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Western Balkans Investment Framework
Infrastructure Project Facility
Technical Assistance 8 (IPF 8)

TA2018148 R0 IPA

Corridor VIII Rail
Detailed Design for the Rehabilitation of the Durres – Rrogozhine Section, Albania
WB21-ALB-TRA-01

Environmental and Social Impact Assessment Study

Environmental and Social Impact Assessment Report

February 2022

COWI | IPF

Western Balkans Investment Framework (WBIF)

Infrastructure Project Facility Technical Assistance 8 (IPF 8)

Infrastructures: Energy, Environment, Social, Transport and Digital Economy

TA2018148 R0 IPA

Environmental and Social Impact Assessment Report

February 2022

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.
WB21-ALB-TRA-01	

VERSION	DATE OF ISSUE	DESCRIPTION	PREPARED	CHECKED	APPROVED
V1	February 2022	ESIA report	A. Shehu F. Konstantopoulou S. Anagnosti	Konstantin Siderovski Kostas Tzanakakis	Richard Thadani

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   (separate sheet in pdf format; 1:10,000)

List of abbreviations

Abbreviation	Meaning
ALB	Albania
ARA	Albanian Road Authority
asl	above the sea level
CDW	Construction and demolition waste
DD	Detailed Design
DG NEAR	Directorate-General for Neighbourhood and Enlargement Negotiations
CTC	Centralized Traffic Control
EBRD	European Bank for Reconstruction and Development
EC	European Commission
EIA	Environmental Impact Assessment
EIB	European Investment Bank
ESMP	Environmental and Social Management Plan
ERTMS	European Railway Traffic Management System
ESAP	Environmental and Social Action Plan
ESIA	Environmental and Social Impact Assessment
ESP	Environmental and Social Policy
ETSI	European Technical Specifications for Interoperability
EU	European Union
EUD	Delegation of the European Union
FI	Financial Institution
FIDIC	International Federation of Consulting Engineers
FS	Feasibility Study
GHG	Greenhouse Gas emissions
GSM-R	Global System for Mobile Communications – Railway
HSH	Albanian Railways
IFI	International Financial Institutions
IFICO	IFI Coordination Office
IPF	Infrastructure Project Facility
IR	Inception Report
LARF	Land Acquisition and Resettlement Framework
LARP	Land Acquisition and Resettlement Plan
LGDP	Local General Development Plan
MIE	Ministry of Infrastructure and Energy
MTE	Ministry of Tourism and Environment
NEA	National Environmental Agency
NIPAC	National IPA Coordinator
NTS	Non-Technical Summary
PA	Protected Area

Abbreviation	Meaning
PD	Preliminary Design
PFS	Preliminary Feasibility Study
PIU	Project Implementation Unit
RAP	Resettlement Action Plan
REA	Regional Environmental Agency
SC	Steering Committee
SEP	Stakeholder Engagement Plan
TA	Technical Assistance
ToR	Terms of Reference
TSI	Technical Specifications Interoperability
WBIF	Western Balkans Investment Framework

Glossary

Term	Meaning
Baseline	An outline the environmental characteristics of a receiving environment that provides the starting point for an assessment.
Consultation Authorities	Public bodies/authorities, who are legally designated to be consulted on the environmental and social aspects of P/P.
EIA	Environmental Impact Assessment, undertaken at the project level. The EIA for the eventual selected PIP projects is undertaken, if necessary, based on the SEA findings and on the environmental regulations.
EIA Directive [1]	Directive 2014/52/EU of the European Parliament and of the Council of 16 April 2014 amending Directive 2011/92/EU: “On the assessment of the effects of certain public and private projects on the environment”
Environmental topic	This term describes the different features of the environment that may be relevant in a SEA. Alternative terms include “environmental receptor” or “environmental issue”.
Espoo Convention [2]	Adopted in 1991 and entered into force in 1997, the Espoo (EIA) Convention sets out the obligations of Parties to assess the environmental impact of certain activities at an early stage of planning. It also lays down the general obligation of States to notify and consult each other on all major projects under consideration that are likely to have a significant adverse environmental impact across boundaries.

[1] http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32014L0052&from=EN
[2] www.unece.org/fileadmin/DAM/env/eia/documents/legaltexts/Espoo_Convention_authentic_ENG.pdf

Term	Meaning
EU acquis [3]	The *acquis* is the body of common rights and obligations that is binding on all the EU member states. Candidate countries have to accept the *acquis* before they can join the EU and make EU law part of their own national legislation. Adoption and implementation of the *acquis* are the basis of the accession negotiations.
European Site	Includes Special Protection Areas (SPA), Special Areas of Conservation (SAC) and candidate Special Areas of Conservation.
Habitats Directive [4]	Directive 92/43/EU of the European Parliament and of the Council of 22 May 1992: “On the Conservation of natural habitats and of wild fauna and flora”. The Directive aims to promote the maintenance of biodiversity, taking account of economic, social, cultural and regional requirements. It led to the setting up of a network of Special Areas of Conservation, which together with the existing Special Protection Areas form a network of protected sites across the European Union called Natura 2000.
Indicator	Normally associated with monitoring, an indicator is used to measure the achievement of a Plan or Environmental objective
Law on EIA [5] (EIA Law)	Law no 10440, of the Albanian Parliament, of July 07.2011: “On Environmental Impact Assessment”. Law is in full compliance with the EU EIA Directive
Objective	An intended goal, specifying the desired direction and outcome
Post-adoption statement	A summary prepared by the Responsible Authority (MEI) to outline how the assessment and consultation process have been taken into account in the adopted plan.
Recharge area	A recharge area is an area where the surface waters penetrate down into the ground, feeding thus the ground water bodies/aquifers.
Responsible Authority	Called also Project/plan developer, a public body responsible for a P/P. The responsible authority for Albanian GMP is MEI.

[3] http://ec.europa.eu/enlargement/policy/glossary/terms/acquis_en.htm

[4] http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:31992L0043&from=EN

[5] http://www.mjedisi.gov.al/files/userfiles/VNM_Paraprake/Fletorja_Zyrtare_101-2011_-_Ligji_nr_10440_date_7_7_2011_-_Per_Vleresimin_e_Ndikimit_ne_Mjedis_%28VNM%29.pdf

Synopsis

Project Title	**Corridor VIII Rail** **Detailed Design for the Rehabilitation of the Durres – Rrogozhine Section, Albania**
Project number	WB21-ALB-TRA-01
Contracting authority	European Investment Bank
TA Consultant	IPF8 - COWI IPF
Main Beneficiary	Albanian Railways (HSH)
Project area	Durres – Rrogozhine Section
Lead International Financing Agency	European Investment Bank
Project Objectives	The specific objectives of the services as described in the ToR (Section 2.2) are to provide the Beneficiary (HSH) and Promoter (MIE) with the necessary support for the preparation of: › The detailed design for the rehabilitation works on Durres (Shkozet station) to Rrogozhine; › An Environmental and Social Impact Assessment (ESIA) of the proposed rehabilitation project to identify environmental and social risks, impacts and benefits, and structure the Project in compliance with the National legislation and the IFI Environmental and Social Policy (ESP) › The necessary works and services tender documentation to implement the final detailed design, along with support to the procurement process.
Outputs	**Activity 1: Inception Period** › Inception Report › Review of the ESIA **Activity 2: Detailed Design** › Updated Preliminary Design drawings › Detailed design **Activity 3: Environmental and Social Impact Assessment (ESIA)** › ESIA scoping report › Final ESIA › Approval/Disclosure **Activity 4: Procurement Plan, Tender Documents and Procurement** › Procurement plan › Tender documents › Report on Tender support **Activity 5: Final Reporting** › Final report **Bimonthly Reports plus updated risk matrix** (No later than 1 month after the end of each 2-month implementation period)
Results to be Achieved	The Consultant should achieve the following main results (ToR, Section 2.3): › Additional Topographical surveys › Geological and Geotechnical investigations › Track Alignment Detail Design (open line tracks and permanent way in stations, secondary tracks in stations)

	› Design of Structures (civil works, bridges, retaining walls, culverts) › Design of Signalling and Telecommunication systems › Design of Rehabilitation of Stations › Updated Preliminary design › The Detail Design shall contain passive provision for the possible future electrification of this section of the line using a high voltage overhead catenary system to accommodate the necessary civil works (i.e. tunnel/structure clearances, ducts and manholes) along the permanent way. › All necessary approvals for the detail designs. › Environmental and Social Impact Assessment, Stakeholder Engagement Plan, Non-Technical Summary, Land Acquisition Framework and Resettlement Action Plan compliant with the national legal and the IFI requirements; › Tender Documents preparation, for works and necessary services, compliant with the procurement rules of the EIB and internationally recognised Conditions of Contract such as FIDIC The design of the electrification sub-system is out of the scope of these ToR.
Project Starting Date	07-02-2020
Project Duration	15 months

1 Introduction

Albania received a grant to prepare the "Detailed Design for the Rehabilitation of Durres – Rrogozhine railway line Section, Albania" in the framework of Infrastructure Project Facility – Technical Assistance 8 – (TA2018148 R0 IPA).

COWI – IPF8 consortium (hereinafter called "the Consultant") updated the existing preliminary design (PD), and is elaborating the detailed design (DD), and the ESIA study. A preliminary design was performed in 2018 under the "Feasibility study for the rehabilitation of the railway line Durres – Elbasan – Pogradec and a new rail link to the border with the former Yugoslav Republic of Macedonia[6]", Component 2: Preliminary Design for Durres - Rrogozhine section (WB13-ALB-TRA-01 project).

The Terms of Reference (ToR) for the proposed subproject (WB21-ALB-TRA-01, which is called hereinafter "the Project") was prepared on the basis of the results of WB13-ALB-TRA-01 subproject by the European Investment Bank, which is the lead IFI. The promoter is the Ministry of Infrastructure and Energy (MIE) and the Beneficiary is the state owned company Albanian Railways (HSH).

The ESIA report (this document) is part of the ESIA study on the Project.

1.1 Project background

Durres-Rrogozhine railway line rehabilitation project is part of Corridor 8, one of ten Pan-European transport corridors.

[6] Nowadays called Northern Macedonia

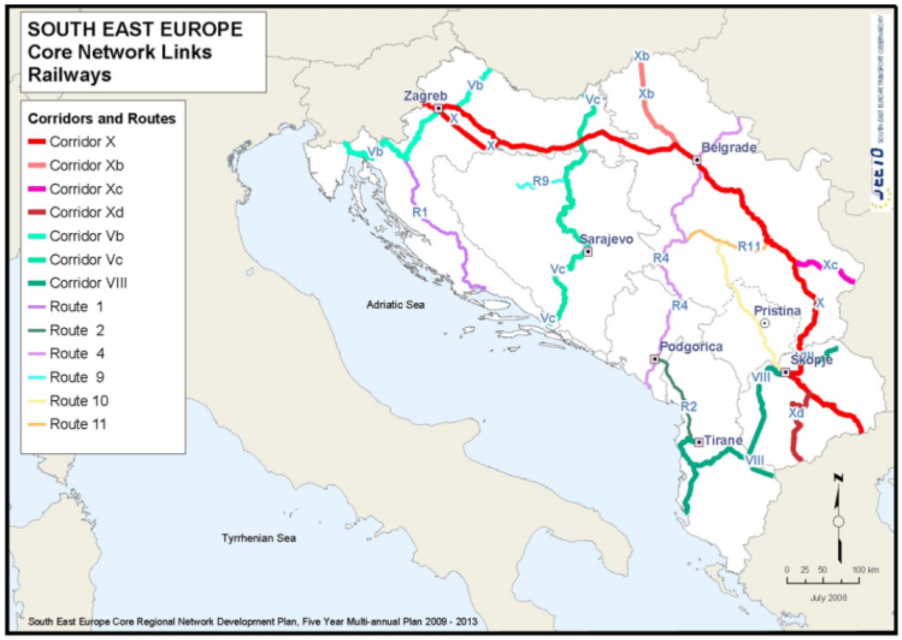

Figure 1-1_South East Europe railway corridors[7]

The Corridor 8 comprises road and rail links and the ferry crossing to Durres.

Figure 1-2_Schema of the Corridor 8 and Durres – Rrogozhine railway line section

The major ferry and rail sections of the Corridor are: Bari / Brindisi ports (Italy) – Durres / Vlora ports – Rrogozhine – Qafe Thane (Albania) - Struga – Skopje (North Macedonia) – Sofia - Plovdiv - Burgas / Varna ports (Bulgaria).

In addition to being part of Corridor VIII, this section also constitutes the sole rail link between the West and East (Qafe Thane and Pogradec town) and South (Vlore and Ballsh towns) parts of Albania.

[7] Working_group_transport_seeto_en.pdf

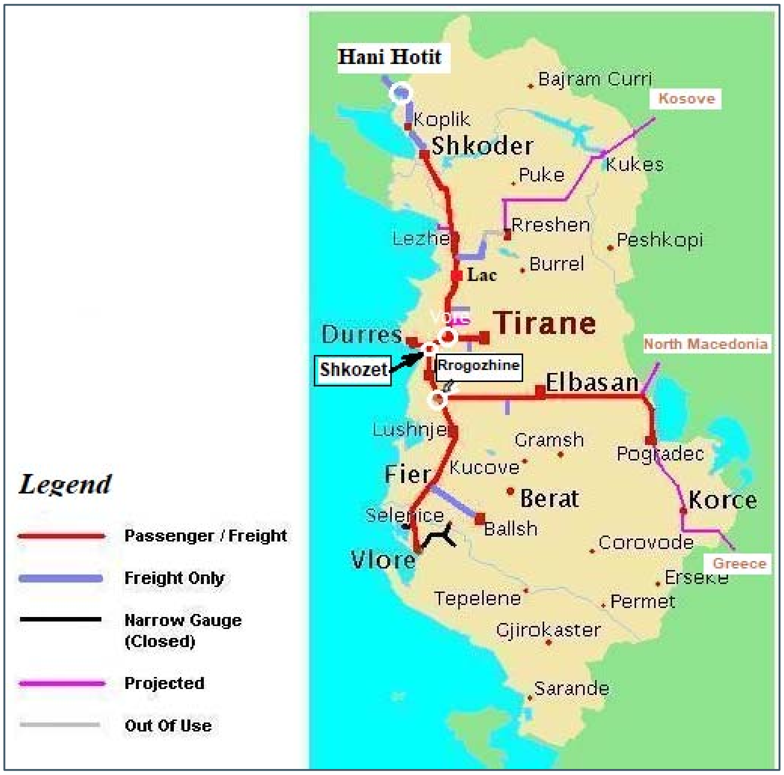

Figure 1-3_Scheme of the Albanian railway network

The railway line Durres – Rrogozhine section was built between 1947 and 1950 with little or no maintenance undertaken over the last 25 years. Trains speed is low due to the conditions of the infrastructure and safety concerns, including numerous unmanaged crossings.

1.2 Project purpose and objectives

The purpose of the proposed project is the upgrading of the railway line to meet European standards, including an increase in train speeds and improve safety.

The overall objective of the Project is the preparation of the Detailed Design for the Rehabilitation of the Durres – Rrogozhine Section, as part of the Railway Line Durres – Elbasan – Pogradec that will continue later towards North Macedonia (at Qafe Thane border place) and Greece (at Kapshtice/Kristalopigi border place).

The specific objectives are to provide the Beneficiary (HSH) and Promoter (MIE) with the necessary support for the preparation of:

- The detailed design (DD) for the rehabilitation works on Durres (Shkozet station) to Rrogozhine related to the railway line. Any additional parallel roads will be decided to be upgraded/built by the local governments and/or the Albanian Road Authority, thus not included in this document.
- An Environmental and Social Impact Assessment (ESIA) of the proposed rehabilitation project to identify environmental and social risks, impacts

and benefits, and structure the Project in compliance with the National legislation and the EIB Environmental and Social Standards (ESS);

- The necessary works and supervision services tender documentation, along with support to the procurement process.

1.3 Purpose of this document

The ESIA report preparation is part of the environmental and social study process.

1.3.1 The ESIA study and the present document

This document is part of the ESIA study package on the proposed project.

As per the ToR and Inception Report the ESIA study should include the following documents:

- ESIA Scoping report;
- **ESIA report – this document;**
- Non-Technical Summary (NTS);
- Environmental and Social Action Plan (ESAP);
- Environmental and Social Management Plan (ESMP).
- Stakeholder Engagement Plan (SEP);
- Land Acquisition and Resettlement Framework (LARF) and, as necessary, a Resettlement Action Plan (RAP)

Further details on each of the above documents are provided in chapter 5 (Regulatory Framework and Guidelines) of this document.

The role and place of the ESIA report in the whole ESIA process is described in section 3.1 of this document.

1.3.2 Purpose of this document

The ESIA report is part of the package of the ESIA study deliverables on the proposed project.

The main purpose of the ESIA study process is to assess the potential significant adverse impacts of a project before the project is approved. Wherever necessary, the ESIA may influence the project design in order to prepare the most possible environmentally friendly design. Generally, this eventual influence is exerted during the ESIA scoping stage. In the case of the Durres-Rrogozhine railway rehabilitation project, this influence has been exerted initially during the Preliminary Design for Durres - Rrogozhine section (WB13-ALB-TRA-01 project, 2018).

Besides, the ESIA study takes into consideration the stakeholders" concerns in the environmental decision-making procedures during the whole project's life cycle.

The ESIA report (this document) follows the ESIA Scoping report, which obtained the non-objection (in November 2020) from the key stakeholders.

Based on the findings of the ESIA report, the Ministry of Tourism and Environmental (MoTE) decides whether the environmental consent on the Project development should be delivered. The environmental consent/permit or Environmental Declaration is part of the permits' package that is necessary for implementing the Project.

In function of the findings of this document, the future lender(s) will decide on the possibility of the project's financing. EIB " … *seeks to promote sustainable and inclusive growth while protecting the natural and social environment in a holistic manner, thereby ensuring that requirements relating to the protection of the environment and human well-being are integrated in the definition, preparation and implementation of all operations financed by the EIB"*[8].

1.4 Stakeholders

The project is funded by EU/DG-NEAR grant under the Western Balkans Investment Framework (WBIF), managed by the European Investment Bank (EIB). The beneficiary is the Albanian Railway (HSH) and the Promoter is the Ministry of Infrastructure and Energy (MIE). The list of the main stakeholders also includes the following:

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[8] Standard 1 of EIB Environmental and Social Standards, 2018

Stakeholder Group	Stakeholder
IFIs	➢ European Investment Bank (EIB): *lead IFI* ➢ EU Delegation in Albania ➢
Government authorities within the Project area, relevant ministries and public institutions	***National Authorities*** ➢ National IPA Coordinator (NIPAC) ➢ Ministry of Infrastructure and Energy (MIE) ➢ Ministry of Agriculture and Rural Development (MARD) ➢ Ministry of Tourism and Environment (MoTE) ➢ Albanian Railways (HSH) ***Environmental authorities*** *(besides MoTE)* ➢ National Environmental Agency (NEA) ➢ National Agency of Protected Areas (NAPA) ➢ Regional Environmental Agency (REA) of Durres; ➢ Regional Environmental Agency (REA) of Tirana ***Technical institutions*** ➢ National Agency of Territory Planning (NATP) ➢ The State Agency of Cadastre ➢ Albanian Road Authority (ARA); ➢ Regional Directorate of National Cultural Heritage (DRKK), Durres; ➢ Regional Directorate of National Cultural Heritage (DRKK), Tirana; ➢ Irrigation and Drainage Directorate (IDD), Durres ***Regional Authorities*** ➢ Regional Council of Tirana and Durres (respectively) ➢ Regional Directory of Agriculture, Tirana and Durres (respectively) ➢ Regional Directory of Health, Tirana and Durres (respectively) ***Local Authorities*** ➢ Municipalities of Durres, Kavaja and Rrogozhina including (respectively): o Mayor o Representatives of various departments in charge of: - Social Protection, - Social Housing, - Expropriation, - Public Works, - Finance, - Property and Legal Affairs, - Environmental Protection, - Traffic Management, - Public Relations Office, - PIU Resettlement Unit ➢ Coordinators of local communities and local community councils in the respective Administrative Units of Durres, Kavaja and Rrogozhina Municipalities ➢ Local Public Utilities owners and operators: o Water Supply and Wastewater Systems (each municipality) o Electricity Distribution Operator
Project affected people, including vulnerable people	➢ Population that will be affected by land acquisition (owners and users of land and operators of

Stakeholder Group	Stakeholder
	businesses within the Project footprint, who will be physically and / or economically displaced). ➢ Residents and businesses operating along the Project footprint (who will not be displaced but will continue residing/operating along the Project) ➢ Users of access roads (residents of villages along the project corridor) ➢ Affected vulnerable groups among affected people (to be identified during the development of the RAP (if required), along with type and method of communication, timing and topics for discussion)
Local residents and businesses in the Project area	➢ Residents and businesses operating along the Project footprint (who will not be displaced but will continue residing/operating along the Project) ➢ Users of access roads (residents of villages along the project corridor)
Employees and workers	➢ MIE staff ➢ Albanian railways staff ➢ Contractors (construction companies, subcontractors and suppliers)
Media	➢ Print: Panorama, Gazeta Shqiptare, etc. ➢ Radio: Tirana, Top Albania Radio, etc. ➢ TV: RTSH, News 24, etc.
Interested NGOs, citizens' associations and other organisations	➢ There are currently no NGOs or other organizations specifically interested in the Project however if some show an interest in the Project at a later stage, they will be added to this list of stakeholders. However, in order to attract the NGOs, contact will be made with the listed NGOs at their contact (e-mail) included in Appendix 5.
Public	➢ All citizens in Durres, Kavaja and Rrogozhina Municipalities

The Stakeholders Engagement Plan (separate document), provides a completed list of the involved stakeholders and their roles and responsibilities in the project development phases.

1.5 Constraints/limitation for preparing the ESIA study

There were some limitations to the ESIA package documents, as follows:

- the devastating earthquake of November 26, 2019 that affected the municipalities[9] along the alignment made difficult the contacts between the Consultant and the counterparts (key informants) in these municipalities (overall during 2020), especially in Durres one, which was heavily affected by the earthquake;

[9] https://ec.europa.eu/neighbourhood-enlargement/sites/near/files/albania_post-disaster_recovery_a_v9.0.pdf

- outbreak of Covid-19 pandemic situation as of March 2020 which adversely affected contacting and meetings with key informants. Often it was challenging to reach key informants due to Covid 19 situation;
- During the period of preparation of the ESIA study, it was not possible to obtain official data on Project Affected People (PAPs). These data can be provided only by the State Agency of Cadastre (SAC) in Albania, as the one and only governmental institution, entitled for registering, keeping and disseminating the information. Although the official communication in this regard was made in due time, and, in addition, the project and beneficiary made every other effort to obtain this information, the expropriation list provided within the "Cadastral Report" includes 229 affected properties associated with a buffer zone from railway axis and other engineering objects with no further information. This list does not define if the area is owned by HSH and does not clarify the type of these properties, e.g. residential houses, warehouses, businesses, agricultural area. Therefore, the analysis of impacts related to land use and all aspects/factors in this regard, is pending, to be performed at another time in the future.

  The Consultant prepared a dedicated RAP concerning the three families living in the stations buildings of Rrogozhine and Lekaj Stations. HSH needs to cooperate with the Municipality of Rrogozhine, concerning their resettlement

1.6 ESIA report preparers

The table below shows the list of this ESIA report preparers and their related tasks.

Table 1-1_List of the ESIA report preparers and their related tasks

No	Name	Role and responsibilities	Tasks
1	Ardian Shehu	Key environmental expert	-Lead and coordinate the ESIA report preparation; -Prepare chapters 1 to 10, excepting the sections 3.3, 5.2, 5.9, 5.18, 6.2.1, 6.9 and 7.18 that concern the noise and vibrations, groundwater and social issues; -Prepare the estimated GHG emissions during operation; -Prepare the Non-Technical summary (separate document); -Prepare the ESMP (separate document); -Prepare the ESAP (separate document)
2	Konstantin Siderovski	Technical Excellence Expert (TEC)	Check out the ESIA compliance concerning the EIB requirements

No	Name	Role and responsibilities	Tasks
3	Agron Hetoja	Country facilitator	Coordinate the Project's staff with the different stakeholders and prepare the needed correspondence
4	Flora Konstanto-poulou	Lead social expert	Lead the Local Social Expert and the Land Acquisition and Resettlement Expert
5	Skerdilajd Anagnosti	Local social expert	-Prepare sections 3.3, 5.17, 6.17, ESMP, ESAP Sections 5.18 and 6.18 that relate to the social issues; - Consultations; - Prepare the Stakeholders Engagement Plan (separate document)
6	Alban Caushi	Land Acquisition and Resettlement expert	Prepare the LARF report (separate document)
7	Elsa Dindi	Groundwater expert	Prepare the ESIA sections 5.9 and 6. 9 that relate to the groundwater
8	Alexandros Gallatas	Noise and Vibrations expert	-Prepare noise and vibrations modelling; -Lead the noise expert; -Prepare the ESIA sections 5.2 and 6.2.2 that relate to the noise and vibrations
9	Gjergji Selfo	Local noise expert	-Selection of noise measurement locations; -Noise measurements; -Prepare the ESIA sections 5.2 and 6.2 that relate to the noise and vibrations

1.7 Structure of this document

This document is structured as follows:

- **Chapter 1: Introduction**. Under this introductory chapter, the Project background and key stakeholders, its purpose and objectives along with the ESIA process and the purposes of the ESIA report is provided;
- **Chapter 2: The Project.** The chapter discusses the Project area along with the Project elements (components, activities and land use issues);
- **Chapter 3: Regulatory framework and guidelines**. This chapter discusses the requirements of the EU, national and EBRD on the different stages of the ESIA process. A detailed comparison between them is provided, and after a gap analysis, the applicable regulations/standards are selected;
- **Chapter 4: Impacts Assessment Methodology.** The chapter provides for the approach and methodology for Project impacts' evaluation; the methodology used for options comparison is also discussed;
- **Chapter 5: Baseline information.** This chapter describes the baseline information. For each environmental topic the Consultant outlined the used references and methodology;

- **Chapter 6: Impacts and Mitigation**. This chapter describes the main sources of impacts and the potential impacts that may raise from the project development, as well as the suggested strategies and measures to avoid/reduce any eventual significant impact;
- **Chapter 7: Monitoring programme.** This chapter provides the environmental parameters that are regularly monitored by the National Environmental Agency and other institutions and agencies, as well as the environmental and social parameters that should be monitored during the Project's implementation;
- **Chapter 8: Main findings:** This short chapter gives the main findings of the ESIA report regarding any negative or positive environmental and socioeconomic effects of the proposed project.
- **Appendices**: Maps, etc.

2 The Project

This chapter outlines the main characteristics of the project area and the main components of the proposed project. Besides, a section of the chapter outlines the considered options and the option the Promoter preferred.

2.1 The Project area

This section outlines the main features of the area crossed by the railway line.

The project area is included within the territories of the municipalities of Durres, Kavaje and Rrogozhine, as follows:

- Durres Municipality: from Km 0+000 to Km 8+500;
- Kavaje Municipality: from Km 8+500 to Km 23+150; and
- Rrogozhine Municipality: from Km 23+150 to Km 35+384

The figure below shows the general location of Durres, Kavaje and Rrogozhine cities, as well as of the stations located between these cities.

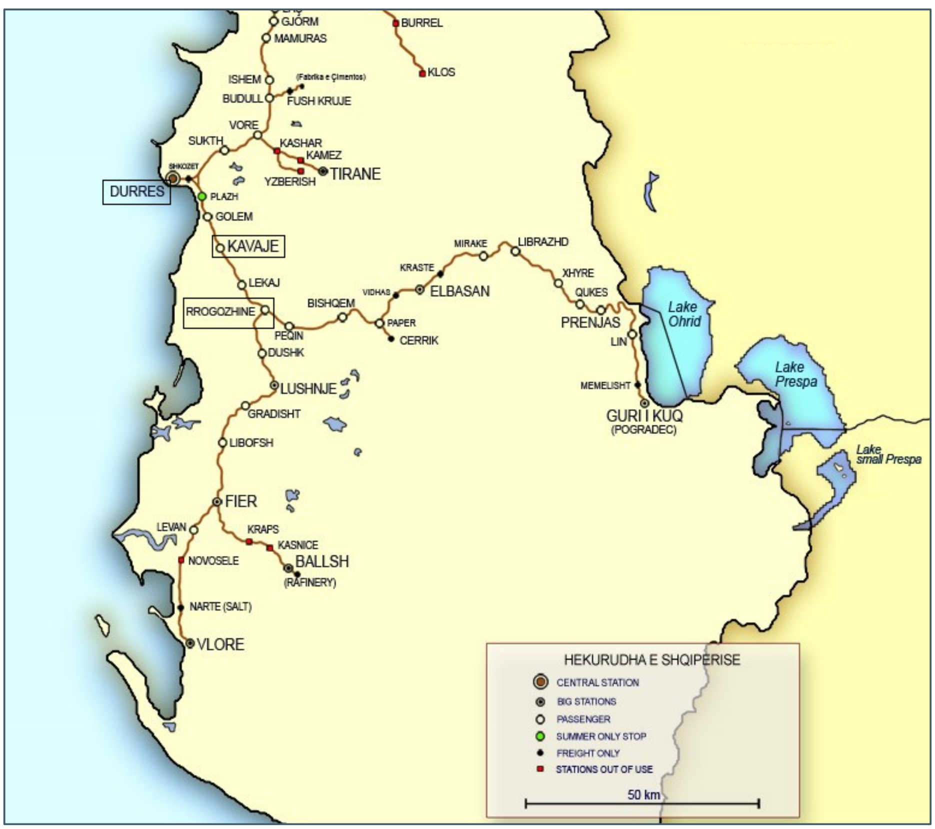


Figure 2-1_General location of Durres, Kavaje and Rrogozhine cities.

The following map shows the location of the territories of Durres, Kavaje and Rrogozhine Municipalities.

Appendix 1.1 (separate document in pdf format) shows the location of the railway line in the administrative map.

The railway line alignment follows the existing line, which has a general direction north – south. The starting point is close to Shkozet station (Km 1+876) that coincides with the ending point of the previously designed segment (Durres-Tirane). The ending point is Rrogozhine station (Km 35+384), where the other segment Rrogozhine – Elbasan – Pogradec starts.

The railway line runs across urban, semi-urban and rural areas. The terrain is in general flat, except a small segment close to Rrogozhine where a hilly terrain is crossed by a tunnel (Rrogozhine one), which is the only tunnel alongside the railway line.

From km 1+876 up to km 5+100 (Shkozet to Plepa), the railway line runs through a very densely populated area where houses and businesses are constructed close to the railway line.

Figure 2-2_Crossed terrain from km 1+876 up to km 5+100

From km 5+100 up to km 15+000 (Plepa area until Kavaje town), the longitudinal alignment runs in low terrain across urban, semi-urban and rural areas. The terrain on the left (West) of the railway line is hilly with some rock formation up to km 9+380, while then it softens up and the alignment cross section is in fill. The horizontal alignment is smooth and goes beside the highway Durres- Rrogozhine. At km 6+500 is located Golem station.

Figure 2-3_Crossed terrain from km 5+100 up to km 15+000

From km 15+000 up to km 28+000, the alignment runs in an almost flat terrain. At km 19+120 is located the station of Kavaje town. Then, the alignment runs through the eastern part of the town.

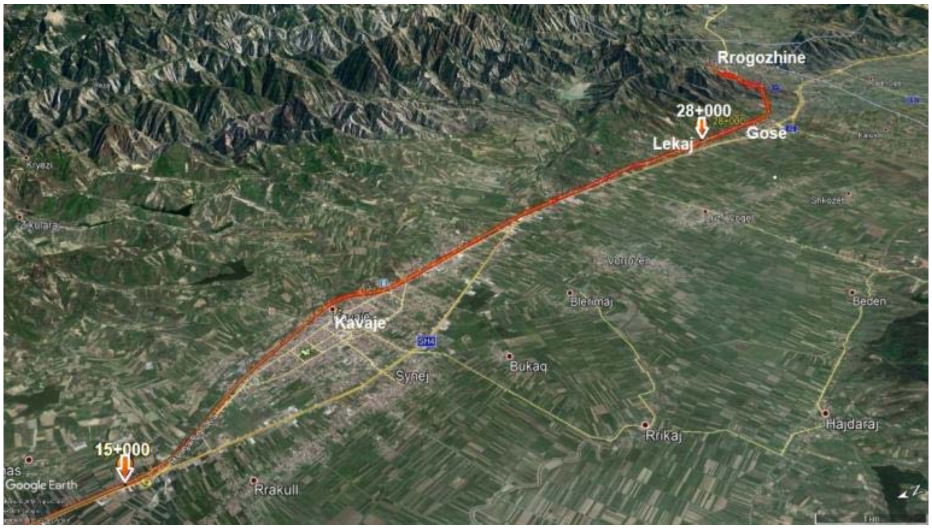


Figure 2-4_Crossed terrain from km 15+00 up to km 28+000

From km 28+000 up to km 35+384, the horizontal alignment runs mostly on a hilly terrain leaving the village of Gosë and going beside a hilly formation through the eastern part of Rrogozhine. Lekaj station is crossed before Gose Village.

Since the part of this section after the tunnel, starting at km 32+470, is in fill, the local roads do not cross the railway. Therefore, there are no level crossings and their connection is made possible through the presence of the underpasses.

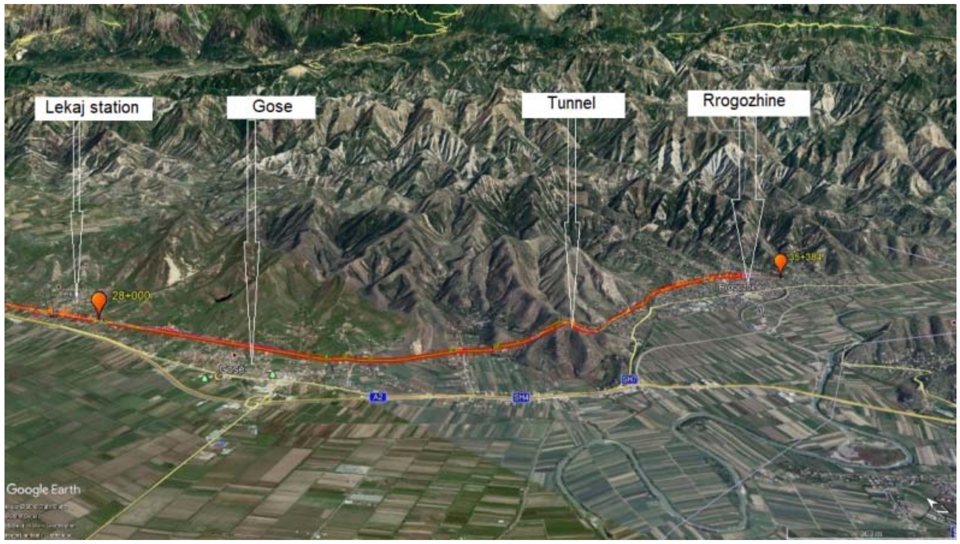


Figure 2-5_Crossed terrain from km 28+00 up to km 35+384

Further details on the physical and man-made environment are provided in the chapter on baseline information (chapter 5 below).

2.2 Considered Project's options and preferred option

The Project's options were considered and discussed in 2018 under the "Feasibility study for the rehabilitation of the railway line Durres – Elbasan – Pogradec and a new rail line link to the border with the Former Yugoslav Republic of Macedonia [10]", Component 2: Preliminary Design for Durres - Rrogozhine section (WB13-ALB-TRA-01 project)".

Under Component 2 of the above-mentioned project, it was concluded to improve the horizontal alignment of the Durres-Rrogozhine railway line. Component 2 has also taken into consideration the possible electrification of the railway line.

However, sections 2.2.1 to 2.2.3 hereinafter summarize once again the considered Project's spatial and technical options and the stakeholders' concerns on these options.

2.2.1 Spatial options

From the spatial point of view, the following options were considered:

- Option 1: Rehabilitation of the railway line within the existing alignment; and
- Option 2: The improvement of the horizontal railway line alignment to reach the trains' speed required by the European standards.

[10] Nowadays called North Macedonia

Option 2 imposes the increase of the line radius in some short railway line segments (see section 2.3.4 below).

The Steering Committee preferred Option 2 to accomplish the purpose and objectives of the Project as given in the section 2.2.3 below.

2.2.2 Technical options

The considered technical options include:

- Option 1: The non-electrified railway line; and
- Option 2: The electrification of railway line to reach the European standards

To be part of Pan European Corridor VIII the Durres-Rrogozhine section needs to comply with the European standards that require an electrified railway line.
Due to the existing non-favourable economic situation of the country, the Promoter cannot support the cost of the line electrification. However, the Detailed Design considers the future line electrification.
Electrification is also preferred from the environmental point of view, as it enhances the existing situation regarding air quality and GHG emissions. Therefore, it is more environmentally friendly than trains running with fuel.

2.2.3 Preferred Option

As mentioned above, the existing railway line alignment and the non-electrified railway line do not meet the European standards that constitute the Project's rationale. In addition, the proposed Project design (and later on the railway line construction) is financed by EU founds as part of the Pan European Corridor VIII. The Beneficiary suggested improving the horizontal railway line alignment and considering the design of the future line electrification.

Furthermore, the preferred option does not present any significant adverse environmental and social effects, whereas the positive effects concern overall the social and economic aspects at national and regional level.

2.3 The Project elements

Projects elements include the Project's components and activities. This section describes the Project's components, their existing condition and the proposed interventions for each of them.

2.3.1 Railway line components

The railway line components are as follows:

- Superstructure: rails, sleepers, fastening components, protective layer and ballast layer;
- Sub-structure: sub-ballast or formation and the subgrade or natural layer;

- Structure: tunnels, bridges, underpasses, overpasses, culverts, drainage channels and retaining walls;
- Other components: level crossings, stations; signalling and telecommunication, fencing

The schematic figure below shows the components of the superstructure and sub-structure of a railway line.

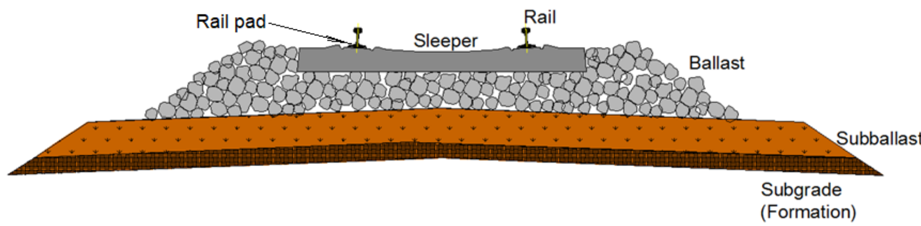


Figure 2-6_Schematic cross section of the railway track

The subgrade plays a role similar to that of a building foundation. The applied loads are transferred by the deflection of the rail to the ballast bed and then passed on via the subgrade to the subsoil.

Appendix 2.1: Typical cross-section of the railway line (separate file in pdf format) shows the typical cross section of the proposed railway line.

2.3.2 The current condition of the railway line

The existing railway line Durres-Rrogozhine was constructed in the 1950's and was designed to serve both freight and passenger operations.

The designed operation speed was up to 100 km/h. Due to its deterioration, the line operates now under low speeds that do not exceed 40 km/h for passenger trains and 35 km/h for freight trains. Passenger services are carried out by only a pair of trains per day, while freight services are scheduled ad hoc. Due to the low speed, the number of passengers is insignificant.

The deterioration of the railway system includes mainly the following:

- Rails, sleepers, and ballast are damaged and therefore cannot allow the initial design speed (100 km/h);
- Bridges and Rrogozhine tunnel, although designed to support loads equivalent to 22.5 ton/axel, are severely deteriorated, and their width does not comply with the typical 6.6 m as per the design standards. Moreover, they do not support the future electrification of the line;
- Damaged drainage system, with erosion and sedimentation;
- A considerable number of non-authorized road and passenger crossings have been recorded through inhabited areas, while along the open line

most of the “official” crossings with the national and regional road network are not protected;

- The signalling system is out of operation;
- Stations’ buildings are out of standards and stations’ platforms require rehabilitation;
- Some of the existing pedestrian overpasses built for highway purposes, do not overpass the railway and therefore, the pedestrians simply cross the railway.

2.3.3 Purpose of the planned interventions

The Project aims to improve the passenger and freight transport services and increase safety and trains’ speed according to the EU standards.

The increased speed and uniform classification (UIC D4 category, 22.5 tons/axle, and 8.0 tons/m), the improved transport services and the increase of safety will be reached through the following technical objectives:

- the improvement of the horizontal and vertical alignment;
- the replacement and rehabilitation of outdated superstructure components (ballast, sleepers, fastening, switches and tracks);
- the replacement and rehabilitation (whether necessary) of substructure components (sub-ballast, subgrade);
- the rehabilitation and improvement of structure components (culverts, retaining walls, underpasses, pedestrians’ overpasses, bridges and tunnel);
- the consolidation of level crossings (reduction of the number of crossings, secured level crossings, rehabilitation and/or interlocking improvements);
- the improvement of interlocking and telecommunications equipment for incorporation into the CTC system;
- fencing the line (where applicable) and exploring alternatives to physical line fencing
- The reconstruction of all the stations, with a new additional seasonal stop near the coastline of Durres City

In addition, it is required the design to take into account the future electrification of the railway line.

The following sections clarify in more detail the existing situation and the planned interventions for each railway line element.

2.3.4 Railway line alignment

The railway line alignment includes the vertical and horizontal alignment.

Existing situation and planned interventions

Vertical alignment: The Updated Preliminary Design foresees an increase of the vertical alignment from 0.0 to 50 cm. This is mostly due to the deformation of the existing track.

Along the whole track, the updated PD has foreseen new layers, as follows:

- 32 cm of ballast; and
- 50 cm of sub-ballast

Additional embankment improvements may be necessary for specific areas, as per Geotechnical Investigations.

Horizontal alignment: The number of horizontal curves is reduced from 44 in the PD (WB13-ALB-TRA-01 – year 2018) to 29 in the updated PD (WB13-ALB-TRA-01 – this Project). Therefore, along the whole project, there are shiftings of the existing alignment from 0.0 to 2.0 m, excepting two sections where the shifting is greater than 2.0m (see table below).

Along with important elements such as bridges, underpasses and stations, the horizontal deviations are in the range of 0-50 cm.

The main planned horizontal deviations are provided in the table below.

Table 2-1_Planned horizontal deviations greater than 2.0m

No	Segment location	Distance from the existing railway line	Comment
1	Km 18+700 – km 19+200	0.0 to 10.0 m westward	Necessary to meet the required standards
2	Km 25+700 – km 26+100	4.5 m westward	

The figure below shows the railway line section (km 18+700 to Km 19+200), which radius will be increased to allow the required trains' speed.

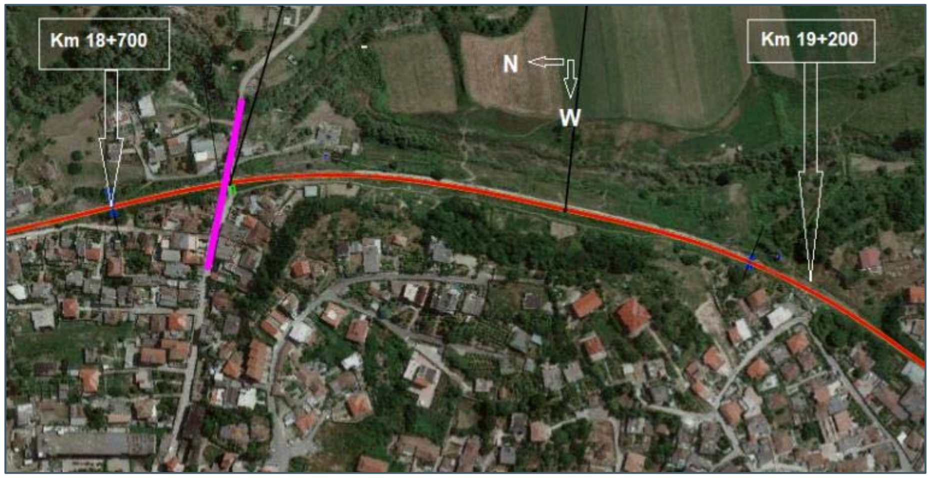


Figure 2-7_Railway line section from km 18+700 to Km 19+200

From the figure above it can be concluded that the increase of the line radius will not affect any urban infrastructure.

The next figure shows that the section from Km 25+700 to Km 26+100 lies in arable land and therefore no infrastructure will be affected.

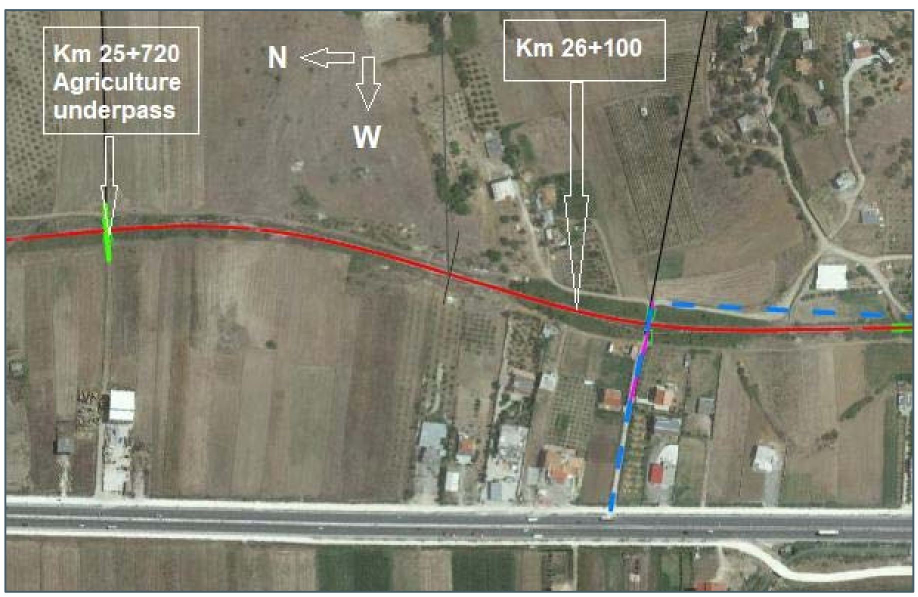


Figure 2-8_Railway line section from km 25+700 to Km 26+100

2.3.5 Railway superstructure

The superstructure includes the rails, sleepers and the ballast bed.

Existing situation

The rails are of type S42 (42kg/m) and/or S49 (49kg/m). The European standard is UIC60 (60kg/m). The rails are generally in good condition because the traffic has not been heavy.

The sleepers are of timber and in very poor condition, with many of them being broken. Some sleepers are missing, and concrete ones have replaced some others.

Figure 2-9_Damaged timber slipper at the northern entrance of Rrogozhine tunnel

The ballast consists generally of gravel or crushed stone, while it is frequently rounded and small providing poor performance. Maintenance has been non-existent for more than 25 years, and a high proportion of the ballast is unsuitable and will be replaced in the proposed renewal operations.

Planned interventions

All the existing superstructure elements will be removed and replaced with new and appropriate ones that fulfil the TEN-T standards.

The ballast will be basalt rock, which has excellent qualities to be used in the railway construction.

2.3.6 Railway sub-structure

The sub-structure includes the sub-ballast and the natural layers or subgrade.

Existing situation

The gauge width is 1,435 mm (normal gauge), while the width of the substructure bed is 5.5 m, narrower than the standard one (6.6 m wide).

For maintenance reasons, the track has been elevated over the years by some 250 to 300 mm. As a result, the embankment width at the top is reduced below the original specification. In some segments, the embankment is of considerable height (4 – 5 m) and has been consolidated over the years resulting in good quality formation.

Planned interventions

It is estimated 0.5 to 1.0m of excavation are necessary to allow the laying of the new appropriate layers.

The table below shows the estimated amount of material to be removed.

Table 2-2_Type and estimated amount of material to be removed

No	Type of excavated material	Amount (in m^3)
1	Top soil (sub - ballast)	76,000
2	Semi-rock material (subgrade)	313,000
3	Rrogozhine tunnel upgrade	24,300

The Project foresees the removal of the railway substructure filling material from Shkozet to Rrogozhine. The removed material will be disposed appropriately in the Municipalities of Durres, Kavaje and Rrogozhine. The Construction Company will prepare a detailed Waste Management Plan, which will be part of the bidding process.
The material necessary for the rehabilitated subgrade will be extracted from authorized quarries. The ballast will be replaced by basaltic material that has excellent qualities for railways line construction. The basalt will be supplied by a licensed supplier.
According to the national legislation, all the licensed suppliers are responsible for the extraction and environmental rehabilitation of their quarries. Therefore, the environmental permit for the quarries is under the responsibility of the suppliers.

2.3.7 Railway structures – Rrogozhine tunnel

Railway line structures include tunnels, bridges, underpasses, overpasses, culverts and retaining walls.

There is only one tunnel, which lies close to Rrogozhine, from km 32+060 (entrance portal) to km 32+460 (exit portal).

Existing situation

The concrete structure of the tunnel is damaged, and the surface waters penetrate through the top of the tunnel. Besides the tunnel is narrow and consequently it does not allow the future electrification of the railway line.

Figure 2-10_Northern entrance of Rrogozhine tunnel

Planned interventions

The main interventions that are included in the Detailed Design are as follows:

- The existing structure will be completely demolished and a new tunnel will be designed and built practically in the same path as the existing one. The planned shape of the new tunnel will be more extensive than the existing one to allow the future electrification of the railway line.

- The horizontal alignment will be improved and the shifting from the existing railway centreline will vary in the range of 0.0 to 1.4m. While the vertical alignment follows almost the existing one with an average shifting of 30cm.

The figure below shows the simplified cross-section (at km 32+080) of the internal profile of the existing tunnel (green line) and of the planned one (black line). The horizontal shift at this location is estimated to be 1.02m, while the vertical one 0.52m.

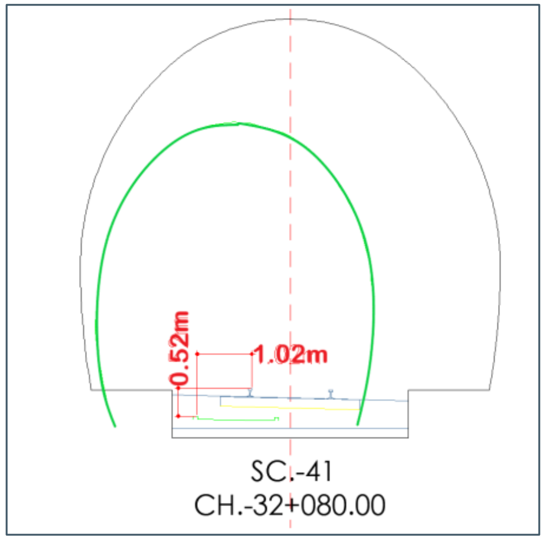


Figure 2-11_Schematic cross-section of the Rrogozhine tunnel

The geological formations traversed by the tunnel are represented by hard sandstones and therefore, it is not expected any collapse of the layers overlying the tunnel. That is confirmed by the geological study performed for the project's purposes. Consequently, the land overlying the top of the tunnel will not be affected by construction activities. This land, which is cultivated mainly with olive trees (see figure below), is private property.

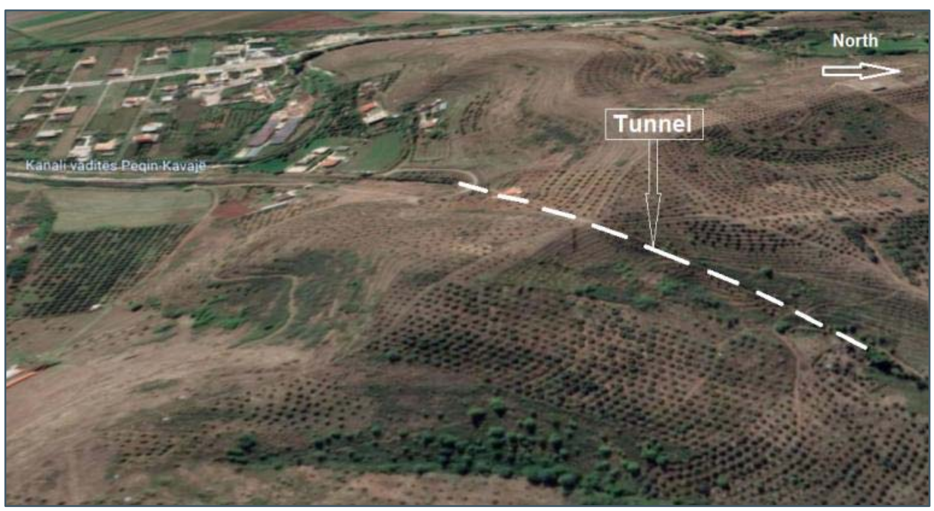


Figure 2-12_Terrain overlying the Rrogozhine tunnel (East-West view – Google Earth)

2.3.8 Railway structures - Bridges

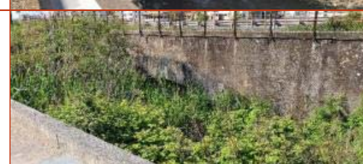
There are several arch bridges with span from 2m up to 80.0m. The bridges with span from 2.0 to 8.0m are located at: Km 11+161.5, Km 14+368.5, Km 14+733.8, Km 14+920.7, Km 22+660, Km 24+377, Km 26+370, Km 26+775, Km 26+992, Km 27+875, Km 28+380, Km 30+317, Km 30+861, Km 34+532, Km 34+868. All these bridges are judged in good conditions.

Hereinafter the bridges with a span length from 8.0 to 80.0m that are the biggest ones of the railway line are taken into consideration.

Existing situation

Along the railway line, there are five bridges with a span length longer than 8.0m. Their current conditions are given in the table below.

Table 2-3_Existing situation – bridges longer than 8.0m

No	Location; Water course	Photo	Comment
1	5+864; Shen Vlashi (Fllake) Channel		-One span cast bridge; -25 m long and 4.5m width; -Low height (1.6m); -Bad conditions
2	8+560; Agai Stream	 	-One span arch bridge; -12m long and 5.6m width; -Visually in good conditions; -Partially blocked by sediments
3	15+420; Lishati River	 	-Three span arch concrete bridge; -4.5 m width; -First span serves as an underpass for locals (cars and pedestrians); -Good conditions; -Built in unreinforced concrete
4	23+150; Darsi River	 	-Five span arch concrete bridge; -80m long and 5.0 m width; -First span serves as an underpass for locals (cars and pedestrians). The level of the road is quite low and it has been observed that it is often flooded; -Good conditions; -Built in unreinforced concrete

5	30+086; Gose Stream		-One span arch bridge; -14m long and 6.0m wide; -Visually in good conditions; -Serves as an underpass for locals. 0.5m wide footpath of each side; -Generally in good conditions; -Built in unreinforced concrete

All the above bridges are functional.

Planned interventions

The table below summarizes the planned interventions to the biggest bridges that are already included in the Detailed Design.

Table 2-4_Planned interventions – bridges longer than 8.0m

No	Location	Name of the watercourse	Proposed interventions / comment
1	5+864	Shen Vlash channel	-Demolish the existing bridge and build a new one; -Depth of piles: 20m.
2	8+560	Agai Stream	-Bridge retrofitting; -Remove sediments; -Vegetation cleaning
3	15+420	Lishati River	-Bridge rehabilitation; -Vegetation cleaning; -Bridge rehabilitation; First span serves as an underpass for locals (cars and pedestrians)
4	23+150	Darsi River	-Bridge rehabilitation; First span serves as an underpass for locals (cars and pedestrians)
5	30+086	Gose Stream	-Bridge rehabilitation; Serves as an underpass for locals (cars and pedestrians)

The small bridges (less than 4.0m long) are all in good technical conditions. They all have the same width on top of the track embankment from min. 5.5m to 6m. The concrete arches have the crown 40cm to 60cm thick. This is why it is proposed to retain the existing structures. The bridges will be 6m wide on top of the existing concrete arch by a slab with 25cm thick seated in the middle of the crown over the arch and hanging on lateral spandrel walls. All arch structures surface will be covered with a wire mesh and 5cm concrete plaster.

2.3.9 Railway structures - Underpasses

The underpasses include the road and pedestrian underpasses

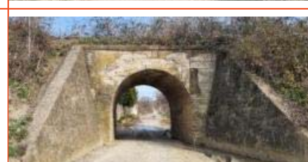
2.3.9.1 Road underpasses

There are 14 existing road underpasses that cross the railway line from Shkozet to Rrogozhine. Their assessment is based mainly on their current conditions and dimensions.

Existing situation and planned interventions
In general, the existing underpasses are in good condition, but due to lack of maintenance, some of them are affected by concrete erosion, spalling, and poor safety problems. In addition, 12 of them are narrowest than required by the present-day standards for local and urban roads. The table below lists the road underpasses and their current conditions, as well as the planned interventions that are included in the already prepared Detailed Design.

Table 2-5_Existing underpasses and planned interventions

No	Location (km); Dimensions (m)	Photo	Existing conditions	Planned intervention
1	10+547; 9.7 x4.0m		Bad conditions	Rehabilitation by retaining the abutment structure and constructing a new deck slab
2	17+100; 9.5 x4.5m		Narrow; Poor concrete; No steel reinforcement	Build a new underpass
3	17+840; 4.0 x3.5m		Narrow; Poor concrete; No steel reinforcement; Bad conditions	Build a new underpass
4	18+758; 9.5 x4.5m		Narrow; Concrete arch bridge; No steel reinforcement; Visually in good conditions	Build a new underpass
5	20+200; 4.0 x3.5m		Narrow; Reinforced concrete slab; Spalling and steel corrosion; No steel reinforcement	Build a new underpass

No	Location (km); Dimensions (m)	Photo	Existing conditions	Planned intervention
6	26+167; 9.5 x5.5m		Narrow; Concrete arch bridge; No steel reinforcement; Visually in good conditions	Build a new underpass
7	27+370; 9.5 x4.5m		**No existing underpass;** Lekaj station	Build a new underpass, only for small cars
8	27+680; 4.0 x3.5m		**No existing underpass;** Lekaj school	New Pedestrian Underpass to be constructed in correspondence of the **school**
9	28+902; 6.5 x 4m		Narrow; Reinforced concrete slab; Spalling and steel corrosion; No steel reinforcement	Build a new underpass
10	29+866; 6.5 x 4m		Narrow; Reinforced concrete slab; Spalling and steel corrosion; No steel reinforcement	Build a new underpass
11	30+601; 6.5 x 4m		Narrow; Reinforced concrete slab; Spalling and steel corrosion; No steel reinforcement	Build a new underpass
12	31+432; 9.5 x 5m		Narrow; Concrete arch bridge; No steel reinforcement; Visually in good conditions	Build a new underpass
13	34+020; 6 x 4.7m		Narrow; Concrete arch bridge; No steel reinforcement; Visually in good conditions	Rehabilitation by retaining the existing structure

No	Location (km); Dimensions (m)	Photo	Existing conditions	Planned intervention
14	34+840; 4 x 3.5m		**No existing underpass;** Rrogozhine station	New Pedestrian Underpass in correspondence of the main road

Applicable standards of the planned interventions

The planned interventions are based on the required standards and the existing conditions of these structures. The table above gives the planned intervention for each underpass, as already included in the Detailed Design.
The design of the underpasses relates to the type of the road. Hereinafter are given the proposed types of underpasses for urban and agricultural areas.

Main urban road: Underpasses up to 9.5m x 5.5m x 5.5m are proposed at five locations: Km 17+100; Km18+750; Km 26+167; Km 27+350; and Km 31+432.5.

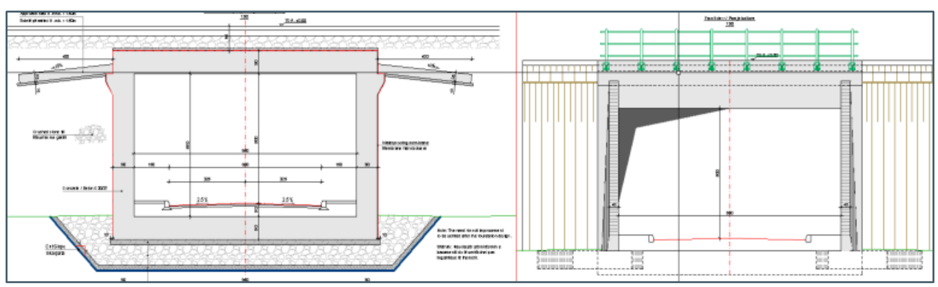


Figure 2-13_Proposed design for main urban road underpass

Secondary local road: Underpasses up to 6.5m x 3.5m x 5.5m are proposed at four locations: Km 11+809; Km28+902; Km 29+866; and Km 30+601.

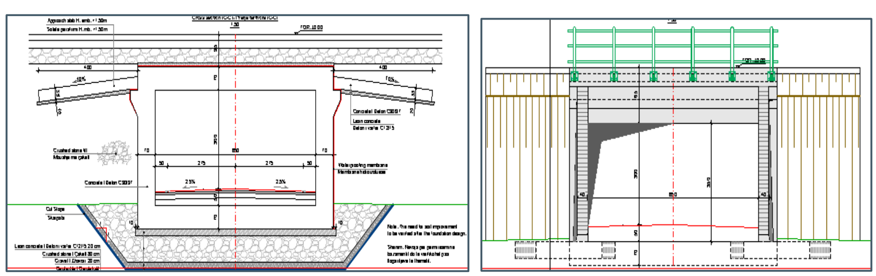


Figure 2-14_Proposed design for secondary local road underpass

Agricultural local road: Underpasses up to 4.0m x 3.0m x 5.5m are proposed at six locations: Km 17+845; Km 25+720; Km 26+992; Km 28+069; Km 28+490; and Km 32+677.

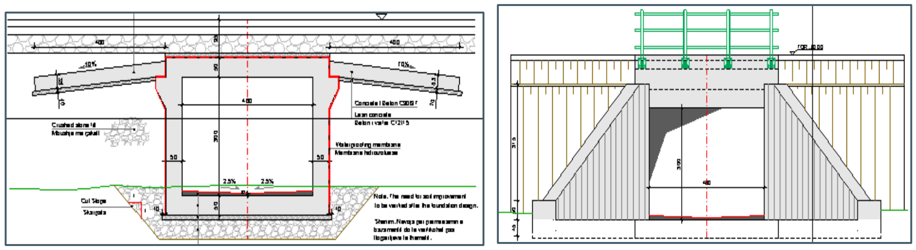


Figure 2-15_Proposed design for agricultural road underpass

2.3.9.2 Pedestrian underpasses

Generally, the pedestrian underpasses are located within the train stations or in areas near where is a concern of safety for children (schools, kindergarten), livestock (agricultural areas), etc.

Existing situation

Currently, along the railway line Durres-Rrogozhine, there is no any underpass dedicated only to pedestrians.

Proposed interventions

To improve the communication and staff and passengers' safety within the railway stations and near school buildings, the Consultant proposed and designed four new pedestrian underpasses as follows:

- Near Kavaje (Km 17+845);
- Near Kavaje (Km 20+208);
- Near Lekaj school (Km 27+680);
- At Rrogozhine station (Km 34+840)

Two types of such underpasses are designed: a-for urban areas; and b-for stations and schools.

The figure below shows the typical design proposed for pedestrian underpasses in urban areas. The proposed dimensions are 4.0 x 3.0 x 5.5m.

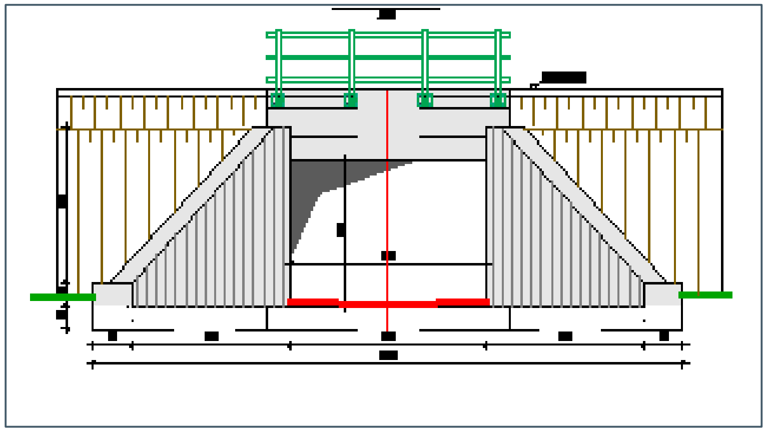


Figure 2-16_General layout of the pedestrian underpass in an urban area

While the typical design proposed for stations and schools is shown in the figures below. The proposed dimensions are 4.0 x 2.5 x 5.5m.

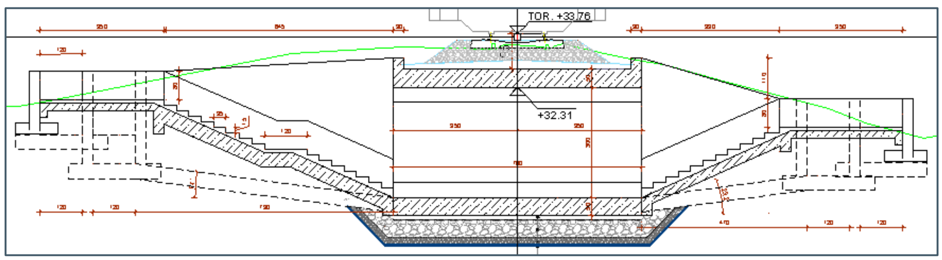


Figure 2-17_Cross section of the pedestrian underpasses at stations

2.3.10 Railway structures - Overpasses

The overpasses are represented by road and pedestrian structures.

2.3.10.1 Road overpasses

There is only one road overpass at the location called Plepa where the railway line is overpassed by the motorway Rrogozhine – Durres. This overpass complies with the required standards and therefore is not included in the project design.

Figure 2-18_Motor road overpassing the railway line at km 5+180

2.3.10.2 Pedestrians' overpasses

There are nine pedestrian overpasses from Shkozet to Rrogozhine. They are all located from Km 5+000 to Km 13+000, where the railway line runs joint and parallel to the motorway.

Existing situation

Only two pedestrian overpasses serve for overpassing both the motorway and the railway. The other seven ones are used for overpassing the motorway only. They do not cross the railway line or have deficiencies on horizontal and vertical clearances (less than 6.5m). Their function is to give pedestrians the opportunity to cross the Durres-Rrogozhine motorway, but the railway line is crossed by unprotected level crossings (see figure below). Thus, with the railway rehabilitation, the closure of the unprotected level crossings and the potential fencing, inhabitants from one side of the railway line cannot reach the nearby beach on the other side.

Figures below show two pedestrian overpasses serving only for the motorway

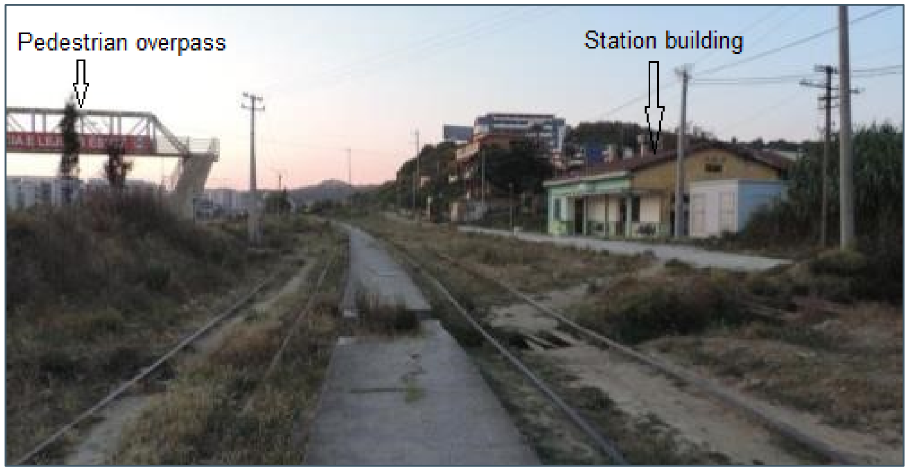


Figure 2-19_Pedestrian overpass that serves only the motorway – Golem station

Figure 2-20_Pedestrian overpass (Km 7+360) serving only for the motorway

Planned interventions

ToR do not provide neither for the construction of any new pedestrian overpass, nor for the upgrading of the existing ones. However, it is indispensable the existing structures to be upgraded to serve for both the motorway and the railway that lie joint and parallel to each other. Otherwise, the existing situation will be a source of accidents for pedestrians and therefore the Consultant COWI-IPF8 suggested this issue be included in the detailed design.

The table below gives the list of the existing pedestrian overpasses, as well as their current function and the planned interventions.

Table 2-6_Current function and planned interventions for pedestrian overpasses

No	Km & place	Current function	Planned intervention	Photo
1	6+200; Shkembi Kavajes	Overpass Highway only	Extension of the existing structure to overpass the Railway and the Secondary Road	
2	7+035; Shkembi Kavajes	Overpass Highway only	Extension of the existing structure to overpass the Railway and the Secondary Road	
3	7+360; Shkembi Kavajes	Overpass Highway only	Extension of the existing structure to overpass the Railway and the Secondary Road	
4	7+665; Shkembi Kavajes	Overpass Highway only	Extension of the existing structure to overpass the Railway and the Secondary Road	
5	8+190	Overpass Railway and Highway	• Level Crossing No. 6, Km. 8+260 nearby • Pedestrian Path to be designed in LC direction • Additional safety measures for pedestrian as fencing, signs, etc.	
6	8+625	Overpass Highway only	Extension of the existing structure to overpass the Railway and the Secondary Road	
7	9+525	Overpass Highway only	•The underpass is located on the Golem Station area. •The issue to be addressed with the Golem Station Design	
8	11+900	Overpass Railway and Highway	•Further additional detailed surveying; • Alternative design for the electrification; • possibility of shifting the alignment to reach	

No	Km & place	Current function	Planned intervention	Photo
9	13+100	Overpass Railway and Highway	3.2m from the supports; • Additional safety measures for pedestrian, as fencing, signs, etc.	

2.3.11 Railway structures – Retaining walls

Existing situation

Site investigations showed that some of the existing old retaining walls are in good conditions (e.g. near Golem), while others are sliding (e.g. near Kavaje) or are missing in some parts where slope protection is needed (e.g. near inhabited areas like Kavaje, Lekaj and Rrogozhine)

Figure 2-21_Retaining wall in good conditions - Golem

Figure 2-22_Sliding of retaining wall - Kavaje

Planned interventions

It is necessary to build retaining walls or gabions for parallel roads in order to reduce the risk.

The Detailed Design proposes the construction of roughly 5km of retaining walls, which total volume could be around 4.400 m^3.
The typical cross sections of the retaining walls and gabions proposed by the Detailed Design are shown hereinafter.

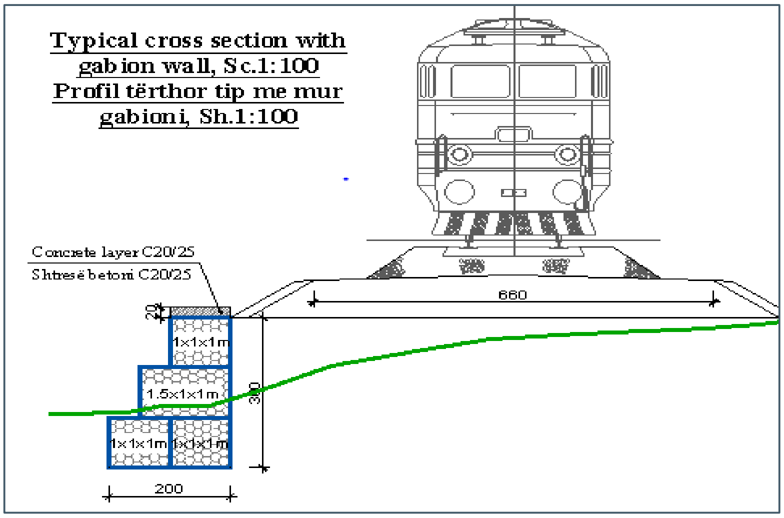


Figure 2-23_Proposed typical retaining wall with gabions

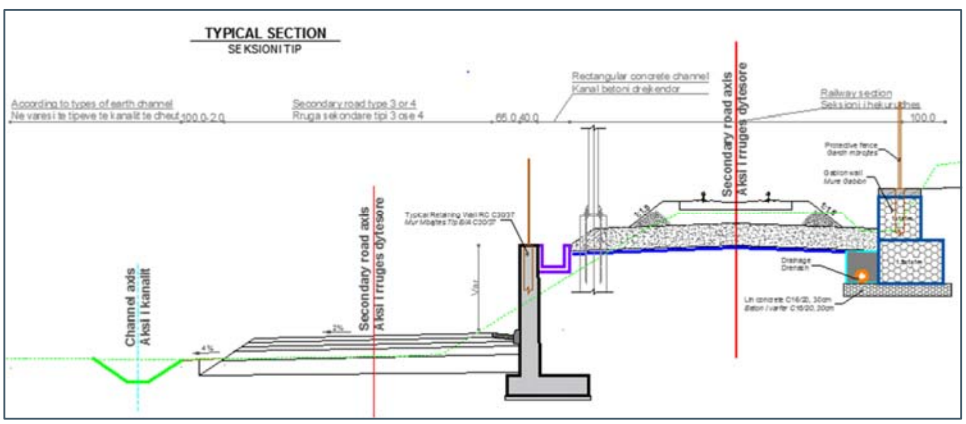


Figure 2-24_Proposed typical retaining wall in concrete

2.3.12 Railway structures - Culverts

In this section are included the structures that serve both as small drainage ones and/or as local agricultural underpasses. In total there are 63 culverts.

Existing situation

Most of these structures are arch concrete ones, which span varies from 1.0 to 5.0 m. The others are in reinforced concrete slab that does not exceed 4.0m span.

The cross section of the pipes and box culverts in most of the cases is inadequate and smaller than what is required based on the new Hydraulic design calculations. The lack of maintenance and uncontrolled vegetation has also been witnessed in almost all cases.

Due also to a number of other reasons such as blocked or possible uncontrolled excavations in the area etc., it has been witnessed in many cases that the water level in the culvert at the inlet was higher than the level of the channel. But some of the arch culverts are in good condition so it will be kept.

Figure 2-25_Existing situation of the majority of the railway line culverts

Planned interventions

Taking into account the existing situation of the pipe and box culverts and the current requirements, the Consultant concluded that from an economical and technical point of view, the repairing and improvement of the existing pipes and box culverts with span up to 1.0m of diameter size is inadvisable.

The culverts length fulfils the requirement of the project design for widening railway track embankment. Consequently, the existing arch culverts that fulfil the hydraulic requirements and are in good condition should be cleaned and retained. The other will be demolished and replaced by new appropriate ones.

Four types of culverts dimensions are proposed and included in the Detailed Design: 2.0 x 2.0 x 5.5m; 3.0 x2.0 x 5.5m; 4.0 x 2.5 x 5.5m; and 4.0 x3.0 x 5.5m. The most common type proposed by hydraulic study is 2.0 x 2.0 x 5.5m

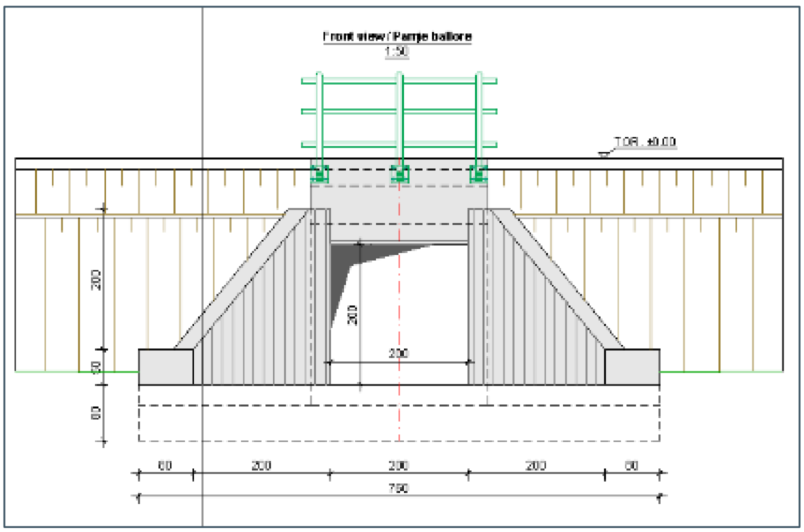


Figure 2-26_Proposed culvert 2.0 x 2.0 x 5.5 m

2.3.13 Drainage channels

Culverts and drainage channels constitute the drainage system. Drainage channels generally consist of open channel drains along the bottom edges of the embankments leading to watercourses.

Existing situation

The operability of the storm-water drainage network is obstructed. The drainage channels are filled with sediments and other debris. The lack of maintenance and the sedimentation accumulated have favoured the growth of aquatic or semiaquatic vegetation. The damages to drainage channels influence the sedimentation of the rails and sleepers and the damage of the woody sleepers.

Figure 2-27_Neglected drainage channel partly filled with sediments and covered of vegetation (pragmites australis). Left: km 5+180 (Plepa); Right: Shkozet station

The drainage channels are filled with sediments because also of the lack of retaining walls in some segments of the railway line.

Figure 2-28_Drainage channel filled with sediments because of the lack of maintenance and retaining walls (Gose Vogel Village area)

Planned interventions

The Detailed Design includes the rehabilitation of the drainage channels on both sides of the railway. All the rehabilitation activities will be carried out within the Albanian Railway land property and therefore there will not be necessary to affect other land surface. The improvement of the drainage channels will impact positively the life span of the railway and will facilitate its maintenance.

2.3.14 Level crossings

Existing situation

In total, there are identified 38 level crossings from Shkozet to Rrogozhine. Eight of them are authorized and serve for both cars and pedestrians, sixteen are unauthorized and serve for both cars and pedestrians and fourteen are unauthorized ones and serve only for pedestrians.

The eight authorized level crossings are somehow controlled with barriers which are not interlocked but operate manually. The 30 unauthorized level crossings are uncontrolled. They have been developed by locals along the line for their daily needs.

Table 2-7_ Existing Authorized Level Crossings on Durres-Rrogozhine section

No	Railway line section	Chainage	Location & Road type
1	Shkozet–Golem	2+665	Plazh (rural road)
2	Shkozet–Golem	5+180	Shkozet–Golem
3	Shkozet–Golem	8+260	Golem (urban road)
4	Golem-Kavaje	18+460	Kavaje (urban road)
5	Kavaje-Lekaj	21+560	Kavaje, Mengel (urban road)
6	Kavaje-Lekaj	23+855	Kryevidh, Kavaje (rural road)
7	Kavaje-Lekaj	25+120	Kavaj, Lekaj (rural road)
8	Lekaj-Rrogozhine	27+985	Kavaje (Lekaj station, rural road)

The unauthorized crossings present a permanent risk to the safety of trains, passengers, cars, goods, pedestrians and livestock. Section 5.15 outlines the recent statistics on level crossings' accidents at country level.

Planned interventions

The eight existing authorized level crossings will be upgraded. 25 of the 30 unauthorized ones will be closed, while five of them will be authorized and therefore will be upgraded according to the required standards.

Taking into account the urban development within the project area during the last 30 years, the Consultant, in agreement with HSH and the municipalities of Durres, Kavaje and Rrogozhine, proposed to add five other new authorized level crossings. Thus, the total number of level crossings is as follows:

Table 2-8_Types and number of level crossings according to PD

No	Type of level crossing	Number	Comment on LCs
1	Total existing level crossings	38	Authorized + unauthorized
2	Existing authorized level crossings	8	To be upgraded
3	Unauthorized existing level crossings	30	25 of them will be closed, while 5 will be authorized and upgraded
4	New authorized level crossings	3	Proposed by PD and DD

No	Type of level crossing	Number	Comment on LCs
5	LC upgrade to the required standards	16	8 existing (authorized) + 5 existing (non-authorized) +3 new ones

During the preparation of the PD Update other level crossings became necessary as follows:

- Shkozet triangle. In the IR, the Consultant noted that with the inclusion of the Shkozet Triangle on the project, an additional level crossing is necessary at the intersection of the new rail track with "Rruga e Shqipeve" street.

- Rrogozhine station area. The PD does not provide any solution regarding the road traffic in the Rrogozhine station area. The situation is more complicated considering the rail track deviation in the south direction. There is an entire district of Rrogozhine city on the left part of the Railway. Their only access road is through "Rruga e Dafinave – Bay Leaf Trees Street" street that intersects both tracks Rrogozhine- Lushnja and Rrogozhine - Elbasan. The Consultant suggested two new LCs, which are already included in the DD.

As a result, 16 secured level crossings were planned in the updated PD and already included in the DD. The table below shows the planned secured level crossings and the stations between which they are located.

Table 2-9_Planned secured level crossings and their respective length

No	Km	Station / interstation	Photo	Comment
0	0+251	Golem-Tirane; Plazh, local urban road		New level crossing
1	2+665	Shkozet-Golem; Plazh, rural road		-Existing, authorized. -To be upgraded
2	3+000	Shkozet-Golem; Plazh, rural road		-Existing, non-authorized; -To be authorized and upgraded

No	Km	Station / interstation	Photo	Comment
3	3+380	Shkozet-Golem; Plazh, rural road		-Existing, non-authorized; -To be authorized and upgraded
4	4+050	Shkozet-Golem; Plepa, rural road		-Existing, non-authorized; -To be authorized and upgraded
5	5+180	Shkozet-Golem; Plepa, national road		-Existing, authorized; -To be upgraded
6	8+260	Shkozet-Golem; Golem, urban road		-Existing, authorized; -To be upgraded
7	18+460	Golem-Kavaje; Kavaje, urban road		-Existing, authorized; -To be upgraded
8	19+360	Golem-Kavaje; Kavaje, urban road		-Existing, non-authorized; -To be authorized and upgraded

No	Km	Station / interstation	Photo	Comment
9	20+340	Kavaje-Lekaj; Kavaje, urban road		-Existing, non-authorized; -To be authorized and upgraded
10	21+560	Kavaje-Lekaj; Kavaje, urban road		-Existing, authorized; -To be upgraded
11	23+885	Kavaje-Lekaj; Kryevidh (Kavaje), rural road		-Existing, authorized; -To be upgraded
12	25+120	Kavaje-Lekaj; Lekaj, rural road		-Existing, authorized; -To be upgraded
13	27+985	Kavaje-Lekaj; Lekaj station, rural road		-Existing, authorized; -To be upgraded
14	35+260	Rrogozhine-Lushnje; Rrogozhine urban road		New level crossing
15	35+260	Rrogozhine-Elbasan; Rrogozhine urban road		New level crossing

All the level crossings are designed to fulfil the EU norms and Standards, including automatic barriers and the new System of Signalling and Telecommunications.

2.3.15 Service and connectivity roads

The service and connectivity roads will not be tendered by the Project. Their rehabilitation/construction will be under the responsibility of the local governments and the Albanian Road Authority. However, the Consultant COWI-IPF8 included them in the ESIA to demonstrate that these roads will facilitate the circulation on both sides of the railway line and that all the settlements crossed by the railway will be linked to the designed level crossings.

Some local roads that run almost parallel to the existing railway line (see Appendix 2.2 – orthophoto of the project area) serves for the circulation of the cars and pedestrian of the local population both parts of the railway line.

Existing situation

The majority of the local roads do not satisfy the required standards for such types of roads. They are non-paved and often narrow. In addition, some local roads cross the railway line at some non-authorized level crossings.

The non-authorized road crossings constitute a permanent risk for cars and pedestrians. They also do not allow the trains to run with the due speed because of the high risk for accidents.

Planned interventions

The project foresees the improvement of the existing service roads and opening of roughly 2.4 km of new ones. The opening of these roads is imposed by the planned grouping of the level crossings (authorized and non-authorized) into a smaller number of crossings that will be all secured in compliance with the required standards. The typical cross sections of the roads will be based on the Albanian Road Design Standard, according to which the following road types may be designed in function of the local situation.

- Type 1: width 6.00 to 7.50 m in urban areas with lateral sidewalks of 1.50 m width;
- Type 2: main roads of width 6.00 to 7.50 m for interurban traffic;
- Type 3: paved secondary roads of width 4.50 to 5.50 m; and
- Type 4: non-paved secondary roads of width 4.00 to 5.50 m.

The figure below shows the different layers applied to each of the above mentioned road types.

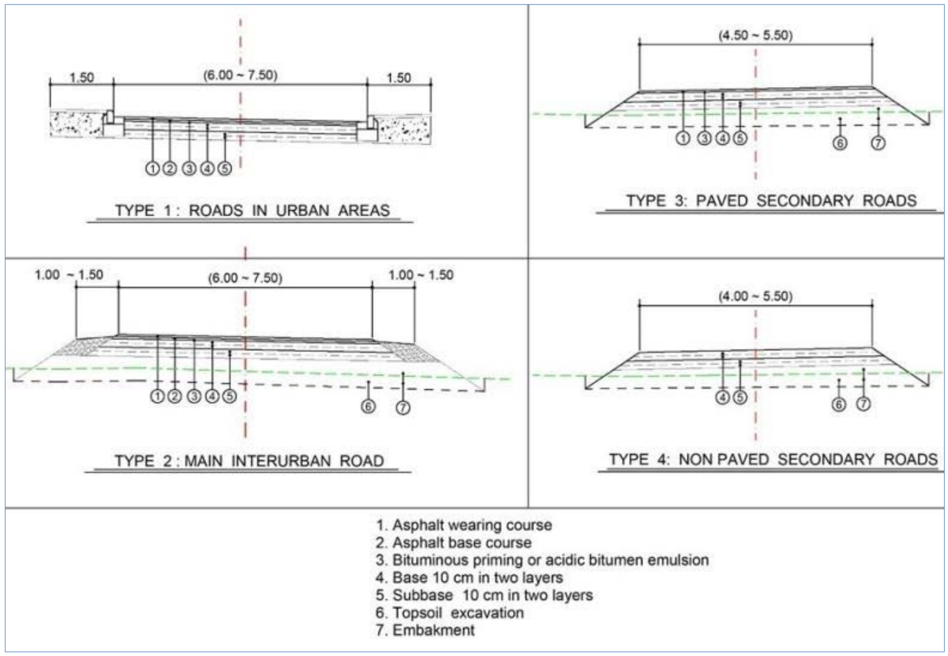


Figure 2-29_Road types 1, 2, 3 and 4 according to the national regulations

The table below lists the existing service roads that are planned to be upgraded

Table 2-10_Existing service roads to be upgraded and new ones

No	Location & length	Current situation	Planned interventions	Photo
1	2+600 to 4+000; (1400 m)	**Existing Road**, partially asphalted on the Urban area of Shkozet	New road (Type F2; Local Urban) designed parallel to the railway	
2	9+500 to 9+600; (100 m)	**No road;** Golem station	New road (Type F2; Local Urban)	
3	19+360 to 20+300; (940 m); Lies from LC8 to LC9	**Existing gravel road**, partially overlapped with the secondary tracks of Kavaje station. The road is used as access to recently built houses.	New road (Type F; Local Urban) designed parallel to railway station fencing).	

4	27+300 to 27+750; (500 m)	Lekaj Station; **Existing gravel road**, partially overlapped with the secondary tracks of Lekaj station	New road (Type F; Local Urban) designed parallel to railway station fencing)	
5	34+840 to 35+270; (430 m)	Rrogozhine Station. **Existing gravel road**, partially overlapped with the secondary tracks of Rrogozhine station. The road is used as access to recently built houses.	New road (Type F; Local Urban) designed parallel to railway station fencing)	

2.3.16 Stations

There are four railway stations within the project area, namely Golem, Kavaje, Lekaj and Rrogozhine. The Shkozet station is part of the Durres-Tirane railway line project that is currently being tendered (September 21.2020) and therefore the construction works will soon start.

Existing situation and planned interventions

The table below shows the railway stations and their location and type.

Table 2-11_Railway stations location and type

No	Station	Location	Type of station
1	Golem	Km 9+540	Passengers
2	Kavaje	Km 20+000	Passengers; Freight
3	Lekaj	Km 27+500	Passengers
4	Rrogozhine	Km 34+700	Passengers; Freight

The table below summarizes the current situation and the planned interventions for each station.

Table 2-12_Current situation and planned intervention for each station

No	Current situation and planned interventions for each station	
1	**Golem station**	
2	Current situation	The existing station building is very old and therefore not compliant with the required standards
3	Planned interventions	New station building; The existing pedestrian overpass should be upgraded to overpass both the motorway and the railway
4	**Kavaje station**	
5	Current situation	The existing station building is very old and not compliant with the required standards

No	Current situation and planned interventions for each station	
6	Planned interventions	New station building
7	**Lekaj station**	
8	Current situation	The existing station building is very old and not compliant with the required standards
9	Planned interventions	New station building; A new pedestrian underpass should be built
10	**Rrogozhine station**	
11	Current situation	-The existing station building is very old and not compliant with the required standards; -There are two families living in the station's building
12	Planned interventions	-New station building, which will be located 70m north of the existing one, inside the area of the existing station; -Both families living in the existing station building should be appropriately resettled.

The tendering process will require the stations' buildings to be "green" buildings, which include the following:

- It is recommended to use *green building materials* with significant recycled content that are non-toxic, regionally available, cost-efficient, durable, and easy to maintain.
- *Rainwater captured* from the stations' roofs and platform canopies, can be used for other water needs in the station. Collected water can be stored in cisterns or cleansed before being redirected to other uses or returned to the municipal grey water supply.
- Buildings and stations' areas will be provided with containers for *differentiated waste collection and recycling.*
- The stations' buildings and platform canopies must fulfil the *EU standards on energy efficiency*.

The backbone of the EU policy for energy efficiency in buildings are the "Energy Performance of Buildings Directive 2010/31/EU" (EPBD) and the "Energy Efficiency Directive 2012/27/EU" (EED) that include:

- *Onsite renewable energy* supplies should be used in order to reduce environmental and economic impacts associated with fossil fuel energy use. Integrated photovoltaics can be installed on stations' roofs and platform canopies.
- *Building orientation and design:* Buildings will be oriented to bring abundant natural daylight through large windows to reduce lighting requirements. The exteriors will have shading devices (sunshades / stretched metal sheets), canopies, green screens, trees), particularly on the southern and western facades to block hot summer sun.
- *Effective insulation* on building's walls and roof to prevent cool air leakage in the summer and warm air leakage in the winter. All insulating materials must comply with EU Standards.

- Use of high efficiency dual-glaze windows, external doors and curtain walls *with thermal and sound insulation* to reduce heat gain in summer and heat loss during winter months.
- *Indoor Environmental Quality:* Natural daylight should reaches at least 75% of the building's interior. Natural ventilation (via operable windows, building orientation, and wind chimneys) will bring fresh air inside. Besides, the HVAC (heating, ventilation and air conditioning) system must filter all incoming air and vent stale air to the outside.
- Use of *energy-efficient heating, cooling and water-heating systems* to reduce maintenance costs and energy consumption. The use of appropriate lighting system will reduce the waste generation, too.
- All the appliances should fulfil the EU standards and have ENERGY STAR ratings.

The design will improve the services to be offered to passengers: accessibility of public transport, parking areas, access to passenger platforms, pedestrian walkways, sidewalks, asphalt paving for the surrounding area for taxi, bus, car drop off, etc.

All the railway stations that have a difference in the elevation between the platform and the parking area are designed with ramps for disabled persons. In addition, there are designed dedicated parking area for this category of persons. Inside all these four station buildings there are designed dedicated spaces and other facilities for this category of persons and the women with little children.

Figure below shows a typical 3D view of a new one-floor station

Figure 2-30_Typical 3D view of a new station – one floor station

The planned interventions for each station are outlined hereinafter.

Golem station

The main pedestrian and vehicle access of the station area is situated on the southern part. There is a pedestrian area or plaza connecting the station building with kiss and ride parking and people with disabilities parking spot positioned on the left side of the main Station area access. There is also a vehicle maintenance/emergency access to the northern part of the building where the operational unit is situated.

Travellers can reach the platform directly, from the pedestrian plaza without passing through the station building. Passengers waiting inside the building can access the platform through the lobby. The platform itself is partially covered by the station canopy.

Figure 2-31_Golem Station Layout

Kavaje station

Kavaje Station building is an example of basic new station building with added modules.

The main pedestrian and vehicle access of the station area is situated on the northern part. There is a pedestrian area or plaza connecting the station building with kiss and ride parking and people with disabilities parking spot positioned in front of the main Station area access. On the left side of the main station area access a drive and ride (parking area) is situated with taxi parking and public parking plots.

Travellers can reach the platform directly, from the pedestrian plaza without passing through the station building. Passengers waiting inside the building can access the platform through the lobby. The platform itself is partially covered by the station canopy.

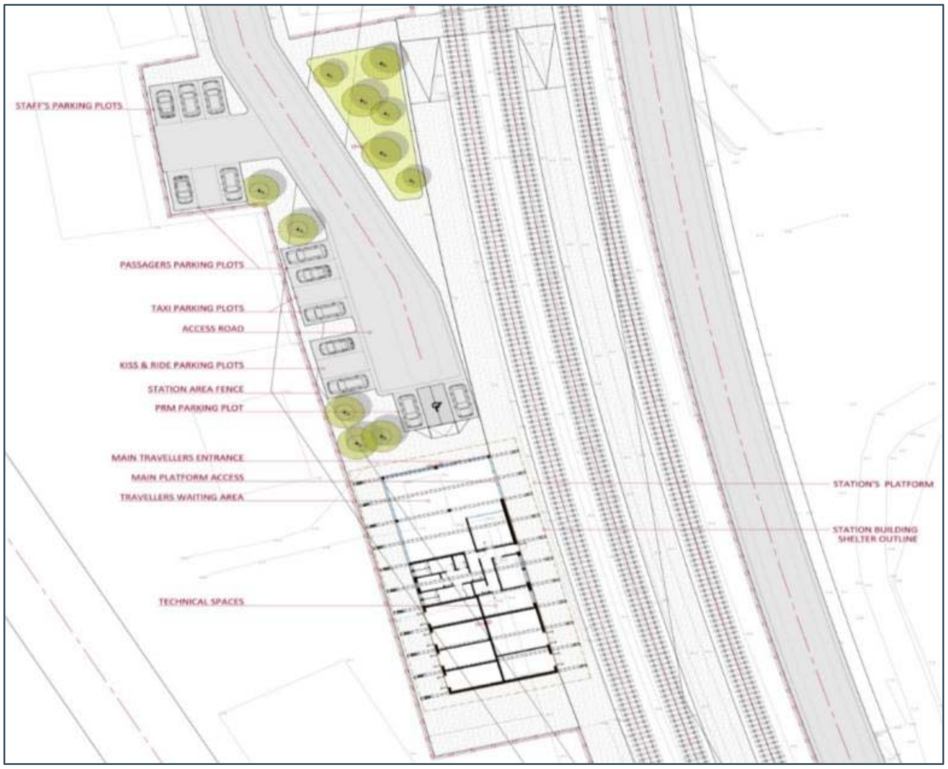


Figure 2-32_Kavaje Station Layout

Lekaj station

Lekaj Station building is an example of basic new station building with added modules.

The main pedestrian and vehicle access of the station area is situated on the northern part. There is a pedestrian area or plaza connecting the station building with kiss and ride parking and people with disabilities parking spot positioned in front of the main Station area access. Taxis plots are situated at the entrance of the area. On the left side of the main station area access, there are public parking plots.

Travellers can reach the platform directly, from the pedestrian plaza without passing through the station building. Passengers waiting inside the building can access the platform through the lobby. The platform itself is partially covered by the station canopy.

Rrogozhine station

Rrogozhine Station building is an example of basic new station building with added modules.

The main pedestrian and vehicle access of the station area is situated on the south-east part. There is a pedestrian area or plaza connecting the station building with kiss and ride parking and people with disabilities parking spot positioned in front of the main Station area access. Entering the station area there are well-organized the drive and ride (parking area), taxi parking plots and public parking plots.

Travellers can reach the platform directly, from the pedestrian plaza without passing through the station building. Passengers waiting inside the building can access the platform through the lobby. The platform itself is partially covered by the station canopy.

Figure 2-33_Rrogozhine Station Layout

Plazh stop

Besides, near Shkozet a station called "Vendqendrimi i Plazhit – Beach Stop" or "Plazh Stop" is designed for the seaside in the summer holidays period. No station building has been designed for this this "Plazh Stop". It consists of the components of the arrival zone such as pedestrian access, Taxis, Kiss and Ride access.

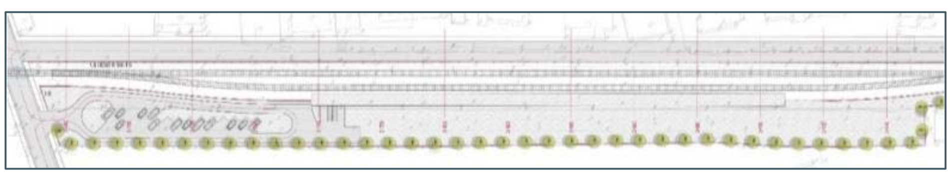


Figure 2-34_Plazh stop Layout

2.3.17 Signalling and Telecommunication

Existing situation

The signalling system was designed and installed in 1982 by an East German company to all stations of the Durres – Elbasan line. It is operated by relays.

Currently, the communication system is based on analogue telephony without clocks, passenger information system, and speakers in the stations. Some level crossings are not secured. The other that have barriers operate manually with the assistance of level crossing attendants, according to sound signals from the passing trains. The railway employees often communicate using cell phones. Accidents may happen when there is a signal failure from the mobile phone providers.

Planned interventions

A signalling and telecommunication system will be installed within the whole railway line. The communication will be based on the installation of an optical cable (along the whole railway line), integrated telecommunication system (at the four stations and Plazh stop).

Signalling system: The train operation must be carried out safely, avoiding dangerous situations and, if necessary, stopping the train sufficiently in advance to avoid reaching or derailing and keeping the train stopped until the danger has been eliminated.

The protection against the trains' collision is done through the following:

- Preventing the train to skip a red light.
- Controlling the speed of the train.
- Advising the driver sufficiently in advance.
- Activating the emergency brakes in case of danger.

To fulfil these functions the Signalling System will use the following sub-systems[11]:

- Interlocking and Field Elements Sub system
- European Train Control System (ERTMS/ETCS).
- Centralized Traffic Control (CTC) Subsystem.

Telecommunication system: The telecommunication system is based on GSM-R system related to Base-Transceiver Stations that will be installed in each station (GSM-R will be installed at a later stage). The communication centre will be based in Vore station, as decided by HSH.

Other installations: Other installations include video surveillance, interruptible power supply (UPS), dispatching system, clocks system, passenger and public announcement systems, office telephony, etc.

Video surveillance is a part of the technical security system to protect the vital parts of the railway line against vandalism, fire, other influences and protection of passengers and personnel working to support railway systems. Video-monitoring system shall be installed on all stations and also on critical places, such as bridges, tunnels, crossings, etc. The video-monitoring system will be remotely controlled from TCC Vorë.

[11] WB21-ALB-TRA-01, Signaling and Telecommunication, draft report, Sept.2020

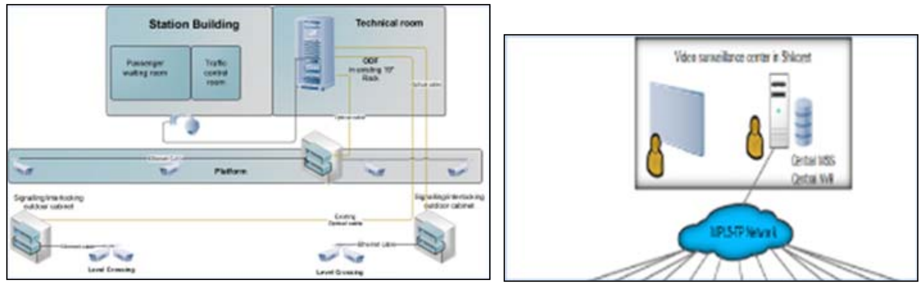


Figure 2-35_Scheme of the surveillance system

Protection measures

Signalling system: The detailed design takes into account the sources of danger and protection measures during the operation of the signalling and telecommunication devices.
The potential danger sources are electrical, including:

- high touch voltage,25 KV 50 Hz
- possible injury because of a fall from the signal mast, possible during the cleaning
- manual throwing of the point or derailer
- Handling of diesel aggregate

While the mechanical sources of danger include mainly any eventual explosion on the battery room.

The protection measures include: protective insulation, protection earthing, low voltage, danger from the 25 kV, 50 Hz voltage of the overhead catenary line (OCL), protection from fire, etc.
Telecommunication system: All electrical equipment and installations affect each other when the devices are interconnected or located in close proximity. The Directive 2004/108/EC determines the limits of electromagnetic radiation of the equipment. The electromagnetic radiation of the devices must be limited in order to be ensured that the use of the device will not disrupt the normal functioning of the telecommunication system and the other equipment. The devices used on the field must fulfil the provisions of national legislation[12] ensuring the protection of the other equipment against electromagnetic interference, as well as the protection of human[13]. The Directive requires that the design and manufacture of equipment correspond to the essential requirements of electromagnetic compatibility.

The Directive applies to the entire telecommunication equipment - electrical and electronic apparatus and fixed installations.
The essential requirements for electromagnetic protection provide that the telecommunication equipment is designed and manufactured in such a way that:

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[12] DCM 2011 "On approval of the rules for protecting against the ionizing radiation"

[13] Law 10469/2011, as amended "On the protection from ionizing radiation"

- The electromagnetic interference generated by it does not exceed the level above which radio and telecommunication equipment or other equipment cannot operate as intended;
- The level of protection of the device against electromagnetic interference is such that it enables it to operate without unacceptable degradation of its parameters when working as intended.

2.3.18 Fencing

Fencing avoids accidents on locals and livestock.

Existing situation

The existing railway line is not fenced and therefore there is a risk for pedestrians and livestock during crossing of the line anywhere.


Figure 2-36_Unauthorized pedestrians and animals crossing at Rrogozhine station area

Planned interventions

The existing railway line is not fenced and therefore there is a risk for pedestrians and livestock when crossing the line anywhere.

The project foresees the fencing of the whole railway line as follows:

- Length of fencing for railway stations: 7.940 meter
- Length of fencing for the open line: 58.828.000 meter

The fence will be installed within the stations' areas and railway belt that are HSH property.

Two typical fencing drawings have been prepared, as follows:

- Fencing for the Open Line, which will be 1.90m height; and
- Fencing for the railway stations, which will be 2.20m height.

At the open line there is a combination of barbed and smooth wires, while at the stations there are designed only smooth wires. The mesh size will be generally 5cm to ensure the fence to be solid.

The Railway Line fencing is part of the General Layout Design of the Railway Line and Parallel Roads.

Figures below show both types of typical fencing.

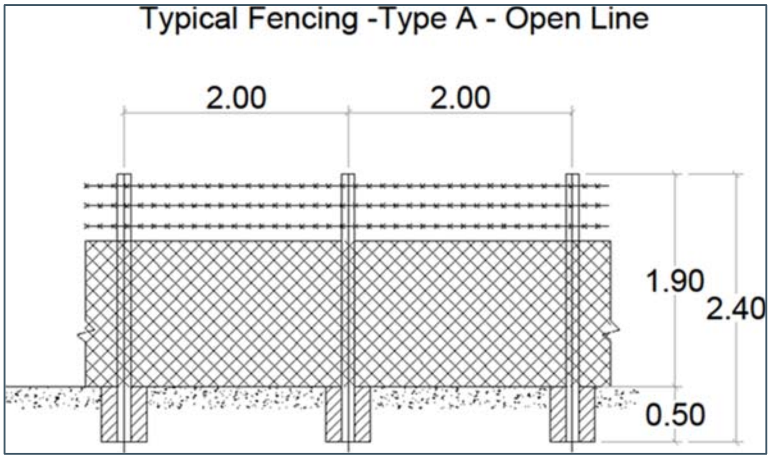

Figure 2-37_Typical fencing for the open line

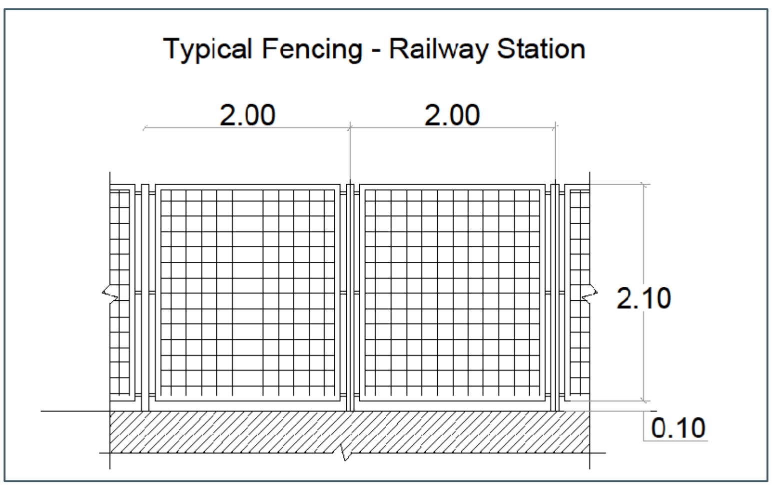

Figure 2-38_Typical fencing for the stations

3 Regulatory framework and guidelines

This chapter analyses briefly the national, EU and EIB requirements regarding the ESIA level assessment, the formal consultations and other aspects of environmental protection to be fulfilled for the proposed project.

ToR state that "the ESIA will consider the provisions of the national laws as well as the IFIs relevant environmental and social policies".

In the Kick of Meeting it was decided an ESIA to be submitted fulfilling the EIB requirements, which are based on the EU environmental regulations.

As the Albanian environmental regulations are in line with the EU ones, it can be concluded that the ESIA process on the proposed project should satisfy the national and EU environmental regulations, as well as the EIB environmental and social standards[14]. According to the ToR, "when the Albanian regulations differ from the EU or IFI environmental standards, the Project is expected to meet those that are the more stringent".

Whether they differ, the most stringent should be applied.

3.1 ESIA process

This section takes into account and compares the national, EU and EIB regulations on the required EIA assessment level and the related consultations.

Steps of the ESIA process

According to the EU EIA Guidance on Scoping stage[15], the steps that need to be followed during the ESIA process are given in the table below. As provided in the comments of this table, the requirements of the national, EU and EIB on the different stages of this process are almost the same.

According to the EU EIA Directive[16], the Albanian Law 10440 "On EIA"[17] and the EIB Environmental and Social Standards (October 2018), the ESIA process involves the following steps.

Table 3-1_ESIA process stages and EU, Albanian and EIB requirements

No	Stage		Comment
1	Screening (as appropriate)	The Competent Authority (NEA) decides whether an EIA is required	Not required for projects included in Annex I of EIA

[14] EIB Environmental and Social Standards, 2018
[15] http://ec.europa.eu/environment/eia/pdf/EIA_guidance_Scoping_final.pdf
[16] ec.europa.eu/environment/eia/pdf/Revised EIA.pdf
[17] Law 10440/2011 "On Environmental Impact Assessment"

No	Stage		Comment
		and if it does, then which level of assessment is required	Directive, Annex I of the Albanian EIA Law; Required for projects included in Annex II of EIA Directive and Annex II of the Albanian EIA Law
2	Scoping (as appropriate)	Identifies the key issues and impacts, the content and extent of the assessment, and specifies the information to be included in the EIA Report, in other words refers to the preparation of ToR for EIA.	Albanian regulations require a scoping stage but not a scoping report; EU EIA Directive foresees Scoping to be mandatory only when it is requested by the Developer to the Competent Authority; Scoping report recommended by EU EIA Directive and EIB ESS
3	EIA report preparation	EIA report includes [18]: Information on the project; Baseline information; Likely significant effects; Proposed Alternatives; Mitigation measures; and a Non-Technical Summary	Required by EU, Albania, and EIB. EIA report to be prepared after the Scoping stage; Structure and content of the EIA report will be prepared during the scoping stage and included in the scoping report; ESAP, LARF/P, SEP, and ESMP to be prepared parallel to EIA report
4	Information and consultation	EIA Report is consulted with public and stakeholders; EIA improved where necessary subject to consultations information	Required by EU, Albania, and EIB

[18] Annex IV of the EIA Directive 2011/92/EU as amended

No	Stage		Comment
5	Decision Making and Development Consent	Based on the EIA report and the consultation results, the Competent Authority decides whether the project causes significant environmental effects. This must be incorporated into the final Development Consent decision.	Required by EU, Albania, and EIB
6	Information on Development Consent	The public is informed on the Development Consent decision.	Required by EU, Albania, and EIB
7	Monitoring (as appropriate)	During construction and operation the developer must monitor the identified significant adverse effects as well as the proposed mitigation measures	Required by EU, Albania, and EIB

The term "EIA" in Albanian and EU environmental legislation, as well as in the EIB ESS also include the social issues, and therefore "EIA" according to these regulations means "ESIA" according to other IFIs (e.g., EBRD environmental terminology). It should be underlined that in the EIB ESS [19] are used both these terms.

The information and consultations according to Albanian and EU regulations correspond to EIB's Stakeholder Engagement [20].

The following flow chart, prepared by UNEP [21] shows the relationships between the EIA standard steps, as well as the main stages of the public involvement.

[19] EIB Environmental and Social Standards, 2018
[20] Standard 10 of EIB Environmental and Social Standards
[21] unep.ch/etu/publications/EIA_2ed/EIA_E_top2...

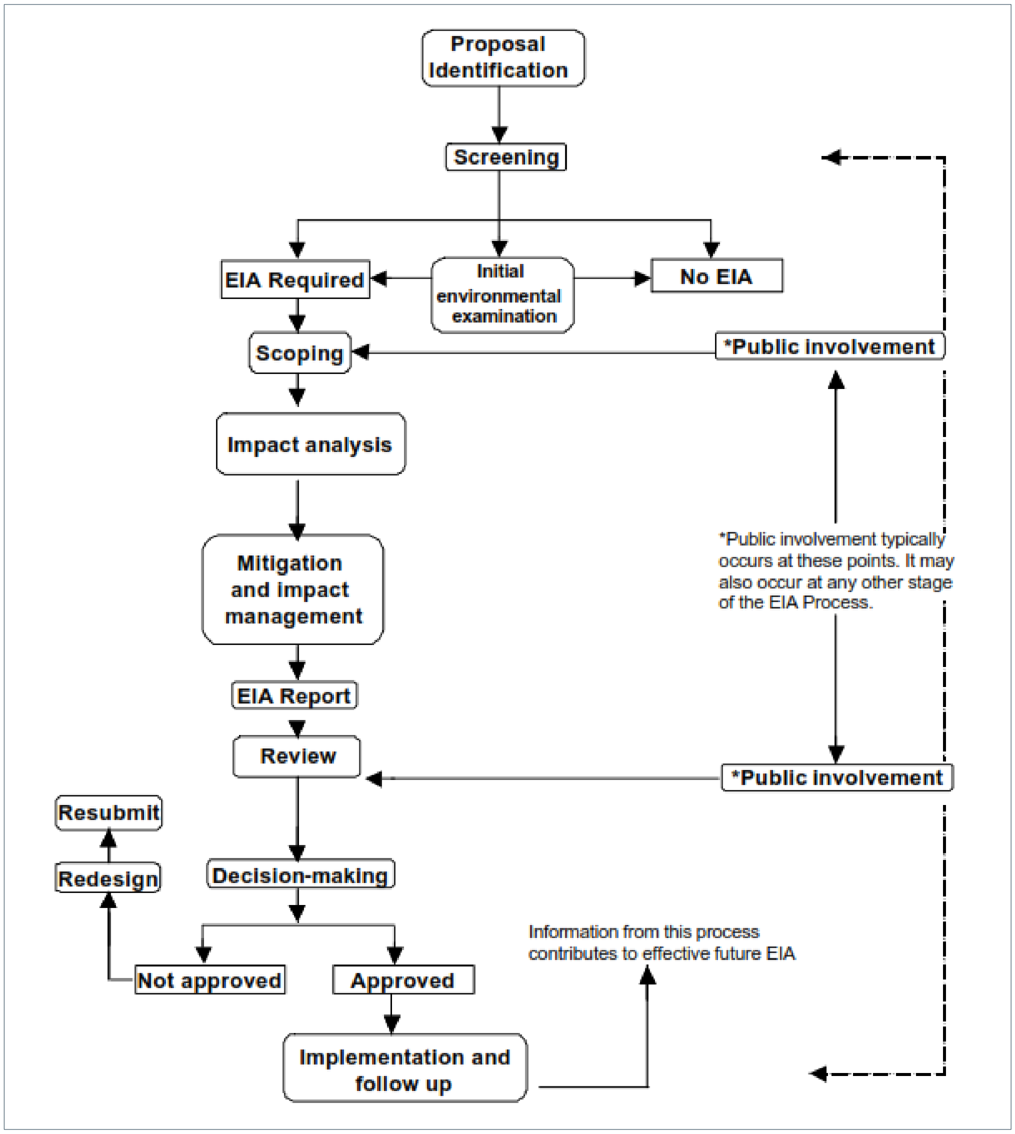

Figure 3-1_ESIA process flowing chart (source: UNEP)

With respect to the ESIA report preparation for the proposed project and the related ToR and IR provisions, the required ESIA process stages and the related outputs are described hereinafter.

3.2 ESIA screening for the proposed project

Although the ToR requires to be submitted to a comprehensive ESIA process, the Consultant judged necessary to discuss the EU and national regulations on the EIA level assessment to which the proposed project should be submitted.

3.2.1 EU regulations

According to the EIA Directive 2014/52/EU amending Directive 2011/92/EU the list of the railway projects that require a compulsory EIA study (see Annex I of the Directive) includes:

- Point 7: *"(a) Construction of lines for long-distance railway traffic and of airports with a basic runway length of 2100 m or more);*

Discussion:

- The Project is listed in Annex I of the EIA Directive, as the existing railway line components (bridges, underpasses, retaining walls, culverts, stations' buildings, etc.) will be demolished and then re-build, mostly within the existing railway track. As such, the Project should be submitted to a compulsory EIA process

3.2.2 National regulations

The Albanian Law 10440/2011: "On EIA"[22], which is in line with the EU EIA Directive, includes two annexes, which contain:

- Annex I: List of projects, which are considered as having significant effects on the environment and therefore require a full EIA;
- Annex II: List of projects, which require a "Preliminary EIA".

The railway projects listed in Annex I of the EIA Law are as follows:

- Point 7: *"(a) Construction of lines for long-distance railway traffic and of airports with a basic runway length of 2100 m or more)";*

Discussion:

- The Project is a railway construction, as the whole railway line (roughly 34 km long) components, including most of the bridges, underpasses, stations, culverts, etc., will be built from the beginning. As such, the Project is listed in Annex I of the EIA Law, and therefore it should be submitted to a "full EIA process", which corresponds to an EIA according to EIA Directive.

3.2.3 Formal screening decision

According to the Albanian EIA Law, a formal screening decision should be taken by the National Environmental Agency (NEA) based on the necessary information provided by the project's developer under the form of a short EIA screening report.

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[22] http://www.qbz.gov.al/Ligje.pdf/mjedisi/ligji%20per%20mjedisin.pdf

On May 2020 the Consultant prepared a screening report, based on which the National Environmental Agency decided[23] the proposed project to be submitted to a "full EIA" according to the Albanian environmental terminology that is identical to "a comprehensive EIA" according to the EU environmental terminology.

3.3 Public information and consultations

3.3.1 Project's requirements

Information and consultations during the ESIA process must fit with the EU, National and EIB requirements on this matter and should be commensurate with the expected impacts and the affected stakeholders.

As stressed in the Inception Report, amongst EU, national and EIB standards on the consultations, the most stringent of them should be applied by the Consultant.

In addition, the Albanian regulations require the consultations to be described and documented. The ESIA documentation package for obtaining the Environmental Declaration includes "a summary of the public consultations"[24].

3.3.2 EU, National and EIB requirements

3.3.2.1 EU regulations

EIA Directive 2014/52/EU provides for the approach to public consultation. Article 6 of the Directive stipulates "Member States shall take the measures necessary to ensure that the authorities likely to be concerned by the project by reason of their specific environmental responsibilities or local and regional competences are given an opportunity to express their opinion on the information supplied by the developer and on the request for development consent. To that end, Member States shall designate the authorities to be consulted, either in general terms or on a case-by-case basis. The information gathered pursuant to Article 5 shall be forwarded to those authorities. Detailed arrangements for consultation shall be laid down by the Member States".

Albania is not a member state and therefore the EU Directive is not binding. However, given the status of the candidate country and the process of approximation of Albanian legislation to the EU legislation, EU directives are relevant in the case of Albania as well.

As a result, due to the full approximation of Albanian Law on EIA with the EU EIA Directive, and CMD 247/2014 which provide for the necessary information

[23] Screening decision taken in June 08. 2020 (see SEP)

[24] https://e-albania.al/eAlbaniaServices/MTM/13278/apl_ndikim_mjedis_dokumentacioni.pdf

and consultations on the EIA process, then, according to EU regulations, the consultations for all stages of the EIA will be arranged based on the Albanian requirements.

Aarhus Convention

The Aarhus Convention came into force in 1998 and links environmental rights and human rights and is based on the belief that it is a basic right of present and future generations to live in an environment adequate to health and wellbeing. The convention is focused on achieving this through the implementation of three pillars: rights of access to information, access to decision-making, and access to justice. Albania has ratified the Aarhus Convention on 27/06/2001.

Public participation in decision-making is fundamental in the Convention. The term public participation is not explicitly defined but involves the activity of members of the public working in partnership with public authorities to reach an optimal result in decision-making and policymaking. A minimum requirement of this is to ensure effective notice, supply of adequate information, proper procedures, and appropriate taking account of the outcome of public participation. The level of involvement of the public in a particular process depends on a number of factors, including the expected outcome, its scope, who and how many will be affected, whether the result settles matter on a national, region or local level, and so on. The Convention states that public participation should be timely, effective, adequate and formal, and contain information, notification, dialogue, consideration and response.

3.3.2.2 National regulations

The consultation requirements at the national context are provided by the Albanian Law 1440/2011 "On EIA" and CDM 247/2014: "On the rules and procedures for consultation with public consultation and public involvement during the environmental assessment process". Article 14 of the EIA Law provides for the public and stakeholders to be involved in the EIA process.

The formal procedure of public hearing during the EIA process is provided by the Council of Ministers Decision (CMD) 686/2015, as amended by CMD 714/2019 "On the approval of rules, responsibilities, time frame and procedures of the Environmental Declaration decision transfer". The land ownership where the project will be developed is mostly Albanian Railways property while a topographic and cadastral survey is ongoing (June 2020).

Law 107/2014 on Territorial and Development Planning (amended by Law No 288/2017) regulates consultations and organisation of public meetings during the development or relevant urban plans. The Planning Authority (respective municipality) notifies the public and interested parties of the location, date and time of each public meeting and makes available the draft planning document, at least 30 days prior to the meeting. The announcement is made through the publication of the information in the register and in major daily newspapers or other media. Comments and suggestions on the draft plan, received during the publication process, are considered in the finalisation of the plan.

Law No. 8561/1999 on Expropriation and Temporary Use of Real Estate for Public Purposes regulates engagement with people affected by permanent and temporary land acquisition. This mainly pertains to the publishing of the application for expropriation and the expropriation decision in the Official Journal of the Republic of Albania, as well as in local and national printed media. The expropriation decision is also delivered individually to directly affected persons who have formal legal rights, by the competent Ministry.

3.3.2.3 EIB standards

EIB has published a set of documents that reflect its environmental and social requirements to ensure the sustainability of all the projects that it finances. The "EIB Statement of Environmental and Social Principles and Standards" (2018) reflects "the evolving EU approach and that of other international institutions towards the promotion of environmental sustainability and social well-being, in the broader context of the goal of sustainable development".

The EIB actively promotes the right to access to information, as well as public consultation and participation. Environmental and Social Standard (ESS) 10 of "EIB Environmental and Social Standards Handbook" (2018) affirms the EIB's expectation engagement to uphold an open, transparent and accountable dialogue with all relevant stakeholders at the local level. With respect to the EU regulations, the Handbook provides the following:

- *"All operations located in the EU, Candidate and potential Candidate countries, which are likely to have significant effects on the environment, human health and well-being and may interfere with human rights, will be subjected to an assessment according to the EU EIA Directive 2011/92/EU" (paragraph 8 of the Standard 1- Assessment and Management of Environmental and Social Impacts and Risks).*

These standards and guidelines all adopt a similar approach to stakeholder engagement. They underscore the importance of stakeholder engagement in building constructive relationships that are essential for environmental and social issues to be managed successfully.

3.3.3 Gap analysis on the applicable regulations/standards

Gaps between Albanian legislation and EIB requirements have been identified, as follows:

- EIB requires the development of a Stakeholder Engagement Plan, to guide the disclosure of Project documents and consultations with affected people and other stakeholders;

- EIB requires a very proactive approach in obtaining the public opinion and identifying and engaging with all stakeholders, as opposed to a reactive approach, i.e. responding only to comments/questions submitted and issues raised, after they have been submitted/raised;

- As regards the working conditions/labour influx, EIB aims at ensuring that the Core Labour standards of the International Labour Organisation (ILO) are respected, as well as at promoting the relevant rights under the UN Guiding Principles on Business and Human Rights for the project to be financed;

- The EIB stresses the employers' duty of care towards project workers and society, in safeguarding occupational and public health, safety and wellbeing within the area of influence of their operations and at associated facilities; Particular attention is required by EIB in identifying and engaging with vulnerable groups in order to avoid or minimise, or otherwise mitigate and remedy, potential harmful effects to vulnerable individuals and groups whilst seeking that these populations duly benefit from EIB operations. As a means to foster those project outcomes, EIB proposes a framework and tools to address inequalities and other factors contributing to vulnerability, and, as appropriate, to allow for equal access to and enjoyment of project benefits for those individuals and groups.;

- EIB requires that gender dynamics need to be duly observed and taken into account throughout the process. Moreover, it is required the ensuring of equal treatment of women during compensation and income restoration processes, especially with regard to women's rights and interests in land, property, assets, and compensation and relocation assistance, even where these are not recognised in formal law.

- Consultations with stakeholders, according to EIB requirements, should be on-going for the duration of the Project as opposed to consultations concentrated during the permitting period;

- The establishment and implementation of a Project dedicated grievance mechanism (accessible for all stakeholders, including vulnerable groups) is required by EIB, in addition to national administrative and judicial grievance procedures;

The project's SEP has been developed to address the above listed gaps and to ensure that all EIB requirements in connection to stakeholder engagement are being adequately addressed by the Project.

3.4 Other relevant regulations/standards

3.4.1 National regulations

In addition to the regulations/standards/guidelines mentioned in the text above, other relevant environmental regulations relevant to the Project include the following:

- Law No. 10431/2011, ”On environmental protection”, as amended;
- Law No. 10440/2011, ”On environmental impact assessment”;
- Law No. 119/2014, “On the Right of Information”;
- Law No. 146/2014, “On Public Informing and Consultation”;
- Law No. 81/2017, “On the protected areas”;
- Law No. 9587/2006 “ On the protection of biodiversity”, as amended;
- Law No. 10006/2008 “On the protection of wild fauna”;
- Law No. 8897/2002, ”On air protection from pollution” as amended;
- Law No. 9774/2007, “On the assessment and administration of noise in the environment”, as amended;
- Law No. 111/2012, “On integrated management of water resources”;
- Law No. 8905/2002, ”On protection of marine environment from pollution and damage”, as amended;
- Law No. 10463/2011, ”On integrated waste management”, as amended;
- Law No. 10463/2011, ”On integrated management of solid waste”, as amended;
- Law No.9548/2006, “On the accession of the Republic of Albania to the protocol on the records of discharge and transfer of contaminants of the Aarhus convention on the public right for environmental information, its participation in decision making and to address the court on environmental issues”;
- Law No. 8672/2000 on ratification by the Albania of the Convention on Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters (Aarhus Convention);
- Law No.10237/2010 “On occupational safety and health”, as amended;

- DCM No. 564/2013 on the approval of the Regulation "On Minimum Requirements for the Safety and Health at the Workplace";
- Law No.5/2014 On safety and health in construction";
- Law No. 27/2018, "On cultural heritage and museums";
- Law No. 9244/2004, "On protection of agricultural land", as amended;
- Law No. 9385/2005, "On forests and forest service", as amended;
- Law No. 107/2014, "On territory planning and development" and respective secondary legislation;
- Law No. 93/2015, "On tourism".

3.4.2 International agreements

The most relevant multilateral agreements, in which Albania is part, and which are related to the project activities include:

- Convention Concerning the Protection of the World Cultural and Natural Heritage – UNESCO World Heritage Convention (Paris, 1972);
- CITES Convention on Trade in Endangered Species of Wild Flora and Fauna (1975);
- Barcelona Convention for the Protection of the Mediterranean Sea against Pollution (1976);
- UN Convention on the Conservation of Migratory Species of Wild Animals – CMS (Bonn, 1979);
- Convention of the Conservation of European Wild Life and Natural Habitats – Bern Convention (Bern, 1982);
- UN Framework Convention on Climate Change – UNFCCC (New York, 1992);
- Kyoto Protocol to the UN Framework Convention on Climate Change;
- UN Convention on Biological Diversity – CBD (Rio de Janeiro, 1992);
- UNECE Convention on Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters- Aarhus Convention (Aarhus, Denmark, 1998);

- ILO Convention C155 "On Occupational Safety and Health", 1981 - ratified on Feb. 2004;
- ILO Convention C167 "On Safety and Health in Construction", 1988 - ratified on April 2016
- ILO Convention C187 "On Promotional Framework for Occupational Safety and Health", 2006 - ratified on April 2016

3.5 Key requirements on ESIA deliverables

ToR requires the preparation of the following ESIA study deliverables:

- ESIA Scoping report;
- ESIA report;
- ESIA non-Technical summary;
- LARF;
- RAP (if any);
- SEP;
- ESAP; and
- ESPM

The sections 3.5.1 to 3.5.4 hereinafter highlight the standards to be satisfied by the documents listed hereinabove.

3.5.1 ESIA Scoping report

The ESIA Scoping report, which has already obtained the non-objection from HSh and EIB, was prepared in accordance with the EU Guidance on the scoping stage[25].

It identifies the key issues and impacts, the content and extent of the assessment, and specifies the information to be included in the EIA Report. Thus, the ESIA scoping report refers to the preparation of ToR for EIA.

3.5.2 ESIA report

3.5.2.1 ESIA report structure and content

The structure and content of the ESIA report should fulfil the EU EIA Directive (Annex IV) and the Albanian DCM 686/2015 "On the rules, responsibilities and timelines for the environmental impact assessment procedure and the procedure for the transfer of the environmental declaration". It should be stressed that this DCM fully complies with the EIA Directive 2014/52/EU.

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[25] http://ec.europa.eu/environment/eia/pdf/EIA_guidance_Scoping_final.pdf

The indicative content of the ESIA report includes the following:

1. A description of the project, including in particular:

   - Location of the project;
   - Physical characteristics of the project, including, the land-use requirements;
   - Main characteristics of the operational phase of the project, including materials and natural resources used;
   - Estimation of expected residues and emissions (water, air, soil and subsoil pollution, noise, vibration, radiation) and waste produced.

2. Project's alternatives (in terms of design, technology, location, size and scale), and the reasons for selecting the chosen option, including an environmental comparison.

3. Baseline information and an outline of the likely evolution thereof without the implementation of the project as far as natural changes from the baseline scenario can be assessed based on the availability of environmental information.

4. Description of the environmental receptors: population, human health, biodiversity, land, soil, water, air, climate, material assets, cultural heritage, and landscape.

5. Description of the likely significant effects of the project on the environment resulting from, inter alia:

   - the construction works, including, where relevant, demolition works;
   - the use of natural resources (e.g. land, soil, water and biodiversity);
   - the emission of pollutants, noise, vibration, radiation, etc., and the disposal and recovery of waste;
   - the risks to human health, cultural heritage or the environment (for example due to accidents or disasters);
   - the cumulating of effects with other existing and/or approved projects;
   - the impact of the project on climate change;
   - the technologies and the substances used.

   This description should take into account the environmental protection objectives established at Union or Member State level that are relevant to the project.

6. The impacts assessment methodology, including details of difficulties.

7. Description of the mitigation measures (to avoid, prevent, reduce and/or offset any adverse effect), and, where appropriate, of any proposed monitoring arrangements.

8. Expected adverse environmental effects deriving from the vulnerability of the project to risks of major accidents and/or disasters that are relevant to the project concerned.

9. A non-technical summary of the information provided under points 1 to 8.

10. A reference list detailing the sources used for the descriptions and assessments included in the report.

3.5.2.2 ESIA scoping matrix

In addition to the issues included in the indicative content of the ESIA report, the Consultant will also take into consideration the likely impacts on the environmental receptors included in the Scoping matrix that was prepared during the scoping stage and included in the ESIA scoping report.

The scoping matrix is given in section 10.3 (Appendix 4) of this document

3.5.2.3 Impact assessment methodology

The approach and methodology for impacts assessment is based on the EU "Guidance on EIA[26]" and GIP, as well as on the previous experience of the ESIA team on similar projects in Albania.

It should be underlined that the Albanian DCM 912/2015 "On national EIA methodology[27]" fully complies with the EIA Directive. Thus, the used methodology complies with both the national and EU requirements.

Details on the impact assessment methodology are given in chapter 5 of this document

3.5.3 ESIA Non-Technical Summary

The preparation of the Non-Technical Summary is based on the EU "Guidance on EIA[28]", which provides that such a summary should fulfil the following characteristics:

- To be written in non-technical language, avoiding detailed information and discussion;
- To be comprehensible to a lay member of the public;
- To be easily identifiable within the EIA Report

While the content of the Non-technical Summary should be focused on the following:

[26] https://ec.europa.eu/environment/eia/pdf/EIA_guidance_EIA_report_final.pdf

[27] http://mjedisi.gov.al/wp-content/uploads/2018/09/VKM-912-2015.pdf

[28] EU "Guidance on EIA" (2017), Box 41

- To explain the role of the EIA in the Development Consent process;
- To provide a concise and comprehensive description of the Project, the baseline information, the likely environmental effects, and the proposed Mitigation Measures, and monitoring arrangements;
- To highlight any significant uncertainties about the Project and its environmental effects;
- To provide an overview of the approach to the assessment

3.5.4 Environmental and Social Management System

In order to integrate the implementation of the environmental and social requirements into the project development phases, the beneficiary (HSH) should establish and maintain an Environmental and Social Management System (ESMS), which should be commensurate to the environmental and social risks and impacts of the project in a consistent way with the relevant EIB standards.

The preparation of the ESMS is based on the findings of the environmental and social assessment process and the stakeholders' concerns. It addresses the identified project's environmental and social impacts and issues and other performance improvement measures to meet the required lender (EIB) standards. In addition, the ESMS should comply with the national and EU requirements.

AS required by ToR and the Inception Report, the Consultant will prepare the following:

- An Environmental and Social Action Plan (ESAP), which will reflect the requirements of the EIB standards; and
- An environmental and social management plan (ESMP), which will be based on the provisions of the EIB standards, the national and EU regulations and guidances, and the good international practice.

3.5.4.1 Environmental and Social Action Plan

The Environmental and Social Action Plan (ESAP) describes the key actions (or mitigation strategies/measures) to be undertaken by the beneficiary (HSH) during the Project's implementation phases to ensure the required environmental and social standards are met. ESAP includes also a timeline for implementing these corrective actions, as well as the related standards for each of them.
As stated above, the ESAP on the proposed project will be based on the EIB standards [29], as well as on the national environmental and social regulations.

3.5.4.2 Environmental and Social Managing Plan

The Environmental and Social Managing Plan (ESMP) is a framework plan that is developed in order the Beneficiary (HSH) and the project implementation

[29] EIB Environmental and Social standards, 2018

Contractors to be provided with the necessary regulations/standards to be followed for reaching the ESAP purposes.

The ESMP is based on the ESAP and the ESIA study. As such, it should be in compliance with the EIB standards and the national and EU regulations.

The main national regulations applicable to ESMP are the CMD 912/2015 "On the EIA methodology", which requires the preparation of a monitoring programme, and the Law 10431/2011, "On Environmental Protection" (article 41) that provides for the parameters/environmental receptors that should be monitored during a project development stages.

The ESMP is composed of a set of topic-specific management plans, which aim to address the management of the main impacts resulting from the ESIA study. The Beneficiary and/or Contractor(s) should detail each of these plans later, prior to the construction stage.

The list of these topic-specific management plans and their main lines are outlined in the Environmental and Social Management Plan (separate document).

4 Impacts Assessment Methodology

The overall approach to assessment methodology includes a general approach for structuring the ESIA report and the adopted methodology for assessing the potential environmental and social impacts.
There are strong relationships between the required national, EU and EIB environmental standards, the environmental and social features of the project area and the project's components and activities.

4.1 General approach

The general approach for assessing the potential impacts that may raise from the project's development phases includes the following steps:

- Defining the project's area;
- Outlining the project's specific technical interventions and the related environmental and social impacts;
- Consultations with the relevant stakeholders, including municipalities, project's beneficiary, the involved IFI, the environmental authorities, etc.;
- Outlining the baseline information;
- Defining the significant environmental and social effects that should be taken into consideration during the ESIA study;
- Evaluating the significant potential environmental and social impacts. This evaluation should be based on the formal standards and good practice. A scoring criterion might be necessary for comparing the considered project's options.

4.2 Assessment of impacts

This section provides for the formal standards and guidelines and best practice on the impacts' assessment.

4.2.1 Formal considerations

As per the EU and Albanian regulations, the evaluation of impacts' significance must be based on the criteria set out in points 1 and 2 of Annex III (3) of EIA Directive[30], as well as in points 1 and 2 of Annex I of CMD 686/2015[31], with regard to the impact of the project on the factors specified in Article 3(1) of the EIA Directive and Annex I (3) of CMD no. 686, considering:

a. The magnitude and spatial extent of the impact (for example geographical area and size of the population likely to be affected);

[30] http://ec.europa.eu/environment/eia/eia-legalcontext.htm
[31] http://www.qbz.gov.al/botime/fletore_zyrtare/2015/PDF-2015/145-2015.pdf

b. The nature of the impact;

c. The trans boundary nature of the impact;

d. The intensity and complexity of the impact;

a. The probability of the impact;

b. The expected onset, duration, frequency and reversibility of the impact;

c. The cumulating of the impact with the impact of other existing and/or approved projects;

d. The possibility of effectively reducing the impact.

Sections 4.2.2 and 4.2.3 hereinafter outline the mitigation strategy and the evaluation of the expected impacts.

4.2.2 Mitigation strategy

Once evaluated, the potential impacts should be dealt with a mitigation strategy, which will aim at minimizing and reducing the likely adverse effects and, whenever possible, enhancing the positive environmental effects of the project.

The principles of mitigation, including their hierarchical setup, would follow four steps:

i. Preference for avoidance and prevention;

ii. Cancellation;

iii. Mitigation; and

iv. Remedial/Compensation

Box below outlines the hierarchy of mitigation strategy.

Box 4.1_Hierarchy of mitigation strategy [32]

Box 4.2_Hierarchy of mitigation strategy
Avoidance measures: These are intended to stop or prevent effects from occurring, or to eliminate (completely remove or get rid of) the risk of them occurring, perhaps by relocating a project away from a sensitive area, or removing from a project the element

[32] Adopted from "Environmental Impact Assessment Handbook". Scottish Natural Heritage. 2018

Box 4.2_Hierarchy of mitigation strategy
that may cause an adverse effect. Successful avoidance measures mean there will be no adverse effect. E.g. Avoid the risk of polluted ground water to the health of local water consumers by avoiding the design and construction of the underpasses over Quaternary gravel aquifers, which water table is close to the surface.
Cancellation measures: Are intended to completely neutralize or fully negate the adverse nature of effects. There will be an effect, but its negative outcomes will be cancelled out. E.g. Design and construct any underpass where the topography is appropriate and where currently there is a risk for human and livestock accidents from any unauthorized level crossings).
Mitigation/reduction measures: Mitigation measures aim to make effects smaller or less in amount, degree, size or likelihood, either by reducing the effect itself, or the likelihood of it occurring, or both. These measures may so reduce the adversity of the effect, or they become so unlikely, that they are no longer of concern. There will, nevertheless, be a residual effect, it may be necessary to check that the residual effects of one proposed change do not exacerbate the effects of others, by way of cumulative, combined or synergistic processes. E.g. the rehabilitation of the drainage system and the design and construction of any new culvert alongside the railway within the sections that can be affected from inundation in case of heavy rainfalls, will reduce the risk of inundation of the land and therefore the railway will no more serve as an embankment that make difficult the draining.
Remedial/Compensation: In environmental assessment these measures are only taken into account after a decision has been made. They are intended to at least try to recompense, or otherwise make up for, or off-set, the adverse effects of a proposed change that could or would occur and would be of concern. Thus, an important negative effect is anticipated and environmental loss or harm is likely to occur. However, it has been decided that the project should nevertheless go ahead, and the compensatory measures try to make amends. The objective should be that the recompense is made in time to make good the environmental benefit or function that would be affected. E.g. remedial of the vegetation cleaned during construction works for the Rrogozhine tunnel; Compensation of the landowners for the land surface necessary for the construction of the proposed new service roads.

4.2.3 Practical considerations

Common criteria for evaluating the significance include the magnitude of the predicted impact and the sensitivity of the receiving environment that should be understood as given in the following box[33]:

Box 4.2_Magnitude and sensitivity of the predicted changes triggered by a project

Box 6.2_Magnitude and sensitivity of changes caused by a project

Magnitude *considers the characteristics of the change (timing, scale, size, and duration of the impact), which would probably affect the target receptor as a result of the proposed Project;*

Sensitivity *is understood as the sensitivity of the environmental receptor to change, including its capacity to accommodate the changes the Projects may bring about.*

Magnitude defines how large of an impact there might be. Magnitude reflects the area of land and the amount of a particular resource or the number of people being impacted.

Figure 4-1 below shows the impact's significance as a function of the magnitude and the sensitivity.

Hereinafter are described the factors that help to evaluate the magnitude and the significance of impacts.

Table below gives some practical explanations on the factors influencing the magnitude of impacts.

[33] http://ec.europa.eu/environment/eia/pdf/EIA_guidance_Scoping_final.pdf

Table 4-1_Factors influencing the impacts' magnitude

Factor	Description
Quality (direction) of impact	
Positive	An impact that is considered to represent an improvement on the baseline or introduces a positive change. E.g., the rehabilitation of the railway will positively affect the passengers and freight circulation and therefore will enhance the economic situation at local and country level.
Negative	Impacts that are expected to cause adverse change from the baseline, or to introduces any new undesirable factor (e.g. the construction of new service roads through agricultural areas)
Timing (period)	
Preconstruction and Construction	Impact may occur as a result of preconstruction and construction activities
Operation	Impact may occur as a result of operational activities
Reinstatement	Impact may occur as a result of reinstatement activities
Nature (type) of impact	
Direct	Impacts that result from a direct interaction between a planned project activity and the receiving environment/receptors. E.g. between occupation of a site and the pre-existing habitats or between waste water discharge and the receiving water body.
Indirect	Impacts caused by other activities, which result as a consequence of the Project development. E.g. employment increase within the project area as e result of the reconstruction of the railway – the increase of the employment will enhanced the life quality.
Secondary	Impacts (mainly socioeconomic ones) which may occur at a point in space or time that is removed from both direct and indirect impacts.

Factor	Description
Cumulative	Impacts that act together with other impacts resulting from other plans/projects in the same project area or in the same sector. E.g. rolling noise from the railway line and noise from the highway within the areas where the railway line is located close to the highway.
Spatial extent of impact	
Working site	Impacts are limited to the spatial boundaries of the development site.
Local/ Moderate	Impacts affect a large area (e.g. several kilometres square) around the development site. E.g. the improvement of the railway line horizontal alignment could affect an area of some km long.
Regional	Impacts affect regionally environmental resources or are experienced at regional level as determined by administrative boundaries, habitat type/ ecosystem, etc. E.g. the rehabilitation of the railway line will increase the summer tourist activity in Durres and Kavaje coastline.
National	Impacts affect environmental resources that extent at national scale or affect nationally important areas / or have macro-economic consequences. E.g. the improvement of the railway transport will have positive economic impacts at national level.
Duration of impact	
Temporary	Impacts are temporary and of short duration (e.g. during some construction activities) or occasional.
Short term	Impacts last only during the construction period.
Medium term	Impacts last after the construction period, but cease in course of the operation stage. E.g. rehabilitation of the vegetation that has been cleared for opening of any temporary road access.

Factor	Description
Long term	Impacts continue for the life of the Project, but ceases when the project stops operating. E.g. positive impact of the Project on the economic situation at country level continue as long as the railway line will be operational.
Permanent/residual /irreversible	Residual change in the affected receptor or resource that lasts during the whole operation phase and/or beyond the project lifetime. E.g. destruction of any ecological habitat or archaeological site/objet.
Intensity of impact	
Intensity describes the physical dimension of a development. Depending on the type of impact, intensity can often be measured with various physical units and compared to reference values, such as the decibel (dB) for sound [34], etc.	
The intensity of impact can also be considered in terms of sensitivity of the environmental or social receptor. E.g. archaeological sites/objects, habitats, species or communities, water resources, vulnerable people, people already affected by the Earthquake of November 2019, etc.	
Probability of occurrence / Likelihood of impact	
Unlikely to occur	Impacts have a very low chance of occurring now or in the future. E.g. Estimated less than 95% chance of impact occurring (e.g. leakage of oil from dredging engines during construction period)
Likely – possibly will occur	The impact is likely to occur under most conditions. E.g. Estimated from 5% to 95% chance of the impact occurring
Definite – Probably will occur	The impact will probably occur. E.g. Estimated greater than 95% chance of the impact occurring

The two successive tables below give a characterization of the environmental and social impacts in terms of intensity [35].

[34] http://ec.europa.eu/environment/eia/pdf/EIA_guidance_Scoping_final.pdf
[35] Source: Environmental Resources Management (ERM)

The intensity of impacts on the biophysical receptors is evaluated in function of the possibility to destabilize the important attributes of the receiving environment.

Table 4-2_Characterisation of the intensity of impacts on the biophysical receptors

Intensity of impact	Description
Bio-physical receptors	
Negligible	Impacts are not detectable
Low	Impacts will neither destabilize nor modify any important attribute of the environmental receptor
Moderate	Impacts are sufficient to modify important attributes of the receptor but not to destabilize it
High	Impacts are clearly noticeable and sufficient to destabilize the environmental receptor, which natural functions will temporarily or permanently cease.

While the impacts' intensity on the socioeconomic receptors can be considered in terms of the ability of the affected people/communities to adapt to changes that may be caused by the development, as shown in the table below.

Table 4-3_Characterisation of socio-economic impacts in terms of intensity

Intensity of impact	Description
Socioeconomic receptors	
Negligible	There is no perceptible change to people's livelihood and/or life's conditions.
Low	People/communities are able to adapt easily and maintain pre-impact livelihoods and/or life's conditions.
Moderate	The affected people/communities are able to adapt with some difficulty and to maintain pre-impact livelihoods and/or life's conditions, but only with some support.
High	The affected people/communities will not be able to adapt to changes or to continue to maintain-pre impact livelihoods and/or life's conditions.

Where appropriate, national and/or international standards are to be used as a measure of quantification or semi quantification of the receptors' intensity. In other cases, specialist studies should try to quantify this intensity and outline the necessary reasoning.

In the case of cultural or natural heritage, the international/national/local protection status and /or the conditions of the site/object may serve as a mean to evaluate the intensity.

For some issues (e.g. air quality, water quality, etc.), formal standards are used to determine the quantification or semi quantification of the receptors' intensity. For other issues (e.g. biodiversity, etc.), professional judgment on case-by-case basis is used.

With regard to social issues, vulnerable people (e.g. ethnic or cultural minorities, woman, children, unemployed persons, people already affected from natural disasters (e.g. Earthquake of November 2019), etc., can serve as indicator to the intensity.

The criteria for defining the intensity and magnitude of impacts depend also from the Project elements (components, activities, land use aspects).

As magnitude considers the characteristics of the change, which would probably affect the target receptor because of the proposed Project, it can be said that the magnitude is a function of both the intensity and the likelihood, as shown in the table below.

Table 4-4_Magnitude of impact in function of intensity and probability of occurrence

		Likelihood		
		Unlikely	**Likely**	**Definite**
Intensity of impact	**Negligible**	Negligible	Negligible	Low
	Low	Negligible	Low	Low
	Moderate	Low	Moderate/medium	Moderate/medium
	High	Moderate	High/Large	High/Large

Impacts characterisation depends also from the socio-cultural, economic, and political context of a project, *including judgments in related decision-making* *areas*[36]. Thus, in addition to the magnitude, impacts characterization should take into account the stakeholders concerns.

The stakeholders' concerns are linked overall with the purpose and the project's objectives and therefore are related to the positive socio-economic and environmental impacts at the local, national and trans-boundary level. At a smaller scale, these concerns are linked to the potential negative effects on the local population directly affected by the project.

Table below gives an indicative characterisation of both magnitude and stakeholders concern.

Table 4-5_Characterisation of impacts in terms of magnitude and stakeholders' concern

Magnitude and stakeholders concern	Description
Negligible	The size of the affected geographical area is negligible; The impact is not significant in the context of the stakeholder and the formal standards; Impact is of short duration, reversible and practically imperceptible; No mitigation is required.
Small/Low	The affected geographical area is of small size (working site to local); The impact is within the accepted standards (with or without mitigation); Impact is of short to medium term duration and reversible; No further action is required if it can be controlled by adopting normal good working practices
Medium/Moderate	The affected geographical area is of medium/moderate size (local to regional); The impact exceeds accepted limits and thresholds; Impact is of medium to long term duration and therefore not reversible; Impact is likely or probable/definite; Mitigation measures are required

[36] http://ec.europa.eu/environment/eia/pdf/EIA_guidance_Scoping_final.pdf, Box 20

Magnitude and stakeholders concern	Description
Large/High	The affected geographical area is of large size (regional /national /international); The affected receptor is of high importance (national /international) for stakeholders; The impact exceeds accepted limits and thresholds; Impact is of long term to permanent; Impact is probable/definite; Mitigation/compensation measures are required

While the impact magnitude is determined mostly by empirical prediction, the determination of the sensitivity involves more subjective judgments in terms of how a certain environmental receptor is valued in the society. Some discretion from the environmental and/or social expert is, therefore, required in assigning different weight to the criteria.

The following table gives some criteria that help in determining the characterisation of the sensitivity of a receptor.

Table 4-6_Description of the receptors' sensitivity[37]

Components of criteria	Description
Existing regulations and guidance (law, programmes, guidelines, zoning)	There are specific receptors in the impact area which have some level of protection, either by law or other regulations (e.g. prohibition against polluting groundwater, Adriatic Sea, Natura 2000 areas, etc.) or whose conservation value is increased by programmes or recommendations (e.g. landscapes designated as nationally valuable). The receptors mentioned in the Directive (Article 3 and Annex IV.4) are: population and human health, biodiversity, land, soil, water, air and climate, material assets, cultural heritage, and the landscape (e.g. Durres Archaeological Park).

[37] http://ec.europa.eu/environment/eia/pdf/EIA_guidance_Scoping_final.pdf, Box 21

Components of criteria	Description
The value of the receptor to the society (recreational values, natural values, number of affected people)	Depending on the type of impact, it may be related to economic values (e.g. water supply), social values (e.g. landscape or recreation, cultural heritage) or environmental values (e.g. natural habitat).
Vulnerability to the changes (ability to tolerate changes, number of sensitive targets)	Vulnerability to the change describes how liable the receptor is to be influenced or harmed by pollution or other changes to its environment. For instance, an area that is quiet is more vulnerable to increasing noise than an area with industrial background noise.

Based on the above, a practical characterisation of the sensitivity of a receptor would be as given in the table below.

Table 4-7_Example of scale of sensitivity of the receiving environment [38]

Sensitivity importance	Description
Negligible	The resource/ receiving environment has common or imperceptible /indistinguishable values from the natural/social background. The receiving environment is tolerant to the project. Changes are imperceptible or negligible and therefore no mitigation action is necessary
Low	Low or medium importance and rarity, local scale. The receiving environment is tolerant of the proposed change subject to design and mitigation
Medium/moderate	Medium importance and rarity, regional/county scale and limited potential for substitution. The receiving environment has some tolerance of the proposed change subject to design and mitigation
High	High importance and rarity, international/national scale, limited potential for substitution and low capacity to accommodate proposed form of change

The last and final step for evaluating a potential impact on a receiving environment is the defining of the impact significance, the principle of which is illustrated in the figure below.

[38] Adapted from http://ec.europa.eu/environment/eia/pdf/EIA_guidance_Scoping_final.pdf, Box 23

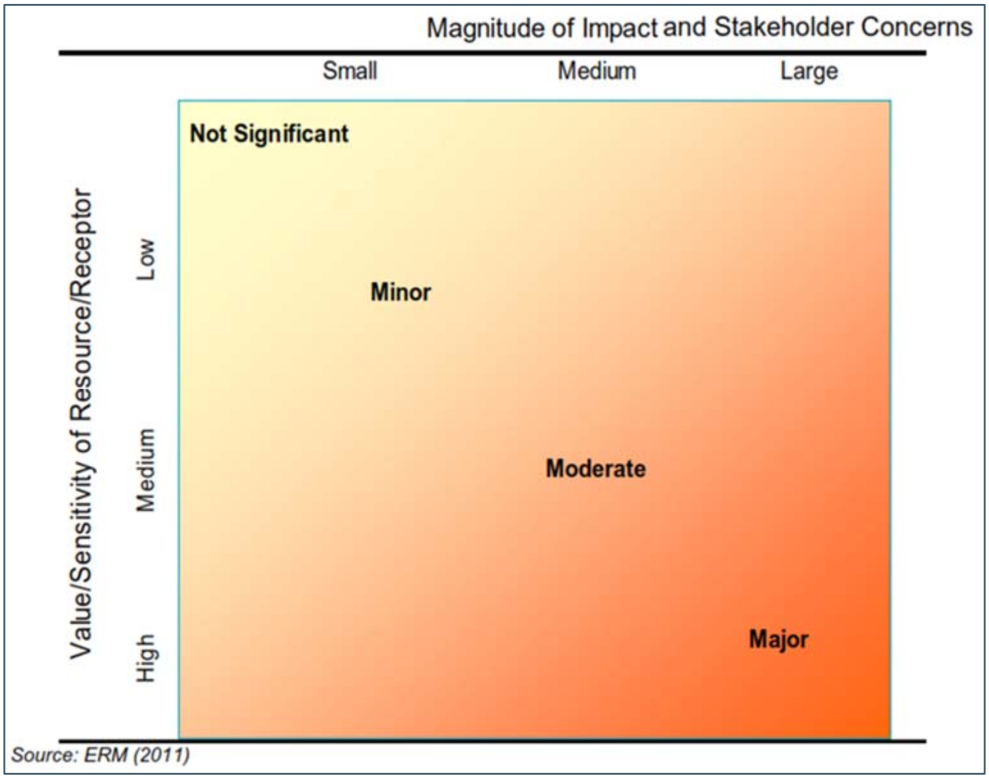

Figure 4-1_Principle of used evaluation of impact significance (source ERM[39])

For making easier the evaluation of the impacts' significance, the figure above can be given in a more explicit version, in a form of a table, as follows.

Table 4-8_Significance of impact, magnitude, and receptors' sensitivity

		Magnitude and stakeholder concerns			
		Negligible	**Small**	**Medium**	**High (Large)**
Value/Sensitivity of Resource/Receptor	**Negligible**	Negligible– Not significant	Negligible - Not significant	Negligible/Minor -Not significant	Minor - Not significant
	Low	Negligible– Not significant	Minor - Not significant	Minor/Moderate -Not significant	Moderate - significant
	Moderate	Negligible/Minor -Not significant	Minor/Moderate - Not significant	Moderate - significant	Major/ Moderate - significant
	High	Minor - not significant	Moderate – significant	Major/Moderate - significant	**Major - significant**

[39] ESIA on Trans Adriatic Pipeline - Albanian section. ERM, 2012

Table below gives a description of the impact significance.

Table 4-9_Characterisation of potential impacts in terms of significance

Significance of impact	Description
Bio-physical and socio-economic receptors	
Insignificant (Negligible)	The receptor will not be affected in any way by the proposed development activities, or the potential effect is considered to be of "negligible" intensity or is imperceptible/indistinguishable from the natural/social background variations;
Minor (Low)	The impact will occur (with and without mitigation. The impact magnitude is small (with and without mitigation) and within the accepted standards, and/or the value/sensitivity of the receptor is low.
Moderate	The impact can be reasonably reduced to a level that is as low as practicable. This does not mean that a "moderate" impact can be reduced to a "minor" one, but that moderate impacts can be effectively managed.
Major (High)	Impacts of large magnitude affect a resource/receptor of high value/sensitivity, or the accepted standards/limits are exceeded. In this case, in function of the regulations/standards the adverse effects must be weighed against the positive ones until a decision of the key stakeholders.

A scoring matrix that helps for practical semi-quantification of the impacts' significance is given in the following table, which is built on the basis of the table 4.8 above.

Table 4-10_Scoring criteria on the impacts' significance related to the environmental receptors

Impact's quality (Direction of change)	Significance of impact							
	No impact	Negligible	Negligible to minor	Minor	Minor to Moderate	Moderate	Moderate to High	High
Negative	0	-1	-2	-4	-5	-6	-8	-10
Positive	0	+1	+2	+4	+5	+6	+8	+10

The adopted values in this scoring matrix are subjective. The weighting, which has been based on the description of the significance of impacts (see figure 4.1 and table 4.8 above) and on the characteristics of the project area and the planned interventions, might be considered as semi-quantitative.

In addition to the evaluation of the significant impacts, table above serves also for comparing, from the environmental point of view, the considered project's options/alternatives.

5 Baseline Information

The environmental topics included in this section are air quality, noise and vibrations, climate, climate change, geology, tectonic and earthquakes, surface and ground waters, drinking water supply, flooding, state of environment, biodiversity and protected areas, landscape, infrastructure, other plans/programmes and social issues.

5.1 Air quality

Material and methods

The main substances polluting the ambient air are particulate matter with a diameter of 10μm or less and particulate matter with a diameter of 2.5μm or less (PM_{10} and $PM_{2.5}$), benzo[ἀ]pyrene (BaP) and nitrogen dioxide (NO_2) [40].

According to the European Environmental Agency, the sources of these substances are as follows [41]:

- PM_{10} and $PM_{2.5}$: primary particulate matter (PM) originates from both natural and anthropogenic sources, and is commonly classified as either primary PM_{10} or primary $PM_{2.5}$. Natural sources include sea salt, naturally suspended dust, pollen and volcanic ash, while anthropogenic sources include fuel combustion for power generation, domestic heating and transport, industry and waste incineration, and agriculture, as well as brakes, tyres and road wear and other types of anthropogenic dust. Black carbon is a constituent of $PM_{2.5}$ formed from incomplete fuel combustion, with the main sources including transport and domestic heating.
- BaP (benzo[ἀ]pyrene): gas emitted as a result of the incomplete combustion of fossil fuels and biofuels. The main sources of BaP are domestic heating (in particular wood and coal burning), waste burning, coke production and steel production. Other sources include outdoor fires, road traffic and rubber tyre wear.
- NO_2: the main sources of nitrogen oxides (NO_x) are combustion processes, which may be either stationary or mobile. Nitric oxide (NO) accounts for the majority of NO_x emissions: NO is subsequently oxidised to form NO_2, although some NO_2 is emitted directly. The proportion of NO_2 (i.e. the NO_2 /NO_x ratio) in vehicle exhaust is considerably higher in diesel vehicles than in petrol-fuelled vehicles, because their exhaust after-treatment systems increase the oxidation of NO, thus generating higher direct NO_2 emissions.

[40] https://www.nik.gov.pl/plik/id,19001.pdf

[41] https://www.eea.europa.eu/publications/air-quality-in-europe-2017

The national standards on the air quality are provided by the DCM 352/2015[42], while the EU ones are provided by the Air Quality Directive 2008/50/EC[43].

The data and information on the air quality have been extracted from the Albania State of Environmental Report (SoER), which is published yearly by the National Environmental Agency (NEA). At the moment of the preparation of this ESIA report the SoER 2020 was not yet published, while for the year 2018 the air quality has not been monitored. Consequently, the air quality data for this ESIA report were based on the SOERs of 2017 and 2018 years. While the map on the location of the air quality monitoring stations is extracted from governmental sources.[44]

Baseline information

The cities crossed by the railway line are Durres and Kavaje. Among them there are air quality monitoring measures only for Durres.

The data from air monitoring during 2017 and 2019 show that typical air polluting substances like SO_2 and NOx are at acceptable levels as per the DCM 352/2015. In recent years, the air quality with regard to suspended particulate matters and PM10 has been improved because of the improvement of the road infrastructure.

The data below, taken from the Reports on Environment (years 2017 and 2019), indicates the levels of Pollution Clouds in some Albanian cities. The DCM 352/2015 provides the national norms and the critical values. Annex XI of this DCM provides for the national norms that are already in force since January 01.2020 (CO, CO_2, NO_2, Benzene) or will be in force on January 01.2030 (PM_{10}).

Thus, the national norms in the table below are those of that Annex.

[42] DCM 352/2015: "On air quality assessments and requirements for certain pollutants "

[43] https://ec.europa.eu/environment/air/quality/directive.htm

[44] https://geoportal.asig.gov.al/

Table 5-1_Annual average of air quality indicators for 2017 and 2019 years -Durres station

Station / standards	**Air quality indicator (μg / m³)**						
	PM_{10}	$PM_{2.5}$	NO_2	SO_2	O_3	CO	benzene
Durres (2017)	24.45	13.01	24.42	3.94	50.16	0.57	1.39
Durres (2019)	24.03	12.33	15.64	9.72	-	0.87	0.88
National standards							
Annual	28	17	32	75	n/a	10	5
Critical value/ period	50 (24 hours)	25 (1hour)	200 (1 hour)	350 (1 hour)	120 (8 hours)	n/a	n/a
EU standards[45]							
Annual	40	25	40	125 (24 hours)	25	10	5
Critical value/ period	50 (24 hours)	n/a	200 (1 hour)	350 (1 hour)	120 (8 hours)	10 (8 hours)	n/a

In 2019, Durres air monitoring station recorded only seven days with PM_{10} values superior to 50 μg/m³. In 2017 this number was 14 for 192 days of monitoring. Therefore, there is an improvement of the air quality. While the EU permitted excedeence is 25 days averaged over 3 years[46]

Note:

- $PM_{2.5}$ is not applied for human health, but only for the protection of the flora and ecosystems;
- The norms of the O_3 are those of the EU norms, as DCM 352/2015 do not give any information on the O_3 concentrations;
- According to DCM 352 /2015 the maximum number of days for which the critical value of PM_{10} (50 μg/m³) can be overpassed is 35.

Figure below shows the location of Durres air quality monitoring station, and the railway line. The figure shows that the distance of Shkozet station from the air quality monitoring station is approximately 2.5 km. The monitoring station is located in an area of dense urban traffic, while the railway line runs across the south eastern and southern neighbourhood of the city, where the traffic is slightly less dense. Therefore, the air quality within the Project site location is expected to be better than in the area of the monitoring station.

[45] https://ec.europa.eu/environment/air/quality/standards.htm

[46] https://ec.europa.eu/environment/air/quality/standards.htm

There is no available official data/information on the air quality in the other urban centres crossed by the railway line (Kavaje). However, Kavaje has a smaller population compared to Durres and therefore the traffic in Kavaje is lower. Besides, Kavaje in crossed in its eastern neighbourhood, where the traffic is much lower than in Durres.

Even though there are no data to monitor the air quality in the rural parts of the project area, this quality, including the suspended particulate matters, is within the acceptable parameters set by the Albanian legislation, because of the lack of activities that pollute the air.

Figure 5-1_Location of the air quality monitoring station - Durres

Findings

The annual average of the air quality within the project area is within the required standards, excepted O_3 in Durres. Ozone near ground level is formed when pollutants emitted by cars and other sources react chemically in the presence of sunlight. However, the air monitoring station is located in the centre of Durres city (2.5 km from Shkozet), where the traffic is very dense and therefore the high concentration of ozone (O_3) is expected. While within the main part of the Project area, it can be supposed the values of ozone concentration to be within the accepted standards because of the lower traffic.

There are no monitoring stations for air quality and noise within the project area. The closest monitoring station is located roughly 2.5 km far from the starting point of the railway line. This monitoring station is located in densely inhabited area that is characterized by a dense road traffic and urban activities.

Although there are no monitoring stations from Shkozet to Rrogozhine station, based on the sources of the air pollution substances, it can be assumed that the air quality alongside the railway line is affected from road traffic, which impacts the air quality mainly along the railway line segments near the motorway or the local roads parallel to the railway line. In addition, there is a flourishing buildings sector close to the railway line section Durres – Golem (see Appendix 2.2 – map of the project area - orthophoto) because of the proximity of the Adriatic Sea and therefore the construction activities and their related transport is source of air pollution (PM_{10} and $PM_{2.5}$).

Besides, a part of the secondary and tertiary local roads are not asphalted, constituting thus a source of air pollution. And finally, the quality of the fuels used for transport and working engines is not always within the required standards and therefore the fuel combustion is a source of BaP and NOx.

It should be stated that the improvement of the road network quality and the decrease of the construction of new buildings will contribute to the improvement of the air quality. The boom of construction activities is already almost stopped and the road infrastructure within the new urbanized areas is improving.

5.2 Noise and vibrations

5.2.1 Noise

There are no permanent noise monitoring stations within the Project area. In the past the National Environmental Agency has measured the noise in the centre of Durres City, roughly 2.5 km far from the starting point of the Project. However, it can be assumed that from Shkozet to Rrogozhine, the main source of noise generation is the road traffic and the construction activities.

The road traffic generates noise mainly along the railway line segments where there are motorways or local roads near the railway. In addition, there is a flourishing buildings sector close to the railway line section Durres – Golem (see Appendix 2.2 – map of the project area - orthophoto) because of the proximity of the Adriatic Sea and therefore the construction activities and their related transport is source of noise generation.

Besides, a part of the secondary and tertiary local roads is not asphalted, constituting thus a source of noise.

Material and methods

Environmental Noise measurements were performed along the proposed alignment at twelve locations during 2021 by the Baseline Noise Measurements Expert of the Consultant. The Noise level measurements were conducted with Class 1 Sound Level Meter / Data Logger type Larson Davis 831 and its readings were validated with type Larson Davis CAL200 Class 1 acoustic calibrator. The measurement methodology follows the guidelines of the European Directive for

Environmental noise 49/2002 and was submitted to HSH before the execution of the measurements.

The legal provisions on noise are provided by the Albanian Law 9774/2007 "On evaluation and administration of noises in the environment". The limits for the acceptable noise levels in the residential areas are provided for in the joint Ordinance of the MoEFWA and the Ministry of Health (MH), No.8, of 27.11.2007 "On the noise limits in specific environments".
Both the Albanian and EU noise limits are based on the World Health Organization (WHO) regulations.

Baseline information

The locations for the measurements have been selected with the criteria to be along the existing railway alignment and in locations where houses or buildings are nearby i.e. in a distance less than 150 m. More specifically, the measurement points which were selected are shown in the following map:

Figure 5-2_ Environmental Noise Measurement locations and railway line alignment

The results from the measurements are given in the table below, grouped in three time periods: day, evening and night. The results are compared to the World Bank General EHS Guidelines in Figure 5-3.

Table 5-2_Measured noise levels [dB (A)]

Location	L_{day}	$L_{evening}$	L_{night}	L_{DEN}
1	67.8	53.2	48.0	65.2
2	65.4	48.1	48.9	63.0
3	54.6	53.4	42.9	55.1
4	63.2	53.8	51.4	62.1
5	52.9	50.5	48.6	56.0
6	65.0	52.4	48.6	62.8
7	67.3	60.8	50.9	65.7
8	54.9	49.2	44.8	54.7
9	58.6	59.2	52.2	61.3
10	45.2	42.9	33.9	45.4
11	50.0	43.3	39.5	49.6
12	52.6	47.6	41.9	52.4

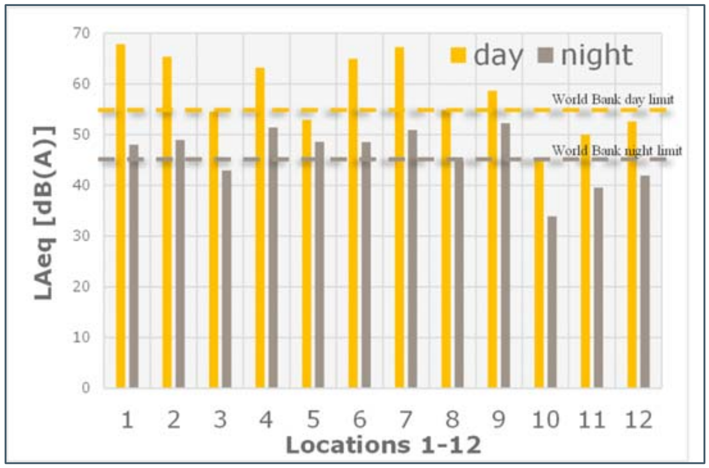

Figure 5-3_Baseline noise measurements – comparison with World Bank limits

5.2.2 Vibrations

Applicable standards

At the moment there are no national directives or regulations related to transit vibrations in Albania. HSH follows the Technical Specifications of Interoperability (TSIs) applied by the European Union, which gives guidance regarding uniform noise & vibration measurements and testing in all member states but does not impose limits for railway induced vibrations in nearby sensitive receivers.

From the various national standards in the EU and the USA, the acceptable annoyance level varies between countries. Similar to many EU countries, Albania has no specific limits for railway induced vibrations[47], while a common European railway vibration legislation is still in final development.

The international standard for building vibrations, in its previous version, ISO 2631-2:1989 "*Evaluation of human exposure to whole-body vibration – Part 2: Continuous and shock-induced vibrations in buildings (1 to 80 Hz)*" defined a base curve for acceptable building vibrations. This curve is not present in the newest version of 2003, but it is used in many countries, for instance in Sweden, in the USA (at the stage Detailed Analysis) and in France directly, whereas in other European countries (Austria, Italy, UK) the legislation is based on this as well, but utilize different descriptors (VDV, ppv) than rms vibration velocity. According to the standard, the vibration level inside residences to not expect adverse complaints, for transient vibration excitation with infrequent excitation during day or night, is 0.2 mm/s. The limit of 0.2 mm/s vibration velocity is considered for this study.

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[47] https://uic.org/IMG/pdf/uic-railway-induced-vibration-report-2017.pdf

Regarding the limits for ground-borne noise inside buildings, a common practice value in many European countries is 40 dB (A) for dwellings.

As there are neither EU, nor Albanian specific norms on vibrations, the Consultant COWI-IPF 8 suggests to be based on the German standards, (DIN 4150 and DIN 45669-1), which are widely used in Europe (UIC-Railway-induced-vibration-report-2017, chapter 5: Targets and Actions Levels[48]). These standards describe the methods of signal processing (DIN 45669-1) and measurements (DIN 4150). DIN 4150-1 defines the measurements and prediction method for the prescribed indicators, DIN 4150-2 focusses on the effects on the humans, whereas DIN 4150-3 on the effects on buildings[49].

Baseline information

The vibration was measured for the purpose of the railway rehabilitation project. A survey has been conducted in the hot-spot areas shown in Figure 5-4 in order to verify the type of the buildings that are close to the track. The survey took place in March 2021 by experts in the field of noise and vibration control. All the sections of the project that were close to habitable places were identified, along with ortho maps and other data to exclude buildings that do not classify for sensitive receivers.

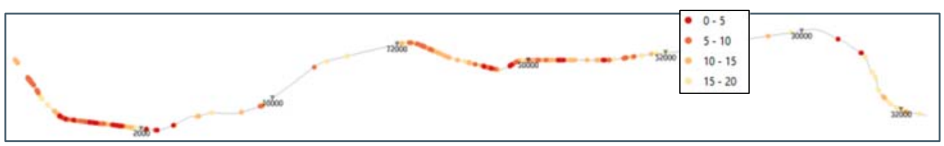

Figure 5-4_Sections inside screening distance (20m) for further analysis

The buildings within the above sections are of mixed use: residential, train stations, warehouses and other non-sensitive uses.

The detailed calculation sheets are shown in Appendix C of the vibration study. The results are summarized below:

Table 5-3_Estimates of vibration and ground-borne noise levels inside buildings

Railway Section	Distance from track	SSI scenario	Ground-borne noise [dB(A)]	Vibration [mm/sec]
VB1	5m	normal	62.8	1.0936
	5m	worst-case	69.8	2.4482
	10m	normal	48.4	0.5246
	10m	worst-case	55.4	1.1745
	20m	normal	34.6	0.1525
	20m	worst-case	41.6	0.3414
	40m	normal	22.6	0.0647

[48] https://uic.org/IMG/pdf/uic-railway-induced-vibration-report-2017.pdf
[49] https://www.en-standard.eu/din-standards/

Railway Section	Distance from track	SSI scenario	Ground-borne noise [dB(A)]	Vibration [mm/sec]
	40m	worst-case	29.6	0.1449
VB2	5m	normal	50.3	0.3640
	5m	worst-case	57.3	0.8149
	10m	normal	42.8	0.3168
	10m	worst-case	49.8	0.7092
	20m	normal	27.9	0.1129
	20m	worst-case	34.9	0.2526
	40m	normal	19.8	0.0699
	40m	worst-case	26.8	0.1566
VB3	5m	normal	55.3	0.5520
	5m	worst-case	62.3	1.2357
	10m	normal	43.5	0.3284
	10m	worst-case	50.5	0.7352
	20m	normal	31.2	0.1602
	20m	worst-case	38.2	0.3587
	40m	normal	22.3	0.0863
	40m	worst-case	29.3	0.1931
VB4	5m	normal	58.3	0.5059
	5m	worst-case	65.3	1.1325
	10m	normal	48.7	0.2754
	10m	worst-case	55.7	0.6166
	20m	normal	35.9	0.0634
	20m	worst-case	42.9	0.1419
	40m	normal	26.4	0.0251
	40m	worst-case	33.4	0.0561
VB5	5m	normal	56.0	0.6052
	5m	worst-case	63.0	1.3549
	10m	normal	43.6	0.3223
	10m	worst-case	50.6	0.7215
	20m	normal	29.7	0.1035
	20m	worst-case	36.7	0.2317
	40m	normal	21.6	0.0495
	40m	worst-case	28.6	0.1109

The exceedance zones along the alignment are shown in the Vibration Study (maps of Appendix D of the Vibration study). From the maps and from the locations of the sensitive receivers, the railway line sections where vibration mitigation measures are needed were determined. These sections are summarised in the following table:

Table 5-4_Sections where vibration mitigation measures should be taken

From	To	Track length [m]

1+840	4+360	2.520
5+440	5+680	240
9+360	9+680	320
18+160	18+680	520
19+280	19+760	480
21+040	21+280	240
Total		**4.320 m**

5.3 Climate conditions and Climate change

This section includes the current climatic conditions and the predicted climate change parameters

5.3.1 Current climatic conditions

The data/information on the climate characteristics have been provided by the former Institute of Hydro Meteorology (IHM). Nowadays is the Institute of Geo-Sciences[50] that deals with the climate issues.

Based on the climatic classification of the Albanian Territory (IHM, 1984), the project area is located in the Field Mediterranean Climatic Zone (see figure below), which is characterized by mild and wet winters and hot as well as dry summers.

Temperature

The entire area of the Western Lowland of Albania, including the Project's area, is highly influenced by the Adriatic Sea. The values of minimum, maximum and average air temperatures reflect this influence. The coldest month is January, whereas the warmest months are July and August

[50] www.geo.edu.al

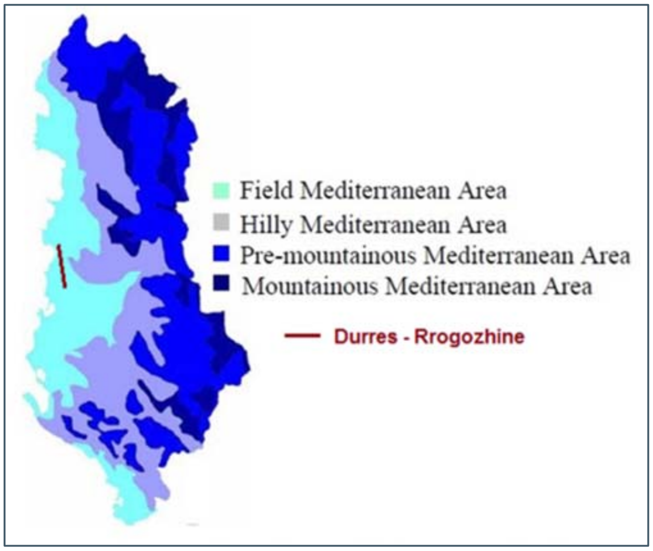

Figure 5-5_Climatic zones of Albania

The characteristic temperatures measured at Durres and Kavaje meteorological stations, which is located in the middle of the railway section, are shown in the table below[51].

Table 5-5_ Annual air temperature in the project area

Station	Temperature parameter (°C)		
	Annual average	**Maximum absolute**	**Minimum absolute**
Durres	15.5	40.5	-7.4
Kavaje	14.8	39.8	-11.6

Precipitation

The average annual rainfall in the project area is 963 mm (Durres station) and 1050 mm (Kavaje station). The maximum annual rainfall in Durres is 1562 mm.

Snowfalls in the study area are rare and of no particular concern. The snow layer within this area may reach only a few centimetres. However, it does not last for a long time.

A detailed distribution of the 24 hours rainfalls within the Project area is provided by the hydrological study, which is based on the data collected by the hydro meteorological stations.

[51] Source: Hydro meteorological Institute (2015), Tirane

Table 5-6_24 hours rainfalls distribution in the Project area

Station	24 hour rainfall with different return periods			
	100 years	50 years	20 years	10 years
Durres	183	165	140	120
Kavaje	211	188	157	133
Rrogozhine	166	149	126	109

5.3.2 Climate change

This section includes the climate change and the greenhouse gas emissions (GHG)

5.3.2.1 Climate Change

This section is prepared based on the Third National Communication on the Climate Change (Albanian Ministry of Environment, 2016[52]), which deals mostly with the Albanian coastal zone where lies the whole Project area (see figure 7.2 below). Another reference document is the fifth synthesis report of the Intergovernmental Panel on Climate Change (IPCC), 2014[53].

The climate change parameters that are of concern for the Project include the temperature, rainfalls and sea level rise.

Climate change projections for the coastal zone of Albania show an increase in temperatures and in frequency and intensity of floods, as projected by IPCC[54]. Latest figures of the European Environmental Agency predict an increase of about 5-15% of the heavy precipitation in the winter period. While summer periods will be dryer.

The table below shows the main projected climate parameters in the coastal zone of Albania based on the Third National Communication on the Climate Change.

[52]https://unfccc.int/sites/default/files/resource/Albania%20NC3_13%20October%202016.pdf

[53] https://www.ipcc.ch/report/ar5/wg2/europe/

[54] Climate Change. *Synthesis Report, IPCC, 2014*

Figure 5-6_Coastal area of Albania

Table 5-7_Parameters of projected climate change for the coastal area, compared to 1990'

Parameter	Time Horizon			
	2030	2050	2080	2100
Annual average temperature (ºC)	+1.0	1.7	2.8	3.2
Annual average precipitation (%)	-3.8	-8.5	-14.4	-18.1
Sea level rise (cm) - (worst scenario)	+13	+25	+50	+73

Temperature: The projections show that maximum temperatures in the summer period are expected to increase. In addition, it is projected a drastic decrease of the return periods of maximum absolute temperatures over the Albanian coastal area. The expected simultaneous increase of the minimum and maximum temperatures would cause an increase of the heat waves.

Table 5-8_Temperature changes projections for the coastal area compared to 1990

Years	2030	2050	2080	2100
Annual				
$T_{average}$(°C)	1.0	1.7	2.8	3.2
T_{max} (°C)	1.2	2.2	3.5	4.1
T_{min}(°C)	0.7	1.3	2.0	2.4
Winter				
$T_{average}$(°C)	0.8	1.2	2.0	2.4
T_{max} (°C)	0.9	1.4	2.3	2.7
T_{min}(°C)	0.7	1.1	1.7	1.9
Spring				
$T_{average}$(°C)	1.0	1.5	2.6	3.1
T_{max} (°C)	1.12	1.8	3.0	3.6
T_{min}(°C)	0.8	1.3	2.2	2.6
Summer				
$T_{average}$(°C)	1.6	2.5	4.3	5.3
T_{max} (°C)	1.8	2.8	4.9	6.0
T_{min}(°C)	0.5	2.1	3.8	4.6
Autumn				
$T_{average}$(°C)	1.0	1.6	2.8	3.5
T_{max} (°C)	1.1	1.8	3.0	3.7
T_{min}(°C)	1.0	1.5	2.7	3.2

Precipitation: All the scenarios reveal a likely decrease in annual precipitation compared to 1990'. The annual precipitation is likely to decrease by up to -8.5% by 2050, by up to -14.4% by 2080 and by up to -18.1% by 2100.

According to the third National Communication on the Climate Change, heavy rainfalls are expected to be intensified over Albania's coastal area. While the return periods of maximum precipitation are likely to decrease. Consequently, more frequent heavy rains with longer duration are likely to happen and to cause flood events.

The table below shows the expected 24h precipitation for different return periods for the Albanian coastal area.

Table 5-9_Expected 24h precipitation for different return periods for the coastal area.

Table 4.7. The expected 24hours precipitation (mm) for the different return periods for three regions of the coastal zone.

	Return period (year)					
Time	2	5	10	20	50	100
North	93±7	132±11	158±14	182±17	215±21	239±25
Central	79±8	105±11	125±14	145±17	170±22	189±25
South	74±6	97±8	116±11	134±13	157±16	174±19

Sea level rise: During the 20th century, the level of the Adriatic Sea has raised by roughly 15cm. It should be stressed that the Albanian coastal area from Vlore to Shkoder is prone to subsidence that might intensify the impact of sea level rise. The expected average sea level rise is roughly 30 cm by 2080 and 40cm by 2100. While the respective maximum values are 50 and 70cm.

The graph below shows the projected sea-level rise, as given by the third National Communication on Climate Change.

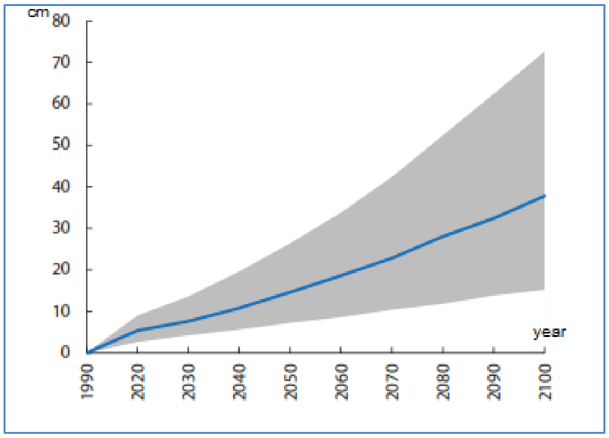

Figure 5-7_Predicted sea level rise on the Albanian coastal area

5.3.2.2 Greenhouse gas emissions

The GHG emissions per capita in Albania are 4–5 times lower than the average of industrialized countries. According to the Third National Communication on Climate Change, Albania's contribution to the global greenhouse gas emissions is estimated at an average of 9, 4 million tons/year of CO_2 eq. The reason is that over 95 percent of Albania's electricity is produced from hydro sources and high-energy intensity industries are no longer operating. Transport, followed by agriculture and waste sectors are the main categories that are found to have a significant contribution to the total greenhouse gas emissions.

Climate change policy in Albanian is developed through national communications that deal separately with the mitigation of GHG emissions and adaptation to climate change. Analysis has been carried out for each economic sector, scenarios for the future have been constructed, and measures have been proposed for mitigating and adapting to expected climate change.

The third Albanian National Communications on the Climate Change did not address any GHG issue. It refers to Albania's Second National Communication on the Climate Changes (MoEFWA, 2009[55]), according to which two scenarios are foreseen for the evaluation of the total greenhouse gas emissions, namely the baseline and the abatement scenarios. The former considers the development of sectors without taking account of the effect of climate change, while the latter assumes implementation of a set of prioritized measures aimed at reducing emissions by 48% by 2025 compared to the baseline scenario.

[55] https://www.adaptation-undp.org/sites/default/files/downloads/albanianc2.pdf

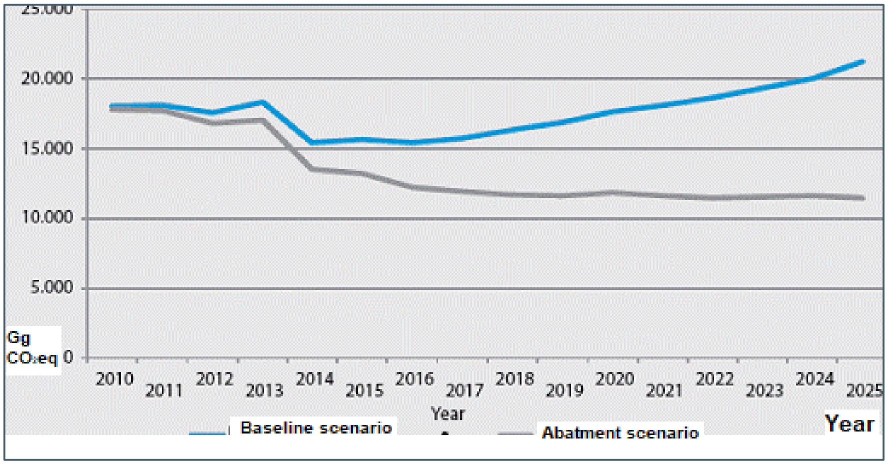

Figure 5-8_ GHG emissions according to the baseline and abatement scenarios for 2010-2025 [Gg CO2 eq]

The national GHG inventory[56] considers three direct GHGs (CO_2, CH_4, and N_2O) and three indirect[57] ones (CO, NO_x, SO, and NMVOC). Emission factors are represented by default factors.

The amount of direct GHG emissions is bigger than the indirect ones. Total direct GHG emissions for the base year 2005 amounted to 8,863 Gg of CO_2 eq., while the total indirect emissions estimated for the year 2005 were roughly 227 Gg. The main contributors to GHG emission are energy and transport, as given in the schema below.

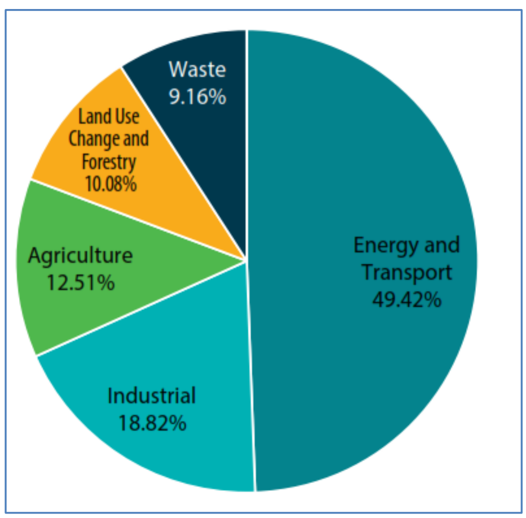

Figure 5-9_Main contributors to GHG emissions in CO_2 eq.

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[56] Third National Communication on the Climate Change. Albanian Ministry of Environment, 2016

[57] Direct GHG emissions are emissions from sources that are owned or controlled by the reporting entity. Indirect GHG emissions are emissions that are a consequence of the activities of the reporting entity, but occur at sources owned or controlled by another entity.

As shown in the figure below, transport is the main GHG contributor of all economic activities.

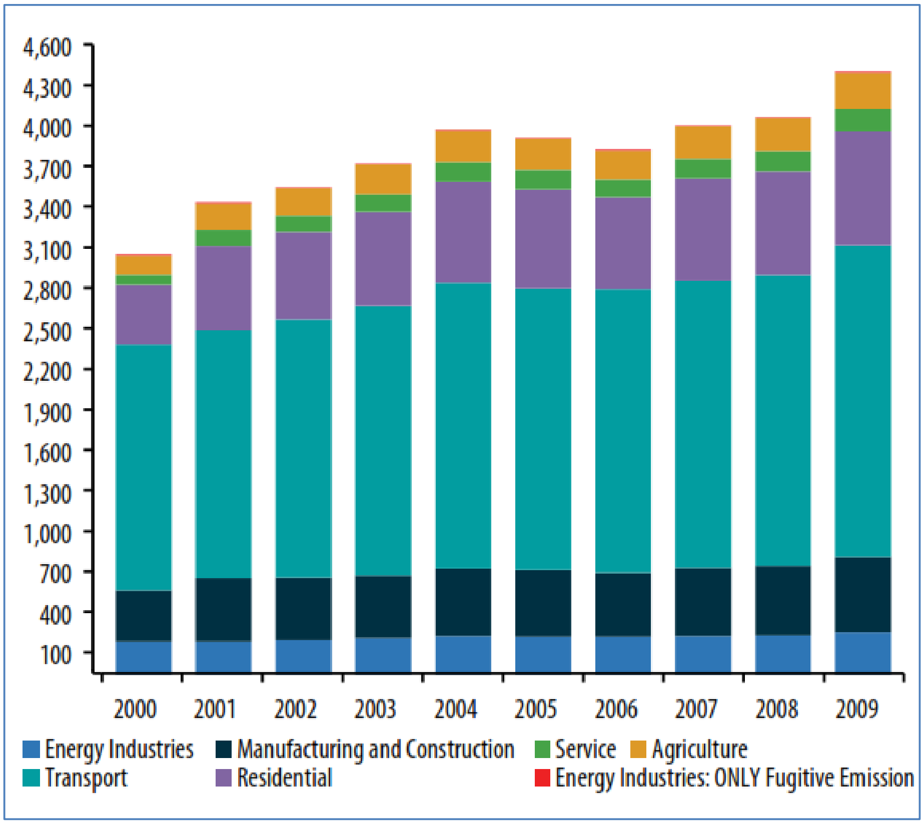

Figure 5-10_Contribution of economic sectors to the GHG emissions[58]

While the table below gives details on the GHG amount (in CO_2 eq) for each energy subsector.

[58] Third National Communication on the Climate Change. Albanian Ministry of Environment, 2016

Table 5-10_Amount of CO_2 eq (in Gg) emission from the energy subsectors in Albania

Table 2.7: Contribution of CO_2, CH_4, and N_2O from the Energy subsectors (Gg)

Sub-sectors	Gases	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009
Whole Energy and Transport Sectors	CO_2	2,987.90	3,372.10	3,477.95	3,648.75	3,896.11	3,835.33	3,749.38	3,925.06	3,983.30	4,319.45
	CH_4	4.73	4.75	4.92	5.13	5.43	5.34	5.38	5.45	5.50	5.50
	N_2O	0.08	0.09	0.09	0.09	0.09	0.09	0.09	0.09	0.10	0.10
	CO_2 eq.	3,111.93	3,499.67	3,609.11	3,784.34	4,038.02	3,975.37	3,890.28	4,067.45	4,129.86	4,466.04
Whole Energy and Transport Sectors	All fossil fuel	3,111.93	3,499.67	3,609.11	3,784.34	4,038.02	3,975.37	3,890.28	4,067.45	4,129.86	4,466.04
	Fuel wood	1,005.00	652.00	665.00	663.00	660.00	658.00	781.00	654.00	649.00	650.00
Energy Industries: ALL	CO_2	245.87	247.86	257.43	270.38	286.42	282.47	284.80	287.71	291.20	312.40
	CH_4	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
	N_2O	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	CO_2 eq.	246.29	248.28	257.85	270.80	286.84	282.89	285.22	288.13	291.62	312.82
Energy Industries: ONLY Fugitive Emission	CO_2	0	0	0	0	0	0	0	0	0	0
	CH_4	0.35508	0.35608	0.35708	0.35808	0.35908	0.36008	0.36108	0.36208	0.36308	0.36408
	N_2O	0	0	0	0	0	0	0	0	0	0
	CO_2 eq.	7.46	7.48	7.50	7.52	7.54	7.56	7.58	7.60	7.62	7.65
Manufacturing and Construction	CO_2	372.77	458.84	455.92	456.46	492.76	484.44	461.39	497.27	506.17	553.64
	CH_4	0.12	0.12	0.12	0.13	0.14	0.13	0.13	0.14	0.14	0.14
	N_2O	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
	CO_2 eq.	381.49	467.56	464.64	465.39	501.90	493.37	470.32	506.41	515.31	562.78
Transport	CO_2	1,815.93	1,830.58	1,901.29	1,991.93	2,110.10	2,080.96	2,098.12	2,119.58	2,145.32	2,301.47
	CH_4	0.08	0.08	0.08	0.08	0.09	0.09	0.09	0.09	0.09	0.09
	N_2O	0.00	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
	CO_2 eq.	1,817.61	1,835.36	1,906.07	1,996.71	2,115.09	2,085.95	2,103.11	2,124.57	2,150.31	2,306.46
Transport	Domestic Aviation	8.38	8.45	8.77	9.19	9.74	9.60	9.68	9.78	9.90	10.62
	Road	1,774.53	1,788.84	1,857.95	1,946.52	2,061.99	2,033.52	2,050.29	2,071.26	2,096.41	2,249.00
	Railways	7.44	7.50	7.79	8.16	8.65	8.53	8.60	8.68	8.79	9.43
	National Navigation	25.58	25.79	26.78	28.06	29.72	29.31	29.55	29.86	30.22	32.42
	Pipeline Transport	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Residential	CO_2	353.14	536.46	556.49	599.43	645.25	632.78	579.22	654.87	667.03	738.69
	CH_4	3.47	3.49	3.63	3.80	4.03	3.97	4.00	4.05	4.09	4.09
	N_2O	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.06	0.06
	CO_2 eq.	441.51	625.25	648.22	694.73	745.38	731.65	678.72	755.42	771.52	843.18
Service	CO_2	56.31	99.15	104.43	113.46	125.27	122.69	109.59	126.91	130.01	145.02
	CH_4	0.66	0.66	0.69	0.72	0.77	0.75	0.76	0.77	0.78	0.78
	N_2O	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
	CO_2 eq.	73.27	116.11	122.02	131.68	144.54	141.54	128.65	146.18	149.49	164.50
Agriculture	CO_2	143.88	199.21	202.39	217.09	236.31	231.99	216.26	238.72	243.57	268.23
	CH_4	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02
	N_2O	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	CO2 eq.	144.30	199.63	202.81	217.51	236.73	232.41	216.68	239.14	243.99	268.65
International Marine Bunkers	CO_2	18.54	18.69	19.41	20.34	21.54	21.25	21.42	21.64	21.90	23.50
	CH_4	0.0008	0.0008	0.00084	0.0009	0.0009	0.00092	0.0009	0.0009	0.00094	0.00101
	N_2O	0.0002	0.0002	0.00021	0.0002	0.0002	0.00023	0.0002	0.0002	0.00024	0.00025
	CO_2 eq.	18.62	18.77	19.49	20.43	21.63	21.34	21.51	21.73	21.99	23.60
International Aviation Bunkers	CO_2	35.91	36.20	37.60	39.39	41.73	41.16	41.49	41.92	42.43	45.52
	CH_4	0.0004	0.0004	0.00042	0.0004	0.0005	0.00046	0.0005	0.0005	0.00047	0.00051
	N_2O	0.0015	0.0015	0.00157	0.0016	0.0017	0.00172	0.0017	0.0018	0.00177	0.0019
	CO_2 eq.	36.38	36.68	38.10	39.91	42.28	41.70	42.04	42.47	42.99	46.12
International Bunkers	CO_2	54.45	54.89	57.01	59.73	63.27	62.41	62.91	63.56	64.33	69.02
	CH_4	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	N_2O	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
	CO_2 eq.	54.45	54.89	57.01	59.73	63.27	62.41	62.91	63.56	64.33	69.02
Others	CO_2	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
	CH_4	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
	N_2O	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO
	CO_2 eq.	NO	NO	NO	NO	NO	NO	NO	NO	NO	NO

From the table above, it results:

- Among CO_2, CH_4, and NO_2, the main amount of gas released into the atmosphere is CO_2;

- The contribution of CH_4 and NO_2 is practically insignificant compared to that of CO_2;

The table below gives a clear view of the contribution of the railways sector compared to road transport and the total GHG emissions.

Table 5-11_Amount of CO2 eq per each transport sector in Albania

Unit	All sectors	Energy & transport	Transport and transport sector				
	Total CO_2 eq	Energy & transport	Transport	Road transport	Maritime transport	Air transport	Railways transport
%	100	49.42	26.31	25.66	0.367	0.121	0.108
Gg	9036.91	4466.04	2306.46	2249.00	32.42	10.62	9.42

Therefore, the contribution of the railways sector is only 0.108% of the total GHG emissions released into the atmosphere by all the economic sectors of the country.

5.4 Geology

The outline of the geological issues is based on the geological map of Albania[59] and the related text, as well as on the site visits.

The railway line runs over Pliocene (N_2) and Quaternary (Q) geological age deposits. The Pliocene deposits are composed of Lower Pliocene (Helmasi unit-N_2^1h) and Upper Pliocene (Rrogozhine unit - N_2^2rr). The Helmasi deposits are composed of clays, silts and sands, while the Rrogozhine ones are composed of sandstones and conglomerates.

The Quaternary (Q) deposits cover all the field terrain and are composed of Holocene (Qh) and Pleistocene-Holocene (Qph) deposits. Some of the Holocene deposits are of marshy origin and area represented by clays, silts and sands, while others are alluvial and composed of silts, sands and gravel. Close to the seaside the Quaternary deposits are composed of marine sands

[59] Geological map of Albania, 1:200,000, Albanian Geological Survey, 2002

Figure 5-11_Geological map of the project area (according to geological map of Albania, 1:200.000, Albanian Geological Survey, 2002)

Legend

Qh	Qh -Holocene. Marine deposits: Mainly sands and sub sands.
Qh	Qh - Holocene. Lagoon-marshy deposits: clays, silts, sands, fine gravel, organic matter
Qh	Qh - Holocene. Alluvial deposits: silts, sands, gravels.
Qp-h	Qph - Pleistocene-Holocene. Alluvial-proluvial deposits: sands, gravels.
N_2^2-rr	N_2^2rr - Upper Pliocene, ("Rrogozhina" unit). Sandstones and conglomerates.
N_2^1-h	N_2^1h - Lower Pliocene, ("Helmesi" unit). Clays, silts, sandstones.
N_1^3m	N_1^3m - Upper Miocene, Mesinian: Clays, massive sandstones and conglomerates.
N_1^3t	N_1^3t - Upper Miocene, Tortonian. Sands, clays, conglomerates and lithotamnic limestones.
N_1^2s	N_1^2s - Middle Miocene, Serravalian. Clays, sands, and lithotamnic limestones
N_1^2l	N_1^2l - Middle Miocene, Langian. Marly clays, clays and sands
N_1^1b	N_1^1b - Lower Miocene, Burdigalian. Marls, Marly clays, silts and lithotamnic limestones.

The marshy deposits are encountered in the lowest part of the project area from Shkozet to Shkembi Kavajes, while the alluvial ones are encountered mostly within the lowland from Golem to Luz i Vogel. The Pleistocene-Holocene (Qph) deposits are of alluvium-prolluvium origin and are represented by sands and gravel and are encountered overall in the hilly foots.

Based on the Geohazard Map of Albania[60] alongside the railway line there is no any geological risk such as landslide, rock fall, mud flow, etc. Besides, the railway body is not affected from erosion and inundation (see Figure 5-25 below).

5.5 Tectonics and seismicity

Seismic source zones in the project area

Nine seismic source zones are distinguished within the territory of Albania and its surroundings[61] (see figure below) based on the historical earthquakes and tectonic features. The railway line (see red rectangle in the figure below) lies within the Pre-Adriatic Lowland (PL), with expected maximum magnitude Mx=7.0 (Richter scale).

The Pre-Adriatic Lowland (PL) is a coastal zone affected by post-Pliocene oblique compression thrust faults, N to NNW-striking, which are cut by rare ENE-trending strike-slips faults. Along this thrust fault zone, numerous strong

[60] Geohazard Map of Albania, 1:200000, Albanian Geological Survey, 2000

[61] Aliaj Sh et al. Seismicity, seismotectonics and seismic hazard "Harmonization of seismic hazard assessment in Albania. Academy of Sciences of Albania. 2010

earthquakes have been recorded (see Figure 5-12 and Figure 5-13 below). The last one occurred on November 26, 2019, with Ms=6.4.

Figure 5-13 below shows the active neotectonic faults and the location of the main historical earthquakes within the Project area and its neighbouring's[62].

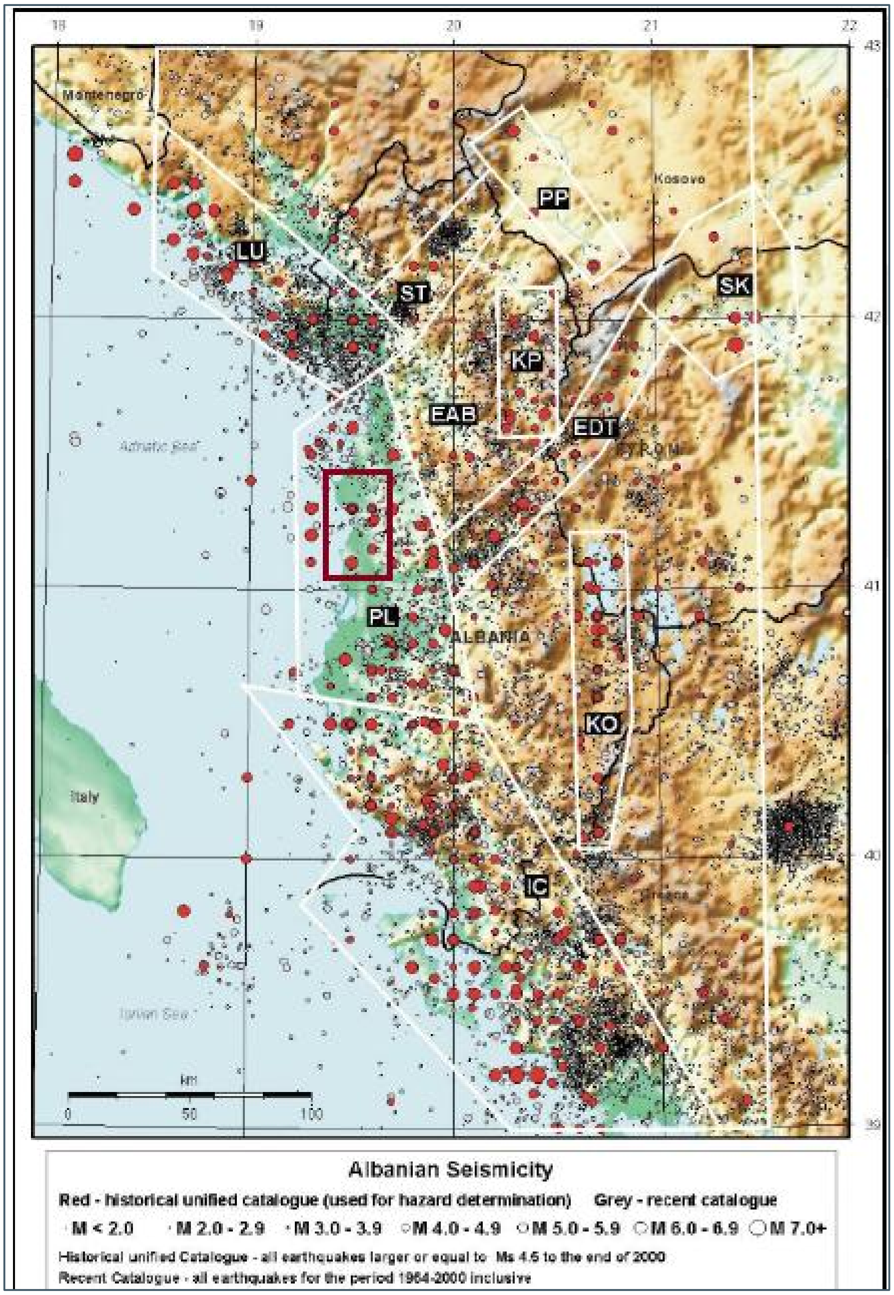

Figure 5-12_Historical earthquakes and seismic source zones in Albania

[62] Seismotectonic map of Albania, 1:500,000. Academy of Sciences, Institute of Seismology. Tirane 2000

Seismologic classification according to the Albanian norms

The seismic hazard map of Albania is based on the observed intensity of the largest historical earthquakes, on the earthquakes occurred during the 20th century, as well as on the seismotectonic synthesis[63]. Thick Consolidated quaternary sediments characterized by deep ground water level have been accepted as average soil conditions[64].

According to the seismic intensity map of Albanian territory[65], the project area is situated on the seismic intensity IX and VIII degree MSK-64 (see figure below), estimated for 100 years (with 70% probability), for an average soil category (2nd Soil Category, according to the technical condition KTP-N.2-89).

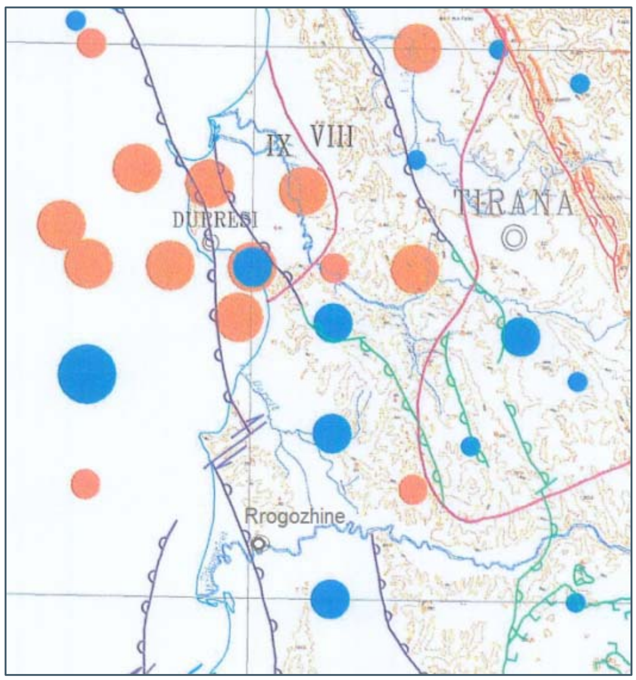

Figure 5-13_Seismotectonic map of the project area

According to Eurocode 8[66] the outcropped ground/subsoil over which runs the railway line can be classified as follows:

- Marshy deposits: Category S1 of subsoil/ground;
- Alluvial deposits: Category E of subsoil;
- Alluvial-prolluvial deposits: Category E of subsoil;

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[63] Sulstarova E. and Aliaj Sh. "Seismic hazard assessment in Albania" AJNTS, 2001.

[64] Sulstarova et al. Seismic regionalization of Albania. Academy of Sciences of Albania. Tirane, 1980

[65] Map of Seismic Regionalization of Albania, Scale. 1:500.000, Tirane 1980; approved by DCM no 371/1979

[66] http://eurocodes.jrc.ec.europa.eu/doc/WS_335/report/EC8_Seismic_Design_of_Buildings- Worked_examples.pdf

- Helmasi deposits: Category B to D of subsoil, in function of the layers' thickness; and
- Rrogozhine deposits: Category D of subsoil;

Amongst the above deposits, the marshy deposits are of concern for construction purposes. These deposits, which are encountered in the Shkozet to Plepa area (km 1+876 to approximately km 6+000) are included within the area of seismic intensity IX degree MSK-64. Besides, these deposits can be classified as Category S1 of soil.

Seismic hazards according to Eurocode 8

According to Euro code 8 (Design of structures for earthquakes Resistance, 2003), the main parameter considered in calculating the seismic hazard is the PGA (horizontal peak ground acceleration) or Amax (Maximal acceleration of vibration of the ground at foundation levels). To assess and calculate the PGA, the considered issues are the regional and local tectonics, geotechnical model of soil/subsoil/ground, and the water table level.

Currently, in Albania, there is not any detailed official map of seismic risk based on PGA values. In the absence of such a map, our estimation is based on a schematic research map from Institute of Seismology (see figure below) prepared in the framework of the project "Harmonization of Seismic Hazard Maps for the Western Balkan Countries"[67]. The calculations were carried out for PGA for repetition period of 475 years of firm rock conditions, with shear wave velocity Vs – 800 m/s at 30 meters depth that corresponds to the A class of Euro code 8 (EC8, 2004). This parameter corresponds to a seismic risk level of 10% probability of exceedance in 50 years (return period of 475 years). According to this estimation, the maximum horizontal acceleration (for Return Period = 475 years for firm rock conditions) in the Project area varies from 0.25 to 0.30g (see Figure 5-14 below).

[67] Aliaj Sh. et al. Seismicity, seismotectonics and seismic hazard "Harmonization of seismic hazard assessment in Albania. Academy of Sciences of Albania. 2010

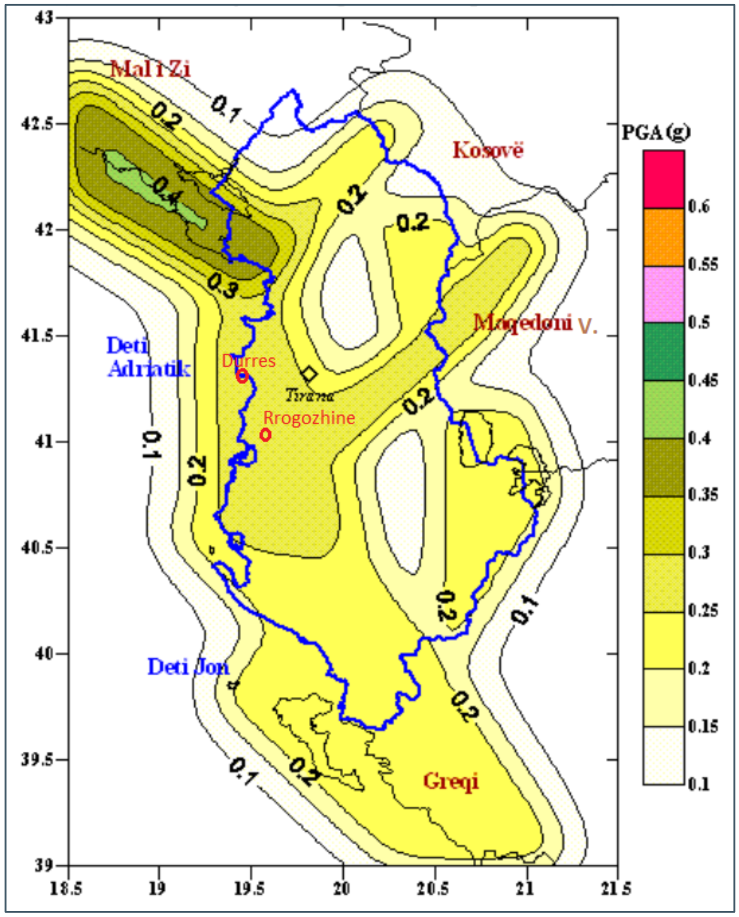

Figure 5-14_PGA values (for return period of 475 years) and the Project area

To calculate the right values of PGA along the railway line, it is necessary to known in detail, especially for each bridge location, the local parameters including the regional and local tectonics, the geotechnical model of the soil/ground, and the water table level.

Latest significant earthquake and the railway line

The strong earthquake which hit the Western Lowland of Albania in November 26.2019, had the following parameters:

> M[68]s = 6.4; MM[69] = IX+; Epicentre roughly 22 km in the north of Shkozet (see Figure 5-15 below).

Hereinafter follows a short summary of this earthquake and its impact on the railway line components.

The occurred within the Preadriatic Lowland seismic source zone. The epicentre was in the Adriatic coastline, some 20km in the NW of Vorë (see figure below).

[68] Ms – magnitude in Mercalli scale

[69] MM- Intensity in Modified Mercalli scale

The magnitude of the main shock has been evaluated at least 6.4, while the intensity in the epicentre to IX degree (MSK-64)[70]. The earth shake lasted at least 50 seconds.

The main shock caused more than 50 casualties, 3000 injuries and thousands of homeless. Thousands of buildings were damaged in Durrës, Shijak, Vorë, Fushe Krujë, Mamurras, Thumanë, Laç, Milot, Lezhë, Tiranë, Kavaje, Rrogozhine, etc.

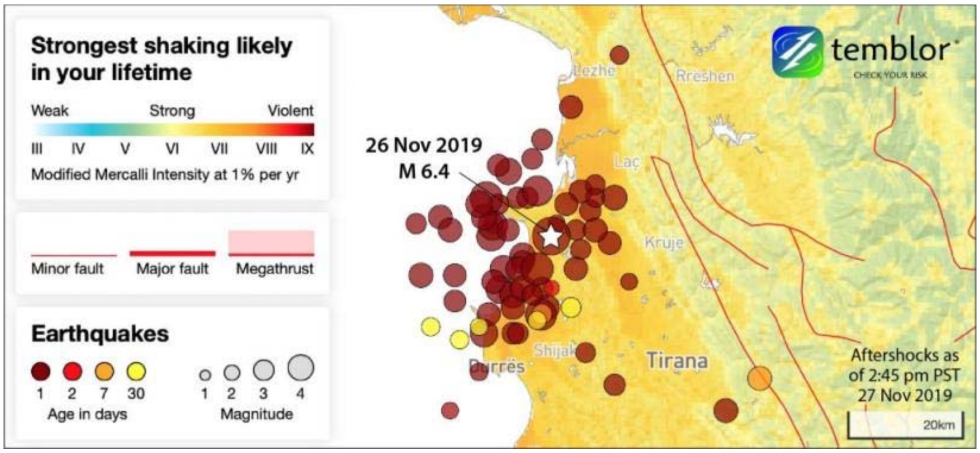

Figure 5-15_Epicentre of the earthquake of November 26.2019 and aftershocks of 24 hours

Figure 5-16 and Figure 5-17 below show the role of the soil conditions in the amplification of the earth shaking.

[70] https://www.volcanodiscovery.com/earthquakes/albania/archive/2019-nov-26.html

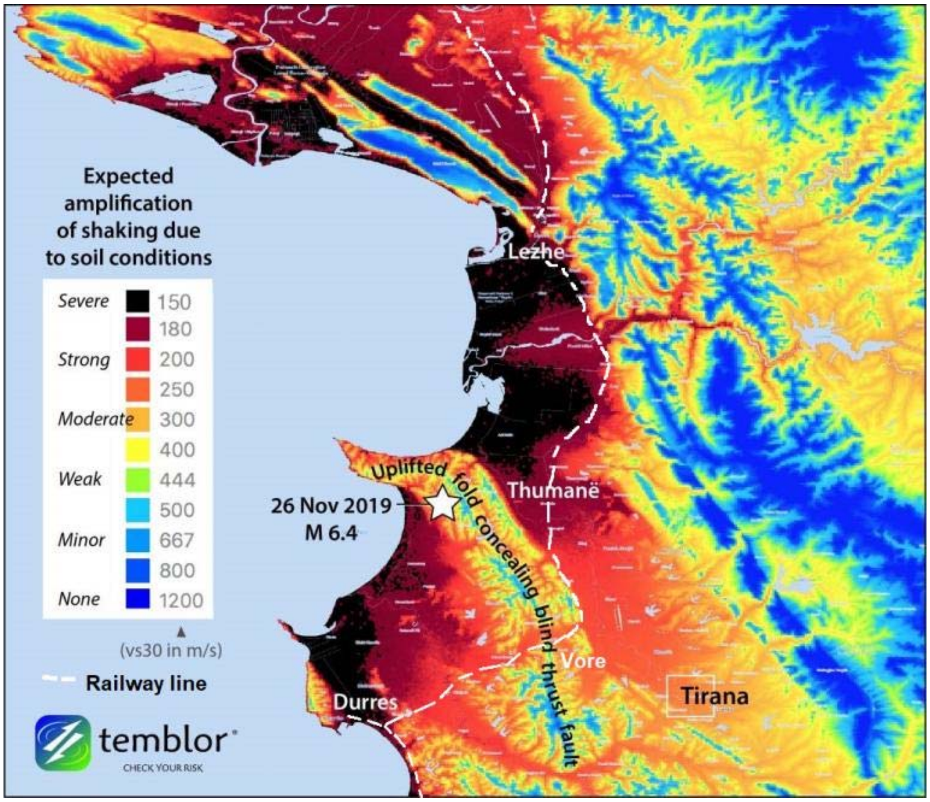

Figure 5-16_Amplification of the earth shaking due to soil conditions

The shaking produced by the earthquake was almost certainly amplified in the weak, unconsolidated deposits surrounding the epicentre. *Temblor's STAMP model shows amplification factors of 4-5 over the shaking that was experienced at bedrock sites, such as at the epicentre itself[71].*

The shaking was higher within the flat areas covered by water- saturated unconsolidated Quaternary deposits, especially marshy deposits. The area crossed by the railway line (see figure above) is affected by active post-Pliocene thrust faults (see Figure 5-13 above).

[71]https://temblor.net/earthquake-insights/albania-earthquake-strikes-highest-hazard-zone-in-the-balkans-devastating-nearby-towns-10153/

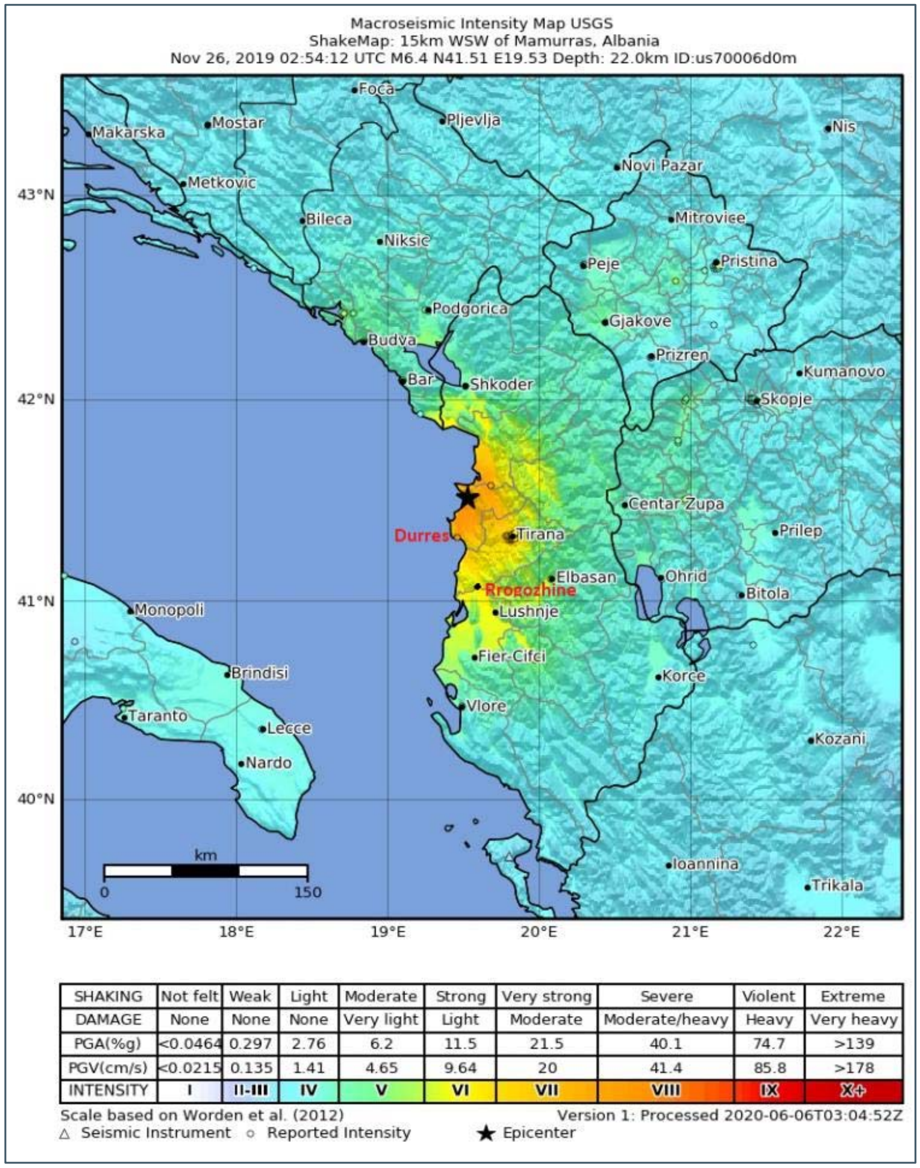

Figure 5-17_Amplification of earth shaking within the Project area[72]

The earthquake of November 26, 2020 damaged also the Ishmi Bridge, which is currently (May 2021) out of work. Consequently, the railway line from Vorë to the North Albania is not in operation.

In addition to the damages occurred within Durres Municipality, the earthquake of November 26. 2020 affected also Kavaje and Rrogozhine Municipalities territories. The recorded damages included also the following:

- 41 houses in the administrative unit of Golem (Kavaje Municipality)
- 148 houses in Rrogozhine Municipality[73]

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[72] https://earthquake.usgs.gov/earthquakes/eventpage/us70006d0m/executive

[73] http://planifikimi.gov.al/index.php?eID=dumpFile&t=f&f=5639&token=e0f0a44486add425efe821ba2f30a1e03c60523f

5.6 Surface waters

5.6.1 Watercourses in the Project area

The surface waters in the project area are represented by some streams, drainage and irrigation channels and two rivers (Lishati and Darsi Rivers - see figure Figure 5-18 and Figure 5-19 below). The table below gives the water courses crossed by the railway, their watershed surface (km^2) and the maximum liquid discharges (m^3/s)

Table 5-12_Main characteristics of the water courses crossed by the railway line

No	Water course (river/stream)	A km^2	Maximum discharges (m^3/s) and probability		
			1%	10%	20%
1	Stream of Manskuri	15.8	150	105	90
2	Lishati River	75.0	389	272.3	233.4
3	Darsi River	133.0	420	294	252
4	Stream of Kërçukje	1.10	13.6	9.52	8.16
5	Stream of Gose e Madhe	1.91	22.9	16.03	13.74
6	Stream of Gose e Vogel	3.40	39.0	27.3	23.4
7	Stream East Gosë Vogel	1.58	19.0	13.3	11.4

Figure 5-26 below shows the location of the above-mentioned watercourses. Excepting Darsi and Lishati Rivers, the other watercourses have small watershed.

Figure 5-18_Lishati River Bridge (km 15+420)

Figure 5-19_Darsi River Bridge (km 23+150)

In addition to the above-mentioned watercourses, from km 1+880 (Shkozet station) to km 13+000 the railway line runs close to the Adriatic Sea (see Figure 5-24 below). The distance from the sea varies from 170 m (at Kavaje Rock – km 6+800 of the railway line) to 1.4 km (at Qerret – km 13+000 of the railway line).

5.6.2 Rivers waters quality

Materials and methods

The assessment of the water quality for rivers and lakes is based on the ecological and physic-chemical parameters, which values are compared to the EU norms, as defined by the EU Water Framework Directive (WFD). The definition of ecological status consists of the abundance of aquatic flora and fauna, the availability of nutrients, and parameters like salinity, temperature and pollution by chemical pollutants.

The EU Water Framework Directive (Directive 2000/60) classification scheme for surface water ecological status includes five categories: high or very good, good, moderate, poor and bad. “High status” means no or very low human pressure. “Good status” means a “slight” deviation from this condition, “moderate status” means “moderate” deviation, and so on.

Law 111/2012 “On integrated management of the water sources”, as amended, fully complies with the Water Framework Directive.

The Guidance No 10 of the EU Water Framework Directive (Rivers and Lakes – Typology, Reference Conditions and Classification Systems) provides for the relative roles of biological, hydro morphological and physicochemical quality elements in ecological status classification according the normative definitions in Annex V (1.2) of this Directive.

The State of Environment Report (SoER), published yearly by the National Environmental Agency, gives the monitoring results on the surface waters quality. This monitoring is based on the DCM 1189/2009 "On the rules and procedures on the preparation and application of the national monitoring programme", as well as on the DCM 246/2014 "On the environmental norms for the surface waters".

The monitoring of the surface waters quality has been based on the DCM 1189/2009 "On the rules and procedures on the preparation and application of the national monitoring programme", as well as on the DCM 246/2014 "On the environmental norms for the surface waters".

The qualitative classification of the water quality is based on the concentration of the Total Organic Carbon (TOC) and the Total Nitrogen (TN). The Total Organic Carbon is the amount of carbon found in an organic compound and is often used as a non-specific indicator of water quality. While the Total Nitrogen is the sum of total Kjeldahl nitrogen (ammonia and organic nitrogen) and nitrate-nitrite.

In Albania, TOC and TN are based on the following standards:

- Total Organic Carbon: International standard ISO 8245; and
- Total Nitrogen: National standard SSH EN 12260: 2003

Table below shows the qualitative classification of the water quality based on the concentration of the Total Organic Carbon and Total Nitrogen[74].

Table 5-13_Qualitative classification of the water quality

Class	I	II	III	IV	V
Water quality	Very good	Good	Moderate	Poor	Bad
Total Nitrogen (µg/l)	< 300	300-400	400-600	600-1200	1200+
Total Organic Carbon (mgC/l)	< 2.5	2.5 – 3.5	3.5 - 6.5	6.5 - 15	15+

The symbols and colours showing the ecological status of the surface water are given in the figure below.

[74] Albania State of Environment Report, 2018 (in Albanian). NEA, 2019

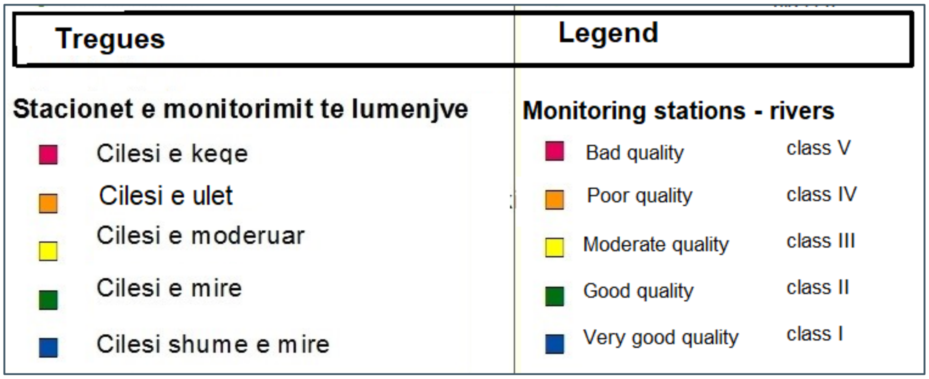

Figure 5-20_Symbols of the ecological classification of the rivers' water quality according to the Water Framework Directive and Albanian standards

Rivers waters quality related to the proposed project

The data/information on the quality of the surface waters has been provided by the National Environmental Agency[75]. While the location of the monitoring stations are provided by the Albanian geoportal[76].

Selection of the monitoring stations

The selected monitoring stations are located close and downstream of the railway line crossings the water bodies. Among the surface waters' monitoring stations, only the station Sh4 can be associated to the proposed projet. This station is located at the Shkumbini River Bridge close to Rrogozhine.

Figure 5-21_Monitoring station Sh4 at Shkumbini River Bridge

[75] http://www.akm.gov.al/lumenjt.html

[76] https://geoportal.asig.gov.al/map/?auto=true

The following table shows the values of the water quality parameters of the Shkumbini River water measured at the Rrogozhine monitoring station.

Table 5-14_Classification of the Shkumbin River water quality at Rrogozhine

No	Indicator	Value	Norm	Classification
1	DO (Dissolved Oxygen)	8.2	>7	I
2	NBO_5	4.8	<7	III
3	NH_4	0.1	<0.3	II
4	NO_2	0.016	<0.06	II
5	NO_3	0.78	<0.8	I
6	P-total	0.08	<0.1	I
7	**Station classification**			**III**

The Dissolved Oxygen is an Indicator of Bioavailable Dissolved Organic Carbon in Groundwater. Greater is the organic pollution of a surface water smaller is the quantity of the dissolved Oxygen into the water.

Box 5.1_Relationships between organic matter and dissolved Oxygen

Relationships between organic matter and dissolved Oxygen
The amount of oxygen dissolved in a stream, river or lake is an indication of the degree of health of the water and its ability to support a balanced aquatic ecosystem. The oxygen comes from the atmosphere by solution and from photosynthesis of water plants. The discharge of an organic waste to a stream imposes an oxygen demand on the stream. If there is an excessive amount of organic matter, the oxidation of waste by microorganisms will consume oxygen more rapidly than it can be replenished[77].

The quality of the river water at Rrogozhine monitoring station is moderate because of the pollution at Elbasan city, which is located upstream, roughly 40 km on the East of Rrogozhine. While upstream of Elbasan the quality of the river's water is very good.

5.6.3 Coastal bathing waters quality

Methodology

Based on the Directive 2006/7/EC (Bathing Waters Directive), the National Environmental Agency[78] provides for the classification of the bathing waters according to the results of the bacteriological analyses. The standards specified in both the Albanian standards and the Bathing Water Directive are based on World Health Organisation (WHO), which records the incidence of gastrointestinal disease in people bathing in waters of differing bacterial concentrations.

The national standards are based on the following parameters:

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[77] https://www.eea.europa.eu/help/glossary/gemet-environmental-thesaurus/dissolved-oxygen

[78] NEA, State of Environmental Report, 2019

- Intestinal Enterococci (IE) – Method ISO 7899-1, which consists on the detection and enumeration of intestinal enterococci in surface and waste water; and
- Escherichia Coli (E.coli)– Method ISO 9308-3, which consists on the detection and enumeration of Escherichia coli and coliform bacteria in surface and waste water.

Annex II of the Bathing Waters Directive classifies the bathing waters quality as follows[79]:

A. **Excellent –** the highest cleanest bathing waters;

B. **Good –** generally good water quality;

C. **Sufficient –** the water meets minimum standards

D. **Poor –** the water do not met the minimum standards and therefore the water quality should be improved to reach, at least, the "Sufficient" level.

Figure below shows the symbols in colour of the coastal waters quality.

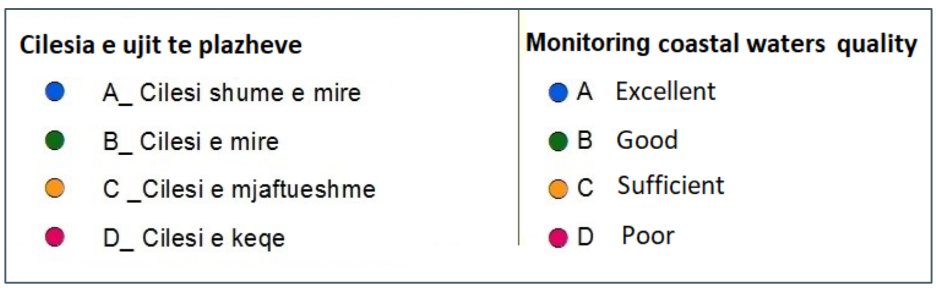


Figure 5-22_Symbols of the coastal waters' quality

The thresholds for classification of coastal waters, are as follows[80]:

Table 5-15_Clasification of coastal waters quality according to the bacteriological analyses

Class of Water quality class	Bacteriological parameter			
	Intestinal enterococci (IE)		Echerichia coli (EC)	
	Method ISO 7899-1		Method ISO 9308-3	
	Threshold	Confidence level	Threshold	Confidence level
Excellent	IE: ≤100 cfu/100ml	Upon 95th percentile evaluation	EC: ≤250 cfu/100ml	Upon 95th percentile evaluation
Good	IE: ≤200 cfu/100ml	Upon 95th percentile evaluation	EC: ≤500 cfu/100ml	Upon 95th percentile evaluation
Sufficient	IE: ≤185 cfu/100ml	Upon 90th percentile evaluation	EC: ≤500 cfu/100ml	Upon 90th percentile evaluation
Poor	The IE and EC values are worse than the sufficient			

[79] https://eur-lex.europa.eu/eli/dir/2006/7/2014-01-01

[80] https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32006L0007

Coastal bathing waters quality related to the proposed project

The Albanian values of the Intestinal enterococci (IE) and Echerichia coli (EC) for the excellent quality of the coastal waters are:

- IE ≤100 cfu/100ml - upon 95% evaluation - Method ISO 7899-1; and
- EC ≤250 cfu/100ml - upon 90% evaluation - Method ISO 9308-3

The data/information on the quality of the coastal bathing waters has been provided by the National Environmental Agency[81]. While the location of the monitoring points are provided by the Albanian geoportal[82].

Nine water samples have been collected for each monitoring point during 2019, as shown in the table below.

Table 5-16_Period of samplings and number of water samples for each monitoring point

Period of water sampling	Number of water samplings for each monitoring point
16 to 31.05.2019	1
01.06 to 15.09.2019	7 (one sampling every 2 weeks)
16.09 to 30.09.2019	1

For each monitoring point the temperature and the pH were measured at the site. Besides, the health inspectors determined the sources of water pollution, including the waste water and the watercourses discharging into the sea, as well as any eventual solid waste spread on the beaches.

Location of the monitoring stations

The selected monitoring stations are located on the right of the railway line, from km 1+880 (Shkozet station) to km 13+000. There are 17 monitoring points within the Durres sandy Beach, and 12 ones within the Golem and Qerret Beaches (Kavaje Municipality). The distance of the monitoring points from the railway line varies from 170 m (at km 6+800 of the railway line) to 1.4 km (at km 13+000 of the railway line).

Appendix 10.1 (Map of microbiological monitoring of sea waters separate file in pdf) and Figure 5-24 below show the location of the monitoring points and of the railway line. While table below gives the rezults of the water quality analyses.

Monitoring results – Durres Beach

Table below shows the monitoring results for Durres Beach

Table 5-17_Results of the bacteriological analyses in Durres Beach monitoring points

Monitoring points – Durres Beach																
Point	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	12	21

[81] http://www.akm.gov.al/lumenjt.html

[82] https://geoportal.asig.gov.al/map/?auto=true

	Monitoring points – Durres Beach																	
E.coli	78	62	67	153	151	107	85	55	95	57	82	704	267	138	143	144	103	179
IE	75	86	67	**234**	**226**	123	79	50	81	89	101	821	336	128	**211**	87	87	138
Class	A	A	A	B	B	A-B	A	A	A	A	A	D	C	A-B	B	A	A	A-B

Legend

Symbol	Water quality
A	Excellent
A-B	Almost excellent
B	Good
C	Sufficient
D	Poor

From the table above it results that the quality of the coastal waters is in general excellent, excepting the following sampling points:

- Sampling point 15: poor water quality because of direct discharge of a drainage channel to the sea. The drainage channel (see Figure 5-25 below) was one of the two channels build to ensure the drainage of the former Durres marshland. Because of the high number of informal constructions within the former marshland, some of them are not yet appropriately connected to the Durres waste water system. Consequently, the drainage channel collects spills of untreated sewage;
- Sampling point 16: sufficient water quality because of the vicinity with the point 15, which is polluted;
- Sampling points 7, 8 and 18: good water quality because of any small local source of pollution (spills of water used by any bar-restaurant, etc.). The values of Escherichia coli are within the permitted level for excellent water quality, while the presence of intestinal enterococci is slighter superior to the permitted value for good water quality (200 cfu/100ml)

The highest level of pollution has been recorded during the first half of August that represents the peak of the seaside holidays and therefore of the beaches and the coastal bar-restaurants frequentation.

Figure 5-23_Drainage channel discharging into the sea at Km 5+864

Monitoring results – Kavaje Beaches

Table below shows the monitoring results for Golem and Qerret Beaches (Kavaje Municipality).

Table 5-18_Results of the bacteriological analyses for Kavaje Beaches

Indicator	Monitoring point											
	Golem Beach									Qerret Beach		
	1	2	3	4	5	6	7	8	9	10	11	12
FC 90% (norm = 250)	127	116	87	82	79	75	64	56	63	55	75	78
IE 90% (norm = 100)	137	127	84	92	66	85	45	44	52	68	73	74
Water quality	A-B	A-B	A	A	A	A	A	A	A	A	A	A

From the table above it results that the quality of the coastal waters is in general excellent, excepting the sampling points 1 and 2 where the quality is between excellent and good, because of any small local source of pollution (spills of water used by any bar-restaurant, etc.).

Besides, the health inspectors found that although it is an improvement compared to the previous years, the number of waste bins and public toilets in Durres and Kavaje beaches is not yet sufficient.

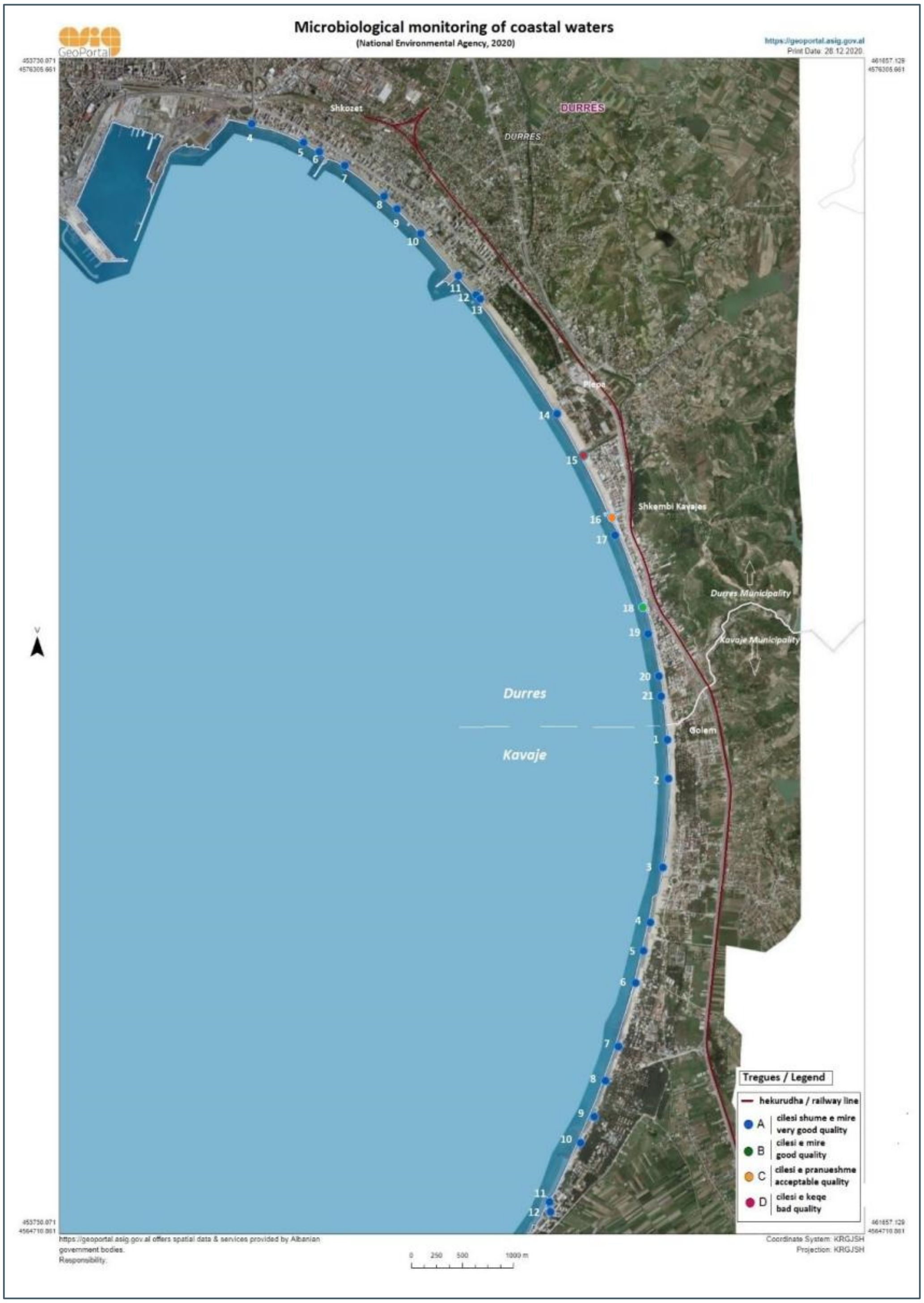


Figure 5-24_Coastal water quality near the railway line

5.7 Flooding

The flood analysis at country level takes into consideration the data and studies carried out from 1950 to date, while as a critical, the flood event of 1962-1963 has been taken into account. According to the data analysis, it resulted that the maximum discharge of this event has a return period of 100 years, while from that time this discharge has not occurred.

It should be mentioned that the railway line from Durres to Rrogozhine has never been flooded, even during the exceptional flood events of 1962-1963.

Figure below shows the geohazards map of the project area[83], including flood hazards.

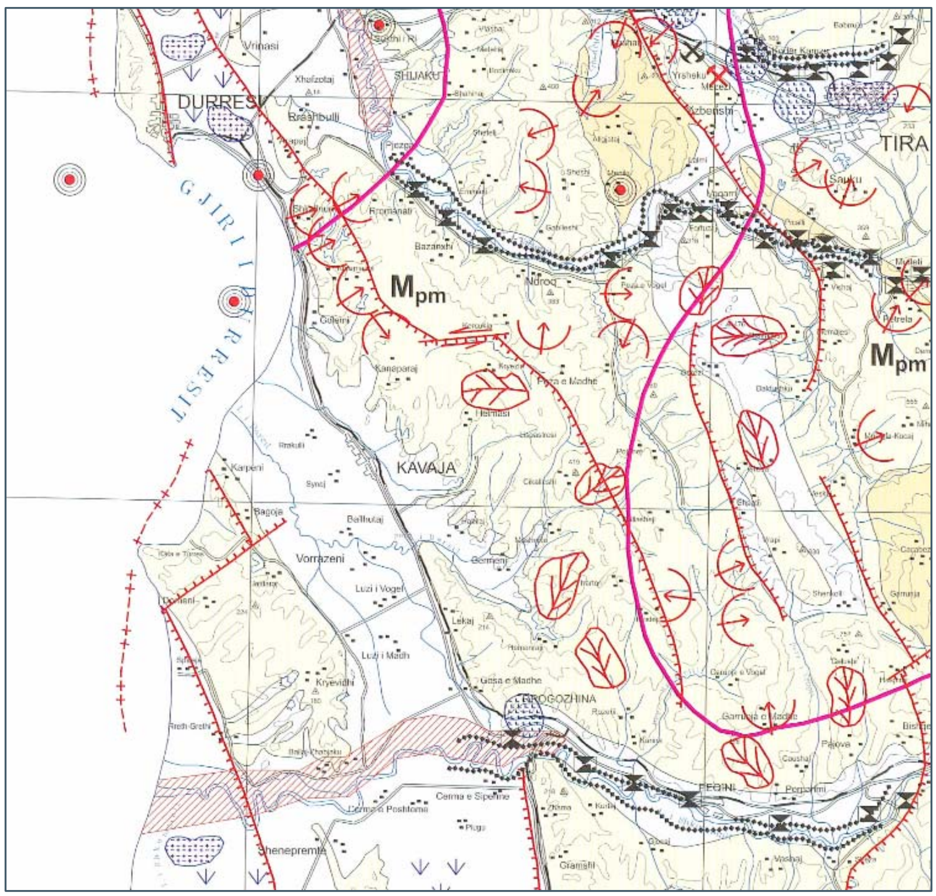
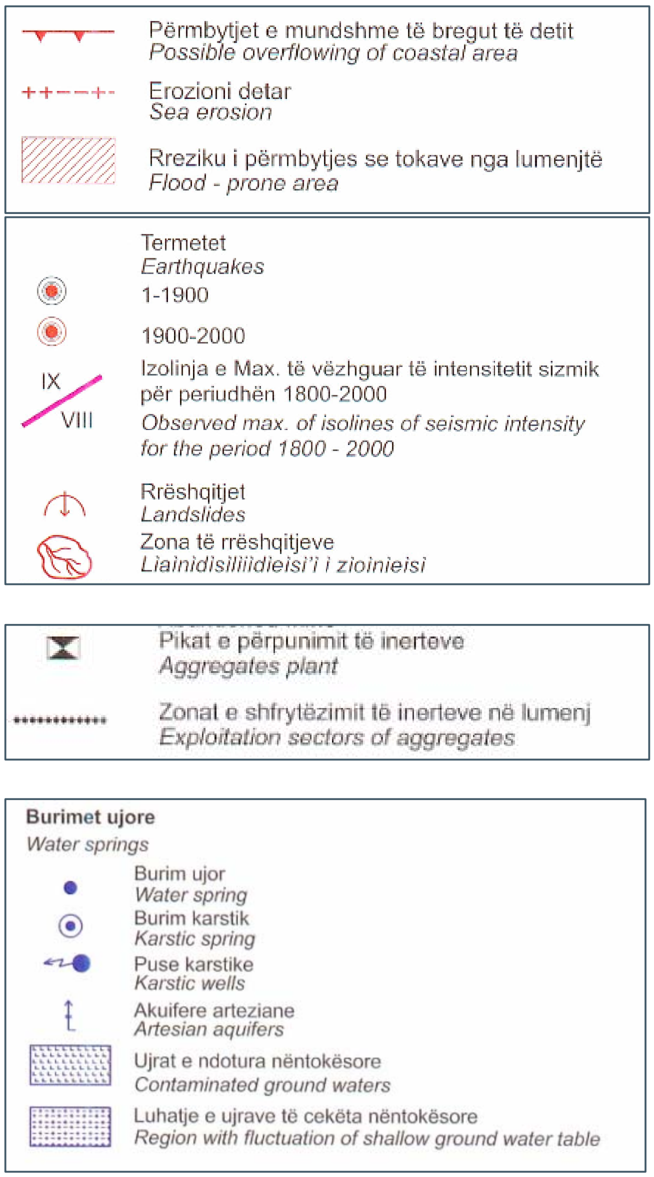


Figure 5-25_Geohazard map of the Project area, including flooding

[83] The Geohazard Map of Albania (1:200.000). Ministry of Industry and Energy and Albanian Geological Survey. 2000

Legend



5.8 Ground waters and water supply

5.8.1 Hydrogeological settings

Ground waters are represented by water bearing complexes of Quaternary (Q) and Pliocene (N_2) deposits. The late are composed of Rrogozhine end Helmasi deposits.

The water bearing complex of Rrogozhine formation (N_2^2rr) underlies the Quaternary deposits. The sandstones and conglomerates of Rrogozhine unit have a high water bearing capacity and a medium to low permeability, while the Helmasi unit (N_2^1h) cannot be considered as a water bearing formation because of the high clay content. While the Quaternary marshy deposits have low water bearing capacity and permeability. Their water is generally polluted and therefore not good for drinking water purposes. From Shkozet to Km 6+100 (Plepa), the level of the water table alongside the highway varies from 0.50 to 1.0 from the surface. The sandy gravelly alluvial-proluvial deposits have medium water bearing capacity and permeability. In Shkozet the level of the water table is close to the surface[84] (see figure 7.6 below). In addition, this level is characterized by frequent fluctuations. That is due to the fact that this zone is a former marshland.

The Pliocene formations are encountered in the hilly foots. Consequently, the level of the water table within these formations is deeper than 5.0m. Within the territory of Golem village, the level of the water table is deeper than 5.0m[85].

The figure below shows the hydrogeological map of the project area[86]

[84] Geohazard Map of Albania, 1:200.000. Albanian Geological survey, 2002

[85] TA2-ALB-ENV-03 – COWI – IPF, 2010

[86] [86] Hydrogeological Map of Albania, 1:200.000. Albanian Geological Survey, 2015

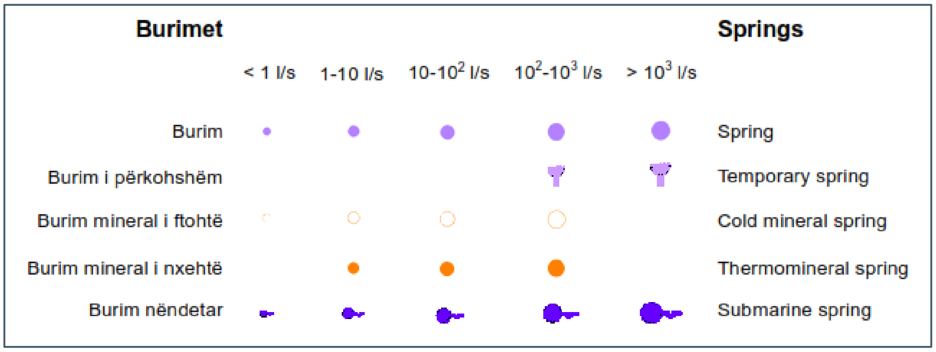
Figure 5-26_Hydrogeological map of the project area

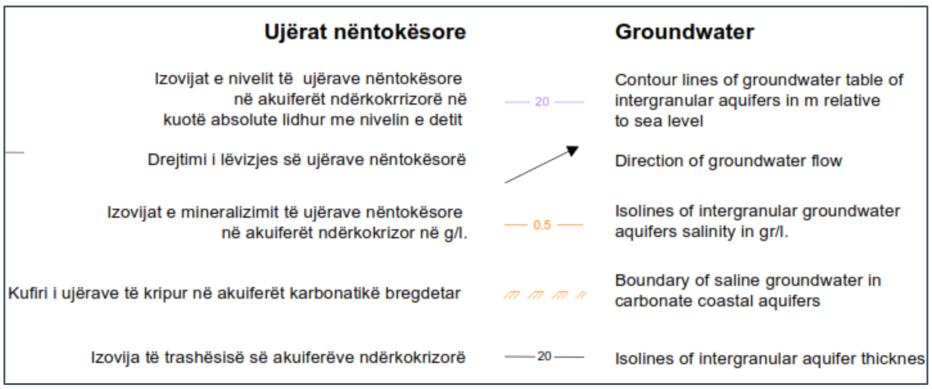
Legend

Akuiferë	T $[m^2/d]$	Aquifer
Me porozitet ndërkokrrizor		*Intergranular porosity*
Akuifer me përhapje të gjerë dhe ujëmbajtje shumë të lartë deri mesatare. (rëra+zhavore, rëra+zhavore+alevrite)	> 10	Extensive and very high – medium productive aquifers. (sand + gravel, sand + gravel + mud/silt)
Akuifer me përhapje të kufizuar dhe ujëmbajtje mesatare deri në shumë të ulët. (argjila + rëra + alevrite + zhavore)	$10 - 10^{-1}$	Local and medium - very low productive aquifers. (clay+ sand + silt + gravel)
Me porozitet çarje - karst		*Fissured / karstified porosity*
Akuifer me përhapje të gjerë dhe ujëmbajtje tepër të ndryshueshme, vende-vende deri në shumë të lartë (gëlqeror, dolomite)	$10^4 - 10^{-1}$	Extensive and strongly alternating productive aquifers, local very high. (limestone, dolomites)
Me porozitet poro - çarje		*Porous / fissured porosity*
Akuifer me përhapje të gjerë dhe ujëmbajtje mesatare deri të ulët. (ranorë + argjila + konglomerate)	$10^2 - 10$	Extensive and medium- very low productive aquifers. (sandstone, claystone, conglomerate)
Akuifer me përhapje të kufizuar dhe ujëmbajtje lokale të ulët deri shumë të ulët (ranorë + alevrolite)	$10 - 10^{-1}$	Local and low - very low productive aquifers. (sandstone, siltstones)
Me porozitet çarje		*Fissured porosity*
Akuifer me përhapje të gjerë dhe ujëmbajtje të ndryshueshme, mesatare deri në shumë të ulët	$10^2 - 10^{-1}$	Extensive and alternating medium - low productive aquifers
Praktikisht jo akuifer		**Practically non aquiferous rocks**
Shkëmbinj praktikisht pa rezerva ujërash nëntokësore (argjila, flish, evaporite)	$< 10^{-1}$	Rocks without considerable groundwater resource (clay, flysch, evaporite),

Pus-shpimet	Boreholes
Pus- shpimi në akuifer pa presion	Borehole in phreatic aquifer
Pus- shpimi në akuifer me presion	Borehole in confined aquifer
Pus -shpimi vetëderdhës	Artesian well flowing
Pus- shpimi që ka kapur disa akuiferë	Boreholes of deep aquifers
Pus- shpimi me ujë mineral të nxehtë	Thermomineral water well

Vepra të ndërtuara për shfrytëzim ujërash nëntokësorë	Artificial work for groundwater intake
Me prurje mesatare 10 - 100 l/s	10-100 l/s average discharge
Me prurje mesatare 100 - 1000 l/s	100-1000 l/s average discharge
Me prurje mesatare mbi 1000 l/s	more than 1000 l/s average discharge





5.8.2 Water springs

There are several springs that emerge in the Rrogozhine geological formation. They all are located on the left of the railway line. The closest of them are found more than 1 km from the railway line (see figure below). Their discharge is up to 1.0 l/sec. The springs emerge approximately 100m above sea level, while the railway line at this section runs approximately 25m above sea level.

5.8.3 Drinking water supply

From the map above it results that there are some water wells and springs close to the railway line. At Kavaje a water work is located in the vicinity of the railway line. The water wells serve to supply in drinking water the villages of the area.

Drinking water supply sources

A summary of the water supply sources concerning the Project area includes:

- The urban and semi-urban area from Shkozet to Durres/Kavaje administrative border Kavaje Rock (1+870 to Km 8+500 - part of Durres Municipality) is supplied in drinking water from Fushe Kuqe Aquifer, which is located 38 km in the North of Durres. The area both sides of Shkozet-Kavaje Rock section do not include ground waters suitable for drinking purposes. As a result, there are no hydrogeological water wells within this area.

- Kavaje Municipality is supplied in drinking water from the following:
  - Shkumbini River Quaternary Gravel Aquifer. The water wells are located in the Village of Cerme, which is located far away from the railway line. In addition, the main water pipeline Cerme-Kavaje do not cross the railway line; and
  - Local hydrogeological wells.

- Rrogozhine Municipality is supplied in drinking water from the following:
  - Shkumbini River Quaternary Gravel Aquifer. The water wells are located in the Shkumbini Riverbed and are located roughly 600m from the end of Rrogozhine station; and
  - Local hydrogeological wells.

5.8.4 Groundwater quality

Six groundwater samples have been collected and analysed for the Project's purposes. The results of the analyses show that the water of the wells is of good quality. Details on the results of these analyses are provided in the Hydrogeological Report (separate document).

The locations of the hydrogeological wells, which waters have been analysed, are shown in the topographic map (see figure below and Map no3 – separate Appendix)

Figure 5-27_Location of the water wells near the railway line

5.9 Ecological resources and biodiversity

5.9.1 Ecological resources and biodiversity

The railway runs across urban, suburban, and rural areas, which landscape is marked by densely urban areas (Durres, Golem, and Kavaje), local and regional roads, farm houses, farm fence boundaries, arable lands, olive yards, drainage and irrigation channels, and some streams running from east to west direction. The vegetation of the crossed streambeds is semi-natural because of human intervention.

Thus, from Durres to Rrogozhine, the railway line does not cross or run in the vicinity of any area of rich biodiversity values.

Flora and habitats

Published materials concerning the area in the vicinity of the railway line are missing because of the lack of biodiversity values within this area. Consequently, field surveys were carried out to describe the biodiversity on both sides of the railway line.

The semi-urban and rural areas crossed by the railway line are characterised by semi-natural and modified vegetation types and habitats. Natural habitats are missing. Semi natural and artificial or modified habitats, especially those intensively used for arable lands, olive yards and fruit trees constitute the habitats crossed in the rural areas.

The main vegetation types and habitats crossed by the railway are as follows:

- agricultural lands, which are cultivated with crops, vegetables, olive groves, vineyards and fruit trees; and
- water courses that are represented by Darsi River (which is a small river), some small streams and irrigation and drainage channels

The arable lands are cultivated with common plant species of low and common biodiversity diversity values. The non-maintenance of the railway line has favoured the development of some plants, especially the *Rubus fruticosus* (Blackberry plant).

Within the crossed water courses and irrigation and drainage channels are encountered mostly reed-beds. Plant species like *Phragmites australis*, *Typha angustifolia*, *Scirpus lacustris*, constitute their basal composition. Reed-beds are frequently accompanied by common plant species with low to moderate biodiversity value.

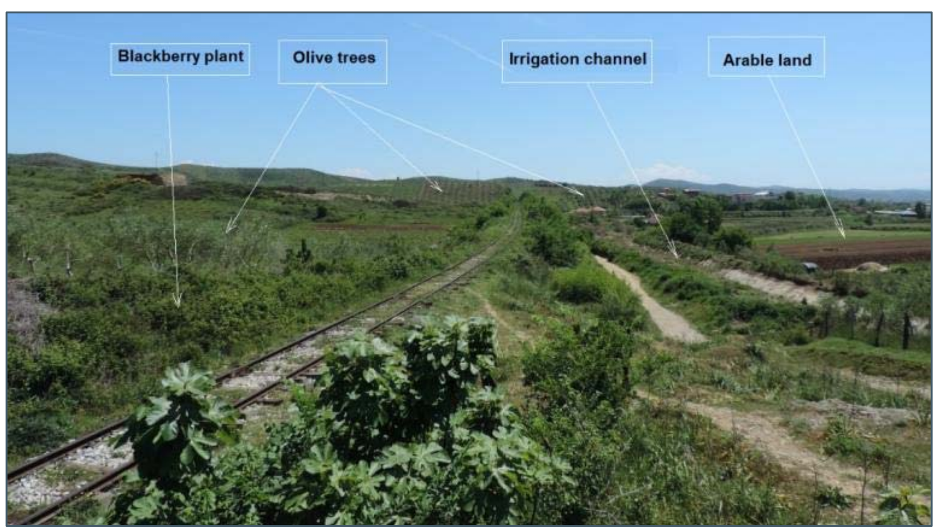


Figure 5-28_Typical landscape in the North of Rrogozhine

Based on the above, there is no any habitat or any plant species of particular interest or threatened that is crossed or is located in the close vicinity of the railway line.

Fauna

The animal species are those related to the cultivated and abandoned agricultural areas (grasslands, croplands, olive groves, etc.) and to the streambeds and irrigation and drainage channels.

The bird species encountered within the abandoned and cultivated agricultural areas are dominated by the passerines (order *Passeriformes*) and finches (family *Fringilidae*).

The stream beds and the neglected irrigation and drainage channels represent an important habitat for amphibians (*Rana graeca*, *Rana dalmatina*, and *Rana temporaria*) and reptiles. None of them is included in the national or international Red Lists.

The most characteristic mammal species encountered within the arable lands are rodents, both mice and voles, such as *Mus macedonicus*, *Mus domesticus*, *Apodemus sylvaticus*, *Microtus thomasi*, etc. None of them is included in the national or international Red Lists.

Based on the above, there is no any fauna species of particular interest or threatened that is found in the close vicinity of the railway line.

5.9.2 Priority biodiversity features

The priority biodiversity features include the protected sites and other sites of particular interest concerning the biodiversity values.

Official sources, including the National Agency of Protected Areas[87] (NAPA) and the map of the protected areas[88] published by this agency show that there is no any protected area and/or nature monument that is crossed by the railway line or is located in the vicinity of this line.

From the map of the protected areas and nature monuments[89] (see figure below) it results that the closest protected area to the railway line is the wetland Divjake-Karavasta, which is located roughly 10 km from Rrogozhine station.

In the list of sensitive sites and biotopes there are enlisted natural, semi natural and artificial or man-made habitats and biotopes that are distinguished for their

[87] http://akzm.gov.al/

[88] http://akzm.gov.al/qgis2web_2019_05_13-09_58_25_161000/index.html

[89] https://geoportal.asig.gov.al/map/?auto=true

rich biodiversity and special importance for birds (EU Bird Directive[90]) and species strictly protected by the Convention on the conservation of European wildlife and natural habitats (Bern Convention[91]). There is no such a sensitive site within the project area.

As a result, there is no any protected area and or site of particular interest that is crossed or is located in the vicinity of the railway line.

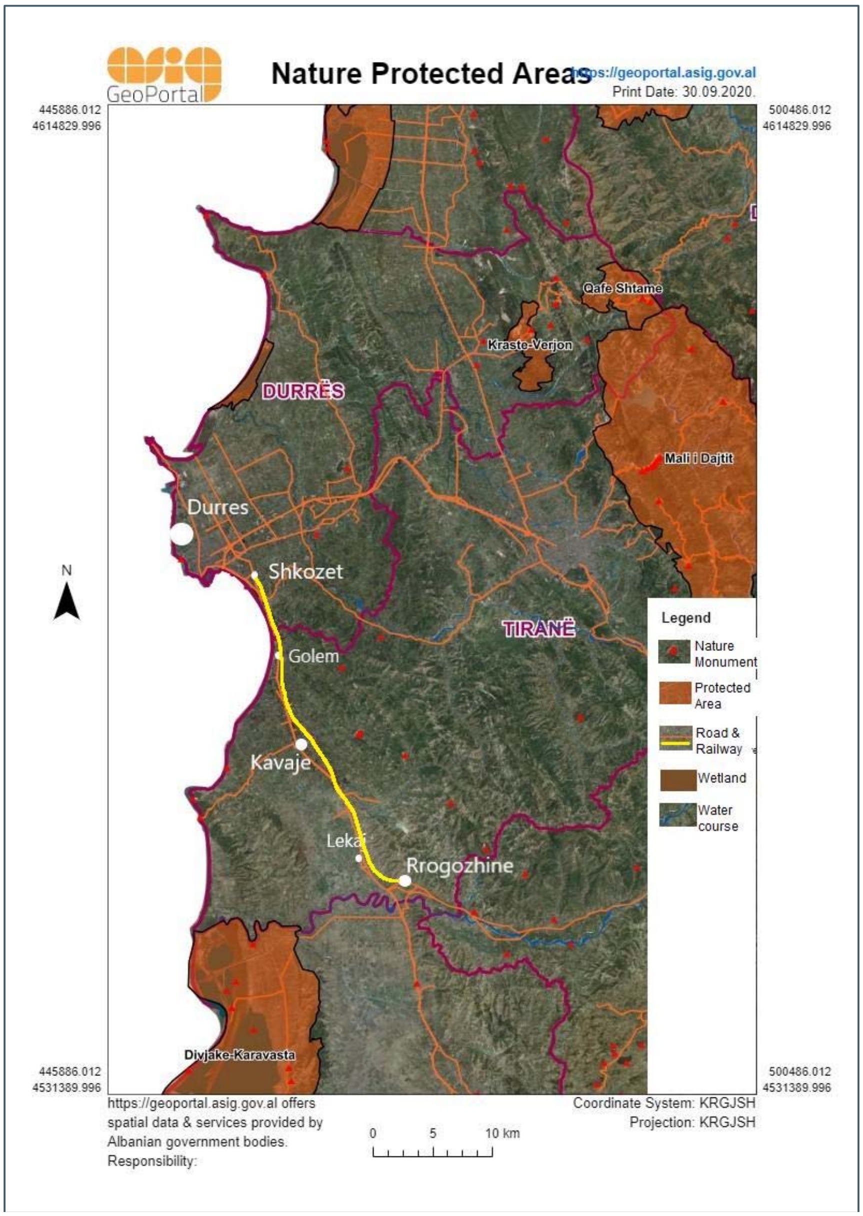


Figure 5-29_Protected Areas and Nature Monuments

[90] https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32009L0147

[91] https://eur-lex.europa.eu/legal-content/EN/TXT/HTML/?uri=URISERV:l28050&from=EN

5.10 Land use

Table below summarizes the land use both sides of the railway line, from the starting to the ending points of the Project.

Table 5-19_Land use both sides of the railway line

No	Railway section	Land use
1	Km 1+880 to km 5+850	Inhabited area – Shkozet – Plepa; The buildings are in general low on the left and high (several floors) on the right
2	km 5+850 to km 6+220	Right: the motorway; inhabited area on the right of the motorway; Left: Agricultural plots (Shkallnur Village)
3	Km 6+220 to km 6+900	Left: Sharp terrain of the Kavaje rock; Right: the motorway; Buildings (Kavaje Rock's Beach) on the right of the motorway
4	Km 6+900 to km 8+900	Left: low houses. A service road runs between the railway and the houses; Right: the motorway; Buildings (Golem Beach) on the right of the motorway
5	Km 8+900 to km 9+920	Golem station; Left: low houses. A service road runs between the railway and the houses; Right: the motorway; Buildings (Golem Beach) on the right of the motorway
6	Km 9+920 to km 10+550	Left: low houses. A service road runs between the railway and the houses; Right: the motorway; Buildings (Kavaje Beach) on the right of the motorway
7	Km 10+550 to km 11+800	Left: Arable land; Right: the motorway
8	Km 11+800 to km 11+900	Left: Small agricultural plots and low houses; Right: the motorway
9	Km 11+900 to km 15+400	Left: Arable land; Right: the motorway
10	Km 15+400 to km 17+400	Left: Agricultural plots; Right: inhabited area of the eastern part of Kavaje city. Low buildings
11	Km 17+400 to km 18+860	The railway crosses the inhabited area of the eastern part of Kavaje city. Low buildings

No	Railway section	Land use
12	Km 18+860 to km 19+360	Left: arable land Right: inhabited area of the eastern part of Kavaje city. Low buildings
13	Km 19+360 to km 20+340	Kavaja station; The railway crosses the inhabited area of the eastern part of Kavaje city. Low buildings
14	Km 20+340 to km 21+250	The railway crosses the inhabited area of the eastern part of Kavaje city. Low buildings; No private property is affected by the Project.
15	Km 21+250 to km 25+000	Left: arable lands; Right: agricultural plots and houses. Low buildings; No private property is affected by the Project.
16	Km 25+000 to km 26+050	The railway line crosses arable lands
17	Km 26+050 to km 26+ 990	Left: unpaved service road; The railway line crosses arable lands
18	KM 21+300 to km 26+990	Left: arable land Right: low buildings (houses) and agricultural plots that are located between the railway and the motorway.
19	Km 26+990 to km 27+680	Lekaj station; Unpaved service roads both parts of the railway line; Agricultural plots and houses both parts of the railway line; No private property is affected by the Project.
20	Km 27+680 to km 27+683	Lekaj station; Agricultural plots and houses both parts of the railway line; No private property is affected by the Project.
21	Km 27+683 to km 30+700	The railway crosses agricultural lands and villages’ houses; Hilly foot on the left; No private property is affected by the Project.
22	km 30+700 to km 31+950	The railway crosses agricultural lands; Hilly foot on the left; No private property is affected by the Project.
23	Km 31+950 to km 32+065	Vertical sides both parts of the railway line at the entrance of Rrogozhine tunnel
24	Km 32+065 to km 32+460	Rrogozhine tunnel
25	Km 32+460 to km 32+660	Vertical sides both parts of the railway line at the exit of Rrogozhine tunnel
26	Km 33+980 to km 34+500	Rrogozhine station; Left: unpaved service road and then agricultural land. The terrain on the left is hilly; Right: Agricultural land and houses; No private property is affected by the Project.

No	Railway section	Land use
27	Km 34+500 to km 35+000	Rrogozhine station; Left and Right: Low buildings;' No private building is affected by the Project.
28	Km 35+000 to km 35+252	Rrogozhine station; Left: agricultural land; Right: Low buildings and service road; No private building is affected by the Project.
29	Km 35+252 to km 35+384	End of Rrogozhine station to the end of the Project. Left: agricultural plot; Right: unpaved local road and low buildings. The road lies between the railway and the buildings.

5.11 Infrastructure

The railway crosses urban and transport infrastructure. The crossed urban area is mentioned in the section on land use, while the crossed infrastructure concerns overall the national and local roads. Appendix 2.2 (Map of the railway line – separate file in pdf format) shows the roads crossed or parallel to the railway line.

Other infrastructure objects are the pedestrian overpasses and underpasses and the road underpasses and overpasses that are included in the proposed project. The list of such infrastructure objects and their location are provided in the section 2.3 (The Project elements) of this document.

Tables below[92] includes the infrastructure utilities crossing the railway line or located near this line.

Table 5-20_Underground infrastructure utilities crossing the railway line

No	Underground infrastructure utilities crossing the railway line	
1	**Sewage and sewerage pipeline**	
	Km 5+800	Near Dajlani Bridge
2	**Water supply pipeline**	
	Km 2+800	Plazh stop; Water supply pipeline
	Km 19+050	Water supply pipeline

[92] Information provided by HSH in June 2020

No	Underground infrastructure utilities crossing the railway line	
3	**Underground electric and telecommunication cable**	
	Km 2+200	Medium voltage cable
	Km 5+500	Medium voltage cable

Table 5-21_Water supply pipelines near the railway line

No	Water supply pipeline near and parallel to the railway line	
1	Km 9+400	Golem station; Water supply pipeline passing alongside the station's platform, on the left of the railway line
2	Km 18+800 to km 19+050	Water supply pipeline passing on the right of the railway line
3	Km 19+050 to km 19+300	Water supply pipeline passing on the left of the railway line

Table 5-22_Overhead power lines crossing the railway line

No	Overhead power lines crossing the railway line
1	**Shkozet – Golem section**
	Km 2+400; 2+900; 3+300; 3+800; 4+000; 4+200; 5+300; 5+800; 6+100; 6+800; 7+200; 7+400; 7+800; 7+900; 8+100; 8+150; 8+600; 8+800; 9+500; 9+600
2	**Golem – Kavaje section**
	Km 10+400; 10+425; 10+450; 11+100; 11+800; 11+900; 11+950; 12+100; 12+300; 12+700; 12+800; 12+900; 13+100; 13+200; 13+300; 13+500; 14+010; 14+500; 14+800; 14+990; 16+010; 16+400; 16+550; 16+600; 16+800; 16+850; 17+100; 17+500; 17+850; 18+400; 19+300
3	**Kavaje – Lekaj section**
	Km 20+300; 21+010; 21+400; 22+100; 23+900; 24+300; 24+900
4	**Lekaj – Rrogozhine section**

No	Overhead power lines crossing the railway line
	No data provided by HSH

5.12 Cultural heritage and tourist assets

Durres city, founded in VII century AC, is very rich in cultural heritage. Durres is among the most ancient cities in Albania, with almost 3,000 years of history. In Durres was founded around 1380 the first medieval University in the whole Balkan area that was a theological institution founded by the Dominican order.

The city is the home to many ancient archaeological sites and findings from the Illyrian, Roman and Byzantine periods. One of these sites is the Roman amphitheatre of the 2d century AD, which with 20.000 places is the second biggest one in the Balkans area.

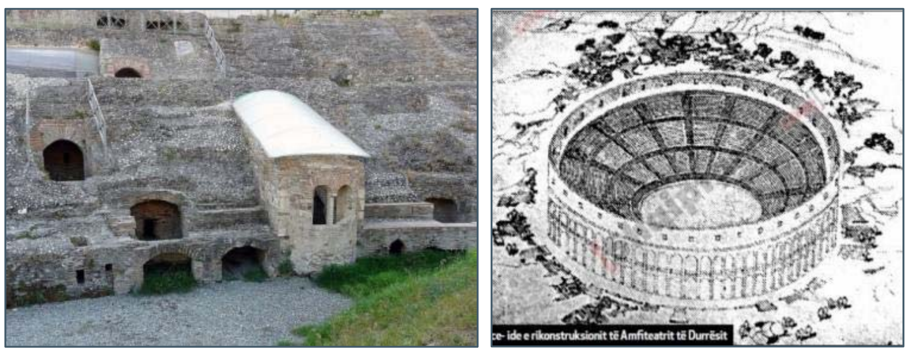


Figure 5-30_Amphitheatre of Durres

Figure 5-31_Ancient walls of Durres

The very rich archaeological heritage of this city and its neighbouring areas are attractive sites/objects for tourism purposes. A beautiful mosaic of size 5.1 x 3.0 metres of the Illyrian Period (IV century BC) has been found in Durres.

Near the amphitheatre has been found "the mosaic of swastika" (IV-III century BC – Illyrian Period) in black and white, representing the ancient symbol of the moving Sun.

Figure 5-32_Left: Mosaic of the IV century BC; Right: "the moving Sun" of the IV-III century BC

Outside Durres city it is to mentioned the ruins of the Paleo - Christian Basilica of Saint Michael in Arapaj (5 – 6th century AC), where a beautiful mosaic has been discovered.

Figure 5-33_The mosaic of Arapaj, Durres Municipality

From formal sources it results that the existing railway does not cross any cultural heritage site/object[93] (see figure below).

The closest ones to the railway line are the following:

- Mosaic Building Ruins with Swastika of Durres: 2.4km - Illyrian Period (4th century BC);
- Ruins of Saint Michael Basilica, Arapaj (Basilica and Mosaic): 300m – 6th century AD - Byzantine Period);
- Durres amphitheatre: 2.5 km – Roman period (2d century AD);
- Ancient Durres city walls: 2.4 km – Byzantine period (5th century AD); etc.

[93] https://geoportal.asig.gov.al/map

Figure 5-34_The closest cultural heritage sites/monuments to the railway line

The tourism within the project area is based on the cultural heritage sites/objects (Durres city, Arapaj, etc.) and the seasonal summer seaside one.

All the coastal area from Durres to Golem is located near the railway. The stations of Durres, Shkozet, Golem and Kavaje may serve also people that use the coastal tourist infrastructure for summer holidays. The total length of the coastline of Durres, Kavaje and Rrogozhine Municipalities is approximately 110 km, the main part of which is composed of sandy beaches.

5.13 Landscape

The railway line crosses urban, suburban and agricultural areas. The urban areas include the section from Shkozet to Plepa, Kavaje town, while the suburban areas include mostly the section from Plepa to Golem and Rrogozhine stations. The other part of the railway runs mostly across rural areas, except for some metres in the north of Rrogozhine tunnel through insignificant small patches of bushes.

So, the landscape within the project area does not have particular value due to the highly and mostly informal urbanization of the project area during the last 25 years.

5.14 Waste

The information on the existing situation regarding waste and waste management within the fingerprint of the proposed project is extracted from the following sources:

- Consultations with the affected municipalities (Durres, Kavaje and Rrogozhine);
- Consultations with the Albanian Railways;

- Site visits;
- Strategic Policies Document and National Plan on Integrated Management of Waste[94].

The neglected existing building facilities in the passengers and (overall) the freight train stations, contain solid waste such pieces of bricks, stones, etc. The neglected drainage system (culverts and drainage channels) is filled with sediments and often covered of vegetation that need to be removed.

Currently there is no any significant environmental hot spot within the proximity of the railway line.

Consultation with municipalities' representatives resulted as follows:

Durres Municipality suggested the solid waste to be disposed at Sharre landfill (Tirane Municipality territory). That does not seem reasonable, because this landfill cannot accept solid waste resulting from earthworks. However, there is no any railway stations building within the railway line section within Durres Municipality territory. While the concrete waste resulting from the demolition of the bridges and culverts will be reused for filling the substructure.

Kavaje Municipality did not answer to the HSH request regarding the management of the solid waste. However, Rrogozhine Municipality expressed the willing the project to send the solid waste in a location near Lekaj. Consequently, all the solid waste resulting from the demolition of the stations buildings can be send to this location.

5.15 Railway accidents and incidents

The Ministry of Infrastructure and Energy, Directorate of Railways Inspecting (DRI), publishes a yearly report, which provides data/information on any eventual accidents situation related to the railway system. The data on the table below are extracted from the yearly reports of 2017 and 2019[95] that include the years 2016, 2017, 2018 and 2019.

The unauthorized crossings present a permanent risk to the safety of trains, passengers, cars, goods, pedestrians and domestic animals. The table below shows the recent statistics on level crossings' accidents at country level.

Table 5-23_ Rail/Road accidents recorded in recent years in Albania

Place of incident	No of accidents	No of injured persons	No of fatal accidents	No of damaged vehicles
	year			

[94] http://turizmi.gov.al/wp-content/uploads/2020/07/Dokumenti-i-Politikave-Strategjike_AL.pdf

[95]http://dih.gov.al/attachments/article/633/ANALIZA%20P%C3%ABr%20vitin%20%202019.pdf

Place of incident	No of accidents				No of injured persons				No of fatal accidents				No of damaged vehicles			
	2016	2017	2018	2019	2016	2017	2018	2019	2016	2017	2018	2019	2016	2017	2018	2019
Authorized level crossing with barriers	4	0	0	0	4	0	0	0	0	0	0	0	1	0	0	0
Authorized level crossing without barriers	9	2	3	2	5	2	2	2	0	0	0	0	9	2	2	4
Non-authorized level crossing	9	6	16	18	8	7	5	2	1	1	2	0	8	7	12	11
Open line	2	1	3	2	0	0	2	2	2	1	1	1	0	0	1	2
Total	24	9	22	22	17	9	9	6	3	2	3	1	18	9	13	17

From the table above it results:

- There is no any fatal accident in the authorized and secured level crossings;
- There are some incidents on the unsecured, but authorized level crossings;
- The higher number of incidents occur at the non-authorized level crossings;
- There are also some incidents related to the situation on the open line

In addition, the monitoring results during the last years shows a slight reduction of the incidents[96], because of the following:

- The number of trains is decreasing from ear to year as a result of the decrease of the freight transport and increase of the road transport;
- The reduction of the number of trains for passengers as a result of the reduced number of passengers that makes this transport not viable from the financial point of view; and
- Low speed of the trains.

5.16 Other development Plans/Programmes

The most relevant development plans to the Project include the following:

- **Pan European Corridor VIII. The Durres – Rrogozhine Railway Rehabilitation** Project is part of the European Corridor VIII which starts at Bourgas/Varna (Bulgaria) and ends in Durres/Vlore to further continue to Italian ports of Bari/Brindisi. It interconnects the transport flows from the Adriatic Sea to the Black Sea, crossing Bulgaria, former

[96] http://dih.gov.al/attachments/article/2/DIH-Raporti%20Vjetor%202017.pdf

Jugoslav Republic of Macedonia, and Albania to Italy. The Corridor has 1,300 km of railways and 906 km of roads.

- ***General Development Plan of Rrogozhine Municipality*** *foresees to displace both the railway line and the station towards the western part of the town. The existing station has been planned to be transformed in green space for recreational purposes.*

- **General Development Plan of Kavaja Municipality**. This Plan foresees to displace towards the north of the town the railway station in order to build a multimodal station for buses and trains.

- While the **General Development Plan of Durres Municipality** does not affect the railway, the modernisation and increase of capacity of Durres port requires the improvement of the railway. Thus, this Plan is in full compliance with the Project.

The General Development Plan of Rrogozhine and Kavaja have been approved by the Albanian government in 2017 and 2018 respectively, while the GLP of Durres municipality it is expected to be approved soon.

Other important plans within the project area include as follows:

- ***General National Plan Albania 2030 (GNP – PKK in Albanian)*** was approved in June 2016. The Plan is of strategic importance at an economic, political and legal level. It offers a strategic framework for long term and qualitative development of the territory.
- **Integrated Inter Sectorial Plan (IMSP) Tirane – Durres (Durana).** The goal of IMSP- Durana is the sustainable economic development "Tirane - Durres" region. One of its strategic objectives is the "*Improvement of the region's transportation and mobility in this area in order to improve the interaction between businesses and their suppliers*".
- **Integrated Inter Sectorial Plan (IMSP) for Coastal area.** The purpose of this document is to define the main directions of development and land use priorities of the coastal zone. In the transport sector the Plan foresees also: "*a- activation of the potential areas through development of public transport and diversified tourism; and b- coverage of the coastline with primary infrastructure.*
- **Ionian Adriatic Gas Pipeline (IAP).** This gas pipeline project aims to supply in gas from the Trans Adriatic Pipeline (TAP) Albania, Montenegro, Bosnia and Croatia. The planned gas pipeline track crosses the railway line Durres – Rrogozhine at Darsi River Bridge (km 23+150).

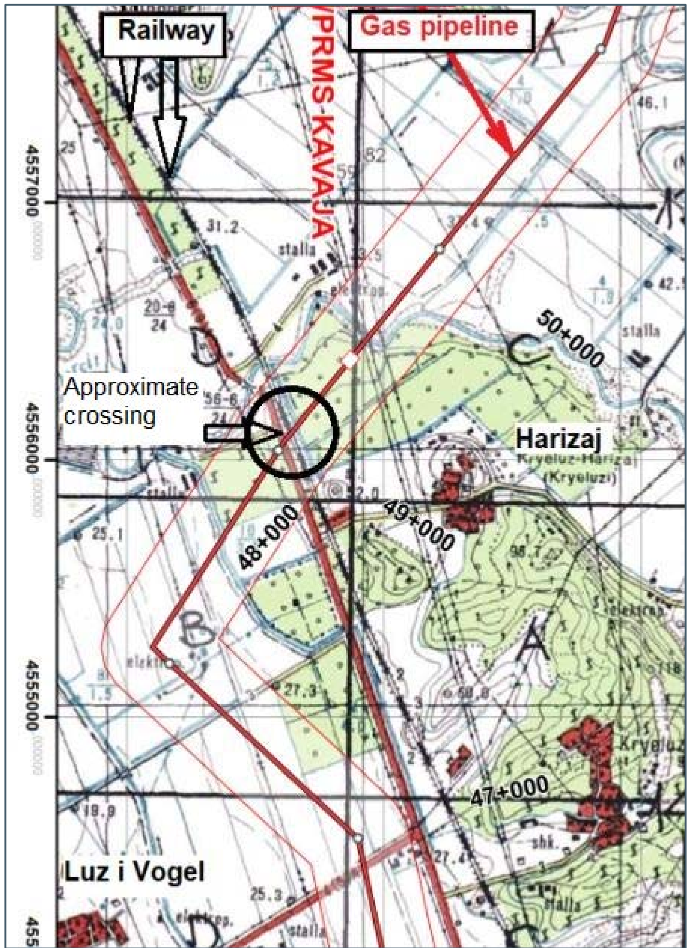


Figure 5-35_Sketch of the crossing of the railway line by the Ionian-Adriatic Gas Pipeline

5.17 Socioeconomic environment

5.17.1 Overview

This Section provides an overview of socioeconomic conditions in the municipalities situated close to the railway line and station buildings. The information presented in this document at a municipal level has been gathered from secondary sources using publicly available information with primary data gathered during stakeholder engagement with the Municipalities in July 2020. Due to COVID-19 restrictions, all communication has been implemented through calls and emails. Additional information on primary and secondary data sources can be found in Appendix 5 of the Socio-economic study – Socio-economic survey / data collection for the affected municipalities. It should be mentioned that the railway line is currently operational, and the project focuses on the rehabilitation of the railway line and stations.

5.17.2 Administrative division

The subproject extends through the following municipalities and administrative units, as shown in Figure below.

- 6.33 Km along the Durres municipality starting from Km. 1+867 to Km. 8+500 (Durres city and Administrative unit Rrashbull)
- 14.65 Km along the Kavaja municipality starting from Km. 8+500 to Km. 23+150 (Kavaja city and Administrative unit Golem)
- 12.25 Km along the Rrogozhine Municipality starting from Km. 23+150 to Km. 35+384 (Rrogozhine city and Administrative units Gosë and Lekaj).

Figure 5-36_Durres – Rrogozhine alignment on topographic map

5.17.3 Development Plans/Programmes

The most relevant development plans to the Project include the following:

- Pan European Corridor VIII. The Durres – Rrogozhine Railway Rehabilitation Project is part of the European Corridor VIII which starts at Bourgas/Varna (Bulgaria) and ends in Durres/Vlore to further continue to Italian ports of Bari/Brindisi. It interconnects the transport flows from the Adriatic Sea to the Black Sea, crossing Bulgaria, former Jugoslav Republic of Macedonia, and Albania to Italy. The Corridor has 1,300 km of railways and 906 km of roads.

- General Development Plan of Rrogozhine Municipality foresees to displace both the railway line and the station towards the western part of the town. The existing station has been planned to be transformed in green space for recreational purposes.

- General Development Plan of Kavaja Municipality. This Plan foresees to displace towards the north of the town the railway station in order to build a multimodal station for buses and trains.

While the General Development Plan of Durres Municipality does not affect the railway, the modernisation and increase of capacity of Durres port requires the improvement of the railway. Thus, this Plan is in full compliance with the Project.

Local plans contain proposals on specific development projects, including those related to the railway line. The implementation of these projects requires as a precondition the cooperation and approval of the relevant state authorities covering the field/sector in question. In this context, it has been agreed that the project on the preparation of the detailed design for the rehabilitation of the segment Durres- Rrogozhine will be realized by designing the railway rehabilitation following the existing alignment.

The General Development Plan of Rrogozhine and Kavaja have been approved by the Albanian government in 2017 and 2018 respectively, while the GLP of Durres municipality it is expected to be approved soon.

Table 5-24_Designated Land Uses (Local Development Plans) along the Railway Line

Municipality	Local Development Plan	Approval Status	Designated Land Use crossed by the Railway Line
Durres	Yes	Pending approval	Intermodal station Pedestrian overpasses and underpasses Green belt Urban infrastructure (residencies, touristic)
Kavaja	Yes	Approved	Urban infrastructure (residencies, business) Agriculture Green belt Two industrial hubs: Northwest (city entrance) Southeast (city exit)
Rrogozhine	Yes	Approved	Green belt Orchards Intermodal Station in the city Urban infrastructure (residencies, business) Industrial Hub Near Lekaj

Source: GLP of Durres, Kavaja and Rrogozhine

Other important plans within the project area include as follows:

- General National Plan Albania 2030 (GNP–PPK in Albanian) was approved in June 2016. The Plan is of strategic importance at an economic, political and legal level. It offers a strategic framework for long term and qualitative development of the territory.
- Integrated Inter Sectorial Plan (IMSP) Tirane– Durres (Durana). The goal of IMSP- Durana is the sustainable economic development "Tirane-Durres" region. One of its strategic objectives is the “Improvement of the region's transportation and mobility in this area in order to improve the interaction between businesses and their suppliers”.
- Integrated Inter Sectorial Plan (IMSP) for Coastal area

- The purpose of this document is to define the main directions of development and land use priorities of the coastal zone. In the transport sector the Plan foresees also: "a- activation of the potential areas through development of public transport and diversified tourism; and b- coverage of the coastline with primary infrastructure.

5.17.4 Socioeconomic baseline information

The municipalities exercise their functions in terms of local infrastructure and services related to transport system, water supply, operation of sewerage system and protective canals of residential areas, lighting of public spaces, administration of public cemeteries, decor service, administration of parks, gardens and public green areas, waste collection, disposal and processing, territorial planning and land management.

The municipalities and each AU provide all public services in accordance with Article 23 of Law No. 139/2015 "On Local Self-Government". The services include: social and housing services, civil status/registry, public transport, cleaning-greenery, educational, cultural and sports infrastructure, etc.

In 2017, according to statistical regions level 1 - Republic of Albania, GDP at current prices is 1,551.3 billion Lekë, marking an increase of about 3.82% compared to 2016. According to statistical regions level 3 - Region, the highest value of GDP is presented in Tirana Region with about 652.1 billion Lekë or 42.03% of the total GDP.

In 2017, the level of GDP per capita in the statistical region level 1 - Republic of Albania was about 540 thousand Lekë. Compared to 2016, GDP per capita increased by 5.45%. The highest level of GDP per capita per regions, in 2016, was in Tirana Region with about 747 thousand Lekë or 38.33% above the national average and had an increase of 7.99% compared to 2016.

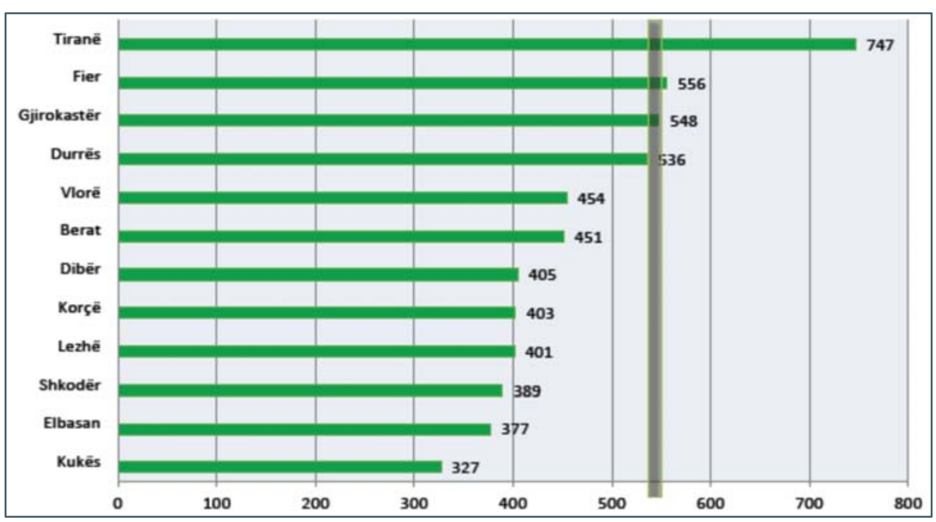


Figure 5-37_GDP/capita per regions vs. the national average (in 000 Lek)

Source: INSTAT data 2017

General Information – Durrës Municipality

Durrës is the second most populous city of Albania and the capital of the eponymous county and municipality. It is located on a flat plain between the river mouths of Erzen and Ishëm on the south-eastern corner of Adriatic Sea.

Durrës can be compared to the largest cities of the ancient and medieval Mediterranean. The city of Epidamn-Dyrrah was built by the Illyrian Taulants, known as "swallows" during the XIll-XI centuries BC. During the Xl-XV centuries, according to Ottoman chroniclers of the XVl century, Durrës or as they call it "the Second Constantinople", was occupied by the Turks on 13 August 1501. Turkish rule had come to an end in 1912, but other invasions seemed to be coveted by the city: the Serbian occupation (1913), the Austro-Hungarian occupation (1916) and the Italian occupation (1918). During the years of the Albanian monarchy (1924-1939), Durrës gained a new breath and the noble Durrës citizenship made its city a model of capitalist economic development. During the period of the socialist system (1945-1990) were made investments in some branches of industry, the collectivization of agriculture, the massification of education, the establishment of a series of socio-cultural objects. In the early 1990s, the first norms of the democratic system began with many problems for the transition phase, but with prospects for the future. The new system and economic reforms that were implemented in Albania and Durrës after 1990, brought significant transformations in economic life.

With reference to AU Rrashbull, it is a former commune of Durres district, which, after the administrative and territorial reform, was attached to Durres Municipality, with the status of an Administrative Unit.

As regards the culture and ethnography, Durrës is an area with early culture, for its ancient origins. The city has inherited many values of the past, historical and archaeological centres such as the Amphitheatre, the Byzantine Fence, the Venetian Tower, the perimeter wall of the Castle, but also cultural and religious centres such as the ruins of the Basilica in Arapaj, Rodon Castle, etc.

General Information – Kavaja Municipality

Kavaja Municipality is bordered on the north by Durrës Municipality, on the east by Tirana Municipality, on the south by Rrogozhine Municipality and on the west by Adriatic Sea. The centre of this municipality is Kavaja city.

Kavaja city of is part of the groups of cities with a very ancient history and a very distinct epos. Through archaeological findings, something has been clarified about the centuries-old origin of this settlement. Based not only on the old archaeological findings but also on the data of the oldest reports collected from historical sources of the medieval period, historians, messengers of the church of Rome, the reports of the merchant missionaries of Venice, it is evident that the territory where the city of Kavaja and its district are closely related to the centuries-old history of ancient and medieval Durrës. Of great importance for the settlement of the territory of the city of Kavaja is the fact that through this territory passed the oldest and most important road that the Romans built in Albania, "Via Egnatia" which in terms of length, width and quality construction was unique for Balkan Peninsula. Then, in later developments, we find the name “Kavaljoni coast” concluding that the name Kavalje for the inhabited centre of Kavaja city today, has existed since 1081.

As regards AU Golem, it is a former municipality in the district of Tirana. With the territorial administrative reform of 2015, it became a subdivision of the Municipality of Kavaja. The coastal area is one of the main beach destinations in Albania, with many resorts, hotels and holiday homes. Golem has experienced rapid urban development and also the problems associated with it.

General Information – Rrogozhine Municipality

Rrogozhine Municipality lies on a partly hilly terrain and partly plain to the sea shore. The municipality focuses on the town of Rrogozhine, which was established during the communist era around the agro-industry, such as the oil and soap factory or the cotton stripping factory, as well as a line for food processing and canning. This industry has long been closed.

The city of Rrogozhine contains about one third of the entire resident population of the new municipality.

The city of Rrogozhine, known in the archaeological and historical literature as "ASPARGAIUM", is mentioned as an ancient settlement and an important geographical and historical crossroads. Aspargaium was located at the intersection of two segments of the road "Egnatia", which came from Apollonia and Dyrrakium in the direction of Rome and Constantinople. Rrogozhine, in addition to being an important trade and geographical hub, it carries cultures, traditions, rites, customs and linguistic features between Central and Southern Albania.

Today's Rrogozhine, positioned between Durrës, Lushnja and Elbasan, is an important junction of the 8th corridor, and the railway junction Rrogozhine-Durrës, Rrogozhine-Vlora and Rrogozhine-Pogradec. Between 1960 and 1990, the town of Rrogozhine had some of the most important production factories, such as the soap-oil factory where sunflower oil was produced and the food processing and canning line, including a pasta factory. The cotton-stripping plant, which housed almost all the local cotton production, as well as the processing plant of medicinal and essential oil plants, ranked the city again alongside other important cities of light industry and economic production.

Rrogozhine Municipality consists of 5 administrative units, which are: Rrogozhine, Kryevidh, Sinaballaj, Lekaj and Gosë. All administrative units are currently part of the Kavaja district and the Tirana district. The new municipality has under its administration a town and 36 villages.

5.17.4.1 Demography

The existing railway crosses the municipalities of Durres, Kavaja and Rrogozhine (see Appendix 1.1 – Administrative map of the project area), the population of which (November 2017) according to governmental sources97, is as follows:

- Durrës municipality: 319.000
- Kavaja municipality: 82.800
- Rrogozhine municipality: 41.600

The population of the main urban centres of the municipalities is as follows:

- Durres city: 220.000
- Kavaja town: 41.600
- Rrogozhine town: 13.900

Durrës Municipality
As previously mentioned, the population of Durrës Municipality is 319,000 inhabitants. The number of families as per Census 2011 was 46,775, while the recent data obtained from Durrës Municipality provide a figure of 73,257 families, or 36% increasing compared to 2011 census. The biggest Administrative Unit (AU) in terms of population in Durrës Municipality is Durrës city, where it is concentrated 64% of the entire Municipality's population. The other units are mainly rural and have a significantly lower percentage of the population compared to Durrës city. Among them, Rashbull AU and Sukth AU have the largest population (INSTAT Census 2011 and administrative data). AU Rrashbull, also demonstrates a significant increase in the number of population, compared to 2011 census. This increase is at the amount of 10,632 inhabitants, or 42% more than 2011.

Regarding the gender structure, it is noticed that the number of males and females is almost equal. Regarding the age structure in AU Durres: 19.3% of the population is of age 0-14 years old, 69.3% of age 15-64 years old and 11.4% over 65 years old. In AU Rrashbull: 23.7% of the population is of age 0-14 years old, 66.8% of age 15-64 years old and 9.5% over 65 years old.

As regards the demography and migration, they are both positive and negative trends. The administrative units of Durrës and Rashbull have changed at a positive pace, although not at high levels. The cause for this trend is the natural and migratory movement. Generally, the migratory movement is from rural to urban areas.

As a result of migratory movements and decreasing fertility rate, the population of the group of ages of 0- 14 years old in the entire Durrës Region has been

97 http://ama.gov.al/preview/wp-content/uploads/2015/04/Popullsia-sipas-ndarjes-administrative-ne-fuqi-.pdf

decreased by 6.67%. For the city of Durrës, children represent 21% of the population. On the other hand, the working age population grew to 68.2% (INSTAT Census 2011 and administrative data).

Durrës district is included among the districts that have a high population density, along with the districts of Tirana, Fier, Elbasan, etc. This density is mostly attributed to internal migration flows. Thus, in the period between the last two censuses, the population of Durrës district has changed from 181,699 inhabitants to 242,801 inhabitants. Compared to 1989, Durrës district has a population growth of 47.61%, ranking second place in the country, after Tirana, where the increase was 94.83%. This proportion of change is significantly larger from the few districts of the country that have recorded positive changes in the population number.

As regards the nationality, the majority of population composition is Albanian, while there is a Roma community living in NISH Tulla area (Durrës city) and in AU Rrashbull.

Age analysis of the population

Factors influencing population change constitute strong reasons for influencing the trends shown by the age analysis of the permanent population. Based on the data presented in the table below, we can also judge on the age characteristics of population of the administrative units. Referring to the UN classifications, which focus more on the proportion of the third age in the age structure of population, the population of the administrative units of Durrës Municipality can be considered older, because the group of ages over 65 years old constitutes about 10.2% of entire municipality’s population.

Table 5-25_Age analysis of the population in Durrës Municipality

Data on population distribution by age groups				
AU	Population total	Under 18 yrs old	18-65 yrs old	Over 65 yrs old
Durrës	299,989	57,897	207,894	34,198
Rrashbull	34,718	8,228	23,191	3,298

Source: Durrës Municipality, 2020

Urbanization scale

The urban phenomenon in Durrës Municipality is represented by three urban centres: Durrës city, Sukth and Manza. The urbanization of these centres has affected the progress of urbanization process in the region, creating poles with differentiated growth and development.

Table 5-26_ Urbanization rate at municipal and administrative unit level

Administrative Unit	Percentage of urban population - 2001	Percentage of urban population - 2011
Durrës	68.02	69.88

Source: INSTAT: Population of Albania 3, Durrës, 2001, INSTAT 2013: Population and Housing Census, Durrës, 2011

It is known that there is a positive correlation between the degree of economic development and the degree of urbanization. Studies but also the reality prove that the number of functions in a settlement increases with the increase of inhabitants' number. If the settlement has many functions it offers more employment opportunities to the population. The higher employment rate, on the other hand, has a positive effect on many socio-economic processes, but despite this, the growth of the urban population must follow the economic development.

Kavaja Municipality
As previously mentioned, the population of Kavaja Municipality is 82,800 inhabitants. Considering the demographic structure on site, it is clear that the concentration is most important around the Kavaja unit and along the northwest coast of the municipality.

Kavaja Municipality has an increasing demographic trend. This positive trend is observed in all constituent administrative units of the Municipality, including AU Golem. Since 1990, more than 25% of the entire population fled the country, mainly in countries such as: Italy, Greece, Great Britain, France, Germany, USA and Canada. A small percentage has emigrated to nearby Durrës and the capital Tirana.

Although the population of Kavaja Municipality is growing steadily, it is considered important to mention the phenomenon of population aging due to the fact that working force generations or skilled workers tend to emigrate to large cities or abroad. On the other hand, the agricultural and tourism potential and the favourable geographical location have had a positive effect on the stay and/or return of the labour force from emigration. Taking into account all these migratory phenomena, the population of Kavaja Municipality is growing.

The population density of urban areas is 285 inhabitants per km2 while in rural areas much less. 57.6% of the district's population live in rural areas while 42.2% live in the city. The gender structure of the population is almost equal. Compared to 2011 census, the new municipality has a very significant increase in the number of families, which is currently more than 3 times higher than in 2011. The same increasing trend is noticed in AU Golem, although at much lower rate, only 30% higher than in 2011.

<u>Age analysis of the population</u>
The majority of the population in Kavaja Municipality is autochthonous Albanian. According to the 2011 Census data, there are 2 main minority groups which are concentrated in AU Kavaja (city), the Aromanian minority representing 0.2% of the population and the Roma minority representing 0.3% of the resident population. The Roma community is located mainly in the northern part of the city entrance, along the Leshniqe stream and at AU Golem, near its centre.

The recent data received from Kavaja Municipality show that about 67% of the population belong to the age-group of 18-65 years old that at the working force category. However, the level of unemployment within this category is 52%.

However, the level of unemployment among the young people constitutes only 3.3% of the total unemployment figure.

The same situation it is noticed in AU Golem. Even there, 67% of the population belong to the working force category, while unemployment within this category is 25%, where only 10% are young people.

Table 5-27_ Age analysis of the population in Kavaja Municipality

Data on population distribution by age groups				
AU	Population total	Under 18 yrs old	18-65 yrs old	Over 65 yrs old
Kavajë	119677	21099	80675	17903
Golem	12830	2530	8633	1667

Source: Kavaja Municipality, 2020

Rrogozhine Municipality

As previously mentioned, the population of Rrogozhine Municipality is 41,600 inhabitants. Taking into account the structure of the population that is currently living in the area, it can be confirmed that the population is mainly concentrated in and around the Rrogozhine AU. According to the civil registry, the population density is 182 inhabitants/km^2, while according to the census, the density is 99 inhabitants/km^2.

Rrogozhine Municipality has an increasing demographic trend. This positive trend is observed in AU Qendër-Rrogozhinë, as well as in all constituent administrative units of the Municipality, including AU Gosë and AU Lekaj. During 1992-2020 in the population has doubled with the families coming from the northeast of Albania, the villages of Librazhd, Peqin and the villages of Rrogozhine. The number of families in 2020 is about 25% higher compared to 2011 census. The tendency of emigration is mostly for Italy, Greece.

Age analysis of the population

The majority of the population in Rrogozhine Municipality is Albanian. There is also a community of Roma-Egyptian minority. Roma community is located mainly in the village of Gosë and in the north eastern part of the railway line. Their settlements are 1 floor, old buildings. Their living conditions are very difficult.

The recent data received from Rrogozhine Municipality show that about 61% of the population belong to the age-group of 18-65 years old that is the working force category.

Table 5-28_ Age analysis of the population in Rrogozhine Municipality

Data on population distribution by age groups						
AU	Total	0-6 yrs old	7-15 yrs old	16-18 yrs old	19-64 yrs old	Over 65 yrs old
Rrogozhine	12208	696	1392	831	7447	1842

Gosë	8870	512	1011	633	5410	1303
Lekaj	9635	550	1098	655	5878	1454

Source: Rrogozhine Municipality, 2020

5.17.4.2 Economic activities and employment

Durrës Municipality

Tirana-Durrës Economic Region is the economic centre of Albania. Consequently, it will continue to remain the country's economic engine and become a competitive region in Western Balkans. "Tirana-Durrës" region aims to support businesses and creative industries, which will allow the technological upgrade of this region. The following targets are set by the Region for 2030:

- GDP growth in the region by 10%
- Reduction of youth unemployment by 5%
- Reduction of total unemployment by 8%
- Increase of Investment in Technology by 10%
- Establishment of 4 specialized economic "Clusters"
- Opening of four economic development incubators

Durrës is the second important economic zone in country level, after Tirana, with over 5600 economic activities and 15% of foreign investment. The economic activities of the study area include mostly transport (Durres port), industrial activities (light industry in Durres and Kavaja), seaside tourism (Durres, Golem, Kavaja coastline) and agriculture (crossed area from Golem to Rrogozhine). The economic activities linked to the railway include mostly the Durres port (freight and passengers), the Porto Romano port (oil deposits) and the coastal area (summer seaside tourism).

Regarding the primary sector, thanks to its favourable climate, hilly and flat terrain, and good soil quality, Durrës district has an important agricultural sector, including overall fruit trees, vineyards, olive trees and vegetables. Durrës port has an important fishing sector as well.

As far as the secondary sector of employment is concerned, because of the existing seaport facilities, an important number of industrial companies are installed in the territory of this municipality. Among the industrial activities, the shaping and processing of shoes and clothes employs a high number or workforce, especially women. Thanks to the proximity of the port and the developed agriculture, the city is developing quickly the food processing industry.

In addition, an important oil port is located in Porto-Romano area, 5km north of Durrës town, while also in the northern part of Durres municipality territory, there are located two areas designated as energy and industrial parks. The area of which is of 850 and 550 hectares respectively.

Finally, regarding the tertiary sector and tourism, tourist activities linked overall to the summer seaside season require a large number of workforces and influence indirectly to the development of the agriculture, livestock and fishing sectors. With an annual volume of approximately 1.5 million of passengers, Durrës is the principal passengers' port in Albania and one of the biggest in the eastern side of Adriatic Sea. 90% of the maritime transport of Albania is realized in Durrës port. It is the only Albanian port that is part of SEETO core network, something which places Durrës to be the most important commercial node in the country.

Education, employment and business needs for qualifications and growth

Durrës Municipality registers the lowest percentage of persons who have completed 9-year education or less (42.48%) compared to Ishëm AU (72%). The predominant level of education in the municipality is the secondary one (high school) with about 39% and 15% of individuals have higher education (university and postgraduate studies). It is worth noting that Durrës enjoys a low degree of illiteracy but inefficiency in compliance between the business needs and jobseekers' education. The typology of school education that dominates in the employment of individuals in Durrës Municipality is the secondary and professional one. Meanwhile, only about 27% of people with university and postgraduate employment are part of the workforce. In this context, considering that there are more employees with 8- or 9-years education compared to those who have completed university and postgraduate studies, there is a need to promote vocational education to absorb as many individuals with lower education so that the labour market manages to adapt.

Based on the employment rate by branches of the economy, services with about 69% of the entire workforce appear to dominate, followed by industry with 29% and agriculture with less than 3%. It is interesting that out of about 4,300 job offers announced by the Regional Employment Directorate Durrës, about 1,800 are allocated to services (call centres and the processing industry with custom-made goods). Although at first glance there is a tendency to reduce unemployment, this regional employment policy can only function in the short term. Orientation towards professions, especially in the hotel-tourism sector is considered to have the highest potential among services in this region.

According to the data extracted from the Decentralization and Local Development Program, it is noticed that in Durrës city 45.4% of employees have a secondary and professional education level. In other areas of the municipality, this indicator is declining, but employment with basic and unqualified education is increasing due to the rural character of the economy in these areas.

Table 5-29_ Employment by educational level

Indicator (%) / AU	Durrës	Rrashbull
Employment by educational level: elementary and 8 or 9 years	27,49	55,17
Employment by educational level: secondary and professional	45,4	34,79
Employment by educational level: university	26,6	9,7

Source: Durrës Functional Area Report, DLDP project

Unemployment

In terms of employment, Durrës area has almost the same status, as shown by the Census 2011 data. Unemployment remains a concern, especially among young people (about 50%) and women (see table below).

Table 5-30_ Gender and age analysis of the unemployment rates in Durrës Municipality

Unemployment rates				
Municipality	Total	Males	Females	Young people
Durrës	31.6%	30.1%	34.1%	49.5%

Source: Durrës Statistical Bulletin 2014

According to the data of the Regional Employment Directorate of Durrës, for Durrës city the unemployment reaches 6514 people, of which 3157 or 48.5% are females and 3357 or 51.5% are males.

Table 5-31_ Gender analysis of the unemployment rates in Durrës City

Unemployment rates					
Year	Total	Females	%	Males	%
2001	5419	2901	53.5	2518	46.5
2002	5997	3208	53.5	2789	46.5
2003	6100	3158	51.8	2942	48.2
2004	5660	2863	50.6	2797	49.4
2005	5583	2758	49.4	2825	50.6
2006	5182	2403	46.4	2779	53.6
2007	5132	2936	57.2	2196	42.8
2008	5029	2871	57.1	2158	42.9
2009	5635	3182	56.5	2453	43.5
2010	6024	3436	57.0	2588	43.0
2011	6131	3472	56.6	2659	43.4
2012	6060	3161	52.2	2899	47.8
2013	6354	3323	52.3	3031	47.7
2014	6514	3157	48.5	3357	51.5

Source: Durrës Statistical Bulletin 2014

The recent data received from Durrës Municipality (2020) show that almost 70% of the population belong to the age-group of 18-65 years old that at the working force category. However, the level of unemployment within this category is 46%, where almost half of it is comprised of young people. The same situation it is noticed in AU Rrashbull, where 67% of the population belong to the working force category, while unemployment within this category is 31.6%, where half belongs to young people.

Table 5-32_ Employment in Durrës Municipality

Employment					
	No. of persons capable to work				
AU	Total	Employed	Unemployed	Young unemployed	Unable to work (invalids)

Durrës	207,894	142,200	65,694	32,518	1,950
Rrashbull	23,191	15,863	7,328	3,627	369

Source: Durrës Municipality, 2020

<u>Poverty</u>

There is currently a lack of data on poverty at the municipal level, as this aspect is measured only at the region level. Poverty at the national level increased from 12.6% in 2008 to 14.3% in 2012 (the latest data), while poverty in the region was 16.5% in 2015. Another parameter that was examined for poverty at the municipal level was based on the number of families receiving economic assistance. 306 families are treated with social aid in AU Durrës (city) and 27 families in AU Rrashbull.

According to the EU's Roma Support Fiche, Durrës has a Roma community in Nishtulla area where there are about 127 families. About 40% of them live with the support of economic assistance, while the rest generate income through the collection of cans, recycling materials, and the sale of used clothing. While most children attend school, a percentage of 10-15% of children do not go to school. There is a community centre in the area that supports and serves the community with direct assistance in school enrolment or childcare. The municipality has undertaken several rehabilitation projects in the area, regarding the housing and access to social, educational and health services; however, there is always space for improvements in this regard.

<u>Education</u>

Since 2006 Durrës had its own university, "Aleksandër Moisiu", which has the following faculties with about 4,000 students: Faculty of Economics and Faculty of Education, as well as the Vocational School. In addition to the university, the following educational institutions operate in Durrës:

- 3 public nurseries
- 20 public kindergartens
- 8 non-public kindergartens
- 22 public 9-year schools
- 9 non-public 9-year schools
- 8 public high schools
- non-public high schools
- 1 vocational high school

Table 5-33_ Elementary education schools in Durrës

	AU	No. of children	No. of teachers	Children / teacher	Ratio schools / 10000 inhabitants	Teachers / 10000 inhabitants
1	Durrës	15724	656	24	2	2
2	Rrashbull	2586	98	26	2	11
	Total / Average	18310	1079	25	2	6

Source: Ministry of Education, Sport and Youth (GLP Durres Municipality)

Table 5-34_ Secondary education schools in Durrës

	AU	No. of children	No. of teachers	Children / teacher	Ratio schools / 10000 inhabitants	Teachers / 10000 inhabitants
1	Durres	5713	266	21	0,7	23
2	Rrashbull	167	6	28	1,5	9
	Total / Average	5880	272	24	1,1	16

Source: Ministry of Education, Sport and Youth (GLP Durres Municipality)

According to a study on the functional areas (DLDP project), the city has the lowest percentage of education level completed for elementary and 8 (or 9) years school with 42.45%. At the same time, it has the highest percentage of secondary education - 38.8% and a five times higher figure related to higher education in comparison to the new administrative units that have been attached to the new municipality. As can be noticed, illiteracy is a problem in the former communes, especially in Ishëm.

Table 5-35_ Education level in Durrës Municipality

Indicator (in %) / AU	Durres	Rrashbull
Educational level completed: elementary and 8 or 9 years	42,45	64,63
Educational level completed: secondary	38,8	26,7
Educational level completed: university and post graduate	15,4	5,3
Illiteracy rate	1,8	2,2

Source: Durrës Functional Area Report, DLDP project

<u>Health care</u>

According to Regional Health Directorate (RHD) of Durrës, the basic figures for health care are as follows:

Table 5-36_ Health care profile in Durrës

Description	Durrës Region	Durrës City
Health Centre with directorate status	18	9
Health Centre acc. to the health activity	39	12
Ambulances	48	
Public Hospital		1 (beds 340)
Private Hospital		1
Policlinic		1
Pharmaceutical Centres as following: Public pharmacies Private pharmacies with state contract	 74	 2 58
Dental clinics Public at RHD Private licensed with dentist Dental cabinets (at Health Centre Katund Sukth)	 2 101 	 80 1

Maternity Clinic		1
Women's counselling	69	1
Children's counselling	84	12
Number of visits to Health Centres and Ambulances (per year?)	399199	274965
Number of live births (per year?)	2742	1684
Indicator of maternal mortality (per year?)	0%	0%
Infant (0-1 years) mortality (per year?)	3.28%	1.78%
Vaccination level	99.9%	99.9%

Source: RHD Durrës

Agriculture and land ownership

As regards the agriculture, in Durrës Municipality there is 2428.5 ha of agricultural land, of which 850 ha of arable land, 707.7 ha of orchards, vineyards, olive groves and citrus, while 870.8 ha are barren, of which 62.8 ha of arable land and 808 ha of orchards. Durres Municipality territory has very few forests, because it has a high degree of humanization: high population density and the return of its natural landscapes to agricultural land, urban areas of inhabited centres. In AU Durres (city) there is not any agricultural activity, nor any forest area. AU Rrashbull also has not any afforested area. Meanwhile, AU Rrashbull has 591 ha of arable land planted with cereals, 910 ha with fodder, 117 ha with vegetables. The main agricultural crops are arable crops (cereals and fodder), vegetables, fruit trees, vineyards, olive groves.

The land ownership throughout the municipalities is public administered by the municipality/respective AU, as well as private (legalized or acquired according to the relevant legislation in force).

Social problems and social stratification

Unemployment is one of the most important social problems for the community, both urban and rural. Community representatives have stated that there are many families in need, but those who benefit from the economic aid scheme are few. Even the economic aid of those who benefit from this scheme is minimal. In rural areas, families in need are mainly newly arrived families in the area, not autochthonous, while in urban areas this is not always the case. The families with a low socio-economic status sometimes benefit from the assistance provided by non-profit associations and organizations but are not included in any particular development program that would enable them to exit from this marginalized state.

In rural areas housing is generally not a concern, while in areas with a more urban profile, housing issues are a problem for the community. Roma and Egyptian residents generally tend to live in barracks with difficult living conditions or in depreciated public buildings.

In general, it is noticeable that in areas with urban profile (Durrës city) social stratification (division of society into groups with different income levels, who practice different lifestyles) is more evident, compared to areas with rural profile, which have a more homogeneous population in this regard.

Development projects

The General Local Plan for Durrës Municipality, pending the final approval, envisages the development projects in the respective sectors (infrastructure, education, health, urban planning, environment, etc.). Currently, in Durrës Municipality, there are several projects, mainly of international funding, under implementation. The projects belong to the following categories:

- Urban development
- IPA CBC
- Social
- Partnership
- Europe for Citizens
- InterregMed Program 2014-2020
- "Municipalities to Europe" Project
- Interreg ADRION Program 2014-2020

Specifically, regarding the Industrial Zone Rrashbull (IZR), with DCM no. 105, dated 09.02.2011 has been declared a Free Zone with the status of Industrial Park. At the moment there are no projections for employment. Information and embryonic developmental phase of this project does not provide opportunities for long-term design.

A detailed socio-economic profile of Durres Municipality and Rrashbull Administrative Unit (both in the area of the railway rehabilitation project) is provided in Annex 5.

Kavaja Municipality

Kavaja Municipality lies in central Albania, bordering on the north with Durrës Municipality, on the northeast with Tirana Municipality, on the south with Rrogozhine Municipality and on the west with Adriatic Sea. This geographical positioning in immediate proximity to the largest economic poles in the country (Tirana and Durrës Municipalities) give Kavaja a potential for economic interaction and further development.

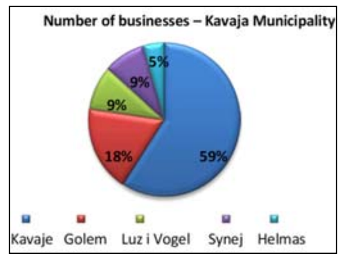
The municipality has economic, infrastructural, social, etc. interaction with the region of Tirana, Durres, Elbasan, and Lushnja. Among the main elements of the infrastructure system, are mentioned road and rail transport, water supply and sewerage network, network of drainage and irrigation canals, electricity and telecommunications network as well as ancillary and service structures in function of these systems. In road transport as the main artery of Kavaja we list the main interurban road part of corridor VIII, the main boulevard of the city, the city ring, while in rural areas the number of road axes paved with asphalt and in good condition is small. The railway, together with its two stations in Golem and Kavaja city is another main element of this system. Water supply infrastructure is obsolete. Water supply in the city and Golem area is realized through the network while for the village areas it is done through wells.

The main activities to secure the livelihood in Kavaja city and AU Golem are: tourism, agriculture, trade, as well as other businesses such as: tailoring enterprises, meat processing enterprises, international transport enterprises and commercial entities for agricultural machinery.

The proximity to Adriatic Sea and the development of coastal areas have contributed to the development of the tourism sector, while the Mediterranean climate and geological characteristics offer opportunities for further development of agriculture and livestock.

Kavaja Municipality with an area of 198.85 km2, counts about 1,631 businesses in its territory which are specialized in various economic sectors. About 82% of the businesses are small businesses, mainly concentrated in the agriculture and trade sector.

AU	Small business	Big business	Total no. of businesses
Kavajë	832	134	966
Golem	212	83	295
Luz i Vogël	135	17	152
Synej	120	24	144
Helmas	43	31	74
Total	1342	289	1631



Source: General Local Plan, Kavaja Municipality, 2017

Based on the division of businesses by administrative units, it is clear that Kavaja unit (town) is an economic pole at the municipal level. This unit, which represents only 4% of the total municipality’s area, contains about 51% of the population and gathers about 59% of businesses. The latter are oriented towards industry and the service sector.

Presence of businesses with national and international impact, such as tailoring enterprises, meat processing enterprises, international transport enterprises and commercial entities for agricultural machinery, etc. strengthen the position of this municipality in the domestic market.

The service sector, which focuses mainly on the Kavaja and Golem AUs, clearly shows the tourist orientation of this municipality. The cultural, natural and climatic potentials suggest a further qualitative and intertwined development of tourism. This means further development of coastal tourism, as well as promotion of culture and local products through agritourism structures.

Agriculture and land ownership

Kavaja Municipality has a complex orientation of agricultural structure, such as the production of cereals, field vegetables, fruit growing and livestock. The basis of agricultural production is comprised of cereals (wheat and corn), field vegetables, livestock and fruit growing. The Administrative Units of Kavaja Municipality are specialized, based on agri-pedological conditions and tradition in terms of field vegetables, mainly tomatoes and peppers, as summer vegetables and carrots and cabbage, as winter vegetables. In the territory of Kavaja Municipality there is a reduced area of solar greenhouses with central heating.

The agriculture, livestock and fisheries sectors are dominated by small businesses, which face difficulties in financing, integrating modern technologies and agro-techniques. The lack of supply, processing, collection, trade, sanitary and quality control points does not provide the right terrain for a higher production efficiency and a more direct contact with the market. The modest development of the agro-food industry, approximated and related to local products, has the effect on developing the agricultural, livestock and fisheries sectors. Although these sectors face different problems, Kavaja Municipality offers a suitable environment for business development, taking into account the climatic advantages, terrain and proximity to local markets such as Tirana and Durres.

The land ownership throughout the municipality is public administered by the municipality/respective AU, as well as private (legalized or acquired according to the relevant legislation in force). In AU Golem, the land allocation was carried out by the commission of each village, at the rate per capita, depending on the land area and the village. Kavaja Municipality has in its administrative territory four areas declared as informal, two of which are informal settlements and lie in the southern part of the city, in the area bordering between the city ring and the new main interurban road Kavaja– Rrogozhine, while the other two are informal areas of which, one in AU Golem and the other in the AU Synej. The entire municipality's area is connected through an infrastructure network with a total approximately consisting of main interurban, urban, regional, rural and local roads. Along the central part of the municipality, passes the important infrastructural and economic axis, which is connected with Tirana, Durrës, Rrogozhine, and Lushnja and continues in the southern part of the country.

Employment

Kavaja municipality's population is affected from unemployment, since only half of the workforce is employed. As a result, since 1990, more than 25% of the total population has migrated elsewhere, mainly to countries like: Italy, Greece, Great Britain, France, Germany, United States and Canada, and smaller percentage towards neighbouring working centres such as Durrës and Tirane.

Table 5-37_ Employment in Kavaja Municipality

Employment					
	No. of persons capable to work				
AU	Total	Employed	Unemployed	Young unemployed	Unable to work (retired + invalids)
Kavajë	80675	38724	41951	1384	39002
Golem	8633	6475	2158	863	1667

Source: Kavaja Municipality, 2020

Poverty

There is currently a lack of data on poverty at the municipal level, as this aspect is measured only at the region level. Poverty at the national level increased from

12.6% in 2008 to 14.3% in 2012 (the latest data), while poverty in the region is 16.5% in 2015. Another parameter that was examined for poverty at the municipal level was based on the number of families receiving economic assistance. There are 3,442 registered jobseekers in Kavaja city who are treated with economic assistance, compared to 199 jobseekers from other administrative units.

Development projects

In 2018 was approved the General Local Plan for Kavaja Municipality, which provides for development projects in the relevant sectors (infrastructure, education, health, urban planning, environment, etc.) which affect also AU Golem. In this unit, currently is being implemented the project for reconstruction of the road connecting the village.

A detailed socio-economic profile of Kavaja Municipality and Golem Administrative Unit (both in the area of the railway rehabilitation project) is provided in Annex 5.

Rrogozhine Municipality

Rrogozhine municipality lies in an area of 223.50 km2. It is part of Tirane County. The municipality was founded in 2015 as a result of the new administrative division of Albania by merging the former rural communes of Gosë, Kryevidh, Lekaj, Rrogozhine and Sinaballaj.

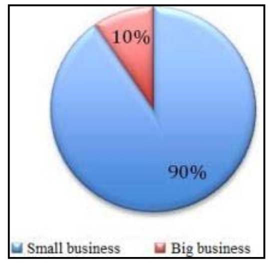
The economy of the Municipality is focused on two main pillars: agriculture where 70% of the territory is agricultural and tourism where it has 20 km of coastline. Drafting appropriate development plans, coupled with appropriate investments for roads, sewerage, lighting and potable water, provides an opportunity to increase the municipality's revenue. As regards the AUs, the livelihood is provided by emigration, agriculture, fruit growing, and livestock.

Rrogozhine Municipality offers a suitable environment for business development, taking into account its geographical position, which is related to the main economic poles of the country (through Corridor 8), and its geological and climatic advantages. This municipality offers a potential for local economic development.

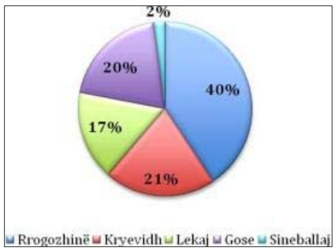
The few industrial activities in the town are linked to the agricultural products and consist mainly of production of olive oil and soap, as well as shaping and processing of clothes and shoes.

The study of various economic activities operating in Rrogozhine Municipality presents a number of 559 businesses in total, where more than 90% of them are considered small businesses.

AU	Small business	Big business	Total no. of businesses
Rrogozhine	190	37	227
Kryevidh	115	1	116
Lekaj	81	12	93
Gose	102	9	111
Sineballaj	12	0	12
Tot. Municipality	500	59	559



Source: GLP Rrogozhine Municipality, 2017



The main businesses are mainly concentrated in the administrative units of Rrogozhine, Kryevidh and Lekaj.
Dividing the number of businesses by administrative units, it is noticed that Rrogozhine AU, which represents only 5.6% of the entire municipality's territory, contains over 40% of businesses.

The fact that this municipality contains a large number of small businesses compared to the small number of large businesses, means that the revenues of the municipality from local business taxes are modest.

Another important sector for Rrogozhine Municipality is the tourism sector, which currently is developed along the coastline and offers a high development potential. Currently, the coastal area is visited by a significant number of daily tourists during the summer period. The development of the coastal area and agro-tourism can be an element that will guarantee a sustainable development and not only seasonal.

Moreover, the picturesque landscape and proximity to agricultural production areas offer a potential for agro-tourism development.

Employment

The recent data received from Rrogozhine Municipality show that about 61% of the population belong to the age-group of 18-65 years old that at the working force category. However, the level of unemployment within this category is 53%. The most dramatic situation is the fact that 83% of the unemployed belong to the young people category. For AU Gosë, 61% of the population belong to the working force category, 24% unemployed, out of which 55% young people. For AU Lekaj these figures are 61%, 10% and 28%, respectively.

Table 5-38_ Employment in Rrogozhine Municipality

Employment					
	No. of persons capable to work				
AU	Total	Employed	Unemployed	Young unemployed	Unable to work (retired + invalids)

Rrogozhine	7447	3501	3946	3275	1842+125
Gosë	5410	4112	1298	714	1303+107
Lekaj	5878	5291	587	164	1454+65

Source: Rrogozhine Municipality, 2020

Businesses operating in this area are mainly oriented towards the agricultural and livestock sector, where the Census 2011 data shows that about 60% of the active population is employed in the agricultural sector, 29% is employed in the service sector and only 11% in the industry sector (INSTAT, 2015). Furthermore, the presence of 31 seasonal businesses operating in the beach area is noticeable, which means the potential importance of the tourism sector.

Agriculture and land ownership

The main economic activity in Rrogozhine is agriculture and livestock. The main agricultural crops in Rrogozhine Municipality (and the AUs) are cereals, vegetables, fruits and fodder. Moreover, AU Gosë is distinguished specifically for carrot production throughout the year, while AU Lekaj for olive production. The fact that the agricultural, livestock and fishing sectors are dominated by small businesses, which face funding difficulties and lack of cooperation with public and private actors, does not provide the appropriate climate for the maturation of this cluster, so the accelerated development of the economy is not favoured.

The low level of technology and agro-technology used, the insufficient and non-standardized number of supply, processing, collection and trade centres, as well as the sanitary and qualitative control points does not provide the right ground for a productive efficiency and a competitive and contemporary positioning in the domestic and foreign market.

In the eastern hilly areas, a development of orchards is observed, thus benefiting from the Mediterranean climate of this area. The development of this activity is difficult due to the lack of infrastructural interconnections which reduce market accessibility.

The lack of agro-food industries approximated and interconnected with domestic products deprives producers of a higher added value.

The land ownership throughout the municipality is public administered by the municipality/respective AU, as well as private (legalized or acquired according to the relevant legislation in force).

Poverty

There is currently a lack of data on poverty at the municipal level, as this aspect is measured only at the region level. Poverty at the national level increased from 12.6% in 2008 to 14.3% in 2012 (the latest data), while poverty in the region is 16.5% in 2015. Another parameter that was examined for poverty at the municipal level was based on the number of families receiving economic assistance. There are 101 families in AU Rrogozhine, 83 families in AU Gosë and 32 families in AU Lekaj that are treated with economic assistance.

Development Projects

In 2017, the General Local Plan for Rrogozhine Municipality was approved, which also provides for development projects in the relevant sectors (infrastructure, education, health, urban planning, environment, etc.) which affect also AUs of Gosë and Lekaj. Some projects under implementation are:

- Reconstruction of neighbourhood roads by the Albanian Development Fund (ADF)
- Reconstruction of the 9-year school "George Sorros" (ADF)
- Construction of the 9-year school in Gosë (ADF)
- Construction of the 9-year school in Okshtun (ADF)

A detailed socio-economic profile of Rrogozhine Municipality and Gose and Lekaj Administrative Units (all three units in the area of the railway rehabilitation project) is provided in Annex 5.

6 Impacts and Mitigation

This chapter describes the potential impacts that may arise from the development stages of the proposed project. The selected impacts derive mainly from the scoping matrix, which has been prepared during the scoping stage, as well as on the detailed description of the baseline information and on the project’s elements and activities.

The followed approach is in accordance with the national environmental legislation, as well as with the environmental and social requirements of EIB. The characterization of the likely impacts is described in the chapter 4.

The identification and the assessment of the potential impacts include the selected option (the basic option).

As the project’s activities during the construction works are different from those during the operational stage, the sources of impacts during these stages are described separately.

6.1 Air quality

6.1.1 Design, preconstruction and construction

Potential impacts and sources of impacts: The construction activities will generate dust and particulate matter from the construction works (work camp, eventual road access, vegetation clearing, demolition of the existing stations, bridges and culverts, removal of filling material in some sections of the railway line, construction of new stations and new bridges and culverts, improvement of the vertical and horizontal railway line alignments, construction of retaining walls, rehabilitation of Rrogozhine tunnel, etc.), transport trucks, etc. Gas emissions will be generated from transport vehicles and construction equipment. Dust, particulate matter and gas emissions may adversely affect the biodiversity, water resources and the health of workers and local population.

Dust and particulate matter: Dust emissions can be divided into dust and particulate matter (PM_{10}). The majority of the dust emissions are likely to occur during the working hours of construction activity. Dust do not cause long-term or wide spread changes to local air quality, but their deposition on the crossed inhabited areas causes temporary nuisances.

Particulate matter (suspended particles), is released by the aggregate material in the same manner as dust. However, it remains suspended in the atmosphere for a longer period and can be transported by wind over a wider area than dust. Particulate matter is also released from the construction machineries, etc. As the magnitude of the PM_{10} emissions is relatively small, any adverse effects resulting from them are likely to be relatively short-term with no significant effects outside the construction sites. PM_{10} is small enough to be drawn into the lung during breathing. Because of this potential impact on health, the limit value for PM_{10} is defined in the Albanian legislation on air quality. The Albanian norms on air quality are slightly more stringent than those of the Directive 2004/107 "On air quality".

Gas emissions: The main pollutants that are associated with working machineries and transport vehicles are NO_2, PM_{10}, CO, benzene (C_6H_6) and benzo[a]pyrene ($C_{20}H_{12}$). Amongst them, NO_2 and PM_{10} are the most likely to result in exceeding relevant air quality standards or objectives.
In construction zones, the dust generated by vehicle movements and local air pollutant emissions from vehicles may be temporarily elevated during the busiest periods of construction activity. However, no significant local air quality effects are expected.

Suggested mitigation measures. The suggested mitigations measures include:

- Watering the working area during the demolition of the stations and bridges;
- Establish the work camps as far away as possible from inhabited areas, water resources, and areas of dense tourist activity. All the work camps will be established within the existing railway stations (Shkozet, Golem, Kavaje, Lekaj and Rrogozhine), where there is free space and the needed infrastructure (electricity, water supply & sewerage, impermeable places in concrete, etc.), without disturbing inhabited areas and water resources. The nearest stations to the watercourses are Golem (650m from the Adriatic Sea) and Rrogozhine (1.1 km from Shkumbin Riverbed);
- Cover the transport trucks and the stockpiles;
- Sprinkle the stockpiles, and access roads with water, during the dry season to minimize dust;
- Watering the working area during earthworks for construction of service roads to minimize dust;
- Take appropriate measures, including personal protective equipment (PPE) to protect the health of the workers from the dust and polluting substances;
- Perform earthwork close to Durres Beach (especially from km 6+700 to 7+700, where the railway distance from the sea is less than 200m) out of the seaside holidays period (June-September);
- Perform earthworks at the level crossings and their vicinity out of the hours when these crossings are used by pupils;
- Respect the deadlines for technical control of the vehicles;
- Use fuels, which are in compliance with official standards (as per Ordinance No. 6, of 09.10.2007; the content of the sulphur in diesel fuel, starting from 01.01.2011 must be 10mg/kg);
- Monitor the air quality based on the provisions of the relevant regulations, including the DCM 352/2015 "On assessment of environmental air quality and the requirements related to some pollutants".

Evaluation of impacts' significance

The area near the working site may be affected from the air quality pollution from the construction and transport activities. This impact is temporary and limited to the working site and transport roads. The most sensitive railway line sections are the urban areas crossed by the railway line (Shkozet to Plepa, Golem and Kavaje). The other part of the railway line runs through arable lands. No sensitive building like education, health, religious, cultural facilities, etc., are located close to the railway line.

Magnitude and stakeholders concern: The magnitude and stakeholders concern is evaluated based on the impact intensity (see Table 4-2 and Table 4-3) and the probability of occurrence (see Table 4-1). Once the mitigation measured mentioned hereinabove are undertaken, especially within the sections mentioned hereinabove, the intensity of the likely impacts can be evaluated as negligible to low (see Table 4-2 and Table 4-3), while the likelihood can be evaluated as "likely" (see Table 4-1). As a result, the magnitude and stakeholders concern results as negligible to low (see Table 4-4 and Table 4-5)

Receptor sensitivity: Without mitigation measures, the air quality during construction can be evaluated as of low to moderate (because of the crossed urban areas) sensitivity (see Table 4-6 and Table 4-7), while once routine mitigation measures specific to transport projects (road network, etc.) will be undertaken the sensitivity of the local community can be evaluated as low.

Significance of impacts: The table below gives the expected significance of the impacts related to air quality during construction (see Table 4-8, Table 4-9 and Table 4-10).

Table 6-1_Evaluation of impact significance related to air quality during construction

Option	Magnitude and stakeholders' concern	Receptor sensitivity	Impact significance	Scoring
0	No impact	No impact	No impact	0
1	Negligible to Low	Low	Negligible to Minor	-2

Option 0: Current situation (without the Project)

Option 1: With the Project; after mitigation measures

Findings: The likely impacts on the air quality are limited to the working areas and last only during the working activities. They can be significantly reduced by routine mitigation measures. If appropriate mitigation measures are undertaken, the Project's impact on air quality can be evaluated as insignificant.

6.1.2 Operation and maintenance

During operation, the main source of air pollution is the fuel combustion from locomotives. The related pollutants released into atmosphere are NO_2, PM10, CO, benzene (C_6H_6) and benzo[a]pyrene ($C_{20}H_{12}$). Amongst them, NO_2 and PM10 are the most likely to result in exceeding relevant air quality standards or objectives.

The air pollution can be mitigated by applying the best international mitigation practices related to the operation and maintenance of locomotives, as described in the section on climate change and GHG emissions, where it is underlined that the expected impacts' significance during the operation phase is insignificant.

6.2 Noise and vibrations

The distance from the alignment axis of the distribution of the railway induced noise levels on buildings' facades is taken 250m.

6.2.1 Design, preconstruction and construction

The noise and vibrations will be generated mainly from the demolition of stations, bridges, culverts, etc., and construction activities and transport vehicles, which are going to be generally heavy trucks and various machineries like excavators, diggers, scrapers, cranes, etc. It is not planned to use blasting for demolishing the existing bridges.

Noise

The table below shows the noise level generated by some vehicles and machineries, which are used in the construction works.

Table 6-2_ Construction machineries and their noise levels

No.	Type / model	Noise level dB(A)
1	Digger	111
2	Excavator	108
3	Roller truck	112
4	Vibrating roller truck	116
5	Driller	118
6	Dozer	113
7	Other machineries	103
8	Truck on gravel road	64
9	Truck on asphalt road	61

The Albanian Law 9774/2007; "On evaluation and administration of noises in the environment", article 10 provides that the measures for protection from noises apply depending on the time when noises are generated. For this purpose, the 24 hours are divided as follows:

- The day lasts 13 hours, from 06^{00} to 19^{00};
- The evening lasts 4 hours, from 19^{00} to 23^{00}; and
- The night lasts 7 hours, from 23^{00} to 06^{00}.

The limits for the acceptable noise levels in the residential areas are provided for in the joint Ordinance of the MoEFWA and the Ministry of Health (MH), No.8, of

27.11.2007 "On the limits for noises in specific environments", presented in the table below.

Table 6-3_Noise generation levels depending on the environment

Environment	Critical impact on health	LA_{eq} (dBA)	Basic time (hours)	LAmax Fast (dB)
Residential area				
Outside residential building	Serious annoyance during the day and the evening	55	16	-
	Moderate annoyance during the day and the evening	50	16	-
Inside residential buildings	Talks clearly heard, and annoyance during the day and the evening	35	16	-
Inside sleeping room	Sleep disturbed at night	30	8	-
Outside sleeping room	Disturbed sleep, open window (measured outside)	45	8	-
Area of social-economic activity				
Industrial, trade zone, street traffic (inner and outer environment)	Hearing damage	70	24	110
Urban environment				
Inside & outside public environment	Hearing damage	85	1	110

Note:
-LA_{eq} (dBA) = equivalent to a level measured at scale A
-LAmax Fast (dB) = Measured level at scale A in "Fast" mode (fast)

The WHO Regional Office for Europe has published a guideline on the recommended noise exposure levels[98]. Both the EU and Albanian norms on the environmental noise are based on the WHO norms.

Vibrations

The response of people to vibrations on the ground is influenced by many factors. Some of those factors are physical, like amplitude, duration and frequency content of vibrations, while other factors like the type of population, age, gender and expectations are physiological. This means that people's reaction to vibrations is subjective and differs from person to person. It is generally accepted that for the majority of people, vibration levels in excess of between 0.15 and 0.3 mm/s peak particle velocity are just perceptible.

The table below presents distances at which vibration may be perceptible for certain type of construction activity. These figures are based on historical field measurements and information available in literature.

[98] https://www.euro.who.int/en/publications/abstracts/environmental-noise-guidelines-for-the-european-region-2018

Table 6-4_Distances at which vibrations may be perceptible

Construction activity	Distances at which vibration may be perceptible [m]
Excavation	10-15
Vibratory compaction	10-15
Heavy vehicles	5-10

Vibration from the construction activities would be perceptible overall within the urban areas crossed by the railway line (Durres, Golem, and Kavaje).

In most countries, including Albania, there is no legal obligation to assess the exposure to vibration[99]. However, the EU Directive 2002/44 "On the minimum health and safety requirements regarding the exposure of workers to the risks arising from physical agents (vibration) (sixteenth individual Directive within the meaning of Article 16(1) of Directive 89/391/EEC)[100]", lays down minimum requirements on exposure to vibrations. It gives to Member States the option of maintaining or adopting more favourable provisions for the protection of workers, in particular the fixing of lower values for the daily action value or the daily exposure limit value for vibrations.

The EU Directive 2016/797 "On the Interoperability of the Rail System" within the EU, annex III (essential requirements), paragraph 1.4.5 (environmental protection) states that "operation of the rail system must not give rise to an inadmissible ground vibration for the activities and areas close to the infrastructure and in a normal state of maintenance[101]"

As there are neither EU, nor Albanian specific railway vibration levels, the Consultant will be based on the target values that are defined or suggested in most of the guidelines on rail vibration. For the purposes of the proposed project, the Consultant suggests to take into account the German standards (DIN 4150 and DIN 45669-1), which are widely used in Europe (UIC-Railway-induced-vibration-report-2017, chapter 5: Targets and Actions Levels). They describe the methods of signal processing (DIN 45669-1) and measurements (DIN 4150). DIN 4150-1 defines the measurements and prediction method for the prescribed indicators, DIN 4150-2 focusses on the effects on the humans, whereas DIN 4150-3 on the effects on buildings[102] .

Potential Impacts: Temporary adverse impacts on the health of workers, local population and fauna.

Suggested mitigation measures

The suggested mitigations measures include:

[99] https://uic.org/IMG/pdf/uic-railway-induced-vibration-report-2017.pdf

[100] https://eur-lex.europa.eu/resource.html?uri=cellar:546a09c0-3ad1-4c07-bcd5-9c3dae6b1668.0004.02/DOC_1&format=PDF

[101] https://uic.org/IMG/pdf/uic-railway-induced-vibration-report-2017.pdf

[102] https://www.en-standard.eu/din-standards/

- Avoid the construction activities near the coastline during the summer holidays season. From km 6+700 to km 7+700 the distance of the railway line varies from 200 to 160m).
- No blasting for demolishing the existing bridges will be applied.
- Limit the working hours of machineries that generate high noise /or and vibration. Machines such as cranes that might be in intermittent use should be shut down between work periods or should be throttled down to a minimum. Machines should not be left running unnecessarily, as this can be noisy and wastes energy.
- Machinery and operational equipment (including excavators, crushers, loading/unloading, generators, concrete plants, etc.) will be placed as far away from noise and vibration-sensitive areas as possible.
- Wherever necessary use compacting rollers without vibration close to vibration-sensitive receivers.
- Avoid the activity of the noisy machinery during night hours.
- Whether possible, avoiding the simultaneous use/operation of noisy equipment.
- Acoustic covers to engines should be kept closed when the engines are in use and idling. If compressors are used, they should have effective acoustic enclosures and be designed to operate when their access panels are closed.
- Working and transport machineries will be regularly checked that they operate efficiently and in accordance with manufacturers' specifications by trained and qualified operators. In addition to increased safety, this process affects both the proper maintenance and the quiet operation of the machinery as possible.
- Respect the deadlines for technical control of the working and transport machineries.
- Whether necessary, install temporary noise barriers around the stations and in front of the closest buildings.
- Ensure that workers are provided with earpieces as protection from noise.
- Place appropriate traffic signs close to construction sites.
- Inform the local population on the type and duration of the works.
- Communicate with the affected people to avoid complaints before carrying out any inevitable activities generating high noise and/or vibration levels near noise and/or vibration-sensitive receivers. They should be informed in advance of the type work to be carried out, and of the expected duration.
- In the case of any complaint, the source of the excessive noise and/or vibration will be identified and measures such as the location of the equipment and the working hours will be assessed. For this reason, sensitive audio receivers should be detected before work begins.
- The working hours should be planned and account should be taken of the effects of noise and/or vibration upon persons in areas surrounding site operations and the likely consequence of any lengthening of work

periods. Where reasonably practicable, quiet working methods should be employed, including use of the most suitable machinery and reasonable hours of working for noisy operations.

- Whether any educational or other sensitive facility is located close to the railway line, perform works out of the teaching hours, in consultation with the local educational authorities.
- Reduce the nuisance of transport vehicles traffic, through the following:
  - Adjust the speed limit of vehicles within the temporary roads of the site to 10 km/h or less, as appropriate.
  - Stabilization of dirt access roads with gravel (or similar).
  - Vehicles shall be loaded and unloaded in such a way as to minimise noise production and, where possible, to be carried out away from noise-sensitive areas.
  - Avoid unnecessary use of horns when exiting/entering nearby roads, unnecessary revving of engines and switch off equipment when not required.
  - Start-up working and transport engines sequentially rather than all together.
- Where possible, electrical equipment should be used instead of diesel or petrol engine equipment and must comply with European Directive 2000/14/EC on project machinery noise.
- Monitor the noise from project activities as provided by the MoE Ordinance 1037/1, dated 12.04.2011 "On the assessment and management of environmental noise**"** and from EU Directive 2000/14, as amended.
- Respect the official standards on noise as provided for in the Albanian Law 9774/2007; "On evaluation and administration of noises in the environment".
- Respect the suggested German standards DIN 4150 and DIN 45669-1 on vibrations (DIN 4150-2 for the effects on the humans and DIN 4150-3 on the effects on buildings[103]).

Evaluation of impacts' significance

The area near the working site may be affected from the noise and vibration nuisance from the construction and transport activities. This impact is temporary and limited mostly to the working site and transport roads.

Magnitude and stakeholders' concern: The magnitude and stakeholders concern are evaluated based on the impact intensity (see Table 4-2 and Table 4-3) and the probability of occurrence (see Table 4-1). Once the mitigation measured mentioned hereinabove are undertaken, the intensity of the likely impacts can be evaluated as low (see Table 4-2 and Table 4-3), while the likelihood can be evaluated as "likely" (see Table 4-1). As a result, the magnitude and stakeholders concern results as low (see Table 4-4 and Table 4-5)

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[103] https://www.en-standard.eu/din-standards/

Receptor sensitivity: The noise and vibration nuisance during construction can be evaluated as of low to moderate sensitivity (see Table 4-6 and Table 4-7). It is limited in time and space (roughly 250m on both sides on the railway line). While once the mitigation measures will be undertaken the sensitivity can be evaluated as low.

Significance of impacts: The table below gives the expected significance of the impacts related to noise and vibration nuisance during construction works (see Table 4-8, Table 4-9 and Table 4-10).

Table 6-5_Impact significance related to noise and vibrations during construction

Option	Magnitude and stakeholders concern	Receptor sensitivity	Impact significance	Scoring
0	No impact	No impact	No impact	0
1	Low	Low	Minor	-4

Option 0: Current situation (without the Project)

Option 1: With the Project; after mitigation measures

Findings: The adverse impacts from noise and vibrations generated during preconstruction and construction works are temporary and of local extent. They can be evaluated as probable and of low significance and can be mitigated by taking the appropriate mitigation measures.

6.2.2 Operation and maintenance

6.2.2.1 Noise

6.2.2.1.1 Noise source

The major source of railway noise is the rolling noise from the interaction between wheel and rail. Another important noise source of lesser magnitude is the squealing noise from curvatures and braking[104].

[104] World Health Organization, "GUIDELINES FOR COMMUNITY NOISE", 1999

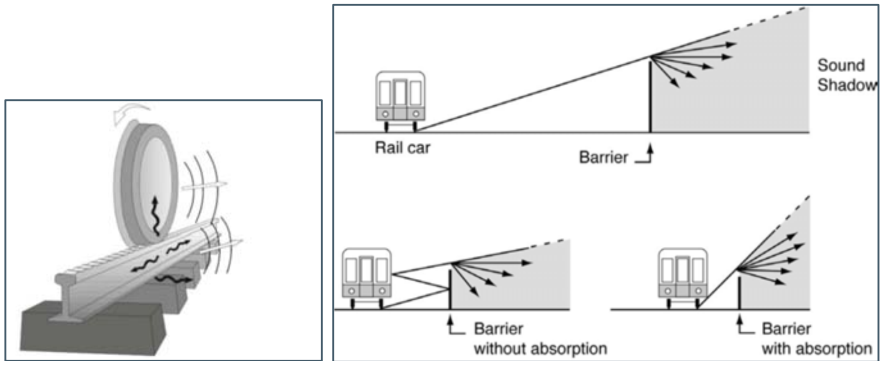

Figure 6-1_Source and path of railway noise impinging on a noise barrier

6.2.2.1.2 Potential impacts

Over recent years, acoustic pollution has become a common problem for developing countries and its treatment one of the new challenges in environmental policy. Furthermore, noise diminishes the quality of life in a more general perspective. According to WHO ("Guidelines for community noise", 1999), the half of the EU citizens (EU 15) are estimated to live in areas which do not ensure acoustic comfort for residents:

- 40% of the population is exposed to road traffic noise with an equivalent sound pressure level exceeding 55 dB(A) during daytime
- 20% of the population is exposed to levels exceeding 65 dB(A)
- At night, more than 30% of the population are exposed to sleep-disturbing sound levels (>55 dB(A))

Often neglected, noise induces a severe impact on humans and living organisms. Some of the adverse effects are summarized below:

- **Annoyance:** Noise creates annoyance to the receptors due to sound level fluctuations. The aperiodic sound due to its irregular occurrences, causes displeasure to hearing and causes annoyance.
- **Physiological effects:** The physiological features like breathing amplitude, blood pressure, heart-beat rate, pulse rate, blood cholesterol, etc., are affected by noise.
- **Loss of hearing:** long exposure to high sound levels causes loss of hearing. This is mostly unnoticed, but it has an adverse impact on hearing function.
- **Human performance:** The working performance of workers will be affected in noisy environments as they will be losing their concentration.
- **Nervous system:** Exposure to high sound levels causes pain, ringing in the ears, feeling of tiredness, thereby affecting the functioning of the human system.
- **Sleeplessness:** Noise affects sleeping, thereby inducing people to become restless and lose concentration and the presence of mind during their activities.

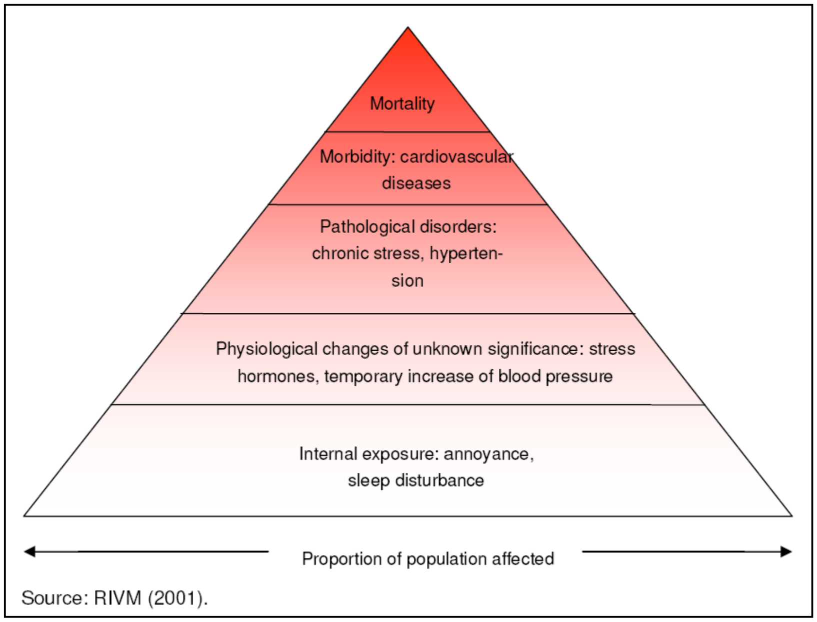

Figure 6-2_Effects of long-term excessive noise exposure

6.2.2.1.3 Noise assessment

Methodology of noise evaluation

To evaluate the noise nuisance from a new railway corridor, as in the case of Railway Corridor VIII the procedures defined in the Common noise assessment methods in Europe (CNOSSOS-EU), a methodological framework by the EU to be used for the purpose of strategic noise mapping for road, railway, aircraft and industrial noise[105]. It is the method of railway noise evaluation suggested by the EU Directive on Environmental Noise 2002/49/EC[106].

The method calculates the sound power of the trains based on their type, their frequency and the track type and condition. Then the dissipation of the noise level from the track to the sensitive receiver is calculated considering the distance, the topology and the sound absorption of the terrain, the environment (temperature, relative moisture, wind) and any obstacle (i.e. noise barrier, other buildings) that comes between the source and the receiver. Figure 6-1 illustrates the effect that noise barrier geometry, both with and without absorption, has on the dissipation of noise as it passes over the top of the barrier.

All the calculations of the sound dissipation are made with the following software: IMMI Premium 2020, licence number S72/354.

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[105] European Parliament Joint Research Centre, "Common Noise Assessment Methods in Europe (CNOSSOS-EU)", 2015

[106] "DIRECTIVE 2002/49/EC

The calculated estimate of the noise level at the receiver is then compared with the noise limits applicable to the area under study. If there are areas where the level is over the limits, mitigation measures should be designed.

Sensitive receivers

For the assessment of the sensitive areas regarding noise pollution, the following criteria were taken into account:

- The distance of schools, health institutions, religious institutions and other relevant institutions;
- The distance of residential houses, population density and recreation places;
- The distance of agricultural farms and plantations with the proposed alignment;
- The distance of industrial activates with the study area;
- HSH stations and facilities were not included in the sensitive receiver list

Based on the above, buildings and structures are clustered in four main locations along the alignment: 1+300 – 10+000, 15+000 – 25+000, 27+000 – 29+000, and 33+000 – 35+960, along with some very small clusters in between:

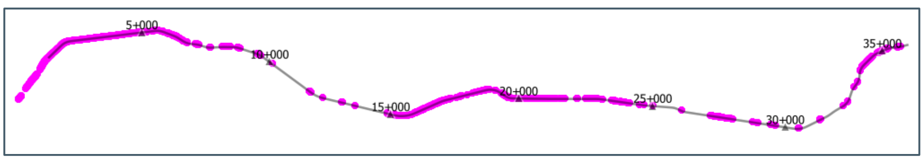

Figure 6-3_Indication of sensitive receivers near the alignment

A school was also identified at chainage 27+600, with its closest facade 43m from the track axis.

Estimated noise levels alongside the railway line Durres-Rrogozhine

The tables presented in the following pages (Table 6-6_ to Table 6-8) shows the distribution of railway induced noise levels on facades for the buildings identified within a 250m distance from the alignment axis:

Table 6-6_Distribution of nearby buildings according to noise levels exposed in comparison to background noise from baseline measurements, 2020 scenario

	>…-35 dB(A)	>35-40 dB(A)	>40-45 dB(A)	>45-50 dB(A)	>50-55 dB(A)	>55-60 dB(A)	>60-… dB(A)	BNL [dB(A)]
Day (07:00-19:00)								
Shkozet - Plazh	1 619	235	168	14	0	0	0	*65 - 67*
Plazh - Golem	1 905	627	396	85	0	0	0	*54 - 63*
Golem - Kavaje	498	145	150	13	0	0	0	*54 - 65*
Kavaje - Lekaj	46	183	91	54	0	0	0	*45 - 59*

	>…-35 dB(A)	>35-40 dB(A)	>40-45 dB(A)	>45-50 dB(A)	>50-55 dB(A)	>55-60 dB(A)	>60-… dB(A)	BNL [dB(A)]
Lekaj - Rrogozhine	120	35	21	11	0	0	0	*45 - 53*
Evening (19:00-23:00)								
Shkozet - Plazh	1 965	72	1	0	0	0	0	*48 - 53*
Plazh - Golem	2 818	189	5	0	0	0	0	*53 - 54*
Golem - Kavaje	745	62	0	0	0	0	0	*49 - 61*
Kavaje - Lekaj	284	91	0	0	0	0	0	*43 - 59*
Lekaj - Rrogozhine	169	18	0	0	0	0	0	*43 - 48*
Night (23:00-07:00)								
Shkozet - Plazh	2 004	33	0	0	0	0	0	*48 - 49*
Plazh - Golem	2 885	127	0	0	0	0	0	*43 - 52*
Golem - Kavaje	782	25	0	0	0	0	0	*44 - 51*
Kavaje - Lekaj	317	57	0	0	0	0	0	*34 - 52*
Lekaj - Rrogozhine	172	15	0	0	0	0	0	*34 - 42*
DEN (weighted 24h)								
Shkozet - Plazh	1 412	349	223	53	0	0	0	*63 - 65*
Plazh - Golem	1 405	925	528	154	0	0	0	*55 - 62*
Golem - Kavaje	319	269	188	31	0	0	0	*54 - 66*
Kavaje - Lekaj	32	174	77	91	0	0	0	*45 - 61*
Lekaj - Rrogozhine	84	64	23	17	0	0	0	*45 - 53*

Table 6-7_Distribution of nearby buildings according to noise levels exposed in comparison to background noise from baseline measurements, 2025 scenario

	>…-35 dB(A)	>35-40 dB(A)	>40-45 dB(A)	>45-50 dB(A)	>50-55 dB(A)	>55-60 dB(A)	>60-… dB(A)	BNL [dB(A)]
Day (07:00-19:00)								
Shkozet - Plazh	789	895	238	109	7	0	0	*65 - 67*
Plazh - Golem	577	1 499	568	337	30	0	0	*54 - 63*
Golem - Kavaje	12	537	143	114	0	0	0	*54 - 65*
Kavaje - Lekaj	0	184	93	94	4	0	0	*45 - 59*
Lekaj - Rrogozhine	13	118	29	28	0	0	0	*45 - 53*
Evening (19:00-23:00)								
Shkozet - Plazh	1 793	198	47	0	0	0	0	*48 - 53*
Plazh - Golem	2 394	471	148	0	0	0	0	*53 - 54*
Golem - Kavaje	592	187	28	0	0	0	0	*49 - 61*
Kavaje - Lekaj	210	104	60	0	0	0	0	*43 - 59*
Lekaj - Rrogozhine	147	23	17	0	0	0	0	*43 - 48*
Night (23:00-07:00)								
Shkozet - Plazh	1 854	168	14	0	0	0	0	*48 - 49*
Plazh - Golem	2 532	396	85	0	0	0	0	*43 - 52*

Golem - Kavaje	643	150	13	0	0	0	0	*44 - 51*
Kavaje - Lekaj	230	91	54	0	0	0	0	*34 - 52*
Lekaj - Rrogozhine	156	21	11	0	0	0	0	*34 - 42*
DEN (weighted 24h)								
Shkozet - Plazh	369	1 196	255	190	28	0	0	*63 - 65*
Plazh - Golem	190	1 614	667	439	103	0	0	*55 - 62*
Golem - Kavaje	3	448	156	182	16	0	0	*54 - 66*
Kavaje - Lekaj	0	39	175	105	56	0	0	*45 - 61*
Lekaj - Rrogozhine	2	109	43	21	12	0	0	*45 - 53*

Table 6-8_Distribution of nearby buildings according to noise levels exposed in comparison to background noise from baseline measurements, 2035 scenario

	>...-35 dB(A)	>35-40 dB(A)	>40-45 dB(A)	>45-50 dB(A)	>50-55 dB(A)	>55-60 dB(A)	>60-... dB(A)	BNL [dB(A)]
Day (07:00-19:00)								
Shkozet - Plazh	378	1 196	246	192	26	0	0	*65 - 67*
Plazh - Golem	193	1 633	645	438	103	0	0	*54 - 63*
Golem - Kavaje	3	459	176	152	16	0	0	*54 - 65*
Kavaje - Lekaj	0	39	175	106	54	0	0	*45 - 59*
Lekaj - Rrogozhine	2	110	42	21	12	0	0	*45 - 53*
Evening (19:00-23:00)								
Shkozet - Plazh	1 727	233	75	2	0	0	0	*48 - 53*
Plazh - Golem	2 187	599	218	8	0	0	0	*53 - 54*
Golem - Kavaje	572	154	81	0	0	0	0	*49 - 61*
Kavaje - Lekaj	198	82	95	0	0	0	0	*43 - 59*
Lekaj - Rrogozhine	138	26	24	0	0	0	0	*43 - 48*
Night (23:00-07:00)								
Shkozet - Plazh	1 786	198	53	0	0	0	0	*48 - 49*
Plazh - Golem	2 330	528	154	0	0	0	0	*43 - 52*
Golem - Kavaje	588	188	31	0	0	0	0	*44 - 51*
Kavaje - Lekaj	207	77	91	0	0	0	0	*34 - 52*
Lekaj - Rrogozhine	147	23	17	0	0	0	0	*34 - 42*
DEN (weighted 24h)								
Shkozet - Plazh	236	1 084	428	219	70	0	0	*63 - 65*
Plazh - Golem	25	1 198	1 074	533	181	1	0	*55 - 62*
Golem - Kavaje	0	256	330	163	58	0	0	*54 - 66*
Kavaje - Lekaj	0	18	184	82	91	0	0	*45 - 61*
Lekaj - Rrogozhine	0	69	76	24	18	0	0	*45 - 53*

6.2.2.1.4 Mitigation measures

Railway noise can be controlled in three sections: at source, along the propagation and at the receiver.

The following table summarises the most popular measures for noise protection[107]

Table 6-9_Overview of railway noise mitigation methods

Measure	Avoided source of noise	Impact (local, network wide)	Noise reduction	Costs/unit[108]
K-blocks	Rolling noise	network wide	Up to 8 dB(A) – 10 dB(A)	4,000 – 10,000€ per wagon
LL-blocks	Rolling noise	network wide	Up to 8 dB(A) – 10 dB(A)	500 – 2,000€ per wagon
Rail grinding	Rolling noise	local	10 -12 dB(A) (up to 20 dB(A) at very bad tracks)	Part of normal maintenance
Special acoustic grinding	Rolling noise	local	1 – 4 dB(A) (depending on local rail roughness conditions), mostly around 2 dB(A) attended	
Disc brakes	Rolling noise	local	10 dB(A)	
Wheel-tuned absorbers	Wheel noise	network wide	2 - 7 dB(A)	3,000 – 8,000 € per wheel à (24,000 – 64,000 per 4-axle wagon)
Bogie Shrouds together with low height barriers	Wheel noise	network wide	8 - 10 dB(A)	
Rail dampers	Rail noise	local	3 - 7 dB(A) (mostly around 3 dB(A) attended)	300 – 400 € per metre (two rails)

[107] Directorate-General for Internal Policies of the Union (European Parliament), "Reducing Railway Noise Pollution," 2012.

[108] Cost information comes from publication "Environmental Noise Directive Development of Action Plans for Railways" prepared by Brian Hemsworth for UIC Noise Expert Network, 2008

Measure	Avoided source of noise	Impact (local, network wide)	Noise reduction	Costs/unit[108]
Slab tracks	Rail noise	local	5 dB(A)	
Rail pads	Rail noise	local	3-4 dB(A)	
Different measures to lower squeal noise	Squeal noise	local	Up to 20 dB(A) depending on conditions	
Shielding of pantographs	High speed trains	global but only at high speed over 200 km/h	5 - 10 dB(A)	
Barriers 2 meter high	All sources	local	10 dB(A)	1,000 €/m
Barriers 3 – 4 meter high	All sources	local	15 dB(A)	1,350 €/m (3 metres high) - 1,700 €/m (4 metres high)
Insulated windows	All sources	In house only	10 - 30 dB(A)	3,000 – 8,000 € per house (4 windows)

At source

Main source of railway noise is rolling noise from the interaction between wheel and rail, hence to reduce this noise one can interfere at the rolling stock and/or at the rail.

Reducing the noise emission from rolling stock is very useful because it has a network-wide effect, where improving the track has only local effect. There is a lot of progress going on at reducing rolling stock noise from noise emission development planning in country-specific and international level. The outcomes is that rolling stock, which is introduced from the year 2000 on, is about 10 dB less noisy than rolling stock from the 1960s and 1970s[109]. The most effective measures are the usage and the retrofitting of freight cars with composite blocks, the usage of resilient wheels/wheel dampers/wheel web shields and the use of lubrication systems to avoid squeal noise. For high-speed trains a lot of progress has been done implementing systems to reduce aerodynamic noise too.

Rail noise can be reduced by resilient track pads, track-based lubrication systems, rail dampers and near-track sound absorbent materials. However, the most important parameter is retaining the track in good condition, which is essential for the railway operation in general. Rail corrugation can increase noise up to 20 dB. Regular grinding of rails helps minimise noise and special 'acoustic' grinding can reduce levels even more, by 1-4 dB.

Dedicated measures to reduce rail noise at source are:

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[109] International Union of Railways (UIC), “"Railway Noise in Europe, 2015.

a) Resilient rail pads

Rail pads are designed to fit under rails or baseplates to provide mitigation of the dynamic loading of train passes, reducing the stressing and fatigue loading on the sleepers (ties) and the track structure. This results in a smoother ride and less noise emission from the rails due to less vibration. Acoustically tuned rail pads can reduce noise by 2-4 dB when adjusted to specific axle loads. Resilient under-sleeper pads, ballast mats and track embedding systems are also under development for railway noise control.

b) Track-based lubrication systems

Track-based lubrication systems use an injection device to lubricate the rail-wheel contact area (Figure 6-4). These systems are mainly installed to curves and breaking sections to reduce squeal noise. They have a big effect in certain local conditions but require permanent power supply to operate and regular maintenance.

Figure 6-4_Track-side lubrication system

c) Rail dampers

Rail damper is a structure fixed to the rail web composed of steel masses embedded in elastomer material (Figure 6-5). Their development is focused on low-noise track designs for high-speed lines. They are most effective in mid-frequencies and can reduce noise up to 6 dB.

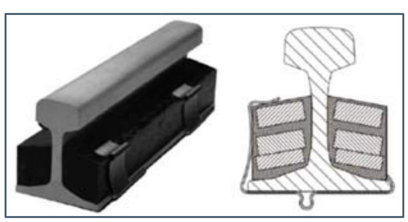

Figure 6-5_Typical tuned rail dampers cross section

d) Near-track sound absorptive materials

For train speeds between 30 – 200 km/h, the major noise source is the rolling noise concentrated in the rail-wheel interaction. Hence installing sound absorbing material very close to the rails (central and lateral) can reduce the amount of emitted noise further away. Trackside barriers 0.7m high and thick sound absorbing track beds can be used. Trackside barriers are under development in order to substitute conventional noise barriers (normally 2m high), as they are very short to have a visible impact both on the passengers and the sensitive receivers[110]. Absorbing track beds are very efficient in concrete slab tracks, where they absorb most of the sound that otherwise would be reflected back to the environment from the hard surface of concrete slab track (Figure 6-6).

Figure 6-6_Sound absorbing material between train and concrete slab

Along the propagation

Along the transition path, noise can be mitigated by the use of noise barriers. The dimensions of the barrier have a big effect on the effectivity; higher noise barriers have a better noise reduction effect that can reach up to 15 dB for 4m high barriers. Meanwhile, higher noise barriers have a higher visual impact which in some cases is unacceptable.

Noise barriers have the same effect for all types of trains and no special tuning is required for the optimal efficiency of the noise reduction. They are easy to implement, and more than 1,000km of noise barriers for railway noise were already installed in European countries by 2005. The on-going maintenance cost and the difficulty of track access should be well-thought-out when installation of noise barriers is considered as a noise protection measure.

[110] B. Hemsworth, “"Noise Reduction at Source - EU Funded Projects”, Rail Noise 2006,

Figure 6-7_Curved noise barrier near high-speed railway track in Germany

The Noise Study has not found necessary to build noise barriers.

At the receiver

Noise control measures can be applied at the receiver side too. Usually, the weakest component of the sound insulation of dwellings is the windows, hence an investment to insulate windows at dwellings that are exposed to excess railway noise might reduce the indoor noise level to acceptable limits, without any other noise protection measures needed. However this measure has in-house effects only and requires that windows are shut all of the time which is not applicable for hot summer days and nights.

Anyway, the design has included the acoustic insulation of the walls and windows of the stations' buildings.

6.2.2.1.5 Findings

Based on the outcome of the calculations from the simulation of the railway traffic noise during the operation of for various scenarios, it is estimated that the noise level in all nearby settlements and sensitive receivers to noise will be lower than 55 dB for L_day and 45 dB for L_night, hence lower than their respective limits. Therefore, no noise barriers or other additional noise mitigation measures are suggested apart from the ones required for the optimal train circulation, such as preserving the track and ballast in a good status condition, lubrication of the line track and especially the track change railway switches, periodic maintenance of train wheels, track rail grinding, etc.

It should also be noted, as the outcome of the baseline noise measurements, that the limits are already exceeded at some areas in the current conditions. This is especially true for sensitive receivers in the parts of the project close to the SH4 highway, due to high road traffic noise levels.

According to the traffic that was taken into account in this study, no new buildings that will host sensitive receivers should be allowed to be built closer than 10m from the railway corridor, which is probably a buffer zone a lot less strict compared to other prerequisites in order to accomplish a safe railway operation.

Based on the above, the specific measures to reduce noise levels during the operation and maintenance stage are summarized as follows:

- Mitigation at the source:
    - preserving the track and ballast in a good status condition;

  - lubrication of the line track and especially the track change railway switches;
  - periodic track rail grinding;
  - periodic maintenance of train wheels; etc.
- Mitigation at the propagation path:
  - No mitigation measures such as noise barriers are suggested at the propagation path.
- Mitigation at the receiver:
  - acoustic insulation of the walls and windows of the stations' buildings.

6.2.2.2 Vibration

The purpose of this Vibration Impact Study is to identify and assess the potential impacts that may arise from the vibrations emitted during the operation of the Durres – Rrogozhina Section of Corridor VIII Rail to the nearby buildings and population (community and workforce).

6.2.2.2.1 Source of vibration

The operation of the railway is a significant source of vibrations due to the dynamic forces that are produced when the trains run on the rails.

The car body is connected to the bogie via the secondary suspension, which usually consists of an air spring in the case of modern passenger trains. The weight of the car body is then transferred to the wheels via a bogie frame (unsprung mass) that is connected to the wheels by the primary suspension system.

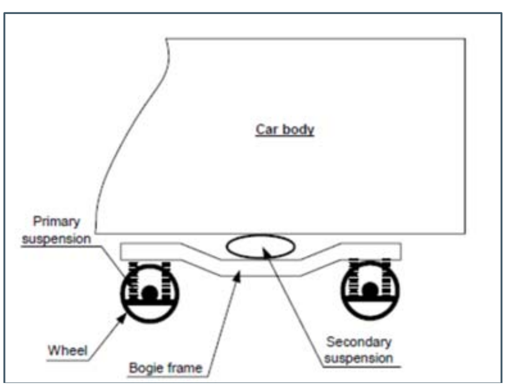

Figure 6-8_Schematic representation of vehicle vibration parameters

The main vibration source is the wheel - rail interaction. Excess vibration is present at special trackwork for turnouts and crossovers, where the wheel impact is more severe.

Most of the vibration energy is carried by Rayleigh waves at significant distances from the train, and a peak is noted at the sleeper passing frequency. If there are different layers of soil types then the reflections of longitudinal and transverse waves will also affect the vibration level (Figure 6-9).

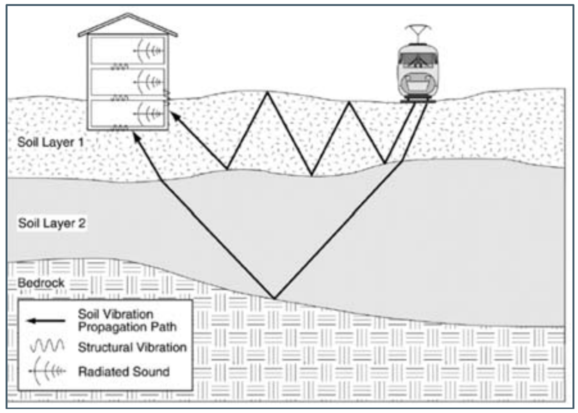

Figure 6-9_Vibration propagation in the ground

Ground-borne vibration caused by train traffic is influenced by factors as wheel and rail roughness, discrete track supports, dynamic characteristics of the rolling stock, rail support stiffness, railway structure design, soil characteristics, and building structure design.

The resonant frequency range for ground propagation is in the range of 0-10 Hz for cohesive soils, and higher frequencies for soils of friction material.

6.2.2.2.2 Potential impacts

Vibrations and ground-borne noise are present in most environments, but most of the times the levels that reach the receivers are usually bellow the perceived limits. Sources that can produce a perceptible level of vibration and ground-borne noise are: transport systems (rail and road under certain circumstances), mining operations (including explosions), construction sites, demolitions, industry and some activities in the housing environment and entertainment.

The ground-borne noise is a special case of structure-born noise, where the means of propagation is the ground. Structure-born noise is the noise generated in a location and transmitted to another location through the oscillations (vibration) of the particles of a solid body, in contrast to airborne noise, which is transmitted directly through the air. Vibration is transmitted through soil in different wave types: body waves (longitudinal and transverse) and surface waves (Rayleigh, Love, etc.). Each type has a different transmission speed and different reduction rate related to the distance from the source.

The impact of vibration in general ranges from annoyance when levels are somewhat above perception, up to structures' collapsing and health issues (vibration white fingers, etc.) when exposed to very high vibration magnitudes.

For vibration from ground excitation, usually there is no major damage impacts on structures except from high magnitude explosions and earthquakes or any direct impact to human health. Nevertheless, sometimes damages can occur at cosmetic parts of nearby buildings.

In the case of railway vibrations, the impact is discomfort in everyday life for low magnitude of vibrations, such as the feeling of vibration to the body when siting or resting, rattling of housewares, etc., up to cosmetic damage to buildings at higher magnitude of vibration.

There are mitigation measures to tackle the above impacts of railway vibrations and ground-borne noise. It is however highly recommended to address the issue well advance in the design stage, because key mitigation measures can only be applied during the construction or the full-scale renovation of the railway line, as it is discussed in the following paragraph.

6.2.2.2.3 Vibration assessment

Methodology

To assess the vibration impact to sensitive receivers near the track, computational methods are used to estimate the vibration propagation from the track to the buildings. The vibration prediction procedure allows predicting the level of the vibration at the source and also taking into account the different parameters that determine the level of vibration that will reach the receivers.

The source parameters are the speed of the train, the condition of the wheels and rails (worn wheels and corrugated track or wheels with flats can cause high vibration levels), the length of the train (freight trains that are longer attenuate with distance at a slower rate compared to non-freight trains) and the weight of the train (wheel force).

The propagation parameters are the track system and the propagation through soil/rock and through the foundations of the building to the building itself.

The procedure is based on using a frequency transfer function, called transfer mobility. Transfer mobility measured at an existing transit system is used to normalize ground-borne vibration data and remove the effects of geology. The normalized vibration is referred to as the force density. The force density can be combined with transfer mobility measurements at sensitive sites along a new project to develop projections of future ground-borne vibration. The transfer mobility between two points completely defines the composite vibration propagation characteristics between the two points.

Results of the assessment

The exceedance zones along the alignment are shown in the Vibration Study (maps of Appendix D of the Vibration study). From the maps and from the locations of the sensitive receivers, the railway line sections where vibration mitigation measures are needed were determined. These sections are summarised in the following table:

Table 6-10_Sections where vibration mitigation measures should be taken

From	To	Track length [m]
1+840	4+360	2.520
5+440	5+680	240
9+360	9+680	320
18+160	18+680	520
19+280	19+760	480
21+040	21+280	240
Total		**4.320 m**

6.2.2.2.4 General Mitigation measures

Railway vibrations can be controlled in three sections: at source, along the propagation and at the receiver[111].

At source

The most efficient way to control the vibration is at the source. This is done mainly by keeping the track and rolling stock in good operating conditions. Maintenance procedures should be applied that include grinding rough or corrugated rail and wheel trying to restore wheel surface (benefits are evident not only when curing flat wheels but also from periodic smoothing the running surface).

Minimizing vibration propagation at the track support system is also considered at source treatment. For ballasted tracks, the major vibration control measures are:

a) Stabilization of soil under the embankment

At the very low frequency region (below 20 Hz), the soil stabilization can effectively mitigate the vibration compared to soft soil. Other track modifications such as heavier rail, thicker ballast layer have only a minor effect on vibration levels.

b) Slab in the ground / Ballasted trough

Apart from soil stabilization, similar (and better) results are achieved with a slab in the ground or a ballasted trough, which can be used to realize a flat and hard layer with high input impedance. Ballasted through is a variant of a concrete slab that provides high input impedance and a side support for the ballast. The

[111] "State of the art review of mitigation measures on track.", RIVAS (Railway Induced Vibration Abatement Solutions) EU Collaborative project - Deliverable D3.1, 2011

effectiveness of these measures is increased when combined with under ballast mats.

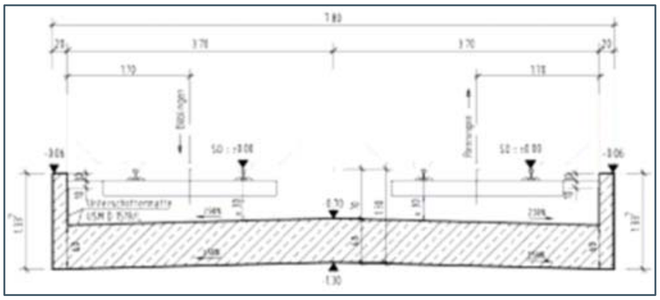

Figure 6-10_Ballast trough

c) Resilient Under Sleeper Pads

A resilient sleeper pad consists of inserting a thin elastomer layer between the concrete sleepers and the supporting ballast. The rails are fastened to the sleepers as normal, using standard rail clips. The resilient element is attached to the bottom of the sleeper. The pad can be attached while casting the concrete or, for existing sleepers, it can be glued or kept in place by including the resilient element and the sleeper inside a "shoe"-like cover.

Figure 6-11_Under sleeper pads

d) Under Ballast Mats

Ballast mats consist of an elastomer layer placed under the ballast. In general, it has better performance than sleeper pads, because it provides mitigation from lower frequencies and their application is for more sensitive receivers. When applied to a stiff under layer such as compacted subsoil or, even better, concrete slab, the efficiency is up to 10 dB better.

Figure 6-12_Ballast mat application (before laying ballast)

Apart from vibration mitigation it should be mentioned that sleeper pads provide smoother distribution of the axle load over a larger number of sleepers and they increase the contact surface between sleeper and ballast from about 8% (without padding) to up to 35%. This results to reduction of maintenance expenses and to the lengthening of the service life of the track structure.

Furthermore, it should also be taken into consideration that sleeper pads are a lot easier to implement in the part of the track were only sleepers and rails will be altered, where applying an under-ballast mat requires the existing ballast to be removed and replaced after the installation of the ballast mat.

Another mitigation method, especially in cases where severe vibration attenuation is required, is by designing ‘floating slab’ track system. This consists of replacing the ballast with concrete slab and inserting a resilient element or springs to isolate the track from its surroundings. This is the most effective measure and has the biggest initial investment.

Along the propagation

Along the transition path, vibration can be mitigated by use of trenches. Their effect is analogous to the way noise barriers are used to control airborne noise. The dimensions have a big effect on the mitigation effect. The deeper it reaches into the ground the better is the vibration reduction effect. In order to mitigate the frequencies of interest in railway applications, it should go down to 4 – 5 meters in most cases.

The barrier can be either open or solid. For solid barriers (lime cement, concrete etc.) the width of the trench is also important, unless narrow trenches filled with special anti-vibration elastomer walls are used.

Figure 6-13_Excavation and filling of near track trench

At the receiver

There are also various measures that can be taken at the receiver, but these are not related to the railway authority and they are very costly for existing structures, unless only protection of sensitive equipment is needed. New buildings near the tracks (i.e. stations) can be based on resilient mats. Special buildings like operas, theatres etc. can be based on spring elements.

6.2.2.2.5 Specific mitigation measures

The outcomes of the calculations regarding exposure to vibrations and ground borne noise during the operation of the line show that higher levels than the statutory limits and environmental conditions of the project are expected and protective measures will be necessary.

Concerning the current project, the most feasible solutions for reducing the vibration impact is the use of under sleeper pads (USP) or under ballast mats (UBM) from homogeneous elastomers type Getzner Sylomer/Sylodyn equal or better. Trenches are hard to be implemented as most of the earthworks are already completed, and they will also require a revision of the designs. Soil stabilization and slabs in the ground/ballasted through is also very costly for the half-constructed part of the track.

Using the input data of the project, simple mass-spring system models can be assumed to evaluate the performance of sleeper pads and ballast mats. The key parameters that influence the efficiency are the weight of what is modelled as the 'mass' and the stiffness of what is modelled as the 'spring'. To account for the dynamic influence of the suspensions of a moving train, 85% of the maximum load is used. It is a more conservative (and more realistic) approach than taking 100% load as it evaluates to higher natural frequencies (for mass-spring systems the lower the natural frequency the better). For the sleeper pads an important parameter is the distance between the sleepers and for the ballast mat is the thickness of the ballast. The input parameters that are considered for the calculations of the insertion loss are given in Appendix E of the Vibration study.

For sleeper pads a natural frequency of 40-45 Hz is expected and for the ballast mat a natural frequency of 20 – 25 Hz, in order to fulfil the 3mm max deflection criteria. Figure 6-14 shows the insertion loss vs frequency for both cases. Zero insertion loss indicate no difference in vibration level, negative insertion loss (near the resonance) means vibration is actually worst after the application and positive values mean improvement in vibration.

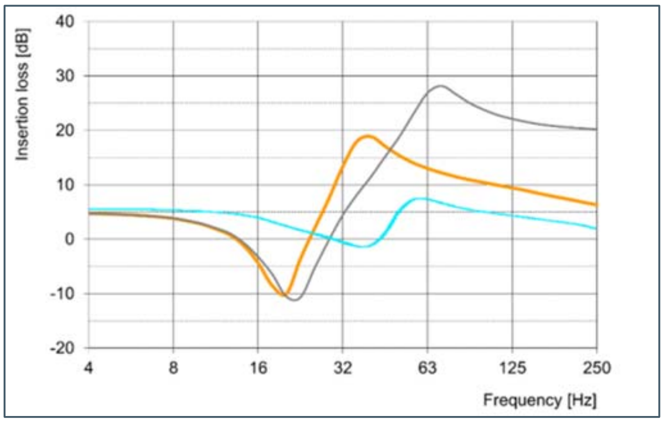

Figure 6-14_Insertion Loss for under sleeper pads, under ballast mat, under ballast mat on infinite stiff subgrade

Both solutions are poor in the low frequency range up to 25 Hz (only floating slabs can achieve good performance in that range), but up to 20 Hz is an inaudible frequency range that it's to no importance for ground-borne noise. Under ballast mat provides 6 dB better attenuation at 50-63 Hz which is the major frequency range of interest for train speeds up to 120 kmh and better attenuation overall; it is effective from lower frequencies (25 Hz in contrast to 50 Hz for sleeper pads) and the insertion loss index reaches up to 19 dB compared to 7 dB for under sleeper pads.

Hence under sleeper pads are not adequate to provide the vibration reduction needed to fulfil the specs, but under ballast mats (UBM) does and it is the suggested mitigation measure.

The railway line sections where the vibration and ground-borne noise are expected to be above the acceptable limits are shown in the following table:

Table 6-11_Railway line sections where vibration mitigation measures should be taken

From	To	Track length [m]	Proposed mitigation measure
1+840	4+360	2.520	Ballast mat
5+440	5+680	240	Ballast mat
9+360	9+680	320	Ballast mat

18+160	18+680	520	Ballast mat
19+280	19+760	480	Ballast mat
21+040	21+280	240	Ballast mat
Total length		**4.320 m**	

As a results, the specific measures to reduce the railway vibration consist on the installation of the ballast mat in the sections listed in the table above.

6.2.2.2.6 Evaluation of impacts' significance

The project will improve the existing situation related to the noise and vibrations generated by trains during the operation phase.

The improved ground conditions (ballast, sub ballast and subgrade), the reduced noise and vibration generated by the interaction between wheels and rails and between rails and slippers, and the installation of ballast mat will reduce the noise and vibrations, despite the increased rail traffic.

Based on the adopted methodology for impacts evaluation (see section 4.2.3), the magnitude and stakeholders' concerns can be evaluated as follows:

Magnitude and stakeholders concern: Currently the population living near the railway line is affected from noise and vibrations. Thus, the magnitude and stakeholders' concerns can be evaluated as low to moderate. The improved railway line components, including the mitigation measures against rolling noise, will improve the existing situation and the magnitude and stakeholders' concerns can be evaluated as low (see Table 4-5).

Receptor sensitivity: The sensitivity is evaluated of moderate value (see Table 4-6 and Table 4-7).

Significance of impacts: The table below gives the expected significance of the impacts (see Table 4-8, Table 4-9 and Table 4-10) related to noise and vibrations.

Table 6-12_Evaluation of impact significance associated with noise and vibrations

Option	Magnitude and stakeholders concern	Receptor sensitivity	Impact significance	Scoring
0	Low to moderate	Moderate	Minor to Moderate	-5
1	Low	Moderate	Minor to Moderate	-4

Option 0: Current situation (without the Project)

Option 1: With the Project; after mitigation measures

6.3 Climate and Climate change

6.3.1 Current climatic conditions

6.3.1.1 Design, preconstruction and construction

Impact of the climatic conditions on the project activities: There are no noticeable differences in climate characteristics along the whole area crossed by the railway line. The project area is part of the Mediterranean Plains Climatic Zone, which is characterized by mild and wet winters and hot and dry summers. These moderate climatic characteristics are suitable for all the project development phases. Thus, the construction works will be able to take place almost all year round. However, it is suggested to take into account the following:

- Schedule the construction of the bridges and the protection works against erosion outside the rainy periods. These works are performed within the rivers and streambeds, which in rainy period may be affected by any sudden flooding that is risky for the workforce and the construction machinery. Besides, working within the rivers and stream beds in the rainy period may increase the erosion within these beds, as well as the turbidity of the water bodies;

- Schedule the earthworks for the railway body and the drainage system outside the rainy periods to avoid erosion and sedimentation.

As the above scheduling of the construction activities is probable, it is not expected that the current climatic conditions will affect the project's activities.

In a conclusion, the impact of the climatic characteristics on the project's activities is expected to be insignificant.

Impact of the project's elements on climatic conditions: The likely impacts of the project components and activities on climate conditions are described in the section on climate change.

6.3.1.2 Operation and Maintenance

Impact of the climatic conditions on the project activities: The moderate climatic characteristics within the whole project area are suitable for the operation phase. The likely changes of these characteristics are outlined hereinafter, in the section on climate change.

Impact of the project's elements on climatic conditions: The only likely impact of the project activities during operation is the release of GHG emissions from fuel combustion by the locomotives. Although insignificant, this impact is mentioned hereinafter in the section on the climate change.

6.3.2 Climate change

6.3.2.1 Design, preconstruction and construction

Potential impacts of the project on the climate changes.

Source of impacts: The preconstruction and construction activities may affect the climate through increase of CO_2 concentration by diminution of vegetation from earthworks for preconstruction and construction purposes (work camps, any eventual access road, vegetation clearing alongside the working strip both sides of the railway line), as well as in a direct way by generation of gaseous effluents generated from construction machineries and transport vehicles.

The railway line runs across urban, semi-urban and rural areas. No forest and/or shrubs are crossed by the railway. Therefore, no significant vegetation clearing is necessary, excepting the cleaning of the existing drainage channels. Consequently, no reduction of the CO_2 capture is expected.

Proposed mitigation measures*:* The generation of gaseous effluents from construction machineries and transport vehicles can be mitigated by applying the mitigation measures related to the air quality.

Impacts of the climate changes on the project elements.

Potential impacts: The likely impacts of the climate change on the project's elements include mainly the erosion of the bridges' foundations in case of increase of rivers and streams discharge (Lishati and Darsi Rivers). The damages to any bridge could lead to the interruption of the railway traffic.

Proposed mitigation measures. The mitigation measures suggested during design and construction stage relate overall to the erosion and inundation phenomena that could affect the railway line components (subgrade, bridges, protection works against erosion, etc.) and the watercourses beds during maximal discharges that can derive from the projected climate change.

The suggested mitigations measures to avoid/reduce the erosion include:

- The design of the Shen Vlash Channel Bridge has been based on the hydraulic study concerning the expected maximum discharge of this channel, etc.;
- Design and construct appropriately the protection works both sides of the rivers and streambeds at the crossings of the railway line. Special attention has been paid to design of the protection works against erosion at the Lishati and Darsi Riverbeds:
- It is important to prohibit the extraction of gravel and sand in rivers 'areas on both sides of the bridges, in compliance with the relevant standards and the local features;
- Minimize the working areas within the rivers and stream beds;

- Choose an appropriate design for protection works against rivers and streams erosion. That is why the Consultant has proposed gabion mattresses, which protect against erosion and decrease the rivers/ streams flow speed. This decrease avoid/reduce the erosion downstream bridges;
- Avoid/minimize any eventual construction of new access roads, and make usage as much as possible of the existing communal and rural roads;
- Minimize the vegetation clearing;
- Wherever possible, minimize work on soft ground in wet weather;
- Compact as soon as practicable the filling material of the railway line body to prevent the run-off to surface waters.

All the above-mentioned mitigation are already taken into consideration in the Project’s design.

Findings: The above-mentioned mitigation measures are already taken into consideration in the Project’s design. Therefore, the following can be said:

- The likely adverse impacts of the project on the climate change can be evaluated on low probability and significance. They can be mitigated by applying the mitigation practices related mainly to air quality, biodiversity, and land use.
- The likely impacts of the climate changes on the project’s components and activities are evaluated of low probability and significance, and of national extent. They can be mitigated by applying the mitigation practices related mainly to erosion, flooding and drainage system. The design of the Shen Vlash Channel Bridge has already taken into account any exceptional discharge of this channel.

6.3.2.2 Operation and maintenance

During operation and maintenance the potential impacts can be grouped as follows:

- Impacts and mitigations of the expected climate changes on the project’s elements; and
- Impacts and mitigation of the project on the climate change that consist on the evaluation of the GHG emissions.

6.3.2.2.1 Impacts and mitigation of the expected climate change on the Project’s elements

According to *Albania’s Third National Communication on the Climate Change* (Albanian Ministry of Tourism and Environment, 2016[112]) and the fifth synthesis

112 https://unfccc.int/sites/default/files/resource/Albania%20NC3_13%20October%202016.pdf

report of the *Intergovernmental Panel on Climate Change* (IPCC), 2014[113], the climate change parameters that are of concern for the Project include the temperature, rainfalls, sea level rise and GHG generation.

Climate change projections for the coastal zone of Albania show an increase in temperatures and in frequency and intensity of floods, as projected by IPCC[114]. Latest figures of the European Environmental Agency predict an increase of about 5-15% of the heavy precipitation in the winter period. While summer periods will be dryer.

The projections show that the expected increase of the maximum temperatures in summer period could reach 6°C. In addition, it is projected a drastic decrease of the return periods of maximum absolute temperatures over the Albanian coastal area. The expected simultaneous increase of the minimum and maximum temperatures would cause an increase of the heat waves.

All the scenarios reveal a likely decrease in annual precipitation compared to 1990'. The annual precipitation is likely to decrease by up to -8.5% by 2050, by up to -14.4% by 2080 and by up to -18.1% by 2100. Summer periods will be dryer and winter periods will be wetter, affecting thus both the magnitude and frequency of floods.

During the 20th century, the level of the Adriatic Sea has raised by roughly 15cm. The expected average sea level rise is roughly 30 cm by 2080 and 40cm by 2100. While the respective maximum values are 50 and 70cm.

Based on these figures, it can be concluded that no impact of the sea level increase on the project is expected. The projected sea level increase for the year 2100 (worst scenario) is approximately 70cm. Given that the lowest terrain alongside the railway line (Shkozet-Plepa area) is located approximately 2.0 to 2.5 m asl (at Shkozet – see Appendix 5.3 _Topographic map 1:10.000 – separate file), it is not expected that this predicted sea level increase to affect the railway line.

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113 https://www.ipcc.ch/report/ar5/wg2/europe/
114 Climate Change. *Synthesis Report, IPCC, 2014*

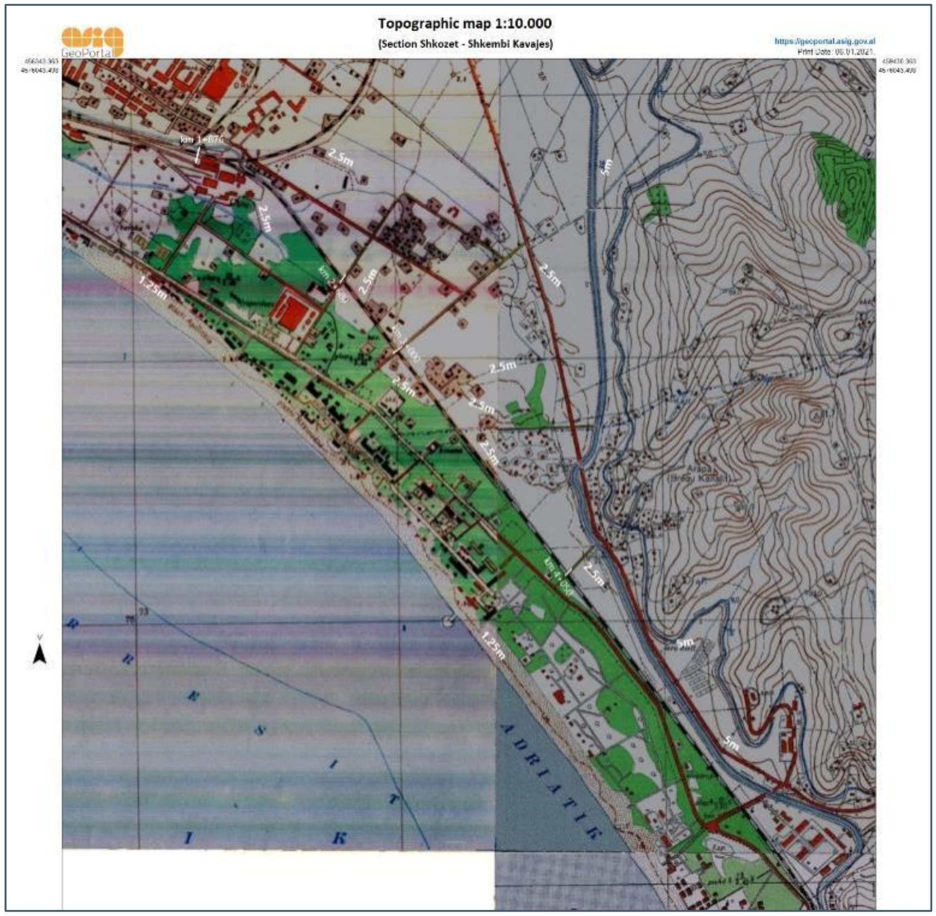

Figure 6-15_The railway line Shkozet – Shkembi Kavajes on the topographic map

Based on the hydrological report, the Project has taken into consideration the scenario when the sea level will raise at maximum (70 cm) and the rainfalls will be very intense.
Based on the above, the most sensitive issues linked to the climate change are as follows:

- Functioning of the rails in case of increase of the maximum temperature. As the maximum temperature recorded within the project area is 40.5 ^{o}C (at Durres meteorological station), based on the projected climate change this parameter could reach 46.5^{o}C;
- Combined effect of the predicted sea level raise, heavy precipitations and low terrain; and
- Erosion of the bridges foundations in case of increase of rivers and streams discharge;

The potential impacts linked to the above-mentioned issues can be mitigated by taking the following measures:

- Select proper railway components such as rails and other materials and facilities that can function normally in high temperatures (up to 47^{o}C);
- The railway line has not been inundated in the past. It cannot be inundated, even in the most pessimistic scenarios projected by 2100,

because the lowest terrain (at Shkozet) is situated approximately 2.5 m above sea level, while the highest predicted increase of the sea level is 70cm;

- The design of the whole railway components has been based on the hydrologic and hydraulic study, which take into consideration the predicted increase of both rainfalls and sea level;
- The design has taken into consideration the improvement of the drainage system;
- The design of the bridges and culverts has already taken into account the likely erosion from rivers and streams in case of discharge increase. The conveyance capacity of the new Shen Vlashi Bridge at km 5+864 will be increased compared to the existing bridge. All the new culverts will have a bigger diameter size compared to the existing ones. The designed increased diameter size will allow also the blockage of the culverts by sediments.

Based on the above, no adverse impact of the climate changes on the project's activities and components would be expected during the operation and maintenance phase.

Conclusion: During operation, the likely impacts of the climate changes on the project's components and activities are evaluated of low probability and of local extent. They are already taken into consideration by the Project's design by applying the best international mitigation practices related to the bridges and culverts design and construction.

6.3.2.2.2 Expected GHG emissions

As mentioned above, the potential impacts and the related mitigations of the project on the climate changes are related to the GHG emissions

During operation, the main source of air pollution is the fuel combustion from locomotives. The related pollutants released into atmosphere are NO_2, PM_{10}, CO, benzene (C_6H_6) and benzo[a]pyrene ($C_{20}H_{12}$). Amongst them, NO_2 and PM_{10} are the most likely to result in exceeding relevant air quality standards or objectives.

The GHG emissions at country level are low due to low industrial and intensive agriculture activities, and lack of any thermo power plants. Currently, the contribution of the transport sector and of the railway transport to the total GHG emissions at country level is 26.31% and 0.108%, respectively[115]. However, the future electrification of the railway line will entirely avoid the railway's GHG emissions.

Evaluation of the expected GHG emissions

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[115]https://unfccc.int/sites/default/files/resource/Albania%20NC3_13%20October%202016.pdf

EIB methodologies for calculating GHG emissions[116] "*are based on the IPCC Guidelines, the WRI GHG Protocol and the IFI's Harmonised Approach to GHG Accounting. In the absence of project specific factors, the methodologies adopt an IPCC factor applicable at the global or trans-national level (termed tier level 1 in IPCC)*".

According to these methodologies, there are two measures of GHGs from investment projects financed by the Bank:

- *the absolute GHG emissions or sequestration of the project; and;*
- *the emissions variation of the project i.e. the relative GHG emissions of the project, which is the difference in emissions between the "with" and the "without" project scenarios. Relative emissions can be either positive or negative, based on whether there is an increase or decrease in emissions.*

GHG emissions are assessed for individual investment projects with significant emissions at appraisal and reported in the project's Environmental and Social Data Sheet (ESDS), which is published on the EIB website on the public register, when either the absolute or relative threshold of 20,000 tonnes CO_2eq emissions/year is crossed. The relative threshold applies to both positive and negative relative emissions, therefore the threshold is +/- 20,000 tonnes CO_2eq emissions/per year.

The absolute GHG emissions from the railway line Durres-Rrogozhine are 602 CO_2 eq. tons/year (see table below) in 2014 (without the project). This is an insignificant amount compared to 20,000 tons. While the relative GHG emissions of the Project do not exceed 238 tons/year (see table below).

Hereinafter is shown the comparison to 2014 (without the project) of the GHG emissions estimated for 2025, 2030 and 2040 (with the project).

Table 6-13_ Estimated GHG emissions and rail traffic for both "Without" and "With" the project

Option	Year				
	Parameter	2014	2025	2030	2040
Without the project	Passenger*km	1,618, 930	2,183,543	2,281,611	2,903,656
	Tons*km	2,231,877	3,359,488	3,857,991	5,401,187
	CO_2 eq. (tons/year)	602.41	139.34	101.6	102.53
With the project	Passenger*km	n/a	6,320,371	6,848,377	9,217,532
	Tons*km	n/a	11,309,667	12,791,667	29,964,767
	CO_2 eq. (tons/year)	n/a	430.56	319.11	438.06

In the table above it is supposed that starting from 2025, the railway fleet will be improved for both options (with and without the project).

[116]https://www.eib.org/attachments/strategies/eib_project_carbon_footprint_methodologies_en.pdf

Further details on the calculation of the GHG emissions are provided in Appendix 5 (see section 10.4) at the end of this document.

Mitigation strategies and measures related to the GHG

The mitigation strategies and measures on the GHG emissions for the Durres-Rrogozhine railway line operation are grouped as follows:

- Direct effects of the project on the decrease of the GHG emissions; and
- Indirect effects of the project on the decrease of the GHG emissions.

A-Direct effects of the project on the decrease of the GHG emissions

These effects are associated with the rolling stock, the load factor and the used fuels, as well as with the stations' energy efficiency as described hereinafter.

A1-Effects associated with the rolling stock, the load factor and the used fuels.

From the table above it results that the amount of GHG emissions will decrease, although both the passenger and freight traffic will drastically increase. So, the generation of the GHG emissions will be reduced compared to the current situation. This reduction is due to:

- Use locomotives of appropriate combustion technology
  - The new freight locomotives with have lower power capacity for the same traction capacity (2,000 tons). Therefore, the GHG emissions will decrease;
  - The new passenger locomotives will have a lower power capacity (450 HP) compared to the existing ones (1340 HP);
  - The new locomotives must fulfil the EU requirements on the GHG emissions. The EU regulation 2016/1628, which is called "the non-road mobile machinery (NRMM) regulation", defines the emission limits for NRMM engines for different power ranges and applications[117]. It also lays down the procedures that the engine manufacturers have to follow in order to obtain type-approval of their engines – which is a prerequisite for placing their engines on the EU market.
- Improve the trains load factor
  - The load factor for both freight and passenger trains will be increased.
- Fuel quality standards
  - The fuel quality currently used in the country fulfils the requirements of the DCM 419/2109. This DCM defines the maximum sulphur content in the fuel. The DCM is in line with the

[117] https://www.eea.europa.eu/publications/emep-eea-guidebook-2019/part-b-sectoral-guidance-chapters/1-energy/1-a-combustion/1-a-3-c-railways/view.

EU Directive 2016/802, which provides for the reduction in the sulphur content of certain liquid fuels. It lays down the maximum permitted sulphur content of heavy fuel oil, gas oil, marine gas oil and marine diesel oil used in the EU;
  - Low sulphur fuels are necessary for enabling the advanced emission control systems introduced by Directive 2004/26/EC[118];

A2-Effects associated with the stations' energy efficiency

The tendering process will require the stations' buildings and platform canopies to fulfil the EU standards on energy efficiency, in accordance with the "Energy Performance of Buildings Directive 2010/31/EU" (EPBD) and the "Energy Efficiency Directive 2012/27/EU" (EED) that include:

- Building orientation and design to take into consideration as much as possible the energy efficiency;
- On site renewable energy supplies should be used in order to reduce environmental and economic impacts associated with fossil fuel energy use. Integrated photovoltaic panels can be installed on stations' roofs and platform canopies;
- Use of energy-efficient lighting, heating, cooling and water-heating systems to reduce maintenance costs and energy consumption;
- Effective insulation on building's walls and roof;
- Use of high efficiency dual-glaze windows, external doors and curtain walls with thermal insulation

The increase of the stations energy efficiency will decrease the GHG emissions released by the fossil fuels that can be used for heating, cooling and generation of electricity.

B- Indirect effects of the project on the decrease of the GHG emissions

Indirectly, the increase of the rail transport will influence to the decrease the road transport. A recent study commissioned by the European Environmental Agency shows a clear hierarchy of passenger and freight transport modes, in terms of GHG emissions. Rail and maritime transport have the lowest emissions per kilometre and unit transported, while aviation and road transport emit significantly more[119]. Trains are generally more than four times more fuel-efficient than trucks.

Therefore, the rail freight connection with Greece, Northern Macedonia and Montenegro will influence to the decrease the GHG emissions because a part of the current road transport from/to these countries and further on (Bulgaria, Turkey, etc.) will be replaced by the rail transport, which is cheaper. The rail connection between Durres Port and the Ports of Varna (Bulgaria) and Thessalonica (Greece) will replace a part of the regional road transport by rail transport.

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[118] EMEP/EEA air pollutant emission inventory guidebook 2019

[119] https://www.eea.europa.eu/publications/rail-and-waterborne-transport

Besides, as the passenger rail transport is cheaper and much safer than the passenger road transport, the rail passenger transport lines linking Tirana and Durres with the Southern and Eastern Albania will increase. Currently this mode of transport is covered by buses, mini buses and personal cars, which transport cost and GHG emissions are higher than those of the rail.

According to the *Railway Handbook 2017*, the passenger rail is the most energy efficient passenger transport mode per passenger per kilometre (pkm). It has a specific energy consumption averaging well below 200 kJ/pkm across all geographical regions and all types of services. The passenger rail requires less than one tenth of the energy needed to move an individual by personal car[120] or by airplane. In average, the freight rail transport needs 4-5 times less energy than the freight road transport. This explains why, despite accounting for 9% of the global passenger activity (expressed in pkm) in 2015, passenger rail services represent only 1% of the final energy demand in passenger transport. So, another way to reduce the GHG emissions released by the whole transport sector, is to replace as much as possible the road transport by the rail transport.

Evaluation of impacts' significance

The likely impact of the proposed project on climate change is related mostly to the greenhouse gas emissions (GHG) that are released into the atmosphere.

Magnitude and stakeholders concern: Based on the lack of industrial activities, Albania generates a modest amount of GHG, and therefore the stakeholders' concern can be considered as insignificant to low. Thus, the magnitude and stakeholders' concern can be evaluated as low (see Table 4-5).

Receptor sensitivity: The sensitivity can be evaluated as negligible to low (see Table 4-6 and Table 4-6).

Significance of impacts: Based on the adopted assessment methodology, the expected significance of the impacts (see Table 4-8, Table 4-9 and Table 4-10) related to climate change are given in the table below.

Table 6-14_Evaluation of impact's significance on the climate change associated with GHG emissions (CO_2 eq.)

Option	Magnitude and stakeholders concern	Receptor sensitivity	Impact significance	Scoring
0	Low	Negligible to Low	Negligible to minor	-2
1	Low	Negligible to Low	Negligible to minor	-2

Option 0: Current situation (without the Project)

Option 1: With the Project; after mitigation measures

[120] Railway Handbook 2017

Thus, the overall impact's significance related to climate change because of the GHG emissions can be evaluated as negligible.

Findings: During operation and maintenance, the likely impacts of the project on the climate changes are evaluated of moderate probability, almost insignificant, and of national extent. They will be reduced by rehabilitation of the railway line, increase of the load factor of the trains and use of locomotives of lower power capacity for the same traction capacity.

The future electrification of the railway line will almost avoid the generation of the GHG emissions, due to the fact that more than 90% of the national electricity is generated by hydropower plants that are clean sources.

Anyway, as already mentioned in the section 6.1 above, the biggest benefits of the project on the GHG emissions are due to the indirect effects from the replacement of the road transport by the rail transport. The passenger rail requires less than one tenth of the energy needed to move an individual by personal car[121]. In average, the freight rail transport needs 4-5 times less energy than the freight road transport.

From the table above it results that there is not expected any significant improvement compared to the current situation. That is due to the fact that currently both the passenger and freight traffic flow is very limited, while once the railway line is built, the traffic will drastically increase.

6.4 Geological issues

The assessment of the potential impacts with respect to geological and soil features within the project area is related to any possible geological risk like erosion, sedimentation and soil liquefaction and subsidence. No landslide or mud flow are expected within the fingerprint of the Project.

Construction: The terrain and geological characteristics and the improvement of the retaining walls and drainage system will avoid the erosion and sedimentation. So the only eventual potential effects related to geology and soil features are the soil liquefaction and subsidence, which might occur in case of earthquake where the railway runs over sandy deposits (Shkozet to Plepa) that are susceptible to be affected from these phenomena if heavy infrastructure objects are built. The only heavy infrastructure object in this section is the planned new bridge at km 5+800 (Shen Vlash Channel Bridge), which pylons will be fixed in the Helmasi geological formation that underlies the sandy deposits (see Figure 9-1 below). Consequently, it is not expected this bridge to be damaged by any eventual soil liquefaction and subsidence in case of any strong earth shaking.

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[121] *Railway Handbook 2017*

Within the other sections of the railway line, the bridges will be only rehabilitated, as their foundations are within the required standards. Whereas the new stations buildings (Golem, Kavaje, Lekaj and Rrogozhine ones) are sited over suitable geological formations (Rrogozhine geological formation) that cannot be affected by the liquefaction and subsidence phenomena in case of strong earthquake. However, the design of their foundations has taken into account these phenomena.

Other mitigation measures against subsidence include the following:

- Prepare a detailed and well-studied geotechnical model of railway line track;
- Choose appropriate material for the railway line body; and
- Wherever necessary, remove the existing filling material and replace it with an appropriate one.
- Select the appropriate design for the new underpasses and culverts.

While the mitigation measures against erosion and sedimentations include:

- Minimize the working areas within the rivers and stream beds;
- Choose an appropriate design for protection works against rivers and streambeds erosion;
- Avoid/minimize any eventual construction of new access roads, and make usage as much as possible of the existing communal and rural roads;
- Minimize the vegetation clearing;
- Wherever possible, minimize work on soft ground in wet weather;
- Compact as soon as practicable the filling material of the railway line body to prevent the run-off to surface waters.

So, the overall potential effects might be evaluated of local extent, and of low probability and significance.

Operation: The only eventual potential effects related to geology and soil features are the soil liquefaction and subsidence, as well as erosion and sedimentation. Effects and mitigation measures are similar to construction stage.

Evaluation of impacts' significance

The railway embankment will be reinforced by taking the necessary geotechnical interventions, including the installation of geotextiles. Based on the methodology for impacts evaluation, the magnitude and sensitivity of impacts can be evaluated hereinafter.

Magnitude and stakeholders concern: After the intervention, (reinforcement of the railway), the likelihood can be evaluated as "unlikely", while the magnitude and stakeholders' concern can be evaluated as of low value (see Table 4-5).

Receptor sensitivity: The railway stability and the safety of the trains can be evaluated of low value once the design has taken into consideration appropriate mitigation measures (see Table 4-7).

Significance of impacts: Based on the adopted methodology (see Table 4-8, Table 4-9 and Table 4-10), the expected significance of the impacts that can be caused by the subsidence of the railway and the trains' safety is shown in the table below.

Table 6-15_Evaluation of impact significance linked to the geological phenomena

Option	Magnitude and stakeholders concern	Receptor sensitivity	Impact significance	Scoring
0	Moderate	Moderate	Moderate	-6
1	Low	Low	Minor	-4

Option 0: Current situation (without the Project)

Option 1: With the Project; after mitigation measures

Findings: The overall potential effects might be evaluated of local extent, and of low probability and significance.

6.5 Earthquakes

The railway line runs across the seismic zone source of Preadriatic Lowland (see Figure 5-13 above) that is seismically active. According to the map of the recorded earthquakes, the expected maximum magnitude (in Richter scale) within the Preadriatic Lowland is Mx=7.0

Subsoil / ground category and seismic coefficient

Table below gives the values of the seismic coefficient k_E. By definition, in KTP No 2-89 the product $k_E g$ is the peak ground acceleration.

Table 6-16 – Seismic coefficient and ground category according to the Albanian norms (KPT No 2-89)

Parameter	subsoil / ground category			
Seismic intensity (MSK-64)		VII	VIII	IX
Seismic coefficient	I	0.08	0.16	0.27
	II	0.11	0.22	0.36
	III	0.14	0.26	0.42

The description of the subsoil/ground conditions (see table below) is based on the Albanian norms, as provided by the KTP-No 2-89.

Table 6-17 Description of subsoil/ground conditions according to the Albanian technical standards (KTP No 2-89)

No	Subsoil / ground category and subcategory			Lithological description of the subsoil / ground conditions
1	I	I.a		Hard rocks, magmatic, partly metamorphized and sedimentary rocks with high static and dynamic stability
2		I.b		Average strength flysch formations not influenced by tectonic or alteration phenomena, sand stones, conglomerates, etc.
3	II	II.a		Rock formations with developed fissures and alteration phenomena
4		II.b		Stiff or semi-stiff silty clay formations independently of water content
5		II.c	1	Loose formations: Sandy and silty clays, clays in the strong plastic and elastic state with saturation
6			2	Loose formations: Stiff or semi-stiff sands and gravels with saturation
7	III		1	Loose formations: Coarse, medium and fine grain size sands, dusty sands with near surface water level
8			2	Loose formations: Clays and soft up to flowing state plastic silty clays

Seismologic classification according to the Albanian norms

The seismic hazard map of Albania is based on the observed intensity of the largest historical earthquakes, on the earthquakes occurred during the 20th century, as well as on the seismo tectonic synthesis[122]. Thick Consolidated quaternary sediments characterized by deep ground water level have been accepted as average soil conditions[123].
According to the map of seismic intensity map of Albanian territory[124], the project area is situated on the seismic intensity IX and VIII degree MSK-64 (see Figure 6-16 below), estimated for 100 year (with 70% probability), for an average soil category (2nd Soil Category, according to the technical condition KTP-N.2-89).

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[122] Sulstarova E. and Aliaj Sh. "Seismic hazard assessment in Albania" AJNTS, 2001.
[123] Sulstarova et al. Seismic regionalization of Albania. Academy of Sciences of Albania. Tirana, 1980
[124] Map of Seismic Regionalization of Albania, Scale. 1:500.000, Tirana 1980; approved by DCM no 371/1979

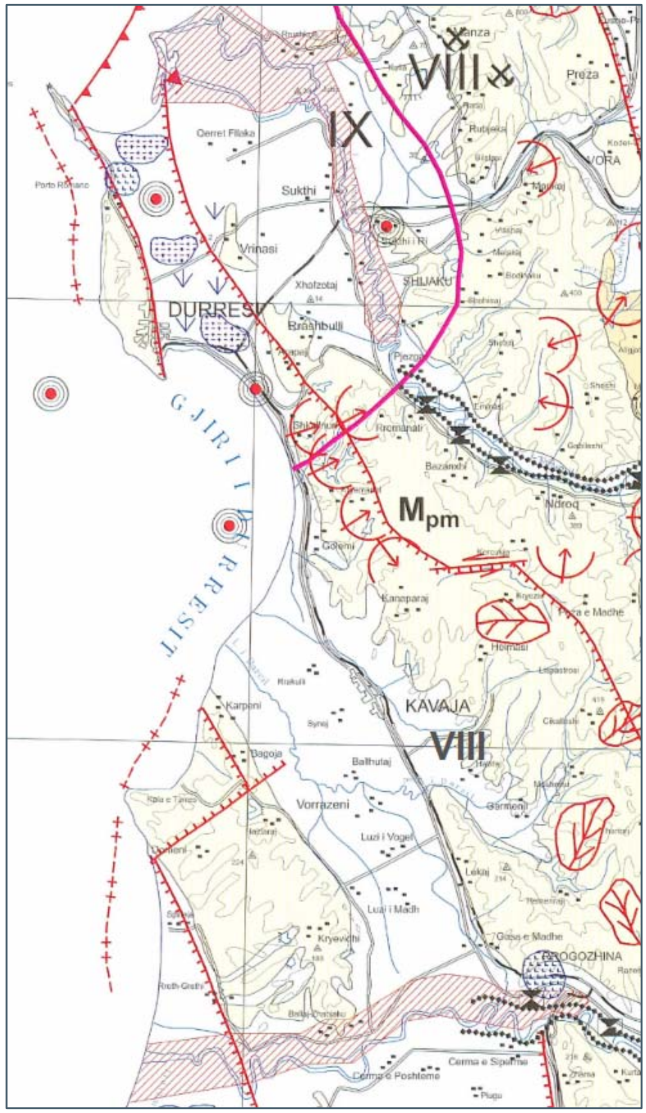

Figure 6-16_Geohazard map of Albania and expected intensity of the earthquakes

Seismic hazards according to Eurocode 8

According to Euro code 8 (Design of structures for earthquakes Resistance, 2003), the main parameter considered in calculating the seismic hazard is the PGA (horizontal peak ground acceleration) or Amax (Maximal acceleration of vibration of the ground at foundation levels). To assess and calculate the PGA, the considered issues are the regional and local tectonics, geotechnical model of soil/subsoil/ground, and the water table level.
Currently, in Albania, there is not any detailed official map of seismic risk based on PGA values. In the absence of such a map, our estimation is based on a schematic research map from Institute of Seismology (see figure below) prepared in the framework of the project "Harmonization of Seismic Hazard

Maps for the Western Balkan Countries"[125]. The calculations were carried out for PGA for repetition period of 475 years of firm rock conditions, with shear wave velocity Vs – 800 m/s at 30 meters depth that corresponds to the A class of Euro code 8 (EC8, 2004). This parameter corresponds to a seismic risk level of 10% probability of exceedance in 50 years (return period of 475 years). According to this estimation, the maximum horizontal acceleration (for Return Period = 475 years for firm rock conditions) in the Project area varies from 0.25 to 0.30g (see figure below). According to the Albanian norms (KPT-89), the whole railway line runs through loose formations that can be classified as of category III of subsoil (see Table 6-17 above).

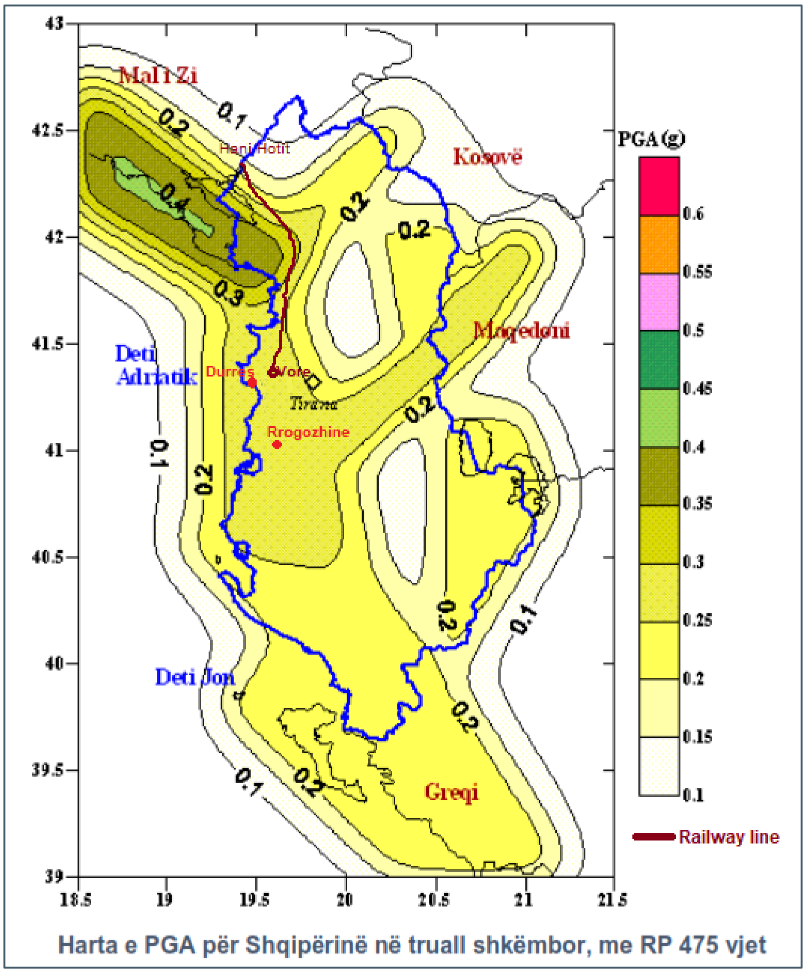

Figure 6-17_Schematic map of PGA values (for return period of 475 years) and the railway line

To calculate the right values of PGA along the railway line, it is necessary to know in detail, especially for each bridge's location, the local parameters including the regional and local tectonics, the geotechnical model of the soil/ground, and the water table level.

[125] Aliaj Sh. et al. Seismicity, seismotectonics and seismic hazard "Harmonization of seismic hazard assessment in Albania. Academy of Sciences of Albania. 2010

Based on the lithological composition of the crossed geological formations (category III of subsoil), as well as on the shallow water table, the project area, especially from Shkozet to Kavaja Rock, can be affected by the soil liquefaction phenomenon during strong earthquakes.
From Shkozet to Kavaja Rock (# km 1+870 to km 6+200), the railway crosses area where the expected intensity is IX degree MSK-64 (see Figure 5-25 above). That conditions the bridges' design to take into consideration this high seismic risk. Such a seismic risk should be calculated by taking into consideration the regional and local tectonic and the geotechnical characteristics of the subsoil/soil/ground. The water table level along this railway section is at the sea level. Therefore, it is important that the bridges' design to take into consideration any eventual soil liquefaction in case of strong earthquake.
In any case, it is compulsory to understand the geotechnical model of the soil through the geotechnical studies, including the information collected by the borehole logs. The evaluation of the seismic risk is made based on the geotechnical model.

6.5.1 Design, preconstruction and construction

Sources of impacts and potential impacts: The railway line runs over an area affected by active post-Pliocene thrust faults. In addition, the lithological composition of the crossed geological formations (category III of subsoil), as well as the shallow water table in the railway line section from Shkozet to PLepa favour the soil liquefaction phenomenon during strong earthquakes. The local soil conditions play a crucial role in the amplification of the earth-shaking during earthquakes.

The earthquake of November 26, 2019 caused structural damage to the Ishmi Bridge, which is currently (October 2020) out of work. Consequently, the whole railway line from Vorë to Hani Hotit is not functioning. As a result, the whole railway freight transport from Tirana and Durrës to the northern Albania and further on to Montenegro is interrupted.

Although this strong earthquake damaged a high number of buildings in Durres, Kavaje and Rrogozhine, it did not affect neither any railway bridge, nor any station buildings in the railway section Durres-Rrogozhine.

Proposed mitigation measures: The bridges' design must take into consideration the seismic risk, which should be calculated by taking into consideration the regional and local tectonic, and the geotechnical characteristics of the subsoil/soil/ground and the water table level. These measures are already taken into consideration in the Project's design.

A detailed seismic report was prepared by the Consultant as part of the technical reports package. The report was based on the seismic refraction method. The report fulfils the Eurocode 8[126] (Seismic Design of Buildings) requirements,

[126]https://eurocodes.jrc.ec.europa.eu/doc/WS_335/report/EC8_Seismic_Design_of_Buildings-Worked_examples.pdf

which are more stringent than the national ones on the "Technical Conditions on the Design of the Anti-Seismic Structures" (KTP-No2, 1989), as provided in the DCM 350/1995.

It fulfils also the national requirements on the seismic and geological risks on the design of such construction structures, as provided in the DCM 1162/2020. According to this DCM, a statement on the fulfilling of the seismic risk is provided by the responsible governmental agency (Albanian Institute of Geosciences, Energy, Water and Environment – IGJEUM, Department of Seismology) before the starting of the construction stage. This statement is based on the geological and seismic evaluation report (Annex 2 of DCM 1162/2020) prepared by an accredited company. The company ALTEA GEOSTUDIO that has prepared both the seismic and geotechnical studies on the Durres-Rrogozhine railway rehabilitation project is licensed fur such studies.

Evaluation of impacts' significance

The railway line runs within a seismically active area where frequent earthquakes occur. The earthquakes of September and November 2019 showed that the railway is sensitive to this phenomenon. The planned construction of the new bridges will satisfy the required seismic measures as provided by Euro Code 8. Besides, the railway will be reinforced with geotextiles to avoid any subsidence in case of ground shaking.

Magnitude and stakeholders' concern: After the construction of the planned railway line, the magnitude and stakeholders' concern is evaluated based on the impact intensity (see Table 4-2 and Table 4-3) and the probability of occurrence (see Table 4-1). After designing the structures following Euro Code 8, the intensity of the likely impacts can be evaluated as moderate (see Table 4-2), while the likelihood can be evaluated as "unlikely". As a result, the magnitude and stakeholders concern can be evaluated as low (see Table 4-4 and Table 4-5)

Receptor sensitivity: The current railway line stability and the safety against earthquakes can be evaluated with moderate sensitivity (see Table 4-6 and Table 4-7), while after the design will take into account Eurocode 8, the sensitivity can be evaluated as low.

Significance of impacts: Based on the adopted methodology (see Table 4-8, Table 4-9 and Table 4-10), the expected significance of the impacts that can be caused by the weak filling material (option 0) on the railway line body and the trains' safety would be evaluated as moderate. While for option 1 the significance of impacts is evaluated as minor, as shown in the table below.

Table 6-18_Evaluation of impact significance related to the risk from earthquakes

Option	Magnitude and stakeholders concern	Receptor sensitivity	Impact significance	Scoring
0	Moderate	Moderate	Moderate	-6
1	Low	Low	Minor	-4

Option 0: Current situation (without the Project)

Option 1: With the Project; after mitigation measures

Findings: During preconstruction and construction stages, the likely impacts associated to the seismic features of the Project area can be evaluated as probable, of national extent and of moderate magnitude. As the design has taken into consideration the appropriate mitigation measures, it is expected the likely impacts to result in an overall minor significance.

6.5.2 Operation and maintenance

The Project area is characterized by a high seismic risk. However, theoretically, it can be assumed that there is no expected any risk from earthquakes during operation because the Project's components, especially the railway bridges, are designed and built by taking into consideration the seismic intensity of the Project's area and the local geotechnical conditions.

Furthermore, a statement on the fulfilling of the seismic risk is provided by the responsible governmental agency (IGJEUM, Department of Seismology) before the starting of the construction stage. This statement is based on the geological and seismic evaluation report (Annex 2 of DCM 1162/2020) that has been prepared by the Consultant.

6.6 Surface waters

Construction: The railway crossed some streams and two small rivers (Lishati and Darsi Rivers). The only bridge that will be demolished and rebuilt is the Fllaka Channel Bridge at km 5+864. The only interventions regarding the other existing bridges will be the widening of their upper concrete layer. So, there is no any risk regarding the hydrological regime of the running waters crossed by the railway line Durres-Rrogozhine. The potential impacts on the water courses associated with this activity include mainly increased suspended solids, pollution from oils used by the working engines, and pollution from solid waste.

A set of general measures of good construction practice for reducing the potential impacts of liquid and solid discharges into surface waters is required. Mitigation measures related to the protection from waste water and solid and hazardous waste should be taken, based on the related Albanian legal standards.

So, there are not foreseen significant impacts on the surface waters, during construction stage. The temporary impacts by waste water and solid and hazardous waste are evaluated of low probability and significance, and of local extent. They can be mitigated by applying the best international practices for managing these types of waste.

Hereinafter follows an analyse of the potential impacts on the surface waters using the concept of **hydrological regime**.

Rivers and streams have seasonally variable patterns in their flows of water, sediment and nutrients, often termed a "hydrological regime". Hydrological alterations can cause a range of pressures, including: changes to the quantity, quality, velocity and temperature of water flows, changes to channel and bed erosion and deposition processes, intermittent or temporary river flows, flash floods, and alterations in water availability to riparian and floodplain environments adjacent to water bodies[127]. The potential impacts on the surface waters have been described under the concept of the hydrological regime.

Impacts and mitigation:

The demolition of bridges and culverts, the activity of transport trucks and working machinery, the construction of abutments, the installation of piers and the construction / rehabilitation of the works for protecting the rivers/streams banks from erosion, may impact the surface waters hydrology and channel morphology, the surface waters quality and the aquatic ecology.

Table below summarizes the potential impacts and the related mitigation measures on surface waters.

Table 6-19 Impacts and mitigation related to the hydrological regime

Potential impact	Mitigation measures
Environmental receptor: surface water hydrology and channel morphology	
Change in flow velocity, increased erosion and subsequent changes in rivers/stream banks stability and increased flood risk, increased sedimentation downstream the bridges.	The only bridge that will be demolished and rebuilt is the Fllaka Channel Bridge at km 5+864. The new bridge will be elevated to increase its conveyance capacity. Consequently, the flow velocity under the bridges, in case of maximum discharge during operation stage, will not be increased.
	The installation/rehabilitation of gabion mattresses will avoid the erosion of the rivers' banks and subsequently the change to riverbed morphology
	The retrofitting of the bridges will be performed in dry period when the rivers and streams have little water
	The piers, abutments and the protection of the side slopes will be installed during the dry season when all the rivers have a little water. That will avoid/ reduce the potential change to hydrological regime of the rivers.
	The protection works against erosion of the streams/rivers' banks at the crossing of the railway line already. The Project aims at the reinforcing of the protection works in the close vicinity of the bridges. Otherwise, the erosion will affect the riverbanks, the

[127] http://fis.freshwatertools.eu/index.php/infolib/pressures/hydrological-alterations.html

Potential impact	Mitigation measures
	bridges' shoulders, the railway body both sides of the bridges and the roads and other infrastructure.
	The protection works against erosion at the riverbeds close to the bridges will be as ecological as possible. That's why the Consultant will mostly apply gabions, which are much more environmentally acceptable than the stone walls or the concrete. Besides, the protection works in gabions attenuate the speed of the water current and therefore attenuate the potential erosion of the rivers and streams banks. The installation of the gabions will only cause temporary increase of suspended sediments, which cannot be avoided. Otherwise, the amount of the suspended solid will increase from the erosion of the rivers/streams banks every time there are heavy rainfalls and the rivers/streams discharge is maximal.
	Avoid the vegetation clearing upstream and downstream of the location of the side slopes protection works. Whether this vegetation is affected, reinstall it immediately once the construction works are performed.
	The culverts will be prepared far away from the Project area and then transported and installed. Therefore, the pollution of the watercourses from the construction of the culverts will be avoided or reduced to insignificant.
	The only expected significant impact on surface waters is the improvement of the drainage system. As the Project's design has taken into account the increase of the number and the size of the culverts, the water circulation in the drainage system will increase.
	Avoid the deepening and widening of the streams/channels beds upstream or downstream during the installation of the culverts.
	Avoid the transport trucks to cross the watercourses
	Revegetate all disturbed areas with native species. Apply seed and mulch in phases throughout construction. This will help stabilize the disturbed areas upon completion of the project.
	Temporarily stabilize disturbed areas, including areas where permanent seeding operations are not feasible due to seasonal constraints (e.g., summer months), and use best practice to prevent erosion.
	Use erosion control blankets or other suitable methods on steep and newly seeded slopes to control erosion and to promote the

Potential impact	Mitigation measures
	establishment of vegetation. Use erosion control blankets with natural fibres and bio-photodegradable mesh.
Environmental receptor: Surface water quality	
Pollution from suspended sediments, construction materials and from transport and working machinery leaks of fuel and oil.	The earthworks, temporary flow diversion and other construction activities will be performed during the dry season when all the rivers and streams have a little water or have no water
	Use erosion logs, silt fence, diversion ditches, temporary berms, sediment traps, temporary detention ponds, and other sediment control devices to divert, control, and filter sediment-impacted water in order to protect the surface water quality
	Work camps will be located at the train stations, and therefore in an appropriate distance from surface waters. Within the existing Railway Stations there is free space and the needed infrastructure (electricity, water supply & sewerage, impermeable places in concrete, etc.), without disturbing inhabited areas, water resources, and areas of high biodiversity values. The nearest station to the watercourses is Rrogozhine station, which is located 500m from Shkumbini Riverbed.
	Avoid the transport trucks to cross the watercourses
	Work camps to be located outside the areas that can be affected by flooding. All the Work Camps will be established within the existing Railway Stations, which are not affected by floods.
	Minimize as much as practicable the vegetation clearing to avoid soil erosion and therefore the increase of turbidity in the closest surface waters.
	Use the existing local roads and avoid the opening of any new access road to avoid soil erosion and run-off sediments to surface waters
	Stockpiling out of the construction sites will be prohibited and areas close to water bodies will be avoided.
	Wherever possible, minimize work on soft ground in wet weather
	Compact as soon as practicable the railway body filling material to prevent the run-off to surface waters

Potential impact	Mitigation measures
	Measures to prevent the run-off of sediment from the working areas to surface waters.
	Avoid water discharge directly to surface waters (rivers and stream) or groundwater
	Avoid water discharge on the ground within the rivers and streambeds during the construction of bridges and culverts
	Avoid water discharge on the ground, especially from Shkozet to Kavaja rock (km 1+_876to km 6+200) because of the high permeability of the sands.
	Regular maintenance of all machinery to prevent engine oil and fuel leaks
	Provision of equipment for the evacuation of leakages;
	No oil deposits for transport and working engines will be located close the railway line and the watercourses.
	Oil interceptors or drip trays are used in vehicle parking areas, and are inspected and cleaned regularly
	No repairing, washing or oil changing service facilities for transport and working machinery will be located close the watercourses. All these services will be carried out in the designated formal facilities.
	Minimize the working area on the rivers and stream beds
	Use erosion logs, silt fence, diversion ditches, temporary berms, sediment traps, temporary detention ponds, and other sediment control devices to divert, control, and filter sediment-impacted water in order to protect surface water.
	Use best management practices and containment structures for work conducted within and adjacent to the floodplain and the crossed watercourses to prevent the water pollution from the concrete washout and other potential pollutants.
	In case of any equipment malfunctions, any release that may impact the waters quality must be reported. Measures of containment will be followed in accordance with the spill prevention and response plan. An outline of this plan is included in the ESMP, while a detailed

Potential impact	Mitigation measures
	plan will be prepared by the Contractor as part of the management plans that will be included in the bidding process.
Environmental receptor: Aquatic ecology	
Negative impact on flora and fauna from increased turbidity, increased sedimentation downstream, dredging works, rivers/streams beds and banks erosion and pollution from oil and fuel leaks, waste and construction materials (cement, etc.); Potential barrier to fish circulation in the rivers, etc.	The construction works within the rivers/stream beds, and the diversion of the water flows will be performed during the dry season when all the rivers and streams have a little water.
	Avoid the transport trucks to cross the watercourses.
	Avoid the water diversion through pipes to avoid any increase of flow speed and therefore the erosion increase downstream the pipe.
	Avoid erosion and changes to river/stream morphology. The installation of gabion mattresses will avoid the erosion of the rivers banks and subsequently the change to riverbed morphology.
	The piers, abutments and the protection of the side slopes will be installed during the dry season when all the rivers have a little water. That will avoid/ reduce the potential change to aquatic ecology.
	No repairing, washing or oil changing service facilities for transport and working machinery will be located close the watercourses. These services will be done at the licensed placed and the work camps.
	Apply all the measures necessary to avoid the surface water pollution (see above the mitigation measures related to the protection of the surface water quality).
	Re-vegetation of all disturbed areas with native species, or appropriate landscaping as required. Apply seed and mulch in phases throughout construction. This will help stabilize the disturbed areas upon completion of the project.
	Protect riparian areas during construction activities through placement of temporary and/or construction-limit fencing
	Limit disturbed areas as much as possible to minimize the impacts to water quality and vegetation.
	The culverts should be inserted below an existing stream/channel bed level to allow for bed formation within the culvert.

Potential impact	Mitigation measures
	Consequently, the culvert may incorporate a low flow channel within its base to retain sufficient water depth for aquatic life.

Operation: During the operational phase, the only source of impact on surface waters is the maintenance of the railway and the trains' circulation. Generally, these operations do not impact the surface water quality and quantity. However. the following mitigation measures are foreseen:

- The only expected impacts that could occur is any accidental leakage of oil from the locomotives;
- No railway repairing area for locomotive and wagons, etc., will be located close to the surface waters or in its vicinity;
- The new railway signalling system, superstructure, substructure infrastructure and secured level crossings will avoid any eventual incident resulting in the soil and surface and groundwater pollution;
- The ESMP includes the main lines of a Pollution Prevention and Response Plan, which will be prepared in detail by the Operation Companies;
- The ESMP includes also the main lines of an Emergency Response Plan, which will be further developed in detail by the Operation Companies;
- Both the Pollution Prevention and Response Plan and the Emergency Response Plan will be part of the tasks of the Contractor. The preparation of these plans will be included in the bidding process.

Conclusion: It is not expected any adverse impact on surface waters during operation if the required maintenance standards are applied.

Evaluation of impacts' significance

The most sensitive areas concerning the surface are the crossed rivers and streams. The waters of the rivers and streams crossed by the railway line will be affected by the demolition or the retrofitting of the bridges.

Magnitude and stakeholders' concern: The construction activities may affect surface water quality and regime. The magnitude and stakeholders concern is evaluated based on the impact intensity (see Table 4-2 and Table 4-3) and the probability of occurrence (see Table 4-1). After mitigation measures (routine mitigation measures related to solid waste, waste water, and hazardous waste (e.g. oils, grease, etc.)), the intensity of the likely impacts can be evaluated as negligible (see Table 4-2 and Table 4-3), while the likelihood can be evaluated as "likely" (see Table 4-1). As a result, the magnitude and stakeholders concern can be evaluated as negligible (see Table 4-4 and Table 4-5).

*Receptor sensitivity: t*he groundwater quality can be evaluated of low sensitivity (see Table 4-6 and Table 4-7).

Significance of impacts: Based on the adopted methodology (see Table 4-8, Table 4-9 and Table 4-10), the expected significance of the impacts that can be caused to the surface waters would be as shown in the table below.

Table 6-20_Evaluation of impact significance to the surface waters

Option	Magnitude and stakeholders concern	Receptor sensitivity	Impact significance	Scoring
0	Low	Low	Minor	-4
1	Negligible	Low	Negligible to minor	-2

Option 0: Current situation (without the Project)

Option 1: With the Project; after mitigation measures

6.7 Flooding

Design, Preconstruction and Construction: The area crossed by the existing railway is not prone to floods. However, the railway crosses a certain number of streams. The construction activities may increase the risk from flooding by the crossed streams in case of heavy rainfalls if the removed materials are thrown out in the stream beds. The blockage of the drainage system, including the culverts, might cause the flooding of the land both sides of the railway. These impacts can be avoided by rehabilitation of the drainage system, by performing construction works in dry period, as well as by applying a set of mitigation measures related to solid waste.

The Return Period (T) taken into consideration in the design of the drainage structures for Railway Durres-Rrogozhine is taken as follows:

- For the design of culverts generally equal to 100 years for full filling and 50 years for freeboard.
- For the design of bridges and important stream deviations equal to 100 years.
- For the longitudinal structures (sewer pipes, shallow side ditches, etc.) equal to 10 years.
- For the design of ditches collecting external catchment areas equal to 50 years.

Evaluation of impacts' significance

The crossed terrain has never been prone to flood events. However, the climate change predicts an increase of heavy precipitations and therefore an increase in flood events.

Magnitude and stakeholders' concern: The design and construction stages may influence the impacts caused by flood events. The magnitude and stakeholders concern are evaluated based on the impact intensity (see Table 4-2 and Table 4-3) and the probability of occurrence (see Table 4-1). The design's related mitigation measures consist mainly in the rehabilitation of the drainage and irrigation system, designing deeper and wider drainage channels, adding new culverts of sufficient diameter size, design culverts with bigger diameter size, etc. Once these measures are undertaken, the intensity of the likely impacts can be evaluated as negligible (see Table 4-2 and Table 4-3), while the likelihood can be evaluated as "unlikely" (see Table 4-1). As a result, the magnitude and stakeholders concern results as low (see Table 4-4 and Table 4-5).

Receptor sensitivity: The current flood events can be evaluated as low to moderate sensitivity (see Table 4-6 and Table 4-7), while once the mitigation measures will be undertaken as provided in the Project's design, the sensitivity can be evaluated as low.

Significance of impacts: The table below gives the expected significance of the impacts that can be caused by flooding (see Table 4-8, Table 4-9 and Table 4-10).

Table 6-21_Evaluation of impact significance related to flooding

Option	Magnitude and stakeholders concern	Receptor sensitivity	Impact significance	Scoring
0	Low	Low	Minor	-4
1	Negligible	Low	Negligible to minor	-2

Option 0: Current situation (without the Project)

Option 1: With the Project; after mitigation measures

Operation: Once the railway is rehabilitated, it is not expected any adverse impact on the flood events, if the drainage system, including culverts, is correctly maintained.

Findings: During construction and operation there is no expected any significant adverse impact on the flood events if mitigation measures are taken.

6.8 Groundwater

From Durres to the location called Kavaja Rock (Shkembi Kavajes) the existing railway runs through permeable sandy – clayey formations. The water table level is close to the surface because of the proximity to the sea. Ground waters are mostly salted and polluted and are not used for drinking purposes.

From Shkembi Kavajes to Gosa village the railway runs across hilly foots through Quaternary geological formations, which upper layer is composed of impermeable clayey formations. Ground waters are located at great depth and therefore are not affected by the railway basement.

From Gosa to Rrogozhine, the railway runs through molassic formations of Rrogozhine geological unit, composed mainly of conglomerates. The water table is located in depth and therefore is not affected by the railway basement.

Construction: The potential impacts on the ground water include mainly pollution from oils used by the working engines. Good construction practice for the reduction of potential impacts of discharges into the soil and the surface waters, during the demolition of the existing bridges and culverts and construction of the proposed railway line components is required. They include mitigation measures related to the protection from erosion and sedimentation, from wastewater, and solid and hazardous waste, including:

- Regular maintenance of all machinery to prevent engine oil and fuel leaks;
- Provision of equipment for the evacuation of leakages;
- Keep vehicles and machinery as far as practicable from watercourses;
- Work camps to be located at the appropriate distance from surface waters. All the Work Camps will be established within the existing Railway Stations, where there is free space and the needed infrastructure (electricity, water supply & sewerage, impermeable places in concrete, etc.), without disturbing inhabited areas and water resources;
- Avoid the pollution of surface water from waste generated from work camps' activities, including wastewater, food, plastic, etc.;
- Work camps to be located outside the areas that can be affected by flooding;
- Use the existing local roads' network and avoid the opening of any new access road to avoid soil erosion and run-off sediments to surface waters (Adriatic Sea and rivers and streams);
- Stockpiling out of the construction sites will be prohibited and areas close to water bodies will be avoided;
- Wherever possible, minimize work on soft ground in wet weather;
- Avoid wastewater discharge directly to surface waters (rivers and stream) or groundwater (permeable cover layers);
- Avoid wastewater discharge on the ground within the rivers and streambeds during the construction/retrofitting of bridges and culverts
- No oil deposits or oil changing service facilities for transport and working engines will be located close the railway line. Whether necessary, special impermeable places should be prepared for oil changing and supplying in fuel the working engines. The transport trucks will change oil and will be supplied in fuel in the existing formal stations. As the railway line runs across urban, semi urban and rural areas where there are sufficiently fuel stations, there is no need for such an additional station;

- No repairing or washing service facilities for transport and working machinery will be located close the railway line. All these services will be carried out in the designated formal facilities.
- The Environmental and Social Managing Plan (ESMP) includes the main lines of a Pollution Prevention and Response Plan, which will be prepared in detail by the Construction Companies;
- The ESMP includes also the main lines of an Emergency Response Plan, which will be further developed in detail by the Construction Companies. All the topic-specific plans included in the ESMP must be developed in detail by the Construction Company as part of the bidding procedure.

Evaluation of impacts' significance

There is a thick impermeable clayey cover layer that protects the aquifers of the crossed area. The railway line is located far away from the sanitary protection zone of the hydrogeological wells that supply drinking water the rural areas and therefore there is no expected any risk to groundwater pollution if routine mitigation measures are undertaken. Durres, Golem and Kavaje are supplied from hydrogeological wells located in Fushe Kuqe and Cerme, which are located roughly 30 km from these settlements. Rrogozhine station is located more than 1km from the hydrogeological water wells.

Magnitude and stakeholders' concern: The construction activities may pollute the groundwater. The magnitude and stakeholders concern is evaluated based on the impact intensity (see Table 4-2 and Table 4-3) and the probability of occurrence (see Table 4-1). After mitigation measures (routine mitigation measures related to wastewater and hazardous waste e.g. oil, grease, etc.), the intensity of the likely impacts can be evaluated as negligible to low (see Table 4-2 and Table 4-3), while the likelihood can be evaluated as "unlikely" (see Table 4-1). As a result, the magnitude and stakeholders concern can be evaluated as negligible to low (see Table 4-4 and Table 4-5)

Receptor sensitivity: The groundwater quality can be evaluated as low to moderate as the railway construction is not a source of hazardous waste generation (see Table 4-6 and Table 4-7).

Significance of impacts: Based on the adopted methodology (see Table 4-8, Table 4-9 and Table 4-10), the expected significance of the impacts that can be caused by the pollution of groundwater would be as shown in the table below.

Table 6-22_Evaluation of impact significance linked to the pollution of groundwater

Option	Magnitude and stakeholders concern	Receptor sensitivity	Impact significance	Scoring
0	No impact	No impact	No impact	0
1	Negligible to low	Low to moderate	Minor	-4

Option 0: Current situation (without the Project)

Option 1: With the Project; after mitigation measures

Findings: there are not foreseen significant impacts on the ground waters, during construction stage. The temporary impacts by waste water and solid and hazardous waste are evaluated of low probability and significance, and of local extent. They can be mitigated by applying the best international practices for managing these types of waste.

Operation: The maintenance of the railway and the trains' circulation generally do not impact the ground waters. The only expected impacts that could occur is any accidental leakage of oil from the locomotives. The mitigation measures related to such types of waste (oil, grease, paints, etc.) include:

- No repairing area for locomotive and wagons, etc., will be located neither close to the sensitive groundwater areas, nor close to surface waters or in their vicinity;
- The new railway signalling system, superstructure, substructure infrastructure and secured level crossings will avoid any eventual incident resulting in the soil and surface and groundwater pollution;
- The ESMP includes the main lines of a Pollution Prevention and Response Plan, which will be prepared in detail by the Operation Companies;
- The ESMP includes also the main lines of an Emergency Response Plan, which will be further developed in detail by the Operation Companies

The electrification of the railway line will avoid the oil leakage.

Conclusion: No adverse impacts on groundwater are expected during operation if the required maintenance standards are applied.

6.9 Biodiversity and ecological resources

The railway doesn't cross any area of rich diversity values or protected area (see Figure 5-29). The existing railway runs only across man-made areas composed of urban, suburban and agricultural ones (see Appendix 2.2 – Map of the Railway line-orthophoto).

Construction: The impact on biological environment during construction is limited to the working strip, which should be maintained clear from any vegetation. The only vegetation to be removed is composed mainly of some invasive species that covers the non-maintained existing railway and its belt (unless 5m wide on each side of the railway).

Noise, dust, air emissions and human disturbance during the construction works will disturb some animal species and deteriorate their habitat quality. This impact is temporary and limited to the working strip. Besides, the area is poor in biodiversity values.

The stream banks and streambeds riparian vegetation will not be significantly affected because there is no need to perform earthworks within these environmental receptors. So, the project avoids the mudding of water flow which might locally affect some animal freshwater species. However concrete works and solid waste may affect the water quality and therefore the aquatic and riparian biodiversity. The suggested mitigations measures should be based on the best related international practices and standards, as well as on the provisions of the national legislation and best practice related to solid waste and waste water and on the environmental monitoring.

Since construction work period is short, the impact results of low significance if appropriate mitigation measures are taken. Due to the possible negative impacts, it is suggested that the construction works on watercourses to be conducted during the periods of low water level. Table below summarizes the potential impacts and mitigation measures on the aquatic ecology

Table 6-23_Potential impacts on aquatic ecology

Potential impact	Mitigation measures
Environmental receptor: Aquatic ecology	
Negative impact on flora and fauna from increased turbidity, increased sedimentation downstream, dredging works, rivers/streams beds and banks erosion and pollution from oil and fuel leaks, waste and construction materials (cement, etc.); Potential barrier to fish circulation in the rivers, etc.	The construction works within the rivers/stream beds, and the diversion of the water flows will be performed during the dry season when all the rivers and streams have a little water.
	Avoid the transport trucks to cross the watercourses.
	Avoid the water diversion through pipes to avoid any increase of flow speed and therefore the erosion increase downstream the pipe.
	Avoid erosion and changes to river/stream morphology. The installation of gabion mattresses will avoid the erosion of the rivers banks and subsequently the change to riverbed morphology.
	The piers, abutments and the protection of the side slopes will be installed during the dry season when all the rivers have a little water. That will avoid/ reduce the potential change to aquatic ecology.
	No repairing, washing or oil changing service facilities for transport and working machinery will be located close the watercourses. These services will be done at the licensed placed and the work camps.
	Apply all the measures necessary to avoid the surface water pollution (see above the mitigation measures related to the protection of the surface water quality).
	Re-vegetate all disturbed areas with native species, or appropriate landscaping as required. Apply seed and mulch in phases throughout construction. This will help stabilize the disturbed areas upon completion of the project.

Potential impact	Mitigation measures
	Protect riparian areas during construction activities through placement of temporary and/or construction-limit fencing
	Limit disturbed areas as much as possible to minimize the impacts to water quality and vegetation.
	The culverts should be inserted below an existing stream/channel bed level to allow for bed formation within the culvert. Consequently, the culvert may incorporate a low flow channel within its base to retain sufficient water depth for aquatic life.

Evaluation of impacts' significance
The railway line runs through urban, semi urban and agricultural areas. The biodiversity values of the crossed area are insignificant. Besides, there is neither any protected area nor any area with high biodiversity values within or in the vicinity of the railway line.

Magnitude and stakeholders concern: The magnitude and stakeholders' concern can be evaluated as of insignificant (see Table 4-5).

Receptor sensitivity: The sensitivity also (see Table 4-6 and Table 4-7) can be evaluated as of low value.

Significance of impacts: Based on the adopted methodology (see Table 4-8, Table 4-9 and Table 4-10), the expected significance of the impacts related to the topsoil would be as shown in the table below.

Table 6-24_Evaluation of impact significance on topsoil

Option	Magnitude and stakeholders concern	Receptor sensitivity	Impact significance	Scoring
0	No impact	No impact	No impact	0
1	Insignificant	Low	Negligible to Minor	-2

Option 0: Current situation (without the Project)
Option 1: With the Project; after mitigation measures

Findings: the potential impacts on the biological environment during construction stage are temporary, reversible, and localised to the working site. They can be evaluated of low probability, local extent, and small magnitude and of low overall significance.

Operation: After the construction works it is not expected any impact on biological environment.

6.10 Soil and soil quality

The railway line, the new service roads and the train stations lie partly in an agricultural area and partly urban areas. However, a part of the railway line and the service roads lie in soil with high agro-pedologic quality. Besides, the railway line crosses the neighbourhoods of Durres, Kavaje, and Rrogozhine cities. Section 5.11 gives the baseline information on the type of soil crossed by the railway line, as well as on soil quality from the agro-pedologic point of view.

6.10.1 Design, preconstruction and construction

Source of impacts and potential impacts: The construction machinery and the heavy trunks may pollute the soil with oil spills, and may compact and damage the soil in the working areas.
The expected adverse impacts on soil include:

- Damage to topsoil from earthworks for the construction works;
- Soil compaction within the working strip from the circulation of the heavy trunks for construction works, and transportation purposes; and
- Soil pollution, which can occur through oil spills from transport and working vehicles or through sewage and urban waste from work camp during construction activities;
- Increase of soil erosion from vegetation clearing.

The above-mentioned adverse impacts are evaluated as probable, of low significance, and local extent.

Note. In total 1,650 m of almost existing parallel roads will be upgraded. Their rehabilitation is not part of the Project.

Proposed mitigation measures: The following mitigation measures are proposed:

- Damage to the soil of good quality within the working strip, because of soil compaction from working and transport machinery.

  The mitigation measures to avoid soil compaction include:

  - Whether reasonable, remove the topsoil within the areas of the working strips. Preserving it during construction activities and reinstall to rehabilitate the same areas once the construction phase is done.
  - using the existing rural and local roads as access roads;
  - Fencing the construction area to minimize soil compaction, mainly in the buffer areas;
  - Performing construction works during dry periods when soils are not saturated.
- Damage to soil quality because of any eventual pollution from working and transport machinery oil spills.

- Applying the best practices for mitigation of soil pollution from wastewater and solid and hazardous waste.
- Develop and implement a Waste Management Plan;
- Regular maintenance of all machinery to prevent engine oil and fuel leaks;
- Provision of equipment for the evacuation of leakages

Evaluation of impacts' significance

The working and transport machinery may compact and pollute the soil within the working strip. The topsoil will be removed and stockpiled to be re-used after the construction works.

Magnitude and stakeholders concern: The magnitude and stakeholders' concern can be evaluated as of low value (see Table 4-5). The stations' buildings will be rehabilitated in their existing locations. The service and connectivity roads are not part of the proposed project. Consequently, the potential impacts on soil affect overall the working strip, which is an Albanian railway property.

Receptor sensitivity: The sensitivity (see Table 4-6 and Table 4-7) can be evaluated as of negligible to low value, because the working strip is not used for agricultural purposes.

Significance of impacts: Based on the adopted methodology (see Table 4-8, Table 4-9 and Table 4-10), the expected significance of the impacts related to the topsoil and soil quality would be as shown in the table below.

Table 6-25_Evaluation of impact significance on topsoil and soil quality

Option	Magnitude and stakeholders concern	Receptor sensitivity	Impact significance	Scoring
0	No impact	No impact	No impact	0
1	Small	Negligible to Low	Negligible to Minor	-2

Option 0: Current situation (without the Project)

Option 1: With the Project; after mitigation measures

Findings: The damage to top soli and soil quality can be mitigated and therefore the overall significance can be evaluated as minor to moderate.

6.10.2 Operation and maintenance

During the operation phase, the only source of impact is the maintenance of the railway line and stations that require the use of small quantities of hazardous waste like oils, greases, paints, etc. that may pollute the soil. The mitigation measures are similar to those applied during the construction stage.
In a conclusion, there is not foreseen any significant impact on the soil quality during the operation stage.

6.11 Infrastructure utilities

Infrastructure includes all utilities that cross or run very close to the railway line, and therefore constitute a risk for the Project's implementation and vice-versa can be adversely affected by the construction of the railway line.

The road infrastructure that can influence the project design and vice-versa can be influenced by the project implementation is studied in detail by the Consultant as part of the service roads, level crossings, and underpasses and overpasses. Whereas the drainage system is taken into consideration in the hydraulic study of the project.

The infrastructure to be identified include gas pipelines, water supply pipelines, power and telecommunication lines (underground cables and overhead lines), and power substations and cabins.

6.11.1 Design, preconstruction and construction

The infrastructure facilities identified by the Consultant include power lines, power substations and cabins, telecommunication lines (including underground cables), and sewerage and water supply pipelines. Neither existing gas pipeline nor exiting optical fibre system exist currently within the fingerprint of the Project's area.

Source of impacts and potential impacts: Infrastructure utilities that cross or run very close to the railway line, and therefore constitute a risk for the Project's implementation and vice-versa can be adversely affected by the construction of the railway line.

As mentioned in section 6.12, the railway line crosses the track of the planned Ionian - Adriatic Gas Pipeline project (IAP project) at km 23+500. Given that the railway line is expected to be rehabilitated before the construction of IAP, it is recommended to insert a concrete pipeline, through which will pass the future gas pipeline. The concrete pipeline will be installed during the rehabilitation of the railway line. As a result, no impact is expected to occur during the construction of the planned gas transmission pipeline.
Passing water pipelines across the railway line may damage the sustainability of the railway subgrade if the pipelines are built after the rehabilitation of the railway line.
Power and telecommunication lines located in the vicinity of crossing the railway line may constitute a risk for the future electrification of the railway line. Besides, an optical fibre backbone with being laid in the railway track to ensure telecommunication among the stations, as well as signalling for level crossings at the open line which will be protected by autonomous automatic protection systems.
As mentioned in section 6.12, there is no transmission power line in the close vicinity of the railway line, and therefore there is no expected cumulative impact with the power lines.

Anyway, before construction activities, the project's developer and the construction company will check out if the railway line is crossed by any distribution power line, telecommunication cable and/or line, and any water distribution pipeline.

Suggested mitigation measures: Mitigation measures will include the following:

- Provide advanced coordination during construction phases, with municipalities, local community, and related institutions/agencies/companies dealing with the infrastructure utilities;
- Maintaining utility connection in a temporary location;
- Minimizing the time without service,
- Installing alternative or new service before disconnecting the existing services; and
- Allowing service disruption only during periods of non-usage or minimum usage.

In any case, good coordination with the due institutions, local governments, and the local community can completely avoid any accidental impact on any longitudinal underground infrastructure.

In conclusion, no significant impacts on the infrastructure utilities during the construction stage are expected.

Evaluation of impacts' significance

The railway line crosses water supply pipelines and power lines. In addition, power lines lie parallel and close to the railway line.

Magnitude and stakeholders concern: The magnitude and stakeholders' concern can be evaluated as of insignificant (see Table 4-5), because the infrastructure utilities can be easily diverted.

Receptor sensitivity: The sensitivity also (see Table 4-6 and Table 4-7) can be evaluated as of low value.

Significance of impacts: Based on the adopted methodology (see Table 4-8, Table 4-9 and Table 4-10), the expected significance of the impacts related to the topsoil would be as shown in the table below.

Table 6-26_Evaluation of impact significance on topsoil

Option	Magnitude and stakeholders concern	Receptor sensitivity	Impact significance	Scoring
0	No impact	No impact	No impact	0
1	Insignificant	Low	Negligible to Minor	-2

Option 0: Current situation (without the Project)

Option 1: With the Project; after mitigation measures

Findings: The damage to infrastructure utilities can be mitigated and therefore the overall significance can be evaluated as insignificant to low.

6.11.2 Operation and maintenance

No adverse impacts on the infrastructure utilities are expected during the operation phase.

6.12 Landscape and visual issues

Due to the lack of landscape mapping, the landscape and visual issues are assessed concerning the Project's components and activities. The landscape characteristics within the project area are described in section 6.13 of the baseline information. The potential impacts to the landscape are described hereinafter in the function of the locations of the railway line components and the natural and cultural values of the project's area.

During preconstruction and construction, the landscape and visual amenity will be affected from the vegetation clearing and earthworks for service roads and drainage channels; the circulation of heavy trucks; the presence of construction engines and activities across typical agricultural areas, etc.

It is not planned neither any eventual access roads nor any service road within any shrubby or forested area as such areas are not found close to the railway line. The railway line crosses only agricultural land and urban and rural settlements. The railway line is located sufficiently far from the cultural heritage sites that have also tourist values.

6.12.1 Design, preconstruction and construction

Source of impacts and potential impacts:
During preconstruction and construction stages, the landscape and visual amenity can be affected by the following:

Demolition of stations, bridges, culverts
The demolition works will temporarily affect the visual amenity. As a mitigation measure, it is suggested to remove the ruins of these objects as soon as possible. The station sites should be fenced. As a result, the impact of demolition works on visual amenity can be evaluated as temporary and mitigable, and therefore there are not expected residual effects.

Construction of the stations' bridges, culverts, retaining walls, and underpasses to replace the demolished ones.
The reconstruction of the existing stations' bridges, culverts, retaining walls, and underpasses affects the landscape during the whole construction phase. The mitigation measures include the fencing, wherever possible, of the working area around the stations and bridges. During the construction works within the urban areas, the transport vehicles should circulate inappropriate hours of the day, etc.

Construction of new railway components.
The construction of the planned new project's components that may affect the visual amenities include:

- Some new underpasses; and
- The fencing of the railway line

The expected adverse effects on visual amenities will be temporary and will last only during the construction stage, excepting the fencing of the railway line.

The expected impacts of the above-mentioned project's components on visual amenity will be permanent, of the local extent and low magnitude, resulting in an overall low significance.

Earthwork for improving the horizontal and the vertical railway alignment
The residual effects that are linked to the changes of landforms across the agricultural area.
The effects of the earthworks for improving the vertical and horizontal railway line alignment and the related transport activities last only during the construction period. They cannot be avoided but can be reduced by performing construction works as soon as practicable, rehabilitating the old tracks of the horizontal alignment, using the existing local roads as access roads, etc.

The impact of the vertical and horizontal line improvements on visual amenity can be evaluated as temporary and mitigable, and therefore there are not expected residual effects. As per the impacts on the landforms, the expected potential impacts can be evaluated as insignificant because of the following:

- The horizontal railway line improvement will be done across agricultural area (Lekaj to Gose Villages) and in the neighbouring of Kavaje town.
- As the railway line already exists and the vertical alignment will be insignificant, the overall impact on landform can be evaluated as insignificant to low significance.

Landscape and cultural heritage and tourist sites
Concerning cultural heritage sites/objects that have also tourist values, the following can be said:

- *Durres city:* The railway line is not visible from the historical/archaeological heritage sites/monuments of Durres city. The railway station and the main bridges are not visible from other cultural heritage sites/monuments. Thus, in general, the impact of the railway line rehabilitation on the visual amenities within the territory of Durres town can be evaluated as insignificant;
- *Coastal area of Durres and Golem:* The railway line, Golem station, the seaside of Plepa and Golem and the Shen Vlash Channel Bridge are visible from the seaside. The closest distance between the railway and the seaside is roughly 600m in a straight line. Consequently, in general, the impact of the railway line rehabilitation on the visual amenities within the seaside can be evaluated as low to insignificant.

As a result, the relationships between the landscape and the cultural heritage and tourist sites within the wide project's area, and the Project's components and activities, results insignificant.

Mitigation measures:
The mitigation measures to reduce any potential effect on the landscape, during the construction phase, include:

- Quick removal of the material resulting from the demolition of stations, bridges, and culvers;
- Reducing as much as practicable the working strip;
- Fencing the stations during construction works;
- Choosing appropriate colours for the fencing and the stations;
- Wherever possible planting trees around the stations

6.12.2 Operation and maintenance

Once the construction works are done some of the expected effects on the landscape will be positive, while others will be negative.

Residual negative impacts and proposed mitigation measures:

- Presence of fencing in both parts of the railway line. This impact can be evaluated as probable, of local extent, and low magnitude. It can be mitigated by choosing the appropriate design and colours for the fencing. Once the mitigation measures are undertaken, the overall impact can be evaluated of low significance;
- Improvement of the horizontal and vertical railway line. This impact can be evaluated as probable, of local extent, and low magnitude. It cannot be mitigated. However, their overall impact can be evaluated as low significance to insignificant, as the railway already exists

Residual positive impacts
The residual positive impacts on the landscape issues are mostly associated with the visual amenity, as follows:

- The visual aspect of the railway station buildings will be much better compared to the existing ones. This impact can be evaluated as probable, of the local extent, and low magnitude. However, their overall impact can be evaluated of low positive significance.
- The visual aspect of the improved and secured level crossings and the newly improved service roads, bridges, underpasses, and drainage channels will be much better compared to the existing ones. This impact can be evaluated as probable, of the local extent, and low magnitude. However, their overall impact can be evaluated of low positive significance.

Evaluation of impacts' significance

The residual positive impacts on the landscape issues are mostly associated with the visual amenity, as follows:

- The visual aspect of the railway station buildings will be much better compared to the existing ones. This impact can be evaluated as probable, of the local extent, and low magnitude. However, their overall impact can be evaluated of low positive significance.
- The visual aspect of the improved and secured level crossings and the newly improved service roads, bridges, underpasses, and drainage channels will be much better compared to the existing ones. This impact can be evaluated as probable, of the local extent, and low magnitude. However, their overall impact can be evaluated of low positive significance.
- The visual aspect of the fencing will be negative compared to current situation. This impact can be evaluated as probable, of the local extent, and low to moderate magnitude. However, their overall impact can be evaluated of low negative significance.

Taking into account only the negative visual effect of the fencing, the following can be said:

Magnitude and stakeholders concern: The magnitude and stakeholders' concern can be evaluated as low to moderate values (see Table 4-5).

Receptor sensitivity: The sensitivity also (see Table 4-6 and Table 4-7) can be evaluated as of low to moderate value, because the fencing is visible from the seaside of Golem, the national road and the highly populated areas of Plepa, Golem and Kavaje.

Significance of impacts: Based on the adopted methodology (see Table 4-8, Table 4-9 and Table 4-10), the expected significance of the impacts related to the landscape and visual amenity would be as shown in the table below.

Table 6-27_Evaluation of impact significance on landscape and visual amenity

Option	Magnitude and stakeholders concern	Receptor sensitivity	Impact significance	Scoring
0	No impact	No impact	No impact	0
1	Low to moderate	Low to moderate	Minor to moderate	-5

Option 0: Current situation (without the Project)

Option 1: With the Project; after mitigation measures

6.13 Cultural heritage

6.13.1 Design, preconstruction and construction

There is no any cultural heritage site/object within the working strip and therefore there is no expected any negative impact on cultural heritage. In addition, according to the Albanian law 17/2018 "On the cultural heritage and museums" prior the start of the construction works the approval of the Archaeological Survey Agency (ASA) might be required. The Law 17/2018 requires the application of the "chance find procedure". All contractual personnel will be trained to stop all activities if any valuable cultural heritage object is found. If this happens, construction will not begin again until authorized by the Regional Directorates of National Cultural Heritage (DRKK), Durres and Tirane.

The existing railway runs close to a seaside tourist area.

Construction and transport engines circulation, noise and vibration, air pollution, etc. may negatively affect the tourist activity overall in the section Durres to Golem.

The expected impacts on the tourist area are temporary, reversible, and located to the working site. Mitigation measures consist firstly by avoiding the tourist period and performing construction works during the other part of the year.

Evaluation of impacts' significance

There is no known cultural heritage site/object within the areas that may be occupied by the railway line realignment, the construction of any eventual underpasses, overpasses and service and connectivity road. The only cultural heritage objects/sites that may be affected by the proposed project are any unknown archaeological objects/sites. If that occurs, the damage to the cultural heritage may be irremediable. The significance of the likely impacts depends on the importance of the eventual archaeological findings. According to the provisions of Law, 27/2018: "On the Cultural Heritage and Museums" and the best practice, the chance of archaeological finds should be applied during construction works.

Magnitude and stakeholders concern: The magnitude of impacts varies in function of the eventual archaeological findings. It can be evaluated from negligible to a low value (see Table 4-5).

Receptor sensitivity: Because of any eventual archaeological finding, a certain value should be accorded to the sensitivity (see Table 4-6 and Table 4-7). As the dredging and earthworks will be performed mostly within the existing railway line belt, the value accorded to the sensitivity is low.

Significance of impacts: Based on the adopted methodology (see Table 4-8, Table 4-9 and Table 4-10), the expected significance of the impacts related to the cultural heritage issues would be as shown in the table below.

Table 6-28_Evaluation of impact significance on cultural heritage

Opt.	Magnitude and stakeholders' concern	Receptor sensitivity	Impact significance	Scoring
"Zero"	No impact	Negligible to Low	No impact	0
1	Negligible to low	Negligible to Low	Negligible to Minor	-2

Option 0: Current situation (without the Project)

Option 1: With the Project; after mitigation measures

6.13.2 Operation and maintenance

No adverse impacts on cultural heritage during the operation phase are expected.
The operation of the trains for passengers will increase the visits to the cultural heritage sites, especially in the archaeological park of Durres and other historic sites/monuments, such as the castle of Bashtove (Rrogozhine Municipality), etc. Besides, the visits in these sites will increase the incomes of the cultural sector.

6.14 Waste

6.14.1 Design, preconstruction and construction

The main source of waste generation will be construction activities and the workforce during the construction stage. The fractions of waste that will be created are concerning the types of materials and equipment to be used during the construction activities (earth and concrete works, electro-mechanical works, installation works, etc.).

Appropriate filling material must replace the removed one and therefore quarries and/or gravel pits for extraction of the filling material (embankment and ballast) and concrete production are necessary. These raw materials are also needed for increasing the width of the embankment to allow the railway line electrification.

The extraction of filling material, including the selection of the related quarries and/or gravel pits are discussed in the Geological Report. The extraction and transport of the filling material (ballast, sub-ballast, and subgrade) as well as the rehabilitation of the used quarries will be under the responsibility of the supplier that is also responsible for the quarries' environmental permit.

The existing ballast and sub-ballast will be removed. Other sources of solid waste are the demolition of the existing stations, culverts, retaining walls and of any bridges (e.g. the Shen Vlash Channel Bridge) that will generate a considerable amount of bricks, mortar, tiles and concrete and metallic waste. The removal of the rails and sleepers will produce metallic, concrete, and wood waste. It should be underlined that only a small amount of the existing sleepers is in concrete because the main part is in wood.

As technical routine maintenance of construction machinery and transport vehicles will not be conducted within the construction zones, no generation of waste that is characteristic for this type of activity (used tires, batteries, oils, etc. from vehicles) is expected.

Fuel storage facilities would not be necessary and therefore would not be provided within any construction areas or contractor's compound.

The workers will produce packaging and sanitary wastes during their stay on construction sites. The packaging waste is municipal waste and according to its composition is similar to the waste from the households.

Any eventual vegetation clearing within the working strip will generate organic waste, which is composed mainly of branches that will be retained and redistributed on the site that would allow production of nutrient that will facilitate the natural regeneration of the working strip.

The table below gives an indicative overview of the expected types of waste generated during the construction activities. This list is systematized according to the classification of the European Waste Catalogue[128] and the Albanian Catalogue of Waste[129]. Both these catalogues are identical.

Table 6-29_Expected waste types during the construction phase

Waste type	Description of waste type	Comment related to the Project (source of waste generation)
Group 01 – Waste resulting from exploration, mining, quarrying, and physical and chemical treatment of minerals		
01 05 04	Drilling muds and other drilling wastes (Freshwater drilling muds and wastes)	Drilling geotechnical boreholes
Group 02 – Wastes from agriculture, horticulture, aquaculture, forestry, hunting and fishing, food preparation and processing		
02 01 07	Waste from forestry	Any eventual vegetation clearing
Group 13 – Oil waste and wastes of liquid fuels		
13 02	Waste engine, gear, and lubricating oils	-Drilling engine; -Dredging engines; -Construction engines; -Transport vehicles
Group 15 – Packaging waste		
15 01	Packaging waste, paper, and cardboard, plastics, wood, metal, composite packaging, glass, etc.	-Workforce; -Work camp; -Construction of the stations' buildings
Group 17 – Construction and demolition waste		
17 01	Concrete, bricks, tiles and ceramics	-Demolition of the bridges and culverts; -Construction of new bridges and culverts

[128] https://ec.europa.eu/environment/waste/framework/list.htm

[129] DCM 09/2018 "On the approval of the Albanian catalogue on waste"

Waste type	Description of waste type	Comment related to the Project (source of waste generation)
		-Demolition of stations' buildings; -Construction of new stations buildings
17 02 01	Wood	-Demolition of stations' buildings; -Construction of new bridges and culverts -Construction of new stations buildings
17 02 04*	Glass, plastic and wood containing or contaminated with dangerous substances	Removal of the wooden sleepers that are oil-impregnated
17 04	Waste from metals	-Removal of the existing rails; -Construction of the stations' buildings; -Construction of covered parking areas; -Fencing the railway line and stations;
17 05 04	Waste from land excavation	-Earthworks for railway line embankment; -Quarries for filling material; -Earthworks for tunnel upgrade; -Earthworks for stations rehabilitation; -Earthworks for construction of underpasses
17 09 04	Other construction waste (mixed waste)	-Work camps; -Construction of the stations' buildings

Sources of impacts

Based on the table above, the sources of the potential impacts can be summarized as follows:

- *Wastewater:* oil, fuels, greases, paints, etc.; and sewage generated from construction activities, including the workforce.
- *Solid waste:* Soil and rocks, vegetation, metallic, concrete and woody waste, limestone, sand and gravel, packaging waste, which are included in the category of solid wastes;
- *Hazardous waste:* Impregnated wood sleepers, oils, fuel, grease, paints, etc., which represent the category of hazardous waste, deriving from construction activities.

Potential impacts

The main potential impacts include the following:

- *Wastewater:* Temporary impacts on the terrestrial and aquatic biodiversity, ground and surface waters, soil quality, and the health of workers and local population.

The main sensitive receiving environments that can be affected from the wastewater include:

- o The ground waters at the crossing Shen Vlash Channel (km 5+860). The Shen Vlash Bridge will be demolished and a new one will be built. The soil is permeable. However, there is no any under lied aquifer, which waters are sensitive because of any domestic usage;
- o The quality of the rivers and streams water because of the retrofitting works for all the existing bridges. However, excepting the new bridge at km 5+860, no other bridge will be demolished.

- *Solid waste:* Temporary impacts on the aesthetics, biodiversity, water resources, soil quality, traffic and tourism.

  The main sensitive receiving environments that can be affected from the solid waste include:

  - o The urban areas of Shkozet – Plepa, Golem and Kavaje;
  - o The working strip located joint to the national road;
  - o The river and streambeds where the existing bridges will be rehabilitated (Lishati and Darsi Rivers Bridges) or new bridges will be built (Shen Vlash Channel at km 5+860);
  - o The areas around the existing stations of Golem, Kavaje, Lekaj and Rrogozhine, which will be demolished and new stations will be built in their existing locations.

- *Hazardous waste:* Temporary impacts on the terrestrial and aquatic biodiversity, ground and surface waters, soil quality, and the health of workers and local population.

  The main sensitive receiving environments that can be affected from the wastewater are identical to those related to the pollution from the wastewater.

Mitigation measures

EIB Standard 2 (Pollution Prevention and Abatement) states "the promoter will prevent waste generation and will reduce its hazardousness to human health and the environment, by strictly applying the waste hierarchy and the requirements defined for specific waste "streams" identified at EU level as requiring specific priority, ensuring high quality of reusing, recycling, recovering, and reaching the target that the recycled waste is used as a major, reliable source of raw materials".
The mitigation measures include the following:

Waste water

The construction company should implement an Environmental Mitigation Plan (EMP) for waste water, which must be prepared prior to the construction period, in compliance with the EIB Standard 2, the Law No 9115/2003, "On environmental management of the waste water", as amended by the law 07/2018, which is in compliance with the Water Framework Directive (2000/60/EC)[130] and especially the Urban Waste Water Directive[131]. The ESMP on the Project includes the main lines of a Waste Management Plan, which will be detailed by the Construction Company prior the construction stage. The Waste Management Plan will be part of the bidding process.

The waste water resulting from the Project's activities include mainly the sewage generated by the work force and the use of concrete for different railway line components (bridges, culverts, stations' buildings, retaining walls, etc.).

As the work camps will be installed within the existing stations, the waste water generated by the workforce will not be a problem of concern, because the existing stations are already connected to the sewage system. Besides, in each station there are impermeable places that will used to park the working machinery whenever necessary. In these impermeable places special spaces must be reserved for any container of hazardous liquid substance for the working machinery such as fuel, oil or grease.

Portable toilet cabins must be installed through the railway sections located far away from the work camps and the urban areas. These sections are as follows:

- All the main bridges locations. The portable toilet cabins must be installed outside of the rivers and streambeds. The location of these bridges is as follows:
    - Shen Vlash Channel Bridge (km 5+860);
    - Lishati River Bridge (km 15+420);
    - Darsi River Bridge (km 23+150)
- In the open line sections crossing agricultural areas and far away from the urbanized areas. The sewerage of the portable toilets will be collected by sewerage trucks, which will be discharged to the sewerage systems of the crossed municipalities. The discharging places and other details will be defined in agreement with the crossed municipalities.

The transport trucks will be washed in the licensed places that do not belong to the Project.

The Constructor will avoid/minimize the discharge of the waste water into the soil and the surface waters; The concrete material for the bridges' piles and piers will be produced by licensed and specialised companies, which production facilities are licensed; The small bridges and the box and pipe culverts will be in precast that will be prepared in licensed places by licensed companies.

[130] https://ec.europa.eu/environment/water/water-framework/index_en.html
[131] https://ec.europa.eu/environment/water/water-urbanwaste/index_en.html

No concrete will be discharged outside the piers' formwork whether it will be necessary to use concrete for bridges foundations.

Solid waste

The temporary impacts of solid waste generated by the project activities can be mitigated by implementing an EMP for such types of waste, which must be prepared prior to the construction period, and in accordance with the Standard 2 of the EIB, the Law No. 9010/2003, "On environmental management of solid waste", as amended, which comply with the Directive 2008/98/EC "On Waste", as amended[132]. The ESMP on the Project includes the main lines of a Waste Management Plan, which will be detailed by the Construction Company prior the construction stage. The Waste Management Plan will be part of the bidding process.

The EU aims to ensure that the construction and demolition waste (CDW) is managed in an environmentally sound way and the CDW to contribute to the transition to a circular economy. Under the Directive 2008/98/EC, construction and demolition waste is a priority waste stream. The EU objective for 2020 is that *the "preparing for re-use, recycling and other material recovery of non-hazardous construction and demolition waste (excluding naturally occurring material defined in category 17 05 04 in the list of waste) shall be increased to a minimum of 70 % by weight*.[133]

The above EU requirements must be taken into consideration by the Albanian Railways and the Construction Company during the preparation of the detailed Waste Management Plan.

The solid waste will be handled in close collaboration with the local governments and the Albanian Railways. In general, the solid waste that cannot be reused neither by the Project nor by the local governments will be disposed at the disposal sites defined by the municipalities, in compliance with their LGDPs. The Albanian Railways will sign an agreement with the Municipalities of Durres, Kavaje and Rrogozhine on the transport, reuse and recycling of the solid waste.

The metallic material (rails, etc.) will be collected and sell by the Albanian railways or send to Elbasan siderurgic plant for smelting and producing iron and related sub-products. Albanian railways organize every two years a tendering process for selling metallic pieces;

The woody slippers will be initially collected at the stations and then treated. After treatment, they can be used for different purposes by the locals or sent to the Elbasan incinerator for producing electric energy;

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[132] https://ec.europa.eu/environment/waste/framework/

[133] https://ec.europa.eu/environment/topics/waste-and-recycling/construction-and-demolition-waste_en

The bricks resulting from the stations' demolition will be sold or given for free to the locals. Roughly, the only solid waste resulting from the demolition of the stations' buildings that cannot be reused are the broken bricks can be reused for construction purposes, concrete waste and plastering. Whether the solid waste cannot be reused by the Project, they can be used for different other purposes. The Municipality of Rrogozhine proposed a location where to dispose such waste types.

The waste resulting from vegetation clearing can be used by locals for domestic purposes. However, the vegetation to be cleared includes only low vegetation (mainly blackberry shrubs).

The solid waste that cannot be reused or recycled will be disposed in compliance with the provisions of the Local General Development Plans of the affected municipalities. The existing General Local Development Plans of the Municipalities, or the regional Waste Area Management Plans can be considered for the disposal/use of the solid waste.

Hazardous waste

Wooden sleepers, leakage of fuels and oil from the transport trucks and working machinery and paintings for the new stations' buildings constitute the hazardous waste. The transport truck will be supplied in fuel in the licensed places. Fuels and oil for the working machinery will be stored in impermeable places. Any accidental leakage of fuel or oil will be collected and transported at the licensed facilities. The same will be applied concerning the leakage of paintings.

All the wooden slippers will be transported initially to the closest stations and then to Shkozet station. The Albanian Railways will find the best possible solution as follows:

- Treating the wooden slippers and then use them for generating energy or heating; or
- Transport them to the Elbasan incinerator, which generates electricity

However, the above proposed solutions will be further discussed and elaborated by the Construction Company. The treatment of the oil-impregnated wooden sleepers is part of the ESMP on the Project, which includes the main lines of a Waste Management Plan that will be detailed by the Construction Company prior the construction stage. The Waste Management Plan will be part of the bidding process.

The temporary impacts of hazardous waste generated by the project activities can be mitigated by implementing an EMP for hazardous waste, which must be prepared prior to the construction period, and in accordance with the: EIB Standard 2; the Law 9010/2003, "On environmental management of solid waste"; Law 9537/2006, "On hazardous waste management"; and the DCM

103/2003 "On Environmental Monitoring", which comply with the articles 17 to 20 of the Directive 2008/98/EC "On Waste", as amended[134].

The mitigation strategy and measures related to the potential impacts from wastewater and hazardous waste should be based on the Groundwater Directive 2006/118/EC, which has been developed in response to the requirements of Article 17 of the Water Framework Directive[135]. The design has already considered the reuse of the waste from land excavation and from demolition of the bridges and culverts.

Environmental benefits from waste management

Once the construction works are finished and all the above-mentioned mitigation measures are undertaken, a short comparison between the existing situation and the situation after the rehabilitation of the railway line would be as follows:

- The existing wooden slippers that are impregnated by oil products will be replaced by more environmentally friendly concrete slippers;
- Any eventual small fuel or oil spot on the slippers surface will be removed because the slippers will be replaced;
- Solid waste remained in the freight stations will be removed;
- Any urban solid waste within the almost abandoned stations will be removed;
- The drainage system will be cleaned from the sediments and the vegetation; etc.

As a result, the Project will bring benefits concerning the situation of the waste compared to the existing situation.

Evaluation of impacts' significance

The Project foresees the removal of the railway ballast, sub ballast and a part of the subgrade. Other source of solid waste is the demolition of the stations and bridges and culverts that will generate a large amount of solid waste, mainly bricks and concrete.

Magnitude and stakeholders concern: The railway embankment is partly filled with material of weak quality, which will be removed. The demolition of the existing stations and bridges will generate a large amount of solid waste, mainly bricks and concrete. The bricks will be reused by the locals with the consent of the Albanian Railways.

The magnitude and stakeholders concern is evaluated based on the impact intensity (see Table 4-2 and Table 4-3) and the probability of occurrence (see Table 4-1). The magnitude without mitigation measures can be evaluated as medium (see Table 4-5). After mitigation measures (removal of the solid waste

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[134] https://ec.europa.eu/environment/waste/hazardous_index.htm

[135] https://ec.europa.eu/environment/water/water-framework/groundwater/resource.htm

to the locations defined by the related authorities/institutions), the intensity of the likely impacts can be evaluated as low (see Table 4-2 and Table 4-3), while the likelihood can be evaluated as "likely" (see Table 4-1). As a result, the magnitude and stakeholders concern can be evaluated as low (see Table 4-4 and Table 4-5).

Receptor sensitivity: As the demolition works are temporary and the solid waste can be removed in a short time, the receptor sensitivity can be evaluated as low (see Table 4-6 and Table 4-7).

Significance of impacts: The impacts' significance without mitigation measures can be evaluated as moderate. While once mitigation measures are undertaken, based on the adopted methodology (see Table 4-8, Table 4-9 and Table 4-10), the expected significance of the impacts that can be caused by the generation of waste would be as shown in the table below.

Table 6-30_Evaluation of impact significance linked to waste generation

Option	Magnitude and stakeholders concern	Receptor sensitivity	Impact significance	Scoring
0	Negligible	No impact	No impact	0
1	Low	Low	Minor	-4

Option 0: Current situation (without the Project)

Option 1: With the Project; after mitigation measures

Findings: Waste generated from construction activities will be significantly reduced. Waste impact, which would be temporary if necessary remediation actions are undertaken, can be evaluated of low probability, low to moderate magnitude and to an overall low significance.

The Albanian Railways will sign an agreement with the Municipalities of Durres, Kavaje and Rrogozhine on the transport, reuse and recycling of the solid waste.

The disposal/use of the solid waste will be done at a later stage (during the project implementation) in compliance with the General Local Development Plans of the Municipalities. If there are no local Waste Management Plans, the regional Waste Area Management Plans can be considered."

The ESMP on the Project includes the main lines of a Waste Management Plan, which will be detailed by the Construction Company prior the construction stage. The Waste Management Plan, which will be part of the bidding process, will take into account the EU objectives for 2020 that intend to re-use and/or recycle up to 70% (in weight) of the construction and demolition waste. As per the metallic waste, they will be recycled at 100% through smelting at the Elbasan siderurgic plant, which produce iron.

6.14.2 Operation and maintenance

The table below gives an indicative overview of the expected types of waste generated during the operational stage. This list is systematized according to the classification of the European Waste Catalogue and the Albanian Catalogue of Waste.

Table 6.8_Expected waste types during operation and maintenance phase

Waste type	Description of waste type	Comment related to the Project (source of waste generation)
Group 02 – Wastes from agriculture, horticulture, aquaculture, forestry, hunting and fishing, food preparation and processing		
02 01 07	Waste from forestry	Vegetation clearing for the maintenance of the drainage system
Group 13 – Oil waste and wastes of liquid fuels		
13 02	Waste engine, gear and lubricating oils	Waste generated from locomotives, cranes (at the freight stations), etc.
Group 15 – Packaging waste		
15 01	Packaging waste, paper, cardboard, plastics, wood, metal, composite packaging, glass, etc.	Waste generated from stations' employee and trains' staff
Group 17 – Construction and demolition waste		
17 04	Waste from metals	Rails' maintenance, parking areas, fencing, etc.
17 05 04	Waste from land excavation	Maintenance of the drainage channels;
17 09 04	Other construction waste (mixed waste)	Maintenance of the woody pieces (e.g. slipper's)
Group 20 – Municipal waste (+similar waste from the industry), including fractions of selected waste		
20 03 01	Mixed municipal waste	Urban waste generated within the stations
20 03 06	Waste from sewage cleaning	Generated from the trains' toilets

The mitigation strategy and measures are similar to those applied during the construction stage.

6.15 Accidents and incidents

6.15.1 Design, preconstruction and construction

During project construction, the density of the built-up area should be observed within a band width of 10 m on both sides of the railway line. There is no need for any working strip around the stations, which site construction will be fenced. The evaluation should be carried out for the characteristics of the environment, the distance between each populated area or object from the axis of the railway line and other facilities (residential or service and industrial areas), taking into account the potential for any eventual accident from construction machinery and transport trucks.

A Traffic Management Plan should be developed and implemented to avoid traffic incidents to the local community and workforce.

The workforce will be trained to avoid accidents and incidents during construction works. A Labour and Working Conditions Management Plan will prevent any accident and incident. The workforce will be equipped with Personal Protection Equipment (PPE) in the function of the type of construction activity.

An Emergency Preparedness and Response Plan will be developed and implemented to respond to every possible accident and incident.

A Community Health and Safety Management Plan will be prepared in detail and implements to address any eventual accident concerning the workforce and the locals. The main lines of this plan are already described in the ESMP.

The work camps and the working areas will be fenced to prohibit any intrusion of the locals and livestock. The work camps will be established in the stations areas that have the necessary infrastructure (electricity, water, sewage) and are fenced.

To avoid/mitigate the accident situations, it is suggested to apply the mitigation strategies and measures associated with the Occupational and Public Health and Safety Management Plan, as well as with a Labour and Working Conditions Management Plan that will be prepared in compliance with the EIB Standards 9 and 8, respectively.
The ESMP includes the main lines of all the topic-specific management plans mentioned hereinabove that will be developed in detail and implemented by the Contractor to respond to every possible accident and incident.

Conclusion: The adverse impacts associated with accident issues may be evaluated of low probability and significance and local extent if the related national standards and legislation and the best international practices are applied.

6.15.2 Operation and maintenance

Overview of the potential accidents and incidents

According to the International Railway Safety Council, the main risks that can occur during the railway line operation and maintenance include[136]:

- Trains collision;
- Derailments;
- Level/grade crossing and trespass;
- Railway staff risks;

[136] https://international-railway-safety-council.com/common-risks-managed-railway-industry/

- Risks at stations;
- Transport of dangerous goods

Mitigation measures: During the design and construction stage, the Albanian Railways will take into consideration the implementation of the applicable standards on the secured level crossings, the closure of the informal crossings, the fencing of the railway line and stations, as well as on the new signalization system will avoid any eventual train collision and other accidents. All these elements (level crossings, fencing, signalization, etc.) will be appropriately maintained during the whole operation phase.

The Project's design has already considered all the TEN-T standards related to railway safety.

For the above-mentioned risks that can occur during railway line operation, the related mitigation measures include:

- Trains' collision can occur between two trains or between trains and infrastructure. Mitigation: The new signalling and communication system will avoid such incidents.
- Derailments are often related to technical failures such as poor track geometry, damaged or defective switches and crossings, wear and fatigue in the wheel-rail interface, vehicle suspension faults. Operator errors such as the incorrect setting of points, excessive speed, and poor driving behaviour can also result in derailments. Mitigation measures: The Project design has improved the horizontal and vertical alignment, the rails and other railway structure components will satisfy the European standards.
- Level/grade crossing. There is a multitude of scenarios in which accidents occur including road users who are unaware of the level crossing, distraction/inattention, failure of level crossing equipment, or a second train unexpectedly approaching the crossing. However, the most common accidents resulting from violations by road users ignoring the warning of approaching trains. Mitigation measures: All the level crossings from Shkozet to Rrogozhine will be secured.
- Trespassers present a common risk, particularly in densely populated areas. Serious injuries and fatalities are common and whilst they do not represent a significant risk to passengers, such events cause both serious disruption and significant psychological trauma to the victim's family, railway staff, and emergency services who have to respond to them. Modern trains are quiet and trespassers often only realize the danger when it is too late. Mitigation measures: Fences, public announcements, education campaigns, and police patrols should be used to prevent trespassers. The Project design includes the fencing of the railway line from Shkozet to Rrogozhine.
- Railway staff risks can cause staff injuries and fatalities. The most vulnerable are the track workers, who operate under the risk of moving trains and high voltage electricity. The prolongation of working hours can result in tiredness because of which the workers are more vulnerable to accidents. Mitigation measures: Improving workers' safety including the use of high visibility clothes, safe-working procedures on track, safety culture interventions, permits to work, and various technologies to warn workers of approaching trains.

- Risks at stations. The typical risks at stations include slips, trips, and falls (particularly on stairs and escalators) and boarding and alighting incidents at the interface between the train and the platform. Mitigation measures include the careful design of stations, clear signage, the use of video surveillance, etc. All the station buildings of will be designed to avoid/reduce as much as practicable these risks. Video surveillance is also included in the Project's design.
- Transport of dangerous goods: The transport of dangerous goods such as chemicals, petrol, liquefied gasses, nuclear waste, etc., require particular measures to control the risk such as improved maintenance of vehicles and track, routing away from heavily populated areas, and special handling and security. Requirements for the safe transport of dangerous goods by rail across borders are controlled by international laws.

Evaluation of impacts' significance

The enhancement of the road traffic through service and connectivity roads improvement, the construction and operation of only secured level crossings, the railway line and stations fencing, as well as the appropriate signalling and interlocking system, will eliminate or drastically reduce the number and severity of accidents.

The improved railway line components will avoid or significantly reduce railway accidents and incidents.

Magnitude and stakeholders concern: The magnitude of impacts can be evaluated as of moderate value (see Table 4-5).

Receptor sensitivity: The sensitivity (see Table 4-6 and Table 4-7) can be evaluated as of moderate value, because of the importance of these issues at the country level.

Significance of impacts: Based on the adopted methodology (see Table 4-8, Table 4-9 and Table 4-10), the expected significance of the impacts related to railway accidents and incidents would be as shown in the table below.

Table 6-31_Evaluation of impact significance linked to the eventual accidents and incidents

Option	Magnitude and stakeholders concern	Receptor sensitivity	Impact significance	Scoring
0	Moderate	Moderate - negative	Moderate	-6
1	Moderate	Moderate - positive	Moderate	+6

Option 0: Current situation (without the Project)

Option 1: With the Project; after mitigation measures

Conclusion: The Project's design has already considered the TEN-T standards related to railway safety. As a result, the adverse impacts associated with accident issues during operation and maintenance may be evaluated of low to moderate probability and significance and of local extent, if the operational standards and the best international practices are applied.

6.16 Compliance with other plans/programmes

The cumulative impacts may arise from the interference of the proposed project with other plans/programs projects within the same sector (transport) or the same project area.

6.16.1 Design, preconstruction and construction

The rehabilitation of the railway line is included in all the existing urban and transport national and municipal development plans and therefore do not contradict these plans. Consequently, no significant adverse cumulative impacts are expected to occur from the Project's development in combining with those plans.

The rehabilitation of the railway line may interfere with the following project:

- Ionian Adriatic gas Pipeline (IAP), which is crossed at Darsi River Bridge (km 23+150);
- The opening of a local road alongside the eastern border of the Golem station area.

Proposed mitigation measures:

The Project is part of the existing urban and transport national and municipal development plans and therefore in compliance with them. Implementing the proposed project means implementing these plans, and therefore the cumulative impacts with these plans are positive, probable, of the national and municipal extent, and an overall moderate to high significance.

As per the crossing of the infrastructure projects, the following can be said:

- Local road lying on the eastern border of Golem station area: Currently locals use the railway station platform as an informal local road. A new local road is planned to pass on the east of the station area. This new road is already designed and will be built soon by the Albanian Development Found (ADF). It is not expected the construction of this road to have any negative effect on the Project and vice-versa. Therefore, no mitigation measures are required. It can be said that the construction of this road will have a positive cumulative effect on the Project;
- Ionian Adriatic gas Pipeline (IAP): Darsi River Bridge (70m long) is located at the planned crossing of the gas pipeline with the railway line. Therefore, the future gas pipeline will be laid under the bridge. Consequently, no other mitigation measures are necessary. Besides, it should be underlined that the railway line is an existing structure and therefore the IAP path must be adapted to the railway.

Conclusion: The cumulative impacts associated with the above-mentioned plans/programs/projects during the construction phase can be evaluated as follows:

- Urban and transport national and municipal development plans: As the proposed project is an integral part of each of these plans, no adverse cumulative impact during the preconstruction and construction stage is expected.

- Longitudinal infrastructure projects: The cumulative impacts during the construction of the railway line are expected to be as follows:
    - Ionian Adriatic gas Pipeline (IAP): The railway line will be crossed at the existing Darsi River Bridge (70m long), and therefore no adverse cumulative impact is expected.

6.2.21.2 Operation and maintenance

The Project is part of the existing urban and transport national and municipal development plans and therefore in compliance with them. Implementing the proposed project means implementing these plans, and therefore the cumulative impacts with these plans can be evaluated as positive, probable, of the national and municipal extent and therefore resulting in an overall moderate to high positive significance.
Besides, the rehabilitated railway line will generate less noise than nowadays. As a result, the expected cumulative impacts during operation will be positive. These impacts are evaluated as positive, probable, of the local extent and moderate magnitude. The overall significance is expected to be low to moderate and positive.
There are not expected cumulative impacts of the railway associated with the operation phase of the Ionian Adriatic gas Pipeline. Once constructed, none of these objects creates any negative impact on the other ones.

Conclusion: The cumulative impacts associated with other plans/programs/projects during operation are expected to be as follows:

- Urban and transport national and municipal development plans: cumulative impacts are expected to be of an overall moderate to high positive significance;
- Longitudinal infrastructure projects (Ionian-Adriatic gas Pipeline): no cumulative impacts are expected.

6.17 Socioeconomic environment

6.17.1 Impacts

6.17.1.1 Introduction

This Chapter addresses potential impacts (adverse and positive) of all planned project activities during the Construction and Operational Phases to different socio-economic receptors/resources that were initially identified during the ESIA Scoping Phase, where the interactions between relevant project activities and the social aspects were considered to determine whether the interaction may create a potential impact.

The impact assessment considers effects on the following:

1. Community Health, Safety and Security

2. Community Tensions
3. Land Use
4. Employment
5. Economy
6. Vulnerable Groups
7. Education & Training
8. Communities' quality of life

The environmental and social impacts are assessed in the context of the project's area of influence that encompasses the assets of HSH and associated works directly owned or managed by the promoter that can be considered an integral part of the main project intervention. It should be mentioned that a road project in Kavaja Municipality that is currently at detailed design phase as part of project development portfolio named "URBAN REQUALIFICATION OF TOURIST AREAS" of Albanian Development Fund, is not considered ancillary/associated to this project and thus, not included in the assessment process.

It should be mentioned that significance of the residual effects is assessed considering the implementation of mitigation measures.

6.17.1.2 Potential Impacts on Community Health, Safety and Security

6.17.1.2.1 Summary of Resources/Receptors

Project's activities related to the rehabilitation of the railway line may increase the potential for community exposure to health, safety and security. Health concerns include exposure to diseases arising from temporary or permanent changes in population; exposure to hazardous materials during construction and transport of raw and finished materials. Safety concerns relate to risk for accidents related to movement of heavy vehicles during construction. During operation, health concerns relate to increased risks for accidents near railway crossings.
It should be mentioned that the electrification of the railway is not part of the project and is not currently foreseen. The detailed design includes only the underground infrastructure and the pillars foundations. Therefore, no impacts are expected to occur, related to electrical safety.

While acknowledging the public authorities' role in promoting the health, safety and security of the public, the Standard 9 from EIB Environmental and Social Standards addresses their Client's responsibility to identify and to avoid or minimize the risks and adverse impacts to community health, safety and security that may arise from project activities. This Standard addresses potential risks and impacts to the affected community from project activities.

6.17.1.2.2 Assessment of the Sensitivity of Impacts

During establishing of the sensitivity of this receptor, the following criteria were applied:

1. Location of influence

2. Intensity of influence
3. Awareness of community
4. Awareness of administration

For each criterion, a scoring value from 0 to 3 was applied with following meaning:

0. – no importance
1. – low importance
2. – medium importance
3. – high importance

The sum of scores will determine sensitivity. The rating of sensitivity was performed on the basis of the following ranges:

0 - 2 - low sensitivity (ls)
3 - 6 - medium sensitivity (ms)
7 - 9 - high sensitivity (hs)
10 - 12 - very high sensitivity (vhs)

Community health with regards to the location of influence has medium importance. The health of communities located at or closest to the railway line is expected to be affected. The intensity of influence can be estimated to high importance despite the fact that worker's camps will be located outside the settlements while the construction work will be carried out at and nearby the line. Awareness of community and administration (medical centres, local authorities, media, NGOs) has high importance for community health. Awareness of both community and administration of potential risks and impacts that project activities could have on community health has very high importance. Based on the very high importance of different criteria, it can be concluded that the sensitivity of this sub-receptor is very high.

Community safety has high importance in respect to all four criteria. Due to the heavy mechanization on site and the presence of heavy traffic on roads which connect the local settlements with the towns, including also rail safety during operation, the location and intensity of influence has high importance. Awareness of community and administration is very important. Thus, the sensitivity of this sub-receptor is very high due to high importance.

Community security is not at risk, providing that the safeguard personnel engaged at the construction site or contractor's facilities is trained adequately in: a) behaving in appropriate manner towards the local community, and b) using of force (tactics and equipment) when necessary. However, community security has high importance regarding awareness and medium importance related to other criteria, thus bringing the sensitivity of this sub-receptor at high level.

The sensitivity of sub-receptors was assessed according to the described methodology. The results are presented in table:

Table 6-32_Sensitivity estimation matrix

Receptor	Location of	Intensity of	Community	Administration	Sensitivity

	influence	influence	awareness	awareness	
Community health	3	2	3	3	11
Community safety	3	3	3	3	12
Community security	2	2	3	2	9

The results from sensitivity estimation matrix determined the following:

Table 6-33_ Results from sensitivity estimation matrix

Receptor	Value (Sensitivity)
Community health	Very high sensitivity
Community safety	Very high sensitivity
Community security	High sensitivity

6.17.1.2.3 Potential Impacts and Likely Significance

The following potential impacts on Community Health, Safety and Security have been identified for the construction and operational phases of the Project:

Construction phase

- Impacts from the influx of temporary workers;
- Impacts from increased community exposure to disease;
- Impacts from increased traffic and heavy vehicles on local roads during construction;
- Safety issues associated to the entrance of non-authorized people on the construction site.

Operational phase

- Impacts from better access to the larger towns and services located in larger towns/cities;
- Safety issues associated with rail track.

Construction phase

Impacts from the influx of temporary workers

Due to technological developments and investment in labour saving equipment, the skilled workforce needed for the Project is estimated to be in the range of 200 - 240 workers and on each of the 3 sections it is estimated that around 70 - 80 skilled workers will be needed. For construction of tunnel and bridges skilled workers are required to be permanent employees of the construction companies. The skilled construction workers will be imported to the area of construction and will reside in labour camps.

A smaller number of local low-skilled jobs may be envisaged. These will include protection and guarding of the construction companies' properties. Low skilled workers will be hired within 5-10 km radius of railway and wider if necessary.

It is expected that the increased number of workers near construction sites will have impact on local communities. Uncontrolled movement of workers will affect residents of affected settlements. Due to this a limited regime of movement of workers in the area around the construction sites and mode of movement must be well organized and defined by agreement between the Employer and the Contractor(s).

Entry of a temporary labour force into an area could cause different negative impacts to the local communities including conflicts between local community members and newly arrived people due to the socio-cultural differences and other issues. The situation when temporary workers come from other regions and they are from different social and cultural backgrounds could easily create conflicts with the local social environment. Due to this, workers must receive training and sign a labour code of conduct, in order not to create conflicts with the local social environment. But is unlikely expected to occur in this project.

With an increase in construction activities and the possibility of job seekers arriving, it may be more difficult to identify strangers in the area. In addition, the increase in disease associated with the entry of a temporary labour force into an area could potentially occur.

There may also be negative issues that need to be managed such as increases in local prices or alcohol consumption.

Estimation of magnitude

Due to the high level of unemployment in the region, it is expected during construction works that most of the employment opportunities will be for local workers who are coming from affected communities. Having this in mind, the impact from the influx of temporary workers is expected to be limited. Location of worker's camps at some distances from local settlements and managed movement in the area will decrease the negative impacts arisen from different kind of conflicts between temporary workers and local community. Table 7-3 provides the justification of the assessment of impacts.

Table 6-34_ Assessment of impacts

Criteria	Assessment	
	Threshold	**Descriptions**
Characterization of Impact	Negative	Impact could create worsening over the current situation in community safety
Type of Impact	Direct	Construction activities will have direct impact upon receptor
Reversibility	Reversible	The effect caused by impact is reversible. Situation can be returned into previous condition
Geographic Extent	Local	Impact is limited to communities that are on the closest distance to the railway
Time when the impact occurs	Immediate	Effect will occur immediately following project activities
Duration	Short-term	Based on estimation for construction activities duration it is estimated impact to last in short-term (between two and three years)
Likelihood of appearance	Certain	There is a high likelihood this impact to occur
Magnitude	Low	Influx of temporary workers is expected to be limited

According to the significance matrix presented in 4, the **initial significance of this impact**, *without mitigation measures*, is ***slight negative***.

Impacts from increased community exposure to disease

The presence of a large number of workers can give rise to an increased spread of communicable diseases. Construction projects are commonly associated with social interactions amongst the construction workers and local communities. This among other factors may produce an inherent increased risk of transmission of sexually transmitted diseases, HIV/AIDS and other contagious diseases such COVID-19, TB, pneumonia etc.

Estimation of magnitude

The Table 7-4 provides the justification of the assessment of impacts.

Table 6-35: Assessment of impact

Criteria	Assessment	
	Threshold	**Descriptions**
Characterization of Impact	Negative	Impact is not desirable
Type of Impact	Direct	Construction activities will have direct impact upon receptor
Reversibility	Irreversible	The effect caused by impact is irreversible. Situation cannot be returned into previous condition
Geographic Extent	Local	Impact is limited to communities that are on the closest distance to the railway
Time when the impact occurs	Immediate	Effect will occur immediately following project activities
Duration	Short-term	Based on estimation for construction activities duration it is estimated impact to last in medium-term (between two and three years)
Likelihood of appearance	Certain	There is a high likelihood for this impact to occur
Magnitude	High	Loss of quality and integrity of resource

According to the significance matrix presented in Chapter 4, the initial significance of this impact, without mitigation measures, is ***large negative***.

Impacts from increased traffic and type of traffic on local roads during construction

The traffic related to construction will contribute to reduced road safety on local roads, especially where the traffic passes through settled areas located close to the road. The traffic to construction site will depart from the public roads. Residents from local settlements on these haulage roads will be exposed to increased possibilities for accidents and injuries. Traffic consisting of heavy vehicles and machinery is especially risky.

Estimation of magnitude

Significantly increased traffic especially with heavy mechanization required for construction activities will change normal traffic which the local communities are used to. This will result in increased risks for accidents and injuries.

The Table 7-5 provides the justification of the assessment of impacts.

Table 6-36_ Assessment of impact

Criteria	Assessment	
	Threshold	**Descriptions**
Characterization of Impact	Negative	Impact is not desirable
Type of Impact	Direct	Construction activities will have direct impact upon

		receptor
Reversibility	Irreversible	The effect caused by impact is irreversible. Situation cannot be returned into previous condition
Geographic Extent	Local	Impact is limited to communities that are on the closest distance to the railway
Time when the impact occurs	Immediate	Effect will occur immediately following project activities
Duration	Short-term	Based on estimation for construction activities duration it is estimated impact to last in medium-term (between two and three years)
Likelihood of appearance	Certain	There is a high likelihood this impact to occur
Magnitude	Medium	Loss of resource, but not adversely affecting the integrity

According to the significance matrix presented in Chapter 4, the initial significance of this impact, without mitigation measures, is ***moderate negative***.

Safety issues associated with the entrance of non-authorized people in the construction site

Contractor/s and Engineer/s could counter threats to their employees, assets and service delivery. They may face different threats because of the nature of their operations, their location and/or the attractiveness of their assets. Because of their duties or work-related situations to which they are exposed, employees are not immune from oral or written threats or acts of physical violence, for example assault. Theft, fraud, vandalism "malicious activity", accidental or intentional loss or damage could be a result from non-authorized entrance of people into construction site. Moreover, safety issues may be raised for the non-authorized people that will enter the construction site.

Estimation of magnitude

Location of contractor's facilities is usually near worker camps at certain distances from local settlements. The design, layout and site location of facilities should facilitate natural surveillance by security and the safeguards engaged by Contractor/s.

Valuable equipment and materials for construction will be located on the site. This could encourage an increased entrance of non-authorized person to the construction site. Due to the loss of integrity of the receptor the impact magnitude can be estimated to be medium.

The Table 7-6 provides the justification of the assessment of impacts.

Table 6-37_ Assessment of impact

Criteria	Assessment	
	Threshold	**Descriptions**
Characterization of Impact	Negative	Impact is not desirable
Type of Impact	Indirect	Construction activities will have indirect impact upon receptor
Reversibility	Irreversible	The effect caused by impact is irreversible. Situation cannot be returned into previous condition
Geographic Extent	Local	Impact occurs only at construction site(s)

Time when the impact occurs	Immediate	Effect will occur immediately following project activities
Duration	Short-term	Based on estimation for construction activities duration it is estimated impact to last in medium-term (between two and three years)
Likelihood of appearance	Probable	There is a medium likelihood of occurring
Magnitude	Medium	Effects are both distinguishable and measurable and could counter threats both to non-authorized people entering the site and to contractor's employees, assets and service delivery

According to the significance matrix presented in Chapter 4, the initial significance of this impact, without mitigation measures, is ***moderate negative***.

Operational phase

Improvement of access to better services located in larger towns/cities

The rehabilitated railway will provide the local residents with new, improved and alternative public transport besides buses and private cars. Villagers of the settlements will in general be able to move more freely for different needs like education, health treatment, school, work, using a cheaper and faster alternative to busses.

Estimation of magnitude

New alternative and cheaper transport will largely improve the receptor quality; thus, it can be estimated the magnitude of this impact to be positive high.

The Table 7-7 provides the justification of the assessment of impacts.

Table 6-38_ Assessment of impact

Criteria	Assessment	
	Threshold	**Descriptions**
Characterization of Impact	Positive	Impact is desirable
Type of Impact	Direct	Impact on receptor quality is going to be direct
Reversibility	Irreversible	The effect caused by impact is irreversible. Situation cannot be returned into previous condition
Geographic Extent	Regional	Impacts extend across the southern region of Albania
Time when the impact occurs	Immediate	Effect will occur immediately following project activities
Duration	Long –term	Impacts extends throughout operation of railway
Likelihood of appearance	Certain	There is a high likelihood of occurring
Magnitude	High	Mayor improvement of receptor quality

According to the significance matrix presented in Chapter 4, the initial significance of this impact, without mitigation measures, is ***large positive***. The impact will result in large significant improvement to community health and safety.

Safety issues associated to rail track

Access will be limited within the railway belt area once the railway section will be continuous/full operational. This area will be HSH's property and access within this area will be prohibited for unauthorized persons, through fencing. The project foresees the upgrading/construction of level crossings, underpasses, overpasses and parallel roads for each municipality, as presented in the Table 7-8 below.

Table 6-39_ Summary table of proposed structures - LCs, RUs, PUs, POs and PRs

Municipality	Level Crossing (LC)	Road Underpass (RU)	Pedestrian Underpass (PU)	Pedestrian Overpass (PO)	Parallel Road (PR) (km)
Durrës	6	-	-	5	2.8
Kavaja	4	3	2	4	1.44
Rrogozhine	5	5	2	-	1.26
Total	**15**	**8**	**4**	**9**	**5.5**

When the railway section is rehabilitated, it will function as a new means of transportation. Transport with trains that runs at a speed up to 120km/h increases the safety risk of the workers on the railway, passengers and third parties. Overpasses and underpasses will be provided and/or upgraded and could mean that the access will be improved and safety will be higher compared to current situation. Railway level crossings pose a risk in terms of accidents and are the greatest health hazard from trains for the general public. Thus, all level crossings should have the maximum safety conditions. People are working and/or living at a very close distance from the railway. On the other hand, the railway line is operational and trains are currently passing on the track. Currently, people are crossing the railway at the approved but also illegal level crossings, thus increasing the safety issues related to rail track.

Estimation of magnitude

Crossing of railway tracks in illegal way could be considered as significant risk of high magnitude to community health and safety resulting in the potential for loss of community lives.

The Table 7-9 provides the justification of the assessment of impacts.

Table 6-40_ Assessment of impact

Criteria	Assessment	
	Threshold	**Descriptions**
Characterization of Impact	Negative	Impact is not desirable
Type of Impact	Direct	Impacts results in a direct impact upon receptor
Reversibility	Irreversible	The effect caused by impact is irreversible. Lost lives cannot be returned
Geographic Extent	Local	Impact is limited to communities that are on the closest distance to the railway
Time when the impact occurs	Delayed	Effect delayed and occurs sometime after project actions
Duration	Long -term	Impacts extends throughout operation of railway
Likelihood of appearance	Certain	There is a high likelihood of occurring
Magnitude	High	Effect will largely change receptor quality

According to the significance matrix presented in Chapter 4, the initial significance of this impact, without mitigation measures, is ***large negative***. The impact will result in severe damage to receptor.

6.17.1.3 Potential Impacts on Community Tensions

6.17.1.3.1 Summary of Resources/Receptors

A potential risk for community tensions prevails with the presence of a number of temporary workers from outside the region in the local communities. Although the numbers of temporary workers are limited to around 70 people within each section, the workers may have different cultural and social background than the local people. This in combination with the disruption to normal life of the local people due to the construction activities, creates a ground for increased community tension. The disruption to normal life includes: Loss of livelihood and land, changes in agricultural production, increased transportation time, heavy vehicles on local roads, restricted movement within construction area, presence of workers camps within the community etc. During operational phase communities at or close to the railway line will mainly be disturbed from and react to noise and vibration caused by train operation in addition to safety regulations related with railway operation.

6.17.1.3.2 Assessment of the Sensitivity of Impacts

During establishing of the sensitivity of this receptor, the following criteria were applied:

1. Location of influence
2. Intensity of influence
3. Awareness of community
4. Awareness of administration

For each criterion a scoring value from 0 to 3 was applied with following meaning:

0. – no importance/occurrence
1. – low importance/occurrence
2. – medium importance/occurrence
3. – high importance/occurrence

The sum of scores will determine sensitivity. The rating of sensitivity was performed on the basis of the following ranges:

0 - 2 - low sensitivity (ls)
3 - 6 - medium sensitivity (ms)
7 - 9 - high sensitivity (hs)
10 - 12 - very high sensitivity (vhs)

The sensitivity of sub-receptors was assessed according to the described methodology. The results are presented in table:

Table 6-41_ Sensitivity estimation matrix

Receptor	Location of influence	Intensity of influence	Community awareness	Administration awareness	Sensitivity
Verbal tensions	2	3	3	3	11
Written threats	1	1	2	2	6
Verbal threats	2	2	2	2	8
Physical violence	1	1	2	2	6

The results from sensitivity estimation matrix determined the following:

Table 6-42_ Results from sensitivity estimation matrix

Receptor	Value (Sensitivity)
Verbal tensions	Very high sensitivity
Written threats	Medium sensitivity
Verbal threats	High sensitivity
Physical violence	Medium sensitivity

6.17.1.3.3 Potential Impacts and Likely Significance

The following potential impacts on Community Tensions have been identified for the construction and operational phases of Project:

Construction phase

- Effects from influx of workforce into local communities
- Community reactions due to the disturbance arising from the construction works

Operational phase

- Community reactions due to the disturbance arising from the operation of railway

Construction phase

Effects of influxes of workforce into local communities

The entry of a temporary labour force into an area could cause different negative impacts within the local communities including conflicts between local community members and newly arrived people mainly due to differences in socio-cultural background. Tensions could arise especially if there is a lack of tolerance. The reactions to this situation could go from verbal fights, oral and written threats to physical violence. Workers must be aware that although the community supports construction of the railway, the disturbance of their normal way of living could be a source to dissatisfaction and complaints.

Estimation of magnitude

Qualified workers are needed for the construction of tunnel and bridges and these will in most cases be brought in by the assigned construction companies. Due to the high level of unemployment in the region, it is expected that all other jobs related to the construction of the railway will be performed by local workers who come from the affected communities. In recent years, many residents from the region have migrated for the purposes of work, mainly to larger cities (Durres, Tirana) and also abroad. Taking this into consideration it is expected that most families would be tolerant towards people who are coming from outside their region identifying themselves with their social situation. Workers who will be employed are estimated to be around 70 - 80 in number for each Section and will reside in camps outside of the local communities. The impact will only be small and if tensions are created it is expected to be due to the different lifestyles or cultural backgrounds. Having this in mind the impact from influx of temporary workers it is expected to be low. With location of worker's camps at some distances of local settlements and managed movement of the workers in the area, the negative impacts on community tensions should be small and controllable. The impact will cause some adaptation of receptor thus the impact magnitude is estimated to be low.

The Table 7-12 provides the justification of the assessment of impacts.

Table 6-43_ Assessment of impact

Criteria	Assessment	
	Threshold	**Descriptions**
Characterization of Impact	Negative	Impact could worsen the current situation in community tension
Type of Impact	Direct	Construction activities will have direct impact upon receptor
Reversibility	Reversible	The effect caused by impact is reversible. Situation can be returned into previous condition
Geographic Extent	Local	Impact is limited to communities that are on the closest distance to the railway
Time when the impact occurs	Immediate	Effect will occur immediately following project activities
Duration	Short-term	Based on estimation for construction activities duration it is estimated impact to last in medium-term (between two and three years)
Likelihood of appearance	Probable	There is a medium likelihood this impact to occur
Magnitude	Low	Some measurable change in resource or its quality or vulnerability

According to the significance matrix presented in Chapter 4, the initial significance of this impact, without mitigation measures, is ***slight negative***. The impact will result in small change in community tensions, they are not considered to be disruptive to the normal socio-economic conditions.

Community reactions due to the disturbance arising from the construction works

During the construction phase, the community living at or close to the railway will be disrupted and subject to inconvenience by bypasses, closures of local roads, dust, construction noise, increased traffic of heavy vehicles on existing roads, changes in the level of services and interference with emergency services. Occasionally, there will also be disturbance caused by vibration from foundation works and movement by heavy traffic. All this together could cause community reactions.

Estimation of magnitude

The alignment of the railway is passing through inhabited areas, whereas the contractor's facilities will be located at some distance to the settlements. This means that construction activities could have significant impact on residents. On the other hand, the heavy traffic on local roads, the bypasses in addition to dust and noise will have a significant direct impact on communities. The impact will cause loss of resources and/or quality and integrity of receptor. Thus, the impact magnitude is estimated to be high.

The Table 7-13 provides the justification of the assessment of impacts.

Table 6-44_ Assessment of impact

Criteria	Assessment	
	Threshold	**Descriptions**
Characterization of Impact	Negative	Impact could worsen the current situation in community tension
Type of Impact	Direct/Indirect	Construction activities will have both direct and indirect impact upon receptor
Reversibility	Reversible	The effect caused by impact is reversible. Situation can be returned into previous condition
Geographic Extent	Local	Impact is limited to communities that are on the closest distance to the railway
Time when the impact occurs	Immediate	Effect will occur immediately following project activities
Duration	Short-term	Based on estimation for construction activities duration it is estimated impact to last in medium-term (between two and three years)
Likelihood of appearance	Certain	The impact can be considered to have a high likelihood of occurring
Magnitude	High	Loss of quality and integrity of resource

According to the significance matrix presented in Chapter 4, the initial significance of this impact, without mitigation measures is ***large negative***. The impact will result in substantive changes in community tensions.

Operational phase

Community reactions due to the disturbance arising from the operation of the railway

Once the railway is operational, freight and passenger traffic will be diverted from roads to trains. The new railway line will lead to a reduction of negative externalities. The shift in the mode of transport should lead to a potential reduction in traffic accidents on the roads, in air pollution and CO_2 emissions. Communities at or close to the railway line is estimated to be relieved by the noise and vibration mitigation due to the new rehabilitated railway line in comparison with the current situation.

Estimation of magnitude

The railway will continue going through the existing alignment; therefore, the towns and villages along the alignment are familiar with the railway and those impacts that are connected with its operation. However, considering that 1) the railway is partially operational for a very long time, and 2) the residencies and businesses along the railway are relatively new (established during the period that the railway is partly operational), most of the residents/communities may be exposed to the continuous/full operation of a railway for the first time. The impact will cause disturbance of the resource and/or quality and integrity of receptor. Thus, the impact magnitude is estimated to be high.

The Table 7-14 provides the justification of the assessment of impacts.

Table 6-45_ Assessment of impact

Criteria	Assessment	
	Threshold	Descriptions
Characterization of Impact	Negative	Is not desirable
Type of Impact	Direct	Operation will have direct impact upon receptor
Reversibility	Irreversible	The effect caused by impact is irreversible. Situation cannot be returned into previous condition
Geographic Extent	Local	Impact is limited to specific individuals or population groups/communities
Time when the impact occurs	Delayed	Effect delayed and occurs sometime after project activities
Duration	Long-term	Impacts extends throughout operation of railway
Likelihood of appearance	Certain	The impact can be considered to have a high likelihood of occurring
Magnitude	High	Disturbance of quality and integrity of resource

According to the significance matrix presented in Chapter 4, the initial significance of this impact, without mitigation measures is ***large negative***. The impact will result in substantive changes in community tensions.

6.17.1.4 Potential Impacts on Land Use

HSH has commenced **preparatory activities** for the beginning of the expropriation process and has requested the detailed information on the properties affected by the proposed project from the State Cadastre Agency. During the period of preparing this report, it was not possible to obtain official data on Project Affected People (PAPs); these data can be provided only by the State Agency of Cadastre (SAC) in Albania, as the one and only governmental institution, entitled for registering, keeping and disseminating the information.

Although the official communication in this regard was made in due time, and, in addition, the project and beneficiary made every other effort to obtain this information, the expropriation list provided within the "Cadastral Report" includes 229 affected properties associated with a buffer zone from railway axis and other engineering objects with no further information. This list does not define if the area is owned by HSH and does not clarify the type of these properties, e.g. residential houses, warehouses, businesses, agricultural area.

Therefore, the analysis of impacts related to land use and all aspects/factors in this regard, is pending, to be performed at another time in the future. It should be mentioned that there are three families living in the station buildings of Rrogozhine and Lekaj Stations.

The **formal expropriation process** has not been initiated yet. That will happen only when HSH will have the necessary funds for the project's implementation. The valuation of the properties will be done by an independent company, which will be hired by HSH once the necessary funds for the project implementation will be available.

6.17.1.5 Potential Impacts on Employment

6.17.1.5.1 Summary of Resources/Receptors

Employment at local and regional level is an important receptor.

6.17.1.5.2 Assessment of the Sensitivity of Impacts

During establishing the sensitivity of these receptors, the following criteria were applied:

1. Work on site
2. Skilled workers
3. Non-skilled workers
4. Work in trade
5. Work in services
6. Work during operation of railway

For each criterion a scoring value from 0 to 3 was applied with following meaning:

0. – no importance
1. – low importance
2. – medium importance
3. – high importance

The sum of scores will determine sensitivity. The rating of sensitivity was performed on the basis of the following ranges:

0 - 3 - low sensitivity (ls)
4 - 8 - medium sensitivity (ms)
9 - 13 - high sensitivity (hs)
14 - 18 - very high sensitivity (vhs)

Direct employment will have high occurrence sensitivity during the construction and operational phase of railway, especially for the required work on site. The sensitivity of direct employment in regard with the work on site is of high occurrence/importance both for skilled and non-skilled works. Operation of railway will create possibilities for opening jobs in railway infrastructure and transport companies, thus the importance in regards with this criterion is going to be high. Based on importance/occurrence from different criteria it can be concluded that the sensitivity of this sub-receptor is high.

Indirect employment both for constructional and operational phase of railway will be created mainly in trade and with service providers (shops, some crafts services, restaurants, café, bars and similar). The sensitivity of this sub-receptor regarding these criteria is going to be of high occurrence. There may be small possibilities for indirect engagement of skilled and unskilled workers on site (for example for repairing of construction equipment) but sensitivity of this sub-receptor in this regard is going to be with low occurrence. Based on importance/occurrence from different criterions it can be concluded that the sensitivity of this sub receptor is high.

The sensitivity of sub-receptors was assessed according to the described methodology. The results are presented in table on the following page:

Table 6-46_ Sensitivity estimation matrix

Receptor	Work on site	Skilled work	Non-skilled work	Work in trade	Work in services	Work during operation of railway	Sensitivity
Local economy	3	3	3	0	0	2	11
Regional economy	1	1	1	3	3	3	12

The results from sensitivity estimation matrix determined the following:

Table 6-47_ Results from sensitivity estimation matrix

Receptor	Value (Sensitivity)
Direct employment	High sensitivity
Indirect employment	High sensitivity

6.17.1.5.3 Potential Impacts and Likely Significance

The following potential impacts on Employment have been identified for the construction and operational phases of Project:

Construction phase

- Creation of local employment (direct and indirect)

Operational phase

- Creation of employment (direct and indirect) at local and regional level
- Improvement in access to employment opportunities across the region

Construction phase

Creation of local employment (direct and indirect)

The employment benefits during the construction phase are positive, since it relates to the project activities, induced by increased employee spending. Considering that a considerable proportion of the total population is economically inactive, the project will increase opportunities for a bigger percentage of the population by giving them access to employment opportunities. The employment opportunities will be created for both skilled and non-skilled labour in the community. The community has the capacity to absorb the employment opportunities arising during construction phase, when employment will be generated mainly for construction workers.

It is estimated that around 30% of the construction workers will be recruited locally. Meaning that construction works could locally provide 90-100 employments. Gender distributions in various sectors of employment are markedly skewed with women making up the majority of workers in the health, social affairs, and education sectors and men predominating in construction, transport, and communication. Thus, both genders are expected to be engaged within work camps and within administration of Contractors (administrative or engineering staff) or with Supervisor (administrative or engineering staff). For construction of tunnel and bridges skilled workers will be required who would in most cases be permanent employees of the construction companies. A smaller number of local low-skilled jobs may be envisaged. These will include protection and guarding of the construction company's property.

The remaining skilled construction workers will be imported to the area of construction and will reside in labour camps. Normally, the camps include kitchen and dining room and provide medical services. Although the camps will provide for canteens, it is expected that both the camp management and the workers will spend money locally utilizing the local business community for ensuring supplies for the camps and entertainment and other services for the workers.

As previously mentioned, the unemployment level in the area is considerable, and the access to education, training or employment, especially for young people, is rather limited. Economic development will improve overall employment rate and reduce the number of people dependent on state benefits. Tackling this economic exclusion is important for improving the quality of life for the residents.

Thus, a positive spin off effect during the construction period on the local economy is expected.

Estimation of magnitude
It is expected the construction phase will create employment opportunities and will have a high magnitude.

The Table 7-17 provides the justification of the assessment of impacts.

Table 6-48_ Assessment of impact

Criteria	Assessment	
	Threshold	**Descriptions**
Characterization of Impact	Positive	Impacts is improvement of current situation in regards with unemployment, it is desirable
Type of Impact	Direct/Indirect	Construction activities will have both direct and indirect impact upon receptor
Reversibility	irreversible	The effect caused by impact is irreversible. Situation cannot be returned into previous condition
Geographic Extent	National	Impact extends through much of Albania (national construction companies could be engaged)
Time when the impact occurs	Immediate	Effect will occur immediately following project activities
Duration	Short-term	Based on estimation for construction activities duration it is estimated impact to last in medium-term (between two and three years)
Likelihood of appearance	Certain	There is a high likelihood this impact to occur
Magnitude	Medium	Moderate improvement of receptor quality

According to the significance matrix presented in Chapter 4, the initial significance of this impact, without mitigation measures, is ***moderate positive*** as it is expected a limited number of low-skilled jobs. The impact will result in positive changes in employment situation and could result in potential improvements in quality of life.

Operational phase

Creation of employment (direct and indirect) at local and regional level

Following the construction period, it is estimated that a number of people who will find employment within the local communities and within region mainly with the railway operation and maintenance, at the stations and other transport related services will be significant. Activation of the whole corridor, passenger and freight transport will induce many employment positions along the railway line. Direct employment will be created, related with operation and maintenance of railway (on permanent way, on signalization, on loading and unloading and similar). Both genders are expected to be engaged; employees for maintenance could be male, while employees for stations could be female. Additionally, the train travellers are expected to have certain needs that can be fulfilled from the local restaurants, cafeterias, markets etc. Thus, long term business opportunities at the new railway stations are likely to emerge for both genders. All in all, it is estimated that around **hundred people** may find employment with the railway operations, at the stations and with other services linked with transport in addition with servicing travellers' needs.

Expected development of the economy at regional and national level (even beyond national, considering the Corridor VIII) will create many job positions. In the region it is expected to positively influence mainly the development of tourism and agriculture. On the other hand, industrial development areas are expected to have huge importance in jobs creation.

Operation of the whole Corridor VIII will improve and strengthen economic and other kinds of cooperation between North Macedonia, Albania, Italy, Bulgaria and Turkey. This will lead to prosperity of the SEE and it will extend beyond. Beside creation of direct employment possibilities on railway, indirect employment possibilities will occur as a result of increased trade and increased economic activities.

Estimation of magnitude

It is expected the operational phase will create employment opportunities and will have a high magnitude.

The Table 7-18 provides the justification of the assessment of impacts.

Table 6-49_ Assessment of impact

Criteria	Assessment	
	Threshold	Descriptions
Characterization of Impact	Positive	Impacts is improvement of current situation, it is desirable
Type of Impact	Direct/Indirect	Operation of railway will have both direct and indirect impact upon receptor
Reversibility	Irreversible	The effect caused by impact is irreversible. Situation cannot be returned into previous condition
Geographic Extent	Global	Effects extends locally, regionally, nationally and even globally beyond SEE area

Time when the impact occurs	Delayed	Effect delayed and occurs after project activities (during operation of railway)
Duration	Long -term	Impacts extends throughout operation of railway
Likelihood of appearance	Certain	There is a high likelihood this impact to occur
Magnitude	High	High improvement of receptor quality

According to the significance matrix presented in Chapter 4, the initial significance of this impact, without mitigation measures, is ***large positive***. The impact will result in positive changes in employment situation and could result in potential improvements in quality of life.

Improvement in access to employment opportunities across the region

The Railway, as an improved/upgraded transport mode will create a new integrated and interconnected transport network. The network will provide better mobility of workforce not only within the region, but within the wider country as well. The unemployment level, especially amongst young people, and particularly the gender differences in employment and activity rates, are serious concerns not only in the region, but also nationwide. Improvement in access to employment will support Albanian institutions in their efforts to ensure gender equality by implementing all relevant legislation which is already in place. Although both men and women in Albania face grave problems locating suitable employment, there are particular barriers facing women who wish to enter the labour market and obtain jobs. Women are very disadvantaged in the labour market and are economically active at much lower levels than men. There are many reasons for that like lack of time due to family obligation, lack of support services such as affordable childcare that would facilitate balancing work and family responsibilities. One important barrier for entering the labour market is connected with limited possibility for obtaining relevant training or concrete skills that are needed in the area in which they wish to work, but also lack of education, especially for Roma or rural women.

With operation of railway, the central and southern region of Albania will be connected to the national economy and national market. People will be able to look for jobs outside the region and with good and affordable transport they could commute between job and home daily. Thus, the railway will accommodate social inclusion by connecting remote areas, vulnerable groups and minorities, and increasing the accessibility to the transport network.

Estimation of magnitude

It is expected this impact to create large scale or high improvement of access to employment opportunities. Thus, it is estimated that the impact will have high magnitude.

The Table 7-19 provides the justification of the assessment of impacts.

Table 6-50_ Assessment of impact

Criteria	**Assessment**	
	Threshold	**Descriptions**
Characterization of Impact	Positive	Impacts is improvement of current situation, it is desirable
Type of Impact	Direct	Operation of railway will have direct impact upon receptor

Reversibility	Irreversible	The effect caused by impact is irreversible. Situation cannot be returned into previous condition
Geographic Extent	National	Effects extends through Albania
Time when the impact occurs	Delayed	Effect delayed and occurs after project activities (during operation of railway)
Duration	Long-term	Impacts extends throughout operation of railway
Likelihood of appearance	Certain	There is a high likelihood this impact to occur
Magnitude	High	High improvement of receptor quality

According to the significance matrix presented in Chapter 4, the initial significance of this impact, without mitigation measures, is ***large positive***. The impact will result in positive changes in employment situation and could result in potential improvements in quality of life.

6.17.1.6 Potential Impacts on Economy

6.17.1.6.1 Summary of Resources/Receptors

During construction phase it is expected that related construction works will have significant impact especially on local economy, regional economy and national economy. During operational phase, new markets will be opened; new transport alternatives will be available which will significantly impact development of local, regional, national and also European region economy.

6.17.1.6.2 Assessment of the Sensitivity of Impacts

During establishing the sensitivity of these receptors, the following criteria were applied:

1. Business opportunities from contracting contractors and subcontractors
2. Trading opportunities
3. Opportunities for provision of basic and other services for the contractors
4. Increased revenue and taxes (VAT) from construction activities
5. Revenue from railway operation
6. Better productivity and market access and increased competitiveness
7. Economic Attractiveness
8. Tourism boosting

For each criterion a scoring value from 0 to 3 was applied with following meaning:

0. – no importance
1. – low importance
2. – medium importance
3. – high importance

The sum of scores will determine sensitivity. The rating of sensitivity was performed on the basis of the following ranges:

0 – 4 - low sensitivity (ls)
5- 11 - medium sensitivity (ms)
12-18 - high sensitivity (hs)

19-24 - very high sensitivity (vhs)

Local economy has high importance as a sub-receptor when it comes to business opportunities. The sensitivity of the local economy has high importance regarding trading opportunities. Direct and indirect business opportunities will increase significantly for local contractors and especially subcontractors during construction works. Food and some construction materials will be supplied locally and thus increase local trade. The local economy will also experience opportunities for providing skilled services from e.g., craftsmen and the sensitivity will be of high occurrence. Increased revenue and taxes that will be accumulated by construction activities will partly be diverted from the state to the local level. The sensitivity of the receptor in regards with this factor will have medium importance. During operation of railway, revenue from national level will also flow to local level with a sensitivity of medium importance. When the railway is operational, the local economy will have assumed better conditions for increased productivity and improved market access, be more economic attractive for investments and have possibilities for boosting the tourism in the area. Sensitivity of this sub-receptor regarding these criteria is of high importance. Based on importance of the different criteria it can be concluded that the sensitivity of this sub receptor is very high.

Regional economy - due to the limited capacity of local economy it is expected that demand for materials, services and subcontractors will extend to the entire central and southern region of Albania. Sensitivity of this sub receptor regarding all criteria is similar to that for the local economy. Based on importance/occurrence from different criteria it can be concluded that the sensitivity of this sub receptor is very high.

National economy is expected to have a high importance in regards with the business opportunities from contracting companies. Most of the larger construction companies are established at a national level. For some of the material to be used during construction, suppliers from other parts of the country will have to be utilized and thus improve opportunities for trade at national level. This is of high importance. Regarding provision of services, medium occurrence is expected. Sensitivity of national economy in respect of revenue and taxes during construction and later during operation of the railway is of high importance. Most of the taxes will end up in the state budget; part will flow to local authorities. When the railway is operational, the Albanian economy will have improved conditions regarding productivity, market access and competitiveness. Industrial free areas within the region and along the Corridor VIII will be economically more attractive. The sensitivity of sub-receptor in regards with this criterion is medium. In addition, cheaper transport modes will provide possibilities for people to travel more often. It is expected that many tourists from both within the country and from abroad will be attracted to visit places along corridor. The sensitivity of the sub-receptor regarding these criteria is expected to be of high importance. Based on importance/occurrence of different criteria it can be concluded that the sensitivity of this sub receptor is very high.

Global economy will be mostly affected by operational railway of whole corridor VIII. During construction phase it is possible that international contractors will be engaged and huge percentage of material to be imported from neighbouring countries. Sensitivity of this sub-receptor in regards with these criteria has high importance. Global economy may supply some of the construction material and the importance could be estimated as medium. During construction works low importance from revenues and taxes are expected. However global economy sensitivity regarding improved productivity, market access, increased competitiveness, economic attractiveness and tourist boosting will have high importance. Based on importance/occurrence from different criteria it can be concluded that the sensitivity of this sub-receptor is high.

The sensitivity of sub-receptors was assessed according to the described methodology. The results are presented in table in the table below:

Table 6-51_ Sensitivity estimation matrix

Receptor	Business opportunities	Trading opportunities	Provision of basic & other services	Increased revenue and taxes	Revenue from operation	Better productivity / market access / increase competitiveness	Economic Attractiveness	Tourism boosting	Sensitivity
Local economy	3	3	3	2	2	3	3	3	22
Regional economy	3	3	3	2	2	3	3	3	22
National economy	3	3	2	3	3	3	2	3	22
Global economy	3	2	1	1	3	3	2	3	18

The results from sensitivity estimation matrix determined the following:

Table 6-52_ Results from sensitivity estimation matrix

Receptor	Value (Sensitivity)
Local economy	Very high sensitivity
Regional economy	Very high sensitivity
National economy	Very high sensitivity
Global economy	High sensitivity

6.17.1.6.3 Potential Impacts and Likely Significance

The following potential impacts on Economy have been identified for the construction and operational phases of Project:

Construction phase

- Stimulation of economic growth at local levels

Operational phase

- Effects on local economy, regional economy, national economy and European region economy

Construction phase

Stimulation of economic growth at local levels

The local economy will be directly and positively affected. Economic impacts during construction will stem from procurement of goods and services by the Project and induced economic effects of spending by Project staff. The construction workers will obtain most of their food and other necessities from the surrounding area. This will create a potential market for the local agricultural producers, fishermen, craftsmen and other small businesses and local shops. This will increase the incomes of the local people which can be invested in other (productive) activities and be used for domestic needs like medical expenses, refurbishing of houses, acquiring new furniture etc. In summary, while Project construction will result in some economic benefits at the regional and local level, these are expected to be fairly limited due to the small workforce required.

The project will also stimulate local economic activities by contracting local entrepreneurs and sub-contractors, providing trading opportunities for local communities and other small enterprises in the province, providing opportunities for provision of basic and other services for the contractors and immediate community. In general, the types of goods and services required will include:

- Transport, catering, laundry, food supply, security services;
- Supply of construction vehicles and equipment;
- Provision of construction materials including aggregates/sand, concrete, and building materials.

Part of increased revenue and taxes will be redirected to the local communities.

Estimation of magnitude
It is expected that the impacts will result in an improved local economy. Thus, it is estimated that the impact will have high magnitude.

The Table 7-22 provides the justification of the assessment of impacts.

Table 6-53_ Assessment of impact

Criteria	Assessment	
	Threshold	**Descriptions**
Characterization of Impact	Positive	Impacts is improvement of current situation, it is desirable
Type of Impact	Direct	Construction activities will have direct impact upon receptor
Reversibility	Reversible	The effect caused by impact is reversible. Situation can be returned into previous condition
Geographic Extent	Regional	Impact extends across the southern region of Albania
Time when the impact occurs	Immediate	Effect will occur immediately following project activities
Duration	Short-term	Based on estimation for construction activities duration it is estimated impact to last in medium-term (between two and three years)
Likelihood of appearance	Certain	There is a high likelihood this impact to occur
Magnitude	High	High improvement of receptor quality

According to the significance matrix presented in Chapter 4, the initial significance of this impact, without mitigation measures, is ***large positive***. The impact will result in positive changes in employment situation and could result in potential improvements in quality of life.

Operational phase

Effects on local economy, regional economy, national economy and global economy

Local economy

During the operational phase, the local economy will benefit through some employment opportunities with the railway operator, will benefit by opening of restaurants, shops at railway stations, through development of local economic activities like agriculture, tourism, harvesting, which is expected to be intensified due to better access to newly opened markets nationally and regionally. All passengers will save money due to the cheaper transport. All Municipalities in the region have already prepared the Local General Plans and planned for development zones within their general Urban Plans and with available railway transport, these zones will be more attractive for foreign investors. Increased direct investments and green field investments can be expected.

Estimation of magnitude

It is expected the impact on the Local Economy will be of a large scale and result in improvement. Thus, it is estimated that the impact will have high magnitude.

The Table 7-23 provides the justification of the assessment of impacts.

Table 6-54_ Assessment of impact

Criteria	Assessment	
	Threshold	**Descriptions**
Characterization of Impact	Positive	Impact is improvement of current situation, it is desirable
Type of Impact	Indirect	Operational railway will have indirect impact upon receptor
Reversibility	Irreversible	The effect caused by impact is irreversible. Situation cannot be returned into previous condition
Geographic Extent	Local	Impact is limited to specific individuals or population groups/communities at or close to the Railway Corridor VIII-Eastern Section
Time when the impact occurs	Delayed	Effect delayed and occurs sometime after project activity
Duration	Long-term	Impact extends throughout operation of railway
Likelihood of appearance	Certain	There is a high likelihood this impact to occur
Magnitude	High	High improvement of receptor quality

According to the significance matrix presented in Chapter 4, the initial significance of this effect, without mitigation measures, is ***large positive***. The impact will result in substantive changes in global economy. The impact will be sufficiently large to result in improvement of the quality of life not only locally but the effects will extend regionally, beyond Project area.

Regional economy

The region is classified as one of the most developed planning regions in Albania. Moreover, the region is rich with natural resources. Their exploitation could be supported with development of a railway line as an alternative cheap transport solution for tourists. By having the Railway Corridor VIII constructed, the region will have access to transport facilities which can accommodate almost any transportation need of people and goods, and it is likely that this will contribute to the stimulation of economic growth within the region.

There is potential for increasing and intensifying the agricultural production of the region. Small and large farmers can have their agricultural products transported to Durres and Tirana and also to the rest of Europe. Railway will improve the connection between the farmers (producers) and the processing industry.

All municipalities within the region have devoted an area for industrial development. With operation of the railway these areas will become more attractive for domestic and foreign investors, due to the closeness of the sources of raw materials, lower salary costs and good access to markets through the Corridor VIII.

Thus, a new railway link will improve the socio-economic situation within the municipalities of the region.

Region has much potential. Railway transport could help this potential to be utilized in direction of economic growth. As potential economic impacts that could arise within this impact could be considered following: Increased income, changes in wages, improved living standard, etc.

Estimation of magnitude
It is expected the impact on the regional economy will be of a large scale and result in improvement. Thus, it is estimated that the impact will have high magnitude.

The Table 7-24 provides the justification of the assessment of impacts.

Table 6-55_ Assessment of impact

Criteria	Assessment	
	Threshold	**Descriptions**
Characterization of Impact	Positive	Impacts is improvement of current situation, it is desirable
Type of Impact	Indirect	Operational railway will have indirect impact upon receptor
Reversibility	Irreversible	The effect caused by impact is irreversible. Situation cannot be returned into previous condition
Geographic Extent	Regional	Impacts extends across the southern region of Albania
Time when the impact occurs	Delayed	Effect delayed and occurs sometime after project activity
Duration	Long-term	Impact extends throughout operation of railway
Likelihood of appearance	Certain	There is a high likelihood this impact to occur
Magnitude	High	High improvement of receptor quality

According to the significance matrix presented in Chapter 4, the initial significance of this effect, without mitigation measures, is ***large positive***. The impact will result in substantive changes in global economy. The impact will be sufficiently large to result in improvement of the quality of life not only locally but the effects will extend globally beyond Albania.

National Economy

Operation of the railway will promote economic growth by rehabilitating, managing and maintaining the railway transport service to the economy. Railway transport will decrease transport costs in final market price of the products which will lead to bigger competitiveness of national economy abroad, especially in the countries along the Corridor VIII (in the first instance neighbouring countries). Railway Corridor VIII will provide new transport model as integrated and interconnected transport network that will establish effective services to the users in the country (both for passenger and freight traffic). The central and southern region of Albania will be connected to the national economy which will lead to its economic development. The railway will provide social inclusion by connecting remote areas and increasing the accessibility to the transport network.

Estimation of magnitude

It is expected the impact on the National economy will be of a large scale and result in improvement. Thus, it is estimated that the impact will have high magnitude.

The Table 7-25 provides the justification of the assessment of impacts.

Table 6-56_ Assessment of impact

Criteria	Assessment	
	Threshold	**Descriptions**
Characterization of Impact	Positive	Impacts is improvement of current situation, it is desirable
Type of Impact	Indirect	Operational railway will have indirect impact upon receptor
Reversibility	Irreversible	The effect caused by impact is irreversible. Situation cannot be returned into previous condition
Geographic Extent	National or Transboundary	Impacts extends through much or all of Albania
Time when the impact occurs	Delayed	Effect delayed and occurs sometime after project activity
Duration	Long-term	Impact extends throughout operation of railway
Likelihood of appearance	Certain	There is a high likelihood this impact to occur
Magnitude	High	High improvement of receptor quality

According to the significance matrix presented in Chapter 4, the initial significance of this effect, without mitigation measures, is ***large positive***. The impact will result in substantive changes in global economy. The impact will be sufficiently large to result in improvement of the quality of life not only locally but the effects will extend globally beyond Albania.

European Region Economy

Pan European Corridor VIII spans over the South Eastern European area where transportation infrastructure is traditionally weak. As regards railways, the links with neighbouring countries (North Macedonia) is missing. Pan European Corridor VIII is thus a challenging project, requiring additional resources and more international cooperation to expose potential. Corridor VIII is bound to open new, crucial connections between Albania and North Macedonia, and of similar importance for the Italian regions, as well as Black Sea ports. Thanks to the sea links between the Apulian ports and Durres in Albania, and the road-rail connections towards the Black Sea, Corridor VIII will allow a further extension to the east, so as to increasingly extend industrial and commercial cooperation the two shores. A better integration and fostered relationships with South Eastern Europe is a fundamental need and of utmost importance for North Eastern and South-Central Italy.

Finalizing of the whole Corridor VIII will provide possibilities for increased economic and other kinds of cooperation between companies from North Macedonia, Albania, Italy, Bulgaria and Turkey. This will lead to prosperity of the Balkan region. Links already established through Corridor X, it could be expected to be rerouted to Corridor VIII.

Operation of the railway will create significant economic benefits in the region providing a significant boost in the regional economic cooperation.

During operation, the Project will provide wider regional socio-economic benefits as result from savings in journey times for business and personal purposes. In addition, connection from east to the west will create trans boundary possibilities, especially in trade of goods and services and traveling of the people.

Estimation of magnitude
It is expected the impact on the European Regional economy will be of a large scale and result in improvement. Thus, it is estimated that the impact will have high magnitude.

The Table 7-26 provides the justification of the assessment of impacts.

Table 6-57_ Assessment of impact

Criteria	Assessment	
	Threshold	**Descriptions**
Characterization of Impact	Positive	Impacts is improvement of current situation, it is desirable
Type of Impact	Indirect	Operational railway will have indirect impact upon receptor
Reversibility	Irreversible	The effect caused by impact is irreversible. Situation cannot be returned into previous condition
Geographic Extent	Global	Effects extends globally beyond SEE area
Time when the impact occurs	Delayed	Effect delayed and occurs sometime after project activity
Duration	Long-term	Impact extends throughout operation of railway
Likelihood of appearance	Certain	There is a high likelihood this impact to occur
Magnitude	High	High improvement of receptor quality

According to the significance matrix presented in Chapter 4, the initial significance of this effect, without mitigation measures, is ***large positive***. The impact will result in substantive changes in global economy. The impact will be sufficiently large to result in improvement of the quality of life not only locally but the effects will extend globally beyond SEE area.

6.17.1.7 Potential Impacts on Vulnerable Groups

Vulnerable groups in the employment context include young people, women, the Roma and low-income families.

Following the updated information received from the respective municipalities, it was concluded that along the Project alignment there are no Roma groups or communities that are directly affected by the Project. Roma communities, identified in Nishtulla and Rrashbull areas (Durrës Municipality), in Golem Administrative Unit (Kavaja Municipality) and in Gosë Administrative Unit (Rrogozhine Municipality) live at a considerable distance from Project alignment. Therefore, on these communities there will be no particular impact or need for the implementation of special mitigation measures, other than those described in the relevant chapters of the ESIA. No other information related to young people, women of low-income families was collected during the duration of this project.

6.17.1.8 Potential Impacts on Education and Training

6.17.1.8.1 Summary of Resources/Receptors

Education and training of residents in communities at or close to the railway is an important receptor.

6.17.1.8.2 Assessment of the Sensitivity of Impacts

During establishing the sensitivity of this receptor, the following criteria were applied:

1. Possibility for capacity building during construction phase
2. Ability of local young people to commute more easily
3. Increase of employment opportunities
4. Creation of new educational and training centres as a consequence of the economic growth of the area

For each criterion a scoring value from 0 to 3 was applied with following meaning:

0. – no importance
1. – low importance
2. – medium importance
3. – high importance

The sum of scores will determine sensitivity. The rating of sensitivity was performed on the basis of the following ranges:

0 - 2 - low sensitivity (ls)
3 - 6 - medium sensitivity (ms)
7 - 9 - high sensitivity (hs)
10 - 12 - very high sensitivity (vhs)

Sensitivity of education and training in respect of the possibility for strengthening of capacities during construction phase has high importance due to the exposure of local people to new technologies and management methods. Operation of railway will provide possibilities for young people to commute more easily and to increase their possibilities for positioning at the job market. Sensitivity of the receptor in regards with these two criteria is of high importance. With regards to the creation of new educational and training centres as a consequence of the economic growth it is expected that overall development and improvement of quality of life will lead to increased demand for new education centres in the region. Due to this, the sensitivity of education and training in this regard is of high importance. Based on importance/occurrence from different criteria it can be concluded that the sensitivity of this receptor is very high.

The sensitivity of sub receptors was assessed according to the described methodology. The results are presented in table:

Table 6-58_ Sensitivity estimation matrix

Receptor	Possibility for capacity building strengthening	Ability of local young people to commute	Increase of employment	Creation of new educational & training centres	Sensitivity
Education & Training	3	3	3	2	11

The results from sensitivity estimation matrix determined the following:

Table 6-59_ Results from sensitivity estimation matrix

Receptor	Value (Sensitivity)
Education & Training	Very high sensitivity

6.17.1.8.3 Potential Impacts and Likely Significance

The following potential impacts on Education & Training have been identified for the construction and operational phases of the Project:

Construction phase

- Capacity building through training

Operational phase

- Education & training benefits from employment opportunities; and
- Education & training benefits from improved access to education and employment opportunities.

Construction phase

Capacity building through training

It is expected that during the construction phase some level of capacity building will be provided (organized and un-organized) through transfer of new technologies and new skills. This will happen mainly as on-the-job training but also as exposure to modern management and logistics procedures and by working with people having international expertise.

Joint venture co-operation between major contractors (who has the financial capacity to put up the required performance bonds) and local sub-contractors could result in transfer of skills which is expected to result in strengthening of local capacities.

<u>*Estimation of magnitude*</u>

It is expected this impact to create minor benefits on education and training including strengthening of some features or elements education and training. Thus, it is estimated that the impact will have low magnitude.

The Table 7-29 provides the justification of the assessment of impacts.

Table 6-60_ Assessment of impact

Criteria	Assessment	
	Threshold	**Descriptions**
Characterization of Impact	Positive	Impact will improve current situation
Type of Impact	Indirect	Construction activities will have indirect impact upon receptor
Reversibility	Irreversible	The effect caused by impact is irreversible. Situation cannot be returned into previous condition
Geographic Extent	Regional	Impacts extends across southern region of Albania
Time when the impact occurs	Immediate	Effect will occur immediately following project activities
Duration	Short-term	Based on estimation for construction activities duration it is estimated impact to last in medium-term (between two and three years)
Likelihood of appearance	Probable	The impacts can be considered to have a medium likelihood of occurring
Magnitude	Low	Minor improvement

According to the significance matrix presented in Chapter 4, the initial significance of this impact, without mitigation measures, is ***slight positive***. The impact will result in minimal strengthening of capacities.

Operational phase

Education & training benefits from employment opportunities

It is expected that the railway operation will stimulate a large and competitive economy in the central and southern region of Albania, which could provide jobs for every working-age resident and a highly qualified local workforce. Operation of railway as well will create possibilities for direct and indirect employment. At the moment, the area has high levels of unemployment, especially amongst the young people. Details on level of employment and education (including age-groups and gender) in the project area, are provided in Baseline Chapter.

<u>*Estimation of magnitude*</u>

It is expected that there will be large scale or high improvement in the education and training due to employment opportunities. Thus, it is estimated that the impact will have high magnitude.

The Table 7-30 provides the justification of the assessment of impacts.

Table 6-61_ Assessment of impact

Criteria	Assessment	
	Threshold	**Descriptions**
Characterization of Impact	Positive	Impact will improve current situation
Type of Impact	Indirect	Construction activities will have indirect impact

		upon receptor
Reversibility	Irreversible	The effect caused by impact is irreversible. Situation cannot be returned into previous condition
Geographic Extent	Regional	Impacts extends across southern region of Albania
Time when the impact occurs	Delayed	Effects delayed and occurs sometime after project activities
Duration	Long-term	Impacts extends throughout operation of railway
Likelihood of appearance	Certain	The impacts can be considered to have a high likelihood of occurring
Magnitude	High	Large improvement of quality of life

According to the significance matrix presented in Chapter 4, the initial significance of this impact, without mitigation measures, is ***large positive***. The impact should result in improvements potentially on quality of life.

Education & training benefits from improved access to education and employment opportunities

Operation of the railway will improve access to education and employment opportunities not only within central region but nationally. New transport model which is cheaper than existing one will provide possibility to many people who are interested to upgrade their skills in some areas to travel on daily basis to Durres and Tirana, where most of the educational and training centres are located. Accommodation in the town for most of the citizens that comes from other regions is not very acceptable solution due to very high price which they cannot afford. The question of how to reach to the big cities and how to attend to some of the training and educational programmes is at the moment problem for many peoples who are thinking how they could reach their educational and employment potential. Most of them they are aware that access to learning allows individuals to take up work options that provide personal fulfilment, financial independence and enhanced community participation. There are many programs ongoing towards change of qualification for some profiles, in order to provide them with required skill for labour market. Thus, participation in skills and training can be expected to increase; children and young people, males and females will have access to a wider range of academic and vocational courses to raise overall achievement and increase career choices. Local people on that way should become more employable, so that they can share in the employment opportunities in the region.

With functioning of whole Corridor VIII, expected economic development and attractiveness of the region due to raw materials sources will attract companies with specific requirements, which will reflect labour market and will impose need for additional training and education. On that way in order to get and remain in the job market certain required skills should be fulfilled. Thus people (including females, older people, careers, parents returning to work, and those facing other barriers to employment, such as disability, or ill health) will recognize importance for having better education/skills and will use possibilities to upgrade themselves towards being competitive on the labour market, which will most probably increase opportunity for people to get and remain in the job market. Changes in employment and educational area will change the existing tendency for females to focus on traditional "women's work" which often pays less or is less likely to result with high earning potential and will change attitudinal issues related to a lack of confidence in one's ability to open a business and general hopelessness about personal economic prospects.

Estimation of magnitude

It is expected that there will be large scale or high improvement in the education and training due to improved access. Thus, it is estimated that the impact will have high magnitude.

The Table 7-31 provides the justification of the assessment of impacts.

Table 6-62_ Assessment of impact

Criteria	Assessment	
	Threshold	**Descriptions**
Characterization of Impact	Positive	Impact will improve current situation
Type of Impact	Indirect	Construction activities will have indirect impact upon receptor
Reversibility	Irreversible	The effect caused by impact is irreversible. Situation cannot be returned into previous condition
Geographic Extent	National	Impacts extends through much or all of Albania
Time when the impact occurs	Delayed	Effects delayed and occurs sometime after project activities
Duration	Long-term	Impacts extends throughout operation of railway
Likelihood of appearance	Probable	The impacts can be considered to have a medium likelihood of occurring
Magnitude	High	Large scale of improvement of quality of life

According to the significance matrix presented in Chapter 4, the initial significance of this impact, without mitigation measures, is ***large positive***. The impact should result in potential improvements on quality of life.

6.17.1.9 Potential Impacts on Communities' Quality of Life

6.17.1.9.1 Summary of Resources/Receptors

Communities which are located at or close to the railway are an important receptor. The quality of the inhabitants' lives will potentially be seriously affected both during construction of the railway due to dust, noise, vibrations, impacts to infrastructure, safety issues and alteration of the landscape as well as during the operational phase of the railway which will expose the inhabitants to noise and vibrations in addition to electromagnetic fields. The communities close to the railway will also be potentially affected by safety hazards and an altered landscape while most other communities in the region will potentially experience improvement in their quality of live following the construction of the railway.

The receptors of potential impacts to infrastructure are not only the settlements near construction activities but also users of the infrastructure that depend on local services and infrastructure including the utilities or the administration which manage affected infrastructure.

6.17.1.9.2 Assessment of the Sensitivity of Impacts

During establishing of the sensitivity of the community to impacts on their quality of life the following criteria were applied:

1. Location of influence
2. Awareness of contractor/s
3. Awareness of rail operator
4. Awareness of community
5. Awareness of administration
6. Awareness of third-party operators

For each criterion a scoring value from 0 to 3 was applied with following meaning:

0. – no importance
1. – low importance
2. – medium importance
3. – high importance

The sum of scores will determine sensitivity. The rating of sensitivity was performed on the basis of the following ranges:

0 - 3 - low sensitivity (ls)
4 - 8 - medium sensitivity (ms)
9 - 13 - high sensitivity (hs)
14 - 18 - very high sensitivity (vhs)

Quality of life sensitivity regarding the location of influence has high importance. It can be expected that the quality of life could be seriously impaired for the communities located at or close to the railway during construction and operation of railway. However, during operation, the quality of life within whole central and southern region of Albania will be improved. Awareness of contractor/s and third-party operators during construction, railway operator during operation and awareness of administration both in the construction and operational phases has high importance. It’s very important that communities, contractor/s, operator and administration are fully aware of potential risks and impacts that project activities could have on quality of life. Based on importance from different criteria it can be concluded that the sensitivity of this receptor is very high.

The sensitivity of the receptor was assessed according to the described methodology. The results are presented in table:

Table 6-63_ Sensitivity estimation matrix

Receptor	**Location of influence**	**Awareness of contractor/s**	**Awareness of rail operator**	**Awareness of community**	**Awareness of administration**	**Awareness of third-party operators**	**Sensitivity**
Quality of life	3	3	3	3	3	3	18

The results from sensitivity estimation matrix determined the following:

Table 6-64_ Results from sensitivity estimation matrix

Receptor	Value (Sensitivity)
Quality of life	Very high sensitivity

6.17.1.9.3 Potential Impacts and Likely Significance

Potential impacts on Communities' Quality of Life have been identified for the construction and operational phases of the Project:

Construction phase

- Deterioration of quality of life due to the overall presence of annoying construction works and activities: dust emissions, high noise level, vibrations, disruption of utility services, safety, etc.

Operational phase

- Deterioration of quality of life due to the presence of railway operations: high noise, vibration and electromagnetic levels in houses close to the tracks, safety, etc.
- Improvement in quality of life due to better access to the larger towns and their health services, education and training centres, recreational facilities, etc.; improved economic conditions, higher levels of employment, etc.

The majority of the identified factors have already been assessed separately under the Environmental Impact Assessment Section. Thus, the remaining issue, i.e., safety and disruption of utility services will be assessed in the following. Moreover, this assessment should be read in connection also with the previous chapter related to Potential Impacts on Community Health, Safety and Security.

Construction phase

Deterioration of quality of life due to the overall presence of annoying construction works and activities – safety factor

The majority of construction activities along the railway will not produce safety risks to the residence due to the distance of construction site to most of the residences. Construction works on or adjacent to the railway can affect the safety of personnel, passengers or the general public, if not managed effectively. Especially dangerous are areas with moving heavy machinery and construction sites. It is a requirement that such work is managed with a level of competence which ensures safety at all times and compliance with all relevant safety legislation.

Construction traffic will have temporary impacts on the traffic network of the area, generating increased traffic risks and accidents. Current road users include local residents, passengers to North Macedonia, Albania, Italy, Bulgaria and Turkey and those accessing the area for recreation. To ensure public safety special traffic regime must be applied.

Estimation of magnitude

Most of constructions activities as sources of safety risks will be located outside the settlements. However, construction traffic will be present on regional and local roads. Due to this, the impact will cause partial loss in quality of life but it will not adversely affect the integrity. Thus, the impact magnitude is estimated to be medium.

The Table 7-34 provides the justification of the assessment of impacts.

Table 6-65_ Assessment of impact

Criteria	Assessment	
	Threshold	**Descriptions**
Characterization of Impact	Negative	Impact could create worsening over the current situation in quality of life
Type of Impact	Direct	Construction activities will have direct impact upon receptor
Reversibility	Reversible	The effect caused by impact is reversible. Situation can be returned into previous condition
Geographic Extent	Local	Impact is limited to communities that are on the closest distance to the railway
Time when the impact occurs	Immediate	Effect will occur immediately following project activities
Duration	Short-term	Based on estimation for construction activities duration it is estimated impact to last in medium-term (between two and three years)
Likelihood of appearance	Certain	There is a high likelihood this impact to occur
Magnitude	Medium	Partial loss of resource

According to the significance matrix presented in Chapter 4, the initial significance of this impact (including all factors), without mitigation measures, is ***moderate negative***. The impact may be sufficiently large to result in diminishing the quality of life.

Deterioration of quality of life due to the overall presence of annoying construction works and activities – disruption of utility services

The railway route will inevitably cross a number of roads and infrastructures with important functions for local stakeholders. Impacts to infrastructure will occur mainly during construction activities across roads and other infrastructure such as irrigation and drainage systems.

In specific, the current stage of design foresees crossing of the railway with approx. 7 local-urban roads, 3 urban-secondary roads, 1 national-interurban road and 5 local-interurban roads, as well as 60 drainage canals. The Project will also upgrade existing or construct new access roads where necessary.

Most vulnerable to impacts to infrastructure are small scale agricultural businesses or households that depend on infrastructure to water and access their land, and elderly and sick individuals living in settlements affected by infrastructure disruption impacts.

Important impact to infrastructure includes temporary loss of its function. Access and services interruption, if poorly managed, could potentially adversely affect local settlements and local traffic (e.g. piped water restrictions, inability to pass roads in an emergency etc.), and could impact on income and livelihoods where irrigation systems are disrupted.

Estimation of magnitude

The railway will cross approx. 16 roads of different significance (i.e., local, regional or major). However, the Project is committed to maintaining the existing road network open for public use throughout construction and to put diversions in place should construction activities require temporary closure of a roadway to construct the railway crossing. This is of particular importance for settlements where the road that is being crossed by the railway is the only/ main access in/ out of the village (i.e., no alternative access routes exist).

Crossing of third-party surface or underground utility supply lines, e.g., water pipes, irrigation channels or sewage discharge pipes will be crossed by established construction methods. For each crossing, a dedicated **Crossing Agreement** will be made with the utility/ owner. Any disruption to utilities will depend on the crossing method. The crossing method, along with provisions or limitations will be determined in collaboration with the relevant authority. Thus, short term interruptions might occur (similar to repair works of ruptures of public water supply lines) and the affected stakeholders and local population will be informed ahead of construction by local announcements accordingly.

Where utility facilities exist sufficiently close enough to the Project works, and there is sufficient supply capacity, services and utilities (i.e. water supply, wastewater and sanitation services, electricity supply, potable water supply, and solid waste management) will be purchased from local suppliers and utility companies will be commissioned to extend transmission lines or water pipes to worksites. This may result in some short-term planned disruption to water supplies or electricity services. Where local capacity is insufficient, contractors will establish their own temporary stand-alone services on site to avoid increasing pressure on existing utility supplies.

Due to the above, the impact will cause partial loss in quality of life but it will not adversely affect the integrity. Thus, the impact magnitude is estimated to be medium.

The Table 7-35 provides the justification of the assessment of impacts.

Table 6-66_ Assessment of impact

Criteria	Assessment	
	Threshold	**Descriptions**
Characterization of Impact	Negative	Impact could create worsening over the current situation in quality of life
Type of Impact	Direct	Construction activities will have direct impact upon receptor
Reversibility	Reversible	The effect caused by impact is reversible. Situation can be returned into previous condition
Geographic Extent	Local	Impact is limited to communities that are on the closest distance to the railway
Time when the impact occurs	Immediate	Effect will occur immediately following project activities
Duration	Short-term	Based on estimation for construction activities duration it is estimated impact to last in medium-term (between two and three years)

Likelihood of appearance	Certain	There is a high likelihood this impact to occur
Magnitude	Medium	Partial loss of resource

According to the significance matrix presented in Chapter 4, the initial significance of this impact (including all factors), without mitigation measures, is ***moderate negative***. The impact may be sufficiently large to result in diminishing the quality of life.

Operational phase

Deterioration of quality of life due to the presence of railway operations – safety factor

The operational railway will significantly change old society patterns in regards with transport culture. Communities along the railway will be exposed to safety risk related with train operation especially if they do not obey the traffic rules. Railway crossing accidents are the greatest health hazard from trains for the general public. In some cases, despite well marked crossings, accidents do happen due to the carelessness of passengers and railway workers. People are killed and injured because they are trespassing or vandalizing the railway. The railway is not a safe place for children and young people to play and it is not safe for adults to take short cuts across the rails.

During diesel traction risks could arise due to fires that could happen due to inappropriate handling with fuel (near train or storage) both by railway workers and passengers.

During electric traction, trains powered by electricity cannot be ever switched off. Electricity on overhead power lines can jump and arc, so person do not have to necessarily touch them to be injured or even killed. The “third rail” is really an electricity line and so strong that if touched by a person he/she will stick to it like glue and not be able to get off.

Estimation of magnitude

Operation of the railway will create many potential risks to community safety which could affect quality of life. It is estimated that the impact will have high magnitude due to significant risks to community safety and impairment of Quality of life.

The Table 7-36 provides the justification of the assessment of impacts.

Table 6-67_ Assessment of impact

Criteria	Assessment	
	Threshold	**Descriptions**
Characterization of Impact	Negative	Impact is not desirable
Type of Impact	Indirect	Indirect effect upon receptor
Reversibility	Irreversible	The effect caused by impact is irreversible. Situation cannot be returned into previous condition
Geographic Extent	Local	Impact is limited to communities that are on the closest distance to the railway
Time when the impact occurs	Delayed	Effect delayed and occurs sometime after project activity
Duration	Long -term	Impacts extends throughout operation of railway
Likelihood of	Certain	There is a high likelihood this impact to occur

appearance		
Magnitude	Medium	Loss of receptor and/or quality and integrity of receptor

According to the significance matrix presented in Chapter 4, the initial significance of this impact, without mitigation measures, is ***moderate negative***. The impact will present significant risks to community safety.

Improvement of quality of life due to changes in economic well-being as a result of the Project, better access to the larger towns and their health services, education and training centres, recreational facilities, from employment opportunities, etc.

Operation of the railway will significantly improve quality of life of many aspects. The railway will not just create jobs in the railway sector, but also in other sectors of economy. Transport costs for moving goods from one place to another will be reduced. This in turn means that the people who made these goods could sell them cheaper. Once goods become cheaper more people can afford to buy them and more can be produced which will create more jobs. Quality of life will be improved through increased financial income, possibility to have better access to the larger towns and their health services, to educational and training centres, to recreational facilities etc.

In providing new opportunities for people to travel, railway will help to break down old cultural divisions and expand social exchange for ordinary people. The railway station can develop as the place where people meet and mingle the starting and arrival point for journeys to work, the country, the city and the wider world. The station could be treated as a gateway through which individuals could expand their network of social exchange beyond their town and village to the wider world. Railway brings diverse communities and regions together. In this process, it will help to diminish regional differences and, at the same time, they advance the process of urbanization by breaking down the distinction between town and country. Operation of railway will help for social inclusion between different regions of Albania.

More details on this factor are provided previously in the Chapter related to Potential Impacts on Local Economy.

Estimation of magnitude

It is estimated that improvement of economic wellbeing as a result of operational railway will impact the quality of life with high magnitude, causing large scale or high improvement of receptor quality.

The Table 7-37 provides the justification of the assessment of impacts.

Table 6-68_ Assessment of impact

Criteria	Assessment	
	Threshold	Descriptions
Characterization of Impact	Positive	Impact is desirable
Type of Impact	Indirect	Indirect effect upon receptor
Reversibility	Irreversible	The effect caused by impact is irreversible. Situation cannot be returned into previous condition

Geographic Extent	Regional	Impacts extends across southern region of Albania
Time when the impact occurs	Delayed	Effect delayed and occurs sometime after project activity
Duration	Long -term	Impacts extends throughout operation of railway
Likelihood of appearance	Certain	There is a high likelihood this impact to occur
Magnitude	High	Large scale or high improvement of receptor quality

According to the significance matrix presented in Chapter 4, the initial significance of this impact, without mitigation measures, is ***large positive***. The effect is likely to be important at a regional to national level contributing in achieving national objectives by improving quality of life.

6.17.1.10 Summary of Social Impacts

The following table presents the summary of impacts that are assessed to have negative effects (related to community health & safety and community tensions) on the affected local communities:

Table 6-69_ Summary of social impacts

Indicators (Social Impacts)	**Description of Impact on Local Community**	**Summary of Magnitude of Impact (on local community)**
Community Health & Safety	Project's activities related to the construction of the railway line may increase the potential for community exposure to health, safety and security issues. Health concerns includes exposure to diseases arising from temporary or permanent changes in population; exposure to hazardous materials during construction and transport of raw and finished materials. Safety concerns relate to risk for accidents related to movement of heavy vehicles during construction. During operation health concerns related to increased risks for accidents near railway crossings cannot be overlooked. Following main impacts were assessed: **Construction phase** • Impacts from the influx of temporary workers	Due to the high level of unemployment in the region, it is expected during construction works most of the employment will be local workers who are coming from the affected communities. Having this in mind the impact from influx of temporary workers is expected to be limited. Location of worker's camps at some distances of local settlements, limited and managed movement in the area will decrease the negative impacts arisen from

	• Impacts from increased community exposure to disease • Impacts from increased traffic and type of traffic on local roads during construction • Safety issues associated to the entrance of non-authorized people in the construction site **Operational phase** • Improvement of access to better health services located in larger towns/cities • Safety issues associated to crossing of rail track	different kind of conflicts between temporary workers and local community. The impact will cause only alteration of receptor thus the impact magnitude is estimated to be **low negative.** Due to the high level of unemployment in the region a big percentage of unqualified construction workers will be from within the region. Still, a risk of increased community exposure to disease persists, especially to communicable diseases. This impact is expected to result in loss of quality and integrity of receptor thus the impact magnitude it is estimated to be **high negative**. Significantly increased traffic especially with heavy mechanization required for construction activities will change normal traffic which the local communities are used to. This will result in increased risks for accidents and injuries. Due to the loss of quality and integrity of receptor the impact magnitude is estimated to be **high negative**. Valuable equipment and material for construction will be located on site. This will result in potential for encouraging the entrance of non- authorized person to the construction site. Due to the loss of integrity of the receptor the impact magnitude can be estimated to be **high negative**. New alternative and cheaper transport will largely improve the receptor quality thus it can be estimated the magnitude of this impact to be **high positive.** Crossing of railway tracks could be considered as significant risk to community health and safety resulting in loss of community lives. Effect will have **high negative** magnitude and will largely change receptor quality.
Community Tensions (due to influx of temporary workforce, disturbance from the Project etc.)	Presence of temporary workers from outside the region with different cultural and social background, changes in way of life due to the construction activities (longer time for transport, heavy transport, worker camps, loss of land, changes in agricultural production, limited movement within construction area	The impact will be insignificant and if occurs it will be due to the different lifestyles or cultural backgrounds. Having this in mind the impact from influx of temporary workers it is expected to be **low negative.**

	and similar), operation of railway could be a suitable base for increasing community tensions.	

6.17.2 Mitigation Measures

6.17.2.1 Introduction

This Chapter covers detailed appropriate mitigation measures to address predicted negative effects and enhancement measures to maximise anticipated benefits and determine significance of residual effects after consideration of the effectiveness of the design and committed mitigation measures. Therefore, this stage of the assessment determines the likely significance of any residual effects following the application of mitigation measures (i.e., Significance of Effects (with mitigation)) by considering the Significance of Effects (without mitigation) along with the probable success of mitigation measures.

6.17.2.2 Community Health, Safety and Security

6.17.2.2.1 Mitigation Measures

Construction phase
During the construction phase, impacts will occur as a result of exposure to diseases arising from temporary or permanent changes in population, exposure to hazardous materials during construction and transport of raw and finished materials, safety concerns related to risk of accidents related to movement of heavy vehicles during construction. Security can be threatened if safeguard personnel engaged at construction site or contractor's facilities are involved in past mistreatments and if they are not trained adequately in the use of force (tactics and equipment).

In order to minimize the negative impacts the following measures will be taken before and during construction:

- Construction work shall commence on site only when the **Health & Safety (H&S) Plan** has been adequately developed by the Contractor and accepted by HSH's Representative;
- **Emergency Preparedness and Response Plan** will be developed prior to construction works;
- **Traffic Management Plan** will be developed for safe access to construction sites with minimum negative impact on the existing roads and in parallel to ensure community safety and easy access to their properties (homes, land, gardens);
- For traffic control and safety, the information about the project activities will be announced through the local radio/TV for carefully driving (low speed) near the working areas. HSH and the Contractor/s will openly and transparently inform residents of the affected places and villages for planned activities that follow quarterly;
- The traffic flow through the site and within the urban areas will be coordinated with the responsible traffic engineers in the municipalities;

- An **Emergency Plan** will be developed, including to cover for the management of cases of incidents during the transportation of raw materials/hazardous substances;
- **Community health and safety educational program** will be developed to inform and build capacity of the local community and drivers on potential adverse impacts during the construction;
- Workers will receive training and guidance in how to avoid conflicts with the local community members and sign a labour code of conduct, in order to avoid creating conflicts with the local social environment;
- Avoidance of unauthorized entry into contractor's facilities will be considered in their design and siting. The design, layout and site location of facilities should facilitate natural surveillance by the safeguards engaged by Contractor/s;
- Adequate selection of qualified security guards with appropriate training;
- Contractor will have to commit to investors that any material damage made by workers on local houses, buildings and other infrastructure will be subject to fair compensation;
- All necessary permits will be obtained prior to the start of construction phase from responsible institutions responsible for urban planning, communal works, forestry management, water protection, electricity and telecommunication, natural gas supply network and cultural heritage protection;
- The designer and Contractor/s will take into consideration all proposed preventive, mitigation and compensation measures included within the ESIA.

Operational phase

During operation, community safety will be mainly endangered from the increased risks for accidents from unauthorized crossing of railway and electrification.

In order to minimize the negative impacts the following measures will be taken before and during the operational phase:

- Designing of railway level crossings will be with overpasses and underpasses;
- Fencing will be applied to prevent trespassing/ illegal crossings as a primary mitigation (already incorporated into the detailed design)
- Adequate warning devices will be installed to warn pedestrians that a train is approaching; special attention will be given to stations
- Community health and safety educational program will be developed and implemented;
- HSH will undertake a series of public relation activities in order to inform local citizens, passenger and workers about the dangers of railway operation and related activities with passing the railway, trespass and vandalism and to emphasize necessity traffic rules and regulations to be obeyed by everybody;
- HSH will run and support community activities, including school visits, safety centres, diversionary activities and communications programs;
- Information on safety performance (relating to both accident investigations and overall statistics) will be made publicly available. Safety performance and other safety related data will be developed;
- Methodology for risk assessment to be developed by HSH/Contractor;
- Making information on the railway publicly accessible - for example by release to a website or newspapers.

6.17.2.2.2 Assessment of Residual Effects

Table 7-39 summarizes the residual effects arising from the Project construction and operational phases.

Table 6-70_ Residual Effects – Community Health, Safety and Security

Social Aspect and Potential Impact(s)	Magnitude of Impact (without mitigation)	Significance of Effect (without mitigation)	Probable Success of Mitigation	Magnitude of Impact (with mitigation)	Significance of Residual Effect (with mitigation)
Construction Phase					
Impacts from influx of temporary workers	Low negative	Slight negative	High	Low negative	Neutral/ Slight negative
Impacts from increased community exposure to disease	High negative	Large negative	Moderate	Low negative	Moderate negative
Impacts from increased traffic and heavy vehicles on local roads during construction	Medium negative	Moderate negative	High	Low negative	Slight negative
Safety issues associated to the entrance of non-authorized people on the construction site	Medium negative	Moderate negative	High	Low negative	Neutral
Operational Phase					
Impacts from better access to the larger towns and health services located in larger towns/cities	High positive	Large positive	Moderate	High positive	Large positive
Safety issues associated with crossing of rail track	High negative	Large negative	Moderate	Low negative	Slight negative

6.17.2.3 Community Tensions

6.17.2.3.1 Mitigation Measures

Construction phase

During the construction phase the presence of a number of temporary workers from outside of the region in the local communities could increase community tensions. Different cultural and social background of the workers compared with the local people could be a reason for potential issues to occur (e.g., verbal conflicts, written and oral threats and even physical violence). This in combination with the disruption to normal life of the local people due to the construction activities creates a ground for increased community tension. The potential disruption to normal life includes: loss of livelihood and land, changes in agricultural production, increased transportation time, heavy vehicles on local roads, restricted movement within construction area, presence of workers camps within the community etc.

Awareness of administration (local authorities, media, NGOs) has high importance for decreasing verbal tensions. It is very important that both the community and the administration are fully aware of the potential risks and impacts that project activities could have on community tensions and to act towards their avoiding and mitigating.

In order to minimize negative impacts, the following measures will be taken before and during construction:

- Workers will receive training and guidance in how to avoid conflicts with the local community members and sign a labour code of conduct, in order not to create conflicts with the local social environment;
- Worker camps will be located outside the communities;
- **Local Workforce Recruitment Plan** will be developed in order to assure employment of as much as possible local workforce;
- Limited regime of movement of workers in the area around the construction sites. Mode of movement must be well organized and defined by agreement between HSH and Contractor/s;
- Strengthening of public/administration awareness (local authorities, media, NGOs) has high importance for decreasing community tensions. Local authorities must be capable for handling increased grievances from the residents towards disturbance of their normal way of leaving. Public to be acknowledging for disruptions that the construction works may cause to the typical way of leaving in the area.

Operational phase

During the operational phase there will be some reaction of the community related to the increased risks for accidents on railway crossings. Communities at or close to the railway line will mainly be disturbed by noise and vibration caused by railway continuous/full operation, but in lower levels than the existing ones. This is expected to be more in the beginning until they have adapted to the changed living conditions associated with railway. Mitigation measures proposed for Community Health, Safety and Security and mitigation measures elaborated under Quality of Life (including the installation of noise mitigation works) cover impacts related to the community reaction to the upgraded operation of railway.

6.17.2.3.2 Assessment of Residual Effects

Table below summarizes the residual effects arising from the Project construction and operational phases.

Table 6-71_ Residual Effects – Community Tensions

Social Aspect and Potential Impact(s)	Magnitude of Impact (without	Significance of Effect (without	Probable Success of Mitigation	Magnitude of Impact (with mitigation)	Significance of Residual Effect (with

	mitigation)	mitigation)			mitigation)
Construction Phase					
Effects from influx of workforce into local communities	Low negative	Slight negative	Moderate	Low negative	Neutral/ Slight negative
Community reactions due to disturbance arising from the construction works	High negative	Large negative	High	Medium negative	Moderate negative
Operational Phase					
Community reactions due to disturbance arising from operation of railway	High negative	Large negative	Moderate	Medium negative	Moderate negative

6.17.2.4 Land Use

HSH has commenced **preparatory activities** for the beginning of the expropriation process and has requested the detailed information on the properties affected by the proposed project from the State Cadastre Agency. During the period of preparation of the ESIA study, it was not possible to obtain official data on Project Affected People (PAPs) as explained in Section 6.17.1.4.

The formal **expropriation process** has not been initiated yet. That will happen only when HSH will have the necessary funds for the project's implementation. The valuation of the properties will be done by an independent company, which will be hired by HSH once the necessary funds for the project implementation will be available.

Although the analysis of impacts related to land use and all aspects/factors in this regard (including resettlement) is pending and expected to be performed at another time in the future, in order to mitigate the expected impacts, the following mitigation measures are proposed:

Construction phase
In order to minimize the expected negative impacts, the following measures will be taken before and during construction:

- ***Detailed survey*** needs to be undertaken in order to understand the detailed situation with regard to land take, taking into consideration also those persons without legal rights over properties and belongings;
- ***Census*** will be conducted in order to facility the process and successful outcomes of resettlement and/or livelihood restoration;
- ***Resettlement Action Plan or Land Acquisition and Resettlement Action Plan (LARP)*** has to be prepared; The Consultant has carried out a short Socio-economic Survey on August 18, 2021 in Rrogozhina Municipality for the directly affected people and households that live in the station buildings. HSH needs to cooperate with the Municipality of Rrogozhine, concerning the resettlement of three families living in Rrogozhina and Lekaj station buildings;

- HSH shall ensure that the affected families are ***duly compensated*** for all their belongings and expenses connected with being resettled in accordance with the LARF and RAP;
- ***Additional assistance*** to be provided to the people who will be resettled for restoring their standards of living and further improve them where possible;
- With regards to the loss of gardens and agricultural production due to temporary land loss, ***owners will be compensated*** (any material damage proved to have been caused to local houses, buildings and other infrastructure [including access roads, where applicable] by the works, will be compensated for and subject to repair on a timely basis) according to the RAP;
- ***Land also needs to be reinstated/restored*** through intentional activities to help restore it its pre-construction conditions. Measures should correspond to the level of scale disturbances. It will include erosion control measures, re-contouring the land, replacing the topsoil, re-vegetation, restoration of habitats, regaining its previous use. Review and assessment of the additional impacts and identification of the appropriate mitigation measures will be done by HSH and will be implemented by the Contractor;
- Temporary land take from sensitive land uses ***will be avoided as far as possible***. Any land take which goes beyond that assessed in the survey or results in additional impacts which could be of a significant nature will be reviewed and appropriate mitigation measures identified and implemented.

Operational phase

During the operational phase some of the changes that occur during construction phase should return the livelihoods of temporarily affected people to their previous condition. Most of the land that was used for construction activities will be returned to previous conditions. With construction of the railway line movement of the residents from communities at or close to the railway line will be forbidden within the area of railway belt. Access to this area will be treated as moving on 'private property' and will be illegal and life threatening. Residents will not be able to undertake their agricultural, livestock and recreational activities within this area.

In order to minimize the negative impacts, the following measures will be taken before commencement and/or during operation:

- Public Information notices - HSH through different kind of media should assure that residents from communities along the railway are duly informed for operation of railway and changes in movement in the area caused by its operations like: forbidden crossing of railway belt, forbidden movement and undertaking different activities within railway area, etc.;
- Public awareness initiatives - HSH should undertake different initiatives together with Local Government for increasing the public awareness (through school visits, safety centres, diversionary activities and communications programs);
- Safety barriers (fencing) and signage to prevent access to railway belt which could endanger residents from the communities at or close to the railway line.

6.17.2.5 Employment

6.17.2.5.1 Enhancement Measures

Construction phase
The employment benefits during the construction phase are positive since they relate to the project activities and not only due to created employment opportunities but as well due to increased employee spending.

In order to maximize the positive impacts, the following measures should be undertaken before and during construction:

- **Local recruitment plan** to be prepared and implemented, when possible and when required skilled workforce is locally available, employment of local workforce to be preferred
- Contractors will be required to develop a **purchasing strategy** that stipulates how regional and local purchase of goods will be optimized. The purchasing strategy will be required to adhere to EU regulations as well as the Bank’s policies and procedures. Agreed measures will be monitored and reported to the authority in charge (including works supervisor).
- **Engagement of woman workforce** to be equally considered, where appropriate and advertise these opportunities accordingly

Operational phase
During operational phase, possibilities for direct employment related with the railway operation will be created. Auxiliary services connected with the railway operation will create indirect possibilities for employment. Expected overall economy development will create new labour demand, not only locally but within central region of Albania and nationally. Development of some economic sectors will bring changes on labour markets such as employment substitution by some profiles and an increase in the demand for other profiles.

In order to maximize the positive impacts, the following measures should be undertaken during operational phase:

- Labour market needs to increase its flexibility and adjust to new demand on the market through restructuring;
- Improving the overall employment rate and having fewer people dependent on state benefits;
- Active labour mobility to be supported, rigidity of labour market to start to change;
- Good quality, accessible and affordable childcare to be available assuring on that way active participation of female in employment opportunities;
- Individuals, companies, local authorities and the government should work actively for the enhancement of labour's knowledge and skill in contributing to the good performance of economy;
- Albania should attach importance to policies designed to enhance the quality of employment;

- Association of Albania within EU market will intensify the progress in globalization, technological innovation and deregulation, nationally and within Western Balkans region.

6.17.2.5.2 Assessment of Residual Effects

Employment (direct and indirect), locally, within central region of Albania and nationally have high sensitivity on impacts that will be caused by construction and operation of railway.

Table 7-41 summarizes the residual effects arising from the Project construction and operational phases.

Table 6-72_ Residual Effects – Employment

Social Aspect and Potential Impact(s)	Magnitude of Impact (without mitigation)	Significance of Effect (without mitigation)	Probable Success of Mitigation	Magnitude of Impact (with mitigation)	Significance of Residual Effect (with mitigation)
Construction Phase					
Creation of local employment (direct and indirect)	Medium positive	Moderate positive	Moderate	High positive	Large positive
Operational Phase					
Creation of employment (direct and indirect) at local, regional, national and global level (Western Balkans and beyond SEE area)	High positive	Large positive	Moderate	High positive	Large positive
Improvement in access to employment opportunities across the region	High positive	Large positive	Moderate	High positive	Large positive

6.17.2.6 Economy

6.17.2.6.1 Enhancement Measures

Construction phase

During construction phase it is expected that related construction works will have significant positive impacts on local, regional, national and European/global economy.

In order to maximize the positive impacts, the following measures should be undertaken before and during construction:

- Inform people in a timely manner about the possible impacts on economic activity in surrounding areas and expected timings of impacts, which will enable them to plan and prepare. The perception of competition is one driver of local economic development activity and its influence, while observable, may be exaggerated. Increased demand on the market will lead to creation of competition especially on local market. Legislation in force ensures open market and free competition among all subjects which will enhance positive impacts from construction activities especially on local economy.

Operational phase

During operational phase, new markets will be opened; new transport alternatives will be available which will significantly impact development of local, regional, national and European/global economy.

- Central and local authorities must undertake activities for attracting direct foreign investments (activation of industrial development areas, green field investments or reactivation of closed capacities related agriculture, tourism, etc.). In this direction country has enacted legislation that not only ensures a generally equal footing for foreign investors with their domestic counterparts, but also provides numerous incentives to attract such investment.
- The road of Albanian towards the EU will significantly contribute also towards integration of Albanian economy into European economy and wider which will lead to overall development of economy not only within the country but within the Balkans region and furthermore.

6.17.2.6.2 Assessment of Residual Effects

Table 7-42 summarizes the residual effects arising from the Project construction and operational phases.

Table 6-73_ Residual Effects – Economy

Social Aspect and Potential Impact(s)	Magnitude of Impact (without mitigation)	Significance of Effect (without mitigation)	Probable Success of Mitigation	Magnitude of Impact (with mitigation)	Significance of Residual Effect (with mitigation)
Construction Phase					
Stimulation of economic growth at local levels	High positive	Large positive	Moderate	High positive	Large positive
Operational Phase					
Effects on local economy	High positive	Large	Moderate	High positive	Large positive
Effects on central and southern Albanian economy	High positive	Large	Moderate	High positive	Large positive
Effects on National economy	High positive	Large	Moderate	High positive	Large positive
Effects on European/Global economy	High positive	Large	Moderate	High positive	Large positive

6.17.2.7 Vulnerable Groups

No Roma groups or communities are directly affected by the Project, so no mitigation measures are envisaged due to unknown situation in the affected communities regarding the young people, women and low-income families.

6.17.2.8 Education and Training

6.17.2.8.1 Enhancement Measures

Construction phase

It is expected that during the construction phase some level of capacity building will be provided (organized and un-organized) through transfer of new technologies and new skills. This will happen mainly as on-the-job training but also as exposure to modern management and logistics procedures and by working with people having international expertise. Joint venture could contribute in transfer of skills which should result in strengthening of local capacities.

In order to maximize the positive impacts, the following measures should be undertaken before and during construction:

- Supervisors and managers will be responsible to utilize available resources to train, qualify, and develop their employees.
- On-the-job training (OJT) is one of the best training methods because it is planned, organized, and conducted at the employee's worksite. OJT to be generally primary method used for broadening employee skills and increasing productivity. It is particularly appropriate for developing proficiency skills unique to an employee's job - especially jobs that are relatively easy to learn and require locally-owned equipment and facilities.

Operational phase

It is expected that the railway operation will stimulate a large and competitive economy in the central and southern region of Albania, which could provide jobs for every working-age resident and a highly qualified local workforce. Operation of railway as well will create possibilities for direct and indirect employment. With better accessibility to universities in the country it can be expected that the percentage both for males and females with secondary education who will continue their education will increase.

In order to maximize the positive impacts, the following measures should be undertaken before and during construction:

- Increasing participation in skills and training amongst priority groups including those receiving social benefit and lone parents, and vulnerable groups;
- Increasing the percentage of secondary educated students who will continue with faculty education;
- Encouraging female to choose untypical profiles - to change the existing tendency for females to focus on traditional “women’s work” which often pays less or is less likely to result with high earning potential and will change

attitudinal issues related to a lack of confidence in one's ability to open a business and general hopelessness about personal economic prospects.

6.17.2.8.2 Assessment of Residual Effects

Table 7-43 summarizes the residual effects arising from the Project construction and operational phases.

Table 6-74_ Residual Effects – Education and Training

Social Aspect and Potential Impact(s)	Magnitude of Impact (without mitigation)	Significance of Effect (without mitigation)	Probable Success of Mitigation	Magnitude of Impact (with mitigation)	Significance of Residual Effect (with mitigation)
Construction Phase					
Capacity building through training	Low positive	Slight positive	Moderate	Medium positive	Moderate
Operational Phase					
Education and training benefits from employment opportunities	High positive	Large	Moderate	High positive	Large positive
Education and training benefits from improved access to education and employment opportunities	High positive	Large	Moderate	High positive	Large positive

6.17.2.9 Communities' Quality of Life

6.17.2.9.1 Mitigation Measures

Construction phase
The quality of the inhabitants' lives will potentially be seriously affected both during construction of the railway due to dust, noise, vibrations, safety issues and alteration of the landscape.

The factors of dust, noise, vibrations and landscape are discussed in the previous chapters of the ESIA (related to environmental issues); therefore, the following proposed mitigation measures are related to safety factor and social impacts related to disruption of utility services.

- Information to the public about the construction works would be announced through the local radio/TV station for carefully low speed driving near the construction location;
- There will be a strict permissible speed for heavy mechanization vehicles and predetermined routes for passing near the settlements;
- **Traffic management plan** to be developed and implemented;
- Appointing community liaison officers that will be present at work fronts to ensure that impacts from planned disruptions are minimized and that any unplanned disruptions are properly managed;

- Ensuring that a **Grievance Mechanism** is in place so that affected stakeholder concerns are addressed promptly and effectively;
- For all crossings, agreements will be made with the public or private owners and in consultation with local municipalities and regional road agencies and public notice of construction activities and implications will be locally made available;
- Temporary diversions will be established where no reasonable alternative local access exists;
- Repair/upgrade work on roads required prior to heavy transportation, maintenance of access roads during construction and reinstatement works after construction will be carried out;
- Documented agreements with utility companies and local authorities and private owners will be made by contractors prior to construction;
- An **Irrigation Continuity Plan** will be developed to address the key issues including water supply by-passes, agreements with utility companies, planning of measures, compensation in case of damages, etc.

Operational phase

Operational phase of the railway will expose the inhabitants, among other factors, to noise and vibrations in addition to electromagnetic fields caused by electric traction. The communities close to the railway will be affected by safety issues (among other factors, analysed in the previous chapters of the ESIA).

In order to minimize negative impacts, the mitigation measures proposed under Community Health, Safety and Security section will be applied.

6.17.2.9.2 Assessment of Residual Effects

Table 7-44 summarizes the residual effects arising from the Project construction and operational phases.

Table 6-75_ Residual Effects – Communities' Quality of Life

Social Aspect and Potential Impact(s)	Magnitude of Impact (without mitigation)	Significance of Effect (without mitigation)	Probable Success of Mitigation	Magnitude of Impact (with mitigation)	Significance of Residual Effect (with mitigation)
Construction Phase					
Safety	Medium negative	Large negative	High	Low negative	Moderate negative
Disruption of utility services	Medium negative	Large negative	High	Low negative	Moderate negative
Operational Phase					
Safety	High negative	Large	High	Medium negative	Moderate negative

6.18 Occupation Health and safety

Occupational health and safety (OHS) aims at the anticipation, recognition, evaluation, and control of hazards arising in or from the workplace that could impair the health and well-being of workers, taking into account the possible impact on the surrounding communities and the general environment.

OHS includes laws, standards, and programs that aim at ensuring a healthy and safe working environment, a well-functioning working community, the maintenance of employees' working ability and functional capacity, and the promotion of their health.

6.18.1 Design, preconstruction and construction

The construction period is estimated at roughly 24 months and will require the employment of about 500 persons. This estimation is based on the Durrës-Tiranë railway line, which construction is planned to last roughly 24 months. The majority of the unqualified workforce will be hired from the local population. Operating with heavy machinery equipment and transport and handling of concrete pieces and rails present serious dangers to the life safety of workers. During the construction works, workers at the construction site will have to follow and comply with the regulations on occupational safety, as provided by the EU Directive 92/57 "On the implementation of minimum safety and health requirements at temporary or mobile construction sites[137]", which prescribe:

- Keeping the construction site in good order and maintaining a satisfactory state of cleanliness;
- Choosing the locations of work camps concerning the easy access to these locations and determining routes or areas for the passage and movement of equipment;
- Specify the conditions under which various materials are handled;
- Perform technical maintenance, pre-commissioning checks, and regular checks on installations and equipment with emphasis on correcting any faults which might affect the safety and health of workers;
- Demarcate the areas for the storage of various materials, in particular when dangerous materials or substances are involved;
- Specify the conditions under which the used dangerous materials are removed;
- Specify the safe manner of storage and disposal or removal of waste and debris;
- Adopt measures based on progress made with the site, of the actual period to be allocated for the various types of work or work stages;
- Assure cooperation between employers and self-employed persons concerning occupational safety;
- Interaction with industrial or urban activities on the area within which or in the vicinity of which the construction site is located.

The Contractor will be obliged to develop and implement procedures to protect workers' health and safety. This will include an introduction of rules for workers and site security to prevent unauthorized access to active construction sites, workers' camps, transport vehicles, construction machinery, and equipment storage areas. The Contractor will prepare emergency response plans to respond to accidents and emergencies in a manner appropriate to the construction and

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[137] https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex%3A31992L0057

operational risks. This plan will be based on the prior identification of major-accident hazards and will include measures necessary to prevent major accidents and to limit their consequences for local communities.

Special attention must be paid during the upgrade of Rrogozhine tunnel, where the provisions of the following legislation must be fulfilled.

- Law 135/2016 "On the safety and health at workplace and emergency in surface and underground mineral-extracting industries and in the underground construction works in the hydro energetic works"; and
- EU Directive 92/104 "On the minimum requirements for improving the safety and health protection of workers in surface and underground mineral-extracting industries (twelfth individual Directive within the meaning of Article 16 (1) of Directive 89/391/EEC)

Transport safety practices will be adopted and implemented according to the Traffic Management Plan to prevent eventual traffic incidents and nuisance impacts on people.

The ESMP (separate document) on the proposed project includes the main lines of a set of topic – specific management plans, including an Occupational and Public Health and Safety Management Plan. The ESMP will be detailed by the Contractor and included in the list of the bidding documents. EIB will approve the ESMP before its implementation.

Conclusion: The adverse impacts associated with occupational health and safety may be evaluated of low probability and significance and local extent if the related national standards and legislation and the best international practices are applied.

6.18.2 Operation and maintenance

The railway operators (Albanian Railways) will develop and implement a Safety Management System for the operational phase that should be based on the EU Directive 2004/49 for Railway Safety, as amended that harmonised safety principles, including procedures for granting safety approval to railway operators and infrastructure owners.
This Directive aims to ensure the development and improvement of rail safety by:

- harmonising the regulatory structure in the Member States;
- defining responsibilities between the actors;
- defining common safety targets and common safety methods;
- establishing a safety authority and an accident and incident investigating body; and
- common principles for the management, regulation and supervision of railway safety.

Article 9 of the Directive requires to establish and implement a Safety Management System in conformity with the national safety rules. This System shall ensure the control of all risks associated with the activity of the infrastructure manager or railway undertaking, including the supply of maintenance and material and the use of contractors. The safety management system shall also take into account, where appropriate and reasonable, the risks arising as a result of activities by other parties. It shall be developed with the aim of coordinating the emergency procedures of the infrastructure manager with all railway undertakings that operate on its infrastructure.

The railway operator should also develop and implement procedures to protect workers and public health and safety. The operator (e.g. Albanian railways) will prepare emergency response plans to respond to accidents and emergencies in a manner appropriate to the operational risks. This plan will be based on the prior identification of major-accident hazards and will include measures necessary to prevent major accidents and to limit their consequences for local communities.

The occupational and safety of rail workers include workers vulnerability due to exposure to high voltage electricity, moving trains, poor environmental conditions (including adverse weather conditions and poorly maintained and disorganized office space), unsociable working hours, risk of slips and fall accidents, exposure to hazardous products, etc.

The EU Directive 92/57 regulations on occupational safety include[138]:

- Specify the conditions under which various materials are handled;
- Perform technical maintenance, pre-commissioning checks, and regular checks on installations and equipment with an emphasis on correcting any faults which might affect the safety and health of workers;
- Demarcate the areas for the storage of various materials, in particular where dangerous materials or substances are involved;
- Specify the conditions under which the used dangerous materials are removed;
- Specify the safe manner of storage and disposal or removal of waste and debris;
- Adopt measures based on progress made with the site, of the actual period to be allocated for the various types of work or work stages;
- Assure cooperation between employers and self-employed persons concerning occupational safety;

Other standards regarding the workforce include:

- Use equipment that is fit for its intended purpose;
- Before to start a job or go on or near the line, be sure the required plans and permits are in place;
- Never undertake any job unless you have been trained and assessed as competent.

[138] EU Directive 92/57

Conclusion: The adverse impacts associated with occupational health and safety may be evaluated of low probability and significance and local extent if the related standards and the best international practices are applied.

6.19 Labour issues and working conditions

6.19.1 Design, preconstruction and construction

The preconstruction and construction duration would require approximately 24 months. It is estimated the total number of the workforce would be around 500.

The construction companies and their employees would be obliged to follow the provisions of the various legal acts in the areas of labour and social protection legislation.

Measures need to be outlined in terms of the protection of employees including:

- Only qualified personnel undertaking tasks relevant to their duties;
- provision of suitable personal protective equipment;
- no activities to be undertaken in adverse weather conditions;
- provision of sanitary services and welfare amenities on-site; and
- risk assessments and identification.

These measures, together with the commitment to comply with EU standards and Albanian health and safety laws will provide the foundation on which the welfare of employees and workers' health and safety would be based.
Working conditions and work camps will be set in compliance with relevant EU and Albanian labour legislation. The work camps will be established on the existing railway stations, which have the necessary infrastructure concerning the power and water supply and the waste water.
During the COVID-19 period, the workers accommodation shall fulfil the EIB requirements that are expressed in a guidance published on May 2020[139].

All contractors will be responsible for the Occupational Health and Safety Plan(s), which provides workers with a safe and healthy work environment. The Albanian Railways will review and approve these plans and will be responsible for overseeing the contractor’s performance. All workers will be trained in proper safety rules and procedures
The ESMP (separate document) on the proposed project includes the main lines of a set of topic – specific management plans, including a Labour and Working Conditions Management Plan; and an Emergency Response Plan. The Labour and Working Conditions Management Plan includes provisions on the workers’ grievance mechanism, accommodation, etc. The ESMP will be detailed by the Contractor and included in the list of the bidding documents. EIB will approve the ESMP before its implementation.

139 https://www.eib.org/attachments/covid19_guidance_note_to_promoters_annex2_labour_en.pdf

Conclusion: The adverse impacts associated with the labour issues and working conditions may be evaluated of low probability and significance and local extent if the related national standards and legislation and the best international practices are applied.

6.19.2 Operation and maintenance

Working conditions during operation are similar to the construction phase. Operation includes also some specific difficult working conditions such as the risk from high electric voltage, the risk from fast trains while working on the railway, risk from the transport of hazardous substances (chemicals, liquid gases, petrol, etc.), the risk from fire (transport of ignitable products), etc.

The Albanian Railways and the employees would be obliged to follow the provisions of the labour and social protection legislation.

6.20 Summary of the assessment

The findings of the assessment for both construction and operational stages for each impact identified are summarized in the Table 9-3 and Table 9-4 at the end of this document.

7 Stakeholder Engagement

Stakeholder engagement is a key element of the ESIA process. The purpose of stakeholder engagement is to allow stakeholders to interact with the project's decision-making process, express their views and influence mitigation and technical solutions to concerns voiced during the process.

7.1 Phases of Stakeholder Engagement

For the purposes of this project, the stakeholder engagement has been divided into three phases, each having slightly different objectives. The following phases were planned:

- **Phase 1: Scoping.** The scoping phase contacts stakeholders at a national and municipal level at selected key locations along the railway line. The aim of this phase is to provide information on the project and generate feedback on the scope, approach, key issues and key stakeholders to be consulted. This phase also enabled the project team to gather additional baseline data.

- **Phase 2: ESIA Finalisation and Public Disclosure**. Stakeholders were presented with the draft ESIA report at the end of the ESIA preparation process. Information on the project impacts were presented along with the mitigation measures designed to minimise or, where positive, to enhance them.

- **Phase 3: On-going Engagement.** The Promoter will continue to engage with stakeholders throughout the project lifecycle. The methodology for this will be developed and finalised using the information compiled during the ESIA process.

A standalone document, the Stakeholder Engagement Plan (SEP) has been prepared as part of the Environmental and Social Impact Assessment (ESIA) process. The SEP is a "living document" which is updated and adjusted as the ESIA progresses and project planning evolves.

7.2 ESIA Consultations

Within the framework of the Project, consultations were organized with key stakeholders. Some events were intended for all stakeholders; other events focused on specific topics that presented interest for selected stakeholder groups. Upon identification of the participants/stakeholders, the administrative persons in each municipality/administrative unit/village were involved for notifying the participants.

Public events included open discussions of the Detailed Design and ESIA documentation in line with EIB requirements and national legislation. Special-purpose events include meetings to address specific issues and problems that are of interest for specific stakeholder groups or specific communities. Face-to-face meetings were organized through phone calls and direct meetings.

Throughout its lifetime, the Project will continue to update stakeholders via the website and other means, as specified above. The grievance procedure described in Section 7 will also remain in place throughout the Project's lifespan.

All interested stakeholders will be timely informed about the Project's scope and contacts for further information inquiries, as well as the availability of Project documentation, through the website of HSH. To ensure accessibility of the disclosed documents, HSH has requested Municipalities to upload the Project documentation at their respective webpages.

Engagement will proceed on the basis of what is culturally acceptable and appropriate for each different stakeholder group. Special attention will be given to the adequate use of official languages in Albania.

The draft ESIA was available for the public using all the available communication tools. These include (but not limited to):

- Publication at the webpages of respective institutions (MIA, HSH, Developer, all three municipalities); hard copies will be available at all institutions, including also the administrative units premises at each municipality (copies to be handed over at request);

- A written notification was publicly available at the public notices/billboard at the municipalities and administrative units premises, clearly indicating among other where could be found the draft ESIA report, information and purpose of the public consultation;

- The Non techinal Summary of the draft ESIA was delivered by e-mail to all e-mail accounts that are in project's database;

- In order to make available the document, and in general involve also the vulnerable people and those that may not have access or knowledge on IT, the traditional ways of communication will be deployed (such as direct phone calls and/or direct face-to-face notifications) engaging key administrative persons such as Heads of Administrative Units and Heads of Villages to support in leaflets and posters distribution.

Vulnerable people will be identified during the socio-economic surveys in the project area but also through discussion with local authorities. Any differentiated impacted groups will be listed and may require targeted support during stakeholder engagement process through non-traditional engagement methods. Differentiated measures may be required so that adverse impacts do not fall disproportionately on them and they are not disadvantaged in sharing development benefits and opportunities.

7.2.1 Outcomes of stakeholder engagement with directly affected people

As already discussed in Section 6.17.1.4, HSH has commenced **preparatory activities** for the beginning of the expropriation process. A short Socio-economic Survey was carried out on August 18, 2021 in Rrogozhine Municipality for the directly affected people and households that live in the station buildings. The survey was conducted by HSH representative and Project's Local Social Expert, with the presence and support of Social Department of Rrogozhine Municipality and Train Station personnel.

The survey was conducted through direct face-to-face interviews, for the purpose of registering and documenting the status and profile of the affected households in the Project area. The Survey was conducted based on a structured questionnaire for households. In brief, the total number of households surveyed is 3 (three), out of which 2 (two) are currently living at Rrogozhine station building and 1 (one) is living at Lekaj station building (Rrogozhine Municipality).

The total number of household members is 12 (8 females and 4 males). The average age of household members is 38.3 (the youngest member is 8 years old while the oldest member is 72 years old). Out of the total number of household members, 33.3% are minors (below 18 years old), 41.7% belong to the age group between 18-60 years old, while 25% are elderly persons (more than 60 years old).

The two families reported having less than 250 EUR of monthly income (governmental or other aid, salaries) while the third reported having income in the range of 250-500 EUR (pension). The dominant perceived loss is the loss of housing thus compensation relates to provision of housing.

7.2.2 Outcomes of stakeholder engagement during public disclosure process

In order to complete the Project Detailed Design and ESIA Phase, the Consultant conducted a public disclosure process. The ESIA Phase of engagement involved revisiting the stakeholders contacted during the ESIA Scoping Phase informing them of the project detailed design, any environmental and social impacts/mitigation along with the next steps of project development. The presentation included the following:

- Corridor VIII and the railway line Durres-Rrogozhine;
- Existing situation of the railway line and causes of its degradation;
- Project's objectives;
- Administrative division and the Project;
- Map of the railway line in each municipality territory;
- Detailed Project's objectives in each municipality;
- Detailed cross-section of the railway line;
- Designed project's elements (bridges, underpasses, overpasses, retaining walls, culverts, drainage channels, stations, service roads, level crossings, signalling and telecommunication, fencing, Rrogozhine tunnel, etc.)
- The General Layout illustrated with orthophoto, by including all connectivity elements such Level Crossings, Road Underpasses, Parallel Roads Pedestrian Overpasses and underpasses;
- Potential impacts and mitigation measures, including, but not limited to: Land use and land use restriction; • Expropriations and standards to be followed; • Grievance mechanism and expropriations; • Waste; • Green stations and relevant EU Directives; • Noise and vibrations; • Surface and ground waters; • Erosion and sedimentation; • Air quality; • Infrastructure facilities; • Overall project's benefits, etc.

Stakeholders were invited to provide any comment and express any concerns. Moreover, the project leaflet was shared with the participants that includes the contact details of HSH, as well as the HSH's web page where are already published the following documents:

• Three extended summaries – one for each municipality, on the planned interventions and the related potential environmental and social effects, as well as the findings of the ESIA report;
• ESIA Scoping report in both Albanian and English languages;
• ESIA Non-Technical Summary in Albanian;
• ESIA in both Albanian and English languages.

As this document may be posted in public domain, any names of individuals have been deleted for data protection reasons. Detailed information, participants lists and photo documentation is only available in the SEP Appendices. A summary of these meetings is presented below.

Table 7-1 Summary of ESIA Public Consultation Participants

Meeting Date and Venue	Participants	No of attendees
11 January 2022, Kavaje Municipality	› Environmental expert, Albanian Road Authority (ARSH) › Deputy Mayor, Kavaje Municipality › Director of Environmental Sector › Director of Urban Planning › Director of Cadastre › Administrator, Kavaje Municipality › Head of Sector of the Management of › projects › Head of Golem Administrative Unit › Head of Helmes Administrative Unit › Head of Cete Village, Helmes › Administrative Unit › Head of District no4, Golem › Administrative Unit › -Other Local employee and inhabitants	21
11 January 2022, Rrogozhine Municipality	› Environmental expert, Albanian Road Authority (ARSH) › General Secretary, Rrogozhine Municipality › Secretary of Municipal Council › Director of Urban Planning › Head of Gose Administrative Unit › Head of Lekaj Administrative Unit › Director of Forests Sector › Environmental Specialist › Agronomist, Lekaj Administrative Unit, › Social Welfare Sector › Other Local employee and inhabitants	21
12 January 2022, Durres Municipality	› Director of Tourism Sector, Durres Municipality › Specialist, Tourism Sector › Director of Public Infrastructure Projects › Specialist, Public Infrastructure Projects Sector › Regional Agency of Protected Areas › Co-owner of Sanremo Hotel › Co-owner of Sanremo Hotel › Owner of Belvedere Hotel › Administrator of Belvedere Hotel › Villa Premium Hotel › Co-owner of Villa Rilandi	19

Meeting Date and Venue	Participants	No of attendees
11 January 2022, Kavaje Municipality	Environmental expert, Albanian Road Authority (ARSH) Deputy Mayor, Kavaje Municipality Director of Environmental Sector Director of Urban Planning Director of Cadastre Administrator, Kavaje Municipality Head of Sector of the Management of projects Head of Golem Administrative Unit Head of Helmes Administrative Unit Head of Cete Village, Helmes Administrative Unit Head of District no4, Golem Administrative Unit -Other Local employee and inhabitants	21
11 January 2022, Rrogozhine Municipality	Environmental expert, Albanian Road Authority (ARSH) General Secretary, Rrogozhine Municipality Secretary of Municipal Council Director of Urban Planning Head of Gose Administrative Unit Head of Lekaj Administrative Unit Director of Forests Sector Environmental Specialist Agronomist, Lekaj Administrative Unit, Social Welfare Sector Other Local employee and inhabitants	21
	Co-owner of Villa Rilandi Owner of Market Keli	

The local level stakeholders invited to attend the meeting included 3 Municipalities and 4 Administrative Units whose administration territory is crossed by the railway line. Its release was announced through email correspondence to all identified stakeholders included in Appendix 2 at that time (98 stakeholders) while the invitation from HSH encouraged the stakeholders to forward the announcement to the following stakeholder actors as well:

- Employees of the respective Municipalities that cover the environmental, social, territorial development, water supply and sewerage, maintenance of the irrigation and drainage network, etc.;
- Heads of Administrative Units Rrashbull, Golem, Gosë and Lekaj as well as employees of these Units;
- Elders of the villages where the railway line passes;
- Residents of settlements and business representatives in the vicinity of the railway line;
- Representatives of educational and health institutions in the vicinity of the railway line, etc.
- Representatives of civil society organizations working and / or implementing projects in settlements in the vicinity of the project area, if any, etc.

Issues raised during meetings were recorded and are summarised below. Stakeholders were also invited to submit follow-up questions and consolidated comments by post or through the HSH Website as the pandemia COVID-19 did not allow other stakeholders to join the events.

7.2.3 Outcomes of stakeholder engagement

During ESIA public consultation, the main comments raised during the meetings include:

- *Concerns regarding compensation and land acquisition*: The detailed information on the properties affected by the proposed project will be provided by the State Cadastre Agency. That will happen only when HSH will have the necessary funds for the project's implementation. In case any building/property is located within the 5m railway belt, it will be demolished and expropriated based on the market value, as required by EIB standards. In case any building is legal, it will be expropriated, and the owner will be compensated for the building and the land; in case it is illegal the owner will be compensated only for the building. As defined in the Railway Code, the railway belt is the strip of land 5.0m wide that starts from the - bottom of the slope on both sides of the railway body or adjacent parallel drainage channels. The valuation of the properties will be done by an independent company, which will be hired by HSH once the necessary funds for the project implementation will be ready. There is a Decision of Council of Ministers, according to which it is prohibited to legalize the informal buildings close to the railway line, without the approval of the Albanian Railways (HSH). The design has avoided at the maximum any eventual expropriations.

- *Concerns regarding service roads*: HSH will provide to the Municipality the design of the service roads, to be considered in their investments as are considered optional for the railway project.

- *Concerns regarding drainage system:* The entire drainage system will be rehabilitated. In addition, 14 km of new drainage channels will be built. The new drainage channels will be paved in concrete and all the culverts will be rebuilt. The new culverts are designed based on the Hydraulic Study done by experts, and usually new structures have bigger dimensions than the existing ones. The principal aim of the culverts' design is the drainage, but in dry period they can be used as underpasses.

- *Concerns regarding Seaside tourism:* The railway Stop of Plazh, at Km. 2+800, will be re-activated. Although this station will not have any passengers' building, it will have all the other necessary infrastructure such platforms, canopies, parking area, etc.

- *Concerns regarding overpasses, underpasses and level crossings:* The design of the underpasses is linked to the topography and the height of the railway line. Within the first kilometres of the railway line, it is almost impossible to design any pedestrian or car underpass because of the low terrain and the shallow ground water table. All level crossings will be safe and provided with all the required EU standards, in order to avoid any accident and/or incident. Currently, pedestrians are crossing the railway track in illegal, unprotected level crossings. The Railway Design includes the extension of the motorway overpasses, with similar steel structures, by guaranteeing the safety overpass of the railway track as well. Currently, the overpasses are ARA-s property and construction of new structures, exceeds the scope of work of the Railway Project, and involves more institutions. HSH will communicate with ARA and Durres Municipality to address this issue.

More details are provided in SEP.

8 Monitoring Programme

This chapter has been prepared in accordance with the national regulations. CMD 912/2015 "On the EIA methodology" requires the preparation of a monitoring programme. Whereas Article 41 of the Law 10431/2011 "On Environmental Protection" provides for the parameters /environmental receptors to be monitored during a project development stages. Law 10431/2011 is in full compliance with the Directive 2004/35/EC "On environmental liability with regard to the prevention and remedying of environmental damage[140]"

EIB Standard 1[141] requires the likely environmental and social effects to be monitored and evaluated in systematic way "using certain parameters that are indicators of the status of the environment and human well-being so as to ascertain that after the implementation of mitigation and compensatory measures, no adverse impacts exceed those initially predicted".

The preparation of the Environmental and Social Monitoring Plan for the design, construction and operation phases of a project is an integral part of the environmental permit.

8.1 Parameters/environmental receptors to be monitored

The monitoring of the state of the environment is the observation and recording of the quality of the environmental receptors. According to the Albanian regulations[142], the list of these receptors includes:

- the quality of surface water;
- the quality of groundwater;
- air quality;
- waste;
- noise;
- radiation;
- the quality of the land;
- flora, fauna, biodiversity, forests;
- the impact of economic sectors on the environment components;
- monitoring of natural phenomena and their potential impact on the environment;
- monitoring the impacts of environmental pollution on human health; and
- monitoring the community and occupation health and safety

This list does not include any social and cultural receptors, which are subject to other regulations, such as the Law 27/2018 "On Cultural Heritage and

[140] https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=LEGISSUM%3Al28120

[141] EIB Environmental and Social Standards, April 2018

[142] Law 10431/2011 "On environmental protection", as amended, Article 41

Museums", Law 8561/1999 "On Expropriations and Temporary Takings of the Private Property for Public Interest", etc.

8.2 Monitoring plan for the proposed project

Based on the provisions of the Law 10431/2011 "On environmental protection", as amended (Article 41), and on the characteristics of the Project's area and of the proposed Project's elements, the receiving biophysical environments that should be monitored with regard to the proposed project are given in the table below.

Table 7-1_Monitoring plan for the proposed project stages

No	Receiving environment (as per Law 10431 /2011, Art. 41)	Phase	Yes /No	Regulations /standards	Comment related to the proposed project
1	Ground water quality				
	-Water wells at the overlaid aquifers	PC	Y	-Water Framework Directive 2000/60/EU (Annex V(2)- Ground waters); -Directive 2006/118 / EU "On the protection of groundwater against pollution and deterioration"[143]; -DCM 379/2016 "On the approval of the regulations on drinking water quality"	-Water of the wells near the railway line were analysed by the Consultant; -Water of the wells monitored twice a year by NEA, the affected municipalities and Health institutions[144]
		C	Y		Monitored also by Regional Health Institutions (DCM 379/2016); Monitoring locations and frequency are defined by Regional Health Institutions; Monitoring indicators are provided by DCM 379/2016.
		O	N		
2	Surface water quality				
	Coastal waters	PC	Y	-Law 111/2012 "On Integrated Water Resources Management[145]"; -Water Framework Directive 2000/60/EU (Annex V(1)- Surface waters);	Monitored quarterly by NEA and published yearly in the State of Environmental Report
		C	N		
		O	N		
	River Shkumbin near Rrogozhine	PC	Y		Monitored twice a year by NEA; The river is located 1.1 km from the Rrogozhine station. Therefore there is no need for

[143] Directive 2006/118/EU develops in detail Article 17 of the Water Framework Directive 2000/60/EU

[144] DCM 379/2016 "On the approval of the regulations on drinking water quality"

[145] Law 111/2012 is in full compliance with the Water Framework Directive 2000/60/EU

No	Receiving environment (as per Law 10431 /2011, Art. 41)	Phase	Yes /No	Regulations /standards	Comment related to the proposed project
		C	Y	-DCM 267/2014 "On approval of the list of priority substances in water environment" -DCM 246/2014 "On the definition of environmental quality norms for surface water"; -Water Framework Directive 2006/44 "On the quality of freshwater that need protection for supporting fish life"	any other monitoring of the river's water quality
		O	Y		
3	Air quality				
	Action area	PC	N	-Law 162/2014 "On environmental air quality protection" -DCM 352/2015 "On assessment of environmental air quality and the requirements related to some pollutants" -Air Quality Directive (2004/107/EC and 2008/50/EC)	Monitored by NEA at Durres city
	Action area	C	Y		Daily visual monitoring of air quality; Monitor mitigation measures related to air quality that can be affected by earth works and transport activities
	Action area	O	N		No need for air monitoring during operation
4	Waste				
	Action area	PC	Y	-Law 10463/2011, "On integrated waste management", as amended; -DCM 687/2015 "On adopting rules for keeping, updating and publishing data on differentiation of waste collection at source	Monitored by the State Agency on Sewage and Waste, and NEA; Monitored by the Consultant for the Project's purposes
	Action area, especially at the stations & bridges	C	Y		Visual monitoring; Monitor mitigation measures related to waste generated by construction activities
	Action area	O	Y		Visual monitoring; Monitor waste management
5	Noise and Vibrations				
	Action area	PC	Y	-Law 9774/2007 "On the assessment and management of environmental noise";	-Noise monitored by NEA at Durres city; -Noise measured by the Consultant in 10 locations

No	Receiving environment (as per Law 10431 /2011, Art. 41)	Phase	Yes /No	Regulations /standards	Comment related to the proposed project
				-MoE ordinance 1037/1, date 12.4.2011 " On the assessment and management of environmental noise"; -Environmental Noise Directive 2002/49/EC; -German standards on vibrations (DIN 4150 and DIN 45669-1)[146]	alongside the railway line, during the preparation of the DD and ESIA; -Vibrations measured by the Consultant during the preparation of the DD and ESIA
	Action area	C	Y		Monitor mitigation measures related to noise and vibrations that can be generated by demolition, construction and transport activities; -During working hours, measure noise and vibrations levels at a distance of one metre from the most affected façade of any occupied dwelling or other residential buildings.
	Action area	O	Y		Monitoring noise and vibrations generated by trains once the rehabilitated railway line will be in operation
6	Soil quality				
	Action area	PC	N	n/a (the soil might be polluted by waste water and hazardous waste)	No need for monitoring; There is no any hot spot within the project area.
	Action area	C	Y		Visual monitoring; Monitor mitigation measures related to hazardous waste (accidental oil leakage, etc.) by construction and transport engines.
	Action area	O	N		Visual monitoring at the stations, especially the freight stations
7	Nature phenomena and their environmental impacts				
	Earthquakes that can damage the Railway components	PC	Y	n/a	The Railway components have not been affected by the strong earthquakes of 2019
		C	N	Eurocode 8	-The damages of the strong earthquakes of 2019 have been taken into consideration by the design;

[146] https://www.en-standard.eu/din-standards/

No	Receiving environment (as per Law 10431 /2011, Art. 41)	Phase	Yes /No	Regulations /standards	Comment related to the proposed project
					-No nature phenomena are associated to the Project development phases.
		O	Y		-The design of the new bridges and stations will be based on Eurocode 8; -Monitoring of any eventual damage in case of earth shaking
8	Effects of environmental pollution on the human health				
	Local communities	PC	Y	DCM 564/2013: On the approval of the rules "On Minimum Safety and Health Requirements at the Workplace".	Information collected by the Consultant (communities living both sides of the railway line)
	Action area	C	Y		Eventual information collected by the developer[147]
	Drinking water quality in the crossed aquifers	O	Y		Drinking water quality monitored (monthly) by the Municipalities' health sector and twice a year by NEA
	Coastal bathing waters of Durres, Golem and Qerret Beaches				Bathing waters (Durres, Golem and Qerret coastal zones) quality monitored quarterly by NEA

PC – Preconstruction; C – Construction; O – Operation; Y – Yes; N - No

As the railway line runs close to Adriatic Sea, there are several monitoring stations that are included in the systematic yearly monitoring of the National Environmental Agency[148], as given in the table below.

Table 7-2_Environmental receptors in the project area that are regularly monitored by NEA

Receiving environment	Monitored parameters	Frequency	Sampling location	Monitoring institution
Coastal bathing waters of Durres, Golem and Qerret beaches	Intestinal enterococci (IE); Echerichia coli (EC); Temperature; and pH	Quarterly	See Map 3: Coastal waters monitoring map	National Environmental Agency; Institute of Public Health
Surface water quality	Total Organic Carbon (TOC) and Total Nitrogen (TN)	Twice a year		

[147] DCM 564/2013: On the approval of the rules "On Minimum Safety and Health Requirements at the Workplace".

[148] National Programme for Environmental Monitoring. NEA, 2019

Receiving environment	Monitored parameters	Frequency	Sampling location	Monitoring institution
(Shkumbin River)				
Ground water quality	Physical-chemical parameters (Temperature, pH K, Na, Ca, Mg, Fe, NH4, HCO3, CO3, Cl, SO4, NO3, NO2, TDS, Total hardness)	Twice a year	See Map 4: Water wells	Albanian Geological Survey and NEA

Other receiving environments to be monitored regard the livelihood restoration and the land acquisition and compensation, as given in the table below.

Table 7-3_Monitoring plan with regard to land acquisition issues

Receiving environment	Parameters to be monitored	Monitoring institution	Regulation / standard	Comment
Project affected people; Affected Municipalities	Damages to livelihood and related compensation	Developer; EIB	-EIB Standard 6; -Law 8561/1999 "On Expropriations and Temporary Takings of the Private Property for Public Interest", as amended in 2016, and 4 DCMs define the procedures for expropriation of immovable property.	To be monitored before and after the construction period
	Land compensation			To be monitored before and after the construction period

The local community and workforce occupation health and safety should be monitored regularly based on the national regulations and EBRD requirements, as shown in the table below.

Table 7-4_Monitoring plan with regard to community and occupation health and safety

Receiving environment	Parameters to be monitored	Monitoring institution	Regulation / standard	Comment
Local community and workforce	Health and safety during construction	-Developer; -Health institutions	-EIB Standard 9: -DCM 564/2013: "On the approval of the rules on Minimum Safety and Health Requirements at the Workplace"; -Law 5/2014: "On safety and health in construction"	During the construction; During operation
Local community and workforce	Health and safety during operation	-Affected Municipalities; -Municipal water and	-EIB Standard 9: -DCM 564/2013: On the approval of the rules "On Minimum Safety and Health	During construction; During operation

Receiving environment	Parameters to be monitored	Monitoring institution	Regulation / standard	Comment
		Sanitation Companies; -Health institutions	Requirements at the Workplace"; -Law 10237/2010: "On occupational safety and health", as amended	

9 Main Findings

This chapter summarizes the main findings of the ESIA report and the expected environmental and social effects that may arise from the implementation phases of the project. It includes also the main findings of the public consultation on the Detailed Design and ESIA that was held in January 2022 (see SEP).

The expected significant effects are the residual ones, which are associated directly with the project elements and activities or indirectly with the interaction between the project and other development plans/programs/strategies within the same project area or in the same sector (transport).

9.1 Expected significant negative effects

The main adverse impacts are expected to occur during the preconstruction and construction stages. Some of them are reversible once the construction works are done. Other last sometime after the construction period.

The main expected permanent negative environmental effect concerns the landscape. The presence of the railway line fencing will permanently affect the landscape and the visual amenities.

9.2 Expected significant positive effects

Expected significant permanent positive effects

The main expected positive impacts occur overall during the operation stage. This category of impacts include:

- Enhancement of the economic situation of the country as a result of the railway line operation;
- The design of the railway line components will avoid/reduce at maximum any eventual damage due to earthquakes and therefore will avoid any eventual railway traffic interruption;
- Avoiding/reducing the railway line accidents and incidents;
- The railway infrastructure at the stations will be adapted to disabled people and woman with little children, etc.;
- The stations' buildings and platform canopies will fulfil the EU standards on energy efficiency and "green buildings";
- The design of the new stations' buildings will improve the visual amenity compared to the existing ones;
- Improvement of the traffic as a result of the improvement of the level crossings;
- The parallel roads are not part of the Project's tendering process. Their improvement will be carried out by the local governments and/or the

Albanian Road Authority (ARA). However, this improvement is a positive cumulative effect;

- Decrease of the GHG emissions from the railway line and stations operation;
- Reduce the railway noise and vibrations;
- The rail passenger transport is safer and cheaper than the road transport. Consequently, this mode of transport is much more preferred by people with reduced incomes.

Main expected temporary positive effects

The main temporary positive impacts last only during the construction stage. They include:

- Temporary creation of employment from the recruitment of the local workforce and the stimulation of the local service sector for the need of the construction company;
- Engagement of the local construction companies, and therefore increase of their incomes.

9.3 Outstanding issues

9.3.1 Land use and compensation

During the ESIA preparation, it was not possible to obtain official data on Project Affected People (PAPs) as explained in Section 6.17.1.4. These data can be provided only by the State Agency of Cadastre (SAC), which is the only official institution for registering, keeping and disseminating this kind of information.

Despite the Promoter's effort, the expropriation list provided in the "Cadastral Report" includes 229 affected properties associated with a buffer zone from railway axis and other engineering objects with no further information. This list does not define if the area is owned by HSH and does not clarify the type of property, e.g. residential house, warehouse, business, agricultural area, etc.

The outstanding analysis of impacts on land use and all the related aspects/factors will be performed in the future, when the Albanian Government will ensure the necessary funds for the project's implementation. Then, as agreed between HSH and EIB, the HSH will hire an independent company for preparing a LARP in compliance with the standards described in the LARF.

The landowner's compensation aspects and standards have been stressed by the Consultant during all the public consultation stages, including the one on the DD and ESIA that was held in January 2022, as shown in the updated SEP.

9.3.2 Additional requested access for pedestrians

During the consultation on the DD and ESIA report held in Durres Municipality in January 2022 (see SEP and the related MoM), some business owners (mainly hotels, bar-restaurants and groceries) insisted the Project to add a new pedestrians' underpass at the location called Shkembi Kavajes. As the improved existing pedestrians' overpass at this location is not suitable for old persons and little children, these businesses are working in low capacity and therefore are losing incomes or are bankrupted. Hence, the local tourism is affected in this location.

But, building an underpass at this location means it must run underneath both the railway and the motorway that runs next and parallel to the railway. Both the motorway and the railway run between the above-mentioned businesses and the sea side, which sandy beach is densely frequented, especially during the hot weather season. So, this issue depends mostly from the Albanian Road Authority (ARA), which should study it and decide whether a motorway underpass is feasible at this location. Therefore, the design and financing of the underpass beneath the motorway is under the responsibility of ARA. That's why Durres Municipality was engaged (see SEP) to follow up with ARA this additional request, which is not included in the tasks of the Project's Detailed Design.

Although the requested additional new underpass in mainly under ARA responsibility, the Consultant has prepared a short note (see section 10.6 at the end of this document), where are included the main difficulties to design such underpass beneath the motorway, as well as the standards that this underpass should fulfil with regard to the railway project.

10 Appendices

10.1 Separate files in pdf format

10.1.1 Appendix 1.1: Map of the Administrative Division of the Project area

Map of the administrative division of the project area – separate file in pdf format

10.1.2 Appendix 2.1: Typical railway line cross-section

Typical cross section of the proposed railway line – separate sheet in pdf format

10.1.3 Appendix 2.2: Map of the railway line components

Map of railway line components – separate sheet (othophoto) in pdf format

10.1.4 Appendix 5.1: Map of the sea water monitoring

Map of sea water monitoring – separate sheet in pdf format

10.1.5 Appendix 5.2: Map of water wells

Map of water wells – separate sheet in pdf format

10.1.6 Appendix 5.3: Topographic Map Shkozet-Shkembi Kavajes

Topographic Map 1:10,000 – separate sheet in pdf format

10.2 Appendix 3: Geotechnical investigations

The project includes a detailed geotechnical investigation, especially with regard to longer bridges (Shen Vlash Channel Bridge and Lishati and Darsi Rivers Bridges).

Four boreholes for each bridge were drilled. The crossed lithological formations are described hereinafter.

Shen Vlash Channel Bridge

Figure below shows the lithological cross-section at Shen Vlashi Bridge (km 5+864) that has been prepared by the geotechnical study on the Project.

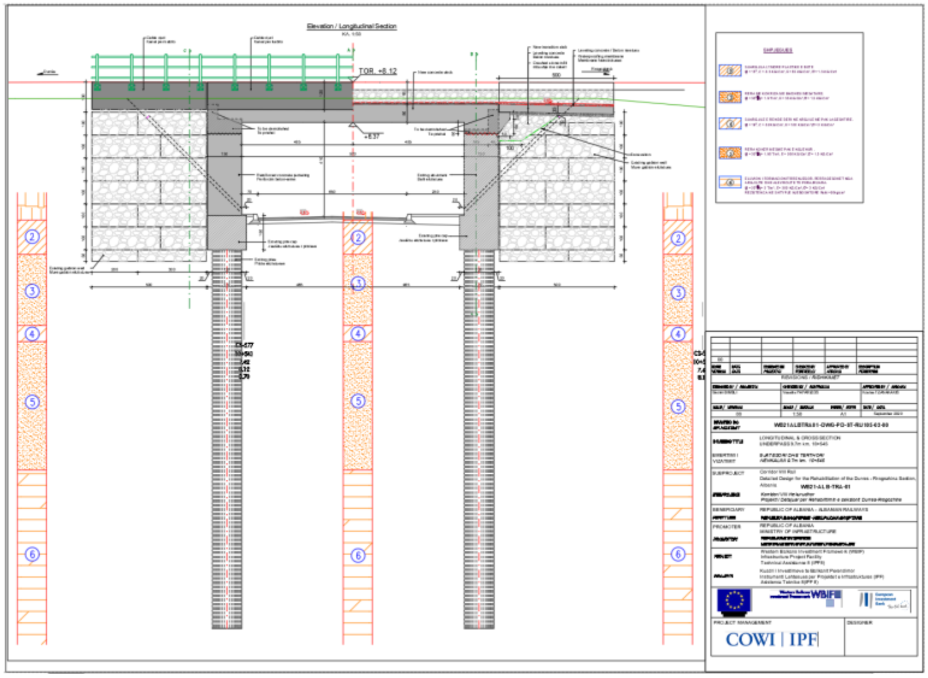

Figure 9-1_Lithological cross-section at Shen Vlashi Bridge

Based on the figure above, it results that the geological formations at the end of the pylons (20m deep) are represented by the Helmasi deposits, which are impermeable.

Lishati River Bridge

Four 40m depth borehole were drilled. The drilling was stopped into silty-clay formations (see layer 6 in the figure below).

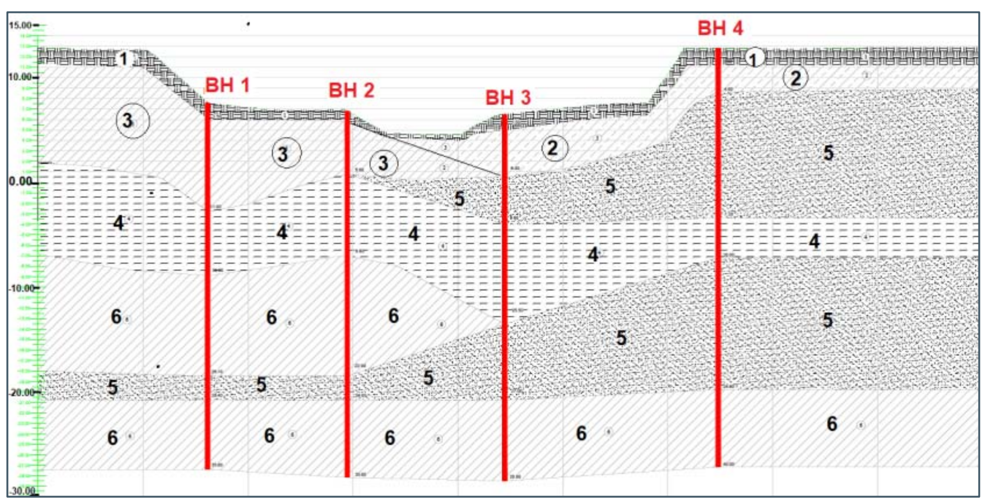

Figure 9-2 Lishati River Bridge - lithological section

The lithological composition of the main soil strata are as follows:

1. Topsoil and made ground; Firm brown to beige silty sandy CLAY. Composed of gravel, concrete and root of plants.
2. Soft beige to grey silty CLAY. Containing beds of silty sand and fine sand.
3. Loose beige to grey silty SAND. Containing organic matters ad beds of silty clay.
4. Soft green to grey silty sandy CLAY. Containing beds of silty sand.
5. Loose to medium dense to grey silty fine to medium SAND. Containing beds of silty clay and a little gravel.
6. Firm to grey with spots of beige silty CLAY. Containing beds of silty sand, fine and a little gravel.

Darsi River Bridge

Four 40m depth borehole were drilled. The drilling was stopped into silty-clay formations, as shows the lithological section in the following figure.

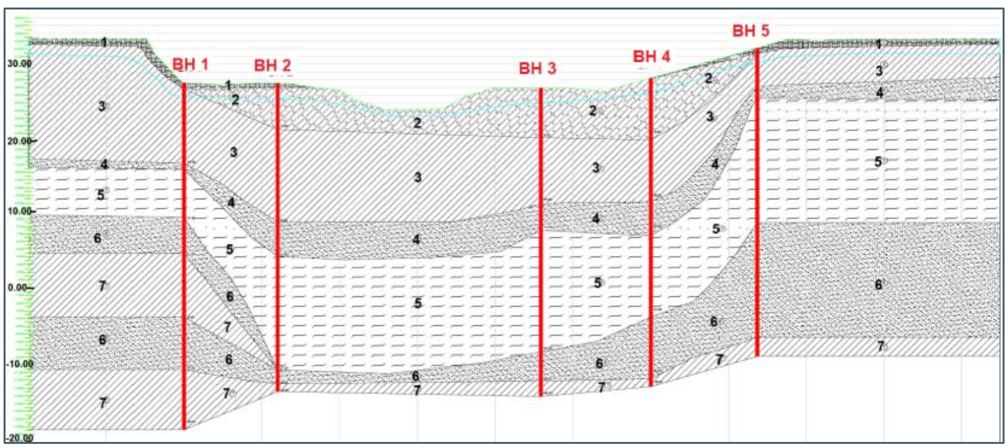

Figure 9-3 Darsi River Bridge - lithological section

The lithological composition of the main soil strata are as follows:

1 Topsoil and made ground; Firm brown to beige silty sandy CLAY. Containing gravel, concrete and root of plants.

2 Soft beige silty gravelly CLAY. The gravel is sub-rounded, rounded in origin limestone and sandstone. Containing beds of silty sand.

3 Soft beige to grey silty CLAY. Containing beds of silty sand and fine sand.

4 Loose beige to grey silty SAND. Containing organic matters ad beds of silty clay.

5 Soft green to grey silty sandy CLAY. Containing beds of silty sand.

6 Loose to medium dense to grey silty fine to medium SAND. Containing beds of silty clay and a little gravel.

7 Firm to grey with spots of beige silty CLAY. Containing beds of silty sand, fine and a little gravel.

10.3 Appendix 4: Scoping Matrix

The table below constitutes the scoping matrix, which intends to include the environmental and social issues to be further developed in the ESIA report.

ESIA Scoping matrix

Table 9-1_ESIA Scoping matrix

ESIA Topic	Source of Impact and Project phase	Receptor(s)	Impact	Key Receptor Sensitivities	Scoped In/Out	Justification for Scoped In/Out
Air	Pollution from construction and transport activities	Locals; Workforce	Stress to local inhabitants and workforce	The whole working area	Out	The beneficiary will apply Good International Practice (GIP) to the construction activities as part of the Environmental and Social Management System (ESMS).
Air	Pollution from fuel consumption from locomotives	Local inhabitants	Health of local inhabitants	The whole working area	Out	Trains will use fuel of good quality
Climate change	Sea level rise during operation	Railway line	Railway inundated	The lowest sections above sea level of the railway line	In	Scoped in with regard to the location of the railway line and the projections of the sea level rise; The beneficiary will apply Good International Practice to the construction activities as part of the ESMS
Climate change	Heavy rainfalls during construction and operation	Railway line; Bridges	Railway damaged from erosion at the bridges' locations	At the bridges' locations	In	Scoped in with regard to the potential effects of the erosion to the railway line and the projections of the precipitations
Climate change	Heavy rainfalls during construction and operation	Drainage system	Drainage system filled by sediments	The whole railway line	In	Scoped in with regard to the potential impact of the sedimentation to the drainage system

ESIA Topic	Source of Impact and Project phase	Receptor(s)	Impact	Key Receptor Sensitivities	Scoped In/Out	Justification for Scoped In/Out
Noise and vibrations	Construction and transport activities	Locals; Workforce	Stress to local inhabitants	Across urbanized areas	In	Scoped in with regard to the potential effects to locals; The beneficiary will apply Good International Practice to the construction activities as part of the ESMS
Rolling noise	Operational phase	Local inhabitants	Stress to local inhabitants	Shkozet, Plepa, Golem, Kavaje	In	Scoped in with regard to the potential effects to local inhabitants
Geology	Subsidence during operation	Railway	Physical harm to railway	From Km 1+870 to # Km 6+00 the railway line runs over marshy deposits	In	Scoped in with regards to identifying high risk areas
Geology; and tectonics and seismicity	Soil Liquefaction during earthquakes	Railway	Physical harm to railway and bridges	From Km 1+870 to # Km 6+00 the railway line runs over marshy deposits; Water table level is close to surface	In	Railway line crosses an area of high seismic risk
Soils	Accidental oil spill from construction and transport engines	Soil	Soil contamination from accidental spills of oils due to poor pollution prevention and control measures.	The whole railway line	Out	The beneficiary will apply Good International Practice to the construction activities as part of the ESMS
Soils	Compaction from construction and transport engines	Agricultural land	Deterioration of soil quality from compaction	Working strip both parts of the railway line; New underpasses; New service roads	In	Scoped in with regard to preserve the quality of agricultural land.

ESIA Topic	Source of Impact and Project phase	Receptor(s)	Impact	Key Receptor Sensitivities	Scoped In/Out	Justification for Scoped In/Out
Soils	Agricultural land surface needed for the construction of new underpasses and new service roads	Agricultural land	Permanent loss of agricultural land, including top soil	New underpasses; New service roads	In	Scoped in with regard to remove *the top soil* and reuse it for improving the quality of agricultural land
Soils	Accidental spills of oils or chemicals from construction and transport engines	Surface and ground water	Pollution to surface and ground water	The whole working area	Out	The beneficiary will apply Good International Practice to the construction activities as part of the ESMS
Groundwater	Accidental spills of oils or chemicals from construction and transport engines	Groundwater	Pollution to ground water	The whole working area	Out	The beneficiary will apply Good International Practice to the construction activities as part of the ESMS
Groundwater	Accidental spills of oils or chemicals from construction and transport engines	Aquifers used for drinking water supply; Drinking water consumers	Pollution to ground water	Railway sections to be determined during DD in function of the geotechnical investigations	In	Scoped in with regard to contamination of the aquifers used for drinking water supply and which are overlaid by permeable deposits
Surface Waters	Accidental spills of oils or chemicals from construction and transport engines	Surface Water quality	Pollution to surface water	Crossed surface waters	Out	The beneficiary will apply Good International Practice to the construction activities as part of the HSE-MS.

ESIA Topic	Source of Impact and Project phase	Receptor(s)	Impact	Key Receptor Sensitivities	Scoped In/Out	Justification for Scoped In/Out
Erosion and sedimentation	Erosion from exceptional rivers discharge- construction and operation	Railway line; bridges	Railway damaged and/or inundated	River and streams beds at the bridges' locations	In	Scoped in with regard to the potential effects from erosion and sedimentation
Biodiversity	Construction and transport activities	Terrestrial biodiversity	Damage to terrestrial flora and vegetation	The whole working area	Out	The project area is of poor biodiversity values. The beneficiary will apply Good International Practice to the construction activities as part of the ESMS
Biodiversity	Construction and transport activities	Aquatic flora and fauna	Damage to aquatic biodiversity	At the crossing of water courses	Out	The project area is of poor biodiversity values. The beneficiary will apply Good International Practice to the construction activities as part of the ESMS
Traffic	Construction and transport activities during construction	Local inhabitants; Road users	Traffic disturbance	Level crossings, road underpasses and pedestrian overpasses; new service roads	In	Scoped in with regard to the potential effects to traffic in local and national roads
Traffic	Trains circulation during operation	Pedestrians; Car users	Traffic interruption	Level crossings	Out	The beneficiary will apply Good International Practice to secured level crossings
Infrastructure	Construction activities	Water pipelines, power and telecommunication lines, etc.	Damage to infrastructure	To be determined during detailed design	Out	The beneficiary will apply Good International Practice to the construction activities as part of the ESMS
Infrastructure	Construction and transport activities	Drainage and irrigation system Landowners, local inhabitants	Damage to drainage and irrigation system	The whole working area	Out	The beneficiary will apply Good International Practice to the construction activities as part of the ESMS

ESIA Topic	Source of Impact and Project phase	Receptor(s)	Impact	Key Receptor Sensitivities	Scoped In/Out	Justification for Scoped In/Out
Landscape	Construction and transport activities	Local inhabitants	Impact to landscape	The whole working area	Out	The beneficiary will apply Good International Practice to the construction activities as part of the ESMS
Landscape	New underpasses and service roads during operation	Local inhabitants	Impact to landscape from new underpasses and service roads	New underpasses and service roads	In	Scoped in with regard to the construction of new underpasses and service roads - The beneficiary will apply Good International Practice to the construction activities as part of the ESMS
Landscape	Operation	Local inhabitants	Impact to landscape from the construction of fencing, trench, etc.	Across the densely inhabited area	In	Scoped in with regard to the construction of any environmentally friendly fencing and noise and vibration mitigation works
Agriculture	Construction and transport activities	Local farmers	Damage to agriculture from construction and transport activities	The whole working area	Out	The beneficiary will apply Good International Practice to the construction activities as part of the ESMS
Land use	Land surface required during construction and Operation	Landowners	Land surface required for new underpasses and service roads	Private landowners	In	Scoped in with regard to land surface required for the new underpasses and service roads
Land use	Land use restriction during construction and operation	Landowners	Land use restriction	The whole project area	Out	The beneficiary will apply Good International Practice to the design of the crossings (LC, underpasses and overpasses) as part of the ESMS.
Solid waste	Vertical and horizontal railway line	Local inhabitants	Impact on landscape; on the quality of the	Sections where alignment needs to be improved	In	-Scoped in with regard to the management of the huge amount of solid waste;

ESIA Topic	Source of Impact and Project phase	Receptor(s)	Impact	Key Receptor Sensitivities	Scoped In/Out	Justification for Scoped In/Out
	alignment during construction		environment; on agriculture			-The beneficiary will apply Good International Practice to the construction activities as part of the ESMS.
Solid waste	Metallic, iron and concrete waste from removal of railway superstructure elements	Local inhabitants	Impact on landscape; on the quality of the environment; on agriculture	The whole railway line	In	-Scoped in with regard to the management of the huge amount of this type of waste; -The beneficiary will apply Good International Practice to the construction activities as part of the ESMS.
Cultural heritage	Construction activities	Cultural heritage	Possible damage to archaeological objects	No known cultural heritage objects are located in the close vicinity of the railway line	Out	-The beneficiary will apply Good International Practice to the construction activities as part of the ESMS.
Project Affected People	Land acquisition for new service roads and underpasses (Construction and Operation)	Directly affected landowners	Difficulties to be fairly compensated for the land needed for the project purposes	New service roads and underpasses	In	Scoped in with regard to the difficulties this category of person may face for being correctly compensated
Project Affected People	Temporary land acquisition for construction activities	Directly affected landowners	Difficulties to be fairly compensated	The whole working area	In	Scoped in with regard to the difficulties this category of person may face for being correctly compensated
Project Affected People	Socioeconomic Changes and Implications (Construction)	Local community, labour market, local businesses.	Possibility to exploit new business opportunities, attaining of new professional skills	The whole working area	In	Socioeconomic assessment will be performed Stakeholder engagement will be conducted during all the ESIA phases

ESIA Topic	Source of Impact and Project phase	Receptor(s)	Impact	Key Receptor Sensitivities	Scoped In/Out	Justification for Scoped In/Out
Project Affected People	Resettlement (Construction)	Directly affected resident structures and/or community/public facilities.	Difficulties to be fairly compensated	The whole working area	In	Scoped in with regard to the difficulties this category of person may face for being correctly compensated
Project Affected People	Decrease of land use intensity (Construction and Operation)	Loss of livelihoods for direct residents affected by the project.	Difficulties to be fairly compensated	The whole working area	In	Scoped in with regard to the difficulties this category of person may face for being correctly compensated
Human health	Construction activities	Local inhabitants; Workforce	Impact on health	The whole working area	Out	The beneficiary will apply Good International Practice to the construction activities as part of the ESMS
Human health	Rolling noise during operation	Local inhabitants	Impact on health	Urbanized areas (Shkozet to Plepa, Golem, Kavaje)	In	The beneficiary will apply Good International Practice to the location and design of any eventual noise barriers
Human health	GPS antennas	Stations' employees; Passengers; Local inhabitants	Impact on health	Train stations	In	Scoped in with regard to any potential impact on health from electromagnetic field

10.4 Appendix 5: Calculation of the GHG emissions

The GHG emissions calculation for diesel locomotives is based on the "*2006 IPCC guidelines for national greenhouse gas inventories*", chapter 3: "*Mobile combustion*"[149].

The choice of GHG emissions estimation method is based on the *EMEP/EEA air pollutant emission inventory guidebook 2019*[150], which provides information for different sectors. The sectorial guidance for the railway that can be found in the following link: https://www.eea.europa.eu/publications/emep-eea-guidebook-2019/part-b-sectoral-guidance-chapters/1-energy/1-a-combustion/1-a-3-c-railways/view, which guides to the methodology for estimating the GHG emissions from the railway transport.

Based on the information provided in the previous section and on the traffic flow provided by the Traffic Study, Tier 1 approach of IPCC 2006 update emission factors for diesel fuel[151] has been applied for estimating the GHG emissions for the Durres-Rrogozhine railway line operation. The predicted GHG emissions are calculated on the basis of passenger*km and tons*km for both categories of rail transport: passenger and freight, respectively.

The predicted traffic flow was provided by the Traffic Study, while the information on the existing and predicted rail fleet is provided from the Albanian Railways.

Table below summarizes the estimated total GHG emissions for Durres-Rrogozhine railway line during the operational phase.

Table 9-2_ Estimated GHG emissions and rail traffic

Mode of transport	**Parameter**	**Year**			
		2014	2025	2030	2040
Passenger	Passenger*km	1,618, 930	6,320,371	6,848,377	9,217,532
Freight	Tons*km	2,231,877	11,309,667	12,791,667	29,964,767
Total	CO_2 eq. (tons/year)	602	430	319	438

[149] https://www.ipcc-nggip.iges.or.jp/public/2006gl/pdf/2_Volume2/V2_3_Ch3_Mobile_Combustion.pdf

[150] https://www.eea.europa.eu/publications/emep-eea-guidebook-2019

[151] https://www.eea.europa.eu/publications/emep-eea-guidebook-2019/part-b-sectoral-guidance-chapters/1-energy/1-a-combustion/1-a-3-c-railways/view.

Note: in the table above the following assumptions have been taken into consideration:

- The estimated GHG emissions for 2020 have not been taken into consideration because of the interruption of the traffic from Vore to Hani Hotit (Northern Albania) as a result of the damage to a bridge by the Earthquake of November 26.2019;
- The year 2014 has been considered as a base year because of the available information provided by the traffic study;
- The railway line is not electrified. The electrification will drastically decrease the indirect GHG emissions because more than 90% of the national electricity amount is generated by clean sources (hydropower plants). Besides, the planned HPP Skavica will increase by 20% the national electricity production. The Trans Adriatic Pipeline is also another clean energy source;
- The railway line sections Rrogozhine-Vlore and Vlore-Fier (see figure below) will be rehabilitated between 2030 and 2040. Therefore, these sections will be operational only in 2040;
- The new railway line section Pogradec border Al/Gr will be built between 2030 and 2040. It will be operational in 2040. Therefore, the freight transport with Greece will be operational in 2040;
- The railway line sections Vore - Hani Hotit, Durres-Tirana, Durres-Rrogozhine, Rrogozhine-Elbasan, Elbasan-Pogradec and further on to the border with the Northern Macedonia will be rehabilitated and it is supposed them will be operational since 2025;
- The whole Albanian railway network and the links to Montenegro, Northern Macedonia and Greece will be operational in 2040;
- Starting from 2025, new passenger locomotives are planned.

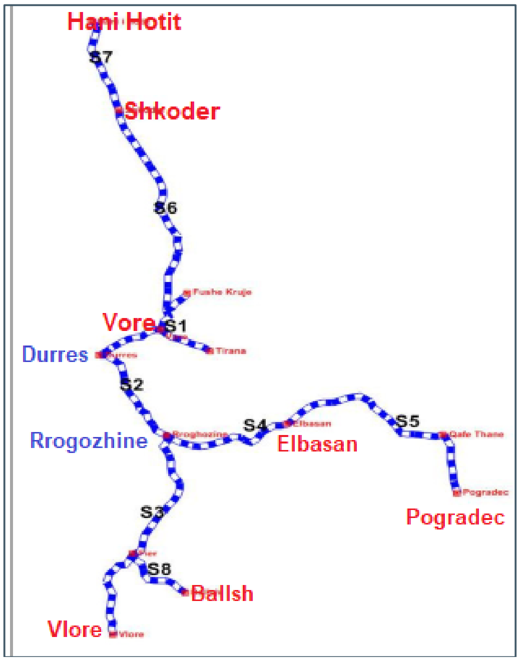

Figure 9-4_Sections of the Albanian railways network

10.5 Appendix 6: Tables on potential biophysical and socioeconomic impacts and related mitigation measures

The tables below show the summarized assessment for biophysical and social impacts.

Table 9-3_Summarized assessment for the identified biophysical impacts

Potential effect	Phase	Direction of change	Type of Impact	Reversibility	Geographic Extent	Time when the Impact Occurs	Duration	Likelihood	Magnitude (without mitigation)	Significance (Without mitigation)	Probable Success of Mitigation	Significance of Residual Effect (with mitigation)
	Construct. /**O**peration	**N**o **I**mpact **N**egative **P**ositive	**D**irect **I**ndirect **C**umulative	**R**eversible **I**rreversible	**W**orking **S**ite **L**ocal **R**egional **N**ational	**I**mmediate **D**elayed	**S**hort **T**erm **M**id-**T**erm **L**ong **T**erm	**L**ikely **P**robably **C**ertainly	**N**egligible **L**ow **M**edium **H**igh	**I**nsignificant **Min**or (Low) **Mod**erate **H**igh Very **H**igh	**N**o **M**itigation **L**ow **M**oderate **H**igh **C**ertainly	**I**nsignificant **Min**or (Low) **Mod**erate **H**igh Very **H**igh
Air quality												
Air pollution from construction activities	C	N	D	R	WS, L	I	ST	P	L	Min	Mod	I to Min
Air pollution from operation	O	N	D	R	L	I	ST	P	L	Min	M	I
Climate change												
Climate change & flooding	C	N	D	R	L, R	I, D	ST	L	L to M	Min	High	I to Min
Climate change & flooding	O	N	D	R	L, R	I, D	LT	L	N	I	C	I
Climate change & GHG emissions	O	N	D	I	R, N	I, D	ST to LT	P	N to L	Min	C	I to Min
Noise and vibrations												
Noise & vibrations from construction	C	N	D	R	L	I	ST	C	L	Mod	High	Min to Mod
Noise & vibrations from operation	O	N	D	R	L	I	LT	C	L to M	Min to Mod	High	Min
Geology (erosion, sedimentation, subsidence, etc.)												
Impact of subsidence on the railway line components	C	N	D	R	L	I, D	ST-MT	P	L	Mod	C	Min
Impact of subsidence on the railway line components	O	N	D	R	L	I, D	ST to LT	P	L	Min	C	I
Earthquakes												
Impacts of Earthquakes on the	C	N	D	R	L	I	ST-LT	L	M	Mod	C	Min

Potential effect	Phase	Direction of change	Type of Impact	Reversibility	Geographic Extent	Time when the Impact Occurs	Duration	Likelihood	Magnitude (without mitigation)	Significance (Without mitigation)	Probable Success of Mitigation	Significance of Residual Effect (with mitigation)
Railway line components												
Impacts of Earthquakes on the Railway line components	O	N	D	R	L	I	ST	L	M	Mod	C	I
Surface waters quality												
Impact of construction works on Surface waters quality	C	N	D	R	L to M	I	MT	L	L	Min	High	I to Min
Impact of operational phase on Surface waters quality	O	N	D	R	L	I	MT	L	N	I	High	I
Flooding												
Impact of construction activities on Flooding	C	N	D	R	L to M	ST	ST	L	L to M	Min	High	Min
Impacts of railway line components on Flooding	O	N	D	R	L to M	ST	ST	L	L	I	C	I
Ground water quality												
Impacts of construction works on Ground water quality	C	N	D	R	L	I, D	MT	L	L	Min	High	Min
Ground water quality during operation stage	O	N	D	R	L	I, D	MT	L	N	I	High	I
Ecological resources and Biodiversity												
Impacts of construction activities on Ecological resources and Biodiversity	C	N	D	R	L	I to MT	MT	P	L	L	Mod	I to Min
Ecological resources and Biodiversity	O	NI	D	R	L	I to MT	ST	L	N	I	High	I

Potential effect	Phase	Direction of change	Type of Impact	Reversibility	Geographic Extent	Time when the Impact Occurs	Duration	Likelihood	Magnitude (without mitigation)	Significance (Without mitigation)	Probable Success of Mitigation	Significance of Residual Effect (with mitigation)
during operation												
Soil and soil quality												
Impacts of construction activities on soil	C	N	D	R	L	I	ST	P	L to M	Mod	High	I to Min
Soil quality during operation	O	NI	-	-	-	-	-	-	-	-	-	-
Infrastructure utilities												
Impacts of construction activities on Infrastructure utilities	C	N	D	R	L	I	ST	L	L to M	Min to Mod	C	I to Min
Infrastructure utilities during operation	O	NI	-	-	-	-	-	-	-	-	-	-
Cultural heritage												
Impacts of construction activities on Cultural heritage	C	N	D	I	WS, L	I	LT	L	L	Min to Mod	M	I to Min
Cultural heritage sites/objects during operation	O	NI	-	-	-	-	-	-	-	-	-	-
Landscape and visual amenities												
Impacts of construction activities on Landscape and visual amenities	C	N	D	I	L, R	I	I, MT	C	M	Mod	L	Min to Mod
Landscape and visual amenities during operation	O	N	D	I	L, R	I, D	LT	C	M	Mod	M	Min to Mod
Waste												
Waste generation from pre-construction and construction activities	C	N	D	I	L, R	I	ST	C	M	Mod	C	Min

Potential effect	Phase	Direction of change	Type of Impact	Reversibility	Geographic Extent	Time when the Impact Occurs	Duration	Likelihood	Magnitude (without mitigation)	Significance (Without mitigation)	Probable Success of Mitigation	Significance of Residual Effect (with mitigation)
Waste generation during operation	O	N	D	R	L, R	I	ST	L	L	L	C	I
Accidents and incidents												
Accidents and incidents during construction activities	C	N	D	R	WS	I	ST	P	L to M	Min to Mod	High	I to Min
Accidents and incidents during operation	O	N	D	R	WS	I	ST	L	L	Min	C	I

Table 9-4_Summarized assessment for the identified social impacts

Social Aspect and Potential Impact(s)	Characteri-zation of Impact	Type of Impact	Reversibility	Geographic Extent	Time when the Impact Occurs	Duration	Likelihood of Appearance	Magnitude of Impact (without mitigation)	Significance of Effect (Without mitigation)	Probable Success of Mitigation	Significance of Residual Effect (with mitigation)
CONSTRUCTION PHASE											
Community Health and safety											
Impacts from influx of temporary workers	N	D	R	L	I	ST	C	Low negative	Slight negative	High	Neutral/Slight negative
Impacts from increased community exposure to disease	N	D	I	R	I	ST	C	High negative	Large negative	Moderate	Slight negative
Impacts from increased traffic and heavy vehicles on local roads during construction	N	D	I	R	I	ST	C	High negative	Large negative	High	Slight negative
Safety issues associated to the entrance of non-authorized people on the construction site	N	I	I	R	I	ST	P	Medium negative	Moderate negative	High	Neutral

Community tensions											
Effects from influx of workforce into local communities	N	D	R	L	I	ST	P	Low negative	Slight negative	Moderate	Neutral/ Slight negative
Community reactions due to disturbance arising from the construction works	N	D/I	R	R	I	ST	C	High negative	Large negative	High	Slight negative
Economy											
Stimulation of economic growth at local levels	P	D	R	L	I	ST	C	High positive	Large positive	Moderate	Large positive
Employment											
Creation of local employment (direct and indirect)	P	D/I	I	N	I	ST	C	High positive	Large positive	Moderate	Large positive
Education and Training											
Capacity building through training	P	I	I	R	I	ST	P	Low positive	Slight positive	Moderate	Moderate positive
Communities' Quality of Life - safety											
Safety	N	D	R	L	I	ST	C	Medium negative	Large negative	High	Slight negative
Disruption of utility services	N	D	R	L	I	ST	C	Medium negative	Large negative	High	Slight negative
OPERATIONAL PHASE											
Community Health and safety											
Impacts from better access to the larger towns and health services located in larger towns/cities	P	D	I	R	I	LT	C	High positive	Large positive	Moderate	Large positive
Safety issues associated with crossing of rail track	N	D	I	R	D	LT	C	High negative	Large negative	Moderate	Slight negative
Community tensions											
Community reactions due to disturbance arising from operation of railway	N	D	I	L	D	LT	C	High negative	Large negative	Moderate	Slight negative
Economy											

Effects on local economy	P	I	I	L	D	LT	C	High positive	Large positive	Moderate	Large positive
Effects on central and southern Albanian economy	P	I	I	R	D	LT	C	High positive	Large positive	Moderate	Large positive
Effects on National economy	P	I	I	N	D	LT	C	High positive	Large positive	Moderate	Large positive
Effects on European/Global economy	P	I	I	G	D	LT	C	High positive	Large positive	Moderate	Large positive
Employment											
Creation of employment (direct & indirect) at local, regional, national & global level (Western Balkans and beyond SEE area)	P	D/I	I	G	D	LT	C	High positive	Large positive	Moderate	Large positive
Improvement in access to employment opportunities across the region	P	D	I	N	D	LT	C	High positive	Large positive	Moderate	Large positive
Education and Training											
Education and training benefits from employment opportunities	P	I	I	R	D	LT	C	High positive	Large	Moderate	Large positive
Education and training benefits from improved access to education and employment opportunities	P	I	I	N	D	LT	P	High positive	Large	Moderate	Large positive
Communities' Quality of Life - safety											
Safety	N	I	I	L	D	LT	C	High negative	Large	High	Slight negative

LEGEND
Characterization the impact: Positive (P), Negative (N)
Type of Impact: Direct (D), Indirect (I), Cumulative (C)
Reversibility: Reversible (R) Irreversible (I)
Geographic extent: Local (L), Regional (R), National (N), Transboundary (T), Global (G)
Time when the impact occurs: Immediate (I), Delayed (D)
Duration: Short-term (ST), Medium-term (MT), Long-term (LT)
Likelihood of appearance: Unlikely (U), Probable (P), Certain (C)
Magnitude: Negligible/No change, Low, Medium, High
Significance: Very Large, Large, Moderate, Slight, Neutral

10.6 Appendix 7: Considerations on an additional requested underpass at Shkembi Kavajes area

Technical Note

Outstanding issue from the "Public consultation on Project Detailed Design and ESIA Report" with Durres Municipality held on January 12, 2022

Subject: Considerations on Design and Construction of an additional requested Pedestrian Underpass in Kavaje Rock area (Km. 6+123 to Km. 7+660)

The subject is an issue from the "Public consultation on Project Detailed Design and ESIA Report" with Durres Municipality, where a group of hotels and other business owners asked for the construction of a Pedestrian Underpass structure in this segment.

Currently, there are 4 Pedestrian Overpasses in this segment, which overpass Durres-Rrogozhine Highway only. Up to date, pedestrians are crossing the railway track illegally by unprotected level crossings. Existing overpasses are under operation and property of "Albanian Road Authority" (ARA).

During the meeting the Consultant's Experts explained the solution provided in the Detailed Design by extending the existing 4 overpasses, with similar steel structures, by guaranteeing the safety overpass of the railway track as well.

The business owners insisted that the construction of Pedestrian Underpass equipped with appropriate elevators is the right solution for their needs.

Considering the fact that the construction of these structures exceeds the scope of work of the Railway Project, and involves more institutions, Durres Municipality expressed their willingness to assist the business owners by trying to address their concern with ARA or other departments of Ministry of Infrastructure and Energy. A potential solution may be discussed in common meetings with the Presence of Durres Municipality, ARA and Albanian Railway

As the Albanian Railway may be present in communications/meetings with ARA or other entities to find any potential solution, below are a few of the Consultant's considerations regarding the issue.

The length of pedestrian underpasses will range from 45 to 60 m, from which only 10-15 are under the railway track. Due to the vicinity of the railway track with the motorway, they can be constructed as single structures only, without splitting the railway and road underpass. Consequently, the design and the construction of these structures exceeds the scope of work of the Railway Project and involves more institutions.

Construction of these structures will probably be very difficult and eventually expensive due to the:

- Considerable length, and negative absolute elevations;
- Need for mechanical ventilation;
- Need for emergency drainage system to avoid the risk of flooding;
- Need of a lighting system; and
- High maintenance cost.

In case ARA or any other entity, will consider the possibility of designing and constructing these structures, the following conditions must be respected for the railway project:

1. Architectural Design must respect the railway alignment of the Detailed Design prepared by the Consultant;
2. Structural design must consider railway codes and standards;
3. The clearance between the Top of the Rail and the top level of the structure shall not to be less than 1.1m;
4. Any vertical part of the structure shall have a minimum distance from the railway axis of 4.0m; and
5. Prior approval of the design from HSH technical department is required.