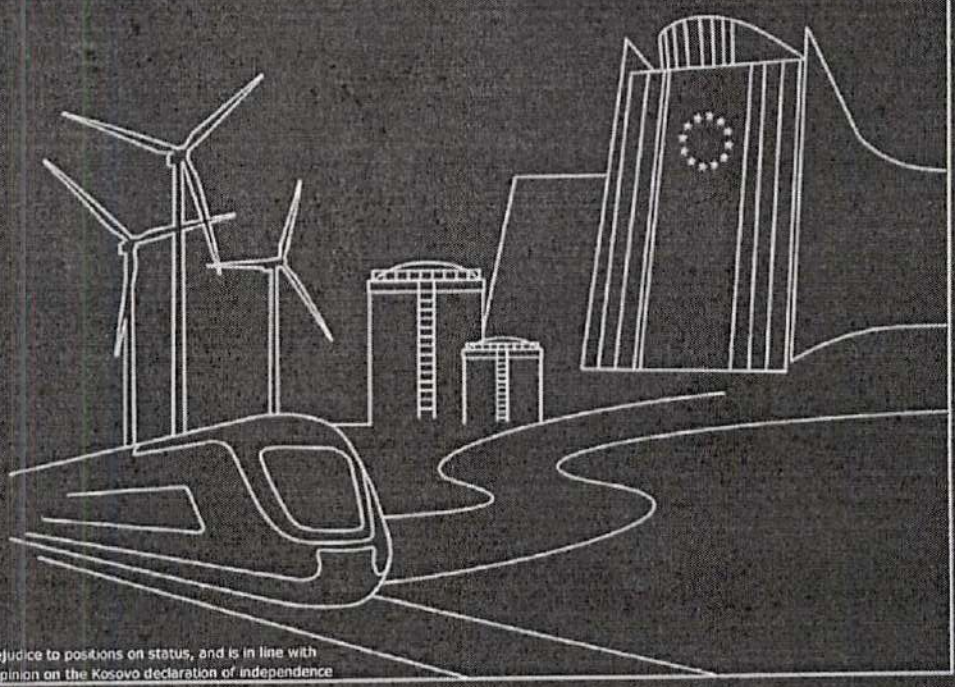
This Project is funded by the European Union

Financed under a specific grant agreement no 220/420-596 from the EU-IPA Multi-Beneficiary Programme for Albania, Bosnia and Herzegovina, Kosovo*, Montenegro, North Macedonia and Serbia

Mediterranean Railway Corridor (Route 2): Podgorica – Albanian border section, Environmental and Social Impact Assessment, Detailed Design and Tender Documents

ESIA Scoping Report - update



*) This designation is without prejudice to positions on status, and is in line with UNSCR 1244/1999 and the ICJ Opinion on the Kosovo declaration of independence

COWI | IPF11

In consortium with CeSTRA, GOPA, Detecon, TRENECON

Western Balkans Investment Framework (WBIF) Infrastructure Project Facility Technical Assistance 11 (IPF11)

AA-010358

Mediterranean Railway Corridor (Route 2): Podgorica – Albanian border section, Environmental and Social Impact Assessment, Detailed Design and Tender Documents

ESIA Scoping Report - update

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

PROJECT NO.	DOCUMENT NO.
IPF11	WB29MNETRA02-ES-GE-REP-001

VERSION	DATE OF ISSUE	DESCRIPTION	PREPARED	CHECKED	APPROVED
3.0	26.03.2025	ESIA Scoping Report - update	Project Team	Ruza Radovic	Panos Pikrodimitris

CONTENTS

TABLES

FIGURES

Abbreviations

CORINE LC or CLC	COoRdinate INformation on the Environment (land cover GIS data base), provided by European Environmental Agency via Copernicus programme
CESMP	Construction Environmental and Social Management Plan
CH	Chainage
COVID-19	Coronavirus disease (2019)
E&S	Environmental & Social
EIA	Environmental Impact Assessment
EIB	European Investment Bank
EPA	Environmental Protection Agency
ESIA	Environmental and Social Impact Assessment
ESMP	Environmental and Social Management Plan
ETCS	European Train Control System
EU	European Union
FS	Feasibility Study
GIP	Good International Practice (measures)
IBA	Important Bird Area
IEC	International Electro-technical Commission
IFI	International Financial Institution
IPA	Important Plant Area
IPF	Infrastructure Projects Facility
JSC	Joint Stock Company Željeznički prevoz Crne Gore (Railway Transport of Montenegro)
MCA	Multi-criteria analysis
MEPA	Montenegrin Environmental Protection Agency
MONSTAT	Statistical Office of Montenegro
PIS	Passenger Information System
RIoM	The Railway Infrastructure of Montenegro (Željeznička Infrastruktura Crne Gore)
SEETO	South East Europe Transport Observatory
SEP	Stakeholder Engagement Plan
TCT	Transport Community Treaty (previously SEETO)
TEN-T	Trans-European Transport Network
TSI	Technical Specifications for Interoperability
UIC	Union Internationale des Chemins de Fer (International Union of Railways)
WBIF	Western Balkans Investment Framework

EXECUTIVE SUMMARY

Need for the Proposed Project

The project's main objective is to modernise the existing railway line Podgorica – Montenegrin / Albanian border (the Project), which is approximately 25 km long, in compliance with Trans-European Transport Network (TEN-T) standards.

Purpose of the Report

This document comprises the Scoping Report for the Environmental and Social Impact Assessment (ESIA) for the proposed Project, intending to enable stakeholders to identify and address the key issues at the beginning of the ESIA process and allow for early recognition of these issues in the Project's design. Scoping helps to focus the ESIA on the key environmental and social issues. The Scoping Report was prepared in accordance with national Law and bylaws (see Chapter 1.3.1) and international requirements for environmental and social (E&S) scoping, which is required by the potential lender to the Project – the European Investment Bank (EIB). The previous Scoping Report was based on the emerging Conceptual Design for modernising the Podgorica – Montenegrin / Albanian border railway line.

This document is an updated Scoping Report aligned with the requirements for the preferred sub-scenario by Project Beneficiaries (Montenegrin Government and RIoM), as well as the Design Parameters Report being the basis of the Detailed design.

The Project is to be developed further through detailed design stages, which will form the basis for the detailed national Environmental Impact Assessment (EIA) (bilingual) and application to the Montenegrin EIA competent authority for screening and scoping purposes.

Level of Details

Within this sub-project, the Environmental Impact Assessment Study will be prepared in accordance with the requirements of the national legal framework and the Environmental and Social Impact Assessment Study for the entire (Podgorica-Border with Albania) section in line with the EIB standards. The ESIA Activity is planned to be implemented in parallel with the preparation of the Detailed Design Activity.

The ESIA will be accompanied by the Non-technical Summary, Stakeholder Engagement Plan (SEP) and Environmental and Social Management Plan (ESMP).

As the result of this Activity, the Environmental Impact Assessments will be developed in line with the relevant national legislation in force, and in line with the EIA Directive and EIB Environmental and Social Standards (last update February 2022).

The Proposed Project – Project Elements

<u>Permanent Way</u>

The Project includes the full modernisation of the existing track, and specifically the widening of the existing cross-section from the existing ~5.70 m wide cross-section to ~6.60 m to accommodate the lateral emergency walkway, as well as the installation of catenary masts, avoiding at the same time additional land occupation, especially in the protected areas. Also, construction of typical ballasted track according to international standards, comprising of a new sub-ballast layer, ballast layer, prestressed concrete sleepers and new rails.

At the Tuzi station the Project includes restoration of any local failure of the track infrastructure, construction of a new sub-ballast layer and application of a ballast layer, with prestressed concrete sleepers on the main line and at the secondary tracks, replacement of existing turnouts with new ones on the main line and on secondary tracks, reconstruction of track sub-drainage network, which is affected by the reconstruction of the tracks, reconstruction of the existing passenger platform to comply with TSI's requirements and extension of the secondary tracks to accommodate long trains. Additional works include the installation of electrification systems as well as signalling and telecommunication systems installation.

Earthworks and Geotechnical Improvement

The required geotechnical works along the railway line are suggested in terms of line safety and protection against failures associated with geological/geotechnical factors. Such works include slope protection and stabilization against rockfalls and surface erosion control measures for the embankments. At the locations along the existing small embankments and at the locations of main structures - bridges and tunnels – no geotechnical works are necessary.

The Project includes geotechnical works for slope and embankment stabilization:

- Rockfall protection measures, and
- Embankment erosion protection measures

Hydraulic – Culverts

The Project will implement specific interventions that will raise the level of hydraulic protection to comply with international standards. This means that all culverts will protect against the 50-year return period flood. All primary culverts are reconstructed to convey the 50-year return period peak flow, including climate change and are designed with minimum dimensions based on standards, and also extension and adjustments of all secondary culverts (if they are structurally safe), to account for the proposed widening of the existing cross-section.

Restoration of cut ditches is also planned, as well as restoration for the pipe culverts draining the flat plain, with potential upstream regulation works.
Construction of tunnel drainage and introduction of the necessary fire protection measures in the tunnels, hydraulic protection of tunnel entrances, and construction of local bridge pier protection, where necessary.

Local Roads – Level Crossings

The existing local roadway network will not be affected by the Project. However, where adjacent road sections may be affected by the proposed railway corridor widening, retaining structures will be applied.

Following the site visit, discussion with RIOM representatives and analysis of the collected documentation, considering the foreseen level of traffic and environmental and social considerations, the following intervention is proposed:

- The level crossing at Km. 4+664 is proposed to be kept at the level and upgraded by installing heavy-duty rubber panels, safety systems, and road and rail signage according to National Regulations.

- The proposal for level crossing at Km. 5+850 is to abolish it and re-direct traffic to the level crossing at Km. 4+664.

Main Structures

Tunnels

All tunnels along the railway line (tunnels BR1, BR2 and BR3), regardless of their length, will comply with the requirements for fire resistance of tunnel structures, fire reaction of building material and evacuation facilities: Escape signage.

In addition, for the longest tunnel (BR 2), which has a length of L=2,050 m (>1 km), a widening is proposed to ensure all provisions and elements required for compliance with TSI except the evacuation facilities regarding safe areas. The tunnel BR2 will comply with the additional following requirements: emergency lighting on escape routes, escape walkways, firefighting points and emergency communication.

All tunnels along the railway line will comply with the international standard series[1] of loading gauges.

Activities in regard to the tunnels include imminent and correction and rehabilitation measures as well as structural interventions aiming to improve the structural integrity and the safety of the tunnels.

In addition, the Project foresees full modernisation of the tunnels, including a cross-section[2] increase to comply with the international requirements[3] relative to gauge and safety features (UIC-GC gauge, escape walkways, fire safety, emergency communication, emergency lighting, etc.) and any required structural upgrade measures, in the portals and the lining.

Bridges and Culverts

The Project foresees particular interventions required for any structural upgrade measures, for compliance with the modern seismic codes (modifications-relocations to comply with the TSI requirements affecting the track cross-section.

It also includes larger-scale works such as reconstruction in case of track width increase, for which a corresponding bridge deck side extension will be required The interventions will be further tailored to the specific needs of each bridge based on its condition, age, and the requirements of the railway rehabilitation project.In regard to the underpasses – culverts, the Project foresees rehabilitation measures related mainly to their durability. A major activity to be undertaken is cleaning the culverts - especially the concrete pipes - and removing any deposited soil and solids, constraining their cross-section. The Project also foresees particular interventions required for any structural upgrade measures, for compliance with the modern seismic codes (EN1998) or modifications-relocations to comply with the TSI requirements affecting the track cross-section, also including larger-scale works, such as reconstruction in case of track width increase.

---

[1] International Union of Railways (UIC) (https://uic.org/)

[2] UIC-GC gauge

[3] Trans-European Transport Network (TEN-T) and Technical Specifications for Interoperability (TSI)

Retaining Walls (Minor Structures)

The Project also foresees interventions required for any structural upgrade measures of the retaining walls, for compliance with the modern seismic codes (EN1998) – only for the higher walls - or modifications - relocations to comply with the TEN-T and TSI requirements affecting the track cross-section.

Tuzi Railway Station – Station Building and Surrounding Area

The Project includes a complete modernisation of the station. It would be reconstructed and arranged to meet the needs of freight and passenger users, as well as the necessary requirements to serve as a joint border station between Montenegro and Albania. The expected harmonization of procedures (following national legislation and bilateral agreement) will also simplify border procedures, make for a more rational use of resources, and result in more successful cooperation of border services.

The Project includes reconstruction of all facilities at the railway station, their modernisation, and commissioning. The total area for the complete reconstruction is considered as follows: residential building 465 m^2, and warehouse 305 m^2. The design basis proposes the construction of the main station building - 1400 m^2, construction of platforms, canopy, etc.

Signalling and Telecommunication

The Project will implement new signalling and telecommunication systems for the railway line.

Electrification

The railway will be electrified by construction of the overhead catenary system by execution of the following activities:

- Construction of overhead catenary system on the line, electrification of transit, station, and manipulative tracks;
- Construction of a traction sub-sectioning point with a neutral section at the border with Albania;
- Development of remote control system

Project Alternative Scenarios Considered

This Scoping report was preceded with the Project *"Modernisation of Rail Route 2, Podgorica – Albanian Border, Feasibility Study and ESIA, including a Cost-Benefit Analysis, the Conceptual Design of the railway link and the respective Environmental and Social Impact Assessment"*. Within that assignment, different Development Scenarios for the line were analysed, out of which Sub-scenario 3A was selected for further development within the current TA. The selection of the preferred development scenario was conducted with the Multi-Criteria Analysis (MCA). The MCA framework for the selection of the preferred development scenario included the following broad criteria categories to capture the different aspects, as identified in the scope and the objectives of the Project:

- Connectivity and regional integration criteria
- Technical and economic criteria
- Transport criteria
- Environmental and social criteria

These categories are considered to have equal importance; therefore, their weights were set equally to 25%. Each category comprises specific criteria.

The selection exercise based on the aforementioned approach and methodology has indicated that the preferred development scenario is Scenario 3 - Full Modernization Scenario. Both options of this scenario, i.e. sub-scenarios 3A and 3B have received almost equal scores, and therefore, both have been proposed for further development.

Based on the subsequent review in June 2022 by the Ministry of Capital Investments of Montenegro and Railway Infrastructure of Montenegro in their capacity as Project Beneficiaries, Scenario 3, option 3A was promoted as the preferred Project option for further development.

Hence, the Full Modernization Scenario, Sub-scenario 3A has been selected as the optimal one.

This Sub-scenario A has been slightly modified within the Design Basis Parameters Report, that is used as the basis for further preparation of the Detailed Design and the present Environmental and Social appraisal. The overview of introduced modifications is presented in the table below:

Table 1 Overview of proposed modifications of the selected scenario 3A

Feasibility Study stage	Detailed Design, final ESIA stage
Construction of Slab Track system in the Tunnel 2	Construction of a slab track system in all the existing tunnels since it enables easier emergency evacuation and reduces the required tunnel cross-section, as well as maintenance costs in the future.
Conversion from the level crossing at km 4+664 to road overpass (construction of road bridge)	Retaining the railway crossing at km 4+664 at level and installation of appropriate safety equipment
Depending on the agreement between Montenegrin and Albanian administrations on details and procedures regarding the use of the facilities, allocation of the Albanian administration staff to the facility where the housing is currently organised, utilisation of the main railway building as a passenger building (with rooms including a cash register, waiting room, small service activities such as an exchange office or post office, information desk, etc.), for the office of railway services (station chief, train dispatcher, etc.) as well as part of the administration for passport (and customs) control and for the rest of the administration for both sides.	Demolition of the existing and construction of a new station building with a total area of 1400 m2, sufficient for the accommodation of all necessary facilities (railway administrative facilities, cash register, waiting room, small service activities such as an exchange office or post office, information desk, etc., administration for passport (and customs) control and for the rest of the administration for both sides, signalling and telecommunication equipment room, the power supply/ batteries equipment).
The building, in which the warehouse is currently located is completely renovated to be multifunctional including various services for passengers such as a restaurant, entertainment facilities, etc.	Reconstruction of the existing warehouse and retention of its current function.

ESIA Scoping Summary

Different aspects of the Project are to be considered when assessing the impact of the proposed developments on the biophysical and societal environment. The table below shows the main environmental and socio-economic aspects associated with the construction and operation of the project, which will be addressed in the subsequent ESIA. Each of these issues is further described in this Scoping Report.

Table 2 Summary of ESIA Scoping

Topic	Key issues/notes
Climate-related aspects	Climate resilience assessment[4] – adaptation of the Project to extreme weather events by measures incorporated into the Project design
Air Quality	› During construction - change of air quality due to movement of vehicles; preparatory works; replacement of obsolete railway elements; earthworks and tunnelling; excavation and installation of drains and communication ducts; construction of retaining walls etc.; surfacing works; stock piling/ storage. › During operation - not anticipated as significant and, therefore, scoped out from the present ESIA. › Scoped out from present ESIA: ambient (baseline) air quality measurements and air pollution modelling due to traffic.
Geological environment and soils	› During construction - disturbance of geological deposits and soils due to geological hazards, primarily erosion and landslides; risk to the soils (erosion; pollution risk). › During operation - potential geological hazards (erosion and landslides); pollution risk.
Water environment	› During construction - risk to water environment (excavation, pollution risk, physical modification); increase in flood risk; impact to water-dependent designated sites (e.g. Skadar Lake). › During the operation – flood risk; pollution risk due to maintenance.
Noise and vibration	› During construction - noise and/or vibration due to the use of heavy vehicles and machinery and implementing construction activities. › During operation - traffic noise impacts the closest receptors › Ambient (baseline) noise measurements and noise modelling due to traffic,
Land cover / land use	In long term, these impacts are related to the proposed widening of the existing railway cross-section and new land-take to accommodate the newly proposed elements (e.g. lateral emergency walkway as well as the installation of catenary masts). Therefore, the operation of the railway upon its modernisation will have certain effects on land use, which are comparable to the existing situation. Both public and privately owned land will likely be affected by the Project.
Biodiversity and natural heritage, landscape	› During construction - impacts to biodiversity receptors (mainly disturbance of species, habitat fragmentation, risk of forest fires, pollution risk to biodiversity and natural heritage (i.e. Skadar Lake National Park, EMERALD / RAMSAR SiteCode: ME0000003); › Temporary physical and visual change to the landscape › During operation – habitat fragmentation, collision risk due to traffic, electrocution of birds), pollution risk due to maintenance.

[4] In line with Final-Report_Climate_Resilience.pdf and CRITICAL INFRASTRUCTURE PROTECTION & RESILIENCE - EC Technical Guidance on Climate Proofing of Infrastructure

Topic	Key issues/notes
	› The Project will have minor impacts on the visual aspects of the landscapes, both in the construction and operational phases. The existing railway line has become part of the landscape in the area. The same railway alignment will be used during the reconstruction of the existing line, and no additional visual changes in the landscape in the study area as a whole will occur.
Waste	› During construction - waste generation, including construction and demolition waste as well as packaging waste › During operation - not anticipated as significant and, therefore, scoped out from the present ESIA.
Social aspects	› The Project activities would remain in the boundaries of the existing railway with a low magnitude of new land-take due to the widening of the railway cross-section, and therefore, no physical resettlement is expected. Particular acquisition of private and/or public land may occur. › Impact on community infrastructure, possible › Impact on vulnerable groups. › Potential impact on workers (labour standards, occupational health and safety) › Health and safety and security of the people (including workers, suppliers, local communities) › Include measures that will enable the use of railway services for persons with reduced mobility.
Cultural heritage	The Project activities would remain within the boundaries of the existing railway, which has a low magnitude of new land-take and a limited scope of earthworks due to the widening of the railway cross-section. Therefore, it is anticipated that the probability of chance-finding during construction works will be very low. The typical chance-find procedure would be established as required by relevant national legislation and good international practice. Therefore, since the impact to the cultural heritage sites is likely to be negligible during the implementation of the Project, these aspects are scoped out of the present ESIA.

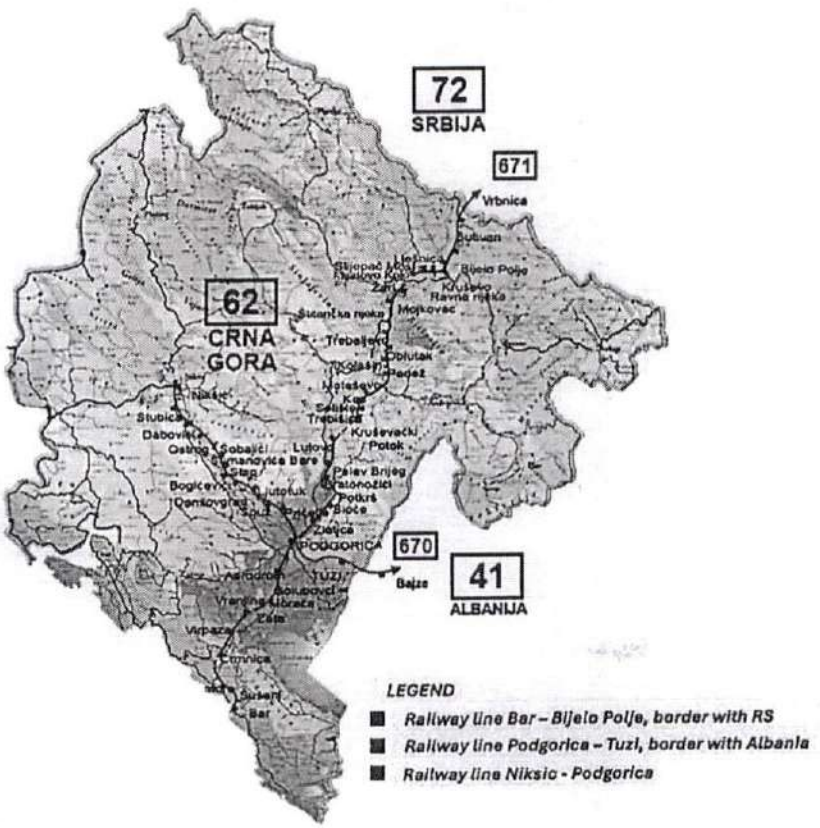
1 Introduction

1.1 Background and Purpose of the Project

The total length of the railway network in Montenegro amounts to 327.72 km, out of which 250.51 km accounts for the open track railway network and 77.21 km accounts for the railway tracks in the stations. Most of the railway network is electrified apart from some 24.74 km. All railway lines are single-track railway lines. Almost 58 km of the railway lines are situated in 121 tunnels. There are also 120 bridges, 11 galleries and 396 culverts. The network consists of three railway lines that converge in Podgorica, making it a junction of the Montenegrin X-shaped rail network:

- Vrbnica (border with Serbia)-Podgorica-Bar, 168 km electrified line;
- Podgorica-Nikšić, 56 km electrified line;
- Podgorica-Tuzi (border with Albania), 25 km non-electrified line.

Figure 1 Railway network in Montenegro



The subject railway line between Podgorica and the Albanian border represents a section (25 km) of the Route 2 SEETO Comprehensive Network (148km) from Podgorica (Montenegro) to Vlore (Albania). This section forms part of the indicative extension of the Core TEN-T Corridor into neighbouring countries.

Figure 2 Subject railway line in the context of extension of the Core TEN-T network

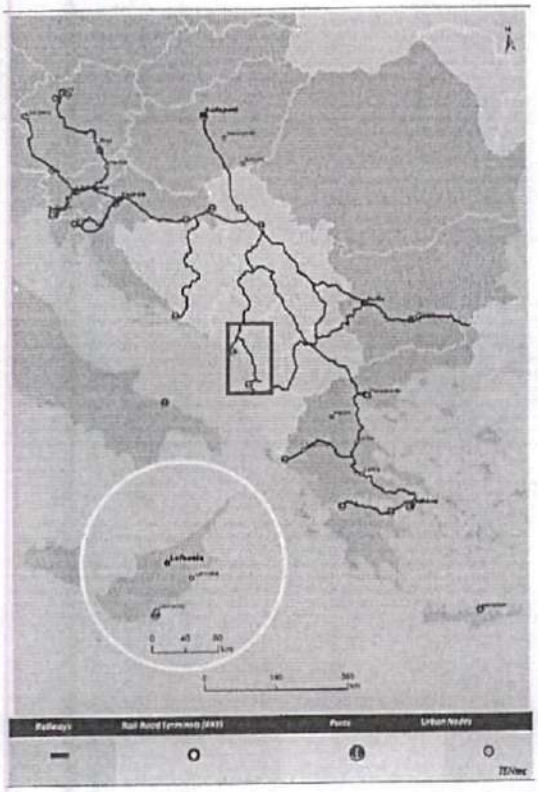
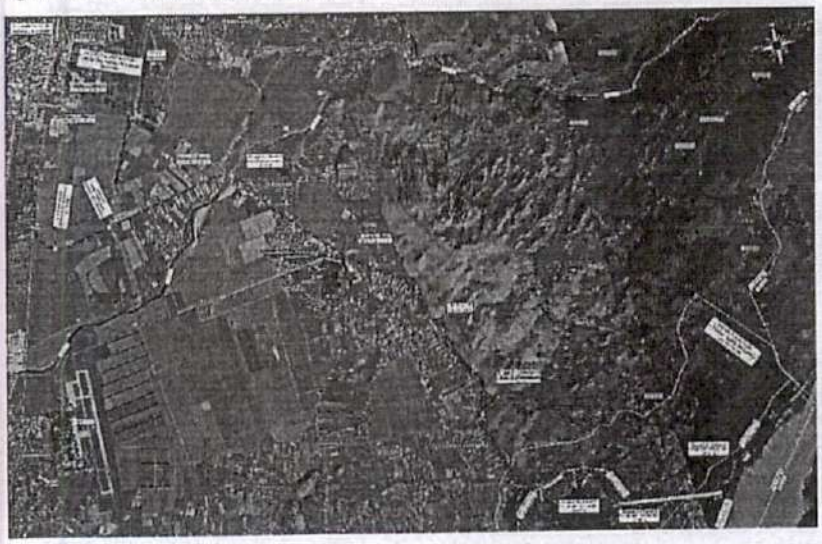


Figure 3 Railway line Podgorica - Tuzi - border with Albania



The section from Podgorica to the Montenegrin-Albanian border was opened in 1986. It was planned for both passenger and freight transport, however since its opening it was used only for freight traffic (maximum of 300,000 net tons of goods per year over the last 10 years). The section is single-tracked, not electrified, and designed for a

maximum 100 km/h speed. However, it is currently in poor condition in many parts, and the permissible operational speed has had to be substantially reduced in some sections (now 30 km/h). In addition, the section does not meet the minimum standards with respect to the TEN-T network for length of loops and signalling.

In order to improve this situation, modernisation of the railway line is required to achieve substantial compliance with the TEN-T and TSI standards with minimal derogations, addressing the following issues:

- Adaptation/enhancement for regional/cross-border passenger services;
- Upgrade of level crossings, and closure (if deemed required);
- Adaptation of loop lengths;
- Kinematic envelope / loading gauge compliance;
- Suitable alignment changes for safety, environmental or slope stability reasons;
- Electrification with an overhead contact line system;
- Rehabilitation and modernisation of the existing signalling and interlocking devices;
- Telecommunications digitalization along the full-length railway line;
- Modernisation of the security and video surveillance system.

Modernisation aims to establish passenger traffic, increase freight traffic, enhance cross-border cooperation, and promote regional integration, cohesion and modal shift from road to rail.

The National Investment Commission of Montenegro adopted the railway reconstruction and electrification project for financing support at the end of 2015, and the project is included in the single project pipeline list of priority infrastructure projects.

Consequently, the present Project placing focus on the development of Environmental and Social Impact Assessment (ESIA), Detailed Design (DD) and Tender Documents (TD) for the Modernisation of Rail Route 2, Podgorica – Montenegrin / Albanian border. The sub-project was initiated on 16 September 2024, with the kick-off meeting held in Podgorica, and its planned duration is 20 months.

1.2 Project Developer

Project developer is the company 'Railway Infrastructure of Montenegro JSC' - Željeznička infrastruktura Crne Gore AD Podgorica' ('RIoM' or Developer). It is a state-owned company, established on 7/7/2008, according to the Strategy of Restructuring of the Railways of Montenegro, adopted by the Montenegrin Government in 2007.

In its capacity as the Montenegrin railway infrastructure manager, RIoM's key functions are as follows:

- develop and invest in railway infrastructure,
- secure modernisation and maintenance of the railway infrastructure,
- ensure access and allocate facilities to all interested railway transporters that fulfil legal requirements,
- define infrastructure access charges,
- make and announce timetable,
- organize and regulate the railway transport.

1.3 Purpose and Structure of the Report

Scoping Report for the Environmental and Social Impact Assessment (ESIA) for the proposed Project (this document) aims to identify the main potential adverse and beneficial impacts associated with the development that will be assessed in more detail in the subsequent impact assessment process.

The Scoping Report was prepared for the purposes of meeting the obligations defined under national legislation, harmonised with the relevant EU acquis and environmental and social (E&S) standards of the potential lender to the Project – the European Investment Bank (EIB)[5].

This document is an updated version of the Scoping Report based on the emerging Conceptual Design for modernising the Podgorica – Montenegrin/Albanian border railway line during the Feasibility study phase. The update is aligned with the requirements for the preferred sub-scenario by Project beneficiaries and the lead IFI, as well as the Design Parameters Report for this project.

The Project will be developed further through reference design stages (i.e. detailed design), which will form the basis for the detailed ESIA/EIA and its application to the Montenegrin EIA competent authority for screening purposes.

The principle purpose of this Scoping Report is, therefore, to:

- Provide a summarized description of the proposed Project, including its location and technical capacity;
- Provide a summary of the alternatives considered to date and the outcome of the process for selection of the preferred option for further development;
- Set out the proposed scope of work and methods to be applied in carrying out the ESIA for the proposed Project.
- Provide the baseline conditions of the environment and social conditions that will be impacted by the project.
- Outlines the methodology for conducting the ESIA, including the tools and techniques that will be used to evaluate environmental and social impacts.
- Identify potential risks that the project may pose to the environment and affected communities,
- Define the geographical scope, time frame, and specific areas of focus for the ESIA.

The main section of this report provides an overview of the proposed Project and its alternatives, the environmental and social baseline in the area affected by its implementation, and the potential environmental and social impacts and principle mitigation.

It should be noted that this Scoping Report is not intended to provide detailed information regarding the Project. Instead, it is a preliminary overview of the Project that can inform the early engagement process with relevant stakeholders and help identify potential impacts. Further details will be provided in a package of additional documents that will be developed during the ESIA process.

[5] European Investment Bank Environmental and Social Standards

1.3.1 Overview of the Main Relevant National Legislation

The Law on Environment (OfG. 52/2016, 73/2019 - another law and 73/2019 - another law) is a key legal act on the management and protection of the environment. It establishes principles, mechanisms and the institutional framework for environmental protection in line with the requirements stemming from Montenegro's international commitments.

The scope of EIA was harmonized with the Convention on Environmental Impact Assessment in a Transboundary Context (Espoo Convention) and EIA Guidelines have been issued. Secondary legislation (Decree on projects for which the environmental impact assessment is performed (OfG. 47/13, 53/14 and 37/18), Rulebook on the close content of the documentation submitted with the request for deciding on the need for elaboration of the Study (OfG. 19/19), Rulebook on detailed content of an Environmental Impact Assessment Study (OfG. 19/19)) was amended in 2019. As a result, the legal framework for EIA is well aligned with the EIA Directive 2011/92/EU and the Espoo Convention.

Concerning the criteria for projects requiring an EIA, Montenegro has chosen for some activities to apply stricter thresholds as compared with the EU mandatory list of EIA installations.

The table below presents the main legislative acts from the legal framework.

Table 3 Relevant legislative framework

Laws and regulations	Official gazette of Montenegro	Relevance
Law on Environment	52/2016, 73/2019 - another law and 73/2019 - another law	The Law on Environment establishes principles, mechanisms and the institutional framework for environmental protection in line with the requirements stemming from Montenegro's international commitments. The Law describes such principles as an integrated approach to environmental protection, cooperation among governmental authorities at different levels and between governmental authorities and stakeholders, access to information and public participation, and the polluter pays, and user pays principles
The Law on Environmental Impact Assessment	75/18	This Law regulates the procedure for assessing the impact of the study on projects that can have a significant impact on the environment, the content of the impact assessment study, the participation of stakeholders and organizations and the public, the assessment and approval process, notification of projects that can have a significant impact on the environment other countries, supervision and other issues of importance for the assessment of environmental impacts.
Law on Integrated Prevention and Control of Environmental Pollution	80/05, 54/09, 40/11, 42/15 and 54/16	Law that regulates conditions and the procedure for issuance of integrated permits for installations and activities
Law on Air Protection	25/10, 40/11 and 43/15	The Law clarifies the competencies of the EPA and defines a strategic framework for air protection, as well as strengthens the harmonization with obligations resulting from

Laws and regulations	Official gazette of Montenegro	Relevance
		Montenegro's international commitments and relevant EU directives.
Law on nature protection	54/16 and 18/19	The Law describes the classification of protected natural assets. These include: (i) protected areas – strict nature reserve, national parks, special nature reserves, nature parks, nature monuments, protected habitats and landscapes with outstanding features; (ii) areas of ecological networks (iii) protected speleological, geological and paleontological sites
Law on National Parks	28/14 and 39/16	The Law defines the borders, level of protection, development limitations within natural parks, permitted resource uses and how the national parks should be managed
Law on Waste Management	34/2024	The Law requires the waste producer to make all efforts to prevent and reduce the generation of waste. It also provides for extended producer responsibility. Holders of waste are obliged to ensure the treatment of waste. If the treatment is impossible or unjustified from the point of view of cost efficiency or environmental protection, the holder of waste should ensure the disposal of that waste. Separate collection is mandatory for paper, metal, plastic, glass and bio-waste. Separate collection, and collection of municipal waste for treatment, are the responsibility of local self-government authorities.
Law on Chemicals	51/17	The Law regulates the classification, packaging and labelling of chemicals, and transport, import and export of dangerous chemicals.
Law on Water	27/07, 73/12, 32/11, 47/11, 48/15, 52/16, 55/16, 2/17, 80/17 and 84/18	The Law stipulates the principles of water management.
Law on the Protection against Environmental Noise	28/11, 1/14 and 2/18	A number of responsibilities for implementation of measures prescribed by the Law are vested with local self-government authorities. They are responsible for their own acoustic zoning.
The Law on Spatial Planning and Construction	64/17, 44/18, 63/18, 11/19 and 82/20	This Law regulates the system of arrangement of the territory of Montenegro, the manner and conditions for the construction of structures, as well as other issues of importance for landscaping and construction of structures. It defines the process of adoption of the planning documents for construction of facilities (spatial plans) including defining the public interest for the expropriation of properties, in order to build the planned facilities.
Expropriation Law	55/00, 12/02 - Con. Ct. Decision, 28/06, 21/08,	This Law regulates the process of involuntary resettlement when public interest is established by separate Law or by the Government of Montenegro. It recognises the expropriation as deprivation or limitation of proprietary rights to immovable

Laws and regulations	Official gazette of Montenegro	Relevance
	30/17, 75/18 an d 33/24	property, when this is of public interest and differs cases of expropriation that changes the owner of expropriated immovable property (complete expropriation), the determination of easement rights on immovable property and lease on the land for maximum of three years.
Labour Law	74/19, 8/21, 59/21, 68/21, 145/21, 77/24, 84/24 and 86/24	Regulates rights and obligations of employees, the methods and procedures regarding those rights, the way of encouraging employment, facilitating flexibility in the labour market, branch and individual collective agreements and labour contracts etc. Montenegro ratified 75 ILO conventions, including all eight fundamental conventions.
Occupational Health and Safety Law and relevant regulations, ratified international health	34/14 and 44/18	It defines that occupational health and safety is provided and implemented by applying modern technical and technological, organizational, health, social and other measures and means of protection in accordance with Law provision, relevant regulations, ratified international treaties
Law on the protection of cultural heritage	49/10, 40/11, 44/17 and 18/19	The Law aims at protection of cultural heritage as preservation and improvement, ensuring the sustainable use of cultural heritage, according to their traditional and appropriate uses, for human development and quality of life, spreading knowledge about the values and importance of cultural heritage, providing for the conditions of cultural heritage, in accordance with their purpose, to serve for cultural, scientific and educational needs of individuals and society..

- **Montenegrin Legal Framework on EIA procedure**

The Environmental Impact Assessment (EIA) process is regulated by the Law on Environmental Impact Assessment (Official Gazette of the Republic of Montenegro, No. 75/18) and other regulations adopted on the basis of this Law.

The Environmental Impact Assessment is defined by the Law as a preventive environmental protection measure, where:

- public and stakeholder consultation is conducted,
- analysis of alternative measures in order to collect data is carried out,
- prediction of the harmful effects of certain projects on the life and health of people, flora and fauna, land, water, air, climate and landscape, material and cultural goods and the interaction of these factors is made, as well as proposal of certain measures that can prevent, reduce or eliminate adverse effects is carried out.

The impact assessment includes projects in the fields of: industry, mining, energy, transport, tourism, forestry, agriculture, water management, waste management, utilities and projects planned in a protected natural asset or special purpose area

defined by the Decree on projects for which the environmental impact assessment is performed (OfG. 47/13, 53/14 and 37/18).

The competent authority responsible for the implementation of the impact assessment procedure is:

- the authority responsible for environmental affairs - for projects for which consents, approvals and licenses are issued by another state administration body;
- local government body competent for environmental protection activities for other projects for which approvals, approvals and licenses are issued by other local government bodies

Starting the process of impact assessment:

- Phase I - Decision-making process on the need for environmental impact assessment of the project
- Phase II - Procedure for determining the scope and content of the Environmental Impact Assessment Study
- Phase III - Procedure for giving approval to the Environmental Impact Assessment Study

The Rulebook on detailed content of an Environmental Impact Assessment Study (OfG. 19/19) defines a detailed content of the study, including a qualitative and quantitative presentation of possible changes in the environment during the project, regular work, in the event of an accident, and assessing whether the changes are temporary or permanent.

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

Since the Environmental Impact Assessment Study is an integral part of the technical documentation needed to obtain a building approval, as a rule, it is developed at the level of the conceptual or detailed design. More specifically:

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

and conduct a public discussion on the Environmental Impact Assessment Study.

The Environmental Protection Agency is in charge for the Environmental Impact Assessment procedure and elaborate approval, in accordance with the EIA law.

According to the Decree on projects for which the environmental impact assessment is performed (OfG. 47/13, 53/14 and 37/18), the proposed Project is on the List II, item 12. Infrastructure projects - (c) Railway transport routes, intended exclusively or mostly for passenger transport (elevated, underground, metro, suburban railway, trams, cog railways, funiculars, and cable cars, excluding ski lifts or elevators), with accompanying facilities; (d) Railway facilities: combined facilities for loading and unloading freight, railway terminals, and facilities for washing passenger and freight cars, as well as item 15. Other - (a) All projects listed in List II within protected natural assets.

1.3.2 Relevant International Legislation

The most pertinent piece of EU legislation for this project is Directive 2011/92/EU, amended by Directive 2014/52/EU on the assessment of the effects of certain public and private projects on the environment. Under this Directive, the proposed railway reconstruction project falls under Annex II, Category 10(c), which includes "Construction of railways and intermodal transhipment facilities, and of intermodal terminals (projects not included in Annex I)." For this categorization, it is necessary to determine, based on specific thresholds or criteria, whether the project will be subject to assessment or not.

In addition to the **EIA Directive**, the project must comply with several key EU Directives and regulations, which are part of the EU acquis concerning environmental protection and social impact, including:

- **Water Framework Directive** (2000/60/EC): Ensures that water bodies are protected and their quality is maintained, setting requirements for the sustainable management of water resources during and after construction.

- **Floods Directive** (2007/60/EC): Addresses the management of flood risks, which is particularly relevant to the railway infrastructure, as it may affect or be affected by floodplains.

- **Groundwater Directive (2006/118/EC):** Governs the protection of groundwater resources, ensuring that construction activities do not harm water quality.

- **Habitat and Birds Directives** (92/43/EEC and 2009/147/EC): These ensure the protection of biodiversity, particularly species and habitats that may be impacted by the project, such as through habitat destruction or fragmentation.

Furthermore, the project must adhere to several international environmental and social agreements, which complement the EU's regulatory framework, including:

- **Bern Convention** (Council of Europe, 1979): Aims to protect European wildlife and natural habitats.

- **CITES** (Convention on International Trade in Endangered Species of Wild Fauna and Flora): Regulates the trade of endangered species, ensuring that no project activities result in harm to protected species.

- **ESPOO Convention** (1991): Establishes the requirement for transboundary environmental impact assessments, ensuring that neighboring countries are consulted in case the project has cross-border environmental effects.

- **International Labour Organization** (ILO) Conventions: These ensure that social impacts related to workers' rights and conditions are addressed, promoting fair labor practices during project execution.

- **UNESCO Conventions (e.g., World Heritage Convention):** Protects cultural heritage sites that could be impacted by the project.

2 The Proposed Project

2.1 Description of Existing Conditions

2.1.1 Railway Alignment

The railway line from Podgorica to the Montenegrin-Albanian border represents a section of the TCT[6] Comprehensive Network Route 2 (144 km) from Podgorica (Montenegro) to Vlore (Albania). This section forms part of the indicative extension of the Core TEN-T Corridor into neighbouring countries.

As noted, this railway line is a standard gauge, not electrified single track line with wooden sleepers. It has been designed for a maximum speed of 100 km/h. Today, this railway axis is in poor condition at many sections. The permissible operational speed has been degraded in certain sections to 30 km/h, probably due to side slope stability issues or other safety reasons related to the train operation. This railway line has a length of 24.7 km. Stations, passing loops, and their location along the alignment, are shown in the Table below.

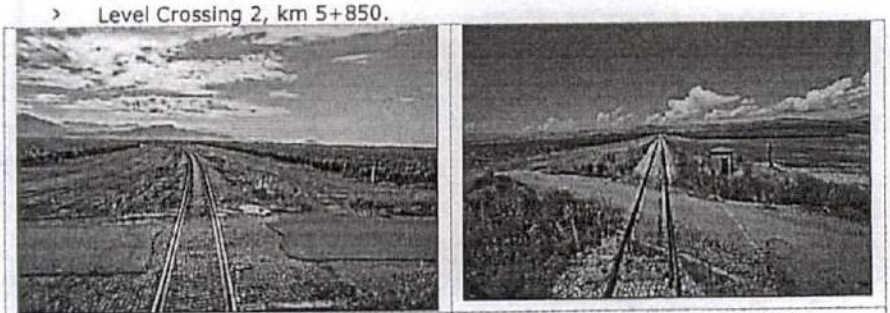
Table 4 Stations and passing loops

Stations and passing loops	location
Station Podgorica	km 0+00
Station Tuzi	km 13+683
Border with Albania	km 24+700

Note: The Podgorica railway Station is considered out of the scope of the Project. The Tuzi railway station has been declared the border station between Montenegro and Albania.

Along the railway line, there are two level rail–road crossings (Figures below), both in legal operation:

- Level Crossing 1, km 4+664; and
- Level Crossing 2, km 5+850.



Level Crossing 1, km 4+664 | Level Crossing 2, km 5+850

Figure 4 Existing level crossings in operation

[6] TCT: Transport Community Treaty, previously SEETO (South East Europe Transport Observatory)

From km 0+000 to km ~15+700 the existing railway line is laid on a flat natural ground. After km~15+700 till the Albanian border, the ground becomes hilly to mountainous. Three tunnels exist in this subsection. In addition, there are five major railway bridges along the railway line. These structures are further described in the following sections.

2.1.2 Tuzi Railway Station

Tuzi Railway Station is one of Montenegro's six main railway stations (the rest being Podgorica, Bar, Niksic, Bijelo Polje, and Sutomore). It is located about 1 km from the centre of Tuzi, and it is connected with the urban area of the municipality with the local road, which is in good condition. It is also connected with the main road (M18), which connects Podgorica (via Tuzi) with the Albanian border checking point (Božaj).

In June 2017, Tuzi station was declared the border station between Montenegro and Albania. The station is supposed to serve passenger and freight transport. The existing passenger platform is a central platform in front of the passenger building, and there is a pedestrian crossing between the passenger building and the central platform. The secondary tracks are four with a maximum useful length of 640 m.

The station complex (Figure below) consists of three buildings: 1) the Main Station Building (including the Passenger Building), 2) Residential Building, and 3) a Warehouse. In front of the station are two platforms and five tracks (main and secondary tracks).

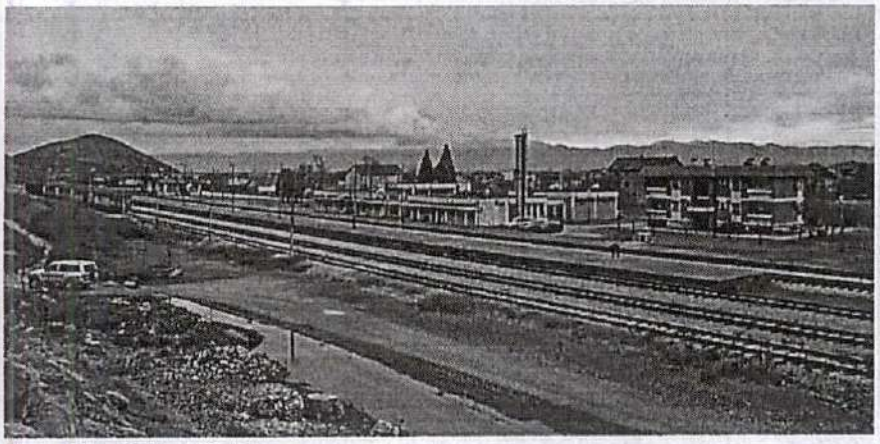


Figure 5 Tuzi Railway Station

- Main Station Building

The central part of the station complex is the Main Station Building. It is a ground-floor building serving various facilities e.g., station office, technical room, etc.

The following facilities are currently installed in this building (Figure below):

- Montenegrin (border) police;
- Montenegrin custom;
- Albanian police and customs;
- Station chief's office, and
- Train dispatcher and other station services.

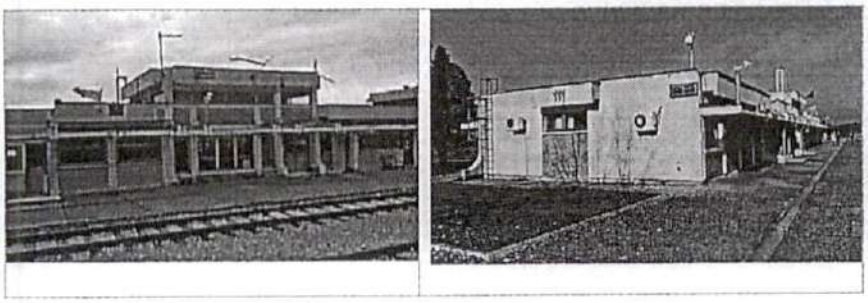


Figure 6 Tuzi railway station (Main station building)

› Residential Building

The second building within the Tuzi railway station is a residential building (Figure below), located close to the Main Station Building. It is a two-floor building with 4 residential units and four basement rooms. The facility currently houses workers hired to work at the station and on the Podgorica-Skadar line.

Figure 7 Tuzi railway station (Residential building)

› Warehouse

The third building within the Tuzi railway station is the warehouse (Figure below), which is not currently in use. There are two offices in the building that are operational, but the majority of the building is practically unusable due to overall poor conditions – broken windows, much damage to the facade, etc.

Figure 8 Tuzi railway station (warehouse)

2.1.3 Structures

Tunnels

The key information for the tunnels is given in the following Table (Figures below).

Table 5 Characteristics of the railway tunnels on the line

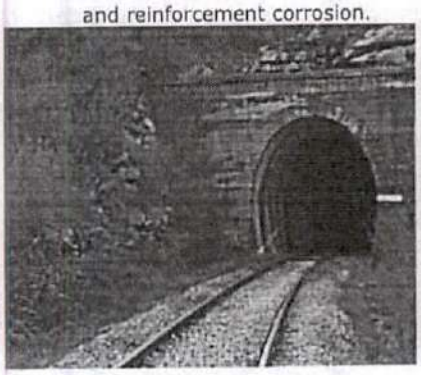
No	Chainage	Type	Length [m]	Comments
1	18+060 – 18+533	Concrete Lining	466	Tunnel 1 (BR1)
2	20+040 – 22+090	Concrete Lining	2050	Tunnel 2 (BR2)
3	22+860 – 23+020	Concrete Lining	160	Tunnel 3 (BR3)

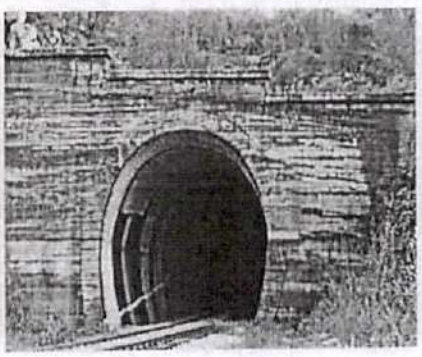
All tunnels are made of plain or reinforced concrete. The existing track in the tunnels is ballasted with wooden sleepers.

The tunnels are not compliant with the requirements for railway tunnels in regard to the fire resistance of tunnel structures and fire reaction of building materials as set for all tunnels regardless of their length in Technical Specifications for Interoperability (TSIs[7]) "safety in railway tunnels" (EU1303/2014)8. The tunnel BR2, which has a length of 2,050 m (>1 km), does not comply with the additional requirements for evacuation facilities as set in the respective TSIs.

The current condition of the tunnels is poor due to (Figures below):

- Evident leakage of water to the inside and
- Degraded concrete surface, with problems such as scouring, carbonation, and reinforcement corrosion.





[7] The Technical Specifications for Interoperability (TSIs) define the technical and operational standards which must be met by each subsystem or part of subsystem in order to meet the essential requirements and ensure the interoperability of the railway system of the European Union. Directive (EU) 2016/797 defines the subsystems, either structural or functional, forming part of the railway system of the European Union. (Source: EU Agency for Railways (ERA), https://www.era.europa.eu/activities/technical-specifications-interoperability_en)

[8] Commission Regulation (EU) No 1303/2014 of 18 November 2014 concerning the technical specification for interoperability relating to 'safety in railway tunnels' of the rail system of the European Union Text with EEA relevance

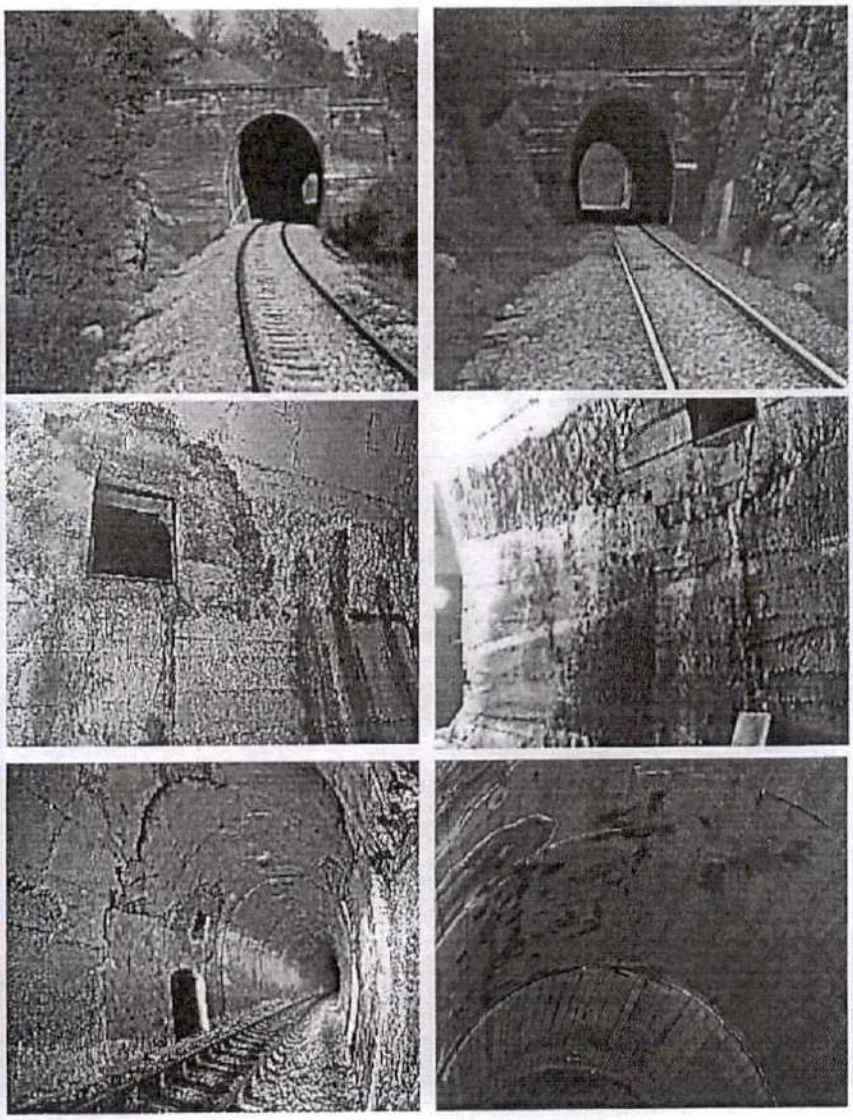


Figure 9 Existing tunnels indicative photos

Bridges

The key information for the bridges is given in the following Table (Figures below).

Table 6 Characteristics of major railway bridges

No	Chainage	Type	Spans / Length [m]	Comments
1	0+675	Prestressed concrete slab – (road underpass)	One / 22.75	Carries five rail tracks. Belongs also to the Bar-Vrbnica railway line.
2	1+560		One / 23.95	Carries five rail tracks. Belongs also to the Bar-Vrbnica railway line.

No	Chainage	Type	Spans / Length [m]	Comments
3	8+403.75		Two / ~ 36	Over the international road M18 (Podgorica-Tuzi-Božaj-border with Albania)
4	8+553.50	Prestressed concrete girders	Four / ~ 100 (4x25)	Over Cijevna River and a local road
5	11+335	Reinforced concrete slab	One / 10	Over Ruela River

› Bridge No.1, at km. 0+675

This bridge was built in 1986 and belongs to the Railway Line Bar-Vrbnica, the country's main rail axis. It is situated at the central railway station in Podgorica. Since many tracks are carried on it, the bridge is designed as three independent structures lying next to each other. The bridge structure consists of multiple box girders made of pre-stressed concrete, simply supported, and with a span of 22.85 m. The bridge's total length is 31.05 m, the width of part I of the structure is 11.8 m, part II is 9.50 m, and the third part is 4.90 m.

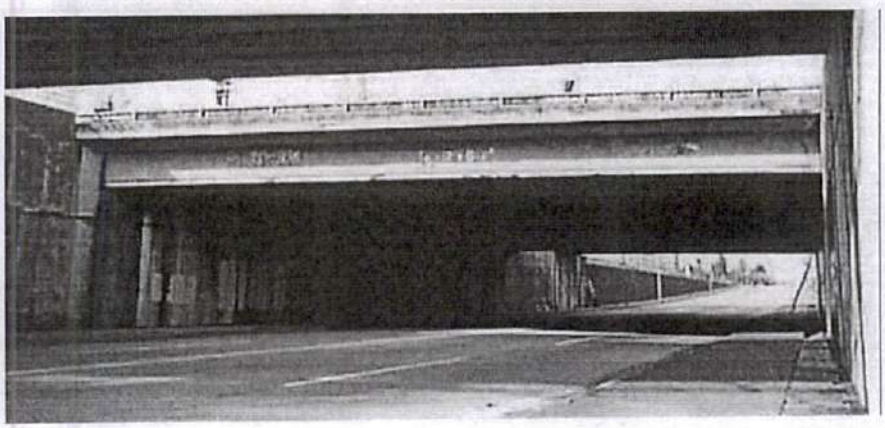


Figure 10 Bridge No.1
Note: Location at km 0+675, view from below

› Bridge No.2, at km. 1+560

This bridge is the newest of all five along this railway line. The following figures show it is also a bridge carrying five tracks. It also comprises multiple decks to carry multiple lines, and it is situated at the entrance of the city's central station. Only one of the decks is currently in use, the rest being empty of lines, as is visible in the following figure. The bridge is made of prestressed concrete and has one span of 23.95 m.

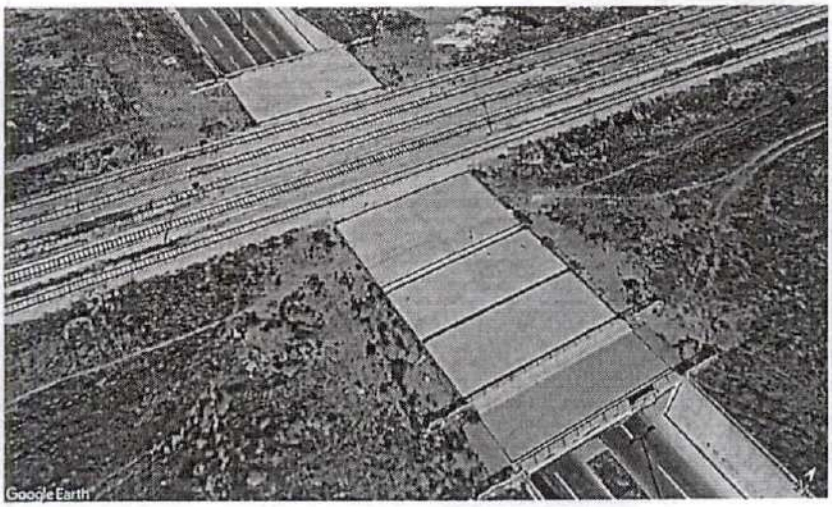
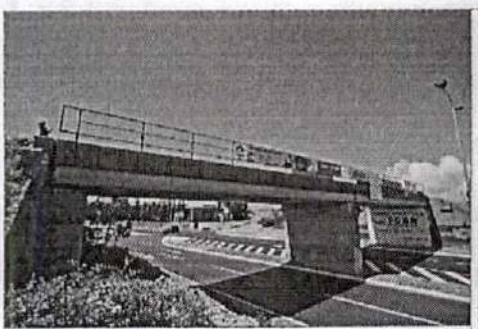


Figure 11 Bridge No.2
Note: Location at km 1+560
Source: Google Earth

› Bridge No.3, at km. 8+403.75

This bridge was built in 1982. The bridge is made of prestressed concrete and consists of two spans of 16 m length each. The superstructure consists of five prefabricated prestressed slabs with circular voids. The width of every independent slab is 1.20 m. The total width of the deck is 6.35 m. A sidewalk (with a cable parapet) is provided on one side of the track.



Note: Location at km 8+403.75, over the road Podgorica-Tuzi

Figure 12 Bridge No.3

› Bridge No.4, at km. 8+553.50

The bridge consists of four spans of prefabricated prestressed concrete girders. The girders are simply supported. The length of the first and the fourth span is 25.50 m, respectively, whereas the two middle spans are 26.00 m each. Thus, the total length of the structure is 103 m. The total width of the bridge is 6.35 m. A sidewalk is provided on one side of the track.

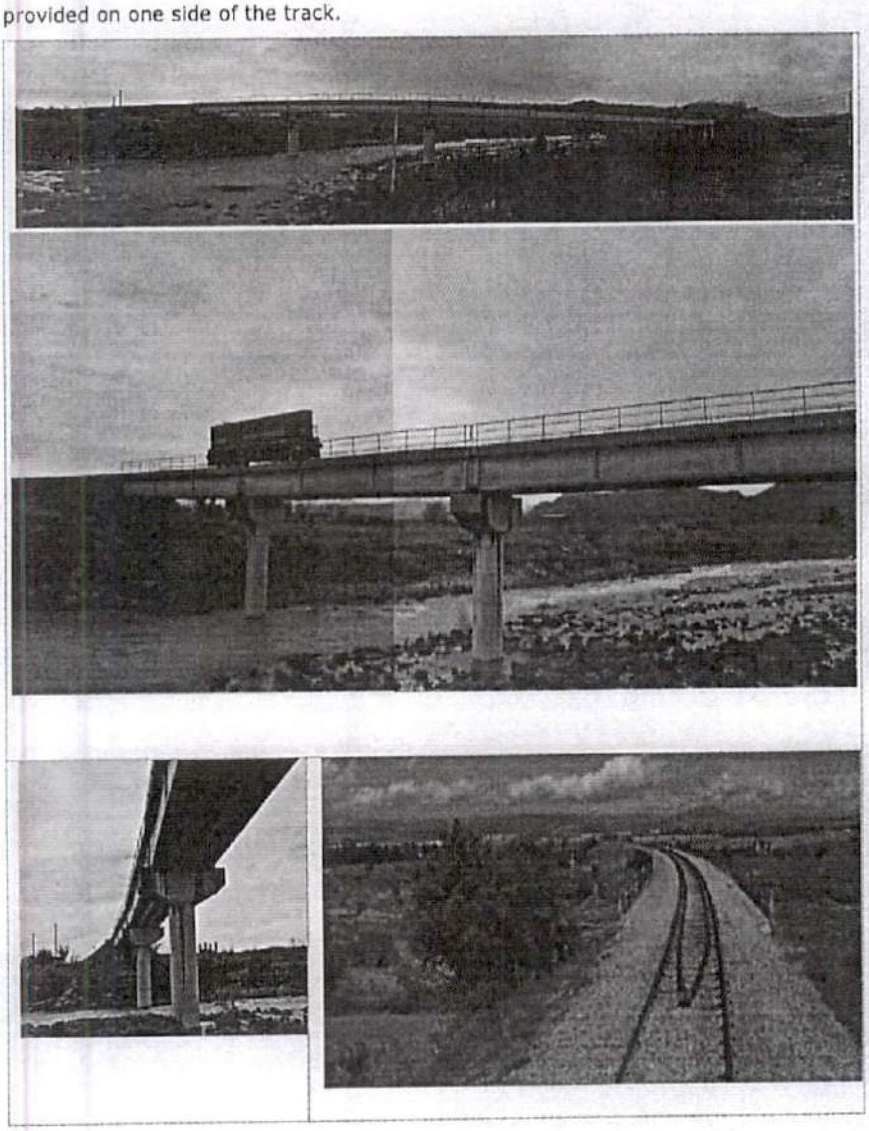


Figure 13 Bridge No.4

Note: Location at km 8+553.50, over the Cijevna River

› Bridge No.5, at km. 11+335

The bridge consists of a single-span reinforced concrete solid slab. The span length is 10.60 m. The total width of the bridge is 6.30 m. A sidewalk is provided on one side of the track.

Underpasses / Culverts

There are seven major underpasses-culverts along the railway line (Table below).

Table 7 Characteristics of underpasses-culverts on the line

No	Chainage	Type	Length [m]
1	14+174	Reinforced concrete slab	5
2	15+427,5	Reinforced concrete slab	8
3	15+833,5	Reinforced concrete slab	3
4	17+685	Reinforced concrete slab	1
5	19+021	Reinforced concrete slab	5
6	24+262	Reinforced concrete slab	2
7	24+680	Reinforced concrete slab	1

Typical underpasses/culverts are presented in the Figure below.

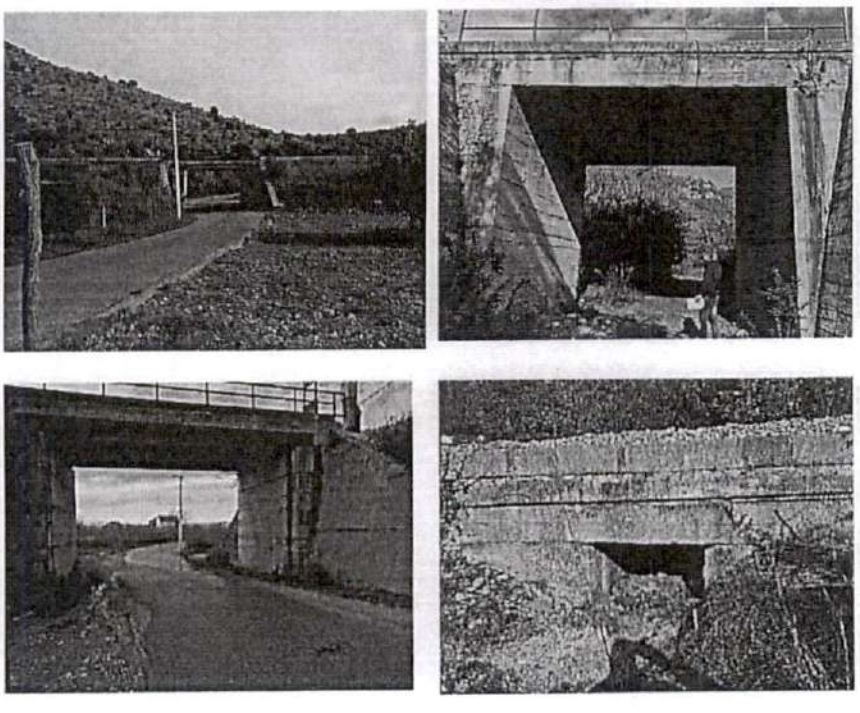


Figure 14 Existing underpasses/culverts indicative photos

2.2 Project Description (Preferred Scenario 3A modified through Design Basis Parameters Report)

2.2.1 International and national regulations in force

Design standards, defined as per international and national regulations in force, are used to define design parameters described in this report to be applied further during Detailed Design development, which are presented in the table below.

Table 8 Applicable design standards

Title of regulation/standard	Applicability
MNE obligations under TCT Treaty transport-community.org/wp-content/uploads/2022/10/treaty-en.pdf	Integration of transport systems in the region, as well as harmonization of transport policies among member states
Directive (EU) 2016/797 of the European Parliament and of the Council of 11 May 2016 on the interoperability of the rail system within the European Union (recast)	Rail systems, subsystems and components
UIC Code 719: Guidelines for the alignment design of railways. UIC Code 774: General principles for the design and construction of railway lines.	Railway alignment
Technical Specifications for Interoperability, "infrastructure" subsystem (EU No 1299/2014).	Railway alignment
Technical Specifications for Interoperability, "safety in railway tunnels" (EU 1303/2014);	Railway alignment Structures
EN 13481: Railway applications - Track - Performance requirements for fastening systems.	Railway alignment
EN 13803:2017 Railway applications – Track – Track alignment design parameters – Track gauges 1435 mm and wider.	Railway alignment
MEST EN 1990:2013-Eurocode - Basis of the structural design/MEST EN 1990:2013/NA:2013- Eurocode - Basis of structural design – National Annex.	Structures
MEST EN 1991-1-1:2017/NA:2017- Eurocode 1: Actions on structures – Part 1-1: General actions - Densities, self-weight, imposed loads for buildings National Annex.	Structures
MEST EN 1991-1-3:2017-Eurocode 1 - Actions on structures - Part 1-3: General actions - Snow loads/ MEST EN 1991-1-3:2017/NA:2017- Eurocode 1 - Actions on structures – Part 1-3: General actions - Snow loads - National Annex	Structures
MEST EN 1991-1-4:2016-Eurocode 1: Actions on structures - Part 1-4: General actions - Wind actions/ MEST EN 1991-1-4:2016/NA:2016- Eurocode 1: Actions on structures – Part 1-4: General actions - Wind actions - National Annex.	Structures
MEST EN 1991-1-5:2017/NA:2017- Eurocode 1: Actions on structures – Part 1-5: General actions - Thermal actions - National Annex.	Structures
EN 1992 (Eurocode 2): Design of Concrete Structures, including the design requirements for concrete railway bridges.	Structures
MEST EN 1992-1-1:2017/NA:2017 - Eurocode 2: Design of concrete structures - Part 1-1: General rules and rules for buildings - National Annex.	Structures

Title of regulation/standard	Applicability
MEST EN 1997-1:2017- Geotechnical design - Part 1: General rules/MEST EN 1997-1:2017- Eurocode 7: Geotechnical design - Part 1: General rules - National Annex.	Structures Geotechnical Design
MEST EN 1998-1:2015 - Eurocode 8: Design of structures for earthquake resistance - Part 1: General rules, seismic actions, and rules for buildings.	Structures
EU on the energy performance of buildings and Directive (2018/844/EU); Revised Energy Performance of Buildings Directive (EU/2024/1275)	Buildings
EN 1991 (Eurocodes): Loadings for Buildings – Part 2: Traffic loads on bridges (relevant for bridge design).	Structures
UIC 776: Guidelines for the design of railway bridges. UIC Code 796: General guidelines for the design of railway structures.	Structures
Directive (EU) 2024/1275 of the European Parliament and of the Council of 24 April 2024 on the energy performance of buildings	Architecture
IEC 60038: Standard voltages IEC 60571: Electronic equipment used on rail vehicles IEC 62014: Railway applications - Power supply and auxiliary power supply systems	Electric Traction and Overhead Contact Line Design
EN 50122: Railway applications - Protective provisions relating to the electric equipment of rolling stock and high voltage installations EN 50163: Railway applications - Supply voltages of traction systems EN 50238: Railway applications - Compatibility between rolling stock and train detection systems	Electric Traction and Overhead Contact Line Design
Energy TSI - Commission Regulation (EU) No 1301/2014 of 18 November 2014 on the technical specifications for interoperability relating to the 'energy' subsystem of the rail system in the Union	Electric Traction and Overhead Contact Line Design
Control Command and Signalling TSI - Commission Implementing Regulation (EU) 2023/1695 of 10 August 2023 on the technical specification for interoperability relating to the control-command and signalling subsystems of the rail system in the European Union and repealing Regulation (EU) 2016/919	Signalisation and telecommunication sub-system
Telematics Applications for Passenger Service TSI - Commission Regulation (EU) No 454/2011 of 5 May 2011	Signalisation and telecommunication sub-system
Telematics Applications for Freight Service TSI - Commission Regulation (EU) No 1305/2014 of 11 December 2014	Signalisation and telecommunication sub-system
Persons with Disabilities and with Reduced Mobility TSI - Commission Implementing Regulation (EU) 2023/1694 of 10 August 2023 amending Regulations (EU) No 321/2013, (EU) No 1299/2014, (EU) No 1300/2014, (EU) No 1301/2014, (EU) No 1302/2014, (EU) No 1304/2014 and Implementing Regulation (EU) 2019/777 Directive (EU) 2016/798 on railway safety Directive 2008/57/EC on the interoperability of the railway system within the European Community	Architecture Railway alignment interface elements (platforms, etc.) Signalisation and telecommunication sub-system
Railway Law (OG of MNE no. 27/13)	Rail systems, subsystems and components
Law on Safety, Organization, and Efficiency of Railway Transport (OG of MNE no. 1/14 and 6/14)	Rail systems, subsystems and components

Title of regulation/standard	Applicability
Law on Spatial Planning and Construction of Structures (OG of MNE no. 64/17, 44/18, 63/18, 11/19 and 82/20)	Conditions for construction of structures and facilities, legalisation of informal/illegal facilities and other issues of importance
Rulebook on the technical specifications of the interoperability of the railway system	Rail systems, subsystems and components
Rulebook on the technical specifications of the interoperability of the railway system in relation to safety in railway tunnels.	Railway alignment Structures
Rulebook on technical condition and maintenance of railway substructure	Railway alignment
Rulebook on technical condition and maintenance of railway superstructure	Railway alignment
Rulebook on railway and public roads crossings	Railway alignment
Rulebook on technical requirements for electric traction substations	Electric Traction and Overhead Contact Line Design
Rulebook on technical norms for the construction of overhead power lines of nominal voltage from 1 kV to 400 kV (SI. List SFRJ, No. 65/88 and SI. List SRJ, No. 18/92);	Electric Traction and Overhead Contact Line Design
General Project and the Catalog of OCS elements on the "JŽ "(Yugoslav Railway)	Overhead Contact Line
EN 12464-1 Lighting Standard	Power supply
Rulebook on the types of signals, signal markings and railway markings	Signalisation and telecommunication sub-system

2.2.2 Permanent Way – Open Line

Activities

The Project includes the full modernisation of the existing track, and specifically the following:

- Widening of the existing cross-section to accommodate the lateral emergency walkway, as well as the installation of catenary masts. For that purpose, the existing ~5.70 m wide cross-section will be widened to ~6.60 m (cross-section width at the level of the ballast foundation). Two widening alternatives are proposed, depending on the existing conditions:
  - One-sided widening at high embankment areas and combined cut & fill cross-sections with high embankments. At the areas where one-sided widening is proposed, horizontal displacement of the track axis is necessary on the side on which the widening is provided.
  - Bilateral widening at low embankments and at sections where railway structures exist (at bridges, overpasses and areas at the tunnels).
- Construction of typical ballasted track according to international standards, comprising of a 30 cm thickness new sub-ballast layer, a minimum 35 cm

thickness ballast layer (measured from the bottom of the sleeper below the rail axis), prestressed concrete sleepers 2.6 m wide and 60E1 type rails[9].

- Construction of a slab track system in the long tunnel. Slab track structure can be chosen for the tunnel section since it enables easier emergency evacuation. Furthermore, slab track structure, especially in the tunnel, can reduce maintenance costs and the required tunnel cross-section. This possibility will be considered during the upcoming design stages of the Project.
- Reconstruction of the embankment and cut side slopes, where affected
- Reconstruction side drains, where affected
- Extension of existing culverts on one or both ends
- Electrification system installation
- Signalling and telecommunication systems installation
- Railway corridor fencing, construction of pedestrian overpasses and sound barrier installation where necessary i.e., where the railway corridor is adjacent to residential areas (e.g., km 10 to km 11).

All tunnels along the railway line will comply with the standard series of loading gauges developed by the International Union of Railways (UIC)[10]. Additionally, all tunnels, regardless of their length, will comply with the requirements for railway tunnels set in TSI "safety in railway tunnels" (EU1303/2014), regarding the fire resistance of tunnel structures and fire reaction of building materials as well as concerning the evacuation facilities (escape signage).

In particular, the Project considers the reconstruction of the existing tunnels at sections where the track is canted and retaining the rest of the existing parts of tunnels (uncanted sections) as they are at the moment.

Project Results

The foreseen modernisation of the permanent way will ensure that:

- Operating speed of 90 km/h (up to 100 km/h) is achieved.
- The railway infrastructure is strengthened to comply with international standards, which means that the bearing capacity of the track is increased.
- Horizontal and vertical track alignment is not amended except in the following cases:
- The track axis has a slight horizontal displacement at sections where one-sided widening is applied.
- Track side drainage improvement
- Restoration of the other trackside structures where is needed (retaining walls, inlets, culverts, etc.).
- TSI's "infrastructure"' requirements relating to track alignment are fulfilled.

[9] A specified in the European standard EN 13674-1:2011+A1:2017 /1/ Railway applications. Track.

[10] https://uic.org/

2.2.3 EIB Environmental and Social Policy

The new EIB Group Environmental and Social Policy as of February 2022 lays out the Group's vision to 2030, namely, to actively contribute to sustainable development and inclusive growth. This is reflected in its environmental and social safeguards, through the EIB Statement on Environmental and Social Principles and Standards from February 2022. Such procedures, principles and standards are translated into the routine practices of the EIB in the Environmental and Social Practices Handbook. EIBs environmental and social standards are listed below:

Standard 1 – Environmental and Social Impacts and Risks

Standard 2 – Stakeholder Engagement

Standard 3 – Resource Efficiency and Pollution Prevention

Standard 4 – Biodiversity and Ecosystems

Standard 5 – Climate Change

Standard 6 – Involuntary Resettlement

Standard 7 – Vulnerable Groups, Indigenous Peoples and Gender Standard

Standard 8 – Labour Rights

Standard 9 – Health, Safety and Security

Standard 10 – Cultural Heritage

Standard 11 – Intermediated Finance

2.2.4 Permanent Way – Tuzi Railway Station

Activities

The Project will ensure the necessary restoration of the initially designed operating parameters in conjunction with the strengthening of the track infrastructure to comply with international standards, including the following works:

- Restoration of any local failure of the track infrastructure.
- Construction of a new sub-ballast layer and application of a ballast layer with prestressed concrete sleepers on the main line and secondary tracks.
- Replacement of existing turnouts with new ones on the main line and on secondary tracks.
- Reconstruction of the track sub-drainage network which is affected by the reconstruction of the tracks.
- Passenger Pedestrian Overpass and elevators are foreseen to cross the tracks
- At-grade crossing is foreseen as an alternative crossing in case the elevators are out of order or cannot be used in case of emergency and to ensure accessibility for people with reduced mobility who hesitate to use the elevator
- Reconstruction of platforms and construction of new canopy
- 740m long track is foreseen for the freight traffic

- A common Signalling system is foreseen for both countries (Montenegro and Albania - GSM-R and ERTMS-1) – eliminate any excessive time needed due to different signalling systems
- A common power supply system is foreseen for both countries - eliminate any time needed due to different power supply systems.

2.2.5 Earthworks and Geotechnical Improvement

Existing state of cut and fill slopes

The existing railway section includes generally stable cut and fill slopes of different heights and one larger embankment at the location of Vitoja/Druma. No settlements were identified along the sections of the railway line on small embankments.

In areas with cuts and fills, the rock layers generally slope favourably towards the formed slopes, falling into the hill. However, in some cases where the layers slope unfavourably, the slopes are generally small.

Near the Tuzi railway station, from Km. 13+470 to Km. 13+620, the rock layers have an extremely unfavourable slope, falling down the slope towards the railway at angles of about 30 degrees. There are also two vertical systems of cracks that divide the layers into blocks of metric dimensions. These blocks slide and collapse in flat layers, falling to the base next to the railway.

Since there is enough space between the railway and the slope, there is no major direct impact on the railway operation. According to the documentation, a landslide occurred during the construction of the railway line between Km. 13+474 and Km. 13+640.

Regarding the cut and fill slopes from Km. 17+530 to Km. 17+880, the rock layers have a favourable slope, falling into the hill at angles of about 20 degrees. The two vertical systems of cracks form blocks with dimensions ranging from centimetres to meters. There is a possibility of small landslides and falling of these blocks.

At the end of the line, from Km. 24+050 to Km. 24+600, there is an extended cut slope, with an unstable slope, and a small-scale rockfall at Km. 24+500. The local and small-scale failures are mostly rockfalls. There are retaining walls at the foot of the cut at several locations.

The embankment at the location of Vitoja/Druma (Km. 19+000 to Km. 19+400) is of considerable height, in the central part almost 17m high. The slopes of the embankment are 1:1.5 (v:h), with benches 2m wide in the middle of the slope. Dispersal and small landslides can be noticed on the slopes. These small-scale movements are probably associated with the surface erosion of the embankment.

Activities

The required geotechnical works along the railway line are suggested in terms of line safety and protection against failures associated with geological/geotechnical factors. Such works include the slope protection and stabilization against rockfalls, and the surface erosion control measures for the embankments. At the locations of main structures - bridges and tunnels – no geotechnical works are necessary.

The Project includes full modernisation of the existing track and, therefore, includes earthworks associated with an extensive widening of existing cross-sections and reconstruction of the embankment and cut side slopes, where affected.

It also requires geotechnical works for slope and embankment stabilization:

› Rockfall protection measures

The rockfall protection measures include the application of anchored meshes. The goal of these systems is the improvement of the surface stability of rock slopes, through the safe detention of loose and/or sliding rock pieces and include a rockfall protection net of high strength and stiffness (double twisted hexagonal woven steel wire mesh) and fully bonded rock bolts (next Figure).

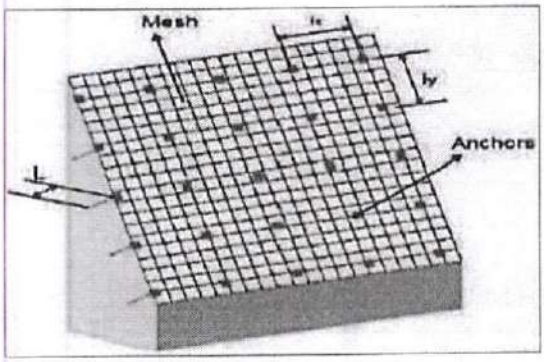


Figure 15 Rockfall protection measures

The sliding of rock pieces from rock slopes is governed by the joints system and the fracture. Additional measures, such as shotcrete application, may be required.

› Embankment erosion protection measures

Reinforced vegetation by using geosynthetic materials to enhance slope stability is a proven method that is widely practised. The main objective of surface protection with geosynthetics is to reduce the intensity of the raindrops impacting the soil, reduce the speed of runoff, and increase the amount of water that soaks into the soil rather than running off and accelerating the vegetative development. The main geosynthetics used in such applications include geotextiles, geomats, geogrids, and geonets. The typical section of a geosynthetic reinforced slope surface against erosion is given in the following figure.

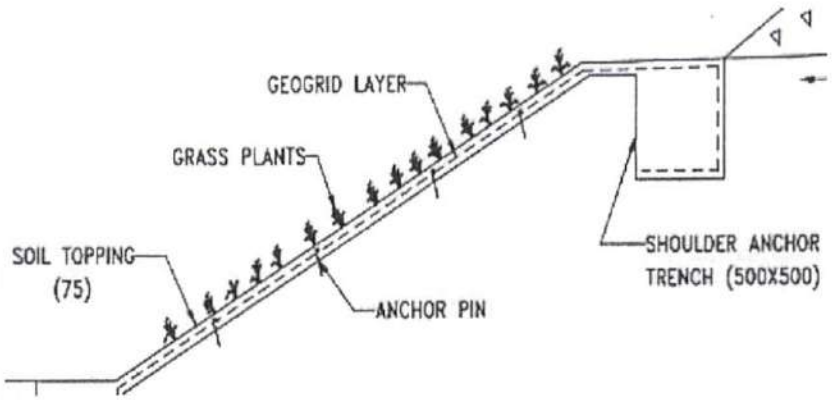


Figure 16 Typical section of erosion protection application

The geosynthetics include geomats and geogrids, which are flexible extruded polymer meshes of high-density polyethylene (HDPE) or polypropylene. In its open mesh formation, it has integrally formed joints or fused joints, giving its dimensional stability and stiffness. The geosynthetic mesh is non-biodegradable, immune to naturally occurring acidic, alkaline, or saline environment. It is generally stabilized against UV ray degradation. The reinforcement mechanism initially incorporates the breakdown of the flow of water by the grid's profile by providing numerous small check dams and holding the structure of the soil in place by reducing the velocity of flow. When sowed with vegetative plants like grass or shrubs, the net reinforced soil cake provides erosion protection to these young plants. Once vegetation is established, the grid acts as a structural matrix for the root mat with intervened roots in the net and creates an extremely strong flexible skin to the slope. Special care must be given in the choice of vegetation, which must have climate and biological compatibility to the site applied. A typical section of the protection system incorporating geomat and vegetation, as well as examples of laying and hydroseeding works are given in the following Figures.

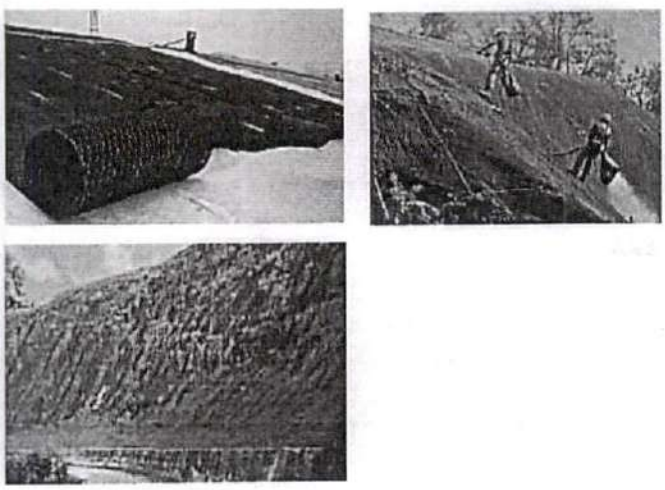


Figure 17 Erosion protection by geomat and vegetation

2.2.6 Hydraulic – Culverts

Activities

The Project will implement specific interventions that will raise the level of hydraulic protection to comply with international standards. This means that all culverts will protect against the 50-year return period flood. This goal will be achieved through the following:

- All primary culverts are reconstructed to convey the 50-year return period peak flow, including climate change and are designed with minimum dimensions based on standards. The secondary culverts are kept the same, as long as they can convey the 50-year return period flows, including climate change.
- Extension and adjustments of all remaining culverts to account for the proposed widening of the existing cross-section, as long as they are structurally safe.
- Restoration, cleaning, and maintenance of the existing hydraulic structures, for culverts and side embankment ditches. Restoration of cut ditches is also planned.
- Restoration for the pipe culverts draining the flat plain, with potential upstream regulation works.
- Construction of tunnel drainage, as well as the introduction of the necessary fire protection measures in the tunnels.
- Hydraulic protection of tunnel entrances, where necessary.
- Construction of local bridge pier protection, where necessary.

2.2.7 Local Roads – Level Crossings

The existing local roadway network will not be affected by the Project. However, where adjacent road sections may be affected by the proposed railway corridor widening, retaining structures will be applied.

Concerning the two existing rail intersections with local roads (see Section 2.1.1), the following is foreseen:

- The level crossing at km. 4+664 is proposed to be kept at level with and upgraded by installing heavy-duty rubber panels, safety systems, and road and rail signage according to National Regulations.
- The proposal for level crossing at km. 5+850, is to be abolished, and traffic re-directed to the level crossing at km. 4+664.

2.2.8 Main Structures

Tunnels

Activities

The reconstruction and rehabilitation of existing railway tunnels require specific technical interventions to ensure structural integrity and safety. The essential

activities to be included, as a minimum, in the design of tunnel reconstruction determined based on the ToR and available documentation and information, as well as the best practices, are listed below:

- Widening of the existing tunnel profile (Tunnel BR1, BR2 and BR3) to accommodate UIC GC gauge;
- Reconstruction of the tunnel sections only where the track is canted and retaining the rest of the existing tunnel uncanted sections.
- Electrification system installation.
- Signalling and telecommunication systems installation.
- Addition of a fire-resistant layer, to increase the evacuation time in case of fire.
- Injection grouting and concrete removal: Perform contact injections in the tunnel lining after executing control wells to assess the void between the rock and concrete lining. Trim or mill the concrete to remove the degraded layers to the required depth, facilitate the installation of anchors, belts (if necessary), reinforcement mesh, and apply shotcrete to the specified thickness, ensuring a minimum allowance of 8 cm for the final lining installation.
- Foot vault renovation: Restore the existing foot vault or construct a new one where significant track deformations occur, ensuring structural stability and alignment.
- Waterproofing and drainage systems: Develop a comprehensive waterproofing system for the tunnel and construct a drainage network to manage collected underground water and incidental liquids. This includes implementing side drains, collector pipes, and manholes for efficient water management.
- Final lining construction: Apply the final tunnel lining using shotcrete, with a minimum thickness of 8 cm, providing durability and finishing.
- Adequate space for overhead electrification equipment
- Drainage and cable channels: Construct new drainage and cable channels to enhance the infrastructure's functionality and accessibility for maintenance.

Construction of a slab track system in all the existing tunnels, since it enables easier emergency evacuation and reduces the required tunnel cross-section, as well as maintenance costs in the future.

The Table below provides an overview of compliance with the relevant TSI "Safety in railway tunnels" (EU1303/2014), Clause 7.2.2 Upgrade and renewal measures for tunnels: "A tunnel is considered to be upgraded or renewed in the context of this TSI when any major modification or substitution work are carried out on a subsystem (or part of it) composing the tunnel. Assemblies and components not included in the scope of a particular upgrade or renewal programme do not have to be made compliant at the time of such a programme. When upgrading or renewal works are carried out, the following parameters apply if they are in the scope of work:

- Prevent unauthorised access to emergency exits and technical rooms
- Fire reaction of building material
- Fire detection in technical rooms

- Emergency lighting: when provided, it is not necessary to apply detailed requirements
- Escape signage
- Emergency communication[11]

Table 9 TSI Compliance reached in the tunnels

Title of regulation/standard	Compliance achieved		
	T1	T2	T3
Prevent unauthorised access to emergency exits and technical rooms (clause 4.2.1.1)	n/a	n/a	n/a
Fire reaction of building material (clause 4.2.1.3);	✓	✓	✓
Fire detection in technical rooms (clause 4.2.1.4);	n/a	n/a	n/a
Evacuation facilities: Escape signage (as per par. 4.2.1.5.5).	✓	✓	✓
Evacuation facilities: Emergency communication (as per par. 4.2.1.8).	✓	✓	✓

In all existing tunnels where the track is canted, gauge UIC GC cannot be accommodated due to pantograph requirements. These track canted sections are the following:

- Tunnel BR 1, Km. 18+065 -18+314 & Km. 18+482 -18+531- L=249+49=298m
- Tunnel BR 2, Km. 20+040 -20+224 & Km. 21+856 -22+090- L=184+234=418m
- Tunnel BR 3, Km. 22+860 -22+937- L=77m.

Concerning fire resistance and fire reaction criteria, it is assumed that these requirements could be fulfilled by covering the existing concrete surface with a certified fire protection plaster or equivalent material of ~5 cm thickness (indicative). Escape signage can be installed without affecting the gauge requirements. The following figures present the typical tunnel cross-sections at canted and uncanted sections.

[11] https://www.era.europa.eu/system/files/2022-11/Guide%20for%20the%20application%20of%20the%20SRT%20TSI%20-%20new%20version%202019%20%28EN%29.pdf

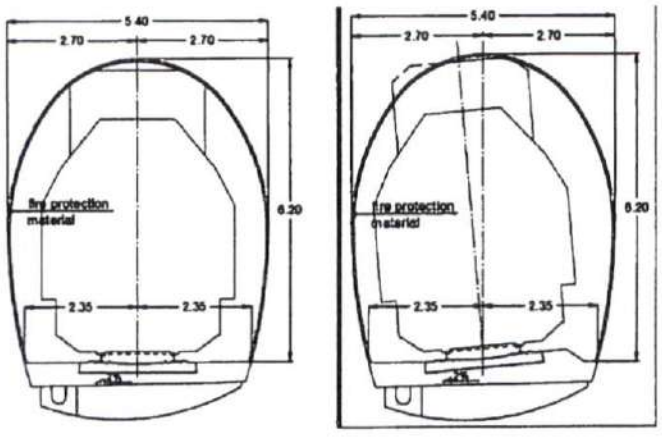


Figure 18 Indicative tunnel cross section - canted and uncanted sections

Bridges and Culverts

Activities

Bridges

Reconstruction of bridge structures is a critical component of any typical railway reconstruction project. Bridges are essential for maintaining the continuity of the rail network across geographical obstacles, and their structural integrity directly impacts the safety, efficiency, and capacity of the entire railway system. Modernising and strengthening bridges during reconstruction not only ensures compliance with current safety standards and load-bearing requirements but also enhances the overall performance and longevity of the railway infrastructure, potentially reducing long-term maintenance costs and service disruptions. The essential activities to be included, as a minimum in the design of bridge reconstruction determined on the basis of the ToR and available documentation and information, as well as the best practices, are listed below:

- structural assessment, including but not limited to visual inspection of the bridge's condition, non-destructive testing to evaluate concrete strength and integrity, assessment of load-bearing capacity and identify any structural deficiencies
- rehabilitation of the damaged and wet parts of the structure (concrete rebounding, reinforcement cleaning, reinforcement protection, application of new protective cover, protective coating);
- rehabilitation of the bridge equipment (replacement of bridge drainage system, waterproofing, expansion joints, bearings, sidewalks, safety barriers, replacement of the damaged prefabricated RC covers of the channels for installations);
- concrete rehabilitation at all joints where water penetration and damages have been identified during the inspection and secured permeability of water on all joints above slabs for water acceptance;
- rehabilitation and prevention of erosion in the foundation area of bridge supports; wings, slopes arrangement under the bridge;

- repair of all other damages and implementation of measures to provide increased durability and safety of the bridge.

The above-listed interventions are and will be further tailored to the specific needs of each bridge based on its condition, age, and the requirements of the railway rehabilitation project, as detailed in the sections below:

Bridge No.1 (at km 405+850.00)

This bridge carries more than one railway line; therefore, its deck is wide enough to accommodate any required increase of the track width. During the detailed rehabilitation design of this bridge for the WB14-MNE-TRA-01 Project, it was concluded that strengthening due to seismic actions is required. The proposed measure is the addition of dampers that help transfer the seismic action to the abutment, which, in the initial design, was not receiving any. The figures below demonstrate the dampers-shock absorbers.

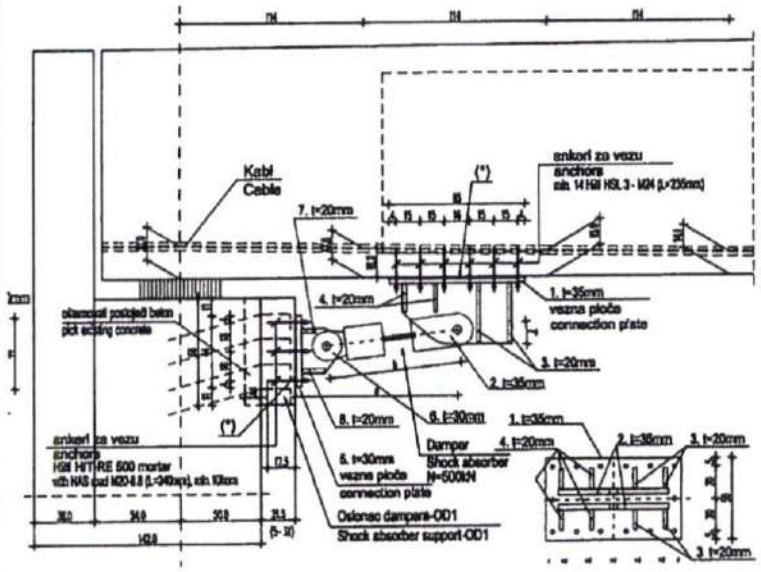


Figure 19 Dampers installation - Longitudinal section

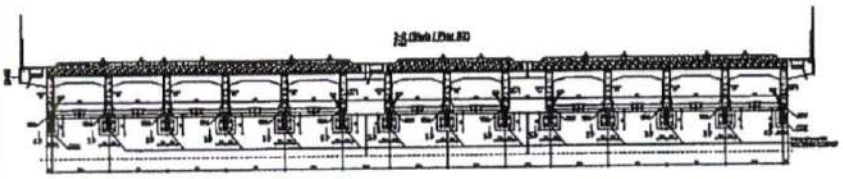


Figure 20 Dampers installation - cross section

Measures to be applied at bridge No 1. (at km 405+850.00) are the following:

- Installation of seismic shock absorbers – dampers in Abutment 2
- Replacement of wooden sleepers with new concrete sleepers with a compatible fastening system.
- Installation of a duct drainage channel for STK installations.
- Making a new waterproofing channel for STK installations.
- Replacement of the bearings.

Bridge No.2 (at km 1+560.00)

Bridge No.2 is the newest of all five. According to the visual inspection of bridge No.2, it has been noticed that RC covers and STK installations are missing, and the expansion joints are damaged, along with dilapidation of sleepers with fastening. The railway markings seem to be damaged and the railway track on the bridge and the sleepers with fastening are also in poor condition. Presence of water on the supports and discoloration of concrete are observed at the deck of the structure and the bearings.

This bridge has the same structural system as Br. No.1, and therefore, the probability of seismic retrofitting requirement may not be ruled out.

Measures to be applied at bridge No 2. (at km 1+560.00) are the following:

- Rehabilitation of channel for STK installations where necessary.
- Installation of a duct drainage channel for STK installations.
- Making a new waterproofing channel for STK installations.
- Replacement of wooden sleepers with new concrete sleepers and fastening.
- Replacement of the bearings.
- Seismic retrofitting (to be confirmed)

Bridge No.3 (at km 8+403.75), Bridge No.4 (at km 8+553.50) & Bridge No.5 (at km 11+335)

All three bridges exhibit similar conditions and problems; therefore, they are presented as a group for which the same measures are foreseen.

During visual inspection of bridges, concrete deterioration and damages due to water penetration were noticed. Furthermore, concerning the railway track of the bridge, sleepers with fastening systems, rails, and safety rails seem to be in poor condition. Except for the above damages, dilapidated guardrails, STK installation channels, and pedestrian paths are covered with crushed stone aggregate.

Measures to be applied at bridges No 3 (at km 8+403.75), Bridge No.4 (at km 8+553.50) & Bridge No.5 (at km 11+335) are the following:

- Rehabilitation of channel for STK installations where is necessary.
- Installation of a duct drainage channel for STK installations.
- Making and mounting of prefabricated RC edge cornice at the entire length of the bridge and concreting of the monolithic part of the edge cornice.
- Production of a new waterproofing channel for STK installations.
- Construction of concrete or steel console for contact line.
- Replacement of wooden sleepers with new concrete sleepers and fastening.
- Replacement of crushed stone aggregate of limestone origin with a crushed stone aggregate of igneous origin.
- Replacement of the bearings.
- Bridge deck side extension in case of track width increase (to be confirmed)
- Seismic retrofitting (to be confirmed).

Underpasses & Culverts

The measures related mainly to their durability will be included in the design. A major activity to be undertaken is the cleaning of the culverts -especially the concrete pipes-

and removal of any deposited soil and solids, constraining their cross-section. Moreover, works include rehabilitation of the parapets and guardrails, and other protective measures against ballast falling over the track. Furthermore, the planned measures include the following:

- Installation of a duct drainage channel for STK installations.
- Making a new waterproofing channel for STK installations.
- Replacement of wooden sleepers with new concrete sleepers and fastening.
- Replacement of crushed stone aggregate of limestone origin with crushed stone aggregate of igneous origin.
- Replacement of the bearings.
- Structure side extension in case of track width increase (where necessary)

Retaining Walls (Minor Structures)

The retaining walls will be repaired mainly to improve their functionality at the locations where slope stability issues exist, e.g., they will require a height increase of the walls. Rehabilitation measures in locations with visible concrete problems and reinforcement corrosion will also be addressed in the design, along with the design of new retaining walls where necessary.

2.2.9 Tuzi Railway Station – Station Building and Surrounding Area

Railway station reconstruction is vital to modernising rail infrastructure, which is crucial in enhancing passenger experience and operational efficiency. When a railway station serves as a border crossing point, its reconstruction takes on additional strategic importance. Such stations must be designed to efficiently handle international passenger and freight traffic, incorporating facilities for customs, immigration, and security checks without compromising on passenger flow or train operations. The reconstruction of these stations often involves complex international coordination to ensure seamless cross-border rail connectivity, harmonise operational procedures, and meet the security requirements of both countries, making them critical nodes in international transportation networks and trade corridors. The Tuzi railway station, therefore, will be reconstructed and arranged to meet the needs of freight and passenger users and the requirements of the border station in terms of the functioning of the Montenegrin and Albanian administrations, all in line with the relevant national and international legislation and regulation.

Planned intervention to be included in the architecture design determined on the basis of the ToR and available documentation and information includes the following:

- Reconstruction of all facilities at the Tuzi railway station, their modernisation and commissioning
- Construction of a new platform in line with the TSI standards in terms of height, width and length, along with the construction of a new canopy. The minimum length of the platform for the category P4 is 200m.

When it comes to the reconstruction of the facilities in Tuzi Railway Station, the scenario presented in the Conceptual Design (prepared within the WB20-MNE-TRA-02) foresees the following:

- depending on the agreement between Montenegrin and Albanian administrations on details and procedures regarding the use of the facilities, allocation of the Albanian administration staff to the facility where the housing is currently organised,
- utilisation of the main railway building as a passenger building (with rooms including a cash register, waiting room, small service activities such as an exchange office or post office, information desk, etc.), for the office of railway services (station chief, train dispatcher, etc.) as well as part of the administration for passport (and customs) control and for the rest of the administration for both sides.
- the building in which the warehouse is currently located is completely renovated to be multifunctional including various services for passengers such as a restaurant, entertainment facilities, etc.

The total area for the complete reconstruction is assessed as follows: main station building 660.32 m^2, residential building 465.00 m^2 and warehouse 303.94 m^2. This kind of extension allows space for the accommodation of the SS&TK and the power supply/battery equipment.

Considering the occupancy status of the existing residential building, alongside the sensitivity of relocation as a significant social concern and recognising the availability of adequate space within the station precinct to accommodate all requisite facilities without necessitating the incorporation of the said building, this report proposes an alternative intervention strategy, diverging from the initial proposal articulated at the Conceptual Design stage. This would encompass the following intervention:

- Demolition of the existing and construction of a new station building with a total area of 1400 m^2, sufficient for the accommodation of all necessary facilities (railway administrative facilities, cash register, waiting room, small service activities such as an exchange office or post office, information desk, etc., administration for passport (and customs) control and for the rest of the administration for both sides, signalling and telecommunication equipment room, the power supply/ batteries equipment). The layout of the proposed new building is provided in the figures below.

Figure 21 New railway station building

Consolidating all functions of a cross-border railway station into a single building offers several advantages:

- Efficiency and Convenience: Housing all services under one roof simplifies passenger navigation and enhances their experience. It allows for smoother transitions between different functional areas, such as ticketing, customs, and waiting areas, reducing the complexity of moving through multiple structures.
- Space Optimisation: A single building design can optimise the use of available space more efficiently than multiple structures. This approach can help in reducing the overall footprint required for station facilities.
- Cost Effectiveness: Constructing and maintaining one building can be more cost-effective than managing multiple separate structures. It can lead to lower construction costs, reduced energy consumption, and simplified maintenance logistics.
- Operational Synergy: Centralising operations facilitates better coordination among various services, such as security, customs, and customer service, leading to improved operational efficiency and response times.
- Enhanced Security: A single, centralised building allows for more streamlined security protocols, as it is easier to monitor and control access points. This is particularly important for cross-border stations where security is a high priority.
- Environmental Considerations: Combining functions into one building can minimise environmental impact by reducing land use and allowing for more efficient energy management and sustainable building practices.
- Structural Flexibility: A single building can offer greater flexibility for future modifications or expansions, allowing the station to adapt to changing demands or technologies.
- Reconstruction of the existing warehouse and retention of its current function.
- Passenger Pedestrian Overpass and elevators are foreseen to cross the tracks
- At grade crossing is foreseen, as an alternative crossing in case the elevators are out of order or cannot be used in case of emergency and to ensure accessibility for people with reduced mobility that hesitate to use the elevator
- Reconstruction of platforms and construction of new canopy
- 740m long track is foreseen for the freight traffic
- Common Signalling system is foreseen for both countries as presented in the Table below (Montenegro and Albania GSM-R and ERTMS-1 is foreseen) – eliminate any time consuming due to different signalling systems
- Common power supply system is foreseen for both countries as presented in the Table below - eliminate any time consuming due to different power supply systems.

2.2.10 Signalling and Telecommunication

Signalling

Full Modernisation Scenario on the rail Route 2 Podgorica – Tuzi – Albanian Border will implement a completely new signalling system. This implies the implementation of the following interventions:

- Installation of new switch point machines

The 14 switch points will be replaced with new ones. The compact electro-hydraulic (mechanic) railway point machine serves in switching rail turnouts independently from types or gauges with an external lock for urban and long-distance traffic. New cables and cable connections will be installed for the new switch point machines relay racks and relay groups.

- Installation of new axle counter system

A new axle counter system will be implemented on the section between Podgorica – Tuzi Station – Albanian border. Axle counters will be installed in the Tuzi Station and one near the entry Signal at Podgorica Station in order to create interstation dependence.

- Installation on ETCS Level 1 system

The centralised system ETCS Level 1 will be implemented on rail route 2 Podgorica – Tuzi – Albanian Border, and it must cooperate with the interlocking system that controls the field side equipment and the information that both systems will send. The indication of the open track will be achieved through the interlocking. ETCS Level 1 system will cover the following functions:

- Supervise the train's maximum speed; the onboard ERTMS equipment continuously and safely monitors the speed and the end of the Movement Authority, including warnings to the driver.
- Supervise the permanent speed profiles on the line.
- Supervise the status of the equipment and interfaces associated with the system.

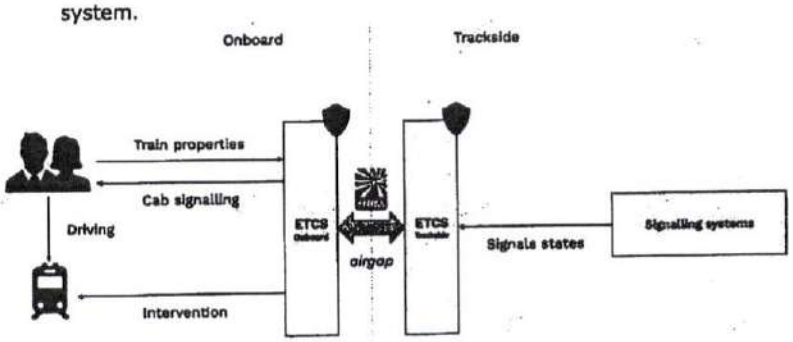


Figure 22 Manual driving supervised by ERTMS/ETCS

Trackside ETCS Level 1 equipment is superimposed to the existing interlocking system (in this case will be the new electronic interlocking SIL4) and interfaced with the track-side signalling equipment (signals, level crossing controllers, etc.). Appropriate, safety-relevant data from the existing signalling equipment are collected by the LEU and converted to the predefined standardised telegrams and transmitted to the

Switchable Euro-balises. Hence, the telegrams represent the real-time status of the signalling equipment (for example the signal aspects) and are sent to the train.

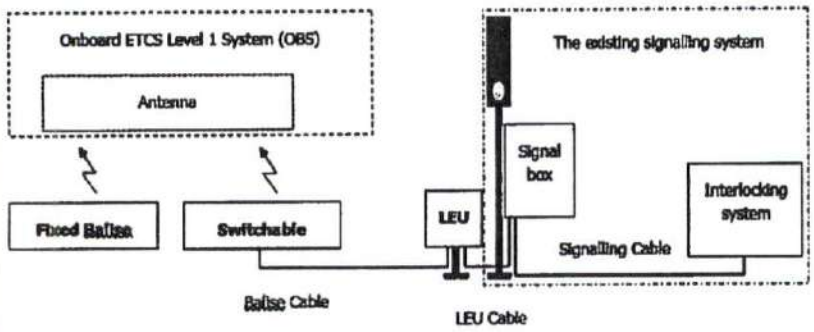


Figure 23 ETCS 1 - Architecture of trackside sub-system – ETCS 1

› Installation of new electronic SIL 4 Signalling system

The Electronic Interlocking SIL 4 System equipment shall be designed, manufactured, and tested to provide the SIL 4 level certificate. The system shall be of very high demand, non-stop working, and with a continuous mode of operation 24 hours per day, all year long. For this reason, the system's architecture shall be from the minimum configuration 2 out of 2 on two redundant parallel chains and 2 out of 3 configurations.

› Installing new Local MMI in Tuzi Station

Local MMI shall be installed at the Dispatcher's place. The Dispatcher from the Tuzi Station will locally drive the management and control of the interlocking. The Local MMI will have basic railway control functionalities: Synoptic representation of the railway line Podgorica – Tuzi – Albanian Border, Video graphic functionality on the minimum "'24' Full HD Monitor, Train labelling, Train monitoring, Remote Control of interlocking, Alarm and incident management.

› Implementation of CTC in Podgorica

Podgorica Station is where the main CTC system is located. Implementation on the CTC for the rail route 2 Podgorica – Tuzi – Albanian Border shall be in Podgorica. CTC will follow a client-server architecture with three main levels: Man-Machine Interface, where the Dispatcher in Podgorica Station is located, Data Processing,), Field Element Communication level, CTC shall include two modes of operation:

› Remote Control and the Control of the station electronic centralisation which is carried out only from the CTC centre in Podgorica; and
› Local Control and the Control of the station electronic centralisation is carried out only by the station dispatcher.

Telecommunications

The intervention foresees the implementation of a completely new Telecommunication System with the introduction of the following systems:

› Installation of GSM – R system

GSM – R is a Digital Radio System that shall provide the bearer services for operational voice and ETCS data communication. The GSM-R system enables flexible voice, text,

data, and group communication between the rail line, trains (as it is shown in the figure below), and railway operations staff. It also supports communication between the trackside workers, station, depot staff, and managerial personnel. The digital GSM-R system meets the highest safety and reliability standards essential for certain facilities' functioning, particularly train control systems (ETCS, Interlocking). The GSM-R System provides key functionalities like Voice-Broadcast (VBS), Group Calls (VGCS), location-based connections, call pre-emption in case of emergency, Railway emergency calls, Functional addressing, Access Matrix, and EIRENE Numbering plan.

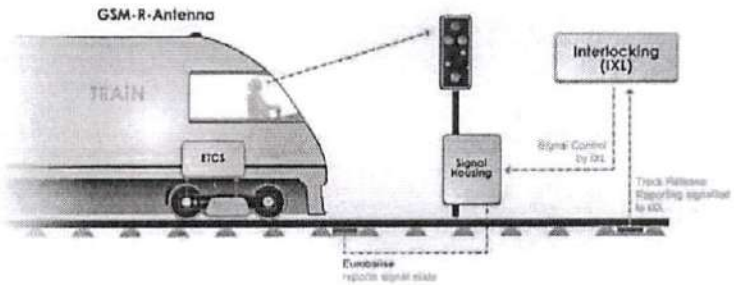


Figure 24 Functional diagram of the GSM-R system

› Installation on SDH backbone system

SDH backbone system shall be installed on the rail route 2 Podgorica – Tuzi – Albanian Border. SDH -16 system will be a compact, high-density STM-16 next-generation access multiplexer that will support high-speed communications services.

Providing a wide variety of interfaces on one common platform, the SDH backbone system will allow the service provider to build an effective, flexible, user-friendly communications network.

› Video Surveillance

A video surveillance system is a security system that will be installed in Tuzi Station and critical locations that will be agreed upon by RIoM (e.g. tunnels, bridges, railway crossings, etc.). The goal of implementing the video surveillance system is to protect the vital parts of the railway system. Digital IP video cameras will be implemented with a digital network video recorder where the surveillance from the locations will be available for at least 30 days for RIoMs checking purposes.

› PIS and PAS

Passenger information system - PIS, shall be installed in the Station Tuzi and shall inform the public transport system users of the current train timetables statuses. It will be designed on the industry's best practices, using modern web technologies and a well-considered architecture. PIS system shall contain modules for integration and external data processing. A high level of security and data accessibility shall be provided.

Public Address System – PAS, shall be installed in Tuzi Station and shall intend to timely inform passengers on platforms of trains arriving. at the platform or departing from it over audio notification channels. The system works over IP networks and can be used in any installation requiring the transmission of high-quality audio with the capacity of Control via serial data and contact signals.

- Chronometric clock system

Chronometric Clock system shall be installed in Tuzi Station in the waiting rooms, in the offices, on the facade of the stations, and platforms in the station. A master clock in Tuzi Station will be synchronised with each clock on the Station.

2.2.11 Electrification

Activities

The following activities are foreseen as part of the electrification of the railway line:

- Reconstruction/new design of electric power installations at the railway station
- Reallocation of all underground and overhead power lines which are crossing the railway alignment.
- Cable lines for the primary and reserve power supply of signalling interlocking and telecommunication facilities and devices
- New outdoor lighting of the railway station plateau, platforms, subways, access roads, and manoeuvring areas
- New indoor electric power installations and lightning rod installation for the station building as well as for the other service facilities in the railway station.
- Expansion of lighting in Tuzi station and lighting of road crossings
- Production of electrical installation and power supply in the traction sectioning post with neutral section (TSPn)
- Construction of pole transformer stations for heating switches and level crossing devices
- Diesel-electric generator for a reserve supply of signalling interlocking and telecommunication facilities and devices is foreseen for accommodation in the railway station building, in the separate room, next to the TS rooms.
- Cabling of electric power crossings with railway.
- Construction of overhead catenary system
- Construction of a traction sub sectioning point with neutral section (TSPn) at the border
- Development of remote control (RC) (including motor-operated disconnectors)

The applied electrification system in Montenegro is a single-phase system 25kV, 50Hz. Voltage is taken from the electric traction substation (ETS) 110/27.5kV, 2x7.5MVA Podgorica. ETS is connected to the three-phase national network 110kV.

TSP Podgorica supplies nearly 58 km of the railway TSPn Bratonožići - TSPn Virpazar, and nearly 52km of the railway Podgorica - Nikšić.

Figure 25 ETS network in Montenegro

The supply of the contact network on the line Podgorica - Tuzi - Albanian border can be achieved by connecting to the existing contact network of the 7th track at the station Podgorica.

Electric traction substation (ETS) "Podgorica" is cc. 3 km away from Podgorica. The power branch towards Tuzi and the Albanian border would be cc. 3 + 24 = 27 km. This is an acceptable length, due to the allowable voltage drop. The connection can be made by installing disconnector "R13 "in Podgorica, in a new insulated overlap.

A compensated overhead line is used for speed up to 120 km/h, with a contact conductor made of hard-drawn copper with a cross-section of 100 mm², and a supporting rope made of BzII 65mm², bypass, supply and connection lines made of Cu 150 mm² rope.

The arrangement of the pillars is according to the wind zone II of 60 daN/m2 and the temperature range from -20°C to +40°C. The supporting structures are steel lattice and galvanised.

The basic design parameters of the OCS are defined in line with the General Design and the Catalogue of OCS elements on the "JŽ "(Yugoslav Railway), as well as with the design parameters defined for the Vore-Hani i Hotit railway line (Albanian side). These parameters are summarised in the Table below:

Table 10 Basic design parameters of the OCS

Element	Values or materials
Contact line system	catenary type without stitch wire
Design speed	100 km/h
Ambient temperature range	-20 to 45° C
OCL components' temperature range	-20 to 70° C
Catenary fixing	CW & MW compensated
Contact Wire (CW) Main line	AC 100 mm²
Messenger Wire (MW) Main line	Bz, 65 mm²

Element	Values or materials
Droppers	Bz, 10 mm², highly flexible
Station by-pass feeder	Copper 150 mm²
Return Wire (RW)	ACSR 95 Al1/15 St1A
Maximum tensioning zone length	1600 m
Mechanical tension forces-main line	10+10 kN for CW – MW Common mechanism
Mid-point anchoring	CW to MW, MW to masts (portal)
Maximum span	65 m (UIC 794 Table 4)
Maximum difference in length of consecutive spans	18 m
CW height	normal 5.50 m, minimum 4.94 m maximum 6.00 m, at level crossings 6.00 m
System height max/min	1800/800 mm
Stagger	straight line ±200 mm; curves: 300 mm outside
Maximum dynamic deviation of the CW caused by wind	±300 mm
OCL Poles	Lattice steel poles
Gauge nominal at open track	2.80 m
Gauge minimal (TSI)	2.50 m (2.25 inside stations)
Insulators	silicone, IEC 1109
Equaliser between MW and CW every 200 m	Cu, 35 mm², highly flexible
Electrical bonding between two catenaries	Cu, 2x70 mm², highly flexible
Cantilevers	Aluminium tubes

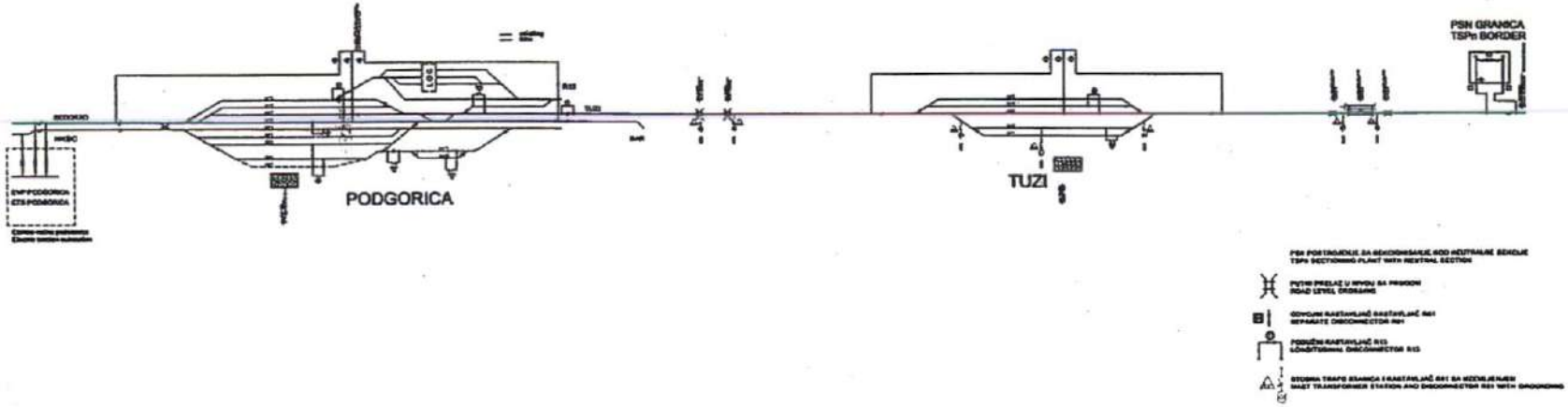


Figure 26 Proposed sectioning scheme

3 Assessment of Alternative Development Scenarios

3.1 Identified Development Scenarios

Based on thorough review of the existing documentation and the assessment of the current condition, concerning rail superstructure and railway structures with emphases to the tunnels, the following Project's development scenarios have been defined:

Table 11 Development scenarios

Scenario	MAIN ACHIEVEMENTs
SCENARIO 1 – BUSINESS AS USUAL	Minimum interventions required, necessary to keep the railway line to the current operational level (or the operational level for which it was initially designed) using National standards and achieving design speed up to 100 km/h. TSI requirements are not meet. Under the business-as-usual scenario, two sub-scenarios (1A and 1B) have been investigated which differ solely in terms of the proposed sleeper type.
SUB-SCENARIO 1A	Superstructure replacement - prestressed monoblock concrete sleeper is proposed.
SUB-SCENARIO 1B	Superstructure replacement - wooden sleeper is proposed.
SCENARIO 2 – LIMITED REHABILITATION	A solution with limited investments which secures an improvement in the line reliability. Under this scenario: a) interventions which increase the service life of the track, b) interventions by which some of the TSIs requirements can be met without the implementation of neither electrification nor ETCS and GSMR systems on the track, and c) use of international standards and achieving design speed up to 100km/h have been considered. TSI requirements are partially meet.
SCENARIO 3 – FULL MODERNISATION	All interventions required to achieve compliance with TEN-T standards (100 km/h for passenger trains, 22.5 t/axle, ETCS implementation, and electrification)using international standards and achieving design speed up to 100 km/h. TSI requirements are partially or completely met. Under the full modernisation scenario, two sub-scenarios (3A and 3B) have been investigated. Sub-scenario 3A differs from sub-scenario 3B proposing in the latter the construction of a new tunnel BR 2, with a fully TSI-compliance.
SUB-SCENARIO 3A	Reconstruction of all tunnels (including Tunnel BR2) at the sections only where the track is canted and retaining the rest of the existing tunnel. TSI requirements for safety for Tunnel BR2 are partially met.
SUB-SCENARIO 3B	Reconstruction of Tunnel BR1 & BR3 (as per scenario 3A) and construction of a new tunnel BR 2, parallel to the existing one. All TSI requirements for all Tunnels are met.

3.2 Selection of Preferred Development Scenario

3.2.1 Overall Approach

The selection of the preferred development scenario was conducted with the Multi-Criteria Analysis (MCA) through the following consecutive steps:

- Steps 1 and 2: clarify the scope, the context of the Project and the decision to be taken and specify the Project objectives and constraints;
- Step 3: identification of the options to be examined and compared;
- Step 4: establishment of the set of criteria that should measure each scenario's performance against the objectives;
- Step 5: options' assessment, based on the following steps:
  - Definition of the criteria "weights" to illustrate their relative importance;
  - Scoring the expected performance of each option against the criteria;
  - Combination of the weights and scores to calculate each option's overall score;
  - Ranking the options according to their scores; and
  - Elaboration of a sensitivity analysis to assess the robustness of MCA results to changes in weights and scores.

The MCA framework for the selection of the preferred development scenario included the following broad criteria categories, to capture the different aspects, as identified in the scope and the objectives of the Project:

- Connectivity and regional integration criteria
- Technical and economic criteria
- Transport criteria
- Environmental and social criteria

These categories are considered as having equal importance, therefore their weights were set equally to 25% (next Figure).

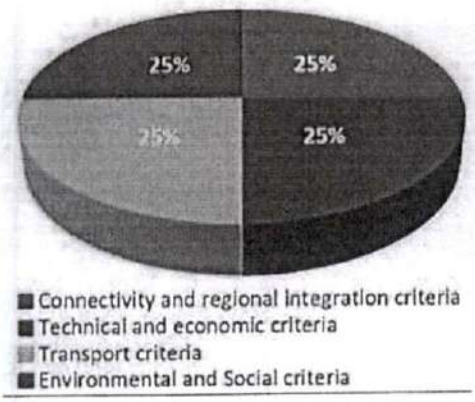


Figure 27 MCA Criteria categories

Each category comprises specific criteria, which are presented in the Table below.

Table 12 Multi-criteria analysis criteria

No.	Criteria Category	Category Weighting	Cr No.	Objective – Criterion	Objective Weighting	Overall weighting
1	Connectivity and regional integration criteria	25.00%	1.1	Completion of the TEN-T network in the region	40.00%	10.00%
			1.2	TSI compliance	60.00%	15.00%
2	Technical and economic criteria	25.00%	2.1	Service life	50.00%	12.50%
			2.2	Economic evaluation results	50.00%	12.50%
3	Transport criteria	25.00%	3.1	Freight modal shift from road to rail	40.00%	10.00%
			3.2	Passenger modal shift from road to rail	40.00%	10.00%
			3.3	Generated passenger traffic	20.00%	5.00%
4	Environmental and social criteria	25.00%	4.1	Avoid / minimise safety risk due to trespassing / illegal crossing railway open track (in proximity to residential zones)	30.00%	7.50%
			4.2	Flood risk / climate resilience (drainage system, hydraulic structures)	30.00%	7.50%
			4.3	Minimise waste generation during construction (earthworks, tunnels, etc.)	10.00%	2.50%
			4.4	Air pollution and climate change mitigation	30.00%	7.50%

3.2.2 Selection of Preferred Development Scenario

The selection exercise based on the aforementioned approach and methodology has indicated that preferred development scenario is Scenario 3 - Full Modernisation Scenario (Table below). Both options of this scenario, i.e. scenarios 3A and 3B have initially received almost equal scores and are therefore both had been proposed for further development.

Table 13 Overall MCA scores of the Identified Development Scenarios

CRITERIA CATEGORY	Scenario 1a Score	Scenario 1B Score	Scenario 2 Score	Scenario 3a Score	Scenario 3b Score
Connectivity and regional integration criteria	0.021	0.021	0.064	0.229	0.250
Technical and economic criteria	0.189	0.184	0.185	0.205	0.212
Transport criteria	0.201	0.201	0.201	0.250	0.250
Environmental and social criteria	0.025	0.025	0.063	0.250	0.225
TOTAL SCORE	**0.437**	**0.432**	**0.513**	**0.933**	**0.937**

The selection exercise based on the aforementioned approach and methodology has indicated that preferred development scenario is Scenario 3 - Full Modernization Scenario. Both options of this scenario, i.e. sub-scenarios 3A and 3B have received almost equal scores and are therefore both had been proposed for further development.

Based on the subsequent review by the Ministry of Capital Investments of Montenegro and Railway Infrastructure of Montenegro in their capacity as Project Beneficiaries, in June 2022, Scenario 3, option 3A was promoted as preferred Project option for further development.

Hence, the Full Modernization Scenario, Sub-scenario 3A has been selected as the optimal one.

This Sub-scenario A has been slightly modified within the Design Basis Parameters Report that is used as the basis for further preparation of the Detailed Design and the present Environmental and Social appraisal. The overview of introduced modifications is presented in the table below:

Table 14 Overview of proposed modifications of the selected scenario 3A

Feasibility Study stage	Detailed Design, final ESIA stage
Construction of Slab Track system in the Tunnel 2	Construction of a slab track system in all the existing tunnels since it enables easier emergency evacuation and reduces the required tunnel cross-section, as well as maintenance costs in the future.
Conversion from the level crossing at km 4+664 to road overpass (construction of road bridge)	Retaining the railway crossing at km 4+664 at level and installation of appropriate safety equipment
Depending on the agreement between Montenegrin and Albanian administrations on details and procedures regarding the use of the facilities, allocation of the Albanian administration staff to the facility where the housing is currently organised, utilisation of the main railway building as a passenger building (with rooms including a cash register, waiting room, small service activities such as an exchange office or post office, information desk, etc.), for the office of railway services (station chief, train dispatcher, etc.) as well as part of the administration for passport (and customs) control and for the rest of the administration for both sides.	Demolition of the existing and construction of a new station building with a total area of 1400 m2, sufficient for the accommodation of all necessary facilities (railway administrative facilities, cash register, waiting room, small service activities such as an exchange office or post office, information desk, etc., administration for passport (and customs) control and for the rest of the administration for both sides, signalling and telecommunication equipment room, the power supply/ batteries equipment).
the building in which the warehouse is currently located is completely renovated to be multifunctional including various services for passengers such as a restaurant, entertainment facilities, etc.	Reconstruction of the existing warehouse and retention of its current function.

4 Consultation and Participation Arrangements

4.1 Context

Effective stakeholder engagement and consultation is seen as fundamental to the success of the proposed Project.

The Project has a wide range of stakeholders (including statutory consultees, local communities, businesses, and other affected groups) with differing interests that will require varied levels of information. Specific communication activities therefore need to be focused to meet the needs of individuals and groups, particularly vulnerable groups. This requires an understanding of the stakeholders and their interest in the Project.

Stakeholder engagement for this Project is based on the following principles:

1. Early and ongoing engagement with relevant stakeholders to inform and influence the Project development process;
2. Seeking an appropriate level of feedback at each development stage to achieve iterative design process by ensuring that comments and concerns received are taken into consideration.
3. Building of long-term relationships with key stakeholders throughout the different stages of the Project to help better understand their views;
4. Where possible and practicable ensuring concerns are addressed; and
5. Ensuring appropriate statutory consultation is undertaken in compliance with national requirements and best international practice.

RIoM intends to implement the project as an example of good practice in the development of transport infrastructure with the aim of involving stakeholders and maintaining good communication practices throughout the life cycle of the project. Therefore, stakeholder engagement process has been initiated in early project's stage and will be further carried on based on the technical analysis and environmental and social appraisal performed so far.

This process will be guided by the Stakeholder Engagement Plan (SEP) prepared to meet the aspirations of RIoM to engage with all relevant stakeholders, and to meet EIB Standard 2 – Stakeholders Engagement.

4.2 Consultation to Date

In wider context, RIoM was involved in the consultation process with the institutional stakeholders in Montenegro during the development of the Railway Strategy[12] of the country.

Additionally, in June 2020, on its website (www.zicg.me), RIoM published basic note on this Project and Project related presentations.

[12] The Railway Development Strategy for the period 2017-2027, Ministry of Transport and Maritime of Montenegro

In the period of 21.01.2022 up to the 01.02.2022, during Feasibility Study stage, some 3 stakeholders engagement events (meetings in person) with affected municipalities and biggest agricultural company, occur. These meetings were used to familiarize the stakeholders with Project development.

The first meeting was held (21.01.2022) in the premises of Municipality of Podgorica (Capital Town of Podgorica) with representatives from the Department for Spatial Planning and Sustainable Development. The meeting purpose was familiarization of the local community's administration with the ESIA process, planned stakeholder engagement activities, and initial ESIA key project actions and impacts. Potential key impacts on the environment (existing social infrastructure facilities in the area of Capital of Podgorica) were discussed and analyzed, as well as existing and future residential facilities in the project's impact zone. The potential negative effects of noise were especially mentioned, so the representatives of the Capital suggested that the local regulation for noise, which was adopted end of 2021, be taken into consideration.

The second meeting was held (27.01.2022) in the premises of Municipality of Tuzi with the Mayor representatives of the local administration. The meeting purpose was familiarization of the municipality with planned stakeholder engagement activities, and initial ESIA key project actions and impacts. Municipality offered cooperation during the project implementation in order to complete all national requirements and avoid problems related to the environmental and social impacts, expropriation and obtaining process for UT conditions. Potential key impacts on the environment (existing social infrastructure facilities in the area of Tuzi Municipality) were analyzed, existing and future residential facilities in the project's impact zone, as well as existing and future upgrade of the Tuzi Railway Station complex. Also, the representatives of the municipality explained that the railway route through the Municipality of Tuzi passes through 3 settlements, 2 of which are covered by the spatial plan, while the urban area of Tuzi still does not have a plan. Therefore, it is considered that a small problem with illegally constructed buildings within the corridor zone will occur, but there should be no other major difficulties, particularly with expropriation (if it occurs).

Third meeting with important stakeholders (01.02.2022), the agricultural company Plantaže, was held on 01.02.2022 in the company's premises. Plantaže's representative expressed Company's readiness to provide support at all stages of project development, in order to avoid possible problems during the construction phase, given that part of the railway passes through the company's property, which furthermore may cause limited access for their personnel to the company's fields. It was also concluded that the project concerns rehabilitation of an existing line by utilizing same route with particular widening - so no modification of the track route is foreseen in this section.

TA WB29-MNE-TRA-02 has been initiated on 16 September 2024. In the period 16 September 2024 – 16 December 2024, the following consultation meetings have been organised:

Kick off meeting (16.09.2024) in the premises of RIoM with the representatives from the RIoM and EIB. Beside project presentation, the meeting served to present and discuss, methodology, potential risks and mitigation measures, project plan, communication, and reporting and preliminary list of necessary data and documentation.

Site visit (11 October 2024) conducted with the representatives of RIoM as a visual inspection focused on identification of the critical sections, the structures and the go-slow subsections.

Progress meeting (16.12.2024) – online meeting with the representatives from the RIoM and EIB, present and discuss, design basis parameters report, progress achieved in the implementation of project, potential risks and mitigation measures, follow up actions.

Meeting with HSH representatives (20.12.2024) - online meeting to discuss updates on implementation of the railway reconstruction projects on Montenegrin and Albanian side, design parameters and communication mechanism to be established and followed throughout project implementation.

5 Approach to Assessment

5.1 Source of Information

The following sources of information will be used in collating the preliminary ESIA documentation:

- Information from the Project Developer;
- Information from the design team;
- Information from statutory stakeholders, landowners and affected population, and other interested parties;
- Published information, including relevant national/regional/local plans;
- Unpublished records made available by stakeholders;
- Relevant topographic and thematic maps; and
- Field visits and surveys carried out during the ESIA process.

5.2 Level of Details of the ESIA

The Environmental Impact Assessment Study will be prepared in accordance with the requirements of the national legal framework and in line with the EIB standards. This Activity is planned to be implemented in parallel with the preparation of the Detailed Design.

It should be noted that by its nature, the subject of the Detailed Design belongs to the type of projects listed in the Annex II of the EIA Directive[13] and the type of projects listed in the Decree on projects for which an environmental impact assessment is performed.[14]

The main objective of the development of EIA and ESIA Studies is to ensure that all the impacts, direct and indirect, especially the environmental, social, and economic factors associated with the proposed reconstruction and modernisation of the railway line, are fully examined and addressed.

The ESIA Study will be defined in accordance with EIB Social and Environmental Standards, (last update published in February 2022)[15] and EIB Project Carbon Footprint Methodology (published in February 2022)[16]. The study will be developed to meet relevant EU standards and regulations, such as EIA Directive 2011/92/EU (amended in 2014 by Directive 2014/52/EU), Birds Directive 2009/147/EC, Habitats Directive 92/43/EEC, Espoo Convention on Environmental Impact Assessment in a Transboundary Context, as well as Commission Notice "Technical guidance on the climate-proofing of infrastructure in the period 2021-2027".

The ESIA will be accompanied by the Non-technical Summary, Stakeholder Engagement Plan (SEP) and Environmental and Social Management Plan (ESMP).

---

[13] Environmental Impact Assessment - EIA - Environment - European Commission (europa.eu)

[14] https://epa.org.me/wp-content/uploads/2019/05/Uredba-o-projektima-za-koje-se-vrsi-procjena-uticaja-na-zivotnu-sredinu.pdf

[15] European Investment Bank Environmental and Social Standards (eib.org)

[16] EIB Project Carbon Footprint Methodologies

As the result of this Activity, the Environmental Impact Assessments will be developed in line with the relevant national legislation in force, and in line with the EIA Directive and EIB Environmental and Social Standards (last update February 2022).

5.3 Approach to the Assessment

A common approach to the assessment of each environmental topic will be followed and reporting. This will include:

- establishing the baseline conditions of the receiving environment through a combination of desk review and site surveys;
- identifying and assessing the changes on that receiving environment (potential impacts) which the Project could have - adverse and beneficial – based on a set of assessment criteria;
- determining the significance of those changes (potential impacts) as a function of their predicted magnitude and the sensitivity/value of the resource/receptor being affected. This is considered as iterative process, whereby the ESIA team will inform the engineering team about the potential for adverse effects from the Project and, consequently, the engineering team will be considering these issues in refining the technical design to avoid, as much as possible, those effects; and
- prescribing mitigation for those impacts which are likely to have, either by themselves or in combination with other impacts, a significant adverse environmental or social effect. This mitigation will be designed to prevent, reduce and, where possible, offset any significant adverse effects.

5.4 Interaction with the Technical Design

The ESIA is planned to be implemented in parallel with the preparation of the Detailed Design. Therefore, it is expected that the teams involved will work in close cooperation; e.g. information gathered during the drafting of the ESIA will be shared with the team developing the Detailed Design, and vice versa. Upon completion of the Detailed Design, the Environmental and Social Impact Assessment will, if needed, be updated based on modifications in the design until completed.

This process of synergy, based on the views / inputs from the environmental and social appraisal, has interacted with the design process from the earliest Project development stage. Such approach has informed the design process with relevant early E&S-related proposals in the scope of the selection / refinement of the Project preferred option thus achieving 'mitigation through design' precautionary goal for impact avoidance. This approach will further continue throughout next stages in order to reduce the likelihood of the Project being designed on a basis that already has built-in negative E&S effects which could have been avoided.

The process of synergy will continue until the design is optimised and sufficiently fixed for ESIA to be finalised – so that those E&S assessments are based on the likely significant effects of the final optimised Detailed Design.

5.5 Study Area

Study areas are to be defined individually for each topic, according to the geographic scope of the potential impacts or of the information required to assess those impacts. They are based on the boundary of the Project, i.e. the land anticipated to be potentially required temporarily and/or permanently for the construction, operation, and maintenance of the Project at the time of preparation of this ESIA Scoping Report and taking into consideration the specifics of the receptor/resource being assessed.

5.6 Existing Baseline

Identify and present available environmental and social baseline data and information gaps. To develop a complete understanding of the existing environmental and social conditions of the project's area of influence and assess the impacts, further desktop and field studies will be carried out. The existing conditions within the project area will be described considering key environmental and social data including:

- Topography and landscape
- Geology, geomorphology, and soils
- Hydrology (surface water) & Hydrogeology (groundwater)
- Air Quality
- Climate
- Noise and vibration
- Waste management
- Nature conservation and biodiversity
- Land use
- Local settlements and community facilities/Services baseline
- Local transport routes, public transport, and pedestrian routes
- Demographics
- Education
- Employment
- Economic development
- Vulnerable groups

- Desk surveys - For development of ESIA report the following baseline research methods will be used:
  - Desk based research through the available strategic planning documents.
  - Research through the existing social-economic databases (e.g. regional and local population indicators like demographics, migration patterns, social development indicators like unemployment, employment, economy structure, labour market, income levels, land use, e-NGO, social organizations and national data on the macro-economic situation, economic activities, education, health, recreation, social policy, development priorities, etc.).
  - Research through the existing environmental databases (e.g. protected areas along the alignment, Emerald Network areas, natural, cultural, and archaeological sites near the route, characteristics of land, geomorphology, noise indicators, water resources and water quality, existing waste practices, air quality monitoring data, etc.).
  - Expert judgment for the issues where no other data source was available.

- Specific emphasis will be given to the need for development of an Appropriate Assessment under Habitats Directive (equivalent in local law) given the proximity of the line to the Skadar lake (EMERALD / RAMSAR SiteCode: ME0000003).
- Undertake a preliminary identification of the potential environmental and socioeconomic issues and impacts and concerns; methodologies, modelling, and further data collection requirements; and potential mitigation measures to be covered.
- Identify key data gaps and within the existing information for in-depth analysis of the potential impacts and determine the additional information requirements.

Intensive field surveys will be conducted by experts in noise measurement and biodiversity to describe the baseline conditions. An adequate characterization of the baseline conditions, including field surveys over multiple seasons as required, should indicate the ecological status of the project site and its assessment areas as they are now and how they would develop in the absence of the planned project. Several site visits will be planned and carried out by the ESIA experts, with the main goal of gathering site-specific information or generating data needed to better understand the sensitivity of receptors that may potentially be affected by the project through meetings, questionnaires, measurements, etc. Noise measurement and the preparation of a report on 24-hour noise measurements (day, evening, night) in the environment will be entrusted to an accredited laboratory.

5.7 Potential Significant Effects and Mitigation

5.7.1 Significance of Impacts – Generic Approach

The significance of an environmental and social effect is typically a function of the "value" or "sensitivity" of the receptor and the "magnitude" or "scale" of the impact.

Receptor Sensitivity or Value

The sensitivity of a receptor refers to its importance i.e. its environmental value/attributes. The sensitivity is generally site specific and is a function of receptor's capacity to accommodate change. It reflects its ability to recover if it is affected, and is defined by the following factors:

- Adaptability – the degree to which a receptor can avoid, adapt to or recover from an effect.
- Tolerance – the ability of a receptor to accommodate temporary or permanent change.
- Recoverability – the temporal scale over and extent to which a receptor will recover following an effect.

Generic criteria guidelines for assigning receptor sensitivity for the purpose of the ESIA for the Project are given in Table below. In principle, the assessment of receptor's sensitivity is a matter of judgment applied by professional experts based on case-by-case approach within the relevant area affected by the proposed development.

Table 15 Generic criteria and typical descriptors for assigning receptor sensitivity/value

Sensitivity/ value	Description – typical descriptors
Very high	Receptor has very limited or no capacity to accommodate changes (impacts) - very high importance and rarity, international scale, and very limited potential for substitution/ replacement.
High	Receptor has a limited capacity to accommodate changes (impacts) - high importance and rarity, national scale, and limited potential for substitution/replacement.
Medium	Receptor has a limited capacity to accommodate changes (impacts) - high or medium importance and rarity, regional scale, limited potential for substitution/ replacement.
Low	Receptor has a moderate capacity to accommodate changes (impacts) - low or medium importance and rarity, local scale and potentially can be substituted / replaced.
Very low	Receptor is generally tolerant of and can accommodate changes or influences - very low importance and rarity, local scale and are not designated, and are easily substituted / replaced.

Impact Magnitude or Scale

The magnitude of an effect is typically defined by number of factors including, but not limited to:

- Spatial extent – the area over which an effect occurs.
- Duration – the time for which the effect occurs.
- Likelihood – probability of occurrence.
- Reversibility – ability to return to the original state.
- Intensity – the degree of change relative to existing environmental conditions.

A typical impact appraisal matrix for different elements of the environment is prepared to guide the impact assessment exercise for the proposed Project and presented in Table below.

Table 16 Typical impact appraisal matrix

Magnitude factor	Description – typical descriptors	
Spatial Extent	Limited (on Project location/route)	Area on, and around the construction and operational location / route of the Project
	Local	In the range of municipality / neighbouring municipalities
	Regional	Montenegro and neighbouring countries
	Global	Continent and wider
Duration	Very short	Few minutes to few hours
	Short	Few hours to few weeks
	Average duration	Few weeks to few months

Magnitude factor	Description – typical descriptors	
	Long	Few months to few years
	Very long	Decades / centuries
Probability of occurrence / likelihood	No probability	Should not occur during normal operation and conditions
	Low probability	Possible, but unlikely
	Average probability	May happen sometimes
	High probability	Likely to occur during the life cycle of the project
	Reliable probability	Will certainly appear
Reversibility	Reversible (Impact)	Reversible impact on the resource / receptor, i.e. impact upon which the environment will be able to return to the original state
	Irreversible (Impact)	Irreversible impact on the resource / receptor, i.e. impact upon which the environment will not be able to return to its original state

Typical criteria descriptors for defining impact magnitude for the purpose of the ESIA for the Project are given in Table below. While this table provides guidelines of a generic nature, it should be noted that specific guidelines in relation to impact magnitude may be required for the particular topics, where considered necessary.

Table 17 Generic criteria and typical descriptors for determining impact magnitude/scale

Magnitude	Description – typical descriptors
High	Loss of resource and/or quality and integrity of resource; severe damage to key characteristics, features or elements (Adverse)
	Large scale or major improvement of resource; extensive restoration or enhancement, major improvement of attribute quality (Beneficial)
Medium	Loss of resource, but not affecting integrity, partial loss of/damage to key characteristics, features or elements (Adverse)
	Benefit to, or addition of, key characteristics, features or elements; improvement of attribute quality (Beneficial)
Low	Some measurable change in attributes, quality or vulnerability, minor loss of or alteration to one (possibly more) key characteristics, features or elements (Adverse)
	Minor benefit to, or addition of, one (possibly more) key characteristics, features or elements, some beneficial impact on attribute or a reduced risk of a negative impact occurring (Beneficial)
Very low	Very minor loss or detrimental alteration to one or more characteristics, features or elements (Adverse)
	Very minor benefit to or positive addition of one or more characteristics, features or elements (Beneficial)

Magnitude	Description – typical descriptors
None / No change	No loss or alteration of characteristics, features or elements, no observable impact in either direction

Impact Significance

The assessment of effects on the environment arising from the Project will consider their significance during both construction and operational phases. Impacts are likely to be significant if they:

- Are extensive over space or time and are intensive in relation to assimilative capacity of the environment.
- Exceed environmental or health standards or thresholds.
- Do not comply with environmental and social policies / land use plans.
- Adversely affect ecological sensitive / important areas or natural heritage resources.
- Adversely affect community lifestyle, traditional land uses and values.

The significance (or the level) of a potential effect is a function of its predicted magnitude and the sensitivity / value of the resource / receptor being affected. The greater the receptor sensitivity and the greater the impact magnitude, the impact is more significant. The impact significance must be set in a context and could be relativistic and to a certain degree - subjective.

In general, an impact could be categorized into following significance categories (Table below):

- Negligible (or neutral): no detectable change to the environment;
- Minor: a detectable but non-material change to the environment;
- Moderate: a material but non-fundamental change to the environment;
- Major: a fundamental change to the environment.

Table 18 Typical impact significance matrix

Receptor sensitivity	Impact magnitude				
	High	Medium	Low	Very low	None
Very high	Major	Major	Moderate	Moderate	Negligible
High	Major	Moderate	Moderate	Minor	Negligible
Medium	Moderate	Moderate	Minor	Minor	Negligible
Low	Minor	Minor	Minor	Negligible	Negligible
Very low	Minor	Negligible	Negligible	Negligible	Negligible

The Table above demonstrates how combining the sensitivity / value of the resource or receptor with the magnitude of change produces a significance of effect category.

For some topics, such as air or water quality, noise, quantifiable (measurable) thresholds or legally defined criteria could be used to determine the significance of an impact. However, for other topics, such as biodiversity or landscape, it is necessary to use combination of quantitative and qualitative criteria – professional judgment on case by case basis.

Assigning impact significance relies on reasoned argument, professional judgment and consideration of the views and guidance of competent organisations. Assigning each

impact to one of four significance categories enables different topic issues to be placed within the same scale to allow a direct comparison. The four significance categories are described in Table below. In arriving at the significance of effect, the assessor will also consider whether they are direct or indirect; short, medium or long-term; permanent or temporary, positive or negative, cumulative.

Table 19 Typical impact significance categories and their decision-making aspects

Magnitude factor	Typical criteria	Description – typical descriptors
Major	A fundamental change to the environment	Only adverse impacts are normally assigned this level of significance, and represents key factors in decision-making process. These impacts are generally but not exclusively associated with sites or features of International, National or Regional importance that are likely to suffer a most damaging impact and loss of integrity. However, a major change in a site or feature of local importance may also enter this category.
Moderate	A material but non-fundamental change to the environment	These beneficial or adverse impacts may be important, but are not likely to be key decision-making factors. The cumulative effects of such factors may influence decision-making if they lead to an increase in the overall adverse impact on a particular resource or receptor.
Minor	A detectable but non-material change to the Environment	These beneficial or adverse impacts may be raised as local factors. They are unlikely to be critical in the decision-making process, but are important in enhancing the subsequent design of the project.
Negligible (or neutral)	No detectable change to the environment	No impacts or those that are beneath levels of perception, within normal bounds of variation or within the margin of forecasting error.

Impacts determined to be minor or negligible (neutral) are not deemed to be significant, and as such will not be reported in detail in the ESIA package and will not require specific mitigation. The exception to this is where the combination of multiple minor effects has the potential to lead to a significant (i.e. moderate or above) cumulative effect.

It should be noted that, although the above describes overall generic approach proposed for the ESIA for the Project – using sensitivity and magnitude to determine the significance of impact – some particular topics may imply different approach which reflects topic's specifics in more appropriate way or variations in terms to the sensitivity or magnitude categories.

5.7.2 Cumulative and Transboundary Impacts

Cumulative impacts are those that result from the incremental impact of a project when added to other existing, planned, and/or reasonably predictable future projects and developments". Cumulative impacts are limited to those impacts generally recognized as important on the basis of scientific concerns and/or concerns from Affected Communities and Stakeholders. Cumulative impacts are those that result from the successive, incremental, and/or combined effects of an action, projects, or activity when added to other existing, planned, and/or reasonably anticipated projects and activities. Areas and communities can be potentially impacted by cumulative impacts from further planned development of the project or other sources of similar impacts in the geographical area, any existing project or condition, and other project-related developments that can realistically be expected. However, the assessment

does not include potential impacts that would occur without the Project or independently of the Project.

The assessment of cumulative impacts considers the combination of multiple impacts that may result when the Project is considered alongside other existing or proposed projects in the same geographic area or similar development timetable. However, considering the nature and magnitude of the Project, the extend of the impacts it will have on both social and environmental component and the necessary mitigation measures it will include, it is likely that all possible cumulative impacts will be merged, examined and assessed in the ESIA process.

Cumulative effects due to noise superimposition can be expected in areas in the immediate vicinity of the railway, primarily in the area of Tuzi

That being said, cumulative impacts will be assessed as appropriate in the proper stages of ESIA report.

Potential transboundary environmental and social impacts are more likely to occur at the area of the railway alignment near the border with Albania, and these could include impact to surface water, groundwater, fauna and protected and designated areas (environment) and impact on economy and quality of life of affected communities (social).

5.7.3 Residual Impacts

Residual impacts are impacts that remain in the case where proposed mitigation measures are implemented. It should be noted that effectiveness of mitigation measures could vary for different impact subjects and receptors. Negative residual impacts overall assessed as being either of minor or negligible significance will be considered to be environmentally and/or socially acceptable. For negative residual impacts assessed as being either major or moderate significance measures will be planned and implemented that compensate/offset for residual risks and impacts (these measures do not eliminate the identified adverse risks and impacts, but they seek to offset it with an-at least- comparable positive one). Evaluation of the significance of residual impacts will be done based on expert judgment and separately for each type of impact.

5.7.4 Uncertainties

Any uncertainties related with impact prediction or the sensitivity of receptors due to the absence and inconclusiveness of data or due to other limitations are explicitly stated. Where applicable, the ESIA report will make recommendations concerning measures that should be put in place with monitoring or environmental or social management plans to deal with the uncertainty so that they may be addressed.

5.7.5 Impact Mitigation

Mitigation measures are to be proposed, where they are available and practical, in those cases where significant adverse impacts are identified. These measures need to be consistent with the requirements of the relevant legislation and policies as well as

with best international practice and should be proportional to the level of the impact predicted.

During the past Project stages, 'mitigation through design' was employed as an important factor in ensuring that the environmental and social impacts of the Project are avoided and minimised as much as possible. Therefore, through the development of the Project so far and the iterative approach used by engineering and ESIA teams, mitigation has been built into the technical Project design (embedded mitigation measures to avoid adverse E&S effects). Where significant impacts potentially remain, further specific mitigation measures will be proposed in the ESIA documentation.

The principles of mitigation, including its hierarchical manner are as follows (Figure below):

- Avoidance and prevention measures - incorporate measures to avoid the effect (e.g. alternative design options or modifying the Project construction programme to avoid environmentally sensitive periods).
- Reduction - incorporate measures to lessen the effect (e.g. fencing off sensitive areas during construction and implementing a Construction Environmental and Social Management Plan (CESMP) to reduce the potential impacts from construction activities).
- Compensation / remediation as last resort – where it is not possible to avoid or reduce a significant effect then offsetting measures should be considered (e.g. provision of replacement of habitat to replace that lost to the proposed Project or remediation such as the clean-up of contaminated soils). It should be noted that compensation or remediation does not automatically make an impact 'acceptable' or excuse the need to consider other forms of mitigation as discussed in the hierarchy.
- Enhancement of eventual positive Project effects.

Impacts that remain after mitigation are referred to as residual impacts. The assessment of the significance of the residual effects after mitigation / enhancement is therefore one of the key outcome of the environmental and social assessment of the proposed Project.

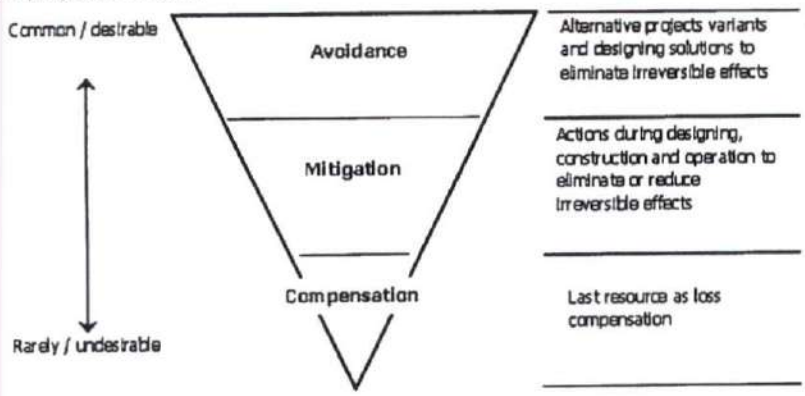


Figure 28 Impact mitigation hierarchy

5.8 Proposed Scope of the Assessment

The topic areas to be considered and the extent of the assessment work proposed are referred to as the scope of assessment. The typical standards of the good international (ESIA) practice and EIA regulations require the process to describe the likely significant effects of the Project to the biophysical and social environment resulting from:

- the construction and existence/operation of the development, including, where relevant, demolition works;
- the use of natural resources, in particular land, soil, water and biodiversity, considering as far as possible the sustainable availability of these resources;
- the emission of pollutants, noise (as well as vibration, light, heat and radiation) and the creation of nuisances;
- the generation and management (including recovery and disposal) of waste;
- the impact of the Project on climate (e.g. the nature and magnitude of greenhouse gas emissions) and the vulnerability of the Project to climate change (climate resilience);
- the risks to human health, cultural heritage or the social environment;
- the accumulation of effects with other existing and/or approved projects.

The environmental and social topic areas proposed for inclusion in the ESIA of the proposed modernisation of the railway section Podgorica to Montenegrin/Albanian border are as follows:

- Climate;
- Air Quality;
- Geological environment;
- Water environment;
- Noise and vibration;
- Land use
- Biodiversity and natural heritage, landscape;
- Waste;
- Social aspects
- Cultural heritage
- Combined and cumulative effects

5.9 Assumptions and Limitations

Throughout this scoping exercise the following generic assumptions have been made:

- This ESIA Scoping Report has been prepared based on the preferred Project development scenario, the environmental and social baseline information available at the time of writing and the current available technical (engineering) design (as described in Section 2 above). Further information will become available as the iterative technical (engineering) design and E&S assessment process proceed and the scope of ESIA will be reviewed and updated as process evolves, if necessary.
- Details in regard to the construction methodologies, including those associated with tunneling, are unknown at present stage of the Project development.

- Locations and details of auxiliary works (e.g. access roads for construction purposes, site compounds, workers camps and materials storage) have not yet been identified. The assumption is that the compounds would be located outside of nationally protected areas or internationally recognized areas.

6 Assessment of impacts

6.1 Climate related Aspects

The Environmental and Social Impact Assessment shall include an assessment of the potential impact and materiality of the identified physical climate risk on the asset over its expected economic life, together with resulting selection and prioritization of appropriate adaptation measures and estimate of their (incremental) cost, all in line with relevant guidance including:

- European Financing Institutions Working Group on Adaptation to Climate Change (EUFIWACC) - Integrating Climate Change Adaptation into Project Development
- European Commission Notice on Technical Guidance on the Climate Proofing of Infrastructure in the period 2021-2027
- European Commission Non-paper Guidelines for Project Managers: Making vulnerable investments climate resilient

The climate topic includes two separate assessments:

- Greenhouse gas (GHG) impact assessment – the effects on the climate from GHG emissions arising from the Project.
- Climate resilience assessment[17] – the resilience of the Project to adapt to the impacts resulting from a changing climate, including how the Project design would take into the account the projected impacts of climate change.

6.1.1 Greenhouse Gas Impact Assessment

Study Area

The study area for GHG impact assessment would need to cover all direct and indirect GHG emissions arising from activities undertaken within the Project area during the construction, operation, and maintenance of the Project. It would need to include emissions based on a lifecycle approach.

Potential Impacts and Principal Mitigation

The key identified contributing GHG emission sources and/or activities associated with the Project, based on a lifecycle approach, are presented in the Table below.

Table 20 Key anticipated greenhouse gas emissions sources associated with the project

Lifecycle stage	Project activity	Key GHG emission sources
Pre-construction stage	Construction site preparatory works	Fuel use - for vehicles, generators on site, etc.
	Clearance works (vegetation clearance; land use change)	Losses of carbon sink - removal of a natural environment that can absorb GHG emissions (e.g. woodlands)
Production stage	Use of products and/or materials required to build the Project (e.g. concrete, steel, etc.)	Emissions resulting from the extraction of raw materials and manufacturing/processing of materials into secondary/final products for use and the transportation of those materials

17

Lifecycle stage	Project activity	Key GHG emission sources
Construction stage	On-site construction activity including: Transport of materials and equipment to the construction site; Transportation of construction work force to the construction site; Use of construction vehicles and plant at the construction site; Disposal of any waste or other materials generated by the construction processes.	GHG emissions from vehicle and plant use GHG emissions from disposal of waste
Operational & maintenance stage	Operation of the railway; Operation of lightning equipment – the railway and tunnel lighting, railway stations, etc.; Maintenance operations	GHG emissions from energy and fuel use. Embodied emissions associated with materials production related to maintenance.

The calculation of GHG emissions associated with the construction will be scoped in the ESIA. It is to be considered as part of the climate impact assessment as the Project development progresses, i.e. in the further ESIA during Detailed design stage, which is expected to provide the necessary information for GHG calculation.

General note is that in long-term context, throughout its operational phase, the Project will have significant positive impacts in comparison with the present situation. The proposed electrification of the railway will result in improvement of local environment through avoiding air pollutants from diesel locomotives and reduction of GHG due to switching to electricity, thus decreasing the current emissions of CO2. Typically, an electric train emits between 20% and 35% less carbon per passenger kilometre than a diesel train and this benefit will only improve as the national electricity generation industry reduces its carbon levels[18]. Hence, the GHG emissions during operation and maintenance of the Project are expected to be very small over time during its operational life. Therefore, these have been scoped out from the ESIA.

The principal mitigation measures to reduce GHG emissions across the lifecycle of the proposed Project would include:

- Specification of alternative materials with lower embodied GHG emissions such as locally sourced products and materials with a higher recycled content.
- Low carbon design specifications such as energy-efficient lighting and durable construction materials to reduce energy consumption and maintenance and decrease replacement cycles.
- A Construction Environmental and Social Management Plan (CESMP) prepared and implemented by the selected construction Contractor to include a range of best construction practice measures with an aim to reduce GHG emissions.

[18] According to www.epcg.com, the production of electricity in Montenegro in the period of 2018-2019 is based on use of 63-65% renewable sources.

6.1.2 Climate Resilience

Study Area

The study area for the climate resilience assessment covers all elements (assets and infrastructure) which constitute the Project.

Potential Impacts and Principal Mitigation

The results from the climate projections show an increase of 1.5° C to 2°C in the mean annual temperature by 2040 throughout the country. The mean annual rainfall is expected to decrease, especially during the summer months and to increase in the winter months in some parts of the country. Significant changes are expected in snowfall, which will decrease from −50% in the north to a change of more than −90% in central parts by 2070.

Montenegro is particularly exposed and vulnerable to climate hazards – extreme events, such as droughts, floods, forest fires, and heat waves. Climate projections show that these climate extremes will increase in frequency and magnitude in the future. Sectors most at risk and related to the Project are water sector and forestry:

- The water sector shows a reduction in the water balance in all river basins in Montenegro. The decrease in rainfall and snowfall will drastically affect surface water availability. By the end of the 21st century a reduction in average annual flow of 27% is expected. Adaptation measures focus on applying an integrated approach to water resources and systems management, and a strengthening of cross-sector planning and activities.
- The greatest risk is to forests located in the coastal and central regions, where high air temperatures during the summer period and the typical vegetation create the necessary preconditions for forest fires to start. Adaptation measures for the forestry sector need to focus on promoting sustainable management of forests and strengthening information and monitoring systems[19].

The Project area may be vulnerable to a range of climate change risks, including an increased frequency and severity of prolonged and/or heavy precipitation events, prolonged droughts and heat waves, a greater frequency of very hot days, and an increased risk of storms. The assessment of the climate resilience of the Project will take into consideration its vulnerability to these climate variables based on sensitivity and exposure to its structural elements in order to identify and assess the potential impacts and their significance.

These extreme weather events associated with the expected climate changes may result in the following principal impacts:

- Material deterioration due to high temperatures and from periods of heavy rainfall.
- Flood risk and damage to drainage systems.
- Storm damage to structures and other Project's assets.
- Asset deterioration from exposure to heat, freezing, snow and ice.

---

[19] Montenegro Third National Communication on Climate Change 2020.

A number of general mitigation and adaptation measures would need to be considered to address these risks. These would need to be identified and incorporated into the Project design, so to achieve that the Project is designed to be resilient to impacts arising from current and future weather events and climatic conditions, and designed in accordance with current planning, design and engineering practice and codes.

6.2 Air Quality

6.2.1 Introduction

The proposed Project has the potential to affect the local air quality more during the construction phase than once the railway is operational. This section provides an overview of the current baseline and potential impacts of the proposed Project on air quality and describes the principal mitigation approach.

6.2.2 Study Area

For the purposes of the assessment, a study area of 300 meters around the proposed Project footprint will be used. This is an area likely to be affected due to the effect of pollutants from road traffic, getting reduced over distance from the point of release, and beyond 300 m these are likely to have reduced to a concentration equivalent to background concentrations.

The processes of site clearance and construction operations with associated effects on local air quality arising from off-site activities (e.g. workers camp(s), work on the railway, construction of access roads) would need to use the same approach for setting the study area and be considered during Project's later stage, by the Contractor, once appointed.

6.2.3 Baseline Conditions

According to the National Strategy for Air Quality Management in Montenegro and based on a preliminary assessment and classification of the territory into zones, the territory of Montenegro is divided into three Air Quality Management Zones – AQMZ (Table below). The boundaries of AQMZs coincide with the administrative boundaries of the municipalities that are part of the zones. In general, these zones include (1) 'areas in which air quality improvement is necessary' (north and south zone) and (2) 'air quality maintenance areas', where air quality is considered satisfactory (central zone) (Figure below).

Table 21 Air quality management zones in Montenegro relative to the Podgorica – Albanian border railway

Air Quality Management Zone	Municipalities within AQMZ	Areas in which air quality improvement is necessary
Northern AQMZ	Andrijevica, Berane, Bijelo Polje, Gusinje, Pljevlja, Kolašin, Mojkovac, Petnjica, Plav, Pluzine, Rozaje, Šavnik, Zabljak	Berane, Bijelo Polje & Pljevlja
Central AQMZ	**Podgorica**, Nikšić, Danilovgrad, Cetinje	**Podgorica**, Nikšić, Cetinje

Air Quality Management Zone	Municipalities within AQMZ	Areas in which air quality improvement is necessary
Southern AQMZ	Bar, Budva, Kotor, Tivat, Ulcinj, Herceg Novi	Bar

Note: Municipalities crossed by the proposed Project are highlighted in bold text
Source: Montenegrin Environmental Protection Agency

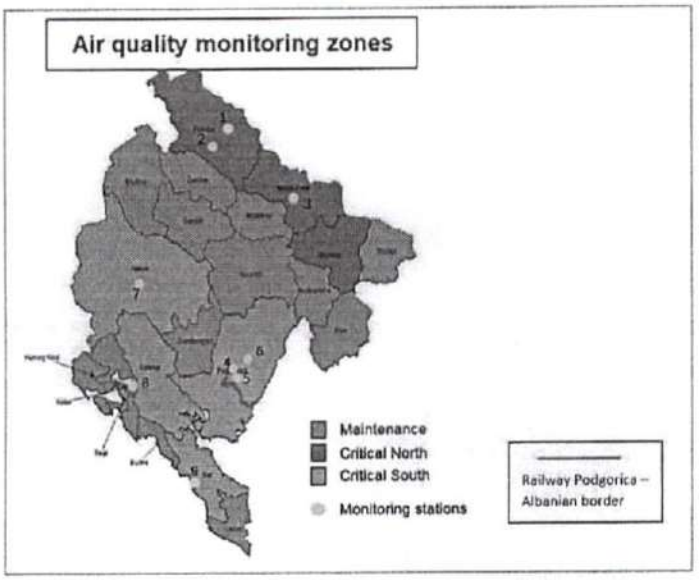


Figure 29 Air quality zones along the Railway

Source: Montenegrin Environmental Protection Agency

The measuring stations within the National Air Quality Monitoring Network, active since October 2019, are given in the table below. These stations are operated by the Montenegrin Environmental Protection Agency (MEPA). The pollutants whose concentration is measured continuously in accordance with the established AQMZs are presented below, also. Relevant monitoring stations for the Project location are Podgorica - Institute for Hydrometeorology and Seismology monitoring the urban zone, Podgorica - Biotechnical Institute, and third, located on the Golubovci airport.

Table 22 Air quality monitoring stations and air quality parameters measured in the project region

#	Monitoring station	altitude	coordinates	Air quality parameters
1	Podgorica Institute	49	42° 26', 19° 17'	SO_2, NO_x, smoke
2	Podgorica BTI	47	42° 26', 19° 16'	Precipitation, Sediment, GAW
3	Podgorica Golubovci	33	42° 22', 19° 15'	Precipitation

Source: Montenegrin Environmental Protection Agency

The monitoring station Podgorica Institute is located at Bulevar Veljka Vlahovića, about 1 km from the central railway station and it may be considered relevant to the Project location.

The air quality around the Project location for the year of 2023 is summarised below, based on the measurements of the monitoring station Podgorica Institute [Ref. 19]:

- SO_2 - All measured values of Sulphur dioxide during the measurements were below the prescribed limit values, classifying the air as clean. All SO_2 values were below or within the detection limit range of the method used.
- NO_x - The air belongs to the category of clean throughout the year, as indicated by the measured average and maximum values of the given parameter.
- Smoke - The relevant parameters in Podgorica correspond to moderately polluted air, due to the dominant contribution of emissions from heating as well as the proximity to the traffic route.

The results of the air quality measurements are available online at the web site of the National Air Quality Monitoring Network (http://www.epa.org.me/vazduh/).

Considering the available measurement results relevant for the study area, following is concluded:

- The available national monitoring and assessments have demonstrated that there is no risk of sulphur dioxide, nitrogen oxides, concentrations exceeding the relevant standards and objectives due to emissions from traffic anywhere in Montenegro. Therefore, these pollutants are not to be considered as relevant as they are very unlikely to be present at levels which would represent potential significant impacts due to the proposed Project, hence no risk of exceeding would be relevant for the Project;
- For smoke, risk of exceedance of the air quality standard is relevant

No other measurements are available, particularly for the areas adjacent to the railway corridor and the settlements of Karabuško Polje and Tuzi where nearest houses are at distances of approx. 15 m from the railway track.

6.2.4 Potential Impacts and Principal Mitigation

Potential impacts on the air quality would be dominantly related to the construction phase of the Project. During this phase, any changes in air quality may occur due to dust emissions from various construction activities and combustion emissions from use of site plant equipment and heavy vehicles as well as from traffic related to the implementation of the Project. Depending on local and meteorological circumstances, without appropriate mitigation measures the impacts may be experienced as nuisance by the recipients in the immediate surrounding area of the construction sites (study area).

The key types of activities considered as sources of dust and combustion emissions during the construction phase are expected to include:

- movement of vehicles;
- preparation works (e.g. vegetation clearance);
- replacement of obsolete railway elements;
- earthworks and tunneling;

- excavation and installation of infrastructures;
- construction/reconstruction of retaining walls etc.;
- surfacing works;
- stock piling/ storage.

Any impacts on air quality would be of localised nature and temporary (i.e. during the period of the construction works only) and could be suitably minimised by application of appropriate environmental mitigation measures and best construction practice. The potential impacts from the above activities would be mitigated by undertaking of construction works in accordance with a CESMP, prepared and structured per source with clearly identified responsible parties, and subsequently implemented by the selected construction Contractor. The CESMP would include GIP measures that are typically adopted on construction projects, which are designed to prevent the occurrence of significant impacts, with emphasis to the nearest receptors (e.g. residential areas along the railway section in Karabuško Polje and Tuzi). Consequently, it is considered that the use of GIP will ensure that no significant permanent or residual air quality impacts would occur due to the construction of the Project.

During the operational phase of the Project, the improvement of the railway section in terms of electrification would result in significant positive impacts and improvement of the local environment by avoiding air pollutants from diesel locomotives. However, the impacts due to electricity production would be still relevant on the source of the production, although less than conventional fossil sources due to combined production (fossil and RES) and efficient electrical railway engines. Once operational, air quality could be affected only by maintenance and related vehicle activities. Therefore, during the operational phase of the Project it is not anticipated that there would be any significant emissions to air and no significant air quality impacts would occur. The assessment of air quality impacts during the operational phase is, therefore, scoped out of the present ESIA.

6.3 Geological Environment and Soils

6.3.1 Introduction

The proposed Project has the potential to affect the geology and soils during the construction and operational phases. This section provides an overview of the current baseline and potential impacts of the proposed project on the geology and soils and describes the principal mitigation approach.

6.3.2 Study Area

For the purposes of the preliminary ESIA, the study area will comprise the project physical footprint – the railway line corridor from Podgorica to the Montenegrin-Albanian border - and the adjacent areas.

6.3.3 Baseline Conditions

The regional geological context was assessed base on the existing geological maps, sheets 'Titograd' (K34-51) and 'Bar' (K34-63) with the respective explanatory notes.

The key geological structures in the wider Project area, which belongs to the outer Dinarides, are represented by various forms of Paleozoic, Mesozoic and Kenozoic ages. The most important features of the baseline geological structure of the corridor is presented in two distinctive sections along the railway line:

› Section I: Podgorica – Tuzi

Upper (third) river terrace (t_3) - Quaternary sediments formed by fluvioglacial and alluvial sediments of Cijevna River and Moraca River, forming major, mostly flattened geomorphic unit, called "Zeta Plain". These sediments are represented by clay, gravel, sand and conglomerate (next Figure below).

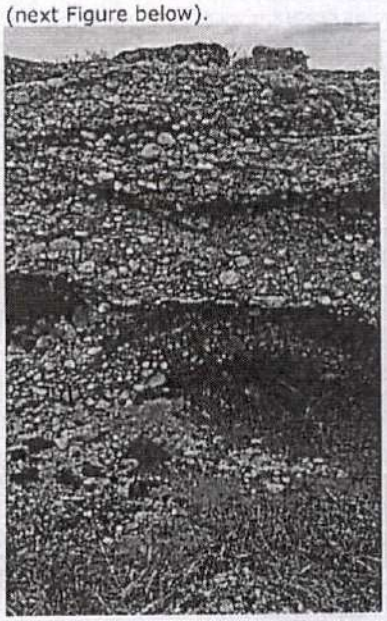


Figure 30 Registered geological conglomerate in Cijevna River valley

From the hydrogeological point of view in these sediments are developed with inter-granular type of porosity, i.e. compact type of aquifer with free GWL, which follows fluctuation of water level of Cijevna and Moraca rivers. From the hydrogeological point of view, these sediments are poorly permeable to impermeable, which depends on the percentage of silt and clay (terrarossa) and because of quality of cementation of gravel and sand grains. Therefore, they can act as hydrogeological collectors or hydrogeological isolators. Regional estimated depth of these sediments varies between 5-25 m.

From an engineering-geological point of view, the terrain in this section is built of complexes of non-cohesive rocks (gravel, sand, conglomerates).

› Section II: Tuzi – MNE/Albanian border

From a morphological point of view, this section of the corridor is a typical hilly-mountainous relief. The terrain of this section is built of carbonate rocks (low and high stratificated limestone, dolomite and their varieties), with Jurassic and Creatious edge (next Figure). This section passes through southern slopes of the rocky carbonate massif. Most of this carbonate rock area appears to represent hydrogeological collectors of cavernous porosity. After a period of precipitation and after the melting snow season, i.e. at the maximum groundwater level, the occurrence of occasional karst springs at hypsometrically higher elevations is noticeable (Figure below).

Figure 31 Registered limestone at the section from Tuzi to the Albanian border (tunnels area)

Figure 32 Occasional karst spring after rain near Tuzi railway station

From an engineering-geological point of view, the terrain in this section is built of well-petrified rocks, represented by massive and layered limestones and dolomitic limestones.

6.3.4 Potential Impacts and Principal Mitigation

Potential impacts on the geological structures and soils during the construction phase of the Project typically include:

- Disturbance of geological deposits and soils due to geological hazards, primarily erosion and landslides.
- Risks to the soils due to:
  - increased erosion of deposits / soils through removal of surface cover, including vegetation clearance as well as through handling and storage of soils
  - potential physical damage to soil, including soil compaction as a result of heavy construction vehicle movements.
  - spillage of fuels or other contaminating liquids causing pollution;
  - soil pollution due to inadequate waste management
  - increasing the potential for contaminated surface run-off to migrate to soils, and groundwater receptors as a result of leaching from uncovered ground material.

The potential impacts on geological environment would be mitigated by undertaking of construction works in accordance with a CESMP. It would contain measures to

ensure compliance with national standards and legislation. Measures contained within the CESMP will be designed to reduce the possibility for dispersal and accidental releases of potential contaminants to soils and uncontrolled run-off to occur during construction. It would also set out how material is to be excavated, segregated and stockpiled to minimise the possibility for run-off and soil quality degradation and would establish procedures for dealing with unexpected soil or groundwater contamination.

The principal potential impacts on the geology and soils during the operational phase of the project include potential geological hazards, primarily erosion and landslides, as well as impacts from pollutants, e.g. oils during railway and structures maintenance activities (e.g. accidental spillages).

In addition, to eliminate or mitigate the land pollution operational risks, primary mitigation would need to be incorporated into the detailed project design (e.g. pollution treatment measures in the railway drainage system where a risk of pollution has been identified).

6.4 Water Environment

6.4.1 Introduction

The proposed Project has the potential to affect the water environment (surface water quality and groundwater resources) and pose a flood risk during the construction and operational phases. This section provides an overview of the current baseline and potential impacts of the proposed Project on the water environment and describes the principal mitigation approach.

6.4.2 Study Area

For the purposes of the assessment of the effects on the water environment, the spatial scope includes features of the water environment that are crossed by the railway corridor.

In wider context, from a hydrographical point of view, the Project area belongs to the catchment area of the Skadar Lake with Morača River, which is a part of the Adriatic Sea Basin (Figure below).

Figure 33 Water bodies relative to the railway

6.4.3 Baseline Conditions

Continues surface water quality control in Montenegro is conducted for the purpose of water quality assessment, monitoring pollution trends and safeguarding water bodies. The purpose of analyzing the characteristic of the water is to determine its status: chemical and ecological status for the surface water bodies and chemical and quantitative status for the ground water. The analysis of the water is done by a body of state administration responsible for hydro-meteorological affairs (Hydrometeorology and Seismology Office of Montenegro) in accordance with an annual surface and ground water monitoring program.

The surface water quality network stations in 2023 included 45 monitoring points out of which 20 water sources were monitored on 27 locations, 4 natural lakes on 7 monitoring locations, 1 artificial lake on 1 monitoring location, 5 mixed waters on 5 locations, and the sea coastal zone on 5 locations.

The monitoring scope includes the following aspects:

- Biological characteristics,
- Physical and chemical characteristics,
- Specific pollutants,
- Hydro-morphological characteristics,
- Chemical characteristics with over 45 priority substances.
- Relevant water body to the Project is Skadar Lake, which has been subject of monitoring during 2023[20].

[20] Latest available Environmental State Report (2023).

In 2019, a new water classification had been adopted introducing an ecological status of water bodies[21]. According to the monitoring results in 2023, the status of Skadar Lake is defined as following:

- Very good status on location Skadar Lake - Moračnik, good on location Skadar lake – Podhum and on location Skadar Lake – Kamenik, in regards to physical and chemical characteristics,
- Good status on location Skadar Lake - Moračnik, in regards to specific pollutants,
- Very good status on all three locations - Skadar Lake - Moračnik, Podhum and Kamenik, in regards to phytobenthos, structure and abundance of silicate algae,
- Moderate status at location Skadar Lake-Moračnik and Podhum, and very bad in location Skadar Lake-Kamenik, in regards to macrophytes.

The water quality of the river Cijevna shows varying statuses based on different elements of analysis. According to the physical and chemical elements, this site has a "good" quality status, aligning with 16 out of 27 measured locations (59.3%). When considering the biological element of phytobenthos, which includes the structure and abundance of diatom algae, the water quality at Cijevna-Dinoša is rated as "very good," similar to 16 other assessed locations (59.3%). However, when examining macrozoobenthos, which considers the structure and abundance of found taxa, the quality status at this location is "poor," a status shared with other sites, reflecting issues from pollution or ecological pressures upstream or within the watershed. Overall, while Cijevna has areas of strong water quality, it also demonstrates challenges in biological diversity, requiring attention to improve its overall environmental health[22].

In regards to ground water, in 2023 six different wells had been subject to monitoring. Quality status had been determined based on 12 basic physical and chemical parameters. The nearest well to the Project location/railway track is a well located in the village of Drešaj, distances about 1000 m of the track. The water showed a poor (moderate) quality status, in terms of basic physico-chemical elements. The water quality in 91.7% of the tested parameters showed excellent quality, i.e., (very) good status, while 8.3% showed poor (moderate) status. Pollutants were below the LOQ values for metals (in µg/l for As<0.20; Cd<0.10; Pb<0.20; Hg<0.05) and for pesticides. Regarding microbiological quality, only live bacteria were present in the water (97-202/ml). There was also an increased content of nitrates and phosphates, which exceeds the good status. These two parameters are accompanied by increased concentrations of K and Na, indicating the impact of used artificial fertilizers. The analyses had shown bad quality status for NO3 and total N – for 66.6% of the parameters the status had been determined as very good, 16.7% of it showed good and for 16.7% bad status.

Based on the results, the Environmental State Report concludes that communal waste waters and the industry affects the ground water quality the most.

---

[21] There are three statuses determined (Very good/Good/Moderate), according to the Rulebook on the manner and deadlines for determining the status of surface waters ("Official Gazette of Montenegro", No 25/2019)

[22] Data from the latest avliable Environmental State Report (2023).

6.4.4 Potential Impacts and Principal Mitigation

Potential risks of impacts on the water environment during the construction phase of the Project include:

- Pollutions risks to the water environment due to:
  - washing off soils, sediment or other construction materials during excavation and other construction activities;
  - spillage of fuels or other contaminating liquids by improper management;
  - temporary physical modifications interrupting the natural passage of surface and sub-surface flow;
  - mobilisation of contaminants following disturbance of ground or through uncontrolled site runoff.
- Pollutions risks to groundwater associated with cuttings and reconstruction of tunnel(s), including:
  - contamination risk to the aquifers, i.e. increase in discharges to ground that may have implications for groundwater quality;
  - temporary dewatering, if required, for reconstruction of tunnel(s), i.e. pumping of groundwater which could cause changes in flows and groundwater flow and level;
  - release or leaching of substances (e.g. concrete, cement) used in the tunneling process which may negatively impact groundwater quality.
- Potential increase in flood risk, mainly due to undertaking construction works within floodplains;
- Potential impacts on water dependent designated sites (Skadar Lake).

The potential impacts for the above activities would be mitigated by undertaking of construction works in accordance with a CESMP prepared and implemented by the selected construction Contractor which will include, at minimum:

- establishing and managing construction camps that include proper storage areas and measures;
- bundling of areas that may generate contaminated water;
- no direct discharges to groundwater or surface waters, but if necessary – appropriate treatment will be undertaken;
- sanitary water discharged to self-contained units and further processed with treatment facilities;
- actions to ensure contaminated material is identified, isolated and removed to appropriate landfill to avoid any water quality impacts;
- minimizing construction works in floodplains;
- temporary land-take would include adequate areas of land set away from surface waters and groundwater areas.

In addition, close communications with the competent authorities (e.g. MEPA, municipal environmental authorities, etc.) in relation to water environment and flood risk would be established during the construction phase.

During the operational phase, water risks are more related to flood rather than pollution, bearing in mind the type of the Project. Pollution risk can be expected due to the maintenance of the railway track (chemical weed removal from the track bed, maintenance or disruption of the drainage systems).

The railway structures (e.g. railway track, tunnels and bridges), cuttings, embankments or other landscaping features constructed in floodplains may have the potential to affect any flood flows, increasing the flood risk and affecting on any potential consequences.

To eliminate or mitigate these potential operational risks, primary mitigation would need to be incorporated into the further Project design (e.g. design of culverts and other facilities where such risks would be identified).

6.5 Noise and Vibration

6.5.1 Introduction

The proposed Project has the potential to result in temporary noise and vibration impacts on the closest environment and receptors during the construction phase as well as bringing occasional and short in duration but long-term impact during operational phase. This section provides an overview of the current baseline and potential noise impacts of the proposed Project and describes the principal mitigation approach.

6.5.2 Study Area

For the purposes of the assessment, a study area of 300 metres around the proposed Project will be considered. This is an area likely to be affected due to the effects of noise from railway traffic, being reduced over the distance from the point of release, and beyond 300 m these are likely to be reduced to a level equivalent to background levels.

The processes of site clearance and construction operations with associated effects on ambient noise arising from off-site activities (e.g. workers camp(s), construction of access roads) will use the same approach for setting the study area and is included in the relevant surveys planned within this project.

6.5.3 Baseline Conditions

Based on the relevant legislation, municipalities have adopted a decision for acoustic zoning of their territories, thus determining limit values for setting up an environmental protection.

The noise monitoring for the capital Podgorica has been done in 2022/23. The measurement of noise levels in the environment was carried out at a total of 11 locations, 10 of which are in the municipality of Podgorica, and one location is in the municipality of Zeta in Golubovci. Three of the monitoring locations are in vicinity of the central railway station, relevant to the Project location. No other noise measurement is available for the area outside of Podgorica along the railway track to the Albanian border.

Two measurement points belong to the residential acoustic zone, and one to the mixed-use acoustic zone.

The average values of the daily noise level indicators (Lday) exceed the limit values in the second measurement cycle. The average values of the evening noise level indicators (Levening), as well as the night noise level indicators (Lnight), exceed the limit values at two locations belonging to the residential acoustic zone.

On the mixed-use acoustic zone the average values of the daily noise level indicators (Lday) exceed the limit values in first and second measurement cycle. The average values of the evening noise level indicators (Levening), as well as the night noise level indicators (Lnight), exceed the limit values in first and second measurement cycle.

Traffic noise continues to be the largest source of noise in the environment of the capital city of Podgorica.

The subject section starts at the exist from Podgorica railway station (nearest houses on 300 m) and continues through a rural area and the adjacent settlements for the next 15 km (settlements of Karabusko Polje and Tuzi, nearest houses on 15 m). The remaining part (about 8 km) the track goes through an unpopulated area (nature) all the way to the Albanian border.

No other noise measurement is available for the area outside of Podgorica along the railway corridor to the Albanian border. A baseline noise survey (ambient noise measurements) at a selection of locations along the railway is planned within this scoping report to provide baseline information regarding the environmental noise in the study area and support the identification of primary mitigation measures that would need to be incorporated into the Project design to reduce the impact from the operational railway traffic.

When it comes to vibrations, there no available data, therefore a baseline survey will be conducted in the study area, which will be used to support the identification of primary mitigation measures that would need to be incorporated into the Project design to reduce the impact from the operational railway traffic.

6.5.4 Potential Impacts and Principal Mitigation

Noise and vibration emissions during the construction phase are inevitable. The main noise and vibration sources would be the use of heavy vehicles and machinery and implementing construction activities. The result of that would be short and temporary noise and vibration impacts at the closest receptors.

The potential impacts would be mitigated with an implementation of a CESMP prepared and implemented by the selected construction Contractor that would include at minimum:

- well planning and organizations of the working activities;
- establish working hours and avoid periods of rest to minimise noise and vibration disturbance;
- careful selection of equipment (quiet and low vibration);
- review of construction programme and methodology to consider low noise/ low vibration methods;
- optimal location of equipment on site and careful unloading of vehicles to minimise noise and vibration disturbance;
- proper maintenance and operation of machinery to minimise noise and vibration disturbance;
- turning off engines when and where possible;

- provision of acoustic enclosures to compressors and static plant, where necessary;
- implementation of a Traffic Management Plan to mitigate traffic impacts during construction, for example, through the choice of routes, the varying of routes and timing of construction traffic.

The operational phase of the Project would result in adverse railway traffic noise impacts to the closest receptors, mainly due to the rolling noise from the interaction between wheels and rail. Another important noise source of lesser magnitude is the squealing noise from curvatures and braking. These impacts are also actual at the moment, since the existing railway is operational and no mitigation in that regard is established.

The most important source of operational vibration are wheel and rail vibrations induced during contact when trains are passing. Finally, re-radiated noise refers to noise that is experienced within a building due to radiation from vibration building elements (e.g. floors, walls and ceilings).

The magnitude of these effects is to be quantified through traffic noise and vibration modeling studies. This was not covered in the previous phase of the project. During the preparation of the Detailed Design and ESIA, traffic noise and vibration modeling will be conducted, and, based on the results, noise and vibration protection measures will be planned.

To minimize these operational impacts, primary mitigation would need to be incorporated into the further Project detailed design, in principle based on the findings of the detailed noise and vibration impact assessment (i.e. baseline noise and vibration survey / measurement and traffic noise and vibration modeling), e.g. mitigation at source by resilient track pads, track-based lubrication systems, rail dampers, use of absorbent materials, etc. and/or mitigation along the source-to-receptor propagation path with noise abatement devices – noise barriers to reduce the impact to the closest receptors. In addition, retaining the tracks in good condition is considered as essential for the railway operation in general since the rail corrugation can increase noise up to several tens decibels.

6.6 Land Cover

6.6.1 Introduction

Land use in the area was assessed based on the available Corine Land Cover (CLC)[23] which is an inventory of 44 European land cover classes, and presented as a cartographic product, at a scale of 1:100000. For this analysis CLC cartographic inventory from 2018 was used.

Land cover analysis presents the types of land use in the study area and their dominance: artificial vs agricultural vs natural areas.

[23] The CORINE Land Cover (CLC) inventory was initiated in 1985 (reference year 1990) to standardize data collection on land in Europe to support environmental policy development.

6.6.2 Study Area

A 1,000 metres wide corridor along the corridor of the railway line (500 metres on both sides from the longitudinal axis of the line) is considered as sufficient to represent and to describe the overall land use baseline pattern in the broader context.

6.6.3 Baseline Conditions

Comparative land cover assessment within the study area is made based on CLC 2018 data (Table and Figure below).

Table 23 Land cover according to Corine Land Cover types within 1,000 metres wide corridor along the railway line (study area)

Land cover type		Within 1 km wide corridor along the existing railway line	
		Area (ha)	Area (%)
Artificial surfaces	112 Discontinuous urban fabric	212.32	8.66
	121 Industrial or commercial units	96.88	3.95
Agricultural areas	221 Vineyards	322.68	13.16
	231 Pastures	285.52	11.64
	242 Complex cultivation patterns	393.16	16.03
	243 Land principally occupied by agriculture, with significant areas of natural vegetation	17.79	0.73
Forest and semi natural areas	311 Broad-leaved forest	105.91	4.32
	312 Coniferous forest	71.66	2.92
	323 Sclerophyllous vegetation	0.62	0.03
	324 Transitional woodland-shrub	525.75	21.44
	333 Sparsely vegetated areas	229.11	9.34
Wetlands	411 Inland marshes	44.13	1.80
Water bodies	512 Waterbodies	146.81	5.99
	Total:	**2,452.35**	**100.00**

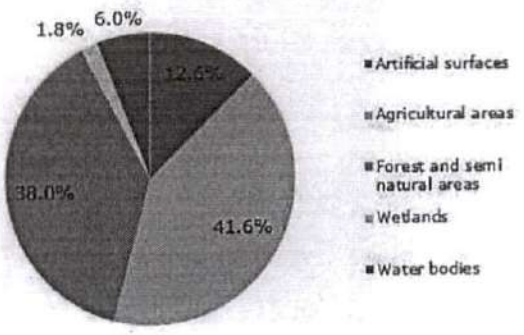


Figure 34 Participation of different Corine Land Cover classes (level 1) within the study area

Artificial surfaces (urban and industrial area) occupy approx. 12.6% i.e. significant portion of the study area. These areas are mostly confined to the city of Podgorica and urban and sub-urban areas in the Tuzi municipality.

Agricultural areas are dominant Corine Land Cover types according to their surface (41.56%). Agricultural land is shared between vineyards, pastures and complex cultivation patterns, vineyards being dominant in this respect as sole culture with 322.68 ha (13.2%). These vineyards as well as orchards along the railway corridor are considered as of great agricultural value in the Project region and dominantly are in ownership of the joint stock company "Plantaže 13 jul"24.

Forest and semi natural areas occupy an area of 933.05 ha or 38%. Transitional woodland-shrub is the dominant Corine Land Cover type in this group, with 525.75 ha (21.44%). Sparsely vegetated areas also cover significant portion (9.34%). They are mainly distributed at the foothills of Bratilja hill between Vuksanlekići and Tuzi. These are followed by broadleaved forests (4.32%) and coniferous forests (2.92%).

Surface bodies (waters of Skadar Lake) are represented by 146.81 ha (5.99%), while Inland marshes are represented by very small area of 44.13 ha (1.80%).

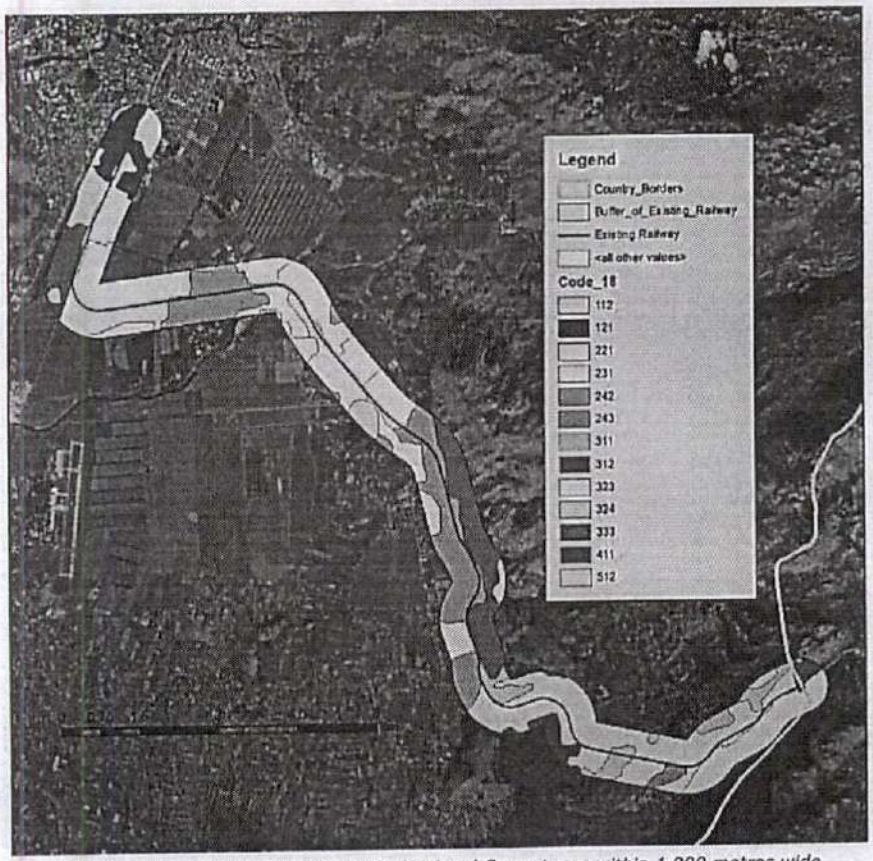


Figure 35 Map - Land cover according to Corine Land Cover types within 1,000 metres wide corridor along the railway line (study area)

Note: For codes of the Corine Land Cover types (see previous Table)

24 For more details see: https://www.plantaze.com/en/

6.6.4 Potential Impacts and Principal Mitigation

No significant impacts due to proposed modernisation of the railway on land use are expected.

In short term, during the construction phase, temporary land-take will likely be required for construction purposes. This would be typically mitigated by reinstatement of land used temporarily during the construction period.

In long term, these impacts are related to the proposed widening of the existing railway cross-section (i.e. the railway footprint) and new land-take to accommodate the newly proposed elements (e.g. lateral emergency walkway as well as the installation of catenary masts). Therefore, the operation of the railway upon its modernisation will have certain effects on land use which are comparable to the existing situation. Both public and privately owned land will likely be affected by the Project (land severance). Nevertheless, the impacts on the land use from the railway reconstruction will be of very low magnitude. Principal measures to mitigate the land take for the purposes of the Project will need to be incorporated into the further designing process by optimisation of the design where the key design principle would be to sought to achieve avoidance of take of agricultural or forest land as well as to minimise the involuntary economical resettlement of people, as far as practicable.

6.7 Biodiversity and Natural Heritage

6.7.1 Introduction

Biodiversity of the area is presented through its primary components: diversity of habitats and diversity of species of flora and fauna. The biodiversity components are presented on the basis of literature review as well as field work and mapping of habitats. Primary objective of the conducted field work was to identify the habitats present in the study area and to assess their importance based on international criteria (primarily EU Habitats Directive and national guidance documents).

Besides assessment of the habitats, one of the primary targets was to present already identified natural heritage in the area. Both nationally protected areas and internationally designated areas were analyzed and mapped.

The Project has the potential to affect the biodiversity (habitats and species of flora, fauna and fungia) and natural heritage sites. Special attention will need to be paid to the designated areas, important species and habitats with global, European or national importance (according to the international documents and Montenegrin legislation). The following text summarizes the study area, identified baseline as well as potential impacts and principal mitigation concerning biodiversity.

6.7.2 Study Area

The study area in the initial assessment stage was focused on terrestrial vegetation and habitats in 1,000 metres wide corridor of the railway line (500 metres on both sides from the longitudinal axis of the line), and was based on the desk-based information, especially concerning the review of important EU habitats and data for the legally protected areas and internationally recognised areas.

The same study area will be used during preparation and implementation of biodiversity surveys planned within the project.

6.7.3 Baseline Conditions

Vegetation and Habitats

The natural vegetation and habitats in the study area are represented by Mediterranean and submediterranean communities. One section of the Project crosses in immediate proximity to the Skadar Lake, which is natural designated area with multiple designation categories

The information on habitats for the purposes of the Project was extracted from documentation on the two affected important plant areas (IPA): 1) Skadar Lake and 2) Cijevna Canyon and Hum Orahovski, crossed by the existing railway.

The aquatic communities of Skadar Lake are submerged (*Najadetum marinae, Potameto-Najadetum, Potametum perfoliati, Potametum lucentis*), flotant (*Myriophyllo–Nupharetum lutei, Nymphoidetum peltatea, Potametum natantis, Nymphaeetum albo–luteae, Trapetum natantis*) or emersed (*Eleocharі – Hippuridetum, Sparagino–Glycerietum fluitantis, Scirpo–Phragmitetum, Menthetum, Ludwigietum*).

Natural terrestrial communities are represented by forests, shrublands and dry grasslands. The forest vegetation belongs to the communities with white oak (*Quercus pubescens*) and Oriental hornbeam (*Carpinus orientalis*) and the dominant forest association around Skadar Lake is *Rusco-Carpinetum orientalis*. Forest communities in the area are represented with different degradation stages, one of them being Carpinetum orientalis punicosum. The community of the Macedonian oak (*Quercetum trojanae montenegrinum*) is reported for the surroundings of Tuzi.

Areas with removed forest vegetation are occupied by different dry grassland communities, the most common being *Bromo-Chrysopogonetum grylli* as well some others (*Stipo-Salvietum officinalis, Asphodelo-Chrysopogonetum grylli*, etc.)[25].

IPA Cijevna Canyon and Hum Orahovski was designated due to the presence of 14 plant species (Criterion A[26]), mycological diversity in coniferous forests (Criterion B) and 10 habitats (Criterion C)[27]. The vegetation in the study area consists of *Orno-Quercetum ilicis*, several associations of *Carpinion orientalis* and *Quercetum trojanae*.

The review of important communities according to the EU Habitats Directive showed possible presence of the habitats presented in the Table below.

---

[25] PPPN nacionalni park skadarsko jezero (2018). Prostorni plan posebne namjene Nacionalni park Skadarsko Jezero (nacrt). Knjiga 4 – priroda Skadarskog Jezera - Integralna verzija. Ministrstvo održivog razvoja i turizma, 76 p.
[26] The identification of IPAs is based on 3 basic criteria: Criterion A: threatened species (AI - globally threatened species, AII - regionally threatened species, AIII - highly restricted endemic species and AIv - range restricted endemic); Criterion B: exceptional botanical richness; Criterion C: threatened habitats.(CI - globally threatened or restricted habitat/ vegetation type and CII - regionally threatened or restricted habitat/ vegetation type)
[27] Petrović, D.(ed.) Important Plant Areas in Montenegro, IPA Programme. 79 pp.

Table 24 Overview and distribution of important habitats within 1,000 m wide corridor of the railway line (study area)

Important habitat according to EU Habitats Directive	Distribution in the railway buffer
9250 Quercus trojana woods	Tuzi (Petrović et al. 2019)
62A0 East sub-Mediterranean dry grasslands (Scorzoneretalia villosae)	Ćemovsko polje, kanjon Cijevne (Petrović et al. 2019), probably Bratilja
3130 Oligotrophic to mesotrophic standing waters with vegetation of the Littorelletea uniflorae and/or of the Isoëto-Nanojuncetea	Surrounding of Skadar lake
3140 Hard oligo-mesotrophic waters with benthic vegetation of Chara spp.	Skadar lake (Petrović et al. 2019)
3150 Natural eutrophic lakes with Magnopotamion and Hydrocharition type vegetation	Skadar lake (Petrović et al. 2019)
8210 Calcareous rocky slopes with chasmophytic vegetation	Individual limestone rocks
8310 Caves not open to the public	Cave Krevenica near Vuksan Lekići

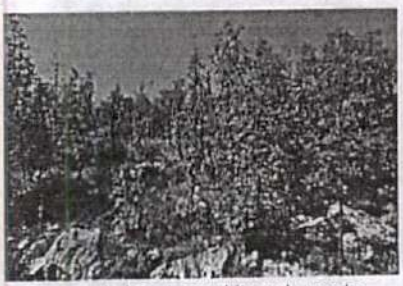
A preliminary Habitat Map was prepared during the ESIA scoping phase (see Annex 4 - Preliminary Habitat Map). This map will be further finalized during the upcoming impact assessment process. At the moment, the used nomenclature is only descriptive but it will be converted to EUNIS classification system[28] and corresponding habitats according to the EU Habitats Directive. This will also enable the assessment of Critical Habitats according to the mapping of habitats that was performed by the analysis of satellite imagery as well as ground truth data obtained during the field work (January 2021). The smallest mapped habitats cover an area of approximately 100 m^2. In comparison, Corine Land Cover has minimum mapping unit (MMU) for status layers of 25 hectares and minimum width of linear elements of 100 metres.

Table 25 Overview of identified habitats and their surface within 1,000 m wide corridor of the railway line (study area)

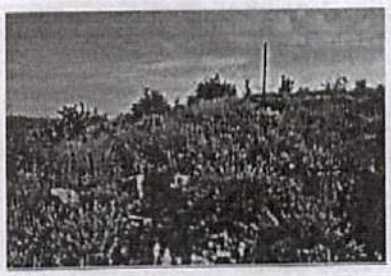
Habitat types	area (HA)	Percentage (%)
Broad-leaved forest	398.54	15.90
Coniferous forest	43.44	1.73
Swamp woodland	18.83	0.75
Shrubland	0.69	0.03
Transitional woodland-shrub	189.44	7.56
Natural grassland	0.31	0.01
Grassland	309.05	12.33
Meadows	13.34	0.53
Rocks	42.86	1.71
Rocks and sparsely vegetated areas	170.94	6.82
Wetland	13.72	0.55
River	4.62	0.18
Lake	101.81	4.06

[28] European nature information system (*https://eunis.eea.europa.eu/habitats-code-browser.jsp?expand=#level_538*) - a comprehensive pan-European system for habitat identification

Habitat types	area (HA)	Percentage (%)
Flotant vegetation in Skadar lake	38.97	1.55
Vineyards	326.45	13.02
Agricultural land	415.52	16.57
Mines, quarries, Industrial zones and dump sites	183.43	7.32
Cemetery	3.29	0.13
Railroad	27.23	1.09
Road	31.11	1.24
Rural area	52.32	2.09
Urban area	113.36	4.52
Urban Forest	8.08	0.32
Grand Total	2507.35	100.00



Degraded Eastern white oak woods



Calcareous grasslands - 62A0 East sub-Mediterranean dry grasslands (*Scorzoneretalia villosae*)

Figure 36 Important habitats within 1,000 m wide corridor along the railway line (study area)

Flora

The area of Skadar Lake is rich in species and it is known to be inhabited by 725 species of vascular flora. Aquatic and wetland species are presented by considerable number (164). There are some endemic chasmophytic species such as *Ramonda serbica, Cymbalaria ebelii* and *Minuartia mesogitana subsp. velenovskyi*. Other Balkan endemics are: *Allium guttatum* subsp. *dalmaticum, Asperulla scutellaris, Chaerophyllum coloratum, Crocus dalmaticus, Dianthus ciliatus* subsp. *dalmaticus, Edraianthus tenuifolius, Fritilaria messanensis* subsp. *gracilis, Genista sericea, Micromeria parviflora, Moltkia petraea, Onosma stellulata, Petteria ramentacea, Quercus robur* subsp. *sutariensis, Stachys mentifolia, Stachys menthifolia, Tanacetum cinerarifolium, Teucrium arduinii, Trifolium dalmaticum*. None of these species is protected by national legislation.

On the other hand, some of the species are protected by national legislation or international conventions. The following list presents the species protected by national legislation: *Anacamptis pyramidalis, Caldesia parnassifolia, Cephalanthera longifolia, Cymbalaria ebelii, Epipactis helleborine, Epipactis microphylla, Galanthus nivalis, Gladioulus palustris, Gymnadenia conopsea, Hermodactylus tuberosus, Himantoglossum caprinum, Limodorum abortivum, Marsilea quadrifolia, Minuartia mesogitana subsp. velenovskyi, Najas flexilis, Ophrys scolopax subsp. cornuta, Orchis coriophora, Orchis laxiflora, Orchis morio, Orchis pauciflora, Orchis quadripunctata, Orchis simian, Orchis tridentata, Platanthera bifolia, Platanthera chlorantha, Quercus*

robur subsp. scutariensis. Some of them are included in the list of Bern Convention (Caldesia parnassifolia, Marsilea quadrifolia, *Najas flexilis*) or EU Habitats Directive (*Caldesia parnassifolia, Galanthus nivalis, Gladioulus palustris, Marsilea quadrifolia*).

Among the important species (Criterion A) of IPA Cijevna canyon and Hum Orahovski are the ones of lower altitudes: *Cymbalaria ebelii, Himantoglossum caprinum, Ramonda serbica, Tulipa grisebachiana, Minuartia velenovskyi*, etc.

Fauna

Fauna of the wider area inhabits both aquatic and other wetlands habitats as well as terrestrial habitats (forests, shrublands, dry grasslands, agricultural, rural and urban habitats).

The fauna of Skadar Lake (aquatic and wetland habitats) is well studied and shows high biodiversity with many endemic species and species of national and international importance as presented in the Table below.

Table 26 Overview of faunistic diversity and important species of Skadar Lake and its surrounding

Species	Number of species	Endemics	EU Habitats/ Birds Directive or other	Reference
Fishes	50 (37 native and 13 allochtonous)	7 species (18%):	7 species	SPSP Skadar Lake NP, 2018[29]
Amphibians	15	4-5 subendemics	9 species	SPSP Skadar Lake NP, 2018 and other sources [30,31]
Reptiles	22 (36 in the whole Skadar lake watershed)	7 endemics and subendemics in the lake area .	*15* species in the lake area	
Birds	260-270 (breeding – 140, wintering – 46, resident -70)	/	~150	SPSP Skadar Lake NP, 2018 Vizi, 2018[32]
Mammals	31	/		SPSP Skadar Lake NP, 2018
Freshwater molluscs	53 (Bivalvia – 10; Gastropoda – 43)	15 endemics	CR-5; EN-9; VU-1; NT-3	Pešić and Glöer 2018[33]
Aquatic subterranean fauna	90 stygobionts Crustacea - 54, Gastropoda – 22, Acari - 12 species	At least 10 species Crustaceans		Pešić and Glöer 2018
Land invertebrates	n/a	n/a	7 species and additionally 5 potential species	SPSP Skadar Lake NP, 2018

[29] PPPN Nacionalni Park Skadarsko Jezero (2018). Prostorni plan posebne namjene Nacionalni park Skadarsko Jezero (NACRT PLANA). Knjiga 4 – priroda Skadarskog Jezera - Integralna verzija -. Ministrstvo održivog razvoja i turizma, 76 p.
[30] Polović, L., Ljubisavljević, K. (2010). Herpetofaunal richness of the Skadar Lake region, Montenegro: a review and update. Scripta Scientiarum Naturalium 1: 113–121.
[31] Crnobrnja-Isailović, J., Polović, L., Ljubisavljević, K., Čađenović, N., Čubrić, T., Haxhiu, I. (2018). Diversity and Conservation Status of Batrachofauna and Herpetofauna in the Lake Skadar Region. In: Pešić, V., Karaman, G., & Kostianoy, A. G. (eds.). The Skadar/Shkodra Lake Environment pp. 383–414. Springer International Publishing, Cham
[32] Vizi, O. (2018). Ornithological Features of Skadar Lake. In: Pešić, V., Karaman, G., & Kostianoy, A. G. (eds.). The Skadar/Shkodra Lake Environment pp. 415–445. Springer International Publishing, Cham.
[33] Pešić, V., Glöer, P. (2018). The Diversity and Conservation Status of the Molluscs of Lake Skadar/Shkodra. In: Pešić, V., Karaman, G., & Kostianoy, A. G. (eds.). The Skadar/Shkodra Lake Environment pp. 295–310. Springer International Publishing, Cham

In EMERALD standard data form with inventory of protected species[34], for ME0000003 site Skadar Lake, there are 5 Species listed in Resolution 6, including *Bombina variegata*, *Elaphe quatuorlineata*, *Elaphe situla*, *Triturus carnifex* and *Vipera ursinii*.

The bird fauna of Ćemovsko Polje and Cijevna canyon are also well documented[35]. The bird fauna of Ćemovsko polje is represented by *Perdix perdix*, *Galerida cristata*, *Anthus campestris*, *Merops apiaster*, *Burchinus oedicnemus*. Some species are present during the wintering period: *Pyrrhocorax graculus, Gyps fulvus*, etc.

Cijevna canyon was the only nesting site for Egyptian vulture, *Neophron percnopterus in Montenegro*. During the summer period it is used as a nesting site by *Circaetus gallicus*, *Accipiter brevipes*, *Alectoris graeca*, *Otus scops*, *Caprimulgus europaeus*, *Upupa epops*, *Galerida cristata*, *Oenante hispanica*, *Sitta neumayer*, etc.

Critical Habitats assessment

Critical Habitats assessment is part of the EIB's Standard 4 – Biodiversity and Ecosystems[36] which is considered to be "the most sensitive of the high-value biodiversity features". There are six broad criteria that should be used to establish the potential presence of critical habitats. Other criteria may also be used if a justification can be given, based on strong evidence or specialist opinion. An area will be considered critical if it supports any of the following, and is needed to sustain it in a viable state[37]:

- Criterion 1. A highly threatened or unique ecosystem;
- Criterion 2. A population of a critically endangered, endangered or vulnerable species, as defined by the IUCN Red List of threatened species and in relevant national legislation;
- Criterion 3. Part of the population, range or distribution of an endemic or restricted-range species, or highly distinctive assemblages of species;
- Criterion 4. Habitat required for the survival of migratory species and/or congregatory species;
- Criterion 5. Biodiversity and/or ecosystems with significant social, economic, or cultural importance to local communities and indigenous groups;
- Criterion 6. Habitat of key scientific value and/or associated with key evolutionary processes.

In previous Tables the important habitats according to the EU Habitats Directive are presented However, none of the identified habitats meets requirements of Criterion 1 i.e. none of the habitats are considered as priority (*) or have important global coverage.

The assessment of fauna showed presence of both aquatic and terrestrial species which are considered to be threatened according to the IUCN Red List of threatened species and/or are listed in Annexes II and IV of the EU Habitats Directive. Such

[34] https://natura2000.eea.europa.eu/Emerald/SDF.aspx?site=ME0000003#3
[35] http://www.birdwatchingmn.org/podrucja-za-ptice/iba-crne-gore
[36] Environmental and Social Sustainability Framework. Standard 4 – Biodiversity and Ecosystems. 2021. https://consult.eib.org/consultation/essf-2021-en/user_uploads/standard_4.pdf
[37] Guidance Note for Standard 3 on Biodiversity and Ecosystems. EIB Environmental and Social Standards. 2018.
https://www.eib.org/attachments/strategies/guidance_note_for_standard_3_on_bioversity_and_ecosystems_en.pdf

species meet Criterion 2, especially sub-criterion d - A population of species listed in Annex II and IV of the Habitats Directive.

Skadar Lake is well known for the presence of endemic species which fulfil Criterion 3: Population range or distribution of endemic or restricted-range species, or highly distinctive assemblages of species.

Skadar Lake should be analyzed under Criterion 4, as it attracts birds, flying long migratory routes, but also provides good nesting and colonisation conditions. The avifauna shows a large number of species: some 271 belonging to 18 taxonomic orders. 90% of the bird species are regionally and intercontinentally mobile, linking the region to neighbouring countries, Asia and Africa. 73 species of migratory nesting birds inhabit the lake in spring and summer, leaving in autumn. About 18 species fly over the area of the lake during autumn and spring, and 45 species are regular winter guests. 12 species spend summers on the lake, while their populations nest in the north. In addition, there are some 90 species that visit the lake irregularly, including those that fly over or visit the lake during the winter or summer season.

As for Criterion 5 and 6, Skadar Lake is not a habitat with significant social, economic, or cultural importance to local communities and indigenous groups, nor is it a habitat of key scientific value and/or associated with key evolutionary processes.

Natural Heritage

Nationally Protected Areas

The existing railway corridor crosses one nationally protected area - National Park Skadar Lake (corresponding to IUCN's Category II). It is proclaimed in 1983 according to the relevant Montenegrin legislation[38]. The crossing section between the railway corridor and this protected area is approx. 7.6 km long section along its north-eastern peripheral (boundary) zone, in vicinity to the border with Albania (Figure below).

It can be noted that the existing railway line crosses either site's II zone of protection (3.34+2.27=5.61 km) or site's buffer zone (1.18+0.72=2.00 km). The existing railway line completely avoids the most important zones of the NP Skadar Lake i.e. I zone of protection or strict reserves within the site and therefore, no impact from the foreseen Project activities to the key valued biodiversity zones within the National Park will occur. The alignment of the railway line is presented in Annex 2 – Environmental Sensitivities)

[38] Law on Nature Protection (OG of MNE no. 54/2016) and Law on National Parks (OG of MNE no. 28/2014 & 39/16)

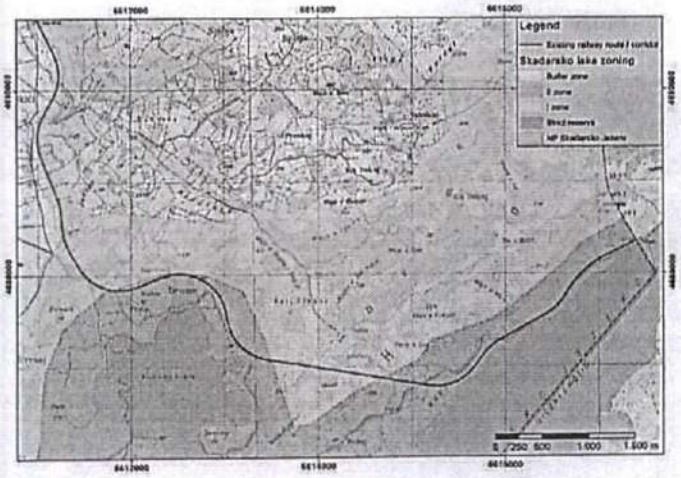


Figure 37 Intersection of the railway line with the National Park Skadar Lake

Skadar Lake is considered as a refuge for many species that survived the glaciation, and the Lake and its vicinity are rich in relict and endemic plant and animal species. This is a relatively shallow lake, with dominant reed, but also includes flooded meadows and flooded forests. South banks and numerous islets are steep, rocky, with scarce sub-Mediterranean pseudo-macquis. The community of algae of the lake is very diverse which characterizes only tropical and sub-tropical freshwater systems. Skadar Lake is considered to be among four most important bird areas (IBA) in Montenegro[39]. The capacity of Skadar Lake is more than 350,000 wintering waterbirds, with 220,000 counted in the 90's in Montenegro only.

Internationally Recognised Areas

In addition to its national designated status, the Skadar Lake is also an international recognised area as:

- RAMSAR site – wetland of international importance, 1995 (unique in MNE) – UN Convention on Wetlands of International Importance especially as Waterfowl Habitat, Ramsar (Iran).
- Nominated as Emerald site, 2011 (prospective EU NATURA 2000 site). Emerald ecological network is developed in the framework of the Bern Convention[40] and is formally regarded as preparation for application of the EU Habitats Directive. The Emerald Network is based on the same principles as EU's NATURA 2000 ecological network and represents its extension to non-EU countries. Crossing section of the corridor of the existing railway line with the Emerald site Skadar Lake is depicted on the Figure below. The railway line either avoids the Emerald site or intersects only marginally in total length of 1.77 km (0.09+0.49++0.95+0.4=1.77 km).
- Important Bird Area, 1989 (IBA) and Important Plant Area, 2009 (IPA).

[39] MSDT (2015). National biodiversity strategy with the action plan for the period 2016 - 2020. Ministry of sustainable development and tourism, 82 p

[40] Convention on the Conservation of European Wildlife and Natural Habitats – Bern Convention

In addition, Skadar Lake is a transboundary protected area between Montenegro and Albania[41].

Figure 38 Intersection of the railway line with Emerald site Skadar Lake

The corridor of the existing railway line also crosses or passing nearby a number of other internationally recognised sites in the Project region (Emerald sites, IPAs and IBAs). Brief description of these crossings is given below.

Emerald sites

The overview map of the corridor of the existing railway line relative to the Emerald sites in the Project region is presented below.

The existing railway line marginally crosses one Emerald site in the Project region: Emerald site Skadar Lake (ME0000003); and passes nearby two other Emerald sites: Cijevna Canyon with Hum Orahovski; and Ćemovsko polje (See Annex 2 – Environmental sensitivities). The overview map is presented in the Figure below.

[41] On Albanian side, Skadar Lake is a protected area as Nature Reserve Skadar Lake.

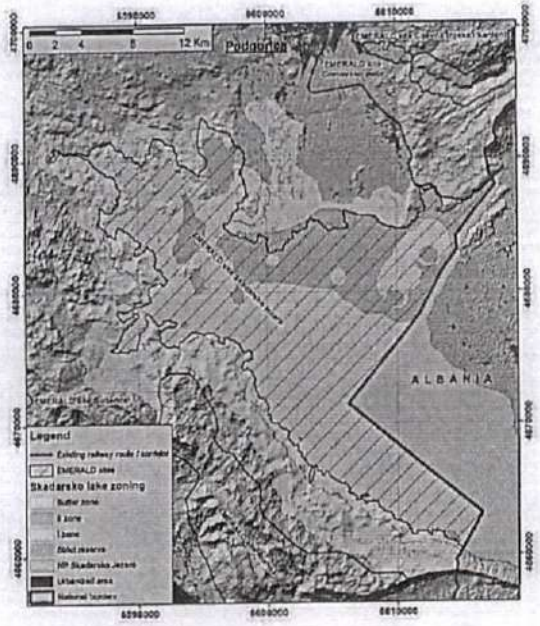


Figure 39 Railway line relative to Emerald sites

Other Sensitive Areas (Important Plant Areas and Important Bird Areas)

The overview maps of the corridor of the existing railway line relative to the other internationally recognised areas (IPA's IBAs, and SPAs) in the Project region are presented below.

In addition to the marginally crossing of the existing railway line of the IPA and IBA Skadar Lake, it also crosses the following internationally recognised sites:

- Important Plant Area Cijevna Canyon and Hum Orahovski (Figure below), in 0.28 km long crossing section (See Annex 2 – Environmental sensitivities).

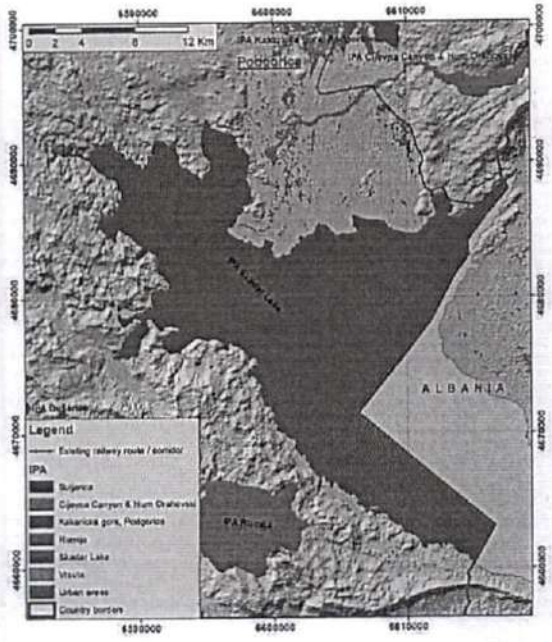


Figure 40 Railway line relative to important plant areas

› Important Bird Areas (Figure below)

The existing railway line crosses IBA Cemovsko Polje in total length of 0.33 km and IBA Cijevna canyon in total length of 0.69 km.

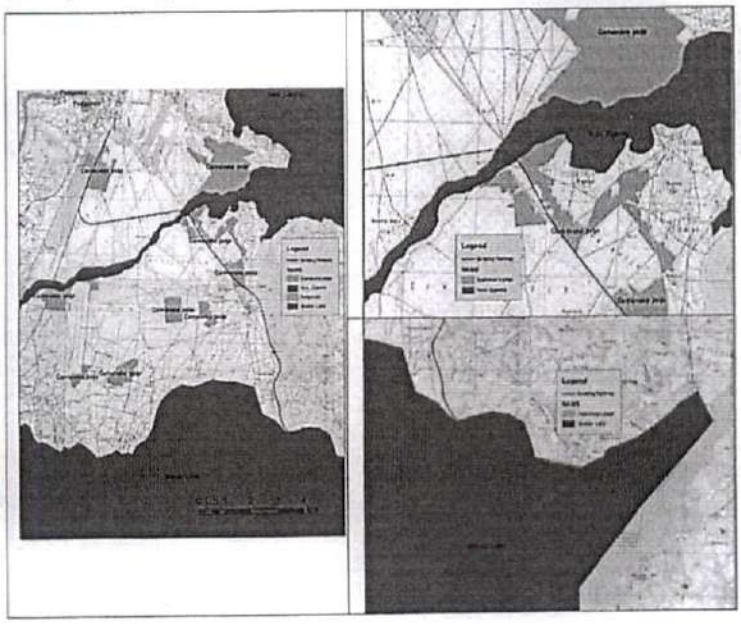


Figure 41 Railway line relative to important bird areas

Note: Overview on the left and detailed view on the right

6.7.4 Planned Biodiversity Surveys

The key activities to be carried out under the biodiversity surveys are the following:

- Review the project impact area based on the biodiversity profile of the project sites, species and habitats of conservation concerns and possible impacts from the project activities; if the project impact area includes a transboundary area, the surveys should cover the entire area that could be impacted, i.e. will not be limited to the territory of Montenegro only.
- Biodiversity survey needs to cover four seasons, including breeding and migratory seasons;
- Field work should be commensurate with the level of baseline understanding required;
- Make an inventory of the flora and fauna diversity within the project impact area to form the baseline information;
- Habitat mapping, including identification of legally protected and internationally recognised areas, critical habitats, ecological networks and ecological corridors, or any other national or international recognised data sources;
- Provision of input data and information to the project team relevant for planned stakeholder engagement activities and cross border cooperation with nature conservation authorities in Albania.

6.7.5 Potential Impacts and Principal Mitigation

The impacts on biodiversity and the designated areas crossed by the railway during the construction and operation of the Project are various and specific depending on the biodiversity features (ecosystems, habitats, species, Critical Habitats), their coverage and sensitivity.

Construction phase

The principal potential impacts on the biodiversity receptors during the construction phase of the Project include:

- Loss of terrestrial and aquatic habitats - direct destruction and alteration of habitats – due to land take requirements especially during the construction of access roads and auxiliary elements). Since the new land-take is expected to be of low magnitude, this impact is likely to be of minor significance.
- Loss of terrestrial flora and fauna. Decrease in plant and animal populations due to forest cut, collisions and destruction of nests, burrows, and other animal sheltering/breeding structures.
- Disturbance of species (breeding, foraging, roosting) due to construction works;
- Risk of forest fires leading to depletion of biodiversity resources;
- Adverse changes in aquatic habitats due to pollution/construction works (e.g. material storage, spoil, waste disposal, sewage, sedimentation and pollution of streams; increased turbidity);

These potential impacts would be mitigated by undertaking of construction works in accordance with a CESMP which will include, at minimum:

- Design and implement adequate plan to monitor the implementation of measures for biodiversity protection in cooperation with Skadar Lake National Park administration.
- Measures of good construction practice (e.g. avoid temporal occupation and destruction of adjacent land; sound storage of hazardous substances (oil, fuel, etc.), provide fire-protection measures and equipment/vehicle, etc.).
- Temporary land-take (including access roads, worker camps, etc.) should avoid sensitive biodiversity areas.
- Implement actions to protect plants and animals from collection/killings by workers.
- Actions to ensure contaminated materials are identified, isolated and removed to avoid any impacts on the biodiversity.
- Excavated soils and fine sediments should be adequately fenced to stop disposal in Skadar lake and the riverbeds through erosion and storm water runoff.
- Leaks and spills from construction equipment and vehicles should be prevented by daily inspecting and repairing those which operated near Project area waters and by cleaning equipment prior to operation.
- Develop and implement a Waste Management Plan

Operational phase

General potential impacts on the biodiversity during the operation phase of the Project include:

- Fragmentation of terrestrial habitats, affecting associated plants and movement of animal species which is already caused by the existing railway.
- Collision with animals due to railway traffic.
- Electrocution of birds with electrified components of the railway;
- Pollution due to solid waste disposal, contaminated railway runoff, accidental oil or fuel spills as well as due to use of chemicals for railway maintenance;
- Risk of forest fires.

To eliminate or mitigate these potential operational risks:

- Primary mitigation would need to be incorporated into the detailed Project design (e.g. create wildlife crossings – culverts and underpasses, to minimize the fragmentation effect enabling wild animals to cross the railway;
- Pollution treatment measures in the railway drainage system where a risk of pollution has been identified);
- Suitable design of insulators in order to avoid electrocution of birds.
- Establish sound waste management, including removal of food and carcasses from the railway, in order to minimize attractiveness to animals and reduce collision risk.
- Monitoring of railway kills and the effectiveness of the animal movement elements (culverts, underpasses, etc.) as well as snow maintenance practices and undertake corrective measures.

After mitigation measures have been implemented, it is common for some residual impacts to remain. These residual impacts are the environmental effects that cannot be completely avoided or eliminated, despite the best efforts. In some cases,

monitoring and management may be required to manage these impacts over time, ensuring that they remain within acceptable levels.

6.8 Landscape

6.8.1 Introduction

Landscape analyses should provide an understanding of natural and cultural conditions, and what function and significance the landscape has for people, animals and plants. The analysis should include various aspects such as relief, geology, land use and vegetation, physical structure and scale, cultural-historical and ecological contexts, human settlements and industry as well as the visual experience and character. All of these aspects are used for identification and delineation of landscapes. The baseline for landscapes in the Project area was established on the basis of the national classification system of landscapes42 as well as field observations.

6.8.2 Study Area

The study area in this assessment stage was focused on landscapes and their structural and functional properties in 1,000 metres wide corridor of the railway line (500 metres on both sides from the longitudinal axis of the line). The visual aspects of the landscape are analysed in wider spatial corridor depending on their distribution and coverage.

6.8.3 Baseline Conditions

Landscapes in the Project area are part of the general landscapes of the wider area – the Skadar Lake basin. According to national classification system the following three local landscape types are identified in the Project area:

- Hilly landscapes of Druma and Hoti
- Flatland landscape of Podgorica
- Skadar Lake

[42] State Institute for Urban Planning and Design (2015), Landscape Mapping and Typology in Montenegro (basic landscape types and areas), Podgorica; (In Montenegrin: Republički zavod za urbanizam i projektovanje (2015), Mapiranje i tipologija predjela Crne Gore (izdvojeni osnovni tipovi predjela i područja karaktera predjela), Podgorica)

Figure 42 Hilly landscapes of Druma and Hoti

Figure 43 Flatland landscape of Podgorica

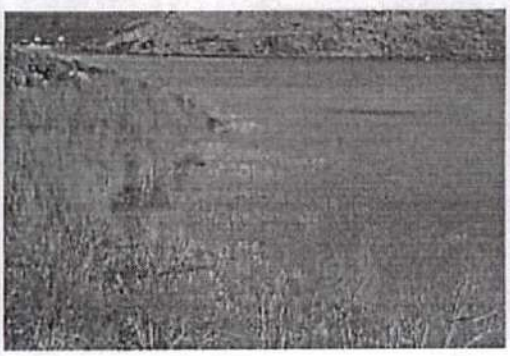


Figure 44 Typical Skadar lake landscape

The character of the landscape changes along the railway line depending on the intensity of human activities, topography and vegetation. The stretch from the border with Albania to Tuzi is natural to semi-natural with a dominant matrix of thermophilous forests on limestone and scattered patches of human settlements and small agricultural land (meadows, orchards. This part of the railway is close the impressive landscape of Skadar Lake. The flatlands area between Tuzi and Podgorica has matrix of agricultural land with large patches of human settlements, while semi-natural habitats represent scattered patches. The parts of Podgorica along railway line are highly urbanized and industrialized.

6.8.4 Scope out rationale

Landscape aspects are usually very important for the linear infrastructure projects. The changes in the landscapes can be observed from the following aspects: visual and functional properties of the landscape.

The modernisation of the railway from Podgorica to the Montenegrin-Albanian border will have no measurable impacts on the visual aspects of the landscapes, both in construction and operational phases. The existing road and railway network will be used during the reconstruction (construction phase) and no temporary impacts on the landscape are expected.

The existing railway line has become part of the landscape in the area. The same railway alignment will be used during the reconstruction of the existing line and no additional visual changes in the landscape in the study area as a whole are going to occur. The widening of the railway's cross-section and interventions on the main structures (bridges and tunnels) will have negligible additional impacts on the visual aspects of the landscapes in long term, as well.

Therefore, since impacts on the landscape in the study area from the proposed modernisation of the rail route from Podgorica to Montenegrin-Albanian border is expected to be of negligible significance, these aspects are scoped out from the present ESIA.

6.9 Waste

6.9.1 Introduction

The proposed Project is expected to generate various waste streams and quantities, but dominantly during the construction and less in the operational phase. This section provides an overview of the current baseline and potential waste generation impacts of the proposed Project and describes the principal mitigation approach.

The Project related risks and impacts associated with the generation of waste and emissions will be assessed in the context of Project location and local environmental conditions. Appropriate mitigation measures will be adopted based on the principal waste hierarchy.

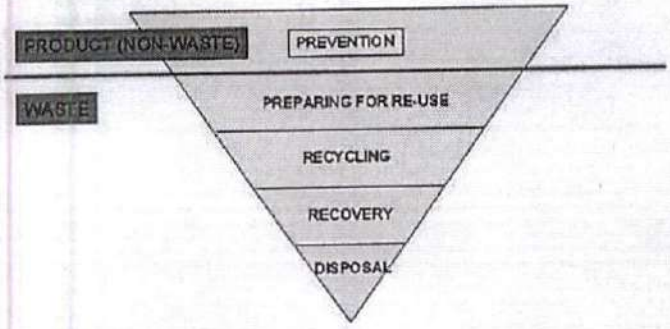


Figure 45 Waste hierarchy

6.9.2 Study Area

For the purposes of the assessment, the study area will comprise the Project footprint - the subject railway track - and the area of the working camps and waste storage/handling locations.

6.9.3 Baseline Conditions

Baseline information consists of the waste generation rates and locations of waste treatment facilities in the wider Project region. Information on baseline waste conditions has been collected from sources including planning documents43 and data on waste facility capacity published by the Competent Authority (Ministry of Ecology, Sustainable Development and Northern Region Development)[44].

- Communal waste

According to the last official announcement of Monstat[45] on municipal waste, during 2021, 325.707,5 tons of municipal waste had been generated in Montenegro, which is 7.1% more compared to the previous year. According to the estimated number of inhabitants, the average waste generation rate per inhabitant in Montenegro is 526,0 kg per year, i.e. 1.4 kg daily.

About 87.6% of the population in the country has an access to a communal waste collection service.

- Construction and demolition waste

There is no official data on generation of construction and demolition waste (C&DW) in Montenegro. According to the available data, it is estimated that about 90,503 t of C&DW is produced annually on state level.

This waste type is not treated in an adequate way in Montenegro. In general, it is disposed of on unregulated locations which impose environmental concerns and negative visual impacts. According to the available data, to date, no municipality has established separate C&DW management system. The common practice includes examples for disposing this waste on the existing non-sanitary and unregulated municipal waste landfills.

When it comes to construction and demolition waste during the reconstruction of the railway track, it should be noted that impregnated wooden ties are hazardous waste and must be treated in a special manner.

During the demolition of the existing station building at the Tuzi station, it is expected that materials based on asbestos may appear, which also fall under the category of hazardous waste.

- Industrial waste

According to the latest official data from Monstat, in 2023, Montenegro generated a total of 722.966,8 t tons of industrial waste.

---

[43] Montenegro Waste Management Strategy until 2030 (2015), Ministry of Sustainable Development and Tourism of Montenegro
[44] State of the Environment Report, 2019, Environmental Protection Agency of Montenegro
[45] Statistical Office of Montenegro

Table 27 Generated waste per sector in 2023 (In tonnes)

Montenegro	Agriculture, forestry, and fishing	Manufacturing industry, mining, and other industries	Construction	Services activities	Households	Total
Non-hazardous waste	11 476,5	413 955,2	212 574,5	91 592,5	272 657,7	1 002 256,4
Hazardous waste	6,5	309 011,6	145,0	2 872,1	-0,8	312 036,0
Total	11 483,0	722 966,8	212 719,5	94 464,6	272 658,5	1 314 292,4

Table 28 Waste management in Montenegro 2023

Montenegro	Waste Processing	Waste management (incineration, disposal)	Exported from Montenegro	Total
Non-hazardous waste	1 097,4	337 246,0	11 751,5	350 094,9

› Waste management facilities in the Project region

The relevant waste infrastructure in the wider Project region includes [Ref. 19]:

› Regional landfill for non-hazardous waste in Podgorica (landfill site "Livade"). [Ref. 23];
› Waste recycling facility in Podgorica;
› End-of-life vehicle treatment site in Podgorica;
› Six recycling yards in Podgorica.

There is no hazardous waste management facility in Montenegro, hence this type of waste is transported out of the country in accordance with the Basel convention requirements. In 2023, nine hazardous waste transport waste permits had been issued by the Environmental Protection Agency for transport of 73 600 t hazardous waste.

6.9.4 Potential Impacts and Principal Mitigation

The construction phase includes implementation of a series of construction activities that would be a source of various types and quantities of construction and demolition waste. Waste is also expected in the operational phase, but in much less quantities.

The types of wastes that may be generated by various activities during the project lifecycle are summarized in the Table below.

Table 29 Key types of waste generation

PROJECT ACTIVITY	WASTE GENERATION
Site preparation / earthworks / tunnel reconstruction / site remediation	› Surplus excavated materials. › Stripped topsoil and subsoil. › Vegetation cut. › Contaminated soils (if any). › Tunnel widening.
Demolition	Waste arisings from the demolition of railway elements (e.g. sleepers) and reconstruction of railway structures (bridges, tunnels, culverts, etc.) and / or existing buildings at Tuzi railway station (parts to be renovated).
Construction	› Packaging from materials delivered to site. › Excess and broken/damaged construction materials. › Waste oils from construction vehicles.

PROJECT ACTIVITY	WASTE GENERATION
	› Waste additives and conditioning agents used for construction purposes. › Construction workforce wastes.
Operation and maintenance	Waste arisings during operation and maintenance (expected to be minimal).

Improper management of the generated waste can have an impact on air quality by being a source of fugitive dust, impact on soil or groundwater through leakage and contamination with hazardous substances, impact on biodiversity through obstruction of movement, visual impact and bad hygiene.

The potential impacts from the above activities would be mitigated by undertaking of construction works in accordance with a CESMP prepared and implemented by the selected construction Contractor which will include a Waste Management Plan for the construction phase, based on the following principles:

- avoid or minimise the generation of waste materials as far as practicable;
- waste arisings will be prevented and designed out where possible;
- opportunities to re-use material resources will be sought where practicable;
- where prevention and re-use are not feasible, waste arisings would be managed in line with the waste hierarchy;
- obtain chain of custody documentation to the final destination and use contractors that are licensed by the relevant competent authority when waste disposal is transferred offsite and/or managed by third parties.

Since waste generation is expected to be very small during operation of the project, these aspects are scoped out from the present ESIA.

6.10 Social Environment

6.10.1 Introduction

The proposed project has the potential to affect the living of the local population and communities where the railway passes, thus causing minor potential disruption of life during the construction phase. This section provides an overview of the current social baseline and potential impacts of the affected local communities and individuals and describes the principal approach to the mitigation measures.

6.10.2 Study Area

For the purposes of the assessment, the study area varies depending on the receptor or resource under consideration. In the wider context it includes communities along the existing railway line from Podgorica towards the border with Albania, with emphasis on communities where private assets (e.g. residential properties, facilities and businesses) or community facilities (e.g. schools, religious temples, cemeteries) may potentially be affected during the project implementation.

The study area within the railway physical footprint (defined for the purpose of this appraisal as 100 metres wide corridor) will be used to identify potential resettlement issues in regard to the private assets (residential or other properties, development land, agricultural land or other local businesses and facilities). These assets are

containing land required to accommodate the project elements during construction and/or operation.

The study area for community facilities is extended to 300 metres around the Project to include public community resources (schools, religious temples, cemeteries, etc.). Community facilities within the study area are considered as potentially directly affected due to the potential for noise and vibration and air quality effects arising from project activities to impact on the health of users of these facilities. In addition, changes to the accessibility of community facilities due to changes in traffic levels and potential diversions during and after construction are of relevance.

The study area is extended to 1,000 metres around the project to include settlements that may be potentially directly or indirectly affected by the project.

6.10.3 Baseline Conditions

The country has a population of 623,633 inhabitants according to the population census held in 2023 and a total area of 13,812 km2. Montenegro has central and local government consisting of 25 municipalities.

The Project passes through the territory of two local self-government units (LSG): City of Podgorica and Tuzi Municipality.

Podgorica is the capital and largest city of Montenegro, which covers the area of approximately 1,508 km2, or 10.7% of the territory of Montenegro. Data from the last census in 2023 indicate that Podgorica has 179,505 inhabitants, which represents approx. 29% of the Montenegrin population. The Capital is located in the northern part of the Zeta valley, in the central region of Montenegro, at the crossroads of several important roads leading from the sea to the mainland. It is located at an altitude of 44.5 meters. The city represents the administrative, political, economic, traffic, scientific and educational - cultural centre of Montenegro.

Tuzi is a small town and seat of Tuzi Municipality. It is located along a main road between the city of Podgorica and the Montenegrin/Albanian border crossing, just a few kilometres north of the Skadar Lake. Tuzi is the newest municipality in Montenegro, becoming an independent municipality since 1st September 2018. According to 2023 census, the town of Tuzi has a population of 4,857 while Tuzi Municipality has 12,979 residents.

The zone of influence of the Project in the administrative context is an area of approximately 1,636 km2 affecting two municipalities of Montenegro: Podgorica and Tuzi. Relevant data for these municipalities, obtained from the Statistical Office of Montenegro (MONSTAT) (2023) include:

- Demography
  - The total population residing within the affected municipalities is 192,484 inhabitants, according to the 2023 census, out of which 48.9% male and 51.1% female.
- Employment-Unemployment:
  - Regarding employment conditions, in 2022 unemployment reached approximately a proportion of 15% (251,200 employed and 43,200 unemployed persons).

In the following Table, detailed socio-economic data are presented, disaggregated for each of the affected municipalities.

Table 30 Socio-economic data for the affected municipalities

Socio-economic data	Podgorica	Tuzi
Population (2023)	179,505	12,979
Male	85,819	6,712
Female	93,686	6,267
Area (sq.km)	1,399	237
Population Density (inhabitants/sq.km)	128.3	54.8
Active population	75,357	2,733
Employed (number)	61,526	1,927
Unemployed (number)	13,831	726
Most represented nationality	54.5% Montenegrin	62.5% Albanian
2nd represented nationality	30.8% Serbian	15.1% Montenegrin
3rd represented nationality	2.6% Bosniaks	13.6% Bosniaks
Other nationalities incl. unspecified	12.1%	8.8%

Settlements in the study area as well as their relative distance to the Project are given in the Table below.

Table 31 Settlements – by LSG – within 2,000 m wide corridor along the railway line

LSG unit	Settlement	Population (2023)[46]	Relative distance to settlement [m]
Podgorica	Podgorica (urban part)	173.024	Crossing
Tuzi	Kuće Rakića	302	50
	Tuzi	5.735	50
	Donji Milješ	386	1000
	Vukšanlekići	267	150
2	5	179.714	-

The following figure illustrates the location of the settlements in close vicinity to the railway line as well as the identified locations of potentially affected features of social and cultural importance.

[46] Source: Census of Population, Households and Dwellings in Montenegro, 2023

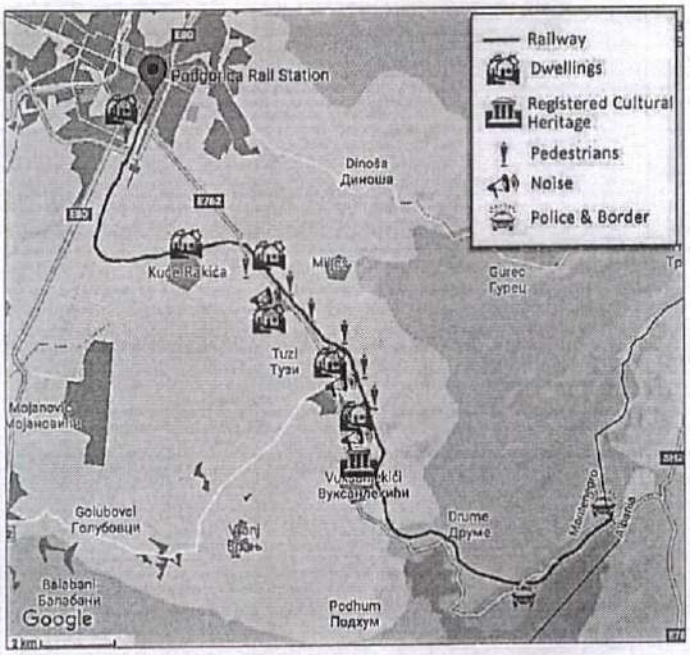


Figure 46 Map of settlements and social sensitivities in vicinity to the railway

Community facilities within a study area that extends to distance of 300 metres from the Project are considered as potentially directly affected due to the potential for noise and vibration and air quality effects, arising from Project activities mainly during construction, to impact on the health of users of these facilities.

Principal social facilities serving the local communities in the study area that contribute to the local context or may be affected by the proposed Project are presented in Table below.

Table 32 Social facilities within 600 m wide corridor along the railway line (study area)

LSG unit	Social Facilities / Settlement	Relative distance to site [m]
Podgorica	Fire Department of Podgorica	200
Tuzi	Catholic church in Vuksanlekići	200
	Catholic cemetery in Vuksanlekići	200
	Muslim Cemetery in Karabuško Polje	200
	Muslim Cemetery in Tuzi (Nizamska Džamija)	250
Total number of potentially affected social facilities (within study area):		5

Near the Podgorica Railway station there are several private companies whose main premises are located near the railway (up to 300 m from the railway line), among most famous are the agricultural company "Plantaže" who owns and operates the biggest agricultural area (vineyards and orchards), through which the railway line is passing.

There are several socially sensitive locations along the railway line, and these are:

- *Podgorica, new residential area*. Apartment buildings near the Railway line at a closest distance of at most 100 m from the railway line and pedestrians are frequently passing over the railway line;

- *Vineyard and Orchard of the agricultural company „Plantaže"*. The railway is passing through the utilized area of vineyards and orchards;
- Houses close to the railway line in Kuće Rakića. In the recent years new houses, that are very close to the railway line, have been built and some are at a closest distance of 20 m;
- *Pedestrians passing the railway line near Karabuško Polje.* Some pedestrians living in village Donji Milješ, travel by public transport means toward Podgorica on a daily basis, and they do cross the railway line in order to reach the main road going in parallel to the railway, and where buses are commuting;
- *Pedestrians passing the railway line in Tuzi*. Some houses in Tuzi are set in the very foot of the hill and these people when reaching Tuzi by feet, are passing over the railway line. Also, this refers to those Tuzi residents living next to the line, where some reaching their fields (sometimes with tractors) by passing over the railway line;
- *Flooding of area surrounding the railway*, after Tuzi Railway Station and just before Vuksanlekići settlement;
- *The graveyard in Vuksanlekići from the WWI*. There are Monument and graves from the past century and the land parcel is only 15-20m far from the railway line. On the monument there is an inscription that says: Martyrs for freedom – erected by grateful descendants to the patriots who died in the Austrian prisoner camp in Vuksanlekići during World War I.

Refer to Annex 3 - Social Sensitivities for images from these critical locations.

6.10.4 Potential Impacts and Principal Mitigation

In general, linear infrastructure (as it is the railway) planning decisions, construction and operation may have a number of potential direct and indirect social impacts and would typically include the following topics:

- Temporary or permanent severance of settlements, community facilities / services (e.g. educational institutions; healthcare or social services; cultural institutions and heritage; religious temples and cemeteries, and others). This impact is of higher significance for newly planned transport infrastructure.
- Temporary or permanent acquisition of private assets - residential properties / houses and associated facilities – involuntary (economic and physical) resettlement, as well as land-take (e.g. arable agricultural land).
- Livelihood aspects.
- Change of the way of life in the affected communities.
- Impact on community infrastructure, if any
- Impact to workers (labour standards).
- Impact on vulnerable groups.
- Health and safety and security of the people (including workers, suppliers, local communities).

As the proposed Project activities remain in the boundaries of the existing railway with low magnitude of new land-take due to widening of the railway cross-section, no physical resettlement is expected. Particular acquisition of private and/or public land may occur. Though, it is foreseen preparation and implementation of a resettlement

document such as **Land Acquisition and Resettlement Framework, and consequently Land Acquisition and Resettlement Plan (if such need occurs).**

Principal mitigation measures during the construction of the Project would include creation of a number of thematic instruments / documents (sub-plans) as part the Project's CESMP for overall social management, such are the following (at minimum):

- Health and safety management plans (Community Health and Safety Management Plan and Occupational Health and Safety Management Plan)
- Traffic Management Plan
- Emergency Preparedness and Response Plan
- Workers' Accommodation Management Plan

These documents would set out the mitigation requirements and would contain measures to ensure compliance of the Project's construction with the relevant national and international standards and legislation in the social domain.

In addition, Stakeholder Engagement Plan with public grievance mechanism to guide the stakeholder participation and engagement is prepared and will be continuously updated and implemented during the project life-cycle.

Operational phase of the Project includes maintenance activities. In that respect, RIoM will need to implement its own management procedures and actions as part of the company's Environmental and Social Management System (ESMS), at a minimum:

- Occupational Health and Safety
- Grievance Mechanism for Workers and Other Stakeholders
- Labour and Working Conditions
- Supply Chain Management.

6.11 Cultural Heritage

6.11.1 Introduction

The proposed Project does not have the potential to significantly affect protected cultural heritage located in the Project area. This section provides an overview of the current cultural heritage baseline and potential impacts on the protected cultural heritage and sets out why the assessment of these has been scoped out of the assessment.

6.11.2 Study Area

For the purposes of the assessment, the study area includes protected cultural heritage assets in an area of 250 meters around the Project, which may potentially and directly be affected during its implementation.

6.11.3 Baseline Conditions

The registered archaeological and cultural heritage sites located within the study area are presented in the Table below.

Table 33 Cultural heritage and archaeological sites within 500 m wide corridor of the railway line (study area)

LSG unit	Facility / Settlement	Relative distance to site [m]
Tuzi	World War I monument and cemetery in Vuksanlekići	15
	Necropolis within Catholic cemetery in Vuksanlekići (III category)	200
	Caf Kish in Vuksanlekići (III category)	300
	Camaj Kula in Vuksanlekići (III category)	150
Potentially affected cultural heritage facilities (within study area):		3

There are no registered archaeological and cultural heritage sites within the study area that belongs to the Municipality of Podgorica.

6.11.4 Potential Impacts and Principal Mitigation

The key potential impact during the construction of the Project is related to the risk of partial or total removal of unknown heritage assets (undiscovered archaeological sites).

As the proposed Project activities remain in the boundaries of the existing railway with low magnitude of new land-take and limited scope of earthworks due to widening of the railway cross-section, it is anticipated that probability of chance find during the construction works is of very low probability.

The potential impacts would be mitigated by establishment and implementation of the Chance Find Procedure, as typically required by the national relevant legislation and the good international practice. This procedure would be developed as part of the Project's CESMP prepared and implemented by the selected construction Contractor.

Therefore, since the impact to the cultural heritage sites is likely to be negligible during implementation of the Project, these aspects are scoped out of the present ESIA. However, the ESIA will provide outline of a typical chance find procedure as part of the Project's Preliminary ESMP, which will be constituent part of the ESIA package.

6.12 Cumulative Effects

Cumulative impacts are combined changes to the environment caused by two or more projects that are close to the same location or area, and which types of construction or operational impacts have similar nature and potential for interaction. Typically, the main cumulative impacts occur as inter-project effects - the effects of a series of other developments of similar type and scale in the vicinity of the proposed project which are proposed, under construction or have been consented, which when combined with the effects of the proposed project may have an incremental significant effect.

The most important cumulative project is the simultaneous modernization of Albanian part of the same railway line (from Albanian border to Vlore). The railway line between Podgorica and the Albanian border represents a section (25 km) of the Route 2 SEETO Comprehensive Network (144 km) from Podgorica (Montenegro) to Vlore (Albania).

In principle, for this Project for modernisation of the railway from Podgorica to Montenegrin/Albanian border, cumulative effects may most likely occur during its construction in a form of typical impacts associated with construction works (air pollution, nuisance due to construction noise, traffic disturbance, etc.).

For the purposes of the ESIA, the assessment of cumulative effects arising from the Project in combination with other proposed railway infrastructure development project will primarily consist of these, as well as the impacts on biodiversity and social cumulative impacts during the operation of the railway.

The Albanian authorities are concurrently undergoing their regulatory Environmental Impact Assessment (EIA) process. There should be a cross-reference between the two procedures, ensuring comprehensive coverage of cumulative impacts (including both negative and positive effects). Proper disclosure should be made in the respective languages and portals, with an invitation for comments to the competent authorities and public. The mitigation and management measures should be symmetric across both procedures.

7 References

1. BirdLife International (2019). Important Bird Areas factsheet: Lake Skadar.
2. Vulnerability Study from Climate Change in Montenegro (2012). SEEFCCA
3. Crnobrnja-Isailović, J., Polović, L., Ljubisavljević, K., Čađenović, N., Čubrić, T., Haxhiu, I. (2018). Diversity and Conservation Status of Batrachofauna and Herpetofauna in the Lake Skadar Region. In: Pešić, V., Karaman, G., & Kostianoy, A. G. (eds.). *The Skadar/Shkodra Lake Environment* pp. 383–414. Springer International Publishing, Cham.
4. Directorate of Democratic Participation, Marc Roekaerts (EUREKO) (2018). *Updated list of officially nominated candidate Emerald sites (November 2018)*. Convention on the Conservation of European Wildlife and Natural Habitats, Strasbourg, 58 p.
5. EU Habitats Directive, C. of the E. (1992). Council directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora. *Official Journal of the European Communities. Series L* 206: 7–49.
6. Hadžiablahović, S. (2018). The Diversity of the Flora and Vegetation of Lake Skadar/Shkodra. In: Pešić, V., Karaman, G., & Kostianoy, A. G. (eds.). *The Skadar/Shkodra Lake Environment* pp. 203–238. Springer International Publishing, Cham.
7. Javno preduzeće za nacionalne parkove Crne Gore (2016). *Plan upravljanja za Nacionalni park Skadarsko Jezero, 2016–2020*. Podgorica, 87 p.
8. Montenegroinženjering (2008). *Detailed Spatial Plan of the Highway Bar - Boljare*. Ministry of Economic Development, 167 p.
9. MSDT (2015). *National biodiversity strategy with the action plan for the period 2016 - 2020*. Ministry of sustainable development and tourism, 82 p.
10. Pešić, V., Glöer, P. (2018). The Diversity and Conservation Status of the Molluscs of Lake Skadar/Shkodra. In: Pešić, V., Karaman, G., & Kostianoy, A. G. (eds.). *The Skadar/Shkodra Lake Environment* pp. 295–310. Springer International Publishing, Cham.
11. Pešić, V., Karaman, G. S., Sket, B. (2018). The Diversity and Endemism of Aquatic Subterranean Fauna of the Lake Skadar/Shkodra Basin. In: Pešić, V., Karaman, G., & Kostianoy, A. G. (eds.). *The Skadar/Shkodra Lake Environment* pp. 339–361. Springer International Publishing, Cham.
12. Petrović, D., Hadžiablahović, S., Vuksanović, S., Mačić, V., Milanović, Đ., Lakušić, D. (2019). *Catalogue of habitat types of EU interest in Montenegro (Verzija 3)*. Podgorica-Banja Luka-Beograd, 174 p.
13. Polović, L., Ljubisavljević, K. (2010). Herpetofaunal richness of the Skadar Lake region, Montenegro: a review and update. *Scripta Scientiarum Naturalium* 1: 113–121.
14. Porej, D., Stanišić, N. (2009). *Results of the initial evaluation of Protected Area Management in Montenegro using RAPPAM Methodology*. Ministry of Tourism and Environment of Montenegro and WWF Mediterranean Programme, 48 p.
15. PPPN NACIONALNI PARK SKADARSKO JEZERO (2018). *Prostorni plan posebne namjene Nacionalni park Skadarsko Jezero (NACRT PLANA). Knjiga 4 – priroda Skadarskog Jezera - Integralna verzija* -. Ministrstvo održivog razvoja i turizma, 76 p.
16. Radulovic, Milan, Radulovic, Micko, Stevanovic, Z., Sekulic, G., Radulovic, V., Buric, M., Novakovic, D., Vako, E., Blagojevic, M., Devic, N. (2015). Hydrogeology of the Skadar Lake basin (Southeast Dinarides) with an assessment of considerable subterranean inflow. *Environmental earth sciences* 74(1): 71–82.
17. Republički zavod za urbanizam i projektovanje (2015). *Mapiranje i tipologija predjela Crne Gore (izdvojeni osnovni tipovi predjela i područja karaktera predjela)*. Podgorica.
18. SES d.o.o. (2018). *Izvještaj o Strateškoj procjeni uticaja na životnu sredinu PRIJEDLOGA Prostornog plana područja posebne namjene za Obalno područje Crne Gore*. Ministarstvo održivog razvoja i turizma, Podgorica, 506 p.
19. State of the Environment Report (2023), Montenegrin Environmental Protection Agency, 2024
20. Stumberger, B., Schneider-Jacoby, M. (2010). International importance of three Adriatic Flyway priority sites: Livanjsko polje, the Neretva Delta and

Lake Skadar-Shkoder with the Bojana-Buna Delta. *Adriatic Flyway: closing the gap in bird conservation (D. Denac, M. Schneider-Jacoby and B. Štumberger, Eds.). Euronatur, Radolfzell, Germany.*

21. Stupar, V., Đorđije Milanović, Brujić, J., Andraž Čarni (2015). Formalized classification and nomenclatural revision of thermophilous deciduous forests (Quercetalia pubescentis) of Bosnia and Herzegovina. doi: 10.14471/2015.35.016.
22. Vizi, O. (2018). Ornithological Features of Skadar Lake. In: Pešić, V., Karaman, G., & Kostianoy, A. G. (eds.). *The Skadar/Shkodra Lake Environment* pp. 415–445. Springer International Publishing, Cham.
23. Waste Management Strategy of Montenegro up to 2030. Ministry of Sustainable Development and Tourism
24. WINsoft d.o.o. (2008). *Strateška procjena uticaja na životnu sredinu za detaljni prostorni plan autoputa Bar – Boljare*. Ministarstvo za ekonomski razvoj, 101 p.
25. Hydromet of Montenegro (Hidrometeorološki zavod Crne Gore), www.meteo.co.me
26. Montenegrin Environmental Protection Agency (Agencija za životnu sredinu Crne Gore), www. epa.org.me
27. MONTSTAT, http://monstat.org
28. Description of Development Scenarios, December 2020; Modernisation of Rail Route 2, Podgorica – Albanian border, Feasibility Study and ESIA (WB20-MNE-TRA-02), Western Balkans Investment Framework, Infrastructure Project Facility, Technical Assistance 9 (IPF9), Infrastructures: Digital, Energy, Environment, Transport and Social
29. Development Scenarios Analysis Report, September 2021; Modernisation of Rail Route 2, Podgorica – Albanian border, Feasibility Study and ESIA (WB20-MNE-TRA-02), Western Balkans Investment Framework, Infrastructure Project Facility, Technical Assistance 9 (IPF9), Infrastructures: Digital, Energy, Environment, Transport and Social
30. Stakeholder Engagement Plan, November 2021; Modernisation of Rail Route 2, Podgorica – Albanian border, Feasibility Study and ESIA (WB20-MNE-TRA-02), Western Balkans Investment Framework, Infrastructure Project Facility, Technical Assistance 9 (IPF9), Infrastructures: Digital, Energy, Environment, Transport and Social

Annexes

Annex 1 – Project Map

(Please see separate pdf. file)

Annex 2 – Environmental Sensitivities

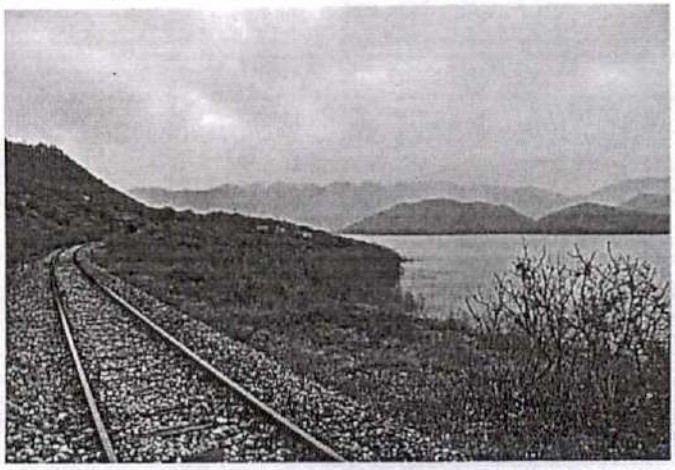


Figure - Existing railway and Skadar Lake (42.318171° N, 19.397988° E) – the existing railway crosses Protection Zone II of the National Park Skadar Lake

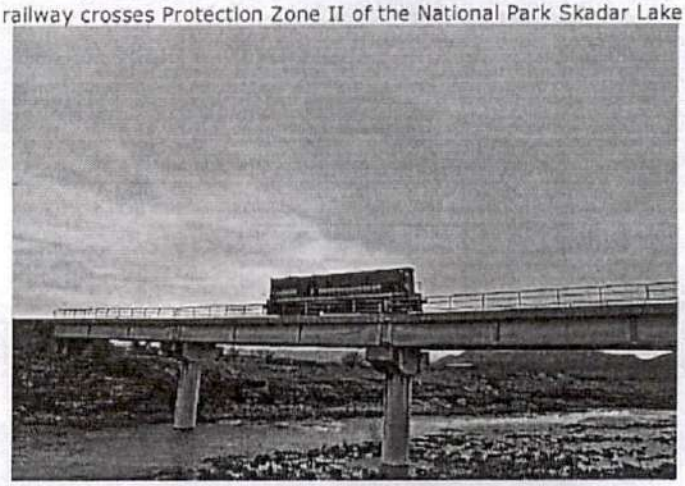


Figure - Railway bridge over Cijevna River (42.397073° N, 19.300175° E)

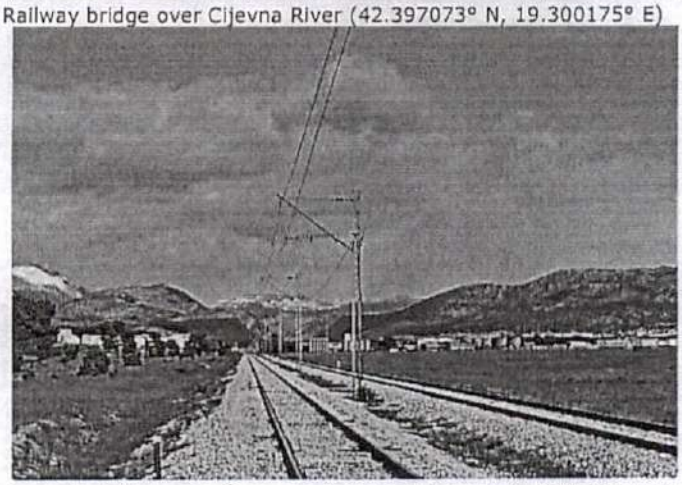
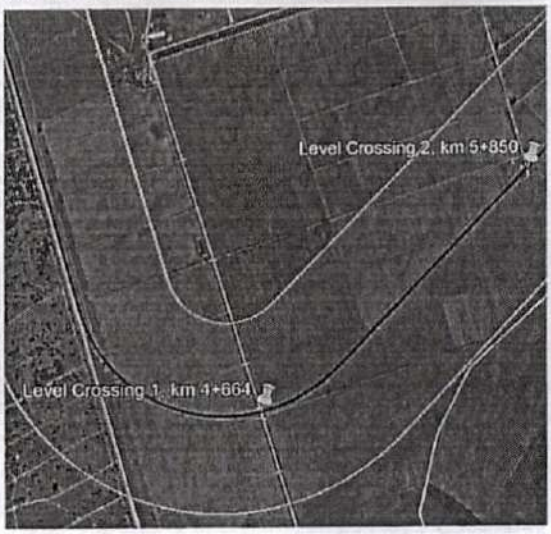
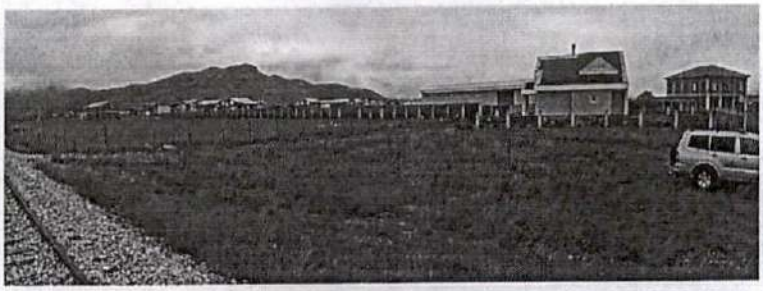
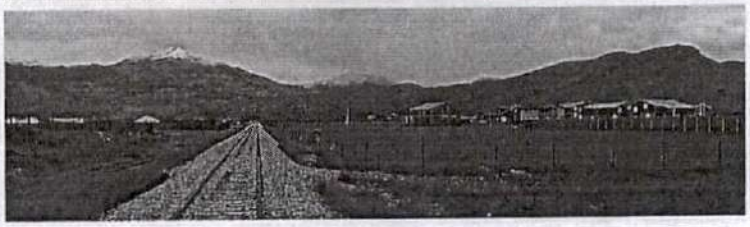


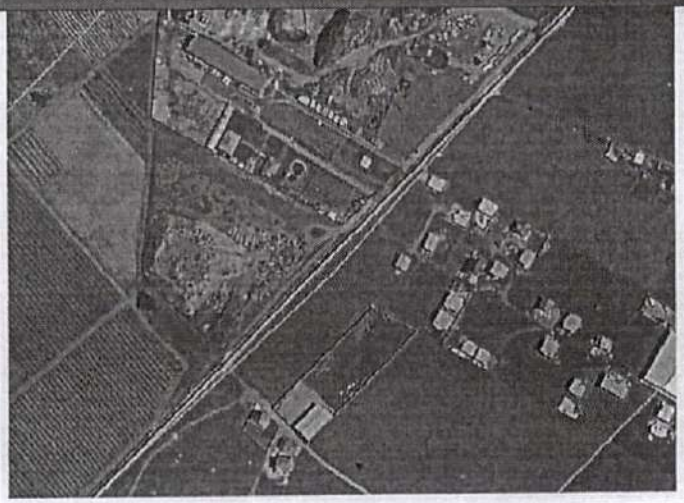
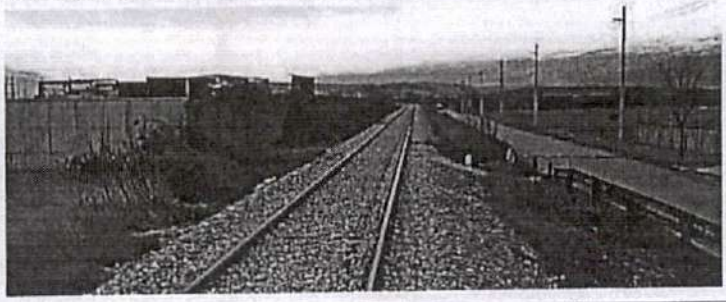
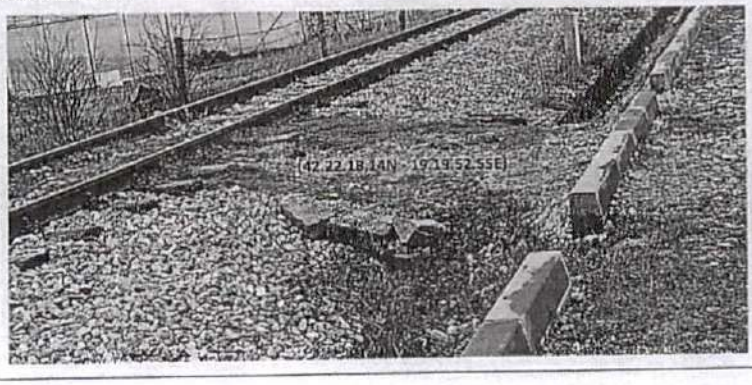
Figure - Important bird area Ćemovsko Polje and important habitat 62A0 East sub-Mediterranean dry grasslands (*Scorzoneretalia villosae*)

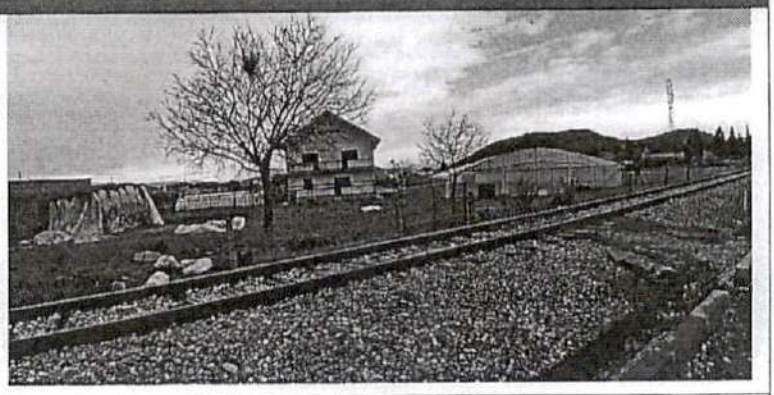
Annex 3 – Social Sensitivities

Table - Social sensitive locations

Item number	Relevant information
1	Location: Podgorica, Residential buildings near the Railway Station    
2	Location: Podgorica, Plantaže

Item number	Relevant information
	
	
3	Location: Kuće Rakića 
	

Item number	Relevant information
	
4	Location: Karabuško Polje (42.23.14,93N - 19.18.33,38E). Pedestrians from Donji Miles wait for a bus on main road. Pedestrian route over the railway line.  
5	Location: Tuzi 

Item number	Relevant information
	
6	Location: Vuksanlekići  
7	Location: Vuksanlekići (42.20.30,20N - 19.20.30,10E). The graveyard from WWI.

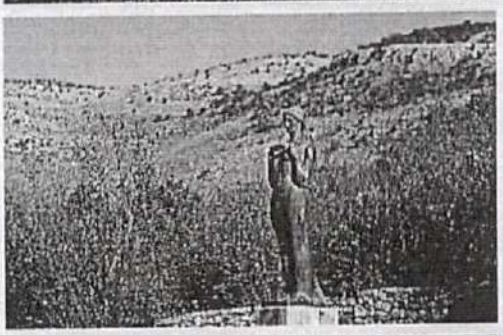
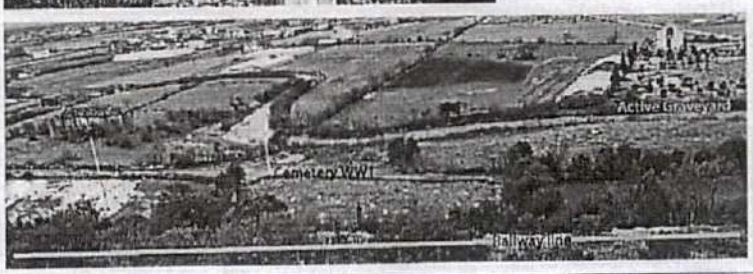
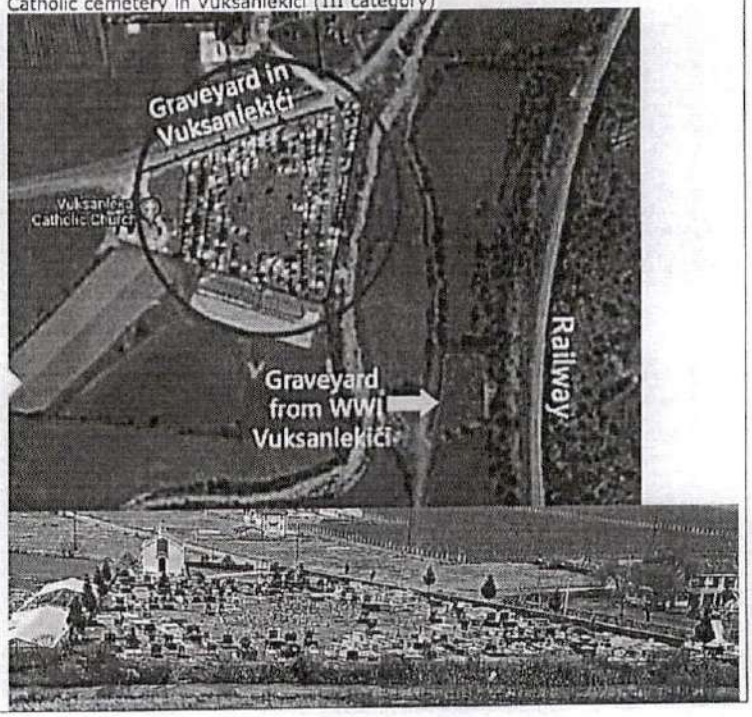
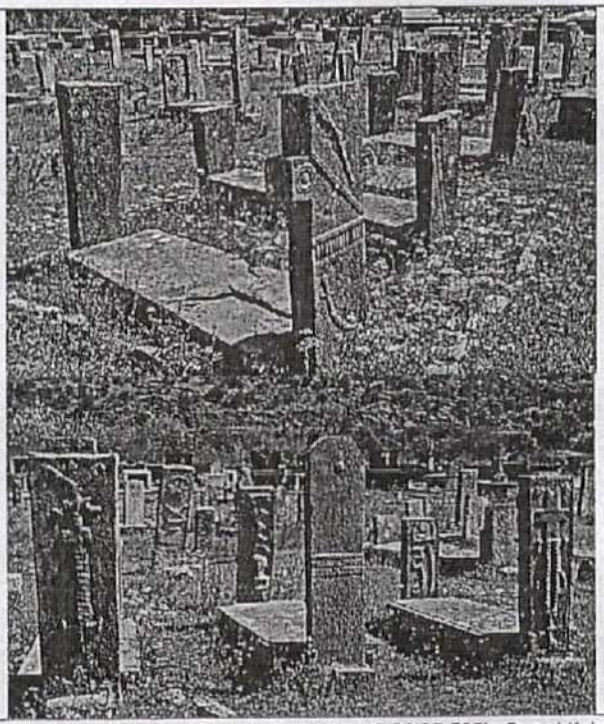
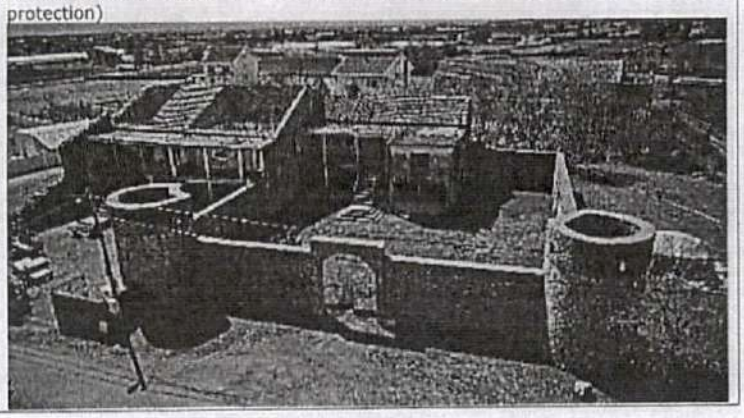
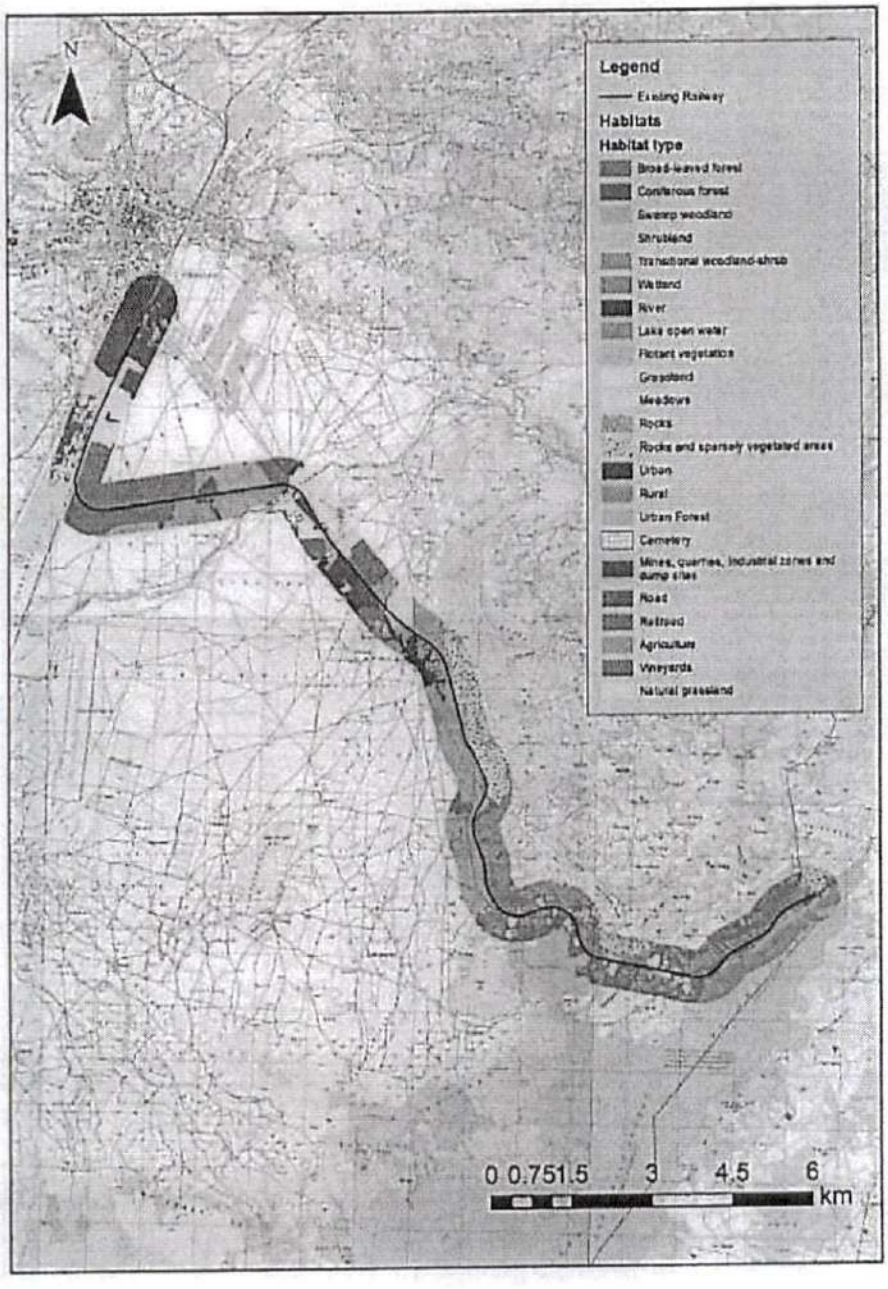
Item number	Relevant information
	
	
	
	

Table - Other relevant social and cultural locations

Item number	OTHER relevant information
1	Location: Podgorica, near the Railway Station. Podgorica Fire Department 
2	Location: Vuksanlekići (42.20.33,20N - 19.20.25,50E). Necropolis within Catholic cemetery in Vuksanlekići (III category) 

	
3	Location: Vuksanlekići (42.20.19,50N - 19.20.27,50E). Camaj Kula (III category protection) 

Annex 4 – Preliminary Habitat Map



Annex 5 – ESIA Work Plan

Introduction

This Annex provides a description of the key tasks which will be undertaken for the ESIA, summarising the work plan and provides key dates for when the tangible ESIA outputs will be delivered.

Key ESIA Tasks

Task 1 – Environmental and social baseline

Undertake a detailed review of all E&S baseline related work undertaken to date in the scope of the Project and, if necessary, undertake supplementary E&S surveys along the selected Project option to corroborate the findings of the initial surveys carried out during the process of the assessment of alternative development scenarios. This task is aimed to fully inform the impact assessment process and mitigation strategy. It would also include detailed review the legal environmental and social national legislation and requirements.

Additionally, this task will include:

- Conducting comprehensive Biodiversity Surveys to establish a detailed baseline of flora, fauna, habitats, and ecosystems in the project area.

- Initiating the Appropriate Assessment (AA) process by identifying potential impacts on protected areas and species.

Task 2 - Environmental and social impact assessment

Assess environmental and social issues and impacts related to the Project and to its associated facilities in a structured way covering all aspects in line with the applicable national standards and international requirements (EIB) as well as the EU EIA Directive. The ESIA shall include a thorough assessment of the E&S risks as scoped into the present ESIA Scoping Report, based on the proposed approach and methodology for assigning impact significance as a combination of evaluated E&S receptor/resource sensitivity (value) and determined impact magnitude.

- If deemed necessary, complete the Appropriate Assessment, evaluating the significance of potential impacts on protected areas and species in relation to their conservation objectives.

- Develop a Biodiversity Management Plan (BMP) that outlines specific measures to avoid, minimize, and mitigate impacts on biodiversity, aligned with the findings of the AA and the conservation objectives of affected protected areas.

Propose mitigation measures where significant adverse impacts are identified, consistent with the requirements of the relevant legislation and policies as well as with best international practice and proportional to the level of the impact predicted. These measures will be incorporated into the BMP and other relevant management plans.

Task 3 – Stakeholder consultation and public participation

Support the Beneficiary to follow the consultation strategy identified in the present Stakeholder Engagement Plan and to undertake engagement activities.

Update the Initial Stakeholder Engagement Plan as necessary to reflect Project's progress and to ensure that the stakeholders and the public are informed on potential environmental and social impacts associated with the Project.

ESIA Deliverables

The following tangible deliverables are indicatively planned :

ESIA Report: meeting the lenders requirements, and in particular the EIB E&S standards, and accompanying package of documents:

- Non-Technical Summary (NTS): a concise, over-arching, standalone NTS will be provided, written in non-technical style and be used to demonstrate compliance with the EIB requirements, ready for public disclosure.

- Environmental and Social Management Plan (ESMP): to outline the key E&S requirements, including health and safety risks, and to detail the management actions and operational procedures necessary for managing the significant issues connected to the Project activities.

- Appropriate Assessment (AA): screening, detailing potential impacts on protected areas and species, and proposing specific mitigation measures, if deemed necessary.

- Biodiversity Management Plan (BMP): outlining comprehensive strategies for biodiversity protection and management throughout the project lifecycle.

- Final Stakeholder Engagement Plan (SEP), including grievance mechanism: to report on stakeholder engagement activities undertaken to date and to guide such activities during further implementation of the Project.