Section Stalac unis, a number of additional structures have been identified as potentially affected by expropriation. Following extensive field work and analyses of the route, it was determined that most, if not all of these structures may be avoided by a minor change in the expropriation line. At the time of developing the RAP, a request was submitted to the responsible company preparing the updated Expropriation study to consider proposed changes in the expropriation line to avoid these structures.

Economic displacement impacts for section other then Stalac -Djunis could not have been quantified at this stage. The very rough estimates of impact to the area of land impacted as provided by the designers varies between 386 and 453 Ha. Only at the level of the Design for Expropriation will the exact area be known including whether individual plots are affected in their total area or just parts of it. Detailed figures for all impacts will be established in the RAP(s). Auxiliary structures affected were not quantified.

6.4 Selection of the Preferred Option

The conclusion can be synthesized through the following points:

1. Variant 1 is significantly more expensive than the remaining two and should not be selected, as the benefits regarding other criteria are not sufficient to overweigh the disadvantages of “Financial” criterion;

If one compares only Variants II and III, Variant III is more acceptable since it dominates according to more criteria.

Table 84 Comparation of Variant II and Variant III, considering all selected sub-criteria

Sub-criterion	Variant 2	Variant 3
Total costs	✗	✓
Cost-effectiveness	✓	✗
Estimated travel time of inter-city trains	✓	✗
Operational efficiency	✓	✗
Population to be resettled	✗	✓
Estimated of noise and vibrations' impact the population	✗	✓
Reduction in total transport CO_2 emissions due to modal-shift	✓	✗
The Expected number of accidents at level crossings	✓	✗
Reduction of road accidents due to modal shift to a safer mode	✓	✗
Duration of construction period	✗	✓

2. Variant III gives better results according to the "Social&Environment" group, except regarding "Reduction in total transport CO_2 emissions due to modal-shift" sub-criterion. Also, Variant III is the variant with the shortest construction period.
3. Variant II has significant advantages regarding "Operational", "Demand" and "Safety", "Total Cost" and Cost effectiveness"criteria.

Taking into consideration the abovementioned, Variant II should be chosen for line modernization.

6.5 The no project scenario

In the "do nothing" alternative, the situation will remain the same. This would mean the following:

- The section from Stalać to Đunis is currently a single-track one.
- The current condition of the railway infrastructure on the Belgrade – Niš line is not satisfactory,
- The electrical equipment is technologically obsolete.
- The commercial speed of passenger trains is about 50 km/h.
- There is a large number of level crossings on the line, which poses danger to road users, as well as for the safety of both rail and road traffic.
- 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 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). The reconstructed and modernized railway for mixed passenger and 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.

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 corridor of the proposed highway
- 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. 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 taking into account the magnitude of the impact and the vulnerability of affected receptors as well as all other above-mentioned dimensions. In order 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 63 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 85 Identification of significance 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	Minor	Moderate	Major

NATURE OF IMPACT NEGATIVE /POSITIVE					
		number of people and/or is of Moderate duration. Frequency may be occasional, and impact may be regional in scale			
	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. That being said, 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 considered to 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 Environmental aspects

The environmental potential impacts and indicative mitigation measures for the construction phase are summarized in the tables below. More localized analysis will be carried out under the ESIA per section at the next stage

Table 86 Environmental aspects during construction phase

Impact area	Potential impacts	Indicative mitigation measures
Construction phase		
Landscape	• 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 tunnel 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. • Replacement tree planting / woodland planting will be carried out within those areas noted as being subject to significant loss • All planting will be of local provenance and in keeping with the local character; and • 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, in order to preserve the structural integrity of the soil. • Mitigation screen vegetation planting, subject to land take, 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,
Resources and waste	• Release of greenhouse gas emissions (through transportation). • Water consumption. • Ecological impacts • Visual, impacts in ecology, waters and air from demolition waste, excavated material, decommissioning of the existing railway line and construction worksite 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. • A Decommissioning Waste Management Plan (DWMP) for the existing railway line will be prepared and maintained by the lead contractors. • Waste generated from the decommissioning of the existing railway line will be re-used, where appropriate, treated or safely disposed in accordance with the Serbian regulatory requirements; • Hazardous waste (e.g. impregnated sleepers) needs to be identified and treated
Geology and soils	• Potential Impacts on Topsoil from Leaks / Spills from HGVs, Machinery and Hazardous Material Storage • Soil erosion from construction activities • Loss of fertile topsoil • Soil stability and risk of landslides	• 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;

Impact area	Potential impacts	Indicative mitigation measures
Construction phase		
		• 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.
Climate change	• The construction activities may affect the climate through increase of CO2 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. • Rail tracks buckling or deforming under extreme heat.	• Design optimisation to reflect the carbon reduction hierarchy • Reduce the requirement for construction materials and excavation; • 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).
Air pollution	• Impacts from generate dust and particulate matter 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.

Impact area	Potential impacts	Indicative mitigation measures
Construction phase		
		• 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
Noise pollution	• Impacts from noise and vibration from blasting, tunnelling, earthworks or pilling	• Preparation of Noise Management Plan by the Contractor • Avoid necessary revving engines and switch off equipment when it is not required; • Keep haul / access roads in close proximity to the Project well maintained; • Use rubber linings for dumpers to reduce noise impact; • Minimise drop height of materials; • Start-up plant and vehicles sequentially rather than all together; • Use of reversing alarms that do not have a tonal component (i.e. broadband), if applicable. • Sources of significant noise should be enclosed, as far as reasonably possible; • Ensure regular and effective maintenance for the plant and any sound-reducing equipment; and • Install temporary local noise barriers for noisy equipment. • The selection of low or non-vibratory piling equipment such as rotary or bored piling. • Reducing the requirement for vibratory compaction and using static force compaction, such as smooth-wheeled or sheepsfoot rollers. • No start up or shut-down of vibratory plant within 50m of receptors. • Communication with residents to highlight potential periods of disruption in order minimise the number of complaints.
Surface waters	• 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.	• 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. • Additional measures and pre-treatment required prior to discharging potentially polluted water from tunnel dewatering to include use of non ecotoxic additives and oil separator. • 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.

Impact area	Potential impacts	Indicative mitigation measures
Construction phase		
	• 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 hydromorphology.	• 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.
Groundwaters	• 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 ideally 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. • Construction Plans and Method Statements Tunnel Construction, Tunnel Handover Plan and Blasting Management Plan to prevent impact to groundwater resources during construction activities.
Biodiversity, protected areas and habitats	• Habitat loss (construction) • Habitat degradation (construction and rehabilitation) • Habitat fragmentation (construction) • Severance of ecological bio-corridors (construction and rehabilitation)	• A Biodiversity Management Plan (BMP) will be prepared and implemented to ensure conservation of the ecological network the Mojsinje Mountain and the Stalać Gorge on the South Morava River. The BPM will include individual habitats or species management plans, including the IUCN Red List of Threatened Species. The BMP will propose appropriate technical measures to support movement of wildlife or restrict it (by screenings, fencing), where appropriate, in accordance with the Regulation on special technical and technological solutions that enable uninterrupted and safe communication of wild animals ("Official Gazette" no. 72/2010); • Pre-construction surveys for Nesting bird habitat/features, presence of specific sensitive receptors, bat roosts, suitable reptile/amphibian hibernacula; And invasive plants. • . avoiding certain types of works in the reproductive seasons • Avoiding of all works that cause noise during reproductive season of birds. • Close cooperation with environmental authorities to identify locations and seasons to be avoided by any construction activities in order to not have harmful impact on nesting, breading or mating of specific species along the corridor. • Delimitation of areas to be cleared before the beginning of the construction activities • Construction/rehabilitation of facilities to be sited on unused land of no particular ecological value

Impact area	Potential impacts	Indicative mitigation measures
Construction phase		
		• Maximum use of existing access roads in order to avoid construction of new temporary access roads for bringing material and vehicles, which will minimize loss and fragmentation of vegetation and natural semi-natural habitats • Restoration of sites after completion of construction rehabilitation (retaining as much of the original vegetation as possible for reinstatement) • Minimized or avoided clearing in riparian areas • The construction of drainage pipes and bridges in water courses will be carried out during the dry season • The extension of the construction area next to water courses will be only that strictly necessary to adequately
	• Loss of flora • Use of pesticides • Direct mortality • Species disturbance including noise / vibration and visual disturbance;	• Gradual vegetation clearance to retain passage for species as long as possible • Avoid dawn-dusk and night-time works, during the activity of nocturnal animals such as carnivore species and bats • Vegetation clearance works should start if possible before the breeding season (spring) • Construction fauna crossing points (i.e. culverts) along the railway. • Improvements on the existing line for underpasses which may not be present and can be installed in the rehabilitation works • Offset planting • Develop and implement a Biodiversity Management Plan (BMP), if necessary to protect ecological values of high biodiversity importance areas (which will be further elaborated after the detailed investigation) – prior to any construction operations • The clearance of vegetation will be limited to the strip of land needed for the occupation of the permanent way and the right of way of the future railway corridor and the adjacent working width for buildings • Avoid the cutting of trees: if cutting will be necessary, it will only be done with the required permits in compliance with the regulations • Preparation of integrated vegetation control and management program, regarding use and application of pesticides, or use of the alternative control measures and methods to avoid use of chemicals • In forested areas, and especially those where the value of vegetation is high or very high, each tree lying in the border of the construction site will be protected by covering its trunk with wooden planks avoiding any damage to the tree • Railways will be designed and maintained to discourage plant growth in the track area • The workers camps will be constructed in areas of vegetation with negligible sensitivity vegetation, or low sensitivity • Construction materials should be stored and maintained away from watercourses. • Surface water runoff from the construction sites into the watercourses should be avoided and a system of cut-off ditches, silt fencing and/or bunds should be installed if required. • Noise and vibration should be controlled and kept to the minimum necessary to prevent potential negative effects on fish. • Lighting used for construction should be switched-off when not in use and, where possible, positioned so as not to spill on to watercourses.

7.2.2 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.

Table 87 Social impacts during construction

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 • Archaeological supervision in place • Reconnaissance of terrain prior to earthworks
Labor 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 Labor laws as supplemented to meet the requirements of PRS 2 and ESS2 • Adopt Project general HR Procedure • Adopt Labor 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 EBRD and 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 through the use of 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 • Disruption of mobility • Railway traffic disruption on the existing line • Temporary influx of workers • Social tension	• Notification to local 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 • 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

Impact area	Potential impacts	Indicative Mitigation measures
		• 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	• Implement The Project resettlement policy Framework • Develop site specific resettlement instrument RAP/LARP) • Implement RAP /LARP • Monitoring and evaluation
Fragmentation of agricultural land plots	• Loss of livelihood	• Implement RPF and surrender of orphan land procedures

7.3 Impacts and mitigation during Operation and Maintenance

7.3.1 Environmental aspects

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 per section at the next stage.

Table 88 Environmental aspects during operation phase

Impact area	Potential impacts	Indicative Mitigation measures
Resources and waste	• Waste that will be generated during the railway operation will be primarily food, paper and packaging waste, coming from passengers • 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 • Public waste bins in passenger trains and inside the stations' facilities will be provided; • 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.
Geology and Soils	• 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;
Air pollution	• Modal shift of passenger and freight movements from road-based travel (car or bus movements for passenger and freight respectively) to rail-based travel.	•
Noise pollution	• Annoyance and complaints from noise and vibration	• Cuttings: The Project benefits from cuttings at some sensitive locations.

Impact area	Potential impacts	Indicative Mitigation measures
		• Tunnel portals will be designed to avoid any significant airborne noise effects caused by the trains entering the tunnel; • Between source and receptor: o Installing noise barriers (protective walls) o 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.
Climate change	• Flooding of underpasses and tunnels. • 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. • Drying out and cracking of substrate leading to damage to foundations and destabilisation of structure	• 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 the bored tunnels and 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 • 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.
Surface water	• 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. • Impacts to hydrology, hydromorphology and flow dynamics associated with any crossing or realignment of watercourses.	• 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. • Design of watercourse crossings to have sufficient capacity • Consider climate change effects. • 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,

Impact area	Potential impacts	Indicative Mitigation measures
		• Further consideration of the potential effects of climate change to flood flows and the extent/depth of the floodplain. • 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 hydromorphology 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.
Groundwaters	• 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.
Protected areas, habitats and biodiversity	• Habitat degradation • Habitat fragmentation	• Restore pre-construction conditions as far as possible (e.g. re-vegetation of working strip) and maintain vegetation - Vegetation/Landscape Restoration Plan. • Preparation of Vegetation Restoration Plan in order to achieve pre-construction conditions as much as possible (e.g. re-vegetation of working strip) • Develop and implementation Monitoring Plan for flora and fauna in order to timely recognise negative impacts and trends related to the railway operation and define additional mitigation measures. • Maintenance clearing in riparian areas will be avoided or minimized • The implementation of the mitigation measures identified for flora, fauna and habitats, will serve to ensure the integrity and conservation objectives of all the ecologically important and designated areas in the railway corridor area.
	• Direct mortality – e.g. as a result of increased collision risk with the railway and electrocution on power lines, Bird collision with high speed trains to be noted, particularly in proximity to IBA or migration routes if identified • Species disturbance - disturbance – including noise/vibration and visual disturbance. • "Barrier effect" • Invasion alien species	• Control of vegetation along the track; use of an integrated vegetation control and management program, regarding pesticides / herbicide uses • Alien and invasive species are not used for the maintenance of corridor; native species will be planted and invasive plant species removed • Development of a natural vegetation along the railway corridor which assist the screening of the Railway • Maintain the multifunctional passages for small and large animals clear of vegetation and debris, in a functional status • Registration where animals are killed; propose appropriate measures (e.g. fencing) • Regular removal of food and organic waste from the railway • Fenced areas to be vegetated with native plant species that attract local fauna and with plantation patterns designed to lead the animals towards the wildlife crossings. • Regular maintenance activities including protective fence maintenance, removal of food, waste, animal carcasses etc. around the railway, in order to reduce the attraction of scavengers.
	• Ecologically important habitats	• Monitoring of the status of these areas, including activities with stakeholders; Monitoring Plan will define further status and condition of these habitats, with

Impact area	Potential impacts	Indicative Mitigation measures
		proposal of specific measures for the preservation of these areas
Landscape and visual	• Permanent change to the nature of the landscape directly within the footprint of the project • Permanent modifications to existing land form (cuttings and embankments) • Addition of a number of permanent built structures within the landscape including bridges, overpasses and underpasses, tunnel portals fencing, noise barriers • Increased visual awareness of disturbance from passenger and freight train movements within the view	• Regular maintenance of vegetation. • The appropriate design and colours for the fencing. • Using as much as possible low and/or transparent noise barriers

7.3.2 Social aspects

The social aspects for the operation phase are summarised below.

Table 89 Social aspects during operation phase

Impact area	Potential impacts	Indicative Mitigation measures
General Operational Safety	Safety issue potentially affecting both crew and passengers 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 of dangerous good and Use of tank cars and other rolling stock that meet national and international standards (e.g. thermal protection and puncture resistance) appropriate for the cargo being carried. • 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

Impact area	Potential impacts	Indicative Mitigation measures
Level Crossing safety	RLC and trespass. As the safety of passengers on trains increases, the greatest harm inflicted by the railways often arises at its external interfaces; boundaries, level crossings. This in particular may be exacerbated by traditional habits of crossing railways with the perceived small risks from slow speed trains.	• The erection of safety barriers/nets should be explored in details as mitigatory actions • RLC in line with National, Safety and EU Standards including signalling • Use of bridges or tunnels in place of level crossings (this is to be explored during the design phase) • Installation of automatic gates at all level crossings, and regular inspection/maintenance to ensure proper operation
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
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 finding 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 Personnel should be trained in herbicide application, including applicable certification or equivalent training where such certifications are	•

[26] The latest incident had occured in October 2021, while a total of 6 have occured since the beginning of the year

Impact area	Potential impacts	Indicative Mitigation measures
	not required; 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	
Station /Halt Closure	As a rule all stations and halts currently operational for local and regional lines will be kept and only trains operating at speed of 200km/h will have a reduced number of stops and stations,	• Municipalities to explore alternative mobility options should stations for local and regional lines need to be closed • Alternative transport through buses shall be explored for remote villages • Stakeholder consultation and engagement on all aspects

7.4 Conclusions

In the section below, the main environmental and social risks will be presented at a general level, since the progress stage of design is conceptual and not many technical details are currently provided, while specific references to moderate, moderate to high and high impacts will be made to the section of Stalac – Djunis through the conclusions of the approved ESIA.

Regarding the construction period, the Contractor will be responsible to mitigate the impacts that will arise, while during the operation period, SRI will be the responsible authority to deal with the impacts and implement any mitigation measures proposed.

Environmental parameters

Regarding the environmental parameters and the selected variant, no red flags have been identified concerning the reconstruction and modernization of the railway line. More analytically:

Landscape

The landscape parameter is scoped in for both phases. The Project, passes by the Velika and Juzna Morava valleys, several hills, populated areas including the E-75 highway corridor and the canyon of Juzna Morava, while for most of its length, it follows the alignment of the existing railway.

This reduces the magnitude of change and impact on surrounding receptors as the new railway would be seen in the context of the existing railway and its infrastructure (rather than as new, detracting features). In these locations, the Project is not expected to be at odds with the existing landscape character. Where sections are offline (at a distance from the existing railway), the Project mainly passes in close proximity to other built forms, including settlements and other linear features, such as roads. Furthermore, the inclusion of tunnels in the design (chainages 0+300-3+370, 9+350-9+530, 12+150-13+030, 18+920-19+110, 20+920-21+045, 26+320-28+075, 29+550-32+150, 32+840-33+320, 56+850-57+180, 57+295-57+760, 58+040-58+200, 170+885-172+335, 172+690-173+380, 173+715-174+150, 174+315-177+590, 177+620-178+660, 184+275-184+890 and 187+580-187+740) will reduce the magnitude of change to the landscape character, by reducing the amount of above ground structures and visually discernible sections of the railway. The Project will result in the loss of some parts of established vegetation, resulting in habitat loss and noticeable changes to the local 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, and in some instances obstruct views of the wider countryside beyond. . Regarding the operational phase, permanent changes to the nature of the landscape will be done in the areas where the new railway parts will be constructed, while the addition of permanent built structures within the landscape at 3+610, 18+600, 19+670, 20+450, 21+290, 24+245, 25+530, 76+325, 115+810, 173+540, 174+200, 178+800, 181+!80, and 214+700 will also impact on the landscape. However, at this design stage, no accurate evaluation of impacts can be done, since limited or no data are available for the structures, cuttings etc. However, all the abovementioned impacts are common in linear projects and can be mitigated with the relevant measures.

Regarding the Stalac Djunis section, construction of the project would result in considerable short-term negative change in the landscape character in the rural sections of the route due to increased “urbanisation”. A peaceful rural landscape would be most affected in the South Morava River stretch where the bridge is proposed and within the

area between Trubarevo and Djunis. These effects would occur within a period of up to two years, they will be temporary and overall would result in moderate adverse effects over this limited time period. The construction activity will result in adverse change in the land use along the route, with the most adverse effects being within the area of cutting (before tunnel 1) and the agricultural landscape between Trubarevo and Djunis. These effects will have a medium degree of exposure on the wider area and as such are expected to be moderate adverse. The major part of the route falls within the boundaries of the ecological network and as such the construction activity will result in direct physical effects on this area. Due to variation in topography and vegetation cover certain localised areas will experience more adverse effects than others. These effects will be attributed to the exposure of these areas to the construction activities and impacts should decrease accordingly with distance and intervisibility from these localised areas. The effect to the Mojsinje Mountain landscape is considered to be low, given that the construction works will be located at the boundaries of the area and would predominantly involve tunnelling. As such, the significance of impact on the Mojsinje Mountain area will be minor adverse. The stretch of the Juzna Morava River where the bridge would be constructed between tunnels 2 and 3 would experience the medium adverse effects and the significance of this impact would be moderate adverse. Regarding visual impacts, moderate adverse impacts will affect the residential receptors in Stalac, Mojsinje, Cerovo andTrubarevo and Djunis, while minor adverse impacts will affect all other types of receptors.

During the railway operation, the likely significant effects on landscape character and viewpoints during operation will result from the introduction of the railway in cutting and the introduction of vertical structures to the rural environment. The most affected areas will be the one in cutting (upon exit from Stalać), gallery in the Mojsinje Mountain and the area from Trubarevo to Djunis where the viaduct, the embankment and the overpass will be introduced. The new elements will contrast with the predominantly rural character of the landscape and will become the dominant feature and a key characteristic of the landscape within those areas. As a result, the changes to the area would cause a moderate adverse impact on the landscape character. In the most part, landscape and visual impacts associated with the railway will reduce over time as any proposed mitigation planting establishes and aids screening of the structures and partly reducing the significance of effects. If the areas of tunnels are excluded, the proposed project would require in total about 18.25 ha of land of which minor portion (1.7 ha) would be farmland. The farmland is not present in abundance in the project area so the sensitivity of this receptor is considered medium. It is anticipated that there will be continuation of current agricultural land use over the rest of the area resulting in effect of a low magnitude. The overall significance of this impact is minor adverse. As previously acknowledged, the proposed project passes through the nature designated area – ecological network of the Mojsinje Mountain and the Stalać Gorge on the Juzna Morava River; therefore the project will result in direct physical effects on this designated area. However, due to the variation in topography, the meandering of the Juzna Morava River and the predominance of dense mature vegetation which covers most of the designated site, and given the relative remoteness and restricted accessibility of the designated area in relation to the wider landscape, the railway structures would be visible, or partially visible from a limited number of locations of the Mojsinje Mountain area. The landscape character of the protected area is defined by the tranquillity and scenic quality. These qualities should be considered essential to the attraction the area has to tourists, seasonal visitors and residents. The landscape effects on the designated site are likely to be moderate adverse. To minimise the adverse effects, the proposed railway shall be considered as a potential contributor to the setting of the landscape protection area and integrated to the landscape accordingly. If the mitigation planting is established, adverse effects will reduce over time as planting matures and the residual impact would be minor adverse. Regarding visual impacts, moderate adverse impacts will affect the residential receptors in Stalac, Mojsinje, Cerovo, Trubarevo and Djunis as well as people in work in the countryside and travelers.

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 per section at a distance of 500m on either side of the railway line and will be based on a desk-based review of the relevant guidance and planning policy context (where possible), in a review of local landscape character, including the existing site and features on the site, on a review of surrounding potential visual receptors, located within study area, including identification of representative viewpoint locations.

Air

A number of on-site construction activities will contribute to the increase of dust and PM_{10} such as site clearance and preparation including demolition activities, preparation of temporary access / egress to the Project and haulage routes, earthworks, materials handling, storage, stockpiling, spillage and disposal, movement of vehicles and construction traffic associated with the Project, use of crushing and screening equipment or plant, exhaust emissions from site plant, especially when used at the extremes of their capacity and during mechanical breakdown, construction of buildings, roads and areas of hardstanding alongside fabrication processes, internal and external finishing and refurbishment and site landscaping. 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. Impacts could occur immediately around routes used by vehicles to access the Project and in

the vicinity of the Project. The Project is likely to present a high risk to nearby receptors for all aspects of construction works. Across demolition, earthworks and construction receptors sensitive to dust soiling and negative ecological effects will be in the high-risk category. Human health is also considered to be at high risk from the Project, however only for demolition activities. For earthworks and construction, the risk is lessened to 'medium'. Providing the construction is completed using good practice, and with the application of controls tailored to the construction processes utilised for the Project, it is unlikely that the Project would give rise to any significant air quality effects. 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 PM_{10} during construction will not result in any significant air quality effect. Residual effects of are considered to be 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 PM_{10} and NO_2 along local road links. The magnitude of this beneficial effect maybe analysed in more detail as part of the Cost-Benefit Analysis of the project. Emissions from road-based travel occur at the source (i.e. from the petrol or diesel combustion within vehicle engines), whereas the electrified rail network draws power from the national grid. There will be an increase in human exposure to PM_{10} emissions arising from brake and rail wear during the operational phase of the Project. However, PM_{10} emissions arising from the operation of the Project represent a very small portion of overall emissions. Overall it is unlikely that the Project would give rise to any significant operational air quality effects. The residual effects of emissions to air from construction vehicles and plant on local air quality is considered to be negligible (not significant), following the enforcement of the mitigation techniques.

Regarding the section of Stalac Djunis already studied, minor adverse impacts during the construction phase will be provoked by the demolition of around 20 buildings in Stalać (the demolition risk category of the area in respect to presence of residential receptors is medium, the scope of demolition works is estimated to be small and with a medium dust emission) and by the earthworks south of Stalać, at about km 177 to km 178 (close to the existing railway corridor along which the residential receptors are lined), after exiting the Stalac area, where sensitive ecological receptors lie along the ecological corridor of South Morava River and the ecological network of the Mojsinje Mountain. Both areas are locally important ecological sites and along the section from Trubarevo to Đunis which passes through uninhabited farmland with a minor number of residential receptors, situated between 100 and 250 m from the proposed route. As the proposed railway line will be powered by electrical supply there will be no direct atmospheric emissions from the operation of trains that will cause an impact on air quality.

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 for each Section at the ESIA stage using professional judgement, and consideration of the number and type of construction traffic and plant likely to be generated by this phase of the Project, the number and proximity of sensitive receptors to the Project and along the likely routes to be used by construction vehicles; the likely duration of the construction phase and the nature of the construction activities undertaken. For the consideration of the magnitude and significance of the impacts to human and ecological receptors, a zone of 300m left and right from the Project will be considered.

Climate change

The climate change parameter is scoped in for both phases. The most dominant climate change impact in the wider area is floods, especially in the vicinity of the Velika and Juzna Morava rivers. In the major flood of 2014, the railway parts of Paraćin-Ćićevac, Velika Plana - Smederevska Palanka and Jagodina were affected. Other climate change incidents will be temperature increase, precipitation decrease (in terms of frequency), precipitation increase (in terms of intensity), wildfires and landslides. Further analysis is given in the vulnerability assessment of the PFS.

Applying the relevant mitigation measures, any possible impacts can be dealt with. Some adaptation measures have been proposed in this scoping report and also as part of the PFS, while during the next stage, these will be more site specific with the cooperation with the design and drainage team.

Regarding the Section of Stalac Djunis, no climate change estimations and projections as well as identification of risks and mitigation measures has been carried in the ESIA prepared.

The key steps of the ESIA for GHG emissions will be to quantify expected changes to GHGs in future years and to explore opportunities for mitigation in the Project design. 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). For the purposes of this assessment, workshops will be held with each the design

teams and environmental specialists inputting into the ESIA to establish a consistent approach to consideration of climate change adaptation. The study area for the assessment of flood risk is defined by the extent by which flood risk maybe influenced. An extent of approximately 1km upstream and downstream of the Project is considered appropriate, although this will be influenced by the likely extent of the floodplain and the likely impact of the works within the floodplain.

Noise and vibration

The noise and vibration parameter is scoped in for both phases. Several settlements are and will be bisected, where with the appropriate mitigation measures (noise barriers, window facades), 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. The noise levels generated by construction have the potential to impact upon nearby noise-sensitive receptors. Noise levels at any one location will vary as different combinations of plant machinery are used throughout construction activities, while the specific locations of these activities will also change. Assumptions will be made on the likely phases during the construction period and the type, location and number of plant items operating in each of them. Noise predictions will be undertaken for a study area of 300m either side of the railway to represent a typical daytime operation. Main core phases can be site preparation, earthworks, bridge construction, tunnel boring machine and rail track construction. It is expected that once good practice measures are implemented the majority of activities will not give raise to significant effects. The construction of the Project will occur in sections, therefore, noise generating activities have the potential to affect receptor areas for a limited period of time only, and this duration will constitute a small proportion of the entire construction programme.

Regarding vibration during construction, a desktop assessment will be undertaken in order to determine impacts along the route due to vibration levels arising during the construction phase. This involves assessing annoyance from human receptors and also damage to building structures. In order to identify human receptors along the Project, publicly available data will be used to identify properties, hospitals, places of worship and educational facilities within a 100m study area from the centreline of the rail corridor for the tunnelling, piling and blasting, and 100m from the expropriation corridor for surface compaction. Activities most likely to generate potentially significant vibration levels during construction are tunnelling undertaken via boring machine, blasting undertaken, surface compaction undertaken with vibratory rollers and piling activities undertaken during the construction of any structures along the route. A large impact relates to vibration that will likely cause annoyance and complaint; however it may be tolerated in certain situations (and for short periods) if advance warning is given to residents. Those most impacted by construction vibration are the receptors that are located nearest to the proposed earthworks and structures that requiring piling. With regard to blasting activities, it is expected that there will be receptors within 200m of the tunnel areas. An assessment should be completed once more information is available relating to the location, size and number of blasting events.

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. The amount of vibration transmitted into the ground is primarily controlled by the roughness of the wheel and rail, the speed of the train, and the stiffness and mass of each element. The wheels, axles, rails, rail pads, components and support structures interact, and the resulting vibration is transmitted into the ground and can then propagate out to sensitive receptors. Since a major part of the railway line runs over the existing route, vibration measurements will be carried out to estimate the current impact.

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 passenger and freight services. Properties within 25m are likely to experience during the operation a moderate adverse (significant) effect, and neutral to Moderate effects experienced elsewhere.

Regarding the Section of Stalac Djunis, the majority of the proposed route passes through an unpopulated area with noise sensitive receptors present only in the settlement of Stalać. There will be noise generated from the concrete batch plants and vehicle movements. Construction of the access roads for construction traffic is planned away from the settlements and such works will be localised and short-term, and would not be expected to generate significant impacts. The construction of the overhead line will be localised and short term, and would not be expected to generate significant impacts. Where construction noise levels are anticipated to be above 55dB $L_{Aeq,T}$ during the day, significant noise impacts are expected to be registered. Such impacts are classified as moderate to high, depending upon the levels of anticipated exceedance. Where construction noise levels are below 55dB $L_{Aeq,T}$ during the day, insignificant noise impacts are expected. Such impacts are classified as low, depending upon the levels of anticipated

exceedance. For a receptor sensitivity of high, which is the case in Stalać and Đunis, the adverse impact significance will be moderate. These impacts will be local, short-term and temporary in nature. During the construction, a temporary interlocking will be installed in stations to enable signalled traffic operation, by using the relocated existing signalling cables for connection of field elements. The existing level crossing interlocking devices will remain in automatic operation mode until the interlocking devices in stations Stalać and Đunis are switched-off. After that, during the remaining construction period, railway traffic over these level crossing will be conducted the train must slow down and stop in front of each level crossing, with audible warning to the road drivers. This will present additional nuisance, especially during the night, to residential receptors in the areas of level crossings. This impact will be temporary, periodical and its significance is assessed as minor adverse.

Regarding the project operation, the major part of the proposed route is kept away from communities, with about 40% low in the ground and sections passing through uninhabited areas. This design measure will significantly decrease the overall noise and vibration effects of the project. The only noise sensitive area along the route is the zone with residential receptors adjacent to the proposed Stalać station. The area comprises mainly residential houses and some commercial properties. No schools, hospitals, kindergartens or similar receptors have been identified. Given the lack of official noise maps for the area, the applicable background noise limits have been decided based on the existing area settings, while no 3D noise modeling for operation was conducted. Upon implementation of proposed mitigation measures, the study concluded that the residual impact of noise and vibration is assessed as minor adverse to negligible.

The ESIA per Section will assess the potential noise and vibration impacts from both the construction and operational phases of the Project. Baseline conditions at locations representative of the proposed alignment for the Project will be established via noise and vibration measurements, while currently no data exist since the national monitoring stations are far from the railway

Waste

The ESIA will assess the potential impacts from waste and wastewater generation during construction.. 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. Key design information collated and analyzed will include:

- The type and volume of materials to be consumed by the Project, including details of any recycled materials content.
- The type and volume of waste to be generated by the Project, with details of planned recovery and / or disposal method (for example on-site re-use, off site recycling, disposal to landfill).
- The cut and fill balance.
- Details of any materials to be specified, where sustainability credentials (particularly those that improve resource efficiency) afford performance beyond expected industry standards.

Implementation of the mitigation measures provided in this assessment are expected to reduce the adverse effects on material resource consumption and generation and disposal of waste and align the Project to EBRD Performance Requirement 3: Resource Efficiency and Pollution Prevention Control. With the application of mitigation, the effects for materials and waste have the potential to be reduced and be not Significant.

During operation, there is anticipated to be minimal waste and therefore this has been scoped out of the ESIA.

Regarding the section Stalac Djunis, the proposed construction works will generate a significant volume of hazardous, non-hazardous and inert waste whose inadequate management could result in the major adverse environmental impact. It is important that “Serbian Railways” require the lead contractor to develop a Construction Waste Management Plan and implement it throughout the construction. If all proposed waste management measures are implemented, the potential adverse effects will be reduced to a low magnitude resulting in impacts of a minor adverse significance.

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. Currently there are no data for topsoil quality and geological characteristics. 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 magnitude of impact from the potential

for leaks is considered to be slight adverse and with proper mitigation can result in neutral/minor adverse. Other impacts to be acknowledged are those from soil erosion from construction activities (site clearance and preparation, tunnels), which from a preliminary assessment are limited in time and physical extent, with a potential to extent to surrounding areas, moderate magnitude resulting to possibly minor adverse impacts. The groundcover surrounding the project alignment is generally comprised of covered agricultural land, areas of hardstanding associated with residential areas and areas of woodland. The extent of topsoil fertility has to 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. On the other hand, the loss of fertile soil will be irreversible, while some of it will be used for landscaping. The magnitude of impact could be moderate. Finally, the risk of landslides and solid stability is a possible impact, which will have a high sensitivity along areas with existing or active landslide. The limited time and extent of construction activities as well as the good implementation of measures can result in an impact of slight magnitude.

Regarding the operation phase, possible impacts on topsoil quality and soil erosion which with the implementation of mitigation measures can end up being of slight magnitude.

Regarding the section of Stalac Djunis, minor adverse impacts will occur during the construction phase by land clearing and top soil removal (total length of about 10,000 m, the route length is 17,700 m of which 6,890 m is in tunnels and 810 m is on bridges, viaducts and overpass, while it is estimated that about 140,000 m_2 (14 ha) of land will be permanently lost due to the railway development, primarily in in the South Morava River alluvium). The affected soil is fluvisol which is not abundant in the project area and its sensitivity is considered medium. The impact will be direct and irreversible (at least during the operational life of the railway). The loss of about 14 ha along the narrow strip of land is considered an effect of low magnitude. The upland part of the project area including the Mojsinje Mountain is covered with soil types that are susceptible to erosion, especially after successive rains. Construction of the project in this limited-accessibility areas will involve clearance of vegetation along the slopes, tunnelling and cuttings which are likely to result in earth movements which will need to be controlled by engineering measures. During the works, the heavy machinery moving over unpaved areas might compact the soil which would result in its change of structure and reduce its fertility. Accidental release of fuels, oils, chemicals, hazardous materials or sanitary wastewater to the ground may result in local soil contamination. The magnitude of these impacts is considered low and the significance of initial impacts is assessed as minor adverse. Measures will be employed to reduce the risk posed by the potential sources of pollutants. All other types of possible impacts will have a negligible impact

During the regular operation and maintenance of the proposed railway, soil might be affected by continuous soil erosion and potential contamination as a result of accidental spillages. Given that no maintenance of the rolling stock is proposed in Stalać and Djunis, potential sources of soil contamination will be limited to accidental spillages or leaks from freight trains or accumulation of heavy metals from herbicides along the right-of-way. If management and control measures are enforced, the risk of accident will be low and the residual impact significance should be minor adverse.

The ESIA will assess potential impact on soils and geology based onsoil and topographical data, data from existing published sources and geotechnical and soil investigations undertaken as part of the design work. From the existing data, erosion is highly pronounced close to the two main rivers of Velika and Juzna Morava. Areas that have to be looked at the ESIA per Section are those where new parts of railway will be constructed, areas where landslides are frequent (i.e. municipalities of Mladenovac, Smederevska Palanka, Velika Plana, Jagodina, Aleksinac, Nis) as well as areas where tunnels will be constructed (chainages 0+300-3+370, 9+350-9+530, 12+150-13+030, 18+920-19+110, 20+920-21+045, 26+320-28+075, 29+550-32+150, 32+840-33+320, 56+850-57+180, 57+295-57+760, 58+040-58+200, 170+885-172+335, 172+690-173+380, 173+715-174+150, 174+315-177+590, 177+620-178+660, 184+275-184+890 and 187+580-187+740).

Groundwaters

This parameter will be scoped in. The ESIA will assess potential impact on groundwater quality and on any groundwater take on local users. Baseline data will be collected from existing published sources and geotechnical investigations undertaken as part of the design work.

The study area considered for the purpose of the assessment consists of the area within the expropriation corridor. It is also defined by the potential receptors that maybe affected by the Project according to potential groundwater flow paths that might extend away from the project alignment towards surface waters and groundwater aquifers. The study area typically encompasses groundwater aquifers up to 1km from the Project that have the potential to be affected directly by the Project. The study area also includes human health receptors and surface water features that are within 500m of the Project and are in hydraulic connectivity with the study area which may therefore be affected by direct or indirect impacts.

The sensitivity of groundwater aquifers is not known, as well as the depth of the groundwater table of the aquifers. Most of the railway line runs over groundwater bodies of shallow intergranular porosity as it is presented in the

relevant section of baseline. The results of geotechnical investigations that will feed the ESIA per section will assist in the better assessment of impacts, especially if these are carried out in the areas of the tunnels proposed, i.e. at chainages 0+300-3+370, 9+350-9+530, 12+150-13+030, 18+920-19+110, 20+920-21+045, 26+320-28+075, 29+550-32+150, 32+840-33+320, 56+850-57+180, 57+295-57+760, 58+040-58+200, 170+885-172+335, 172+690-173+380, 173+715-174+150, 174+315-177+590, 177+620-178+660, 184+275-184+890 and 187+580-187+740.

Potential impacts will be provoked in groundwaters from leaks/spills from HGVs, machinery and hazardous material storage. Accelerated degradation may lead to a reduction in the quality of the groundwater by reducing the content of organic matter, contamination, salination and acidification. The project alignment crosses groundwater aquifers which are used for the supply of drinking water. The majority of the project alignment will run in parallel with the existing railway and will include bridges, tunnels, overpasses and underpasses. The lengths of the track which are to be constructed at ground level with limited below ground disturbance or construction required are unlikely to result in adverse impacts upon the groundwater quality, flow, or recharge of those underlying aquifers. The proposed bridges, overpasses and underpasses and tunnels are likely to require construction methods such as deeper foundations or piling and could penetrate into geological strata which are considered to be aquifers. They could also cause connections between shallow and deeper groundwater aquifers with the potential to degrade the quality of the resource.

The construction phase of the Project will be limited in time and physical extent. However there is potential for large impacts, if the construction activities affect the quality of the groundwater resource as a potable water supply. This will be better clarified at the scoping report of the ESIA per Section. Regarding the operation phase, although the sensitivity of the groundwater aquifers is not currently known, the impacts would be limited in physical extent. The Preliminary Design of the Project per Section has to include measures such as watertight concrete or a plastic geomembrane to prevent water entering the tunnels and therefore result in slight magnitude impacts.

Regarding the Stalac Djunis section, construction works in the alluvial aquifer (south of Stalać or between Trubarevo and Đunis) might require temporary decreasing of groundwater level. The sensitivity of alluvial aquifer is medium. The aquifer has a high hydraulic conductivity and is directly hydraulically connected to the River which enables fast recharge of the dewatered zone and re-establishing of the natural conditions. As such, the magnitude of reducing the groundwater level in these areas is considered to be low. The impact would be short-term with significance that is assessed as minor adverse. Accidental spillages of hazardous materials during freight transport during the operation phase could have a high-magnitude effect, depending on the pollutants and volume released. The substructure layers present a solid protective barrier for propagation of contaminants to soil or subsurface. However, in case of more serious accidents, the risk of groundwater contamination will be higher. The prevention of accidents that may have environmental consequences should be managed by implementation of environmental management systems and the set of emergency preparedness and response measures. The minimisation of accident-related impacts should be implemented by control measures on-site. If management and control measures are enforced, the risk of accident will be low and the residual impact significance should be minor adverse.

Waters

The water parameter is scoped in for both phases.

Pollution risk to surface water bodies from increased sedimentation and spillages is a possible impact that may derive from land clearance, excavation, dewatering of excavations, tunnelling, construction of earth embankments and construction materials such as aggregate and stockpiles of topsoil. Temporary increased sedimentation within watercourses is also likely to occur as a result of the construction of bridge piers with the watercourse channel. Runoff with high sediment load may have adverse impacts on adjacent water bodies through increasing turbidity and by smothering vegetation and be substrates. Increased pollution risks from the discharge or spillage of fuels or other harmful substances associated with temporary works may also migrate to local surface water receptors. Currently, only the quality of the main rivers (Velika Morava, Juzna Morava and Nisava) is known, ie.all three rivers are polluted to highly polluted, while the quality of smaller rivers and streams is not known. Surface water measurements are needed to be carried out at the ESIA per section so the magnitude and significance of this impact can be estimated.

Temporary works within watercourses (most probably by the construction of new culverts) could reduce the hydraulic capacity of the watercourse either by temporary diversion, restriction of blockage of the watercourse to facilitate the construction of new structures. This may reduce the volume of river flows downstream of the Project available for abstraction or supporting water environments. This is most likely to be a greater risk to smaller watercourses and tributaries that have a low flow and therefore the risk to larger watercourses that have a lager catchment is likely to below. Currently however, there are no data for the type of flow of the watercourses (low and temporary, medium, high and permanent).

According to the PFS, bridges will be at the km chainages 3+610, 18+600, 19+670, 20+450, 21+290, 24+245, 25+530, 76+325, 115+810, 173+540, 174+200, 178+800, 181+!80, and 214+700. More justified impacts will be provided at the ESIA per section, where the design stage and the relevant details for structures will be more analyzed.

Regarding the section of Stalac Djunis the proposed route will cross the Juzna Morava River and 9 other waterways (streams). The waterways in the project area are characterised by their torrential flows and a significant volume of sediment load. In addition, the Juzna Morava River flow in the area is rather slow, with meander bends and numerous gravel bars and islands. In respect to bank erosion, the surface waters along the route are considered medium to high sensitive. The ecological status of the South Morava River is already affected with high sediment load resulting the status to vary between "moderate" and "bad". Another potential impact to the Juzna Morava River is related to the removal of significant volume of sediment (gravel, sand, silt) needed for the embankment proposed at km 187+550. It is estimated that about 250.000 m_3 of material will be required for the embankment. Given the high sensitivity of the receptor and the high magnitude of the effect (i.e. volume of the needed material) this potential impact significance is assessed as moderate to major adverse and will need to be properly managed.

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 stream bed hydromorphology. The bridge over the Juzna Morava River (at km. 181+555) will have two piers located within the river. All other bridges' piers will be located outside the streams. Construction of the piers in the South Morava River will require localised excavations which can cause local disturbance to the riverbed and, if uncontrolled, could generate siltation, suspended sediment and temporarily deteriorate the water quality of the river. The effect (if uncontrolled) would be short-term and reversible and would have a medium magnitude. The initial impact on temporary water quality deterioration is assessed as moderate adverse and requires control measures. Construction techniques and good practice should be used to eliminate the possibility of large and sustained sediment release. In the event that adequate measures are implemented, the residual short-term effect should be minor adverse.

Construction of the bridge will require removal of riparian vegetation in order to site the pier footings. This might affect the stability of the banks and increase erosion and sediment release before rehabilitation and revegetation is ensured. The magnitude of potential effects of short-term increase in sediment loading or contaminated effluent discharge during construction is assessed as medium. The impact is assessed as moderate adverse and requires the set of preventive and mitigative measures to avoid any risk. If the measures are implemented, the residual effect will be minor. Worksites, particularly the concrete batching plants generate surface run-off and the washout that can significantly deteriorate the water quality due to highly alkaline properties of uncured concrete. The effect (if uncontrolled) would have a medium magnitude. The initial impact on temporary water quality deterioration is assessed as moderate adverse and requires control measures. In the event that adequate measures are implemented, the residual effect should be minor adverse. Sensitivity of other surface waters in the project area is considered medium, primarily given that they are tributaries of the South Morava which is designated as an ecological corridor of international importance. The ecological status of streams is not determined and is assumed to be "moderate". The streams that will be crossed by bridges are torrential, periodically conveying significant sediment loads and it will be important to prevent or minimise further sediment discharge. Removal of riparian vegetation could affect the stability of the banks and increase erosion and sedimentation before the banks are rehabilitated and revegetated. The magnitude of potential effects of short-term increase in sediment loading during construction is assessed as medium. The impact is assessed as moderate adverse and requires the set of preventive and mitigative measures to avoid any risk. If the measures are implemented, the residual effect on streams will be minor.

Construction of the culverts will require temporary horizontal realignments of the streams. As the all streams are tributaries of the Juzna Morava, no change of hydrological regime will be caused. The magnitude of potential sediment mobilisation and risk of spills during construction of the culverts is considered low. The impact would be short-term and moderate adverse and requires the set of control measures to avoid deposition of silt or release of suspended material. If the measures are implemented, the residual effect on the affected streams will be minor adverse.

Potential operational impacts of the project structures to surface water are related to (1) reduction of natural flood plain capacity due to the embankment passing along the low-lying flood plain of the Juzna Morava River and (2) accumulation of sediment in the area of 2 bridge piers in the South Morava River. In addition, the proposed railway line could affect the surface water as a result of: (1) discharge of accidentally contaminated run-off from the track drainage system, (2) discharge of contaminated run-off during bridge maintenance works, (3) discharge of untreated sanitary wastewater or contaminated run-off from Stalać and Đunis station facilities, (4) contamination of surface water during application of herbicides. These types of impacts will be of minor adverse character.

The ESIA per Section will focus on the potential impacts of the Project's activities on water quality for key receptors (i.e. the Velika Morava River, the Juzna Morava river and their tributaries) both during construction and operation. Baseline conditions at locations representative the proposed alignment for the Project will be established using desk-

based sources, field survey findings identifying the watercourses that maybe affected by the project and the results of baseline surface water quality sampling.

The study area for surface water characterization and assessment is defined according to potential receptors that maybe affected by the Project and the surface water catchment within which the Project is located. The study area typically encompasses surface water features up to 0.5km from the Project that have the potential to be affected directly by the proposed works. The study area also includes surface water features that are in hydraulic connectivity with the study area, such as those downstream of features that within5km of the Project and that may thereore be affected by indirect impacts.

Biodiversity

The biodiversity parameter is scoped in for both phases.

Habitat fragmentation caused by the physical presence of the railway track and the traffic of trains was found to have a large significance, particularly because of an abundant presence of habitats with a rich biodiversity. A long the railway, there are two ecological corridors which are part of the national ecological network of the Republic of Serbia. The physical presence of the railway tracks and the heavy traffic of trains during the day will considerably limit the free movement of animals across relatively long stretches of habitats that are rich in fauna and host important species (nationally and internationally protected species). The application of mitigation measures, particularly the construction of wildlife crossings at strategic sites, will certainly help to increase the permeability of the railway to wildlife. The impact would be distinguishable and measurable, although needed to be managed in appropriate way.

The decrease of animal populations would be due to the killing of animals by the traffic of trains as a result of increased collision and electrocution risk or by the fixed physical structures associated to the railway. Because of the richness of fauna all along the railway, and the high probability of accidents involving animals, the significance of the impact was found to be moderate to large. However, for habitats, flora and fauna, no proper assessment of impacts can be carried out if analytical field surveys are not done which will indicate the presence of flora and fauna species a full analysis of habitats.

Regarding the section Stalac Djunis,the principal construction impacts on ecology and nature conservation will be related to: (1) permanent loss of natural and semi-natural habitats within the railway footprint and (2) temporary disturbance and fragmentation of fauna habitats and construction collisions.

The Juzna Morava River and adjacent riparian habitats belong to the designated ecological corridor and support aquatic fauna and amphibian species and some wading birds. Presence of bats using the river as a flyway corridor is not excluded. The ecological value of the River and associated habitats is considered medium. The area of Mojsinje Mountain (km 181+725 to km 186+670) belongs to the designated ecological network and is the natural woodland habitat supporting diversity of flora and fauna (reptile, mammal, bird and bat species) some of which have conservation significance in Serbia. The ecological value of this area is considered medium to high. The major land clearance required for construction of the railway substructure and superstructure and access roads will result in permanent destruction and loss of terrestrial habitats within the footprint. The significance of this effect will vary along the route, depending on the sensitivity and ecological value of the affected habitats. Semi-natural and artificial habitats in the area of Stalać and Djunis have a low ecological value and the significance of impact on their ecology is considered to be minor to negligible. Hilly upland with shrub and woodland habitats south of Stalać will be passed by tunnelling which will limit the magnitude of habitat loss to low. Construction of bridges' abutments will require removal of riparian vegetation and destruction of riparian habitats, especially at the affected South Morava River stretch (km 181+563). The permanent habitat loss will be limited to the narrow area around the abutments and piers which is a temporary effect of a low magnitude, compared to the abundance of surrounding riparian habitats. The adverse impact will be of moderate significance, only being significant at a site-specific level. However, to compensate for the decrease in habitat quality the appropriate measures should be implemented. If the measures are implemented, the residual effect would be minor adverse.

Construction of the bridge on the Juzna Morava with two piers positioned in the River has a potential to increase the sediment load and temporary degrade the water quality at this stretch and to reduce the fish and aquatic invertebrate habitat diversity and quality. There is potential for destruction of shelters and spawning sites of aquatic species due to release of sediment during construction. Sensitivity of the South Morava River is considered medium given that (1) the River is designated as an ecological corridor of international importance, (2) the biological status of the River is "moderate" which already deteriorates from the legally required "good" status and shall not be degraded further. The effect on fish habitats would be short-term and reversible and its magnitude is considered to be medium. The overall significance of unmitigated impact is assessed to be moderate adverse and control measures will need to be implemented to prevent and mitigate the impact. If the measures are implemented, the residual effect would be minor adverse.

Construction of tunnels' portals, shafts and the 30 m-long gallery (including associated construction compounds) will affect woodland on the slopes of the Mojsinje Mountain. Woodland is a high value resource and is important for the ecological value of the whole designated area. If present in the area, notable plant species could be affected during vegetation clearance which could have a permanent adverse effect on their conservation status at the local level. The tunnelling option is the least disruptive when construction in a sensitive area is concerned. Compared to the total area of the nature designated site (ca. 3,985 ha), the magnitude of loss of highly valued woodland is considered low. This is the impact of a local significance and is assessed as moderate adverse. The control measures will be needed to restore the affected woodland areas by plantations of native vegetation and mitigate the effects. The remaining residual impact will be minor adverse.

Vegetation clearing, disturbance and fragmentation of habitats and construction-related noise and ground vibration will be the main sources affecting local fauna, including bats, birds, fish, reptiles and mammals. The reptile species present in the area are of a high sensitivity and could be affected by loss of grassland and hedgerows thus reducing the extent of habitat available for foraging and sheltering. This includes winter snake refuges (hibernaculums) that might be discovered during the earthworks. The species of the greatest concern are Hermann's tortoise (*Testudo hermanni)* and European pond turtle (*Emys orblcularis*), both in the European IUCN Red Least of Nearly Threatened species. Construction works have an adverse effect on the conservation status of reptiles with impact significance assessed as moderate adverse.

The ecological value of the project area for bats has not been determined but given their confirmed presence in the wider region, it cannot be excluded that bats use linear structures (the South Morava waterway, local roads) as flyway corridors and that the forest habitats are possible roost sites. Vegetation clearance will be carried out during the hours of daylight when bats are not active. The removal or disturbance of woodland potentially utilised by bats will amount to only a small proportion of the wider available resource. Although there is a risk of individual roosts being destroyed the risks are considered to be minimal and there is likely to be a minor adverse significant impact on the conservation status of any of the bat species.

The principal operation impacts on ecology and nature conservation will be related to: (1) permanent fragmentation of habitats, (2) potential disturbance of specific biological functions (nesting, breeding, foraging) by noise or light effect, (3) electrocution on power lines or collision with the railway, (4) potential contamination of vegetation by herbicides. All of these impacts will be of minor adverse impact.

To ensure conservation of the ecological network the Mojsinje Mountain and the Stalać Gorge on the Juzna Morava River, the ESIA stated that a Biodiversity Management Plan (BMP) should be prepared and implemented. It should include individual habitats or species management plans, including the IUCN Red List of Threatened Species. The BMP should encompass the necessary assessments of the area needed to fully comply with the EU Habitats and Birds Directives.

At this stage of the project, stakeholder consultation was carried out with the relevant biodiversity institutions in order to provide some valuable input to be taken into consideration. More precisely;

- Considering the barrier effect, pillars of the bridges in water bodies will not have such effect; however Belgrade-Niš railway itself represents a barrier for animals along its entire length. If the railway would be fenced, it will certainly have a barrier effect along its entire length, which should be regulated through mitigation measures, e.g. proposal for the construction of "green bridges".
- Regarding the impact of railway reconstruction on protected areas, sensitive areas, critical habitats, protected and strictly protected species, any open issues will be resolved and problems will be assessed through nature protection conditions according to the Law on Nature Protection (Articles 8 and 9 of the Law), which the investor is obliged to request from competent institutions (Institute for Nature Conservation of Serbia). They also emphasize that the complete list of all parts of the ecological network that are located nearby, or on the railway route, will be issued within the conditions for nature protection, after the investor addresses this institution.
- Project on potential NATURA 2000 sites in Serbia has been prepared. The results of the project will be submitted to the Ministry of Environmental Protection of the Republic of Serbia, during the next period, so the experts involved in the ESIAs per section should communicate with the Ministry about the availability and use of the database for this project.
- The Mojsine Mountains have been withdrawn from the protection process (although the website of Institute for nature conservation of Serbia states that they are in the protection process), but WWF has initiated a revitalization procedure, which makes this area an area of interest for protection.

Taking into this consultation result, the consultation with the stakeholders should continue during the ESIA phase so the status of this area to be also then verified and better defined.

- Cumulative effect can be manifested after the reconstruction, ie construction of the railway and the period of exploitation, through possible intensification of urbanization and other human activities in the narrower and wider area around the route, which may result in additional habitat fragmentation, landscape change, pollution, increased noise level and further amplification of the barrier effect. Ultimately, these effects may, directly or indirectly, affect the population status of flora and fauna in the zones of influence.
- There are sites of special interest along the railway, such as snake hibernacles, or habitats within the IBA area where protected bird species nest / winter / feed, so these sites should be given special attention at later stages, detected them, determine on the map the areas where they are located and propose the necessary protection measures through the project, if necessary.
- There are no fish species of importance for protection in watercourses, but it is necessary to consult Law on Protection and Sustainable Use of Fish Stock, in order to avoid intensive works and disturbance, and to reduce the intensity of works, during spawning of fish species.

The ESIA per Section will assess the potential impacts of the Project's construction and operation activities on habitats, fauna and flora in the study area. The baseline will provide a description of the habitats and fauna baseline and the wider ecological study area. The ESIA per Section will pay utmost care in assessing the project Biodiversity impact and will estimate via consultations, targeted field surveys and additional data to proceed to a screening for appropriate assessment for the 2 IBAs. The Consultant will identify any Priority Biodiversity Features and propose any targeted mitigation measures for the minimization of impacts.

The Area of Influence may extend up to a precautionary maximum distance of 500m of either side of the Project centreline (this could be less, i.e. 200m either side in areas where the existing line will be rehabilitated or constructed, while 500m in areas where screening for appropriate assessment is needed), within which a level of acoustic impact will be experienced during construction and operation of the Project. This zone will be used to inform the scope of receptors requiring consideration through the assessment process (i.e. those potentially impacted) as well as providing the basis for predicting likely impact magnitudes. 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. Consistent with requirements of the EU Habitats Directive and Birds Directive, the assessment will also verify any natural protection areas that could be affected by the Project. Depending on the outcome of the assessment, there may also be a requirement to develop a specific Biodiversity Action Plan as a key mitigation strategy.

A CH/PBF screening process will involve a combination of initial consultations and desk-based study. The following potential CH/PBF triggers will be considered for further analysis:

- Designated sites and other nature conservation areas of recognised importance nationally or internationally, together with the ecological features and species that they support.
- Species and habitats of global, national and/or regional conservation importance including nationally rare, restricted-range and threatened species, globally Critically Endangered or Endangered species (IUCN Red List)
- Species included within Annex II and IV of the EU Habitats Directive and Annex I of the Birds Directive.
- Other species based on feedback provided by local and international biodiversity experts during the ESIA.

Further assessment for a habitat to be characterized as critical will be done, where EBRD PR6 criteria will be taken into account leading to the preparation of Critical Habitat Assessments.

As for the impacts and according to EBRD PR6, the steps of the mitigation hierarchy are presented below:

- Avoidance: this is the first step in the mitigation hierarchy and is defined as measures taken to avoid causing direct and indirect project-related impacts from the outset. Examples of avoidance measures include the spatial or temporal relocation or removal of infrastructure, to completely avoid impacting key components of biodiversity (i.e. particularly priority species, habitats or ecosystem services). Avoidance is often regarded as the most effective way of reducing potential negative impacts to biodiversity and ecosystem services.
- Minimisation: this is the second component of the mitigation hierarchy. Minimisation measures (or mitigation measures) are designed to reduce the duration, intensity and / or extent of direct, indirect and cumulative project-related impacts that cannot be completely avoided, as far as is practically feasible. Robust and

pragmatic minimisation measures can be effective in reducing biodiversity impacts below significance thresholds.

- Rehabilitation / Restoration: this third step in the mitigation hierarchy should be applied to rehabilitate or restore biodiversity and / or ecosystem services that are impacted by project activities that cannot be completely avoided and / or minimised. An example includes rehabilitating degraded habitats or restoring cleared habitats to reduce residual project-related impacts.
- Offset: Biodiversity offsets are measures taken to compensate for any residual significant, adverse impacts that cannot be avoided, minimised and / or rehabilitated or restored, to achieve no net loss or a net gain of biodiversity. Biodiversity offsets are measurable positive conservation outcomes on priority biodiversity features that are attributed to project activities, and whose magnitude outweighs that of the residual adverse biodiversity impacts arising from the project development. Offsets require investments in conservation management protection where the results of these investments can be quantified. Offsetting is based on systematic biodiversity accounting based on the explicit calculation of biodiversity losses and gains at matched impact and offset sites.

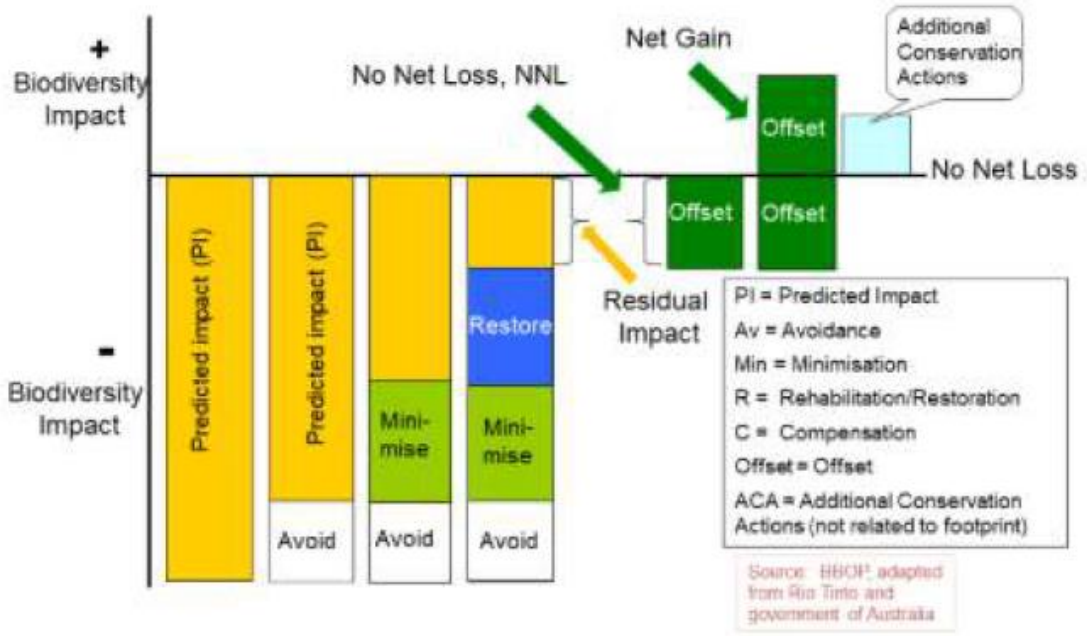

Figure 64 Mitigation hierarchy regarding PR6

In addition, following related paragraphs of PR6 which consider PBF and CH, the measures proposed will be in line with following requirements:

- "demonstrate that any proposed development is legally permitted, which may have entailed that a specific assessment of the project related impacts on the protected area has been carried out as required under applicable law
- act in a manner consistent with any government recognised management plans for such areas
- consult protected area managers, relevant authorities, local communities and other stakeholders on the proposed project in accordance with PR 10
- implement additional programmes, as appropriate, to promote and enhance the conservation objectives of the protected area".

Social parameters

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. A potential for concern has been observed in the impacts stemming from land acquisition and resettlement, however the ongoing work has provided evidence of effective avoidance measures.

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).

The adverse impacts have been observed against the below social receptors:

Community health and safety risk

Community health and Safety risk have been scoped in as risks during construction, reconstruction and operation. It is assessed that risks are constrained to the usual types of risks in similar Projects - such as 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, and other on and off-site risks. Given the scale of the Project and the reliance on vehicles to access the route, vehicle and road safety was identified as one of the biggest health and safety risks.

Regarding the Stalac Djunis section, the principal potential effects on the community during the construction will be related to: (1) road traffic disruption and safety, (2) railway traffic disruption and safety, (3) presence of temporary workers in the local area, (4) safety risks due to unauthorised access to construction compounds and work sites. Construction transport and increased traffic can lead to more possibilities for accidents for the local population as well as to a reduced quality of life. The construction phase will involve a large number of transport movements involving slow vehicles carrying aggregates and other materials. This will include the M-5 road (Kruševac – Stalać – Ćićevac) and the state road of IIA category from Kruševac to Đunis. The works will also involve temporary closures and diversions of roads. This may increase the risk of traffic accidents in the area, especially to vulnerable road users (e.g. pedestrians, tractors, bicycles). General public is a high-sensitive receptor. The effect magnitude is expected to be major in the area of Stalać, which is most populated on the route and will primarily be affected by proposed road realignments. The initial significance of this impact (if not controlled) is major adverse.

If the relevant mitigation measures are implemented, the significance of the residual impact would be minor adverse. Railway traffic disruption on the existing line will be occasional at the points of connection with the proposed railway in order to accommodate transition from old to new tracks. To maintain safety, the works will primarily take place in the periods when no traffic is scheduled. The international train schedule is not expected to be affected as the works will be programmed in accordance with it.

The domestic passenger trains will be replaced by buses which may affect the passengers to a low extent. The domestic freight transport will be re-scheduled when necessary which may cause minor disruptions to businesses but can be mitigated by timely informing them about the schedule alteration. The magnitude of this effect is considered to be low. Potential influx of temporary workers to the area is expected to be limited, given that it is very likely that local workforce (Kruševac region) will be employed during the construction. In addition, worksites along the major part of the route will be distanced from the settlements. The presence of workers may cause some disturbances in the project area, however these are expected to be minor and as a result, the impact on local communities in relation to social pathologies and conflicts is assessed as minor adverse.

The principal public health, safety and security issues during the operation are related to (1) general operational safety of the railway, (2) level crossings safety, (3) transport of dangerous goods, (4) pedestrian safety, (5) electromagnetic interference (EMI). All types of impacts mentioned are expected to have a low to negligible impact.

Labor and OHS risks

Labor and OHS Risks have been scoped in. Although assessed that OHS risks associated with the activities are usual types of risks i.e. from working at hights, risk from working with electrical circuits, Risk from operation of machinery and equipment, Inadequate resources, equipment, procedures, training, In the context of the COVID-19 outbreak, basic infection prevention measures can help the containment of the spread of the disease and protect the workers and the public but also develop response plans to cover minimising the virus spread. One of the prominent risks in the construction sector as also highlighted in the baseline section is the risk from shadowed and informal Labor.

Regarding the section Stalac Djunis, the construction of a railway line and associated structures, similar to other large infrastructure construction projects, carries several key health and safety risks to the workers employed on the project. Key issues for consideration associated with the proposed project are the following: (1) work at heights, (2) slips and falls, (3) moving machinery, (4) struck by objects, (5) dust and asbestos-fibres dust, (6) confined spaces and excavations, (7) biological hazards (poisonous snakes). Some of the construction activities may be classified as high risk with a significant potential for incident. However, incidents are preventable through the implementation of appropriate management systems and the following of its requirements by the work force. An overview of the health and safety management and mitigation requirements for the construction. If the appropriate measures are implemented, the health and safety risk of the project during construction to be low.

The main hazards are related to train/worker accidents in the vicinity of rail lines, noise and vibration from the rolling stock and machinery, electrical hazards during the work on overhead wires or conductors, electric and magnetic fields due to working in proximity to electric power lines, fatigue in case of working irregular work hours. The hazards are preventable through the implementation of appropriate management systems and the adherence to the management system requirements by the work force. In the event that the appropriate measures are implemented, the residual risk is classified as low.

Land acquisition and resettlement

The estimates of impact at this stage are rough based on the very early draft of the Conceptual design. To assist with the estimated displacement impacts, a set of criteria has been applied to assess the Physical and Economic displacement impacts.

The Right of Way against which the impacts have been identified are defined as follows:

The Primary area of influence (AoI) - Direct protection zone (Rail belt) – requires permanent acquisition of land on both side of the rail for the purpose of construction and operation in the width of 8 m in rural areas and 6m in urban, measured from the centerline of the outer rail, and 14 m of air rights above as land required for the standard gauge. The direct protection zone includes the scope of the official places (stations, rail crossings, halts, junctions etc.) including any technical-technological structure, utilities and any fire access route to the nearest public road. Impacts within the Primary AoI (at this stage) have been assessed based on the flat terrain drawing of the alignment. The methodology of impact assessment has included both 8m and 12 m (as an additional buffer zone). However, as the technical details of the design and the construction technology become available, based on which the detailed Expropriations design is developed the figures will be refined. The proposed route has been developed using the existing rail as far as practicable. A number of offline sections need to be designed to allow safe running of trains. The estimate at this point could not include impacts from any associated facility, transmission lines, temporary construction and permanent operation phase facilities as location for these have not been identified by the design. The entire Primary area of influence is divided by the following sections and the land requirements will differ, depending whether it's an upgrade of the double track sections requiring less land, construction of a second track next to the existing single one and the offline sections where the impacts will be greater. For the Section Stalac Djunis, for which a Resettlement Action Plan is already being prepared, the impacts have been identified at the household levels. already. More precisely:

1. Two single-track sections:

    a) Belgrade - Mladenovac - Palanka - Velika Plana length 90.4 km,

    b) Belgrade - Jajinci - Mala Krsna Velika Plana length 99.7 km,

2. Double-track section:

    a) Velika Plana - Stalać length 85.9 km - requiring limited additional land outside the RoW established for the existing line,

3. Single-track section:

    a) Stalać - Djunis length 18.7 km - land acquisition of 750 private plots (129 plots acquired totally and 621 partially affected) in the area of 33,97 ha and 127 public plots in the area of 44.97Ha),

4. Double-track section:

    a) Djunis - Trupale - Crveni Krst - Niš length 48.6 km - requiring limited additional land outside the RoW established for the existing line.

Narrower protection zone - infrastructure belt on both side of the rail in the width of 25 m of the centerline of the outer rail, in use for maintenance and technological development of the infrastructure capacity. Construction within this zone requires consent protection measures and consents from the railway operators for planning, design and

any construction and earthworks including repurposing of land. Existing buildings within the 25 m protection zone will unlikely be impacted, and new construction within the protection zones is allowed subject to permitting and condition requirements from SRI, und unless new noise protection is required.

Wider protection zone – land area on both sides of the rail in the width of 50m measured from the centerline of the outer rail where the construction is limited in terms that facilities like mines, quarries using explosives, chemical industry and explosive products, plants and other similar facilities are not allowed.

Area of controlled construction – protection belt in the area of 100 m from both sides of the centerline of the outer track were expansion of existing and development of new activities that do not conflict with the functional and technical requirements of existing and planned main infrastructure systems is allowed.
The RPF has covered all typical types of impacts and thereby associated entitlements which will apply to the above ipacts once known.

The impacts anticipated are Land acquisition of private land plots, structures and assets, physical relocation of affected households, and may result in livelihood losses. In this context of involuntary resettlement, Project Affected People (PAP) are person/people, household, firm, or private institution who are physically displaced (relocation, loss of residential land, or loss of shelter) and/or economically displaced (loss of land, assets, access to assets, income sources, or means of livelihoods) as a result of: (i) involuntary acquisition of land, or (ii) involuntary restrictions on land use or on access to legally designated parks and protected areas. However, as the final design and the definitive land needs for the Project Components are not yet available, the exact number of PAPs is unknown and only an estimated number has been provided. The exact numbers of PAP will be determined through a census and a detailed socio-economic survey, site visits (physical surveys) all based on the final designs to be conducted as part of the Resettlement Action Plans (RAPs) which are yet to be prepared.

No public amenities nor community resources have at this stage been identified to be impacted. However, some high-level estimation of such impacts anticipates that damages to local roads from heavy construction traffic, uncharted water electricity and other utilities could be expected.

A Multi Criteria Analysis has been conducted as a model to help take the decision in setting the alignment. Three different alternatives have been examined against land physical displacement impacts affecting private properties with and without formal title (informal- constructed without permits). The preferred alignment, Variant II, has been further adapted to avoid displacement impacts to the extent feasible at this stage (fine tuning). With further mitigations possible as explained above depending on the scale of construction (single vs double vs offline sections).

Below are the results which have been derived from overlapping the available drawings (made available in dwg and Google earth) with the official Georeferenced database of Serbia (Geosrbija) cross-referenced with the Orthophoto image.

The Project has adopted an adaptive design management model, and shall explore other viable and feasible adaptations within the option to avoid physical displacement impacts to the extent feasible (figures below present the best estimate at this stage):

Table 90 Involuntary resettlement affecting private property in the Primary Area of Influence

Option Analysed	Impacted Residential Structures and Households (HH)[27] (No) A=B+C	Impacted[28] residential structures (With formal title /permit) (No) B	Impacted residential structures (Without formal title/Permit) (No) C	Impacted auxiliary structures (fences, barns, tool sheds etc) (No) D
Belgrade – Nis Variant I (within 8 m)	196	140	56	197
Belgrade – Nis Variant II (within 8 m)	178	137	41	154

[27] The exact number of households is not known at this stage. For the purposes of the assessment the methodology that at least one household is impacted per each structure has been applied. During the Census and Socio-economic survey, the precise number of affected HH will be identified.

[28] Cadastral data identified some land parcels host more than 1 structure. Whether all of these are permanent dwellings could not have been identified from secondary data. Currently the estimate has included only structures clearly identified as residential. The detailed inventory of losses shall be identified during preparation of the RAP(s).

Belgrade- Nis Variant II fine tuning (within 12 m offset)	165	101	64	25
Belgrade – Nis Variant II fine tuning (within 8 m)	110	66	44	22
Belgrade – Nis Variant III (within 8 m)	133	101	32	36

These data presented are indicative only and the final data and numbers will be confirmed in the RAP.

Economic displacement could not have been quantified at this stage. The very rough estimates of impact to the area of land impacted as provided by the designers varies between 386 and 453 Ha. Only at the level of the Design for Expropriation will the exact area be known including whether individual plots are affected in their total area or just parts of it. Detailed figures for all impacts will be established in the RAP(s). Auxiliary structures affected were not quantified.

Below are maps showing avoidance of impacts to sensitive receptors. The figures depict refinement and realignment between Variants II with and without potential fine-tuning (presented in below figure as Option II A), the yellow and the red lines in the figures represent the two cases respectively.

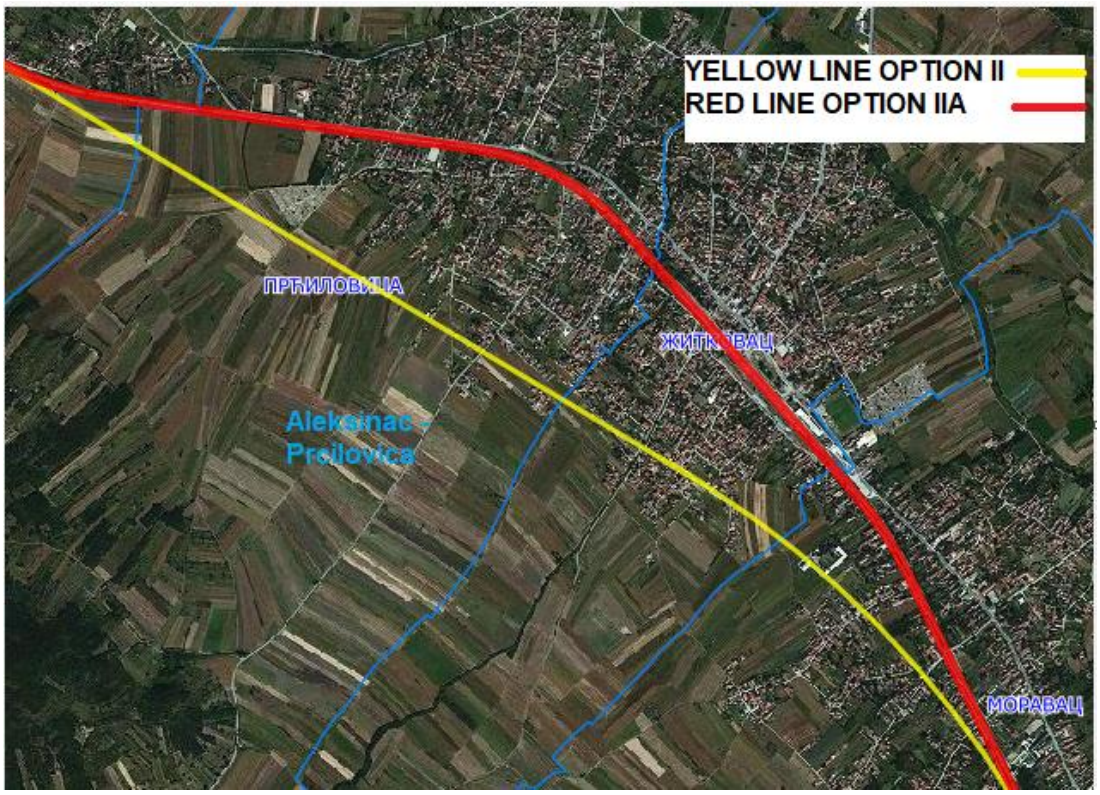

Figure 65 Avoidance of physical displacement in Aleksinac – Settlement Prcilovica

Figure 66 Avoidance of physical displacement impacts in Rakovica (left) and Jagodina - Settlement Bukovce (right)

Figure 67 Avoidance of physical displacement impacts in the Municipality Mladenovac (left) and Aleksinac settlement Trnjane (right)

Regarding the Stalac Djunis section and construction phase, development of the proposed railway will require physical displacement of a limited number of residential and commercial properties in the settlement of Stalać (176+920 to km 177+050), about 600 m south of the Stalać station (about 20 in total). Some of the affected residential properties appear unoccupied, and some are used as ancillary houses. The total area is estimated to be around 0.75 hectares. In respect to economic displacement, it is estimated that about 18.25 ha of land will be permanently needed for the project and expropriated, thus potentially affecting the owners and users of the land. It is estimated that about 1.7 ha of that land is cultivated land. The minor part of the affected area is located upon the exit from Stalać (km 177+594 – km 178+895) and the major part is between Trubarevo and Đunis (km 186+680 – km 189+922). At the moment, the exact number of project affected persons is not available. In relation to the size of local communities, the number of affected households is expected to be a small percentage. Although this may be significant for the households in question, it is not significant to the population as a whole. As such, the scale of project-related resettlement is considered to be low. However, the sensitivity of project affected persons is considered to be high, given the economically disadvantaged area with majority of village population age over 50 with limited possibilities of finding the alternative source of income. The overall significance of this impact is moderate adverse. It is of the highest priority that "Serbian Railways" avoid or minimize the economic displacement, provide information and consultations, provide compensation at full replacement value, offer in-kind compensation, provide of legal assistance to affected persons, and establish and implement a grievance mechanism involving the local community. In that respect, a Resettlement Action Plan is being developed to set out the measures needed to complete the resettlement in accordance to the EBRD requirements, something which is currently being prepared.

Land use

The project area comprises developed land with buildings, cultivated land (crops and gardens), meadows and pastures, and forest land. Developed land with buildings is present in the areas of settlements crossed by the alignment and in the the brownfield areas. Cultivated land is primarily used for growing maize, wheat, fodder and vegetables. The majority of farmland plots are small (up to 3 hectares). Most of the land has traditionally been with the families for many generations. Dependency of livelihood and to 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. State owned agricultural areas are sporadically present along the route. Land use is extremely important to be considered in cases of severance of land which will likely happen only in offline areas such as presented below in the area of settlement of Trupale, Municipality Crveni Krst in the City of Nis. Purple areas depict availability of public agricultural areas which may serve for replacement land. The picture below shows cases of severance impacts from the alignment in offline sections.

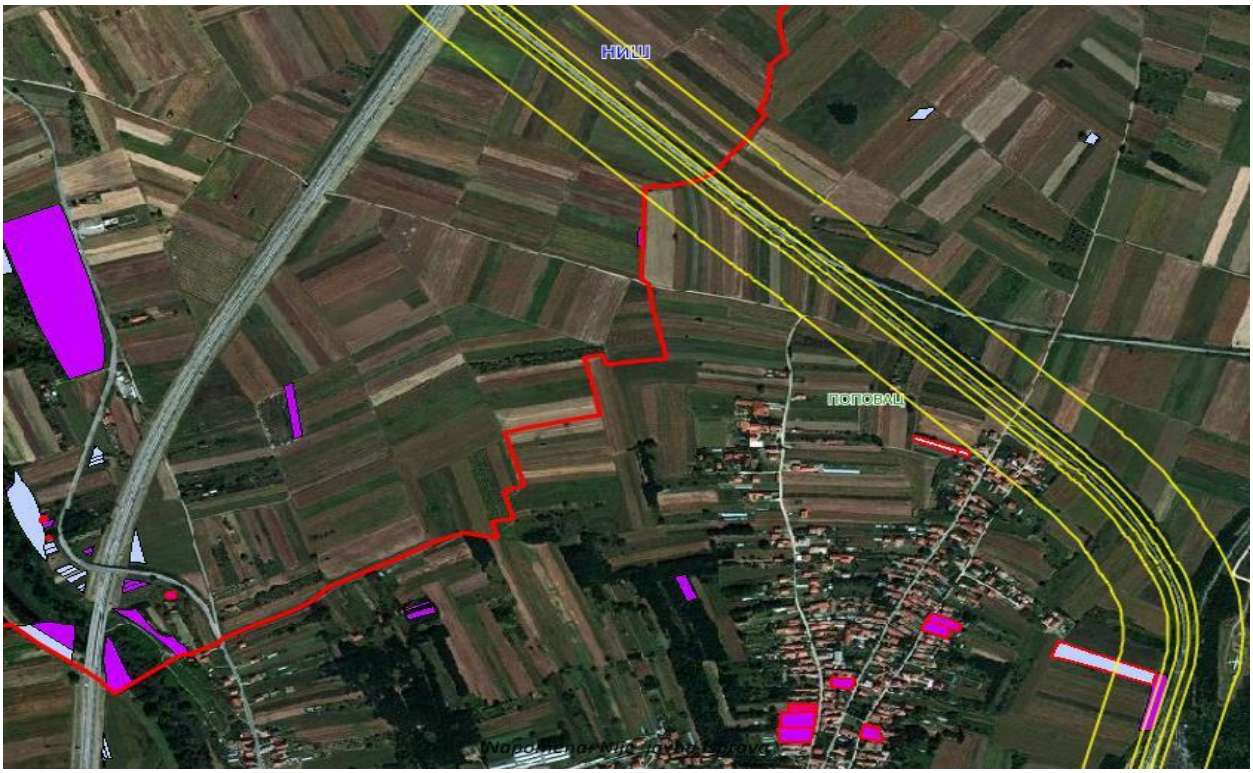

Figure 68 Typical case of severance impacts to arable land to areas with likely high intensity agriculture activities

Regarding land use and the Section of Stalac Djunis, during construction, land in the project area will be affected and occupied by haulage and access roads, excavated material disposal sites, concrete batching plants, worker compounds, and stock yards. The majority of land affected during construction will be forest land in hilly areas and developed land in Stalać and Đunis. However, the railway construction will permanently acquire about 1.7 ha of cultivated land: a minor part upon the exit from Stalać and the major part in the area between Trubarevo and Đunis. In the same areas, the construction activity will temporarily occupy an additional few hectares of cultivated land needed for siting of the facilities and mechanisation. Construction is expected to last up to 48 months, however, an average plot of land needed for the construction might be unavailable for farming for a period of few months. This means that one season's crops might be affected (depending on the season in which construction is carried out on a particular plot). The temporary land needs will have to be located and estimated prior to the start of construction works. It is expected to have a low level of impact on social aspects. It is expected that some changes in resource or its quality will occur but the impact is reversible. After completion of construction activities, the majority of the land will be returned into its previous condition. Due to minor loss of or alteration in a short-time period, the magnitude of this impact could be estimated as low and the impact significance is assessed as minor adverse.

Finally, regarding impacts on livelihoods and the Section of Stalac Djunis, it will be a result of physical and economic displacement of the affected persons. In addition to permanent displacement, temporary effects on livelihood are likely to result in restriction of land use and damage to the crops due to (1) siting of construction compounds on cultivated land plots, (2) crossing cultivated land plots during transport and affecting the crops. In respect to physical displacement, although the number of affected persons is expected to be small compared to the size of local communities, the sensitivity of receptors is considered high. The magnitude of potential effect on someone's life after losing the house is high and can significantly decrease the quality of life. Company "Antić Kosta" (affected by displacement) has about 50 employees. The initial significance of this impact (without mitigation measures) is therefore considered major adverse. It is of the highest importance that "Serbian Railways" mitigate this impact through adequate replacement or compensation and to include persons both with and without the formal title of ownership. If appropriate compensation and livelihood restoration measures are implemented the residual impact significance will be moderate adverse. Construction activity is likely to occupy some agricultural land which may result in damage to crops and compaction of the agricultural soil. The impact for an average land plot is expected to last several months, and potentially crops in the ground along the temporary haulage routes will be lost. "Serbian Railways" will compensate all lost crops and damages in accordance with the Law on Planning and Construction and the principles set out in the Resettlement Compensation Framework. In addition, the implementation of the Construction Traffic Management Plan, reinstatement of all affected land and provision of information to farmers who will be affected, should assist in managing impacts on livelihoods. This impact is assessed as being low to moderate adverse, as it is presently not possible to determine the number of people who will be affected.

Vulnerable and disadvantaged groups

The initial screening against drivers of vulnerability, identified the potential vulnerable groups: retired, elderly and people with disabilities and chronical disease; single parent headed households, male and female; people with low literacy and ICT knowledge; economically marginalized and disadvantaged groups; persons living below the poverty line; women. Since the project location is not yet finally set the granular profile within detected vulnerable groups is not known at this moment. However, the main drivers of vulnerability as presented above coupled with impacts from land acquisition and resettlement have determined all the above to be scoped in for further assessment and identification during the ESIA stage. The socio-economic surveys at ESIA and RAP level with provide an in depth vulnerability assessment and set the vulnerability criteria for various impacts. These will be adapted to the impacts and the different mitigation measures to apply to wider project impacts (such as loss of access to services, utilities) and to direct economic and physical displacement impacts as these would require differentiated attention.

Impacts to vulnerable groups are scoped in and have been observed from the stakeholder engagement lens coupled with the risks stemming from land acquisition and involuntary resettlement as these groups will be represented in both the Project affected and other interested parties. Impacts to these groups are identified from the exposure to risks and adverse impacts and their sensitivity to those risks including their adaptive capacity. With the current bassline data and the subsequent in depth household surveys, outreach and communication strategies in line with the SEP, the Project will ensure that vulnerable groups are not disadvantaged in the resettlement process, are fully informed and aware of their rights, and are able to benefit equally from the resettlement opportunities and benefits.

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. The assumption is that Roma women use rail transport as the cheapest

form of transport to neighboring settlements in search of most often daily employment such as housework, cleaning services in companies, work in agriculture.

Regarding the section of Stalac Djunis, the relevant ESIA does not make any reference to the project impacts on vulnerable groups.

The presence of Roma settlements and substandard dwellings are likely expected only in the Municipality of Mladenovac, Settlement Rajkovac as has been highlighted by one of the key informants from the Local community. There is a Roma Family (possible multigenerational) living adjacent to the existing rail. Other communities have not reported (at this stage) location with high sensitivity due to impacts to wellbeing of Roma in any aspect. The Map below depicts Sub-standard Settlements in Serbia and in the Project area. The decision to scope aspects of particular vulnerability of Roma is also driven by their migratory nature.

Cultural heritage

The Project for the most part closely follows the alignment of the existing railway. This reduces the magnitude of change and impact on surrounding receptors as the new railway would be seen in the context of the existing railway and its infrastructure (rather than as new, detracting features). In these locations, the Project is not expected to be at odds with the existing cultural heritage character. Where sections are offline (at a distance from the existing railway), the Project mainly passes in close proximity to other built forms, including settlements and other linear features, such as roads. However, this parameter has been scoped in although archaeological sites and cultural heritage sites are present in the broader Project area and direct impact to registered sites is unlikely. The baseline has presented the sites identified, while more granular information will be known at the next stage once the physical footprint of the Project is set and the design is informed with detailed conditions from the relevant cultural heritage authorities (at national Level and Nis). Risk to which potential cultural heritage sites unknown at this stage may be exposed to are Impacts to cultural heritage by chance finds during earthworks. One cultural heritage site is under prior protection – the Rail station in Lapovo which is counted as a valued structure of industrial architecture. For this site a Management Plan has been commissioned and is under preparation. However, this assessment is constrained to the registered and known sites of tangible cultural heritage sites, while chance finds as per nature are not covered, and will be part of the mitigation strategy through the ESIA and ESMP.

The Church of St. Jovan i Stevanac near Cicevac is a cultural heritage of significant importance. While not under direct impact, its location within densely forested area should be taken into account and considered in details during the ESIA. Emphasis shall be given to impacts from access roads, borrow and deposit areas. In cases of suspected elevated risks, the ESIA shall prepare the Cultural Heritage Impact Assessment and a commensurate Cultural Heritage Management Plan to be developed as a self-standing document. The CHMP will be prepared to define the avoidance, minimization and mitigation measures necessary to prevent that adverse impacts on known and unknown CH sites, as a result of project activities are prevented or, if not possible, reduced to as little as reasonably practicable during the construction phase. The objective of the CHMP is to ensure that work related to cultural heritage management is in accordance with the EBRD EIB requirements, legislation of the Republic of Serbia, international conventions ratified by the Republic of Serbia, ESMMP, CHIA Project and best international practices to avoid, minimize or mitigate potential adverse impacts on CH.

Regarding the Stalac Djunis section, the available information on designated cultural heritage and archaeological sites in the study area indicates the presence of two sites situated within 250 m of the proposed route in Djunis Nikoljac. Other identified cultural heritage sites are situated on the opposite side of the South Morava River, distanced more than 350 m from the route, in the upland, connected by village roads, not directly connected to any areas or haulage roads which will be utilised during construction. Their sensitivity to the proposed railway development is low and they are not considered relevant for this assessment. Given the lack of archaeological reconnaissance of the wider area and the likelihood of presence of uncovered archaeological findings, the whole project area is considered to be of medium to high sensitivity. The initial significance of this impact (if uncontrolled) would be major adverse. Therefore, a set of precautionary measures should be enforced during the construction works in order to prevent any adverse impact on the cultural heritage or archaeological sites. This will include the archaeological surveillance of construction works in the areas determined by the Institute for Protection of Cultural Monuents from Kraljevo. In case that the measures are implemented, there should be no impact on cultural heritage and archaeological findings.

Since more social than environmental impacts maybe expected for this Project, a more analytical approach of scoping in/out exercise has been followed for the social parameters as presented in the table below.

Table 91 Scoping decisions taken relevant to social impacts and sensitivity of receptors

Issues	Potential Impact/sources	Scoping Decision and rational	Potential preventive/mitigation measures
Labour and working conditions	General implementation of the EBRD PR 2 EIB ESS2 - gaps between Serbian laws are minor, but local practices are in some cases not in line with either set of provisions.	Scoped IN – √ Lack of legal and Labour standards application can have a major effect on Project social performance.	ESMP, Human resource management plans
Labour and working conditions	Child and forced labour	Scoped IN – √ Occurrence is very unlikely as it is prohibited and disappeared from practice for decades. However, monitoring will be required	ESMP, Human resource management plans Labour management plans Include standards in contractor and sub-contractor agreement mandatory clauses, control and enforce implementation
Labour and working conditions	Inadequate worker accommodation with various negative potential consequences COVID -19 impacts might impose traveling restrictions requiring the workforce to be provided with accommodation	Scoped IN – √ on a precautionary basis. Due to the migration trends, there might be an abundance of local work force.	ESMP - Accommodation to be provided in line with IFC/EBRD | Guidance on Workers' Accommodation
	Informal employment of workers - informal workers (without formal employment contracts) are not guaranteed many of their legal rights. Economic effects of COVID-19 are further drivers of vulnerability	Scoped IN – √ Due to commonness of informal economy, likely to occur. The effect is that for a part of the labour force legal, EBRD, EIB and GIP standards are not applied	ESMP, Human resource management plans Include obligation in contractor and sub-contractor agreement mandatory clauses, control and enforce implementation Assessment of informal employment in the Construction Sector during ESIA
	Inadequate employee grievance mechanism resulting in infringement of employee rights	Scoped IN – √ legislation mechanism is formal and limited, in many cases there is no workers effective grievance mechanism	ESMP, Human resource management plans Plan, transparent grievance process, third party management, control and enforce implementation Include specific Monitoring of Labour issues
Occupational health and safety	Risk of injuries for workforce as a result of construction works, major excavations, tunnelling and working in the vicinity of active roads and electric power lines	Scoped IN – √ Often available and acquired protective equipment, enforcement and discipline of employees in using proper equipment and applying proper measures of safety, training and knowledge of employees in applying measures of OHS is not adequate	OHS procedure plans, ESMP, Human resource management plan, Mandatory insurance policies, acquiring protective equipment, enforcement and discipline of employees, training and knowledge of employees in applying measures of OHS, third party management, control and enforce implementation
Community health and safety	Risk of injuries of community due to proximity of construction works and on construction sites, risks of trespassing onto sites, the meaning of signs, the dangers of playing on or near equipment or entering fenced areas. Potential temporary health and wellbeing impacts on residents who are located close to construction sites, if the construction phase is prolonged (for example due to cumulative construction impacts with other projects)	Scoped IN – √ Local practices are below EU CHS standards, part of construction taking place in vicinity of settlements, measures and procedures are often not fully applied	ESIA, SEP, ESMP, public consultations and information, Safety Management plans, workers Code of conduct, contractor and sub-contractor mandatory clauses Awareness campaigns for the community on construction related risks

Issues	Potential Impact/sources	Scoping Decision and rational	Potential preventive/mitigation measures
	Potential to temporarily impact traffic conditions for road users (including motorists, pedestrians and cyclists) on existing road networks – particularly if there is congested traffic and parking in the area		
Community dynamics	Potential temporary changes to the way of life for people living, working, or accessing services, institutions or businesses near construction zones Temporary amenity impacts to community facilities which are potentially more sensitive to such impacts and may not be able to function, or be properly enjoyed by the community, where they are located close to a construction site Potential temporary impacts if access to the natural environment or public open space changes Potential disruption to way of life caused by temporary changes to access arrangements to and from properties, public transport or community facilities -changes to pedestrian access could potentially be more challenging for people with a disability	Scoped IN – √	ESIA, SEP, ESMP, public consultations and information, Safety Management plans, workers
Community health and safety	Increased number of traffic accidents due to increased traffic around construction sites, increased traffic loads on local roads and traffic density affecting the local community and existing road and rail user.	Scoped IN – √ Influence during construction to local traffic roads will be significant, measures and procedures are often not fully applied	ESIA, SEP, ESMP, public consultations, Safety Management plans, Traffic management plans, contractor and sub-contractor mandatory clauses Adequate signalling on local roads, rail level crossing (during construction) awareness campaigns for the community with emphasis to most vulnerable road users (children, elderly, pedestrian and cyclists), reduce speed limits, control and enforce implementation to contractors and sub-contractors Assessment on vulnerable road users during ESIA
	Risks associated with influx of workforce and job-seekers, including communicable diseases, Gender based violence/ Fraternization, tension and violence, illicit behaviour crime including prostitution, theft and substance abuse	Scoped IN – √ Due to proximity of a major city significant influx of labour force is unlikely to happen however this has been scoped in due to potential cumulative impacts from other ongoing activities and the migration trends	ESMP, SEP, workers Code of conduct will include precautionary control mechanisms Risk assessment at ESIA stage
Public utilities and services	Use of local solid waste containers for construction site waste disposal site waste disposal	Scoped IN – √	Implement Waste Management Plan Use of local solid waste containers for construction
Public utilities and services	Use of local water source, supplied by local wells, during construction for	Scoped IN – √ Use of waters and waste production will be seriously	ESIA, SEP, ESMP, specialist studies, contractor and sub-contractor mandatory clauses

Issues	Potential Impact/sources	Scoping Decision and rational	Potential preventive/mitigation measures
	any purposes, possibly endangering water supply, Discharging construction site waste waters into local sewage system can cause strain on local sewage systems, Increased pressure on the public electric grid by the compressor stations, construction camps and construction sites	increased and local service systems may be vulnerable. Key discrepancies between GIP and national	Use of technical waters for construction, use of alternative source of drinking waters, adequate construction solid waste disposal, use of waste containers at site, mobile toilets services, control and enforce implementation to contractors and sub-contractors Assessment of potential pressure to water supply systems due to construction works
Public traffic and transport	Delays and traffic congestions due to increased vehicle traffic around construction sites, road closures or diversions in traffic affecting Existing Road users, regular commuters for purpose of work, education and health service	Scoped IN – √ Several roads that provide access or communication between compact settlements will be intersected during construction, in few cases the only existing road from villages	Traffic Management Plan, Emergency Traffic Management Plan Stakeholder engagement and communication with most vulnerable receptors, hospitals and ERs
Public traffic and transport	Deterioration of local roads due to increased traffic of heavy vehicles to construction sites	Scoped IN – √ Deterioration is likely to occur given the state of roads that may cause higher delays, risk of accidents etc.	Avoid usage of local roads in bad condition, repairs of local roads in final stages of construction phase Specialist studies, Traffic management plans, SEP Mandatory clauses in Contract documents
Livelihood	Benefits to the local community & economy as a result of local procurement of materials for construction, goods and other services to supply the Project	Scoped IN – √ Positive impact likely to occur that could benefit local communities	Procurement plan of Contractors might have a quota for procurement of goods from local suppliers through sub-contracts to local firms SEP, ESMP, Procurement plan and public consultation and information
Livelihood	Employment of local workforce benefiting the local community and livelihood of PAPs and vulnerable groups	Scoped IN – √ Project goals should include ensuring that these positive impacts produce more significant benefits to the local community	Employment plan should favour employment of local workforce. Job opportunities must be tailored when possible, for inactive, long time job seekers, gender sensitive job opportunities, provide a fair and transparent recruitment process and enhance local skills base through training, additional training employment courses for women and vulnerable groups like Roma population, IDPs, people living below or close to poverty line that are affected by the Project etc.
Business and Livelihood	Some businesses located around the proposed construction sites may experience continued positive impacts during the proposed construction works, including: Depending on their location, some businesses may benefit from a net gain, increase for businesses located close to construction sites or en route to construction sites, which sell goods to construction workers. Related industries, such as service stations, takeaway food shops and hotels, could also benefit from the Project	Scoped IN – √	While significant advance notice would be given to all businesses of a power or utility shutdown, accidental events would be more difficult to manage. A business impact assessment will be carried out as part of the Environmental Impact Statement for this proposal.

Issues	Potential Impact/sources	Scoping Decision and rational	Potential preventive/mitigation measures
	Potential business impacts that could continue to occur during the proposed construction works may include: •Temporary adjustments to servicing, deliveries and access due to temporary street closures, increased traffic congestion and/or travel times –: Temporary loss of power and utilities – businesses may be disrupted by accidental or planned shutdowns of electricity or other utilities to enable construction work.		
Resettlement - relocation	Resettlement of people and property, relocation, loss of shelter (on land used for Project construction route)	Scoped IN – √	Implementation of RPF and Compensation at full replacement cost including moving, transaction costs/ taxes and additional assistance before displacement restrictions. Socio-economic survey, public consultation and information and gender-inclusive consultation
Resettlement - relocation	Resettlement of people and property, relocation of persons that are part of vulnerable groups, as such more adversely affected by project impacts	Scoped IN – √ economic and socio-cultural conditions of displaced persons must be sensitive to gender, age and other potential drivers of vulnerability	Actions to ensure that vulnerable groups are not disadvantaged in the resettlement process, fully informed and aware of their rights, additional measures and compensation Implement RPF and SEP Socio-economic survey, public consultation and information and gender-inclusive consultation
Resettlement - Economic displacement	Temporary or permanent loss of income or livelihood through, for example, interruption or elimination of a person's access to his/her employment or productive assets, regardless of whether the affected people are physically displaced. Loss of livelihood and income	Scoped IN – √ Business owners, employed, permanent and seasonal workers are likely to face temporary disruption of livelihood streams	Compensation at full replacement cost if property is acquired, including moving, transaction costs/ taxes and additional assistance before displacement restrictions. For workers, compensation for the period of loss of income. If applicable, provide training employment courses and retraining for other jobs. Restore the livelihoods and standards of living of displaced persons to pre-project levels. Implement RPF and SEP Socio-economic survey, public consultation and information and gender-inclusive consultation
Resettlement - Economic displacement	Resettlement of informal business affecting Business owners, employed, permanent and seasonal workers	Scoped IN – √ Due to the fact this is common practice, likely impact.	Compensation at full replacement cost consistent with compensation packages designed for formally registered businesses Take into account COVID-19 economic impacts to informal business and employees. The Socio-economic survey shall be on the lookout for informal business
Resettlement of agricultural land and	Resettlement of arable, cultivated land, orchards and vineyards, livestock facilities, for grazing used	Scoped IN – √ Very likely impact that can significantly impact	Closely monitor household transitional phase after resettlement and provide additional

Issues	Potential Impact/sources	Scoping Decision and rational	Potential preventive/mitigation measures
households - land use	meadows and pastures, beehives etc.	livelihood of the agricultural household, regardless of compensation	measures if needed in accordance with RPF
Temporary resettlement	Damage to properties during construction, loss of perennial trees (orchards, olive trees, vineyards etc.)	Scoped IN – √	Any damage shall be assessed and compensated at replacement cost or replacement of asset if in cash compensation is not suitable. Compensation and transitional allowance for each year until the trees are grown to same yield capacity as pre construction level.
Cultural heritage (known) including "intangible cultural heritage" (ICH)	Ground disturbing construction activities including permanent and temporary occupations of areas near culturally significant heritage sites	Scoped IN – √ Due to type of construction works potential psychical damage to identified tangible cultural heritage sites may occur without mitigation and shall be reconfirmed based on the spatial positions of all project alternatives	ESIA, SEP, ESMP, LARF, public consultation and information, Cultural Heritage Management Plan (including ICH), specialist studies. Acquiring national legislation envisaged permits, reconnaissance survey of known monuments, avoidance of certain and likely impacts by project redesign, use of low impact construction techniques
Cultural heritage - chance finds	Limited potential impacts or risks to unknown cultural heritage ("chance finds") during construction or repair activities	Scoped IN – √ Unknown archaeological sites might be present	ESIA, SEP, ESMP, LARF, Cultural Heritage Management Plan (including ICH), chance finds procedure, specialist studies Implementation of archaeological monitoring and a "chance finds" procedure with special focus on high potential archaeological areas, inform and train employees on Chance finds procedure

Cumulative impacts

Cumulative impacts will be better assessed at the ESIA per Section. There are road upgrades in the surrounding areas, industrial developments in some parts of the project area, large scale and uncontrolled exploitation of sand and gravel, especially within the IBA area of Gornje Pomoravlje, in the riverbed and in the wider alluvial area of Velika Morava River and persistent water and soil pollution due to the creation of a large number of illegal landfills along the river and abandoned gravel pits. One of the most significant projects is the E761 Motorway Pojate –Preljina (Morava Corridor), It is a dual lane highway tolled motorway in the length of approximately 112 km located approximately 200 kilometers south of Belgrade in a low floodplain that runs along the West Morava River. The motorway route will enable the connection in the part Pojate - Kruševac - Kraljevo Preljina, with branches to A1 (i.e., E- 75 international code) and A2 (i.e., E-763 international code) state roads. Due to the requirements on the route, the Morava Corridor is divided into three sections: Pojate-Kruševac (27.83km), Kruševac-Adrani (53.89km) and Adrani-Preljina (30.66km).The preliminary design of the Project has started in September 2019 and the construction is expected to be completed in 4 years. The project also includes (i) overhead structures such as interchanges, bridges, culverts, over and under passes; (ii) a telecommunications network (digital corridor); and (iii) river regulation works aimed at protecting the Project and surrounding areas from floods. A total of 18 separate hydraulic structures are planned, including "sections" (straightened, canalized sections of the river), linings and embankment reconstruction. In addition, temporary facilities to be built under the Project include quarries and pit pits, camps and warehouses, crushers, concrete and asphalt bases, and access roads.

At a preliminary stage, it can be said that regarding biodiversity all these activities can lead to further habitat degradation and loss as well as adverse impacts to species, particularly the increase risk of barriers to movement for fauna. The road upgrades could have a cumulative noise impact.

Where planned and foreseeable future developments within or near by the Project AoI are identified, they will be investigated and assessed during the ESIA Phase to determine whether any of these planned projects will cause additional unanticipated environmental and social impacts.

8. STAKEHOLDER ENGAGEMENT

8.1 Introduction

Consultation and engagement with stakeholders an integral part of the Environmental and Social Impact Assessment (ESIA) process. To support the realization of the Project, the Project Promoter will develop and implement a Stakeholder Engagement Strategy, the overall aim of which is to ensure that a consistent, comprehensive, coordinated and culturally appropriate approach is taken for stakeholder consultation and disclosure. This approach is in full compliance with national and local legal provisions and IFIs Performance Requirements.

The Project Promoter will undertake a practice of stakeholder engagement throughout the project planning, construction and operation phases. The plan for this engagement, including identification of stakeholders (i.e. people and organizations who have a role in the Project or could be affected by the Project activities or who are interested in the Project) and disclosure of information, consultation, and handling of suggestions, comments and concerns, is to be documented in the Stakeholder Engagement Plan (SEP). This plan will be updated as required as the Project progresses. The purpose of the Stakeholders" Engagement Plan (SEP) is to provide a basis for a constructive relationship, between the Project Promoter and the affected stakeholders over time, by ensuring relevant and understandable information and by providing, to all the Project Affected Persons opportunities to express their views and receive responses. The nature of and frequency of engagement is defined by the risks and impacts that the Project will have. The SEP also stipulates for stakeholders how their concerns are to be considered in compliance with a grievance procedure. According to IFIs Environmental and Social Policy, the Project is classified in Category A project, that is likely to have adverse environmental or social impacts.

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 (Stakeholders Engagement Plan - SEP), that will focus on short- and long-term goals of stakeholder engagement, 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 Projector that may have an interest in the Project or that have influence over the Project. 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 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, construction/rehabilitation activities and operation. These stages are described in the following table.

Table 92 Stages of stakeholder engagement

Phase	Objectives	Status
Alternative's assessment	To introduce the Project and identify environmental, social and cultural heritage sensitivities that should be taken into account in selecting the preferred route.	*Completed*
Scoping disclosure and consultation	To provide further detail on the Project and an opportunity for stakeholders to provide feedback on the scope, approach and key issues that will be addressed during the ESIA as well as the plans for future engagement activities. An ESIA Scoping Report (dated February 2022) was prepared in English and salient features shall be translated to Serbian and will be circulated for comment to key stakeholders during February/March 2022. Consultees consist of the Municipalities and Cities (including Settlements) through which the alignment is planned to pass; relevant government agencies (including relevant line Ministries). The ESIA Scoping Report will be posted on the SRI website in line with disclosure principles of this SEP (please see chapter 4.3) in both English and salient features in Serbian.	*Completed* *Planned*

Phase	Objectives	Status
	Relevant Stakeholders identified will be informed that the Scoping report has been disclosed and how it can be accessed and that comments, questions and queries can be submitted to SRI within 30 days following the disclosure of the ESIA Scoping Report. Following the disclosure period, the ESIA Scoping report shall be subject to public consultations. Depending on the COVID-19 constraints the consultation shall take the form of one or several online or face to face meetings. Stakeholder feedback shall be taken into account as relevant.	
RPF, 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 Project phases (construction, operation and maintenance) to continue engaging with stakeholders throughout the project lifecycle. The methodology for this will be developed and finalised using the information compiled during the ESIA process.	*Planned*

In parallel a Stakeholder Engagement Plan has been developed commensurate to the stage of the Project. The SEP has focused on engagement during all Project Phases from Planning, Scoping, Main ESIA, Construction and Operation Phase.

The SEP has identified all key stakeholders Project affected and Other Interested Parties. The SEP has ensured that disadvantaged or vulnerable individuals or groups, relevant to the project, are identified, that their particular sensitivities, concerns and barriers to project information are assessed and that they fully understand project activities and benefits and participate in consultation processes. Vulnerabilities identified in the baseline have helped informing the SEP. The vulnerability may stem from person's origin, gender, age, health condition, economic deficiency and financial insecurity, disadvantaged status in the community (e.g. minorities or fringe groups), 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.

A preliminary vulnerability assessment has been made with an in depth impacts assessment during all project phases.

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 Cultural Heritage Institute of Serbia and Nis.

- A number of Biodiversity experts and stakeholders, Biologists, Ornithologists, Theriologists, Ichthyologists, Hunting associations
- Representatives from 24 settlements/local communities crossed by the Project (Presidents, Vice Presidents or Secretaries of the Community Offices (the smallest administrative cell in the administrative division

The SEP has made arrangement for adequate disclosure of documents and information sharing avenues. For more details on the Stakeholder Engagement practices adopted for the Project please refer to the SEP.

8.3 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. Should the Project benefit from a Technical Assistance support it is recommended to inter alia bolster the existing capacity of SRI in Grievance Management.

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, Municipal 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 through local avenues (in the value chain labelled as Step 1, Step 2 and Step 3 in the SEP).

The system and requirements (including staffing) for the grievance redress chain of action – from registration, sorting and processing, and acknowledgement and follow-up, to verification and action, and finally feedback – are embodied in this GM. As a part of the GM outreach campaigns, SRI will make sure that the relevant staff are fully trained and has relevant information and expertise to provide phone consultations and receive feedback. The project will utilize the existing system (hotline, online, written and phone complaints channels) to ensure 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 publicized in line with sub-chapter 6.1 of the SEP.

Stakeholders are encouraged to send all grievances, concerns and queries to the contact points below:

Table 93 CFD contact details

Description	Contact details
Implementing agency:	SRI
Main contact:	During the transitional period the PR Department of SRI shall be the main point pf contact
Address:	Nemanjina 6, 11 000 Belgrade
E-mail:	nenad.stanisavljevic@srbrail.rs
Telephone:	*+ 381 11/3618443*

9. MANAGEMENT AND MONITORING ARRANGEMENTS

9.1 Environmental and Social Management Plan

9.1.1 General

The aim of the Environmental and Social Management Plan is to provide a road map to orient the separate ESIAs, per each of the sections. The ESMP, which will be analysed under the ESIA preparation and be based on more precise data that will derive from the Preliminary Design, will provide rational and practical environmental guidelines to:

- Orient the control and minimize the extent of environmental/social impacts, by their management, and where possible, to improve the condition of the natural and social environments;
- Guide the prevention of environmental degradation and social negative effects;
- Comply with all applicable laws, regulations, standards and guidelines for the protection of the environment;
- Provide guidance regarding method statements which are required to be implemented to achieve appropriate environmental specifications;
- Describe all monitoring procedures required to identify impacts on the environment during construction and operational phases;
- Orient training of employees and Contractors with regard to environmental and social obligations

The measures that are specifically outlined in the ESMP are based upon the information gathered regarding the baseline conditions of the project sites and the impact characterization and mitigation measures that were described in the chapters above. It summarizes the organizational requirements, actions and monitoring plans during construction and operational phases, to ensure that the necessary measures, with respect to environmental, health and safety (H&S) and social aspects, will be taken in consideration by the Project actors. The ESMP covers a long-term process, while it will be required to be regularly reviewed and updated as the Project progresses in order to reflect any changes in the Project future phases, as well as in regulatory requirements.

The ESMP under the ESIA stage will reflect the mitigation hierarchy and, where technically and financially feasible, favour the avoidance and prevention of risks and impacts over minimisation, mitigation or compensation, and ensure that all relevant stages of the project are structured to meet applicable laws and regulatory requirements and the PRs.

The process to manage change impacting Environmental and Social aspects of the project will be integrated in the overall change management process applicable to all Project Changes. Environmental and Social changes addressed in an ESMP section include new planned activities or processes and or changes in project activities, design or footprint leading to potential impacts that were not subject to assessment as part of the Project ESIA package, changes to ESHS management, mitigation and monitoring commitments not considered in the Project ESIA package and changes/updates of legal and regulatory requirements, technical codes and business objectives that may trigger potential impacts that were not subject to assessment as part of the Project ESIA package.

Triggers for consideration in relation to changes specified above may include design refinement or detailed design outcomes, changes in construction methodologies; field obstacles during construction, results of further field surveys and monitoring, comments/concerns submitted by public/stakeholders/lenders and changes in regulations or requirements by regulatory bodies.

At this stage, some general arrangements for environmental and social monitoring and management are shared.

9.1.2 Construction Phase

The Construction ESMP consists of a management system and environmental guidelines which contain enough detailed specifications that need to be undertaken or adhered to, by the project developer (Contractor). Two types of specifications need to be complied with, by the ESIA and Preliminary/Detailed design phase, by the Contractor namely; standard and specifications. The Construction ESMP needs to be developed in parallel with the Final Design Stages, and constructive input should be invited from the selected Contractor. The objectives of the Construction ESMP are to:

- Define the requirements for compliance with the national and local regulations, permit/consent conditions, client/contract requirements, and all other applicable environmental documents including the Environmental

and Social Impact Assessments (ESIA), Environment and Social Management Plan (ESMP), followed by Environmental and Social Action Plan.

- Clearly define the responsibilities and actions required by all parties during Project implementation and to maintain compliance with the environmental and social requirements.
- Provide necessary procedures for communication, documentation, and review of environmental and social compliance activities.

The Construction ESMP takes into account the following per each of the Sections:

- The size and complexity of the Project scope of work;
- All applicable laws, statutes and regulations and international agreements and conventions, including the EBRD Performance Requirements on Social and Environmental fields.
- All mitigation measures and requirements as set out in the ESIA and related ESMP and ESAP, must be transferred to the implementation of Construction EMP as commitments;
- The risk factors that may be faced during the construction of the Project;
- The principle of continuous improvement in environmental and social performance.

The Construction ESMP, will condition the implementation of mitigation measures by developing specific plans, which will be further elaborated as guidelines under the ESIA preparation stage:

- Emergency Response and Preparedness Management Plan
- Spill Prevention Management Plan
- Air quality and dust management plan
- Noise and vibration management plan
- Construction Traffic Management Plan
- Sedimentation and Erosion Control Plan
- Water and River Crossings Management Plan
- Waste Management Plan
- Biodiversity Management Plan
- Landscape and Visual Management Plan
- Health and Safety Management Plan
- Cultural Heritage Management Plan (CHMP)
- Chance finds Management Plan

In addition to the topic specific plans, a number of site-specific plans will also be required, including construction plans and method statements (Borrow pit management plan, Bridge Construction Plan, Tunnel Construction Plan, Tunnel Handover Plan, Slope Stabilisation Plan, Method Statements for Temporary Activities including storage areas, river crossings, roads/ Access Roads), Blasting Management Plan providing the methodology for the management of control of tunnel blasting including methods for noise and air quality management and occupational and community health and safety.

9.1.3 Operation Phase

The ESMP consists of environmental and social measures for the operation of the railway, including the requirement to establish and implement an Operational Environmental and Social Management System (OESMS) and relevant Management Plan. The OESMS will be developed and implemented in-line with the international standards and include inter alia the organization, responsibilities and resources, the Operational Environmental & Social Management Plan, including supplementary plans e.g. Waste and Water Management Plans, Erosion Control Plans etc., the Operational Maintenance Plan; the Emergency Preparedness & Response Plan, the Landscape Management Plan; the Tunnel Operational Management Plan; the Community Health, the Safety and Security Plan; the Health, Safety and Security Plan; Chemical Accident and Spills Management Program, the Rail System Plan. the training program and the Auditing and reporting of Environmental & Social performance.

The SRI will develop and be responsible for the OESMS and the implementation of the measures of the OESMP that are proposed within it, as well as for ensuring that its Contractors (e.g. vegetation management Contractor, Railway section maintenance Contractor/s) understand the requirements contained within the ESMP (operational phase) and have contractual conditions in place to ensure that applicable elements of the ESMP are achieved.

9.1.4 Administration and Regulation of Environmental Obligations

Management Structure

The Contractor must compile an organogram illustrating the management structure for inclusion within the final EMP. This organogram should depict the organization structure of the Contractor, and must contain supporting documentation to demonstrate the environmental responsibilities, accountability and liability of the Contractor s employees. The Contractor should assign responsibilities for the following:

- Reporting structures.
- Actions to be taken to ensure compliance.
- Overall design, development and implementation of the ESMP.
- Documenting the environmental policy and strategy.
- Implementing the ESMP in all stages/phases of the Project.
- All the aspects which require action under the other core elements and sub-elements of the EMP.
- All official communication and reporting lines including instructions, directives and information shall be channelled according to the organization structure.

Roles and Responsibilities

The parties involved in the implementation of the ESMP are the following:

- SRI (Serbian Railway Institute)

SRI is the applicant and will therefore be the entity monitoring the implementation of the ESMP. However, if the SRI appoints Contractor/s to prepare an ESIA per each section, which will prepare related detailed EMP per each of the Railway sections, then the successful Contractor responsibilities are summarized in the section that follows. SRI will organize a PIU, where specific experts have to be appointed to supervise the environmental and social elements of the project. This will be one of the requirements of the Technical Assistance that will be prepared.

- Contractor

The Contractor shall prepare the ESMP documentation to ensure that all third parties who will carry out all or part of the Contractor obligations under the Contract will consider also with the requirements of this ESMP and be responsible for the overall planning of implementation of the ESMP in accordance with the requirements of SRI and the environmental permits requirements and for obtaining any environmental permits, which are required for the design, construction and operation of the railway. The Contractor shall define the roles for appoint a nominated representative of the Contractor as the Environmental and Social Advisor (ESA) for the contract. The ESA will be site-based and shall be the responsible person for implementing the environmental provisions of the construction contract. The ESIA will include in the ESMP more details for:

- Implementation Schedule
- Reporting
- Environment and Health Training and Awareness
- Emergency Preparedness
- Checking and Corrective Action
- Communication and Grievance Procedure
- Management Review

9.2 General arrangements on Environmental and Social Monitoring Plan

Monitoring is a tool to assess environmental conditions and trends, support policy development and its implementation, and develop information for reporting to national policymakers, international forums and the public. The monitoring program refers to both construction and operational phase and deals with the natural and social parameters.

The characterization of impacts chapter defines how important is the evaluation of mitigation measures caused by the construction works or wrong implementation of mitigation measures as well as during the operational phase.

9.2.1 Monitoring during Construction

The Contractor environmental monitoring includes continuous and periodic observations, the recording, storage and treatment of data for environmental and social protection and the reporting of the results to the management and to the affected parties and the general public as sets of primary, calculated or aggregated data and general information in quarterly reports.

Monitoring costs will be included in contingencies costs. These costs can be considered during construction and operational phases and will be estimated at the next phase. Additionally, the responsibility for the type of monitoring will be defined at the next stage.

Table 94 Environmental monitoring during construction

Environmental and Social parameters	Sites	Monitoring Method and Parameters	Frequency of monitoring
Landscape	Construction sites and areas in the vicinity, camps and ancillary areas, auxiliary roads, interchanges, bridges, tunnels,	Visual assessment of landscape impact	At the beginning date of the construction phase and then every three months, paying attention to high rainfall events.
Change in Geology, geomorphology, erosion/slides and seismicity	Rocks to be cut, soils to be dredged and used for fillings, agricultural, soils of semi managed and managed lands to be directly affected by construction activities	Visual evaluation considering quality and soil/rock structure and proprieties, existence of calcareous water pockets, slope gradient, draining systems and vegetation cover. Geotechnical analyses for rock characteristics and possibility of transmit of vibrations, sensitivity to slides and collapse phenomenon in tunnel sites, sedimentation and permeability. Soil physical characteristics and structure in agricultural and managed lands, river/streams valley and channel slopes in sites that will be directly affected by construction works	Once prior starting the construction works. Seasonally during construction works
	Cut/fill slopes, river valleys and Hill/mountain slopes to be affected directly by construction works Soil disposal in construction sites Slopes and valleys, upper soils level, green cover and soil stability Topsoil stockpiles	Volumetric Survey on loss of surface soils by erosion or by changes in topography (cut/fills). Site observations and visual inspection of works on sites prone to erosion and slide Volumetric Surveys and inspection of works for slope rehabilitation and erosion control Site observations and visual inspection of disturbed areas for top soil erosion and of top soil stockpiles for erosion.	Once prior starting construction works At the end of the works for slopes stabilization and re-vegetation Monthly with selected areas inspected after heavy rainfall events at the discretion of the environmental manager
	River bodies and valley slopes, bridge sites, channel slopes etc.	-Sites where bridges will be constructed, defining of monitoring sites etc. -Site observations and visual inspection	Once prior starting construction works. Daily during works in sea/river/stream/channel bodies Monthly till the end of constructions in water bodies.
Soil pollution	Soils to be dredged, and all sites directly affected by railway construction and its facilities etc. Areas for spills and leaks which might impact top soil quality and ultimately groundwater recharge areas.	Soil quality analysis Content of pesticides/herbicides, organic and inorganic elements (in accordance of land use and possible soil pollution sources), Contractor records, site observations and visual inspection of unannounced sampling for particle size distribution, soil reaction, etc.	One set of analyses, prior starting the construction Seasonally (4 times/year), sampling/analyzing and monitoring during construction phase.
Seismicity	Along the whole corridor with focus on sensitive sites to earthquakes, slopes, unstable rocks, tunnels, bridge.	Evaluation of seismic norms of construction according seismicity parameters and map	Once before starting the construction works Seasonally during construction works
Wastes	Waste storage areas Toilets in working campus Waste transport vehicles	Contractor observation and records, site observations and visual inspection of areas for draining and temporal collection of spills and leaks which	Daily

Environmental and Social parameters	Sites	Monitoring Method and Parameters	Frequency of monitoring
	Accidental waste distribution	might impact on soil quality, surface and ground waters. Visual observation of sites sensitive to leakage, or solid waste distribution by wind activity. Visual observation of cleaning, maintenance and disinfection of temporary toilets, septic tanks, Contractor observation and records, on temporary disposal sites of solid waste, their selection, charging in equipment for solid waste transfer Checking of vehicles for wastewaters and solid transfer, to be sure that no accidental leakages or solid waste fall down, during the transport. Observe and record of the cleaning and disinfection of waste sites.	
Air quality, dust and noise and vibrations	Territories close to inhabited areas and settlements, natural habitats and woodlands and surrounding sites All construction sites, camps and ancillary areas.	Inspection and visual observation for disturbance of gases and dust emissions from construction sites. Air monitoring procedures will be implemented at sensitive receptors that will be defined in the baseline of the ESIA per Section along the expressway Monitor complaints of affected population Complaints register Air, dust and noises and vibration (dB) monitoring procedures will be implemented at sensitive receptors as will be defined by pollution sources that will come up in ESIA findings Visual checking of gas emissions for signs of not appropriate emissions from vehicles and equipment. Air monitoring procedures will be implemented if disturbance will be identified by community or workers complaints. If it will be exceedance of gas discharges or dust and noise generation, from the levels provided by profound ESIA and Environmental Permit, the works should be stopped and restart only after restoring of situation described on above mentioned documentation. Noise monitoring with hand held analyser with application software	Daily – supervisions and visual observations Regular monitoring of air and noise 4 times/year, Unannounced inspection during material delivery Quarterly during construction works for air Increased frequency during dry season for air In the beginning and then bimonthly for noise
Climate change	Sites sensitive to floods, Exposed lands without green cover, woodland and forests, agricultural lands, settlements	Inspections and observations of draining channels, in respect of mitigation measures due to floods. Measure the flood level and assets affected, in case of floods, and if needed propose amelioration of flood control measures. Record of public disclaims on risk of floods. For monitoring of GHGs, please refer to the row above (air quality) Visual evaluation of fires in the sensitive sites and record the forest resistance during high temperatures	Days with heavy rain. Twice per year (Springtime and winter)
Surface waters	As all construction sites 100m far from the bridges,	Surface water monitoring of main rivers, through water analysis of water turbidity and suspended solids, pH, TSS, electrical conductivity, temperature, dissolved oxygen, oil and grease, heavy metals, chlorides, sulphates, ammonia, nitrites, nitrates,	Seasonal/ 4 times/year, regular monitoring Daily, visual observation of surface waters and possible leakages. Additional analyses in case of accidental pollution

Environmental and Social parameters	Sites	Monitoring Method and Parameters	Frequency of monitoring
		TOC. Sampling stations will be specified depending on the ESIA needs Visual checking of construction sites for drainage and bridges.	
Groundwater	At all construction areas close to groundwater recharge areas (hydro-geological windows)	Visual checking of groundwater discharges during excavation works for contamination and ensuring that these are sealed efficiently. Visual observation of leakages etc. In all sites, over recharge areas, monitoring of microbiological, heavy metals and organic parameters in existing wells for extraction of groundwater, should be analysed. The chemical parameters, to be analysed should be referred to the possible pollution/contamination elements.	Daily, visual observation Seasonal monitoring of groundwater and analyses Additional analyses in cases when leakages or other accidental pollution is observed.
Biodiversity	All terrestrial natural habitats.	Field investigation and observation of all natural habitats, especially sensitive habitats. Check of: Number of accidents with fauna Number of fauna (using testimonies, photos of species or their tracks etc) in surroundings of construction sites, Number and species of plants cut Number of trees and bushes planted Registering of damaged species with specific status. Percentage of completion of required measures, including: passages, barriers, surveys for reptiles, amphibians, mammals and bird nests. Photographs to compare habitats before and after restoration activities, and evaluation of rehabilitation with definitions of BMP/BAP, Pre / During / Post Construction Survey	Daily observation and record of construction woks in the territory of Potential Protected Areas. Weekly observation for plants and wildlife, status of fences etc, to protect nests, etc. Seasonal inventory of registered flora/vegetation and wildlife with specific status.

Table 95 Social monitoring during construction

Social parameters	Sites	Monitoring Method and Parameters	Frequency of monitoring
Impact to Archaeological sites and cultural resources (Chance find)	Construction sites and areas in the vicinity, camps and ancillary areas, auxiliary roads, interchanges, bridges, tunnels,	Visual check Site inspection reports Reconnaissance by relevant authority and archaeological /cultural heritage supervision During the construction work, if archaeological or historical sites and objects are discovered the Contractor shall mark and secure new identified sites (with a protective railing or other means of protection) to avoid damage in the course of road construction and immediately notify the relevant Institute for the Protection of Cultural Monuments.	At the beginning date of the construction phase and then every three months, paying attention
Increased risk of illicit behaviour and crime	Construction sites and areas in the vicinity, camps and ancillary areas	Grievance Records (number of grievances received originating in illicit behaviour and crime) Percentage of local employment compared to the overall workforce (records of the Contractors) Cultural Awareness Training records (as needed depending on the country of origin of Contractor's and specific experience in the region and Serbia in particular) Skill development training content for local labor Local Law enforcement reports	Prior to construction Monthly
Risk of social conflict	Construction sites and areas in the vicinity, camps and ancillary areas	Training records on the Code of Conduct, Project Orientation and Cultural Awareness Consultation records and proof of interactions of local CLOs with communities in the vicinity of the camp accommodation	Monthly

Social parameters	Sites	Monitoring Method and Parameters	Frequency of monitoring
Burden on and competition for public services (e.g. electricity, water, etc) worker accommodation facilities will include additional or separate supply systems.	Along the whole corridor with focus on the areas with new construction activities	Grievances records related with the pressure on the public services and infrastructure (number of grievances related to utility malfunction, disruption or suspension in relation to project attributable activities)	Monthly
SEA/SH	Construction sites, camps	Grievance records (number of SEA/SH grievances received)	Monthly
Impacts on local infrastructure	Construction sites and areas in the vicinity, camps and ancillary areas	Incident/accident records regarding local infrastructure Community engagement records Grievance records	Weekly
Impacts on the local road network	Construction sites and areas in the vicinity, camps and ancillary areas	Visual inspections approved TMPs Incident Reports number and type of traffic incidents/accidents Training Records – records Vehicle Inspection records and driver logs Grievance records	Daily
Employment	All Municipalities in the social AoI	Statistics on workforce from the social AoI Project-specific Human Resources Policy and relevant	Monthly
Permanent acquisition of lands	Construction sites and areas in the vicinity, camps and ancillary areas	Documentation associated with implementation of RAP Documentation associated with implementation of Livelihood Restoration Plan Grievances records	Monthly
Temporary land allocation	Construction sites and areas in the vicinity, camps and ancillary area	Protocols with land owners Grievances records	Monthly
Fragmentation of land	Construction sites and areas in the vicinity, camps and ancillary area requiring permanent land acquisition	Documentation associated with implementation of RAP Documentation associated with implementation of Livelihood Restoration Plan Grievances records	Monthly
Damage to crops during construction	All construction sites, camps and ancillary areas.	Inspection and visual observation for disturbance Grievance records	Daily – supervisions and visual observations Unannounced inspection during material delivery Monthly
Physical and economic displacement	All construction sites, camps and ancillary areas.	Implementation of RAP and LRP as relevant Grievance records Expropriation records	Weekly
Labour and working conditions risk	All construction sites, camps and ancillary areas.	HR Policy Workers Grievance Mechanism Labor inspectorate records Contractors self-monitoring report	Daily for OHS related risks and monthly form employment and benefits related risks
Equal employment opportunity and Non-discrimination	All construction sites, camps and ancillary areas	HR Policy Workers Grievance Mechanism Labor inspectorate records Contractors self-monitoring report Gender disaggregated employment records	Monthly
Labour Risks and Impacts Related to Subcontractor and Supply Chain Management (Including Child and Forced)	All construction sites, camps and ancillary areas	HR Policy Workers Grievance Mechanism Labor inspectorate records Contractors self-monitoring report Gender disaggregated employment records Workforce statistics	Monthly
Health and Safety Risks due to General Occupational Health and Safety Hazards	All construction sites, camps and ancillary areas	OHS Performance Reports including accident/incidents, corrective actions, trends, risks, Subcontractor & supply chain performance	Monthly
Health and Safety Risks due to Physical and Chemical Hazards	All construction sites, camps and ancillary areas	OHS Performance Reports including accident/incidents, corrective actions, trends, risks, Subcontractor & supply chain performance	Weekly

Social parameters	Sites	Monitoring Method and Parameters	Frequency of monitoring
		Training Records	
COVID-19 Related OHS and Labor risks	All construction sites, camps and ancillary areas	OHS Performance Reports including accident/incidents, corrective actions, trends, risks, Subcontractor & supply chain performance (Number of confirmed COVID-19 cases) Adherence to safety protocol record Training Records	Daily
Health and Safety Risks due to Emergencies	All construction sites, camps and ancillary areas	OHS Performance Reports including accident/incidents, corrective actions, trends, risks, Subcontractor & supply chain performance (Number od accident/incidents) Training Records	Weekly
Community Health and Safety Risks due to Construction Traffic	All construction sites, camps and ancillary areas	OHS Performance Reports including accident/incidents, corrective actions, trends, risks, Subcontractor & supply chain performance (Number of accidents/incidents) Training Records	Daily records on construction traffic
Health and Safety Risks on Accommodation	Camps and other workers accommodation sites	OH&S Induction personnel working on site Statistics on workforce using accommodation facilities. Grievance records Task specific training (Project employees, subcontractors & suppliers) Camp management plan Contractors self-monitoring report on workers accommodation conditions Grievance mechanism (number of grievances related to workers accommodation)	Weekly
Increased risk of communicable diseases and	All construction sites, camps and ancillary areas	SEP engagement records Health trends Training Records on health topics, community awareness, code of conduct	Monthly
Increased traffic and rise in accidents	All construction sites, camps and ancillary areas	Grievance Records Traffic Accident Records Training Records on drivers TMP approved by local authorities Visual inspections of the traffic control devices Training Records of the road safety awareness trainings within community & schools,	Weekly
Security around the Project site	All construction sites, camps and ancillary areas	Training Records – community consultations Training Records - security personnel Incident Records - security incidents Grievance mechanism (number of grievance related to incidents with security personnel)	Weekly

9.2.2 Monitoring during Operational phase

During the operation of the railway, monitoring will be implemented by the central and local government.

The Environmental and Social Monitoring Plan will describe:

- mitigation measures,
- monitoring method,
- location of points
- frequency of monitoring and
- responsibility (for both mitigation and monitoring).
- provisional cost

Many measures will be checked by simple observation, by records' check, or by interviews with residents or workers, while most of the mitigation measures outlined simply require the Contractor to adopt good site and construction practice. Costs of acquiring land and compensating businesses for loss of income during the construction period cannot be calculated until further studies are carried out; estimates will be provided in the final Resettlement Plan. Many actions in the Environmental Monitoring Plan are to be conducted by the Supervision Consultant, and will be included in the supervision contract.

Table 96 Environmental monitoring during operation

Environmental and Social receptors	Sites	Monitoring Method and Parameters	Frequency of monitoring
Landscape	Infrastructure and infrastructure facilities affect landscape directly and indirectly in the: ▪ Vicinity of tunnels and bridges and all major structures ▪ Sites close to the waste collectors near by. ▪ residential sensitivity areas. ▪ Sites exposed to torrential events and floods. ▪ All river and stream valleys.	Visual inspection: identification of erosion processes, poor and scarce vegetation cover, poor maintenance of structures.	At the end of construction activities and on yearly basis during spring time
Geology, geo-morphology, soil pollution and seismicity	River and stream valley, in surroundings of bridges, Slopes of cuttings, embankments, other areas prone to erosion	Soil monitoring Visual observation of landslides, erosion and de-vegetation in slopes prone to erosion Observation of vegetation status planted for soil stabilization Visual observation on changes in river flows and morphology, by bridges. Visual inspection of the railway for spills and leaks which might impact soil quality (and ultimately potentially groundwater), monitoring of particle size distribution, soil reaction, calcium carbonate content, organic matter content,	Seasonally (four times per year), Before operational activities and Periodically during operation: quarterly for the first year and then annually thereafter
Wastes	Sites close to the waste collectors of rail services etc.	Monitoring of waste management, waste vehicle routes and their frequency	Daily for waste management
Noise and vibration	Areas with sensitive residential receptors and passenger sensitive locations. These receptors will be identified in the baseline chapter of the ESIA per Section Regarding noise, areas where Lday exceeds 55dB and Lnight exceeds 45 dB	Monitoring of noise; Measurement of vibration at sensitive receptors; Noise limits set by 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) and by Acoustic zones defined according to Law on environmental noise protection ("Official Gazette of RS", no. 96/21).	Before operational activities and Periodically during operation: twice a year during year 1 and then once a year
Climate change	Sites prone to floods and heavy rains such as valleys	Observation and recording of effects during heavy intensive rains or floods, recording of maximal level of water	Once per year for pavement monitoring After every heavy rain or flood.
Biodiversity	All terrestrial natural sites. Natural barriers on air pollution, noises and dusts. Ecological corridors	Use of crossings/passages by wildlife, based on visual observation traces, food remains. Status of artificial bio-corridors (opened paths, vegetation, water levels, Check growth of shrubs, trees and low vegetation, in natural barriers, reforestation/afforestation areas, river and stream valleys etc. Direct mortality per species or species group	Quarterly If hot-spots of direct mortality are detected, modifications to passages and/or ecological corridors should be considered

Table 97 Social monitoring during operation

Social parameters	Sites	Monitoring Method and Parameters	Frequency of monitoring
Health and Safety Risks due to Railway maintenance)	The Rail Beograd - Nis and Operational Project Facilities	OHS Management Plan (number of operation related incidents/accidents)	Annually
Local Employment	Train Stations and official rail places	Worker Contracts Training Records Grievance Records Labour Audit Repots	Annually
Level crossings safety	All Rail level crossings	Grievance Records (Number of grievances related to safety at TLC)	Annually

Social parameters	Sites	Monitoring Method and Parameters	Frequency of monitoring
		Incident Records (Number of incidents and root cause reports) SRI records on RLC incidents Training Records (number of awareness campaigns and completed trainings including of number of participants)	
Transport of dangerous goods	The Rail Beograd - Nis and Operational Project Facilities	Grievance Mechanism OHS Management Plan TMP Dangerous goods records (number of relevant permits and certificates issued)	Monthly
Land acquisition and resettlement	The Rail Beograd - Nis and Operational Project Facilities	Identify any outstanding issue related to project related land acquisition (e.g., accessibility to compensation in escrow accounts, handling of absentee's cases etc)	Semi-annually

10. TERMS OF REFERENCE FOR ESIA

10.1 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.
- The following sections present the Terms of Reference of the ESIA. This is a section that is structured as follows:
- Overview of activities to complete the ESIA process;
- Desktop research and specialist studies;
- Outline structure for the final ESIA report; and
- Provisional schedule for the ESIA process.

10.2 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.

10.3 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;
- Report findings in a comprehensive ESIA report. A Final draft ESIA Report will be submitted addressing IFI's and Beneficiary's comments.

10.4 Methodology and key aspects included

10.4.1 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. Ideally 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.

10.4.2 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.

10.4.3 Baseline Conditions

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 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 IFIs Policy Requirements and ways to bridge the gaps.

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, rivers, 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.

Environmental

More specifically, during the ESIA stage, the following have to be planned:

- Vibration and noise: measurements after defining the sensitive receptors per Sections 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)
- Landscape: 3D Landscape modelling which will result in landscape images to define visual impacts
- Surface measurements at the sensitive receptors
- Biodiversity: analytical field inventories (habitats and fauna categories), screening of potential critical habitats and priority biodiversity features, screening for Critical Habitat Assessments (if needed) and Biodiversity Action Plans per Section (if needed) and screening for Appropriate Assessment for the 2 IBAs.

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, archeological 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 he 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 and EBRD requirements (this effort shall be linked to the RPF and RAP studies).

- 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 behaviors among youth, child and forced labor 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.

10.4.4 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.

10.4.5 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).

10.4.6 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.

10.4.7 Residual Impacts

Those impacts that remain once mitigation has been put in place will be described as residual impacts.

10.4.8 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 power plants and associated facilities.

10.4.9 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 and the EBRD PRs. 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;
- Relevant parts of the EBRD PRs;
- 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.

10.5 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	The Introduction will include: • General background (also including information of Developer) • Project objectives and scope • Project history • Existing studies
Legal framework	Legislation will include: • Environmental Law • Permits and licences • International Standards/Guidelines
Project Description	The Project Description will include: • Project design (alignment-permanent way, stations, structures, other) • Project schedule • Description of construction and operation activities • Description of the key role players and purpose of the ESIA study and report.
Evaluation of alternatives	Evaluation of alternatives will include: • General methodology • Summarized presentation of the MCA • Environmental and social evaluation of options • Environmental and social evaluation of options, including the no project alternative.
ESIA Methodology	ESIA methodology will include: • Introduction to ESIA

Section	Summary of Contents
	• Baseline environmental conditions • Spatial and temporary scope • Key assumptions and impact assessment methodology • Impact identification • Cumulative impacts
ENVIRONMENTAL PARAMETERS	
Noise and vibration, air quality, climate change, geology, soils and hydrogeology, landscape and visual, surface waters, ecology	Per parameter will include: • climate and climate change • waters (not only surface waters), • soils, • waste and materials management.
SOCIAL PARAMETERS	
Labor and working conditions, OHS risk, community health and safety risks, private and public property, fragmentation of agricultural land plots, cultural heritage	Per parameter will include: • Baseline conditions • Potential impacts • Mitigation measures • Residual impacts • Monitoring
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.

10.6 Timeline for the ESIA

The final timeline for the ESIA is still not r clear given that the allocation of the design period per section in the coming years still needs to be decided. Therefore, in order to be realistic, it was decided to prepare a timeline for an ESIA for a representative section and this could be adopted to all other Sections. Therefore, the ESIA period per Section could be split into two stages:

1) Scoping report stage. This stage could be completed within two months. A prerequisite for this stage is that the design has to be provide the necessary project details to the E&S team, while some primary result of geotechnical investigations should be also provided. This report will include all the necessary details that could give an overview of concise baseline and representative impacts and mitigation measures. Additionally, studies and measurements will be proposed based on the baseline data which will be more localized in comparison to the current stage. Scoping report has to go through a disclosure period, which may durate maximum for a month, while outcomes and recommendations of this phase will lead the E&S team to move on to the ESIA stage while they will feed in the Stakeholder Engagement Plan that will be continuously updated.
2) ESIA stage. This stage could be completed within six months. During this stage, all necessary surveys (noise and vibration, surface waters, biodiversity, social) may take place. Depending on what the Project preparation starts and terminates, biodiversity surveys may take place exclusively in the ESIA stage or some may begin even during scoping phase, taking into account that it is advisable, field surveys to take place twice per year, ie. in spring and autumn.
3) Public consultations and IFIs disclosure. Taking into the longest consultation period refers to EBRD, i.e. 120 days as disclosure period, then this period could be taken as the maximum time limit for this phase.
4) Depending on the decision whether Resettlement Action Plans and/or Livelihood Restoration Plans would be part of the ESIA Package (separately for each section) their development would require a period of 4-6 months depending on the approach to household surveys, and the number of affected households.

ANNEX 1: INSTITUTIONAL ASSESSMENT QUESTIONNAIRE

SRI Questionnaire (In this Questionnaire reference made to the Company is deemed to be the SRI)

1.1 Information concerning the carried out and planned ESIA procedures, including public consultations. Provide copies of the available documents:

- ESIA reports and environmental consents issued by the competent authorities.
- Screening out decisions issued by the competent authorities (for components not subject to ESIA).
- Assessment of potential impacts on nature conservation sites.
- Statements of the competent authority concerning the impact of the project on nature conservation sites (Form A or Form B, see attached).

Regarding screening out decisions, there is no such decision.

The Ministry of Agriculture and Environmental Protection has issued the scoping Decision No. 353-02-02113/2015-16 dated December 14, 2015 (The Decision requested a full EIA in line with national guidelines). The decision called for an EIA in line with Article 17. Of The EIA Act ("Official Gazette! RS 135/04 and 36/09) which related to the scope.

The EIA indicated the following limitation - The development of the Preliminary Design was done at the same time as the development of the Spatial Plan of the special area the purpose of the infrastructure corridor of the Stalac - Djunis railway and the Strategic Environmental Assessment. Until the completion of the Impact Assessment Study, the Spatial Plan was not completed. Consequently, the EIA could not observe the data from the Decision on location conditions, which will be known only after adoption of the Spatial Plan.

Notwithstanding the EIA has annexed the following:

MCTI – Location conditions dated October 6, 2016 – the Location Conditions state the validity is 12 months calculated from the date of issuing. The MCTI has obtained a number of conditions from holder of public authority – The Ministry of Defense, Telenor d.o.o., EMS Eltro network, Institute for nature conservation (dated December 7, 2017) Institute for protection of cultural heritage of Kraljevo (dated November 27, 2017), Public Water Company and Water Supply of Krusevac", Public enterprise for urbanism and design of Krusevac, Ministry of Interior, Srbija gas, SBB Cable operator, PE " Srbijagas", PE " Srbijasume", PE " Roads Of Serbia", PUC " Varvarin", Republic Institute for protection of monuments and cultural heritage, " Juhgorosgas-Trasnport-Nis,

- *Regarding assessment of potential impacts on nature conservation sites.*

Institute for Nature protection of Serbia - Decision on protection of nature – provided conditions/measures for protection dated June 17, 2014. The decisions stated that the spatial area of the Spatial plan is on the list of ecological significant areas and types of habitats (ecological network) with natural monument Mojsinjske planine and Stalacka klisura – The validity of this decision is 2 years subject to activities for which this decision has been issued, had not been commenced with.

Institute for Nature protection of Serbia issued the decision on December 17, 2015 that the project will be developed in the ecological significant area (Ecological network of Serbia Mojsnijske Planine and Stalacka klisura Juzne Morave)

- *Statements of the competent authority concerning the impact of the project on nature conservation sites (Form A or Form B, see Annex 2).*

No such specific Statement is included but the Institute for Nature – conditions and measures issued under 020-2732/2 dated December 7, 2017 and states "The route of the Stalac Djunis railway passes partly through the ecologically important area of "Mojsinjske Planine" and "Stalacka Klisura" of the ecological network of the Republic of Serbia (EMRS). South Morava with a coastal belt in its natural and near-natural state is an ecological corridor of international significance, while smaller watercourses with a coastal belt and landscape elements (individual trees) have the role of an ecological corridor of local importance. Mojsinjske Planine and Stalcka Klisura are sites registered for protection. In addition, a number of conditions have been listed from the nature protection perspective. - The validity of this decision is 2 years subject to activities for which this decision has been issued had not been commenced with.

Statements from the Institute for the Protection of Cultural Monuments of Serbia ref 2/656 dated March 30, 2017

1.2 Has any stakeholder engagement meeting already taken place?

The Project is recognized of high importance by the Government and as such has received extensive media coverage. However, only Institutional Stakeholder engagement has taken place up to date, while project affected parties and ither interested parties have not been subject to target communication activities so far.

"Serbian Railway Infrastructure" has an authorized person for communication with the public, as well as an organizational part in whose competence are public communications, which carry out their activities in accordance with the company's business policy and the powers of the CEO

PR manager of "Serbian Railway Infrastructure" manages, organizes and controls the implementation of the following public communications: public relations, internal and external information, media activities, appearances in the media and gives statements on behalf of the company, website and internet activities, presentations and promotional activities, socially responsible and educational activities, cooperation with local governments and business partners.

The PR manager manages the Media Center, as an organizational part of the "Serbian Railway Infrastructure", which is in charge of public communications. The Media Center "Infrastructure of the Serbian Railways" performs, among other things, the following tasks: public relations; media activities; external information affairs(cooperation with the media, press releases, press conferences, organization of media events, informative announcements and announcements in the media, production of informative and promotional publications and other publications, media cooperation with local governments, economy, institutions, institutions and organizations, organization of presentations and promotion, professional gatherings and exhibitions); internal information affairs; web site (www.infrazs.rs), and internet activities; organization of socially responsible, non-profit and educational campaigns).

The PR manager and the Media Center realize their activities, among other things, through announcements, statements and information for the media, press conferences, organization of media and promotional events and activities, announcements on the website. In addition, they are responsible for communication with the general public, from end users to government agencies, on all aspects of the company's business, and is done in writing (emails) or direct communication.

The PR manager and the Media Center realize their activities, among other things, through announcements, statements and information for the media, press conferences, organization of media and promotional events and activities, announcements on the website. In addition, they are responsible for communication with the general public, from end users to government agencies, on all aspects of the company's business, and is done in writing (emails) or direct communication.

1.3 Are the Project Affected Persons already aware of the project?

Project Affected Persons (affected by land acquisition impacts) have not been identified, and only location, type and magnitude of economic and physical displacement impacts were identified relevant o this Project stage. Communities potentially to be affected by future construction and operation activities have been identified but no extensive stakeholder engagement activities have yet commenced. Disclosure and consultation on the Scoping Report shall be the starting point.

1.4 Is there any opposition to the project from individuals, private organisations and/or public authorities?

No formal activities of opposition have been registered by SRI. Up to date there were no protests form the stakeholders regarding the investment. Media searches for the past two years were conducted including NGOs, and apart from criticism related to the current state of the railway, no opposition or negative media coverage was found.

1.5 Any official court cases.

Not reported.

1.6. Does your organisation have a gender Strategy / Action plan / Practices (concerning users and/or aimed at gender equality in employment)? If yes, what is their focus? (If available, please provide copies of these documents).

"Serbian Railway Infrastructure" has adopted the Code of Equality, with a Plan of Measures for Ensuring Gender Equality, and according to international activities and research, it is at the top of Europe in terms of gender equality and women's participation in the railway sector.

Serbian Railway Infrastructure" adopted the Code of Equality (which we submit in the attachment) 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.

As of June 30, 2021, there were 5,680 employees in the "Serbian Railway Infrastructure", of which 81 percent were men and 19 percent were women. The company also employs 36 people with disabilities.

The adoption of the Code of Equality was preceded by the adoption of the Code of Business Ethics ("Official Gazette of the Serbian Railways", No. 56/17).

Also, in May 2018, "Serbian Railway Infrastructure" introduced its employees in a transparent manner to the Joint Recommendations of CER and the European Federation of Transport Workers (ETF) for better representation and integration of women in the railway sector /https://infrazs.rs/ 2018/05 / joint-recommendations-organization-of-cer-and-etf-for-better-representation-and-integration-of-women-in-the-railway-sector /

All these positive results are of great importance for the reputation of our company at the international level, as well as proof that gender equality is at the top of the business priorities of "Serbian Railway Infrastructure".

At the end of November 2018, at the meeting in Brussels, the "Serbian Railway Infrastructure" signed the "Declaration on Gender Equality in the Transport Sector" of the European Railways (CER).

https://infrazs.rs/?s=Deklaracijom+o+rodnoj+ravnopravnosti+u+transportnom+sektori

At the meeting of the Working Group for Human Resources of the European Railways, of which "Serbian Railway Infrastructure" is a member, a total of fourteen railway companies that participated in this gathering signed a document on equal opportunities for women and men in the transport sector.

This Declaration on Gender Equality in the Transport Sector, among other things, defines that non-discrimination and equality between men and women are among the basic values of the European Union, but also that the European transport system does not have a gender balance, because only 22% of the workforce women, and that the improvement of this balance will bring positive internal and external effects and contribute to the attractiveness of this sector.

By signing this Declaration, the "Infrastructure of the Serbian Railways" once again confirmed at the international level that gender equality is at the top of the business priorities of this railway company.

Thanks to its active engagement and diligence in this area, IHS has been invited to participate in high-level meetings of the European Union concerning gender equality in the future (although Serbia is not yet a member of the EU). It is a forum called "Platform for change-improvement of the position of women in the railway sector". The plan is for the members of this Forum to propose concrete measures and projects to improve the position of women in the railway sector.

"Serbian Railway Infrastructure", according to the results of the research from 2019, is at the top of Europe in terms of gender equality and women's participation in the railway sector. This is the result of a research conducted by the Association of European Railways and Infrastructure Companies (CER), which in 2019 included 28 European railway companies from 21 European countries.

The aim of this research is to motivate railway companies to increase the employment rate of women in companies and improve their position

According to that research, "Serbian Railway Infrastructure" ranked ahead of many more developed railway companies from the European Union. According to this research, "Serbian Railway Infrastructure" is ahead of railway infrastructure companies from Austria, Belgium, Bulgaria, France, Germany, Hungary, Italy, Luxembourg, Slovenia and Switzerland in terms of participation and position of women in the company, while only companies from the Czech Republic are better ranked. Finland, Slovakia and Romania.

These results are the result of extensive research conducted by the European Railways, which includes, among other things, the number of women in the company, the number of women in management and certain specific jobs, equality in earnings, implementation of CER recommendations in the field of gender equality. measures to improve the position of women in railway companies, transparency in this area and numerous other information

The CER report for 2019 especially praised the progress that "Serbian Railway Infrastructure" has achieved in terms of implementing measures that contribute to the improvement of gender equality. In that sense, the European Railways Association especially praised the "Serbian Railway Infrastructure" for adopting the Equality Code and the Code of Ethics, appointing persons responsible for support in preventing harassment at work, as well as introducing employees in a transparent manner to the CER and ETF Joint Recommendations. for better participation and representation of women in the railway sector.

Based on all the conducted research, the Association of European Railways and Infrastructure Companies (CER) and the European Federation of Transport Workers (ETF) have reached an agreement, which will be officially adopted on November 4, regarding the position of women on the railway. After that, the obligation of this document will be defined at the level of railway companies, including the "Serbian Railway Infrastructure", which will determine the recommendations for improving the position of women in railway companies.

1.7 How are the environmental and social matters managed in SRI? Is there an environmental policy? Is there a special department or unit in charge of environmental and social matters? Is SRI certified according to ISO 14000? If yes, please provide a copy of the certificate.

"Serbian Railway Infrastructure" within the Sector for Human Resources and General Affairs has a Department for Environmental Protection with eight employees, which deals with monitoring and implementation of legal provisions in the field of environmental protection.

"Serbian Railway Infrastructure" does not have the ISO 14000 certificate.

In addition to the application of the law in this area, "Serbian Railway Infrastructure" has regulated environmental protection and waste management with the following internal acts, which also define the environmental protection policy in this company

1. Waste management plan in "Serbian Railway Infrastructure" a.d. ("Official Gazette of the Serbian Railways" No. 22/18)

2. Rulebook on the manner of recording, storage, movement and sale of inactive stocks and materials obtained in the process of work ("Official Gazette of the Serbian Railways" No. 16/16)

3. Instruction on the manner of handling, storage, sale and delivery of materials that have the properties of hazardous waste ("Official Gazette of the Serbian Railways" No. 16/16)

4. Instructions on the classification of used wooden railway sleepers ("Official Gazette of the Serbian Railways" JSC No. 32/17).

1.8 Does your organisation have a human resources policy? Does the policy cover hiring, training, promotion, retrenchment, workers-employers relations and grievance mechanism?

Yes, submission of HR policy is pending. However, SRI bases its HR on the Labor Act of RS. The Serbian legal framework guiding Labor and Working Conditions, including OHS, is, except for a few minor gaps, fully aligned with the standards set out in EBRD PR 2 and EIB ESS2 as Serbia is signatory to the International Labor Organization (ILO) and United Nations (UN) Conventions informing these standards. Serbia has ratified more than 70 ILO Conventions including the 8 Core Conventions.

1.9 Does your organisation have Occupational Health and Safety Plans and a qualified team to supervise and monitor H&S plan?

"Serbian Railway Infrastructure" has occupational safety plans and a qualified team that monitors their implementation.

"Serbian Railway Infrastructure" as an employer decides on the manner of organizing work for safety and health at work depending on: technological process, organization, nature and scope of the work process, number of employees participating in the work process, number of shifts, estimated risks, number of locations separate units, types of activities.

Occupational safety and health in "Serbian Railway Infrastructure", Belgrade is performed by persons who have passed the professional exam for performing occupational safety and health at the competent ministry.

By the decision on appointing a person to perform safety and health at work in the Company number 1 / 2021-2078 from 16.09.2021. 22 employees were appointed for the practical performance of safety and health at work.

The Constitution of the Republic of Serbia, the National Strategy of Serbia, EU Council Resolutions, the ILO Convention and EU Directive 89/391 / EEC (1989) and over 27 other directives in this area that have been implemented in the Law on Safety and Health at Work and bylaws, the arrangement is conditioned,

provided a system for implementing safety and health at work in the "Infrastructure of the Serbian Railways".

The Law on Safety and Health at Work is the basis for the establishment of systems at all levels of the Republic of Serbia, both in large systems and in small and medium enterprises, and which has been applied in the "Serbian Railway Infrastructure".

In "Serbian Railway Infrastructure", this area is regulated by the Collective Agreement and the Risk Assessment Act (Risk Assessment Act for all work places in the work environment of SRI No. 1 / 2016-4958 dated December 9, 2016. The risk assessment Act has been amended and update by 8 supplemental acts with the latest passed on September 1, 2021.

2.0 Is the ESIA (including associated studies) prepared for Stalaç- Djunis available? Was the study subjected to public consultation and when and is it in the public domain (a link to the document would be helpful). The ESIA at this stage is equally useful both in English and/or Serbian.

The ESIA for Stalac Djunis has been provided both to the Consultant and EIB however confirmation on public consultation and disclosure is pending.