Draft 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

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Mott MacDonald

IPF CONSORTIUM

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A	01/11/2015	Tatjana Simić Andrijana Mladenović	Joanne Griffiths	Arthur Schankler	ESIA
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Synopsis

Project title:	IPA 2011-WBIF-Infrastructure Project Facility-Technical Assistance 3
Reconstruction and Modernization of the Existing Railway Track and Construction of a Second Track on the Line Belgrade–Nis, Section Stalac – Đunis	
Project Number:	EuropeAid/131160/C/SER/MULTI/3C
Contract number:	2012/293-208
Contracting Authority:	European Commission, DG ELARG
Beneficiaries:	Albania, Bosnia and Herzegovina, Croatia, the former Yugoslav Republic of Macedonia, Montenegro, Serbia, Kosovo*and Iceland
Region:	South Eastern Europe (SEE)
Contractor:	Mott MacDonald Ltd. (UK) in Consortium with WYG International Ltd (UK), W. S. Atkins International (UK)
Contract signed:	20 June 2012
Mobilisation started:	25 June 2012
Project Duration:	72 months
Anticipated completion:	19 June 2018
Contractor's Project Director:	Wim Verheugt
Project office:	Kneginje Zorke 2, 11000 Belgrade, Serbia.
Telephone:	+381 (0)11 308 22 97

* "This designation is without prejudice to positions on status, and is in line with UNSCR 1244 and the ICJ Opinion on the Kosovo Declaration of Independence"

List of Abbreviations

Abbreviation	Meaning
AADT	Annual Average Daily Traffic
ACM	Asbestos Containing Materials
a.s.l.	above sea level
b.g.l.	below ground level
BMP	Biodiversity Management Plan
CEMP	Construction Management Plan
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
DEMP	Decommissioning Management Plan
EBRD	European Bank for Reconstruction and Development
EMF	Electric and Magnetic Field
EMS	European Macroseismic Scale
EIA	Environmental Impact Assessment
ESIA	Environmental and Social Impact Assessment
EU	European Union
GW	Groundwater
H&S	Health and Safety
IFIs	International Financial Institutions
IUCN	International Union for Conservation of Nature
NATM	New Austrian Tunnelling Method
No.	Number
OEMP	Operation Management Plan
PAP	Project Affected Person
PPE	Personal Protective Equipment
PR	Performance Requirement
RAP	Resettlement Action Plan
RCF	Resettlement and Compensation Framework
RS	Republic of Serbia
Off.	Official
SEP	Stakeholder Engagement Plan
US SCS	United States Soil Conservation Service
WB	Water Body
DWMP	Decomissioning Waste Management Plan

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1 Introduction

In an effort to revitalise and develop its railway network, the Republic of Serbia has given priority to the Pan-European Corridor X which is the backbone of the railway infrastructure system of the country. Corridor X passes from Austria to Greece: (Salzburg-Ljubljana-Zagreb-) Šid-Belgrade-Niš-Preševo (-Skopje-Veles-Thessaloniki) with branches towards Hungary (Subotica, Serbia) and Bulgaria (Dimitrovgrad, Serbia). The corridor length through Serbia is 872 km.

The important part of the corridor and the subject of this Project is the section Stalać – Đunis on the railway line Belgrade – Niš. The section is about 18.6 km long and is the only single-track section on the railway line Belgrade - Niš. Once the Stalać – Đunis section is reconstructed and modernised, the entire section of the railway Corridor X through Serbia will become a double-track line. The project developer is the Public Enterprise “Serbian Railways”.

1.1 Main Project Characteristics

The project is related to the upgrading of the existing single rail track line on the section Stalać – Đunis to double track, while renewing the existing line, with a route able to offer speeds up to 160 km/h. The main project components are the following:

- Construction of the dual railway track for speeds up to 160 km/h;
- Construction of the overhead contact line, signalling safety and telecommunications installations;
- Construction of tunnels, bridges and a viaduct;
- Upgrade of railway stations;
- Removal of level crossings;
- Decommissioning of the existing railway line from Stalać to Đunis.

The new route will have the following major structures:

- Five tunnels with a total length of 6,890 m, out of which one is 3,275 m;
- Six bridges, out of which one is the bridge over the South Morava River, 310.9 m long;
- Gallery (30 m long);
- Two stations.

1.2 Project Location

The project is located in central-south Serbia, about 200 km south-east of Belgrade (Figure 1). The city closest to the project is Kruševac. Administratively, the project area belongs to the municipality of Ćićevac and to the city of Kruševac.

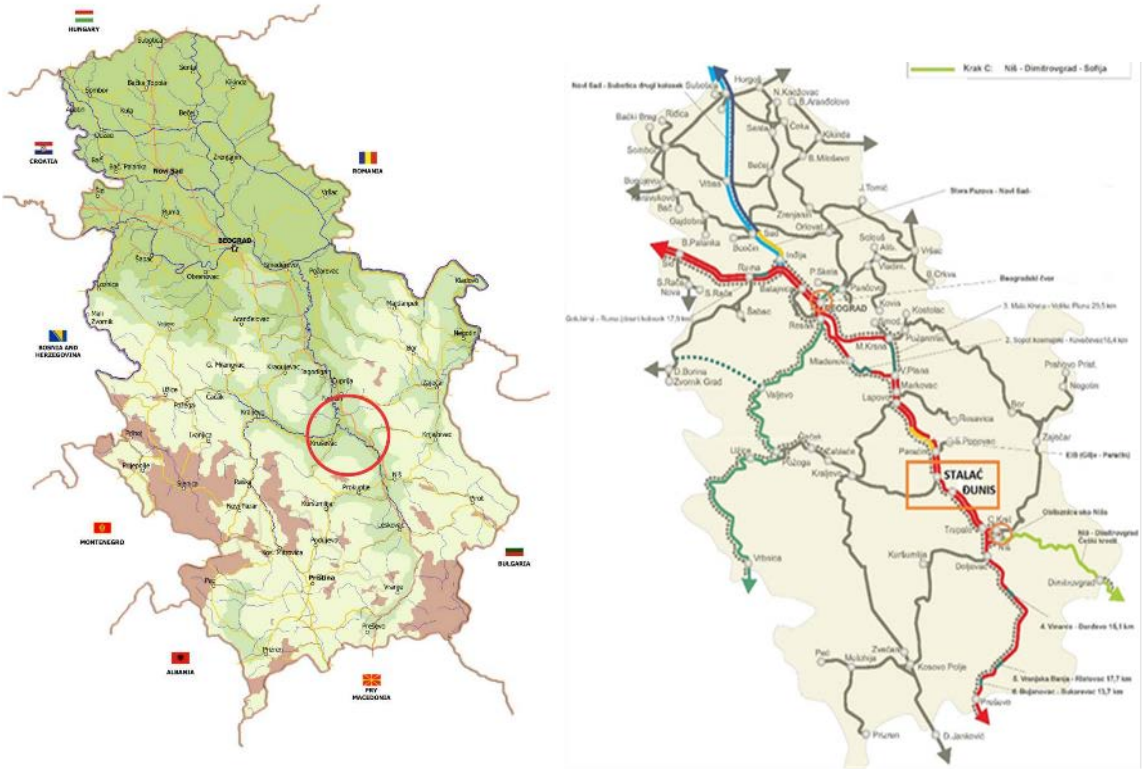

Figure 1 Location of the proposed railway line Stalać – Đunis in the Corridor X

1.3 Project Categorisation

Based on the information available, this project has been categorised as Category A. This Category is based on EBRD criteria because:

- the scale and its location could potentially have significant impacts on the environment;
- the project could potentially have significant socio-economic impacts;
- the project has been categorised as requiring full environmental impact assessment where such assessment is mandatory for construction of lines for long-distance railway traffic (Appendix 2 of the EBRD Environmental and Social Policy[1], 2014). According to the Serbian legislation, the environmental impact assessment of the project is mandatory (construction of regional railroads and associated structures – viaducts, tunnels, stations).

In accordance with international standards, Category A projects are subject to:

- full Environmental and Social Impact Assessment (ESIA);
- evaluation of alternatives, including non-implementation;
- recommendation of mitigation or other measures to prevent or minimise impact; and
- public disclosure.

[1] http://www.ebrd.com/downloads/research/policies/esp-final.pdf

1.4 Methodology of the ESIA

The overall approach to this assessment has been based on the following:

- Establishment of baseline environmental conditions in the study area;
- Identification of the legislative framework for the proposed development and applicable guidance;
- Determination of significance criteria to assess the level of any identified potential impacts arising from the proposed development;
- Identification, prediction and assessment of the likely significance of the environmental and social effects, both positive and negative, of the proposed development (during construction and operation);
- Identification of adequate mitigation, enhancement and monitoring measures to prevent, reduce or remedy any likely significant adverse environmental effects; and
- Assessment of the significance of any residual impacts (those remaining after implementation of mitigation measures).

The proposed project has been assessed using site visits and available information and knowledge of the study area, to determine the potential for significant environmental effects. Where likely significant environmental effects are identified, mitigation measures to prevent, reduce or remedy these effects are recommended.

1.4.1 Stages of the Assessment

The following stages have been followed during the preparation of this ESIA:

- Baseline assessment of existing environmental conditions within the study area;
- Identification of potential effects arising from the construction and operational phases of project;
- Evaluation of the significance of potential effects;
- Identification of mitigation measures; and
- Assessment of any residual impacts after implementation of the identified mitigation measures.

Baseline assessment

The baseline conditions were established through site visits and surveys, desk-based studies, review of existing information and consultation with the relevant parties.

Identification of Effects

To determine the potential for significant environmental effects of the construction and operation of the proposed project, various methodologies were applied. The specific methodologies are elaborated in Chapter 5 of this ESIA.

Evaluation of Significance

The assessment of the likely significance of potential environmental effects arising from both the construction works and operation of the proposed project required consideration of the following:

- Beneficial and adverse impacts;
- Short, medium and long term impacts;
- Direct and indirect impacts;
- Permanent and temporary impacts; and
- Cumulative impacts.

Several criteria have been used to determine whether or not the likely environmental effects of the proposed development will be deemed 'significant'. The effects have been assessed quantitatively, where possible.

Generally, the significance of effects has been assessed using one or more of the following criteria:

- International, Serbian and local standards;
- Sensitivity of receiving environment;
- Extent and magnitude of the impact;
- Reversibility and duration of the impact;
- Inter-relationship between effects; and
- Nature and extent of cumulative effects.

Each impact has been assessed against the change of magnitude and the sensitivity of the receptor as shown in Table 1 below.

Table 1 Matrix for determining significance of effects

		Sensitivity of Receptor/Receiving Environment to Change/Effect			
		High	**Medium**	**Low**	**Negligible**
Magnitude of Change/Effect	**High**	Major	Moderate to Major	Minor to Moderate	Negligible
	Medium	Moderate to Major	Moderate	Minor	Negligible
	Low	Minor to Moderate	Minor	Negligible to Minor	Negligible
	Negligible	Negligible	Negligible	Negligible	Negligible

The following terms have been used to assess the significance of effects, where they are predicted to occur:

- **Major beneficial or adverse effect** - where the proposed project would cause a significant improvement or deterioration to the existing environment;
- **Moderate beneficial or adverse effect** - where the proposed project would cause a noticeable improvement or deterioration to the existing environment;
- **Minor beneficial or adverse effect** - where the proposed project would cause a barely perceptible improvement or deterioration to the existing environment; and
- **Negligible** - where the proposed project would result in no detectable improvement or deterioration to the existing environment.

The inter-relationship between likely significant environmental effects and residual impacts following implementation of mitigation measures has also been discussed.

Mitigation Measures

Following the assessment, where appropriate, mitigation measures have been recommended to prevent, reduce or remedy any potentially significant environmental effects. Such measures are to be implemented during design, construction and/or operation of the proposed project.

Residual Impact Assessment

Following the implementation of mitigation measures, an assessment of the significance of any residual impacts was undertaken. The findings are presented in Chapter 5 of this ESIA.

Decommissioning

Decommissioning of construction sites, temporary facilities and the existing railway line is also considered within the scope of the assessment as part of the Construction Phase activities. However, decommissioning of the new railway line has not been considered within this ESIA given that with appropriate maintenance the railway line will continue to operate beyond its design life. In the event

that the railway line ceases operation and needs to be decommissioned relevant approvals will be sought and, if required, an ESIA produced for that phase.

1.5 Project Area of Influence

1.5.1 Environmental Area of Influence

Approximately 22.16 ha of land will be required for the railway right-of-way (the corridor within 25 m of the outermost rails). The project area of influence ("investigation area") has been determined to include the proposed right-of-way of the railway to be constructed, the related permanent roads, the area of the existing railway to be decommissioned and the surrounding areas.

The project area of influence has been determined for each of the environmental receptors / potential effects, as follows:

Ambient air quality: The spatial scope of the assessment has reflected the area over which effects are likely to be measurable, from the immediate vicinity within 100 m from the works (e.g. for dust emissions) to receptors potentially affected by traffic congestion during the construction works;

Surface water: All surface waters which will be crossed by the proposed railway – this includes the South Morava River and its tributaries.

Hydrogeology: The investigation area considers up to 10 m deep aquifers along the proposed route and areas which will be used as access roads for construction works. The assessment addresses potential hydrological and qualitative effects on groundwater due to, for example, dewatering and potential contamination effects due to accidental spillage.

Soil: Disturbance and contamination issues have been considered within 250 m of the boundary of the construction works and areas which will be used as access roads for construction works.

Waste: The study area has been defined as the municipalities (local area) and the region (Rasina district) through which the proposed route will pass. This is also part of the related waste management region.

Nature conservation and ecology: The spatial scope of the assessment depended on the ecological receptor under consideration and the magnitude and nature of the potential impacts. For all ecological receptors this has, as a minimum, included areas located within and adjacent to the land required for the construction (up to 250 m from each side of the proposed route). The indirect area of influence extends up to 5 km.

Landscape / Visual Effect: Landscape character and visual receptors within 500 m of the proposed route have been considered. However, this has been varied according to the local topography and structures already present.

1.5.2 Social Area of Influence

Noise and vibration: The area of influence has been generally defined to be within 250 m of the boundary of the construction works, access roads and the right-of-way.

Cultural Heritage and Archaeology: The study area has comprised the land required for construction (both temporary and permanent), plus 500 m on either side.

Traffic and Transport: The study area included all affected roads in the road network and all modes of transport.

The primary social area of influence is the focus of the impact assessment and it encompasses all project impacts on local resources and receptors. It includes the areas within the boundaries of the local communities surrounding the proposed railway line: Stalać, Town Stalać, Braljina (Ražanjska), Braljina (Kruševačka), Cerovo, Mojsinje, Trubarevo, Đunis.

The secondary social area of influence is a wider, regional level study area and includes larger scale economic and infrastructure impacts. This area comprises Stalać municipality, Ražanj municipality, Kruševac city. It also includes the population engaged in the railway operation and population whose income depends on the existence of the proposed railway

The tertiary social area of influence considers the wider, national and international scale impacts of the project - the passengers and population whose income depends on the existence of the railway.

2 Legal and Regulatory Framework

2.1 National Environmental Legal and Policy 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.

Serbia has largely transposed the EU regulatory requirements related to **environmental impact assessment** into national legislation, including the EIA Directive (Directive 92/11/EC, as amended). An EIA is required during the Preliminary Design stage of a project. The fulfilment of environmental impact assessment requirements is a prerequisite for the construction permit. The national EIA procedure comprises the phases of screening, scoping, impact assessment and public consultation.

Obligation to do an EIA is regulated by the Decree on the List of projects for which the EIA is mandatory and the List of projects for which the EIA may be required (Off. Journal of RS, No. 114/2008). The “List 1” sets the facilities for which an EIA is mandatory, and among others, it includes the “construction of regional railroads and associated structures – viaducts, tunnels, stations”.

The authority in charge for EIA approval of the “List 1” facilities is the Ministry of Agriculture and Environment.

Nature conservation is primarily regulated by the Law on Nature Conservation (Off. Journal of RS. No. 36/2009, 88/2010 and 91/2010) which is harmonised with the EU Habitats Directive and the Birds Directive. Specific aspects of nature conservation are regulated by various by-laws. The Decree on Ecological Network (Off. Journal of RS, No. 102/2010) identifies ecological network areas in Serbia and sets the management, financing, monitoring and protection requirements. Protection of habitats and species is regulated by the Regulation on the criteria for separation of habitat types, habitat types, sensitive, vulnerable, rare, and for the protection of priority habitat types and safeguards for their preservation („Off. Journal of RS“ No. 35/2010), the Regulation on the proclamation and protection of strictly protected and protected wild species of plants, animals and fungi („Off. Journal of RS“ No. 5/2010 and 47/2011) and the Regulation on special technical and technological solutions that enable undisturbed and safe communication of wild animals („Off. Journal of RS“, No. 72/10).

Standards for **surface water quality, groundwater and sediment** are regulated by the Decree on limit values of polluting substances discharged into surface water, groundwater and sediment and deadlines for compliance (Off. Journal of RS, No. 50/2012) setting the limit values of polluting substances and defining five classes of the ecological status: high, good, moderate, poor and bad. Limit values of parameters related to general water conditions, oxygen regime, nutrients, salinity, metals, organic matter and microbiology are defined by the Regulation on parameters of ecological and chemical status of surface water and parameters of chemical and quantitative status of groundwater (Off. Journal of RS, No.74/2011). Limit values for priority and priority hazardous substances are set by the Decree on limit values of priority and priority hazardous substances polluting surface waters and deadlines for compliance (Off. Journal of RS, No.35/2011).

Standards for **contaminated soil and groundwater** are stipulated by the Regulation on the program for systematic monitoring of soil quality, indicators for evaluation of soil degradation and methodology for preparation of remediation program (Off. Journal of RS, No.88/10).

Environmental noise is regulated by the Law on Environmental Noise (Off. Journal of RS, No. 36/2009, 88/2010) as the main legislative document. 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. Journal Of RS No. 75/2010). This Decree stipulates the noise levels (Table 2), 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.

However, it is not stated what the appropriate noise limit is in the case of a new development, where the prevailing noise levels already exceed the stated values.

Table 2 Noise Levels in Open Spaces (Limits as Defined in Serbian Legislation)

Zone	Purpose of the area	Noise Level [dB(A)]	
		Daytime and evening	Night-time
1	Recreation areas, health institution areas, cultural and historical sites, large parks	50	40
2	Tourist areas, schools, camps	50	45
3	Residential areas	55	45
4	Commercial and residential areas, children playgrounds	60	50
5	City centre, workshop area, commercial area, administrative area with apartments, zones along highway, regional roads and city streets	65	55
6	Industrial areas, warehouse and service areas, transport terminals with no residential buildings	Noise level at the boundary of this zone shall not exceed the limit value defined for the zone it borders	

The main legislative document in Serbia regulating the **waste management** is the Law on Waste Management (Off. Journal of RS, No. 36/2009, 88/2010). The Law is supplemented by 29 by-law documents regulating specific waste management aspects. In 2015 the Law was revised and amended to transpose more precisely certain requirements of the Waste Framework Directive and its adoption is expected shortly (by 2016). **Hazardous waste** is primarily regulated by the Law on Waste Management (Off. Journal of RS, No. 36/2009, 88/2010) and the Regulation on Categories, Testing and Classification of Waste (Off. Journal of RS, No 56/2010).

Regulation in respect to **railway transport** is the following:

- Law on Railways (Off. Journal of RS No. 45/2013, 91/2015);
- Law on safety and interoperability of the railways (Off. Journal of RS, No. 104/2013);
- Regulation on the transport of dangerous goods by road and rail transport (Off. Journal of RS, No. 53/2002);
- Regulation on railway and road crossing (Off. Journal of SRJ, No. 72/99)
- Rulebook 120 on transport of dangerous goods by rail (Off. Journal of SRJ, 7/92, 25/92);
- Instruction 79 on procedures in case of emergency (Off. Journal of SRJ, 9/92, 10/92).

The Ministry of Agriculture and Environment is in charge for the country's environmental management. Cities and local municipalities are in charge of local environmental planning and issuing of local approvals and permits.

The competent authorities and organizations which will issue their conditions and approvals for the purpose of the Spatial Plan of Special Purpose Area of the railway and the Preliminary Design are the following:

- Ministry of Defence, Department for Infrastructure
- Ministry of Interior Affairs, Department for Emergency Situations

- Municipality of Ćićevac
- PUC “Razvitak”, Ćićevac
- PUC “Kruševac“, Kruševac
- City of Kruševac
- Institute for Nature Protection of Serbia
- Institute for Protection of Cultural Monuments (Kraljevo)
- Republic Hydro-Meteorological Institute (Belgrade)
- Republic Institute for Seismology of Serbia (Belgrade)
- Public company for electricity transmission “Elektromreza Srbije” (Belgrade)
- Public company for gas supplying “Srbijagas”
- Public company for water management “Srbijavode”
- Public telecommunication company “Telekom Srbija”
- Public company for electricity distribution
- Radio-Television of Serbia (Belgrade)

2.2 National Social Legal and Policy Framework

2.2.1 Public Consultation and Information Disclosure Framework

Serbian legislation guarantees to its citizens the right to information, i.e. that everyone shall have the right to be informed accurately, fully and timely about issues of public importance. These provisions are included in the Constitution of the Republic of Serbia: (Official Journal of the RS, No. 98/2006), as well as in the Law on Free Access to Information of Public Importance (Official Journal of the RS, No. 120/04, 54/07, 104/09, 36/2010).

The Law on Planning and Construction (Off. Journal of RS, No. 72/2009, 81/2009, 64/2010, 24/2011, 121/2012, 42/2013, 50/2013, 98/2013, 132/2014 and 145/2014) regulates the development and adoption of spatial and urban plans in Serbia, which are all subject to a public disclosure and consultation process.

Serbia ratified the Aarhus Convention in 2009. Provisions of the Aarhus Convention were incorporated into the environmental regulation, including the Law on Environmental Impact Assessment and the Law on Strategic Environmental Impact Assessment.

The disclosure of environmental impact assessment documents is regulated by the respective Law and applies to all three stages (Screening, Scoping, EIA) of the process. The competent authority is obliged to publicly disclose the documents and to organise the public consultation in respect of the Environmental Impact Assessment Study.

2.2.2 Land Acquisition

Land in Serbia is legally categorised as construction land or agricultural land. According to the Law on Planning and Construction (Off. Journal of RS, No. 72/2009, 81/2009, 64/2010, 24/2011, 121/2012, 42/2013, 50/2013, 98/2013, 132/2014 and 145/2014) agricultural land can be changed into construction land through the adoption of relevant spatial plans. In the case of traffic infrastructure (railway) development, the Spatial Plan of the Special Purpose Area needs to be adopted by the relevant state authority. i.e. the Ministry of Construction, Traffic and Infrastructure.

Land needed for construction of the public (state-funded) projects is typically acquired through expropriation, regulated by the Law on Expropriation (Off. Journal of RS, No. 53/95, 16/2001, 20/2009, and 55/2013). The Law enables government institutions to acquire private property for projects that are deemed to be of national and/or local interest, while protecting the interests of all project-affected persons with legal title (ownership), whose assets are to be expropriated. The Law also enshrines the principle of fair compensation. The public interested is declared by the Government through the adoption of the specific law or decision.

The most important features of the Law on Expropriation are the following:

- The fair value of the land affected by a particular scheme, or project, is determined by the Tax Administration' accredited expert, on behalf of the "Beneficiary of Expropriation"[2] . The value is assessed on the basis of current market price, i.e. based on comparable sales transactions in the area in the recent past;
- In the case of privately owned agricultural land, if comparable land of the same type and quality or the appropriate value, can be identified in the same area or vicinity, it is offered to the project affected person with formal title;
- In case of disagreement on the comparability of the land offered, the project affected person can resort to the judicial process, where a decision would be made on the comparability of the land, or the payment of the assessed fair value in monetary terms;
- Where comparable land cannot be identified, the project-affected person with legal title is offered the fair compensation as determined by the Tax Administration. If the project affected person wishes to challenge the assessment of "fair value" they can resort to the judicial process;
- The expropriation may also include the instigation of an easement over the immovable property or a lease of the parcel of land for a specific period of time, which will be occupied temporarily and not for a period exceeding three years;
- The project affected person who owns or leases the affected residential building (public or private), or business premises has the equivalent right over another equivalent residential building (public or private), or equivalent business premises, in the same area or vicinity;
- The Beneficiary of Expropriation can be requested by a Court Decision to offer a compensation amount in monetary terms that exceeds the assessed fair market value, as defined earlier, if other personal or family circumstances of the project affected person deem it necessary to ensure that his/her livelihood is protected (e.g., number of family members, number of family members capable to earn a living, or number of family members who are employed, health status of family members, monthly income of the household, etc);
- For the project affected person without formal title, there is no provision for payment of compensation;
- The Beneficiary of Expropriation is not required to prepare a social assessment (socio-economic study) or a baseline census with regard to project affected persons.

The additional laws regulating certain aspects of land acquisition and property transaction issues are the following:

- Law on Fundamentals of Property Relations (adopted in 1980, amended 1990, 1996 and 2005);
- Law of Planning and Construction (adopted and corrected in 2009, and amended in 2011);
- Law of Agricultural Land (adopted in 2006, amended in 2009);
- Law on State Cadastre (adopted in 2009, amended in 2010).

2.2.3 Labour and Working Conditions

Serbia was a member state of the International Labour Organisation (ILO) between 1919 and 1992 and restarted its membership in 2000. The country has ratified 72 ILO International Labour Standards (Conventions), including the eight fundamental Conventions.

Labour and human resource management in Serbia is primarily addressed through the Law on Labour Off. Journal of RS, No. 24/2005, 61/2005, 54/2009, 32/2013, 75/2014). Compliance with labour laws is monitored by the Labour Inspectorate of the Ministry of Labour and Social Policy of the Republic of Serbia.

Other applicable laws include:

[2] Beneficiary of Expropriation under the Republic of Serbia Law is defined as the person, or legal entity, on whose behalf the expropriation is being undertaken.

- Law on Amicable Resolution of Labour Disputes (Official Journal of the RS No. 125/04, 104/09);
- Law on Strikes (Official Journal of the FRY No. 29/96);
- Law on Mobbing (Official Journal of the RS No. 36/10);
- Anti-Discrimination Law (Official Journal of the RS No. 22/09);
- Law on Preventing Discrimination Against Persons with Disabilities (Official Journal of the RS
- No. 33/06);
- Law on Vocational Rehabilitation and Employment of Disabled Persons (Official Journal of the RS No. 36/2009);
- Pension and Disability Insurance Law (Official Journal of the RS No. 34/03, 64/04, 84/04, 85/05, 101/05, 63/06, 05/09, 107/09, 101/10).

2.2.4 Occupational Health and Safety Framework

The Law on Occupational Health and Safety (Off. Journal of RS, No. 101/2005) is the main legislative document regulating Occupational Health and Safety issues in Serbia. The Law was enforced in 2005 and incorporated the principles of the EU Workplace Health and Safety Directive (89/391/EEC).

The Law is based on general principles of prevention and requires: (1) avoiding risks, (2) evaluating the risks, (3) combating the risks at source, (4) adapting the work to the individual, (5) replacing the dangerous by the non- or the less dangerous, (6) prioritizing collective protective measures (over individual protective measures) and (7) giving appropriate instructions to the workers.

Enforcement of the Law is provided by implementation of the set of by-laws (regulations and decrees) which stipulate specific requirements related to the general principles defined by the Law.

The Regulation on manner and procedure of risk assessment at work place and working environment (Off. Journal of RS, No. 72/06,84/06) is the main legislative document related to assessment of health and safety risks at the workplace.

Occupational health and safety is under the responsibility of the Ministry of Labour and Social Policy. Particularly, the Directorate for Occupational Health and Safety is in charge for legislation preparation and the Labour Inspectorate is competent for supervision of the legislation enforcement.

2.3 EBRD Environmental and Social Policy

The EBRD has developed an Environmental and Social Policy (2014) that outlines its commitment to the environmental and social dimensions of sustainable development. The EBRD expects projects that they finance to meet good international practice related to sustainable development and in order to assist projects achieve this, the EBRD has defined specific Performance Requirements (PR) for key areas of environmental and social issues and impacts.

A brief overview of the applicable PRs is presented below.

PR1. Assessment and Management of Environmental and Social Impacts and Issues

This Performance Requirement outlines the client's responsibilities in the process of appraising, managing and monitoring environmental and social issues associated with projects proposed for EBRD financing. These include the following:

- identifying and assessing the environmental and social impacts and issues, both adverse and beneficial, associated with the project;
- adopting measures to avoid, or where avoidance is not possible, minimize, mitigate, or offset/compensate for adverse impacts on workers, affected communities, and the environment;
- identifying and, where feasible, adopting opportunities to improve environmental and social performance;

- promoting improved environmental and social performance through a dynamic process of performance monitoring and evaluation.

PR2. Labour and Working Conditions

This PR sets out the client's responsibilities with regard to labour and working conditions, including, inter alia, the abolition and elimination of child and forced labour. The provisions of this document are based on the conventions adopted by the International Labour Organisation (ILO) and are very similar to the requirements of the Serbian labour legislation. The main difference relates to the requirement for the Bank's client to ensure that contractors involved in the project meet EBRD standards.

PR3. Resource Efficiency, Pollution Prevention and Control

This PR requires from the client to identify project-related opportunities for energy, water and resource efficiency improvements and waste minimisation, to adopt the mitigation hierarchy approach to addressing adverse impacts on human health and the environment arising from the resource and to promote the reduction of project-related greenhouse gas emissions.

PR4. Health and Safety

This PR requires the Bank clients to identify and assess community health and safety risks associated with the project and take appropriate preventive measures. These measures will favour the prevention or avoidance of risks and impacts over minimisation and reduction.

PR5. Land Acquisition, Involuntary Resettlement and Economic Displacement

This PR outlines requirements to be met for the projects involving involuntary resettlement and economic displacement. Involuntary resettlement refers both to physical displacement (relocation or loss of shelter) and economic displacement (loss of assets or resources, and/or loss of access to assets or resources that leads to loss of income sources or means of livelihood) as a result of project-related land acquisition and/or restrictions on land use.

PR6. Biodiversity Conservation and Sustainable Management of Living Natural Resources

This PR outlines the client's responsibilities with regard to the conservation of biological and landscape diversity in the project area. The client is required to assess the state of biodiversity, identify sensitive areas and habitats and develop appropriate mitigation measures designed to avoid/minimize impact on flora and fauna. The client needs to adopt the mitigation hierarchy approach, with the aim of achieving no net loss of biodiversity, and where appropriate, a net gain of biodiversity.

PR7. Indigenous peoples (not applicable to this project)

PR8. Cultural Heritage

This PR sets out the client's responsibilities with regard to the conservation and protection of cultural heritage, both tangible and intangible (including traditional skills, knowledge, beliefs and/or minor dialects and languages). The presence and potential for presence of any cultural heritage assets, both tangible and intangible, in the Project area will be addressed in the ESIA.

PR9. Financial intermediaries (not applicable to this project)

PR10. Information Disclosure and Stakeholder Engagement

In particular, the EBRD requires the clients to carry out a comprehensive and systemic identification of stakeholders to identify those parties that are affected or likely to be affected by the project impacts (affected parties) and those groups that may have an interest in the project (other interested parties). Also, the EBRD considers stakeholder engagement as a continuous and ongoing process that starts at a very early stage of the project and continues/evolves throughout the entire project lifecycle. The Stakeholder Engagement Plan should be developed and maintained for the Category "A" projects.

2.4 Relationship between International ESIA and Serbian EIA Processes

The two processes are generally aligned in terms of 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. Table 3 summarises the similarities and differences between the ESIA and Serbian EIA process.

Table 3 Relationship with the local EIA

Activity	ESIA	EIA	Comments
Screening Study	✓	✓	Due to nature and scale of the proposed project and the clear requirement under international standards and national legislation, a formal screening study was not produced for this project.
Categorisation	✓	✓	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	✓		A formal stakeholder engagement plan is not required under national legislation. However, stakeholder consultation is part of the EIA process.
Scoping Study	✓	✓	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.
Consideration of alternatives	✓	✓	Both the impact assessment process for the purposes of investment and national regulatory requirements, require the consideration of other feasible approaches, including alternatives locations, technologies, scales and 'no project' options.
Environmental Impact Assessment	✓	✓	The environmental impact assessment requirements are generally aligned. The standards adopted in the environmental assessment undertaken for the purposes of 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

Activity	ESIA	EIA	Comments
			requirements outside of the country.
Environmental impacts assessment in cases of accidents	Limited	✓	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	✓	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, local national legislation does require assessment of effects where impacts are associated with impacts to human health.
Non-Technical Summary (NTS)	✓	✓	NTS is required for investment requirements for use as disclosure document. It is recognised as good practice to produce a 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	✓	✓	The public consultation process for both investment and national regulatory purposes is required.
Management of Grievances and Objections	✓		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).

3 Project Description and Project Alternatives

3.1 Technical Description of the Project

The project involves the following components: (1) construction of the new double-track railway line 17.7 km long for speeds up to 160 km/h, (2) upgrade of the railway stations in Stalać and Đunis, (3) construction of the overhead contact line, signalling safety and telecommunications installations, (4) decommissioning of the existing single-track railway line.

This section provides a detailed description of the proposed works as well as the present state of the existing railway line.

3.1.1 Present state of the existing railway line from Stalać to Đunis

Presently, the railway line from Stalać to Đunis is a single track, with small radius of horizontal curves and low maximum speeds of the trains. The section is approximately 18.6 km long. There are six official points on the section: Stalać station at km 176 + 311, the Stevanac passing loop at km 181 + 880, Braljina station at km 186 + 487, Cerovo Ražanj halt at km 190 + 300, the Staro Trubarevo passing loop at km 192 + 216 and Đunis station at km 194 + 940.

Passenger traffic

At the moment, 8 pairs of passenger trains operate daily on the section, as follows:

- 1 pair of international regular passenger trains connecting Belgrade and Sofia (Bulgaria);
- 1 pair of international regular passenger trains connecting Belgrade and Skoplje (FYR Macedonia);
- 2 pairs of international agency' trains connecting Edirne (Turkey) – Filah (Austria). These trains serve the needs of the agency Optima Tours (Germany). The commercial contract on agency trains was signed between the "Serbian Railways" and the agency. It is estimated that approximately 20 trains per month will run during the season from May to November;
- 3 pairs of internal domestic passenger trains connecting Belgrade and Niš (via Mladenovac);
- 1 pair of internal domestic passenger train on the route Niš – Lapovo – (Palanka).

Freight traffic

Presently, 15 freight trains per day (both international and domestic) operate at the section.

International freight traffic operates in the following way:

In Stalać – Đunis direction there are 6 regular available freight train-paths:

- Subotica – Batajnica – Niš Marshalling Yard – Preševo – 1 train-path
- Subotica – Batajnica – Crveni Krst – Dimitrovgrad – 1 train-path
- Belgrade Marshalling Yard – Crveni Krst – Dimitrovgrad – 2 train-paths
- Belgrade Marshalling Yard – Niš Marshalling Yard – Preševo – 2 train-paths

In Đunis – Stalać direction there are 5 regular available freight train-paths:

- Dimitrovgrad – Crveni Krst – Batajnica – Subotica / Šid – 1 train-path
- Dimitrovgrad – Crveni Krst – Belgrade Marshalling Yard – 1 train-path
- Preševo – Niš Marshalling Yard – Batajnica – Subotica – 2 train-paths
- Preševo – Niš Marshalling Yard – Belgrade Marshalling Yard – Preševo – 1 train-path

In respect to domestic freight traffic, there are two regular train-paths in the direction Lapovo Marshalling Yard – Stalać – Niš Marshalling Yard (Stalać – Đunis direction), and two regular train-paths in the direction Niš Marshalling Yard – Stalać – Lapovo Marshalling Yard (Đunis – Stalać direction).

Main technical characteristics of the existing railway line

The permitted axle load is 22.5 t. The minimum radius of the single-track section line is 300 meters. The maximum speed limit is the following:

- From Stalać to Braljina (176+311 to 186+487): 65 km/h;

- From Braljina to Đunis (186+487 to 194+940): 85 km/h.

The existing structures in this section are the following:

- a single-track bridge on the South Morava River at km 190+699, L = 3x52 m;
- a single-track railway tunnel Stevanac with length of 229.10 m, at km 181+452 km;
- 68 objects shorter than 100 meters;
- 8 level crossings.

The present project plans almost complete abandonment of the existing railway route and the use of a new corridor. Stalać and Đunis railway stations will be fully reconstructed. Therefore, analysis of the current situation at the mentioned stations is provided below.

Present condition of the existing stations in Stalać and Đunis

Stalać station is an interstation on the railway line from Belgrade to Niš. The station building is located on the left side of the railway line (looking south). There are 8 tracks and one dead-end track. The station is electrified by a single phase system.

The last track overhaul was in 1967. The track is in a poor condition in terms of stability, route and direction. The side rail tracks have a high percentage of defective wooden sleepers, used rail and accessories for rail. The main tracks have S49 rails on wooden sleepers whose percentage of deterioration is about 20%. On the other tracks the number of worn-out sleepers is much higher, up to 40%. The maximum speed on the 8th track is limited to 10 km/h.

The station underpass (for passenger use) is in a poor condition with inadequate run-off water discharge and consequently it is out of use. There is no drainage of run-off water from the tracks, so the ballast on all tracks is contaminated.

The industrial track is owned by the company "Putevi invest" Užice dealing with the manufacture and repair of concrete elements. The industrial track is electrified in the length of 770 m, ending at a portal in front of the entrance gate of the company.

The village of Stalać does not have a sewage system. The station has its own internal separated system for surface run-off and sanitary wastewater and both discharge to the nearby watercourse without pre-treatment which is not in accordance with Serbian regulatory requirements.

The station building is shown in Figure 2.

Figure 2 Stalać station – present state

Đunis station is located at km 194+940. The station building is on the left side of the railway (looking south). There are 5 tracks in total. The last track overhaul was in 1989/1990 with new tracks laid, new sleepers JŽ70, a = 60 cm, "K" accessories and new switches.

The station has drainage of run-off water from the tracks, between the 1st and 2nd and the 3rd and 4th track.

From switch No. 4 there is a dead-end, 100 m long. The station is electrified by mono-phase 25 kV 50 Hz. All the tracks at the station are electrified along the entire length, except the dead-end track.

The village of Đunis does not have a sewage system developed. The station has its internal system for surface run-off, discharging it directly to the nearby watercourse. No sanitary sewage is present at the site. The present state is not in accordance with Serbian regulatory requirements.

The station building is shown in Figure 3.

Figure 3 Đunis station – present state

3.1.2 Proposed new railway route from Stalać to Đunis

The proposed route will comprise two railway tracks. The railway infrastructure will have an overall width of 14 m. The rail corridor width may vary depending on the local topography and cuttings. 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 rail corridor will not be fenced.

The total length of new route (including the sections before Stalać and after Đunis)will be about 17.7 km long (approximately 5 km shorter than the exisiting 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 main parameters of the horizontal and vertical alignment are the following:

- Horizontal curve radius R = 1,500m,
- The length of the transition curve L = 180m
- Maximum permissible longitudinal slope of track of 12.5‰.
- On the "AV" connections in the stations switches type 60E1-500-1:12 are designed, while on the main through tracks switches type 60E1-300-6° are designed.

The proposed railway route will intersect with the existing one at four locations. It is proposed that the existing railway is used during the period of construction of the new one. Therefore, the safety distance between the existing and the proposed route has been considered.

The map of the proposed route and the existing railway line is provided as Annex 1.

Proposed route

The proposed railway route starts at about km 174+700 and ends at about km 196+500 of the existing railway line (about km 191+500 of the new railway line).

Stalać station is located at about km 175+750 but the upgrade works will start about 1 km before the station in order to fit into the existing railway line. The tracks will remain within the existing rail corridor.

After passing Stalać station, the railway line runs through the settlement (Stalać) and then through cultivated land between the existing railroad and the South Morava River. It then turns to the left and enters tunnel 1. After exiting tunnel 1, the railway crosses two no-name streams by a bridge (at km 180+436) and after 200 m enters the tunnel 2. After exiting tunnel 2, the railway runs across the South Morava River, via the new 300 m-long bridge (km 181+555) and enters tunnel 3 (435 m long). After exiting tunnel 3, the railway crosses the road and the Gorčilovac stream, so a new bridge is proposed there (km 182+200). This bridge will enable access to the entrance to the tunnel 4. Tunnel 4 will be 3,275 m long and will have 3 emergency access routes. The emergency access routes from the tunnel will be connected to the existing municipal road Stalać – Đunis (which will be realigned and widened in this area). After exiting the tunnel 4, the railway continues in a gallery (30 m long) and enters the tunnel 5 (1,040 m). After exiting tunnel 5, the railway crosses the existing road Stalać – Đunis. Given that the railway vertical alignment is 7 m higher than the road route, a viaduct is proposed (km 186+846) over the existing road.

After passing the viaduct (311 m), the railway will run on a high embankment all the way to Đunis station. It will cross 4 streams. The first of them, Livadski stream, will be conveyed through a culvert. Two bridges are planned to cross the Trubarevački stream (km 187+520) and the Zmijarnik stream (km 187+658). The railway line continues along the high embankment which divides the area between the South Morava River and the road connecting Stalać and Trubarevo village. An underpass is planned at km 188+342 in order to enable access to the nearby cultivated land. The reason for raising the vertical alignment in this section, km 187+000 to km 189+500, is the flood level of the South Morava river and the Ribarska river.

Before Đunis station, near the bridge over the Ribarska river, the existing railway line intersects with the state road of IIA category, with a separated grade underpass. After testing several solutions that would include a new underpass, the designers came to the conclusion that, due to the proximity of the riverbed and flood level, the optimal variant would be to construct an overpass along with a new alignment of the state road.

3.1.3 Cuttings and Embankments

A cutting is proposed upon exiting the area of Stalać at km 178+750 and will be formed by excavation given that the local topography is at a higher level than the proposed route.

An embankment is proposed at km 187+550 where the route crosses the South Morava flood plain. To ensure sufficient clearance between the bottom edge of structures on tributaries through which the railroad passes, the vertical alignment has been raised to a certain level, which caused the railway on that part to be on embankments that are 5-6 m high. Embankment slopes will be 1:1.5 for the first three meters and then 1:2 to the intersection with the terrain.

Cross-sections of the proposed cutting and embankment is illustrate in Figure 4 and Figure 5.

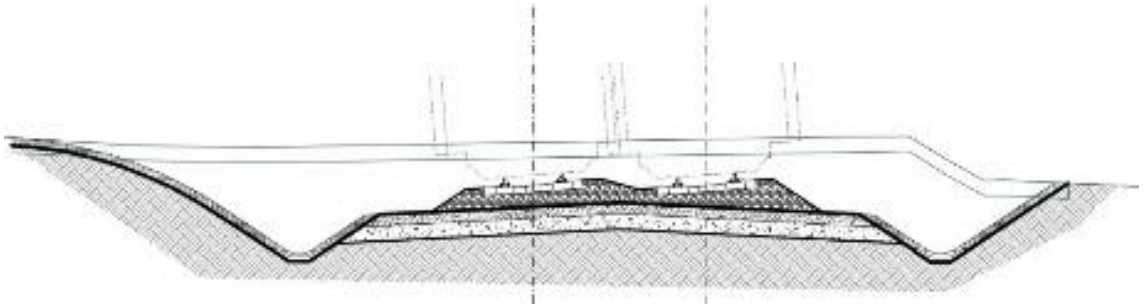

Figure 4 Cross-section of the cutting at km 178+750

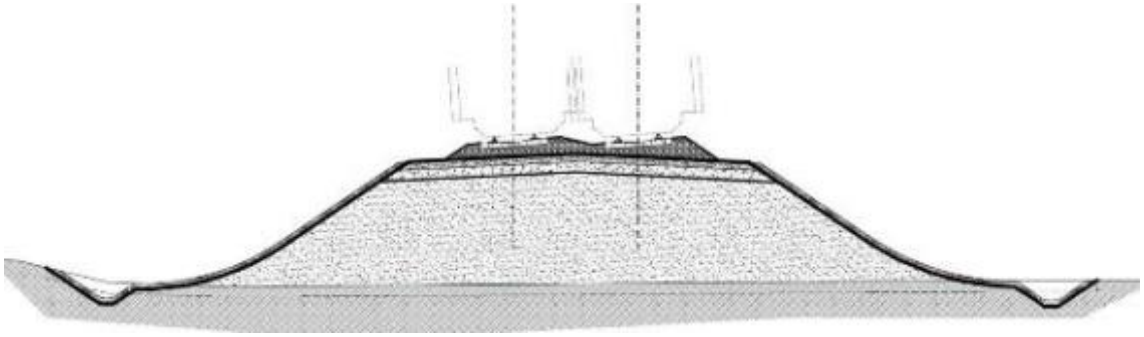

Figure 5 Cross-section of the embankment at km 187+550

3.1.4 Drainage

Lowering of groundwater level is generally not expected along the route. There is a possibility that groundwater drainage may be required during construction of the culverts in the South Morava River flood plain (between Stalać and tunnel 1) and between Trubarevo and Đunis.

Diversion of streams will be necessary during the culverts' construction. Two forms of diversions will be considered: constructing a temporary stream diversion adjacent to the stream, building the new culvert, and then diverting the stream through the new culvert; or by-passing the construction area by pumping water over the length required to build the culvert. The choice between options will depend on specific location, the volume of water, availability of land for the diversion, requirements from authorities, etc.

3.1.5 Tunnels

All tunnels are designed as single bore two track tunnels with distance between track centres of 4.50 m. The tunnels will be created according to the NATM (New Austrian Tunnelling Method). Two methods of construction will be used: mined (leaving the original surface features intact) and cut-and-cover, requiring temporary disruption at the surface during construction, after which the surface conditions are reinstated. All tunnels will have portals (exit/entrance structures) and longer tunnels will have emergency evacuation escape routes.

The overview of the proposed tunnels is provided in Table 4.

Table 4 Proposed tunnels along the railway route

No.	Tunnel length (m)	Start point (km)	End point (km)	Comment
1.	1,450	178+895	180+345	Tunnel is with entrance in diluvium (deposits formed by floods). First part of tunnel (100 m long), will be built as cut and cover, with invert. The rest of tunnel will be excavated with NATM. 450 m from the entrance an emergency exit is designed to the surface, on the right side of tunnel.
2	690	180+700	181+390	NATM
3	435	181+725	182+160	NATM
4	3,275	182+325	185+600	NATM. Three emergency exits to the surface are designed: 1000 m, 1633 m and 2275 m from the entrance, on the left side of tunnel.
5	1,040	185+630	186+670	NATM

Gallery

A gallery is proposed at km. 185+615, between the tunnels 4 and 5. It will be 30 m long and is designed on a slope instead of an open railway, because of the very steep terrain.

3.1.6 Bridges

The overview of bridges proposed along the railway line is provided in Table 5.

Table 5 Characteristics of the bridges along the railway route

No.	Chainage	Length (m)	Width (m)	Crosses river / stream / road	Comment
1	**km. 180+436**	102.4	12.8	2 no-name streams	Bridge is straight, designed as continuous beam with 4 spans. No piers in the streams.
2	**km. 181+555**	310.9	12.8	The existing railway line, the South Morava River and the existing road	Bridge is curved, R=1500 m, designed as continuous beam with 7 spans. Two piers in the river.
3	**km. 182+200**	46.4	12.8	The existing road and the Gorčilovac stream	Bridge is straight. No piers in the stream.

No.	Chainage	Length (m)	Width (m)	Crosses river / stream / road	Comment
4	**km. 187+520**	26.5	13.05	Trubarevački stream, a dirt road	Bridge is straight. No piers in the stream.
5	**km. 187+658**	22.8	13.05	Zmijarnik stream	Bridge is straight. No piers in the stream.
6.	**km. 189+191**	62.8	12.8	Road, Ribarska river	Bridge is straight, designed as continuous beam with 3 spans. No piers in the river.

3.1.7 Viaduct

A viaduct is proposed at km. 186+846. After the exit from the tunnel 5, the railway will run on the viaduct, 311 m long and 12.80 m width. The viaduct will be curved, R=1500m, and will pass over the existing road at km. 186+723. In the part where it crosses the local road, it is designed as a simple beam. In the part where it crosses the valley, it is designed as a continuous beam with 10 spans. Foundation dimensions for piers are 10 x 5.2 x 1.5 m, and for abutments 12.6 x 4.20 x 1.5 m.

3.1.8 Overpass

One overpass is proposed, at km. 189+098. Before Đunis station, near the bridge over the Ribarska River, the existing railway line intersects with the state road IIa, with a separated grade underpass. After testing several solutions that would include a new underpass, the designers came to the conclusion that, due to the proximity of the riverbed and flood level, the optimal variant would be an overbridge along with a new alignment of the state road.

3.1.9 Underpasses

Two underpasses are proposed, they will be straight and will pass over roads at km. 177+594 and km. 188+342. Static system is frame L=10.0 m. Total length of underpass with wing walls is 24.0 m.

3.1.10 Culverts

Fourteen culverts are proposed in total. All of them under the two railway tracks. Some of them will be designed new, and some will be extended, according to the distance between the existing and new railway tracks. The culverts are reinforced concrete structures. The prefabricated construction elements will be 1.0 or 2.0 m long. Other elements with dimensions: 4.0 x 3.0 m; 5.0 x 3.0 m and 6.0 x 3.0 m are not expected to be prefabricated because of their weight.

3.1.11 Upgrade of Stalać Station

The new Stalać station will have 8 tracks and 3 platforms. The usable track length will be 750 m. Platforms are will be 55 cm high, with shelters. Two platforms will be 400 m long, and one 220 m long. The scheme of the proposed station is shown in Figure 6.

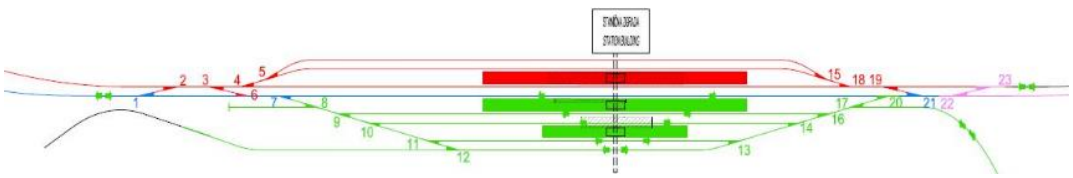

Figure 6 Stalać station – scheme

The main upgrade works at the station building will involve the following:

- Construction of the new underpass and adaptation of the existing connection of the underpass to the station building, new exits to the platforms, platform shelters, stairways, platforms paving, lighting, public address system and alarm system. The underpass and access platforms will be designed to be accessible for disabled persons by using stair lifts;
- Upgrade of the entrance hall and waiting room (intervention on the internal compartment and interior elements, furniture, finishing the ceiling with ceiling lighting and sound);
- Improved access to the main entrance (paving, landscaping, lighting, marking);
- New ticket office.

The 3-D model of the station is illustrated in Figure 7.

Figure 7 3D model of Stalać station

No train maintenance activities are proposed as part of the station operations.

Sanitary wastewater from Stalać station will be collected by internal sewage systems, treated in a septic tank and discharged to the surface water recipient.

Surface run-off from uncontaminated areas will be collected by internal stormwater sewer systems and discharged to the surface water recipient. Where necessary, the drainage system in stations will also incorporate pollution control devices such as oil and silt traps.

3.1.12 Upgrade of Đunis Station

The new Đunis station is proposed about 400 m east of the existing station. The station will have 5 tracks and 2 platforms. The usable track length will be about 750 m. The scheme of the proposed station is shown in Figure 8.

Figure 8 Đunis station - scheme

The station will be unmanned, controlled by the telecommunication centre in Niš. The platforms for passengers are designed to be 55 cm high and 220 m long. The station will have the access road from the existing asphalt access road, parking space, passenger access to the platforms, station building and footbridge with lifts (for the disabled) to access the platforms.

The 3-D model of the station is illustrated in Figure 9.

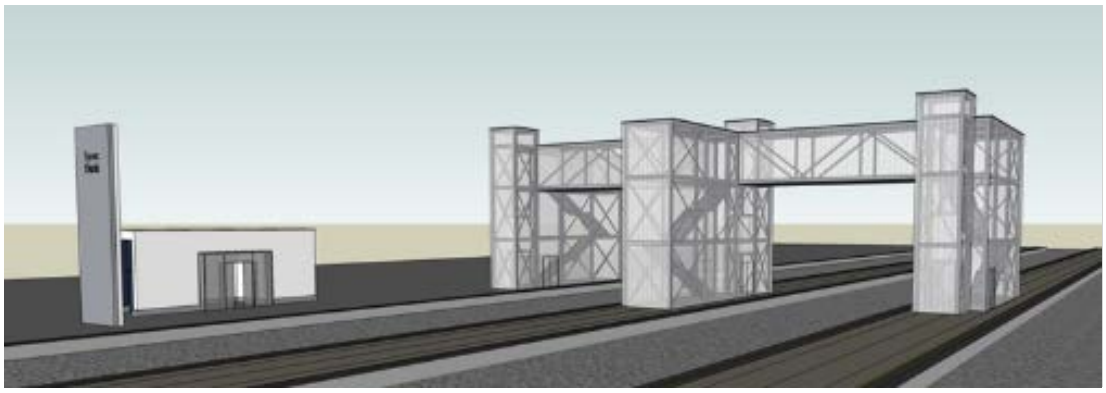

Figure 9 3D model of Đunis station

The internal sewer system for sanitary wastewater will be constructed as part of the station upgrade and will involve a septic tank. Sanitary wastewater from the station will be collected by internal sewage systems, treated in the septic tank and discharged to the surface water recipient. Surface run-off from uncontaminated areas will be collected by internal stormwater sewer systems and discharged to the surface water recipient. Where necessary, the drainage system in stations will also incorporate pollution control devices such as oil and silt traps.

Given that the track No. 5 is proposed in the area of the substation, part of the existing substation will be removed and re-constructed.

No train maintenance activities are proposed as part of the station operations.

3.1.13 Realignment of existing roads and grade separated railway crossings

As part of the project development, some of the existing roads are planned to be realigned and new access roads will be created, all of which will require additional land acquistion. The realignments are a result of design requirements related to safety distances between the rails and roads or the track geometry. In addition, there will be 5 crossings of the proposed route with roads, all designed to be grade separated, at km 177+594, at 181+692, at km 186+723, at km 188+342 and at km 189+098.

An overview of the proposed road realignments and new access roads is provided in Table 6.

Table 6 Proposed road realignments and new access roads

Type of Road	Railway chainage (Right track)	Location	Road length	Road width
Local dirt road relocation	from 174+445.05, right side of the railway	Stalać	815 m	3.5 m
Local asphalt road relocation	from 175+060.56, left side of the railway	Stalać	300 m	6.0 m
Local asphalt road relocation	from 176+919.77, left side of the railway	Stalać	150 m	6.0 m
New local asphalt road	from 176+943.66, right side of the railway	Stalać	680 m	6.0 m
Underpass	from 177+593.80	Stalać	155 m	6.0 m

New access road to tunnel portals and signaling facility, over the existing railway alignment	from 177+593.80, right side of the railway	To tunnel 1 exit signaling facility	4175 m	3.5 m
Local dirt road relocation	From 177+758.29	Stalać	1070 m	3.5 m
New access road to tunnel 1 entrance	from 178+753.77, right side of the railway	To tunnel 1 entrance	155 m	3.5 m
New access road to tunnel 1 emergency exit	from 180+134.82, right side of the railway	To tunnel 1 exit	225 m	3.5 m
New access road to tunnel 4 entrance	from 182+211.60, right side of the railway	To tunnel 4 entrance	270 m	3.5 m
Service road to evacuation plateau, tunnel 4		Tunnel 4	1445 m	3.5 m
Local road relocation	from 186+499.17, left side of the railway		330 m	3.5 m
New access road to tunnel 5 exit	from 186+545.73, left side of the railway	To tunnel 5 exit	150 m	3.5 m
Underpass	188+342.27	Trubarevo	410 m	3.5 m (underpass 6.0 m)
New access road toĐunis power substation	189+202.46, right side of the railway	Đunis	1105 m	3.5 m
Access road to Đunis station building	189+922.44, left side of the railway	Đunis	200 m	3.5 m

3.2 Construction Works

This section provides an overview of activities and methods that are expected to be adopted during construction of the project. Two broad types of construction works are expected: civil engineering works and railway installation works (ballasted track).

Civil engineering works will consist of earthworks (excavation and embankment), construction of structures on open line sections (bridges, tunnels, overpasses, culverts) and in stations (reconstruction of station buildings, construction of underpasses, overpasses, others facilities for the railway).

Railway installation works will involve construction of superstructure (ballast materials (crushed volcanic origin), rail (UIC 60) with elastic fastening accessories and concrete sleepers). On the main station tracks, the rail type 60E1 will be installed, on concrete sleepers with elastic fastenings and turnouts-type 60-300-6^{o} on concrete sleepers. On secondary tracks rails type 49 and type-49 turnouts can be installed using new or used material. Rails and switches will be welded as continuously welded rail.

3.2.1 Construction land requirements

During the construction, land will be temporarily required for: (1) construction compounds and worksites and the access to them; (2) realignment of roads, (3) diversion of streams, (4) temporary

storage of topsoil and excavated material; and (5) road and railheads (where bulk delivery or dispatch of materials takes place via public roads or the existing railway).

Construction compounds will have aggregate crushing facilities, concrete batching plants and pre-cast concrete facilities. Excavation of gravel and sand from the river may be necessary. These locations have not been decided at this stage.

Land for the temporary storage of excavated material will be required during the earthworks, mainly at locations where large volumes of excavated material will arise (e.g. tunnel portals). Temporary material stockpiles will be required at certain sections of the route to limit the distances over which such materials need to be transported.

3.2.2 Construction traffic

Vehicles accessing the construction compounds and the worksites will comprise heavy goods vehicles (lorries for plant and materials, concrete trucks, bulk tipper trucks, abnormal/oversize loads), light goods vehicles (pickups, small tipper trucks, cars) and rail vehicles which will be to deliver materials to or from the site. The rail network will have preference to public roads and will be used wherever practicable.

The existing dirt roads will be used in Stalać as access roads for the machinery. The existing roads and new planned roads will be used for the machinery transport along the route. The new access roads will be 3.50 m wide consisitng of three layers of crushed stone aggregate fraction 0/8 8cm thick, 0/31.5 20cm thick, and 0/63 25cm thick.

3.2.3 Construction of railway structures

Cuttings will be excavated using excavators, graders and scrapers, and the resulting material will be reused as fill in the embankment (if suitable) or for landscape earthworks. Earthworks will include the bulk excavation of material and placing of that material to create the route alignment.

It has been assumed that all bridges and the viaduct will be constructed by casting in situ.

Smaller culverts will be constructed using pre-cast concrete units, lifted into place by a crane onto a prepared bed of granular material and sealed. Headwalls (i.e. the walls around the mouth of the culvert) may be constructed in-situ from reinforced concrete. Larger culverts will be constructed in-situ in reinforced concrete.

The tunnels will generally be mined by drill and blast or using a road header following a sequential excavation method (in two or more drifts). The typical support elements in the NATM are shotcrete and rock anchors. Steel ribs or lattice girders may be used to provide limited early support before the shotcrete hardens and ensure correct profile geometry. The primary lining and the dowel heads are covered with a smoothening layer in preparation for the installation of the waterproofing system. The secondary lining is typically unreinforced and cast in 8.0 m to 12.0 m long bays using a steel formwork mounted on a carrier. The steel formwork provides a high-quality surface.

At this stage of the project development, it has been assumed that the excavated material from the tunnels will not be used for embankment construction. It is estimated that about 500.000 m^3 of excavated material will be generated, and it will be used in the following ways:

- Temporary surcharge of the 5 to 6 m high embankment to accelerate settlement;
- If geological surveys during the tunnels excavations indicate suitability of this material for forming embankments, half of the excavated volume (about 250.000 m^3) will be used in the embankment, and the rest will be delivered to the local municipalities to utilise in road construction;
- The surplus of the excavated material could be offered to the water management company for construction of flood protection embankments the flood plain area of the South Morava River.

3.2.4 Intersections with existing railway route

The proposed route will intersect with the existing railway line at four points. As the existing line will continue to operate throughout the construction of the new one, timing of construction works at intersections will be planned to avoid any accidents and safety risks and to minimise traffic suspension. The timing of works will be programmed to minimise delays and alterations of schedule as far as possible. Traffic of international trains will not be disrupted and the timing of construction will be planned to accommodate the international train schedule. Domestic train schedule will be changed when necessary, the passenger trains will be replaced by buses and domestic freight transport will be re-scheduled.

3.2.5 Estimated duration of construction works

It is estimated that the construction stage of the project will last about 1500 days (4 years). Land acquisition, mobilisation, construction of access roads, power supply and cable diversions will take about 6 months. Construction of the embankment and structures is estimated to about 30 months in total. Reconstruction works in Stalać and Đunis stations will take about 24 months for each station.

3.3 Decommissioning of the existing railway line

Decommissioning of the 18.6 km-long railway line will involve the removal of track superstructure. The ballast is not planned to be removed. In the areas where the existing railway route will be used for the construction of access roads, the ballast will be compacted and used as a base layer for new roads. The removal of track superstructure is not expected to be a complex process or to involve large volumes of hazardous materials that could result in releases of harmful materials into the ground.

Decommissioning works will be undertaken by contractors. Prior to decommissioning, “Serbian Railways” should develop a Decommissioning Management Plan which will define environmental and health and safety considerations and precautionary measures during this activity, including recycling of materials whereever possible.

3.4 Project Alternatives

The proposed project was selected as preferable in the phase of the General Design of reconstruction and modernisation of the railway line Stalać – Đunis. Three other project options involved upgrade/development of the railway line for speeds up to 100 km/h, 120 km/h, and 200 km/h, respectively. This section provides an outline of options considered within the selected project – the development of the railway line for speeds up to 160 km/h.

The proposed railway route as defined in the phase of the General Design has been slightly changed to accommodate new information and requirements resulting from the further investigations along the route and preparation of the Preliminary Design.

3.4.1 "Do Nothing Alternative"

The no project scenario is that the railway line is not developed. In the event that the railway line is not constructed there will be no adverse environmental effects typical for construction of linear projects (permanent loss of land along the narrow strip, changes to topography and landscape, crossings of waterways, etc.). However, the main adverse environmental and public safety effects would remain. There is a high risk of derailments and spills due to the poor infrastructure condition. Apart from potential contamination due to accidents with hazardous materials, any derailments would block the line and cause delays.

The principal adverse effect of the "do nothing" alternative would be from a national perspective, the main "bottle-neck" along the Serbian part of the railway Corridor X will remain and the corridor will not be possible to be developed, the opportunity of diverting road traffic to rail will not be realised, trade with neighbouring countries and through Serbia will be hindered and, with further deterioration of the railway infrastructure, major costs will be incurred in renewing the decaying infrastructure. Development of the region (Ćićevac municipality, Kruševac city) will be further slowed down.

3.4.2 Alternative alignment

The first option of the route (in the General Design) did not consider the intersections with the existing railway. The final route option minimised the number of intersections with the existing line and proposed the route at a safe distance (14-15 m) from the existing railway line, where possible.

Also, the route from the General Design was changed to avoid the inevitable regulation of the South Morava River and development of the river embankments at 5 locations.

On entering Stalać station, at the point where the state road crosses the railway by the overpass, according to the route from the General Design, the railroad is in collision with the overpass pier. In the Preliminary Design, an increased spacing between tracks is envisaged, in order to avoid intervention on the overpass. This fact and the required removal of curves in the station geometry resulted in the intervention on the existing railway line at approximately one kilometre before the entrance to Stalać station.

Stalać station is defined according to the new technology of traffic and transport, and therefore not changed when compared to the General Design. Also, the existing station geometry includes a number of horizontal curves. The Preliminary Design established the proper station geometry. The corrected geometry of the station, as well as elements of the project that required rigorous track geometry, led to the fact that it was not possible to avoid the demolition of about 20 residential buildings at the exit from the station. However, given the importance of such a facility, changes in the area are minimal compared to the value of the investment.

After the preparation of Preliminary transport and traffic technology design, and also because of the complex topographical conditions of the terrain, the two halts (Braljina Kruševačka and Trubarevo) envisaged in the General Design were removed from the route in the Preliminary Design.

The location of Đunis station proposed in the General Design has been changed due to unfavourable hydrological settings at the site (required regulation of the South Morava River in a length of 2 km with the riverbed gradient being 0%). Because of that, the station Đunis has been moved, and it is located about 400 m to the east of the existing station.

3.4.3 Alternative structures

Upon detailed hydrological and hydro-technical investigations, the length of some hydraulic structures was changed.

The position and number of tunnels on the route remained the same, while the length of tunnels and gallery was slightly changed as a result of the changed design geometry, for reasons explained above.

All crossings with the existing roads have been planned as grade separated. During the preparation of the Preliminary Design the number of intersections of the new railway line with existing roads was reduced due to the adjustment to topographical conditions of the terrain and regulatory requirements for urban and interurban roads. Initially there were four underpasses and there are two in the final solution.

4 Environmental and Social Baseline

4.1 Environmental Baseline

4.1.1 Topography and Relief

The main topographic feature in the study area is the Stalać gorge cut by the South Morava River between the two hilly upland areas, namely the Mojsinje Mountain (to the west) and the Poslon Mountain (to the east), see Figure 10. The Stalać gorge is about 20 km long and about 350 m deep.

The topography of the area varies from the flat alluvial terrain along the South Morava River (south-east to north-west direction) to moderately undulating land to the east and the west. The terrain elevation is in the range 135 m a.s.l. to about 500 m a.s.l., where the lowest points are associated with the South Morava River plain and highest are located in the hilly upland. It should be noted that although both upland areas are formally called “mountains”, they are actually “hills”, given that the highest point is at 493 m a.s.l (peak Šiljegarnik in the Mojsinje Mountain).

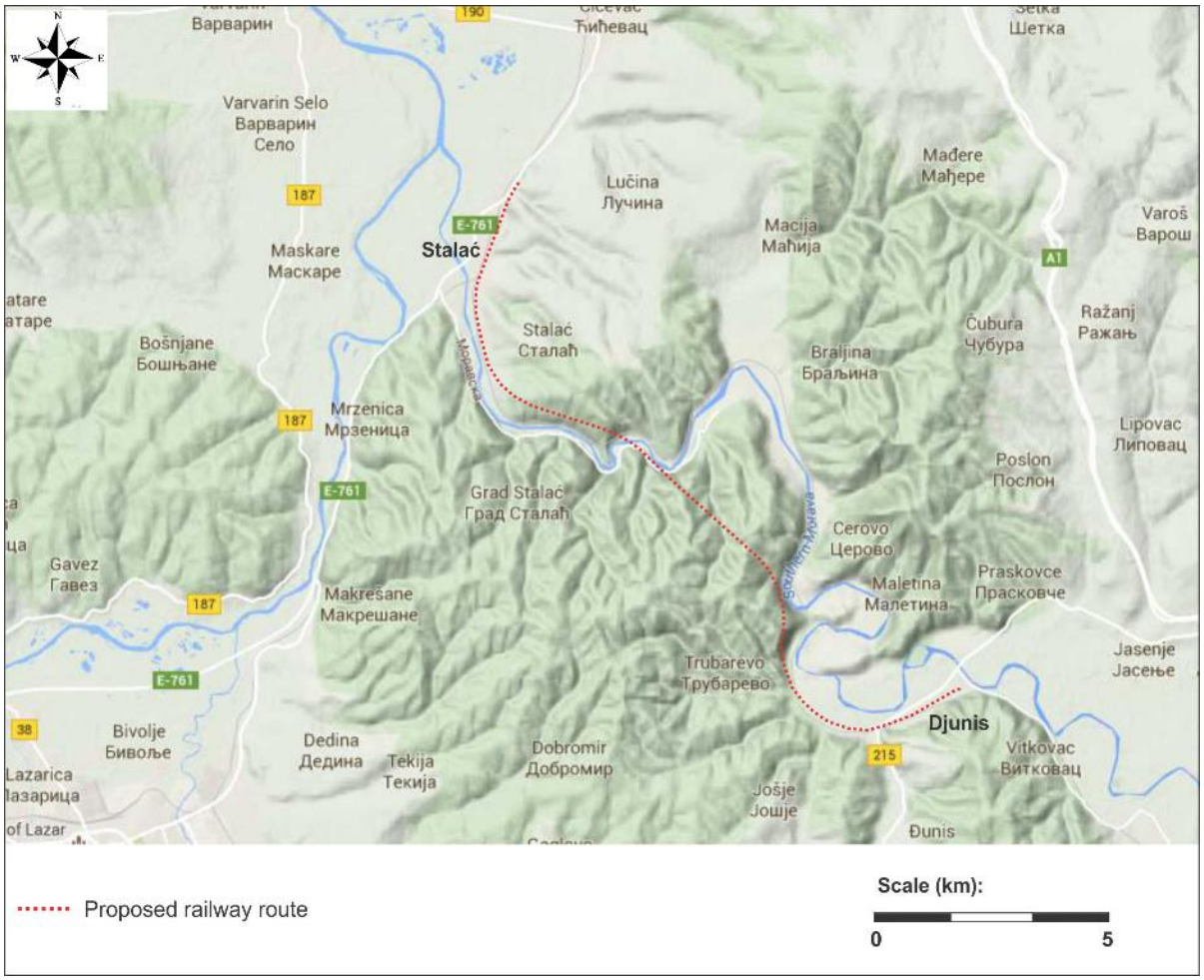

Figure 10 Topography of the project area

A schematic map of the project area terrain elevation (based on the terrain elevation map from www.geosrbija.com) is provided in Figure 11.

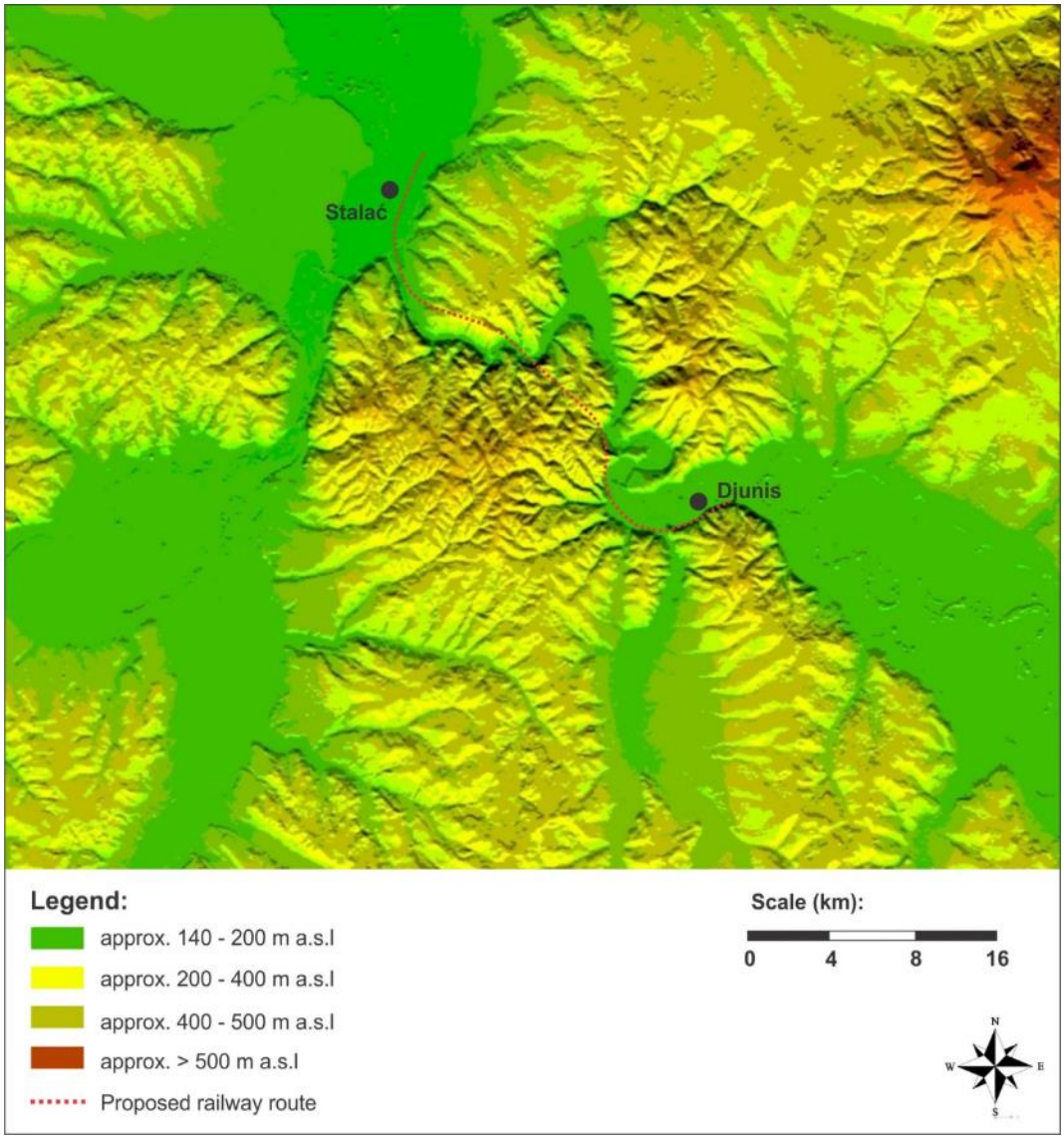

Figure 11 Terrain elevation in the project area

4.1.2 Geology

Information on the geological settings in this ESIA is based on the Report on geotechnical investigations (Geomehanika d.o.o., January 2016) and provides a short overview of the geological features along the proposed route.

The proposed railway route passes through a hilly area characterised by specific geological structure. The area belongs to the Serbian crystalline core in the Rhodope-Moravian metamorphic belt which is one of the oldest terrains in Serbia. The terrain consists of geological structures of Proterozoic, Paleosoic (Pz), Tertiary (T) and Quartarian (Q) age.

A geological map of the project area is provided in Figure 12.

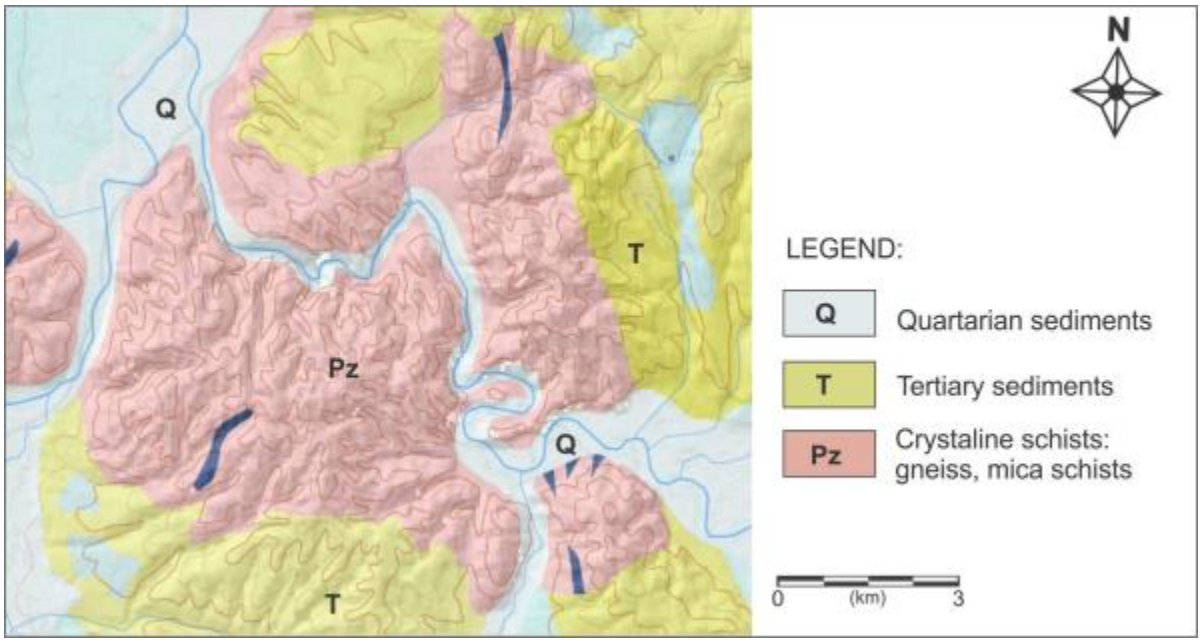

Figure 12 Geological map of the project area

(Pz): The oldest sediments in the area belong to Proterozoic – Paleosoic age, consisting of crystalline schists of high-grade metamorphism: migmatite, gneiss and leptinolite and amphibolite and amphibolite schists, amphibolite gneiss, eclogite (see Figure 13 below from the Geotechnical Report). There are also Quartz intrusions and gneiss granites of Paleosoic age. A different degree of alteration and tectonic damage of this metamorphic massif provide different conditions for construction. Excavation and creation of cuts in fractured gneiss is prone to erosion and land instability.

Figure 13 Gneiss rocks in the area of the exit from tunnel 1

(T): Tertiary sediments are of the middle Miocene age (M_2) which transgressively overly the crystalline schists. They consist of marl clay, sand, sandstone and rarely limestone and gravel. These sediments occur in the wider area, at a distance from the proposed route.

(Q): Quartarian sediments had been formed by (1) the fluvial processes (alluvial sediments (al) and terrace sediments – (t), especially along the South Morava River) and (2) the slope processes (deluvial (d), proluvial (pr), coluvial (co)).

4.1.3 Hydrogeology

Alluvial aquifer: Alluvial sediments of the South Morava River had been deposited on both River banks. The width of the alluvial plain varies depending on the terrain morphology. In the areas where the River meanders through the narrow valley, the sediments are deposited only on one river bank. Alluvial sediments are of typical composition where the lower parts are formed of coarse gravel while the upper parts consist of sand and silt, rarely clay. Hydraulic conductivity of the gravel sections are mostly high, varying between $5.0x10^{-2}$ and $6.5x10^{-1}$ cm/s. The upper sections formed of silt and sand have a lower hydraulic conductivity of $2.0x10^{-7}$ and $6.9x10^{-5}$ cm/s. Groundwater level formed within the alluvial aquifer is in direct hydraulic connection with the South Morava River and tributaries. During the geotechnical investigations undertaken in July-August 2015, the groundwater level in the area from Trubarevo to Đunis was recorded at a depth of about 1.3 – 2.5 m b.g.l.

Vulnerability of groundwater in the alluvial aquifer is considered medium, given the presence of low-permeable upper layer of silt and sand which provides a semi-permeable barrier to the lower alluvial section of highly permeable gravel.

Fractured rock aquifer: The crystalline massif consisting of schists is characterised as impermeable geological structure. Consequently, the surface run-off is the predominant type of water drainage forming the dense network of mostly intermittent surface water flows. The fractured aquifer is formed in the subsurface fractured zone of crystalline schists (with a high degree of metamorphism). Formed within the system of fractures, this type of aquifer is of a low porosity, forming low-yield mountain sources (Q= 0.1 l/s). Those sources are not significant in respect to local water supply.

Groundwater vulnerability in the area of fractured aquifer is considered low, given the very low permeability of present geological structures and absence of significant groundwater aquifers.

The state groundwater monitoring network does not cover the project area therefore no chemical or quantitative status of groundwater has been determined. However, in respect to the shallow aquifer in the project area, there is a likelihood that it is contaminated, primarily by organic pollutants due to inadequate management of sanitary wastewater in the area. Lack of sewage infrastructure and usage of septic tanks (of unknown integrity) is the major diffuse source of water pollution in the area.

No designated drinking water protection zones are present in the wider area. Water supply in the villages of Mojsinje, Kruševačka Braljina and Trubarevo is organised individually (tapping of the low-yield mountain sources, groundwater wells).

4.1.4 Climate Settings

In the Ćićevac municipality climate is moderate continental. However, as this territory is not protected by large mountain ranges, the area is exposed to climatic influences from the north and east. From October to April there is a period of frequent temperature inversions, when there are over twenty frosty days and when there is a big difference in temperature amplitudes.

Since a meteorological station in Ćićevac does not exist, data from the meteorological station in Kruševac are used. They have a role of approximate indicators, with approximately equal values for the territory of both municipalities (Table 7).

Table 7 Average monthly and average annual temperature in Kruševac

	January	February	March	April	May	June	July	August	September	October	November	December	Annually
Kruševac	-1,0	0,8	5,8	11,5	16,4	20,0	22,0	21,4	17,4	11,7	6,7	1,8	11,2

The table above shows that the average January temperatures range around -1° C, which is an indicator of moderate cold winters. Average monthly temperature is highest in July and in August - between 21 and 22° C, indicating that the summer in this area is quite warm.

Annual precipitation amounts are relatively small, around 620mm. There is a continental pluviometric regime, with a minimum of rainfall in the winter, in February and March, and the highest in May and June (which can be seen from Table 8). Although a small annual rainfall, its monthly schedule is favourable for agriculture, because most rainfall occurs in the spring and summer, or in the period of the most intense cycle of vegetation.

Table 8 Average monthly and average annual rainfall in Kruševac, Stalać and Đunis (mm)

	January	February	March	April	May	June	July	August	September	October	November	December	Annually
Kruševac	41	35	37	54	82	74	59	46	40	56	55	47	626
Stalać	46	41	45	50	70	76	54	40	45	36	54	53	575
Đunis	49	47	50	55	76	77	59	42	46	41	60	62	665

Based on the data presented in the table it can be concluded that the spatial distribution of rainfall is relatively uniform. At least annual mean values are in Stalać - 575mm, while the most rainfall appear in Đunis - 665mm. Ducić, Radovanovic (2005) reported the following: "The river valleys are mostly certain depression in geomorphological sense, but towards the periphery of basin have a gradual elevation of the terrain, generally do not belong to the "rainy depressions". If their watersheds do not have a higher altitude, the distribution of rainfall is more or less equally represented ..."

Given that the differences in altitude are relatively small, slightly larger amount of rainfall in Đunis than in Stalać could be explained by their position in the narrowed valleys of the Ribarska and the Ražanjska river. "In the valleys, where in all directions of movement of air masses prevail descending air currents, rainfall is less, as compared to the surrounding mountains, as well as compared to gorges that connect adjacent valleys" (Rakićević T. 1979). By analogy with these two stations, in the Stalać gorge (on the stretch Trubarevo-Stevanac) rainfall of about 650-700 mm can be expected.

Considering the small amount of total precipitation in winter, there is also a little snowfall. Average maximum height of snow cover is about 20 cm, but the snow is held briefly. Average annual number of days with snow cover of 10 cm ranges from 20 to 40 days, and a height of 30 cm does not retain an average of more than 5 days (Table 9).

Table 9 Average monthly and average annual humidity in Kruševac (%)

	January	February	March	April	May	June	July	August	September	October	November	December	Annually
Kruševac	88	87	80	72	68	66	66	70	69	76	78	83	75

As can be seen from the table above, average annual air humidity is quite high, 75%, which is caused by the valley-position of these places. The highest humidity occurs in the winter months (83-87%), and lowest in summer (66-70%), which is favourable for summer tourism, because drier air reduces summer sultriness and makes the space a more conducive climate for tourist stays in this period of year.

Cloudiness is also one of the most important climatic elements, because it affects the level of insolation, rainfall and temperature fluctuation. It is expressed in tenths of sky coverage (Table 10).

Table 10 Average monthly and average annual cloudiness in Kruševac (tenths of sky coverage)

	January	February	March	April	May	June	July	August	September	October	November	December	Annually
Kruševac	7,4	8,5	7,9	7,0	7,9	4,5	3,8	4,4	3,8	6,0	7,9	7,1	5,8

The data provided in Table 10 show that the average annual cloudiness 5.8 tenths, which represents moderate cloudiness. However, the annual flow of clouds is very variable, from high cloudiness in the winter period (7.1 to 8.5) to very low cloudiness from June to September (3.8 to 4.5).

Wind largely depends on the deployment of cyclones and anticyclones. In conditions where there are no topographic obstacles, horizontal airflow moves from areas with higher towards areas with lower air pressure. However, where the morphological dissection of the area is expressed, wind adapts to the layout of the field. Vujević P. (1953) showing the streamlines over Serbia in the warmer (streamlines in July) or colder (streamlines in January), part of the year is as follows:

"The areas without streamline indicate that either no clearly prevailing average air movement, or the mean direction vector field is conditioned by geographical factors, for example ... the direction of the valley." As already mentioned, although there is no climate station in the Stalać gorge, based on the previous theory it could be assumed that because of the exisitence in the observed area of an axial direction (north-south and northwest-southeast), the wind in the gorge will follow the morphology of the terrain, while in the higher parts of the monitored area, where the ground is slightly indented, the wind direction will depend on broader scale circulation process.

4.1.5 Surface Water

The main surface water body in the wider area is the South Morava River. Together with tributaries it belongs to the Great Morava River catchment area (the Black Sea basin). The hydrographic network of the project area is moderately dense with moderate average discharge.

Rivers and streams in the area are characterized by torrential flow with significant seasonal fluctuations. The flow rates are usually low in the summer which creates an additional adverse impact on water quality. Flooding occurs often, mainly during the high rainfall or during the periods of snow melting when rivers transport significant sediment load.

The proposed railway line will intersect several surface water bodies. The largest of them is the South Morava River, the major surface water in the area. In addition, the railway line will intersect several minor streams, namely: the Vinogradski creek, twelve unnamed streams, the Gorčilovac stream, the Livadski stream, the Hajdučki creek, the creek Zmijarnik and the Ribarska river. The proposed route runs parallel to the South Morava River near the village of Cerovo.

The map of the proposed railway line and the intersected surface waters is provided in Annex 2.

<u>The South Morava River</u>

The South Morava River originates in Macedonia and runs towards the north, to Serbia. The river length is about 295 km. About 3 km from the town of Stalać, the South Morava discharges to the Great Morava River. Both rivers belong to the Black Sea basin.

According to regulation related to the national typology of running waters[3], the South Morava River is divided in six water bodies (WB): JMOR_1 to JMOR_6. The project area belongs to the water body

[3] Regulation on establishment of water bodies for surface water and groundwater (Off. Journal of RS 96/2010)

JMOR_1 which extends from the confluence to the Great Morava River (near Stalać) to the confluence of the Ribarska River (near Đunis). The stretch is about 23.15 km long and classified as Type 2 – Large rivers with medium-sized sediment, apart from rivers of the Pannonian plain[4]. The surface body category is: river.

Hydrography

The project area is situated in the lower section of the South Morava River where the river cuts through the gorge and has a lowland character forming meanders, river bars and river islands. The riverbed is not regulated and no flood protection embankments have been built in the project area. The riverbed width is in the range 60-70 m. The River is not navigable.

The South Morava riverbed is wide and shallow incised into bulk sediments, with unstable banks that large flood waters easily destroy, demolish and carry (Rakićević T, 1969). Downstream of Đunis, between the Mojsinje and the Poslon Mountain, the South Morava forms the Stalać gorge, coming out of which its valley expandsand after a further 3.8 km it merges with Western Morava.

The South Morava valley is a typical composite valley, consisting of basins separated by gorges. The longitudinal profile of the South Morava has the appearance of stairs that descend from the source to the confluence, and no parabolic shape with falls, which are gradually reduced downstream, as is the case in most watercourses. In the gorges there are higher falls often with rapids where there is a deepening of the river bed and lowering its longitudinal profile. In basins there are lower falls, and in the river bed there is a pronounced accumulation of material, which is why in places the shallow trough bottom of the river is constantly rising. The most visible example of the intense accumulation of material are numerous sandbars, around which the South Morava branches out.

The South Morava is in the 3rd torrent category. The coefficient of erosion is 0.487. Based on the state sediment monitoring network data[5], it is estimated that the annual sediment load in the South Morava is about 2.5 millions of tons. The suspended sediment is conveyed down the river and there is a certain continuity to sediment transport. Of course, part of the sediment deposits along the way (in stretches where the transport capacity is low or the fluvial erosion is present).

Hydrology

The hydrological monitoring station relevant for the project area is Mojsinje, situated about 8.5 km downstream of Đunis. At the Mojsinje station, the following hydrological data are available for the South Morava River, for the period 1946-2006 (the Draft Water Management Strategy of Serbia – The Ministry of Agriculture and Environment, 2015):

- Surface of the river basin (F): 15.390 km^2
- Minimal flow rate $Q_{min,\ month\ 95\%}$: 11.30 m^3/s
- Average flow rate (Q_{av}): 93.52 m^3/s
- Maximal flow rate Qmax, month 1%: 2.131 m^3/s

The annual precipitation in the project area is about 667 mm and surface run-off of the South Morava of 112 mm.

The river flow rate has significant seasonal fluctuations. High water levels and flow rates occur in spring time (March-April), the lowest values occur in early autumn (September).

[4] Regulation on parameters of ecological and chemical status of surface water and parameters of chemical and quantitative status of groundwater (Off. Journal of RS No. 74/2011)

[5] River Sediment Transport in Serbia – S. Petković, The Institute Jaroslav Černi, 2014

The average annual river flow rate is 93.52 m^3/s. Mean average monthly flow rates are provided in Table 11.

Table 11 South Morava River - mean average monthly flows and average annual flow, m^3/s (1946-2006)

Jan	Feb	Mar	Apr	May	June	July	Aug	Sep	Oct	Nov	Dec	Year
104.2	145.8	178.5	180.6	135.9	94.40	48.76	29.87	28.28	38.24	54.60	82.98	93.52

South Morava River Quality

On its course through Serbia, the South Morava runs along several towns and numerous villages. The towns do not have wastewater treatment in place, so the River has been the main recipient of wastewater from each of them. Additional pressures on the River are related to lack of sewage treatment in villages and the presence of septic tanks of an unknown integrity, waste dump sites along rivers and streams, illegal extraction of sand and gravel from the River and a low control of private use of pesticides. The described conditions have resulted in deterioration of the South Morava River water quality and deviation from the "good" ecological status. The recent water quality monitoring results from the Mojsinje station in 2014, 2013 and 2012 indicate the "moderate" ecological status of the River[6].

The biological elements of water quality which had been monitored by the Agency (2012-2014) are phytobenthos and macroinvertebrate community[7].

Phytobenthos: The results of the assessment of ecological status based on phytobenthos community parameters indicate "moderate" status of the water body.

Macroinvertebrate: The results of the assessment of ecological status based on macroinvertebrate community parameters indicate "moderate" ecological status.

Assessment based on physico-chemical elements for the period 2012-2013 categorised the ecological status of the water body as "moderate". It was mainly due to low concentrations of dissolved oxygen and increased concentrations of nutrients (total nitrogen, nitrites ammonium ion, orthophosphates and total phosphorous), mainly in the low flow periods (August-November).

In 2014, the ecological status was assessed as "bad". It was due to increased concentrations of suspended solids (up to 144 mg/l). Faecal coliform values had been recorded to be in the "poor" category of water quality. Other nutrients (TOC, nitrites, total nitrogen, orthophosphates and total phosphorous) belonged to the "moderate" ecological status. The status indicators are shown in Table 12.

Assessment based on the presence of specific pollutants which caused deterioration from "good" quality at the monitoring station Mojsinje indicated several occurrences of increased phenols and iron.

[6] Report on status of surface water in 2012 and 2013 – Environmental Agency of Republic of Serbia and Results of analysis of surface water and groundwater quality in Serbia in 2014

[7] Phytoplankton had been monitored only in water bodies categorised as Type 1 - the South Morava is Type 2 water body

The ecological status has been assessed without consideration of the hydro-morphological parameters.

Table 12 Ecological status of the South Morava River (2012-2014) at Mojsinje station

	Biological elements						
Year	**Phytoplancton**	**Phytobenthos**	**Aquatic Macroinvertebratae**	**Physical and chemical parameters**	**Specific polluting substances**	**ECOLOGICAL STATUS**	**Data reliability**
2012	-	moderate	-	moderate	good	**moderate**	High
2013	-	moderate	moderate	moderate	moderate	**moderate**	High
2014	-	moderate	moderate	bad	moderate	**bad**	High

As part of the ichtyofaunistic investigation carried out in October 2008 by the Institute for Nature Conservation of Serbia, the hydromorphological and physico-chemical testing had been performed at the two profiles in the project area: (1) Mojsinje (about 8.5 km downstream of Đunis) and (2) Braljina (about 10 km downstream of Đunis). The results are provided in Table 13.

Table 13 Morphometric and physico-chemical characteristics of the South Morava River

Parameter		**Mojsinje profile**	**Braljina profile**
Riverbed width / River depth (m)		*50-70 / 0,5-4,0*	*60-80 / 0,5-4,0*
Water velocity (m/s)		0,70	1,10
River bottom character (%)	Rocks and big stone	10	20
	Stone up to size of a fist	40	20
	Gravel, pebble	30	20
	Sand	10	10
	Sludge	10	20
	Detritus	10	10
Water temperature ºC		14,50	13,8
pH		7,86	8,05
Electric conductivity (µS/cm)		474,00	492,00
Oxygen mg/l (%)		6,4 (70,20)	7,86 (78,00)
Turbidity		5,11	7,8
Nitrates as N (mg/l)		4,9	5,20
Ammonia (mg/l)		1,09	1.29
Phosphates as P (mg/l)		0,56	0,78

The South Morava water temperature recorded was in range from 13.8 to 26.1 °C. The riverbed average is around 60 m wide, the average depth is 1 to 2 m, but with significantly greater depths in whirlpools and calm stretches. Mineralisation of the water is quite high, with an average close to 400 µS/cm. Electric conductivity increases significantly with increasing temperature and decreasing flow. The water is often turbid and carrying a large amount of sediment that accumulates in areas of flow. Very often submerged objects (rocks, trees, etc.) are covered with a layer of slime residue. The concentration of the nutrients is quite high: the nitrate is in the range of 2.8 to 7.8mg/l, and the phosphate from 0.142 up to 0.78 mg/l. On certain parts of the flow, especially downstream of settlements, there is an increasing value of ammonia (up to 1.29 mg/l and BOD (up to 7.2 mg/l) indicating increased pollution from sewage in these stretches of the river.

Other surface waters

Other surface waters in the project area are not legally designated water bodies. They are minor rivers and streams, cut in the upland area of the Stalać gorge, discharging to the South Morava. Some of the streams are intermittent, forming only after high precipitation periods. Due to steep slopes and high gradient they flow quickly, eroding the banks and conveying sediment load. The overview of other surface waters intersected by the proposed route with respective probabilities of high water occurrence is provided in Table 14.

Table 14 Peak flows of the affected streams calculated by US SCS method

No.	Profile	Surface water stream	$Q_{0.1}$%	Q_1%	Q_2%	Q_{10}%
			(m^3/s)	(m^3/s)	(m^3/s)	(m^3/s)
1	km 175+103	Toplik stream	13.70	9.92	8.88	6.59
2	km 176+623	No-name stream	17.89	13.22	11.92	9.03
3	km 177+080	Vinogradski stream	11.68	8.37	7.46	5.47
4	km 178+513	Papradina stream	5.25	3.58	3.13	2.18
5	km 182+208	Gorčilovac stream	13,92	9.50	8.33	5.80
6	km 187+050	Livadski stream	3.83	2.61	2.28	1.59
7	km 187+522	Trubarevački stream	33.02	23.96	21.46	15.95
8	km 187+658	Zmijarnik stream	35.59	27.08	24.44	18.55
9	km 189+191	Ribarska river	212.39	162.41	148.27	116.40

4.1.6 Natural Hazards

Earthquakes

According to the data from the Institute for Seismology of Serbia, the macroseismic intensity of the local ground with 10% probability of exceedance in 50 years (return period 475 years) for the project area is VIII and VII of the EMS-98 (European macroseismic scale) which refers to heavily damaging and damaging earthquake, respectively. The macroseismic map for the area is provided in Figure 14.

Definition of the heavily damaging earthquake' effect in buildings (VIII degree of macroseismic intensity) is that (1) majority of masonry buildings (simple stone or unreinforced stone) suffer heavy structural damage and a few of them suffer very heavy structural damage and that (2) a few of

reinforced concrete buildings suffer substantial structural damage or heavy structural damage[8]. Assessment of the seismic risk at the site has been part of the geotechnical engineering of the railway design.

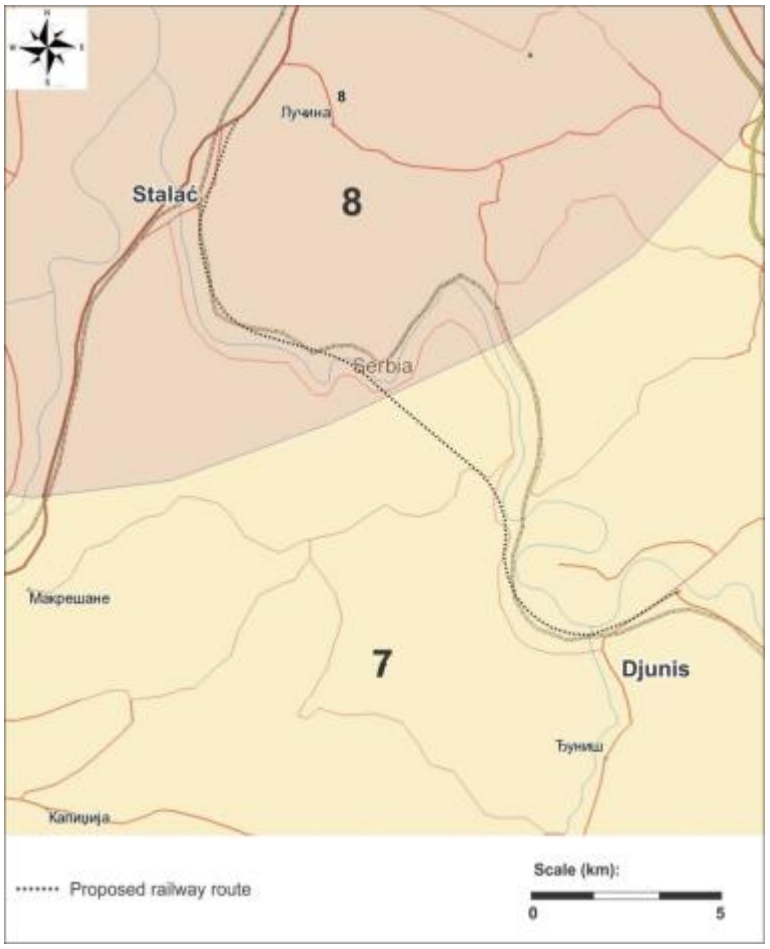

Figure 14 Macroseismic map of the project area

Erosion

The South Morava River catchment area is prone to erosion. The River tributaries are predominantly torrential, with a wide span between low and high flows. The upland of the river gorge has high slopes. The crystalline schists (migmatite, gneiss) are prone to erosion and minor landslides have been observed along the proposed route.

Flooding

The project area is prone to torrential flooding, primarily in the area between Cerovo and Đunis which has been significantly affected, most recently in 2014 and 2015 when 25 houses and about 120 hectares of land were flooded and the traffic was halted in the area. No systems for flood protection have been built in the area.

Torrential (flash) floods result from a sudden occurrence of maximal discharge in a torrent bed with a high concentration of sediment. This has a seasonal character. The critical periods in the South Morava catchment area are the end of spring (from May to the first half of June) and the end of winter (from February to the first half of March). The period from May to the first half of June is marked as the primary maximum due to intensive rainfall of a few-hours duration. The period from February to the first half of March is noted as the secondary maximum.

[8] European Macroseismic Scale EMS-98 – European Seismological Comission, 1998

High water occurrences for the South Morava River at the Mojsinje hydrological station (about 8.5 km downstream of Đunis) are provided in Table 15[9].

Table 15 Peak flows of the South Morava River

River	hydrological station	$Q_{max,p}(m^3/s)$					
		probability (%)					
		0.1	1	2	5	10	50
The South Morava	Mojsinje	2854	2045	1814	1494	1247	623

The most critical area is between the village of Cerovo and Đunis (Figure 15). The proposed railway route is planned to exit the last tunnel (before Đunis) on a high embankment, designed in accordance to the recorded high water levels of the South Morava.

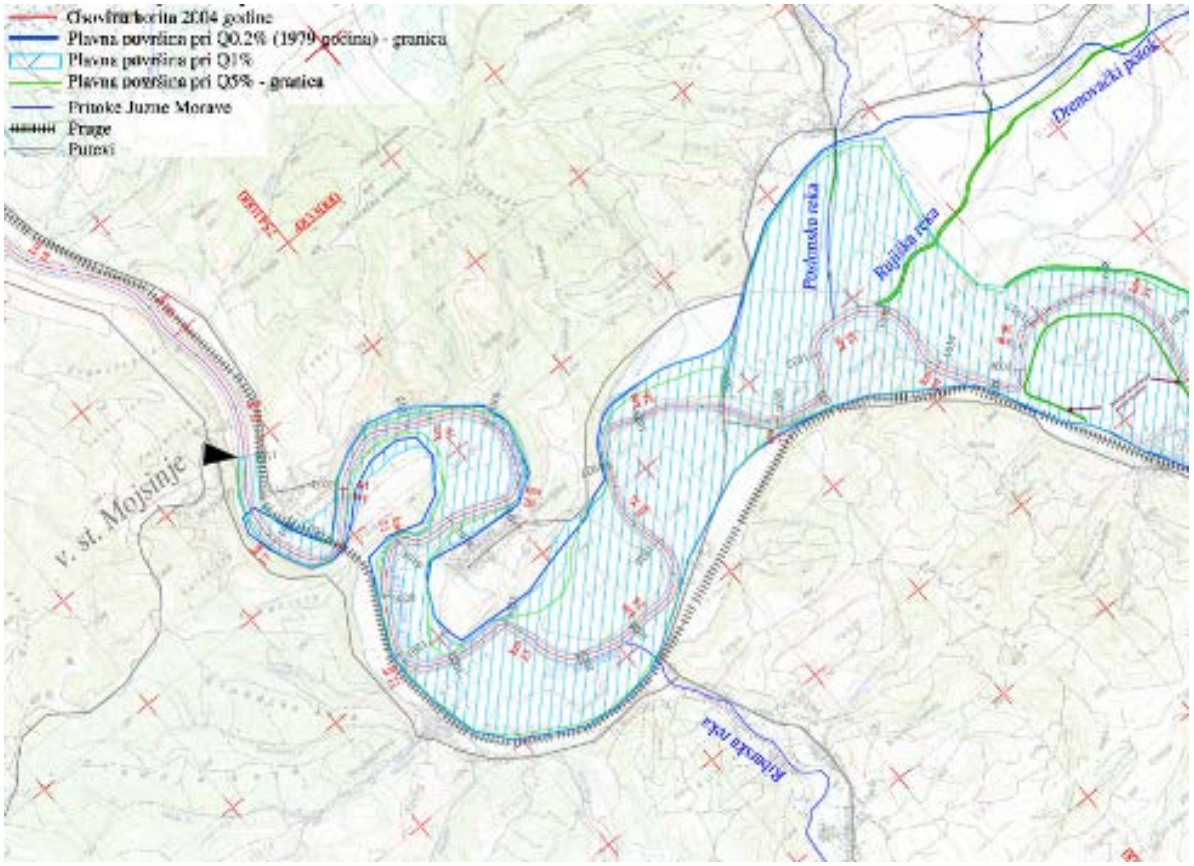

Figure 15 Flood plain of the South Morava River between Cerovo and Đunis

[9] General Project E-761 highway Pojate (connection E-75) Krusevac line-Kraljevo-Cacak (connection E-763), 5. Book Study of climatic, hydrological and geological parameters (Highway Institute, Belgrade, 2007).

4.1.7 Soil Settings

Information on soil has been gathered by desktop studies with the purpose of identifying the soil resources in the project area and making a preliminary assessment of the agricultural land quality and the disposition of land uses. The main sources of information have included the Pedology Map of Serbia (1:2.000.000) and aerial photography. The following soil types have been identified:

Fluvisol is present in the South Morava River valley. It is poorly developed soil on young recent sediments. The mechanical composition varies from sandy to clay. Humus content is mostly 1-2%, rarely 3-4%. Content of potassium is medium and phosphorus is poor. It is usually used for field crops and vegetable growing.

Eutric cambisol is present on mild slopes in the upland area close to the South Morava River (at 100 m a.s.l and higher). These are areas of combined deciduous forests (primarily oak and beech with conifers at higher altitudes). Eutric cambisol is categorised as heavy soil (hard clay soil or light clayey soil). It is prone to leaching and erosion. Reaction is mild acid, the content of total nitrogen and potassium is medium to good, and the content of phosphorus is low. Used for all field crops, orchards and vineyards.

Vertisol is formed in in the hilly area at 200 - 500 m a.s.l under deciduous forest, mainly oak and grass associations. This is potentially fertile soil with a humic horizon of 50-100 cm. It contains 3 - 5% of humus. Field water capacity is very high, and air capacity low. It is very rich in nitrogen and potassium, poor in phosphorous.

The state soil monitoring network does not include the project area and consequently no official data on soil properties and (potential) contamination is available. It should be noted that individual usage of pesticides in Serbia is poorly controlled and that agricultural pollution of farmland cannot be excluded. Therefore, the farmland along the South Morava River may potentially be affected by pesticides and other persistent organic contaminants.

Given the rural character of the area, no industrial soil contamination is likely.

4.1.8 Ambient Air Quality

The Serbia state monitoring network of ambient air quality is primarily focused on urban background locations and industrial areas. Given that the project area is remote and rural, it is not included in any ambient air monitoring network. The closest monitoring station is located in the city of Kruševac (about 10 km south-east) but the results are not considered representative of air quality conditions in the project area and thus not presented.

The main sources of emissions in the project area are the municipal road, the IIA category state road connecting Đunis to Kruševac and the existing railway line from Stalać to Đunis, when rarely operated by diesel locomotives. However, the volume of rail and road transport in the area is low, and is not considered a significant source of air pollution.

The stationery sources are individual heating units in villages combusting wood and coal and boiler units using heavy fuel oil in Stalać, in the winter months. It can be presumed that, similar to other towns in Serbia where wood, coal and heavy fuel oil are combusted, the concentrations of sulphur-dioxide, PM_{10} and $PM_{2.5}$ occasionally exceed the air quality standards during the winter. The remaining part of the project area located in the upland is undeveloped and it is assumed that concentration of pollutants (primarily PM_{10}) is significantly below the air quality standards.

Both human and ecological receptors in the project area, which are considered to be susceptible to changes in air quality due to construction or operation of the proposed railway, have been identified (100 m of the boundary of construction site). These include:

- Properties along the road in Stalać close to those which will be demolished as part of the railway development;
- Properties in Đunis in the vicinity of construction works;

- Properties in the vicinity of haulage roads;
- The South Morava River – designated as ecological corridor of international importance (Chapter 4.1.10);
- The Mojsinje Mountain and the Stalać Gorge on the South Morava River – designated as the ecological network (Chapter 4.1.10).

4.1.9 Noise and Vibration

Serbian noise legislation has been recently harmonised with the relevant EU Directives so the EU requirements on assessment and management of environmental noise have only started to be enforced. Consequently, the noise maps of agglomerations or existing railways that would involve the project area have not been prepared yet. The closest area where the background noise is monitored is the city of Kruševac which is not considered relevant for the project area. For the purpose of this ESIA, a desk review has been undertaken to identify potential noise sensitive receptors in the vicinity of the proposed route and this included available mapping and aerial photography for the surrounding area.

The desk review identified a series of potential noise sensitive areas and their receptors in the area of Stalać. Apart from Stalać, no other potentially sensitive receptors were identified along the route (including Đunis).

The identified noise sensitive areas were checked on-site, to confirm the nature of receptors (i.e. whether residential dwellings, commercial buildings, hospitals, school, etc.). Based on that, the areas of receptors closest to the proposed route were identified. The closest noise sensitive receptors to the proposed development are located to the east and west of the proposed route. The identified receptors are primarily residential and to the minor extent commercial. No schools, hospitals or kindergartens were identified.

Based on the identified sensitive receptor areas, three monitoring locations were selected on the basis that each of them constitutes a sample of the closest identified receptors within the vicinity of the proposed route (Figure 16). The sample receptor locations were confirmed by a site walk-over in advance of the commencement of the baseline noise survey. The site walk-over was undertaken together with representatives of Anahem Laboratory (who undertook the baseline noise survey). It was confirmed that the receptors detailed in the following figure constituted a representative sample of the closest noise sensitive receptors to the proposed route.

Figure 16 Noise monitoring locations for background noise in Stalać

Given the lack of noise maps for the area, the applicable background noise limits had to be decided based on the existing area settings. Given that the affected area has already been located in the vicinity of the existing railway line, it could not be considered as strictly residential. Therefore noise limit values for Zone No. 5 have been applied: city centre, workshop area, commercial area, administrative area with apartments, zones along highway, regional roads and city streets. The daytime and evening noise limit is 65 dB(A) and night-time limit is 55 dB(A).

Background noise measurement was conducted on 23rd December 2015 from 13.45h to 16.30h, at 1.5 m height from the ground. Weather conditions were: clear, without precipitation. Air temperature was: 12° C, air humidity 58%, wind speed: up to 2.0 m/s, air pressure: 1030 mbar.

The results of the background noise during daytime are presented below.

Monitoring location MT1

The first residential building selected as representative is situated in Ilija Nagulić Street no. 131 (Figure 17). Close to the house there is a group of houses planned for demolition as part of the railway development. The house is situated in the vicinity of future works on the railway line and the road, and near the existing level crossing which will be disused. At the measuring point no. 1, in the yard of the house, the background daytime noise level measured was L_{Req} = 52 dB(A).

Figure 17 Noise monitoring location MT1 in Stalać

Monitoring location MT2

The second measuring point was located near the residential building in Ilije Nagulića street no. 48 (Figure 18). This measuring point is selected because of its openness towards the exit of the Stalać railway station. At the MT2 the background daytime noise level measured was L_{Req} = 44.5 dB(A).

Figure 18 Noise monitoring location MT2 in Stalać

Monitoring location MT3

The third measuring point is representative for the entire row of houses on the right side of the Stalać station (about 15 houses), situated up to 25 m from the last track in the proposed station upgrade. The house address is Mirko Tomic street no. 39 (Figure 19). At the MT3 the background daytime noise level measured was L_{Req} = 45 dB(A).

Figure 19 Noise monitoring location MT3 in Stalać

Local noise sources identified can be split into two categories, those which occur naturally, and those which are generated by human activity. Local sources generated by human activity include road traffic, rail noise and sporadic noise associated with house workings. The key road traffic source in this area is the street of Ilije Nagulića, partly located along the proposed route. Natural noise sources in the vicinity of the site include bird song, the wind rustling through trees and vegetation.

4.1.10 Ecology and Nature Conservation

The proposed railway route is partly located within the ecologically important area (core area in terms of EU Directives), part of the ecological network of Serbia - "Mojsinje Mountain and Stalać Gorge of the South Morava River" (The Decree on Ecological Network, "Official Gazette of RS", No. 102/2010). In addition, the South Morava River is designated as the ecological corridor of international importance by the same Decree. The total surface area of the site is ca. 3,985 ha.

Both areas have been included in the Serbia ecological network because they have already been nominated for designation as Landscape of Outstanding Features (in 2012 by the Institute for Nature Conservation of Serbia). The formal designation has still not occurred. Landscape of Outstanding Features is legally defined[10] as *an area of distinctive presence with significant natural, biological, ecological, aesthetic, cultural and historical values that have evolved over time as a result of interaction between nature, the natural potential of the area and the traditional way of life of local residents.*

The route intersects the ecological corridor of the South Morava River at the proposed bridge (km 181+563) and enters the core area. The route continues through the core area almost entirely in tunnels, the only exception being the 30 m-long gallery between tunnel 4 and tunnel 5, south of Mojsinje village. The map of the proposed route in relation to the nature designated area is provided in Annex 3.

Once Serbia becomes an EU member state, the areas registered being part of the ecological network will become part of the NATURA 2000 ecological network of the EU, which would also apply to the Mojsinje Mountain and Stalać Gorge of the South Morava River.

Identified Habitats

The CORINE Land Cover classification has been used to describe habitats present within the study area. Overall, the study area is dominated by the meandering South Morava watercourse and associated wetland habitats, cultivated farmland in the river valley and a hilly upland covered by broad-leaved forests with occasional fragments of grassland and pastures. Sparse villages (as a discontinuous urban fabric) are located in the river valley (Table 16).

Table 16 The CORINE Land Cover classification of habitats within the study area

CORINE Land Cover class	Description
Watercourses	The natural watercourses of the South Morava River and its tributaries (streams) run through the central part of the study area.
Land principally occupied by agriculture with significant areas of natural vegetation and complex cultivation patterns	Small plots of cultivated land with monocultures, arranged in parallel strips, with occasional natural and semi-natural woodland spread along the South Morava river valley (between 140 and 170 m a.s.l.).
Transitional woodland – shrub	Bushy vegetation with scattered trees, occasionally present in the transition from the farmland to the natural woodland in the upland areas.
Pastures	Minor areas in the upland, close to the villages of Trubarevo and Cerovo, used for fodder growing.
Broad-leaved forests	Woodland habitats present in the upland hilly areas (between 200 and 500 m a.s.l.) at both sides of the South Morava River valley, including the Mojsinje Mountain in the southern part of the study area.
Natural grasslands	Minor areas occasionally present in the Mojsinje Mountain, far from houses and farming activities.
Discontinuous urban fabric	Small villages sparsely lined along the South Morava River valley.

[10] The Law on Nature Protection (Off. Journal of RS, No. 36/2009, 88/2010)

The map of forest land in the project area is provided in Figure 20.

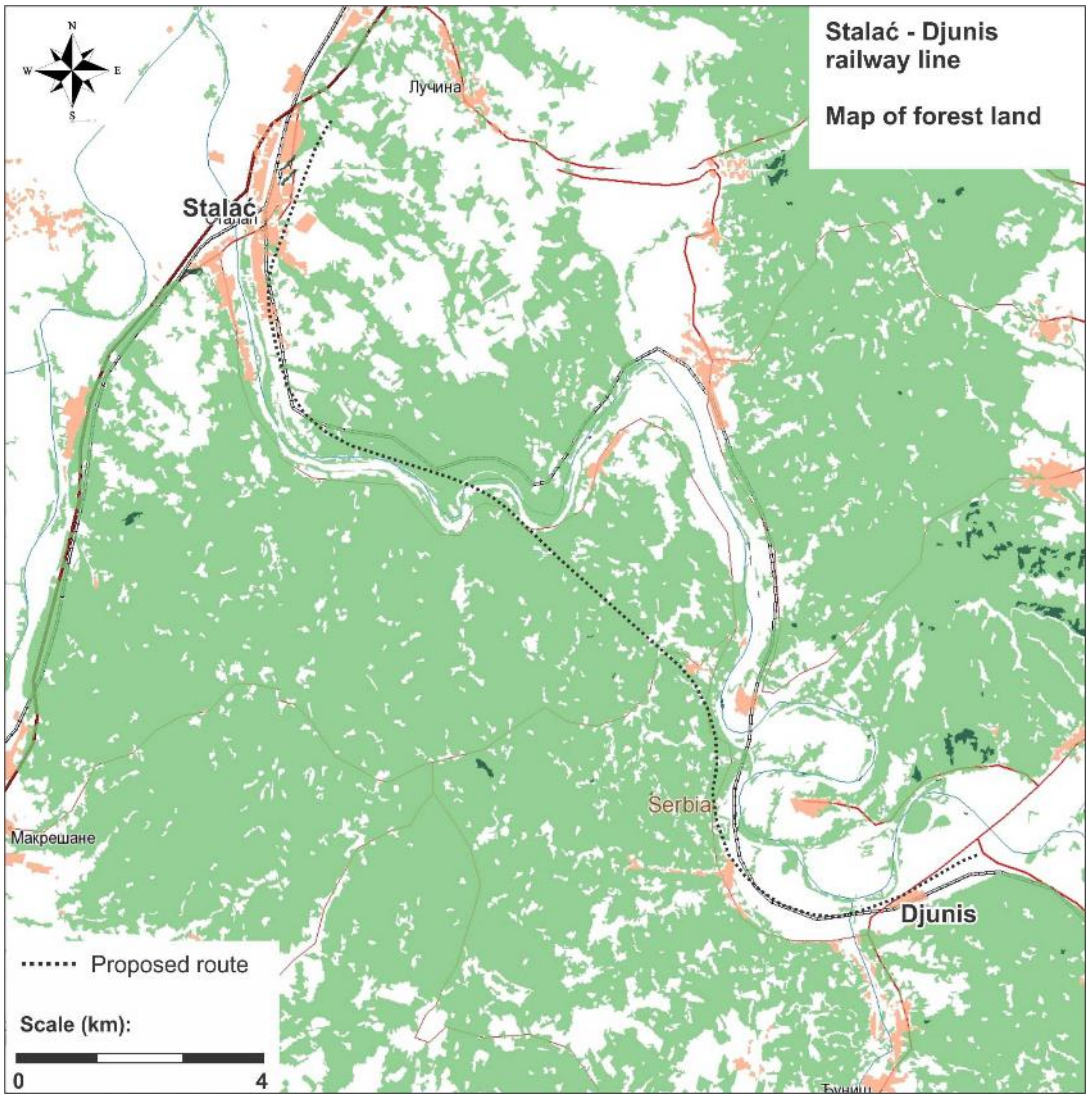

Figure 20 Map of forest land in the project area

Baseline information about the flora and fauna present in the project area has been primarily based on the Study of Protection of the Landscape of Outstanding Features "The Mojsinje Mountain and the Stalać Gorge on the South Morava River, prepared by the Institute for Nature Conservation of Serbia, 2012.

Forests and forest land

The project area is rich in forests, especially in western part. The most represented species are oak (*Quercus*), beech (*Fagus*) and hornbeam (*Carpinus betulus L.*). Forests are mostly private, while the majority of state-owned forests are in the Mojsinje Mountain.

In this area the mixed deciduous forest vegetation is formed, at an altitude between 150 m and 500 m. The forests are represented by forests of Hungarian oak and Turkey oak (*Quercetum-farnetto cerris Rud. 1949*), sessile oak and Turkey oak (*Quercetum petraeae- cerris Jov. 1979*), forest oak and hornbeam (*Querco- Carpinetum moesiacum Rud. 1949*) , mountain beech forests (*Fagetum moesiacae submontanum Rud.1949.*), forests of white willow (*Salicetum albae Issl. 1936*), black poplar forests with white willow (*Salici-Populetum nigrae Parabuc. 1965*), black poplar forests (*Populetum nigrae Knapp 1948*), forests of white poplar (*Populetum albae balcanicum Karp., 1962*) and forests of white and black poplar (*Populetum nigro-albae Slav. 1952*).

There are evergreen trees at the top Šiljegarnik and several low mountain tops, where they take a very small area. Low vegetation is far more diverse, often grouped according to specific types.

Broad-leaved forests of the Mojsinje Mountain

The forest of Hungarian oak and Turkey oak - Quercetum frainetto cerris (Rud. 1949)

The stands are coppice origin, small height and medium complex, with well-differentiated and rich shrub layer and ground flora. In a typical forest of Hungarian and Turkey oak the following species are the most present: Oak (*Quercus Jarnette*), cerium (*Quercus*), silver linden (*Tilia argentea*), wild pear (*Pyrus pyraster*), service tree (*Sorbus domestica*), rowan (*Sorbus torminalis*) black ash (*Fraxinus ornus*), maple (*Acer campestre*), tatarian maple (*Acer tataricum*), dogwood (*Cornus mas*), hawthorn (*Crataegus monogyna*), wayfarer (*Viburnum lantana*), wild rose (*Rosa gallica*), honeysuckle (*Lonicera carpifolium*), black bryony (*Tamus communis*), black pea (*Lathyrus niger*), hellebores (*Helleborus odorus*), bellflower (*Campanula persicifolia*), speedwell (*Veronica chamaedrys*) and others.

The forest of sessile oak and Turkey oak - Quegsetum petraeae- cerris (Jn. 1979)

Considering the monodominant sessile oak forests of mountain regions and zonal vegetation of Hungarian and Turkey oak, there appears the community of sessile oak and Turkey oak. For the most part this represents a lower belt sessile oak forests up to 600 m above sea level. Exposure where forest sessile oak and Turkey oak appears are warm and the land brown and passivized on different surfaces.

The sessile oak and common horn-beam forests - *Querco-Carpinetum moesiacum* (Rud. 1949)

Forests of oak and hornbeam are conditioned by the orographic or appear as extrazonal vegetation and cover smaller areas. The stands are formed on the small fragment areas in which they are blended with species from neighboring communities. Moesian forests of sessile oak and hornbeam are extremely mesophilic phytocoenoses caused by site conditions-shaded position, relatively high humidity of air and soil, brown soil with moderately acid reaction. In this community mesophilic characteristics are reflected in the presence of a species: hornbeam (*Carpinus betulus*), oak (*Quercetum petraea*), wild cherry (*Prunus avium*), maple (*Acer campestre*), hazel (*Corylus avellana*), common spindle (*Euonymus europaeus*), dogwood (*Cornus sanguinea*), silver lime (*Tilia argentea*), large-leaved lime (*Tilia platyphylos*), violet (*Viola silvestris*), sedge (*Carex sylvatica*), lungwort (*Pulmonaria officinalis*), primrose (*Primula vulgaris*), sweet woodruff (*Asperula taurine*), lesser celandine (*Ranunculus ficaria*), wood avens (*Geum urbanum*), wild ginger (*Asarum europaeum*), herb Robert (*Geranium robertianum*) and others.

The montane beech forests - *Fagetum moesiacae submontanum* (Rud. 1949)

The community of mountain beech is conditioned by the orographic conditions and occurs on cold exposures or sheltered, shaded coves with specific microclimate elements. Floor trees are characterized by strong assembly and absolute domination of beech and admixed occur: wild service tree (*Sorbus torminalis*), silver lime (*Tilia argentea*), hornbeam (*Carpinus betulus*), sycamore maple (*Acer pseudoplatanus*), maple *(Acer campestre*), Norway maple (*Acer platanoides*), wild cherry (*Prunus avium*), oak (*Quercus Petraea*), mountain elm (*Ulmus montana*). The shrub layer is poorly developed due to overshadowing, and in it there are: elderberry (*Samucus nigra*), common hazel (*Corylus avellana*) and blackberry (*Rubus hirtus*). The characteristic species in the ground floor are: woodruff (*Asperula odorata*), coralroot (*Cardamine bulbifera*), herb Robert (*Geranium robertianun*), wild ginger (*Asarum europaeum*), lungwort (Pulmonaria officinalis), blackberry *(Rubus hypoglossum*) and others.

The white willow forests - *Salicetum albae* (Issl. 1936)

White willow forest represents a pioneering vegetation in the immediate vicinity of the water flow and it's conditioned by incessant additional moisture. The forest of white willow may be formed in the lower parts of the alluvial plain, where there is a high level of groundwater. The plots are fresh, moist

alluvial deposits of different particle size distribution. This community occurs in the form of a belt next to the river flow. The stands are small and infrequent assembly.

The black poplar forests with white willow – *Salici - Populetum nigrae* (Parabuc. 1965)

This intermediary community is the wettest forests of poplar. It is flooded at high water - occasionally flooded. In the stands one or other of the species dominates, depending on the habitat. Rarely are both species equally represented. The forest has a mosaic character, with the domination of one kind or another.

The black poplar forests - *Populetum nigrae* (Knapp 1948)

Forests of poplar occurs in small areas, above the willows where there is less flooding from high water. On the first floor there is a black poplar (*Populus nigra*) in the shrub there are black poplar (*Populus nigra*), purple willow (*Salix purpurea*), black locust (*Robinia pseudoacacia*), and on the ground floor there are black poplar (*Populus nigra*), purple willow (*Salix purpurea*) common dogwood (*Cornus sanguinea*), European dewberry (*Rubus caesius*), false-brome (*Brachypodium silvaticum*), plantain (*Plantago lanceolata*), sweet clover (*Melilotus albus*), elm (*Ulmus effusa*), St. John's wort (*Hypericum perforatum*), reed canary grass (*Phalaris arundinacea*), Birthwort (*Aristolochia clematitis*), and others.

The white poplar forests - *Populetum albae balcanicum* (Karp. 1962)

This community was developed in fragments, in the form of small groups. Thanks to good adjustment the community of white poplar occur at a considerable distance from the river.

The mixed forests of white and black poplar - *Populetum nigro-albae* (Slav. 1952)

The forest of white and black poplar is wider spread than monodominant poplar forests. It occupies top positions and larger areas in the coastal and central parts of the alluvial plain. In this community dominated white poplar (*Populus albae*) and black poplar (*Populus nigra*), and besides them there are also: narrow-leafed ash (*Fraxinus angustifolia*) and elm (*Ulmus effusa*). In the shrub and on the ground floor are can occur: buckthorn (*Frangula alnus*), dogwood (*Cornus sanguinea*), midland hawthorn (*Crataegus laevigata*), the black hawthorn (*Crataegus nigra*), guelder-rose (*Viburnum opulus*), European dewberry (*Rubus caesius*), dyer's broom (*Genista tinctoria*), grey sedge (*Carex divulsa*) and others.

Meadow and pasture vegetation

A large number of species of medicinal and edible wild herbs has been identified in the area: mint (*Mentha piperita*), thyme *(Thymus serpyllum)*, St. John's Wort *(Hypericum perforatum)* and other herbs. Some of these species are protected and listed in the Red Book of Flora of Serbia. Wild cyclamen *(Cyclamen purpurascens)*, a rare plant, can also be found (Figure 21).

Figure 21 Wild cyclamen (Cyclamen purpurascens)

Birds

Mosaic cultural landscapes are predominant in the Mojsinje Mountain, with forest enclaves, meadows and fields. Because of this mosaic, different fauna species (typical of forest habitats, cultural landscapes, open habitats and other similar habitats) alternate in a relatively small area so it is difficult to determine the proper type of ornithofauna, because fauna alternate in a very small space. Potentially this area corresponds to the type of ornithofauna of hilly and mountainous forests, but due to significant alterations of habitats, ornithofauna typical for cultural landscapes is the predominant.

Typical species that can be regularly seen at the Mojsinje mountain, and which reflect the composition of ornithofauna are the following:

buzzard *Buteo buteo*
hawk *Accipiter gentilis*
honey buzzard *Pernis apivorus*
common kestrel *Falco tinnunculus*
hobby *Falco subbuteo*
quail *Coturnix coturnix*
turtle dove *Streptopelia turtur*
wood pigeon *Columba palumbus*
cuckoo *Cuculus canorus*
owl *Otus scops*
hoopoe *Upupa epops*
wryneck *Junx torquilla*
Syrian woodpecker *Dendrocopos syriacus*
great spotted woodpecker *Dendrocopos major*
crested lark *Galerida cristata*
Eurasian skylark *Alauda arvensis*
woodlark *Lullula arborea*
barn swallow *Hirundo rustica*
forest pipit *Anthus trivialis*
white wagtail *Motacilla alba*
nightingale *Luscinia megarhynchos*
redbreast *Erithacus rubecula*
whinchat *Saxicola rubetra*
blackbird *Turdus merula*
whitethroat *Sylvia communis*
Sardinian warbler *Sylvia atricapilla*
great tit *Parus major*
sombre tit *Parus lugubris*
red-backed shrike *Lanius collurio*
magpie *Pica pica*
common starling *Sturnus vulgaris*
tree sparrow *Passer montanus*
goldfinch *Carduelis carduelis*
greenfinch *Carduelis chloris*
serin *Serinus serinus*
Hawfinch *Coccothraustes coccothraustes*
yellowhammer *Emberiza citrinella*
cirl bunting *Emberiza cirlus*
ortolan bunting *Emberiza hortulana*
corn bunting *Miliaria calandra*

Aquatic and wetland habitats are represented in a narrow strip along the South Morava River. In that narrow band there is no favourable conditions for breeding for a large number of wading birds, but still there are several species:

little grebe *Tachybaptus ruficollis*
grey heron *Ardea cinerea*
mallard *Anas platyrhynchos*
little ringed plover *Charadrius dubius*
common sandpiper *Actitis hypoleucos*
grey wagtail *Motacilla cinerea*

Protected bird species

Most bird species encountered on Mojsinjske mountains are strictly protected under the Ordinance on proclamation and protection of strictly protected and protected wild species of plants, animals and fungi ("Official Gazette" no. 05/10 and 47/11). Several species of birds deserve particular attention. These are:

- Short-toed snake eagle (*Circaetus gallicus*) - it is estimated that in Serbia there are 75-90 pairs (Puzović et al., 2003). Probably one pair nesting in this area, according to the investigations around the Stalać gorge in previous years. The eagle is endangered due to habitat destruction and disturbance by man.
- Tawny Owl (*Strix aluco*) is still relatively numerous and frequent in the forests of Serbia. It is estimated that there are about 10,000 breeding pairs (Puzović et al., 2003). This species is related to the forest habitats and is a good indicator of preservation and naturalness of forests.
- Owl (*Otus scops*) - there are from 8500 to 11,500 nesting pairs in Serbia. The species is related to the cultural landscape with extensive use.
- Little ringed plover (*Charadrius dubius*) - Serbia has 900-1200 pairs of this species (Puzović et al., 2003) and it is widespread along the river. Nevertheless deserves special attention due to the sensitivity of the habitat in which nests (riverbank).
- Green woodpecker (*Picus viridis*) - widespread in Serbia and still relatively numerous.
- Woodlark (*Lullula arborea*) - common breeding species of cultural landscape in Serbia.
- Red-backed shrike (*Lanius collurio*) - a common species in the Mojsinjske Mountains as well as in most rural, mountainous areas in Serbia. As insectivorous species is sensitive to intensive land use with the use of pesticides.
- Ortolan bunting (*Emberiza hortulana*) - as the previous species is characteristic of rural areas with intensive agriculture.

The owl, green woodpecker, Woodlark and red-backed shrike in Europe have an unfavorable conservation status (species whose global populations are concentrated in Europe and who do not have adequate protection status SPEC 2; BirdLife, 2004).

Fish fauna

The Institute for Nature Conservation of Serbia carried out the ichtyofauna investigations of the South Morava River in the period of 16-17.10.2008 on two locations: at the water monitoring station Mojsinje (No. 1 in Figure 28) and downstream of the suspension bridge in Braljina (No. 2 in Figure 22). Field laboratories WTW Multi 340i, Lovibond multidirect RS and Lovibond RS checkit were used to analyse the basic physical and chemical water quality parameters.

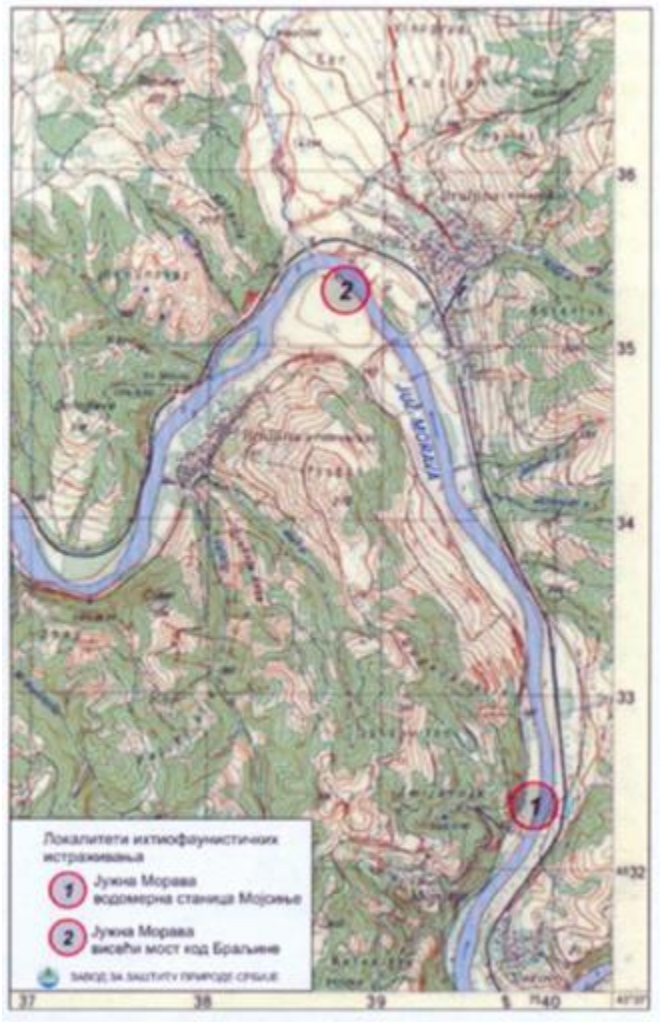

Figure 22 Locations of ichtyofauna investigations

Fishing was carried out by electrofishing and mesh tools. The equipment used is an electric type Aquatech IG 200/2. Basic features of the machine are: input - 12V/max 25A; output - 300/400/500/600 Volts; Level 2 – 10 kilowatts per pulse amplitude; frequency of 35 to 100 pulses/second; Impulse shape - a rapid increase, a slight exponential decline. The device is designed in accordance with the German DIN, VDE and IEC standards.

The research results are presented in Table 17.

Table 17 Abundance of fish species in the South Morava River

Taxon	collective sample			
	number		biomass	
	no/s	no/km	gr/s	kg/km
Rat. Esocidae,				
Esox lucius (Linnaeus, 1758)	1	10	1112	11,12
Rat. Cyprinidae				
Abramis brama (Linnaeus, 1758.)	6	60	7600	76,00
Alburnoides blpunctatus (Bloch, 1782).	7	70	56	0,56
Barbus peloponnesius (Valenciennes, 1844)	9	90	432	4,32
Alburnus alburnus (Linnaeus, 1758)	32	320	574	5,74
Barbus barbus (Linnaeus, 1758)	6	60	216	2,16
Carassius auratus (Linnaeus, 1758)	13	130	4408	44,08
Chondrostoma nasus (Linnaeus, 1758)	10	100	1990	19,9
Cyprinus carpio (Linnaeus, 1758)	1	10	685	6,85
Goblo goblo (Linnaeus, 1758)	3	30	14,25	0,142
Goblo uranoscopus (Agassiz, 1828)	1	10	2,7	0,027
Leuciscus cephalus (Linnaeus, 1758)	12	120	1813	18,13
Tinca tinca (Linnaeus, 1758)	1	10	43,3	0,43
Rhodeus sericeus (Pallas, 1776)	29	290	95,7	0,96
Fam. Siluridae				
Silurus glanis (Linnaeus, 1758)	6	60	2102	21,02
Fam. Percidae				
Percajluviatilis (Linnaeus, 1758)	1	10	286	2,86
Fam. Centrarchidae				
Lepomis gibbosus (Linnaeus, 1758)	4	40	88	0,88

According to the ichthyofauna investigations, barbell *(Barbus barbus)* is the subdominant, while the predominant are common nase *(Chondrostoma nasus)* and/or bleak *(Alburnus Alburnus)*.

To summarise, it can be concluded that the bleak is abundant in almost all parts of the River, while common nase with larger specimens occur in places of increased organic pollution. Only catfish *(Silurus glanis)* from the predatory species occurs in slightly greater numbers in certain parts of the South Morava.

The status of conservation of the South Morava fish species, according to the Regulation on strictly protected and protected wild species of plants, animals and fungi (Off. Journal of RS, No. 5/2010, 47/2011) is provided in Table 18.

Table 18 Status of conservation of the South Morava ichthyofauna

Species	Status
Esox lucius – pike	P
Abramis brama - common bream	P
Alburnoides bipunctatus - bleak	P
Aspius aspius – asp	P
Barbus barbus - common barbel	P
Barbus peloponnesius – western Balkan barbel	P
Carassius carassius - crucian carp	**SP**
Chondrostoma nasus - common nase	P
Cyprinus carpio – common carp	P
Gobio albipinnatus - white-finned gudgeon	P
Gobio kesslerii - Kessler's gudgeon	P
Gobio uranoscopus- Danubian longbarbel gudgeon	P
Leuciscus cephalus - chub	P
Tinca tinca - tench	**SP**
Cobitis elongata - Balkan loach	**SP**
Cobitis taenia - spined loach	P
Misgurnus fossilis - European weather loach	**SP**
Sabanejewia aurata – golden spined loach	**SP**
Silurus glanis - wels catfish	P
Perca fluviatilis - perch	P
Stizostedion lucioperca - zander	P
Zingel streber - streber	**SP**
Zingel zingel - common zingel	**SP**

P - protected species

SP - strictly protected species

Amphibians and reptiles

The surveys conducted in the area of the Mojsinje Mountain and the Stalać gorge were practically among the first ones.

A total of 19 species of herpetofauna were recorded (eight species of amphibians and eleven reptile species).

The area is characterised by high diversity of herpetofauna. One of the most unfavourable factors, which occurs on the banks of the South Morava River is fast changing water levels. This factor primarily has an adverse effect on the group of amphibians due to the impossibility of survival submerged and emerged vegetation, which represents a necessary base during the reproductive season of this group. Due to this problem, most of the species are forced to withdraw during reproduction to the quieter sections of tributaries that flow into the river.

All recorded amphibian and reptile species are protected in accordance to the Regulation on protection of strictly protected and protected wild species of plants, animals and fungi (Off. Journal of RS, No. 5/2010, 47/2011) except the following: *Lacerta agilis*, *Lacerta viridis* and *Podarcis turalis*.

The overview of recorded amphibian and reptile species in the Mojsinje mountain and their IUCN status of protection (vulnerability) is provided in Table 19 and Table 20.

Table 19 The list of registered species of amphibians and their protection status

AMPHIBIA	Name	CITES	IUCN
Caudata			
Salamandridae			
Salamandra salamandra (Linnaeus, 1758)	fire salamander		LC
Triturus karelinii (Strauch, 1870)	long-fingered newt		LC
Anura			
Bomblnatoridae			
VomЬlna variegata (Linnaeus, 1758)	yellow-bellied toad		LC
Bufonidae			
Bufo bufo (Linnaeus, 1758)	common toad		LC
Bufo viridis Lašepti, 1768	green toad		LC
Hylidae			
Hyla arborea (Linnaeus, 1758)	European tree frog		NT
Ranidae			
Rana kl. *esculenta* Linnaeus, 1758	green frog		LC
Rana dalmatina Bonaparte, 1840	tree frog		LC

LC – Least Concern

NT – Near Threatened

Table 20 The list of registered species of reptiles and their protection status

REPTILIA	Name	CITES	IUCN
Testudines			
Emydidae			
Emys orblcularis (Linnaeus, 1758)	European pond turtle		LRnt
Testudinidae			
Testudo hermanni Gmelin, 1789	Hermann's tortoise	II	LRnt
Lacertilia			
Anguidae			
Anguis fragilis Linnaeus, 1758	blindworm		LC
Lacertidae			
Lacerta viridis (Lašepti, 1768)	European green lizard		LC
Podarcis muralis (Laurenti, 1768)	wall lizard		LC
Serpentes			
Colubridae			
Dolichophis caspius (Gmelin, 1789)	Caspian whipsnake		LC
Coronella austriaca Laurenti, 1768	smooth snake		LC
Zamenis longissima (Laurenti, 1768)	Aesculapian snake		LC
Natrix natrix (Linnaeus, 1758)	grass snake		LC
Natrix tessellata (Laurenti, 1768)	dice snake		LC
Viperidae			
Vipera ammodytes (Linnaeus, 1758)	horned viper		LC

LC – Least Concern

NT – Near Threatened

To summarise, the following species have the European IUCN Red List Near Threatened conservation status in the project area: European tree frog (*Hyla arborea),* Hermann's tortoise *(Testudo hermanni,* Figure 23) *and* European pond turtle (*Emys orblcularis).*

Figure 23 Hermann's tortoise (Testudo hermanni)

Mammal fauna

According to available data, potential mammal fauna on area Mojsinjske mountains makes a total of 59 species, divided into 6(7) taxonomic categories. This number includes species for which there is still no confirmed findings in the study area, but their presence can realistically be expected according to their total complex in Serbia and the existence of suitable habitats characteristic. Also, when it comes to bats (Chiroptera), it should be noted that in this group there is remarkable uniformity in exploration in some areas in Serbia, largely because of the specific habitats that they inhabit (caves, notches, cracks and cuts in the rock and the like.). Therefore it can not be concluded with certainty that for all listed species are also confirmed in the narrow area of research. One part of these findings is from the surrounding, close spaces, and, due to day-night rhythms and seasonal movements of bats, it can be assumed that they use part or all the researched territory at different stages of life cycle for different purposes. For these reasons the types have been enumerated and included in the list (Table 21).

Table 21 Taxonomy of mammal species

Genus	Number of species	share (%)
Insectivora	8	13,6
Lagomorpha	1	1,7
Rodentia	18	30,5
Carnivora	13	22
Artiodactyla	2	3,4
Chiroptera	17	28,8

Habitat range of mammal fauna is presented in Table 22. Classification of landscape habitat types is based on internationally standardised classification of landscape types (CORINE). There are five types of registered landscape. The greatest preference is recorded to forest habitats CORINE Nº 4 (27 species or 45.8%), then to the grassland and shrub steppe type habitats CORINE Nº 3 (13 species, or 22%) and rocky habitats CORINE Nº 6 (12 species-20.3%). Preference to cultural ecosystems and human settlements CORINE Nº 8 shows 6 species, i.e. a total of 10.2% recorded in the area.

Table 22 The representation of landscape habitat types in mammals' fauna

CORINE habitat type	3	4	5	6	8
Number of species	13	27	1	12	6
presence (%)	22	45,8	1,7	20,3	10,2

Specifics of mammal fauna diversity

After a summary examination of fauna, specifics were discussed by analyzing diversity within particular orders of mammals.

Insectivores (Eulipotyphla)

In the area of Mojsinjske Mountains the presence of three families with a total of eight species of insectivores were registered. No endemic and relict representatives at the species level. Geographic regions of High and South Morava Valley are areas of relatively high diversity of insectivores. Typical representatives of European broadleaved and mixed forests are Northern white-breasted hedgehog, European mole and Mediterran water shrew. Other species are not as specific. These are: common shrews, pygmy shrews and water shrews. Lesser white-toothed shrew is treated as a species related to the subregion steppes, which are secondary and partly extremely entrenched in the forest habitats. All species have a relatively wide area, but the two species related to aquatic habitats have narrow habitat.

Rabbits (Lagomorpha)

The order is represented by the European hare (*Lepus europaeus*). Type is steppe and forest-steppe element of a broad spectrum in terms of the areal distribution and habitats, ecological preferences and mesophilic semi-open habitats on clay. Although the state of hare populations is stable, it should be noted that this type is a significant hunting resource and is often exposed to strong hunting pressure, which results in a significant decrease in the number of population and narrowing its range over the past decades.

Rodents (Rodentia)

Rodents order is represented with five families and 18 species. They are the largest and best adapted group of mammals. They live in different habitats and characterized by high reproductive potential. The range of habitats in which they live, the greatest preference is for semi-opened (6 species) and forest habitats (7 types), and for open habitats only 2 species. There is an obvious tendency to mesophilic habitats (9 species), to dry 3 types and to aqueous 2 types. Also there is a strong preference for habitats with clay (11 species).

Carnivores (Carnivora)

Order of carnivore is represented with 3 families and 13 species. Geographic region of Veliko Pomoravlje has been an area of moderately high and high diversity of this order. In the biome spectrum dominate southern European elements (mainly broadleaved forest) 4 species, sub-Mediterranean elements (mainly broadleaved forest) 4 species, and elements of European, predominantly coniferous forests of boreal type, steppe and forest-steppe, rocks, pastures and forests to the rocky Mediterranean type and aquatic habitats appear with one species.

Artiodactyla (even-toed ungulates)

Ungulate fauna is represented with just 2 families and 2 species. Since ungulate fauna in Serbia makes a total of 7 species, of which only 4 are indigenous, the area of Mojsinjske mountains can be treated as a zone of relatively low diversity. Both species are native to this area. Roe deer and wild boar are the elements of southern European, predominantly deciduous forests. Ecological preference toward semi-open habitats for Roe deer, toward forest habitats for the wild boar, and both types for mesophilic habitats on clay.

Typical representatives of fauna of European forests are: Northern white-breasted hedgehog *(Erinaceus roumanicus),* Mediterran water shrew *(Neomys anomalus),* European mole *(Talpa europaea), European hare (Lepus europaeus),* bank vole *(Myodes glareolus)*, European pine vole *(Microtus subterraneus),* yellow-necked mouse *(Apodemus flavicollis),* edible dormouse *(Glis glis),* European polecat *(Mustela putorius)*, pine marten *(Martes martes)* and wildcat *(Felis silvestris).* Typical representatives of European steppes are lesser mole-rat *(Spalax leucodon)* and steppe mouse *(Mus spicilegus),* and as a species inhabiting similar habitats to steppe occurs common vole *(Microtus arvalis)*, although it is widespread in the sub-area of European forests. Species such as common shrew *(Sorex araneus),* water shrew *(Neomys fodiens),* red squirrel *(Sciurus vulgaris),* striped field mouse *(Apodemus agrarius)* and forest dormouse *(Dryomys nitedula)* have a much wider distribution of the territory than one sub-group, and are not treated as specific.

The most represented group within the mammal fauna in the study area consists of species that are residents of specific sub-group of European forests and species of relatively wide distribution, which are primarily related to forest habitats but are often present in other two subfields. Specific steppe species are only lesser mole-rat, steppe mouse and conditionally common voles.

4.1.11 Landscape and Visual Settings

The following section describes the existing landscape character areas and visual receptors identified in the project area.

Landscape character

The existing landscape is described in terms of its constituent parts (landform; land cover and pattern and settlement and communication structure).

Considering the area widely, the landscape is characterised by the South Morava River gorge (about 20 km long). The meandering River forms a narrow valley bordered by short steep slopes through an undulating landform. The lowest point is at about 140 m near the River and the highest point is about 500 m in the hills. A view of the area from the village of Braljina is provided in Figure 24.

Figure 24 View of the project area from the vicinity of Braljina village

Land use within the River valley is predominantly arable and sparsely populated with settlement areas in Stalać, Braljina, Mojsinje, Cerovo, Trubarevo and Đunis. The River banks are covered with dense riparian vegetation. Fields in the valley are cultivated under an open field system, where strips of land

vary in width and are under a variety of arable crops (mainly maize and wheat). As the terrain elevation increases, the lower slopes are covered with shrubs, pastures and occasional gardens and the higher slopes are covered by woodland and broadleaved forests.

The villages are in average about 2 km apart. They mostly have similar structure: made of brick, ground floor or one storey houses with garden. The area is rural and economically disadvantaged with numerous houses in villages which appear old and in poor condition. Stalać is the largest settlement in the area and the only one with visible structures that are not strictly households.

The existing railroad and the municipal road (connecting Stalać to Đunis) follow the river along the flat land. The upland is occasionally intersected by village roads.

A view of the area near the village of Trubarevo is provided in Figure 25.

Figure 25 Landscape near the village of Trubarevo

There are four distinctive landscape character areas along the proposed route:

- Stalać station and the nearby South Morava River valley: mixed land use, residential housing and agricultural land use; degraded landscape in the area of Stalać station. The area has a low level of tranquillity and is considered low-sensitive to change;
- The South Morava River: rural area with river meanders with dense riparian vegetation cut through the short steep slopes. The area has a high level of tranquillity and is considered highly sensitive to change;
- The Mojsinje mountain: remote and rural area in the upland, predominantly covered by woodland, occasionally with pastures and rather rare structures. The area has a high level of tranquillity and is considered highly sensitive to change;
- The river valley from Trubarevo village to Đunis station: semi-natural area with broad valley of the meandering river bordered by short steep slopes. The valley has primarily agricultural land use with small-scale villages of Mojsinje, Cerovo and Trubarevo. The area has a medium level of tranquillity and is considered medium-sensitive to change.

Visual receptors

The following groups of visual receptors have been found relevant for the visual impact assessment:

- Residential receptors in Stalać: located in the vicinity of the proposed route (20-30 m), view from the settlement; the area comprises the existing railway infrastructure and industrial and commercial properties; the sensitivity of receptors is considered low.
- Residential receptors in Mojsinje, Cerovo, Trubarevo: located within 2 km of the proposed route, view from the settlement; rural area with view of the existing railway line; the sensitivity of receptors is considered medium.
- Residential receptors in Đunis: located within 100 to 150 m of the proposed route, view from the settlement; the area comprises the existing railway infrastructure; the sensitivity of receptors is considered low.
- People in work in the countryside: The sensitivity will be dependent on distance;
- Recreational receptors: The sensitivity will be dependent on distance (medium from viewpoints in the upland, low from restricted views);
- People travelling along: the existing railway line Stalać – Đunis and the municipal road Stalać – Đunis: the sensitivity will be dependent on distance.

4.2 Social Baseline

4.2.1 Population

The proposed railway route is located in the south-central Serbia, a largely remote, rural, livestock and crops farming area. The area is characterised by the alluvial flood plain of the South Morava River and gently undulating hilly upland. It is sparsely populated, with small villages of populations typically between 15 and 700. The largest settlements are towns of Stalać and Đunis. The industrial development in the area is limited, mainly located in Stalać (companies up to 50 employees) but no significant industrial facilities are present. Within 5 km of the proposed route there is a population of approximately 3,300 (Table 23).

Table 23 Settlements within 5 km of the proposed railway line

Settlement	Approximate Population	Comment
Stalać	1563	Main settlement on the proposed route and the starting point of the project. Railway station. Within Ćićevac municipality.
Town Stalać	693	Actually a village. Located on the left bank of the South Morava River, opposite to the proposed route. Within Ćićevac municipality.
Braljina (Ražanjska)	125	Village located on the right bank of the South Morava River, north-east to the proposed route (about 3.5 km distanced). One of the stops of the existing railway line. Within Ražanj municipality.
Braljina (Kruševačka)	68	Minor village located about 2 km (by road) north-east to the proposed route. Within Ćićevac municipality.
Mojsinje	17	Village located about 2 km north to the proposed route. Within Ćićevac municipality.
Cerovo	48	Village located on the right bank of the South Morava River, north to the proposed route, about 1.7 km distanced. Within Ražanj municipality.
Maletina	131	Village located on the right bank of the South Morava River, opposite to the proposed route, about 1 km distanced. Within Ražanj municipality.
Trubarevo	108	Village located on the proposed route (has a railway station). Within Ćićevac municipality.
Đunis	680	Final point of the project. Railway station. Within the city of Kruševac.

Source: Census in Serbia "Population by age and sex, by settlements 2011, in Republic of Serbia"

The depopulation trend in the mountainous villages in Serbia is rather developed and the project area is not an exception. The majority of the households in the project villages comprise up to 2 members. The young population usually migrates and the average age in the project area is 55 years (Table 24). The elementary schools in villages (Kruševačka Braljina, Mojsinje, Trubarevo) have been closed over the years. Numerous village houses have been abandoned. The local population mainly migrates to the larger settlements and towns, namely Ćićevac, Kruševac, Ražanj, and Varvarin (Table 25).

Table 24 Age structure of population, number of households and household members

Settlement	Average age	Number of households	Avg. household members
Stalać	44.5	477	3.28
Town Stalać	46.1	202	3.43
Braljina (Ražanjska)	59.7	62	2.02
Braljina (Kruševačka)	56.5	33	2.06
Mojsinje	66.6	9	1.89
Cerovo	63.4	23	2.09
Maletina	54.7	51	2.57
Trubarevo	56.3	48	2.25
Đunis	47.5	234	2.89

Source: Census in Serbia "Population by age and sex, by settlements 2011, in Republic of Serbia"

Table 25 Depopulation trend in the project settlements

Year	Stalać	Town Stalać	Rasinska Braljina	Braljina Kruševačka	Mojsinje	Cerovo	Maletina	Trubarevo	Đunis
1948.	1995	992	920	363	116	210	332	535	1567
1953.	2077	1191	898	369	117	191	346	522	1637
1961.	2137	1166	804	357	106	165	328	478	1417
1971.	2087	1055	653	259	84	157	285	324	1278
1981.	2150	1027	491	221	62	119	245	260	1139
1991.	2048	888	335	156	51	91	208	210	1006
2002.	1828	814	266	130	36	66	188	152	812
2011.	1563	693	125	68	17	48	131	108	680

Source: Census in Serbia "Population by age and sex, by settlements 2011, in Republic of Serbia"

4.2.2 Ethnicity and Religion

The ethnic majority is Serbian (95.7% in the municipality of Ćićevac, 96% in Ražanj, and 95% in the city of Kruševac). The largest minority is Roma (1.83% in Ćićevac, 2.13% in Ražanj, 1.9% in Kruševac). Other minorities are Macedonian, Montenegrin, Croatian, etc.

The predominant religion is Orthodox (over 97%).

4.2.3 Education

Based on the 2011 Census[11], in the Ćićevac municipality, there are currently approximately 20.6% of people with no education or incomplete primary education, 27.2% have basic primary education, 43.9% have secondary education and 8% have college or university level education.

In the Ražanj municipality, about 37.9% of population have no education or incomplete primary education,27.9% have basic primary education, 29.2% have secondary education and 4.7% have college or university level education.

4.2.4 Employment and Unemployment

Employment and unemployment statistics are only available at the municipal level. General information about the economy in the villages was provided by spatial plans of the respective municipalities. The overall conclusion is that all villages appear to be economically disadvantaged. Agriculture is the dominant economic activity in the project area, while other economic activity is limited to manufacturing, retail and services (in Stalać, Ćićevac and the city of Kruševac).

The employment statistics in Serbia is based on "the old method" and the percentage of the working-age population. The official unemployment rate is in the range from 27% (Ćićevac) to 30% (Kruševac) which is higher than the Serbian average (21%). The unofficial rates might be even higher, given that the official statistics don't capture all unemployed persons, only those registered at the National Office Service, actively seeking for a job (Table 26).

Table 26 Employment and unemployment in the project area

Municipality / City	Employed		Unemployed		
	Total	Women	Total	Applying for first job	Women
Ćićevac	2871	38.8%	795	355	44.6%
Ražanj	3377	25.4%	277	142	51.9%
Kruševac	35880	41.8%	15419	6067	46%

In November 2015, the average net monthly salary in Ćićevac municipality was 240 EUR, in the city of Kruševac - 316 EUR and in Ražanj municipality - 255 EUR which is lower than the Serbian average. The average net salary at the state level in the same period was 365 EUR (Institute for Statistics of Serbia, 2015).

Information regarding employment by sectors suggests that in the city of Kruševac about 24% of employed people work in the manufacturing sector, about 23% works in the administration, education and health services, about 14% works in trade and commerce and about 13.8% works in agriculture. Employment in agriculture is more dominant in Ražanj municipality (55% of employed population) where only 13.2% work in the manufacturing sector. In Ćićevac, about 29.8% of employed population work in the manufacturing sector, 16.1% in agriculture, 17% in the administration, education and health services and 12.7% in trade and commerce.

A relatively small percentage of employees are engaged in the construction sector – 3.8% in Kruševac, 5% in Ražanj and 6% in Ćićevac.

4.2.5 Agricultural Activity

The project area is characterised by a low-intensity agricultural activity, with plots of maize, wheat and barley in the South Morava River valley. Vegetables (pepper, tomato, onion, cucumber, carrot, potato,

[11] Census in Serbia "Population aged 15 and over by educational attainment and sex, by municipalities 2011, in Republic of Serbia"

beans) and legumes farming (lucerne and clover) is developed as well. The majority of farmland plots (over 75%) are individually owned and small (up to 3 hectares) which is limiting for any intensive farming. Agricultural mechanisation is old (over 10 years and more). Livestock farming has been developed in higher altitudes (up to 500 m a.s.l.) but has been in a significant decline for the the last two decades. The main reason is depopulation of the area with the remaining old population unable to hold large number of livestock. This resulted in livestock farming aimed mainly for private needs, with only a few cattle, pigs, sheep or small number of poultry per household.

Houses in the village of Mojsinje are shown in Figure 26.

Figure 26 Mojsinje village

4.2.6 Vulnerable Groups

Although the entire project area is economically disadvantaged with average income lower than the national average, the village population (Cerovo, Mojsinje, and Trubarevo) can be considered vulnerable in respect to dependence on the land and average age above 50 (Figure 27). Their vulnerability may be a result of either lack of permanent income or income below the official poverty line. This population may be more adverse affected by the project than others in the area.

Figure 27 Elderly man from one of the villages in the project area

4.2.7 Land Use and Property

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 Stalać and Đunis settlements.

Cultivated land is primarily used for growing maize, wheat, fodder and vegetables. The majority of farmland plots are small (up to 3 hectares) and assumed to be individually owned. The possibility of substitution of the land is medium, given the limited areas of agricultural land along the River valley. Most of the land has traditionally been with the families for many generations and the sentimental value has thus high importance. Given that the area is economically disadvantaged with the elderly population not likely to find an alternative source of income, the sensitivity of cultivated land from the social aspect is considered to be high. Renting of privately owned land is rare in the area and therefore the likelihood of the existence of users of land, who are not owners, is very small. The existence of individuals using the land without the knowledge of the owners is considered not very likely.

Forest land with occasional meadow and pastures is the predominant land type in the area. The state owned forest area is managed by the public company Serbia Forests. The forest land is part of the designated ecological network therefore its sensitivity is considered medium to high. It is assumed that the possibility of adequate substitution with similar forest is high.

4.2.8 Industry

Industrial activity in the project area is low. Only Stalać has a few industrial facilities and minor private companies.

The main industrial facilities in Stalać are mechanical processing and conveyor manufacturing “Trasing“ (30 employees), manufacturing and repair of concrete elements (thresholds, platforms, channels, columns) at the company "Putevi invest" (Figure 28), extraction and separation of gravel (50 employees), and manufacturing of rain water channels, gutters, grids, covers of chimneys and ventilation covers at the company “Antić Kosta” (50 employees, Figure 29). Manufacturing of bricks by “Vojvoda Prijezda” (85 employees) has been halted from 2013 (company in liquidation).

Figure 28 “Putevi Invest” (L) and factory of brick products "Duke Prijezda" (R)

Figure 29 Company “Antić Kosta”

4.2.9 Health

Within the Ćićevac municipality, life expectancy is 74.71 years. In the city of Kruševac the average life expectancy is 75.54 years. Within the Ražanj municipality, life expectancy is 75.16 years (Health Yearbook of the Republic of Serbia for 2014 – The Institute Milan Jovanović Batut, 2015).

There are two hospitals in the region, both in Kruševac City. Each municipality has a primary health care centre. Stalać and Đunis each have one ambulance and one pharmacy. Other villages don't have any health facilities.

4.2.10 Infrastructure

Main Road Network

The main road network in the area encompasses the state roads of IB No. 23 (former R-221b) and IIA No. 215 (former E-761) category, shown in Figure 30. The motorway E-75 (IA category) passes about 7 km to the east of Đunis railway station.

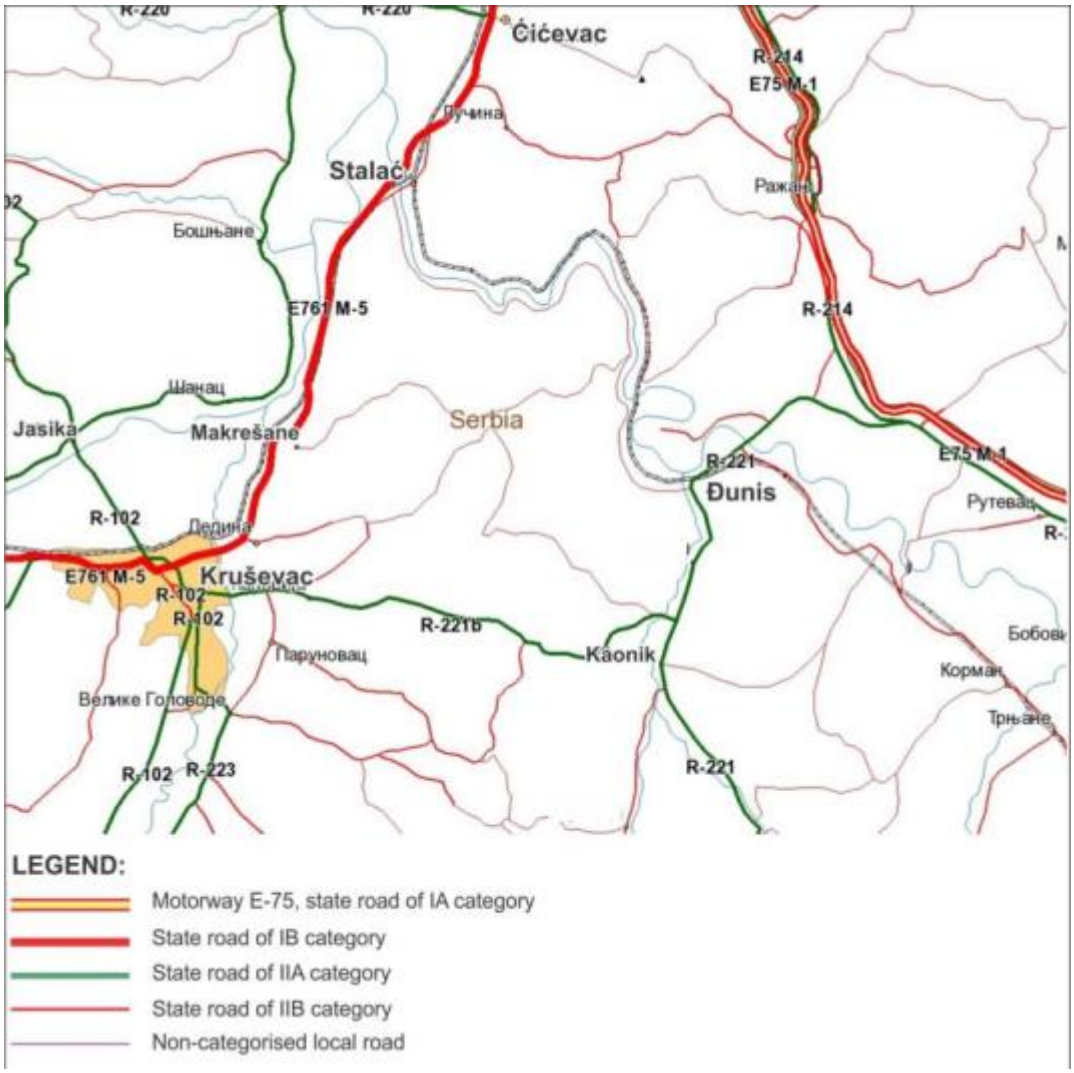

Figure 30 The network of I and II category state roads in territory of railway corridor Stalać - Đunis

The state road of category IB No. 23 (former E-761) connects Stalać to Kruševac and Ćićevac. The average roadway width is 7.10m, the average width of shoulders 1.0m, the road has 2 carriageways (lanes). The road has no intersection with the route of the railway line on the section Stalać - Đunis.

State road of category IIA no. 215 connects Đunis to Kruševac and E-75 motorway. Average roadway width is 6.0 m, 2 traffic lanes, the average width of shoulders is 0.8 m. The road intersects with the route of the railway line in the area of the railway station Đunis.

The total length of state roads of I and II category in the project area is about 8.5 km. These roads have an asphalt surface.

Of all the roads in the project area, the traffic volume data is monitored only at the state road of IB category (E-761 in Figure 36) which connects Stalać to Kruševac and Ćićevac (regional centres). The annual average daily traffic (AADT) is monitored at two road sections: (1) Jasika – Makrešane and (2) Makrešane – Ćićevac. The data recorded in 2014 are provided in Table 27[12].

Table 27 Average annual daily traffic in 2014 at the IB category road

Road	Section Length (km)	Passenger car	Bus	Light truck	Medium truck	Heavy duty truck	Trailer-truck	Total
Jasika – Makrešane	6.7	2760	35	84	167	72	421	3539
Makrešane – Ćićevac	11.9	6254	174	111	214	84	557	7394

The traffic volume is not monitored at the IIA category road connecting Đunis to Kruševac and Đunis to E-75 motorway. It is assumed that the AADT on this road is low, with passenger cars being predominant.

Local Road Network

Villages in the project area are connected by municipal roads (IIB category), some of which are not paved but made of gravel. Due to poor maintenance and occasional flooding (recently in 2014 and 2015), some of the roads are in a bad condition.

The level of motorization (expressed as the number of passenger cars per 1000 inhabitants) in the project municipalities is below the national average, indicating the need for organized public mass passenger transport (road or rail traffic), as well as the existence of potential users of rail transport in the passenger local and distant traffic. In the current situation the main form of public mass passenger transport is the bus system. In addition to long-distance transport, school bus transportation of children is organized in some settlements.

Water supply

Drinking water supply in the project area is provided from the public mains only in Stalać and Town Stalać. The capacity of water supply network is insufficient and occasionaly microbiology issues have been reported due to improper water chlorination.

All other villages in the area have only individual groundwater wells for water supply.

Wastewater collection

No sewage network is present in the project area, meaning that wastewater is discharged into individual septic tanks (of unknown integrity) or directly into subsurface. Industrial facilities do not have wastewater treatment in place, discharging wastewater to the surface water recipients (the South Morava River).

Municipal waste

Given that no regional sanitary landfill has been operational yet, municipal waste is disposed at local dump sites. The organised waste collection is present only in Stalać and Stalać Town.

[12] Average annual daily traffic in 2014 - Roads of Serbia
http://www.putevi-srbije.rs/index.php/brojanje-saobra%C4%87aja

Electricity and Telecommunications

Electricity and telecommunications networks are developed in each village but their capacities are not sufficient (stability of electrical supply, insufficient mobile signal coverage).

Heating

Heating is provided from individual boilers (coal and wood). Heating in villages is individual.

4.2.11 Cultural Heritage and Archaeology

The cultural heritage and archaeology sites in the project area have been presented based on publicly available information and the data obtained from the Institute for Protection of Cultural Monuments from Kraljevo.

The study area is famous for its medieval churches and monasteries of which 28 have still remained (from the initial 77). Six of them are designated as Mojsinje churches and monasteries as a cultural heritage of great importance (Decision on establishing the immovable cultural property of outstanding significance and cultural heritage of great importance, "Off. Gazette of SRS" no. 28 dated 21 July 1983). The existence of a large number of sacral objects in a relatively minor area is related to the arrival of the monks in XIV century. Monks, retiring before Turks, colonized the Mojsinje Mountain, rebuilt the monasteries, churches and raised hermitages. The area is colloquially called The Small Serbian Holly Mount.

There are also numerous archaeological prehistoric sites in the wider area (Ukosa, Ornice, Jazbine, Selište, Kruškar, Gologlava), and ancient sites are divided into two groups: the fortifications on exalted places (Town Stalać, Ukosa, Gradac) and settlements in river valleys (Duge njive, Kruškar, Braljina).

In addition, fortified towns such as Gradina (Jerina's town) at the entrance to the Stalać gorge (area of village Trubarevo) and the Town Stalać at the exit of the gorge are among the largest and strategically important fortified towns in Serbia in the 14th and 15th century (Figure 31).

Figure 31 Town Stalać (L) and Tower Todor of Stalać (R)

Given the presence of a significant number of structures of historical and cultural value (some of which have been identified and designated) it is likely that zones with archaeological material are present in the project area but have not been identified due to lack of regular reconnaissance work. The study area is therefore considered to be of medium to high sensitivity.

The overview of identified designated cultural heritage and archaeological sites in the area of 3 km of the proposed railway line is provided in Table 28. Sensitivity of each monument has been assessed based on its proximity to the proposed route.

Table 28 Cultural heritage and archaeological sites in the wider project area

No.	Cultural heritage	Village	Position in relation to the proposed route	Type of cultural heritage	Sensitivity
1.	Church of the Holy Archangels Michael and Gabriel (17th century)	Stalać	660 m to the north-east	Cultural heritage of great importance	Low
2.	Church of Holy Spirit (14th-15th century)	Town Stalać	500 m to the south-west, opposite side of the river	Cultural heritage of great importance	Low
3.	Church of St. John (14th century)	Stevanac	820 m to the south, opposite side of the river	Cultural heritage of great importance	Low
4.	Church of St. Mark	Stevanac Jakovac	630 m to the south, opposite side of the river	Cultural heritage of great importance	Low
5.	Church of St. Nicholas (14th century)	Braljina	350 m to the north, opposite side of the river	Cultural heritage of great importance	Low
6.	Church of St. Sava (Middle Ages)	Braljina	3 km to the north the proposed railroad	Archaeological site	Low
7.	Medieval fortress Trubarevo	Trubarevo	1 km to the north-east of the proposed railroad (tunnel 5 exit)	Archaeological site	Low
8.	Church of St. Panteleimon (cemetery church)	Đunis Nikoljac	180 m south of the proposed railroad	Cultural heritage under preliminary protection	Medium
9.	Archaeological site (remains of the medieval church)	Đunis Nikoljac	210 m south of the proposed railroad	Archaeological site	Medium

Locations of identified cultural heritage sites and archaeological sites along the route are provided in the Cultural Heritage Map (Annex 4).

Photos of some of the Church of Holy Spirit, the Church of Holy Archangels and the Church of St. John are provided in Figure 32.

Figure 32 Church of Holy Spirit (L); Church of Holy Archangels (R); Church of St. John (D)

It can be concluded that in the area of 250 m from the proposed route, there are two designated sites whose sensitivity is assessed as medium.

Given the long history of settlements and presence of numerous archaeological findings in the wider area, the sensitivity of the project area in respect to archaeology is considered medium to high.

5 Environmental and Social Impact Assessment

The following sections detail the environmental and social impact assessment of the proposed railway line. The approach to the environmental and social assessment has been informed by:

- The requirements of the international investment banks, namely the requirements of the Equator Principles and European Bank for Reconstruction and Development (EBRD);
- Serbian regulatory requirements, in particular the Law on Environmental Impact Assessment (Off. Journal of RS, No. 135/2004, 36/2010) as well as issue-specific regulating requirements such as those associated with nature conservation, surface water quality, waste management, etc.;
- The nature of the project design;
- The environmental and socio-economic background of the proposed project area;
- The expertise of the ESIA team in undertaking similar projects.

The applicable environmental and socio-economic requirements are discussed in more detail in Chapter 2.

5.1 Environmental Impacts during Construction

The following sections provide an assessment of the potential impacts of the project activities during the construction phase. The assessment has been done based on expert knowledge and expert judgement. Where specific approaches to identify impacts have been adopted, these are described in the sections introductions.

5.1.1 Air Quality Impact

Construction activities with potential to directly affect the ambient air quality by generating fugitive dust, fine particulate matter ($PM_{2.5}$, PM_{10}) and exhaust emissions (NO_2) from machinery are the following: (1) demolition of buildings situated along the proposed route, (2) earth works (including land clearing, excavation, levelling, tunnelling), (3) transport and disposal of excavated material, (4) construction plant and delivery of concrete (premix), (4) movement of construction mechanisation and transport vehicles. In addition, there may be changes in concentrations of NO_2 and particulate matter due to changes in road traffic during the construction of the proposed project.

Re-suspension of dust through construction activities or the wind can cause a nuisance and affect vegetation. Dust particles are larger than PM_{10} and deposit very rapidly, therefore the health concern is not significant. Favourable conditions for dust generation are dry weather combined with high winds. The possible impacts may be expected along the route, near to dust sources, at a distance of up to 100 meters.

Impact of demolition works

The planned demolition of around 20 buildings in Stalać will involve crushing works in an area where residential receptors are present in the radius of 100 m. There are up to 20 commercial and residential buildings to the east of the demolition area, just across the Ilije Nagulića Street (the street will be realigned as part of the project development). The demolition activities will be carried out at less than 10 m above ground level given that the houses have up to 2 storeys. The houses appear to be made of brick and/or concrete. The total building volume is estimated to be less than 20.000 m^3. Given all the above, 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. The overall demolition effect will be direct, short-term moderate adverse and will require implementation of mitigation measures. If appropriate dust suppression measures are implemented, the residual impact is assessed to be **minor adverse**.

In addition, there are two remote residential houses close to the underpass at km. 177+594 that will need to be demolished. This is considered minor demolition works so the potential effects is estimated to be **minor adverse.**

Impact of earthworks and associated activities

Earthworks will involve excavations, levelling, drilling, blasting, material haulage, and stockpiling.

In the area south ofof Stalać, at about km 177 to km 178, the earthworks will take place close to the existing railway corridor along which the residential receptors are lined. The estimated number of receptors in the perimeter of 100 m is up to 100. There is a shrub buffer zone between the houses and the proposed route. In that respect the sensitivity of the area is considered to be medium. In the winter months, due to individual heating, primarily on wood and coal, the baseline PM_{10} concentrations in the area may be expected to be close to the Serbian air quality standard with periodical exceedance. The magnitude of air emissions during earthworks is considered to be low. The impact will be temporary with significance assessed as **minor adverse**.

After exiting the Stalać area, the proposed railway line passes through the long uninhabited section with no human receptors but with sensitive ecological receptors (flora and fauna) present: the ecological corridor of the South Morava River and the ecological network of the Mojsinje Mountain. Both areas are locally important ecological sites. Ecological receptors will be present at less than 20 m from construction works. Therefore the sensitivity of the area is assessed as medium. The total daily construction surface area will be up to 500 m^2 and the construction works are expected to be longer than 12 months. The majority of construction works in this section will be in tunnels which is expected to significantly reduce the air dispersion of dust. Given the rural character of this remote section, the baseline PM_{10} concentrations are assumed to be significantly (over 70%) of Serbian air quality standard. Based on the above mentioned facts, the magnitude of dusting effect of earthworks is considered to be low. The impact of dust deposition will be temporary, limited to the local area of works and is assessed as **minor adverse**.

The section from Trubarevo to Đunis passes through the uninhabited farmland and does not have any ecological receptors potentially exposed. There is a minor number of residential receptors (up to 10) in both Trubarevo and Đunis situated between 100 and 250 m from the proposed route. The sensitivity of these receptors is considered to be low. The area is rural and the baseline PM_{10} concentrations are assumed to be rather below the Serbian air quality standard. The magnitude of earthworks in this area is considered to be medium. The impact significance is assessed as **minor adverse**.

5.1.2 Soil Impact

Construction of the new railway line will lead to (1) permanent loss of soil along the right-of-way, (2) potential soil destabilisation and erosion in cuttings, (3) degradation of soil resulting from top soil removal and compaction and (4) potential soil contamination in case of accidental release of fuels and chemicals.

The permanent loss of soil along the narrow railway footprint is inevitable. Land clearing and top soil removal will be required in the 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). The total width of the strip required for the subgrade construction will be about 14 m in average. Therefore, 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 overall significance of permanent loss of soil is assessed as **minor adverse**.

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. The Preliminary Design of the project has been informed by the geotechnical investigations and erosion measures will be part of the railway design. In the event that the measures are implemented, the residual impact to soil erosion should be **minor adverse**.

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 possible steps will be taken to restore the condition of areas used during construction. In the event that the restoration measures are implemented, the residual impact to soil should be **minor**.

The excavated material from cuttings and tunnels deposited in the stockpiles is considered to comprise natural material and as such is unlikely to contain constituents that will adversely affect the soil quality. As such, the significance of this impacts is assessed as **negligible**.

5.1.3 Groundwater impact

Construction activities could potentially affect the groundwater in case of (1) dewatering and changing the groundwater regime and (2) accidental release of fuels, oils, chemicals or hazardous materials to the ground with subsequent leaching to subsurface.

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**.

Construction works in the area of crystalline schists (the area of Mojsinje Mountain) are not expected to require dewatering, given that no groundwater level is formed and groundwater occurrences are local, related only to the shallow subsurface fractured (weathered) layer. **No impact** is expected in this aquifer.

Potential for contaminants to enter groundwater depends on the aquifer sensitivity and type and quantity of the released contaminant. In that respect, the alluvial aquifer along the South Morava River is more sensitive than the fractured aquifer in the hilly upland. Major maintenance activities are not planned to be conducted at work sites. However, certain amounts of hazardous materials might be used during the construction (paints, chemicals). The potential for spillage of hazardous materials or leakage from the machinery and equipment is considered as an effect of a low magnitude. Sensitivity of the alluvial aquifer is considered medium, given the presence a semi-permeable barrier (upper layer of silt and sand which is low-permeable) protecting the lower alluvial section of a highly permeable gravel. Sensitivity of the fractured aquifer is considered low, given the very low permeability of present geological structures and absence of significant groundwater aquifers. The initial significance of this impact (even if uncontrolled) would be moderate to minor adverse. The precautionary measures will be employed to reduce the risks of accidental spillages. In the event that the control measures are implemented, the residual impact to groundwater should be **negligible**.

The proposed project is not predicted to result in local or temporary effects to groundwater that will affect the quantitative or chemical properties of aquifers in the area.

5.1.4 Surface Water Impact

The proposed route will cross the South Morava River and 9 other waterways (streams). During the construction of bridges and culverts, the surface water receptors along the route will be under risk of erosion, riverbed modification and sediment run-off. In addition, uncontrolled discharge of effluent from construction areas or accidental release of chemicals could deteriorate the river water quality and affect the associated ecological habitats. Sanitary wastewater from the workers domestic facilities (if uncontrolled) is an additional potential source of organic pollution of the surface water.

The waterways in the project area are characterised by their torrential flows and a significant volume of sediment load. In addition, the South 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 South 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. It has been assumed that the excavated material from tunnels (gneiss) is not suitable to be used for the embankment construction. The least preferable environmental option would be to remove the sediment from the South Morava River instead of utilising the excavation material from the tunnels. No information is available about the existing gravel and sand borrow pits in the area. Removal of sediment from the river will require specific conditions to be issued by the relevant water management authority and other competent institutions. It is important to carefully select the area for sediment removal, i.e. the river stretch which will not trigger the later river instability issues (creation of knickpoints, eroding the river upstream and overloading the downstream with sediment). 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. During the Main design phase of the proposed project, the exact volume of the required material will be calculated and screening of potential borrow site(s) conducted. In case that a new borrow site will need to be established, the Main design of the borrow site will need to be prepared and the environmental impact assessment might be required from the competent environmental authority.

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 South Morava River (at km. 181+555) will have two piers located within the river. All other bridges’ piers will be located outside the streams.

The bridge will be situated about 200 m from the meander bend. The designed width of the bridge’ piers foundations is 2.0 m. The South Morava riverbed is about 60 m wide in that area so the piers footprint is estimated to occupy about 6% of the cross-sectional area of the River. The stretch of the River where the proposed bridge will be constructed is shown in Figure 39.

Figure 33 Stretch of the South Morava River planned for the bridge construction

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 South 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.**

A Construction River Crossings Plan should be developed and implemented (as part of the Construction Management Plan) to set the environmental requirements and control measures during the construction works near the waterways including the in-water works.

Major maintenance activities are not planned to be conducted at worksites. However, certain amounts of hazardous materials might be used during the construction. They will not be stored in the immediate vicinity of waterways and will be bunded. The potential for leakage from the machinery and equipment affecting the surface water recipients is considered an effect of a low magnitude. The precautionary measures will be employed to reduce the risks of any accidental spillages in the area of waterways. In the event that the control measures are implemented, the residual impact to surface water should be **negligible**.

Sanitary wastewater from worksites will not be discharged to surface water and will be collected in chemical portable toilets and waste adequately managed. There will be no impact on surface water.

5.1.5 Impact on Ecology and Nature Conservation

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 railway corridor supports diversity of habitats of different ecological value. Habitats in the area of Stalać and Đunis settlements have been affected by rural residential developments and as such have a low ecological value. Shrub and woodland habitats on steep slopes in the area of the proposed cutting and the portals of tunnel 1 (km 178+895) and tunnel 2 (km 181+390) are likely to support terrestrial fauna, birds and bats communities and as such their ecological value is considered low to medium. The South 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 Đunis 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 South 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**.

The proposed construction works are not expected to involve permanent groundwater level reduction or change to surface water regime that would result in alteration of abiotic factors and thus affect the quality of water-dependant habitats.

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**. It will be of the highest priority to avoid disturbance of sensitive periods of fauna life cycles (e.g. breeding; migration; spawning and breeding grounds, nesting and nursery areas, summer or winter refuge areas). The point at which such impacts are considered likely to result in a significant adverse effect on conservation status will differ according to the species concerned. 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 increased noise levels, vibration and human presence during the construction will have an effect of temporary disturbance and displacement of bird species. The effect would be short-term and would remain only for the duration of the construction at a certain location and therefore is not considered significant in the long-term. The effect of this temporary disturbance and displacement for raptor species, waders and breeding / wintering farmland and woodland bird is considered to be of low magnitude and **minor** significance. Vegetation clearance will be timed to avoid the breeding bird

season, therefore ensuring that bird nests, eggs or young are not destroyed during the construction process.

To ensure conservation of the ecological network the Mojsinje Mountain and the Stalać Gorge on the South Morava River, a Biodiversity Management Plan (BMP) should be 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.

5.1.6 Excavated Material and Waste Impacts

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.

Demolition waste

Demolition waste will result from the necessary demolition of buildings (about 20) in the area of Stalać station. It will comprise utilities, residential property, industrial and commercial property and may include non-contaminated soil, rubble, bricks, cement, timber, pallets, scrap metals, plastics, glues, wires. A pre-demolition asbestos survey will need to be undertaken on all buildings to be demolished to identify the presence of any asbestos-containing materials (ACM) that may be present. Where identified, ACM should be removed by a licensed asbestos removal contractor and managed in accordance with the Serbian regulatory requirements on asbestos-containing waste.

Excavated material

Construction of five tunnels along the route will result in a significant volume of excavated material (ca. 500.000 m^3) which is an inert natural material (mainly gneiss). In case that the material is not suitable for the embankment, other possibilities for utilisation should be found, in cooperation with the local authorities. Possible options are environmental mitigation earthworks fill in this project or construction material / flood protection bund material in some other project. Part of the material is likely to be used for the construction of the access roads.

Top soil (up to 0.4 m thick) and agricultural subsoil will be stripped and temporarily stockpiled in dedicated areas for later use (restoration, landscaping, etc).

Decommissioning of the existing railway

Decommissioning of the 18.6 km-long railway will result in waste metal tracks, wooden sleepers, fastenings, catenary wires and posts and similar material. The ballast is not planned to be removed. In the areas where the existing railway route will be used for new access roads, the ballast will be compacted and used as base layer for the new roads.

The tracks in Stalać already have concrete sleepers, therefore wooden sleepers will need to be removed from the remaining 17.6 km of the existing track. As the average distance between sleepers is 65 cm, it can be estimated that the total number of waste wooden sleepers will be ca. 27,000.

The current waste management practice in “Serbian Railways” is that waste from the decommissioned railways is re-used as much as possible, and re-installed on minor (local service) railways. It is likely that the tracks will be mainly reused. Part of the sleepers will certainly not be possible to recover and as they are likely to be contaminated by fungicides, oil, diesel residuals, etc., they should be considered hazardous waste and managed accordingly.

Construction work site waste

Construction site waste will primarily comprise general worker waste and will be similar to household waste (food, packaging, office waste, sanitary waste). The average daily generation of household waste in Serbia is 0.87 kg/person[13] and based on that the waste generation per worker per month (based on average working week of five days) is estimated to be around 17.4 kg/worker.

"Serbian Railways" had already established the Operating Procedure on Waste Management (No. 300/2011-981) which sets the criteria for locating of temporary storage of construction waste including household waste and cooperation with local public utility companies in respect to waste removal and disposal.

Major maintenance of the construction machinery will not be provided in construction worksites. The machinery and equipment will be transferred to the agreed service centres in the closest towns for major maintenance. Waste from routine maintenance (waste lubricants, oils, oil filters from equipment and machinery, waste fuels, tyres, absorbable pads and oily rags, etc.) will be controlled by a Waste Management Plan for the relevant worksites.

5.1.7 Landscape and Visual Impact

For the purpose of assessment of landscape and visual effects, the activities occurring during the peak construction phase, i.e. the period during which the main civil engineering works will take place have been considered. This includes establishment of compounds, main earthworks and structure works.

Effects on Vegetation and Land Cover

It is anticipated that the construction activities will result in adverse changes in localised areas of land cover. Localised areas of tree and shrub vegetation will be cleared adjacent to construct cuttings, bridges and tunnels. Vegetation will be cleared for the installation of the concrete batching plants and the excavation for the underground cabling works. The above impacts will be temporary. The parts of land cover that would be removed during construction are considered minor compared to the remaining vegetation and land cover. As such, the magnitude of change is considered to be low. The low magnitude of change assessed alongside moderate to low sensitivity in terms of land cover will result in **minor adverse impact**.

Effects on Landscape Character

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 Đunis. 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.

Effects on Land Use

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 Đunis. These effects will have a medium degree of exposure on the wider area and as such are expected to be **moderate adverse**.

Effects on Designated Sites

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

[13] Waste Management Strategy of Serbia (2010-2019) – Ministry of Environment and Spatial Planning, 2010

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 South 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**.

Visual impacts

Exposure of sensitive receptors (neighbouring residents and those traveling or seeking recreation in a specific area) to the temporary effects of construction works has been analysed in Table 29.

Table 29 Assessment of construction effects on visual receptors

	Receptor area	Receptor Sensitivity	Effect Magnitude	Significance of impact
1.	Residential receptors in Stalać	Medium	Medium Views of the construction activities would be seen by a large number of houses in the southern and southwestern part of the village.	Moderate adverse
2.	Residential receptors in Mojsinje, Cerovo, Trubarevo	Medium	Low to Medium The visual effect is dependent on distance. Residents from Cerovo and Mojsinje would be under visual impact of low magnitude. Residents of Trubarevo would be under visual impact of moderate magnitude.	Moderate adverse
3.	Residential receptors in Đunis	Medium	Low Views of the construction activities would be seen by houses in the vicinity of the station and partly restricted by local scrub and trees.	Minor adverse
4.	People in work in the countryside	Medium	Low to medium The visual effect is dependent on distance. Beyond about 500 m from the construction site, there would be a visual impact of low magnitude.	Moderate to minor adverse
5.	Recreational receptors	Medium	Low to Medium Depending on the viewpoint, construction works would be visible from the upland hills, partly filtered by local scrub and trees. At certain viewpoints in the South Morava River valley, construction of bridges would be visible and the effect would be of medium magnitude.	Moderate to minor adverse

	Receptor area	Receptor Sensitivity	Effect Magnitude	Significance of impact
6.	People travelling along: the existing railway line Stalać – Đunis and the municipal road Stalać – Đunis	Low	Low to Medium Travelling along the existing railway or the municipal road connecting Stalać and Đunis, construction works would be visible in the area of Stalać, Trubarevo and Đunis. The effect would be of low to medium magnitude.	Minor adverse

5.1.8 Impacts of Decommissioning of the Existing Railway line

Environmental effects of the decommissioning of the existing railway line will be largely similar to the installation of superstructure at the new line. Given that the ballast is not planned to be removed, the expected environmental effects are rather limited. This includes short-term and local effects of a low magnitude, caused by the machinery. The major concern will be the decommissioning waste and possibilities of its re-use or recycling. The issue of waste is analysed in Chapter 5.1.6.

In general, management and mitigation during decommissioning will follow the same requirements as during construction.

5.2 Social Impacts during Construction

As a public company, “Serbian Railways” will acquire land for the project by expropriation, which is a common legal procedure enforced in Serbia when projects are developed by the state-owned companies. Once the Spatial Plan of the Special Purpose Area of the Railway Stalać - Đunis is completed (in January 2016 it was still under preparation), the Government of Serbia will have the necessary administrative conditions fulfilled to proclaim the special public interest for the project. This will provide the legal basis for commencement of the land expropriation process which will be administratively managed by the municipality of Ćićevac and the city of Kruševac. Owners of the affected land will be identified from the cadastre and formally contacted to start the expropriation procedure and obtain the offer for compensation for land, structures and/or crops.

Given that land acquisition for the project will be implemented through the expropriation procedure, the acquisition process is considered involuntary resettlement in terms of the EBRD Policy requirements. Therefore, a Resettlement and Compensation Framework (RCF) has been prepared as part of this ESIA. The RCF sets out the agreed principles to be used and entitlements under which compensation is to be given with respect to any land acquisition that results in either physical or economic displacement which occurs as a result of project activities. In later stages of the project development, a more detailed plan shall be prepared – the Resettlement Action Plan (RAP). The Resettlement Compensation Framework is presented in Annex 5.

5.2.1 Impact on Resettlement

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). The displacement is a result of upgrading for high speed railway and necessary changes of the project parameters. Five of the affected (residential) properties are situated in Ilije Nagulića Street which will need to be realigned in this section. Other properties are situated within the proposed new route and involve residential houses, private metalworking company “Antić Kosta“ (about 50 employees), community office building and a shop (“Midžor“). The land ownership status is not completely known at this stage but it is assumed that some of the properties in this section do not have the legal right to land. Four of the properties are located within the existing railway’ right-of way (which is not in accordance to regulatory standards which allow only “Serbian Railways” structures to be within this belt). Some of the affected residential properties appear unoccupied, and some are used as ancillary houses. It is estimated that about 20 houses will be directly affected. The total area is estimated to be around 0.75 hectares. The affected area is shown in Figure 34.

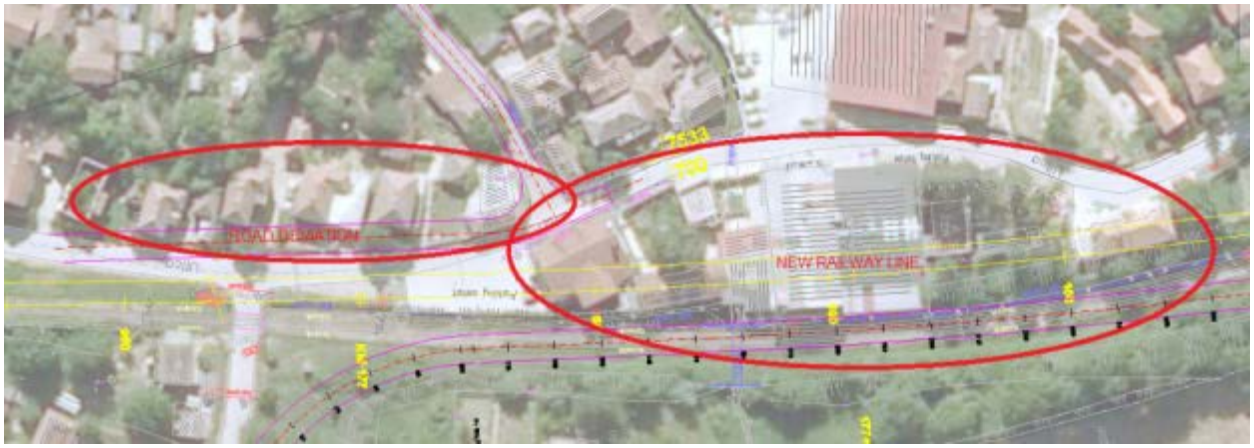

Figure 34 Residential and commercial buildings that are on the route of the new railway line

Some of the properties situated within the new route are shown in Figure 35.

Figure 35 Properties situated within the right-of-way of the new route

About 850 m to the south, there are two additional residential properties which will need to be displaced given that they are situated within the proposed route. The houses are located south of the underpass at km 177+594 (Figure 36).

Figure 36 Two residential properties at the South Morava River bank planned for displacement

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 January 2016 no land has been acquired for the project and no project affected persons have been informed about the development. It is mainly due to Serbian regulatory requirements that do not require public consultation with project affected people before the expropriation. However, there is a possibility of public consultation as part of the Spatial Plan of Special Purpose Area adoption. Presently, the Plan is still under preparation and no public disclosure has been planned yet. Consequently, the cut-off-date has not been established.

According to the regulatory requirements, the Expropriation Study is part of the Main Design. However, the Study is primarily an inventory of affected properties and basic information about registered owners of properties, so that they can be identified and compensated. It does not include the properties without the legal rights on land and does not describe the socio-economic conditions of the affected persons.

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 minimise 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 will need to be developed to set out the measures needed to complete the resettlement in accordance to the EBRD requirements.

5.2.2 Impacts on Land Use

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. At this stage of the project development no precise plan on construction activities is developed, therefore locations of borrow pits and spoil material disposal sites are yet to be decided.

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. At this stage of the project development, no information is available on legal rights to land (public or private) in the affected area.

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**.

5.2.3 Impact on Livelihoods

The impact on livelihoods 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.

Transport and increased traffic are not expected to have significant impacts on livelihoods. Difficulties in accessing land described may be occasional and may impact only individuals. Transport will be carried out primarily via the existing railway line and the main regional transport network. Any businesses along this route are not expected to suffer income losses, as a result of project related increased traffic. While there may be impacts on the quality of life of residents living in these areas, impacts on livelihoods are not expected.

5.2.4 Employment and Procurement Opportunities

Construction of the proposed railway is estimated to last about 4 years and will involve a variety of civil engineering and railway installation works. At this stage of the project no data is available about the number of construction workers involved. However, similar to other infrastructure developments of this scale, the project will have both a direct and indirect effect on employment and procurement opportunities in the region.

Direct employment

The workforce needed during the construction phase will be sourced locally (municipalities of Ćićevac, Ražanj, city of Kruševac) and nationally (from other parts of Serbia) through third party construction firms. Both skilled and semi-skilled workers will be sourced. “Serbian Railways” will select contractors through an open tender. Contractors will hire their existing work force and will hire additional staff if needed. Typically in Serbia, construction firms employ unskilled labour from the local communities, primarily to reduce costs associated with travel and accommodation.

Not all workers will be employed all the time during the 4-year construction period. The frequency at which workers will be employed and the duration of their engagement could not be estimated at the time of developing the ESIA and will depend on the contractors’ organization of work.

The estimated population of all three affected local communities is 42,128 (Section 4.2.4). Employment of locals will give a significant effect on those who are employed but this will be a small portion of the total population. However, the employment of individuals from local communities will be beneficial to improve the local skill set which may be valuable for future projects and reduce influx of labour into the project area and associated negative impacts. This impact has been assessed as **minor beneficial**.

Indirect employment

The creation of indirect employment opportunities is associated with the project’s supply chain (goods and services) and spending of project employees in local communities.

It is highly likely that materials needed for civil works (i.e. cement, gravel), as well as the materials needed for realignment of roads will be procured locally, in the city of Kruševac and Ćićevac Municipality, as they are available in these areas. These materials will be procured by the selected construction contractor.

Employment of non-locals, as well as the increase of incomes of local employees, may also bring in some minor benefits for local communities, associated with increased spending in the project area. Indirect employment is likely to provide more opportunities for women, as opposed to direct employment which will most likely involve more men.

There is no available data from which to estimate levels of indirect employment in Serbia and the impacts will depend on the nature of the local economy, the availability of required goods and services in the project area and ways in which employees choose to spend their earnings. However, impacts related to indirect employment are assessed as **minor beneficial**.

5.2.5 Noise and Vibration Impact

The majority of the proposed route passess through an unpopulated area with noise sensitive receptors present only in the settlement of Stalać. The effects of construction noise and vibration on fauna are considered as part of Chapter 5.1.5. Residential receptors are considered to be of high sensitivity when noise and vibration are concerned.

Guidance on acceptable levels of noise from construction activities is given in British Standard BS 5228:2009. Part 1 of this standard indicates that for long term and large scale activities involving earth movements, noise from daytime construction activities would not be significant if below 55 dB LAeq. For smaller schemes, noise from daytime construction activities would not be significant if below 65 dB LAeq.

The existing daytime ambient noise levels near the residential receptors in Stalać are such that construction activities at 55dB LAeq are likely to be audible at the nearest noise sensitive locations. The nearest noise sensitive receptors to the worksites are approximately 50 m away. Given that the noise levels of the construction activities are about 90dB(A) at 10m, then 55dB LAeq is likely to be temporarily exceeded at the closest receptors.

Table 30 presents a sample of construction working operations and a typical range of associated sound pressure levels at 10m (obtained from BS 5228-1:2009).

Table 30 Sample of construction activities and associated typical sound pressure level data at 10m (BS 5228-1:2009), Free-field dB(A)

Plant / Operation	Sound Pressure Level ($L_{Aeq,T}$ / L_{AFmax} at 10m) from BS 5228 – L_{AFmax} level denoted by
Tracked Excavator – Trenching	71 – 77
Tracked Excavator – Earthworks	68 – 80
Tracked Excavator - Dumping / Spreading Load / Compacting	78 – 86
Driven Piling Rig	61 – 101
Auger Bore Piling Rig	73 – 83
Dumper Truck – Distribution	56 – 92
Dumper Truck - Tipping / Load	74 – 86
Lorry - Pass-by / Movement of Materials	76 – 88
Mixing Concrete – Truck discharging / idling / mixing	71 – 80
Wheeled Crane	70 – 78

There will be noise generated from the concrete batch plants and vehicle movements. Location of the concrete batch plants have not been determined at this stage. The plants will be the focal point for the delivery of aggregates and cement as well as the movement of mixer trucks. Properties near the roads wich will be used for construction traffic (including rotating mixer trucks) have the greatest potential for increases in noise due to construction traffic. Properties within a few metres of a road with increased traffic flows may also be affected by an increase in ground-borne vibration, particularly from heavy vehicles when there are irregularities in the road surface.

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 according to the procedure defined in Traffic Rulebook /Rulebook 2/-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**.

5.2.6 Community Health, Safety and Security Impacts

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. A Construction Traffic Management Plan should be developed and implemented. The plan should be prepared in cooperation with the relevant local traffic authorities, especially where transport is moving through or near settlements or areas with vulnerable road users. If the Plan is implemented and the set of other mitigation measures enforced, 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. A detailed programme of works should be developed and implemented, in accordance with the operating procedures of “Serbian Railways” related to planning of traffic during construction works. If the programme is implemented and the set of traffic safety measures enforced, the significance of the residual impact would be **minor adverse** and **no impact is expected** in respect that construction works could affect the safety of train passengers and crew.

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**.

In case that members of the public access the construction site without authorisation, they will potentially be putting themselves at risk. In order to prevent this, appropriate security features will be implemented, including fencing, sign posting and potentially security personnel. It is therefore expected that the health and safety risk to the general public will be **negligible**.

5.2.7 Impact on Cultural Heritage and Archaeology

The available information on designated cultural heritage and archaeological sites in the study area (Chapter 4) indicates the presence of two sites situated within 250 m of the proposed route (Table 31). Locations of the two sites are provided in the map in Annex 4.

Table 31 Cultural heritage sites within the 250 m perimeter

Cultural heritage	Village	Position in relation to the proposed route	Type of cultural heritage	Sensitivity
Church of St. Panteleimon (cemetery church)	Đunis Nikoljac	180 m south of the proposed railroad	Cultural heritage under preliminary protection	Medium
Archaeological site (remains of the medieval church)	Đunis Nikoljac	210 m south of the proposed railroad	Archaeological site	Medium

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.

5.2.8 Occupational Health and Safety Impacts

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. It is important to ensure that the contractors selected by the “Serbian Railways” will employ workers that are fully trained, have an appropriate awareness of the hazards of working at construction sites and are trained to use and use the appropriate equipment to undertake their tasks in a safe manner. All workers associated with the project, and in particular the site management, will need to be familiar with appropriate safety measures for this type of construction works, starting with undertaking appropriate hazard and risk assessments for all activities. This should be followed by appropriate training, that personnel undertaking hazardous tasks are certified to do so and implementation of specific international requirements for working at height and working in enclosed spaces. A particularly vulnerable group of workers may be associated with the section of the workforce sourced from the local communities who may not have previous experience of working on large scale construction projects.

An overview of the health and safety management and mitigation requirements for the construction phase of the project is presented in Chapter 6.2.5. If the appropriate measures are implemented, the health and safety risk of the project during construction to be **low**.

5.3 Environmental Impacts during Operation

The following sections provide an assessment of the potential impacts of the project activities during the operational phase.

5.3.1 Air Quality Impacts

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. Therefore these have not been assessed. In normal operations there will be no pollutant emissions from vent shafts as there are no air pollutants emitted within the tunnels and indirect emissions from sources such as rail wear and brakes have been assumed to be negligible. Indirect impacts from the operation of the railway will relate to changes in the volume, composition and distribution of road traffic. However, the magnitude of this beneficial effect is analysed in more detail as part of the Cost-Benefit Analysis of the project.

5.3.2 Soil and Groundwater Impacts

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 Đunis, potential sources of soil and groundwater contamination will be limited to accidental spillages or leaks from freight trains or accumulation of heavy metals from herbicides along the right-of-way.

Post-construction soil erosion may continue to occur in the upland part of the railway route, south of Stalać and in the Mojsinje Mountain. The local soil and geological features are susceptible to erosion. Given the slopes and cuttings on the route, the magnitude of effect of potentially non-mitigated erosion would be high, primarily affecting the project operation. It is important to continue with erosion control throughout the project operation. In the event that the control measures are implemented, the residual impact to soil erosion should be **minor adverse**.

Minor leaking of oil, grease and other chemicals from the rolling stock may result in local ballast contamination with hydrocarbons. This effect is expected to be limited, given the construction characteristics of the railway substructure. The ballast is underlined by compacted fill soil which is placed on natural subsoil (also compacted). These substructure layers present a solid protective barrier for propagation of contaminants to soil or subsurface and the sensitivity of receptors is therefore low. The magnitude of this effect to soil and groundwater is considered low. The overall significance of this impact will be **negligible**.

Accidental spillages of hazardous materials during freight transport 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 soil and 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**.

Control of weed and other vegetation along the tracks and the right-of-way will require application of herbicides. If herbicides containing persistent organic pollutants are used it will result in a long-term accumulation of toxic substances in soil along the right-of-way. The proposed route involves areas where farmland soil is likely already affected by individual application of pesticides, therefore its sensitivity is considered medium. Forest soil in the Mojsinje Mountain is natural and assumed to be non-polluted so its sensitivity can be considered high. However, the application of herbicides will be

limited along the narrow strip of the railway line, dedicated for the transport corridor, so its magnitude is considered low. The impact requires implementation of control measures and managing the application of herbicides to reduce unnecessary over use and to reduce the risk of leaching to soil and groundwater. If management measures are implemented, the residual impact on soil should be **negligible**.

5.3.3 Surface Water Impacts

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 South 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.

The embankment proposed at km 187+550 will be about 6 m high and will pass along the South Morava River flood plain. The construction of embankments in the low-lying areas susceptible to flooding may result in a barrier effect to the natural surface water run-off. The project design will define the drainage characteristics of the embankment so that it does not impact the natural flood plain capacity and potentially affect the upstream areas. The significance of the embankment residual impact to the natural surface water run-off is assessed as **minor adverse**.

Due to the relatively small footprint of the bridge piers compared to the size of the river (designed width of piers foundations is 2.0 m, the riverbed is about 60 m wide), the piers footprint will occupy about 6% of the cross-sectional area of the River. The magnitude of potential effect of piers being barriers in the River, affecting the natural processes of erosion and deposition and alteration of the water flow is considered low. It is therefore assessed that the operational impacts on the River hydromorphology and flow restrictions will be **minor adverse**.

Run-off from the railway line will be contained by the track drainage system. The regular operation of the railway does not affect the run-off which might contain residues of pollutants from the ballast (e.g. herbicides, hydrocarbons) in concentrations that are limited and not likely to contribute to exceedance of the surface water quality standards. The magnitude of this effect is considered low. The significance of surface water impact during the regular railway operation is **minor adverse**.

In the event of accidental leakage or spillage of hazardous materials on any of the bridges, the surface water recipient would be affected. All surface water recipients crossed by the railway line are considered highly sensitive to the effect of accidental spillage. Given the length (311 m), the bridge crossing the South Morava presents the most sensitive section. Depending on the hazardous material and the volume released, the magnitude of this effect would be considered medium to high and the significance of non-mitigated impact would be **moderate to major**. The prevention of accidents that may have environmental consequences should be managed by implementation of suitable management systems. The minimisation of accident-related impacts should be implemented by control measures on bridges. If management and control measures are enforced, the risk of accident will be low and the significance of residual impact should be **minor adverse**.

The maintenance work on bridges will involve cleaning, paint removal, re-painting, application of track de-icing and grease and is likely to generate run-off that, if uncontrolled, might be directly discharged to the surface water recipients. The magnitude of this effect depends on the volume and type of hazardous material used and is considered to be low to medium. The sensitivity of surface water recipients in the project area is medium so the significance of potential impact is assessed as minor to moderate adverse. Control measures of painting, application of de-icing fluids and track grease

should be implemented and any run-off contained and treated. Usage of caustic and acid solutions for cleaning should be avoided where possible. This would reduce the residual impact to **minor adverse**.

No rolling-stock maintenance and associated effluent discharges are planned in Stalać and Đunis stations. Run-off from the parking areas in Stalać and Đunis will be contained and treated in oil and silt traps prior to discharge to the sewage. If run-off treatment units are regularly maintained, there should be **no impact** on surface water.

Given that no municipal sewage systems exist in Stalać and Đunis, sanitary wastewater will be treated in septic tanks. Sanitary wastewater shall be discharged to surface water recipient only if effluent can meet the related Serbian standards for effluent discharge into surface water. If treatment of effluent on-site is unfeasible, the septic tanks should be regularly emptied by local licensed companies and sludge disposed in accordance with Serbian regulatory requirements. In the event that sanitary wastewater issue is managed, there will be **no impact** on surface water.

5.3.4 Impact on Ecology and Nature Conservation

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.

About 40% of length of the proposed route will pass through tunnels, the majority of which are proposed in shrub and woodland habitats south of Stalać (low to medium ecological value) and the nature designated area of Mojsinje Mountain (medium to high ecological value). Both areas are characterised by rich terrestrial fauna, including the reptile species of conservation concern. Particularly tortoise species (*Testudo Hermanni*) may be affected if stuck on the tracks and could cause a rail malfunctions and delays if stuck in the train switches. The Mojsinje Mountain habitats also support diversity of other fauna species (mammals, birds, bats). The tunnelling in both areas will to a large extent provide habitat continuity and greatly minimise the effect of habitat fragmentation or disturbance of bat roosts sites. It will also reduce the risk of animal mortality due to collision with trains. The magnitude of habitat fragmentation in these two areas is therefore considered low and the impact significance is **minor adverse**. The viaduct and overpass are proposed along the cultivated land, upon the exit from the Mojsinje Mountain tunnel and are not expected to have an effect on habitat fragmentation. The last railway section along the 4 km-long embankment to Đunis will cross the flood plain with farmland. Semi-natural arable farmland habitats south of Stalać and between Trubarevo and Đunis have the potential to accommodate small mammals (rodents) and reptiles. The magnitude of habitat fragmentation in the arable land areas is considered to be medium. However, due to use of pesticides, these habitats are sub-optimal for these species so the significant numbers are unlikely to be present and the significance of this impact is minor adverse. Habitats in Stalać and Đunis settlements have been affected by rural residential developments and as such have low ecological value for ground small mammals and reptiles. The magnitude of habitat fragmentation is considered to be low and the significance of impact in Stalać and Đunis is negligible. The overall significance of habitat fragmentation effect is assessed as **minor adverse**.

To ensure the conservation of species in the project area, the Biodiversity Management Plan should 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 (Off. Journal of RS, No. 72/2010). Underpasses, overpasses and bio-corridors should be considered, designed, sized and located for amphibians, small and large mammals and reptiles, including the specific underpasses for Hermann's tortoise (*Testudo Hermanni*).

The proposed railway is not expected to disturb bats in moving between between breeding sites, hibernation sites and other roosts which they commonly utilise. It cannot be excluded that bats use linear structures such as the South Morava waterway as flyway corridors. The construction of the

proposed bridge will cross this corridor, however most bat species are expected to fly either underneath or over the bridge. Although there is a risk of individual bats being killed or injured by collision with trains, the risks are considered to be minimal and there is **not likely to be a significant effect** on the conservation status of any of the bat species.

The noise, vibration and light from passing trains has the potential to disturb birds and bats within habitats close to the proposed railway. The impact of train noise on birds has not been clearly evidenced yet. There is some literature information to suggest that breeding birds and some bat species might be affected by persistent noise from busy roads due to birds being unable to hear each-other songs and bats having reduced foraging success. However, this is not expected to occur with the proposed railway as the majority of bird and bats-supporting habitats along the route will be passed in tunnels and the noise from the railway is regular but temporary (intermittent). The significance of effect of train noise to the breeding birds and foraging is therefore considered **minor adverse**.

5.3.5 Waste Impacts

Waste that will be generated during the railway operation will be primarily food, paper and packaging waste, coming from passengers that will use the stations in Stalać and Đunis. Waste from passenger trains will not be removed in Stalać and Đunis, given that there are no facilities for cleaning trains and they are not generally terminating railway stations.

Rolling stock maintenance waste will not be generated as there will not be any rolling stock maintenance depots from Stalać to Đunis.

Track maintenance waste and ancillary infrastructure waste can be expected along the route and their quantities will depend on the maintenance activity. Waste will be removed from the route immediately upon completion of the work and is not planned to be stored in Stalać or Đunis. Field maintenance equipment will not be maintained in Stalać or Đunis.

The magnitude of this effect is considered low. As appropriate number of waste bins and containers will be provided in the stations and cooperation with local public utility companies for waste disposal continued, the significance of this impact is assessed as **negligible**.

5.3.6 Landscape and Visual Impacts

During the railway operation, the principal effects on landscape and visual receptors will be a result of the vertical structures (bridges, tunnel portals, embankment, viaduct, overpass, underpasses and electricity poles). The effect on landscape largely depends upon a combination of land use and topographic features. The significance of impact on receptors is based on sensitivity of receptor as well as the special nature of the view.

Landscape impacts

Effects on Vegetation and Land Cover

The railway development will result in loss of landscape features such as agricultural fields and woodland. The most affected areas will be between Trubarevo and Đunis (loss of agricultural land), south of Stalać (loss of woodland), the South Morava River bridge (loss of riparian vegetation) and the Mojsinje Mountain (areas of tunnel portals and the gallery). The parts of land cover that would be lost to the project are considered minor compared to the remaining vegetation and land cover. As such, the magnitude of change is considered to be low. The low magnitude of change assessed alongside moderate to low sensitivity in terms of land cover will result in **minor adverse impact**.

Effects on Landscape Character

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 Đunis 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.

Effects on Land Use

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**.

Effects on Designated Areas

As previously acknowledged, the proposed project passes through the nature designated area – ecological network of the Mojsinje Mountain and the Stalać Gorge on the South 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 South 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**.

To illustrate the scale of expected changes in the landscape character, a set of aerial visualisations of the proposed railway has been provided from Figure 37 to Figure 42.

Figure 37 Aerial visualisation of Stalać station

Figure 38 Aerial visualisation of the area of tunnel 1 portal entrance

Figure 39 Aerial visualisation of the area of tunnel 2, the South Morava bridge and tunnel 3

Figure 40 Aerial visualisation of the exit portal of tunnel 5 and viaduct at km. 186+846

Figure 41 Aerial visualisation of the area of overpass at 189+098

Figure 42 Aerial visualisation of Đunis station

Visual impacts

Exposure of sensitive receptors (neighbouring residents, travellers, agriculture workers and those seeking recreation in a specific area) to the permanent alteration of perspectives and views has been analysed in Table 32.

Table 32 Assessment of operation effects on visual receptors

	Visual receptor	Receptor Sensitivity	Effect Magnitude	Significance of impact
1.	Residential receptors in Stalać	Medium	Medium There will be open views to the route	Moderate adverse
2.	Residential receptors in Mojsinje, Cerovo, Trubarevo	Medium	Medium There will be open views to the route, viaduct and embankment across the adjacent agricultural field.	Moderate adverse
3.	Residential receptors in Đunis	Medium	Low There will be open views to the route but limited number of houses affected.	Moderate adverse
4.	People in work in the countryside	Medium	Low There will be open views to the route at certain viewpoints.	Moderate adverse
5.	Recreational receptors	Medium	Low There will be open views to the route at certain viewpoints.	Moderate adverse
6.	People travelling along: the existing railway line Stalać – Đunis and the municipal road Stalać – Đunis	Low	Low Railway structures will be seen only at certain viewpoints and over short time periods.	Minor adverse

5.4 Social Impacts during Operation

5.4.1 Noise and Vibration Impacts

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. As the affected area has already been located in the vicinity of the existing railway line, it could not be considered a strictly residential zone. Therefore, the noise limit values for Zone No. 5 have been applied: city centre, workshop area, commercial area, administrative area with apartments, zones along highway, regional roads and city streets. The daytime and evening noise limit is 65 dB(A) and night-time limit is 55 dB(A).

During the preparation of the Main design for the project, a detailed noise modelling will be conducted and the Noise Study produced in order to determine the required parameters of the noise barriers. In case that noise modelling indicates the expected noise level to exceed the legal limit, noise insulation of windows will be offered for the affected receptors.

Upon implementation of proposed mitigation measures, the residual impact of noise and vibration is assessed as **minor adverse to negligible**.

5.4.2 Community Health, Safety and Security Impacts

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).

General operational safety of the railway could affect both crew and passengers by threat of injury or potential loss of life due to train collisions or derailment or other operational causes. To prevent the risk, the set of precautionary measures should be implemented, including rail operational safety procedures, regular inspection and maintenance of the rail lines and implementation of a safety management program equivalent to internationally recognised (EU) railway safety programs. If appropriate measures are implemented the risk of collision and derailment should be **low**.

Level crossings safety on the proposed railway project will be significantly improved when compared to the present condition. The proposed project envisages only grade separated railway-road crossings (underpasses and overpasses) thus eliminating the safety risks. **No impact is expected** in respect to this issue. The proposed project will contribute to the improvement of the traffic safety conditions in the area.

“Serbian Railways” provide transport of hazardous goods for third-parties along the proposed railway and do not have a full control over the risks involved given that tank cars and their condition is most often a third-party responsibility. The proposed project will replace the existing railway infrastructure which is in a poor condition and has a high risk of accidents due to potential derailment. The proposed project will contribute to the improvement of the hazardous materials transport safety conditions in the area.

Transport of dangerous goods represents a potential environmental risk in the event of accidents, through valve leakage, safety valve releases, in pressurised and general service tank cars, or other hazardous material containers. The magnitude of this potential effect can be in range from low to major, depending on the specific accident. The initial significance of the potential impact is assessed as major adverse. However, the set of preventive measures will be proposed, including the proper

screening acceptance procedure, development of the Emergency Preparedness and Response Plan (including Spillage Response Plan), timing of transport, limiting train speeds in order to minimise the risks, etc. If appropriate measures are implemented the risk of chemical accident to affect the local community health should be **low**.

Pedestrian safety may be affected in case of trespassing on rail tracks, electrical lines and equipment and facilities. People in the project area have not been used to trains running at speeds up to 160 km/h. The principal method of controlling this risk is education, local presence with information and warning devices, fencing (where appropriate), clear indication of pedestrian routes in stations, etc. If preventive measures are implemented the risk for pedestrian safety should be **low**.

Electro-magnetic fields from the railway traction power system can cause electromagnetic interference to other electric/electronic equipment (communications) or infrastructure (power lines) or TV signal. The EMI issue is not expected to be significant at the proposed route, primarily because electromagnetic fields extend over relatively short distances. There will be no residential receptors closer than 25 m to the railway line. If it is assumed that acceptable levels are achieved on the railway itself, any residual risk to nearby receptors (e.g. residential properties, businesses or communications infrastructure) will be **negligible**.

5.4.3 Occupational Health and Safety Impacts

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. “Serbian Railways” has already established a certain system, complying with the national regulatory requirements. The permanent workers including the management are familiar with appropriate safety measures for railway operation. In addition, all personnel undertaking hazardous work should be certified to do so and international requirements for working in areas with the risk of electrocution should be implemented. An overview of the health and safety management and mitigation requirements for the proposed railway during the operational phase is presented in Chapter 6.4.5. In the event that the appropriate measures are implemented, the residual risk is classified as **low**.

5.5 Cumulative Impacts

Cumulative effects are those that result from a combination of a number of individual effects. They can be either temporary or permanent and can arise from the following:

- a number of individual environmental impacts (e.g. noise, dust and traffic) on a receptor that, in combination, are likely to have a significant effect;
- the accumulation of individual effects on a type of receptor (e.g. an ecological species) which when summed in a regional context or across the proposed route, are likely to result in an effect of greater significance than the sum of the individual effects; and
- the effects from other developments in the vicinity of the proposed route (during their construction or operation), which when combined with the effects of the proposed railway are likely to have an incrementally significant effect on the receptors that experience both effects.

Information about the major infrastructure or related developments currently proposed in the region have been obtained from the relevant spatial planning documents, namely: the Spatial plan of Ćićevac Municipality (2008-2020) and the Spatial plan of Kruševac city (2011-2020).

The proposed project is currently the only infrastructure project planned in the project area. The area is not located close to any national road corridors planned for upgrade or development. The developments planned in the area are related to the rehabilitation of the IIA category of the state road connecting Đunis to Kruševac and Đunis to Deligrad (E-75 motorway) and construction of the sewage system in the settlements of Stalać and Đunis but no time frame has been provided for these developments.

Since the project is the only infrastructure in the area and no other large scale local construction projects have been identified, no other effects are expected which can be considered as cumulative effects. Therefore, there are **no cumulative impacts** expected as a result of the proposed railway.

6 Management and Mitigation

This section outlines the management and mitigation requirements associated with actual and potential impacts identified throughout the project phases.

The management and mitigation measures identified should be detailed in appropriate environmental management plans. The plans are documents that should detail methods and procedures for management and mitigation of issues and should be applicable to the phase of the project, namely:

- Construction Management Plan (CEMP) for construction phase;
- Operation Management Plan (OEMP) for operation phase;
- Decommissioning Management Plan (DEMP) for decommissioning phase of the existing railway.

The plans should be supported by a suite of other environmental management plans developed to address specific environmental and social risks during construction and operation of the project ("sub-plans"). The sub-plans are either specifically required by the EBRD Policy or are developed to address the specific issue. These plans should include the following:

- Resettlement Action Plan (RAP);
- Biodiversity Management Plan (BMP);
- Construction Traffic Management Plan;
- Construction Dust Management Plan;
- Construction River Crossings Plan;
- Construction Waste Management Plan;
- Construction Emergency Preparedness and Response Plan;
- Operational Emergency Preparedness and Response Plan including Chemical Accident and Spill Response Plan.

The plans should remain up to date and accurate, based on the activities undertaken in the project. The plans should encompass all of the issues described in this ESIA, as well as any other requirements or conditions set by the regulatory authorities.

The implementation of the plans should be through a robust management system (Environmental and Social Management System), incorporating the requirements of environmental, health and safety, and any other requirements including issues associated with members of the public.

6.1 Environmental Mitigation Measures during Construction

The following sections provide an overview of the management and mitigation measures required during construction, based on the findings of the impact assessment. The impacts associated with the construction of the project are most severe of all the project phases.

6.1.1 Ambient Air Quality

“Serbian Railways” will require its contractors to manage dust, air pollution and exhaust emission during the construction works in accordance with Best Management Practice. This will include the following, as appropriate:

- Where reasonably practicable, the construction site layout will be planned to locate plants, machinery and dust-generating activities away from sensitive receptors;
- Barriers along the construction site boundary will be used, where appropriate, to mitigate the spread of dust to any sensitive environmental receptors;
- Deliveries or loads entering and leaving the construction site will be covered. This will apply to the transport of materials by road and rail;
- Vehicles transporting materials within or outside the construction site will not be overloaded;
- Speed limits on haul roads will be enforced and vehicle speeds on the construction site will be minimised;
- Haul routes will be regularly inspected and promptly repaired, if required;
- During dry weather conditions: supressing of dust will be enforced on haul routes, in vehicle waiting areas and areas where sensitive receptors are likely to be affected. This will include watering / sprinkling;
- Stockpile areas will be kept away from sensitive receptors (including natural and historic features) and watercourses. Stockpiles will be covered or enclosed and stabilised, as appropriate.
- Drop heights from excavators to vehicles involved in the transport of excavated material will be kept to the reasonably practicable minimum;
- Topsoil will be stripped as close as reasonably practicable to the period of excavation or other earthworks activities to avoid risks associated with run-off or dust generation;
- Mixing of large quantities of concrete or bentonite slurries will be undertaken in enclosed or shielded areas;
- Soil spreading, seeding, planting or sealing of completed earthworks will be undertaken as soon as reasonably practicable following completion of the earthworks;
- All plants, vehicles and machinery used during construction will have evidence of compliance with applicable Serbian and EU standards and will be regularly maintained throughout the construction period.
- Buildings or structures to be demolished will be sprayed with water or screened as necessary, prior to and during demolition;
- Rubble chutes will be shielded or enclosed or water will be used to suppress dust emissions from such equipment.

6.1.2 Soil and Erosion

Measures will be implemented by the selected contractor to mitigate potential avoidable impacts on soils, including erosion. This will include the following:

- The maximum width of the work corridor will be clearly defined and limitations of haul routes for material supply will be strictly limited;
- Major earthworks will be scheduled to low-rainfall season;
- Appropriate specifically designed areas for the temporary stockpiling of construction materials will be identified including “no-go” areas or specific sensitive locations (ecology receptors,

sloping areas or areas that are susceptible to erosion, river flood plains); “no-go” areas boundaries will be physically demarcated, if appropriate;

- Handling and storage of agricultural and forestry soils will include the separate handling and storage of different soils, particularly topsoils and subsoils;
- Topsoil removal and stockpiling will be ceased if topsoil is saturated with water; soil compaction and long-term damage to soil structure will be avoided by handling soils that are in a suitably dry condition and not during wet weather;
- Removed topsoil will be preserved for re-use/landscaping;
- Topsoil stockpiles will have adequate height and slope gradient and their erosion will be prevented by controlled compacting to the level that presents no threat of development of anaerobic processes;
- Surface run-off from construction sites (including topsoil stockpiles) will be facilitated by adequate drainage;
- Clearance operations and soil stripping will be organised to minimise erosion risks (e.g. movement of machinery in parallel to contour lines; starting from higher ground and moving downward);
- Appropriate solutions (technical, bio-engineering) will be adopted to avoid or protect against erosion, rock fall or landslides from cleared areas, exposed slopes etc.
- Gradual revegetation of exposed areas that are prone to erosion (e.g. steep slopes, river banks etc.) will be undertaken;
- Where appropriate, snowdrift-protection fences will be arranged to stabilise cut slope and protect the rails from snowdrift during heavy snows in winter;
- Pollution control measures will be implemented at construction sites (concrete batch plant, storage areas, workshops, fuelling facilities, parking areas), including provision of sealed surfaces and oil separators, according to the Serbian regulatory requirements and international best practice;
- Procedures for spill prevention, response and clean-up for construction equipment will be defined and implemented;
- Upon completion of construction, works areas will be restored to their previous condition, including ripping of compacted soils, landscaping and re-vegetation as appropriate;
- Where land used temporarily for construction is to be reinstated to agricultural and forestry use, reinstatement works will be implemented in accordance with the contract specification and will be carried out under appropriately qualified supervision.

6.1.3 Surface Water and Groundwater

“Serbian Railways” will require its contractors to manage their site activities and working methods to protect the quality of surface water and groundwater from adverse effects through controls to manage the rate and volume of run-off.

- Construction works will be scheduled to low-rainfall season/low-flow periods;
- Creation of steep slopes and large exposed areas in proximity to rivers will be minimised;
- Measures to contain and manage surface water run-off from the construction site will be implemented and requirements of the relevant authorities fulfilled;
- Suitable construction site drainage system will be provided including cut-off valves, ditches or drains and sustainable drainage systems, or equivalent, with suitably sized treatment facilities such as settlement or detention basins;
- Oil separators will be used, if required by the relevant authority at site offices and works compounds;
- A Construction River Crossings Plan should be developed and implemented and set the environmental requirements and control measures during the construction works near the waterways including the in-water works;

- Necessary approvals will be obtained for discharge of dewatering, surface water run-off and wastewater from the construction site to watercourses or disposal off-site;
- Watercourses and associated land drainage within or adjacent to construction sites will be protected in accordance with requirements set out by the relevant authority; This will include appropriate precautions when working in the watercourses or adjacent to watercourses, diversion of streams, construction of new culverts;
- Where appropriate, works in watercourses will involve installation of the discharge point for the pumped water (depending on the quantities of pumped water erosion protection measures may be required);
- Storage of major earthwork stockpiles, hazardous materials (oil, paints), parking of machinery, disposal of waste is not allowed by the relevant authority[14] and will be away from watercourses and flood prone areas;
- Establishing and operation of concrete batching plants will be compliant to requirements set by the relevant authorities. Wash water from batching plants will not be discharged to watercourses unless approved by the relevant authority;
- Sanitary wastewater from workers facilities will be contained by temporary sewer facilities and disposed off-site by licensed contractors or connected to local sewer system where present;
- Construction activities will be undertaken to avoid any significant increase of flood risk, including measures such as keeping watercourses clear of obstructions and debris to reduce blockage risk
- Suitable access and safe refuges will be identified for use in the event of a flood. Appropriate maintenance access will be made available to watercourses, if required;
- In the areas at risk of flooding, the contractors will consult the relevant water management authorities and fulfill any requirements for works within areas at risk of flooding;
- Emergency response plan (including spill management) will be implemented, addressing any common risks or impacts, defining response, responsibilities, equipment, training needs for staff at the site, etc;
- In the areas where hazardous materials and waste will be stores, secondary containment will be provided to retain any leakage and emptied at regular intervals to prevent overflow; Spillage kits will be stored at key locations on site and in particular at refuelling areas; staff will be trained in their use;
- Restoration and re-vegetation of work site areas or gradual re-vegetation as construction proceeds will be implemented.

6.1.4 Ecology and Nature Conservation

"Serbian Railways" will require from the contractors to protect the ecology of the project area with special attention to ecological values of the designated ecological network – the Mojsinje Mountain and the Stalać Gorge on the South Morava River. This will include the following:

- 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. It will include individual habitats or species management plans, including the IUCN Red List of Threatened Species. The BMP will include the necessary assessments needed to fully comply to the EU Habitats and Birds Directives;
- Abutments of the proposed bridges will be designed to retain habitats along the waterways and associated movement of species;
- Construction activities will be scheduled to avoid or to be restricted during the fauna-sensitive periods (breeding/spawning/mating/migration of potentially affected species);

[14] Decision on Nature Conservation Requirements for the Project issued for the Preliminary Design - Institute for Nature Conservation, 17.12.2015.

- Works in the watercourses will be timed with due regard to mitigate potential impacts to migratory fish, mammals, birds, amphibians and invertebrates;
- Where practicable, any habitat loss will be reduced by keeping the working area to the minimum required for construction; Clearance within the ecological network area will be strictly minimised, including marking of construction footprints before commencing vegetation clearing and minimisation of other mechanical operations to the technically required minimum;
- Clearance of forest vegetation will be undertaken in accordance with the requirements set by the relevant forest management body “Srbijašume”. Selection of woodland to be cleared will be done by an authorised representative of “Srbijašume” and will involve physical marking of trees; Cleared timber will be controlled and properly stored prior to delivery to the land owner or user;
- Drainage of swampy areas in the South Morava River alluvial plain will be avoided or minimised;
- Construction areas will have barriers or fences to control animal movement during and post-construction;
- In case that winter snake refuges (hibernaculums) are discovered during the earthworks, the works will be ceased and the relevant authority (the Institute for Nature Conservation) contacted to relocate them.
- Upon completion of construction works, complete restoration of sites will be undertaken to restore the previously existing conditions. This will include soil rehabilitation, plantations of native trees and shrubs or other vegetation, as appropriate;
- Control and treatment of invasive, non-native species and weeds will be implemented along the route.

6.1.5 Excavated Materials and Waste Management

“Serbian Railways” will require from the contractors to minimise the waste generated from their construction activities where practicable. Waste management measures will be enforced that facilitate the re-use and recovery of excavated material and diversion of waste from landfilling in line with the waste hierarchy (prevention, re-use, recycling, recovery, and disposal).

- A Construction Waste Management Plan (CWMP) will be prepared and maintained by the lead contractors. The Plan will identify the specific types and quantities of waste likely to arise during the construction process, including: excavated materials, construction, demolition and excavation waste;
- The majority of excavated material that will be generated will be reused, if suitable, either as engineering fill material or in the environmental mitigation earthworks of the project;
- The surplus excavated material will be used in other construction projects or flood protection in the region where opportunities arise;
- If excavated material is not suitable as engineering fill, the opportunities will be searched to find the appropriate utilisation (regional construction projects, flood protection, etc.);
- Where generated, waste will be classified in accordance with the Serbian regulatory requirements on inert, non-hazardous and hazardous waste;
- Mixing of inert, hazardous and non-hazardous waste, either during collection or storage will not be permitted;
- Waste will be segregated and stored in containers (skips) and other storage vessels, clearly labelled, sheeted or closed when waste is not disposed in them;
- Plastic sheeting will be used to prevent leaching from waste soils and aggregates where these are not contained within skips or other storage vessels;
- Liquid wastes will be stored on hard-surfaced areas with secondary containment to prevent spillages;
- Any removal of waste from site will be done by licensed sub-contractors in compliance to the Serbian regulatory requirements on transfer, treatment and disposal of waste and accompanied with appropriate documentation;

- A pre-demolition asbestos survey will be undertaken on all buildings to be demolished (in Stalać) or refurbished (in Stalać and Đunis) to identify the presence of any asbestos-containing materials (ACM) that may be present. Where identified, ACM will be removed by licensed asbestos removal contractor and managed in accordance with the Serbian regulatory requirements on asbestos-containing waste.
- A Decommissioning Waste Management Plan (DWMP) for the existing railway line will be prepared and maintained by the lead contractors. The Plan will identify the specific types and quantities of waste likely to arise during the decommissioning work, including: tracks, wooden sleepers, OCL and other material, hazardous and non-hazardous;
- 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;
- Decommissioned wooden sleepers will be temporarily stored near the decommissioning areas, covered and protected from rainfall or lined with run-off collectors. Waste sleepers will be delivered to a licensed waste sub-contractor as soon as possible and in compliance to the Serbian regulatory requirements on transfer, treatment and disposal of waste, accompanied with appropriate documentation.

6.1.6 Landscape and Visual

The selected contractors will be required by “Serbain Railways” to put in place appropriate controls to protect the visual amenity from construction activities, including rural, urban, and recreational areas. Controls will include, as appropriate:

- Existing vegetation will be preserved as much as possible. Vegetation clearance will ensure only limited vegetation is cleared to facilitate construction access and operations;
- Planting and other landscape measures will be implemented as early as is reasonably practicable where there is no conflict with construction activities or other requirements of the proposed project;
- Relevant local authorities (where they have an interest) will be consulted, as appropriate, regarding the planting proposals;
- Planting and seeding works will follow best practice and will be approved of the relevant authority.

6.2 Social Mitigation Measures during Construction

6.2.1 Land and Property

"Serbian Railways" will ensure that effects of physical and economic displacement are minimised and that people affected by the project will be compensated in accordance to the principles set in the Resettlement Compensation Framework (Annex 5):

- A detailed socio-economic assessment will be undertaken to identify impacts on people affected by the project, including land acquisition impacts and restriction to land use;
- A census will carried out to determine: persons to be displaced by the project, persons that are eligible for compensation and assistance, inventory of affected land and property;
- A Resettlement Action Plan (RAP) will be prepared, based on the Expropriation Study, the socio-economic assessment and the census. It will detail the impacts of the project on land ownership, land use, property and livelihoods. The RAP will set out the resettlement-specific stakeholders and the consultations that are required, and will set out the measures needed to address gaps between national laws and EBRD requirements, including how those will be addressed in practice;
- The amount of land occupied / disrupted during construction will be minimised;
- Users of land will be timely informed when construction is planned to begin and how lost crops and damages will be compensated;
- All users of land whose crops are lost or affected by any other damage during construction will be compensated at full replacement value, in accordance with the Serbian Law on Planning and Construction and the EBRD Policy;
- Any business losses will be compensated at full replacement value, in accordance with the Serbian legislation and the EBRD Policy;
- Grievance mechanism will be established;
- Temporary affected land will be reinstated / restored to its pre-construction condition.
- If compensation alone is not sufficient to restore livelihoods, implement livelihood restoration measures in accordance with IFI policies.

6.2.2 Noise and Vibration

"Serbian Railways" will require from the contractors to minimise noise and vibration at neighbouring residential properties and other sensitive receptors (including ecological receptors, local businesses, etc) arising from construction activities. The following measures will be implemented:

- Noise and vibration affected residential or business receptors will be timely informed on the construction activity through appropriate communication channels;
- All staff will be briefed on the requirement to minimise nuisance from construction activities;
- Where appropriate, haul routes for construction material will avoid additional nuisance in residential areas or at sensitive sites;
- Construction operations will have agreed and limited site working hours for "normal" construction activities; works that require working outside of normal working hours will be minimized;
- Best Practicable Means will be used during construction work;
- Where appropriate, silenced / enclosed construction equipment / machinery will be utilised;
- All plants, vehicles and machinery used during construction will be regularly maintained and turned-off when not in use;
- During taking significantly noisy or vibration-causing operations near to sensitive locations (e.g. tunneling), agreed criteria for works will be established.

6.2.3 Cultural Heritage

"Serbian Railways" and its contractors will manage the impact of construction works on cultural heritage including both designated and potentially discovered heritage.

- Archaeological surveillance of construction works will be undertkane in the areas determined by the Institute for Protection of Cultural Monuments from Kraljevo;
- "Serbian Railways" will ensure the contractors will develop and implement a chance finds procedure. This will include notification of the Institute for Protection of Cultural Monuments from Kraljevo of found objects, alerting project personnel to the possibility of chance finds being discovered and preventing any disturbance or destruction.
- The contractors will be required to ensure that appropriate management systems and training are in place to implement the procedure.

6.2.4 Community Health and Safety and Security

"Serbian Railways" and their contractors will ensure that health, safety and security of the local community members and passengers and crew on the existing railway will not be affected during the construction works and any unavoidable temporary effects will be mitigated. This will include mitigation of impacts from construction traffic, minimisation of rail traffic disruptions and maintenance the public access wherever practicable:

- A Construction Traffic Management Plan (CTMP) will be prepared and implemented in consultation with road and traffic authorities and emergency services; The Plan will include haul routes, access to the construction site, traffic diversions, exceptional loads, speed limit controls on and off-site, and driver training. The Plan will cover transport of all types of construction materials to be brought or removed from the site.
- Local community will be timely informed on temporary and permanent closures of roads;
- Affected roads will be cleared and cleaned from mud and other debris once the work affecting them is completed;
- A detailed programme of works related to the intersection points of the existing and the proposed railway will be developed and implemented. The programme will involve planning of works in the limited time period, traffic safety measures during works, etc.
- Contractors will be encouraged to hire workforce from local communities;
- Workers Code of Conduct will be enforced, including guidelines on safe driving;
- Properties with restricted access will be provided with temporary access and where necessary, appropriate drainage to minimize nuisance for local residents or business owners;
- Affected population and stakeholders will be consulted timely and grievance mechanism will be developed and implemented;
- Local community will be timely informed on temporary restrictions in their activities such as hunting, harvesting of forest food, or recreation;
- Construction compounds, work sites and other contractors' offices will be marked, fenced and secured from an unauthorised access;

6.2.5 Occupational Health and Safety

"Serbian Railways" will ensure that the contractor will establish a Health and Safety Construction Plan with special focus on (but not limited to): movement of vehicles and traffic management, working at heights, working in confined spaces, working with hazardous material (e.g. explosives), management of electrical hazards, prevention of unintended ground movements and collapse, and biological hazards (poisonous snakes). Contractual conditions will ensure that all sub-contractors follow the H&S Construction Plan.

There will be a set of general site rules that must be followed by all construction workers. Examples of these are below:

- Individuals must register upon arrival and sign out when departing from site;
- Individuals must be site inducted before commencing work;
- Alcoholic beverages and prohibited drugs are strictly forbidden. Operatives taking prescribed drugs are required to notify the site manager / H&S officer;
- The wearing of safety helmets, safety glasses, gloves, high visibility coats / vests and safety boots which provide ankle support will be mandatory while on site. Ear defenders must be carried at all times. Additional PPE shall be worn as deemed appropriate by risk assessment. Suitable work wear must be worn at all times;
- All accidents, incidents, injuries and near misses must be reported to the HSE officer. All injuries (however small) must receive medical treatment from a qualified first aider;
- The instruction or command depicted on safety signs must be complied with at all times;
- Individuals may only carry out tasks for which they are competent and authorised to do. Individuals may only operate and use plant or equipment for which they are trained and authorised. Copies of all operators certificates will be retained;
- Smoking will only be allowed in the designated smoking areas. Smoking inside the site establishment cabins will be strictly forbidden;
- Weapons and explosives will be strictly forbidden;
- Fighting, gambling, horseplay, and practical jokes will be strictly forbidden;
- Any query from the general public must be politely referred to the site manager / HSE officer.
- No food is to be consumed at the work area. Welfare facilities are to be provided on site for the consumption of food and for personal hygiene. These will be kept clean and hygienic;
- No person under the age of 18 years will be engaged for work activities on site without the prior approval of the site manager;
- Defective or suspect plant will be tagged and withdrawn from use and not used until repaired or replaced; and
- Waste and debris will be cleared up as work progresses.

Specific precautionary measures will include, but not limited to the following:

- Construction plant and equipment used on the project will be inspected by the contractor for condition and suitability and be subject to verification of maintenance certificates or records, statutory or otherwise, prior to being put to use. All equipment will carry a suitable and valid examination certificate. Operations using heavy plant and equipment will be undertaken and supervised by a suitably competent person;
- Site-specific factors which may contribute to excavation slope instability will be controlled (including the use of excavation dewatering, side-walls support, and slope gradient adjustments that eliminate or minimize the risk of collapse, entrapment, or drowning);
- During blasting operations, work areas will be evacuated, and blast mats or other means of deflection will be used to minimise fly rock or ejection of demolition debris (if work is conducted in proximity to people or structures);
- During tunnelling fresh air will be supplied to all underground work areas in sufficient amounts to prevent any dangerous or harmful accumulation of dusts, fumes, mists, vapours, or gases;

- Safe means of access and egress from excavations will be provided, such as graded slopes, graded access route, or stairs and ladders;
- Workers undertaking hazardous tasks will be certified to do so;
- Specific safety rules will be set up to be followed when working near live electrical equipment. A specific permit to work system will be in place for such work;
- Slips and falls will be avoided where possible through good housekeeping, spill prevention and cleanup, avoiding uncontrolled use of ropes and cords, proper storage of construction materials and the use of slip resistant footwear;
- The use of hazardous substances will be in compliance with various EU Directives, including 80/1107/EEC on protection or workers from the risks related to exposure to chemical, physical and biological agents at work, and Directive 1907/2006 on the registration, evaluation, authorisation and restriction of chemicals (REACH). Appropriate health and safety assessments will be undertaken, including handling, storage, transfer and use. A register and site inventory of hazardous materials will be kept;
- Emergency contact numbers will be made available at the work sites. This will include the fire and rescue service and the environmental inspection. A 24-hour spill response contract will also be in place.

6.3 Environmental Mitigation Measures during Operation

The following sections provide an overview of the management and mitigation measures required during operation, based on the findings of the impact assessment. The impacts associated with the operational phase of the project are not as widespread and severe as during construction. However, where the impacts associated with specific receptors have been identified to be severe if appropriate management and mitigation measures are not implemented, mitigation measures have been proposed.

6.3.1 Soil and Groundwater

- A Chemical Accident and Spill Response Plan will be developed for for the transport of dangerous goods and will based on the risk analysis including the nature, consequence and probability of accidents during the freight transport; The Plan will be developed in cooperation with the relevant dangerous goods transport authorities;
- Application of herbicides will be managed to reduce unnecessary over use and to reduce the risk of leaching to soil and groundwater.

6.3.2 Surface Water

The following control measures have been proposed to prevent surface water pollution:

- Regular control and maintenance of drainage structures will be conducted to check they do not become clogged with debris or sediments;
- A Chemical Accident and Spill Response Plan will be developed for the transport of dangerous goods and will based on the risk analysis including the nature, consequence and probability of accidents during the freight transport; The Plan will be developed in cooperation with the relevant dangerous goods transport authorities;
- An operating procedure for herbicide application will define the areas where the use of herbicide is prohibited (e.g. in areas of sensitive vegetation, zones near the rivers);
- Untreated buffer zones or strips will be established along the South Morava River and the streams to reduce the risk of unintentional drift or run-off;
- Verge vegetation will be planted along the affected waterways to minimise soil erosion and reduce suspended matter in surface run-off;
- Usage of surface water-polluting substances (paints, de-icing fluids, track grease) during the maintenance of bridges will be controlled and any run-off contained and treated;
- Application of hazardous liquid chemicals during the maintenance of bridges will be avoided, where appropriate;
- Integrity of the septic tanks for sanitary wastewater in Stalać and Đunis stations will be tested in regular intervals;
- Sanitary wastewater from the stations' facilities will not be discharged to surface water recipients without prior treatment. The septic tanks will be regularly cleaned by local licensed companies and sludge disposed in accordance with Serbian regulatory requirements;
- If required by the competent authority, contaminated surface run-off from the station parking areas in Stalać and Đunis will be treated in oil and silt traps prior to discharge to surface water recipient;
- Application of herbicides in the riparian areas of the bridges will be controlled so that herbicides do not unintentionally drift or run-off;

6.3.3 Ecology and Nature Conservation

The following measures have been proposed to avoid or reduce impacts on features of ecological value:

- 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);
- Based on the BMP, underpasses, overpasses and bio-corridors will be considered, designed, sized and located for amphibians, small and large mammals and reptiles, including the specific underpasses for Hermann's tortoise (*Testudo Hermanni*) whose IUCN Red List species status is Near Threatened;
- Vegetation around the crossing entrances will be linked to natural vegetation by low shrubs or herbaceous vegetation; the crossing entrances will be covered by natural soils, where appropriate and concrete will be avoided;
- Vegetation of bio-corridors in the areas of abutments will be maintained to provide habitat continuity alongside the river banks for terrestrial species;
- Overhead power lines and catenary will be made more visible to birds and measures will be implemented to reduce risks to birds from electrocution;
- Right-of-way maintenance will be based on the integrated vegetation management which ensures effective vegetation control while considering environmental and human health values; This will include the operating procedure for herbicide application: type of herbicides to be used, application doses, time and frequency of application, areas where the use of herbicide is prohibited (e.g. in areas of sensitive vegetation, zones near the rivers).
- Noxious weeds or invasive plants will be controlled by adopting an appropriate regime which identifies and remedies areas of weed growth which might threaten nearby agricultural areas;
- Where appropriate, utilisation of biological, mechanical and thermal vegetation control will be implemented;
- Application of herbicides prohibited by the Stockholm Convention on Persistent Organic Pollutants will be avoided (except under the conditions noted in the Convention);
- The area of vegetation control will be kept minimised to avoid the growth of successional species and reduce the likelihood of the establishment of invasive species along the tracks;
- Maintenance clearing of riparian vegetation will be avoided or minimized;
- Food, organic waste and animal carcass will be regularly removed from the railway.

6.3.4 Waste Management

“Serbian Railways” and the contractors will adopt the waste management hierarchy (prevention, re-use, recycling, recovery, and disposal) in the railway operation, including the following:

- 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. Hazardous waste will be delivered to licensed sub-contractors in a way compliant to the Serbian regulatory requirements on transfer, treatment and disposal of waste and accompanied with appropriate documentation;

6.3.5 Landscape and Visual

“Serbian Railways” will implement mitigative landscape planting which including the following:

- Bridges, overpass, viaduct and tunnels portals’ will be aesthetically integrated to the surrounding terrain by using construction materials with colours and textures that blend well with those of the surrounding landscape;
- Planting of autochthonous species will be undertaken on slopes of the cuttings and the embankment, in the areas of tunnels portals, in the bridges abutment areas, underneath the bridges and the overpass, and in the area of viaduct;
- Newly exposed surfaces (retaining walls) will be redesigned with natural stone, where appropriate to integrate visually into the surrounding landscape;
- Relevant local authorities (where they have an interest) will be consulted, as appropriate, regarding the planting proposals;

6.4 Social Mitigation Measures during Operation

6.4.1 Noise and Vibration

The following noise and vibrations controls will be implemented:

- Ground-borne noise and vibration effects will be primarily reduced through utilisation of modern non-metallic disc brakes, continuously welded rail and regular maintenance of the track and track-bed;
- Tunnel portals will be designed to avoid any significant airborne noise effects caused by the trains entering the tunnel;
- Noise barriers (acoustic screens) will be installed in the area of affected residential reseptors in Stalać. As part of the Main design, the Noise Study will be prepared involving noise modelling along the route and siting the noise barriers where necessary. Noise barriers will be designed in the form of fence barriers and landscape earthworks, where appropriate;
- In case that noise modelling indicate the exceeded noise limit during the night, noise insulation will be offered for the affected receptors.

6.4.2 Community Health and Safety and Security

The risks of affecting the community health and safety will be minimised by implementing the following types of measures:

- Railway operational safety procedures will be enforced, periodically reviewed and updated;
- The railway and facilities will be regularly inspected and maintained to ensure track stability and integrity, according to Serbian regulatory requirements;
- A railway safety management program will be implemented, similar to internationally recognised (EU) railway safety programs;
- A screening acceptance procedure (or similar) for third-party tank cars will be implemented. It will incorporate requirements of international standards applicable to packaging, marking, and labelling;
- Only rolling stock that meets international standards for the cargo being transported will be accepted;
- An Emergency Preparedness and Response Plan (including Spillages Response Plan) will be developed and implemented, in cooperation with relevant local emergency authorities. The Plan will incorporate requirements for timing of dangerous goods transport, limiting train speeds at certain sections, etc;
- Warning devices will be installed to warn pedestrians that a train is approaching, especially in the stations;
- Clear and prominent signs will be posted at points of entry to track areas in stations;
- Public relation activities will be undertaken to inform the local community about the new railway line and associated risks of trespassing and the need for obeying the traffic rules.

6.4.3 Occupational Health and Safety

"Serbian Railways" will establish a Health and Safety Operational Plan with special focus on (but not limited to): train/worker accidents, noise and vibration, electrical hazards, electric and magnetic fields, fatigue. Contractual conditions will ensure that all maintenance contractors follow the H&S Operational Plan.

In this section, an outline of general mitigation measures is provided:

- Workers will be trained in personal track safety procedures;
- A warning system will be employed on lines where maintenance is occurring;
- Air conditioning systems will be used to maintain cabin temperature and provide fresh air so that windows can remain closed, limiting wind and outside noise;
- Personal protective equipment (PPE) will be used if engineering controls are not feasible or adequate to reduce noise levels;
- Seats and cabins will be equipped with dampers and vibration control systems;
- Only workers who are specifically trained and competent in working with overhead lines and conductor rails will approach these systems;
- Safety zones will be established to differentiate between work areas with expected elevated electric and magnetic field (EMF) levels compared to those acceptable for public exposure, and limiting access to properly trained workers.

7 Monitoring Programme

An Environmental and Social Monitoring Programme will be implemented to check the effectiveness of the proposed mitigation measures and compliance with relevant regulatory requirements.

During the project construction, the selected constructor will have the primary responsibility for monitoring activates but “Serbian Railways” will need to supervise the monitoring as well. Aspects to be monitored should include the impact of the works and the effectiveness of mitigation measures, and any actions that may be necessary for compliance will be identified.

7.1 Environmental Monitoring

Proposed environmental monitoring during construction and operation is provided in Table 33 and Table 34.

Table 33 Construction environmental monitoring

Receptor	Location	Indicator	Frequency and method	Responsibility
Surface water quality	The South Morava, the Ribarska River and all streams along the route, in the construction areas	Natural stream flow and velocity Sediment load	Monthly during construction	Contractor Supervision by “Serbian Railways”
Soil erosion and sediment control	All construction sites and access roads Areas prone to erosion Disturbed areas	Erosion status/ soil stability	Daily After major rainfalls Visual or by erosion control devices, where required	Contractor Supervision by “Serbian Railways”
Disposal of excavated material (spoil) and top soil stockpiles	Spoil disposal areas and top soil stock piles	Stability / erosion issues	Daily Visual	Contractor Supervision by “Serbian Railways”
Soil	All construction sites	Spills and leaks	Daily Visual	Contractor Supervision by “Serbian Railways”
Groundwater	Dewatering areas (if any)	Groundwater level in dewatering wells to be monitored until the natural regime is re-established	Weekly Monitoring equipment	Contractor Supervision by “Serbian Railways”
Noise and vibration	In the zone of affected receptors	Noise levels Vibration levels	Only in the event of complaint	Contractor Supervision by “Serbian Railways”
Air quality	Along the route, particularly where adjacent to human and ecological receptors	Dust emission Maintenance schedules for construction vehicles, plant and machinery	Daily Visual	Contractor Supervision by “Serbian Railways”

Receptor	Location	Indicator	Frequency and method	Responsibility
Ecology and habitats	Along the route, particularly at worksites within the Mojsinje Mountain area	Only prescribed vegetation clearing has occurred Level of disturbance of sensitive habitats, wintering habitats and shelters, nests. Monitoring parameters to be defined in the Biodiversity Management Plan.	Depending on the season or daily Visual	Contractor Supervision by "Serbian Railways"
Landscape	Construction sites and ancillary areas	Landscape planting and seeding requirements Progress of new landscape works through the construction	Periodically, upon completion of construction at the section Visual	Contractor Supervision by "Serbian Railways"

Table 34 Operational environmental monitoring

Receptor	Location	Indicator	Frequency and method	Responsibility
Soil and groundwater	Affected area	Level of contamination	Only in the event of spillage accident	"Serbian Railways"
Surface water	Affected surface water	Level of contamination	Only in the event of spillage accident	"Serbian Railways"
Erosion	Slopes of cuttings, embankments, other areas prone to erosion	Land stability / signs of erosion	Twice per year Visual	"Serbian Railways"
Ecology and habitats	Animal crossings, bio-corridors underneath the bridges, riparian vegetation.	Weed density witching rehabilitated zones Native plant stock within rehabilitated zone Constructed fauna underpasses, vegetation at entrances, water levels. Fauna strike incidents, so that any 'hot spot' areas can be identified Monitoring parameters to be defined in the Biodiversity Management Plan.	Depending on the season or monthly Visual	"Serbian Railways"

Receptor	Location	Indicator	Frequency and method	Responsibility
Landscape	Slopes of cuttings and embankment, tunnel portals, watercourses and banks underneath the bridges; Bridge abutments, etc.	Condition of vegetation cover Condition of rehabilitated zones and threatening processes (e.g. flood, erosion etc) that may affect the success of rehabilitation	Annually in spring Visual	"Serbian Railways"

7.2 Social Monitoring

Proposed social monitoring during construction and operation is provided in Table 35 and Table 36.

Table 35 Construction social monitoring

Receptor	Location	Indicator	Frequency and method	Responsibility
Physical and economic displacement	Each permanently or temporarily displaced property	Compliance to the EBRD PR 5, RCF and RAP; Complaints from affected persons through the grievance mechanism.	To be defined by the RAP	"Serbian Railways" Municipal authorities Tax administration
Noise and vibration	In the zone of affected receptors	Noise levels Vibration levels	Only in the event of complaint	"Serbian Railways"
Community health and safety	Affected community areas	Safety barriers and signage. Accidents involving the local community members Complaints from residents through the grievance mechanism.	Daily during construction	Contractor Supervision by "Serbian Railways"
Roads	All haulage routes	Condition of roads, need for repair, periodical cleaning	Random checks/minimum once per week Visual	Contractor Supervision by "Serbian Railways"
Cultural heritage	All construction areas along the route	Presence of chance finds, according to the relevant procedure	Visual	Contractor Supervision by "Serbian Railways"
Occupational health and safety	All construction sites along the route	Injuries PPE and safety equipment; according to regulatory requirements; Complaints from workers through the grievance mechanism.	Continuously Visual	Contractor Supervision by "Serbian Railways"

Table 36 Operational social monitoring

Receptor	Location	Indicator	Frequency and method	Responsibility
Noise and vibration	In the zone of affected receptors	Noise levels Vibration levels	Only in the event of complaint	"Serbian Railways"
Community health and safety	Affected community areas	Accidents Complaints from residents through the grievance mechanism.	Annualy	"Serbian Railways"
Occupational health and safety	All work places obliged to health surveys	Worker's health PPE and safety equipment; according to regulatory requirements; Complaints from workers through the grievance mechanism.	According to the OHS Management Plan and OHS Risk Assessment	"Serbian Railways"

8 Summary of Residual Environmental and Social Impacts

The impact assessment considered the condition of the existing environment (the "baseline" conditions), the impact of the environment that would occur from the construction and operation of the railway, how these impacts could be reduced (or mitigated) and the residual impact after the mitigations have been implemented.

The mitigation measures suggested by the ESIA will reduce any potential negative impact associated with the proposed project. These mitigation measures include management measures to avoid or minimise impact. Once the management and mitigation measures are applied to a potential project issues, the resulting impact is termed the "Residual Impact".

The Residual Impact is summarised as a simple graduated scale from positive benefits to negative impacts as follows:

	major beneficial
	moderate beneficial
	minor beneficial
	negligible beneficial
	no change
	negligible adverse
	minor adverse
	moderate adverse
	major adverse

The residual impact ratings are shown in Table 37. The summary is divided into the two phases of the project: construction and operations. Where the summary of the impact is variable (e.g. the impact is variable over a number of individual receptors) the residual impact will be shown with an asterisk (*) to indicate there is a range of impacts per one issue. In these cases, the highest "Adverse" or "Beneficial" rating is shown.

Table 37 Summary of residual impacts of the proposed railway

ISSUE	SUB-ISSUE	CONSTRUCTION	OPERATION
Air quality	Air emissions		-
Soil and groundwater	All impacts to soil and groundwater	*	*
Surface water	All impacts surface water	*	*
Ecology and nature	All impacts on habitats	*	*
	All impacts on vegetation	*	*
	All impacts on fauna	*	*
Landscape and visual amenity	All landscape and visual impacts	*	*
Waste	All waste issues		
Socio-economic	Displacement	*	-
	Land use impacts		-

ISSUE	SUB-ISSUE	CONSTRUCTION	OPERATION
	Cultural heritage impact	-	-
	Noise and vibration		
	Community health safety and security		
	Employment and procurement opportunities		

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10 Annexes

Annex 1 Map of the Proposed Railway Route

ESIA Annex 1 Proposed railway route.pdf

Annex 2 Surface Water Crossings Map

ESIA Annex 2 Surface water crossings map.pdf

Annex 3 Map of the Designated Ecological Network

ESIA Annex 3 Ecologically important area.pdf

Annex 4 Cultural Heritage Map

ESIA Annex 4 Cultural heritage and archaeology map.pdf

Annex 5 Resettlement and Compensation Framework

INTRODUCTION

In an effort to revitalise and develop its railway network, Republic of Serbia has given priority to Pan-European Corridor X which is the backbone of the railway infrastructure system of the country. The important part of the corridor and the subject of this Project is the section Stalać – Đunis on the railway line Belgrade – Niš. The section is about 18.6 km long and is the only single-track section on the railway line Belgrade - Niš. Once Stalać – Đunis section is reconstructed and modernised, the entire section of the railway Corridor X through Serbia will become a double-track line. The project developer is Public Enterprise "Serbian Railways".

OBJECTIVE AND SCOPE OF THE DOCUMENT

The purpose of this Resettlement and Compensation Framework (RCF) is to set out the principles for addressing the potential impacts of land acquisition within the project, in accordance with:

- The laws and regulations of the Republic of Serbia;
- The EBRD Environmental and Social Policy (2014), particularly Performance Requirement 5: Land Acquisition, Involuntary Resettlement and Economic Displacement.

This RCF is meant to guide the development of a Resettlement Action Plan (RAP) for the project which will provide more precise details on the project affected people, the eligibility criteria and the procedures to be applied.

PROJECT DESCRIPTION

The project is located in the central-south Serbia, about 200 km south-east of Belgrade (Figure 1). The city closest to the project is Kruševac. Administratively, the project area belongs to the municipality of Ćićevac and to the city of Kruševac.

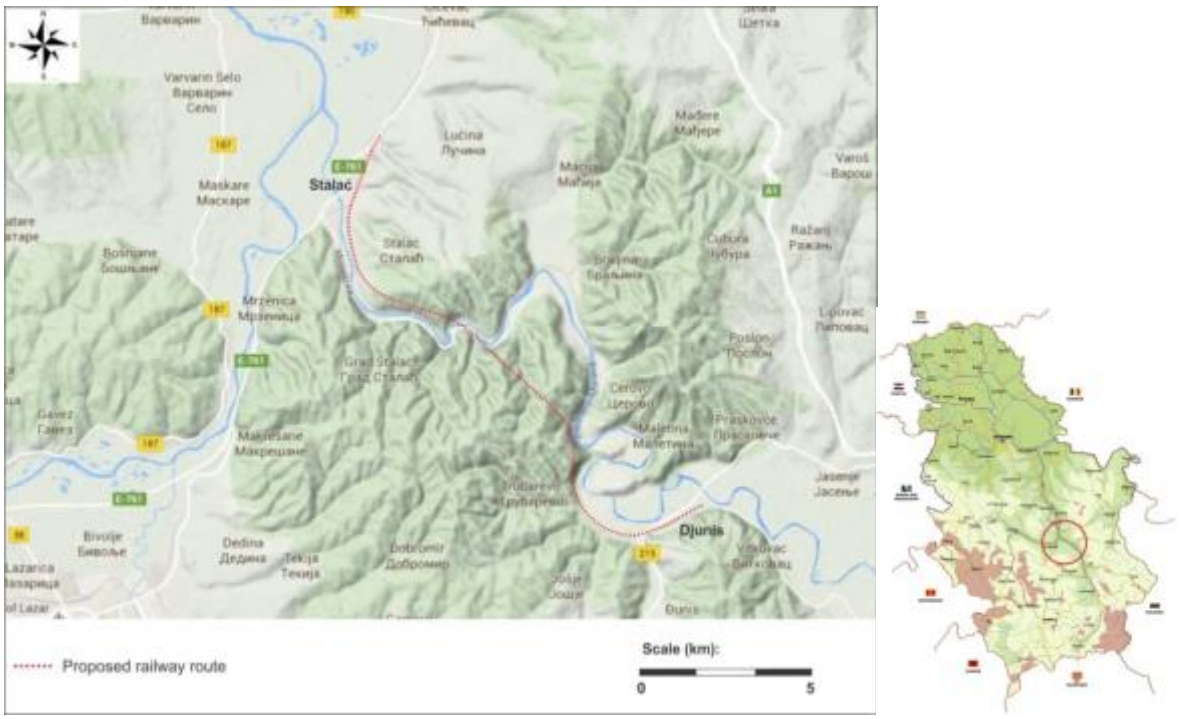


Figure 1 Location of the proposed railway line Stalać – Đunis

The project involves the following components: (1) construction of the new double-track railway line 17.7 km long for speeds up to 160 km/h, (2) upgrade of the railway stations in Stalać and Đunis, (3) construction of the overhead contact line, signalling safety and telecommunications installations, (4)

decommissioning of the existing single-track railway line. The main project components are the following:

- Construction of the dual railway track for speeds up to 160 km/h;
- Construction of the overhead contact line, signalling safety and telecommunications installations;
- Construction of tunnels, bridges and a viaduct;
- Upgrade of railway stations;
- Removal of level crossings;
- Decommissioning of the existing railway line from Stalać to Đunis.

The new route will have the following major structures:

- Five tunnels with a total length of 6,890 m, out of which one is 3,275 m;
- Six bridges, out of which one is the bridge over the South Morava River, 310.9 m long;
- Gallery (30 m long);
- Two stations.

An environmental and social impact assessment has been carried out for the two phases of the project: construction and operation.

Impacts have been classified as those related to surface water, ecology, landscape and visual impacts, noise and vibration, socio-economic impacts, traffic and transport, health safety and public nuisance, emissions to ground and water, air emissions, and cultural heritage.

Identified impacts can be managed and mitigated in accordance with best practice. The measures that will be adopted include informing the local population in a timely manner about construction activities and repairing any damages made to local access roads, as well as restoring any disturbed land. The implementation of the project is requiring some resettlement and land acquisition which will be implemented through the legal procedure of expropriation.

REGULATORY REQUIREMENTS

National Requirements

Land in Serbia is legally categorised as construction land or agricultural land. According to the Law on Planning and Construction (Off. Journal of RS, No. 72/2009, 81/2009, 64/2010, 24/2011, 121/2012, 42/2013, 50/2013, 98/2013, 132/2014 and 145/2014) agricultural land can be changed into construction land through the adoption of relevant spatial plans. In the case of traffic infrastructure (railway) development, the Spatial Plan of the Special Purpose Area needs to be adopted by the relevant state authority. i.e. the Ministry of Construction, Traffic and Infrastructure.

Land needed for construction of the public (state-funded) projects is typically acquired through expropriation, regulated by the Law on Expropriation (Off. Journal of RS, No. 53/95, 16/2001, 20/2009, and 55/2013). The Law enables government institutions to acquire private property for projects that are deemed to be of national and/or local interest, while protecting the interests of all project-affected persons with legal title (ownership), whose assets are to be expropriated. The Law also enshrines the principle of fair compensation. The public interested is declared by the Government through the adoption of the specific law or decision.

The most important features of the Law on Expropriation are the following:

- The fair value of the land affected by a particular scheme, or project, is determined by the Tax Administration' accredited expert, on behalf of the "Beneficiary of Expropriation"[15] . The value

[15] Beneficiary of Expropriation under the Republic of Serbia Law is defined as the person, or legal entity, on whose behalf the expropriation is being undertaken.

is assessed on the basis of current market price, i.e. based on comparable sales transactions in the area in the recent past;

- In the case of privately owned agricultural land, if comparable land of the same type and quality or the appropriate value, can be identified in the same area or vicinity, it is offered to the project affected person with formal title;
- In case of disagreement on the comparability of the land offered, the project affected person can resort to the judicial process, where a decision would be made on the comparability of the land, or the payment of the assessed fair value in monetary terms;
- Where comparable land cannot be identified, the project-affected person with legal title is offered the fair compensation as determined by the Tax Administration. If the project affected person wishes to challenge the assessment of "fair value" they can resort to the judicial process;
- The expropriation may also include the instigation of an easement over the immovable property or a lease of the parcel of land for a specific period of time, which will be occupied temporarily and not for a period exceeding three years;
- The project affected person who owns or leases the affected residential building (public or private), or business premises has the equivalent right over another equivalent residential building (public or private), or equivalent business premises, in the same area or vicinity;
- The Beneficiary of Expropriation can be requested by a Court Decision to offer a compensation amount in monetary terms that exceeds the assessed fair market value, as defined earlier, if other personal or family circumstances of the project affected person deem it necessary to ensure that his/her livelihood is protected (e.g. number of family members, number of family members capable to earn a living, or number of family members who are employed, health status of family members, monthly income of the household, etc);
- For the project affected person without formal title, there is no provision for payment of compensation;
- The Beneficiary of Expropriation is not required to prepare a social assessment (socio-economic study) or a baseline census with regard to project affected persons.

The additional laws regulating certain aspects of land acquisition and property transaction issues are the following:

- Law on Fundamentals of Property Relations (adopted in 1980, amended 1990, 1996 and 2005);
- Law of Planning and Construction (adopted and corrected in 2009, and amended in 2015);
- Law of Agricultural Land (adopted in 2006, amended in 2009);
- Law on State Cadastre (adopted in 2009, amended in 2010).

International Requirements

Requirements of EBRD in regards with the Land Acquisition, Involuntary Resettlement and Economic Displacement are covered with EBRD PR 5. Application of this Performance Requirement (PR) supports and is consistent with the universal respect for, and observance of, human rights and freedoms and specifically the right to adequate housing and the continuous improvement of living conditions both for physical displacement (relocation or loss of shelter) and to economic displacement (loss of assets or access to assets that leads to loss of income sources or means of livelihood) as a result of project-related land acquisition or restriction of access to natural resources.

The main points of PR 5 are the following:

- All feasible alternative project designs should be explored to avoid or at least minimise physical and/or economic displacement, while balancing environmental, social, and financial costs and benefits;
- Adverse social and economic impacts from land acquisition or restrictions on affected persons' use of and access to land should be mitigated by: (i) providing compensation for loss

of assets at replacement cost; and (ii) ensuring that resettlement activities are implemented with appropriate disclosure of information, consultation, and the informed participation of those affected;

- The livelihoods and standards of living of displaced persons should be improved or, at a minimum, restored to pre-project levels, through measures that can be enterprise-based, wage-based and/or enterprise based, so as to facilitate sustainable improvements to their socio-economic status;
- The living conditions among displaced persons should be improved through provision of adequate housing with security of tenure at resettlement sites;
- Persons who have no recognisable legal right or claim to the land they occupy are not entitled to compensation for land, but they should be compensated for the structures that they own and occupy and for any other improvements to land at full replacement cost. In addition, they should be offered resettlement assistance sufficient to restore their standards of living at a suitable alternative site.
- Affected persons shall be given the opportunity to participate in the negotiation of the compensation packages, eligibility requirements, resettlement assistance, suitability of proposed resettlement sites and the proposed timing;
- Special provisions shall apply to consultations which involve individuals belonging to vulnerable groups.
- A grievance mechanism must be established as early as possible in the process in order to receive and address in a timely fashion specific concerns about compensation and relocation that are raised by displaced persons and/or members of host communities, including a recourse mechanism designed to resolve disputes in an impartial manner.
- Where involuntary resettlement is unavoidable, the client will engage a suitably qualified specialist to carry out a census and a socio-economic baseline assessment within a defined affected area, and assist in the preparation of the Resettlement Action Plan or Livelihood Restoration Framework.
- In the case of transactions involving economic (but not physical) displacement of people the client will develop procedures to offer to the affected persons and communities compensation and other assistance that meet the objectives of the PR 5.
- When displacement cannot be avoided, the client will offer displaced persons and communities' compensation for loss of assets at full replacement cost and other assistance to help them improve or at least restore their standards of living or livelihoods.

Gaps between the national and international requirements

The main gaps between the requirements of the EBRD E&S Policy and the Serbian legislation are related to the issues of public consultation, socio-economic survey, entitlements to compensation, grievance mechanism and support to vulnerable groups.

Public Consultation: The EBRD Policy requires that all stakeholders are adequately informed and meaningfully consulted well in advance of any expropriation activities. The Serbian regulatory requirements do not require public consultation with project affected people prior to expropriation. Provision of information to the affected population in the expropriation process is typically limited, particularly with regard to those who have no legal title over properties i.e. they are generally not informed about expropriation at all. However, there is a possibility of public consultation as part of the adoption procedure of the Spatial Plan of Special Purpose Area of the Railway Stalać - Đunis. Presently, the Plan is still under preparation and no public disclosure has been planned yet.

Socio-economic survey: Conducting of a socio-economic survey is not required according to Serbian legislation. For each EBRD project which requires land acquisition (physical or economic displacement), the implementation of a survey and development of a RAP/LRF is necessary. The regulatory requirements in Serbia related to the development of expropriation studies which are in fact inventories of affected properties and basic information about registered owners of those properties,

so that they can be identified and compensated. There are no provisions for conducting an inventory of all affected properties (i.e. including those that are not formally registered), nor a survey describing the socio-economic conditions of affected owners or residents, as required by the EBRD's PR 5.

Entitlements to compensation: The Serbian expropriation requirements allow compensation for lost profit/income of affected formal economic activities resulting from displacement. Those who have no formal legal rights over properties and those who undertake informal economic activities are not entitled to any compensation. In addition, the expropriation laws do not foresee any livelihood restoration assistance, i.e. transitional support, access to credit facilities, training, or job opportunities, for people affected by expropriation, even if their livelihoods or income levels are adversely affected.

According to the EBRD Policy, people who do not have formal legal rights to land and/or structures which they use for their economic activities, still have to be compensated for their replacement structures and/or any improvements they need to make to the land (i.e. crops). One way to enable them to re-establish their income or livelihood is to provide access to other land and/or structures under lease, where they can continue their economic activities.

Grievance mechanism: There is no specific requirement in Serbian legislation to establish an independent grievance mechanism. The expropriation law does forsee right of affected persons (with formal legal rights) to appeal to relevant administrative authorities and courts. The PR 5 required the development of grievance mechanism as early as possible in the process in order to receive and address in a timely fashion specific concerns about compensation and relocation that are raised by affected persons.

Vulnerable groups: The expropriation regulation does not include special requirements for organising consultations and relocation assistance for vulnerable groups. During the census, it is necessary to identify vulnerable groups and assess their needs related to resettlement and relocation assistance. Vulnerable groups, as for all other affected people, must be engaged in meaningful consultations regarding resettlement options and assistance. However, consultation with vulnerable groups may require a special approach that will enable them to participate equally in the process (i.e. involvement of social workers, use of a different language, or carrying out the consultations in an accessible venue, for people with disabilities, at a particular time of day when e.g. affected single parents are available, etc.)

PRESENT STATUS OF THE PROJECT AND PLANNED EXPROPRIATION

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). The displacement is result of upgrading for high speed railway and necessary changes of the project parameters. Five of the affected (residential) properties are situated in Ilije Nagulića Street which will need to be realigned in this section. Other properties are situated within the proposed new route and involve residential houses, private metalworking company "Antić Kosta" (about 50 employees), community office building and a shop ("Midžor"). The land ownership status is not completely known at this stage but it is assumed that some of the properties in this section do not have the legal right to land. Four of the properties are located within the existing railway' right-of way (which is not in accordance to regulatory standards which allow only "Serbian Railways" structures to be within this belt). Some of the affected residential properties appear unoccupied, and some are used as ancillary houses. It is estimated that about 20 houses will be directly affected. The total area is estimated to be around 0.75 hectares. The affected area is shown in Figure 2.

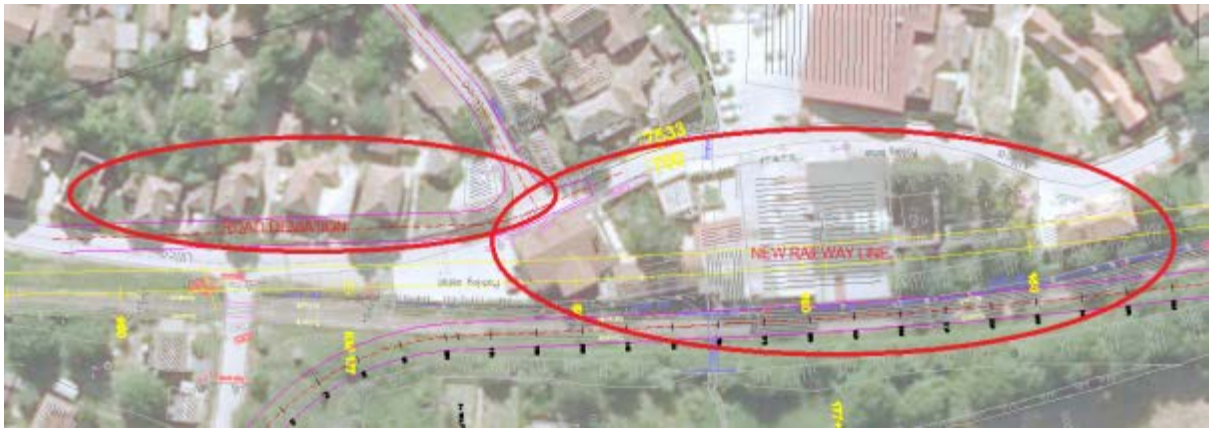


Figure 2 Residential and commercial buildings that are on the route of the new railway line

Some of the properties situated within the new route are shown in Figure 3.

Figure 3 Properties situated within the right-of-way of the new route

About 850 m to the south, there are two additional residential properties which will need to be displaced given that they are situated within the proposed route. The houses are located south of the underpass at km 177+594 (Figure 4).

Figure 4 Two residential properties at the South Morava River bank planned for displacement

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.

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. Construction activity is likely to 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.

In January 2016 no land has been acquired for the project and no project affected persons have been informed about the development. It is mainly due to Serbian regulatory requirements that do not require public consultation with project affected people before the expropriation. However, there is a possibility of public consultation as part of the Spatial Plan of Special Purpose Area adoption. Presently, the Plan is still under preparation and no public disclosure has been planned yet. Consequently, the cut-off-date has not been established.

According to the regulatory requirements, the Expropriation Study is part of the Main Design. However, the Study is primarily an inventory of affected properties and basic information about registered owners of properties, so that they can be identified and compensated. It does not include the properties without the legal rights on land and does not describe the socio-economic conditions of the affected persons.

It is of the highest priority that “Serbian Railways” avoid or minimise 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 will need to be developed to set out the measures needed to complete the resettlement in accordance to the EBRD requirements.

KEY LAND ACQUISTION AND COMPENSATION PRINCIPLES

The following principles of land acquisition and compensation will be applied by “Serbian Railways” during the project implementation:

- Land acquisition will be carried out in compliance with the Law on Expropriation (Off. Journal of RS, No. 53/95, 16/2001, 20/2009, and 55/2013), the EBRD Environmental and Social Policy (2014) and internationally accepted good practice;
- All affected persons will be informed and consulted during the project preparation and implementation. All owners/occupants will be visited and explained the land acquisition process, and the specific impacts on their land;
- A detailed Resettlement Action Plan (RAP) in compliance with the EBRD PR 5 will be developed and will include basic information about the project, project impacts, affected people and assets, entitlements for all categories of affected people, as well as a detailed budget and timetable;
- The cut-off date for the establishment of eligibility (for both formal and informal land properties) will be the date of submission of proposals for expropriation. Persons who have settled in the project area after the cut-off date will not be eligible for any compensation;
- The cut-off-date will be disclosed publicly through publication in the daily newspapers, on public bulletin boards in settlements and consultation meetings in the affected communities;
- All owners, occupants and users of affected land at the time of the cut-off date, whether with or without fully recognised ownership rights, are eligible for compensation and/or assistance:
- Temporary occupation of land for construction purposes will be compensated in accordance with the the Law on Expropriation, as stipulated in the Entitlements Matrix (Table 1);

- Livelihoods and standard of living of affected persons will be improved or at least restored to prior levels, in as short a period as possible;
- A specific grievance management mechanism will be established for the project, and it will involve independent third parties;
- Issues related to payment of cash compensation will be discussed and agreed with owners and all affected members of households. Cash compensation will be paid in full or in instalments as agreed with the owners and affected members of the households and as defined by contracts, to the bank accounts specified by the owners. In cases where there is more than one owner of property (co-owners), compensation amounts will be divided and paid to the bank accounts they specify;
- "Serbian Railways" will monitor the implementation of the land acquisition and livelihood restoration processes, both through internal, official institutional arrangements, as well as through an independent, external monitor.

COMPENSATION AND ENTITLEMENTS

Compensation for permanent loss of land plot

Permanently affected properties shall be compensated at full replacement value through provision of cash compensation or similar replacement property. Replacement value is calculated as the market value of the property plus legal costs of acquiring another property, such as taxes and fees related to purchase of another property, registration in land registry, etc.

Compensation for loss of right of way

Owners/occupants of land shall be compensated for the loss of right of way in the amount of reduced market value of the property and for any damages on the property. Owners of crops affected by the project, regardless of the type of occupancy of land, shall be fully compensated for any losses caused by the project.

Compensation for businesses

In case when a business is affected, livelihood restoration assistance will be provided as compensation for income lost during the period of construction works, to be assessed on a case-by-case basis (i.e. based on accounting reports or other applicable documents / receipts).

Compensation for crops and trees

To the extent possible, land acquisition and land entry will be scheduled so that any standing annual crop, regardless of its development stage, can be harvested before the initiation of construction works. Annual crops that are harvested prior to land entry by the expropriation beneficiary shall not be compensated for. Annual crops that cannot be harvested prior to land entry or that are damaged by construction works shall be compensated for at full market value. Recent agricultural produce prices at municipal level should be applied.

Perennial crops and trees will be valued at the cost of replacement. The determination of the full replacement value requires consideration not only of the yield of the crop over one year, but also of the cost of re-establishing the plantation (seedlings, soil preparation, fertilizers, etc.), as well as of the lost income during the period needed to re-establish the crop.

Unlike perennial fruit plantations, which can be harvested over a long period of time, most commercial timber tree species are yielded only once, as is the case with annual crops. The replacement value should therefore be the market value of the logged timber. If an affected forest cannot be logged before entry of the expropriation beneficiary into the plot, the compensation principle will be similar to that described for annual crops, taking consideration of the market value of the lost timber.

Assistance to vulnerable persons

Assistance to vulnerable people shall include various activities, depending on a case-by-case screening to be carried out with support from the relevant municipal social departments. An indicative list of activities includes: individual meetings to explain eligibility criteria and entitlements, payment process (i.e. making sure that compensation documents and payment process are well understood), assistance in the post payment period to secure the compensation money and reduce risks of misuse or robbery.

Compensation entitlements for different categories of eligible persons and assets are summarized in Table 1.

Table 1 Entitlement matrix

Project affected person / Type of project affected right or property loss	Applicable legal / policy framework	Entitlement
RESIDENTIAL LOSS		
Owner		
- Permanent loss of residential land plot	The Law on Expropriation (Off. Journal of RS, No. 53/95, 16/2001, 20/2009, and 55/2013) EBRD E&S Policy	Replacement property: residential plot of land of similar size and characteristics. Compensation for expropriated land is determined by giving replacement other land, which in size, quality and location is appropriate to the expropriated land or cash compensation for land plot at replacement value;
- Temporary loss of residential land plot	The Law on Expropriation (Off. Journal of RS, No. 53/95, 16/2001, 20/2009, and 55/2013) EBRD E&S Policy	Cash compensation for temporary use of the land plot at market value;
- Permanent loss of residential structure with construction permit and formal land title	The Law on Expropriation (Off. Journal of RS, No. 53/95, 16/2001, 20/2009, and 55/2013) EBRD E&S Policy	Replacement property: residential structure of similar size and characteristics or Cash compensation for residential structure at replacement value The costs of all expenses for moving and any legal documentation shall be covered.
- Permanent loss of residential structure without construction permit but with formal land title	The Law on Expropriation (Off. Journal of RS, No. 53/95, 16/2001, 20/2009, and 55/2013) EBRD E&S Policy	If legalisation is possible – same as the formal owner; If legalisation is not possible: Cash compensation at replacement value for the private land plot to the owner or his/her successors; The right to take away the building materials or provision of cash compensation for residential structure at construction value to structure owner; The costs of all expenses for moving and any legal

Project affected person / Type of project affected right or property loss	Applicable legal / policy framework	Entitlement
		documentation shall be covered.
- Loss of apartment or flat within residential structure	The Law on Expropriation (Off. Journal of RS, No. 53/95, 16/2001, 20/2009, and 55/2013) EBRD E&S Policy	Replacement property: apartment of similar size and characteristics with entitlement (proof of ownership). or Cash compensation for apartment at replacement (market) value + the costs of all expenses for moving and any legal documentation shall be covered.
- Permanent loss of annual crops	The Law on Expropriation (Off. Journal of RS, No. 53/95, 16/2001, 20/2009, and 55/2013) EBRD E&S Policy	The right to harvest crops or Cash compensation for annual crops at replacement (market) value. Cash compensation for any developments on the land to the owner of these developments (may apply to irrigation or drainage structures, perennial plantations, structures, etc.)
- Temporary loss of annual crops	The Law on Expropriation (Off. Journal of RS, No. 53/95, 16/2001, 20/2009, and 55/2013) The Law on Planning and Construction (Off. Journal of RS, No. 72/2009, 81/2009, 64/2010, 24/2011, 121/2012, 42/2013, 50/2013, 98/2013, 132/2014 and 145/2014)	The right to harvest crops or Cash compensation for annual crops at replacement (market) value.
- Permanent loss of perennial crops	The Law on Expropriation (Off. Journal of RS, No. 53/95, 16/2001, 20/2009, and 55/2013) EBRD E&S Policy	The right to pick fruits, vegetables, etc. Cash compensation for perennial trees, plants at replacement value. If the perennial crops cannot be harvested, the owner is entitled to cash compensation for the expected crops.
- Temporary loss of perennial crops	The Law on Expropriation (Off. Journal of RS, No. 53/95, 16/2001, 20/2009, and	The right to pick fruits, vegetables, etc. Cash compensation for the expected crops in the period of temporary losses.

Project affected person / Type of project affected right or property loss	Applicable legal / policy framework	Entitlement
	55/2013) The Law on Planning and Construction (Off. Journal of RS, No. 72/2009, 81/2009, 64/2010, 24/2011, 121/2012, 42/2013, 50/2013, 98/2013, 132/2014 and 145/2014) EBRD E&S Policy	
Tenant		
Loss of residential structure or apartment	The Law on Expropriation (Off. Journal of RS, No. 53/95, 16/2001, 20/2009, and 55/2013) EBRD E&S Policy	Timely notification to enable tenant to find other accommodation. The tenant will be provided with assistance in finding an equivalent property, support for renting for an interim period, moving costs and a disturbance allowance. If required assistance will be provided with job placement and skills training in the new location.
Project affected person without formal title		
- Permanent loss of residential structure without construction permit and without formal land title	EBRD E&S Policy	Cash compensation at replacement value for the private land plot to the owner or his/her successors; The right to take away the building materials or provision of cash compensation for residential structure at construction value to structure owner; The costs of all expenses for moving and any legal documentation shall be covered.
BUSINESS LOSS		
Owner		

Project affected person / Type of project affected right or property loss	Applicable legal / policy framework	Entitlement
- Permanent loss of place of business	The Law on Expropriation (Off. Journal of RS, No. 53/95, 16/2001, 20/2009, and 55/2013)	When a business is displaced the affected person will be provided with monetary compensation or resettlement. If the affected person chooses resettlement, an equivalent plot of land will be provided at an acceptable location and with similar commercial potential and secured tenant status. Compensation will include costs of moving and legal and transaction fees. A disturbance payment will be made equivalent to net income for an agreed period (based on tax records from the affected or a comparable business). or Same as for residential property.
- Temporary loss of place of business	The Law on Expropriation (Off. Journal of RS, No. 53/95, 16/2001, 20/2009, and 55/2013) EBRD E&S Policy	Cash compensation for any assets affected or Where business premises are rented the owner will receive compensation for the building and the tenant will be provide with assistance in finding an equivalent location, support for renting for a period to allow the business to reestablish, and moving costs.
Tenant		
- Permanent loss of place of business / income	EBRD E&S Policy	Timely notification to enable tenant to find other accommodation The fee for the lease is determined according to the amount of the lease to be realized for same or similar land at free market. If on this base, losses to the owner of the real estate are caused, he is entitled to be compensated for losses. The remuneration to the damages is determined for each concrete case. An allowance will be made for all moving costs including

Project affected person / Type of project affected right or property loss	Applicable legal / policy framework	Entitlement
		transport and labour and any legal or other transaction costs.
- Temporary loss of place of business / income	EBRD E&S Policy	Timely notification to enable tenant to find other accommodation An allowance will be made for all moving costs including transport and labour and any legal or other transaction costs.
Project affected person without formal title on land or business		
- Permanent loss of land plot or business without formal title but with livelihood that is directly dependent on the affected land or businesses (e.g., those working on affected agricultural land or working in the affected businesses).	EBRD E&S Policy	Compensation should be provided to these project affected persons to ensure no loss, the extent as determined appropriate by the socio-economic assessment (socio-economic study);

PUBLIC CONSULTATIONS AND DISCLOSURE

The requirements for disclosure of the project relevant information and public consultations have been set out in the Stakeholder Engagement Plan (SEP) prepared for the purpose of enhancing stakeholder engagement throughout the life cycle of the Project, and carrying out stakeholder engagement in line with the EBRD requirements.

GRIEVANCE MECHANISM

First Tier of Grievance Management

"Serbian Railways" will establish a registry of grievances. Project affected persons will be able to submit grievances directly with "Serbian Railways" (a sample Grievance Form is attached to this document). All grievances will be recorded in a register and assigned a number, and acknowledged within 5 working days.

Each grievance will be recorded in the registry with the following information:

- Description of grievance;
- Date of receipt acknowledgement returned to the complainant;
- Description of actions taken (investigation, corrective measures); and
- Date of resolution and closure / provision of feedback to the complainant.

"Serbian Railways" will make all reasonable efforts to address the complaint upon the acknowledgement of grievance and will appoint the person in charge for grievance management. If the grievance is not able to be addressed by immediate corrective action, a longterm corrective action will be identified. The complainant will be informed about the proposed corrective action and follow-up of corrective action within 25 working days upon the acknowledgement of grievance.

If "Serbian Railways" is not able to address the particular issue raised through the grievance mechanism or if action is not required, it will provide a detailed explanation/justification on why the issue was not addressed. The response will also contain an explanation on how the person/organization which raised the complaint can proceed with the grievance in case the outcome is not satisfactory.

Second Tier of Grievance Management

If the complainant is not satisfied with the implemented corrective action and/or a justification on why the corrective action is not required, the complaint will be directed to the Grievance Commission. The Grievance Commission will be established for the project by an internal act of "Serbian Railways" and comprised of:

- One representative of "Serbian Railways" (other than the person directly involved in resolving the grievance described in the previous step);
- And one representative per each municipality affected by the project and selected by the municipality officials;

Additionally, the Commission may include the relevant Ministry, if found necessary.

The Commission will re-evaluate the existing corrective action and/or the justification on why an action is not required, and reconsider alternatives to address the complaint on the satisfactory manner.

The complainant will be informed about the proposed alternative corrective action and follow-up of alternative corrective action within 25 working days upon the acknowledgement of grievance.

In case that no amicable agreement can be reached at the first two tiers, grievance can at any time be handed over to the basic municipal court in charge.

Resorting to the amicable mechanism of grievance management does not preclude the aggrieved person to resort to justice at any point in the process.

CONTACT DETAILS FOR THE PUBLIC

PE “Serbian Railways”
Nemanjina 6
11000 Belgrade
call centre: +381 11 360-28-99
e-mail: medijacentar@srbrail.rs
www.zeleznicesrbije.com

MONITORING AND REPORTING

“Serbian Railways” will conduct monitoring and maintain a land acquisition database on the families/businesses whose properties have been affected (including the non-owners). The data/information will be updated periodically in order to keep track of the families’ and businesses’ progress.

The indicators to be used for monitoring will include, in particular, the following:

- Overall spending on expropriation and compensation;
- Number of Project Affected Persons by categories;
- Number of public meetings and consultations with affected people;
- Number and percentage of individual compensation agreements signed before the beginning of construction activities;
- Types of assistance provided to vulnerable individuals/households in a timely manner;
- Number of people having received cash compensation in the period with distribution by compensation type and by classes of amounts;
- Number and amount of payments that restore loss of income;
- Number and type of grievances, including any court cases, related to land acquisition (submitted and resolved and how long it took for them to be resolved).

PUBLIC GRIEVANCE FORM

Reference No.	
Full Name	
Contact information and preferred method of communication Please mark how you wish to be contacted (mail, telephone, e-mail)	☐ By Post: please provide postal address: _____ _____ _____ ☐ By Telephone: _____ ☐ By e-mail:_____
Description of incident or grievance:	What happened? Where did it happened? Who did it happened to? What is the result of the problem? What is the source and duration of the problem?
Date of incident/grievance:	
	☐ One time incident/grievance (date _____) ☐ Happened more than once (how many times?_____) ☐ On-going (currently experiencing problem)
What would you like to see happen to resolve the problem?	

Annex 6 Stakeholder Engagement Plan

INTRODUCTION

In an effort to revitalise and develop its railway network, Republic of Serbia has given priority to Pan-European Corridor X which is the backbone of the railway infrastructure system of the country. The important part of the corridor and the subject of this Project is the section Stalać – Đunis on the railway line Belgrade – Niš. The section is about 18.6 km long and is the only single-track section on the railway line Belgrade - Niš. Once Stalać – Đunis section is reconstructed and modernised, the entire section of the railway Corridor X through Serbia will become a double-track line. The project developer is Public Enterprise "Serbian Railways".

OBJECTIVE AND SCOPE OF THE DOCUMENT

Effective stakeholder engagement is needed to avoid and minimise the social risks of the proposed project. This document is a Stakeholder Engagement Plan (SEP) describing the planned stakeholder consultation and engagement process for the project. It outlines a systematic approach to stakeholder engagement that will help "Serbian Railways" to develop and maintain a constructive relationship with their stakeholders. The document also includes a grievance mechanism for stakeholders to raise their concerns about the project.

The SEP has been produced in accordance with the international standards required by the European Bank for Reconstruction and Development (EBRD), and other international financial institutions (IFIs), as the project might require financing from the EBRD and potentially from other international investment banks.

The SEP is a living document and it will be regularly monitored, reviewed and updated by "Serbian Railways" throughout all stages of Project implementation.

PROJECT DESCRIPTION

The project is located in the central-south Serbia, about 200 km south-east of Belgrade (Figure 1). The city closest to the project is Kruševac. Administratively, the project area belongs to the municipality of Ćićevac and to the city of Kruševac.

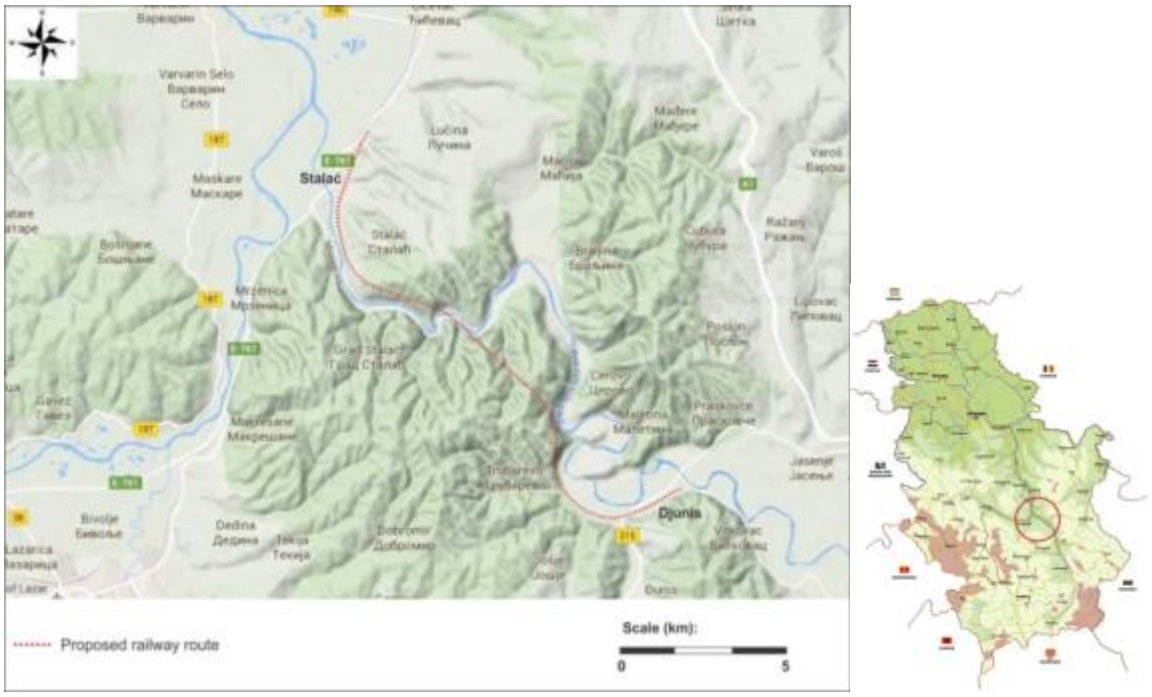


Figure 1 Location of the proposed railway line Stalać – Đunis

The project involves the following components: (1) construction of the new double-track railway line 17.7 km long for speeds up to 160 km/h, (2) upgrade of the railway stations in Stalać and Đunis, (3) construction of the overhead contact line, signalling safety and telecommunications installations, (4) decommissioning of the existing single-track railway line. The main project components are the following:

- Construction of the dual railway track for speeds up to 160 km/h;
- Construction of the overhead contact line, signalling safety and telecommunications installations;
- Construction of tunnels, bridges and a viaduct;
- Upgrade of railway stations;
- Removal of level crossings;
- Decommissioning of the existing railway line from Stalać to Đunis.

The new route will have the following major structures:

- Five tunnels with a total length of 6,890 m, out of which one is 3,275 m;
- Six bridges, out of which one is the bridge over the South Morava River, 310.9 m long;
- Gallery (30 m long);
- Two stations.

An environmental and social impact assessment has been carried out for the two phases of the project: construction and operation.

Impacts have been classified as those related to surface water, ecology, landscape and visual impacts, noise and vibration, socio-economic impacts, traffic and transport, health safety and public nuisance, emissions to ground and water, air emissions, and cultural heritage.

Identified impacts can be managed and mitigated in accordance with best practice. The measures that will be adopted include informing the local population in a timely manner about construction activities and repairing any damages made to local access roads, as well as restoring any disturbed land. The implementation of the project is requiring some resettlement and land acquisition which will be implemented through the legal procedure of expropriation.

REGULATORY REQUIREMENTS

National Requirements

Requirements in relation to public disclosure, participation and access to information kept by state bodies and organisations, as well as the right to petition state authorities and the right to a healthy environment in Serbia are prescribed by the Constitution of the Republic of Serbia (Official Gazette of the RS No. 98/2006).

Serbia ratified the Aarhus Convention in 2009, by adopting the Law on Confirming the Convention on Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters (Official Gazette of the RS No. 38/09). The basic principles contained in this Convention are supported by other Serbian laws and bylaws, including:

- The Environmental Protection Law (Official Gazette of the RS 135/2004 and 36/2009)
- The Law on Environmental Impact Assessment of the Republic of Serbia (Official Gazette of the RS 135/04 and 36/09)
- The Law on Strategic Environmental Impact Assessments (Official Gazette of the RS 135/2004 and 88/2010)

These regulations require the public to be informed about and involved in all matters concerning the environment.

Serbia also has a Law on Free Access to Information of Public Importance (Official Gazette of the RS, No. 120/04, 54/07, 104/09, 36/2010), which stipulates that everyone has the right to access information of public importance. Information of public importance is information held by a public authority body, created during work or related to the work of the public authority body, contained in a document, and related to everything that the public has a justified interest to know.

The Law on Planning and Construction (Off. Journal of RS, No. 72/2009, 81/2009, 64/2010, 24/2011, 121/2012, 42/2013, 50/2013, 98/2013, 132/2014 and 145/2014) regulates the development and adoption of spatial and urban planning documents in Serbia, which are all subject to a public disclosure and consultation process. These plans are categorised as spatial plans, master plans, regulation plans, etc. Planning documents are displayed for public scrutiny after the technical review is completed and this has to be announced in a daily and local newspaper. The process is managed by the Agency for Spatial Planning of the Republic of Serbia i.e. the body of the local self-government unit responsible for spatial and urban planning. Once the process is complete, the competent authority is obliged to prepare a report containing all remarks, which is submitted to the document developer who is obliged to act upon these remarks. In the event that the remarks fundamentally change the planning document, the competent authority is obliged to instruct the document developer to prepare a new draft.

International Requirements

All Projects funded by the EBRD and other IFIs are required to meet best international practice and specifically the requirements for stakeholder engagement and public consultations, as specified in the EBRD Environmental and Social Policy (2014).

These requirements are described in detail in the EBRD Performance Requirement 10. In summary, the IFC considers stakeholder engagement an ongoing process which involves:

- the client's public disclosure of appropriate information so as to enable meaningful consultation with stakeholders
- meaningful consultation with potentially affected parties, and
- a procedure or policy by which people can make comments or complaints.

SUMMARY OF PREVIOUS STAKEHOLDER ENGAGEMENT ACTIVITIES

During 2013 and 2014, "Serbian Railways" approached the stakeholders from municipal and government authorities in order to obtain their requirements and conditions that will be incorporated to the spatial planning documentation and the project design. At the time of writing (January 2016), the Spatial Plan of the Special Purpose Area of the Railway Stalać – Đunis has been under preparation.

No public consultations have been taken to date.

During the environmental and social impact assessment for the project (ESIA) no stakeholders from the local communities were met.

STAKEHOLDER IDENTIFICATION AND ANALYSIS

The stakeholder groups that may be affected by or be interested in the implementation of the project, as well as proposed communication methods and media for each group, are presented in Table 1.
It shoud be noted that this stakeholder identification table should be regularly reviewed to ensure that any new stakeholders are correctly identified and their concerns addressed.

Table 1 Project Stakeholders

Stakeholder	Interest in the project	Method of Communication	Responsibility	Timing
Project affected persons				
Project affected persons (private and business)	Directly affected by involuntary resettlement or temporarily restricted to use properties or land	Meetings, Community meetings Providing timely information on expropr iation, compensation and construction activities Local media, Grievance procedure, ESIA and SEP published on the Developer's web site	"Serbian Railways"	Pre-construction and until the resettlement / compensation process is completed
Local residents				
Local residents and businesses from villages (Municipality of Ćićevac, Municipality of Ražanj, city of Kruševac)	Indirectly affected by the project	Community meetings, Public notice board, Local media, Safety signs Grievance procedure, ESIA and SEP published on the Developer's web site	"Serbian Railways"	Throughout of implementation of the project
Public utility companies				
Local public electricity distribution company	Specific participation in development and operation of the proposed project	Official correspondence and meetings, Permitting procedures	"Serbian Railways"	Prior to and during construction and operation

Stakeholder	Interest in the project	Method of Communication	Responsibility	Timing
Local waste and wastewater management company **PUC „Razvitak“ Ćićevac** Address: Svetog Save 2 37210 Ćićevac	Specific participation in development and operation of the proposed project	Official correspondence and meetings, Permitting procedures	“Serbian Railways”	Prior to and during construction and operation
Local waste and wastewater management company **PUC “Kruševac” from Kruševac** Address: Nikole Čolovića 2 37000 Kruševac Tel: +381 37 423 026	Specific participation in development and operation of the proposed project	Official correspondence and meetings, Contracts	“Serbian Railways”	Prior to and during construction and operation
Local groups and organizations				
NGOs, fishing associations, hunting clubs	Specific interest in development and operation of the project	Official correspondence and meetings,	“Serbian Railways”	Throughout the project cycle
Local (municipal) authorities				
Municipality of Ćićevac Address: Karađorđeva 106 37210 Ćićevac Tel: +381 37 811 260	Possibility to influence and make decisions on implementation of the proposed project	Official correspondence and meetings, Permitting procedures Official correspondence and meetings, Permitting procedures	“Serbian Railways”	Prior to and during construction
City of Kruševac Address: Gazimestanska 1 37000 Kruševac Tel: + 381 37 430 332	Possibility to influence and make decisions on implementation of the proposed project	Official correspondence and meetings, Permitting procedures Official correspondence and meetings, Permitting procedures	“Serbian Railways”	Prior to and during construction
Government agencies in charge for permitting and conditions				

Stakeholder	Interest in the project	Method of Communication	Responsibility	Timing
Ministry of Construction and Traffic Contacts: Nemanjina 22-26 11000 Belgrade Tel: +381 11 3612 938	Possibility to influence and make decisions on implementation of the proposed project	Official correspondence and meetings, Progress reports Permitting procedures	"Serbian Railways"	Prior to and during construction
Ministry of Agriculture, and Environment Contacts: Omladinskih brigada 1 11070 Novi Beograd Tel: +381 11 31-31-394	Possibility to influence and make decisions on implementation of the proposed project	Official correspondence and meetings, Progress reports Permitting procedures	"Serbian Railways"	Prior to and during construction
Public water management company "Srbijavode" - WMC "Morava" Contacts: Trg Kralja Aleksandra Ujedinitelja 2 18000 Nis Tel: 018 42 58 185	Specific participation in development and operation of the proposed project	Official correspondence and meetings, Progress reports Permitting procedures	"Serbian Railways"	Prior to and during construction
Republic Hydromethereologicial Institute of Serbia (RHMZ) Contacts: Kneza Viseslava 66 11000 Belgrade Tel: 011 30 50 823	Possibility to influence and make decisions on implementation of the proposed project	Official correspondence and meetings, Progress reports Permitting procedures	"Serbian Railways"	Prior to and during construction
Institute for Nature Conservation of Serbia (Belgrade) Contacts: Dr Ivana Ribara 91 11070 New Belgrade Tel: 011 2093 801	Possibility to influence and make decisions on implementation of the proposed project	Official correspondence and meetings, Progress reports Permitting procedures	"Serbian Railways"	Prior to and during construction

Stakeholder	Interest in the project	Method of Communication	Responsibility	Timing
Geodetic Institute of Serbia Contacts: Bulevar Vojvode Misica 39 11000 Belgrade 011 26 50 886	Possibility to influence and make decisions on implementation of the proposed project	Official correspondence and meetings, Progress reports Permitting procedures	"Serbian Railways"	Prior to and during construction
Public company Roads of Serbia Contacts: Bulevar Kralja Aleksandra 282 11000 Belgrade Tel: 011 30 40 701	Possibility to influence and make decisions on implementation of the proposed project	Official correspondence and meetings, Progress reports Permitting procedures	"Serbian Railways"	Prior to and during construction
Institute for Protection of Cultural Monuments (Kraljevo) Contacts: Cara Lazara 24 36 000 Kraljevo Tel: 036 331 866	Possibility to influence and make decisions on implementation of the proposed project	Official correspondence and meetings, Progress reports Permitting procedures	"Serbian Railways"	Prior to and during construction
Republic Institute for Seismology of Serbia (Belgrade) Contacts: Park Tasmajdan BB 11000 Belgrade 011 3227 013	Possibility to influence and make decisions on implementation of the proposed project	Official correspondence and meetings, Progress reports Permitting procedures	"Serbian Railways"	Prior to and during construction
Internal project stakeholders				
"Serbian Railways" employees	Directly interested in the project	Bulletin board, Grievance procedure, Code of conduct	"Serbian Railways" management	Throughout of implementation of the project
Temporary construction workers and contractors	Directly interested in the project	Information in contract, Bulletin board, Training, Grievance procedure, Code of conduct	"Serbian Railways"	Upon selection of selection of contractors and during construction

DISCLOSURE OF INFORMATION AND STAKEHOLDER ENGAGEMENT

All information on the project will be made available to the public prior to the start of the project. The ESIA, RCF and SEP will be published on the official website of "Serbian Railways" (www.zeleznicesrbije.com).

"Serbian Railways" will cooperate with relevant local municipal authorities and departments during project design and throughout the implementation of the project. Regular meetings will be held to discuss any issues.

"Serbian Railways" with the assistance of local municipal authorities and local community councils will ensure that the local population, particularly residents and businesses living or operating in the vicinity of the project or using land which may be affected are informed about the project. This particularly pertains to the start-up of construction activities and expected impacts.

Public consultation meetings will be held in the project area with the affected people and communities, prior to and during the construction. Individual consultative meetings aimed at engaging individual stakeholder groups regarding specific issues and on a need basis.

Meetings will be held with owners and users of private and public land that will be disturbed during construction, at least 6 months before construction begins. The topics to cover will include evaluation of crop and other damages, mechanism for making claims and receiving payment, any land use restrictions as well as expected difficulties in accessing land plots during road upgrades.

Facilitation of access to information and assistance for vulnerable groups will be appropriate for each person/family according to their specific needs and/or situation.

An EIA will also be developed and submitted to the relevant Serbian authorities after the Preliminary Design is completed and all conditions from relevant authorities are obtained. A public consultation process, as defined by *The Law on Environmental Impact Assessment of the Republic of Serbia (Official Gazette of the RS 135/04 and 36/09)* and the *Regulation for Disclosure of Information, Presentations and Public Consultations Regarding EIAs (Official Gazette of the RS 69/2005)* will also be held to present the EIA. The public meetings will be announced in the local newspapers and announcements will be put up in the official notice boards of Ćićevac and Ražanj municipalities, the city of Kruševac and in the affected local communities.

GRIEVANCE MECHANISM

"Serbian Railways" and the contractors will receive and consider all comments and complaints associated with the project. A sample of the Project Public Grievance Form is provided at the end of this document. Any person or organisation may send comments and/or complaints in person, by phone or via post or email using the contact information provided at the end of the document.

All comments and complaints will be responded to either verbally or in writing, in accordance with the preferred method of communication specified by the complainant, if contact details of the complainant are provided.

All grievances will be registered and acknowledged within 5 working days and responded to within 25 working days of receiving the grievance. Individuals who submit their comments or grievances have the right to request that their name be kept confidential.

"Serbian Railways" will monitor the way in which grievances are being handled. "Serbian Railways" will keep a grievance log of all grievances (including those received and addressed by the contractor.

A separate, internal grievance mechanism is available for "Serbian Railways" employees and will also be made available for contracted workers, once they begin working.

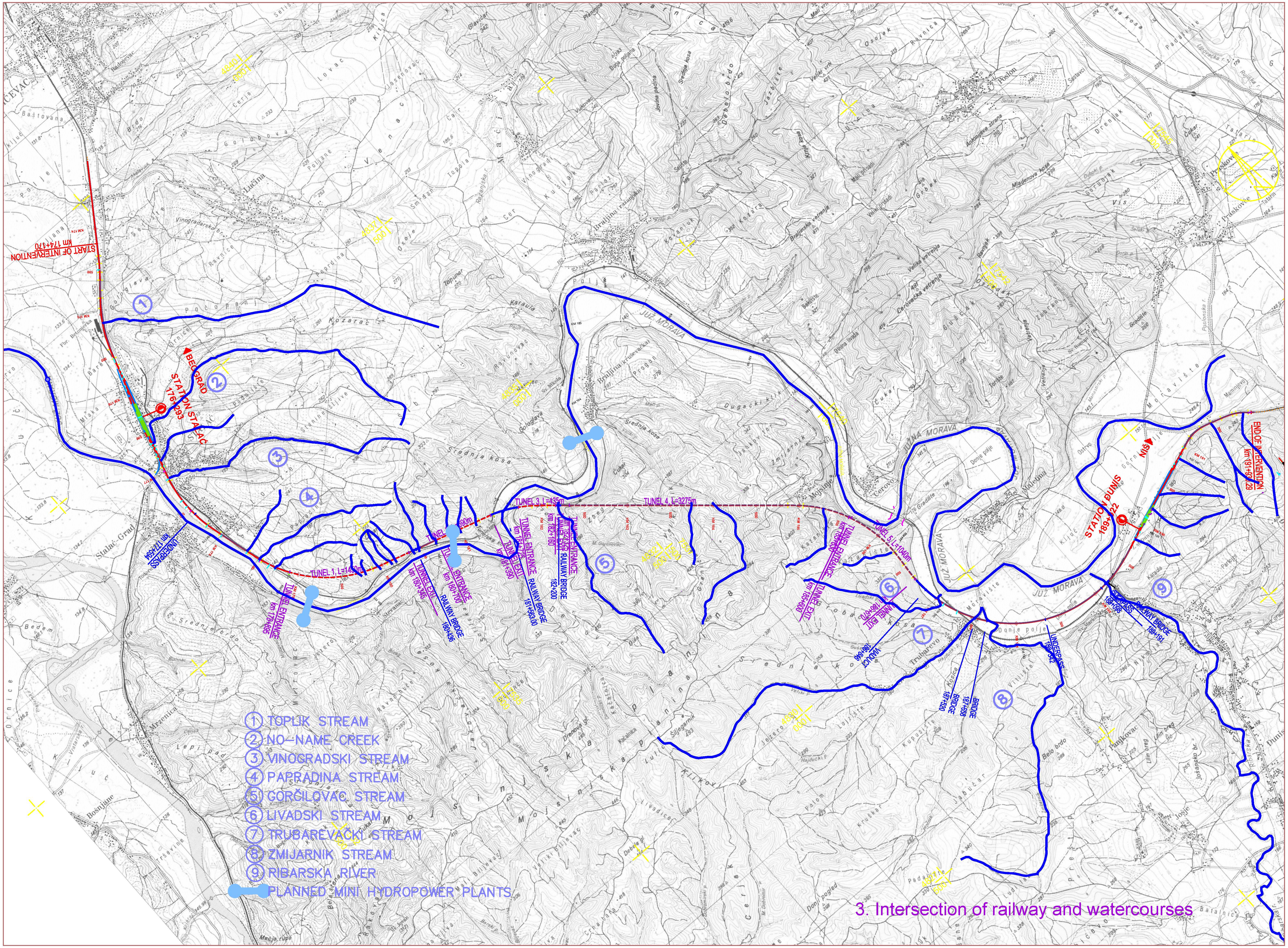
CONTACT DETAILS FOR THE PUBLIC

PE “Serbian Railways”
Nemanjina 6
11000 Belgrade
call centre: +381 11 360-28-99
e-mail: medijacentar@srbrail.rs
www.zeleznicesrbije.com
Contact details of the contractors will be added subsequently, when the contractors are selected.

PUBLIC GRIEVANCE FORM

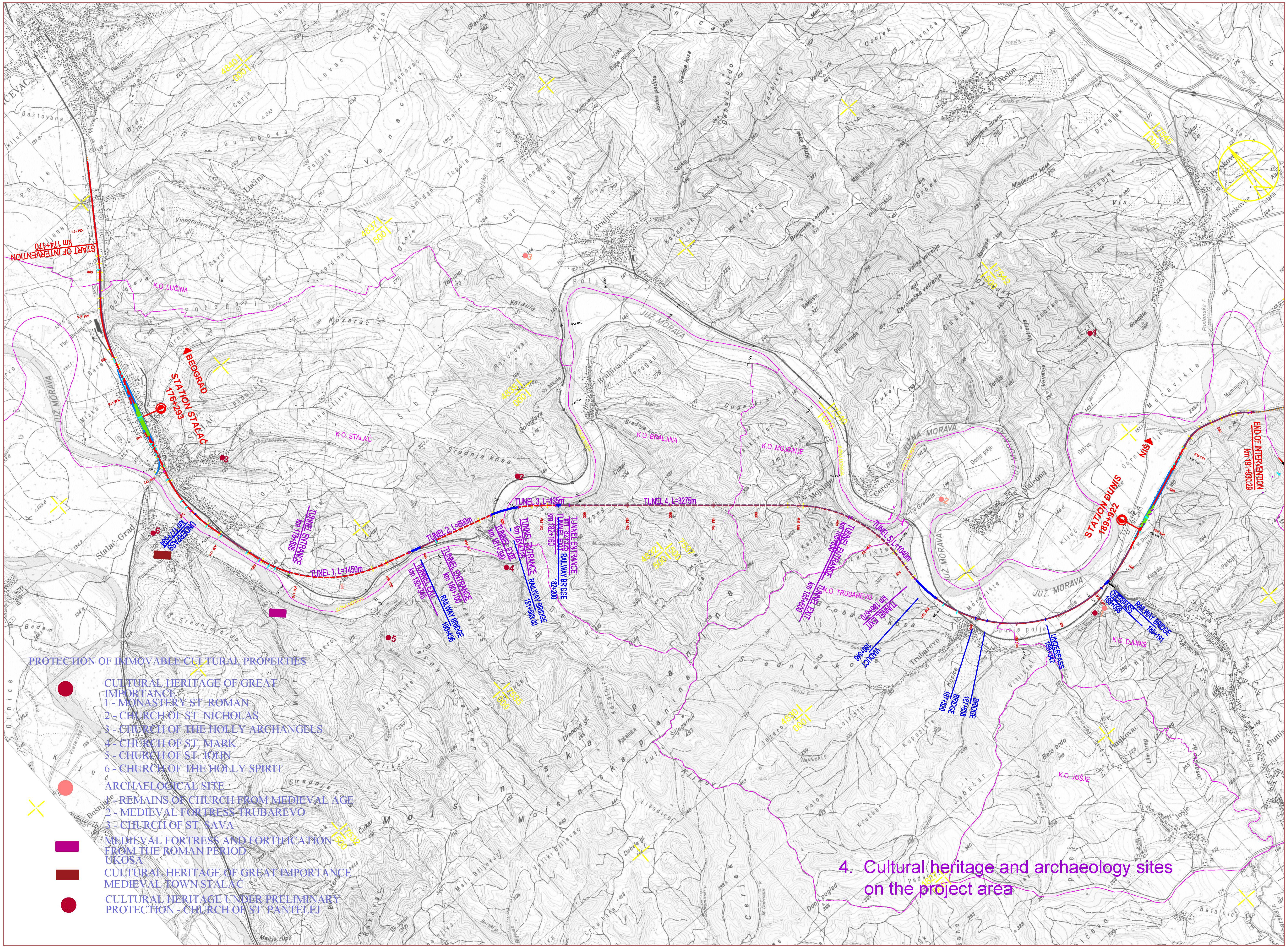
Reference No.	
Full Name	
Contact information and preferred method of communication Please mark how you wish to be contacted (mail, telephone, e-mail)	☐ By Post: please provide postal address: _____ _____ _____ ☐ By Telephone: _____ ☐ By e-mail: _____
Description of incident or grievance:	What happened? Where did it happened? Who did it happened to? What is the result of the problem? What is the source and duration of the problem?
Date of incident/grievance:	
	☐ One time incident/grievance (date _____) ☐ Happened more than once (how many times?_____) ☐ On-going (currently experiencing problem)
What would you like to see happen to resolve the problem?	

1. Existing and planned railway with structures



3. Intersection of railway and watercourses

2.New railway and ecologically important area, part of Serbian ecological network



4. Cultural heritage and archaeology sites on the project area