Preliminary Design for the Rehabilitation of the Railway Corridor VIII Rrogozhina – Pogradec

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ENVIRONMENTAL AND SOCIAL IMPACT ASSESSMENT ESIA REPORT

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The authors take full responsibility for the contents of this report. The opinions expressed do not necessarily reflect the view of the European Investment Bank.

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PROJECT DATA SUMMARY

ACTION	Preliminary Design for the Rehabilitation of the Corridor VIII Rrogozhinë - Pogradec Section, Albania
REFERENCE NUMBER	AA-010284-001
BENEFICIARY	Ministry of Infrastructure and Energy of Albania
PROMOTER AND END RECIPIENT	Albanian Railways – HSH
COUNTRY	Albania
FINANCIER	European Investment Bank
Budget	EUR 1,802,500
Contract Signature	30/01/2023
Commencement date	10/02/2023
Duration (month)	18
Due date for completion	10/08/2024
Key Experts	KE1 – Team Leader – Aris KARLAFTIS KE2 – Transport infrastructure engineer – Deputy TL – Hector MARTINEZ KE3 – Tunnel engineer – Alejandro Antonio VILLAESCUSA GONZALEZ KE4 – Rail signalling / telecom engineer – José Ignacio VIVAS ORTEGA

LIST OF ABBREVIATIONS

ALUIZNI	Agency on the Legalization of Informal Construction
AoI	Areas of Influence
ARA	Albanian Road Authority
ASIG	Albanian State Authority of Geospatial Information
CBA	Cost Benefit Analysis
CMD/DCM	Council of Ministers Decision
CoM	Council of Ministers
CTC	Centralized Traffic Control
DD	Detailed Design (also referred to as Main Design – MD)
EBRD	European Bank for Reconstruction and Development
EIB	European Investment Bank
ERI	Economic Resilience Initiative
ESIA	Environmental and Social Impact Assessment
ETSI	European Telecommunications Standards Institute
EU	European Union
FS	Feasibility Study
GHG	Greenhouse Gas Emissions
GoA	Government of Albania
h	Hour
HSH	Albanian Railways - Hekurudha Shqiptare
IFI	International Financial Institutions
IPA	Instrument for Pre-Accession Assistance (EU)
IPF	Infrastructure Project Facility
IPRO	Immovable Property Registration Office
IR	Inception Report
JASPERS	Joint Assistance to Support Projects in European Regions
KE (s)	Key Expert (s)
Km	Kilometre
KOM	Kick-Off Meeting
KP	Kilometre Point
LARF	Land Acquisition and Resettlement Framework
LARP	Land Acquisition and Resettlement Action Plan
LC	Level Crossing
m	Metre
MCA	Multi-Criteria Analysis
MIE	Albanian Ministry of Infrastructure and Energy
MoM	Minutes of Meeting
NKE (s)	Non-Key Expert (s)
NTS	Non-Technical Summary
OB	Operational Backstopping
PAP	Project Affected Persons
PD	Preliminary Design
PEA	Public Expropriation Agency
PFS	Pre-Feasibility Study
PIU	Project Implementation Unit
PMIS	Project Management Information System
POC	Point of Contact
QA	Quality Assurance

QM	Quality Management
RAP	Resettlement Action Plan
REBIS	Regional Balkans Infrastructure Study
SC	Steering Committee
SDG	Sustainable Development Goals
SEETO	South-East Europe Transport Observatory
SEP	Stakeholder Engagement Plan
TA	Technical Assistance
TB	Technical Backstopping
TEN – T	The Trans-European Transport Network
TL	Team Leader
ToR	Terms of Reference
UIC	International Union of Railways
WP	Waypoint

1 Introduction

1.1 General background

This ESIA is prepared for the Study Section of the Project of the Preliminary Design for the Rehabilitation of the railway line Rrogozhinë - Pogradec Section, Albania.This project is developed by the Ministry of Infrastructure and Energy (MIE) and the Albanian Railways (HSH) based on the Contract number: AA-010284-001*: "Preliminary Design for the Rehabilitation of the Corridor of VIII Section Rrogozhinë - Pogradec",*

The project consists of the rehabilitation of the existing line of the Rrogozhinë - Pogradec section with a total length of 119.5 km.

It is an important project that will contribute to the phased rehabilitation and improvement of the railway Corridor VIII in the territory of Albania to enable the provision of transport services and increased safety and speed to EU standards.

The Project would lead to improved transport connectivity, reduction of road traffic congestion, decrease of transit traffic in cities and reduction of local pollution and GHG due to vehicle emission. The Project is of regional importance, and it will facilitate trade, regional integration, and sustainable growth and it will have a positive impact on the economy of Albania.

The project footprint starts at Km 35+300, which belongs to the existing station of Rrogozhina in the direction of Elbasan, and ends at Km 152+800, which belongs to the station of Guri i Kuq (Pogradec).

The existing railway line, from Rrogozhina to Pogradec, has been constructed in sections from ‘50s to ‘70s and includes 12 stations. It has been designed to serve both freight and passenger operations.

The ESIA report (this document) for this phase of the project (Preliminary design) is part of the Environmental and Social Impact Assessment (ESIA) study package on the Project that is prepared by the consortium SUEZ - Consulting (SAFEGE).

Two main segments of the footprint of the project are:

- Rrogozhine -Prrenjas section
- Prrenjas –Porgadec Section

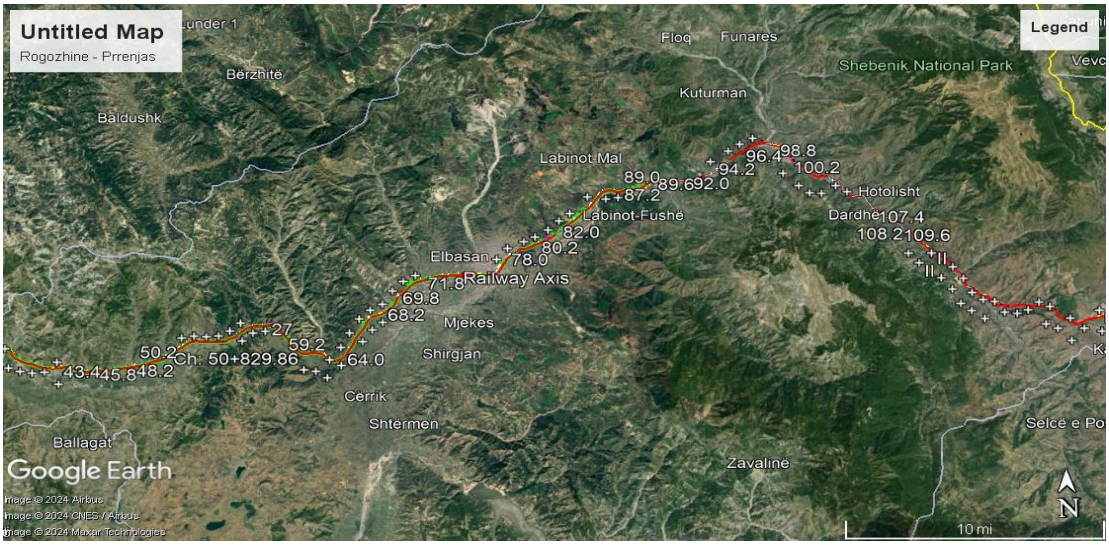


Figure 1-1 The footprint of the project (Rogozhine – Prrenjas)

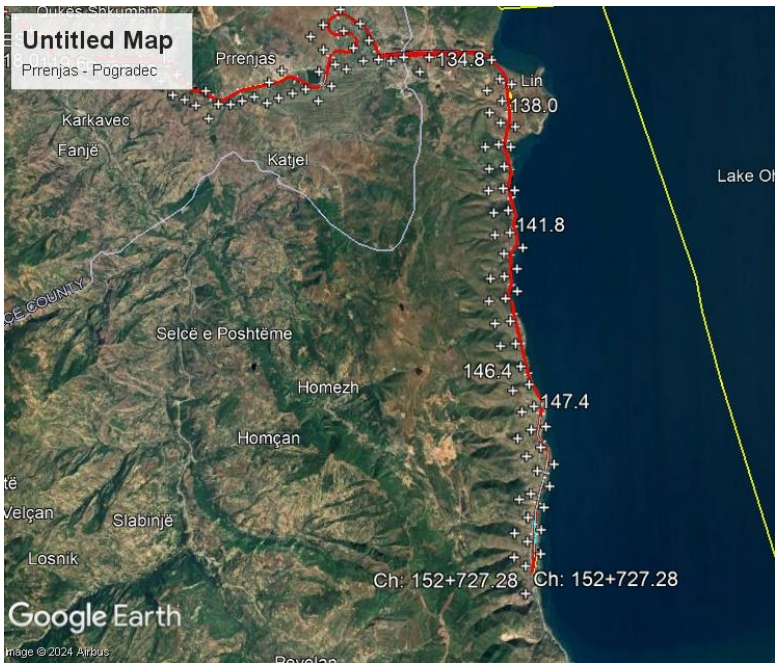


Figure 1-2 The footprint of the project (Prrenjas – Pogradec)

1.2 Information about Developer

The Beneficiary of the Project is the Ministry of Infrastructure and Energy (MIE) of Albania (MTI), with the Albanian Railways (HSH) as promoter/end recipient.

The Albanian Railways operate under the Ministry of Infrastructure and Energy (MIE) as a separate General Directorate composed of five Business Units, with separate accounts for infrastructure and operations.

The operational and the policy functions are separate in the railway sector, although the core railway businesses (infrastructure, passenger operation, freight operation) are, for the time being, undertaken by the same legal entity. The sector is undergoing reforms in line with the country's accession strategy for joining the EU in the coming years.

1.3 Objectives and scope of this document

The purpose of the ESIA is to assess and predict potential adverse social and environmental impacts and to develop suitable mitigation measures, which are documented in an Environmental and Social Management Plan (ESMP) since in this phase of the project which will be more detailed and evaluated /updated during the detailed design of the project.

The scope of the ESIA is defined in the ToRs "Preliminary Design for the Rehabilitation of the Corridor VIII Rrogozhina - Pogradec Section AA-010284-001":

This document is part of the package of the ESIA study deliverables on the proposed project for the preliminary design phase of the project in which it shall be submitted:

- Feasibility study and Preliminary Engineering Design for the "Study Section", and
- Preparation of Environmental and Social Impact Assessment for the "Study Section".

As per the ToR, required standards for the ESIA outputs that shall be prepared and submitted are as following:

- Environmental and Social Impact Assessment (ESIA);

- Climate Change Resilience and Vulnerability Assessment Report (CC Report);
- Environmental &Social Management Plan (ESMP)developed as part of the ESIA;
- Land Acquisition and Resettlement Framework (LARF);
- Stakeholder Engagement Plan (SEP);
- Non-Technical Summary (NTS).

The ESIA for the Study Section, will be based on the preliminary environmental and social screening report developed within the framework of the Pre-Feasibility Study

The ESIA will consider the provisions of the national laws as well as the Contracting Authority's relevant environmental and social policies. All the communities likely to be affected and other interested stakeholders will be identified.

The ESIA will be structured to fulfil the relevant EU standards and regulatory documents, including the EIA Directive 2011/92/EU (amended in 2014), Birds Directive 2009/147/EC, Habitats Directive 92/43/EEC, the EBRD Environmental and Social Policy (2014), EIB Standards, and the local procedures and provisions. When the Albanian regulations differ from the EU or IFI environmental standards, the ESIA is expected to meet those that are the more stringent. The ESIA shall take account of the cumulative impact of the associated works of subsequent electrification.

The geographical area will cover the railway line between Rrogozhina and Pogradec Railway Section.

Consultations and coordination will be provided with all relevant stakeholders, including, but not limited to: Environmental and nature protection authorities; Municipalities; Ministry of Tourism and Environment; Etc.

1.4 Key requirements on ESIA study deliverables

ToR requires the ESIA study deliverables to be as follows:

- Environmental and Social Impact Assessment (ESIA) report;
- LARF;
- Climate Change Resilience and Vulnerability Assessment Report (CC Report);
- ESMP;
- Non-Technical summary ESIA;

The sections hereinafter highlight the requirements on the other documents listed above.

1.5 Gap analysis on EIA

Basic laws of the Albanian legislation in the field of environmental protection, environmental assessment, waste management, water sources, air, and biodiversity protection are partly aligned, fully or approximates aligned with EU directives. Referring to the EC Albania report (2021), efforts need to be made to achieve full alignment and implementation in most areas.

The main recommendation was referred to:

- Implementation of the Environmental Impact Assessment (EIA) and Strategic Environmental Assessment (SEA) Directives needs to be significantly improved concerning concrete projects before construction and operation, especially for large infrastructure projects in the energy, transport, tourism and mining sectors;

- Implementation of the 2014 national air quality strategy is still pending.
- Albania has to strengthen its administrative capacities to determine the national emission ceilings and align with the National Emissions Reduction Commitments Directive.
- Implementation of the Directive on sulphur content in certain liquid fuels is ongoing.
- Implementation of Directive 94/63/EC on the control of volatile organic compound (VOC) emissions resulting from the storage of petrol and its distribution from terminals to service stations and 2009/126/EU on Stage II petrol vapour recovery during refuelling of motor vehicles at service stations needs to start.
- The legal framework for waste management is partially aligned.
- Albania should promote circular economy and should incentivise preventing, reducing and recycling waste to cut down landfilling. The implementation of the waste streams legislation should be speeded up.
- Alignment with the EU legislation on industrial pollution and risk management is still at an early stage. The limited data on industrial pollution rely on companies' self-monitoring and declarations.
- On chemicals, Albania continued to align with the EU Regulation on the registration, evaluation, authorisation and restriction of chemicals (REACH).
- Albania should strengthen its administrative capacity for preparing strategic noise maps and action plans.
- However, the implementing legislation remains to be adopted and adequate administrative structures to be established.

Refer to Climate change:

- Albania has adopted in December 2020 the climate law, but alignment with the acquis still remains limited.
- The implementation of the climate law will largely depend on future secondary legislation, regulations, and measures delegated to the minister for the environment.
- Lack of specific administrative structures and available staff for handling climate change issues remain a matter of serious concern. As per the Albanian Legal Framework for this project is not required evaluation and assessment of GHG.

Action taken to fill the gaps:

The Consultant has prepare the Climate Change Resilience and Vulnerability Assessment Report (CC Report), as per EU Climate Requirements &regulations[1].

Threshold Limit Values of Air Quality:

There are differences in the value of threshold Limit for the parameters of Air Quality refer to Albanian Framework /EU and WHO (World Health Organization) Actions taken by the Consultant to fill the gaps.

[1] Regulation (EU) 2021/1119 of the European Parliament and of the Council of 30 June 2021 establishing the framework for achieving climate neutrality and amending Regulations (EC) No 401/2009 and (EU) 2018/1999 ('European Climate Law'). http://data.europa.eu/eli/reg/2021/1119/oj

Table 1-1 Threshold Limit Values of Air Quality

Pollutant	Concentration Limit EU[2]	Averaging period	Permitted exceedances each year	AL limit[3]	New WHO [4] Guidelines 2021
SO_2	350 µg/m^3	1 hour	24	360 µg/m^3	500[5] µg/m3
	125 µg/m^3	24 hours	3	120 µg/m^3	40 µg/m3
	40 µg/m3	1 year		60 µg/m^3	
NO_2	200 µg/m^3	1 hour	18	250 µg/m^3	200 µg/m3
	40 µg/m^3	1 year	n/a	60 µg/m^3	10 µg/m3
CO	10 mg/m^3	Maximum daily 8 hours mean	n/a	10 mg/m^3	10 mg/m3
	2 mg/m3	24 hours		2 mg/m^3	4 mg/m3
PM_{10}	50 µg/m^3	24 hours	35	150 µg/m^3	45 µg/m3
	40 µg/m^3	1 year	n/a	60 µg/m^3	15 µg/m3
$PM_{2.5}$	25 µg/m^3	1 year	n/a	66 µg/m^3	5 µg/m3
PM2.5		24 –hour			15 µg/m3
C_6H_6	5 µg/m^3	1 year	n/a	5 µg/m^3	5 µg/m3

Action to fill the gaps:

The most stringent standards will be applied for this project.

1.6 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: Regulatory framework and guidelines. Under this chapter are discussed the requirements of the EU, national, EIB 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;

[2] Ambient Air Quality Directive 2008/50/EC;

[3] DCM No 803, dt. 04.12.2003 – On Approval of air quality limits

[4] https://www.who.int/news-room/questions-and-answers/item/who-global-air-quality-guidelines

[5] (ten min)

- Chapter 3: The Project. The chapter discusses the Project area along with the Project elements (components, activities, and land use issues);
- 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 environmental each topic the used material and methods are provided;
- Chapter 6: Impacts and Mitigation. This chapter describes the main sources of impacts and the potential impacts that may arise from the project development, as well as the suggested strategies and measures to avoid/reduce any eventual significant impact;
- Chapter 7: Comparison of the considered options. The considered Project's options have been compared during the scoping stage. Under this chapter are compared from the environmental and social point of view the Option "zero" – "do-nothing" option and the preferred Option ("the basic" option);
- Chapter 8: Monitoring program. This chapter provides for the environmental parameters that are regularly monitored by the National Environmental Agency and other institutions and agencies, as well as on the environmental and social parameters that should be monitored during the Project's implementation;
- Chapter 9: Main findings: This short chapter gives the main findings of the ESIA report regarding any negative or positive environmental and socioeconomic effect of the proposed project;

2 REGULATORY FRAMEWORK AND GUIDELINES

2.1 ESIA process stages

The Consultant during development of ESIA for this phase of the project (preliminary design/feasibility study) followed the requirements of ToR. Existing studies were taken into consideration as well (Pre-feasibility Study).

ESIA process stages during preliminary design phase passes through these steps:

- Inception report in which was included the main topics to be taken into consideration during ESIA report.
- Alternative analyses in which were considered and assessed the alternatives proposed.
- ESIA report draft (preliminary design)
- ESIA report final (preliminary design)

Following are shown the national and EU regulations and EIB/EBRD standards on the stages and steps of the EIA process during detail design phase.

The table below gives the stages and steps to be followed during the EIA process (in detail design), as provided by the EU EIA Guidance on the preparation of the EIA report.[6] As shown in the column on comments, the requirements of the EIA Directive[7], the Albanian Law 10440 "On EIA"[8] and the EBRD Environmental and Social Policy[9] (April 2019), on the different stages of this process are almost the same. This resemblance derives from the fact that the EIA Law complies with the EIA Directive and the EBRD is a signatory to the European Principles for The Environment[10].

Table 2-1 ESIA process stages and steps, and EU, Albanian, and EBRD requirements

No.	Stage	Description	Comment
1	Screening (as appropriate)	The Competent Authority (MoTE) decides whether an EIA is required and if it does, then which level of assessment is required.	For preliminary design this step is not applicable Not required for projects included in Annex I of EIA Directive, Annex II of the Albanian EIA Law, and Appendix II of EBRD ESP (2019); Required for projects included in Annex II of EIA Directive and Annex I 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. Thus, scoping refers to: Preparation of ToR for EIA	For preliminary design this is not applicable; Albanian regulations require a scoping stage when submitting ESIA for Environmental declaration (detail design phase) 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 and if it is included in ToR; (Not included in ToR for this phase of the project)
3	EIA report preparation	EIA report includes[11]: Information on the project, Baseline information; Likely significant effects; Proposed Alternatives;	Required by Albanian legislation, EU, EIB and EBRD. EIA report to be prepared after the Scoping stage.

[6] https://ec.europa.eu/environment/eia/pdf/EIA_guidance_EIA_report_final.pdf
[7] ec.europa.eu/environment/eia/pdf/Revised EIA.pdf
[8] Law 10440/2011 "On Environmental Impact Assessment"
[9] https://www.ebrd.com/news/publications/policies/environmental-and-social-policy-esp.html
[10] https://www.ebrd.com/key-sustainability-downloads.html
[11] Annex IV of the EIA Directive 2011/92/EU as amended

No.	Stage	Description	Comment
		Mitigation measures; and a Non-Technical Summary (during detail design phase of the project)	During preliminary design as per Albanian there is not any regulations because there is not any submission to the institutions. As per ToR ESIA shall be prepared after inception report. Structure and content of the EIA report shall be prepared as per ToR during preliminary design (feasibility phase of the project) Required by Albania: Structure and content of the EIA report during feasibility phase will be prepared as per ToR as requested by the Developer to the Competent Authority. During detail design the structure of ESIA Report shall be as per the Decision No. 686, dated 29.7.2015 "for the approval of rules, responsibilities and deadlines for the development of the environmental impact assessment procedure (EIA). SEP, LARF, ESAP, and ESMP to be prepared parallel to EIA report
4	Information and consultation	EIA Report is consulted with the public and stakeholders; EIA improved where necessary subject to consultations information	Required by EU, Albania (during detail design when submitting ESIA for Environmental Declaration, EIB and EBRD. Required by EU and Developer (during preliminary design). EIA Report is consulted with stakeholders since in the alternative analyses phase and even during ESIA drafting; Consultation with public is not required during this phase of the project. This is required during detail design, and it is leaded by MoTE.
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.	For preliminary design this request is not applicable. There is not any report to be submitted to the Institution during this phase of the project. Required by EU, Albania, EIB and EBRD during detail design of the project.
6	Information on Development Consent	The public is informed about the Development Consent decision.	For preliminary design this request is not applicable. Required by EU, Albania, EIB and EBRD during detail design phase.
7	Monitoring (as appropriate)	During construction and operation, the developer must monitor the identified significant adverse effects as well as the proposed mitigation measures	For preliminary design this request is not applicable. Required by EU, Albania, EIB and EBRD during detail design of the project.

The following flow chart, prepared by UNEP[12] gives the relationships between the EIA standard steps, as well as the main stages of the public involvement during detail design phase.

[12] unep.ch/etu/publications/EIA_2ed/EIA_E_top2...

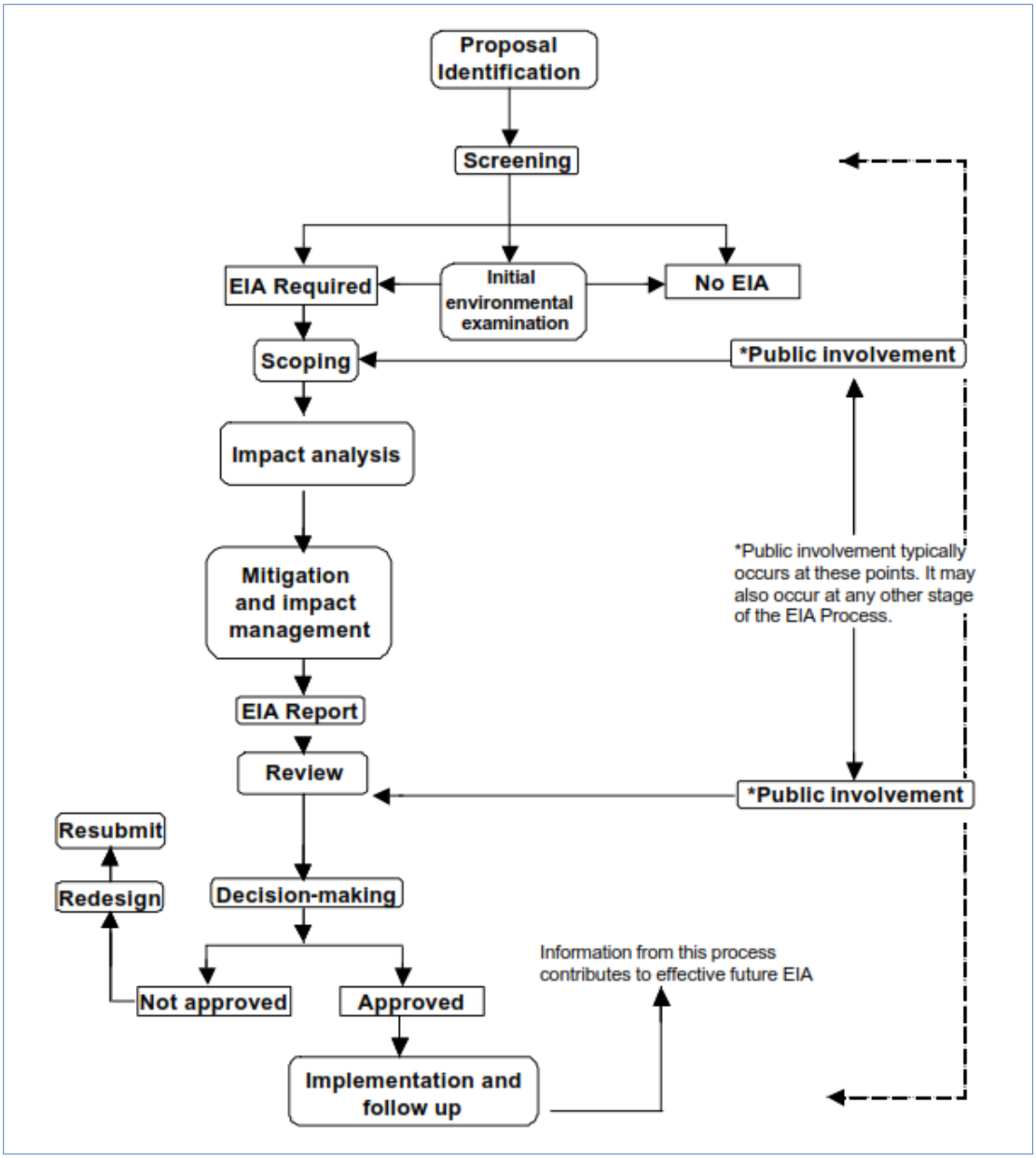


Figure 2-1 ESIA process flowing chart (source: UNEP) shall be follow during detail design phase

Concerning the proposed railway Rrogozhinë – Pogradec rehabilitation project in this phase of preliminary design (feasibility phase) and the related ToR provisions endorsed by EIB/EBRD, the required ESIA process stages and the related outputs are described hereinafter.

2.1.1 ESIA process stages for the proposed project preliminary design

Limitations regarding the preparation of ESIA outputs at the Preliminary Design

Based on the provisions of the Albanian environmental legislation, the ESIA prepared during the Preliminary Design cannot fully satisfy the requirements of the Law 10440/2011 “On EIA”, which is in line with the EIA Directive. Some of the unsatisfied requirements of the Law, include:

ToRs on the Preliminary Design for Rrogozhinë – Pogradec railway line do not require any detailed construction plan including its implementation’s timeline, quantity of generated waste, sources of construction material for the railway body, quantity and disposal of waste including wastewater, pollution released into atmosphere, etc., elements required by the EIA Law during detail desing;

According to EIA Law, a full ESIA (or comprehensive ESIA – EU Directive terminology), is prepared during the Detailed Design, only.

The Environmental Declaration is based on the conclusions of an ESIA study that is prepared during the Detailed Design. The Environmental Declaration is valid for a period of two years from its issuing date. If the construction works do not start within two years from this date, then the EIA study procedure must be done from the beginning.

Therefore, at this stage of the project, it is not feasible to secure an Environmental Decision from the competent authority and the "Building Permits".

The ESIA deliverables, including the standards that will be addressed at this study stage, as well as their limitations, are summarized hereinafter.

ESIA report

As explained hereinabove, the ESIA report will be a slightly simplified form of a comprehensive ESIA that will aim at avoiding the main potential impacts through suggesting the most environmentally friendly spatial and technical options of the project that should be taken into consideration during the next stage (Detailed Design). The full ESIA (comprehensive ESIA – EU Directive terminology) should be prepared during the Detailed Design.

Non-Technical Summary (NTS)

NTS will satisfy the national, EU and EIB standards.

Environmental and Social Management Plan (ESMP)

ESMP will be further elaborated during the next stage of the Project development (Detailed Design and full ESIA), as at the PD stage the potential impacts are not known in detail (e.g. lack of complete information on the groundwater and erosion because the PD does not include geotechnical drillings).

Climate Change Resilience and Vulnerability Assessment Report (CC Report)

CC Report will be further elaborated during the Detailed Design and full ESIA, as at the PD stage the sources of impacts are not yet fully known (e.g. impacts on groundwater, erosion and sedimentation, impacts on biodiversity, access roads within the steep and fragmented mountainous terrain, etc.).

Stakeholder Engagement Plan (SEP)

SEP will include consultations at the administrative unit level, and whether necessary at village level. That is necessary to foresee the necessary level crossings, side/parallel roads, underpasses and/or overpasses for local population, businesses, etc. No public hearing will be included during the PD, as the directly affected properties and landowners cannot be known in detail at this stage. Public hearing will be performed during detail design, and it is leaded by the MoTE.

Land Acquisition and Resettlements Framework (LARF)

LARF will satisfy the national, EU and EIB requirements. Wherever they differ from each-other, the most stringent will be selected.

Environmental and Social Impact Assessment (ESIA)

The content of the ESIA report will satisfy both the Albanian DCM 912/2015 "On the EIA methodology", the EIA Law and the EIA Directive. The Consultant will follow the EU "Guidance on EIA" for preparing it, satisfying, thus, the national, EU and EIB requirements.

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" fully complies with the EIA Directive 2014/52/EU. Consequently, the structure and

content of the ESIA report will be based on Annex IV of the EU EIA Directive. Besides, the requirements of the involved IFI (either EIB Environmental and Social Standards or EBRD Environmental and Social Performance Requirements), will be integrated in the ESIA report. Between the requirements of EU and the involved IFI, the most stringent will be applied.

The indicative structure and content of the ESIA report includes the following:

- Introduction: Project background, justification and objectives; ESIA purpose and objectives; The ESIA study and the ESIA report; Eventual risks and uncertainties about the Project and its likely environmental effects.
- The Project: Project location; Project elements (components, activities, land use requirements); Resources used and sources of impacts; Project's alternatives and preferred alternative.
- Regulatory framework: The ESIA process; the formal consultations; the eventual land use issues; the EU, national and involved IFI environmental and social regulatory framework; Gap analysis of the applicable ESIA standards.
- Methodology for impacts assessment: Methodology for selecting and assessing the potential impacts; Limitations; Impacts' weighting based on their significance and stakeholders' concerns.
- Baseline information: Baseline information on the natural and man-made environment associated to the preferred alternative/option. Description of the environmental receptors such as air, noise, climate, climate change, geology, soil, water resources, land use, biodiversity, material assets, cultural heritage, landscape, development plans, population, human health, accidents and incidents associated with the railway sector, etc. Special attention will be paid to the sensitive areas/sites.
- Stakeholders Engagement: Phases and results of the consultation carried out during the preparation of the ESIA study; Main stakeholders' concerns.
- Impacts' assessment: Resources use and sources of impacts during the different stages of the Project's development; Assessment of impacts associated to air quality, noise and vibration, climate change, geological risks, surface and ground waters, biodiversity and nature protected areas, infrastructure utilities, cultural heritage, waste generation, accidents and incidents, human health and socio-economic issues such as population, demography, incomes and employment, education and health, etc.; the cumulative effects; The assessment will take into account the Project's relevant environmental protection objectives established at national or EU level.
- Monitoring Programme: Preparation of a monitoring programme, which covers the whole life cycle of the Project.

Non-Technical Summary (NTS)

The Consultant will prepare a concise and standalone Non-Technical Summary (NTS), which will satisfy both the EU and national regulations. The NTS will be based on the EU "Guidance on EIA" (2017), according to which such a summary should avoid detailed information and discussion, be written in non-technical language in order to be comprehensible to a lay member of the public and should be easily identifiable within the EIA Report.

The NTS content will be focused on the role of the EIA in the Development Consent process and highlight any significant uncertainties about the Project and its likely environmental effects. It will provide a concise and clear description of the Project, the considered alternatives/options, the baseline information, the approach to the assessment, the likely environmental effects, and the proposed mitigation strategies and measures.

Environmental and Social Management Plan (ESMP)

The ESMP is a framework plan which provides the Beneficiary and the project implementation Contractors with the necessary regulations / standards to be followed for reaching the objectives of the mitigation measures provided in the ESIA. The ESMP aims at the following:

- specify the anticipated environmental and social effects and the respective strategies/mitigation measures at each stage of the project activities;
- ensures the mitigation measures are correctly applied, by monitoring them; and
- identify the responsible bodies for the monitoring activities.

The ESMP will be in compliance with the national and EU regulations and the involved IFI (either EIB or EBRD) standards. It will take into account the relevant environmental protection objectives established at national or EU level. The main national regulations applicable to ESMP are the DCM 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 stage.

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 in this phase of the project. The Beneficiary and/or Contractor(s) should detail each of these plans prior to the construction stage. In indicative list of topic-specific management plans includes environmental receptors and issues such as noise and vibration, water resources, topsoil, erosion and sedimentation, biodiversity, landscape, infrastructure utilities, cultural heritage, waste, construction material, health and safety, emergency response, etc.

Climate Change Resilience and Vulnerability Assessment Report (CC Report)

The CC report will be taken into consideration the following key issues:

- The applicable regulatory and legislative requirements;
- The nature of the project, its location and its resilience to climate change;
- The climate-related parameters likely to influence the project and how sensitive is the environment potentially affected by the project to those climate parameters;
- The project impacts' significance in combination with climate change; and
- The potential Mitigation measures.

This Climate Change report will be based on the information and data provided by the Albania Fourth National Communication on the Climate Change (September 2022), and the requirements of the EU and the involved IFI (either EIB or EBRD) on this issue, including those provided either in EIB Environmental and Social Standards (February 2022) or EBRD Environmental and Social Policy (April 2019). The report will take into account also the EU Directive on Energy Performance of Buildings (2018), which will be applied to the new stations' buildings.

Stakeholder Engagement Plan (SEP)

The Consultant will carry out a stakeholder engagement process with the development of a Stakeholder Engagement Plan (SEP), in order to meet the national, EU and the involved IFI (either EIB Standard 2: Stakeholders Engagement, or EBRD Performance Requirement 10: Information Disclosure and Stakeholder Engagement) requirements for stakeholder engagement and public consultation and disclosure. The stakeholder engagement aims to ensure the interaction between the engaged stakeholders and the project's decision-making

process, to allow the stakeholders to express their concerns and, wherever reasonable, influence spatial/technical solutions and/or mitigation measures to address these concerns.

SEP is a live document, which is developed at the start of the Project, and revised and improved continuously, during the whole life of the Project's development. The stakeholder's engagement during the ESIA process will be in line the various phases of this process.

The stakeholder engagement includes the following activities:

- identification of the project stakeholder groups; identification of stakeholders: directly or indirectly affected by the Project, participants in the implementation, stakeholders that can potentially influence and take decisions on the implementation of the Project;
- stakeholder engagement process and information disclosure;
- meaningful consultations; and
- grievance mechanism

Land Acquisition and Resettlements Framework (LARF)

The Consultant will prepare the Land Acquisition and Resettlement Framework (LARF) to set out the principles for addressing the potential resettlement and economic impacts of the temporary and/or permanent temporary land acquisition within the Project area.

The LARF will be aligned with the provisions of the ToR, the national regulations (Law 8561/1999 on Expropriation) and the involved IFI (either EIB or EBRD). EIB and EBRD provisions are described in EIB Environmental and Social Standards (February 2022) and EBRD Environmental and Social Policy (April 2019), respectively. Land acquisition and resettlement are developed in particular in EIB Standard 6 (Involuntary Resettlement) and EBRD Performance Requirement 5 (Land Acquisition, Involuntary Resettlement and Economic Displacement).

The LARF outlines the general principles, procedures, and entitlement framework concerning the potential impacts of land acquisition.

LARF serves as additional guidance to bridge any gaps between the national legislation and the involved IFI requirements related to land acquisition and livelihood restoration. ESIA report preparation and framework.

2.1.2 EU regulations on the proposed project

According to the EIA Directive 2011/92/EU, as amended, the list of 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);*
- Point 24*: "Any change to or extension of projects listed in this Annex where such a change or extension in itself meets the thresholds, if any, set out in this Annex".*
- 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 during detail design phase

2.1.3 National regulations and the proposed project

The main national regulations include:

- The Project's categorization according to the EIA Law; and
- The protected areas that can be affected by the Project.

EIA Law and the proposed project

The Law 10440/2011 "On EIA"[13], which is in line with the EIA Directive, includes two annexes:

- Annex I: List of projects, which are considered as having significant effects on the environment and consequently 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 railway lines for long-distances";*

Despite of the title of the project (rehabilitation), the Project is a railway construction, as the whole railway line (117.3 km long) components, including most of the bridges, underpasses, stations, culverts, etc., will be built from the beginning. The new railway line will be located, mostly within the existing track but the construction operation involves whole works as a new project as even the existing line will be demolished.

Conclusion:

- The Project is listed in Annex I of the EIA Law, and therefore it should be submitted to a "full EIA process", during detail design phase which corresponds to an EIA according to EIA Directive

2.2 National Environmental Framework

The main part of legal framework for Environmental Protection in the Republic of Albania is partially aligned or approximately in line with EU standards.

Referring to the EC Albania report (2021)[14], Albania needs to step up efforts to achieve full alignment and implementation in most areas.

Main part of Albanian legislation relevant to the project, mentioned in this section are fully, partially aligned or approximately in line with EU directives.

Based on Consultant experience and what we faced in practice here in Albania we have problems much more in poor implementation of legislation than in improving the legislation.

The legal framework for Environmental and Social Impact Assessment (ESIA) procedure in Albania is based on Law No. 10440 on Environmental Impact Assessment approved on July 07, 2011 (amended by the law 128/2020).

According to the law no. 10440 "On Environmental Impact Assessment" amended by the law 128/2020 "Some changes on the law no 10440 dates 7/07/2011 (For Environmental Impact assessment[15]), this Project is the list of projects that require a "full EIA". Despite of this a formal screening opinion by the competent authority (MoTE) is necessary to be obtained by the Developer during detail design phase of the project while starting the procedure of drafting ESIA..

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

[14] EC Albanian Report" COMMISSION STAFF WORKING DOCUMENT Albania 2021 Report Accompanying the document Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions 2021 Communication on EU Enlargement Policy

[15] "This law is partially aligned with: Directive 2011/92/EU of the European Parliament and of the Council, dated December 13, 2011 "On the assessment of effects of some public and private projects on the environment", amended". CELEX Number 32011L0092, Notebook Official Journal of the European Union, series L, no. 26, dated 28.1.2012, pp. 1-21.

This decision is based on the following:

- the provisions of the EIA Law;
- the characteristics of the project's area;
- the project's elements (project's components and activities); and
- The preliminary information and verifications provided by the project's developer. If needed, the necessary information/verifications can be provided under the form of a short EIA screening report that the developer can prepare after the Inception phase.

The ESIA report (this document) is prepared based on the Inception report, in accordance with the national, EU, and EIB/EBRD requirements and as per the requirements of Developer included in ToR. The main regulations for preparing the ESIA report include the following:

- Law 10440/2011 "On EIA" amended by the law 128/2020;
- DCM 912/2015 "On the national EIA methodology";
- EIA Directive 2014/52/EU[16] and EU Guidance on EIA (2017)[17]; and
- EIB Environmental and Social Standards (ESS) and EBRD Performance Requirements (PR) (referred in Environmental and Social Policy (ESP)2019).

Following is presented the environmental legal framework implemented in Albania.

2.2.1 Climate change

Legislation	Description	Relevance to the Project
Law No. 155/2020, dated 17.12.2020.	On Climate Change. This law is partially aligned with: - Directive 2003/87/EC of the European Parliament and of the Council, dated October 13, 2003 "On the creation of a scheme or the trading of permits for emissions of greenhouse gases within the Community and amending Directive e Council 96/61/EC", amended". CELEX number 32003L0887, Official Journal of the European Union, series L, no. 275, dated 25.10.2003, pp. 32-46. - Regulation (EU) no. 525/2013 of the European Parliament and of the Council, dated May 21, 2013 "On the mechanism of monitoring and reporting of greenhouse gas emissions and reporting of other information related to climate change at the national and European Union level, which repeals decision no.280/2004/EC", amended", Number CELEX 32013R0525, Official Journal of the European Union, series L, no. 165, dated 18.06.2013, pp. 13 - 40.	Applicable The project should be in accordance with the requirements defined in the law aiming to contribute on the reduction of the greenhouse gases
DCM No. 466, dated 03.07.2019	The National Strategy for Climate Change and Action Plan (NSCCAC) is the main strategic document that addresses climate change in Albania. The strategy was approved by the Government of Albania in 2019 and was drafted in support of EU legislation on the environment and climate and aims to strengthen coordination between sectors regarding adaptation measures, environmental protection and sustainable development.	Applicable The project should be in line with the objectives defined in the DCM and the development towards a low-carbon economy is key to achieving the objectives of global mitigation measures.

[16] https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:02011L0092-20140515

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

2.2.2 Biodiversity and Protected Areas

Biodiversity conservation in Albania is regulated by the national legal framework for biodiversity conservation and the one dedicated to protected areas.

The main strategic document that sets out the goals and objectives of biodiversity conservation in the country is the "Document of Strategic Policies on Biodiversity Protection", approved by DCM no. 31, of 20.1.2016, and that is fully in line with Aichi biodiversity targets to 2020. The latest National Report (NR6) of Albania to the CBD provides an assessment of the implementation of the convention at the national level.

Currently the revision and update of the NBSAP is about to begin and will be aligned with the Post 2020 Global Biodiversity Framework of the Convention of Biological Diversity to 2030. The main target will be the increase of the Protected Areas coverage to 30 % of the territory and their affective management by 2030.

The Law "On biodiversity conservation" no. 9597 of 20.07.2006, as amended, and Law "On protected areas" no. 81/2017 of 4.5.2017, as amended, enact the legal provisions for biodiversity conservation and protected areas of national and international importance in Albania. Again, IUCN categories for protected areas are endorsed in this law. Protected Areas network in Albania actually stands at 21,3 % of the country's territory.

By-laws relevant to the topic are:

- Decision of the Council of Ministers (DCM) No. 303, of 10.5.2019 "On the approval of the revised and updated list of nature monuments of Albania".
- DCM no. 369, of 2019 "On Special areas of conservation" (future Natura 2000 sites).
- Order of Minister no. 62, of 4.4.2016 "On the approval of the list of birds, especially vulnerable" that endorses the Annex I of Birds Directive (2009/147/EC – consolidated version).
- DCM no. 866, of 10.12.2014 "On the approval of the lists of natural habitat types of flora, fauna and birds of interest to the EU", that endorses Annexes of Habitats Directive 92/43/EEC.
- Decision of the National Territory Council no. 10, of 28.10.2020 "On the approval of the boundaries of the Protected Areas in Albania", after an extended national study carried out during 2019-2020 for the revision and update of the protected areas network in Albania, in order to reflect the changes and gaps in the existing network and related DCM-s.
- DCM no. 60, of 26.1.2022 "On the designation of the natural ecosystems Managed Nature Reserves/Nature Parks (Category IV) and the approval of the change of the status and of the existing surfaces of protected areas that belong to this category.
- Order of the Minister of Environment no. 1280, of 20.11.2013 "On the approval of the Red List of wild flora and fauna".

International designation categories of Protected Areas include:

- Ramsar sites of wetlands on International Importance, especially for waterfowl habitats;
- UNESCO Nature Heritage Sites;
- Sites of Community Importance (Natura 2000);
- Special Areas of Conservation for Habitats (under Directive 92/43/EC);
- Special Protection Areas for Birds (under Birds Directive 2009/147/EC – consolidated version);

- Areas of Special Conservation Interest (Emerald sites);

Albania has ratified/acceded to a significant number of MEAs and respects their obligations for the conservation of species of wild flora and fauna and of natural habitats are implemented in the country, of which CBD, CMS, CITES, Bern Convention, Barcelona Convention - Biodiversity and Protected Areas Protocol, UNCCD are the most important ones;

Albania enjoys candidate status to the EU and the negotiations with the EU are opened in June 2022. The transposition of the EU acquis on nature protection, of which the most important pieces are:

- Habitats Directive (92/43/EEC);- consolidated version, is well advanced, whilst there remains a lot to be done for its proper enforcement in practice, which has been already stated clearly in the last years' Progress Reports of the EU;
- Birds Directive (2009/147/EC) – consolidated version, is well advanced, whilst there remains a lot to be done for its proper enforcement in practice, which has been already stated clearly in the last years' Progress Reports of the EU;
- The identification of Natura 2000 network of SCI-s and their national designation are the major obligation in the field of nature protection, under chapter 27 'Environment';
- Meanwhile Emerald network of ASCI-s complies with the obligations under the Bern Convention.

2.2.3 Forests Protection

Law No. 57 dt. 30.4.2020 for forests.

Law No. 5/2016 "On the announcement of the moratorium on forests in the Republic of Albania".

Law No. 9385, dated 4.5.2005 "On forests and forest service", amended by law no. 15/2012 "For an amendment and addition to law No. 9385, dated 4.5.2005 "On forests and the forest service", as amended, as well as by Law No. 48/2016 "On some changes and additions to the law No. 9385, dated 4.5.2005, "On forests and the forest service", as amended.

Law No. 9693, dated 19.3.2007, "On the Pasture Fund", amended by Law No. 49/2016 "On some changes and additions to the law No. 9693, dated 19.3.2007, "On the Pasture Fund", amended.

Law No. 10431, dated 9.06.2011 "On Environmental Protection" as amended.

DCM No. 814, dated 31.12.2018 "On the approval of the policy document for forests in Albania, 2019-2030".

DCM No. 591, dated 9.10.2018 "On some changes in the decision no. 1353, dated 10.10.2008, of the Council of Ministers, "for determining the rules for submitting the request, maintaining and completing the technical documentation, as well as the criteria and procedures of reducing the area and volume of the forest fund".

DCM No. 592, dated 9.10.2018 "On some changes in decision no. 1374, dated 10.10.2008, of the Council of Ministers, "On determining the rules and procedures to be followed for the removal, addition and change of the destination of the pasture fund".

DCM No. 391, dated 21.6.2006 "On the determination of tariffs in the forest and pasture sector" amended by the Decision of the Council of Ministers No. 1064, dated 22.12.2010 "For some changes in Decision No. 391, dated 21.6.2006 "On determining tariffs in the forest and pasture sector".

DCM No. 1353, dated 10.10.2008, "On determining the rules for submitting the request, maintaining and completing the technical documentation, as well as the criteria and procedures

for reducing the area and volume of the forest fund" as amended by the Decision of the Council of Ministers No. 434, dated 8.6.2016 "On some changes and additions to Decision No. 1353, dated 10.10.2008, "On determining the rules for submitting the request, maintaining and completing the technical documentation, as well as the criteria and procedures for reducing the area and volume of the forest fund".

DCM No. 1374, dated 10.10.2008, "On determining the rules and procedures to be followed for the removal, addition and change of the destination of the pasture fund" amended by the Decision of the Council of Ministers No. 435, dated 8.6.2016 "On some changes and additions to Decision No. 1374, dated 10.10.2008, of the Council of Ministers, "On determining the rules and procedures to be followed for the removal, addition and change of the destination of the pasture fund".

Instruction of the Minister of Environment No.1 dated 26.01.2017 "On maintaining the cadaster of the national forest and pasture fund".

Instruction of the Minister of Environment No.2 dated 3.3.2017 of the Minister of Environment "On the technical requirements for the designation of plots, group plots and forest economies for treatments with regenerative cutting, the rules for harvesting wood material to provide firewood for heating".

Instruction of the Minister of Environment No.1 dated 09.06.2016 "On the rules, research procedures, review and approval of requests for the use of the public forest and pasture fund".

Instruction of the Minister of Environment No.2 dated 20.07.2016 "On the technical criteria for the classification of pastures and meadows and the procedures for granting them for grazing and grass cutting".

2.2.4 Protection of Physical Environment Framework

Albania has developed legislation for the protection of the physical environment including guidelines, thresholds, and limits for emissions. Legislation related to water, air, noise, vehicle and equipment emissions, fuel quality, waste, and wastewater is summarized in Table 2-2.

Table 2-2 Legislation related to water, air, noise, vehicle and equipment emissions, fuel quality, waste, and wastewater

Legislation	Overview	Relevance to the Project
Law No. 111/2012, dated 15.11.2012 amended with Law No. 6/2018, dated 08.02.2018	"On integrated management of water resources" amended with Law No. 6/2018 "On some changes and updates "On integrated management of water resources" based on Directive 2000/60/EC Water Framework. The aim of the law focuses on (i) environmental protection and improvement of water, surface water, either temporary or permanent, internal sea waters, territorial waters, exclusive economic zones, continental shelf, transboundary waters, groundwater, and their status; (ii) security, protection, development and rational utilization of water resources, protection of water resources from pollution, etc. This law provides the definition of water bodies and sets some protection and usage restrictions and requires others to be approved by several by-laws. The law defines the banks of the water resources and restricts	Applicable The project might impact water and aquatic ecosystems, it is necessary to undertake special protection measures. Protected areas shall be determined, based on this Law and other specific laws. Protected areas may include the following: a) sanitary protected zones for potable water; b) areas for fish and shellfish farming, according to the fishing legislation; c) areas for bathing and recreation; d) areas prone to eutrophication and areas vulnerable to nitrates; and e) areas intended for the protection of humans, plants or animals, or habitats, maintaining or improving water status is a significant element for their protection. Mitigation measures for the protection of groundwater and surface water quality will be proposed.

Legislation	Overview	Relevance to the Project
	certain harmful construction activities on the banks[18]/ shores and water protection areas.	
DCM No. 177 (31.3.2005)	"On the allowed norms of liquid discharges and host water environmental criteria" - provides the allowed norms for effluent discharges on the environment, for the protection of water resources.	Applicable The water discharge standards related to the project are limited to the construction of temporary construction facilities. Several options for wastewater will be evaluated within the scope of the EIA process. It shall be noted that there are no standards for small wastewater discharge facilities and current standards consider only community discharge after treatment in a specific plant. Currently, there are no specific standards for the discharges of small agglomerates (as might be generated by faculties for the 200 or so workers). In the absence of such emission standards for the project, international standards can be applied but this shall be agreed upon with authorities through a clarification procedure for (potential) construction facilities.
DCM No. 379 (25.5.2016)	"On the approval of the regulation [19] on Drinking Water Quality" - Its objective is to protect human health from adverse effects of any contamination of water intended for human consumption, by ensuring that it is wholesome and clean. Regulates several issues related to testing of drinking water and protection zones around the water well or community groundwater deposit. The regulation determines three protection zones (buffer zones) around groundwater wells or water deposits placed on the ground. The immediate zone of protection ranges from 15 to 100 m from the axis of the well or the deposit. The precise distance is determined based on the evaluation of the geological formations by the hydrogeological expert. The second and third buffer zones surround the first one. For these zones, the regulation does not set out any distance criteria but restricts the activities that can impact the water quality such as disposal or burial of waste, mining, etc.	Applicable The standard set by this DCM (immediate zone of protection) should be considered in the EIA and appropriate mitigation measures will be proposed.
Law No. 162 (04.12.2014), amended by law no.52/2020, dated 30.04.2020	"On protection of ambient air quality", fully transpose Directive 2008/50/EC on ambient air quality and cleaner air for Europe, as well as Directive 2004/107/EC relating to arsenic, cadmium, mercury, nickel, and polycyclic aromatic hydrocarbons in ambient air. This Law entered into force on the 1st of January 2018 and provides the institutional	Applicable Mitigation measures to limit the impact of project activities will be proposed in the EIA.

[18] Banks" are strips of land adjoining seas, lakes, reservoirs, lagoons, ponds, rivers and streams which comprise a minimum of two areas of land: i. 5 meters at a right angle upper edge of the natural banks on steep banks and 20 meters from the maximum water level over a period of 25 years on flat banks, which can be used, on the basis of special provisions, for public purposes, ii. 100 meters at a right angle from the upper edge of the natural banks on the steep banks, and 200 meters from the maximum water level over a period of 25 years on flat banks, where every activity undertaken will be determined by the water authorities.

[19] Based on Council Directive 98/83/EC of 3 November 1998 on the quality of water intended for human consumption) concerns the quality of water intended for human consumption.

Legislation	Overview	Relevance to the Project
	framework, regulations, roles, and penalties to ensure compliance. The law stipulates that natural and legal persons, public or private, native or foreign, have a duty to keep the air clean and protect it from pollution caused by the activities they conduct in the territory of the Republic of Albania.	
DCM no.594, dated 10.09.2014	"On the approval of the national strategy on ambient air quality" aiming to improve the air quality for a long period through setting objectives. Improving the air quality impacts directly on public health, life quality and environmental protection.	Applicable Mitigation measures to limit the impact of project activities will be proposed in the EIA and are in alignment with the objectives of the national strategy.
DCM no.412, dated 19.06.2019	"On the approval of the national plan on air quality management"	Applicable Mitigation measures to limit the impact of project activities will be proposed in the EIA and are in alignment with the intended goals and activities of the national plan.
Guideline No. 6527 (24.12.2004)	Minister of Environment and Minister of Transport "Over the permissible values of the elements of air pollutants from the environment and noise emissions caused through road vehicles and methods to control them" amended by Guideline No. 12, dated 15.6.2010 "On amendments and addenda to Guidelines No. 6527 of 24.12.2004 accompanied by the Manual of Vehicles Control.	Applicable A certificate of technical compliance is mandatory for all vehicles registered in Albania (with Albanian license plates). Compliance with this guideline has been considered in the development of mitigation measures for the EIA.
Order of Minister of Transport and Infrastructure No. 149 (07.04.2014)	"On the approval of the rules on implementing the airworthiness and environmental certification of aircraft and related products, parts and appliances, as well as for the certification of design and production organizations", fully aligned with the EU Regulation No 748/2012 of 3 August 2012, laying down implementing rules for the airworthiness and environmental certification of aircraft and related products, parts and appliances, as well as for the certification of design and production organizations.	Applicable Compliance with this order has to be considered in the development of mitigation measures of the EIA.
Instruction No.6527 (24.12.2004)	"On allowed vehicle air emission, noise generation levels, and control methods "amended - This instruction includes requirements for annual vehicle inspections and allowed air emissions. All vehicles must comply with these norms.	Applicable Heavy machineries will be used for the construction of the Project. Compliance with this decision has been considered in the development of mitigation measures of the EIA.
DCM No.613 (07.9.2011)	"Approval of the technical rules for the assessment of the noise conformity for the equipment installed in open spaces or environment". Set noise release norms for certain equipment generating noise, such as electricity generators, tractors, compressors, etc. The regulation lists set thresholds.	Applicable Heavy machineries will be used for the construction of the Project. Compliance with this decision has been considered in the development of mitigation measures of the EIA.
Guidance No.10 (30.5.2015)	"Relating to the type-approval of agricultural or forestry tractors, their trailers and interchangeable towed machineries, together with their systems, components and separate technical units" based on EU Directive 2003/37/EC dated 26.5.2003.	Applicable Compliance with this guidance will be considered as mitigation and recommendation measures at the EIA report.
Law No. 9774, dated 12.07.2007, amended by Law No. 39/2013, dated 14.02.2013 and law no.50/2023, dated 22.06.2023	"On the assessment and administration of ambient noise" – defines the requirements for environmental protection from noise, how to avoid and prevent, reduce and eliminate the harmful effects of exposure to them, including inconvenience from noise. This Law aims to	Heavy machineries and trucks will be used during the construction of the Project. It is important for the EIA process, to operate with noise-generating machineries during

Legislation	Overview	Relevance to the Project
	protect human health and the environment from adverse effects caused by noise emissions and sets general rules, authorities, inspections etc.	daytime hours[20]. Compliance with this law will be considered as a relevant document for suggesting mitigation and management measures within the scope of the EIA process.
DCM No. 587, dated 07.07.2010	"On monitoring and control of noise levels in urban and touristic areas" – sets the rules and regulations on the protection from noise generation and noise level administration in urban and touristic areas.	Compliance with this law will be considered as a relevant document for suggesting mitigation and management measures within the scope of the EIA process.
DCM No. 1063 (23.12.2015)	"On the Approval of the technical rules for the assessment of the noise conformity for the equipment installed in open spaces or environment" sets the noise release norms for certain equipment's generation noise such as electricity generators, tractors, compressors etc. The regulation lists set thresholds (mainly power capacity - kW).	Compliance with this decision will be considered in the development of mitigation measures of the EIA. Application of these rules needs to be ensured by the sub-contractor based on the list of equipment and vehicles that will be employed for operations.
Joint instruction no.2 (15.11.2023)	Ministry responsible on environment, Ministry responsible on health and Ministry responsible on interior affairs have proposed and approved the joint instruction "On the noise limit level for a certain area and for the economic-social activities"	Compliance with this joint instruction will be considered in the development of mitigation measures of the EIA.
Guideline/Instruction No.6527 (24.12.2004)	"On allowed vehicle air emission, noise generation levels, and control methods" amended - This includes requirements for annual vehicle inspections and allowed air emissions. All vehicles must comply with these norms.	Compliance with this instruction will be considered in the development of mitigation measures for the EIA.
DCM no.123, dated 17.02.2011	"On the approval of the national plan on noise management" is one of the most important documents that assist on drafting the local plan on noise management.	Compliance with the goals of this national plan should be considered in the development of mitigation measures for the EIA.
DCM No. 147 (21.03.2007)	"On the quality of petrol and diesel fuels".	Only fuel available in Albania that is in compliance with this decision will be used.
DCM No.781 (14.11.2012)	"On the quality of certain liquid fuels for thermal, civil, industrial and water transport use (sea, river and lake)".	Only fuel available in Albania that is in compliance with this decision will be used.
Law No.10463 (22.09.2011) amended by law no.32/2013, dated 14.02.2013; law no.156/2013, dated 10.10.2013 and law no.28/2022, dated 17.03.2022	"On the integrated waste management" (as amended) - aims to protect human health and the environment and to ensure environmentally sound management of waste through integrated management.	Both hazardous and non-hazardous wastes will be generated principally only during the construction of the Project. Waste management should be considered in the development of mitigation measures and will be addressed in the Environmental Management and Monitoring Plan (EMMP)
DMC No.402 (30.06.2021)	"On approval of waste catalogue" - which makes the classification of the waste, based on industry types, and the criteria to assess the hazardousness of the waste. The regulation codifies the waste types based on the European Waste Catalogue.	This DCM should be considered in the classification of the wastes to be generated during the construction and operation of the Project.
DCM No. 229 (23.04.2014) amended by DCM no.1031, dated 16.12.2020	"On the approval of the rules for non-hazardous waste transfer and the data to register in the transferring document" - The newly enforced regulation requires transferring the waste to licensed companies	Non-hazardous wastes generated during the construction of the Project should be transferred and disposed of in accordance with this DCM.

[20] IFC Guidelines Environmental Noise Management https://www.ifc.org/wps/wcm/connect/4a4db1c5-ee97-43ba-99dd-8b120b22ea32/1-7%2BNoise.pdf?MOD=AJPERES&CVID=ls4XYBw

Legislation	Overview	Relevance to the Project
	and ensuring final disposal in approved facilities. This act requires tracking and documenting the waste transfers and providing the final disposal certificate to the NEA. The regulation requires all waste-generating companies to be registered at NEA and obtain a personal waste generation number.	
DCM No. 371 (11.06.2014) amended by DCM no.1032, dated 16.12.2020	"On the approval of the rules for transferring the hazardous waste and the data to register in the transferring document" - The newly enforced regulation requires transferring the waste at the licensed company and ensuring final disposal in approved facilities. This act requires tracking and documenting the waste transfer and delivering the final disposal certificate at the NEA. The regulation requires all waste-generating companies to be registered at NEA and obtain a personal waste generation number.	Hazardous wastes will be considered within the scope of the ESIA process. A personal waste generation number with be registered to the NEA in compliance with Albanian legal requirements.
DCM No. 418 (25.06.2014)	"On the differentiated collection of waste at source". The object of this decision is the realization of a differentiated collection for these wastes: paper, metal, plastics, and glass.	During the development of this project need to separate at source these wastes: paper, metal, plastics, and glass in order to fulfill the requirements of the DCM.
DCM No. 575 (24.06.2015)	"On the approval of requirements for inert waste management". The object of this decision is to manage the inert waste that generate from the companies that operate in the construction area.	During the development of this project should be considered all the requirements set in this decision.
Law No. 9115/2003 (24.07.2003) amended by law no.34/2013, dated 14.02.2013.	"On the Treatment of polluted water" provides regulations that state the need for the treatment of polluted water before it is discharged. Article 6 sets the obligations of physical and legal entities that discharge polluted waters. Physical and legal entities, the activity of which discharges polluted waters, are obligated to take measures to: a) Continuously reduce the number of used waters they discharge in the receiving environment; b) reduce the degree of pollution in discharged waters, especially such pollution caused by hazardous substances and waste; c) manage and treat polluted waters. To comply with these obligations, the physical and legal entities whose activities discharge polluted waters must design a program of technical, technological, and organizational measures. This program is subject to control by the Environmental Inspectorate, the licensing authority, and the local government structures	Compliance with this law should be considered in the development of mitigation measures for the EIA.
Law no.27/2016, dated 17.03.2016	"On chemicals" aims among others to promote alternative methods for assessing the risks of chemicals; ensure that risks from hazardous substances of very high concern are adequately controlled and that these substances are progressively replaced by less hazardous substances.	Compliance with this law should be considered in the development of mitigation measures for the EIA.

2.2.5 Health and Safety Framework

Law No. 10237/2010 "On safety and health at work" ensures the security and protection of health through the prevention of professional risks, eliminating the factors that constitute risk and accidents, informing, advising, and balanced participation, in accordance with the law. The

present law applies the following:

The Directive of the European Council 89/391/EEC, dated 12 July 1989 "On the introduction of measures to encourage improvements in the safety and health of workers at work";

The Directive of the European Council 94/33 EEC, dated 22 July 1994 "On the protection of young people at work," article 6; and,

The Directive of the European Council 92/85 EEC "On the introduction of measures to encourage improvements in the safety and health at work of pregnant workers and workers who have recently given birth or are breastfeeding".

Albanian legislation on health and safety and its relevance to the project are presented in table below:

Table 2-3 Legislation for health and safety

Legislation	Overview	Relevance to the Project
Law No. 10237 (18.02.2010)	"On Safety and Health at Work" – This law regulates the framework of health and safety in the workplace and determines the roles of each party subject to the law.	Theproject will comply with this law to ensure the health and safety of its workers. Specific measures will be included in the mitigation plan.
Law no.7643, (02.12.1992), amended by law no.7941, dated 31.05.1995, law no.9635, dated 06.11.2006, law no.45/2013, dated 14.02.2013, law no.54/2020, dated 30.04.2020	The State Sanitary Inspectorate aims to protect workers from the impacts of adverse working conditions, such as exposure to toxic substances, radiation, unworkable noise, vibrations, and unfavorable microclimate, and controls the level of occupational diseases and accidents as a result of adverse conditions.	The project will comply with this law to protect the health and safety of its workers. Specific measures will be included in the mitigation plan.
Law No. 9863/2008 (28.01.2008) amended by law no.10137, dated 11.05.2009; law no.74/2013, dated 14.02.2013; law no.8/2019, dated 26.02.2019; law no.16/2020, dated 12.02.2020; law no.10/2022, dated 27.01.2022	"On food" specifies the rules of food safety in Albania	The project needs to ensure the safety of the food consumed by its workers. Specific measures will be included in the mitigation plan.
Law No. 10433/2011 (16.06.2011)	"On Inspection in the Republic of Albania"	The project is subject to inspections for adherence to health and safety regulations.
DCM No. 562/2013 (03.07.2013)	Decision of the Council of Ministers concerning the approval of the regulation on minimum safety and health requirements for the workplace.	The project/ employer needs to ensure the safety of its workers in the workplace. A specific set of rules are to be drafted in the Safety Regulation of the Employer. Specific measures will be included in the mitigation plan.
DCM No. 312/2010 (05.05.2010)	"On safety in site construction" sets the rules of safety for construction activities.	The installation of worker facilities needs to comply with the rules of this decision. Specific measures will be included in the mitigation plan.
DCM No. 410/2015 (13.05.2015)	"On the establishment, organization, and operation of technical and industrial state inspectorate". This act regulates the inspection of the installations related to industrial processes in Albania.	The project may be the subject of several inspections as regulated in Albanian legislation and standards. Compliance with these rules is to be ensured by the Subcontractor for power plant operations. An initial screening of equipment that will be used, and communication with the appropriate inspectorate, are required in order to determine any obligation before starting the field operations of importing the equipment.
Decision No. 692/2001 (13.12.2001)	"On special measures on safety and health protection at work"	The project will comply with this law to protect the health and safety of its workers. Specific measures will be included in the mitigation plan.

Legislation	Overview	Relevance to the Project
DCM No. 842/2014 (03.12.2014)	"For the health safety and protection of the employee from noise risks in the working places" requires the employer to assess the noise levels at the working place and ensure the protection of its workers	Specific measures will be included in the mitigation plan.
DCM No. 841 (03.12.2014)	For the protection of employees from risk related to vibration mechanics at the workplace	Sets minimum requirements to protect employees from risks for safety and health, which are created or may are created by exposure to mechanical vibration

2.2.6 The Protection of Cultural Heritage

The protection of cultural heritage in Albania is addressed by the Ministry of Culture and several specialized institutions. The Cultural Heritage Law 27/2018 "On Cultural Heritage and Museum" provides the most important legal framework for all the activities in relation to preserving, promoting, and managing the Albanian national heritage.

Article 146 of Law 27/2018 requires any persons who discover or excavate objects of cultural heritage value by chance during construction works to suspend work immediately and inform the relevant local authorities within three days.

The relevant local authorities responsible for the preservation, restoration, and management of cultural monuments consist of the Regional Directories of Cultural Heritage (RDCH), the Directorate of Archaeological Service (DAS) under the National Institute of Cultural Heritage (NICH), and the National Council of Archaeology (NCA) and National Council of Cultural Heritage (NCCH) under the Ministry of Culture (MOC). These institutions are responsible for assessing the archaeological value of the objects found and determining whether work may continue or whether work must remain suspended until further ground investigations will be undertaken. The local authorities may also decide on any necessary changes or total suspension of work to preserve the objects found.

Albanian legislation for the protection of cultural heritage is summarized below in Table 2-4.

Table 2-4 Albanian legislation for the protection of cultural heritage

Legislation	Overview	Relevance
Law 27/2018 (17.05.2018)	"On Cultural Heritage and Museums" - All matters relating to cultural heritage in Albania are governed by this law". The law defines the preservation and chance finds procedures (archaeological objects or items of cultural heritage value that are discovered by chance) to be used during Project implementation.	Cultural heritage monuments in the vicinity of the area will be preliminarily identified based on literature data and NATP E-planning and ICM portal.
Article 146 of the law	Requires and obliges any person who discovers or excavates objects of cultural heritage value, by chance during construction works, to suspend work immediately and inform the relevant local authorities within three days. The relevant local authorities consist of the local government office (municipality), the Police Department, and the Regional Directory of Cultural Heritage (RDCH). The RDCH verifies the situation/findings and reports to the National Institute of Cultural Monuments (NICH). These institutions are responsible for assessing the archaeological value of the objects found and determining whether work may continue or whether it must remain suspended until further ground investigations will be undertaken.	A chance finds procedure has to be developed and implemented prior to any project and in the event of a chance finds, the authorities will be notified as required.
Article 5, paragraph 64 and article 31	Defines the conservation of non-material cultural heritage by measures that aim for the long-lasting preservation of such cultural assets.	There are no identified intangible (non-material) cultural assets.

With raged to international conventions and agreements, Albania has signed/ratified the following conventions on cultural heritage:

Table 2-5 International Convention on cultural heritage

Convention name	Ratified by Albania
UNESCO Convention concerning the Protection of the World Cultural and Natural Heritage (1972)	10.07.1989
Convention on the Means of Prohibiting and Preventing the Illicit Import, Export, and Transfer of Ownership of Cultural Property (1970)	13.06.2002
UNESCO Convention for Safeguarding the Intangible Cultural Heritage (2003)	04.04.2006
Convention on the Protection and Promotion of the Diversity of Cultural Expressions (2005)	17.11.2006

2.2.7 Social issues and Gender

Law	Number	Overview
"On Gender Equality"	Law no. 9970, dated 24.07.2008	This law regulates fundamental issues of gender equality in public life, the protection and equal treatment of women and men with regards to equal chances and opportunities for the exercise of their rights, as well as their participation and contribution in the advancement of all social spheres.
"On Protection Against Discrimination"	Law no. 10221, dated 04.02.2010	This law regulates the implementation of, and compliance with, the principle of equality and non-discrimination in relation to race, ethnicity, colour, language, citizenship, political, religious or philosophical beliefs, economic, education or social situation, gender, gender identity, sexual orientation, sex characteristics, living with HIV/AIDS, pregnancy, parentage belonging, parental responsibility, age, family or marital condition, civil status, residence, health status, genetic predispositions, appearance, disability, affiliation with a particular group or any other ground.
"On Safety and Health at Work"	Law No. 10237/2010	This law regulates the framework of health and safety in the workplace and determines the roles of each party subject to the law.
"On the Right to Information"	No. 119/2014	This Law regulates the right to know the information produced or held by public authorities. Provides rules with intent to guarantee public's understanding of the information, in the framework of exercising individual's rights and freedoms in practice and forming views on the state and the society. Aims to promote integrity, transparency and accountability of public authorities.
The Law "On inclusion of and accessibility for persons with disabilities"		This Law defines the principles and services in the areas of equality and access to justice. It provides for the promotion and protection of the rights of people with disabilities, with a view to facilitating their full and effective participation on an equal footing with the rest of the society, and promoting autonomy and independent living by providing support and care services

2.2.8 Conventions and Agreements Ratified by Albania

Environment

- Convention on Biodiversity (Biological Diversity) (1992)
- UNESCO Convention concerning the Protection of the World Cultural and Natural Heritage (2003)
- UN Framework Convention on Climate Change (UNFCCC)
- Aarhus Convention (Convention on Access to Information (1998), Public Participation in Decision making and Access to Justice in Environmental Matters)
- Barcelona Convention (1976); Convention for the Protection of the Mediterranean Sea against Pollution
- Kyoto Protocol
- UNESCO Convention for Safeguarding the Intangible Cultural Heritage (2003)

- Convention on the Protection of Underwater Cultural Heritage (2001)
- Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management
- Basel Convention
- Stockholm Convention on Persistent Organic Pollutants
- Protocol on Water and Health
- Albania is signatory to a number of international agreements relevant to the Project.

UN human rights treaties

- International Covenant on Civil and Political Rights (ICCPR)
- International Covenant on Economic, Social and Cultural Rights (ICESCR)
- Convention on the Elimination of All Forms of Discrimination Against Women (CEDAW)
- Convention on the Rights of Persons with Disabilities (CRPD)
- Convention on the Rights of the Child (CRC)
- International Convention on the Elimination of All Forms of Racial Discrimination (CERD)
- International Convention on the Protection of the Rights of All Migrant Workers and Members of Their Families (CMW)

Convention on the Protection of the World Cultural and Natural Heritage (1989)

- Cultural Heritage
- UNESCO Convention for Safeguarding the Intangible Cultural Heritage (2003)

Labor

ILO Fundamental Conventions:

- C029 - Forced Labour Convention, 1930
- C087 - Freedom of Association and Protection of the Right to Organise Convention, 1948
- C098 - Right to Organise and Collective Bargaining Convention, 1949
- C100 - Equal Remuneration Convention, 1951
- C105 - Abolition of Forced Labour Convention, 1957
- C111 - Discrimination (Employment and Occupation) Convention, 1958
- C138 - Minimum Age Convention, 1973
- C182 - Worst Forms of Child Labour Convention, 1999

ILO Governance Conventions:

- C081 - Labour Inspection Convention, 1947
- C122 - Employment Policy Convention, 1964
- C144 - Tripartite Consultation (International Labour Standards) Convention, 1976
- ILO Technical Conventions

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

- UN Convention on Wetlands of International Importance – Ramsar Convention, (Ramsar, Iran, 1971);
- 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 (Barcelona, Spain,1976);
- UN Convention on the Conservation of Migratory Species of Wild Animals – CMS (Bonn, Germany, 1979);
- Convention of the Conservation of European Wildlife and Natural Habitats – Bern Convention (Bern, Swiss, 1982);
- UN Framework Convention on Climate Change – UNFCCC (New York, USA, 1992);
- Kyoto Protocol to the UN Framework Convention on Climate Change (Kyoto, Japan, 1997);
- UN Convention on Biological Diversity – CBD (Rio de Janeiro, Brazil, 1992);
- UNECE Convention on Environmental Impact Assessment in a Transboundary Context (Espoo Convention), signed in Espoo, Finland, in 1991 and entered into force in 1997.
- 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

2.2.9 Albanian legislation regulating land acquisition and resettlement

The key law regulating the expropriation and governing the land acquisition process for the Project is Law 8561/1999 on "Expropriation and Temporary Takings of Private Property for a Public Interest", as amended (Expropriation Law). This Law is complemented by several Decisions of the Council of Ministers (DCM), guidelines and regulations, including:

- DCM 127/2000 on the "Content and procedures of introducing the request and or initial announcement of expropriation and temporary takings of private property for a public interest";
- DCM 138/2000 on "The technical criteria for the assessment and calculation of the compensation number of private properties that are going to be expropriated for a public interest, of properties that are devaluated and of the rights of the third parties" as amended;
- DCM 257/2007) on "The criteria and procedures for the physical compensation with state properties of expropriated subjects, in special cases";
- Guideline No.1 (Oct.05.2000) on the "Technical criteria to calculate the value of the fruit trees that are being expropriated for public interest, in the cases when indicators of declared purchase are missing".

Expropriation Law regulates expropriated or temporarily occupied properties (land and structures), in the public interest for activities that cannot be realized in another way, and which bring greater benefit to the public. The law provides compensation in such cases and even when

the land is temporarily occupied. Only registered properties and formal legal owners of the properties are entitled to benefit by the law. No provision applies to unregistered properties. Furthermore, the Expropriation law does not provide for any resettlement regime.

DCM 138/2000 regulates the compensation issues. Properties are categorized as Category 1: Construction objects (a-residential structures; and b-any other structures rather than residential (warehouse, shops, etc.); Category 2: Agriculture land; Category 3: Construction land. For (a) residential structures, the valuation is set as the average of sales and purchases, as determined by the Immovable Property Registration Office (IPRO), or in case such information is not available, the valuation is to be made based on the building costs, using the prices as provided by the National Entity of Residences. Another method that can be used for evaluating the industrial or agricultural objects is through the method of building cost.

The compensation for construction and agriculture land, forests, fruit trees, etc., is based on prices set by the Immovable Property Registration Office based on the location of the property. The valuation for fruit and trees is made using the cost method (investments, number of roots, surface area, other expenses, etc.); valuation of crops is based on expected productivity.

2.2.9.1 Informal constructions on both sides of the railway

Law 9317/2004, on the "Railway Code of the Republic of Albania", as amended, provides for the limitations of constructions on both sides of the railway. According to Article 18, it is forbidden any form of construction along the railway belt, except those that facilitate the railway line. For any construction within the railway belt, the approval of the Albanian Railway Authority is required. Article 35/d of this law prohibits any kind of construction along the railway line, closer than 25 meters from the railway belt, outside urban areas. For the construction of any type of object located in urban areas, at a distance of up to 25 meters from the railway belt, permission from the Albanian Railway Authority is required.

Law 9482/2006 on "Legalization, Urbanization Planning and Integration of Unauthorized Buildings" aims to formalize the informal constructions and develop the relevant areas. DCM 280/2016, as amended, provides a list of those informal buildings exempted from the legalization process. Section II, 2/b of the DCM provides that informal constructions cannot be formalized when they affect the railway system/lines or crosses the existing railway protection belt defined by the Railway Code. The railway protection belt consists of the land on both sides of the railway line, with a width of 100 meters, starting from the outer extremity of the railway line.

Key Legislation is presented in the table below:

Table 2-6 List of Albanian Laws

Name	Number and reference of approval	Key issues addressed
Constitution of the Republic of Albania	Law no. 8417, dated 21.10.1998, amended with the law no. 9675, dated 13.01.2007 and law no.9904, dated 21.04.2008.	Main constitutional principles, essential rights and freedoms, organization of the state and independence of the state bodies, elections, hierarchy of the laws etc. The right of private property is guaranteed. Property acquired by gift, inherited, purchase, or any other method provided for in Civil Code. Law may provide for expropriations or limitations in the exercise of that right of property only for public interests. The expropriations or limitations of the right to property based to expropriation are permitted only against fair compensation. For disputes regarding the amount of compensation may be appealed in court. The right to information is guaranteed. Everyone has the right to be informed about the status of the environment and its protection

Name	Number and reference of approval	Key issues addressed
Civil Code of the Republic of Albania	Law no. 7850, dated 29.07.1994, amended with law no. 8536, dated 18.10.1999, law no. 03.05.2001 and law no. 17/2012, dated 16.02.2012.	Legal rights related to immovable properties (such as ownership, easement-servitudes and usufruct rights, lease, etc.) Interacting and beneficiary parties, their contractual rights, modalities of acquisition of rights referred above, and the obligation to register them.
Law "On Cadastre"	On 20.12.2018, the Parliament of the Republic of Albania approved the law no. 111/2018 "On Cadastre" (hereinafter "Law on Cadastre"). This act was published with the Official Gazette no. 28, dated 06.03.2018	The Law on Cadastre provides, inter alia, for the rules on the registration of the public or private immovable properties and the real rights over them, as well as the establishment, organization and functioning of the State Agency of Cadastre (SAC), which is constituted from the institutional merge of the Agency for Inventory and Transfer of Public Property (AITPP), the Agency for Legalization Urbanization and Integration of Informal Areas/ Constructions (ALUIIAC/ALUIZNI) and the Immovable Property Registration Office (IPRO).
Law "On the completion of the ownership transitional processes in the Republic of Albania"	Law 20 dated 05.03.2020 "On the completion of the ownership transitional processes in the Republic of Albania"	Establishing a simplified and harmonized legal framework for the finalization of the transitional registration procedures of the state and private land consisting of: The registration of ownership titles of agricultural land. The finalization of the transfer to their users of the ownership of agricultural land previously owned by cooperatives and agricultural enterprises. The legalization and registration of illegal constructions, constructions without an ownership title and yards granted for use. The specification of ownership rights of individuals and entities, which have benefited from the Law no. 7665, dated 21.01.1993 "On development of economic zones with touristic priority", repealed. The finalization of the inventory update process of public real estate. Handling of the problems related to the overlapping of ownership immovable property titles The finalization of the process of transfer of ownership over non privatized construction land of privatized buildings (ii) not privatized construction land of buildings sold from state enterprises prior to the entry into force of the law no. 7512, dated 10.08.1991 "On protection of private property, free initiative and privatization"; (iii) not privatized construction land of constructions built based on a permit issued by competent authorities
Law "On expropriation and temporary use of private property for public interest"	Law no 8561, dated 22.12.1999.	Regulates the right of the state to expropriate or take in temporary use, for public interest the properties of legal entities or individuals and the protection of the rights and interests of the expropriated owners. Expropriation procedures and evaluation criteria of the compensation for the expropriated properties are defined respectively by the Decision of CM no. 127, dated 23.03.2000 and Decision of CM no. 138 dated 23.03.2000 and its amendments
On expropriation Decision	Decision No. 7, dated 6.1.2020.	Expropriation /Decision no 7, dated 6.1.2020 "On the Conditions and Procedure for Expropriations and /or Exchange Of Property, for Public Interest, In Function of the Reconstruction Process"
On expropriation	DCM No. 127 dated 23/03/2000	Decision of Council of Ministers (DCM) No. 127 (23/03/2000) on the "Content and procedures of introducing the request and of initial announcement of expropriation and temporary takings of private property for a public interest
On "The technical criteria for the assessment and calculation of the compensation number of private properties that are going to be expropriated for a public interest,	DCM No. 138 dated 23/03/2000	DCM No. 138 (23/03/2000) on "The technical criteria for the assessment and calculation of the compensation number of private properties that are going to be expropriated for a public interest, of properties that are devaluated and of the rights of the third parties" and amendments No 662 (18/12/2002), No 872 (12/12/2007) and No 136 (23/02/2011);

Name	Number and reference of approval	Key issues addressed
"On Territory Planning and Development"	Law No. 107/2014	The law aims to integrate the urban planning legislative framework into a single law, and includes the concept of the protection of natural and cultural heritage, and community's health and safety for territory. The law and its by-laws require declaration for any construction. The regulation specifies the type of installations requiring a construction permit. Installations of mobile structures require a preliminary clearance (or declaration of works) issued by the municipality.

2.3 The regulatory framework for information and consultations

Information and consultations during the ESIA process must fit with the EU, national, and EIB ESS/EBRD PR requirements on this matter and should be commensurate with the expected impacts and the formal requirements of the affected stakeholders.

Amongst EU, national and EIB ESS/EBRD PR on the consultations, the most stringent of them should be applied by the Consultant.

2.3.1 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 has the status of the candidate member country of the EU and the process of approximation of Albanian legislation to the EU legislation, EU directives are relevant in the case of Albania as well despite of the fact that the Albania is not member of EU yet.

Due to almost full approximation of Albanian Law on EIA with the EU EIA Directive, and DCMs 247/2014[21] and 598/2015[22] which provide for the necessary information 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.

2.3.2 National regulations

The "Right to Information" is a constitutional right, as provided by the Albanian Constitution (Article 23). This universal right is further strengthened by the applicable environmental legislation.

The Albanian legislation on the consultations on the EIA process comprises a national and a trans-boundary context. This process is developed during detail design, and it is leaded by the MoTE in collaboration with Developer and the Consultant as the procedure for submitting ESIA report has started.

The EIA Law and CDM 247/2014 "On the rules and procedures for consultation with public

[21] DCM 247/2014 provides for consultations at country level

[22] DCM 598/2015 provides for consultations at transboundary level

consultation and public involvement during the environmental assessment process" provide for the consultation's requirements at the national context. Article 14 of the EIA Law provides for the public and stakeholders to be involved in the EIA process during detail design phase.

During preliminary phase of the project there are only stakeholders / institutions /local authorities involved in the meeting /consultations.

Similarly, EIA Law and DCM 598/2015, "On the rules and procedures for consultation with public and stakeholders, and public consultations during the environmental assessment process in trans boundary context" regulate the public information in trans-boundary context. Both the EIA Law and DCM 247/2014 are in line with the EIA Directive, while DCM 598/2015 complies with the Espoo Convention, which sets out the obligations of Parties to assess the environmental effects 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 whether they are likely to have any significant adverse environmental impact across boundaries.

SEP (separate report) provides details on the formal consultations.

According to Albanian legislation, jointly with the scoping phase, the social impact assessment is not considered mandatory.

The directly relevant legislation to the Public Consultation includes:

- Law No. 8672, dated 26.10.2000, "On the Aarhus Convention Ratification on the public right to information, to participate in decision-making and to have access to justice in environmental matters";
- DCM No. 994, dated 02.07.2008, "Public Participation in Environmental Decision Making";
- DCM No. 16, dated 04.01.2012, "On Public Access to Environmental Information";
- DCM No. 247, dated 30.04.2014, "On the Determination of the Rules and Requirements of the Procedures for Information and Involvement of the Public in Environmental Decision Making".

The relevant legislation to environmental information and public participation:

- Law No 119/2014, dated 18.09.2014, "On the Right to Information";
- Law No 146/2014 – On Notification and Public Consultation" – regulates the process of notifying the public on drafting legislative work and other strategic national and local documents; furthermore, it Establishes the Commissioner the right of Information: to address all complaints if the public right to information and consultation has been infringed by the public authority;
- Transparency Programs for all public institutions made obligatory;
- Public Consultation Coordinator in every public institution;
- New unique electronic register, yearly public reports on all planned acts, number of planned public hearings;
- Yearly public reporting on all approved acts, number of public hearings, number of adopted recommendations and refused ones.

2.3.3 EBRD Performance Requirement

The consultation process is a critical part of EBRD Environmental and Social Policy (ESP), specifically Performance Requirement 10 (Information Disclosure and Stakeholder Engagement) points out the importance of an open and transparent engagement between the project developer and the different stakeholders at an early stage of the project cycle. "*Stakeholder*

engagement is central to building strong, constructive, and responsive relationships which are essential for the successful management of a project's environmental and social risks and impacts ". This PR that is guided by the UNECE Convention principles, states that "*the nature and frequency of stakeholder engagement at all phases of the project development will be proportionate to the nature and scale of the project, its potential adverse environmental or social risks and impacts and the level of stakeholder interest*".

EBRD ESP states *"As a signatory to the European Principles for the Environment, EBRD is committed to ensuring that projects are structured to meet EU environmental principles, practices and substantive standards, where these can be applied at the project level, regardless of their geographic location. When host country regulations differ from EU substantive environmental standards, projects will be required to meet whichever is more stringent[23]".*

Regarding the consultations and disclosure, the EBRD PR 10 requires "*the consultation and disclosure process shall meet any applicable requirements under national environmental impact assessment laws and other relevant laws*"[24].

The requirements of the EBRD PR 10, related to Information Disclosure and Stakeholder Engagement, can be summarized as follows:

- Stakeholder consultation is an ongoing process that continues during all the Project's life cycle.
- Stakeholder engagement involves stakeholder identification, proactive stakeholder engagement, the availability of a grievance mechanism opens to all, and monitoring.
- The nature and frequency of stakeholder engagement actions are proportionate to the nature and scale of the project, its potential adverse impacts, and the level of public and other stakeholders' concerns.

EBRD has also issued several guidelines that deal with stakeholders' engagement and grievance mechanisms. The Stakeholders Engagement Plan provides details on how these guidelines are useful for the proposed project.

2.3.4 EIB ESS

Standard 2 Stakeholder Engagement, promotes an inclusive and systematic approach to engaging constructively with stakeholders. It acknowledges stakeholder engagement as essential for the effective assessment, management, and monitoring of environmental, climate and social impacts and risks, and to ensure projects are sustainable and deliver better outcomes. This standard outlines the promoter's responsibilities for implementing continuous and transparent engagement with project stakeholders.
The consultation process that follows the EIB ESS is based on a structured and inclusive approach to engaging stakeholders. The preparation of consultation process unfolds:

- Identification of Stakeholders: Determine who will be affected by the project and who can influence or contribute to its success.
- Stakeholder Analysis: Understand the interests, concerns, and expectations of various stakeholders.
- Consultation Strategy: Develop a clear strategy outlining how and when stakeholders will be consulted throughout the project lifecycle.

The EIB's consultation process aims to ensure that stakeholders are informed, heard, and able

[23] EBRD ESP, Section III (1)

[24] EBRD PR 10, paragraphe 25

to contribute to projects that affect them. This approach aligns with international standards for responsible investment and sustainable development, fostering transparency, trust, and constructive dialogue between project developers and affected communities.

2.4 International Standards

2.4.1 EIB Standards

EIB Standard [25]	Description	Relevance to the project [26]
STANDARD 1 — ENVIRONMENTAL AND SOCIAL IMPACTS AND RISKS	Standard 1 promotes an integrated approach to impact and risk assessment and management by ensuring that environmental, climate, social and human rights considerations are taken into account and addressed at every step of the project. The standard sets out the promoter's responsibilities for assessing, managing, monitoring and reporting on the potential environmental, climate and social impacts and risks associated with the project and for maximising positive outcomes throughout the project. This is essential to achieve the environmental, climate and social outcomes in line with the EIB Group Environmental and Social Policy and the EIB Environmental and Social Standards.	Applicable These impacts and risks need to be taken into account at the earliest possible stage of planning and decision-making processes, including to ensure consistency with "Do Not Significant Harm" (DNSH) and "Minimum Safeguards" (MS) principles and requirements.
STANDARD 2 — STAKEHOLDER ENGAGEMENT	Standard 2 promotes an inclusive and systematic approach to engaging constructively with stakeholders. It acknowledges stakeholder engagement as essential for the effective assessment, management and monitoring of environmental, climate and social impacts and risks, and to ensure projects are sustainable and deliver better outcomes. This standard outlines the promoter's responsibilities for implementing continuous and transparent engagement with project stakeholders.	Applicable Requirements on information dissemination and public consultation are raised in other environmental and social standards to be duly cross-referenced with the present Standard.
STANDARD 3 — RESOURCE EFFICIENCY AND POLLUTION PREVENTION	Standard 3 recognises the importance of resource efficiency to relieve pressure on the environment and curb climate change. It encourages the identification, design and use of technologies, processes and services best suited to achieve environmental quality objectives. The standard also strengthens the approach and requirements for projects involving existing activities, facilities, modifications and/or extension	Applicable The Standard applies during the environmental and social impacts and risks identification process.
STANDARD 4 — BIODIVERSITY AND ECOSYSTEMS	Standard 4 emphasises that the protection and conservation of biodiversity and ecosystems, and maintaining their ecological functions and processes, are fundamental to environmental and social sustainability. This standard sets out the requirements and measures that the promoter has to adopt throughout the different stages of a project supported by the Bank to achieve a "no loss" of biodiversity and — where required — a net positive impact. Standard 4 also addresses the sustainable management and use of living natural resources, such as plants, trees and forests, and recognises the need to consider the livelihood of project-affected people whose access to, or use of living natural resources may be affected by the project. The Standard emphasises the need for developments to be designed and implemented in accordance with relevant instruments of European and international law and commitments made by the European Union (EU) under international agreements and conventions (paragraph 5). The EU meets its obligations by means of Directive 2009/147/EC on the conservation of wild birds (the Birds Directive) (the codified version of Council Directive 79/409/EEC as amended) and the Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora (the Habitats Directive). The	Applicable Application of the Standard in Natural, Semi-Natural, and Urban Habitats. Project promoters are expected to identify, classify and map habitats, partitioning them into natural, semi-natural and urban categories. Applicable and relevant only for the Emerald Candidate Site Landscape Protected Area of Pogradec (AL0000019). Not relevant for the Emerald Candidate Site of Managed Nature Reserve of Kuturman-Qafe Bush (AL0000018) as the railway coresses the site through a tunnel.

[25] https://www.eib.org/attachments/publications/eib_environmental_and_social_standards_overview_en.pdf

[26] https://www.eib.org/attachments/publications/eib_environmental_and_social_standards_en.pdf

EIB Standard [25]	Description	Relevance to the project [26]
	Emerald Network of Areas of Special Conservation Interest (ASCI) underpins the Convention's efforts to conserve natural habitats. Article 6(3) of the Habitats Directive requires appropriate assessment to be carried out if a planned project might affect integrity of a Natura 2000 site or the ability to achieve favourable conservation status for a European protected species. The standard also emphasises the need to engage with traditional and indigenous communities as key stakeholders in protecting and managing biodiversity and natural resources, while respecting their rights to their land, culture and spirituality	Not relevant the need to engage with traditional and indigenous communities as key stakeholders in protecting and managing biodiversity and natural resources, while respecting their rights to their land, culture and spirituality
STANDARD 5 — CLIMATE CHANGE	In line with the EIB's enhanced climate action and environmental sustainability ambitions and its 2021-2025 Climate Bank Roadmap, this standard promotes the alignment of projects supported by the EIB with the goals and principles of the Paris Agreement and the EU Sustainable Finance Action Plan. It does so by stipulating that promoters must explicitly address and incorporate climate change mitigation and adaptation considerations into the decision-making process for EIB-supported projects throughout the project cycle, by assessing and minimising greenhouse gas emissions and physical climate risk.	Applicable All projects must comply with appropriate national related to climate change policy. EIB requests information from project promoters on the climate change risks the projects face but also, those of the system within which they operate, e.g. vulnerability in the supply chain or surrounding infrastructure, communities and ecosystems.
STANDARD 6 — INVOLUNTARY RESETTLEMENT	EIB projects sometimes involve land acquisition and/or restrictions on land use, which can result in the temporary or permanent displacement of people from their original places of residence or their economic activities or subsistence practices. A situation when affected individuals or communities do not have the right to refuse such displacement is referred to as involuntary resettlement. Standard 6 seeks to avoid involuntary resettlement in the first instance and minimise and define the appropriate mitigation measures that should be in place to counter the adverse impacts of involuntary resettlement. It also aims to assist all affected persons so they can improve or at least restore their socioeconomic and cultural conditions.	Applicable This Standard applies to all components of operations financed by the EIB, including associated facilities, which result in involuntary resettlement. Standard 6 shall not apply to instances where resettlement is considered voluntary and conducted as an open market transaction.
STANDARD 7 — VULNERABLE GROUPS, INDIGENOUS PEOPLES AND GENDER	The objective of this standard is to address inequalities and other factors contributing to vulnerability, marginalisation and/or discrimination in an EIB project. The standard also promotes gender equality as a basic human right crucial for sustainable development. It outlines the promoter's responsibilities for assessing, managing and monitoring project impacts, risks and opportunities related to Indigenous Peoples and vulnerable persons/groups.	Applicable Not applicable responsibilities for assessing, managing and monitoring project impacts, risks and opportunities related to Indigenous Peoples and vulnerable persons/groups
STANDARD 8 — LABOUR RIGHTS	Good labour practices and the use of appropriate codes of conduct are important to ensure that workers' fundamental rights are respected and that working conditions are fair and decent. This standard aims to ensure that promoters of EIB projects comply with the core labour standards of the International Labour Organization and with national labour and employment laws. It sets the need for a workers' grievance mechanism. It further defines standards to protect migrant workers and workers affected by collective dismissals. The standard also requires the establishment, maintenance and improvement of worker-management relationships and terms and conditions of employment. The standard defines the assessment requirements that are needed for the promoter's own workforce, third-party workers and supply chain work.	Applicable This Standard applies in full to all workers directly engaged by the promoter throughout the project life cycle. The promoter will determine that third parties are legitimate, reputable and that their workers are protected consistently with these standards
STANDARD 9 — HEALTH, SAFETY AND SECURITY	Standard 9 outlines the promoters' and workers' responsibilities to safeguard the health, safety and security of workers and affected people and communities. It establishes the importance of putting in place a well-defined health and safety management system, endowed with appropriate resources and expertise. The standard further reinforces requirements to prevent gender-based violence and introduces impact and risk assessment requirements for new areas such as traffic and road safety,	Applicable to all sectors of activity, both public and private The promoter is expected to take all necessary measures to ensure that such third parties observe and comply with these standards,

EIB Standard [25]	Description	Relevance to the project [26]
	natural hazards (including those triggering technological disasters) and pandemics and epidemics.	duly reflecting them in procurement documents, contracts and monitoring arrangements
STANDARD 10 — CULTURAL HERITAGE	The EIB recognises the central role of cultural heritage as a source of valuable historical and scientific information, an asset for economic and social development and an integral part of people's cultural rights, identity and practices. Consistent with the applicable international conventions and declarations, this standard aims to identify and assess project risks and potential impacts affecting tangible and intangible cultural heritage and covers the engagement and monitoring of related mitigation measures. It emphasises the need for a chance find procedure outlining the actions to be taken if previously unknown cultural heritage is encountered.	Applicable The applicability of this Standard is established during the environmental and social impacts and risks identification process if, as an outcome of the process, it is identified that, during the project life cycle, the project is likely to affect irreplaceable cultural heritage. The requirements of this Standard apply to cultural heritage regardless of whether or not it has been legally protected or previously disturbed.
STANDARD 11 — INTERMEDIATED FINANCE	Standard 11 sets out the requirements and processes that financial intermediaries must have in place to assess, manage, monitor and report on the environmental, climate and social impacts and risks associated. with the sub-projects it finances, as appropriate to the nature of intermediated financing	Not applicable

2.4.2 EBRD Standards and guidelines

EBRD Performance Requirement (PR)[27]	Description	Relevance
Performance Requirement 1: Assessment and Management of Environmental and Social Risks and Impacts	This PR recognises the importance of an integrated assessment to identify the environmental and social risks and impacts associated with projects and the client's management of environmental and social performance throughout the life of the project.	Applicable This PR applies to all projects financed by the EBRD as established in the Environmental and Social Policy. The client will, as part of its environmental and social assessment process, identify the relevant requirements of this PR, and how they will be addressed and managed through the project design, construction, operations, and decommissioning or closure and reinstatement.
Performance Requirement 2: Labour and Working Conditions	This PR recognises that for clients and their business activities, the workforce is a valuable asset, and that good human resources management and a sound worker-management relationship based on respect for workers' rights, including freedom of association and the right to collective bargaining, are key ingredients to the sustainability of business activities.	Applicable The scope of application of this PR will be established during the environmental and social assessment process and depends on the type of contractual relationship between the client and the project workers.
Performance Requirement 3: Resource Efficiency and Pollution	This PR outlines a project-level approach to climate impacts and greenhouse emissions, resource management and pollution31 prevention and control. It builds on the mitigation hierarchy, the principle that environmental damage should as a priority be rectified at its source, and the "polluter pays" principle. The project related risks and impacts associated with resource use, and the generation of waste and emissions need to be assessed in the context of project location and local environmental conditions.	This PR applies to all projects directly financed by the EBRD as established in the Environmental and Social Policy. The client will, as part of its environmental and social assessment process, identify the relevant requirements of this PR, and how they will be addressed and managed throughout the project life cycle. The implementation of the actions necessary to meet the requirements of this PR will be managed under the client's overall environmental and social management system (ESMS)

[27] file:///C:/Users/cexte/Downloads/ebrd-environmental-and-social-policy-2019-english.pdf

EBRD Performance Requirement (PR)[27]	Description	Relevance
		and the project specific environmental and social management plan (ESMP).
Performance Requirement 4: Health, Safety and Security	This PR recognises the importance of managing health, safety and security risks to workers, project-affected communities and consumers associated with project activities.	Applicable This PR applies to all projects financed by the EBRD as established in the Environmental and Social Policy. The implementation of the actions necessary to meet the requirements of this PR will be managed under the client's overall environmental and social management system (ESMS) and the project specific environmental and social management plan (ESMP).
Performance Requirement 5: Land Acquisition, Restrictions on Land Use and Involuntary Resettlement	This PR addresses impacts of project-related land acquisition, including restrictions on land use and access to assets and natural resources, which may cause physical displacement (relocation, loss of land or shelter), and/ or economic displacement (loss of land, assets or restrictions on land use, assets and natural resources leading to loss of income sources or other means of livelihood).	This PR applies to physical or economic displacement that can be full or partial, permanent or temporary, and resulting through expropriation or other compulsory procedures, expropriation or other compulsory procedures, expropriation or other compulsory procedures, relocation of people without formal, traditional, or recognisable usage rights under national laws, relocation of people without formal, traditional, or recognisable usage rights under national laws. Displacement or economic displacement carried out by the client or a government for purposes relevant to the project before EBRD's involvement. This PR does not apply to resettlement resulting from voluntary land Transactions.
Performance Requirement 6: Biodiversity Conservation and Sustainable Management of Living Natural Resources	This PR recognises that the conservation of biodiversity72 and sustainable management of living natural resources73 are fundamental to environmental and social sustainability.	Applicable This PR applies to all projects directly financed by the EBRD as established in the Environmental and Social Policy.
Requirement 7: Indigenous Peoples	There is no presence of indigenous people in Albania. Albania has 4 groups of minorities: Egyptians, Greeks, Macedonians, and Roma[28]	Not applicable
Performance Requirement 8: Cultural Heritage	The aim of this PR is to protect cultural heritage and to guide clients to avoid or mitigate adverse impacts on cultural heritage in the course of their business operations.	Applicable The client will, as part of its environmental and social assessment process, identify the relevant requirements of this PR, and how they will be addressed as an integral part of the client's overall environmental and social management system (ESMS) and/or the project's environmental and social management plan (ESMP).
Performance Requirement 9: Financial Intermediaries	This PR recognises that financial intermediaries (FIs) are a key instrument for promoting sustainable financial markets and provide a vehicle to channel funding to the micro, small and medium sized enterprise sector.	Not applicable

[28]https://webarchive.archive.unhcr.org/20230518094222/https://www.refworld.org/docid/4954cdfe1a.html

EBRD Performance Requirement (PR)[27]	Description	Relevance
Performance Requirement 10: Information Disclosure and Stakeholder Engagement	This PR recognises the importance of an open and transparent engagement between the client, its workers, worker representatives, local communities and persons affected by the project and, where appropriate, other project stakeholders as an essential element of good international practice and corporate citizenship.	Applicable This PR applies to all projects. As a minimum, all projects will carry out stakeholder identification and develop and implement a grievance mechanism. The client will identify and engage with stakeholders as an integral part of the project's environmental and social assessment process, environmental and social management systems (ESMS) and the environmental and social management plan (ESMP) as outlined in PR 1.

2.4.3 EIB and EBRD standards and guidelines for land acquisition and resettlement

This section describes shortly EIB and EBRD requirements on land acquisition and resettlement. It includes also a gap analysis of these requirements. Further details are provided in the Land Acquisition and Resettlement Framework (LARF) – a separate document.

2.4.3.1 EIB STANDARD 6 — INVOLUNTARY RESETTLEMENT

EIB projects sometimes involve land acquisition and/or restrictions on land use, which can result in the temporary or permanent displacement of people from their original places of residence or their economic activities or subsistence practices. A situation when affected individuals or communities do not have the right to refuse such displacement is referred to as involuntary resettlement. Standard 6 seeks to avoid involuntary resettlement in the first instance and minimise and define the appropriate mitigation measures that should be in place to counter the adverse impacts of involuntary resettlement. It also aims to assist all affected persons so they can improve or at least restore their socioeconomic and cultural conditions.

This Standard applies to all components of operations financed by the EIB, including associated facilities, which result in involuntary resettlement.

Standard 6 shall not apply to instances where resettlement is considered voluntary and conducted as an open market transaction.

2.4.3.1.1 EIB Standards (Specific requirements for promoters)

Involuntary resettlement occurs when affected individuals or communities do not have the right to refuse displacement that occurs as a direct result of project-related land acquisition or restrictions on land use. It can take the form of physical or economic displacement (i.e. the loss of income sources or means of livelihood) and can be permanent or temporary.

If an EIB-financed project leads to the displacement of settlements of refugees or internally displaced persons, the involuntary resettlement process should be adapted to be aligned with the UN Guiding Principles on Internal Displacement.

Requirements for projects located in the rest of the world, including EU candidate and potential candidate countries should be following Standard 6, which reflects the core principles and essential procedural elements in EU legislation that the EIB considers relevant to involuntary resettlement, as well as compliance with any obligations arising from the applicable national legislation and international human rights instruments.

Project design – Consider and document feasible alternative projects, project designs and/or locations; limit the size of buffer zones or rights of way.

Eligibility criteria – Establish criteria for who is eligible for mitigation measures in cases such as:

persons with formal legal rights to land or assets, persons without formal legal rights, but who have claims that are recognised or recognisable under national laws or customary and traditional rights, and persons who occupy or use the land or assets but have no recognisable legal rights or claim to them.

Project-specific census and socioeconomic baseline for theaffected population with a cut-off date – Conduct a census that covers the total population of affected persons and includes a socioeconomic baseline and an inventory of all losses, including those for seasonal resource users. After the cut-off date, the census, socioeconomic baseline and resulting inventory of losses need to be updated.

Valuation, compensation and livelihood restoration – Make in kind or monetary compensation available to affected persons at full replacement cost. If an affected person's livelihood is land-based or the land is collectively owned, the promoter should favour land-for-land compensation or provide sufficient justification for their alternative choice of compensation method to the EIB. Livelihoods must not be affected by failure to replace land. The value or quality of replaced houses, land or assets should be equal to or higher than the pre-project conditions. Provide resettlement assistance suited to the needs of each group of displaced persons.

Relocation sites – Consult the choice of the site with those affected. Apply a set of requirements in line with Standard 6, points 40-42. Stakeholder engagement and disclosure – The promoter must comply with EIB Standard 2 and should inform affected persons/groups about their options and rights pertaining to resettlement, as well as document the process. Compensation and resettlement understandings that the promoter reaches with the affected parties should be reflected in written agreements Obtain free, prior and informed consent (FPIC) if required under EIB Standard 7

Grievance mechanism – The promoter must comply with EIB Standard 2, and additionally, the mechanism must include a recourse procedure to resolve any disputes in an impartial manner. The mechanism should not impede access to the country's judicial or administrative remedies.

Evictions – Forced evictions are not tolerated. Evictions must comply with the requirements of Standard 6, points 48-51.

Vulnerable groups and gender dimensions – During the process, give special consideration to individuals and groups that are vulnerable, marginalised, systematically discriminated against or excluded on the basis of their socioeconomic characteristics.

Resettlement planning documents – Ensure the preparation, disclosure, implementation and monitoring of the relevant resettlement planning documents in compliance with this standard. These may include: a Resettlement Policy Framework, Resettlement Action Plan or Livelihood Restoration Plan. The minimum requirements are set in annexes 1a and 1b of Standard 6.

Entities responsible for the resettlement – The promoter must ensure that those responsible for the involuntary resettlement (for example, national authorities) follow this standard.

2.4.3.2 Monitoring and evaluation – Set up monitoring systems; submit monitoring reports, including information about grievances and how they were redressed. Upon completion of all resettlement activities, provide an audit report to the EIB.EBRD PR5

Under EBRD's Environmental and Social Policy[29], the involuntary resettlement issues are covered by PR5, the main points of which are the following:

- avoid or, when unavoidable, minimize, involuntary resettlement by exploring alternative

[29] EBRD Environmental and Social Policy, 2019

project designs;

- mitigate adverse social and economic impacts from the land acquisition or restrictions on affected persons' use of and access to assets and land by (i) providing compensation for loss of assets at replacement cost; and (ii) ensuring that resettlement activities are implemented with appropriate disclosure of information, consultation and the informed participation of those affected;
- restore or, where possible, improve the livelihoods and standards of living of displaced persons to pre-displacement levels; and
- improve living conditions among physically displaced persons through the provision of adequate housing, including the security of tenure at resettlement sites.

2.4.3.2.1 EBRD Guidance on resettlement and good practice

EBRD has issued in 2017 a guidance on resettlement best practices[30], which sets out the process by which the beneficiary can fulfil the requirements of the EBRD PR5 when projects involve resettlement. PR5 is based on the Land Acquisition and Involuntary Resettlement Performance

The guidance provides practical advice to face the difficulties that are commonly encountered in the resettlement process, including the following:

Legislative Review: Identification of the national regulations dealing with the protection of the most vulnerable groups (e.g. poor people, people lacking legal title of land, ethnic and/or cultural minorities, etc.). The beneficiary must identify the areas in which the national regulations fail to meet the EBRD PR5 applicable standards and attempt to "fill in the gaps";

Census: The beneficiary must undertake a census to identify the individuals and households that may be benefiting from the resettlement. Conducting the census too early may necessitate additional or repeated steps as the residents and the economic activities may change over time. Whilst a late census may result in opportunities for some individuals to move onto the land for obtaining benefits from the resettlement process. That is why preparing and undertaking a census requires careful timing;

Socio-Economic Survey: Each project and each PAP have their characteristics and therefore it is expected that no two socio-economic surveys will be exactly alike. That is why the guidance suggests the involvement of skilled experts, who should be independent of stakeholders and, wherever possible, locals;

Asset Inventory and Valuation: This is the most important and amongst the most difficult issues in the resettlement process. PAPs assets inventory such as informal housing and/or land are difficult to value using traditional methods of calculation. The guidance recommends considering alternative valuation methods (e.g. the cost of replacing the building materials, the damage to agricultural assets, etc.), and allowing PAPs to select their valuators, where practical. The assets, including affected land, should be rigorously documented, including aerial photography, to avoid attempts by opportunistic individuals to artificially increase their potential benefits;

Livelihood Restoration: Once the resettlement has been achieved, the beneficiary must be ensured that the livelihoods of affected people have been correctly restored. The livelihood restoration issues cover more than a simple economic restoration and may involve cultural and familial considerations (e.g. interruption of the passage to school, to agricultural land, etc.). The guideline suggests a combination of providing options to affected people at each step of the

[30] https://www.ebrd.com/news/2017/ebrd-launches-new-resettlement-guidance-and-good-practice-publication.html

process and careful documentation of the beneficiary's efforts and results; and

Importance of appropriate consultations: Major impediments to the completion of the project (e.g. problems with the assets inventory, assets valuation, livelihood restoration, etc.) can be avoided by obtaining the opinion of PAPs and stakeholders and involving them to take an active role in shaping the resettlement process.

2.4.4 Gap analysis and regulations/standards to be applied to the proposed project

A summarized version of this analysis is given in the table below, while a detailed analysis is given in the LARF (a separate document).

Table 2-7 Gap analysis between national and EBRD requirements

No.	National regulations	EBRD PR	EIB ESS	Standard to be applied / comment
1	The Albanian law provides regulation only for people having legal rights over the properties and focuses on assets that may be expropriated or temporarily occupied properties for the public interest.	EBRD includes PAP that has formal and/or informal rights.	The EIB requires that formal landowners be duly compensated for any land acquired for projects it finances. Compensation should be based on fair market value or according to agreed-upon valuation methods that are transparent and equitable.	EBRD standards to be applied.
2	The law provides no regulation on restrictions resulting in people experiencing loss of access to physical assets or natural resources	EBRD standards foresee these issues	ESIA identifies potential restrictions or changes in access to these assets and resources that may occur due to project activities.	EBRD standards to be applied; The Consultant will pay special attention to the PAP that may be affected by the land use restriction from the limitation of the unauthorized crossings. Side roads, underpasses, and overpasses will be built to avoid/minimizing land use restriction
3	The law imposes no requirements for avoiding and/or minimizing physical and/or economic displacement;	EBRD standards foresee these issues	The EIB emphasizes the importance of preventing or minimizing physical and economic displacement wherever possible. This includes considering alternative project designs or locations that could reduce the need for displacement	EBRD standards to be applied; The Consultant (helped by the affected municipalities) will scrutinize all kind of potential physical and/or economic displacement; Anyway the only physical and/or economic displacement may occur concerning the land surface required for the proposed new freight station of Prrenjas and Pogradec; The Consultant will pay special attention to the PAP that may be affected by the land use restriction from the limitation of the unauthorized crossings. Side roads, underpasses, and overpasses will be built to avoid/minimizing economic displacement.
4	A resettlement/ livelihood restoration plan nor the implementation of a socio-economic survey is required by the Albanian legislation in force. The law is also silent regarding consultations with affected persons or informing vulnerable groups	EBRD standards include a careful socioeconomic survey and early consultation with the vulnerable groups	For projects where displacement cannot be avoided, the EIB requires the development and implementation of a Resettlement Framework or Action Plan. This framework outlines procedures for identifying affected persons, assessing their losses, and providing adequate compensation and resettlement assistance.	EBRD standards to be applied; However Albanian Law "On EIA" requires a public hearing before the delivery of the Environmental Consent; The Consultant (helped by the affected municipalities) will identify all the affected persons, including vulnerable ones.

No.	National regulations	EBRD PR	EIB ESS	Standard to be applied / comment
5	No specific provision on the compensation of registration costs and transfer taxes is provided	EBRD standards foresee this compensation	EIB-financed projects must comply with national laws and regulations regarding land acquisition, including requirements related to registration fees and transfer taxes. The compensation provided by the EIB should cover these costs as part of ensuring full and fair compensation to affected landowners.	EBRD standards to be applied
6	The expropriation law, as amended through Article 19, provides for compensation in cash and in-kind, which was not the case before	EBRD standards include physical compensation	Overall, the EIB aims to provide fair and adequate compensation to mitigate the adverse impacts of projects it finances, using both cash and in-kind compensation methods as appropriate to ensure the effective resettlement and rehabilitation of affected persons and communities.	EBRD standards to be applied; The land surface required for railway line improvement may be compensated by the land surface being free from railway line relocation; The land surface required for the proposed new freight station of Prrenjas and Pogradec may be compensated in cash (at the free market price) and therefore the landowner may buy agricultural land.
7	Public consultations are not required before expropriation. Only those having formal legal rights over the affected properties are consulted once the expropriation process has initiated	EBRD standards apply to all the PAP at the early stages of the project development	Consultations may begin during the scoping and feasibility studies of the project. This initial phase involves identifying potential project impacts, including land acquisition and resettlement issues, and engaging with stakeholders to gather their input and concerns.	EBRD standards to be applied to this category of PAP; However Albanian Law "On EIA" requires a public hearing before the delivery of the Environmental Consent; The Consultant (helped by the affected municipalities) will scrutinize all kinds of claims on the ownership of the affected land surfaces.
8	Relocation costs and assistance for vulnerable groups are not foreseen by the Expropriation law, however, homeless persons are entitled to social welfare assistance	EBRD standards apply to all PAP	Relocation costs and assistance for vulnerable groups are included in the European Investment Bank (EIB) standards and guidelines for projects that involve displacement or resettlement of communities.	EBRD standards to be applied to this category of PAP; However, no homeless persons are affected by the Project; No relocation is needed for the proposed project; Anyway, the Consultant (helped by the affected municipalities) will scrutinize all potential impacts on the vulnerable groups.
9	Consultation of communities regarding the loss of public amenities is not provided	EBRD standards include the loss of public amenities	ESIA identifies potential restrictions or changes in access to these assets and resources that may occur due to project activities.	EBRD standards to be applied to this category of PAP; The Consultant has already taken into consideration this issue. Side roads, underpasses, and overpasses will be built to resolve this issue.
10	The law does not apply to those who have a claim to land that is recognized or recognizable under national laws and those who have no recognizable legal right or claim to the land. Furthermore, those belonging to these categories are not entitled to any compensation or livelihood restoration	EBRD standards apply to all PAP	The EIB's standards promote inclusivity and fair treatment for all affected persons and communities, regardless of their legal status regarding land tenure.	EBRD standards to be applied to this category of PAP; The Consultant will pay special attention to the PAP that may be affected by the land surface required for the construction of the proposed side roads, underpasses, overpasses, and the proposed new freight station in Prrenjas and Pogradec.

No.	National regulations	EBRD PR	EIB ESS	Standard to be applied / comment
	assistance (except social housing)			
11	No requirements for the monitoring of the expropriation process are provided	Monitoring of the expropriation process is required	Monitoring of the expropriation process is required.	EBRD standards to be applied

3 The proposed Project

3.1 Existing situation

Currently, the railway is operational for the segment Rrogozhinë – Elbasan, while from Elbasan to Pogradec has not been operational, due to its seriously degraded technical condition, since 2011.

The railway line Rrogozhinë - Pogradec has a total length approximately of 117 km. The Railway has been constructed between the 1950s and the 1970s, according to the following sections:

- Section Rrogozhinë - Peqin: constructed in 1947;
- Section Peqin - Elbasan: constructed in 1950;
- Section Elbasan - Librazhd: constructed in 1972;
- Section Librazhd - Prrenjas: constructed in 1974;
- Section Prrenjas - Pogradec: constructed in 1979.

The baseline information on the railway line conditions conducted on the frame of the Project shows that in the current situation, the railway line cannot handle the expected increase of the transit freight. Furthermore, community safety issues are in question due to lack of signalling, unprotected authorised level crossings and emergence of many unauthorised level crossings, downgraded engineering networks, abandoned rail stations and other elements.

In addition, the baseline surveys have identified the existing level crossing per each section of the route:

- Rrogozhinë – Elbasan: 41 LCs, 45 over/under-passes, 40 pedestrian paths.
- Elbasan – Prrenjas: 34 LCs, 48 over/under-passes, 33 pedestrian paths.
- Prrenjas – Pogradec: 32 LCs, 14 over/under-passes, 23 pedestrian paths.

3.2 Project location and access to site

The maps in figure present the alignment of the railway line by sections Rrogozhinë – Mirake length 55km (flat terrains) , Mirake – Prrenjas length 35.7 km (mauntain terrains) and the section Prrenjas – Pogradec length 26.2 km (mauntain terrains and near Ohrid lake).

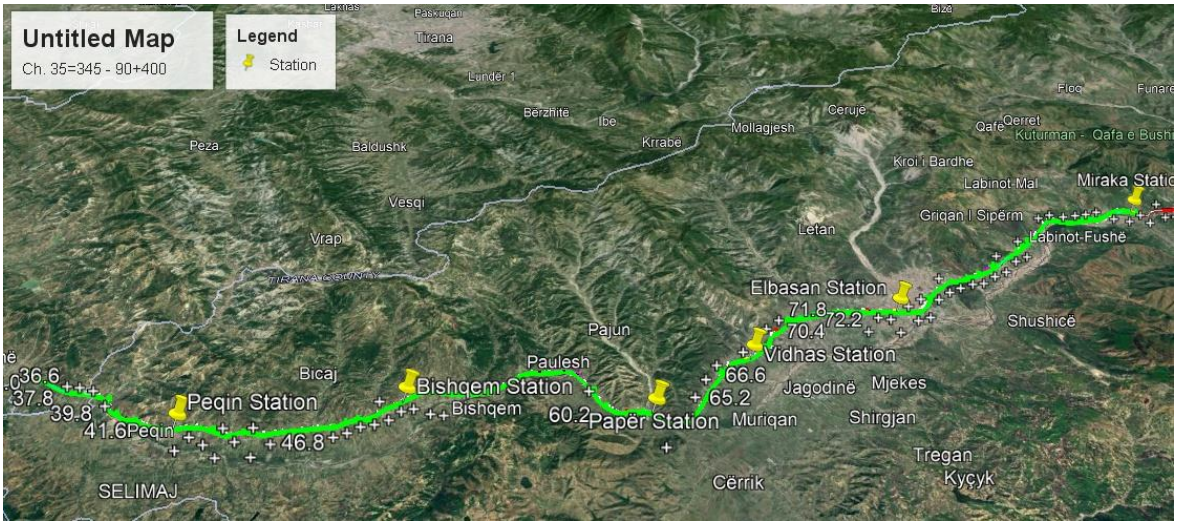


Figure 3-1 The map of the first section Rrogozhinë – Mirake (lot1)

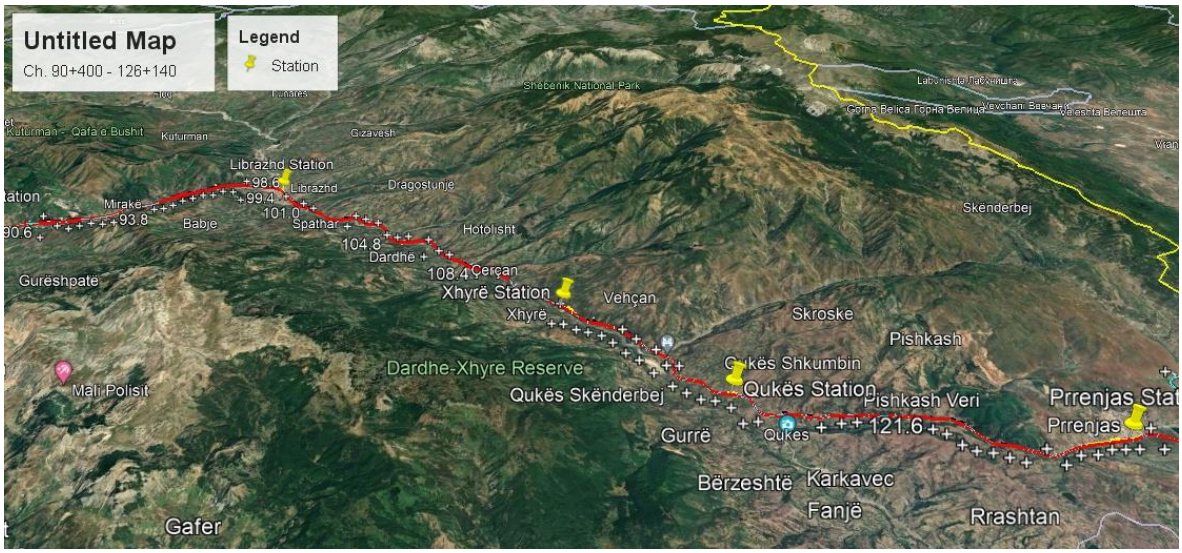


Figure 3-2 Map of the second section Mirake – Prrenjas (Lot1)

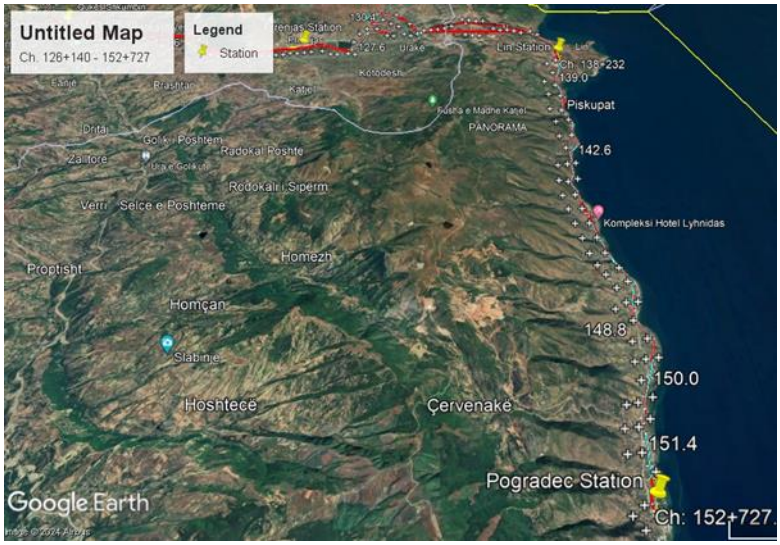


Figure 3-3 Map of the third section Prrenjas – Pogradec (Lot 2)

The railway line Roogozhinë – Pogradec passes through six municipalities – Rrogozhinë, Peqin, Elbasan, Librazhd, Prrenjas and Pogradec. The railway line passes mainly through urban, suburban, and agricultural areas and E&S sensitive areas. This area has experienced also the migration of population from the mountainous region to flat terrains, which has led to many unauthorized level crossings serving this population. Across the urban areas (i.e., Elbasan, Librazhd, Prrenjas and Pogradec) many formal and informal buildings have been built at an inappropriate distance from the railroad. Besides, these buildings have damaged the drainage channels on both sides of the railroad.

Across the environmental and social sensitive areas:

- The segment Mirakë – Librazhd passes along the perimeter of the Nature Managed Reserve Kuturman Qafë – Bushi.
- Lin – Pogradec goes through the Landscape Protected Area of Pogradec. The area is IBA and Emerald site.
- Along the Lin Peninsula, with its natural and cultural assets as the springs of Drilon, numerous endemic species made it part of UNESCO.

Given the geographic and economic structure of the area, it can be expected that the main

impact of the Project will be on land acquisition, land access and livelihood restoration.

3.3 Existing documents

The railway segment Rrogozhinë – Pogradec is part of the Durrës-Pogradec railway line, which is expected to connect with Northern Macedonia (in the village of Lin). There are several documents, that have been as reference for the project of "Preliminary Design for the Rehabilitation of the Corridor VIII Rrogozhina - Pogradec Section, as follows:

- "Feasibility study for the rehabilitation of the railway line Durrës – Elbasan – Pogradec and a new rail line link to border with the former Yugoslav Republic of Macedonia", Component 1: Pre-feasibility Study (WB13-ALB-TRA-01), 2018"Albanian Transport National Plan", Louis Berger S.A. (EU funded), Sept 2004 including the "First Five-year Review of ANTP", Louis Berger S.A. (also EU funded), June 2010.
- "Transport Infrastructure Priority Projects" Albanian Ministry of Transport and Infrastructure, 2014.
- "National Sector Strategy for Transport - Transport Sector Strategy in Albania", "Final Strategy and Action Plan 2016-2020", TIEG, Jan 2016.
- "SEETAC Financial Plan", ERDF PP9 – A.U.Th., Sept 2012.
- "Strategic Framework for Implementation of ITS on TEN-T Core/Comprehensive Network on the WB6", TA to Connectivity in the Western Balkans, December 2018.
- "Preparation of Maintenance Plans 2018-2022 for Road/Rail TEN-T indicative extension to WB6", TA to Connectivity in the Western Balkans, December 2018.
- Apart from the regional and national strategic documents presented above, the most relevant studies to this task (as listed hereafter) will be provided by HSH and MIE and reviewed by the Consultant.
- "Albanian Railway Network: Infrastructure and Signalling Improvement"; (WBIF TA-ALB-06), Nov 2009.
- "Detailed design of railway line Durrës -Tirana Public Transport Terminal (PTT) and of the new railway connection to Rinas's airport (TIA) and financial/economic appraisal of the whole Albanian railway network", "Component B"; Consortium led by Dromos Consulting (WBIF –WB4-ALB-TRA-09), Oct 2015.

Various other older studies, as below, have been performed and considered by consultant:

- "Pre-feasibility Study on the Development of the Railway Axis – Corridor VIII", "Final Report"; Multinational Railway Working Group, Italferr and Italian National Railways Agencies, (funded by Italian Ministry of International Trade – Corridor VIII Secretariat and Central European Initiative CEI), Sept 2007.
- "Feasibility Study for railway line Tirana-Durrës-Elbasan-Lin (border with the FYROM)", Sudop Praha A.S. (sponsored by Ministry of Transport and Communications of the Czech Republic), Dec 2002.
- "Feasibility Study on Rail Connection Albania-Macedonia", Albanian Institute of Transport, 2003.
- "Technical Documentation on Study Level and Preliminary Design of Railway Corridor VIII Kichevo-border Republic of Albania, Annex", Eurotransproject (funded by PE for Railway Infrastructure "Macedonian Railways" Skopje), 2010.
- "Updating the Regional Balkans Infrastructure Study" (REBIS); SYSTEMA Transport

Planning Consultants & WYG International (funded through WBIF, WB7-REG-TRA-SD-02), 2015.

- "Pre-feasibility Study on the Development of the Railway Axis – Corridor VIII", "Final Report"; Multinational Railway Working Group, Italferr and Italian National Railways Agencies, (funded by Italian Ministry of International Trade – Corridor VIII Secretariat and Central European Initiative CEI), Sept 2007.
- "Feasibility Study for railway line Tirana-Durrës-Elbasan-Lin (border with the FYROM)", Sudop Praha A.S. (sponsored by Ministry of Transport and Communications of the Czech Republic), Dec 2002 A Feasibility study for the rehabilitation of the railway line Durrës – Elbasan – Pogradec and a new rail line link to border with Republic of North Macedonia was prepared in 2018 and financed under the Western Balkans Investment Framework (WBIF). The Detailed Design for the Rehabilitation of the Durrës – Rrogozhina Section has recently been prepared.
- "Feasibility Study on Rail Connection Albania-Macedonia", Albanian Institute of Transport, 2003.

3.4 Actual status of the Project regarding the EIA approval by the authorized Ministry

The project refers to the phase of preliminary design in which are already assessed the alternatives proposed. The purpose of the ESIA in this phase is to assess and predict potential adverse social and environmental impacts and to develop suitable mitigation measures, which are documented in an Environmental and Social Management Plan (ESMP) since in this phase of the project based on the existing situation of the environment and social life, alternative proposed and on inception report.

During the inception period, the ESIA team prepared the initial ESIA inputs for the Inception Report

ESIA study shall be updated and re assessed during the detailed design of the project in which phase are obtained even the relevant permissions from the Institutions (Environment and Tourism Ministry).

Environmental issue referring at this stage of project (preliminary design) include environmental existing situation based on site surveying and relevant existing documents /studies.

The quality of environment in this stage of the project is based on the data obtained from documents (reports, relevant studies carried out in the project area). These data are used as a comparison of the quality of environment near the project area.

Local Government Units and National and Regional Institutions, as well as Focus Groups with community participation Administrative Units Impacted by Project, transboundary stakeholders (UNESCO) are notified since in this phase of the project;

Environmental and Social impact assessment at this stage (Preliminary design) is a planning tool, that aims to ensure that environmental and social issues throughout the entire project lifecycle are anticipated and considered. It also serves as a risk assessment tool and allows the establishment of ownership, to a certain extent, over the Project by reducing or preventing adverse social impact.

Social impact assessment is prepared by using the local knowledge and involvement of stakeholders in participatory processes to analyze the concerns during the alternative assessment and monitoring of affected social receptors.

This tool together with other documents part of ESIA, especially the Resettlement Policy Framework (RPF) and the Stakeholder Engagement Plan (SEP) provide analyses and arguments

and opinion/considerations of stakeholders to decision-makers regarding the environmental and social costs for alternatives presented.

No approval from the Albanian institutions is required to be obtained during the preliminary design.

ESIA in preliminary design phase helps the ***Consultant in detail design*** to be focus on:

Environmental quality data will be ensured in the most sensitive and representative area of the project by measurements with laboratory for air quality, noise & vibration level, air and noise modelling as well to assess the extension of the impact during operation phase of the project.

ESIA for Detailed Design shall be focused on the selected alternative and shall assess and predict potential adverse social and environmental impacts and to develop suitable mitigation measures.

During Detail design phase the focus shall be on the chosen alternative and more actions will be required as:

- It is requested to consider Detailed local plans for each municipality of the project;
- The map of stakeholders will be expanded at the capillary level (administrative units, elders, and interview with direct Project Affected People (PAP);
- More meetings and interactions with stakeholders, detailed inventory of properties and assets shall be evaluated;
- ESIA shall assure the Investors that all factors have been taken into consideration before starting the construction phase;
- Transborder parts shall be included (not just notifying) during this phase of the project;
- International agencies with focus protection of cultural /natural heritage (as UNESCO) etc.
- Detailed biodiversity baseline surveys, both aquatic and terrestrial, for Lake Pogradec Landscape Protected Area, IBA and Emerald Site as well as Qafe Bush – Kuturman Nature Managed Reserve shall be conducted;
- Appropriate Assessment to be conducted for the Candidate Emerald Site of Pogradec Landscape Protected Area in accordance with Article 6/3 of Habitats Directive as well as in accordance of the requirements for Water Framework Directive stipulated in the document “Water Framework Directive JASPERS Checklist tool”.

  Implementation of the steps foreseen in “Water Framework Directive JASPERS Checklist tool”.

  The steps implemented to check/ensure the compliance of the project with Water Framework Directive are:

  Step 1 - Context and Screening - Recording the future ecological and chemical status objectives for relevant EU protected areas. In this context, there is a Management Plan for Lake Pogradec (a Candidate Emerald Site) and its conservation objectives are highlighted in 6.2. Impacts and mitigation during design, construction, and operation. For the other Candidate Emerald Site of Kuturman - Qafe Bush there is no Management Plan.

  Step 2 - Scoping the assessment - is used to determine whether any further assessment is needed and, if so, which WFD elements should be investigated. In this context, the need for an Appropriate Assessment is highlighted above. It stresses that the Assessment should take in account the requirements of the

Water Framework Directive (see 3.4 Actual status of the Project regarding the EIA approval by the authorized Ministry).

Step 3 - Further data collection or investigations - ESIA foresees "Appropriate Assessment to be conducted for the Candidate Emerald Site of Pogradec Landscape Protected Area in accordance with Article 6/3 of Habitats Directive as well as in accordance of the requirements for Water Framework Directive stipulated in the document "Water Framework Directive JASPERS Checklist tool". (see 3.4 Actual status of the Project regarding the EIA approval by the authorized Ministry).

Step 4 – Application of Tests for the Article 4(7) of Water Framework Directive - Checklist tool" will be performed during Detailed Design and in accordance with the annexes of "Water Framework Directive JASPERS Checklist tool".

- Updating impact assessment for all indicators (as may have changed by passing the time from preliminary design). ESIA study (even in detail design phase) is not considered relevant if the construction activities do not start within 2 years of obtaining Environmental Declaration from the MoET (as per Albanian legislation);
- Update of avoidance and mitigation measures complying with mitigation hierarchy;
- Specifying information regarding No Net Loss and Net Gain measures respectively for Priority Biodiversity Features and Critical Habitats.

3.4.1 Other related EIA approvals

During this phase of the project (preliminary design) is not required any submission to the institutions or any relevant approvals. This phase of the project helps the Developers and Consultant to follow the next step of the study which is the detail design phase. All relevant approval and permits are obtained during detail design phase.

During detail design phase of the project, based on the Law 10440/2011 "On Environmental Impact assessment ", appendix 1, point 7/a (Construction of the railway lines in a long distance) this project required *Detail Environmental impact assessment* Report.

The ESIA (in detail design phase) shall meet the requests of 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. DCM 686/2015 requires the ESIA report.

Given that the project area covers the territory of several municipalities, the construction permit for the proposed project needs to be approved by the National Council of Territory Planning (NCTP), which is led by the Prime Minister. The necessary documents are the Environmental Permit and the approval from the National Agency of Territorial Planning (NATP).

Article 39(1) of Law 107/2014, "On Territory Planning and Development", as amended, states "a Construction permit is required for any construction, repair, restoration or demolition of existing buildings, installation or building of temporary constructions, except for the cases provided by Article 41 of this Law".

3.5 Project Description

The railway project is located on the existing line Rrogozhine-Pogradec and will be part of Corridor VIII. The line is about 120 km long and passes through various landscapes and regions. It starts from Rrogozhina, a small town in the coastal plain, and heads eastward towards Elbasan. The terrain is mostly flat or gently sloping in this area, with agricultural fields and orchards. Then, the line goes to Elbasan through a narrow passage between the hills that leads to the city of

Elbasan. The terrain becomes rugged in this location, with rocky cliffs and forests. The line follows the valley of Shkumbin River, crossing some bridges and tunnels. Elbasan is a large city in central Albania, and the railway corridor in this location becomes part of the densest urban area of the project. Afterwards, it continues eastward towards Librazhd Qukes, Prrenjas, and Rajce. The terrain in this area is hilly and mountainous, with some villages and farms. In Rajce, the railway alignment continues as a serpentine, dividing this agricultural region into several parts. The line then goes in the Qafe-Thane Tunnel and descends to the shore of Lake Ohrid. The line follows the lake shore for about 18km till the end of the existing railway Guri i Kuq.

Currently, the railway line is partially used only in the segment Rrogozhine-Elbasan, which has very little traffic and a maximum speed of 40km/h. In the other part, it has not been used since 2012. In these circumstances, the local population uses the railway as a footpath or accessway to private properties. Several unauthorised level crossings have been created throughout the line.

The preliminary design has been prepared for two construction LOTs,

Lot 1, which is part of the core TEN-T network along corridor 8 ,starts after the end of Rrogozhina station and ends after approximately 91km at the end of Prrenjas station around km 126

Lot 2 starts after Lot1 and ends at Pogradec station for a length of approximately 27km

- Lot1 90.6
- Lot 2 26.7
- Tot 117.3

Figure 3-4The footprint of the project

3.5.1 Rrogozhina - Elbasan

The section from Rrogozhinë to Elbasan is approximately 41km long. Four stations exist along this section: Peqin, Bishqem and Paper, along with a major yard at Vidhas. The stations are located an average of 8 km apart.

The line passes through the foothills of the Krabe Mountains crossing numerous small valleys resulting in a series of embankments of the order of 5-6m in height followed by cuttings of similar height and is considered a generally flat-terrain railway line. This section consists of turns with a radius of 500m to 1000m with a leading slope of up to 0.9%.

The superstructure of the Rrogozhinë - Elbasan line is made up of Chinese-made P-43 type rails, wooden sleepers and concrete sleepers placed on the line alternately. The ballast of the line is made of complete cast iron and no filtering and dampening functions of the train load are performed. The wooden crossbars are connected to the P-43 rails by means of railway nails.

Figure 3-5 Infrastructure condition of the railway line between Rrogozhina and Elbasan

In general, the maintenance on this section has been poor and the Rrogozhina track structure is requires major overhaul. The ballast comprises mainly of gravel contaminated with fine materials and vegetation. The sleepers are general of timber with some sections having been replaced recently with twin block concrete sleepers on new crushed rock ballast.

In this railway segment, there is no signalling, command and control system for the movement of trains and level crossings along the line, as well as telecommunications between stations according to safety standards in the system.

3.5.2 Elbasan – Prrenjas

This railway line section is approximately 51km long and includes the railway stations at Miraka, Librazd and Xhyre. The Krasta station was considered to be non-operational, even before the main line ceased its operation.

The terrain is hilly to mountainous, and the existing track alignment provides general minimum radius at curves Rmin= 300m, allowing for design speeds of 80km/hr. However, the maximum gradient exceeds 2.2%.

Ballast is generally gravel, being in poor condition mainly due to the absence of good maintenance. The sleepers are of timber and are in very bad condition with many of them being broken. The rails are light P-43 type rails and wooden beams.

The existing embankments are in high height and are consolidated over the years, while multiple rockfalls have been identified in high cuts.

Figure 3-6 Railway line between Elbasan and Prrenjas

There is a complete lack of a signalling system for connecting and commanding trains, as well as communication system between stations.

3.5.3 Prrenjas – Pogradec

The railway line section Prrenjas - Lin - Pogradec has been constructed in 1973-1979, and has a length of 28.2 km. This railway section includes the longest railway tunnel of Qafë - Thana, with a length of about 3km.

This railway section is designed having minimum radius 300 m and a main gradient of 18 ‰, while the maximum exceeds 22‰.

At km 137+500, Lin railway station is constructed, which will serve in the future to connect the link with Republic of North Macedonia railway network. The railway line from Lin up to railway station of Pogradec, with total length of 16.6 km, passes parallel with Lake of Ohrid, close to the reconstructed road of Lin – Pogradec.

Taking into account the elevation difference to be covered from Prrenjas to Lin, the gradient of railway is acceptable, but the alignment of railway is designed with minimum radius of 300m.

Lack of maintenance has resulted the railway superstructure to be in poor condition and vegetation covers the track. The timber sleepers and the ballast have not been substituted with new material.

Figure 3-7 Railway line between Prrenjas and Pogradec

The main features of the railway line have to do with the terrain:

- in the flat terrain for the section from Durrës – Rrogozhinë – Elbasan, most of the curves have a radius of 500m and above;
- while in the mountainous segment from Librazhd to Lin, the minimum curve radius used is 300 m and the transition from a straight line to the curve is made through a parabolic transition curve.

Referred to HSH information, the max gradient is reported to be 1.8%, however, the topographic survey showed that the actual longitudinal grades exceed 2.2%, considerably reducing the operational speed on the mountainous sections.

3.5.4 Road crossings

Along the Durres-Pogradec section, the rail network crosses the road network on numerous locations, not being level separated in most cases.

Unauthorized (illegal) level crossings present a very serious risk to safety, of trains, passengers and road users. There is a mandatory requirement to provide a safe control at level crossing in order to protect users. This means that the unauthorized (illegal) crossings present a particular problem. Recent statistics are presented below.

Table 3-1 Rail/Road accidents recorded in recent years (source: TCPS report, 2022)

Year	No. of traffic accidents	No. of fatalities	No. of severely injured
2014	9	1	8
2015	9	3	6
2016	15	2	13
2017	4	2	2
2018	8	3	5
Total	**45**	**11**	**34**

In all cases of accidents, more than 80% of the cases have occurred due to non-enforcement of the rules by drivers. There is a lack of emphasized culture of vehicle drivers in terms of road traffic regulations and vehicle speed. In Albania, there were 89 accidents reported in the last 5 years, 45 occurred on LCs, i.e. about 51 %.

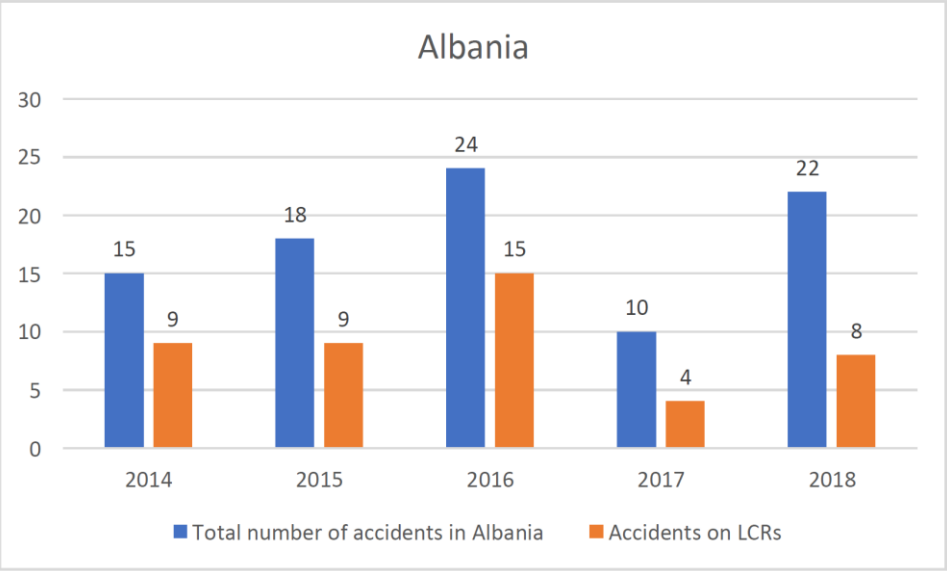


Figure 3-8 Comparison between the total number of accidents and those on LCs in Albania (2014-2018)

As part of this study there are identified all level crossings (authorised & unauthorized) and at the same time there are given recommendations according to each scenario in order to bring

their operation under safe conditions. Some of them can probably be closed. Some can be brought under proper control and legalised.

According to the existing situation, we have identified the existing level crossing per each section of the route.

- Rrogozhina – Elbasan: 41 LCs, 45 over/under-passes, 40 pedestrian paths;
- Elbasan – Prrenjas: 34 LCs, 48 over/under-passes, 33 pedestrian paths;
- Prrenjas – Pogradec: 32 LCs, 14 over/under-passes, 23 pedestrian paths.

Table 3-2 Existing Crossings along the Railway Line

Type of Crossing	Quantity (Pcs.)
Level Crossings (Authorised and Illegal)	73
Road Underpasses	86
Road Overpasses	7
Pedestrian Crossings	73

3.5.5 Railway structures

The railway structures along the Rogozhine -Pogradec railway line have been identified through existing documentation (former studies) and site visits perform ed by the structural team, as well as the topographic survey. During the site visits, the condition of these structures has been visibly evaluated to support the proposed rehabilitation options examined under the Options Analysis task.

Based on the loading schemes (the vertical loads of trains) that are used in Albania, class load N7 and N8, the structures are capable of supporting the required axle load of 22.5 tones. In general, the structures are in reasonable condition .The main problems identified include:

- Vegetation is completely uncontrolled;
- The embankments at the abutments are too steep;
- Parapets are missing on all bridges;
- Expansion joints protection cover plates are missing in most bridges;
- Bearings have had no maintenance;
- The drainage and the waterproofing on the deck is frequently degraded or non-existent;
- In some slabs and main beams, the reinforcement is exposed.

The following Table presents a summary of the various structures along the railway line.

Table 3-3 Number of structures by type and section

Section	Bridges	Viaducts	Under passes (1)	Culverts (2)	Retaining walls (3)
Rrogozhina – Elbasan	29	0	21	86	3 (375m)
Elbasan - Prrenjas	71	5	27	155	110 (11.2km)
Prrenjas - Pogradec	11	0	10	121	41 (8.25km)
Total	**111**	**5**	**58**	**362**	**154 (19.7km)**

(1) Includes also agricultural and pedestrian underpasses,

(2) Includes also drainage structures that could not be inspected (demolished or completely covered by vegetation),

(3) All types of retaining walls (stone masonry, gabion, concrete, reinforced concrete, etc).

3.5.6 Railway tunnels

The site visit has revealed the exterior condition of the tunnels, but cannot guarantee its long-term stability, especially following demolition and modification intervention works. Additionally, no geotechnical data are available at this stage and, in any case, very limited is foreseen to be available for the preliminary design phase. In order to design the rehabilitation of the tunnels that will be decided the following observations need to be taken into consideration:

- Since no falls or major lining failures have been identified, all tunnels are considered stable at this stage.
- Dimensions and quantity of reinforcement of the existing lining cannot be reliably measured although indications have been noted in cases where the lining is discontinuous, and reinforcement is visible.
- Water infiltration is noted in various points along the tunnels, without major inflows. Nevertheless, repair works are identified occasionally with probable cause water inflow. Simple water protecting measures for protection of the interior of the tunnels will not stop water action on the existing lining, action which will deteriorate lining's condition.
- No data from the designing of the tunnels is available that could allow for checking and redesigning the lining for the rehabilitated tunnels. Neither is, at this stage, new data available from geotechnical investigation and testing.

➢ Lot 1: Rrogozhina-Prrenjas

22 tunnels and 1 structure (No5 concrete shells);

Total length is 6.607m;

5.701m are lined with concrete - 906m (in 9 tunnels) unsupported.

➢ **Lot2: Prrenjas to Pogradec**

2 tunnels;

Total length is 3.223m;

3.133m are lined with concrete - 90m unsupported (both tunnels).

Table 3-4 List of existing tunnels and characteristics

Tunnel index	Section	Name	Chainage	Length (m)	straight (S) / curved (C)	Overburden est. (m)
T1	Rrogozhina – Elbasan	Bishqem I	53+787	294.66	S	25
T2		Bishqem II	54+287	210.95	C	34
T3		Bishqem III	57+644	727.22	C	un.
T4		Bishqem IV	58.302	455.67	C	un.
T5		-	38+296	just a series of concrete shells on the rails		
T6	Elbasan – Librazhd	Mirake I	91+899	590.16	S	123
T7		Mirake II	92+626	460.55	S	>35
T8		Murrashi I	96+023	918.66	S	un.
T9		Murrashi II	96+750	283.28	S	>30
T10		Librazhd I	99+744	314.29	S	un.
T11	Librazhd - Prrenjas	Librazhd II	100+184	203.32	S -> C exit	>15
T12		Librazhd III	100+807	260.15	C	33
T13		Librazhd IV	102+487	245.53	S	>17
T14		Hotolisht I	107+785	414.57	S	>27

Tunnel index	Section	Name	Chainage	Length (m)	straight (S) / curved (C)	Overburden est. (m)
T15		Hotolisht II	109+003	170.16	S	23
T16		Xhyre I	112+368	95.53	C	16
T17		Xhyre II	112+567	111.80	C	38
T18		Qukes I	113+641	332.65	S	un
T19		Qukes II	118+527	94.09	S	20
T20		Qukes III	118+988	62.63	C	16
T21		Prrenjas I	121+843	53.20	C	20
T22		Prrenjas II	122+014	122.60	S	38
T23		Prrenjas III	123+003	132.82	S	21
T24	Prrenjas – Pogradec	Qafe Thane	134+667	3,013.66	S -> C entry	>35
T25		Piskupat	140+450	206.44	S -> C entry	16
Total:				**9,774.58**		

In general, the following issues are noted regarding the existing tunnels:

- Tunnel lining is occasionally discontinuous;
- Occasional water ingress is observed which have deteriorated the concrete lining quality;
- Existing lining presents serious durability problems where water ingress is observed;
- No signs of rock fall or soil intrusion in the tunnels;
- Local interventions are needed for waterproofing or lining reinforcement/repair;
- Vague conditions regarding tunnel portals' safety, but with no signs of failures;
- Small dimensions, insufficient for the modern requirements (TSI, electrification, safety, etc).

The existing design drawings have been made available for the tunnel design. According to these, the design was based on the Protodyakonov classification with immediate construction of final lining. Therefore, it is concluded that geologic formations were stable enough to permit construction without regular temporary support.

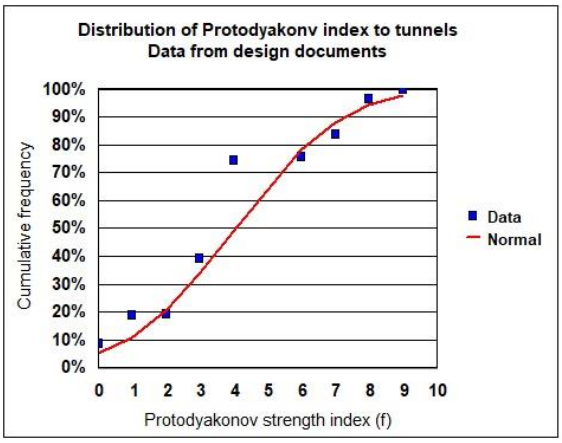


Figure 3-9 Distribution of Protodyakonov index over the tunnels according to the design documents

The proposed geotechnical investigations being conducted will allow to approach the extent of the necessary interventions and to assess the available options for the tunnel rehabilitation or upgrading. The preliminary study of each tunnel based on the investigation findings will finalize the intervention and/or excavation methodology and provide precise cost estimates.

In the next phase additional investigations of both the rock material and the concrete lining will determine the material properties to be considered in the design.

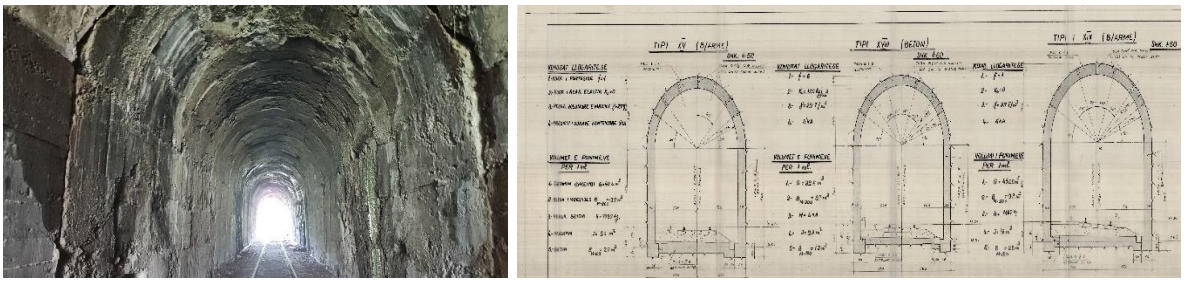


Figure 3-10 Existing railway tunnel of Qukes II and excerpt of old design

3.5.7 Railway stations

As mentioned earlier, along the Rrogozhina – Elbasan – Pogradec railway line, 12 railway stations are located to serve the traffic.

The tracks layout and the size of station buildings have been the result of the traffic demand these stations have been designed to serve, either it was freight or passengers. The existing layouts of the tracks and the condition of the buildings of each station are given in Annex 4A and are summarised below:

Table 3-5 Existing railway stations' characteristics

No.	Station	Building Type	Main Lines	Turnouts	Platforms
1	Peqin	Small	2x600m	7	1 Platform (150x5m)
2	Bishqem	Small	2x750m, 4x600m	8	1 Platform (150x5m)
3	Papër	Small	2x500m	5	1 Platform (150x5m)
4	Vidhas	Small	2x700m, 2x500m	8	1 Platform (150x5m)
5	Elbasan	Medium	2x750m, 4x600m, 3x500m	18	2 Platforms (200x5m)
-	Krasta	Small	Has not been used for over 10 years before closure of the line		
6	Miraka	Small	2x500m	5	1 Platform (150x5m)
7	Librazhd	Medium	2x600m, 2x500m, 1x500m	10	1 Platform (200x5m)
8	Xhyra	Small	1x400m, 2x500m, 1x500m	6	1 Platform (150x5m)
9	Qukës	Small	1x300m, 1x250m	4	1 Platform (150x5m)
10	Prrenjas	Medium	2x750m, 2x500m, 2x600m	16	2 Platforms (200x5m)
11	Lin	Small	2x500m, 1x300m	6	1 Platform (150x4m)
12	Pogradec	Medium	2x500m, 2x300m	8	2 Platforms (200x5m)

Small stations like Lekaj have been designed for passenger traffic only, with only two tracks, accommodating train lengths up to 500m, while other aiming to serve freight traffic operations, like Elbasan have been designed with multiple tracks. Their principal pair of tracks has been designed to accommodate trains 600-750m long.

Figure 3-11 Railway stations of Peqin and Pogradec

3.6 Railway line components and planed interventions

The rehabilitation of the railway foresees the revitalisation of the line, an increase of the freight traffic and a speed of 80-120 km/h. The new conditions of the railway pose a real danger to the local community. A mandatory requirement is to provide safe control at level crossings to protect users. For this reason, the railway corridor must be fenced, and the unauthorised (illegal) crossings must be eliminated. One solution to improve safety is to minimise the number of existing level crossings. This could involve closing some crossings and redirecting road traffic through alternative routes, or, if possible, should be converted to grade-separated interchanges. For those level crossings that cannot be eliminated, enhancing safety through technical equipment and signalisation is crucial. This might include the installation of warning lights, barriers, and alarms to alert road users of approaching trains.

Taking into consideration the activities required for the reconstruction of the railway line, permanent land acquisition is expected to result from the restoration of local road network connectivity due to the track safety fencing, the improvement of railway track geometry, stations, level crossings and train road crossings. Additional land may be required by the contractor for construction works, borrow pits, landfills, storage areas, etc. which are expected to result in temporary land acquisition only.

The railway alignment starting point is the end of the section ''Durrës - Rrogozhinë''. The starting point of the design alignment chainage is Ch.35+384 according to the ending chainage of the previous section. The existing railway line horizontal alignment needs to be improved to the expected transport services and increased safety and speed.

The terrain characteristics of the existing improved Railway Line differentiate two broad sections of the project, as below:

- The generally flat terrain section from the project start (Ch. 35+384) up to Ch.90+400;
- The hilly – mountainous terrain section from Ch.90+400 up to the project end. (Ch. 152+384).

The initial improvement alternative analysed by the team included a horizontal alignment with full compliance to the TSI, with speeds up to 120km/h for the flat terrain and 80 km/h for the mountainous sections, while the longitudinal gradient would not exceed 1.2%. This alternative also

included the bypass of Elbasan, as proposed by the local Municipality. However, it was quickly understood that this alternative deviates significantly from the existing line creating significant connectivity issues (as more than 40% of the populated areas would not be easily connected to the line), is outside the parameters of the PFS and existing studies prepared, and outside the scope of a railway line upgrade and rehabilitation.

The proposed alternative of the railway alignment is:

- Alternative, which allows speed V=120km/h in flat terrain and V=80km/h in hilly/mountainous terrain, which mostly remains within the right-of-way of the existing railway line. (The segment Rrogozhinë - Prrenjas should be considered in the framework of Corridor VIII, that will connect Albania with Republic of North Macedonia. Segment Prrenjas - Pogradec will remain as an alternative.)

Figure 3-12:Track alignment design speed

3.6.1 Technical parameters of the alignment

The following table summarizes the performance parameters to be fulfilled by the design of the railway line.

Table 3-6 Elements of the whole railway line Rrogozhina – Pogradec

Element	Parameter	Reference Code/Standard
Line category	P5 – for passenger traffic F1 – for freight traffic	EU TSI
Structural Gauge	GC structure gauge: (speed of freight trains up to 100km/h, maximum axle load of 225kN, max train length 740m)	INF TSI
Type of track	Single Ballasted track	
Nominal track gauge	1435 mm (standard gauge)	INF TSI
Maximum Axle Load	22.5 t	INF TSI
Load Gauge	UIC D4 (22.5 t/axle, 8.0t/m)	UIC

Element	Parameter	Reference Code/Standard
Switching & crossing geometry	UIC 60 -R300 – 1:9	INF TSI
Platform Length & Height	L = 150-200m H=0+55 m	INF TSI
Type of Rail	UIC 60 (S60) Continuous Welded Rails (CWR)	UIC
Sleepers	pre-stressed concrete with length: 2.60 m for the open line 2.40 m for stations	INF TSI and UIC
Track ballast height below sleeper	min 32 cm	
Ballast shoulder width	40 cm	
Fastening system	Padrol	
Distance between sleepers	60 cm	
Signalling	ETCS Level – 1	
Telecommunication	GSM – R	

Limiting Values for Design Speed 80, 100 & 120 km/h

The railway geometry parameters are based on the EN 13803-2017 norm which is mandatory under EU TSI. The following table shows these parameters for speeds of 80 km/h, 100 km/h and 120 km/hr.

Table 3-7 Track alignment limiting values according to Design Speed

	Parameter	Design Speed		
		80 km/h	100 km/h	120 km/h
Horizontal Alignment	Minimum radius of horizontal curves, **R_{lim}**	R_{lim}=300m	R_{lim}= 450m	R_{lim}=600m
	Type of transition curve	Clothoid		
	Minimun length of transition curve **Lt,min**, in compliance with radius of horizontal curve R_{lim}	$L_{t,min}$=72m	$L_{t,min}$=89m	$L_{t,min}$=107m
	Minimun length of constant cant	NL: V_{max}/2 = 40m EL: 20m	NL: V_{max}/2 = 50m EL: 20m	NL: V_{max}/2 = 60m EL: V_{max}/5+2 = 24m
Vertical Alignment	Maximum track gradient, **Pmax**	NL = 1.0% (1.4%) Gradients as steep as 3.5% are allowed for main tracks at the design phase provided the following 'envelope' requirements are observed: · the slope of the moving average profile over 10km is less than or equal to 2.5%; · the maximum length of continuous 3.5% gradient does not exceed 6 km.		
	Maximum gradient for passenger platform	0.25%		
	Minimum radius of convex curve, **$R_{V,lim}$**	NL: $R_{V,lim}$=2,300m EL: $R_{V,lim}$=10	NL:$R_{V,lim}$=3,500m $R_{V,lim}$=1,500m	NL: $R_{V,lim}$=5,100m $R_{V,lim}$=2,200m
	Minimum radius of concave curve, **$R_{V,lim}$**	NL: $R_{V,lim}$=2,300m $R_{V,lim}$=900m	NL:$R_{V,lim}$=3,500m $R_{V,lim}$=1,300m	NL: $R_{V,lim}$=5,100m $R_{V,lim}$=1,900m
	Upper limits for abrupt change of track gradients,	NL= 1‰ EL= 2‰	NL= 1‰ EL= 2‰	NL= 1‰ EL= 2‰

	Parameter	Design Speed		
		80 km/h	100 km/h	120 km/h
	Δp			
	Minimum length of vertical curve, **Lv**	Lv=20m	Lv=20m	Lv=20m
	Maximum gradient for stabling yards	0.25%		
Cant	Upper limit of cant, **D**	D=160mm		
	Upper limit of cant deficiency, **I**	NL: I=153mm EL: I=180mm		
	Upper limit of cant excess, **E**	NL: E=153mm EL: E=180mm		
	Upper limit for rate of change of cant, dD/dt	NL = 50mm EL = 70mm		
	Upper limit for rate of change of cant deficiency,**dI/dt**	NL = 55mm EL = 100mm		

3.6.2 Proposed Crossings & Local Road Network Connectivity

The general approach for the proposal of crossings is:

- The LC should be eliminated as much as possible as they pose an elevated danger to road users with increased speed and volume of railway traffic.
- Almost all road underpasses will be retained as underpasses. The dimensions (Height and Width) of the proposed underpass will be at least equal to the dimensions of the existing one. If the existing underpass structures will be demolished and reconstructed, the following will be taken into consideration for the necessary requirements:

    1. **Maximal water level for bridges or culverts used as road underpasses**. When existing structures, such as bridges or culverts, are used as road underpasses, a hydraulic assessment will determine the maximum water level they can safely handle. This evaluation is essential to ensure that the underpasses can continue to serve as both road passages and water passages without causing flooding or compromising the safety of road users.
    2. **Adjustment of Underpass Height**. The underpass will be adjusted to the required height. This adjustment may be necessary to accommodate the road clearance requirements or other factors. If adjusting the height is not possible due to technical constraints or cost considerations, the existing underpass height will be maintained.
    3. **Span Adjustment for Road Traffic Requirements**. The span of the underpass will be adjusted to meet the road traffic requirements, ensuring that the underpass can safely accommodate vehicles, including their height and width. This may involve widening the underpass or modifying its structure to meet the necessary cross-sectional requirements.

- The existing road overpasses will be retained if they are in good structural condition and have a height clearance larger than 6m.
- The new road overpasses will have a height clearance of 6.75m

The table below shows the number of crossings along the railway line.

Table 3-8 Proposed Crossings along the Railway Line (Lot1)

Type of Crossing	Quantity (Pcs.)
Level Crossings (Authorised and Protected)	10
Road Underpasses (incl. bridges)	98
Road Underpasses	49
Bridges also used as Road Underpass	48
Road Overpasses	9
Pedestrian Underpasses	13
Pedestrian Overpasses	9

Table 3-9 Proposed Crossings along the Railway Line (Lot 2)

Type of Crossing	Quantity (Pcs.)
Level Crossings (Authorised and Protected)	7
Road Underpasses (incl. bridges)	11
Road Underpasses	10
Bridges also used as Road Underpass	1
Road Overpasses	4
Pedestrian Underpasses	10
Pedestrian Overpasses	1

Level Crossings (LC)

LCs will operate with signage & safety equipment, and their design will ensure their safe operation. In some cases, this will result in necessary local relocations of the existing roads, which may require expropriations.

Road Underpasses (RU)

In the case of existing underpasses that are demolished and reconstructed, the new structures will have an appropriate width according to the road cross-section and the maximum possible height clearance of up to 5m. In order to ensure this height, in some cases, the superstructure must have the minimum permissible structural thickness, and of course, the existing road must also be locally lowered. Lowering the road redline will be feasible only if there are no roadside constraints, no problems with rainwater runoff, and the terrain/ground conditions allow such road modification.

Concerning the existing underpasses that will be retained, they will continue serving the road passage with their existing widths & height clearances (i.e., same as today).

Road Overpasses (RO)

In the case of the existing overpasses that are demolished and reconstructed, the maximum possible reduction of the superstructure thickness in combination with the local lowering of the RW redline is

required. Lowering the RW redline will be feasible only if there are no problems, mainly in rainwater runoff and no lateral constraints.

Pedestrian Crossings

Pedestrian underpasses or overpasses are provided along the most used pedestrian paths.

Pedestrian underpasses must have no issues with rainwater runoff, and lighting must be provided wherever required.

Pedestrian crossings are proposed considering the final arrangement of the road crossings and the results of public consultations. All the relevant pedestrian crossings will be converted to pedestrian underpasses or overpasses.

Segments with dense populations along the railway:

Rrogozhina-Prrenjas (Lot I)	52+100 to 52+900 (Bishqemi
	54+600 to 55+500 (Paulesh)
	76+000 to 78+000 (Elbasan Urban Area
	104+800 to 105+700
	115+000 to 118+300 (Qukes)
Prrenjas-Pogradec Lot II	127+800 to 132+800 (Rajce)
	151+000 to 152+200 (Memelisht)

Figure 3-13:Segments with dense populations along the railway

Local Road Network

The proposed local road networks which needed to be designed according to the rehabilitation of the railway line, depending on their purpose and usage, are categorised as:

a) Those that ensure access to the crossings in the areas of railway alignment and restore the connectivity of the road network (residential areas, buildings, fields, etc.),

b) Those which need to be restored on a specific location at level crossing areas to make them appropriate for use in terms of safety for the vehicles and the passengers,

c) Those that need to be restored (locally or broadly) because the proposed RW realignment affects them,

d) Those meant to be in the future and will probably have conflicts with the RW line. At the present stage, the only known RW axes affecting the RW line is Elbasan Qafe-Thane Road, section Elbasan – Librazhd, Phase 2, from RW Ch.91+800 to Ch.92+900 approximately. The specific road project is under construction, and the tendering process is ongoing. A meeting with ARA about this issue of railway–road interaction has already taken place.

For the existing road network affected by the Railway corridor, the following road types are proposed to restore the road network connectivity:

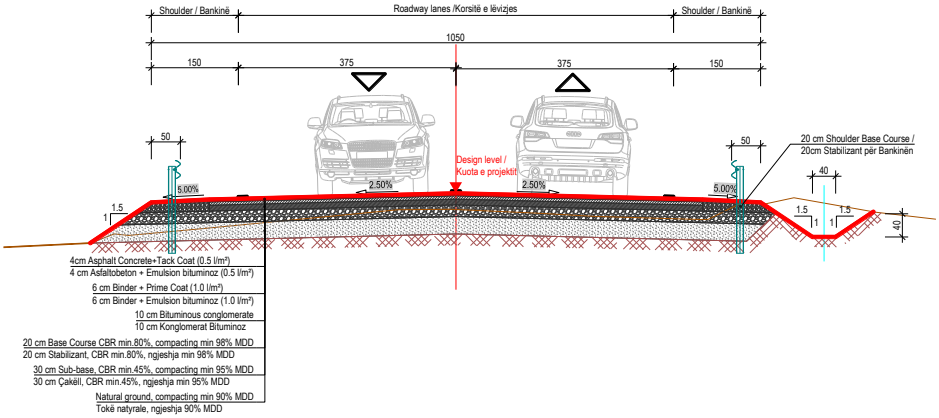


Figure 3-14 Typical Cross section No.1 - Interurban road "C1" (New National Road)

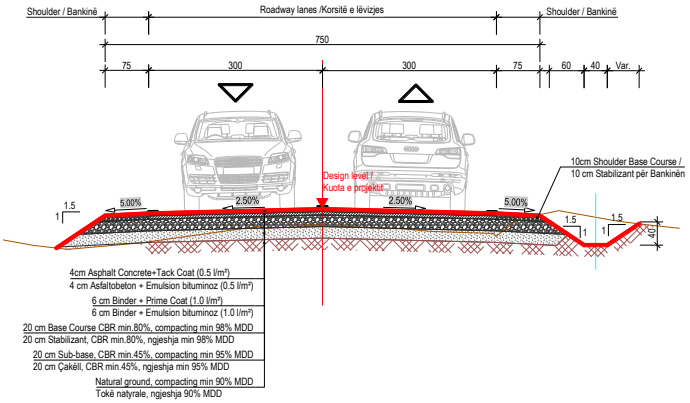


Figure 3-15: Typical Cross section No. 2 - Local Road "F2" (New Rural Road)

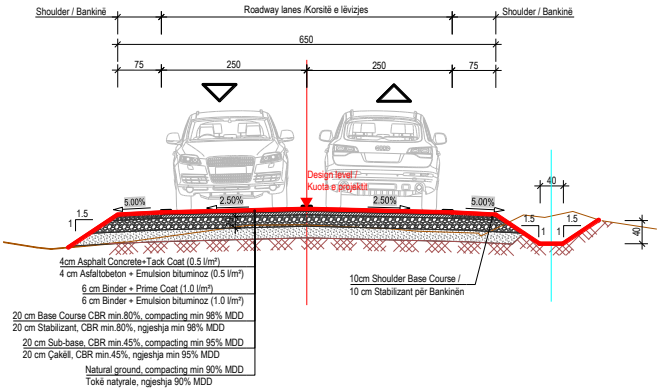


Figure 3-16: Typical Cross section No. 3 - Local Road "F2-mod" (New Rural Local Road)

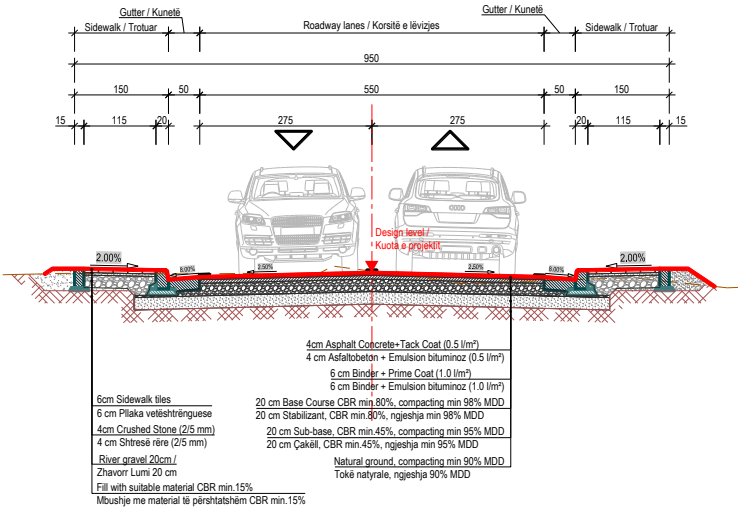


Figure 3-17: Typical Cross section No. 4. - Urban Local Road "F3"

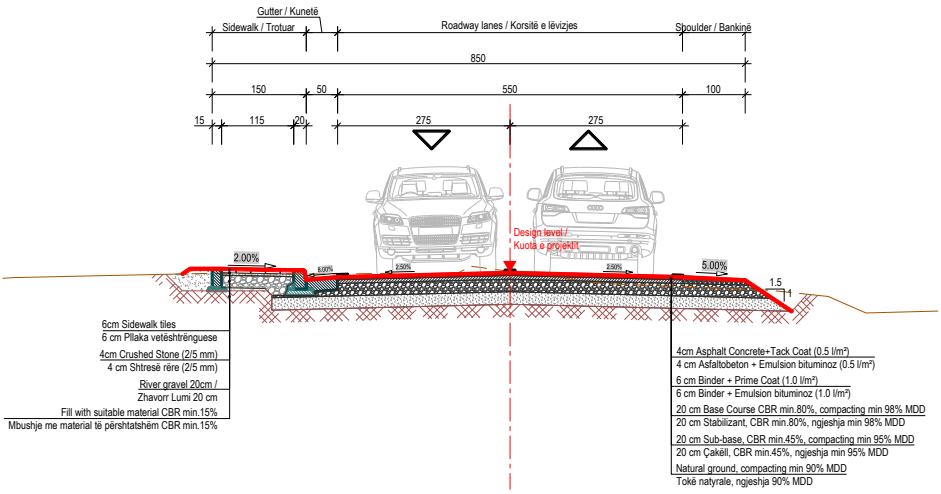


Figure 3-18: Typical Cross section No. 5 - Urban Local Road "F3-mod"

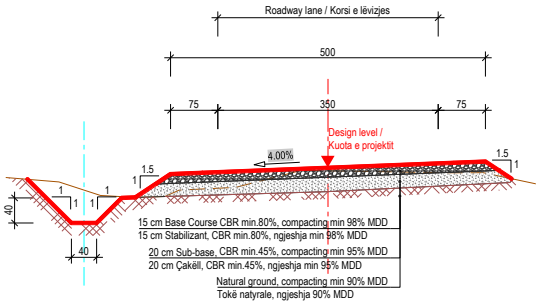


Figure 3-19: Typical Cross section No. 6 - Agricultural Road

For the existing road network affected by the Railway corridor, the following road types are proposed to restore the road network connectivity:

Table 3-10 Proposed Side Roads along the Railway Line (Loti1)

Type of Road	Length (km)
Interurban Road "C1" (Type 1)	2.43
Local Road "F2" (Type 2)	0.53
Local Road "F2-Mod" (Type 3)	3.84
Urban Local Road "F3" (Type 4)	0.29
Urban Local Road "F3-Mod" (Type 5)	2.10
Agricultural Road (Type 6)	18.39
Total Length	**27.58**

Table 3-11 Proposed Side Roads along the Railway Line (Loti2)

Type of Road	Length (km)
Interurban Road "C1" (Type 1)	0.53
Local Road "F2-Mod" (Type 3)	1.46
Urban Local Road "F3" (Type 4)	0.07
Urban Local Road "F3-Mod" (Type 5)	0.19
Agricultural Road (Type 6)	5.91
Total Length	**8.16**

3.6.3 Railway alignment

The railway alignment starting point is the end of the section ‘’Durres - Rrogozhina’’. The starting point of the design alignment chainage is Ch.35+384 according to the ending chainage of the previous section. According to the first stage’s (Option Analysis) results and decisions the flat terrain section up to Ch.~90+400 is designed with V=120km/h. The main characteristics of the proposed improvements for this first section (with a length of about 55km) are as follows:

i. The existing alignment is improved at 37 curves in total

ii. The longitudinal profile has gradient values less than the normal limiting value (1.40%);

iii. 23 horizontal alignment improvements / realignments are proposed

Major intervention’s locations are shown on the next table:

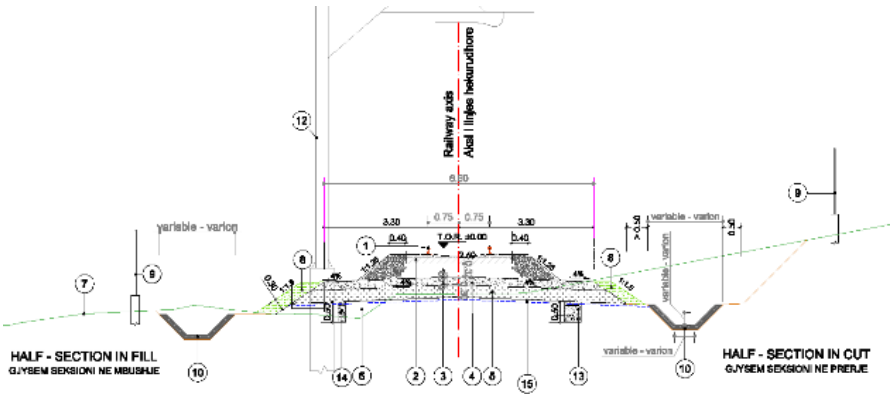
Table 3-12 Location of major interventions

No	Chainage		Length (m)
	From	To	
1	44+200	45+700	1500
2	60+450	61+050	600
3	62+650	63+400	750
4	77+508	77+875	370
5	78+450	79+200	750
6	81+768	82+036	270
7	85+450	87+050	1600

Typical cross sections

The typical cross sections for the "open line" are presented onthe drawings of the preliminary design (in fill sections, in cut sections and in curves). The proposed railway typical cross section is in accordance with the TEN-T and TSI standards. The width of 6.60m provides for the future electrification needs. Also, it has almost the same characteristics with the typical cross section applied on the Detailed Design of the project ''Rehabilitation of Durres-Rrogozhina'' of the previous section.

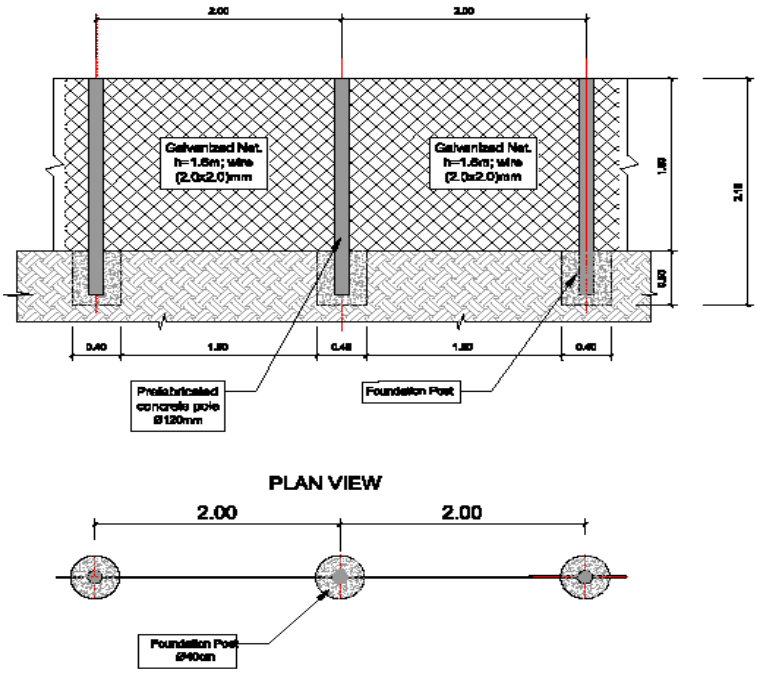
The details of the proposed superstructure configuration are initially identified as shown below:



1. Main track CWR rails 60E1 (UIC60) Shine CWR 60E1 (UIC60)
2. Main line precast prestressed sleepers type B70, L=2.60m
3. Ballast (min thickness 32 cm) as in Technical Req's
4. Sub-base protective layer of 20 cm thickness ($E_d \geq 120$mPa as instructed in the superstructure design and the Technical Req's)
5. Sub-grade layer of 30 cm ($E_d \geq 80$mPa as instructed in the superstructure design and the Technical Req's)
6. Filling with selected material, 45mPa ≤ E_v≤60mPa
7. Existing ground
8. Cover of fill slopes with top soil of 30 cm thickness
9. Fencing (types are shown in the fencing design)
10. Drainage RC Channels, if required, according to Book2 drainage design drawings, shown also on the RW & Roads plans
12. Space for the future Catenary pole and foundation construction for railway electrification
13. Signalling cable trench approx. 0.50m (depth from embankment top) x 0.40m width (2xPVC Φ160 + 1HDPE Φ50 fiber optic). Yellow marking protective tape.
14. Telecommunication cable trench approx. 0.50m (depth from embankment top) x 0.20m width (2HDPE Φ50 fiber optic). Yellow marking protective tape.
15. Geotextile layer, according to the Geotechnical design and the Technical requirements

Noise barriers shall be installed where the residents are impacted. Initial noise modelling should be conducted to determine exactly the location of necessary noise barriers.

The railway line is in general proposed as fully fenced. The following figure shows the proposed type of fencing.



3.6.4 The Civil Works

The civil works for the rehabilitation of the railway line Rrogozhinë – Pogradec will be divided into five Sections as presented in the table below.

Table 3-13 Civil works as per Section 1 Rrogozhinë (km 35+000) - Paulesh (km 55+400)

Existing Crossing Type	Number	Proposed Solution	Number	Change, improvement in number
Rrogozhinë (km 35+000) - Paulesh (km 55+400)				
Road Underpass (RU)	24	Road Underpass (RU)	30	6
Road Underpass (RU) - Intersection with national road		Road Underpass (RU) -Intersection with national road		0
Road Overpass (RO)		Propose to convert Road Overpass (RO)		0
Road Overpass (RO) - Intersection with national road		Road Overpass (Ro) -Intersection with national road		0
Level Crossing (LC)	5	Authorised & Protected LC	1	-4
2 Railway Stations (Peqin, Bishqem)				

Table 3-14 Civil works as per Section 2 Paulesh (km 55+400) - Miraka (km 89+600)

Existing Crossing Type	Number	Proposed Solution	Number	Change, improvement in number
Paulesh (km 55+400) - Miraka (km 89+600)				
Road Underpass (RU)	29	Road Underpass (RU)	34	5
Road Underpass (RU) - Intersection with national road	3	Road Underpass (RU) -Intersection with national road	3	0
Road Overpass (RO)	0	Propose to convert Road Overpass (RO)	2	2

Existing Crossing Type	Number	Proposed Solution	Number	Change, improvement in number
Road Overpass (RO) - Intersection with national road	3	Road Overpass (Ro) -Intersection with national road	3	0
Level Crossing (LC)	13	Authorised & Protected LC	8	-5
5 Railway Stations (Papër, Vidhas, Elbasan, Krastë & Mirakë)				

Table 3-15 Civil works as per Section 3 Miraka (km 89+600) - Qukës (km 112+000)

Existing Crossing Type	Number	Proposed Solution	Number	Change, improvement in number
Miraka (km 89+600) - Qukës (km 112+000)				
Road Underpass (RU)	12	Road Underpass (RU)	15	3
Road Underpass (RU) - Intersection with national road	3	Road Underpass (RU) -Intersection with national road	3	0
Road Overpass (RO)	2	Propose to convert Road Overpass (RO)	2	0
Road Overpass (RO) - Intersection with national road	2	Road Overpass (Ro) -Intersection with national road	2	0
Level Crossing (LC)	3	Authorised & Protected LC	0	-3
2 Railway Stations (Librazhd, Xhyra)				

Table 3-16 Civil works as per Section 4 Qukës (km 112+000) - Rrajcë (km 133+000)

Existing Crossing Type	Number	Proposed Solution	Number	Change, improvement in number
Qukës (km 112+000) - Rrajce (km 133+000)				
Road Underpass (RU)	13	Road Underpass (RU)	14	1
Road Underpass (RU) - Intersection with national road	3	Road Underpass (RU) -Intersection with national road	3	0
Road Overpass (RO)	1	Propose to convert Road Overpass (RO)	1	0
Road Overpass (RO) - Intersection with national road	1	Road Overpass (Ro) -Intersection with national road	1	0
Level Crossing (LC)	2	Authorised & Protected LC	3	1
1 Railway Stations (Prrenjas)				

Table 3-17 Civil works as per Section 5 Rrajcë (km 133+000) - Pogradec (Gur i Kuq) (km 152+800)

Existing Crossing Type	Number	Proposed Solution	Number	Change, improvement in number
Rrajce (km 133+000) - Pogradec (Gur i Kuq) (km 152+800)				
Road Underpass (RU)	6	Road Underpass (RU)	7	1
Road Underpass (RU) - Intersection with national road	0	Road Underpass (RU) -Intersection with national road	0	0
Road Overpass (RO)	0	Propose to convert Road Overpass (RO)	0	0
Road Overpass (RO) - Intersection with national road	2	Road Overpass (Ro) -Intersection with national road	2	0
Level Crossing (LC)	6	Authorised & Protected LC	5	-1
2 Railway Stations (Lin, Pogradec)				

Table 3-18 Civil works as per Section 1 Rrogozhinë (km 35+000) - Paulesh (km 55+400)

Existing Crossing Type	Number	Proposed Solution	Number	Change, improvement in number
Rrogozhinë (km 35+000) - Paulesh (km 55+400)				
Level Crossing (LC)	2	Level Crossing (LC)		-2
Pedestrian Path Level Crossing (PP)	5	Pedestrian Path Level Crossing (PP)		-5
Pedestrian Overpass (PO)		Propose Pedestrian Overpass (PO)	5	5
Pedestrian Underpass (PU)		Pedestrian Underpass (PU)	4	4

Table 3-19 Civil works as per Section 2 Paulesh (km 55+400) - Miraka (km 89+600)

Existing Crossing Type	Number	Proposed Solution	Number	Change, improvement in number
Paulesh (km 55+400) - Miraka (km 89+600)				
Level Crossing (LC)	1	Level Crossing (LC)		-1
Pedestrian Path Level Crossing (PP)	2	Pedestrian Path Level Crossing (PP)		-2
Pedestrian Overpass (PO)		Propose Pedestrian Overpass (PO)	2	2
Pedestrian Underpass (PU)	3	Pedestrian Underpass (PU)	5	2

Table 3-20 Civil works as per Section 3 Miraka (km 89+600) - Qukës (km 112+000)

Existing Crossing Type	Number	Proposed Solution	Number	Change, improvement in number
Miraka (km 89+600) - Qukës (km 112+000)				
Level Crossing (LC)		Level Crossing (LC)		0
Pedestrian Path Level Crossing (PP)	1	Pedestrian Path Level Crossing (PP)	1	0
Pedestrian Overpass (PO)		Propose Pedestrian Overpass (PO)	4	4
Pedestrian Underpass (PU)		Pedestrian Underpass (PU)		0

Table 3-21 Civil works as per Section 4 Qukës (km 112+000) - Rrajcë (km 133+000)

Existing Crossing Type	Number	Proposed Solution	Number	Change, improvement in number
Qukës (km 112+000) - Rrajce (km 133+000)				
Level Crossing (LC)	7	Level Crossing (LC)		-7
Pedestrian Path Level Crossing (PP)	4	Pedestrian Path Level Crossing (PP)		-4
Pedestrian Overpass (PO)		Propose Pedestrian Overpass (PO)	1	1
Pedestrian Underpass (PU)	1	Pedestrian Underpass (PU)	11	10

Table 3-22 Civil works as per Section 5 Rrajcë (km 133+000) - Pogradec (Gur i Kuq) (km 152+800)

Existing Crossing Type	Number	Proposed Solution	Number	Change, improvement in number
Rrajce (km 133+000) - Pogradec (Gur i Kuq) (km 152+800)				
Level Crossing (LC)		Level Crossing (LC)		0
Pedestrian Path Level Crossing (PP)	3	Pedestrian Path Level Crossing (PP)		-3
Pedestrian Overpass (PO)		Propose Pedestrian Overpass (PO)	1	1
Pedestrian Underpass (PU)		Pedestrian Underpass (PU)	2	2

Taking into consideration the activities required for the reconstruction of the railway line, permanent land acquisition is expected to result from the restoration of local road network connectivity due to the track safety fencing, the improvement of railway track geometry, stations, level crossings and train road crossings. Additional land may be required by the contractor for construction works, borrow pits, landfills, storage areas, etc. which are expected to result in temporary land acquisition only. The preliminary assessment indicates that no physical displacement will occur with the main impact on land.

3.6.5 Construction of Freight & Passenger station

A new freight station is proposed to be built in the Elbasan and Prrenjas. The territory of these stations is in the property of the Albanian Railways. Currently the space planed for construction is occupied by illegal constructions. It is assessed that the land area affected for train stations and platformas amounts to ≈14 ha.

Table 3-23 Data about the train stations (length, width and respective surfaces affected)

No.	Station	Building Type	No. of Lines	Length of Lines (m)	Average width between line (m)	Average surface of the trains stations (ha)	Turnouts	Platforms	Average surface of the trains platforms (ha)
1	Peqin	Small	2	600	5	0.6	7	1 Platform (150x5m)	0.075
2	Bishqem	Small	2	750	5	0.75	8	1 Platform (150x5m)	0.075
			4	600	5	1.2			
3	Papër	Small	2	500	5	0.5	5	1 Platform (150x5m)	0.075
4	Vidhas	Small	2	700	5	0.7	8	1 Platform (150x5m)	0.075
			2	500	5	0.5			
5	Elbasan	Medium	2	750	5	0.75	18	2 Platforms (200x5m)	0.2
			4	600	5	1.2			
			3	500	5	0.75			
-	Krasta	Small	Has not been used for over 10 years before closure of the line						
6	Miraka	Small	2	500	5	0.5	5	1 Platform (150x5m)	0.075
7	Librazhd	Medium	2	600	5	0.6	10	1 Platform (200x5m)	0.1
			2	500	5	0.5			
			1	500	5	0.25			
8	Xhyra	Small	1	400	5	0.2	6	1 Platform (150x5m)	0.075
			2	500	5	0.5			
			1	500	5	0.25			
9	Qukës	Small	1	300	5	0.15	4	1 Platform (150x5m)	0.075
			1	250	5	0.125			
10	Prrenjas	Medium	2	750	5	0.75	16	2 Platforms (200x5m)	0.2
			2	500	5	0.5			
			2	600	5	0.6			
11	Lin	Small	2	500	5	0.5	6	1 Platform (150x4m)	0.06
			1	300	5	0.15			
12	Pogradec	Medium	2	500	5	0.5	8	2 Platforms (200x5m)	0.2
			2	300	5	0.3			
Total						**13.325**			**1.285**

The railway stations are also proposed as fully fenced.

The main characteristics of the layout design are shown in the following table:

No	STATION	FROM Ch.	TO Ch.	TRACK 1 (m)	TRACK 2 (m)	TRACK 3 (m)	TRACK 4 (m)	TRACK 6 (m)	CURVED SEGMENTS (between Tracks) (m)	DEAD LINE	SWITCHES (pcs)
1	PEQUIN	42+383.21	43+100.00	716.79	0.00	521.26	0.00	0.00	198.00	97.87	3
2	BISHQEM	50+829.86	51+592.69	762.83	0.00	566.54	0.00	0.00	198.00	98.31	3
3	PAPER	61+745.11	62+400.00	654.89	501.59	0.00	0.00	0.00	156.00	0.00	2
4	VIDHAS	67+284.85	68+371.87	1,087.02	871.39	989.70	665.00	0.00	1,320.00	1,327.52	10
5	ELBASAN	74+737.16	75+529.57	792.41	635.95	0.00	369.11	89.55	556.00	298.12	8
6	MIRAKA	89+710.10	90+402.30	692.20	537.62	0.00	0.00	0.00	156.00	0.00	2
7	LIBRAZHD	98+288.29	99+213.03	924.74	455.35	764.82	0.00	0.00	312.00	120.00	5
8	XHYRA	111+317.78	111+879.94	562.16	243.07	243.99	0.00	0.00	390.00	192.00	7
9	QUKES	116+970.00	117+208.00	238.00	81.52	0.00	0.00	0.00	156.00	0.00	2
10	PRRENJAS	124+708.00	125+968.00	1,260.00	422.21	771.89	771.89	0.00	600.00	374.41	6

Peqin Station: Rehabilitation is not always considered the most economical solution, and demolition and new construction is a better solution for the station of Peqin. The total area considered for this masterplan si 7690 m2

Figure 3-20 Peqin station master plan

Figure 3-21 Peqin station building view

Bishqem railway station: new construction

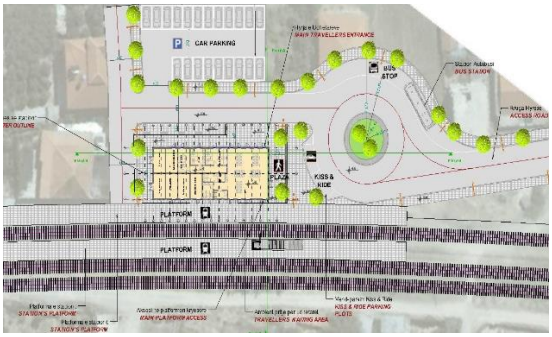


Figure 3-22 Bishqem station master plan

Figure 3-23 Bishqem station building view

Paper train Station: New construction. Total area: 258 m²

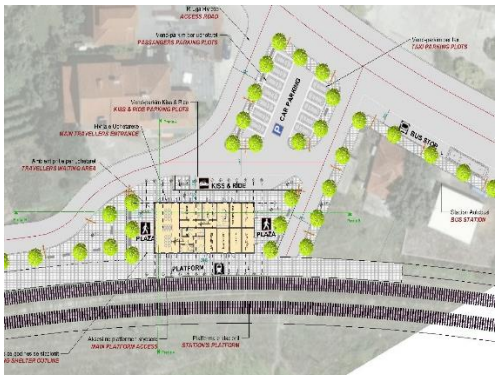


Figure 3-24 Paper station master plan

Figure 3-25 Paper station building view

Vidhas Train Station: Refurbishment

The station building is located within the plants of the Ferro-chrome ore processing industry, next to the railway freight lines. The station building is accessed only by walking, through hard terrain, then on-level crossing the railway lines. Vidhas station is going to be used as a freight only station. The structure is decided to be preserved and it will be restructured and refurbished with modern amenities.

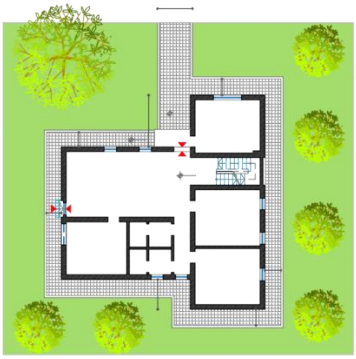


Figure 3-26 Vidhas station master plan

Figure 3-27 Vidhas station building view

Elbasan train station: Refurbishment. Total area: 612 m²

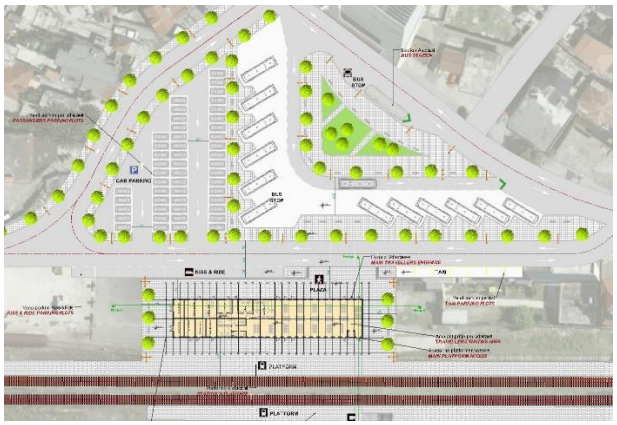


Figure 3-28Elbasan station master plan

Figure 3-29 Elbasan station building view

Miraka train Station: New Construction. Total area: 120 m²

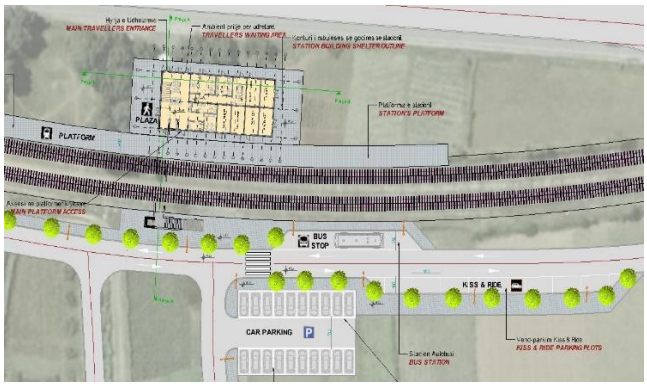


Figure 3-30 Miraka station master plan

Figure 3-31 Miraka station building view

Librazhd train Station: Refurbishment: Total area:691 m²

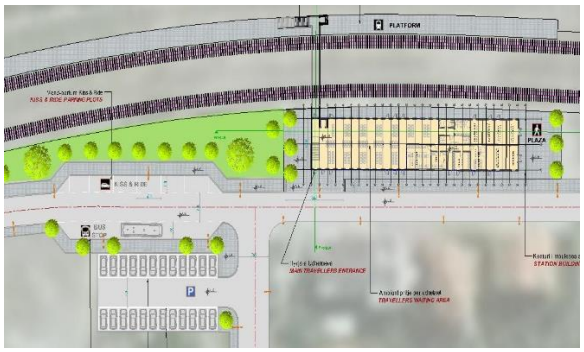


Figure 3-32 Librazhd station master plan

Figure 3-33 Librazhd station building view

Xhyre Station: New Construction. Total area: 228 m²

Figure 3-34 Xhyra station master plan

Figure 3-35 Xhyra station building view

Qukes Train station: New Construction. Total area: 212 m²

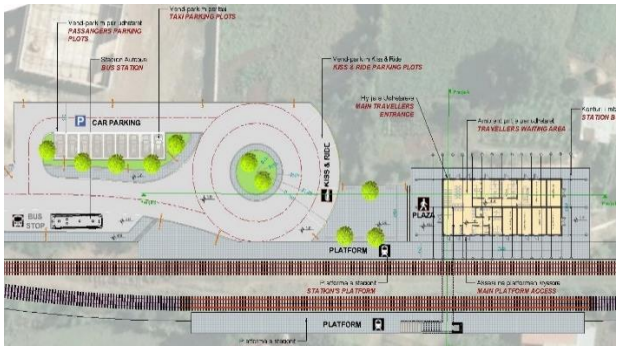


Figure 3-36 Qukes station master plan *Figure 3-37 Qukes station building view*

Prrenjas Train station: Refurbishment. Total area: 779 m²

Figure 3-38Prrenjas station master plan *Figure 3-39 Prrenjas station building view*

Lin train station: New Construction. Total area: 84 m²

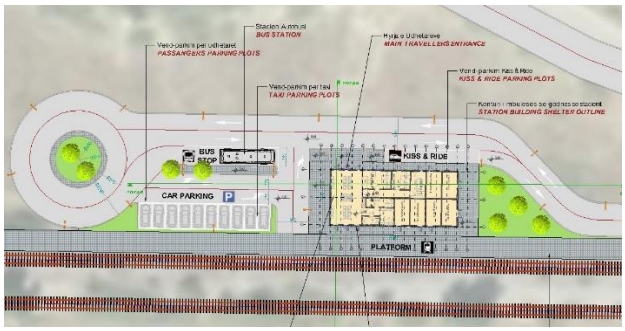


Figure 3-40 Lin station master plan *Figure 3-41 Lin station building view*

Pogradec Train station: Refurbishment. Total area: 408 m²

Figure 3-42 Pogradec station master plan *Figure 3-43 Pogradec station building view*

3.6.6 Construction of numerous short side roads

Several kilometres of local roads are proposed to be built for reaching the level crossings that will be formalized and secured. The construction of these local roads will replace unauthorized crossings. A part of this land surface belongs to Hekurudha Shqiptare (railway belt), while the other part belongs to private landowners or the local governments. It is assessed that the land area needed for local roads, outside the railway belt amounts to ≈18 ha.

Table 3-24 The length of side roads per Option

Side Road Code		Start Railway Chainage - End Railway Chainage	Side Road Length (m)
Rrogozhinë (km 35+000) - Paulesh (km 55+400)			
LC	Level Crossing	km 35+000 - km 55+400	90
RU	Pedestrian Path Level Crossing	km 35+000 - km 55+400	3517
RO	Pedestrian Overpass	km 35+000 - km 55+400	
SR	Side Road	km 35+000 - km 55+400	7204
Paulesh (km 55+400) - Miraka (km 89+600)			
LC	Level Crossing	km 55+400 - km 89+600	726
RU	Pedestrian Path Level Crossing	km 55+400 - km 89+600	2615
RO	Pedestrian Overpass	km 55+400 - km 89+600	1,049
SR	Side Road	km 55+400 - km 89+600	6905
Miraka (km 89+600) - Qukës (km 112+000)			
LC	Level Crossing	km 89+600 - km 112+000	
RU	Pedestrian Path Level Crossing	km 89+600 - km 112+000	1461
RO	Pedestrian Overpass	km 89+600 - km 112+000	522
SR	Side Road	km 89+600 - km 112+000	1479
Qukës (km 112+000) - Rrajcë (km 133+000)			
LC	Level Crossing	km 112+000 - km 133+000	103
RU	Pedestrian Path Level Crossing	km 112+000 - km 133+000	646
RO	Pedestrian Overpass	km 112+000 - km 133+000	292
SR	Side Road	km 112+000 - km 133+000	5008
Rrajcë (km 133+000) – Pogradec (Gur i Kuq) (km 152+800)			
LC	Level Crossing	km 133+000 - km 152+800	365
RU	Pedestrian Path Level Crossing	km 133+000 - km 152+800	670
RO	Pedestrian Overpass	km 133+000 - km 152+800	334
SR	Side Road	km 133+000 - km 152+800	3077

Local Road Network:

Table 3-25:Total Length of side roads:

Road Type	Rrogozhina-Prrenjas -Lot I (km)	Prrenjas-Pogradec – Lot II (km)	Total (km)
Interurban Road "C1" (Type 1)	2.43	0.53	2.96
Local Road "F2" (Type 2)	0.53	-	0.53
Local Road "F2-Mod" (Type 3)	3.84	1.46	5.30
Urban Local Road "F3" (Type 4)	0.29	0.07	0.36
Urban Local Road "F3-Mod" (Type 5)	2.10	0.19	2.29

Agricultural Road (Type 6)	18.39	5.91	24.3
Total	27.58	8.16	35.74

3.6.7 Horizontal alignment improvements

The existing railway line horizontal alignment needs to be improved to allow for the increased design speed. The rehabilitation of Rrogozhinë - Pogradec railway line maintains the geometric alignment and profile of the exiting line, therefore the project works are confined within the boundaries of the existing right of way of the railway. There are some areas of design improvements as shown in the table below:

Table 3-26 Area of horizontal alignment improvements

No.	From Ch.	To Ch.	Length (m)	Existing Curve Radius (m)	To be improved Curve radius (m)	No of the affected land parcels
1	39+200	39+400	200	500	600	5
2	62+600	63+400	800	300	600	35
3	86+400	87+000	600	500	500	1
	101+500	101+700	200	300	500	7

The line alignment radius will be improved in the ≈ 13 section as is shown on below table:

Main Railway Lines Alignment segments, deviating from the existing railway

(Included are segments out of Railway Stations)

From Ch	To Ch	Relative Impact	Deviation aver. dist.	Corridor width	Area Estimate (in ares or 100m2)
39+000	39+600	Minor	~ 8.5 m		27
44+200	45+700	Minor	~ 9.0 m		72
58+700	59+500	Minor	~ 2.0 m		9
60+500	61+000	Major	~ 20.0 m		53
62+650	63+400	Major	~ 100.0 m	~ 28.0 m	185
66+900	67+150	Minor	~ 5.0 m		7
69+100	69+550	Minor	~ 7.8 m		19
77+600	77+800	Minor	~ 4.5 m		5
78+500	78+850	Major	~ 24.0 m		45
85+500	86+350	Major	~ 17.0 m		77

86+400	87+000	Major	~ 30.0 m	~ 27.0 m	95
89+150	89+500	Minor	~ 7.0 m		13
132+800	133+050	Minor	~ 1.0 m		2

The sum of the areas of the above main segments of deviation makes the rough estimate around 61000 m² (≈6.1 ha), not including any area for the stations. The estimate refers to the additional land (without substracting any land of the existing track freed by the deviation.

The detailed percentage of land to be expropriated in relation to the whole property, is yet to be calculated.

At this stage of project development, it is assessed that the rehabilitation works will not affect any immovable property, such as houses and/or businesses.

3.6.8 Vertical alignment improvements

New overpasses will be constructed in the rehabilitation works. The construction of underpasses is not expected to require the land surface to be occupied permanently, as the needed land surface is assessed to be found within the railway belt.

3.6.9 Drainage channels improvements

The rehabilitation of the railroad will respect the existing drainage and irrigation system. Special attention has been provided to the areas that are prone to floods, in order for the railroad not to play the role of embankment or barrier and therefore to allow the water circulation between both railway sides. Due to the necessary rehabilitation works of the drainage system along the existing railway corridor, limited localized expropriations might be necessary.

3.6.10 Level crossing improvements

A major safety objective of this railway rehabilitation design is to minimize the existing level crossings and to secure the remaining ones with technical equipment and signalisation. Solutions to the closure of the existing level crossings have been carried out taking into account traffic rerouting to restore the road network functionality or by grade separation was technically feasible and acceptable from a social impact perspective.

The unauthorized crossings are grouped to reduce at minimum their number and will be secured with technical equipment and signalisation, in the function of the new situation of the newly created settlements.

In addition, to bring the local roads in standards to enter and/or exit the authorized level crossing areas, some land will be required to improve the local roads entry and exit from these secured level crossings. This area is assessed at about 18 ha.

3.6.11 Railway tunnels

Preliminary Design proposed rehabilitation (LOT I & II)

- Unlined sections have proved to be stable: Widening is done by pre-bolting with fiberglass bolts to ensure stability during construction;
- Lined sections are assumed to be unstable: Widening is done following a grouting scheme around the tunnel to ensure stability during construction.
- Shotcrete layer is applied on the final excavation for temporary support.

- Waterproof membrane and drainage layer is applied on the shotcrete covered walls of the excavation.
- Final lining by concrete and fire resistant layer is applied.

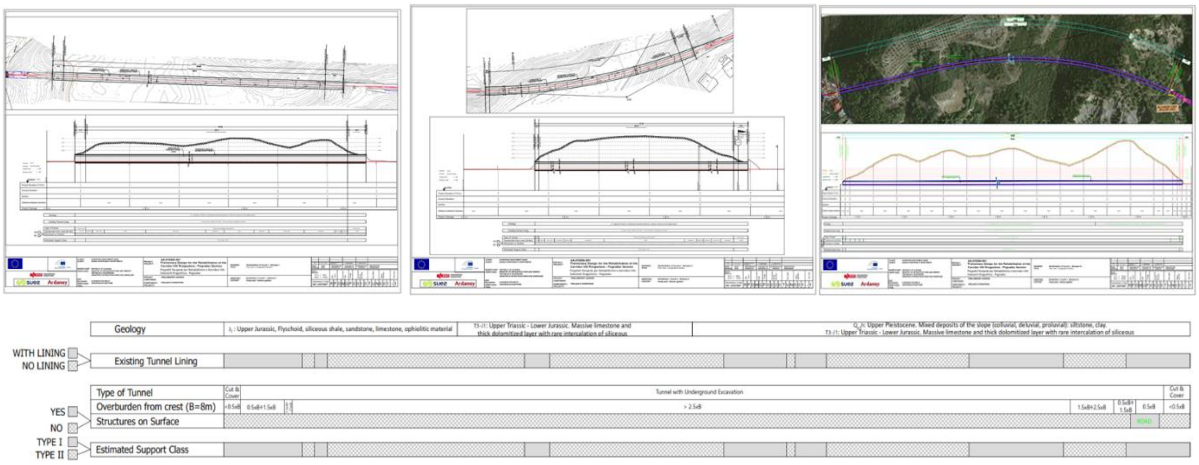


Figure 3-44Horizontal and longitudinal drawings of preliminary design:

Lot I and Lot II:

- All tunnels, regardless of their condition, do not fulfil the requirements for the new tunnel section dimensions following the application of European standards;
- Unknown stability conditions are dealt by applying pre-support by grouting;
- Known stability conditions are improved by pre-support with fiberglass bolts;
- Demolishing and excavation is to be done with drum cutter for minor disturbance;
- Proposed process is a minimum disturbance and low-cost solution.
- Lot II: Tunnel No24 requires a section with independent escape way.

3.6.12 Railways land's property

The RPF/LARF will take into consideration also the railway belt which is the property of the Albanian Railways according to Law 9317/2004 as amended by Law 142/2016 (Railway Code). This law stipulates that "the railway land surface belt consists on the land surface of 5.0m minimal width on both sides of the lowest point of the railroad basement or 5.0m from the drainage channels both sides of the railroad".

CMD 280/2015, as amended by CMD 756/2016, states that "… informal buildings/constructions cannot be formalized when they affect the railway belt defined by the Railway Code". This means that informal constructions that overlap the railway belt cannot be legalized as the inhabitants have no recognisable legal right or claim to the land they occupy. Nevertheless, the Project either will seek design solutions to not affect the building properties or offer resettlement in line with EBRD PR5 requirements. Displaced persons shall be offered a choice of options for adequate housing with legal tenure or financial compensation for affected structures.

It should be noted that lack of proper maintenance along the railway line with no proper enforcement of legal framework has resulted in unauthorized occupancy of the railway corridor in the last 30 years.

3.7 Summary of environmental and community concerns considered by project design

There is no specific restriction, from an environmental point of view, that does not allow rehabilitation of the railway as per the options proposed in the previous chapter. None of them interfere with restrictions nor regulations that condition approvals from the institutions.

One of the most sensitive segments of the project, from a natural resources point of view, is the segment from Ch. 94+960 to Ch. 96+960 that passes along the perimeter of the protected area Kuturman Qafe – Bushi (Miraka – Librazhd).

The segment Lin – Pogradec is part of the traditional use and sustainable development area of Lake of Pogradec, Protected Landscape, Category V (IUCN), DCM no. 80, dated 18.02.1999 and forms part of the EMERALD network.

The Protected Areas of national (and international) protection status:

- The Managed Nature Reserve of Kuturman – Qafe Bush, an Emerald Candidate Site(AL 0000018),designated as such by Bern Convention on the Conservation of European Wildlife and Natural Habitats. The area is known for the presence of several species of fish, amphibians, reptiles, birds, bats and other mammals, part of the Resolution 6 of the Convention, as well as some other species of flora and fauna of local conservation concern.
- Pogradec protected landscape (Category V of IUCN), characterized by rich biodiversity and a high level of endemism, Important Bird and Biodiversity Area (IBA AL002), an Emerald Candidate Site of Pogradec Protected Landscape / Peizazhi i Mbrojtur Pogradec (AL0000019), a pilot Natura 2000 site, as well as a trans-boundary natural and culturally sensitive area as part of the whole terrestrial and aquatic area of Ohrid Lake, which are important and sensitive areas regarding overall their aquatic life, including migratory birds.

Other important features to be considered during the ESIA, are:

- **Important river valleys crossed by the railway line**: Shkumbin river valley, Rrapuni, Lingajca, sources of ground waters used for irrigation in the Qafe mountainous area that flow toward Ohrid lake and Ohrid's lake itself;
- **Important historical areas**: such as the area of Domosdova or areas rich in archaeological heritage such as the recently discovered 7,500-year-old Palafitti settlement near Buceze village close to Ohrid's lakeshore;
- **Urbanized areas** affected from informal constructions close to the railroad and informal crossings constituting a risk for the local population;
- **Existing waste from demolishing and abandoned buildings** used to be facilities of HSH are still near the train stations (especially Librazhd, Qukes, Perenjas, and Pogradec). This waste includes asbestos, Fe-Ni , Cr mineral, etc;
- **Sporadic urban waste** is noticed on the railway, where the residential area is close to the railway line;
- **Demolishing debris** as per options is almost 71 % of the waste generated;
- The **excavated material** for alternative alignment 1 is much higher than alternative 2;
- The **disposal area** for inert/debris available in the project area may not be sufficient to dispose the material from demolished buildings and structures (bridges);
- Several water bodies are close to the railway;

4 IMPACT ASSESSMENT METHODOLOGY

The approach and methodology for impacts assessment are based on the EU "Guidance on EIA[31]" 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[32]" fully complies with the EIA Directive. Thus, the used methodology complies with both the national and EU requirements.

The methodology on rules and procedure to be followed during ESIA process ***in detail design phase*** shall be as per DCM 686, dated 29.7.2015 " On approval of the rules, responsibilities and timelines for the development of the procedure of environmental impact assessment (EIA) and procedures for the transfer of the decision of the Environmental Statement amended by DCM No. 95, dated 14.2.2018, No. 714, dated 6.11.2019, No. 828, dated 28.12.2023), in which are described in detail the steps to be followed by Developer to obtain Environmental Declaration. This procedure is not applicable for this phase of the project as no approval from Institution can be obtained in preliminary design phase.

The approach to the ESIA study includes a general approach for structuring the ESIA report and the adopted methodology for impacts evaluation.

There are some strong relationships between the environmental standards, the project's components and activities, the land use requirements, and the general approach to be followed for such studies.

The methodology for impacts assessment is based on the EU "Guidance on EIA" and DCM 912/2015 "On national EIA methodology" that fully complies with the EIA Directive. Thus, the used methodology complies with both the national and EU requirements.

The methodology on rules and procedure to be followed during ESIA process in detail design phase shall be as per DCM 686, dated 29.7.2015 "On approval of the rules, responsibilities and timelines for the development of the procedure of environmental impact assessment (EIA) and procedures for the transfer of the decision of the Environmental Statement amended by DCM No. 95, dated 14.2.2018, No. 714, dated 6.11.2019, No. 828, dated 28.12.2023);

4.1 General approach

The approach used for assessing the potential impacts is summarized below, and it includes more specifically 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 affected municipalities and other relevant stakeholders;
- Describing the baseline information;
- Defining the environmental and social impacts that will be taken into consideration;
- Evaluating the significant potential environmental and social impacts.

4.2 Assessment of Impacts

The main potential impacts of the Project on the affected environmental and social receptors

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

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

are considered by considering the railway line as per alternative proposes referring to the most sensitive environmental and social receptors.

4.2.1 Factor influencing the significance of impacts

Impacts are evaluated in terms of "significance", which assessment "relies on informed experts' judgments about what is important, desirable or acceptable with regards to changes triggered by the Project in question. These judgments are relative and must always be understood in their context[33]", as given in the following box.

Box 4.1 Experts' judgment to changes triggered by a project

Box 4.1_Experts judgment concerning changes triggered by a project

- *They are value-dependent: while judgments are, in most cases, informed by scientific data (e.g. regarding the type of impact being examined), they are subjective to some degree as they are the opinion of one practitioner or by a team of practitioners. Experts' judgements vary, depending on the perspective (legal or institutional recognition, political or public recognition), deemed to be important professionally.*
- *They are context-dependent: judgments are made within the socio-cultural, economic, and political contexts of a Project. A thorough understanding of contextual factors (e.g., local ecological, social, and cultural conditions, judgments in related decision-making areas), likely to influence judgments' significance, is essential when identifying a Project's impact on the environment.*

The assessment methods define thresholds or criteria for determining whether an impact is significant, based on the characteristics of an impact, in a clear manner.

4.2.2 Formal considerations and guidelines

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[34], as well as in points 1 and 2 of Annex I of DCM 686/2015[35] amended, concerning the impact of the project on the factors specified in Article 3(1) of the EIA Directive and Annex I (3) of this DCM, considering:

a. The magnitude and spatial extent of the impact (as: geographical area and size of the population likely to be affected);
b. The nature of the impact;
c. The transboundary nature of the impact;
d. The intensity and complexity of the impact;
e. The probability of the impact;
f. The duration, frequency, reversibility of the impact;
g. The cumulating of the impact with other existing / ongoing projects near the project
h. The possibility of effectively reducing the impact.

The evaluated of potential impacts should be dealt with mitigation measures strategy, which 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, follow four steps:

1. Preference for avoidance and prevention;

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

[34] http://ec.europa.eu/environment/eia/eia-legalcontext.htm

[35] http://www.qbz.gov.al/botime/fletore_zyrtare/2015/PDF-2015/145-2015.pdf

2. Cancellation;
3. Mitigation; and
4. Remedial/Compensation

The hierarchy of mitigation strategy is described as per the table below.

Box 4.2 Hierarchy of mitigation[36]

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 that may cause an adverse effect. Successful avoidance measures mean there will be no adverse effect. E.g., Avoid the risk of polluting groundwater that might affect the health of local water consumers by avoiding the design and construction of the underpasses over recharge.
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.
Mitigation/reduction measures: These are intended 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***.***
Remedial/Compensation: These measures intended at least to try to recompense, or otherwise make up for, or offset, 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. 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/damaged during construction work across the shrubby area Compensation of the landowners for the land surface necessary for the construction of the proposed new freight station of Elbasan and Prrenjas.

4.2.1. 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[37]:

Box 4.3 Magnitude and sensitivity of the predicted changes triggered by a project

Box 4.3_Magnitude and sensitivity of changes caused by a project

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

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

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.

Following table shows the impact's significance as a function of the magnitude and the sensitivity.

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

Table 4-1 Factors influencing the impacts' magnitude

Factor	Description
Quality (direction	
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 the country level. It will contribute to the improvement of the railway Corridor VIII in the territory of Albania to enable the provision of transport services and increased safety and speed to EU standards. It led to improve transport connectivity, reduction of road traffic congestion, decrease of transit traffic in cities and reduction of local pollution and GHG due to vehicle emission.
Negative	Impacts that are expected to cause an adverse change from the baseline, or to introduce any new undesirable factor (e.g. new track of footprint of the proposed project from the deviation from existing line will require land acquisition , etc.).
Timing (period)	
Preconstruction and Construction	The impact may occur as a result of preconstruction and construction activities.
Operation	The impact may occur as a result of operational activities.
Reinstatement	The impact may occur as a result of reinstatement activities.
Nature (type) of impact	
Direct	Impacts that result from a direct interaction between planned project activity and the receiving environment/receptors (e.g. between the occupation of a site and the pre-existing habitats or between wastewater discharge and the receiving water body, emissions to the air and waste generated due to the project implementation etc.).
Indirect	Impacts caused by other activities, which result because of the Project development (e.g. employment increase within the project area as e result of the

Factor	Description
	reconstruction of the railway – the increase of the employment will enhance the life quality).
Secondary	Impacts (mainly socioeconomic ones) may occur at a point in space or time that is removed from both direct and indirect impacts.
Cumulative	Interaction between different Projects in the same area: Cumulative effects can occur at different temporal and spatial scales. The spatial scale can be local, regional or global, while the frequency or temporal scale includes past, present and future impacts on a specific environment or region. Impacts that act together with other impacts resulting from other plans/projects in the same project area or the same sector (e.g. noise from the operation phase of the railway and the existing level of noise produced from the road transport passing close to railway line etc.)
The spatial extent	
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 affects an area of several km long).
Regional	Impacts affect regionally environmental resources or are experienced at a regional level as determined by administrative boundaries, habitat type/ ecosystem, etc. .g.,).
National	Impacts affect environmental resources that extent at a national scale or affect nationally important areas / or have macro-economic consequences (e.g. Ohri Lake Protected Area is important at a national level; the improvement of the railway transport will have positive economic impacts at a national and transboundary level).
Duration of impact	
Temporary	Impacts are temporary and of short duration (e.g. during 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 shall be removed due to some deviation of existing line of railway from the proposed line as per the project).
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 the country level continue as long as the railway Rrogozhinë - Pogradec will be operational);
Permanent/ irreversible	Residual change in the affected receptor or resource (e.g. land use change due to the expropriation for rehabilitation of the existing railway especially to the land requires in the segments of the deviations from existing line that lasts during the whole operation phase and/or beyond the project lifetime.

Factor	Description
Intensity of impact	
Intensity describes the physical dimension of 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 sound38, etc.	
The intensity of impact can also be considered in terms of sensitivity of the environmental or social receptor (e.g. habitats, species or communities; water resources, vulnerable people, sensitive area, natural protected area and monuments, archaeological sites/objects, 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 vehicles 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 following tables show a characterization of the environmental and social impacts in terms of intensity[39].

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

[39] Source: Environnemental Ressources Management (ERM)

Table 4-2 Characterisation of potential nature impacts in terms of intensity

Intensity of impact	Description
Bio-physical receptors	
Negligible	Impacts are not detectable. very low importance and rarity, local scale
Low	Impacts will neither destabilize nor modify any important attribute of the environmental receptor. Low or medium importance and rarity, local scale. 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 or medium importance and rarity, regional scale, limited potential for substitution. Impacts are sufficient to modify important attributes of the receptor but not to destabilize it.
High	Impacts are noticeable and sufficient to destabilize the environmental receptor, which natural functions will temporarily or permanently cease. High importance and rarity, national scale and limited potential for substitution. Impacts are noticeable and sufficient to destabilize the environmental receptor, which natural functions will temporarily or permanently cease.

While the intensity of the socioeconomic receptors can be considered in terms of the ability of affected people/communities to adapt to changes that may be caused by the development of the project, as it is described in the following table.

Table 4-3 Characterisation of potential 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 can adapt easily and maintain pre-impact livelihoods and/or life's conditions.
Moderate	The affected people/communities can 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.

Referring some indicators of environment as 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 a case-by-case basis is used.

In the case of sensitive receptors as natural protected area and monuments, cultural heritage, the international/national/local protection status and /or the conditions of the site/object are used to evaluate the intensity.

National, and/or international standards are used as a measure of quantification of the receptors' intensity where it is appropriate, or specialist are based on studies to quantify this intensity

Concerning social issues, vulnerable people (e.g. minorities, women, children, unemployed persons, vulnerable groups etc.) are used as indicator of the intensity.

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

The magnitude of impact is a function of both the intensity and the likelihood, as shown in the table below.

Table 4-4 Magnitude of impact in the 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 characterization depends also on the socio-cultural, economic, and political context of a project, including judgments in related decision-making areas . Thus, in addition to the magnitude, impact characterization should take into account the stakeholders' concerns.

The stakeholders' concerns are linked 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 levels. On a smaller scale, these concerns are linked to the potential negative effects on the local population directly affected by the project.

The table below gives an indicative characterization of both magnitude and stakeholders' concerns.

Table 4-5 Characterisation of potential impacts in terms of magnitude

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; The 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); The 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; The impact is of medium to long term duration and therefore not reversible;

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

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 society. Some discretion from the environmental and/or social expert is, therefore, required in assigning different weights to the criteria.

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

Table 4-6 Description of the receptors' sensitivity[40]

Components of criteria	Description
Existing regulations and guidance (law, programs, 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 and Natura 2000 areas) or whose conservation value is increased by programs 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.
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), 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 characterization of the sensitivity of a receptor would be as given in the table below.

Table 4-7 Example of the scale of the sensitivity of the receiving environment[41]

Sensitivity importance	Description
Negligible	An impact is negligible when a resource / receptor (including people) is assigned (e) in any way by a particular activity or when the intended effect is judged. "Imperceptible" or indistinguishable from natural background.

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

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

Sensitivity importance	Description
	The receiving environment is tolerant to the project. Changes are imperceptible or negligible and therefore no mitigation action is necessary.
Low	An impact is minor when a resource / receptor is affected, but the intensity of the impact is small enough to remain within the limits of applicable standards (i.e., regulations and guidelines applicable) or in the absence of standards when sensitivity / vulnerability / importance of the resource / receptor is 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	An impact is moderate when its intensity remains within the standards but is between a threshold below which the impact is minor and a level likely to be on the verge of a legal offense. For moderate impacts, it should reduce impacts to a level as low as reasonably practicable (ALARP for as low as Reasonably Practicable English). This does not necessarily mean that so-called impact "moderates" must be reduced to minor impacts, but they are managed efficiently and effectively; The receiving environment has some tolerance of the proposed change subject to design and mitigation.
High	A major impact is when the acceptable or allowable standards limits may be exceeded, or high intensity impacts can allocate resources / receptors quality / importance / high sensitivity. High importance and rarity, international/national scale, limited potential for substitution, and low capacity to accommodate the proposed form of change.

The magnitude of impact significance, is illustrated in the figure below.

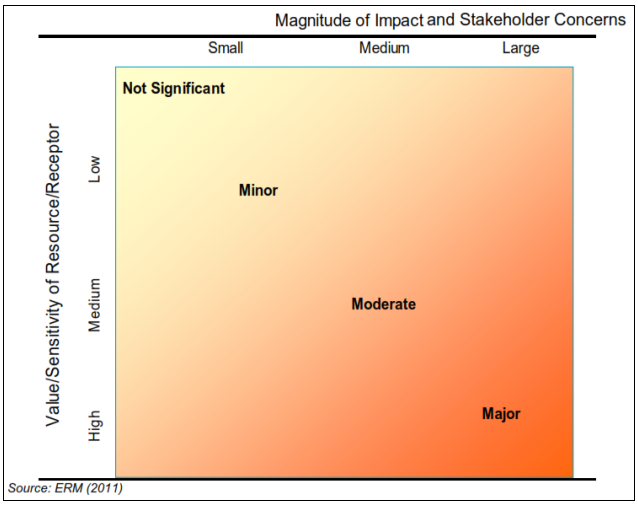


Figure 4-1 Principle of used evaluation of impact significance

The following figure show the evaluation of Significance of impact, magnitude, and receptors' sensitivity:

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**

The table below describes the impact significance.

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

Significance of impact	Description
Biophysical 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 the function of the regulations/standards, the adverse effects must be weighed against the positive ones until a decision of the key stakeholders.

4.3 Options to be compared to the environmental and social point of view

This chapter presents the main findings and recommendations from the Environmental and Social point of view.

Considered railway line alternatives:

The options that were considered by the staff to be evaluated and compared referring environmental and social category and sub criteria are as follow:

1. Existing RW Line which also includes Railway Stations
2. Option 1 which allows speeds V=120km/h in flat terrain and V=100km/h in hilly/mountainous terrain (see files OPTION_1_120.kmz & OPTION_1_100.kmz)

3. Option 2 which allows speeds V=120km/h in flat terrain and V=80km/h in hilly/mountainous terrain (see file OPTION_2_80.kmz)
   Section km 35.4 ~ km 90.4 (V=120km/h in flat terrain) is common for both Options 1 & 2.

- **Option 1**

From the project start (Ch.35+384) up to Ch.90+400, i.e., for the first 55km the existing alignment runs mostly in flat terrain .

Option 1 of the New RW Line alignment that allows speed V=120km/h in flat terrain and V=100km/h in hilly/mountainous terrain.

Option 1 that allows design speed of V=120km/h for the first project section up to Ch.90+400 (generally on a flat terrain) and for the second hilly–mountainous section design speeds of:

i. V=100km/h from Ch.90+400 up to Ch. 126+140

ii. V=80km/h from Ch. 126+140 up to Ch. 132+850 (due to the ''difficult'' terrain conditions and rest of elevation constraints of this intermediate section), and

iii. V=100km/h from Ch.126+140 up to Ch. 152+384 (project end).

- **Option 2**

Option 2 of the New RW Line that allows speed V=120km/h in flat terrain and V=80km/h in hilly/mountainous terrain,

Option 2 that allows design speed of V=120km/h for the first project section up to Ch.90+400 (flat terrain) and design speed of V=80km/h for the whole second project section up to the project end at Ch. 152+743 (hilly – mountainous terrain).

Note that for the first project section up to Ch.90+400 (of a length of about 55km) the proposed improvements are common to Options 1 and 2.

In the mountainous section of the Project (from Ch.90+400 up to the end), the horizontal alignment of Option 2 ensures speed V=80km/h and in general it follows the existing axis with new improvements at specific locations (by increasing the existing radii) in order to achieve the necessary parameters according to the geometry standards.

4.3.1. Alternative Analysis Methodology

The main criteria and sub-criteria used to evaluate the alternatives are:

Criteria and sub criteria:

1) Nature and biodiversity
2) Other Environmental issue
3) Social impacts

1. Nature and biodiversity:
- Impact on species of conservation concern,
- Impact on habitats of conservation concern,
- Impact on areas of conservation concern (Protected Areas, IBAs, KBAs, Candidate Emerald Sites), and
- Impact on bio-corridors.
- Vegetation clearing

2. Other Environmental issue:
- Exposure of residential centers to project impacts (noise, gaze, vibration).
- The need to install barriers that reduce the noise level.

- Impacts on water resources (rivers and streams).
- Land disturbance , erosion , excavated material, visual impact
- Waste from demolition and excavated material

3. **Social impacts**
   - Health, safety and quality of life for the community
   - Efficiency / access to the use of agricultural land affected by the project.
   - Exposure of residential centers & businesses to project impacts (road, utility connections)
   - The need to create access for residential areas & businesses due to the project
   - The need for resettlement & relocation of facilities (creating the necessary spaces) for the implementation of the project.

Considered railway line alternatives comparison:

The comparison of the railway line alternatives has been carried out based on the impacts' significance. Annex gives details about the comparison(*refer to Option analizes ESIA*) ;

4.3.2. Evaluation Results and Conclusions Environmental

Criteria and sub-criteria		OP0	OP1	OP2
Nature and biodiversity				
1	Impact on species of conservation concern	11	21	13
2	Impact on habitats of conservation concern	10	19	11
3	Impact on areas of conservation concern (Protected Areas, IBAs, KBAs, Candidate Emerald Sites)	6	11	6
4	Impact on bio-corridors	12	23	15
5	Vegetation clearing	11	21	13
Environmental issue				
1	Exposure of residential centers to project impacts (noise, gaze, vibration).	15	19	18
2	The need to install barriers to reduce the noise level.	17	18	17
3	Impacts on water resources (rivers and streams).	18	18	18
4	Land disturbance , erosion visual impact	13	19	15
5	Waste from demolishing and excavated material	6	24	18
	Total	119	193	144

Meanwhile, a more detailed assessment of each alternative can be made, based on the main criteria as illustrated in the table below. The higher the rating, the greater the impact.

	CRITERION	OP0	OP1	OP2
I	**Nature and biodiversity**	**50**	**95**	**58**

II	**Other Environmental issue**	**69**	**98**	**86**

Having in consideration the significance of each selected criterion in environmental impacts, we will have to evaluate alternatives according to the selected criteria and their significance:

	Criterion	OP0	OP1	OP2	Significance
I	Nature and biodiversity	**50**	**95**	**58**	**55 %**
II	Other Environmental issue	**69**	**98**	**86**	**45 %**

The assessment of the impacts of alternatives taking into account significance according to the criteria gives this assessment:

Classification of criteria					Performance of alternatives			Ranking of alternatives as per the weight		
Categories	**Prioritization of categories**	**Weighting factor of each category**	**Criteria**	**Weighting factor of each criterion**	**OP0**	**OP1**	**OP2**	**OP0**	**OP1**	**OP2**
Nature and Biodiversity	1	55	Impact on species of conservation concern	**20**	11	21	13	**220**	**420**	**260**
			Impact on habitats of conservation concern	**25**	10	19	11	**250**	**475**	**275**
			Impact on areas of conservation concern (Protected Areas, IBAs, KBAs, Candidate Emerald Sites)	**30**	6	11	6	**180**	**330**	**180**
			Impact on bio-corridors	**15**	12	23	15	**180**	**345**	**225**
			Vegetation clearing	**10**	11	21	13	**110**	**210**	**130**
				100	50	95	58			
Environmental issue	2	45	Exposure of residential centers to project impacts (noise, gaze, vibration).	25	15	19	18	**375**	**475**	**450**
			The need to install barriers to reduce the noise level	25	17	18	17	**425**	**450**	**425**
			Impacts on water resources (rivers and streams).	20	18	18	18	**360**	**360**	**360**
			Land disturbance , erosion visual impact	10	13	19	15	**130**	**190**	**150**
			waste from demolishing and excavated material	20	6	24	18	**120**	**480**	**360**
										0
	Sum	**100**		**100**	69	98	86	**23.50**	**37.35**	**28.15**

Summary of impacts by alternatives taking into account the significance according to the criteria

CRITERION	OP0	OP1	OP2
Nature and Biodiversity+ other Environmental issue	**23.50**	**37.35**	**28.15**

Conclusion: As per the evaluation ,it seems that OP do nothing (zero) has the lowest environmental impact , then option 2 and the highest environmental impact it refers to Option1.

The best option to be considered from the environmental point of view is Option 2.

4.3.3. Social Impact Alternative Analyses

Table 4-10:Following the summarize the alternatives evaluations:

Summarize	OP 1(120/100)	OP 2 (120/80)
P1 - Seg.1 Kp. 35+345 – KP.90+400 (L1=55.055 km)	13	13
P2 - Seg.2 KP. 90+400 – KP. 126+140 (L1=35.740 km)	10	11
P3 - Seg.3 KP 126+140 – KP 132+850 (L1=6.710 km)	10	10

P4 - Seg.4 KP 132+850 - KP 152+384 (L1=19.534 km)	12	12
P1*L1+P2*L2+P3*L3+P4*L4 Total Weighted Scores = L1+L2+L3+L4	11.75	12.05

Based on the methodology of the Evaluation System (with points) we measure the Degree of Influence in the negative sense (negative impact) where the higher degree (Very high / High impact) corresponds with the greater of negative impact. From this point of view, Alternative 1 is more acceptable from a social point of view.

If compare the alternatives based on the positive social impact, we argued that OP 1(120/100) is better compared to OP 2(120/80):

- The difference in the total cost of the project is created only by segment 2, from Ch.90+400 up to Ch. 126+140 (L1=35,740 km) and segment 4 from Ch.126+140 up to Ch. 152+384 (L1=19,534 km), which are 47% of the total length.
- OP 1(120/100) foresees interventions that better improve the infrastructure and the railway is designed with a speed of + 20 Km/hour. This ensures more efficiency and increases the number of users (passengers and freight trains) in perspective.
- The standard of the railway after the rehabilitation, (according to OP 1(120/100), is somewhat closer to the international standards (which are currently very high).

Note: For more detail information about the options analyses and finding refer to :

Preliminary Design for the Rehabilitation of the Corridor VIII Rrogozhina - Pogradec Section, Albania AA-010284-001 (Environmental and Social Alternative Analyses)

4.3.1.1 Application of the mitigation hierarchy in the construction of the access roads

By applying mitigation hierarchy, project developer can effectively address potential impacts of access road construction on sensitive areas, aligning with EIB and EBRD standards for sustainable development and responsible project management. This approach aims to balance infrastructure development with environmental and social considerations, ensuring long-term benefits while minimizing adverse effects on sensitive ecosystems and communities. The steps included in the mitigation hierarchy:

Avoidance: The first preference is to avoid impacting sensitive areas wherever feasible. This might involve re-routing access roads to avoid ecologically sensitive habitats, culturally significant sites, or areas prone to erosion or other environmental risks.

Minimization: If avoidance is not possible, efforts should be made to minimize the impact of access roads on sensitive areas. This could include:

- *Designing roads to follow existing topography and natural features to reduce habitat fragmentation.*
- *Implementing erosion control measures to minimize soil disturbance and sedimentation into nearby water bodies.*
- *Using appropriate construction techniques and materials to minimize noise and air pollution.*

Rehabilitation and Restoration: Where impacts cannot be fully avoided or minimized,

rehabilitation and restoration measures should be implemented. This involves restoring affected areas to their original state or enhancing them to improve ecological or cultural values. Examples include:

- *Replanting native vegetation in disturbed areas.*
- *Implementing erosion control measures to stabilize soils.*
- *Rehabilitating cultural heritage sites affected by construction activities.*

Compensation: As a last resort, compensation measures may be considered to offset residual impacts that cannot be adequately avoided, minimized, or mitigated. Compensation could involve:

- *Creating or enhancing alternative habitats or cultural facilities.*
- *Supporting community development projects that provide benefits to affected stakeholders.*

Monitoring and Adaptive Management: Throughout the project lifecycle, monitoring should be conducted to assess the effectiveness of mitigation measures. Adaptive management involves adjusting strategies based on monitoring results to ensure mitigation objectives are achieved.

5 Baseline Information

The main purpose of this section of the ESIA report is to provide an understanding of current environmental and social conditions that form the baseline against which project impacts can be predicted and measured during project implementation. To understand the context at the project site, the Consultant collect primary data at the site.

5.1 Approach to Baseline Information

The approach to baseline information description includes:

- Findings from site surveying conducted from the team of ESIA.
- Findings from existing documents /study for the project area relating with existing environmental and social issue.
- Sources of information at country and project area level.

5.1.1 Findings from site surveying conducted from the team of ESIA

The team of ESIA conducted site survey along all the footprint of the project to evaluate the existing situation relating environmental, biodiversity and social indicators.

The findings are including in the ESIA report as per the respective receptors in the following sections.

5.1.2 Findings from existing documents /study for the project area relating with existing environmental and social issues

Findings from existing reports /documents /studies with relevant information for the project area are taken into consideration from the ESIA team as following:

- General Plan of the Municipal of Elbasan Municipality" (Environmental Strategic Assessment Report);
- Action Local Plan for Integrated Waste Management of Pogradec Municipality;
- General Local Plan of Rrogozhinë Municipality (Environmental Strategic Assessment Report);
- General Local Plan of Librazhd Municipality (Environmental Strategic Assessment Report);
- General Local Plan (2016-2030) for Prrenjas Municipality (Environmental Strategic Assessment);
- General Local Plan of Peqin Municipality (Environmental Strategic Assessment Report);
- National Environmental Agency _" The Environmental Situation in Albania –Yearly Report _2022";
- National Environmental Agency _" The Environmental Situation in Albania –Yearly Report _2021";
- National Environmental Agency _" The Environmental Situation in Albania –Yearly Report _2020";
- Protecting Lake Ohrid, Albania and Macedonia;
- Ohrid Lake Watershed Management Plan Towards strengthening water resource management cooperation in the Ohrid Lake region;

- World Heritage Supplement to the Management Plan for the Protected Landscape of Pogradec 2017-2027.

5.1.3 Sources of information at country and project area level

The description of the baseline information along the whole Project area is based on the following main resources that include:

- Prefeasibility study, preliminary design, of Rrogozhinë-Pogradec project;
- Technical reports prepared for the DD on the Project;
- Literature research on the geology, hydrogeology, flood events, biodiversity, and protected areas, air quality and noise, socioeconomic issues, accidents, etc.;
- State of Environment Report, published early by the National Environmental Agency;
- Thematic maps (state of the environment, geological risks, hydrogeology, geology) that are published in 2014 by the Albanian Geological Survey;
- The web page of the National Agency of Protected Areas;
- Map of Protected areas, National Agency of Protected Areas, 2018;
- The web page of the National Agency of Protected Areas;
- The web page of the official geoportal (geoportal.asig.gov.al);
- The web page of the National Agency on Territory Planning;
- Data/information on climate conditions, IHM;

5.1.4 Specific approach for each environmental receptor

The following environmental and social receptors are taken into consideration in the ESIA study report :

- Materials and methods that involve:
  - Documents/ study (literature, maps, data/information, site visits, etc.);
  - The applied standards /regulations for each receptor (whether possible) the specific methodology.
- Description of the baseline information for each environmental receptor within the target area:

The environmental and social topics taken into consideration in this chapter are as follows:

- Climate conditions;
- Geology;
- Tectonics and seismicity;
- Ground waters
- Surface waters
- Flooding;
- Air quality;
- Noise;
- Climate change;
- Biodiversity and Ecological sources and protected areas;
- Waste;
- Land Use;

- Infrastructure;
- Landscape and visual amenity;
- Cultural heritage;
- Socioeconomic issues;
- Demography
- Economy
- Education
- Health
- Other plans/programs within the same sector and/or the same area;
- Accidents and safety situation.

- Main findings

The main findings for each environmental receptor help to know where to be focused to facilitate the preparation of the chapter on the likely impacts and mitigation measures.

5.2 Baseline Information on Biophysical Environment

Railway Rrogozhinë - Pogradec routes in the Central Albania form East to West. Mainly all the Railway route is located in Shkumbini River Basin and only a small part of Railway passes along Ohri Lake Part of Black Drin River Basin.

The territory that includes the Rrogozhinë-Elbasan-Pogradec railway according to geographical division of Albania is part of the West Central Plain of Albania and more specifically Elbasani field. The Elbasani field is situated in the middle part of Shkumbini River.

The most part, the region that the railway goes through is made of fields and hills (it also goes through valleys of the hilly region which go up to 500-600m above sea level) between Krraba hills in the north and Sulova hills in the south direction. Elbasani field extended up to Labinot-Fushë area.

5.2.1 Climate conditions

5.2.1.1 Materials and method

The data/information on the climate characteristics are extracted from the information published by the former Institute of Hydro Meteorology (IHM), nowadays the Institute of Geo-Sciences that deals with the climate issues.

A full description on Climate Conditions is presented in the Hydrology & Climate Change Study report drafted for this project.

The data are provided from:

- The IGEO Monthly Climatic Bulletin Publications (https://www.geo.edu.al/Services/Department_of_Meteorology/Monthly_Climatic_Bulletin/);
- Meteorological Bulletins 1960-1990, from Albania Science Academy-Meteorological Institute.

5.2.1.2 Baseline information

Based on the climate classification of our country, the railway axis Rrogozhinë-Elbasan-Pogradec is included in three climate subzones.

The Central Coastal Mediterranean subzone which is characterized by mild and wet winters and dry and hot summers. The average annual temperature goes up to 14°-15°C. In January it can go

up to 5.6-7°C and in July it can go up to 22-24°C. The absolute minimum temperature reaches -7 up to -11°C and the absolute maximum temperature reaches 38°-42°C. The freezing period can last from 15 up to 30 days. Precipitations vary from 900 to 1200 mm/year. Snow is very rare.

Based on the climate classification of Albania, the railway axis Rrogozhinë-Pogradec is included in three climate subzones (See figure below).

- Mediterranean Central Plane Subzone: Rrogozhinë, Peqin, Elbasan;
- Mediterranean Hilly Central Subzone: Elbasan, Librazhd, Prrenjas;
- Mediterranean Pre-Mounatinous South: Exit of tunnel - Lin – Pogradec.

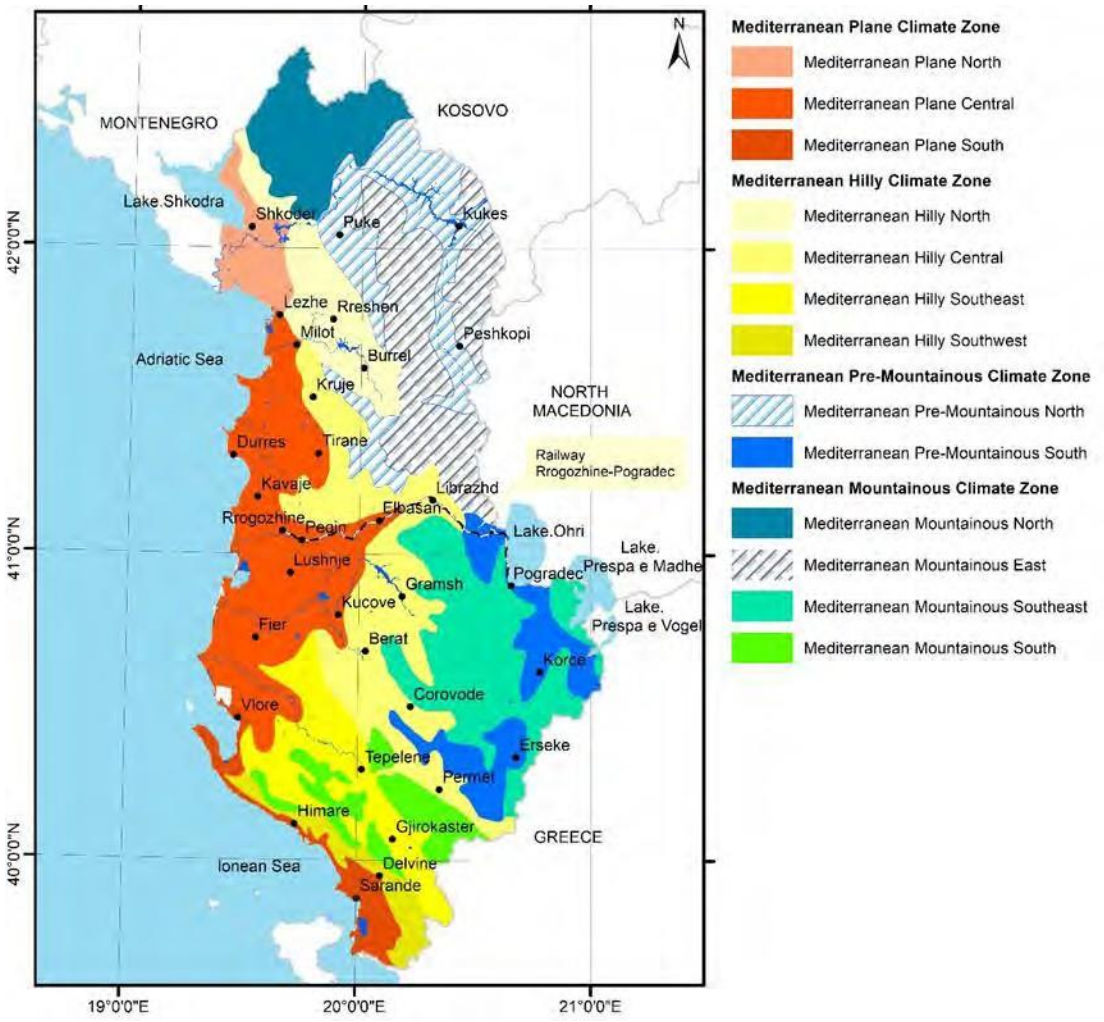


Figure 5-1 Climate Sub-Zones

Air Temperature

Table 5-1 Air temperature, monthly and yearly averages

Station	1	2	3	4	5	6	7	8	9	10	11	12	Annual Averages
Kavajë	7.2	8.1	10	13.1	17.1	20.6	22.5	22.5	22	16	12.1	8.6	**14.8**
Peqin	7.7	8.7	10.7	13.3	17.9	21.7	24	24.1	21.2	17.1	12.7	9.2	**15.7**
Elbasan	6.8	7.8	10.1	13.4	17.8	21.5	23.6	23.6	20.6	16.2	11.6	8.2	**15.1**

Librazhd	4.6	5.9	8.6	12.5	16.8	20.5	22.9	23	19.7	14.8	10.1	6.2	**13.8**
Klenje	-1.6	-0.2	2.2	6.1	11.3	14.4	16.4	16.3	13	8.3	4.2	0	**7.5**
Prrenjas	2.6	4	-	6.8	10.4	15.3	18.7	20.9	20.7	17.5	12.9	8.4	**4.3**
Pogradec	2.2	3.4	5.9	10.1	14.7	18.5	20.8	20.8	17.3	12.4	8.1	4.3	**11.6**

Ref: Meteorological Bulletins 1960-1990, from Albania Science Academy-Meteorological Institute.

Table 5-2 Absolute minimum air temperature, monthly and yearly

Station	1	2	3	4	5	6	7	8	9	10	11	12	Annual
Kavajë	-11.6	-7.0	-6.6	0.3	3.2	7.2	8.8	10.5	4.5	-1.0	-3.9	-6.5	**-11.6**
Peqin	-10.3	-8.0	-5.0	-1.5	1.8	7.5	9.0	11.3	6.0	-0.5	-3.6	-6.5	**-10.3**
Elbasan	-7.5	-7.5	-4.8	-0.7	2.8	6.5	7.4	8.9	4.3	-1.0	-6.2	-6.8	**-7.5**
Librazhd	-15.5	-10.9	-11.5	-1.8	1.3	4.8	7.1	8.2	3.2	-2.8	-8.5	-14.8	**-15.5**
Prrenjas	-20.7	-22.4	-11.0	-5.4	0.0	2.3	6.0	5.0	0.5	-9.0	-12.7	-16.7	**-22.4**
Pogradec	-14.5	-12.7	-9.3	-2.9	0.2	4.8	6.7	7.6	3.5	-2.1	-6.3	-11.4	**-14.5**

Ref: Meteorological Bulletins 1960-1990, from Albania Science Academy-Meteorological Institute.

Atmospheric Precipitation

Table 5-3 Annual and monthly precipitation

Station	1	2	3	4	5	6	7	8	9	10	11	12	Annual
Kavajë	126	106	95	82	67	45	30	39	65	113	159	129	**1060**
Rrogozhinë	114	104	91	85	59	39	23	35	62	97	147	120	**980**
Peqin	123	111	97	94	79	45	28	35	62	101	155	135	**1070**
Elbasan	136	130	106	108	68	60	37	45	69	110	164	146	**1210**
Librazhd	165	155	126	120	100	62.3	41.1	48.1	78.2	117	184	184	**1380**
Prrenjas	107	97	82.5	69.5	68.7	37.3	25.1	29.1	51.7	81.9	127	118	**896**
Pogradec	78	86	65	57	65	31	23	32	44	81	108	88	**758**

Ref: Meteorological Bulletins 1960-1990, from Albania Science Academy-Meteorological Institute.

Table 5-4 Maximal 24-Hour Precipitation (mm)

Station	1	2	3	4	5	6	7	8	9	10	11	12	Annual
Kavajë	102	94	77	67	150	58	40	95	110	172	90	87	**172**
Rrogozhinë	75	54	59	66	137	70	37	88	120	174	122	62	**172**
Peqin	77	54	61	58	111	78	47	65	68	175	116	61	**175**
Elbasan	78	56	90	49	61	40	60	81	93	135	75	85	**135**

Librazhd	100	87	88	54	125	134	55	92	68	136	114	80	**136**
Prrenjas	55	86	55	43	34	30	29	52	46	91	102	76	**102**
Pogradec	44	40	31	33	41	31	28	58	50	77	74	70	**77**

Ref: Meteorological Bulletins 1960-1990, from Albania Science Academy-Meteorological Institute.

Snow

Local climatic conditions and especially the air temperature determine the durability of the snow layer and the numbers of days with snow cover. The snow layer regime varies distinctly from west to east in the valley of the Shkumbini River. In the Elbasan - Fushë Labinot sector the snow layer goes from 10 to 20 cm, in the Librazhd - Prrenjas section the height of snow reaches 25 to 50 cm. The average number of days with snow Elbasan - Librazhd is 5 days, while Librazhd – Prrenjas is 15 days a year.

Table 5-5 Average number of snowy days

Station	1	2	3	4	5	6	7	8	9	10	11	12	Sum
Elbasan	0.6	0.5	0	0	0	0	0	0	0	0	0	0.2	**1.3**
Librazhd	1.6	0.5	0	0	0	0	0	0	0	0	0.8	1.6	**4.5**
Prrenjas	1.0	1.0	0	0	0	0	0	0	0	0	1.0	2.0	**5.0**
Pogradec	6.8	5.9	2.6	0	0	0	0	0	0	0	0.2	4.3	**19.8**

Ref: Meteorological Bulletins 1960-1990, from Albania Science Academy-Meteorological Institute.

Wind

Important wind parameters include its direction, its frequency according to different directions and its velocity according to different directions.

Table 5-6 Wind characteristics in the study area

Station	Q%		N		NE		E		SE		SW		W		NW	
Elbasan	m/s	%	m/s	%	m/s	%	m/s	%	m/s	%	m/s	%	m/s	%	m/s	%
	46.5	1.1	2.0	18.7	4.2	9.1	3.3	2.4	1.7	2.1	1.7	10.7	2.9	4.2	2.3	4.4

Ref: Meteorological Bulletins 1960-1990, from Albania Science Academy-Meteorological Institute.

Elbasan station is characterized by high calmness value, 46.5%, with a velocity that varies from 2 to 4.2 m/s. The predominant direction is SW with frequency of 10.7% and the velocity of 2.9 m/s.

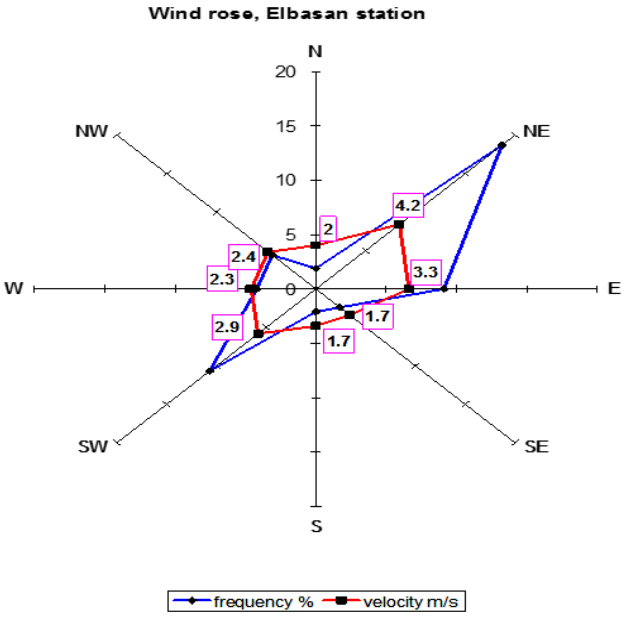


Figure 5-2 Wind rose, Elbasan station

Table 5-7 Average frequency of wind speed

Station	frequency 0-1 m/s	frequency 2-5 m/s	frequency 6-10 m/s	frequency 11-15 m/s	frequency ≥ 15 m/s
Elbasan	55.5	36.0	6.5	1.4	0.2

Ref: Meteorological Bulletins 1960-1990, from Albania Science Academy-Meteorological Institute.

Relative Humidity

As shown on the table below, shows, the zone from the Western Plain up to Elbasan and in the Valley of Shkumbini River is characterized by a relative air humidity of 60 to 70%.

In general, the western part of the zone that we are studying has higher average relative air

humidity, which is manly caused by the effect that the Adriatic Sea has on the zone. The east part of the Shkumbini Valley is characterized by smaller values of relative humidity starting from Librazhdi town.

Table 5-8 Average monthly and annual relative humidity%

Station	1	2	3	4	5	6	7	8	9	10	11	12	Annual
Elbasan	68	68	66	70	70	66	61	63	69	66	74	70	**68**
Pogradec	77	77	71	66	66	64	59	59	66	71	76	77	**69**

Ref: Meteorological Bulletins 1960-1990, from Albania Science Academy-Meteorological Institute.

Fog

In general, fog mostly appeared inside the territory and during the cold months; along the coast, the fog mostly appeared during the hot months.

Table 5-9 Average number of days with fog, monthly and annual

Station	1	2	3	4	5	6	7	8	9	10	11	12	Annual
Elbasan	0.5	0.4	0.8	0.4	0.0	0.1	0.0	0.2	0.3	0.8	1.0	0.6	**5.1**

Ref: Meteorological Bulletins 1960-1990, from Albania Science Academy-Meteorological Institute.

Hail

The highest number of days with hail is observed in Elbasan, 3.5 days a year. There have been particular days where it hailed in Krrabë, especially in 1971, where the hail reached 200 grams. Also, on June 25, 1962, in Elbasan, for twenty minutes, the weight of hail was between 80 and 120 grams.

Table 5-10 Average number of days with hail, monthly and annual

Station	1	2	3	4	5	6	7	8	9	10	11	12	annual
Elbasan	0.3	0.3	0.6	0.6	0.2	0.2	0.1	0.1	0.1	0.2	0.4	0.4	**3.5**

Ref: Meteorological Bulletins 1960-1990, from Albania Science Academy-Meteorological Institute.

5.2.1.3 Findings

Air temperature:

Annual averages temperature is 15.7^{0}C in Peqin (the highest one); Elbasan 15.1^{0}C; Librazhd 13.8^{0}C; Prrenjas 11.9 ^{0}C and the lowest annual averages temperature is in Pogracdec 11.6 ^{0}C.

Annual Absolute maximum air temperature

The maximum of annual absolute maximum air temperature is in Elbasan with 42 .0 ^{0}C and the minimum of annual absolute maximum air temperature is in Prrenjas with 39.1 ^{0}C followed by Pogradeci with 39.6 ^{0}C;

Absolute minimum air temperature

The maximum of the *annual absolute minimum* air temperature is in Elbasan with -7.5 .0 ^{0}C and the minimum of the *annual absolute minimum* air temperature is in Prrenjas with – 22.4 ^{0}C followed by Pogradeci with -14.5^{0}C;

Number of days with temperatures ≤ 0ºC (annual)

Prrenjas has the maximum number of the days with temperature ≤ **0ºC** 63.3 days (annual) and Peqin has the minimum number of the days(10.9 days).

Number of days with temperatures ≤ -5.0ºC (annual)

Prrenjas has the maximum number of the days with temperature ≤ **-5.0ºC** 12.6 days (annual) and Peqin has the minimum number of the days (0.7 days).

Precipitation

The entire zone that we are studying is under the influence of the Adriatic Sea. This influence is seen in the average air temperature, as well as the minimum and maximum temperature.

The highest precipitation is expected during the cold period of the year and the wettest months are November and December.

In November it falls 164 mm in Elbasan, 184 mm in Librazhd and 127 mm in Prrenjas. The driest months are July and August: in Elbasan the precipitation is 37 mm, in Librazhd 41 mm and in Prrenjas 25 mm.

Snow

Throughout the entire Plain (Coastal) region, there is an average of 1-5 snowy days per year. Meanwhile in the hilly region of Shkumbini River Valley and more specifically in the sector Prrenjas-Librazhd the snow is present partially, not every year.
The snow layer regime varies distinctly from west to east in the valley of the Shkumbini River.
In the Elbasan - Fushë Labinot sector the snow layer goes from 10 to 20 cm, in the Librazhd -

Prrenjas section the height of snow reaches 25 to 50 cm.
The average number of days with snow Elbasan - Librazhd is 5 days, while Librazhd – Prrenjas is 15 days a year.
In the area of interest starting from Rrogozhina, snow is a rare phenomenon and when it begins to fall it does not create a layer and if it creates a layer, it doesn't last long.
In this sector of the railway every year is observed on average 1 to 5 days with snow, while in the hilly part it is from 5 to 10 days. These days are observed more in January - February and December. The snow layer stays long only during extraordinary winters associated with negative temperatures.

Wind

Elbasan station is characterized by high calmness value, 46.5%, with a velocity that varies from 2 to 4.2 m/s. The predominant direction is SW with frequency of 10.7% and the velocity of 2.9 m/s.

The velocity interval 0-1 m/s prevails through the entire zone that we are studying. Other prevailing velocity intervals are: 2-5 m/s (36-37%), and the 6-10 m/s interval is rare (4-6.5%).
During the day, wind reaches its maximum velocity at midday.
The local winds in the zone that we are studying are seen in Elbasan: Murlani, Juga (warm wind).
The study area from Rrogozhina to Librazhd, the winds occurring once in 50 years is 38 m/s and from Librazhd to Pishkash is 33 m/s. While the wind once in 20 years from Rrogozhina to Librazhd it is 33 m/s and from Librazhd to Prrenjas is 25 m/s and the occurrence of maximum winds once every 10 years from Durrës to Librazhd is 30 m/s and from Librazhd to Prrenjas 25 m/s.

Relative Humidity

The zone from the Western Plain up to Elbasan and in the Valley of Shkumbini River is characterized by a relative air humidity of 60 to 70%. The east part of the Shkumbini Valley is characterized by smaller values of relative humidity starting from Librazhdi town.
The highest values are usually seen during the cold months of the year, November, December and then January. The lowest values are observed during the warm months, like July and August.
The maximum relative humidity is reached at 4 and 5 o'clock, and the minimum is reached at 14 and 15 o'clock.
In the zone that we are studying, the average number of days with a relative humidity of over than 80%, at 14 o'clock, varies from 40.5 days in Durrës to 32.5 in Elbasan.

Fog

In general, fog mostly appeared inside the territory and during the cold months; along the coast, the fog mostly appeared during the hot months. In the hilly zone of Elbasan, the highest numbers of foggy days are registered during the cold season, (October-March). In total during the year there are 5.1 days with fog, with November having the most days.

Hail
The highest number of days with hail is observed in Elbasan, 3.5 days a year. Also, on June 25, 1962, in Elbasan, for twenty minutes, the weight of hail was between 80 and 120 grams.
In general, hail lasts from 3 to 5 minutes. In the zone that we are studying, hail is seen in each season, but higher number of days with hail is recorded during the cold season. During the warm season, the number of days with hail is low.

5.2.2 Geology

5.2.2.1 Materials and method

Geological settings, the ground conditions, seismologic features affect the design, operation, and maintenance of the railway.

The material used for assessing the geological issues in the project area included the following:

- Geological Study conducted for the proposed project area (Study of the engineering-geological conditions of the site “preliminary design for the rehabilitation of the corridor viii Rrogozhina - Pogradec section, Albania);
- The assessment of the results from geological and hydro-geological reports carried out by the Albanian Geological Survey for the infrastructure projects around the project area;
- “Neotektonika i.e. Sizmotektonika e Shqipërisë”Aliaj Sh. (1988)“;
- Geology of Albania", 2002;
- Geological map of Albania. (scale 1:200,000). 2002 edition;
- Hydrogeological map of Albania. (scale 1:200,000);
- Tectonic map of the Republic of Albania on a scale of 1:200,000;
- Text of engineering geology and Hydrogeology (scale 1:200,000). Group of authors, N. Konomi;
- https://www.geo.edu.al/. Department of Meteorology, Bulletin of climate;
- IGEO, Department of Seismology, Seismic Hazard. PGA;
- Maps extracted from the governmental site www.geoportal.gov.al;
- Scientific articles on the geomorphology, geology, seismology, hydrogeology, etc., regarding the wide project area;
- Field investigations in the project area concerning the proposed project.

The geological issues are described in a seperate report for the project.

The classification of the soil (ground/subsoil) types is based on the Eurocode 8 (Eurocode 8, ground types, 2004) and the lithology provided by the geological report and the geological maps.

This section includes the geomorphology, lithology, and geological hazards, except for the tectonics and seismicity issues, which are developed in the next section (tectonic and earthquakes).

5.2.2.2 Baseline Information

Geomorphology

The morphology of the studied area is closely related to the lithology (Muceku et al. 2021). Generally, it represents a flat and less hilly area which is built by alluvium and diluvium deposits, as well as molasses, pre-molasses, ultrabasic and blocks in matrix formations with above sea level varies from 15-50m (Rrogozhina-Peqin), 115m (Elbasan), 230m (Librazhd), 430- 450m (Qukës), 70 Prrenjas up to 720-730m (Memelisht village). The hills extend from northwest to southeast in chains form, which are divided by the streams and rivers valleys. Along of this region from southeast to northwest direction has established its valley the Shkumbini River with a valley like “U” shape.

Based on morphology features the studied area is divided in two morphological units:

- Flat morphological unit
- Hilly morphological unit

Based on feature’s morphology, each morphological unit is classified in several subunits.

Flat morphological unit

The flat morphological unit is characterized by terrain with a slope angel smaller than 5o (very gently). Based on site investigation the studied are classified into several subunits:

- Terrace of Shkumbini River;
- Terrace of Rapuni stream;
- Plain area of Prrenjas;
- Plain area of Livagjes and Stalecit;
- Terrace-delta of Kroi Bardhë stream;

Terrace-delta of Torbili stream.Terrace of Shkumbini River:

- The studied area, where the railway passes from Rrogozhina to Pogradeci, is built by first and second terrace of Shkumbini River, which morphologically form a flat area. This area lies on the right side of the Shkumbin River flow and continues eastward to the village of Bishqemi. Due to the extension of the hilly area towards the riverbed, of Shkumbin River, the terrace narrows. That is the reason why the railway passes through hill's area. With terrace expansion in the village of Paper, railway alignment continues again in the Elbasan town up to Labinot Fushë village through the river terrace. Also, we should mention that in the village of Xibrakë the railway passes through a flat area, which represents the second terrace of the Shkumbin River. The first and second terrace of Shkumbini River consist of sands-gravels deposits with thickness range from 5-10m up to 20-30m.

Terrace of Rapuni stream

- It spreads from the Rapuni streambed to the entrance of the Librazhd town. The Rapuni terrace stream is composed by gravels with sands.

Plain area of Prrenjas

- It lies from Prrenjas village up to Kostriçan village. The Prrenjas plain area consist of gravel-sands-silts mixtures.

Plain area of Livagjes and Stalecit

- They are located between the exit of the Qafe Thanes train tunnel and the Buqez village. In addition, this area extends on west of Pogradeci Lake. The present area consists of diluvium deposits, which represented by rubble stones mixture with sand-silt.

Terrace-delta of Kroi Bardhë stream

- It located in Udenisht village along Pogradeci Lake and composed by rubble stones mixture with sands-silts.

Terrace-delta of Torbili stream

- The terrace of Torbili stream founded in Memlisht village along Pogradeci Lake side. It is consisted of rubble stones mixture with sands-silts.

Hilly morphological unit

- The Hilly morphological unit with inclination angel 6° - 15° (gentle), 16° - 25° (moderately gentle), 26° - 35° (moderately steep), 36° - 45° (steep) and > 45° (very steep). In the hills, slopes are prevailing the sedimentary rocks, which are highly weathered. Based on field works, in the studied area is distinguished the following morphological subunit:
    - The hills zone of Bishqemi village up to Paper village;
    - The hills zone of Labinot Fushë up to Xibrakë village;

- The hills zone of Xibrakë village up to Rapuni stream valley;
- The hills zone of Librazhd town up to Prenjas village;
- The hills zone of Kostriçan village up to the Qafe Thanes train tunnel exit;
- The hills zone of Buqëz-Piskopat villages up to Udenisht village.
- The hills zone of Bishqemi village up to Paper village
- This hills zone is built by pre-molasses's deposit of Burdigalian (N11b), pre-molasses's deposit of Aquitanian (N11a) and flysch formations of Upper Oligocene (Pg33). Field observations and surveys show that the slope angle of this zone ranges from 10o -15o to 25o. The most studied area represented by weathered rocks and covered by deluvial deposits, which have a thickness of 1-2m up to 3-5m. The studied area, as a result of the processes of geodynamic phenomena, such as landslides and erosion, is characterized by many erosion troughs and furrows, which during the rainy season collect surface water debris materials and discharge to the railway route, endangering it.

The hills zone of Labinot Fushë up to Xibrakë village

- It is represented by hills, which consist of thin to medium bedded limestones of Upper Cretaceous (Cr2). The slope angle of this zone ranges from 35o -45o to 75o. Generally, the rocks formations are slight weathered. However, they are affected by tectonic activities.

The hills zone of Xibrakë village up to Rapuni stream valley

- This hills zone is built by flysch's formations of Eocene (Pg2), ultrabasic rocks (J2), melange formations-blocks in matrix (J2) and limestone deposits, (T2-J2). Field observations indicated that the slope angle of this zone ranges from 15o -25o to 55o -70o(limestone). Apart from the limestone rocks, all the other formations that make up this hills zone, are highly weathered and covered by deluvial deposits.

The hills zone of Librazhd town up to Prrenjas village

- It is built by hills, which are composed by molasses formations (N21)-thick-bedded to massive conglomerates, intercalated with thin strata 0.5m up to 1.0-1.5m of sandstone and siltstone-claystone. The slope angle of this zone ranges from 15o -25 o to 45o. Generally, the rocks formations are highly weathered.

The hills zone of Kostriçan village up to the Qafe Thanes train tunnel exit

- This area is built by hill, which are composed by ophiolitic breccia of Upper Jurassic (J3), ultrabasic and medium-bedded limestones and dolomites rocks of Upper Triassic-Lower Jurassic (T3-J1). The breccias and ultrabasic rocks are intensively affected by tectonic and weathered crust activities.

The hills zone of Buqëz-Piskopat villages up to Udenisht village.

- The presented hills zone is built by ultrabasic rocks, which are intensively serpentinized and fissured from tectonic phenomena. The slope angle of this zone ranges from 20o -35o to 45-60o.

Geology settings of the site

The studied area is located on the existing Rrogozhina-Pogradeci railway route. Based designer's requests in this work, we have briefly described the geological and geomorphological characteristics of the Rrogozhina-Pogradeci railway site.

So, based on geological works (Xhomo et al. 2002), as well lithological and engineering geological studies carried out in the studied area (Muceku, et al. 2021), we shortly describe the geological

and lithological features of the area, where the Rrogozhina-Pogradeci railway is built.

Geologically, the investigated area consists of different types of rocks, which are:

- Quaternary deposit (Q);
- Molasses formations of Medium Miocene (N21);
- Pre-Molasses's Deposit of Burdigalian (N11b);
- Pre-Molasses's Deposit of Aquitanian (N11a);
- Flysch formations of Upper Oligocene (Pg33);
- Flysch's formations of Eocene (Pg2);
- Limestone deposits, Upper Cretaceous (Cr2);
- Intrusive rocks (Middle Jurassic-(J2);
- Melange formations-blocks in matrix of Middle Jurassic(J2);
- Ophiolitic breccia deposits of Upper Jurassic (J3)
- Limestone deposits of Middle Triassic- Middle Jurassic (T2-J2);
- Limestone deposits of Upper Triassic-Lower Jurassic (T3-J1).

Quaternary deposit (Q)

The Quaternary deposits consist of alluvium and deluvium deposits. The alluvium deposits are found on first and second terrace of Shkumbini River and are represented by sands-gravels soils with thickness range from 5-10m up to 20-30m. These deposits are located on right side of Shkumbini River, extending from Rrogozhina town up to Bishqemi village, from Paper village up to Xibraka village and from Rapuni streambed to Librazhdi town. Whereas, the diluvium deposits are located on down slopes, which extend in areas between Librazhdi town and Kostriçani village and Lini and Piskupati village. The deluvium deposits are composed of limestone, ultrabasic and sandstone boulder mixtures by sands-silt-clay soils. Generally, they have a thickness range from 1.5-2.5m to 4.0-6.0m.

Molasses formations of Medium Miocene (N21)

A considerable area of the studied zone occupied by the molasses formations. From the age point of view, these rocks belong in Medium Miocene (N2 1) age. These formations consist of thick-bedded to massive conglomerates, intercalated with thin strata 0.5m up to 1.0-1.5m of sandstone and siltstone-claystone layers. The claystone and siltstone formed strata range from 0.5-1m up to 2-3m thick. Molasses formations situated on older rocks and covered by diluvium and eluvium deposits. Generally, the molasses formations extend from Librazhd town to Qukës village.

Pre-Molasses's Deposit of Burdigalian (N11b)

Pre-Molasses's formations consist of sandstones rocks intercalated with the claystones-siltstones and conglomerate layers. The sandstones, claystones and siltstones layers are 0.2-0.3m up to 1.0-1.5m thick. These formations found from Bishqemi village up to Paper village.

Pre-Molasses's Deposit of Aquitanian (N11a)

Pre-Molasses's Deposit of Aquitanian are represented by combinations of sandstones-siltstones and claystones layers. They are widespread from Bishqemi village up to Paper village.

Flysch formations of Upper Oligocene (Pg33)

Flysch formations are composed by thick to massive sandstones intercalated with claystone and

siltstone layers. They are found from Qukës village up to entrance of Prrenjas town.

Flysch's formations of Eocene (Pg2)

These formations are represented by the claystone and sandstone intercalated with conglomerate and limestone layers. In the studied site these deposits are found at Xibraka village.

Limestone deposits of Upper Cretaceous (Cr2)

They consist of thin to medium bedded limestones, which are compact, hard and crystalline. They are found in Labinot Fushe area.

Intrusive rocks of Middle Jurassic (J2)

The intrusive are represented by ultrabasic rocks, which are represented by serpentinized cataclastic harzburgite rocks with light-dark green colour and much fractured by techtonic activity. Serpentine is chrysotile and antigorite types. They are much fissured by weathering processes. They are part of the Tectonic Zone of Mirdita and are extended from Xibraka village up to the entrance of the Librazhd town, as well as from Piskopat village up to Memelishti village.

Melange formations-blocks in matrix of Middle Jurassic (J2)

Melange formations-blocks in the matrix are part of the Tectonics Mirdita zone and are extended on the east of Xibraka village on both sides of Shkumbini river valley.

Ophiolitic breccia deposits of Upper Jurassic (J3)

Ophiolitic breccia consisting of dolerite, peridotite, dunite, and gabbro clasts. There are also pieces of limestone from the Triassic and Lower-Medium Jurassic, as well as siliceous and sandstones, etc. These formations found from Kostriçani village up to Lini village.

Limestone deposits of Middle Triassic-Middle Jurassic (T2-J2)

They consist of thin bedded limestones with siliceous that are compact. These formations are found on the east of Xibraka village on right side of Shkumbini river valley.

Limestone deposits of Middle Triassic- Middle Jurassic (T3-J1)

These formations composed by thin to medium-bedded compacted limestones and dolomites. These formations are found from Kostriçani village up to Lini village.

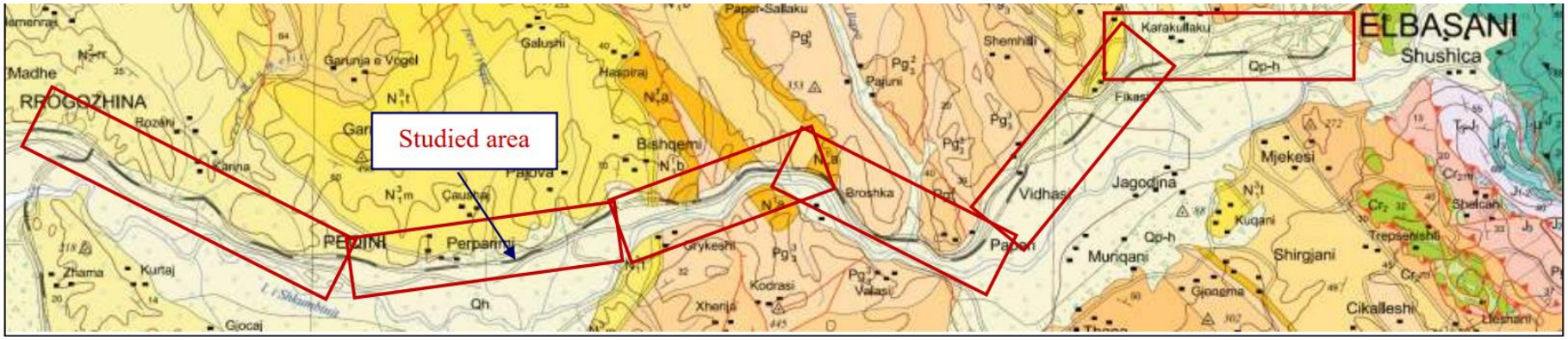


Figure 5-3 Geologic map of Rrogozhinë-Elbasan (Source SHGJSH)

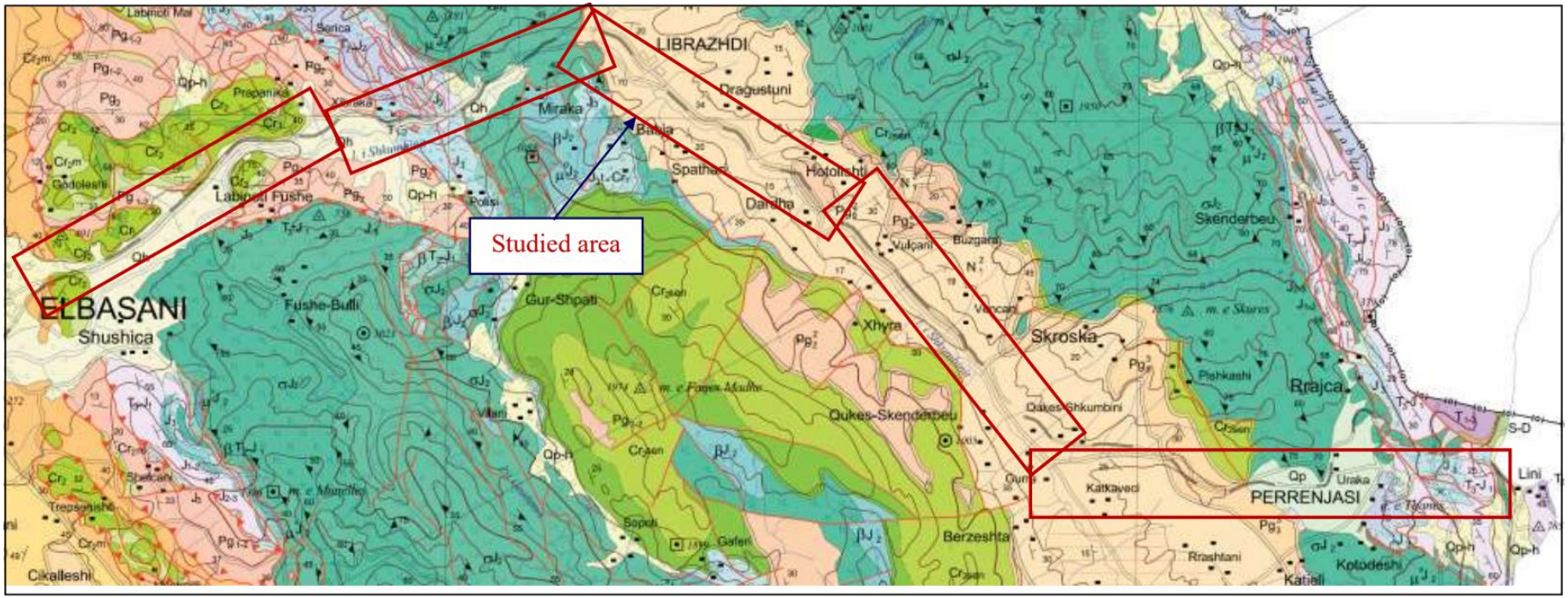


Figure 5-4 Geologic map of Elbasan- Prrenjas (Source SHGJSH)

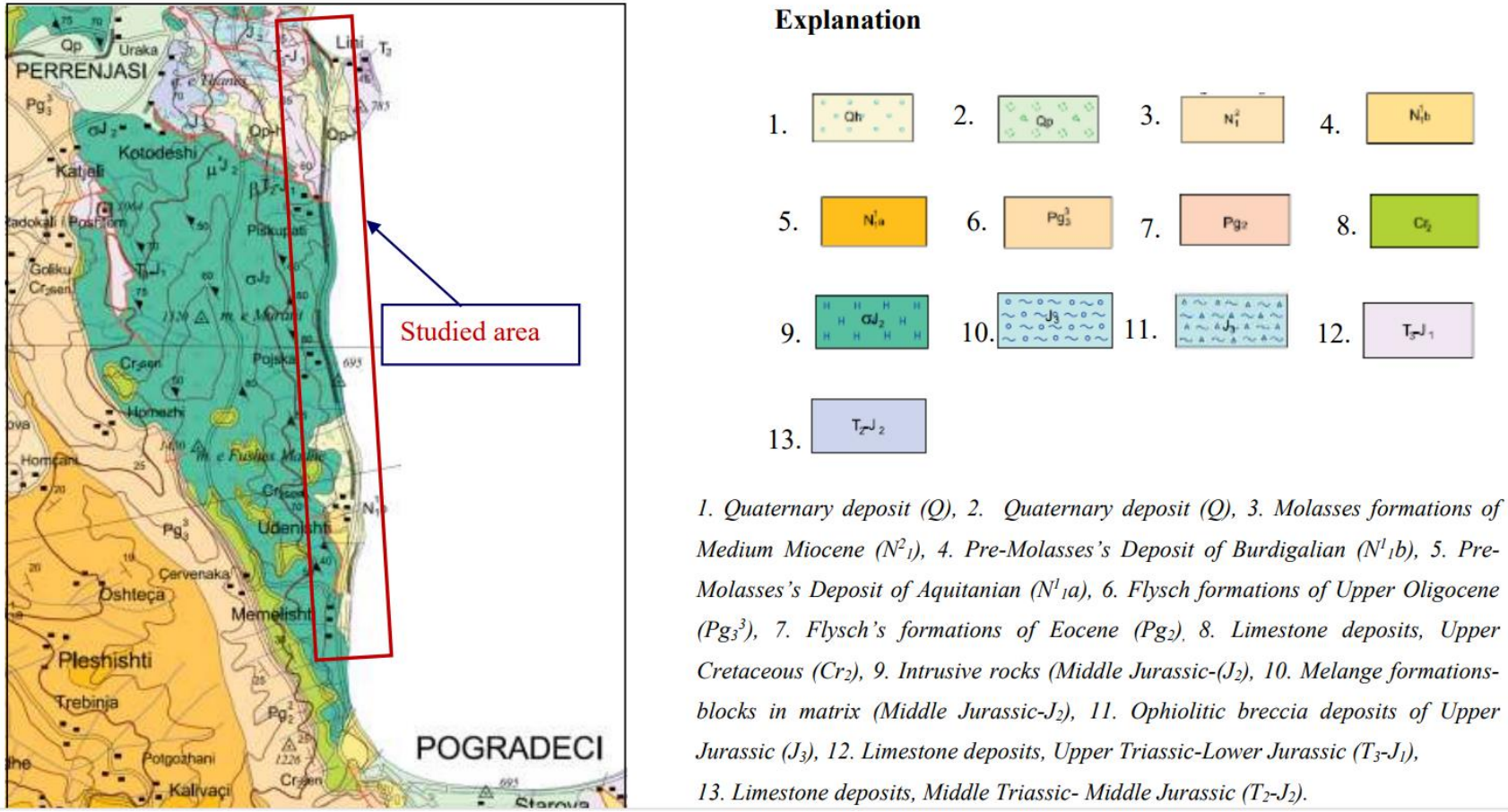


Figure 5-5 Geologic map of Prrenjas- Pogradec (Source SHGJSH)

Geodynamic phenomena

Several mass movements have been distinguished during Fields Works at the project's alignment, along backslope (cut slope). Such movements have been classified as rock falls, debris slide, and earth slide type. Landslide areas are located in soil deposits (diluvial) and weathered bedrocks. The majority of the landslides investigated in this area are rock falls which move very fast. They are a real threat for all the traffic users (train), due to their potential high risk to fall down on the Project trafficked alignment without any previous warning sign. In this report, we shortly described the geodynamic phenomena as mass movement and erosion etc., which are occurred along the railway alignment on the cut slopes and railway's embankment.

Rock fall

The rock falls have been identified at several places on the cut slopes of the railway alignment. The materials, which fall down on the cut slope of railway alignment consist of broken stones and cobbles. Most of the cases have occurred on the cut slope of railway alignment, which is built on the hard rocks (limestone and ultrabasic) with slope angle exceed 75°. Generally, the rock fall is situated in upper part of the cut slope and are composed of separate blocks (0.5-1.0 m3 up to 2.0- 3.0m^3), which fall down on railway route. Based on the fields works carried out in the studied area the rocks fall phenomena have occurred in several areas of railway route. These types of mass movements have been found in several places in the following areas:

- The hills zone of Labinot Fushë up to Xibrakë village;
- The hills zone of Xibrakë village up to Rapuni stream valley;
- The hills zone of Librazhd town up to Prenjas village;
- The hills zone of Buqëz-Piskopat villages up to Udenisht village.

Debris slides

In the investigated area along of the cut slopes from railway alignment, numerous debris slides have occurred, on both side of the railway. The slide material consists of mixtures of rubbles, broken stones, and cobbles with sands and silts. The surface rupture is extended in direction of movement, whereas the state of mass movement activity is very active. Most of these debris slides occurrences were moved down on the rout during heavy rain periods, threatening the lives of the railway users.

The debris slides were distinguished in some places of the following areas:

- The hills zone of Labinot Fushë up to Xibrakë village;
- The hills zone of Xibrakë village up to Rapuni stream valley;
- The hills zone of Buqëz-Piskopat villages up to Udenisht village

Figure 5-6 View of debris slide, Labinot Fushe

Earth flow

Generally, the earth slides are situated in the upper part of the molasses rocks, flysch and mélange rocks on cut slope of railway with inclination 20^{o} -45^{o}.

According to the railway alignment investigation, the earth flow was found in several places in the hills zones:

- The hills zone of Bishqemi village up to Paper village;
- The hills zone of Librazhd town up to Prenjas village.

Erosion

Extremely intensive erosion between Elbasan and Prrenjes town has been occurred over route embankment, as a result of high quantities of precipitation along railway area. This phenomenon occurred because of the lack of drainage infrastructure, such as drainage ditches, etc.

5.2.2.3 Findings

The project area extends from Rrogozhina town up to Guri i Kuq village (Pogradec).

Geologically, the investigated area consists of different types of rocks, which are, Quaternary deposit, molasses formations of Medium Miocene, pre-molasses's deposit of Burdigalian, pre-molasses's deposit of Aquitanian, flysch formations of Upper Oligocene, flysch's formations of Eocene, limestone deposits, Upper Cretaceous, intrusive rocks Middle Jurassic, melange formations-blocks in matrix of Middle Jurassic, ophiolitic breccia deposits of Upper Jurassic, limestone deposits of Middle Triassic-Middle Jurassic and Upper Triassic-Lower Jurassic.

The studied area related to geomorphological features is divided in two morphological units as flat and hilly morphological units.

Most of the project's alignment passes on a flat terrain, composed of soil deposits, while the rest is in a hilly area, which consist of molasses, limestones, melange formations-blocks in the matrix and ultra-basics rocks, which have been intensively affected by the tectonic movements and weathering crust processes.

The mass movements mainly occurred on the railway along cut slopes. They are classified in the rocks fall, debris slide, earth slides and erosion. Most of the landslides in studied area are rock falls, which move very fast, therefore they are a real potential risk for the for the railway users.

Underground water table range from 0.0m to 2.0m deep from the surface on first terrace of Shkumbini River (extending Rrogozhina to the vicinity of the village of Labinot Fushë, Elbasan) and Rapuni terrace stream (Librazhd town).

Underground water table range from 2.0m to 5.0m deep from the surface on plain area of Prrenjas, plain area of Livagjes and Stalecit, terrace-delta of Kroi Bardhe stream, as well as terrace-delta of Torbili stream.

Underground water with a depth below 5.0m from the surface was found at the bottom of the hill slopes as well as in the areas that are formed by rock formations (Bishqemi village up to Paper village, Labinot Fushë up to Xibrakë village, Xibrakë village up to Rapuni stream valley, Librazhd town up to Prenjas village, Kostriçan village up to the Qafa e Thanës train tunnel exit, area of Buqëz-Piskopat villages up to Udenisht village).

5.2.3 Tectonics and seismicity

5.2.3.1 Materials and method

The geotechnical survey is provided in accordance to the types of plots defined by EUROCODE (EC8, 2004), which are respectively: types A, B, C, D, E, S1 and S2.

Definition of the ground category by following the EUROCODE 8 (EC8, 2004) standards. The study was based on the Vs30 – the medium velocity of the shear waves for the first 30m of the subsoil thickness.

EN 1998 asks for a two-level seismic design establishing explicitly the two following requirements:
i) No-collapse requirement:

ii) Damage limitation requirement

Following a decision of the Albanian Government, the latter will be introduced as the unique official norm in the evaluation of seismic hazards.

The description of the seismological characteristics of the project area has been based on the following referenced sources:

- Seismic Micro zonation Map of the city of Elbasan and Librazhd in 1:10.000 scale
- The bibliographical data, the previous reports, the geological, hydrological, geo-hazards, geomorphological and engineering-geological maps
- Information/data on the destructive earthquakes of the year 2019.
- Eurocode 8 (Design of structures for earthquakes Resistance, 2003);
- AASHTO Standard 2006.
- ASTM Standard 2017.
- British Standard (BS1377) 1990.
- Skrame, K., Gaudiosi, I., Muçi, R., Mancini, M., Simionato, M., Fociro, O., Benigni, M. S., Ramollari, A., Giuffrè, M. & Moscatelli, M. [2021]: Earthquake-resistant cities in Albania: The Seismic Micro zonation Studies (SMS) and Limit Condition in Emergency (LCE) integrated approach. Albanian Academy of Science Journal.
- Seismotectonic map of Albania, 1:500,000. Academy of Sciences, Institute of Seismology. Tirana 2000.
- The map of the seismic regionalization of Albania (Sulstarova et al., Tirana, 1980).
- Seismic regionalization of Albania (Sulstarova et al., Tirana, 1980).
- Geological engineering map of Albania, 1; 200.000 scales. Albanian Geological Survey, 2014.

5.2.3.2 Baseline Information

From the seismotectonic point of view, the area under study is part of the Ionic - Adriatic

earthquake belt, which is divided into three large sectors, through transverse tectonic faults near Lezha and the one north of Sazan Island, thus forming three areas of seismic sources (seismogenic zone that have a kind of independence from each other)

The construction site, according to the Geological Risk Map of Albania, is located exactly next to a very active tectonic fault which passes through the construction sites. Great care must be taken in the design of the new building as this tectonic fault was classified as active during the study and construction of this map. It can be activated at any moment and can bring catastrophic consequences for the objects located near it.

Also, the construction site is characterized by very fragile geological formations that present very weak physioco-mechanical properties and where the fluctuation of the underground water level is very pronounced.

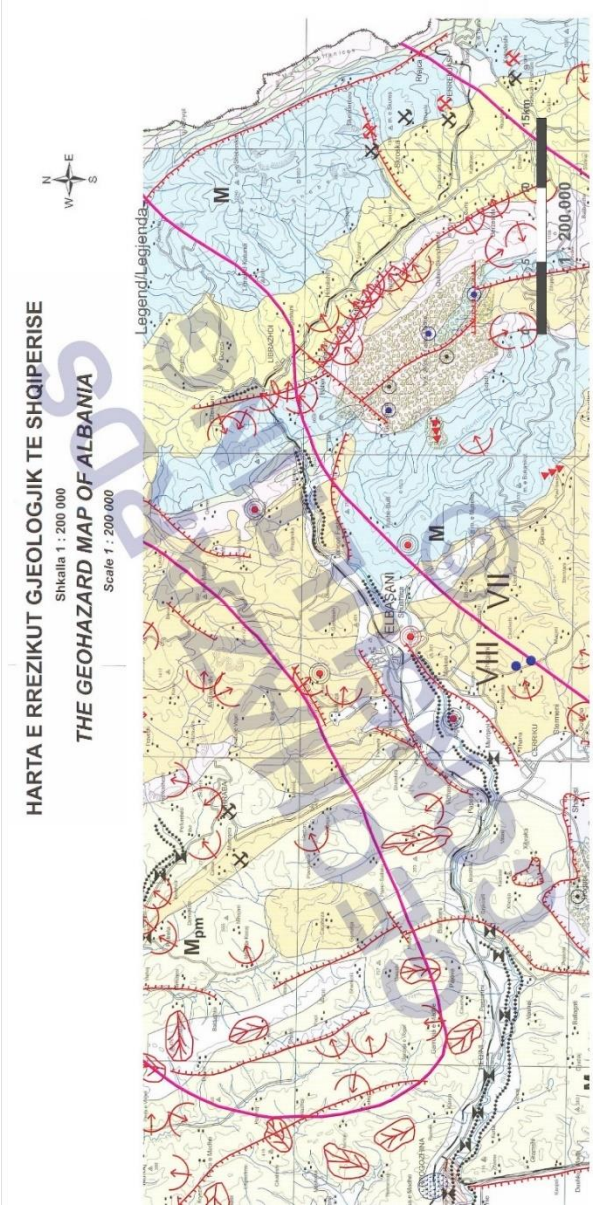


Figure 5-7 Geological Risk Map of Albania where it is evidenced the seismic risk of the case studies.

5.2.3.3 Seismo-Tectonic Setting

The area where the construction site is located, from the geological point of view, is part of the Pre-Mountain (Near-Adriatic) Lowland, which is an area that continues to be affected by post-Pliocene compaction movements. From the seismotectonic point of view, the study area is part

of the Ionian-Adriatic earthquake belt, which is divided into three major sectors, through transverse tectonic faults near Lezha and the north of Sazan Island, thus forming three areas of seismic sources (seismic areas). having a kind of independence from each other).

From northwest to south-east, the Ionian-Adriatic earthquake belt is built from the following areas:

i) Lezha-Ulqin coastal area:

where some pre-Pliocene detachments are observed in pure slip-overpressure type compacts with PVP extension that run parallel to the Dalmatian coast. Here overlap-type disconnections are rarely expected from LVL-extended transverse disconnections.

ii)Pre-Mountain (Pre-Adriatic) Lowland Area:

where post-Pliocene detachments in oblique compression with V to VVP extension are observed which are rarely expected from LVL extension type excitation detachments.

iii) Jonian Ionian Coast Area

Containing pre-Pliocene detachments in pure high-slip-overpressure type VP extensions that are rarely expected from VL and JL extensor-type detachments.

5.2.3.4 Seismicity

Based on the historical data and the geological-tectonic construction described earlier, it should be noted that the construction site is located near the overlying forehead of the Albanian Orogen and therefore the movements with compression mechanism in this area are very strong. They have caused many seismic events (earthquakes) with magnitudes over 5 and intensity IX (MSK-64).

Earthquakes that have been felt in the study area start in 58 with:

I. Earthquake of the year 58. - Earthquake in Durrës with M_s = 6.3 and I_0 = 8.5 (MSK-64).

II. Earthquake of 334. -Earthquake in Durrës and surrounding villages. It is estimated as a major earthquake with catastrophic consequences. M_S = 6.3, I_0 = 8.5 (MSK-64).

III. Earthquake of 506. - Earthquake in Durrës and surrounding villages. According to historical data, starting from the VI century, Durrës suffered great devastation from strong earthquakes. M_S = 6.3, I_0 = 8.5 (MSK-64).

IV. Earthquake of March 1273. - Catastrophic earthquake. Durrës is completely destroyed. Only the Acropolis remained unharmed. According to Pachymeris this city turned into a heap of ruins. There were many casualties. The city of Durrës at that time was a city with 25,000 inhabitants. Those who survived moved to Berat. M_S = 6.6, I_0 = 9 (MSK-64).

V. Kruja earthquake of 1617 with M_0 = 6, I_0 = 8 points (MSK-64).

VI. The earthquake of August 26, 1852 in Cape Rodon. The earthquake destroyed the church of St. Andon on Cape Rodon. M_S = 6, I, I_0 = 8 (MSK-64).

VII. The earthquake of May 16, 1860. This earthquake destroyed the villages around the Beshir Bridge (near Tirana). M_0 = 6, I_0 = 8 points MSK-64).

VIII. Durrës Earthquake of 1926. - In December 1926, Durrës and the region around it were hit by a series of powerful earthquakes. The first quake struck on December 16 and was followed by other shocks. The strongest shock is that of December 17 with magnitude M_S = 6.2 (according to the Sarajevo bulletin M_S = 6.5), I_0 = 9 (MSK-64). This blow caused and severely damaged many buildings in the city of Durrës, Kavaja and Shijak as well as in the surrounding villages.

IX. The earthquake of February 4, 1934, with its epicenter in the village of Ndroq M_S = 5.6, I_0 = 8 (MSK-64). The villages were damaged: Ndroq, Kërcukaj, Bozaxhijas, Romanat, serious damages were also noticed in Durrës.

X. The earthquake of 19 August 1970 with epicenter in the village of Vrap (Tirana) (M_S = 5.5, I_0 = 7) causing serious damage in the villages of Vrap and Baldushk as well as in the city of Kavaja.

XI. Earthquake of 16 September 1975 with M_S = 5.3 in Cape Rodoni, Durrës.

XII. Earthquake of January 9, 1988, with epicenter in Tirana with magnitude M_S = 5.4 and I_0 = 7. (MSK-64).

The last and most important were the earthquakes of 2019. During the period September 2019 - January 2020 there were 8 earthquakes with magnitude higher than 5. Earthquakes of September 21, 2019, with magnitude M_L = 5.4 and M_L = 5.2 with epicenter 5km north of the city of Durrës and the earthquake of the date 26 November 2019, with M = 6.4, with epicenter 7 km north of the city of Durrës have been the strongest. These earthquakes were accompanied by five strong aftershocks with magnitude M = 5.1, M = 5.3, M_L = 5.4, M_L = 5.4 and the last one on January 28, 2020, with mb = 5.0. and 5.3. These earthquakes caused an intensity I_0 = 9 (MSK-64. The earthquake of November 26, 2019, caused the death of 51 people and damage to thousands of buildings in cities and villages: Durrës, Tirana, Kavaja, Shijak, Thumana, etc.

For this reason, it is very important to be carefully and responsibly when new structures are constracted in these areas with such high seismicity.

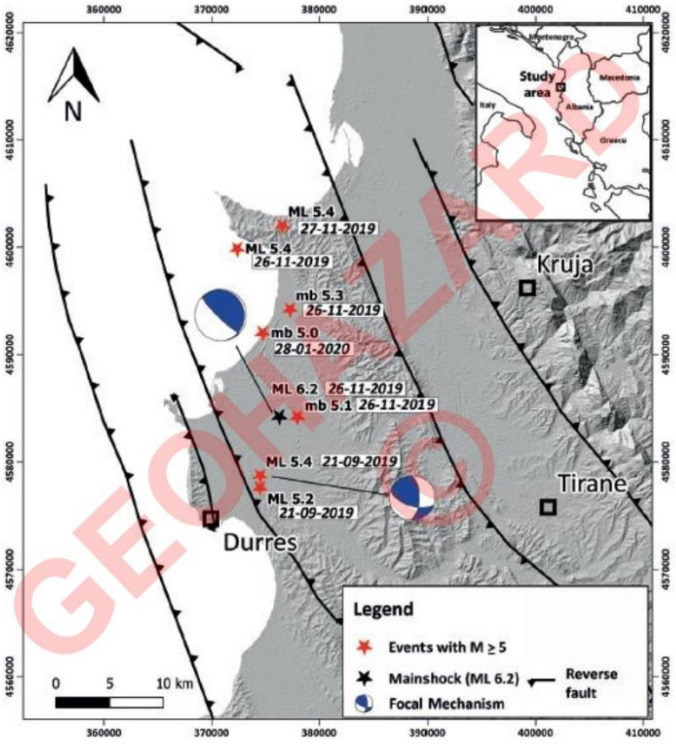


Figure 5-8 The map shows the epicentres of the 2019 earthquakes and the active disconnections that occur in the Durrës Region but that were also felt a lot in the study area

- **Determination of the ground type of the case study according to the Eurocode 8 – 2004 standards**

Based on the types of plots defined by EUROCODE (EC8, 2004), which are respectively: types A,

B, C, D, E, S1 and S2, that the study area can be classified as "C" and "D" Ground Type. But since the transverse wave velocities Vs are very small, the construction site taken in the study can also be classified as S1 or S2 Ground Type to be safer and to design better.

Table 5-11 Ground Type Classification according to the EUROCODE EC8 2004

Ground type	Description of stratigraphic profile	Parameters		
		$v_{s,30}$ (m/s)	N_{SPT} (blows/30cm)	c_u (kPa)
A	Rock or other rock-like geological formation, including at most 5 m of weaker material at the surface.	> 800	–	–
B	Deposits of very dense sand, gravel, or very stiff clay, at least several tens of metres in thickness, characterised by a gradual increase of mechanical properties with depth.	360 – 800	> 50	> 250
C	Deep deposits of dense or medium-dense sand, gravel or stiff clay with thickness from several tens to many hundreds of metres.	180 – 360	15 - 50	70 - 250
D	Deposits of loose-to-medium cohesionless soil (with or without some soft cohesive layers), or of predominantly soft-to-firm cohesive soil.	< 180	< 15	< 70
E	A soil profile consisting of a surface alluvium layer with v_s values of type C or D and thickness varying between about 5 m and 20 m, underlain by stiffer material with v_s > 800 m/s.			
S_1	Deposits consisting, or containing a layer at least 10 m thick, of soft clays/silts with a high plasticity index (PI > 40) and high water content	< 100 (indicative)	–	10 - 20
S_2	Deposits of liquefiable soils, of sensitive clays, or any other soil profile not included in types A – E or S_1			

5.2.3.5 Geological hazards

i) The phenomenon of consolidation of swamp and alluvial deposits.

During the study, it was found that in the area where the new building will be rebuilt, there are deposits with extremely weak characteristics, therefore the designers of the object are recommended to pay special attention. They must take engineering measures to minimize the damage to the building in the event of another earthquake.

ii) Weathering phenomena

This phenomenon is visible in the root formations that consist of argillite and siltstone. These rocks are new deposits with weak clay cementation. Under the action of atmospheric agents, they transform from soft rocks to soil. This phenomenon is more common in the hilly part of the study area.

iii) The liquidation phenomenon

The Liquefaction Phenomenon is a physical condition in which coarse-grained soils (usually sands) saturated with water can occur, when their shear resistance decreases drastically due to the increase in water pressure in the subsoil. During a seismic event (earthquake) that causes dynamic and cyclic loads, undrained conditions will be created on the ground, where water remains trapped in the pores and increases its pressure. This change brings about a change in the shear resistance of the sands, which can behave like a viscous fluid. The phenomenon of liquefaction occurs when several geological/geotechnical and seismic conditions are verified at the same time. During the earthquake of November 2019, this phenomenon was verified on the

beach of Durrës, more precisely near the Mira Mare hotel.

The study of this phenomenon requires specific studies with higher costs. It would have been important for this study to be carried out for the construction site taken in the study, but the very low values given for the study do not allow it.

Figure 5-9 The liquefaction phenomenon observed on the beach of Durrës during the earthquakes of 2019

iv) Seismic waves amplification

Seismic waves, during their passage from the earthquake centre to the topographic surface, can be significantly modified in function of the subsoil stratigraphy and geomorphological conditions. They can undergo changes in amplitude, frequency and duration during the transition from a rock formation (seismic bedrock ($Vs \geq 800\ m/s$)) to layers of deposits (loamy rocks (soils)) superimposed, reaching the surface. This phenomenon is significantly influenced by local conditions: the morphology and stratigraphy of loose rocks and rocks, as well as by their physical and mechanical parameters.

v) The landslides phenomenon

Landslides are movements of rock masses (mainly soils) that involve limited surfaces. It is usually a question of colluvial deposits which are moved in the direction of the downslope.

These deposits consist of clays and silts containing organic matter and fragments of root formations. The colluvial cover is placed over the bedrock formations. Given that the study is carried out on a steep escarpment, the colluvial cover of the deposits tends to shift from the high elevations of the terrain to the low elevations.

vi) The seismic-inducted landslides phenomenon

This phenomenon appears mainly in Neogene formations during a seismic event. During the September 2019 earthquake, this phenomenon was evident on the Kavaja Rock.

vii) Slope erosion phenomenon

It is a fairly widespread phenomenon in the territory of the District of Elbasan. This phenomenon is widespread in areas mainly composed of clay and silty formations. This phenomenon has been helped to a very large extent by the numerous deforestations. In Elbasan County, this phenomenon appears mainly in the hilly area and in the weathered formations of the Neogene deposits and their colluvial cover. Surface waters during heavy rains erode the colluvial cover and the aerated part of the deposits.

We recommend paying special attention to the protection of the construction site from surface water. During the service phase of the facility, it is recommended to collect and regulate surface water, which must flow through channels or drainage pipes. Collected water should be discharged into a local drainage system or away from the construction site.

5.2.3.6 Seismic risk assessment

Seismic Risk Values in terms of PGA for return periods of 95 and 475 years, (referring to the recommendations given by the Institute of Geosciences (IGJEO), former IGJEUM), for the subsoil of the case study are presented in the following table. These values represent the agR parameter according to the EUROCODE 8 standard in seismic-geological-engineering conditions of seismic rock (Bedrock Seismic, Ground of Type "A" according to EC8, with Vs> 800 m / s).

Table 5-12 Seismic Risk for the Municipalities and Administrative Units (referring to the recommendations given by the Institute of Geosciences (IGJEO), former IGJEUM

BRIDGES	MUNICIPALITY	ADMINISTRATIVE UNIT	OVERCOME PROBABILITY	
			10% in10 years (g)	10% in 50 years (g)
1	RROGOZHINË	SINABALLAJ	0.141	0.290
2	PEQIN	KANINË	0.143	0.294
3 & 4		PËRPARIM	0.152	0.311
5, 6, 7, 8, 9		PAJOVË	0.158	0.321
10, 11, 12	ELBASAN	PAPËR	0.169	0.341
13, 14, 15	LIBRAZHD	LIBRAZHD	0.163	0.328
16, 17, 18, 19		HOTOLISHT	0.152	0.307
20	PRRENJAS	QUKËS	0.146	0.294

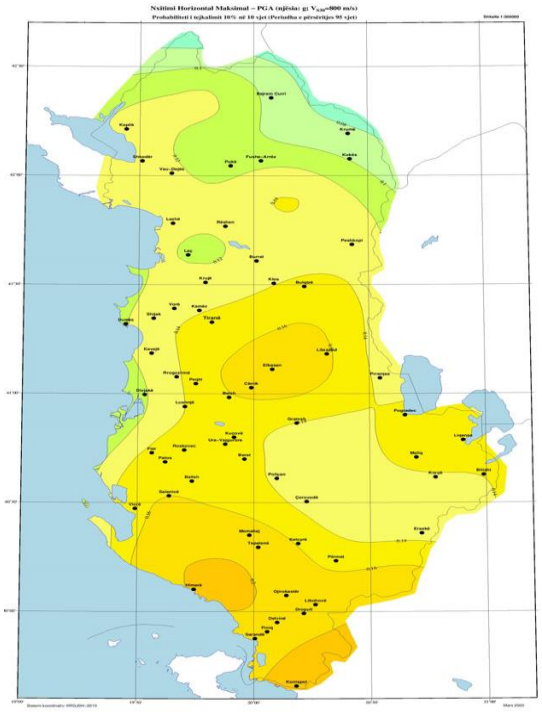


Figure 5-10 PGA maximum acceleration map for Albania in Seismic Bedrock terrain, Type "A" terrain according to EC8, with Vs > 800 m/s, with a probability of exceeding 10% in 10 years (return period 95 years) (referring to the recommendations given by the Institute of Geosciences (IGJEO), former IGJEUM).

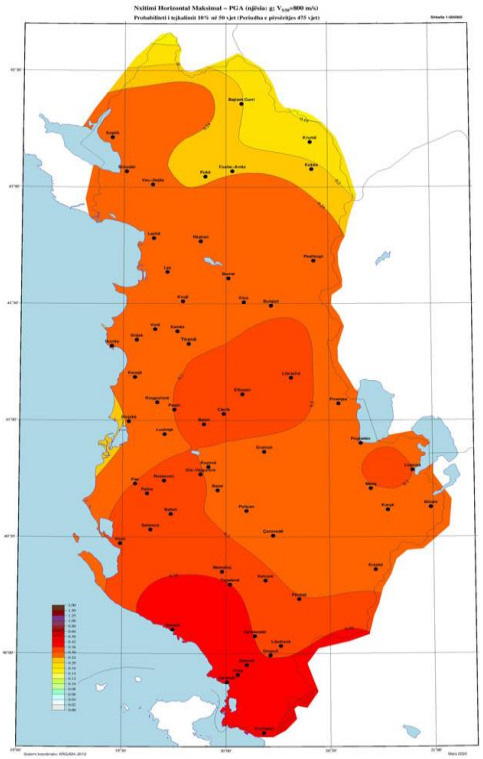


Figure 5-11 PGA maximum acceleration map for Albania in Seismic Bedrock terrain, Type "A" terrain according to EC8, with Vs > 800 m/s, with a probability of exceeding 10% in 50 years (return period 475 years) (referring to the recommendations given by the Institute of Geosciences (IGJEO), former IGJEUM).

5.2.3.7 Findings

Based on the distribution profile of "P" waves (Vp) with depth and the obtained geological-engineering-seismological model of the construction sites, we can state that we are dealing with 3 geological-engineering-seismological layers which are very similar from a geophysical point of view and present very similar Vp values and where the impedance contrast between them is very small.

Based on the types of plots defined by EUROCODE (EC8, 2004), which are respectively: types A, B, C, D, E, S1 and S2, we can state that the study area can be classified as “C” and “D” Ground Type. But since the transverse wave velocities Vs are very small, the construction site taken in the study can also be classified as S1 or S2 Ground Type to be safer and to design better. Horizontal and vertical elastic response spectra according to EUROCODE 8 for both performance levels "limited damage condition" and "non-collapse condition" (respectively, that with a probability of exceeding 10% in 10 years (return period 95 years) and probability of exceeding 10% in 50 years (return period 475 years) are calculated according to the criteria of EUROCODE 8 for "C” and “D" Ground Type.

Regarding the importance classes values for the buildings (γI) it is recommended that the engineering structure to be built on the study area could belongs to the fourth (IV) category, according to the criteria set by EUROCODE 8 (table 2), but if the designer of the structures, constructors or investors consider it reasonable, they can also apply other value factors.

Table 5-13 Importance classes and recommended values for importance factors for buildings (γi)

Importance class	Buildings	(γI)
I	Buildings of minor importance for public safety, e.g. agricultural buildings, etc.	**0.8**
II	Ordinary buildings, not belonging in the other categories.	**1**
III	Buildings whose seismic resistance is of importance in view of the consequences associated with a collapse, e.g. schools, assembly halls, cultural institutions etc.	**1.2**
IV	Buildings whose integrity during earthquakes is of vital importance for civil protection, e.g. hospitals, fire stations, power plants, etc.	**1.4**

The seismic foundation (seismic bedrock) with Vs> 800 m / s is located at depths higher than 30m from the ground surface, but as input of strong oscillations is taken the depth equal to 30m from the ground surface according to the criteria defined by the laws in force in Albania and by EUROCODE EC8 2004.

5.2.4 Ground water

5.2.4.1 Materials and method

The assessment of the ground waters is important input during drafting ESIA report as the construction works, excavations potentially may pollute the ground waters and therefore affect the quality of the water bodies. The project area is surrounded by important water bodies.

The purpose of the surface and groundwater assessment in the project area is to demonstrate the potential impacts on the quantity and quality of these waters. The assessment of the

hydrological issues of the project area was based on the following:

- Geological report for the preliminary design phase for this project
- Existing reports/study referring to the quality of the water bodies near the project area (NEA Environmental reports);
- The hydro-geological reports carried out by the Albanian Geological Survey for the infrastructure projects around the project area;
- Site surveying /investigation in the project area and its surroundings.
- Existing studies / articles on the geology, hydrology, and ground waters within the wide project area;
- Hydro-geological map of Albania, scale 1:200,000, Albanian Geological Survey,

Groundwater is universally recognized as the most essential and abundant resource for any nation. Its volume can be augmented by atmospheric precipitation, facilitating increased infiltration, or through interaction with neighbouring aquifers. Groundwater monitoring endeavours to evaluate both the quantity and quality of these resources, utilizing a network dispersed across the basins within the country's borders.

5.2.4.2 Baseline Information

The project line is part of Shkumbini Water Basin.

Figure 5-12 Shkumbini Basin

Within the Shkumbin basin, the waters exhibit generally favorable physico-chemical characteristics. They are categorized as fresh, ranging from moderately hard to very hard, and are weakly alkaline.

The groundwater within this basin typically exhibits favourable physico-chemical properties. It serves as a source of drinking water for both the populace and commercial enterprises. However, the presence of NO2, NO3, and NH4 in the groundwater is attributed to the failure to enforce designated zones of strictness and sanitary protection during drilling operations;

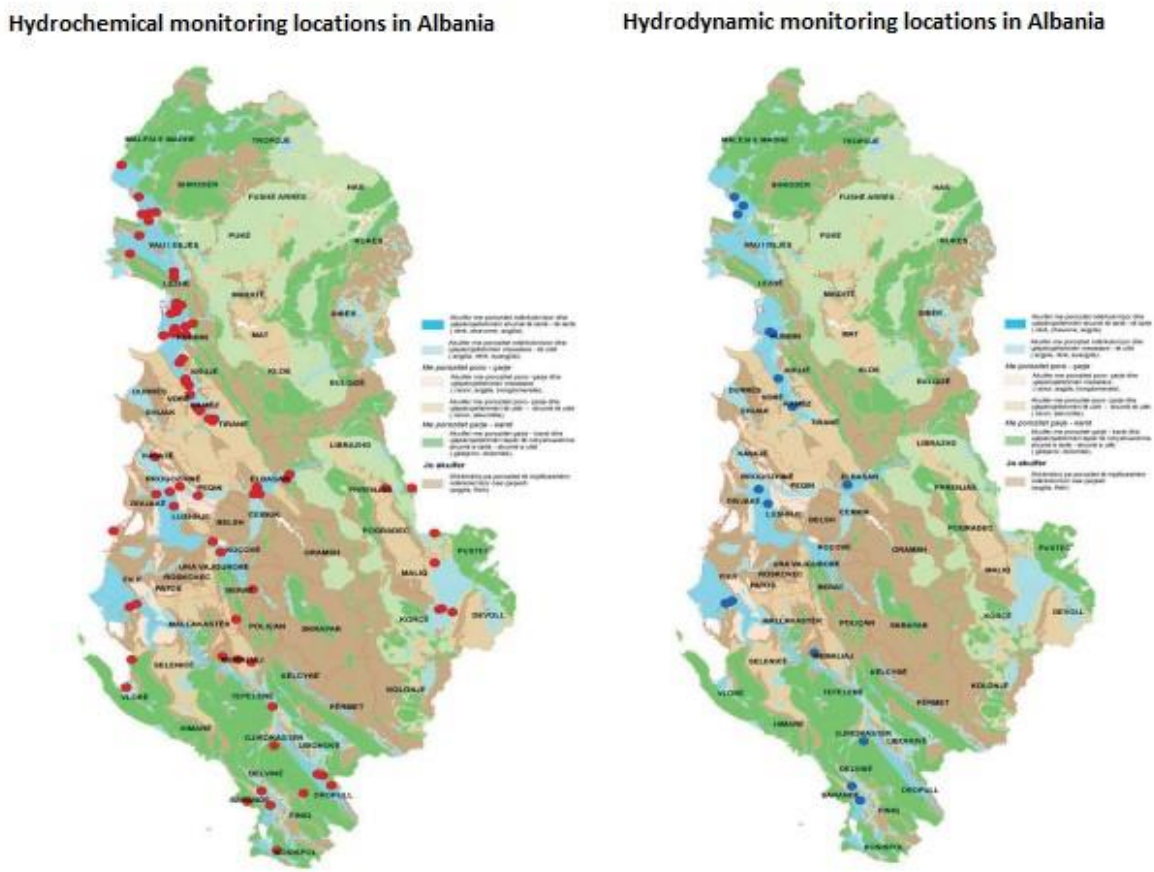


Figure 5-13 Map of hadrochemical monitoring points in Albania

The assessment of the quality of underground water is carried out based on DCM no. 379 dated 25.05.2016, for the approval of the regulation "Quality of drinking water".

Table 5-14 Norms according to DCM 379 on the quality parameters of underground water

Parameters	pH	NH4 mg/l	NO3 mg/l	NO2 mg/l	General Mineralization mg/l	Overall hardness ° gj	Chlorine mg/l	Na mg/l	Mg mg/l
Norms DCM 379 (25.05.2016)	6.5-9.5	0.1 (0.5)	50	0.5	1200	10-20 (25)	250	200	50

- **Shkumbini basin**[42]

The hydrodynamic and hadrochemical monitoring of groundwater in the aquifers of the Shkumbin basin was carried out according to the following monitoring network with a frequency of twice a year.

Table 5-15 Hydrodynamic and hydro chemical monitoring points for the years 2020 - 2022 Shkumbin basin

No	Location	X	Y	Basen	Hydro chemical Monitoring	Hydrodynamic monitoring
1	Central station Konjat	4541309	4386305	Shkumbin	+	
2	Çermë - Well 281- Lushnjë	4547371	4382919	Shkumbin	+	
3	10 A. Vidhas – Elbasan	4549249	4415162	Shkumbin	+	

[42] https://akm.gov.al/ova_doc/raporti-per-gjendjen-e-mjedisit-2022/

No	Location	X	Y	Basen	Hydro chemical Monitoring	Hydrodynamic monitoring
4	Shp.2/ 90 Station Krastë e madhe- Elbasan	4426424	4554520	Shkumbin		+
5	Shp.3/70 Station Krastë e Vogel- Elbasan	4425230	4552550	Shkumbin		+
6	Shp.Bujqes-Mjeksi	4420363	4549715	Shkumbin		+
7	Shp.10 A. Vidhas - Elbasan	4415162	4549249	Shkumbin		+
8	St. Muriqan- Elbasan	4416051	4546365	Shkumbin		+
9	St. Cerikut- Elbasan	4414050	4546336	Shkumbin		+
10	Station - Peqin	4394669	4545671	Shkumbin		+
11	St. Rrogozhinë	4388350	4549422	Shkumbin		+
12	Shp. 3 Konjat-Lushnje	4386305	4541309	Shkumbin		+
13	Shp. 286 Çerme- Lushnje	4384850	4547350	Shkumbin		+
14	Shp.1D(Divjake)-Lushnje	4380126	4546265	Shkumbin		+
15	Spring Qafë Thanë	4459750	4548875	Shkumbin		+
16	Well Nr.1. Pump Station Konjat (v. 2008)	4541634	4387018	Shkumbin		+
17	Well Nr.2. Pump Station Konjat (v. 2008)	4541610	4386639	Shkumbin		+
18	Well Nr.4. Pump Station Konjat (v. 2008)	4541838	4385880	Shkumbin		+
19	WellNr.5. Pump Station Konjat (v. 2008)	4541948	4385493	Shkumbin		+
20	Well Nr.6. Pump Station Konjat (v. 2008)	4542053	4385109	Shkumbin		+
21	Pump Station Çermë, pusi nr.5	4547428	4383027	Shkumbin		+
22	Shp.2 WATER SUPPLY Kavajë	4561750	4379800	Shkumbin		+
23	Shp.2/ 90 Station Krastë e Madhe - Elbasan	4426424	4554520	Shkumbin		+
24	Shp.3/70 Station Krastë e Vogël- Elbasan	4425230	4552550	Shkumbin		+

The groundwater within this basin typically possesses favourable physico-chemical characteristics. It serves as a vital source of drinking water for both the population and commercial establishments. However, the presence of NO2, NO3, and NH4 in the groundwater can be attributed to the lack of implementation of designated zones for strictness and sanitary protection during drilling activities.

In the Shkumbin basin[43], about 2300 - 2500 l/sec are used, distributed as follows:

In the porous aquifer of Elbasan

- The total amount of water used from the Elbasan aquifer reaches Q = 700 - 1250 l/sec, this amount is almost unchanged compared to previous years. The annual coefficient of utilization varies K= 0.25 - 0.3.
- Groundwater levels in the Vidhas aquifer of Elbasan fluctuate in the following values:
- Nmin= -7.74 m, Nmax= -3.8 m. The amplitude goes to the value A= 3.94 m
- In the carbonate aquifer:
- Temperature (T) varies in values 9 - 15oC - pH varies in values 7.41 - 7.82, they are weak alkaline waters.

[43] https://akm.gov.al/ova_doc/raporti-per-gjendjen-e-mjedisit-2022/

- Fp ranges from 9.52-10.92o German, so they are moderately hard water - Mp goes from 283.61 - 312.21 mg/l, so they are fresh water, water type is HCO3 – Ca - They do not contain NH4 and NO2.

In the quaternary aquifer of Elbasan

- T = 14 – 17oC - pH = 7.21-7.86, they are weak alkaline waters,
- Fp varies from 11.2 - 13.72 o German at the stations of Krastave, 17.21 - 18.61° German at Cërrik, so they are moderately hard waters. In Vidhas - Muriqan, Fp ranges from 25.05 - 29.52° German, they are very strong waters.
- Mp ranges from 324.74 - 391.24 mg/l, in Krastë and increases in Vidhas and Muriqan to values of 775.52-848.95 mg/l, while in Cërrik it drops to 524.08 mg/l, so it is fresh and fresh water, the type of water is HCO3 –Mg – Ca.
- NH4 and NO2 are at low values within the parameters.
- Iron F reaches values of 0.01 - 0.11 mg/l, where 0.11 mg/l was captured only once in the period 2020-2021.

In the quaternary aquifer of Peqin-Rrogozhina

- T varies in values of 15 - 17oC.
- pH varies in values 7.25 - 7.54 are weak alkaline waters.
- Fp ranges from 29.11 - 30.51o German are very hard waters.
- Mp ranges from 716.23 – 879.57 mg/l, so it is fresh water, the type of water is HCO3 – Mg – Ca.
- NH4 ammonia is in low values from 0.02 to 0.1 mg/l. Local pollution is found during the period of high water.
- NO2 Nitrites have values ranging from 0.01 – 0.28 mg/l.
- NH4 ammonia is at low values of 0.005 - 0.88 mg/l. Continuous NH4 pollution is found at the Konjat station.

➢ **Quantitative assessment 2020-2022**

Pogradec

The aquifers in Pogradec Municipality are reflected in the following table, referring to the Pogradec Strategic Environmental Assessment report [44]:

Table 5-16 Aquifer of Pogradec

Aquifer	Dynamic resources of groundwater m3/s	Utilization of groundwater m3/s	Use
Pogradec porous aquifer	0.05	0.02	For municipal water
Gore-Moker fissure aquifer	0.07	0.07	Drinking water supply
Aquifers with fissure	0.1	0.1	Drinking water supply
Karstic aquifer of Mali I Thate Rakice	3.15	0.5	Drinking water supply

[44] Environmental Strategic Assessment Report _ Pogradec

Aquifer	Dynamic resources of groundwater m3/s	Utilization of groundwater m3/s	Use
Non-Aquifer	0.07	0.05	Drinking water supply
AMOUNT	3.44	0.74	Drinking water supply

Aquifers with fissure porosity

The groundwater in this category is linked to dense and fractured ultrabasic rock formations. These aquifers extend as a continuous stream along the northwestern periphery of the area under examination, stretching from the town of Pogradeci to the village of Lin. Additionally, they manifest as localized occurrences along the northwestern border, particularly in the village of Peshkepi.

Aquifers with fissure porosity – karst

Aquifers characterized by fissure-karst porosity, exhibiting water conductivity with highly variable ranges, including some locations with notably high values, are associated with carbonate rock formations spanning the Upper Triassic, Jurassic, Cretaceous, Paleocene, and Eocene periods. This aquifer type is predominant in the municipality of Pogradec, covering an expanse of 110.26 km^2, constituting approximately 18% of the municipality's territory. These aquifers exhibit extensive karst phenomena, harboring substantial water resources. In karst regions, the average coefficient of useful infiltration can reach levels of 0.6-0.7. These aquifers serve as the primary water source for cities such as Pogradec, Bucimaşi, Gështenjas, Lini, and Qafë-Thane customs, providing drinking water at a rate of approximately 0.5 m^3/s. Significant volumes are also utilized for agricultural and light industrial purposes. The dynamic flow of this aquifer is estimated at Qd=3 m^3/s.

Cervebake and Qafa e Thanës caustic aquifer

These aquifers manifest as localized occurrences near the villages of Rrëmenjë, Vërdovë, Guri i Kuq, and Cervenakë, extending toward Qafë Thanë. Comprised of conglomeratic limestone and limestone with rudist, this aquifer is characterized by massive and layered formations with abundant karstified cracks.

Rrogozhinë[45]

The groundwater within the aquifers of the Rrogozhina series is generally of subpar quality. These underground waters typically exhibit hardness and frequently contain traces of iron. Below are the key hydrochemical indicators associated with them:

- Hydrochemical type HCO3-Ca-Mg;
- Dry residue 400-1000 mgL;
- General hardness 17-30 ° German;
- Magnesium 30-70 mgl-1;
- Iron 0.2-0.6 mg L-1.

The city of Rrogozhina currently relies on water supplied from two wells drawing groundwater from the gravel aquifers of the Shkumbin river valley. However, the city faces significant water scarcity issues, necessitating the use of water trucks dedicated to supplementing the water supply for the population. Villages primarily depend on shallow village wells, often shared by a single family or group of families, for their water needs. While groundwater quality varies, the

[45] Environmental Strategic Assessment Rrogozhine

predominant concern lies in poor bacteriological conditions. Unfortunately, the general population shows little interest in ensuring bacteriological protection of well water. Many wells are poorly situated, lacking sufficient cementing around the wellhead to prevent contamination from surface water infiltration. Additionally, cleanliness standards for buckets and ropes are often disregarded, and wells are rarely disinfected. Some villages, such as Gosa e Vogël, Kërçukje, Ballaj, and Vile Bashtovë, rely on water from wells located in the sandstone-conglomerate rocks of the Rrogozhina Series.

5.2.4.3 Findings

Water quality monitoring was conducted at four sampling stations spanning[46] its entire length. These stations are detailed in tabular format below.

Table 5-17 Sampling locations, Shkumbin River 2022

No.	Sampling code	Name of river	Location	Coordinates	
1.	Sh1	Shkumbini River	Qukës–500 m above the Qukës village	N 41.070265	E 20.467855
2.	Sh2	Shkumbini River	Bridge of Toplias	N 41.097940	E 20.081447
3.	Sh3	Shkumbini River	Bridge of Paprit	N 41.052378	E 19.942619
4.	Sh4	Shkumbini River	Bridge of Rrogozhinë	N 41.062902	E 19.645174

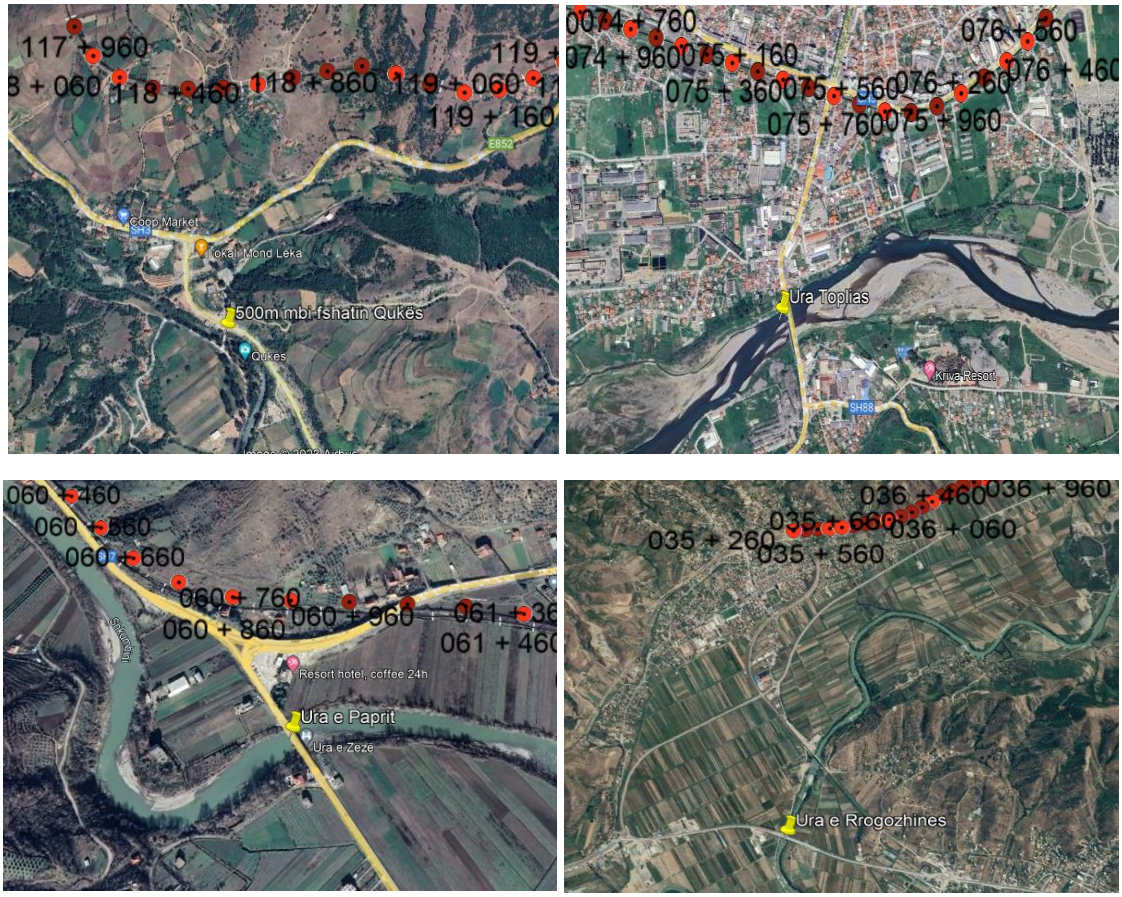


Figure 5-14 Orthophoto of the sampling stations for the Shkumbin River and the proximity to the project

[46] https://akm.gov.al/ova_doc/raporti-per-gjendjen-e-mjedisit-2022/

footprint

The stations indicate water saturation with oxygen, categorizing the waters of the Shkumbin Basin as Class I - High condition. BOD5, a critical parameter for assessing river water quality and pollution levels, does not exceed the limit at any monitored station.

Ammonia concentrations are below permissible levels at all stations, classified as Class II - Good condition. Additionally, nitrites, nitrates, ortho-phosphates, and total phosphorus levels fall below allowed thresholds, resulting in all four monitoring stations in the basin being classified as Class I - High condition. Considering all parameters outlined in the Water Framework Directive, the waters of the Shkumbin Basin are estimated to be in Class III - Moderate condition. In terms of heavy metal content, the Shkumbin Water Basin, centered in Elbasan, has been monitored at five stations, the locations of which are detailed in the table below.

Table 5-18 Estimated results of heavy metals in the Shkumbin Basin and comparison with the norms determined by Water Framework Directive, for the year 2022

Measured parameter	Symbol	Unit	Classification Framework Water Directive (75/440/ EEC)			Stations				
			A1 Good	A2 Moderate	A3 Bad	Qafe -Plloce	Qukës	Bridge Toplias	Bridge Paprit	Bridge Rrogozhinë
Arsenic	As	µg/l	<50	50	>100	2.2	n.d.	2.2	3.5	2.5
Cadmium	Cd	µg/l	<1	5	>5	n.d.	n.d.	n.d.	n.d.	n.d.
Copper	Cu	µg/l	<50	100	>1000	1.735	0.335	0.47	0.505	1.475
Lead	Pb	µg/l	<50	50	>50	19.275	9.615	8.235	12.915	13.75
Mercury	Hg	µg/l	<1	1	>1	n.d.	n.d.	n.d.	n.d.	n.d.

It is observed that Arsenic, Lead, and Copper are present in the monitored stations. However, the levels of these elements at all stations are below the permissible limits, resulting in the classification of the waters of the Shkumbin basin as Class A1 - Good condition.

As per the 2021 report on the state of the environment by NEA for the Shkumbin basin, water quality analysis was conducted at the same locations listed in the sampling locations table for the Shkumbin River in 2022. The findings are illustrated in the figures below.

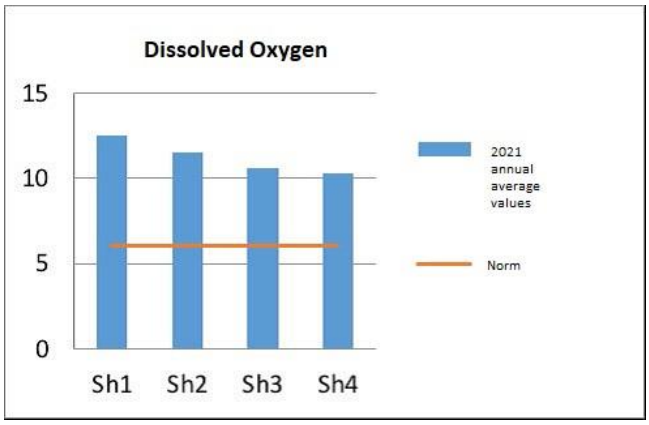


Figure 5-15 Average dissolved O2 value, mg/l Shkumbin Basin 2021

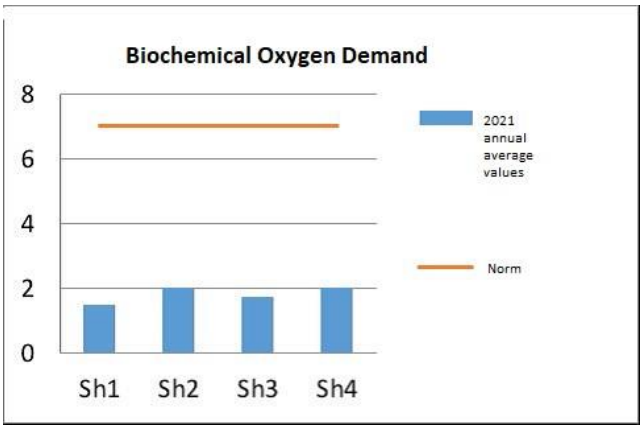


Figure 5-16 Average NBO5 value, mg/l Shkumbin Basin 2021

The average dissolved oxygen levels categorize the waters of the Shkumbin Basin as Class I - High condition, as they exceed the standard of > 7mg O/l. Furthermore, none of the monitored stations show a breach of the limit value for BOD5.

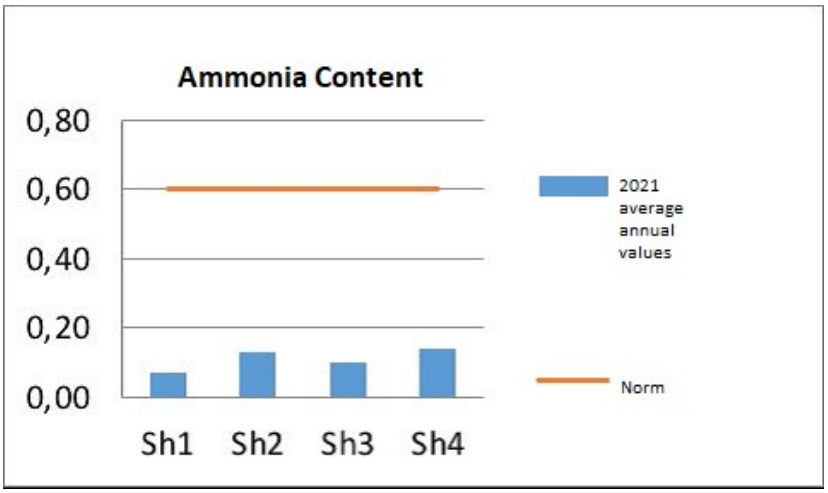


Figure 5-17 Average N-NH4 value, mg/l Shkumbin Basin 2021

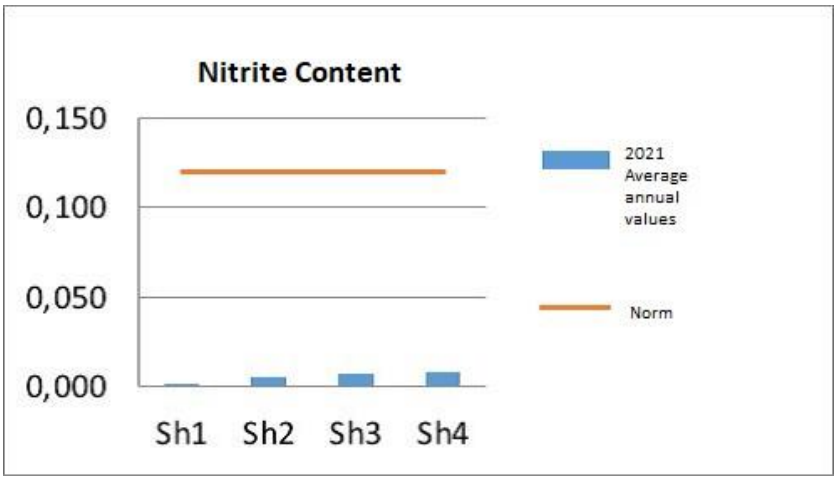


Figure 5-18 Average N-NO2 value, mg/l Shkumbin Basin 2021

Based on the ammonia levels, the waters of this basin are categorized as Class II - Good condition. Additionally, the nitrite content is below the permissible limit, leading to the classification of the stations as Class I - High condition.

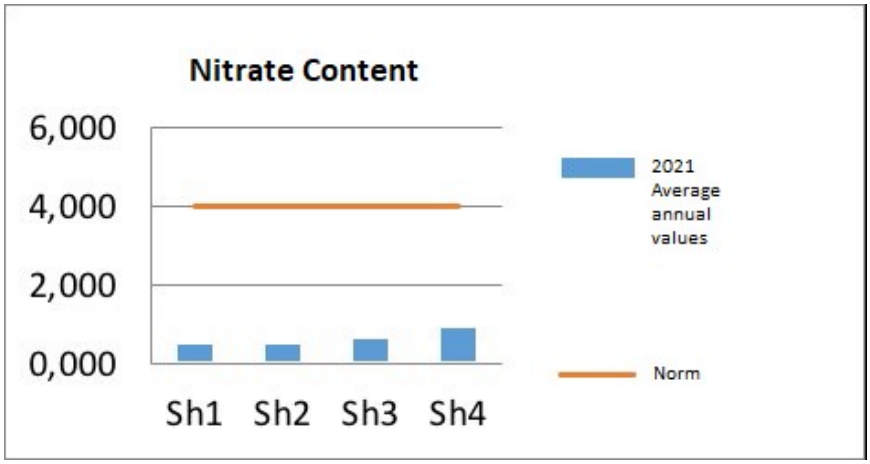


Figure 5-19 Average N-NO3 value, mg/l Shkumbin Basin 2021

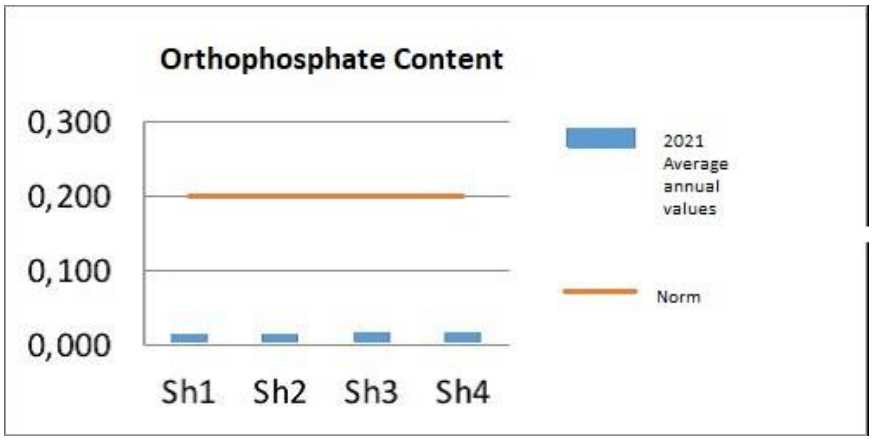


Figure 5-20 Average P-PO4 value, mg/l Shkumbin Basin 2021

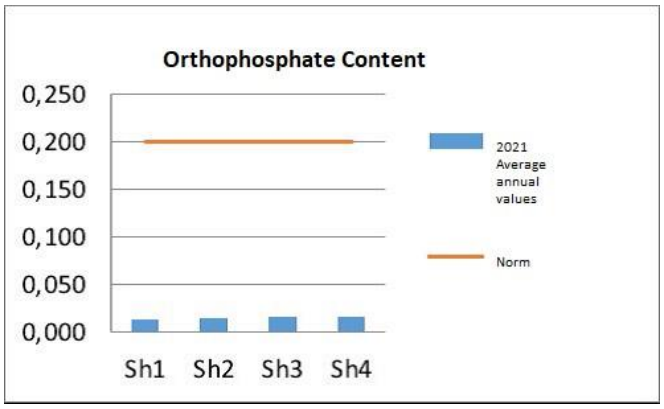


Figure 5-21 Average P-total value, mg/l Shkumbin Basin 2021

The levels of nitrates, orthophosphates, and total phosphorus in all monitored stations are below the permissible threshold, thereby classifying them as Class I - High condition.

5.2.5 Surface waters

5.2.5.1 Materials and method

Based on the topographical survey, site visit and by using the topographical maps 1:10'000, 1:25'000 and digital terrain model are determined the catchments for intersections of river, streams and channels with railway.

Identification of the surface water and evaluation of the quality of it in the project area is important to assess the potential impacts on the quality /quantity of the water bodies due to implementation of this project, especially to the rivers' crossings.

5.2.5.2 Baseline Information

Mainly all the Railway route is located in Shkumbini River Basin. And only a small part of Railway passes along Ohri Lake .

The territory that includes the Rrogozhinë-Elbasan-Pogradec railway according to geographical division of Albania is part of the West Central Plain of Albania and more specifically Elbasani field. The Elbasani field is situated in the middle part of Shkumbini River.

For the most part, the region that the railway goes through is made of fields and hills (it also goes through valleys of the hilly region which go up to 500-600m above sea level) between Krraba hills in the north and Sulova hills in the south direction. Elbasani field extended up to Labinot-Fush area. The total length of Elbasani field from Paper up to Labinot-Fush area is 20 km, meanwhile the width goes up to 5 - 7 km.

Shkumbini River

The Shkumbin River Basin is located in Central Albania. The surface of the River Basin District is 2,772.4 km2, the average elevation is 666 m above sea level, and the length of the main river is 181 km. The Shkumbin River Basin lies between the Erzen River Basin in the north and the Seman River Basin.

The east side of the basin is bordered by mountains 1800 -2000 m high. The central part of Shkumbin River Basin is covered by hilly areas, with around 150-300 m in height and the downstream part is relatively flat. The general slope of the catchment area is in the East-West direction.

Shkumbin subbasin has an average altitude of 753 m.a.s.l. The Shkumbin River flows into the Adriatic Sea, while its highest point is at eastern watershed Mali Valamara, with an altitude of 2366 m.a.s.l.

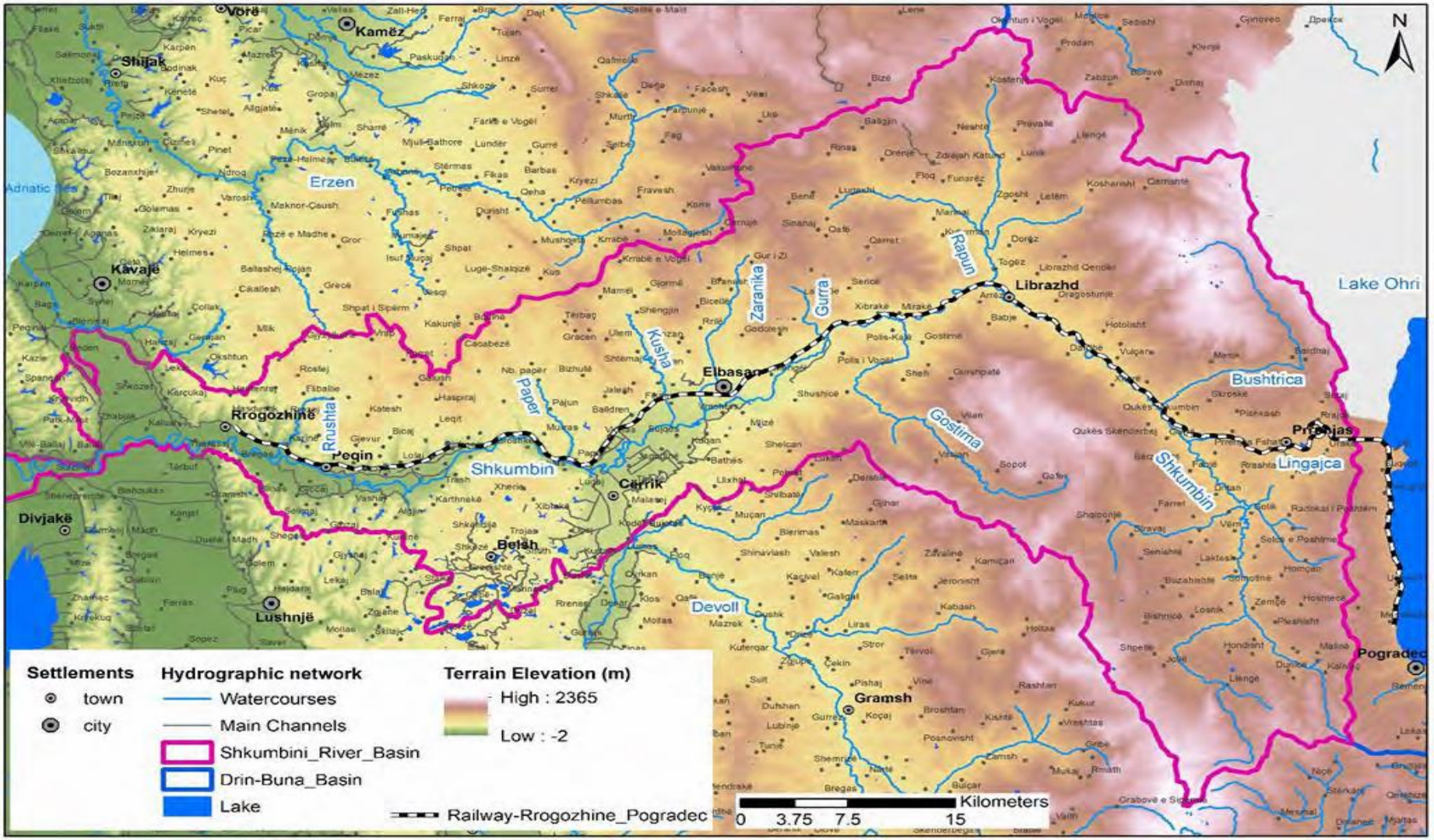


Figure 5-22 Shkumbin River Basin

Shkumbin River is one of the most important rivers in Albania, with its entire watershed within the Albanian territory. The upstream part of the river lies in the Central Mountain Zone (close to the border with North Macedonia), while the downstream part is in the Western Lowlands. It originates from the eastern slopes of Valamara Mountain and Kamja Stone. In the upper part, it passes through a deep valley and then enters the province of Mokra and flows in a north-westerly direction towards Librazhd, where it receives the waters of Rrapuni. Beyond Librazhd it takes a south-westerly direction and flows through a narrow valley. In the Elbasan plain, the bed widens and takes a westerly direction until it finally reaches the Coastal Lowlands in the Adriatic Sea, North of Karavasta Lagoon. The main tributaries of Shkumbin River are the Dushna, Radicina, Bushtrica, Rrapuni, Gostima, Zaranika, Kushnja and Zalli i Paprit streams.

Main Rivers Crossing: In table below are shown where Railway Rrogozhinë-Pogradec crosses the main River/Streams.

Table 5-19 Main Rivers Crossing

No.	Stream Name
1	Stream Madh
2	Stream Rumlit
3	Stream Listica, close Ejola village
4	Stream Pajoves
5	Stream Babluçit before Bishqemi tunnel
6	Stream Zalli i Ranxës
7	Stream Paprit
8	Stream Kushes Elbasan
9	Stream Zarranikes Elbasan
10	Stream Labinotit (Gurrës)
11	Stream Xibrakës close Xibraka village
12	Shkumbini Murash
13	Rapuni River
14	Stream Sheja Librazhdit east Librazhd
15	Stream Sheja Hotolishtit
16	Stream Hotoloishtit
17	Stream Qukut
18	Bushtrica River
19	Lingajca Stream

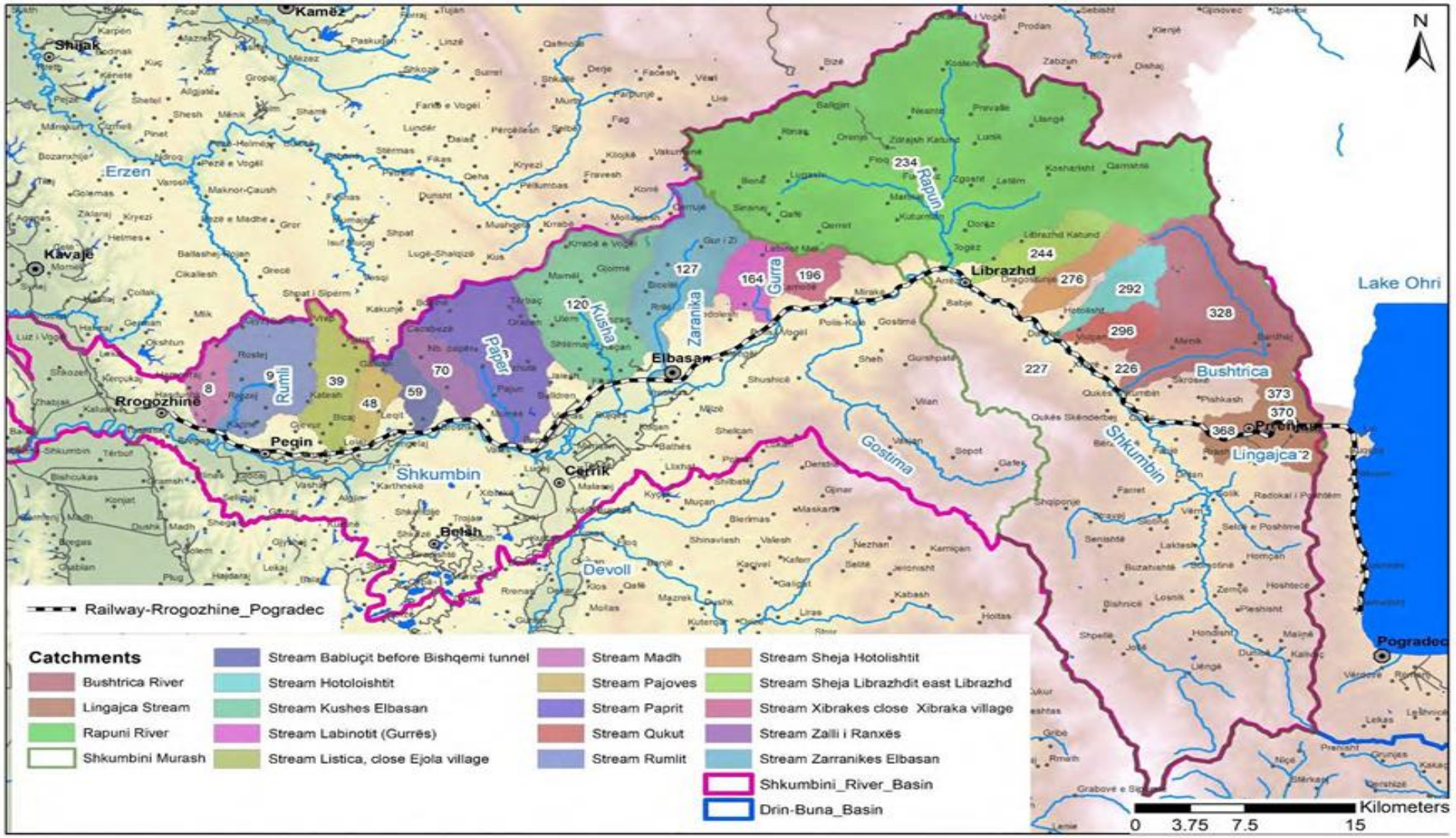


Figure 5-23 Main Sub catchments

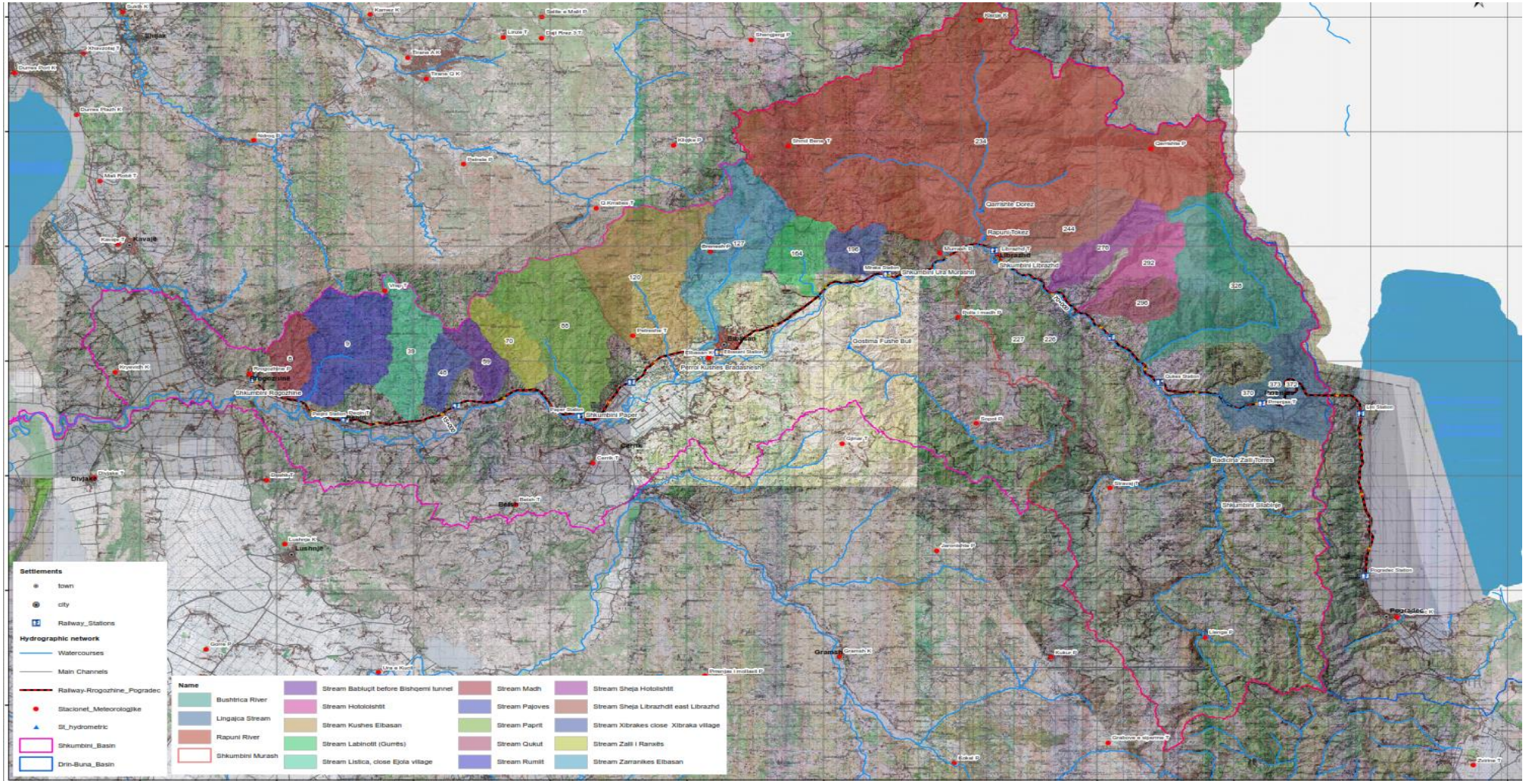


Figure 5-24 Main watersheds

5.2.5.3 Findings

Along the railway Rrogozhinë-Durrës, there are about 474 intersections from small streams or canals and 23 intersections when the biggest rivers are Shkumbini (Murash), Rapuni, Bushtrica and Lingajca.

There are around 77 intersections where railway crosses streams with a catchment area greater than 1 km2. These streams due to their mountainous nature during the rainfall storms bring very rapidly the flows causing like this the flash flood which can be dangerous to hydraulic structures. These streams bring alluvions also thy cause erosion.

Along the railway alignment there are irrigation or drainage channels which intersect the railway or go parallel with it.

5.2.6 Water quality

5.2.6.1 Materials and method

Water quality assessment is based on the existing studies /reports as following:

- Environmental Strategic Assessment reports for Librazhdi,Elbasani ,Peqin , Rrogozhine,Pogradec Municipalities.
- NEA _Annual Environmental Situation report (2021;2022).

5.2.6.2 Baseline Information

Water Quality of Lake Ohrid

Lake Ohrid's waters are categorized as oligotrophic. In terms of heavy metal values, Lake Ohrid is designated as having good quality waters, falling under Class A1 - Good condition.

Reviewing the chemical and biological parameters of the lake's water quality over the years, it is observed that these waters consistently **maintain a mesotrophic quality from 2018 to 2022.**

Due to its considerable depth, Lake Ohrid exhibits stratification, evident from temperature variations from the surface to the depths.

Transparency measurements at the reference station average at 7.6 meters, **indicating the oligotrophic state of the lake.** At the littoral station, however, transparency is lower, measuring at 4.6 meters. Oxygen saturation levels in the lake range from 7.58 to 13 mg O/l.

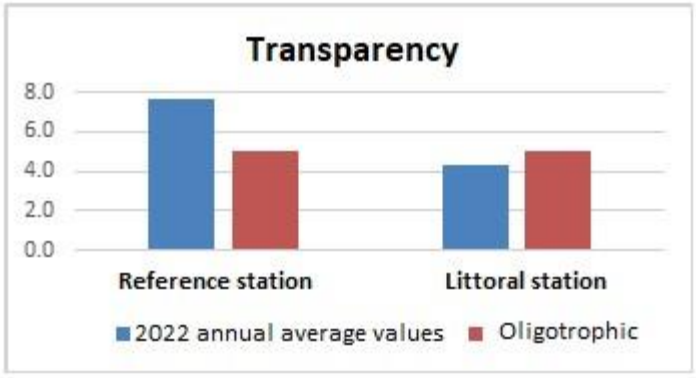


Figure 5-25 Transparency, Lake Ohrid

The chemical oxygen demand content is measured at 4.25 mg/l, whereas at the littoral station, it registers at 7 mg/l, indicating a mesotrophic classification.

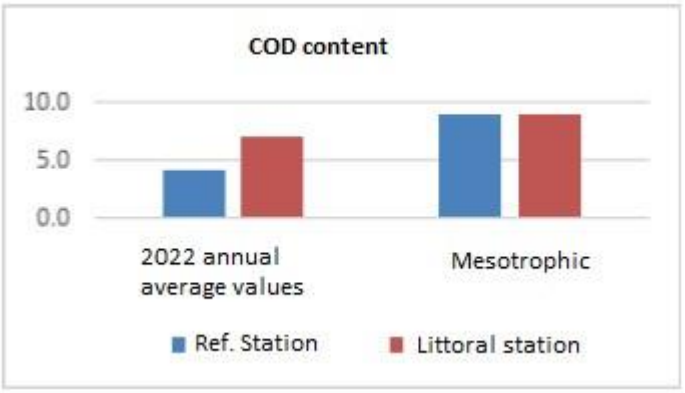


Figure 5-26 Content of chemical oxygen demand, Lake Ohrid

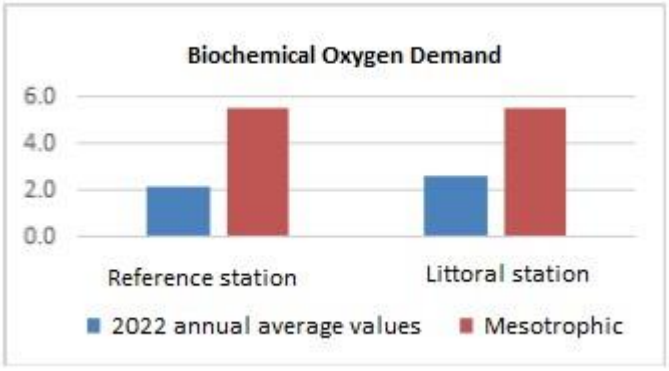


Figure 5-27 Biochemical oxygen demand content, Lake Ohrid

At the reference station, the biochemical oxygen demand content measures at 2.1 mg O/l, while at the littoral station, it is 2.6 mg/l, categorizing the littoral station as oligotrophic.

Nitrates content meets the criteria for oligotrophic quality, as the average monitoring values for both stations remain below the permissible norm of < 1 mg N/l. Additionally, the average total phosphorus content at both stations is 0.007 mg/l, indicating oligotrophic quality.

Based on monitoring data for chlorophyll-a and the trophic index, **the lake's waters are evaluated as oligotrophic.**

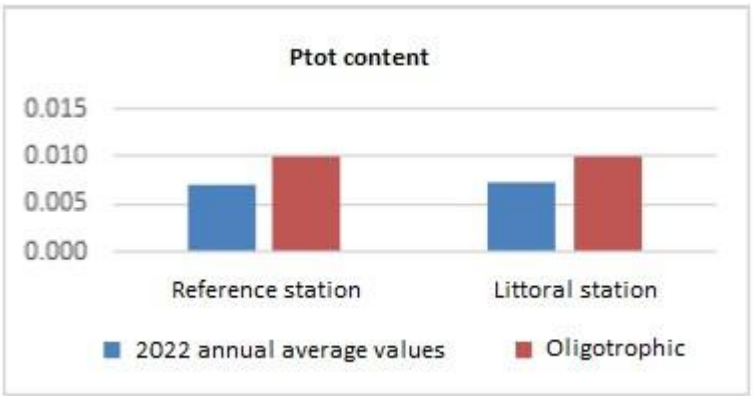


Figure 5-28 Total phosphorus content, Lake Ohrid

The chemical oxygen demand values suggest that Lake Ohrid's **waters are of mesotrophic quality.**

- **Heavy metals**

Apart from Mercury and Cadmium, which were not detected, the other three elements are present in these waters. However, despite their presence, their levels are below the permitted thresholds outlined in the Water Framework Directive.

Table 5-20 Estimated results of heavy metals in Lake Ohrid and comparison with the norms determined by Water Framework Directive for the year 2022

Parameter	Symbol	Unit	Lake Ohrid Classification Water Framework Directive (75/440/EEC)											
			A1 Good	A2 Moderate	A3 Bad	0m	10m	20m	40m	60m	80m	100m	150m	200m
Arsenic	As	µg/l	<50	50	>100	n.d.	2.5.	4.5	4	5	5.5	4	2.5	7
Cadmium	Cd	µg/l	<1	5	>5	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d
Copper	Cu	µg/l	<50	100	>1000	0.555	0.525	1.055	0.59	0.615	0.70	0.72	0.565	0.63
Lead	Pb	µg/l	<50	50	>50	3.655	3.89	3.955	3.865	4.025	3.91	4.055	6.44	9.945
Mercury	Hg	µg/l	<1	1	>1	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d.	n.d

Lake Ohrid, referring to all the above parameters, is classified as good quality water, Class A1 - Good condition.

- **Shkumbini River**

As per the NEA annual report, 2021 presenting the environmental conditions [47], the upper section of the Shkumbin River in Elbasan County, starting from the Labinot field downwards, exhibits numerous hazardous points causing erosion to agricultural land. These risks escalate following bed swelling, particularly from mountain streams with considerable flows. Constant erosion is noted on the left side of the river at the Shushica point, prompting defensive embankments above Shushicë. Over a 16-year period, approximately 1 hectare of land has eroded. Lands in the village of Bujqës lie below previously constructed embankments. The confluence of the Shkumbin River with the Zarranika Stream introduces significant solid materials, altering flow patterns to the left and encroaching upon agricultural land. Erosion totaling 0.86 hectares has occurred in this area. In Paulesh, approximately 3 hectares of agricultural land have eroded between 2002 and 2021. At the Sulzotaj point, erosion on the left side, mainly affecting light alluvial soils, has led to an eroded area of around 1.3 hectares from

[47] https://akm.gov.al/ova_doc/raporti-per-gjendjen-e-mjedisit-2021/

2005 to 2021.

Figure 5-29 Topography at the Shkumbin River monitoring points, year 2021

Assessment of the quality of rivers based on the parameters TOC (total organic carbon) and TN (total nitrogen)[48]:

The evaluation of TOC (Total Organic Carbon) and TN (Total Nitrogen) parameters in river waters follows a qualitative classification into five categories, as defined by the Norwegian Water Institute (NIVA).

Table 5-21 The evaluation of TOC (Total Organic Carbon) and TN (Total Nitrogen) parameters in river waters

Parameter	Quality classes				
	I	II	III	IV	V
	Very good	Good	Average	Bad	Very bad
Total Nitrogen (µg/l)	< 300	300-400	400-600	600-1200	>1200
TOC (mgC/l)	< 2.5	2.5-3.5	3.5-6.5	6.5-15	>15

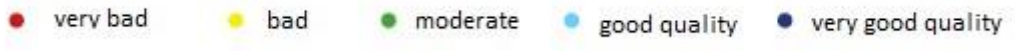
The data presented in the table below for both parameters are in different colours according to their quality.

Table 5-22 Results of TOC and TN parameters in river waters

Basin District	River	Station Name	Average TOC (mg/l)	Average TN (µg/l)
Shkumbini basin	Shkumbini river	Shkumbini (Sh), Qukësi (Prrenjasi) – on the river Shkumbin, about 500 m upstream of the village of Qukës (1)	1,804	302.3

[48] https://akm.gov.al/ova_doc/raporti-per-gjendjen-e-mjedisit-2020/

Basin District	River	Station Name	Average TOC (mg/l)	Average TN (µg/l)
	Shkumbini river	Shkumbini (Sh), Metallurgical plant (Elbasani) – on the river Shkumbini About 6km downstream of the Toplia Bridge Southwestern part of the city of Elbasani	2,219	582.7
	Shkumbini river	Shkumbini (Sh), Rrogozhina – on the river Shkumbin, at the Rrogozhina bridge (Kavajë-Lushnje national road).	2,361	722.0
	Shkumbini river	Shkumbini (Sh), Papri (Cërriku) – on the Shkumbin River, at the Papri bridge in Shkumbin	2,203	709.5



The TOC parameter indicates that the rivers within the Shkumbin basin boast very good quality. Conversely, for the TN parameter, the Shkumbin Basin exhibits average to poor quality, with higher levels of pollution observed in TN (total nitrogen) compared to TOC (total organic carbon). **Considering both TOC and TN parameters, the overall quality assessment of the Shkumbin basin suggests poor and good quality, respectively.**

As per the Environmental Strategic Assessment report of Librazhd, the Shkumbin River's waters demonstrate physico-chemical and organoleptic parameters suitable for drinking and economic utilization, particularly at the source. **Analyzing the water body's state, particularly at monitored points in Rrapun and Miraka, reveals significant erosion trends**. Over an eight-year period until 2015, studies indicate a noteworthy increase in erosion, with a recorded change of -1.7 cm, showing an upward trend. Additionally, in the Miraka area, erosion of the Shkumbin Riverbed is substantial, measuring approximately -14.7 cm, equating to nearly 1.84 cm/year, characterized as high-level erosion according to the Albanian Geological Service-2015.

Furthermore, the physico-chemical analysis of flowing water's hydric parameters, estimated at the river's end concerning the municipality, yields the following results:

- Dissolved oxygen content 9.5 mg/l, i.e. of good quality (rate >7).
- The content of organic matter expressed in biological needs for oxygen or BOD, is very low and is classified as second quality, while the part between Drogostunja and Murras is classified as third quality.
- Containment of the chemical need for oxygen. COD, which is an indicator of chemical and organic pollution due to sewage, urban, sanitary water discharges with a load of 6.75 mg/l
- The content of total phosphorus is 0.063mg/l, being a normal value and the waters are considered of good quality.
- The nitrite content is 0.016mg/l, undergoing a slight increase due to agricultural discharges.
- The content of NH_4 (ammonia) is 0.105, so it is water of the second quality, good condition.
- The content of nitrates NO_3, is estimated to be of very good quality below the permitted rate of <0.8 mg/l.

The monitoring point located at the end of the river in relation to the municipality indicates that the **segment of the Shkumbin River** exhibits second-grade quality, with an upward trend.

Conversely, all aforementioned water sources are rated as first-grade quality, denoting very good conditions**. Additionally, chemical element and anion analyses, along with cation evaluations, classify the groundwater in the area as very good.**

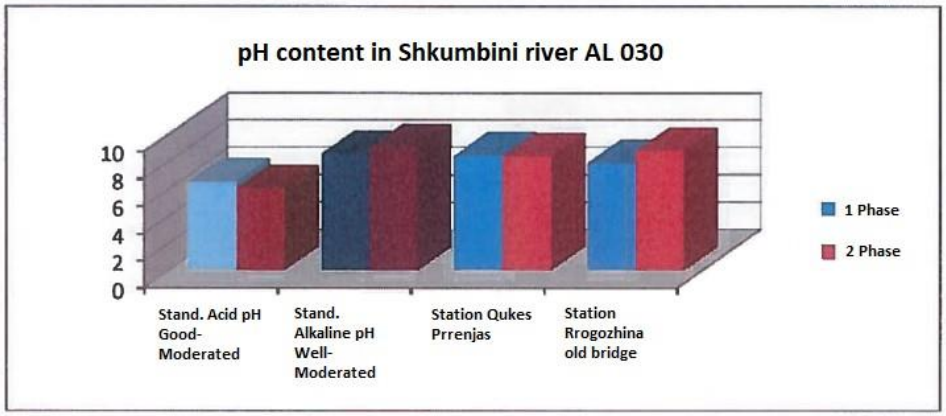


Figure 5-30 pH of Shkumbini river[49]

The content of dissolved oxygen varies from 4.12 - 4.85 - 6.4 mg/l, seasonal variations are significant 8 - 15 mg/l and according to the Water Framework Directive standard, is considered as poor-quality water.

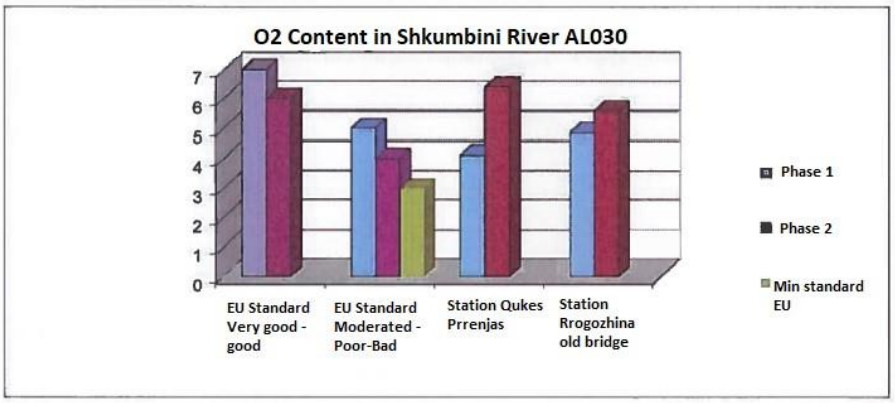


Figure 5-31 Dissolved oxygen in the river Shkumbin[50]

The BOD5 content ranges from 0.6 to 4.01 mg/l. Consequently, the waters of the upper part are classified as very good quality, whereas those in the lower part (below the town of Librazhdi) are deemed moderate.

[49] ENVIRONMENTAL STRATEGIC ASSESSMENT Librazhd https://planifikimi.gov.al/index.php?eID=dumpFile&t=f&f=3420&token=df00acd9942e566b6f27b309041225699e15827f\

[50] ENVIRONMENTAL STRATEGIC ASSESSMENT Librazhd https://planifikimi.gov.al/index.php?eID=dumpFile&t=f&f=3420&token=df00acd9942e566b6f27b309041225699e15827f

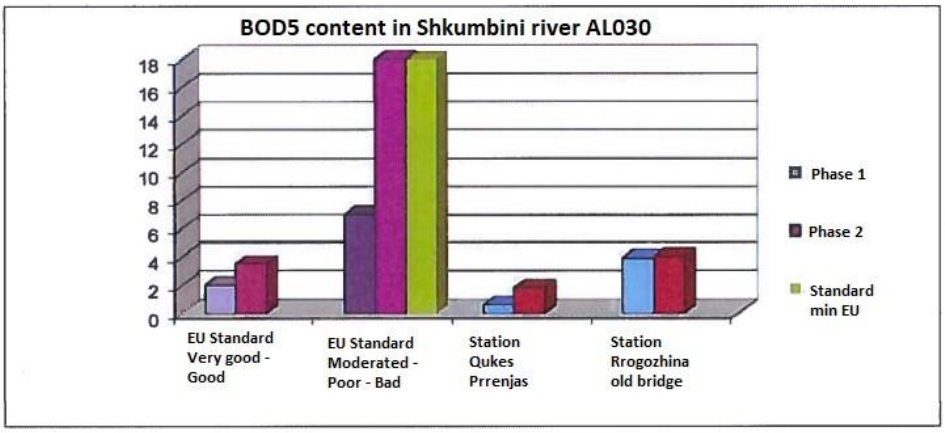


Figure 5-32 BOD5 content in Shkumbin river

Source: ENVIRONMENTAL STRATEGIC ASSESSMENT Librazhd
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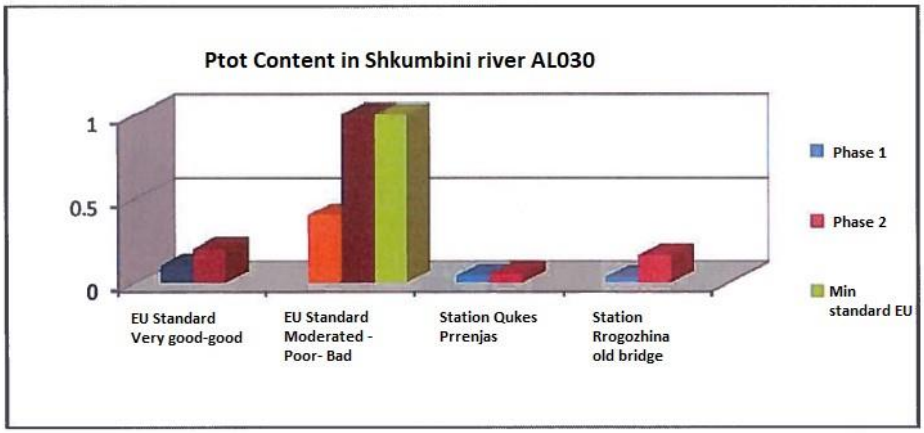

Figure 5-33 Total P content in Shkumnin river [51]

Ammonia content values range from 0 - 0.05 - 0.22 mg/l and are within normal parameters.

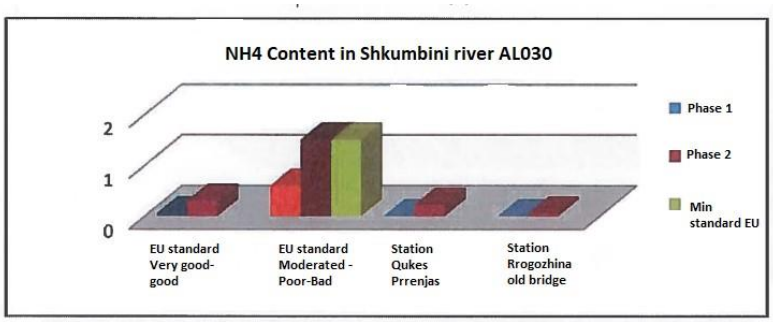

Figure 5-34 NH4 content in Shkumbin river [52]

Nitrate content values ranging from 0.9 - 4-8 mg/l according to Water Framework Directive

[51] *ENVIRONMENTAL STRATEGIC ASSESSMENT Librazhd*
https://planifikimi.gov.al/index.php?eID=dumpFile&t=f&f=3420&token=df00acd9942e566b6f27b309041225699e15827f

[52] *ENVIRONMENTAL STRATEGIC ASSESSMENT Librazhd*
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standards are considered poor quality water.

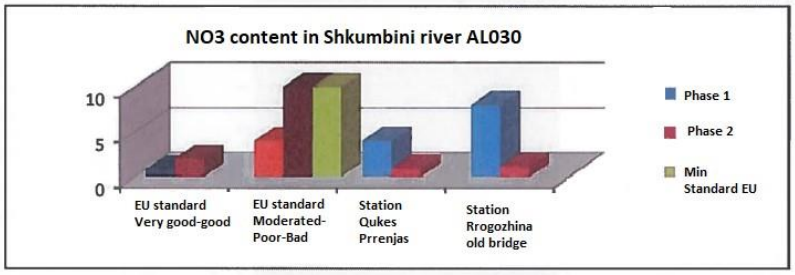

Figure 5-35 The content of NO3 in the river Shkumbin [53]

There is significant variation in suspended solids levels from one point to another, with minimum and maximum values ranging from 9.6 to 74.4 mg/l.

The nitrite content varies between 0 and 0.02-0.07 mg/l. According to the Water Framework Directive's limit value for nitrite content, the waters of the Shkumbin are classified as moderate quality.

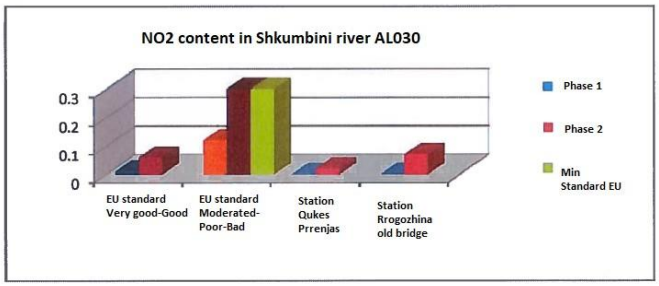

Figure 5-36 The content of NO2 in the river Shkumbin [54]

5.2.6.3 Findings

According to the Water Framework Directive's limit value for nitrite content, the waters of the Shkumbin are classified as moderate quality.

Pollution in Lake waters[55]

The presence of nutrients (phosphorus and nitrogen) in stream waters, particularly following pollution from the nearby fish breeding facility near Volorek and untreated domestic wastewater (still outside the treatment collection system), promotes the proliferation of algae and aquatic plants. This, in turn, accelerates the process of eutrophication in the lake. During summer, these algae and aquatic plants contribute to the deterioration of water quality in terms of turbidity, colour, taste, and odour. Additionally, their continuous growth affects the dissolved oxygen content in the water. Moreover, dead algae accumulate at the lake bottom, leading to the expansion of the sediment layer.

[53] *ENVIRONMENTAL STRATEGIC ASSESSMENT Librazhd*
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[54] ENVIRONMENTAL STRATEGIC ASSESSMENT Librazhd
https://planifikimi.gov.al/index.php?eID=dumpFile&t=f&f=3420&token=df00acd9942e566b6f27b309041225699e15827f

[55] Environmental Strategic Assessment Pogradec

5.2.7 Flooding

5.2.7.1 Materials and method

The assessment of the inundation issues of the project area was based on the following sources:

- State Authority for Geospatial Information (ASIG) has published on the National Geoportal on the topic "Areas with natural risks", the geospatial information for Flood Risk Maps for the 6 main basins
- Risk assessment from floodings in the rivers of Albania[56]
- Shkumbini river at the ending flow the Rrogozhina Bridge - Rivermouth, degradation and protection (Interdisciplinary Journal of Research and Development, Vol.6, no 1,2019 [57])
- Hydrological study on the proposed Project;
- The assessment of the results from earlier geological and/or hydro-geological reports carried out by the Albanian Geological Survey for the infrastructure projects around the project area;
- Field investigations in the project area and its surroundings.

5.2.7.2 Baseline Information

Flooding is a natural phenomenon in Albania. The floods are flashy and flood – waters occupy the floodplain; in the biggest rivers, close to the rivermouth area, these waters inundate the floodplain for several weeks.

When water overspills riverbanks, it spreads out along the adjoining floodplain . Flood - waters may occupy the floodplain for a matter of hours, as in case of flash floods, or for several weeks, as sometimes occurs during the winter period, when the period of rainfall is longer or during the floods of spring period caused by snowmelt.

- An overview of historical floodings in Albania
- Flooding of the winter 1962-63

Amongst all flooding observed until now in the rivers of Albania one of the biggest are considered those of 1962-63 in relation to the occupation of the territory, duration and damages caused by them. Because of intensive showers, wind storms etc. in coastal lagoons a big quantity of water has been entered, causing high changes in salt, oxygen and sediment regime. In the Lakes of Ohrid, Prespa and Shkodra very high water levels were observed.

Based on the information provided during the Field Survey, existing relevant studies /documents, the Project area is not considered vulnerable to negative impacts from flooding. Storm water surface run off is directed away from the railway line, which therefore does not require any specific means of flood protection.

[56] Risk assessment from floodings in the rivers of Albania(group of autors Agim Selenica, Mehmet Ardicioglu ,Alban Kuriqi) Department of Hydrotechnic, Polytechnic University, Albania and Department of Civil Engineering, Epoka University, Albania May 2011;

[57] (Prof.Dr. Sherif Lushaj, Prof. Dr. Vezir Muharremaj, Artan Kacani)

Table 5-23:Flood characteristics of the period November 1962 – February 1963

No	River	Station	Surface of watershed A(km²)	River stage over"0" H (cm)	Discharge	Period
					(m3/s)	
9	Shkumbini	Murrash	1240	542	945	16.11.1962
10	Shkumbini	Paper	1890	631	1430	16.11.1962

The discharge is not computed because the waters overflowed the riverbanks.

Table 5-24Inundated zones during the floods of November 1962- February 1963.

No	Zone	Inundated surface in ha	Duration in days
4	Fields downward Rogozhina in both river banks of Shkumbini	6896	7

Based on the existing studies [58], historical floodings in Albania , the area risky from flooding is considered the area at the segment from Rogozhina to the rivermouth (out of project area) are identified the biggest problems of flooding, river erosion, damage of engineering works and embankments, forest cover, massive exploitation and without criteria of inert materials (sand and gravel mining) over a period of almost 30 years, coastal erosion, change of position to the river mouth.

In the ending part of the Shkumbini watershed, ecological and morphological balances have been destroyed due to the misuse of the sand and gravel from the riverbed, the lack of sediment transport for the protection of the coastal line from erosion, the water near the rivermouth with high salt content that is not suitable for irrigation.

In the last 25 years, the Shkumbin River, as well as other rivers in the country, have been influenced by informal activities such as uncontrolled use of river inertia, loss of protective structures with consequences in increasing the river's aggressiveness expressed by the risk of bridges, damaging protection structures, floods, changes in the natural state of the river, morphological changes, river and coastal erosion, extreme impacts on agricultural production, etc.

Identification of problems on the Rrogozhina-Rivermouth :

[58] Interdisciplinary Journal of Research and Development, Vol.6, no 1,2019 5 (Prof.Dr. Sherif Lushaj, Prof. Dr. Vezir Muharremaj, Artan Kacani)

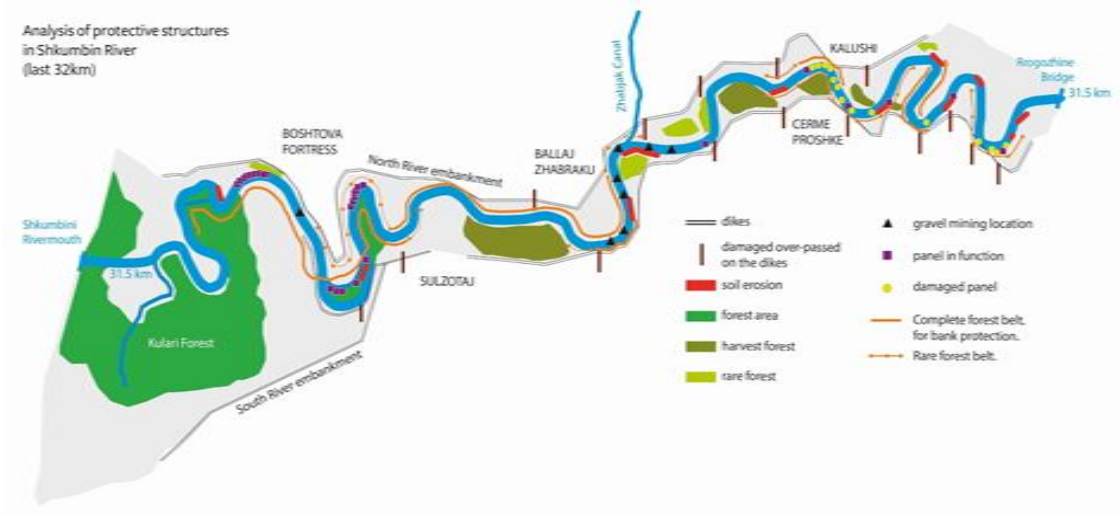


Figure 5-37 Rrogozhina-Rivermouth

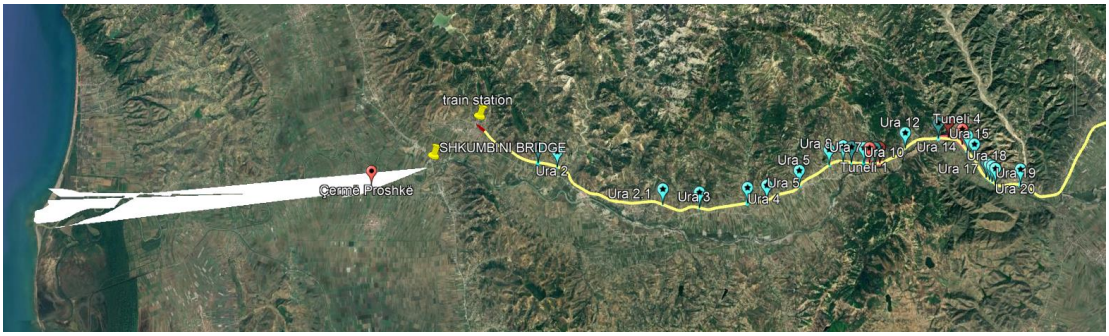


Figure 5-38The flooding rrisky area refering the footprint project (Rrogozhina bridge to the Rivermouth- project line)

During the assessment of the environment situation of the Shkumbini River from Rrogozhina Bridge to the Rivermouth, there were identified several degradation sources of the river channel and coastline, such as: river erosion, exploitation of river inertia from the riverbed without studying the reserves, land sliding on the riverbanks, soil and water salinization on the ending part of the river, chemical and urban pollution of the water, change of coastline, increase of erosion on the erosion/accumulation ratio, land flooding, damage of river protection structures like embarkments, dikes, cover of riverbanks with forest trees on 50-60%.

Since 1991, with intensification of constructions, exploitation of inertia without studyning the reserves, exploitation under the water mirror for gaining qualitative sand, cultivation of arable land on riverbanks have caused high erosion of banks, low inertia transport to the rivermouth that negatively impacts on coastline and coastal erosion that is evident in a high degree during the last years.

As a consequence of interventions on the river bed extracting gravel and sand, even in this segment have been damaged the river protection structures (especially the embarkments and pomping stations for irrigation), riverbanks in a considerable length have been uncovered by forest vegetation, and have been cut the forest trees cultivated for the protection from erosion and flooding.

From the field observations and measurements resulted that from Çerma to Sulezotaj was identified a river erosion ,in parallel with erozion, were identified places with sediment depositions, suitable for cultivation of vegetation on riverbanks like willow, poplar and reed.

Flooding: during the high discharges, the Shkumbini River at the Rrogozhina Bridge-Rivermouth segment overpasses the bed, flooding the land on both river sides (soils of Lushnja and Kavaja districts). The main identified points during the flooding are: Rrogozhina Bridge, Çerme Sulzotaj segment, Copani Bridge, Gose- Zhabjak, Kular, Boçove. The most massive flooding on both riversides have happended by 1937, 1946, 1956, 1962, 1971, 1981, 1983, 1996, 2010 and 2012.

The main causes of flooding are identified like: (i) damage of river protection structures (longitudinal embarasements); (ii) gravel mining without any criteria; (iii) damaged dikes by vehicles that transport gravel; (iv) poor operation of the drainage system on cultivated agricultural soils; (v) damaging interventions on riverbanks; (vi) lack of restauration of exploited zones; (v) infiltration of water on eroded points and without forest cover.

Following picture showing the map of flooding risk to the project area (ASIG_ updated maps) . As it is seen the footprint of the railway is distanced from the risk area .

The most sensitive area to flooding are considered Papër, entrance of Elbasan city where the area is flooded by Shkumbini river ,Bradashesh from Kusha stream, in the village of Çengelaj-Peqin but the footprint of the project seems not to be affected.

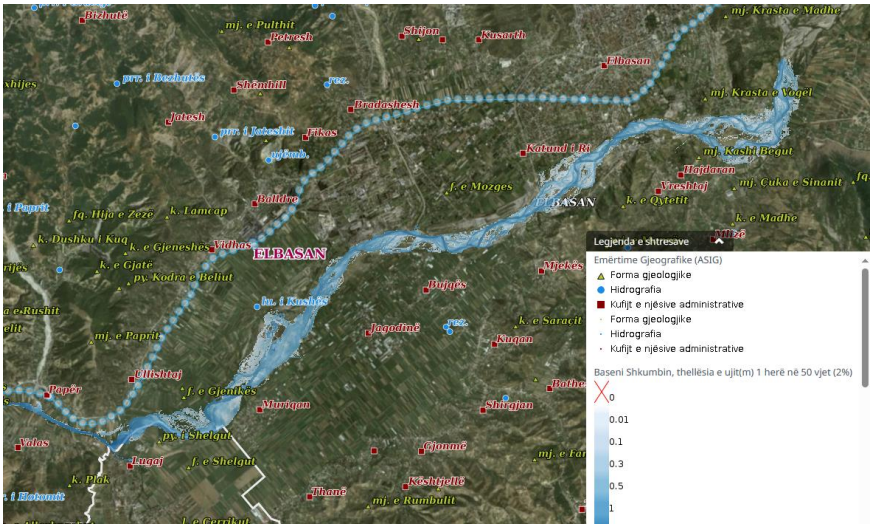


Figure 5-39Shkumbin basin, water depth (m) 1 time in 50 years (2%)

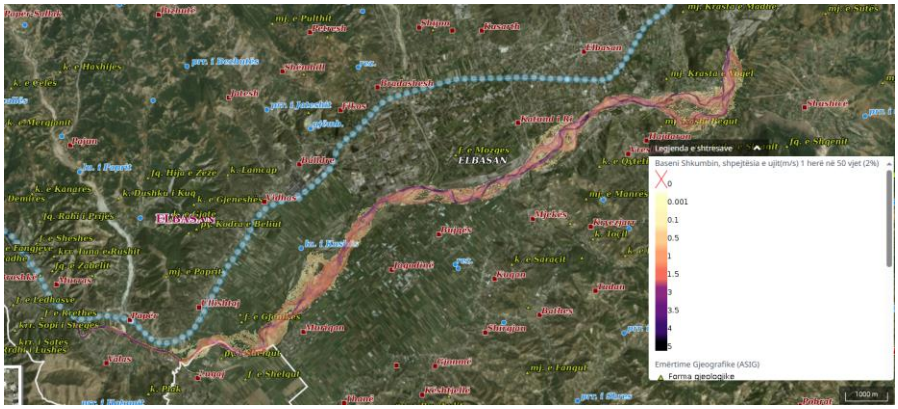


Figure 5-40Shkumbin basin, water speed (m/s) 1 time in 50 years (2%)

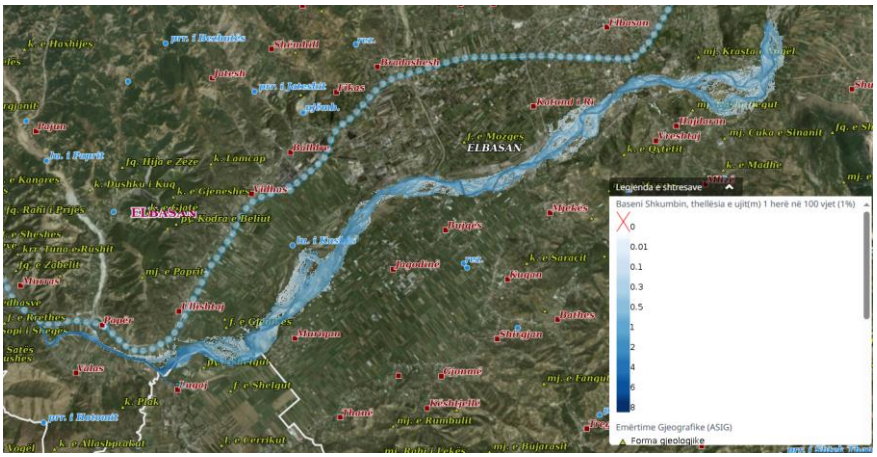


Figure 5-41 Shkumbin basin, water depth (m) 1 time in 100 years (1%)(ASIG)

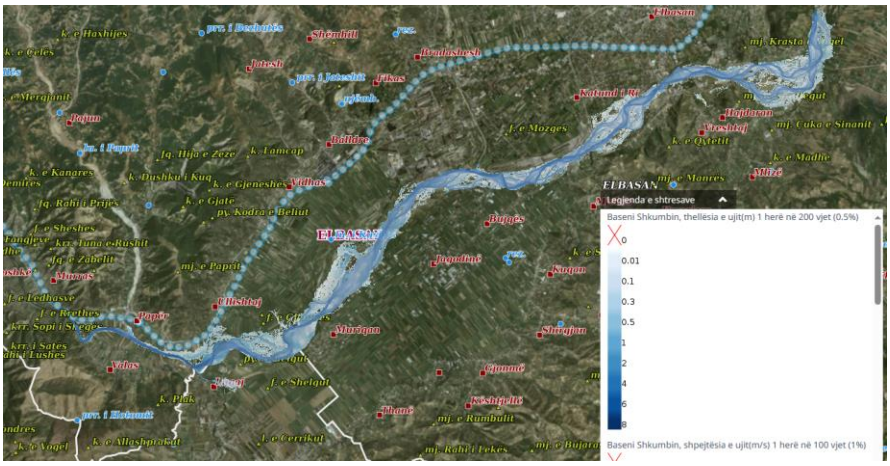


Figure 5-42 Shkumbin basin, water depth (m) 1 time in 200 years (0.5%)(ASIG)

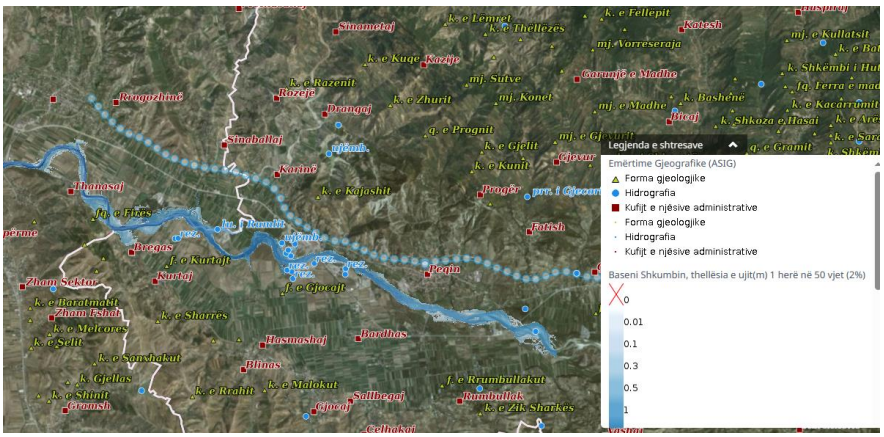


Figure 5-43 Shkumbin basin, water depth (m) 1 time in 50 years (2%)(ASIG)

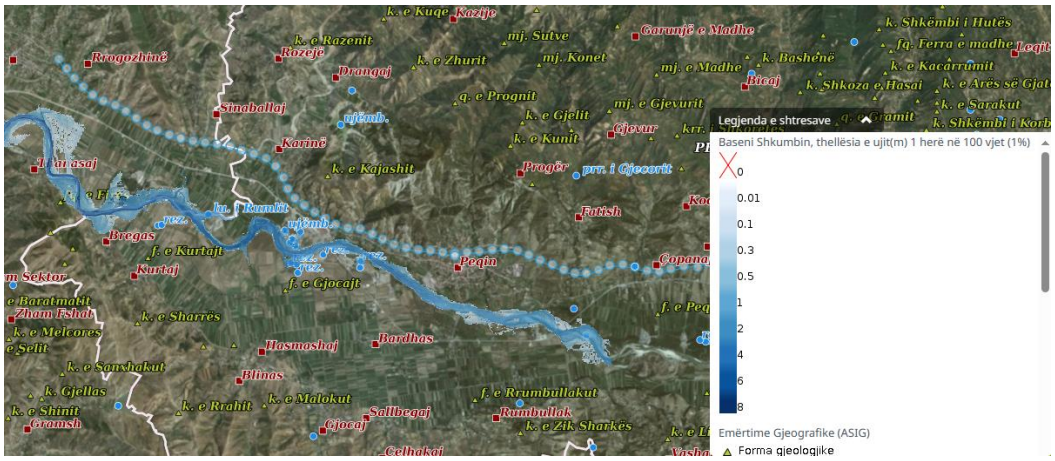


Figure 5-44 Shkumbin basin, water depth (m) 1 time in 100 years (1%)(ASIG)

Figure 5-45 Shkumbin basin, water depth (m) 1 time in 200 years (0.5%)(ASIG)

5.2.7.3 Findings

In the ending flow, at the segment from Rogozhina to the rivermouth, are identified the biggest problems of flooding, river erosion, damage of engineering works and embankments, forest cover, massive;

The project footprint is not considered rrisky by the flood.The mos sensitive area near the footprint of the project are considered Papër, entrance of Elbasan city where that are flooded by Shkumbini river ,Bradashesh from Kusha stream, the village of Çengelaj-Peqin;

Mitigation measures to some flooding:

- Measures for the improvement of the drainage systems and the channels of high water, especially the work of the pumping stations.
- Identification of the state of dykes and necessary measures for rehabilitation and eventually, building of new structures on both riverbanks (partly Shkumbini).
- Rehabilitation of existing dams in small irrigation reservoirs and eventually building of new reservoirs, which could increase the capacity of the flood control.
- Reducing the high erosion rates by means of reforestation, building of small dams in the upper part of mountain torrents etc;

5.2.8 Land Cover

5.2.8.1 Materials and method

The Corine Land Cover Map, which is officially published by a governmental portal[59], shows the land use within the project area.

The land use description is based also on the maps of the Protected Areas and Cultural heritage, as well as on the watercourses across the railway line.

Besides, a practical description of the land use on both sides of the railway line is described hereinafter.

5.2.8.2 Baseline Information

- **The section Rrogozhine -Prrenjas:**

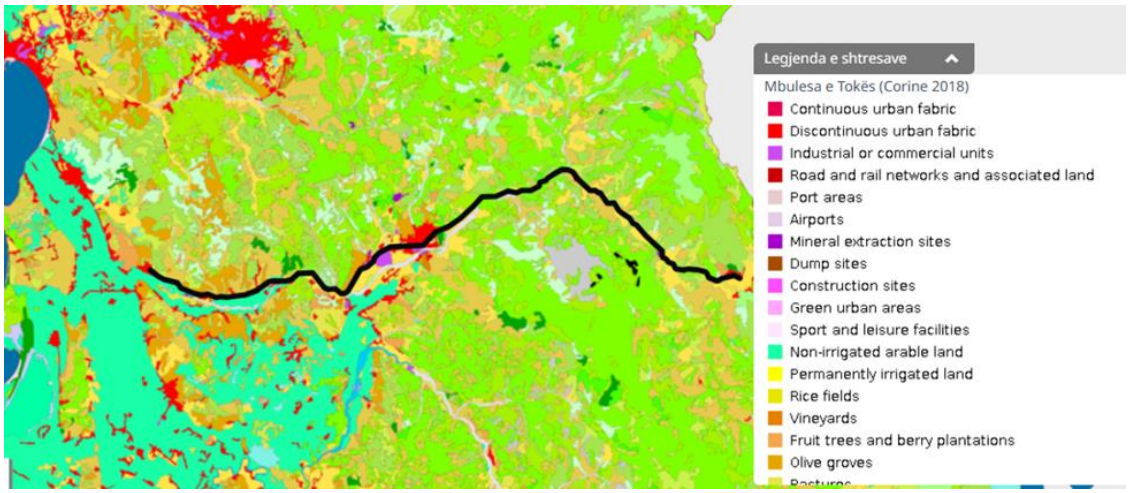


Figure 5-46 The Corine Land Cover Map(2018)Rrogozhine-Prrenjas section

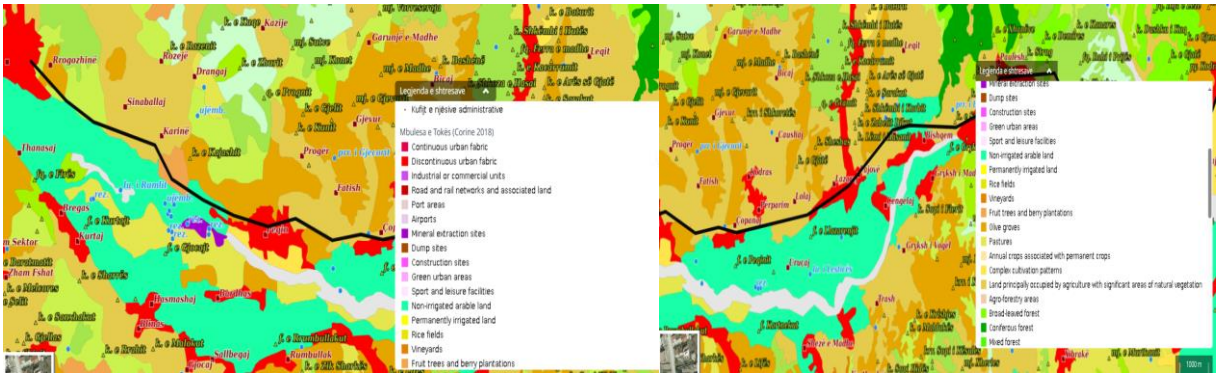


Figure 5-47The Corine Land Cover Map(2018)Rrogozhine-Peqin -Paulesh section

Bases on the Corin Land the footprint of this segment (Rrogozhine-Peqin -Paulesh) passes through discontinues urban fabric, non irrigated arable land , olive groves, vineyard, complex cultivation patterns

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

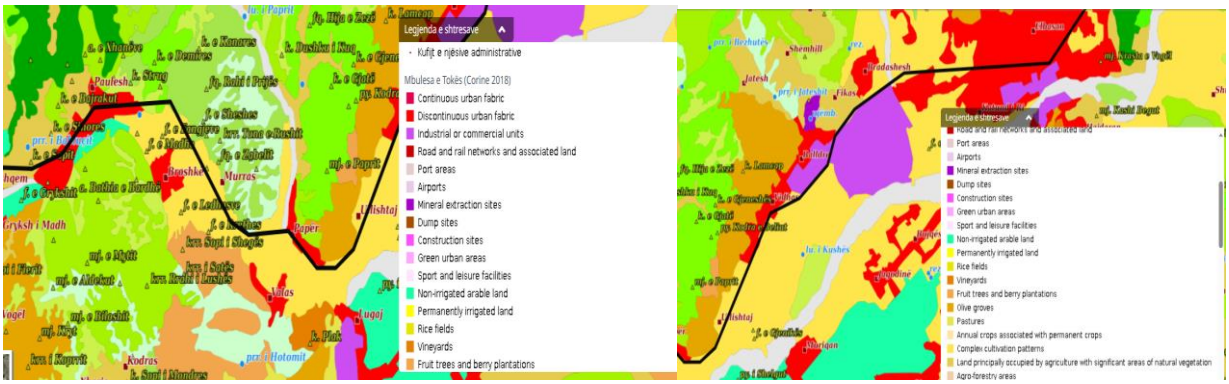


Figure 5-48The Corine Land Cover Map(2018) Paulesh – Paper -Elbasan section

The segment Paulesh – Paper -Elbasan section passes through discontinues urban fabric, non irrigated arable land , mixed forest , broad-leaved forest, complex cultivation patterns.

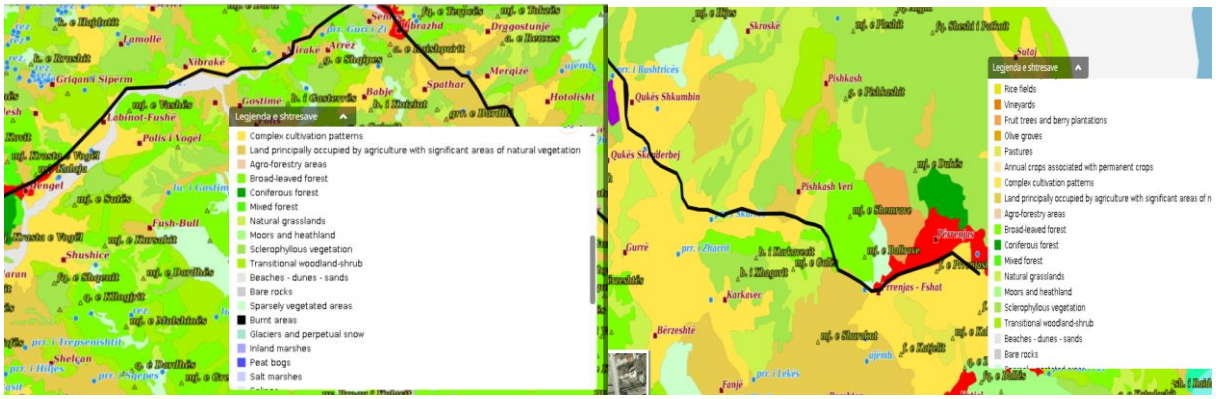


Figure 5-49The Corine Land Cover Map(2018) Mirake- Librazhd – Prrenjas section

Mirake- Librazhd – Prrenjas section passes through discontinues urban fabric, complex cultivation patterns , broad-leaved forest , mixed forest , transitional woodland -shrubs,

The land use description is based also on the maps of the Protected Areas and Cultural heritage, as well as on the watercourses across the railway line.

Besides, a practical description of the land use on both sides of the railway line is described hereinafter.

- **The segment Prrenjas -Pogradec**

Figure 5-50The Corine Land Cover Map(2018) Prrenjas-Pogradec section

This segment passes through complex cultivation patterns, broad-leaved forest, natural grassland, transitional woodland -shrubs,non irrigated arable land.

Table 5-25 Land use territory crossed by Rrogozhinë-Pogradec Railway[60]

Municipalities Affected	KP	Length of Railway	Administrative Units affected	Settlements (villages) affected	Land use
Rrogozhinë	35-345-38+780	3.4 km	Rrogozhinë;	Rrogozhinë;	Urban area
			Sinaballaj;	Sinaballaj;	Agriculture
Peqin	38+780-57+200	18.4 km	Karinë;	Karinë;	Agriculture
			Peqin	Peqin	Urban area
			Përparim	Fatish Çopanaj; Përparim; Lolaj;	Agriculture
			Pajovë;	Lazarej; Pajovë; Bishqem Fushë; Bishqem; Paulesh.	Agriculture
Elbasan	57+200-89+750	32.5km	Papër	Murras; Papër; Ullishtaj; Vidhas; Balldre.	
			Bradashesh	Bradashesh	
			Elbasan	Elbasan	Urban area
			Labinot-Fushë	Mengel; Labinot-Fushë; Xibrakë.	
Librazhd	89+750 - 114+600	24.8km	Polis	Mirakë	
			Librazhd	Librazhd	Urban area
			Librazhd Qendër	Librazhd Qendër	
			Hotolisht	Hotolisht; Çerçan; Vulçan; Xhyrë; Vehçan.	
Prrenjas	114+600-133+810	19.3 km	Qukës	Qukës Shkumbin; Qukës; Pishkash; Pishkash Veri.	
			Prrenjas	Prrenjas-Fshat; Qyteti Prrenjas.	
			Rrajcë	Rrajcë; Kostrican.	
Pogradec	33+810 – 152+384	18.6 km	Udenisht	Lin; Buqez; Piskupat; Udenisht; Memlisht.	
6 municipalities		**117km**	**18 AU**	**43 settlements**	

5.2.8.3 Findings

The types of land use on both sides of the railway line are as follows:

[60] Source of information: https://portavendore.al/

- Agricultural lands (almost arable lands);
- Inhabited rural areas;
- Service and industrial buildings;
- Train stations;
- Urban areas (towns of Peqin, Elbasan, Librazhd, Prrenjas and Pogradec);
- River and stream beds (Shkumbini); and
- Forest and shrubs (terrestrial part of the Nature Managed Reserve of Librazhd).

The permanent land acquisition for the project purposes is needed for the service and connectivity roads, which total length is approximately 117.3 km, (Rrogozhinë – Prrenjas 91 km) and for the Elbasan (792mx50m=39,600m2) and Prrenjas (1260mx50m=63,000m2) freight stations. The total need for permanent land surface is approximately 102,600m2 or 10.26ha.

5.2.9 Air quality

Providing information about existing quality of the air near the project area is important not only to know the existing air quality near the project area , but also to help to assess if the quality of the air is compromises due to implementation of the project including construction works and operation activities, or due to the project implementation the cumulative effect in air quality is significant and specific prevention measures shall be implemented.

The air quality is expected to be affected during the construction and operation phase as well.

5.2.9.1 Materials and method

The information on the sources of ambient air quality pollution and the key air polluting substances is provided by the European Environmental Agency61 .

The air quality standards are based on the following:

- Law 162/2014 "On protection of ambient air quality", and DCM 352/2015 “On air quality assessments and requirements for certain pollutants”, as amended in 2019.
- Air Quality Directive (2004/107/CU, 2008/50/CU and 2011/850/EU)

The data on the air quality included in this report are taken from :

- The from State Environment Institutions , for the period 2020, 2022, published by the National Environmental Agency in the annual report on environmental status[62].
- Annual report 2019 - 2021 compiled by Co-Plan on air quality monitoring, in the city of Elbasan,

The monitored parameters include SO2, NO2 (NOx), CO, O3, PM10 (PM2.5), and Benzene. For each of them, the annual average value is given.

5.2.9.2 Baseline Information

Railway line passes through urban areas Rrogozhine , Peqin , Elbasan, Librazhd, Perrenjas and Pogradec;

[61] https://www.eea.europa.eu//publications/air-quality-in-europe-2019

[62] https://akm.gov.al/ova_doc/raporti-per-gjendjen-e-mjedisit-2020/

- Elbasan city

The Elbasan City is considered one important monitoring station included in the program of periodic air monitoring. The data below, taken from the Annual Reports63 on Environment Status indicates the levels of Pollution in some Albanian cities.

Table 5-26EU rates for hourly and annual data

Norm as per EU	PM10 µg/m³	PM2.5 µg/m³	SO2 µg/m³	O3 µg/m³	CO mg/m³	NO2 µg/m³	Benzen µg/m³
1 Hour		350		200			
8 Hours	120	10					
24 Hours	50		125				
Annual	40	25			40		5

The monitoring was carried out for the period 15.09.2020- 31.12.2020 with automatic air monitoring stations, in Elbasan. The main indicators of urban air quality such as: PM10, PM2.5, NO2, SO2, O3, CO were monitored. Specifically the data generated below are reflected.

Table 5-27 Air monitoring stations, Elbasan

No	Station	Location	Parameter	Coordinates
1	Elbasan	In front of the Elbasan district building, Elbasan (800 m from the project footprint)	PM10, SO, NO2, O3	41°06'39.53" N 20°04'53.96" E

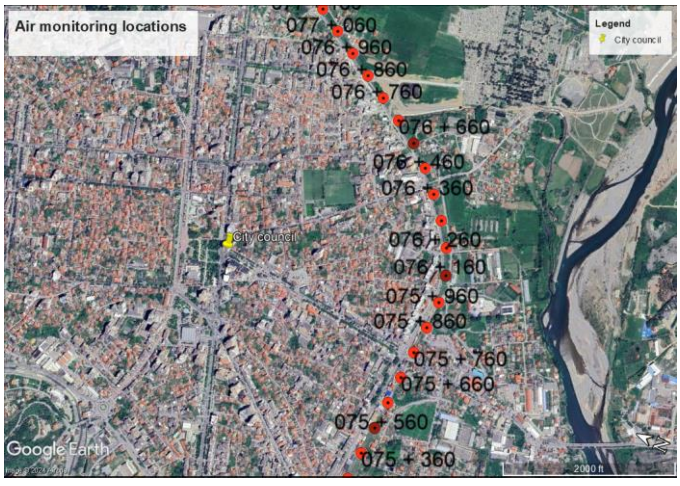


Figure 5-51 Orthophoto of the air monitoring station, Elbasan municipality referring to the footprint of the project

- The level of the dust (PM10 dhe PM2.5)

[63] https://akm.gov.al/ova_doc/raporti-per-gjendjen-e-mjedisit-2020/

Dust particles (PM) are a mixture of aerosols (solid or liquid) spanning a wide range in size and chemical composition.

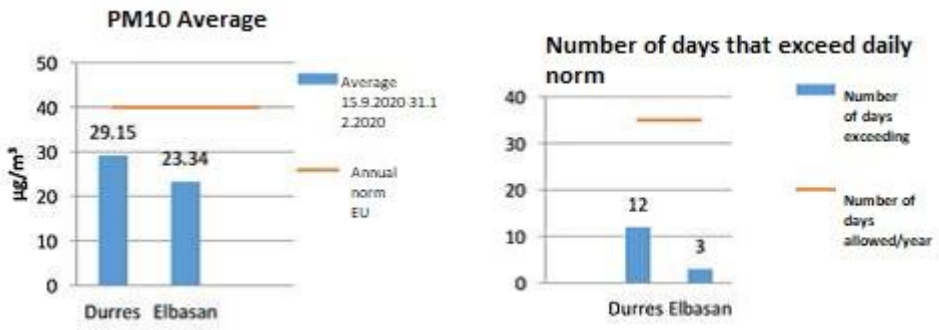


Figure 5-52 The average value of PM10 and exceeding from the EU norm, Elbasan

Based on the monitored data, results that there is no exceedance of the average value and the number of days allowed for the period 15.09.2020-31.12.2020.

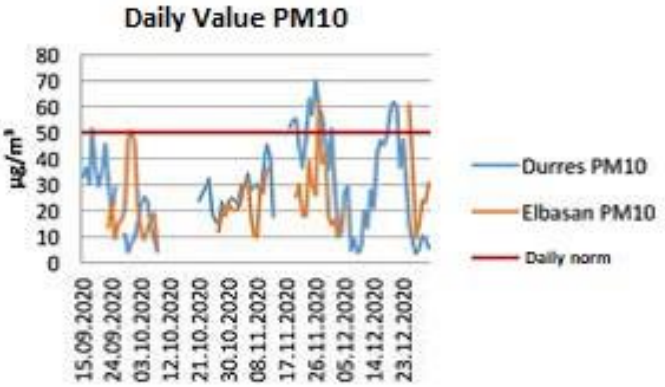


Figure 5-53 The daily value of PM10 and exceeding from the EU norm, Elbasan

It results in exceeding the EU daily rate in both stations. The main source of PM10 pollution at Elbasan station is traffic . The reason for this pollution is that the stations are installed on the side of roads with heavy traffic.

The location of the monitoring station for dust, is presented at figure above (Orthophoto of the air monitoring station, Elbasan municipality referring to the footprint of the project)

- The level of NO2 (Nitrogen Dioxide)

NOx is a pollutant that is emitted into the atmosphere as a result of burning fuel in industrial processes and the road transport sector. NOx is a group of gases consisting of NO (Nitrogen Monoxide) and NO2 (Nitrogen Dioxide). NO2 accounts for the majority of NOx emissions and contributes to the formation of ozone and dust particles.

Figure 5-54:The average value of NO2, Elbasan

Based on the monitored data, it appears that there is no exceeding of the annual limit value in any of the monitored stations

- The level of SO2 (Sulfur Dioxide):

SO2 is produced through the oxidation of sulfur, primarily during the combustion of fuel containing sulfur. The electricity generation sector stands out as the primary contributor to SO2 emissions. Additionally, it plays a role in the creation of secondary sulfate particles and contributes to the formation of acid rain. SO2, as a pollutant, poses significant health concerns for the population, including the exacerbation of asthma, reduction in lung function, and irritation of the respiratory system. Exposure to SO2 can lead to symptoms such as headaches, restlessness, and anxiety.

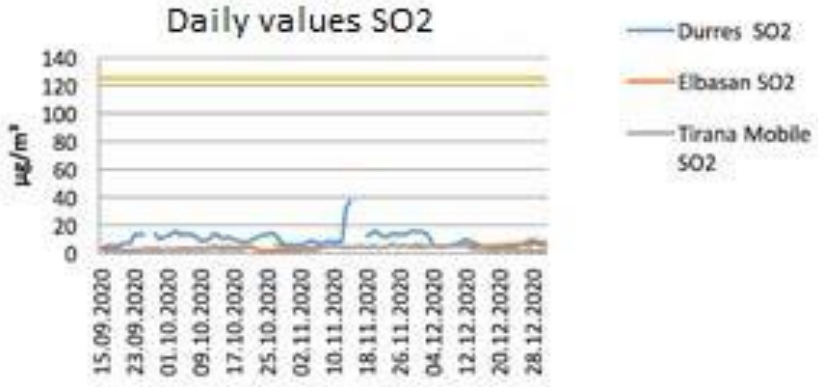


Figure 5-55:Daily values of SO2, Elbasan

It results that there is no exceeding of the daily limit value nor the hourly limit value of the EU in any station.

- Level of the ozone (O3) :

Low troposphere ozone is not emitted directly into the atmosphere, it is formed as a result of a chain of chemical reactions with precursor gases emitted into the atmosphere such as NOx, CO, VOCs and CH4 in the presence and solar radiation. High ozone levels can cause respiratory health problems by reducing lung function, worsening asthma and other lung diseases, and leading to premature death.

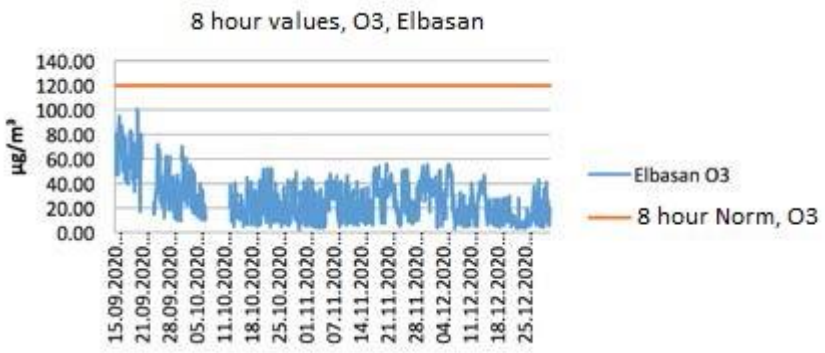


Figure 5-56: Values 8 hours at O3, Elbasan

In the city of Elbasan, no exceeding of the 8-hour limit values is recorded.

Another source of air quality monitoring (Co-Plan) shows different results as following:

[64] Air quality in the territory of Elbasan Municipality is presented with different variations, due to land use and geo-physical conditions of the territory. The state of air quality in the city is relatively polluted, while in the mountainous areas, the air is of a very good quality.

Referring to the annual report 2019 - 2021 compiled by Co-Plan on air quality monitoring, in the city of Elbasan, conducted in three different areas on air monitoring for NO2, SO2, VOC, PM2.5, PM10, O3, CO, CO.

- ✓ **NO2**

  Upon comparing the data measurements to the EU standard, it was determined that in area A (central area) during 2019, the level of NO2 in the majority of the nine monitored plots exceeded the allowed limits. Precisely, out of 47 measured points, only 4 adhered to the standard, while in the remaining 43, pollution exceeded the EU norm. Specifically, the data ranged from 50 µ/m3 to 100 µ/m3 for NO2 in points where the EU standard is 40 µ/m3.

[64] ENVIRONMENTAL STRATEGIC ASSESSMENT Elbasan https://planifikimi.gov.al/index.php?eID=dumpFile&t=f&f=2293&token=b5d1dee8d90f89cf20d0bc2eabae3e31ff1d5058

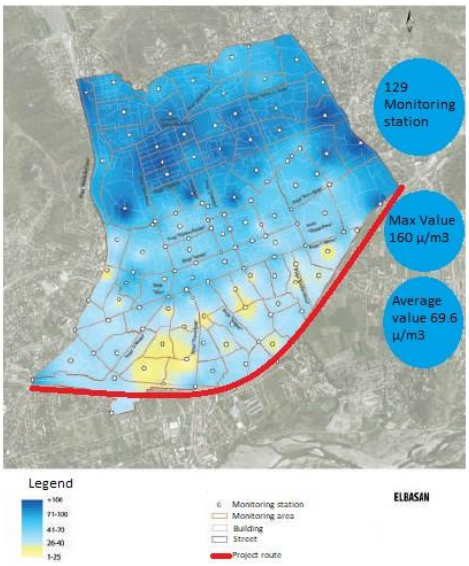


Figure 5-57 The concentration of NO2 in the city of Elbasan (red line is the footprint of the project)

✓ **VOC**

As for VOC, the trace of the pollutant is in worrying values and this is a consequence of the industrial activity near the urban area. Compared to the standard which is 0.500 µ/m3, the measured data show a concentration of 0.9-1 µ/m3 for at least 10 different points throughout the monitored territory.

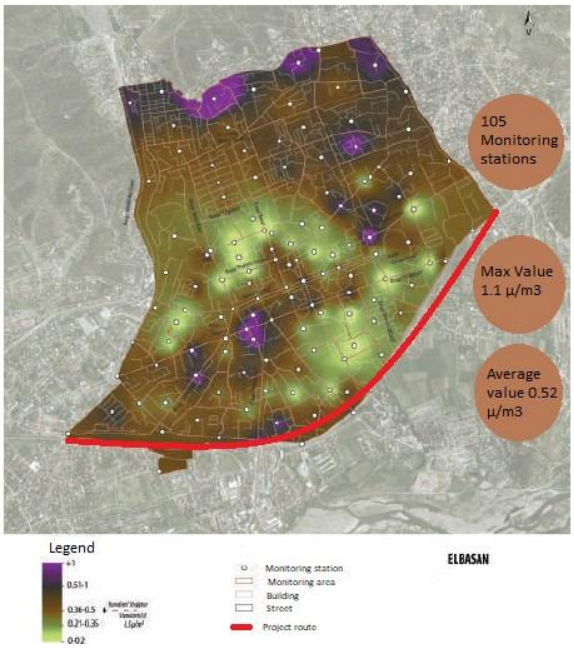


Figure 5-58 The concentration of VOC in the city of Elbasan(red line is the footprint of the project)

➢ PM2.5 ;PM10

Concerning the pollution status from PM2.5 particles, 25 points recorded figures within the standard, while in the remaining 22 points, the values exceeded the standard, ranging from 30 µ/m3 to 180 µ/m3. The highest parameters were observed specifically in point A1-7, registering 130 µ/m3, and in point A1-6, reaching 180 µ/m3.

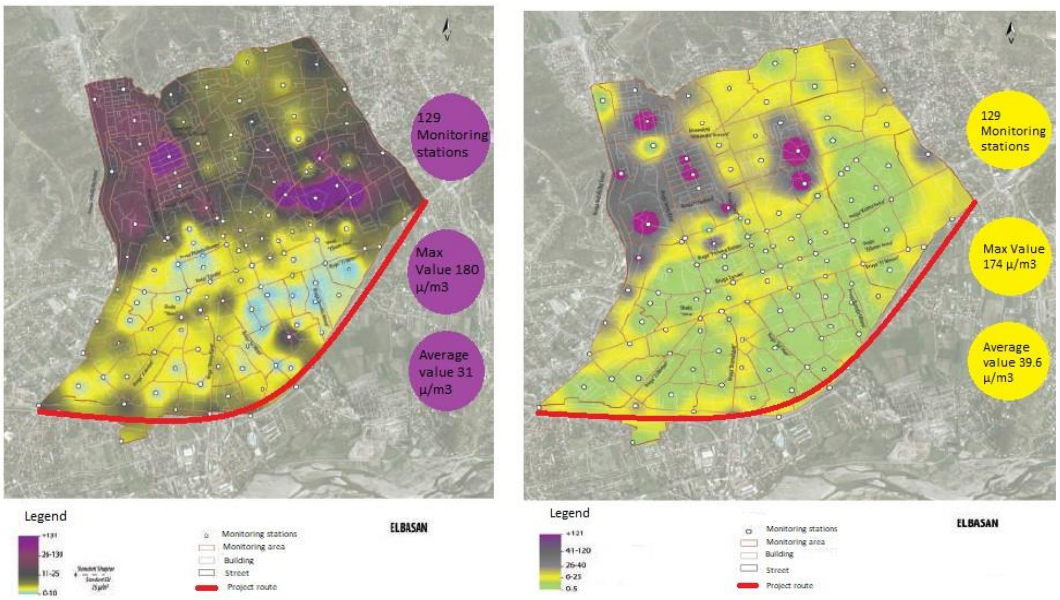


Figure 5-59 The concentration of PM2.5 in the city of Elbasan Figure 18: The concentration of PM10 in the city of Elbasan

The pollution status is more accurately depicted by PM10 particles. Out of 47 measurements at various points, it is evident that in 8 of them, the standard is surpassed, ranging from 32 µ/m3 to 122 µ/m3, in comparison to the EU norm of 30 µ/m3.

- **SO2**

Sulfur dioxide was monitored at 100 stations in the city of Elbasan, recording a maximum value of 181 µ/m3 and an average value of 137.1 µ/m3, while the standard set by the EU is 125 µ/m3.

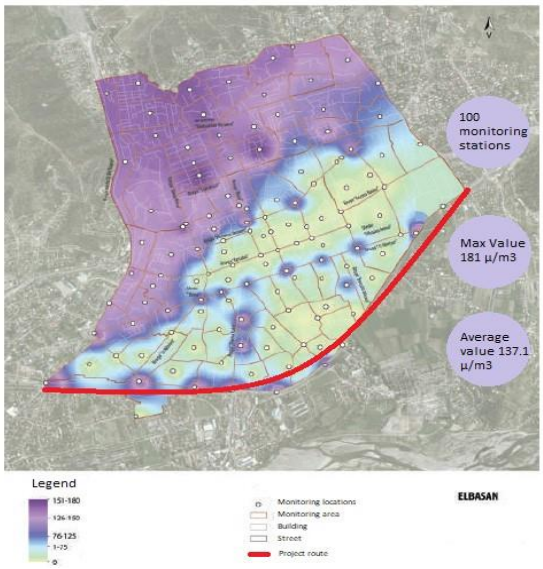


Figure 5-60 Concentration of SO2 in the city of Elbasan (red line is the footprint of the project)

- **CO**

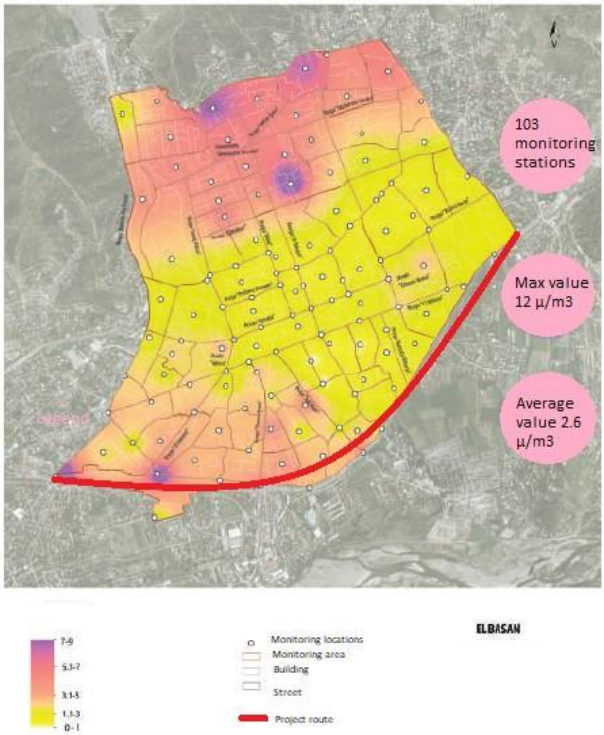


Figure 5-61The concentration of CO in the city of Elbasan(red line is the footprint of the project)

Regarding the concentration of carbon monoxide (CO), it reached the maximum value of 12µ/m3, while the average value was 2.6µ/m3 compared to the EU standard which is 10µ/m3.

- CO2

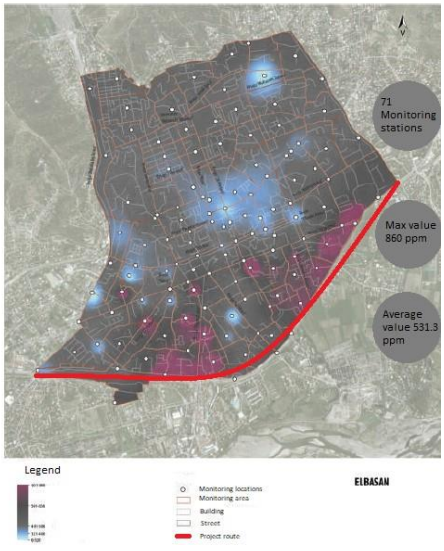


Figure 5-62 CO2 concentration in the city of Elbasan(red line is the footprint of the project)

Meanwhile, the parameter of carbon dioxide (CO2) turns out to have an average value in the entire surface of the city of Elbasan of 531.3 ppm, from 350 ppm which is the EU standard, while the maximum value was recorded at 860 ppm.

- **O3**

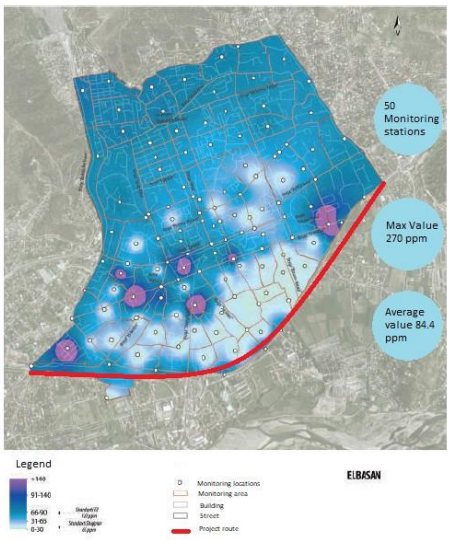


Figure 5-63 The concentration of O3 in the city of Elbasan(red line is the footprint of the project)

Ozone (O3) across the monitored area recorded an average value of 84.4 ppm, exceeding both the Albanian norm of 65 ppm and the EU norm of 120 ppm.

Real-time daily measurements produced by the IQAir device The device, situated in the city of Elbasan, has provided CO2 and PM2.5 data for a duration of 5 months. The graphs below present the generated data alongside the permissible standards. The values indicate that, for CO2, the daily average consistently surpasses the allowed values (350 ppm), and for PM2.5, the daily averages mostly exceed the permitted values (25 µ/m3).

- **Air monitoring (particles, CO2) Elbasan, October 2020-March 2021**

Figure 5-64 Air monitoring (particles, CO2) Elbasan, October 2020-March 2021

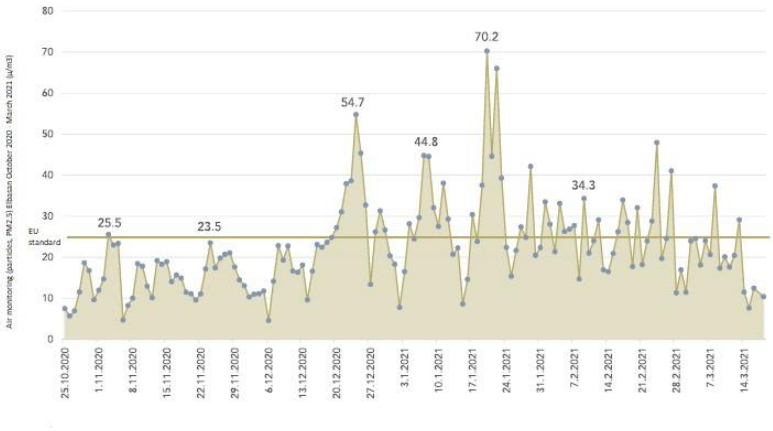


Figure 5-65 Air monitoring (PM2.5 particles) Elbasan, October 2020-March 2021

- **Air monitoring data Co Plan conducted during (2022-2023) :**

(i) August - September 2022
(ii) end of February - beginning of March 2023.

Referring to the report on air quality prepared by Co-Plan, a total of 150 points were monitored in the city of Elbasan, including the main streets and neighborhoods of the city. The monitoring process was carried out in 2 phases: (i) August - September 2022 during which 127 stations were monitored and in November '22 the remaining 23 stations were monitored, as well as (ii) end of February - beginning of March 2023.

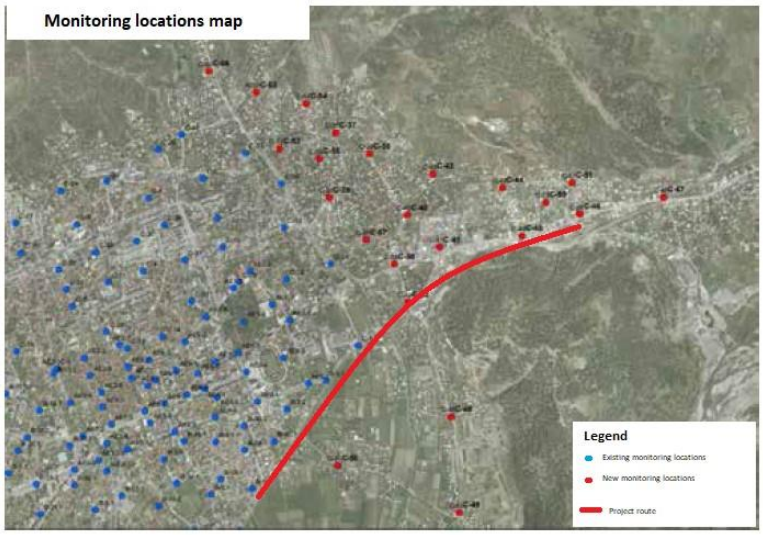


Figure 5-66 Map of monitored points/stations in Elbasan Municipality

- ✓ **Nitrogen dioxide, NO2**

From 150 monitored points in the summer of 2022, 105 stations have shown concentrations within the allowed Albanian and EU norms of the NO2 parameter. While the average value according to the results is 43.84 µg/m3 (allowed rate 40 µg/m3). However, there are areas where a 3 times higher value of NO2 has resulted, due to heavy traffic and dense movement of vehicles. This, especially in the afternoon when the activity of vehicles is higher.

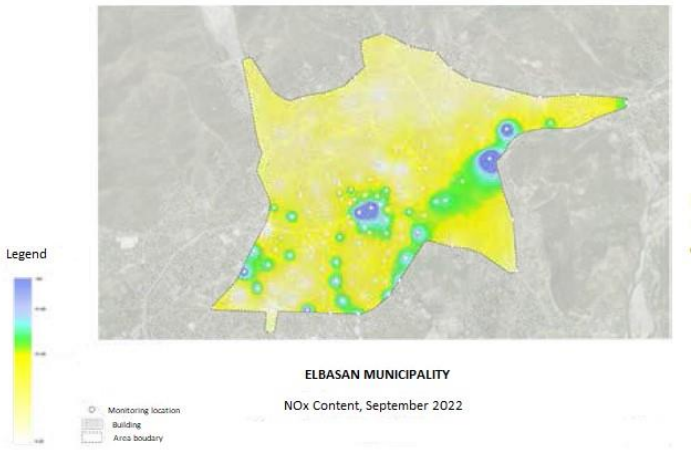


Figure 5-67 NO2 concentration in Elbasan, autumn 2022

In the winter of 2023, out of 150 monitored points/stations, 54 stations showed concentrations outside the permitted norms. In 9 points, maximum values up to 142.00 µg/m3 were reached and in 49 points it reached 50.00 - 100.00 µg/m3. While the average value according to the results is 50.00 µg/m3. The areas where the maximum values were obtained are the southern ring road and the city center. These values come as a result of heavy traffic and dense movement of vehicles, especially in the afternoon.

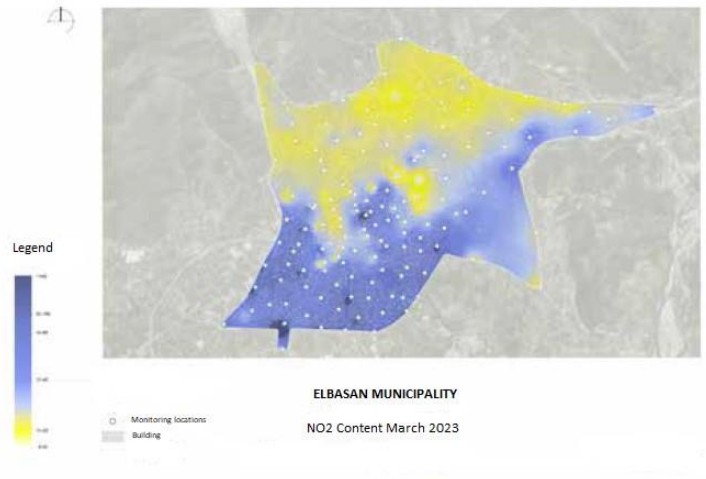


Figure 5-68 NO2 concentration in Elbasan, winter 2023

Table 5-28 NO2 concentration in Elbasan, Autumn - Winter 2023

NO_2 EU Standard = 40.0 µg/m^3	Autumn 2022	Winter 2023
Max Value	75.00 µg/m^3	142.00 µg/m^3
Average value	43.84 µg/m^3	50.00 µg/m^3

- **Carbon dioxide, CO2**

CO2 values measured in Elbasan during the summer season present an average of 395.66 ppm (350.00 ppm the permitted rate). The concentration of CO2 at all measured points/stations

shows maximum values above the Albanian, European and WHO standards. These values are worrying, considering the negative impact that the high presence of CO2 (black carbon) in the air has on health. The main cause of the high values is mainly the overloaded traffic and the dense movement of vehicles on the monitored roads of the city of Elbasan and is directly affected by the burning of low-quality car fuel.

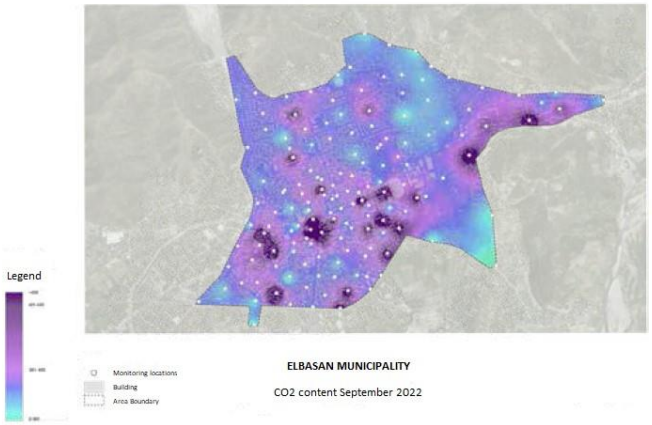


Figure 5-69 CO2 concentration in Elbasan, summer 2022

CO2 values measured during the winter season of 2023 present an average of 395.23 ppm (norm 350.00 ppm). Values above the allowed rate were recorded in 25 points, reaching values from 450.00 ppm to 465.00 ppm. Compared to the results of the first phase measurements in this period, fortunately, they have resulted in fewer points of concern. The main cause of pollution is the heavy traffic, especially in the southern ring road of the city and the boulevard, where works are carried out very close by, which increase the dust.

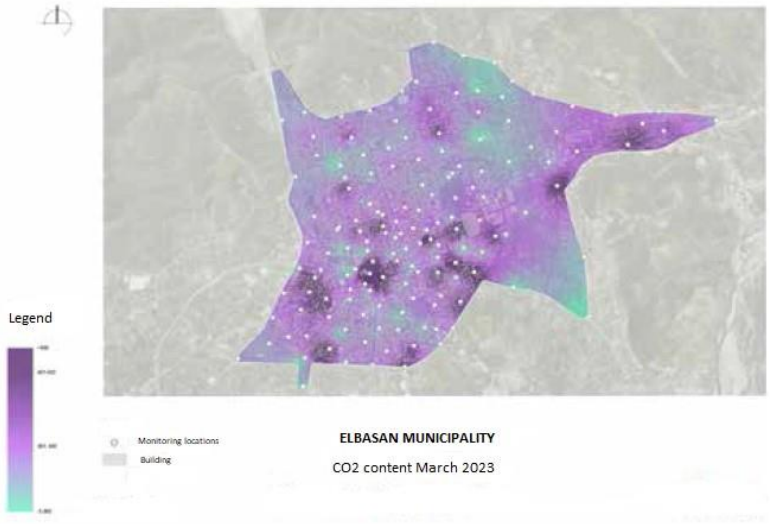


Figure 5-70 CO2 concentration in Elbasan, winter 2023
Table 5-29 CO2 concentration in Elbasan, Autumn - Winter 2023

CO_2 EU Standard = 350.00 ppm	Autumn 2022	Winter 2023
Max value	461.00 ppm	465.00 ppm
Average value	395.66 ppm	395.23 ppm

- **PM10 / PM2.5**

PM10 dust particles. Measurements during the summer period in Elbasan at all monitored stations show that PM10 dust particles are within the allowed EU standards with an average value of 13.83 µg/m3 out of 40.00 µg/m3. Only in 2 points have higher values resulted.

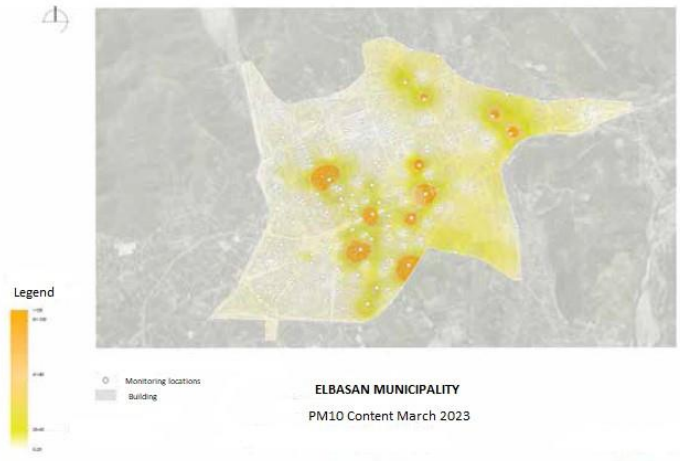


Figure 5-71 PM10 concentration in Elbasan, summer 2022

Measurements during the winter period show that in 9 points the measured values ranged from 50.00 - 130.00 µg/m3 (unlike the measurements in the summer period) with an average value of 41.00 µg/m3, considerably high. The maximum was recorded in the area between Rr. "Bardhul Popa" with Rr "Rinia" in the value of 130.00 µg/m3. The main reason for the high values is mainly the heavy traffic caused by the dense movement of vehicles as well as the constructions (there are construction sites and works are being carried out).

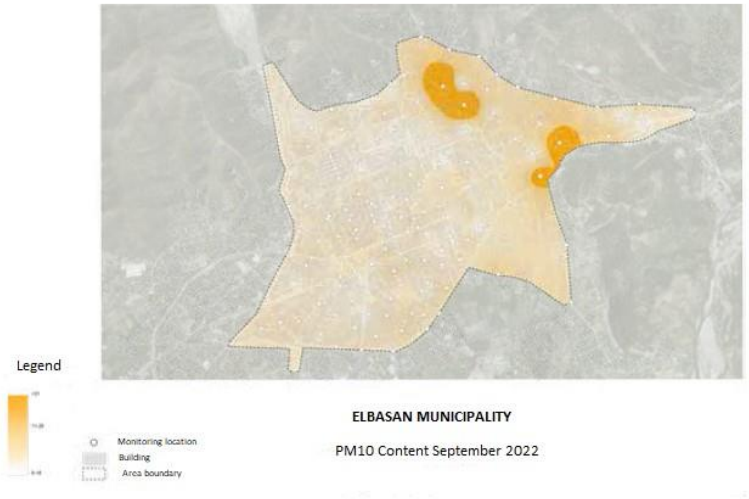


Figure 5-72 PM10 concentration in Elbasan, winter 2023

Table 5-30 PM10 concentration in Elbasan, Summer - Winter 2023

PM10 EU Standard = 40 µg/m^3	Summer 2022	Winter 2023
Max value	100.00µg/m^3	130.00 µg/m^3
Average Value	13.83 µg/m^3	41.00 µg/m^3

Dust particles PM2.5 Measurements carried out in Elbasan during the summer season show that the average value is 10.84 µg/m3 out of 25.00 µg/m3, so this parameter is within the allowed standards. 4 are the points that came out with the highest value according to the map, and this is again related to the movement of vehicles and the discharge of low-quality fuel.

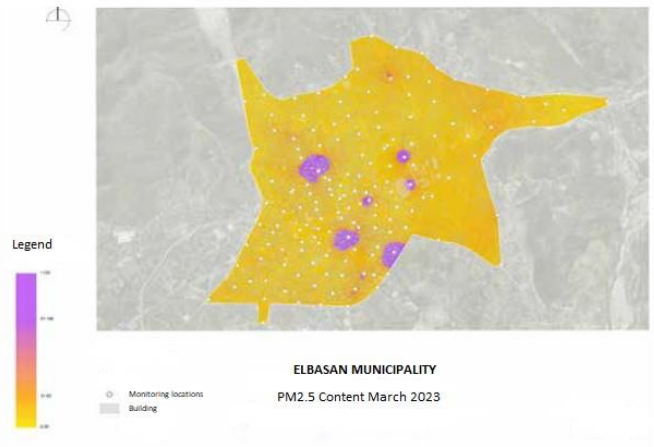


Figure 5-73PM2.5 concentration in Elbasan, summer 2022

The measurements carried out in the winter of 2023 show that the average value is 32.00 µg/m3 from 25.00 µg/m3. 10 are the points that came out with the highest value according to the map, and this is again related to the movement of vehicles and the discharge of low-quality fuel that causes harmful emissions into the air. The maximum values have reached from 81.00 - 128.00 µg/m3, mainly in areas where there is continuous work on construction sites and high traffic of

vehicles.

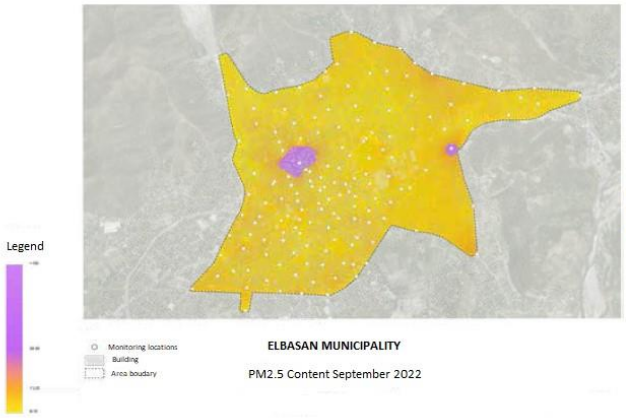


Figure 5-74 PM2.5 concentration in Elbasan, winter 2023

Table 5-31 PM2.5 concentration in Elbasan, Summer - Winter 2023

PM2.5 EU Standard = 25.00 µg/m^3	Summer 2022	Winter 2023
Max Value	29.00 µg/m^3	128 µg/m^3
Average value	10.84 µg/m^3	32.00 µg/m^3

- **Monitoring with the IQAir device (Co Plan)[65]**

In the city of Elbasani, 2 devices have been placed in two areas with different typologies.

Figure 5-75 The station where IQAir equipment is located in Elbasan

The following figure shows the monthly average for the PM2.5 parameter as well as the allowed standard. From the values it is noted that for PM2.5 the monthly average is above the allowed values (25µg/m3) in the months of January and February 2023.

[65] https://greenlungs.al/newsContent.php?id=37

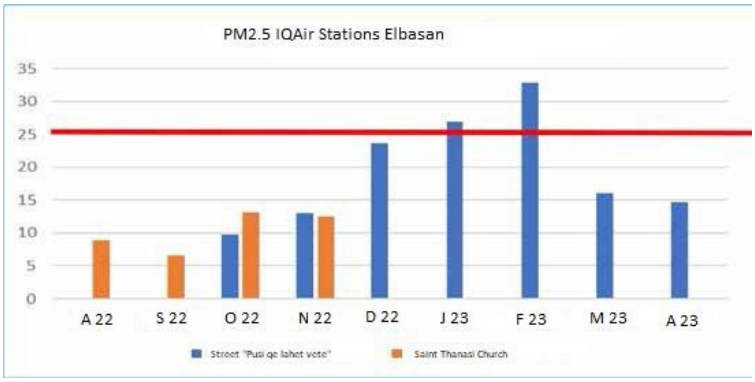


Figure 5-76 Monthly values of PM2.5, August 2022 – April 2023

The following figure shows the monthly average for the CO2 parameter as well as the allowed standard. From the values, it can be seen that the monthly average is above the allowed values (350 ppm) in both stations and throughout the monitoring time.

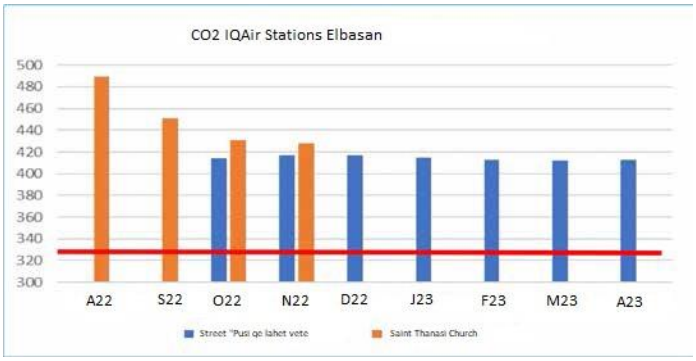


Figure 5-77 Monthly CO2 values, August 2022 – April 2023

Apart from the monthly averages, as part of this analysis, were also examined the daily results for two parameters (CO2 and PM2.5) for the month of December 2022, considering their elevated values during this period, as depicted below. The CO2 parameter consistently registers high values every day of the month (exceeding 400.00 ppm), whereas PM2.5, particularly in the period from 8-31 December, exhibits values significantly surpassing the EU-permitted limit (25.00 µg/m3).

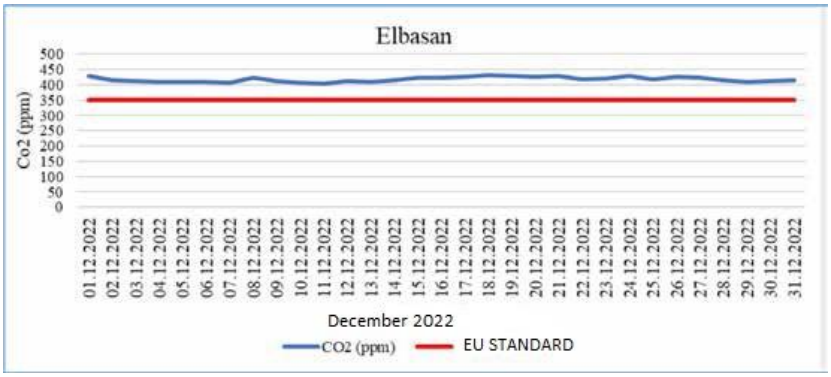


Figure 5-78 Monthly CO2 values, December 2022

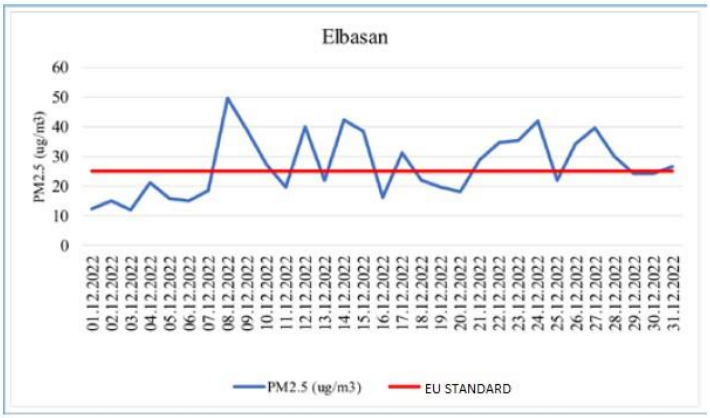


Figure 5-79 Monthly CO2 values, December 2022

- **Pogradec city**

Environmental issues in Pogradec are primarily attributed to mining and quarrying activities involving chrome, iron-nickel, construction materials, and river inerts, accompanied by inadequate waste management. Notably, sites like Guri i Kuq contribute to soil and water pollution due to the influence of atmospheric agents.

Based on the "Action plan for integrated waste management for Municipality of Pogradec years 2017-2020"[66] ,where it is reported that Pogradec exhibits relatively low concentrations of the emission in the air compared to other cities; however, the levels of PM10 and PM2.5 remain a cause for concern, and several factors contribute to this, including:

- A significant number of vehicles, with a prevalence of diesel-powered vehicles and a scarcity of those using gasoline or gas. The circulation of old vehicles or those emitting gas compounds exacerbates the issue.
- Unfavorable topography, surrounded by mountains and hills, limiting the smooth circulation of air.
- Widespread use of wood for heating instead of alternative sources like solar panels, geothermal energy, or pellets.

Ozone concentrations in Pogradec align with values seen in other cities. The levels of carbon monoxide (CO) in Pogradec are attributed to the prevalent use of firewood as a fuel source for residential heating.

Table 5-32 Average air quality data

Indicator	Pogradec	EU Standard
PM_{10}	39	40
$PM_{2.5}$	23	25
SO_2	5	

[66] https://portavendore.al/wp-content/uploads/2018/08/Plan-i-Veprimit-per-menaxhimin-e-integruar-te-mbetjeve-Bashkia-Pogradec-2017-2020.pdf

O_3	42	
CO	0.9	
NO_2	10	40

Source: NEA report

- **Gas emission**[67]

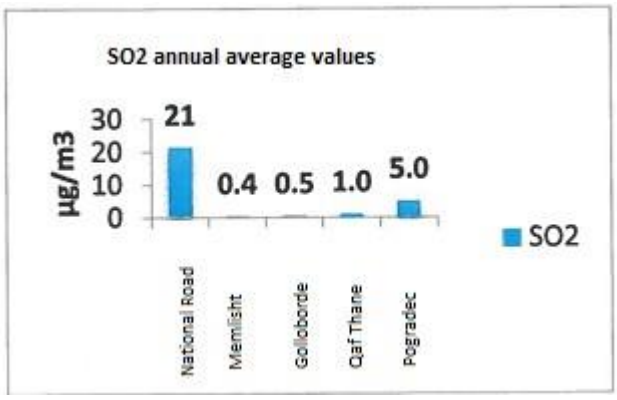
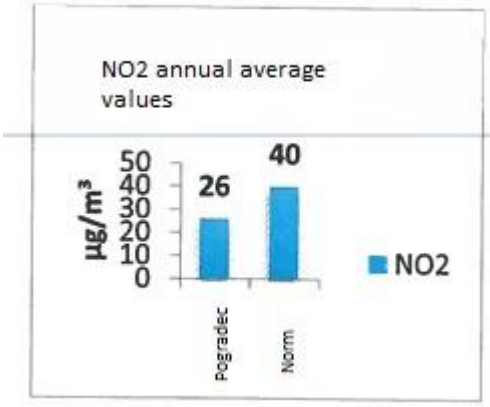


Figure 5-80 Average values of SO2 Pogradec Municipality

The emission of SO2 is directly linked to the sulfur content in the burned fuel, allowing for immediate reductions.

NO2, a pollutant stemming from burning fuel in industrial processes and the road transport sector, is associated with adverse health effects, impacting organs such as the liver, lungs, spleen, and blood. Similar to SO2, NO2 contributes to acid rain formation and soil and water eutrophication.

Vehicle exhaust stands as the primary source of NO2 pollution, with the highest levels observed near roads with heavy traffic, as indicated by monitoring stations. Despite the presence of industrial activities within the city, the NO2 levels recorded at these stations are relatively low. This can be attributed to various factors, including the existence of green surfaces per m2/inhabitant and a vegetation structure conducive to dust absorption.



[67] ENVIRONMENTAL STRATEGIC ASSESSMENT POGRADEC

Figure 5-81Annual average values of NO2 (2015) Pogradec Municipality

Table 5-33 Monitoring results for the three monitored periods for NOx and O3 indicators

City	Sampling points	Period May-June 2015		Period August-September 2015		Period November-December 2015	
		NOx **µg/m³**	O3 **µg/m³**	NOx **µg/m³**	O3 **µg/m³**	NOx **µg/m³**	O3 **µg/m³**
Pogradec							
1	Entrance of the city	21.3	55.4	30.6	62.7	20.49	61.23
2	Public health Directorate	25.6	49.5	34.8	60.9	22.14	63.78

Dust particles (PM) constitute a mixture of aerosols, solid or liquid, encompassing a broad range in size and composition. PM10 and PM2.5 refer to particles between 10 and 2.5 microns in diameter or smaller.

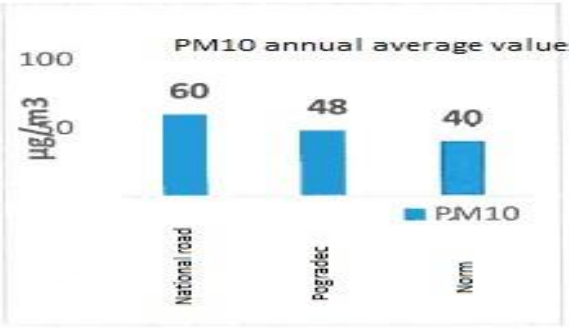


Figure 5-82Annual average values of PM10

PM10, also known as "particulate matter," consists of fine particles with a diameter less than 10µ (microns). The elevated red level of PM10, reaching 60 µg/m3, can be attributed to various factors, including:

- a high number of vehicles concentrated in a specific area;
- the prevalence of diesel-fueled vehicles, with fewer gasoline or gas-powered ones;
- challenging topography, surrounded by mountains and hills impeding air circulation;
- industrial activities within the city;
- the presence of old vehicles emitting gas, and more;
- limited use of alternative energy sources in households, such as solar panels, windmills, geothermal energy, and pellets.

PM2.5, another category of "particulate matter" with a particle diameter less than 2.5µ (microns), is denoted by the red level, indicating values surpassing 35 µg/m2. Similar to PM10, the elevated PM2.5 concentration is influenced by the aforementioned factors.

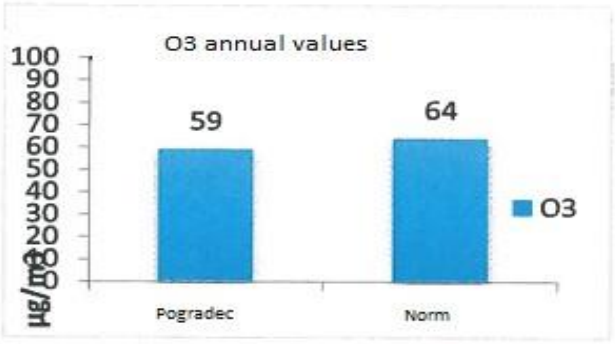


Figure 5-83 Annual values of O3, Pogradec

Regarding O3, in all monitored points the concentration is relatively constant. Pogradec has the highest concentrations of ozone near the Public Health Directorate.

- **Librazhd . General description of air quality**

The municipality[68], as a whole, exhibits optimal air parameters, a condition attributed to geographical, relief, climatic, and biodiversity factors, coupled with the impact of human activities. Field research, employing alternative assessment methods or equivalent time/function units, indicates that air quality is good to very good in rural areas.

However, in some specific road segment along the Shkumbin valley is identified as a problematic area concerning air quality, primarily due to traffic, leading to a notable increase in dust particles (PM10 and PM2.5). Other parameters of emitted gases align with national or local circulation network norms.

In Librazhd, air pollution originates from various sources, including construction on the city outskirts, and former industrial areas. Rural regions face challenges such as recurrent uncontrolled fires, extensive forest exploitation, waste disposal, and natural decomposition.

Insufficient road infrastructure in rural areas contributes to significant dust levels. Observations indicate that air quality in these areas surpasses EU daily standards, with specific concern regarding elements like PM10, PM2.5, and SO2, associated with the use of wood for heating.

- **Prrenjas**

The entire configuration[69] of the municipality exhibits optimal air parameters, attributed to geographical, relief, climatic, and biodiversity factors. The impact of the inefficient activity of the current mines in use is also a contributing factor. The air quality in rural areas is consistently good to very good.

The main sources of air pollution in urban areas, particularly in the city of Prrenjas and areas with economic activities, are evident in constructions and numerous uncontrolled fires. Inadequate road infrastructure, especially in rural areas with unpaved roads, contributes to the significant generation of dust. The use of outdated motor vehicles emitting substantial amounts of gases is also a concern for air quality.

The area of the national axis crossing the city of Prrenjas poses a more severe issue, surpassing the EU daily standard (50µg/m3) on several days, where the permissible limit is 35 days.

[68] ENVIRONMENTAL STRATEGIC ASSESSMENT Librazhd

[69] ENVIRONMENTAL STRATEGIC ASSESSMENT Prrenjas

In urban areas, the level of NO2, SO2, O3, CO, and BTEX is not very good, primarily attributed to cars, fires, burning of biomass, waste buring, dust, and constructions activities . Real pollutants of concern, evaluated in relation to generating sources and the lack of alternative measures such as cleanliness and greenery, include PM10, PM2.5, and SO2.

5.2.9.3 Findings

Air quality in Elbasan city (Referring to the annual report 2019 - 2021 compiled by Co-Plan):

- It was determined that in central area of Elbasan city during 2019, the level of NO2 in the majority of the nine monitored plots exceeded the allowed limits.
- Level of VOC ,compared to the standard which is 0.500 µ/m3, data show a concentration of 0.9-1 μ/m^3 for at least 10 different points throughout the monitored territory.
- $PM_{2.5}$ level in 25 stations show the data within the standard, while in the remaining 22 stations , the values exceeded the standard, ranging from 30 µ/m3 to 180 µ/m3.
- PM_{10} level :out of 47 measurements at various points, it is evident that in 8 of them, the standard is surpassed, ranging from 32 µ/m3 to 122 µ/m3, in comparison to the EU norm of 30 µ/m3.
- Regarding the concentration of CO, it reached the maximum value of 12µ/m3, while the average value was 2.6µ/m3 compared to the EU standard which is 10µ/m3.
- CO_2 shows an average value in the entire surface of the city of Elbasan of 531.3 ppm, from 350 ppm which is the EU standard, while the maximum value was recorded at 860 ppm.
- Ozone (O3) across the monitored area recorded an average value of 84.4 ppm, exceeding both the Albanian norm of 65 ppm and the EU norm of 120 ppm.

Air quality in Pogradec city:

- Pogradec exhibits relatively low concentrations of the emission in the air compared to other cities; however, the levels of PM10 and PM2.5 remain a cause for concern, and several factors contribute to this, including a significant number of vehicles , old vehicles , un favourable topography, surrounded by mountains and hills, limiting the smooth circulation of air, use of wood for heating
- The levels of carbon monoxide (CO) in Pogradec are attributed to the prevalent use of firewood as a fuel source for residential heating.
- SO2 is directly linked to the sulfur content in the burned fuel, allowing for immediate reductions.
- Vehicle exhaust stands as the primary source of NO2 pollution, with the highest levels observed near roads with heavy traffic
- NO2 levels recorded are relatively low.
- The level of PM10, PM2.5 reaching respectively 60 µg/m3 and 35 µg/m2, can be attributed to various factors, including number of vehicles, the prevalence of diesel-fueled vehicles un favourable topography surrounded by mountains and hills impeding air circulation , use of wood for heating

Air quality in Librazhd city:

- Air quality is good to very good in rural areas.
- In some specific road segment along the Shkumbin valley is identified as a problematic area concerning air quality, due to traffic, leading to a notable increase in dust particles (PM10 and PM2.5).
- Other parameters of emitted gases align with national or local circulation network norms.

- Insufficient road infrastructure in rural areas contributes to significant dust levels .Air quality in these areas surpasses EU daily standards, with specific concern regarding elements like PM10, PM2.5, and SO2, associated with the use of wood for heating.

Air quality in Prrenjas city:

- The air quality in rural areas is consistently good to very good.
- The area of the national axis crossing the city of Prrenjas poses a more severe issue, surpassing the EU daily standard (50µg/m3) on several days, where the permissible limit is 35 days.
- In urban areas, the level of NO2, SO2, O3, CO, and BTEX is not very good, primarily attributed to cars, fires, burning of biomass, waste burning, and constructions activity.
- Real pollutants of concern include PM10, PM2.5, and SO2;

5.2.10 Noise

The railway line crosses several villages and towns (Rrogozhine, Peqin, Elbsan, Librazhd, Prrenjas, Pogradec). It is expected that noise and vibrations are of concern during both construction and operational phases.

Impact of noise and vibrations generated during construction phase is considered temporary as long as construction activities last. This impact can be managed and may be reduced by implementing prevention, corrective measures as per the source of noise and vibration emitting. Meanwhile the noise and vibrations generated from operational phase last as long as the trains circulate, and therefore they are of concern for the inhabitants of the crossed towns, as well as for the wild fauna.

Thus, the level of the noise and vibrations should be taken into consideration during the preparation of the detailed design and ESIA by recommended installing the noise barrier close to the sensitive receptors.

Noise modelling is recommended to be done (during detail design phase) in order to evaluate the level of noise during operation phase taken into consideration the existing level of the noise close to the sensitive receptors.

5.2.10.1 Materials and method

Baseline data referring the noise level are obtained from the existing reports, studies especially within the urban area by the Institutions (NEA /Municipality).

The legal framework on environmental noise includes the Law 9774/2007 “On evaluation and management of environmental noise”, Law 9095/03 “For the assessment and administration of noise in the environment amended by Law 9774/07 add guideline no 8 on noise emission limits applicable in certain environments “, the DCM 587/2010 “On the monitoring and control of noise levels in urban and tourist centres”, and the Minister Ordinance no 1037/1 of April 12. 2011 “On environmental noise assessment and management” and from the common instruction of the Minister of Tourism and Environment, the Minister of Health and Social Protection and the Minister of the Interior,No.2, dated 15.11.2023 "For the exposure limits of noise for certain environment and for economic and social activities";

The maximum noise levels are provided in the Minister Ordinance No. 8 of November 27, 2007 “On threshold levels of noises in the environment”. This ordinance, which relies on the WHO recommendations, provides that the acceptable noise levels shall be up to 50 -55 dB outside the residential dwellings during day time, 45 dB during night time, and 35 dB (A) inside the residential

dwellings during day time and 30 dB (A) during night time. Both WHO Guideline[70] and DCM No.8, dt 27.11.2007, of Ministry of Health and Min. of Environment "On limit noise values in certain environments", 2002; Environmental Noise Directive 2002/49/EC apply the same thresholds for the level of noise as following:

Table 5-34Guideline and values for community noise in specific environments.

Specific environment	Critical health effect(s)	LAeq [dB]	Time base [hours]	LAmax, fast [dB]
Outdoor living area	Serious annoyance, daytime and evening Moderate annoyance, daytime and evening	55 50	16 16	- -
Dwelling, indoors Inside bedrooms	Speech intelligibility and moderate annoyance, daytime and evening Sleep disturbance, night-time	35 30	16 8	 45
Outside bedrooms	Sleep disturbance, window open (outdoor values)	45	8	60
School class rooms and pre-schools, indoors	Speech intelligibility, disturbance of information extraction, message communication	35	during class	-
Pre-school ;Bedrooms, indoors	Sleep disturbance	30	sleeping - time	45
School, playground outdoor	Annoyance (external source)	55	during play	-
Hospital, ward rooms, indoors	Sleep disturbance, night-time Sleep disturbance, daytime and evenings	30 30	8 16	40 -
Hospitals, treatment rooms, indoors	Interference with rest and recovery	#1		
Industrial, commercial, shopping and traffic areas, indoors and Outdoors	Hearing impairment	70	24	110
Ceremonies, festivals and entertainment events	Hearing impairment (patrons:<5 times/year)	100	4	110
Public addresses, indoors and outdoors	Hearing impairment	85	1	110
Music through headphones/ Earphones	Hearing impairment (free-field value)	85 #4	1	110
Impulse sounds from toys, fireworks and firearms	Hearing impairment (adults) Hearing impairment (children)	- -	- -	140 #2 120 #2
Outdoors in parkland and conservation areas	Disruption of tranquillity	#3		

#1: as low as possible;
#2: peak sound pressure (not LAmax, fast), measured 100 mm from the ear;
#3: existing quiet outdoor areas should be preserved and the ratio of intruding noise to natural background sound should be kept low;
#4: under headphones, adapted to free-field values

[70] WHO Guideline values for community noise in specific environments, 2002; Environmental Noise Directive 2002/49/EC.

The WHO Regional Office for Europe published in 2018 a new noise guideline, which the main purpose is to provide recommendations for protecting human health from exposure to environmental noise originating from various sources, including transportation road and railway traffic71 . This guideline, which aims to be suitable for policy-making in the WHO European Region72 , suggests that noise levels generated by the railway should be 54 dB during daytime and 44 dB during nighttime.

Table 5-35Noise level norms according to WHO

Measurement of noise levels	Norm
LAeq Day	55 dB(A)
LAeq Night	45 dB(A)

The data base showing the noise levels in the cities crossed by the railway line are obtained from the Environmental state institutions for the year 2018 - 2022 and published by the National Agency of Environment and from In 2021, as well as from Co-Plan who conducted noise level monitoring in Elbasan as part of the "Green Lungs for Our Cities" project.

The monitoring is based on DCM 1189/2009 “On the rules and procedures for and implementation of the National Environmental Monitoring Programme”. The noise has been monitored according to the method IEC 61672-1[73]

5.2.10.2 Baseline Information

Noise[74] near the project area is caused from a multitude of sources, encompassing both natural elements and various human activities. The primary contributors to noise pollution include:

1. Road traffic
2. Railway traffic
3. Air traffic
4. Industrial activities
5. Natural phenomena

Residential areas, public parks, schools, hospitals, and other noise-sensitive structures are particularly vulnerable to the effects of these activities. Noise pollution is defined as the intrusion of noise into residential spaces, whether indoors or outdoors, causing annoyance or disturbance during rest and other human activities. This poses risks to human health, disrupts ecosystems, damages material goods, and interferes with the natural composition of the environment.

In Albania, road traffic emerges as the predominant cause of noise emissions. Consequently, monitoring of road traffic noise has been conducted in several major cities across the country. The National Environment Agency oversees urban noise monitoring, assessing the state of noise pollution in accordance with the norms outlined in Law No. 9774, dated 12.07.2007, titled "On the assessment and administration of noise in the environment." These norms align with the standards set by the World Health Organization (WHO).

- Pogradec

[71] Environmental Noise Guidelines for the European Region (2018)

[72] https://www.euro.who.int/__data/assets/pdf_file/0009/383922/noise-guidelines-exec-sum-eng.pdf

[73] https://idoc.pub/download/iso-iec-61672-1-eletroacoustics-sound-level-meterspdf-6ngejqq731lv

[74] https://akm.gov.al/ova_doc/raporti-per-gjendjen-e-mjedisit-2022/

Both[75] monitoring stations in the city of Pogradec show a surpassing of the standard for LAeq/Day and LAeq/Night. The most significant exceedance during the daytime occurs at the "Terminal Crossing" point, whereas during the night, it is observed at the "City Entrance" point, located approximately 3-3.8 km away from the project route.

Figure 5-84Noise monitoring stations in Pogradec

Table 5-36Average value of noise level for Day and Night, Pogradec

Monitoring points	Laeq/day db (a)	Exceeding the norm during the day,%	Laeq/ night db (a)	Exceeding the rate at night, %
Station 1. The entrance of the city	57.21	4.01%	47.93	4.51%
Station 2. Crossing at the bus terminal	57.7	4.9%	46.08	2.4%
Albanian standard and WHO	55		45	

Table 5-37Daily average values, for all monitored cities, years 2018-2022.

Laeq/day dB(A)	2018	2019	2020	2021	2022	Norm
Pogradec	57.44	56.78	56.33	58.07	57.45	55

It is estimated that from 2018-2022, in Pogradec there will be an exceedance of the LAeq standard during the day.

[75] https://akm.gov.al/ova_doc/raporti-per-gjendjen-e-mjedisit-2022/

Table 5-38Average nightly values, for all monitored cities, years 2018-2022.

Laeq/night db(a)	2018	2019	2020	2021	2022	Norm
Pogradec	45	46.08	45.52	46.6	47	45

It is estimated that from year 2018-2022, in Pogradec there is an exceedance of the standard for LAeq at night.

Instruction No. 2, dated 15.11.2023 " For the limit level of noise for a certain environment for economic and social activities" takes into account all the negative health effects identified for specific environments.

- Librazhd

The impact [76] of noise extends to human behavior, health, and the broader biological environment. Acoustic pollution induces physiological harm, acoustic damage, aggressiveness, stress, sleep disturbances, hearing loss, and alterations in reproductive or feeding behavior among fauna.

Persistent noises, particularly along the Shkumbin River bed traversed by corridor 8, are a prevalent concern. The urban area is particularly susceptible to various noise sources stemming from construction, commercial activities, and socio-economic endeavors.

The municipality center, situated 300 meters from the project area at KP 099+860 in the city of Librazhd, is notably affected by noise originating from the construction industry, transportation systems, vehicle conditions and numbers, and establishments. Another significant noise source, particularly impacting biodiversity and biological corridors, is corridor 8, generating considerable noise. This issue gains sensitivity due to noise persisting during both day and night intervals, surpassing the EU limit (55/45 dB). In rural areas, the acoustic environment is comparatively better. However, a notable concern arises from noise emissions by sawmills, posing potential impacts on the faunal regime and raising reproductive concerns, especially within bio corridors.

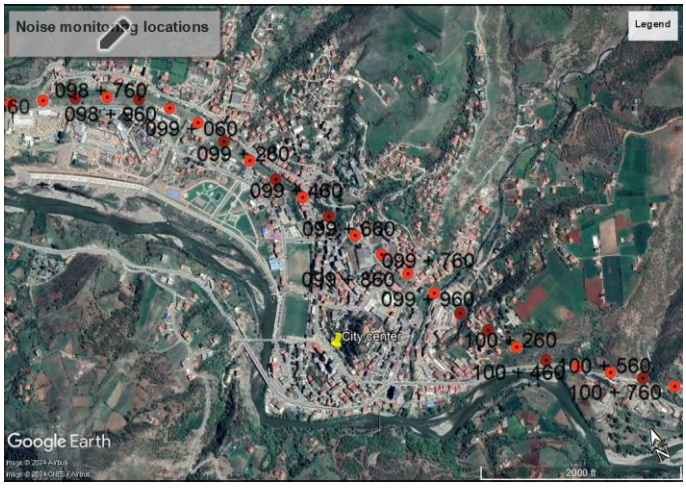


Figure 5-85Noise monitoring station in Librazhd

- Prrenjas

[76] ENVIRONMENTAL STRATEGIC ASSESSMENT_ Librazhd

The impact [77] of noise manifests in human behavior, health, and the broader biological environment. Acoustic pollution results in physiological harm, acoustic damage, aggressiveness, stress, sleep disturbances, hearing loss, and alterations in reproductive or feeding behavior among fauna.

The origin of noise is a concern for the municipality center, located 400 meters from the project area. The noise stems from the construction industry, transportation systems, motor vehicle conditions, and premises. A significant source, especially affecting biodiversity and biological corridors, is corridor 8, generating considerable noise. This issue gains sensitivity due to noise persisting during both day and night intervals, exceeding the EU limit (55/45 dB). In rural areas, the acoustic environment is considerably better. However, problematic situations arise from sawmills that disregard legal requirements (noting that some operate outside the law), influencing the faunal regime with consequent reproductive concerns or operating within bio corridors;

Figure 5-86Noise monitoring station in Prrenjas

- Elbasan

The primary environmental concern[78] in the city of Elbasan revolves around noise pollution, primarily stemming from transportation, vehicle speed, aging vehicles, and key traffic axes. The most problematic areas are the boulevard and the city ring road due to traffic congestion. Main roads and their intersections, particularly during afternoon rush hours, are identified as hotspots.

The A3-1 to A5-3 axis experiences high traffic both in the morning and evening, with a decrease only during the evening in the A5-1, A5-3 axes. Similarly, the A6-1 to A9-4 and A1-1, A2-7 axes show a decline in values only during the evening in specific axes.

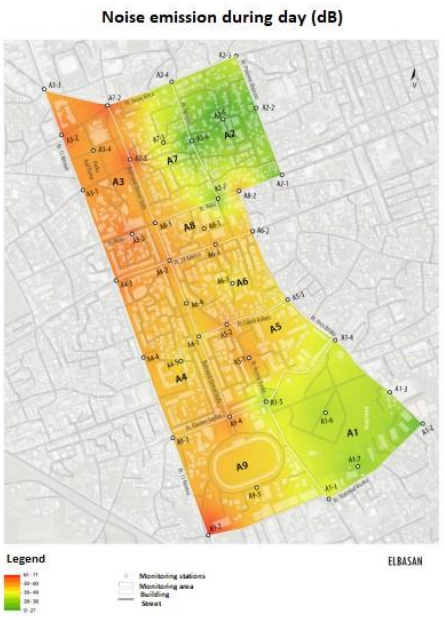
Observations indicate that during early morning and afternoon hours, both the minimum and maximum noise levels at all points surpass the prescribed limits of Regulation No.8, dated 27.11.2007, by the Ministry of Environment and MSH "On the permissible noise levels in certain environments." In urban areas, the permissible noise level during the day should not exceed 55dB,

[77] ENVIRONMENTAL STRATEGIC ASSESSMENT Prrenjas

[78] https://www.co-plan.org/wp-content/uploads/2021/08/GREEN-LUNGS-BULETIN-2020.pdf

while during the night, the limit is set at 45dB. The average noise levels at measurement points exceed both EU and Albanian standards for both day and night periods.

Monitoring conducted in Elbasan from January 2019 to May 2020 indicates that the most problematic stations are located near intersections and construction sites. Conversely, stations with lower noise levels are situated near city parks, residential complexes, and state institutions.



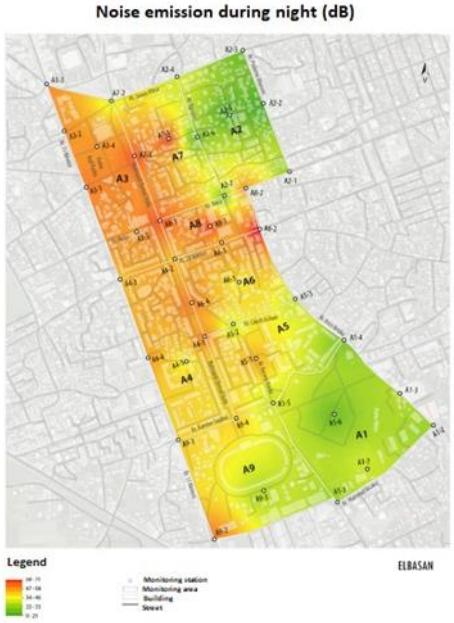


Figure 5-87Noise levels during the day in Elbasan Figure 5-88Noise levels during night in Elbasan

The maximum value recorded during the monitoring of the noise level during the day is 81.8 dB.

The average value recorded during the monitoring of the noise level during the day is 60.43 dB.

The maximum value recorded during the monitoring of the noise level during night is 85.9 dB.

The average value recorded during the monitoring of the noise level during the night is 59.74 dB.

In 2021, Co-Plan[79] conducted noise level monitoring in Elbasan as part of the "Green Lungs for Our Cities" project. Measurements were conducted in various city zones, with a primary focus on major road axes and intersections. The highest noise levels were observed during the afternoon, particularly on key axes. The areas around Sheshi Valmi to Sheshi Elbasan Arena, central zones, and the southeast and southwest peripheries experienced noise levels that exceeded EU standards. The average noise level (2019-2021) reached 52.2 dB, with a maximum of 71.2 dB, surpassing the EU's 55 dB limit. Noise pollution was primarily attributed to traffic, vehicle speed, and road conditions. The report underscores the necessity for measures to address noise-related challenges in Elbasan.

[79] https://greenlungs.al/newsContent.php?id=36

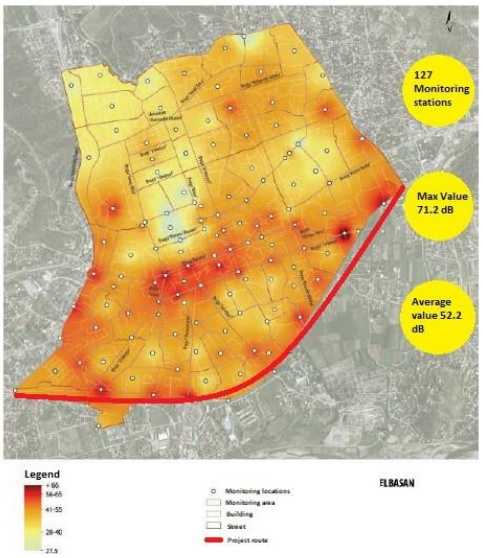


Figure 5-89Noise levels during the morning in Elbasan

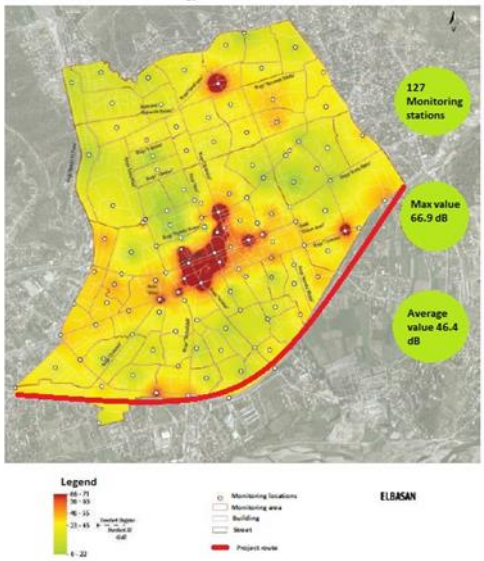


Figure 5-90Noise levels during night in Elbasan

Following it is shown the data of monitoring of the noise level carried out in the city of Elbasan, thanks to the Green Lungs project[80] in different points of the city. For the purpose of presenting information about the project's footprint, the following figure and table show the monitored stations near the project's footprint.

Figure 5-91Orthophoto of the monitoring points compared to the project footprint

Table 5-39Noise level in the vicinity of the project track, City of Elbasan[81]

Monitoring station	Morning (LAeq)	Night (LAeq)
B-12.1	60.20 db	52.00 db
B-37.2	62.10 db	49.30 db
B-36.2	66.20 db	49.30 db

[80] https://greenlungs.al/index.php?lng=al

[81] https://greenlungs.al/noise.php?lng=al

B-23.1	63.30 db	58.60 db
B-25.2	67.90 db	56.60 db
B-14.1	55.90 db	51.20 db
B-26.1	59.90 db	47.60 db
B-1.2	60.50 db	40.20 db
B-1.1	64.30 db	49.30 db
B-30.1	60.70 db	52.20 db
B-2.2	48.70 db	44.50 db
B-2.1	53.00 db	46.60 db
C-1	67.20 db	55.25 db

Table 5-40Maximum and average noise level, City of Elbasan82

City	Morning (LAeq)		Night (LAeq)	
	Max	Average	Max	Average
Elbasan	85.9	59.74	86.7	55.18

5.2.10.3 Findings

- **Pogradec :**

- Exiting level of noise in Pogradec city measured in two stations within urban area show a surpassing of the standard for LAeq/Day and LAeq/Night. The most significant exceedance during the daytime occurs at the "Terminal Crossing" point, whereas during the night, it is observed at the "City Entrance" point, located approximately 3-3.8 km away from the project route.
- There is no any data on the existing level of the noise along the railway line and near the train station in Pogradec. After the tunnel (km 136.4 – Km 137.8) the railway footprint passes along a rural area with no significant noise level. At Km 137.8 – 152.6 Km the railway footprint passes parallel to the existing road so it is expected during operation phase an increase in the existing level of traffic noise caused by operation of the train.
- During operation phase of the railway, it is expected the level of the noise to be increased and a cumulative effect it is expected referring to the existing level of the noise. As close to the train station (Pogradec) even the speed of the train will be reduced , this cumulative effect it is expected to be not significant .Anyway noise measurements and modelling (recommended to

[82] https://greenlungs.al/noise.php?lng=al

be conducted during detail design phase) will show how much the effect of operation phase on noise level will be in order to avoid installing the barrier not necessary but only close to the houses that may be impacted . From Km 136- km 152 the footprint of the railway passes along a very beautiful scenery for the passengers to be enjoyed , and installing noise barriers not necessary will bring more visual impact than benefit , that why reducing the speed of the train for this section will be considered as alternative to avoid installing barriers ;

- **Librazhd**

- There is no any data on the existing level of the noise along the railway line and near the train station for this segment. As the railway passes within urban area and near the center of Librazhd (300 -400 m meters from the project area at KP 099+860), it is notably affected by noise originating from the construction industry, transportation systems, vehicle conditions and numbers, and establishments.
- From Kmp 97 (entrance of the city) up to Kmp 100 the railway passes through the city but also even close to the station .So it is expected the speed to be reduced and the cumulative noise level to be not significant.
- In rural areas, the acoustic environment is comparatively better. However, a notable concern arises from noise emissions by sawmills, posing potential impacts on the faunal regime and raising reproductive concerns, especially within bio corridors.
- Noise measurments and modelling (recommended to be conducted during detail design phase) will show how much the effect of operation phase on noise level will be in order to avoid installing the barrier not necessary but only close to the houses that may be impacted .

- **Prrenjas**

- There is no any data on the existing level of the noise along the railway line and near the train station for this segment.
- From Kmp 124 (entrance of the city) up to Kmp 126 the railway passes along or close to the road but also even close to the station .So it is expected the speed of train to be reduced and the cumulative noise level to be not significant.
- In rural areas, the acoustic environment is comparatively better. However, a notable concern arises from noise emissions by sawmills, posing potential impacts on the faunal regime and raising reproductive concerns, especially within bio corridors.
- Noise measurements and modelling (recommended to be conducted during detail design phase) will show how much the effect of operation phase on noise level will be in order to avoid installing the barrier not necessary but only close to the houses that may be impacted

- **Elbasan**

- From Kmp 73 (entrance of the city) up to Kmp 80 the railway passes within urban area and near the center of city. So it is expected the speed of train to be reduced and the cumulative noise level to be not significant compared with the existing level of the noise.
- The source of noise emission in the city of Elbasan primarily stemming from transportation, vehicle speed, aging vehicles, and key traffic axes and industry area. During early morning and afternoon hours, both the minimum and maximum noise levels at all points surpass the prescribed

limits (exceed both EU and Albanian standards for both day and night periods). The most problematic stations are located near intersections and construction sites;

- Noise measurements and modelling (recommended to be conducted during detail design phase) will show how much the effect of operation phase on noise level will be in order to installing the barrier close to the impacted houses .

To minimize noise, it is recommended to:

- Installing noise barrier close to the resident area based on a noise modelling study .
- Using electrical trains that emits low noise comparing with fuel trains
- Promote the provision of facilities and measures to reduce urban noise, such as the creation of a green protective belt and spaces planted with trees and ornamental shrubs between residential areas and main roads as an environmentally friendly measure.
- Promote and construct alternative transport to reduce traffic (as railway);
- Regulate the distances between roads (based on their classification) and dwellings.
- Emphasize public education as a crucial societal demand.
- Acknowledge that noise reduction intervention programs require active participation from the population.
- Utilize modern communication channels to create widespread awareness of the detrimental effects of noise pollution.
- Implement regular checks on vehicles generating excessive noise.
- Consider interventions in road signage, including signals related to noise, strategically placed at certain points.
- Enhance urban governance through increased transparency and accountability in executing all urban planning and management policies.
- Incorporate noise reduction efforts into the design of new constructions.
- Ensure the proper maintenance of the road system.
- Strengthen efforts to implement defined standards for urban noises and conduct continuous monitoring.

5.2.11 Climate change

5.2.11.1 Materials and method

- Hydrology & Climate Change Study (Preliminary Design for the Rehabilitation of the Corridor VIII Rrogozhina - Pogradec Section, Albania)
- Climate Change Resilience and Vulnerability Assessment Report (CC Report) for the project (Preliminary Design for the Rehabilitation of the Railway Corridor VIII Rrogozhina – Pogradec Specific Contract number: AA-010284-001)

5.2.11.2 Baseline Information

Current climate variability presents a major challenge to the operation and maintenance of transport infrastructure. In some countries, transportation systems are vulnerable to various extremes of weather, such as temperature changes, rainfall, thunder, strong winds, poor visibility, sea level rise, etc.

In the recent past, climate change and its impact on society have been the main focus of government policies and political programs around the world. Many industries and organizations have also begun extensive efforts to assess the impacts of climate change on transportation

infrastructure in relation to their business goals. Developed Climate Change models showed that the Earth's average annual temperature will probably increase by 1° to 5.5°C. Additionally, annual precipitation is expected to increase in the Northern Hemisphere and decrease in the Southern Hemisphere. In addition, the daily intensity of precipitation and the possibility of extreme precipitation may increase in each region.

Climate change endangers and jeopardizes basic aspects of daily life for people around the world and further affects access to basic amenities such as food, health, water, land use and environment. An increase in extreme weather events such as temperature, humidity, winds, precipitation, sea level, and storm surge will have a significant impact not only on transportation infrastructure, but also on other related infrastructures.

For climate changes in the Shkumbin river basin, we have referred to three studies. First, we are based on the conclusions of a study of the trend of temperatures and rainfall in the coming decades for the region, which is based on long-term data: "Study on climate change in the Western Balkans region"[83];

Representative Concentration Pathway [84] *RCP) is considering in this assessment as more adequate option of climate change for the future - *One high pathway which leads to >8.5 W m^{-2} in 2100 (the corresponding ECP, Extended Concentration Pathways, has constant emissions after 2100 until 2150 and constant concentrations after 2250).*

5.2.11.3 Findings

Summarized, from the two-scenario analysis (RCP 4.5, RCP 8.5), the temperature and precipitation trends are as follows:

According to the minimum impact model (RCP 4.5) (until 2050):

a) Temperature change is significant across the region, with an average increase of 0.8°C, and significant seasonal variation in maximum and minimum temperatures is expected;
b) The change in rainfall is not expected to be significant; the variability in annual and seasonal values is within the range of -5% and +5%, with decreasing trends in most of the region.

[83] Ana Vuković, and Mirjam Vujadinović Mandić, 2018, Study on climate change in the Western Balkans region, 76 pages.

[84] Representative Concentration Pathways (RCPs): Scenarios that include time series of emissions and concentrations of the full suite of greenhouse gases (GHGs) and aerosols and chemically active gases, as well as land use/land cover (Moss et al., 2008). The word representative signifies that each RCP provides only one of many possible scenarios that would lead to the specific radiative forcing characteristics. The term pathway emphasizes the fact that not only the long-term concentration levels but also the trajectory taken over time to reach that outcome are of interest (Moss et al., 2010). RCPs were used to develop climate projections in CMIP5. The RCPs are listed below for reference should the SSP impacts not yet be available for countries or regions: o RCP2.6: One pathway where radiative forcing peaks at approximately 3 W m-2 and then declines to be limited at 2.6 W m-2 in 2100 (the corresponding Extended Concentration Pathway, or ECP, has constant emissions after 2100). o RCP4.5 and RCP6.0: Two intermediate stabilization pathways in which radiative forcing is limited at approximately 4.5 W m-2 and 6.0 W m-2 in 2100 (the corresponding ECPs have constant concentrations after 2150). o RCP8.5: One high pathway which leads to >8.5 W m-2 in 2100 (the corresponding ECP has constant emissions after 2100 until 2150 and constant concentrations after 2250).

Under the maximum scenario (RCP 8.5):

a) Temperature changes are significant for the entire region with a regional average increase of 1.0 °C, reaching the highest increase during the period 2050-2060. In some places in the southern regions of Albania, the average annual temperatures can reach about 3.0 °C higher than currently.

The change in precipitation still shows no statistically significant change in the annual mean or in the seasonal values, but the decrease in the annual values tends to spread.

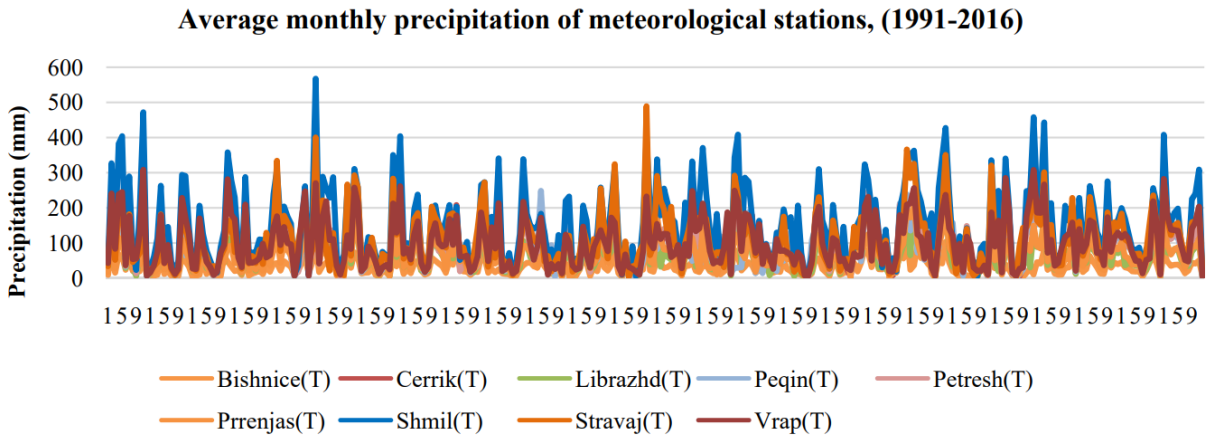
Based on the second communication on climate change[85], we summarize as follows:

a) In 2050, the average annual temperature is expected to change from +1.7 to +2.3 °C;
b) Annual rainfall is expected to be lower from 5.3 to 6.9%

According to this scenario, it is likely to have a significant effect on environmental conditions and will increase the impact of human activity on the aquatic environment. Rising water temperatures and changes in precipitation patterns are of particular importance to surface water ecosystems. Such changes are likely to affect the way ecosystems function, especially in combination with changes in water chemistry.

According to Lata, L., 2021[86] which interpolated the average rainfall values for a 25-year period in the Shkumbin basin, it results that:

a) Rainfall has decreased in the study area and its distribution is irregular. This means that the climatic events of rainfall will become more severe and the impacts on flooding and erosion will be greater.



FFigure 5-92:Average monthly precipitation by meteorological stations in the Shkubini River Basin, for time

[85] Ministry of Tourism and Environment): Albania's Second National Communication under the UN Framework Convention on Climate Change.

[86] Lata L., 2021, Climate Data Interpolation for Shkumbini WEAP Model, Journal of Environmental Science and Engineering B 10 (2021) 90-102.doi:10.17265/2162-5263/2021.03.002

record 1991-1916

According to the chart above, among the 7 measured streamflow stations, the rainfall in the mountainous areas of Shmil, Peqin and Librazhd are in values that exceed 250 mm and reach up to 400 mm during the winter season. These stations coincide with the railway segment from Peqin to Elbasan and from Librazhdi to Perrenjas, in which the biggest changes in the amount of precipitation are expected. Although we do not have the dates of the events with the highest amounts, we estimate that the risk of flooding, erosion and landslides will be in the months of November and March.

In the long term, the observed impacts of climate change are projected to continue due to the projected increase in the intensity and frequency of extreme weather events in the region.

Table 5-41:The assessment of Variability (sensitivity x Exposure) and Risks (Probability/Likelihood x Severity score) according the climate variable

Hazard Categories and Climate Hazard	Rail infrastructure impact	Climate Variables	Sensitivity	Exposure	Vulnerability	Severity/ magnitude	Risk Assessment
High temperatures	-Expansion of moveable assets such as swing bridges hindering operation; -General increase in failure rate of assets in high temperatures; -Sagging of the overhead line equipment;	Annual / seasonal / monthly average (air) temperature	1 Slight impact on bridge structures, overhead line, signaling and related electrical cables	**1** National data (hydrological Institute) on high temperatures	1	**3** Possible impact during the lifetime	**3** **Negligible risk**
		Extreme temperature occurrences (including heat waves)	**1** Possible effect on heating electrical transformer substation and other related equipment	**2** Number of days with high temperature according the temperature trend predictions in 2050	2	**3** Possible impact during the lifetime	**6** **Low Risk**
		Wild Fire	**2** All electric cables, electric substation and all equipment	**3** According data of National Civil Emergencies	6	3 Possible impact based on data of Emergency National Agency	**18** **High Risk – Extreme Risk**
Low Temperatures	-Rail breaks, cracks and/or associated misalignment problems; -Ice-jam flooding damaging infrastructure, particularly bridges; -Tree and branch falling onto tracks due to snow loading; -Icefalls in tunnels, under bridges and other structures causing damage or derailment of trains.	Cold spells	0 No Impact	0 No Impact	0	1	**0** **Negligible risk**
		Freeze-thaw damage	0 No Impact	0 No Impact	0	1	**0** **Negligible risk**
		Ice	1 Possible impact on bridges element and electrical overhead wires	1 Days of snow and ice expected is lower than current however possible impact	1	1	**1** **Negligible risk**
High precipitation	-Increased risk of earthworks failure and landslides in wet weather; -Increased risk of bridge scour arising from flood events; -Failure of other structure supports due to increased risk of scour;	Annual / seasonal / monthly average (air) rainfall	**2** Standing water fouling track ballast and erosion	**2** Possible impact by increase rain Intensity	4	2	**8** **Medium Risk**
		Extreme rainfall (frequency and magnitude)	**2** Bridge structure risk by Flooding and track erosion	2 Possible impact by increase rain Intensity expected	4	3 Possible impact based on data of Emergency	**12** **High Risk**

Hazard Categories and Climate Hazard	Rail infrastructure impact	Climate Variables	Sensitivity	Exposure	Vulnerability	Severity/ magnitude	Risk Assessment
	-Standing water fouling track ballast; -Lahars causing structural damage to infrastructure;					National Agency	
		Land slide	2 Land slide due to terrain slope in limited section of railway	3 Possible impact by increase rain Intensity expected	6	3 Possible impact based on data of Emergency National Agency	**12** **High Risk**
		Rocks fall	**2** Rock fall due to terrain slope in very limited limited section of railway	**3** Possible impact by increase rain Intensity expected	6	3 Possible impact based on data of Emergency National Agency	**18** **High Risk – Extreme Risk**
		Danger of the supporting legs of bridges from floods	**2** Possible impact on bridge legs	2 Possible accident on small bridges based on old project design	4	2	**8** **Medium Risk**
High Winds	-Increased risk of leaf fall leading to low track adhesion; -Damaged trees and debris falling onto track; -Excessive wind loading on structures such as masts and towers; -Increased risk of damage to bridges in high winds	The wires of the railway overhead lines (electrical and communication) endangered by high-speed wind	**1** Possible damages of wires	1 Possible accident on electrical and communication wires	1	1	**1** **Negligible risk**
		Bridges risk from high speed wind	**1** Possible damage of bridges supported elements	1 Possible damage on expected climat change	1	1	**1** **Negligible risk** **Negligible risk**

Exposure is moderately influenced by expected extreme temperatures and high impact by Wild Fire for all electric cables, electric substation and all other equipment. Exposure is higher in two consequences due to slates: in landslides and rock fall in a steep segment Librazhd - Perrenjas.

Particularly influenced by the exposure scoring and less influenced by sensitivity Vulnerability is high in areas of high temperatures (mainly due to wild fire), extreme rain fall (Land Slides and Rock Fall)

According to the risk assessment ranking, six variables are categorized as Negligible Risk (score ≤ 3):

- Annual / seasonal / monthly average (air) temperature;
- Cold Spells;
- Freeze – thaw damage;
- Ice;
- High Wind (for the wires of the railway overhead lines (electrical and communication) endangered by high-speed wind and bridges risk from high-speed wind).

Variable with **Low Risk (score ≤ 8)** results only in the case of extreme temperatures (including heat wave). In this case, the relatively low level of vulnerability has an impact. However, wave heat has impacts on wild fire (frequency and intensity, railway infrastructure.

Medium Risk (≤ 12) is assessed risk assessment in the variable of high rainfall (Annual / seasonal / monthly average (air) rainfall) as well as in the danger of the supporting legs of the bridge. Risk assessment at level High risk (=12) included the impact of tow variables related with high precipitation (extreme rainfall (frequency and magnitude) and landslide.

Risk assessment at the level of **High - Risk to Extreme Risk (12-18)** includes extreme rainfall (rock fall) and extreme temperature - heat wave (wild fire) variables.

5.2.12 Biodiversity and Ecological sources and protected areas

5.2.12.1 Materials and method

The overview of habitats and species is based on a combination of desk-based research, field investigations and casual interviews with local stakeholders.

Desk research

The desk-based research gathered a range of information to identify the existing information on habitat and species within the study area and to identify areas of interest for the field survey. Scientific work, scientific articles, monographs, ecological surveys, inventory reports on flora and fauna, management plans for protected areas etc., are an important source of information and reliable data. Information on overall biodiversity, habitat types, land use, protected species and species of conservation concern has been obtained through desk-based reviews of available studies as well as from information from biologists with experience in the study area.

The reviewed information includes:

Information from the Ministry of Tourism and Environment and the National Administration for Protected Areas and the Regional Administrations for Protected Areas of Elbasan and Korca on different categories of protected areas;

- IUCN Red list[87]
- Red List of Albania[88];
- Flora of Albania, vol. 1- 4[89];
- The forests Map of Albania[90];
- Data from International Waterbird Census for Albania; and
- Different studies on the Landscape Protected Area of Pogradeci Lake, including its Management Plan .
- BirdLife International on the assessment of certain species of birds
- Wetlands International for the 1% threshold of regional population for waterbirds
- Directive 2009/147/EC of the European Parliament and of the Council on the conservation of wild birds (The Birds Directive)
- Council Directive 92/43/EEC of 21 May 1992 on the conservation of natural habitats and of wild fauna and flora

Field Surveys

The main objective of the field survey was to confirm the information gathered during the desk-based research, and to gather more site-specific information on habitats and species presence. During the field surveys in the area, abundant points were visited and the features of the landscape and environment including the dominant habitats and species recorded. Survey points were chosen to ensure adequate coverage along the area. Photographs and notes were made at each point to record the habitat and species present and field reconnaissance was made to examine the flora present and to search for signs or tracks of fauna. Following the reconnaissance visit and preliminary desk-based review of available information, specific ecological features have been identified which will need to be further surveyed during the Detailed Design for the Rehabilitation of the Railway Corridor VIII Rrogozhina – Pogradec

The survey area was split in two main sections:

- ✓ **Section Rrogozhine-Librazhd**

The subsections below have the same biological and ecological characteristics:

- *Subsection Rrogozhinë-Mirakë (km 39 to 90.2)*

The section Rrogozhinë-Mirakë is characterised more or less by the same biological and ecological characteristics as a result of the climate characteristics, the composition of the outcropped geological layers and of the topsoil, the ground and surface waters, the open part of Shkumbini valley and the more intense urban and agricultural development.

- *Subsection Mirakë-Librazhd (km 90.2 to 99)*

The section Mirakë-Librazhd is characterised more or less by the same biological and ecological characteristics as a result of the climate characteristics, the hilly terrain and the limited agricultural development.

Within this section lies the Managed Nature Reserve of Kuturman-Qafe Bush which is also a

[87] IUCN Red List of Threatened Species

[88] https://faolex.fao.org/docs/pdf/alb144233.pdf

[89] Flora of Albania, vol. 1- 4, Paparisto K. et al. 2000

[90] The forests Map of Albania, Llubani F. et al. Tirana, 1988

Candidate Emerald Site RNM Kuturman-Qafe Bush (AL0000018) [91] in following Map .

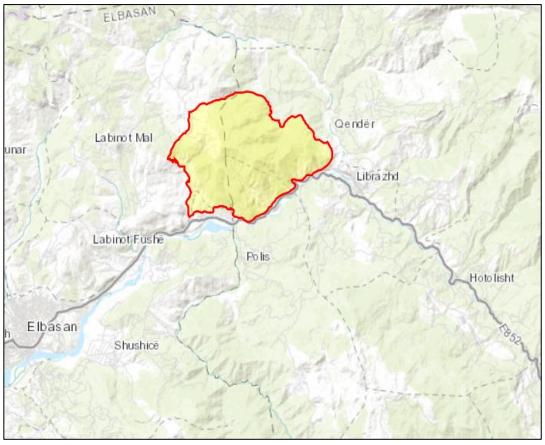


Figure 5-93Candidate Emerald Site of Kuturman-Qafe Bush

✓ **Section Librazhd-Pogradec**

- *Subsection Librazhd-Prrenjas (km 90 to 125)*

It goes mostly along the Shkumbini river valley as well as a few tunnels in hills covered by shrubs and oak forests.

- *Prrenjas-Lin (km 125 to 137.6)*

It goes mostly through a large tunnel of 4.3 km connecting Rrajce with Lin and it has the same geological and ecological characteristics.

- *Subection Lin-Guri I Kuq (Pogradec) (km 137.6 to 152)*

The section goes through the Landscape Protected Area of Pogradeci Lake, the Candidate Emerald Site of Pogradec Protected Landscape (AL0000019)[92] in Map 2, Important Bird and Biodiversity Area (IBA) Lake Ohrid and the surrounding area (AL002)[93] in the following Map :

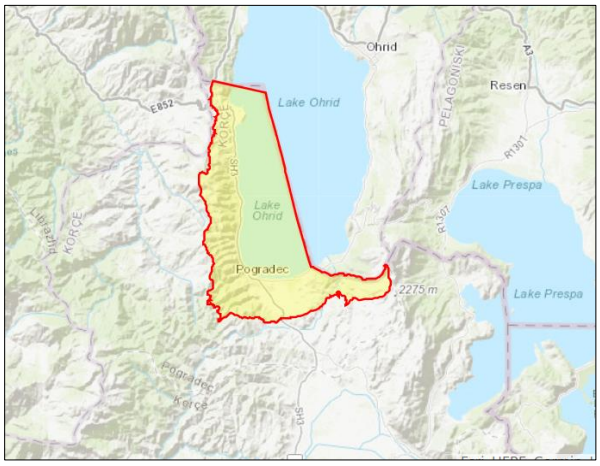


Figure 5-94 Candidate Emerald Site of Pogradec Protected Landscape

[91] https://natura2000.eea.europa.eu/Emerald/SDF.aspx?site=AL0000018

[92] https://natura2000.eea.europa.eu/Emerald/SDF.aspx?site=AL0000019

[93] https://datazone.birdlife.org/site/factsheet/lake-ohrid-and-surrounding-area-iba-albania/text

Figure 5-95: IBA Ohrid lake and surroundings

5.2.12.2 Baseline Information

The following paragraphs provide a short description of the main vegetation types and habitats occurring along the proposed railway line, listing key species as well as the abundance and distribution for species with solid quantitative information deriving from desk research.

5.2.12.2.1 Flora along the railway

Some 100 plant taxa were identified along the Rrogozhinë-Pogradec railway. 97 taxa are phanerogams (plants with seeds) and 3 ferns (Pteridium aquilinum, Asplenium adiantum nigrum and Ceterach officinarum).

The plant species found in the railway or close to it were almost the same with the plant species which composed the natural vegetation along the railway. The most dominant species which were found very frequently are: Elmleaf blackberry Rubus ulmifolius, Thatching grass Hyparrhenia hirta, Felty germander Teucrium capitatum, Wild savoury Micromeria juliana, False yellowhead Dittrichia viscosa, Tunic flower Petrorhagia saxifraga, Rush skeletonweed Chondrilla juncea, Old man's beard Clematis vitalba, Italian viper's bugloss Echium italicum, European heliotrope Heliotropium europaeum, etc.

In the serpentine walls between the Memëlisht and Udënisht villages were found the endemic species Festucopsis serpentini.

The serpentine area of Librazhd is also known for the presence of some other endemic and rare species such as: Genista hassertiana, Forsythia europaea, Halacsya sendtneri, Hypericum haplophylloides subsp. devollense, Aster albanicus, Cistus albanicus, Centaurea candelabrum, Gladiolus illyricus, Thymus teucrioides, Silene damboldtiana, Athamanta macedonica, etc. The above species were not found in our sampling points. Therefore, further field work should be carried out during the detailed design to other sections along the railway.

Although the railroad is a transport infrastructure and therefore a modified habitat, some of the plant species with conservation concern and some medicinal species are found as well. More frequent is Platanus orientalis with conservation status VU A2b according Albanian Red List (2013) and VU according IUCN europe. This species probably is planted to stabilise the railroad ballast and humid hill slopes where the railway passes but nowadays, they should be considered of special interest since natural populations are reduced a lot because of fungal diseases. In case of railroad rehabilitation, the individual of Platanus orientalis should be translocated. Other threatened plant species according to the Albanian Red List (2013) found along the railroad are: Origanum vulgare (EN A1b), Juglans regia (EN A1b), Juniperus oxycedrus

(VU A1b), Festucopsis serpentini (VU A1b), Cupressus sempervirens (VU A1b), and Ulmus minor (VU A2b).

Table 5-42 Locations of species with conservation concern along the railway

No.	Species name	Coordinates	
1.	*Origanum vulgare*	41° 7'36.33"N	20° 7'29.42"E
2.	*Satureja montana*	41° 9'59.36"N	20°14'5.77"E
		41°10'13.43"N	20°15'20.53"E
		41°11'21.75"N	20°17'22.28"E
		41° 6'30.92"N	20°25'53.81"E
3.	*Juniperus oxycedrus*	41°10'53.31"N	20°16'25.69"E
		41°11'21.75"N	20°17'22.28"E
		40°58'54.57"N	20°38'23.64"E
		41° 4'29.22"N	20°35'11.44"E
		41° 4'31.43"N	20°29'57.45"E
		41° 6'30.92"N	20°25'53.81"E
		41° 9'50.41"N	20°20'59.19"E
4.	*Festucopsis serpentini*	40°58'54.57"N	20°38'23.64"E
5.	*Cupressus sempervirens*	41° 7'36.33"N	20° 7'29.42"E
6.	*Juglans regia*	41° 8'8.01"N	20° 8'23.07"E
		41°10'13.43"N	20°15'20.53"E
		41° 4'21.76"N	20°37'37.99"E
		41° 3'50.50"N	20°31'54.31"E
		41° 4'31.43"N	20°29'57.45"E
		41° 5'10.20"N	20°27'13.47"E
7.	*Ulmus minor*	41° 2'11.86"N	20°38'0.87"E
		41° 3'50.50"N	20°31'54.31"E
8.	*Platanus orientalis*	41° 8'8.01"N	20° 8'23.07"E
		41° 9'4.11"N	20° 9'46.71"E
		41° 9'37.26"N	20°10'29.09"E
		41° 9'47.88"N	20°12'15.04"E
		41°10'13.43"N	20°15'20.53"E
		41°11'12.87"N	20°17'7.04"E
		41° 2'11.86"N	20°38'0.87"E
		41° 5'10.20"N	20°27'13.47"E
		41° 6'30.92"N	20°25'53.81"E
		41° 9'8.78"N	20°22'0.38"E

The presence of alien and invasive species is very high along the railway, such as, Ailanthus altissima, Robinia pseudoacacia, Dittrichia viscosa, Conyza canadensis, Aster squamatus, etc. Robinia pseudoacacia is one of the most frequent invasive species along the railway. It is found almost everywhere along the railway from Rrogozhine to Pogradec, especially in those parts where the railway passes in the hill slopes or along the gravel riverbed. Probably it is planted to stabilise the railroad ballast and to aid drainage, but it is spreading aggressively along the railroad, risking spreading in the natural or agricultural habitats along it. Ailanthus altissima is spreading also aggressively along the railway (Fig. 1). At the kilometre 96.6-97.6 this species together with Robinia pseudoacacia forms dense galleries along the railroad, very close to the riparian galleries along the Shkumbin River which are important habitats and which can be impacted negatively from this alien species. Spreading of these alien species in this segment cloud occupy even the serpentine slopes along the railway which are well known for hosting some rare and endemic plant species of Albania.

Figure 5-96 Young and very dense galleries of Ailanthus altissima (km 96.8-97.6)

- **Habitats along the railway**

Section :Rrogozhine-Librazhd

- ✓ Subsection Rrogozhinë-Mirakë (km 39 to 90.2)

Several types of habitats have been registered in this section of the railway including planted Pine tree forests, shrubs, riparian woodland along Shkumbini river as well as plants in domestic gardens of villages and urban peripheries or plants in cities, towns and villages

G3.749 Illyrian Pinus halepensis forests (km 57.2-58.2, 78.3-79, 80.4-80.7)

This type of habitat is found fragmented along the Rrogozhinë-Elbasan railway. It represents Pinus halepensis forests and woods of the southern and central part of the meso-Mediterranean Orno-Quercetum illicis zone of the Balkan peninsula, extending in a narrow coastal and archipelagic band from the Gulf of Sarandë to northern Dalmatia.

Pinus halepensis was planted about 70 years ago, in the clay hills with maquis to protect them from erosion. Now, these planted forests have created their physiognomy and constitute an important element of the landscape in the Elbasan region. Often the shrub and herb layer are very poor because of the dense pine canopy. In an open pine forest, the shrub layer is composed of maquis elements such as Arbutus unedo, Phillyrea angustifolia, Juniperus oxycedrus etc. As such there are many similarities with the maquis from the floristic point of view.

At the kilometre 57.2-58.2, this habitat is less impacted from the railway because the railway goes through several tunnels.

Figure 5-97 Pinus halepensis forests above the railway tunnel

F5.51 Thermo-Mediterranean brushes, thickets and heath-garrigues (km 80.4-82.8; 84.6-87.7)
This habitat type ,(Fig. following) represents the lensic-dominated or lentisc-rich scrub and related formations with Olea europaea var. sylvestris, Pistacia lentiscus, Rhamnus spp. and

Rhamnus lycioides subspecies, Myrtus communis, Rubia spp., Asparagus spp., Phillyrea spp., Osyris spp., Bupleurum spp., various oaks (Quercus ilex, Quercus coccifera and other species), Calicotome spp., Laurus nobilis, Helichrysum italicum and other species widespread in the whole thermo-Mediterranean zone (except the arid Iberian Southeast: unit F5.55).

This habitat type is found fragmented along the railway, in the segment between Mengel and Labinot Fushë villages (km. 80.4-82.8). It is represented by dense evergreen shrubs dominated by Phillyrea latifolia mixed with Olea europaea subsp. oleaser and Pistacia lentiscus. The herb layer is dominated by Stipa bromoides, Teucrium polium, Petridium aquilinum, Asparagus acutifolius, Micromeria juliana, Calamintha nepeta, etc. These herb species are dominant even in the railway, adding Rubus ulmifolius, Verbascum sinuatum, Erigeron canadensis, Clematis vitalba, Smilax aspera, Hyparrhenia hirta, etc.

About 70 years ago to prevent the hill slopes from erosion, some parts of Phillyrea latifolia scrub formations were planted with Pinus halepensis (km 80.4). In some small patches this formation is mixed with Carpinus orientalis which is dominant above the evergreen shrublands (km 84.6; km 86).

Figure 5-98 Evergreen shrubs dominated by Phillyrea latifolia mixed with Olea europaea subsp. Oleaser

Figure 5-99 Evergreen shrubs dominated by Phillyrea latifolia mixed with Carpinus orientalis

G1.3 Mediterranean riparian woodland (km 88.6).

This habitat type represents the riparian forests and gallery woods of the Mediterranean region. It may be dominated by a single species, a few species or mixed with many species including Fraxinus, Liquidambar, Platanus, Populus, Salix, Ulmus (Fig. below).

The railway in the section of Rrogozhinë-Mirake crosses several streams and rivers, most of

them branches of Shkumbin River (Paper River, stream of Bradashesh, stream of Graboz, Rrapuni River etc.). Some other segments of the railway cross the Shkumbin River or are very close to it (km 88.6, 93-93.4, 94-94.4, 95-95.5, 96.5, etc.).

Along these rivers and streams the riparian vegetation is dominated mainly by Oriental plane Platanus orientalis which mainly are in the form of sparse trees or narrow galleries. In the tree and shrub layer occurs Salix alba, Populus alba, P. nigra, Alnus glutinosa, Crataegus monogyna, Cornus sanguinea, Rosa sempervirens, Hedera helix, Clematis vitalba, Salix elaeagnos, etc.

Often, Platanus orientalis is found only sparsely and not real galleries, representing just some component of this habitat type and not real habitat itself. This situation is at the railway bridge of Paper River etc.

Figure 5-100 Narrow riparian galleries with Platanus orientalis, Salix alba, Populus alba, P. nigra, Alnus glutinosa, ect.

J1 Buildings of cities, towns and village

The railway passes through many villages and urban areas. The biggest urban areas in section Rrogozhine-Mirake are: Rrogozhinë, Peqin and Elbasan (following picture). According to the EUNIS classification, all urban, rural, infrastructural and industrial areas, etc., are classified in this habitat type. The vegetation in these urban areas is dominated by ruderal and urbanophile species such as: Urtica dioica, Sambucus ebulus, Chenopodium album, Cirsium vulgare, Sonchus oleraceus, Solanum nigrum, Urtica urens, Datura stramonium, Portulaca oleracea, Ballota nigra, Parietaria officinalis, Verbascum sinuatum, Artemisia campestris, Echium italicum, Malva sylvestris, Cirsium vulgare, Populus canadensis, Heliotropium europaeum. In these urban areas and along the railway some alien and invasive species such as, Ailanthus altissima, Robinia pseudoacacia, Dittrichia viscosa, Conyza canadensis, Aster squamatus, etc., are very frequent.

Figure 5-101 Train station of Rrogozhina and Elbasan

X25 Domestic gardens of villages and urban peripheries

There are many gardens and agricultural lands along the railway line, especially along the Rrogozhine-Bradashesh section. These parcels, often smaller than 0.5 ha, are classified in habitat X25 according to EUNIS. The soils range from shallow with low calcium content to deep soils with higher plant nutrient content. The most important agricultural crops of the agricultural gardens of villages and urban suburbs are: corn, beans, barley, alfalfa, but also by fruit trees (apples, olives, plums, etc.), vineyards, etc.

The spontaneous flora of these agricultural lands is represented by weeds such as: *Agrostemma githago, Ranunculus arvensis, Papaver rhoeas, Buglossoides purpurocaerulea, Legousia speculum-veneris, Capsella bursa-pastoris, Verbena officinalis,* etc., which are more present in winter crops. Nitrophilous plants such as: *Polygonum aviculare, Amaranthus retroflexus, Chamomilla recutita* etc., are more present in spring crops. A high presence of invasive alien species such as *Dittrichia viscosa, Conyza canadensis* and *Aster squamatus* is often observed in these environments (Following picture).

Figure 5-102 Gardens and agricultural lands next to the railway

- ✓ ***Subsection Mirakë-Librazhd (km 90.2 to 90)***

Several types of habitats have been registered in this section of the railway including shrubs, riparian woodland along Shkumbini river, chasmophytic vegetation in rock fissures and cracks, oak woodland as well as plants in domestic gardens of villages and urban peripheries or plants in cities, towns and villages.

F5.51 Thermo-Mediterranean brushes, thickets and heath-garrigues (km 91.1-91.7)
It is represented by dense evergreen shrubs dominated by *Phillyrea latifolia* mixed with *Olea europaea subsp. oleaser* and *Pistacia lentiscus*. The herb layer is dominated by *Stipa bromoides, Teucrium polium, Petridium aquilinum, Asparagus acutifolius, Micromeria juliana, Calamintha nepeta*, etc. These herb species are dominant even in the railway, adding *Rubus ulmifolius, Verbascum sinuatum, Erigeron canadensis, Clematis vitalba, Smilax aspera*, *Hyparrhenia hirta* etc (following picture).

In some small patches this formation is mixed with *Carpinus orientalis* which is dominant above the evergreen shrublands (km 91.1-91.7).

Figure 5-103 Evergreen shrubs dominated by Phillyrea latifolia mixed with Olea europaea subsp. oleaser.

G1.3 Mediterranean riparian woodland

GPS reference of sampling plots: wp. 50, 51, 52, 53 (km 93-93.4, 94-94.4, 95-95.5, 96.5, 97.8).

As above, this habitat type represents the riparian forests and gallery woods of the mediterranean region. Dominance may be of a single species, of few species or mixed with many species including *Fraxinus, Liquidambar, Platanus, Populus, Salix, Ulmus*.

The railway Rrogozhinë-Prrenjas crosses several streams and rivers, most of them tributaries of Shkumbin River (Paper River, stream of Bradashesh, stream of Graboz, Bushtrica River, etc.). Some other segments of the railway cross the Shkumbin River or are very close to it (km 88.6, 93-93.4, 94-94.4, 95-95.5, 96.5, etc.).

This habitat type is more typical along the kilometre 94-94.4 of the railway, along the Shkumbin River. Along the segment 103.5-105.6 of the railway and Shkumbin River it is represented by galleries dominated mostly by *Populus nigra* mixed with few young galleries of *Tamarix parviflora*. The railway is very close to Ligosnjes stream (a tributary of Shkumbin River) at the kilometre 123.8-124.5. Along this stream there are good galleries of *Salix alba* mixed with *Populus nigra* and *Ulmus minor*.

8220 Siliceous rocky slopes with chasmophytic vegetation

H3.1 Acid siliceous inland cliffs (km 95.6; 96.4-96.6; 97-97.7;)

This habitat represents the rocky serpentine/siliceous slopes, extending inland and populated by chasmophytic vegetation. Along the railway, this habitat is fragmented, very close to it, between kilometre 95.6; 96.4-96.6; 97-97.7 (Fig. 9).

The vegetation which is adapted to thrive in this habitat type is generally floristically poor compared with limestone. The edaphic conditions are very extreme and only a small number of species that are adapted to these conditions can survive, but these species are very rare and many of them are with conservation interest.

Because of special ecological conditions of this habitat, potentially many endemic and rare species of conservation concern can be found there: Festucopsis serpentini, Genista hassertiana, Forsythia europaea, Halacsya sendtneri, Hypericum haplophylloides subsp. devollense, Aster albanicus, Cistus albanicus, Centaurea candelabrum, Gladiolus illyricus, Thymus teucrioides, Silene damboldtiana, Athamanta macedonica, etc.

During the field work in this habitat type were found some typical species such as Festucopsis serpentini (endemic of Albania), Sedum serpentini, Euphorbia spinosa, Alyssum murale (wp. 58) and Asperula scutellaris at wp 52.

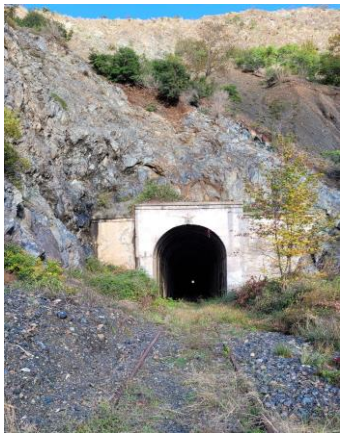


Figure 5-104 The serpentine/siliceous slopes

G3.57 - *Pinus nigra* reforestation (km 96.6-97.6)

This habitat type represents the pine plantations of Pinus nigra group, accompanied by semi-natural undergrowth formations. These are usually calciphilous communities when accompanying Pinus nigra, acidophilus ones when with Pinus laricio.

The habitat it's found along the kilometre 96.6-97.6 (see following picture). The railway tunnel in this segment is covered partly by Pinus nigra planted. The shrub layer of pine forest is represented by natural vegetation of the area with Buxus sempervirens and Juniperus oxycedrus. The substrate is serpentine and this area is well known for some rare and endemic species such as: Festucopsis serpentini, Genista hassertiana, Forsythia europaea, Halacsya sendtneri, Hypericum haplophylloides subsp. devollense, Aster albanicus, Cistus albanicus, etc. They were not observed during our field work but some further field surveys should be carried out during the detailed design phase.

Along the railway of this segment were observed an aggressive invasion of *Ailanthus altissima and Robinia pseudoacacia.*

Figure 5-105 Pinus nigra plantations mixed with Buxus sempervirens and Juniperus oxycedrus

J1 Buildings of cities, towns and village

The railway passes through many villages and urban areas. The biggest urban area in this section is: Librazhd. According to the EUNIS classification, all urban, rural, infrastructural and industrial

areas, etc., are classified in this habitat type. The vegetation in these urban areas is dominated by ruderal and urbanophile species such as: *Urtica dioica, Sambucus ebulus, Chenopodium album, Cirsium vulgare, Sonchus oleraceus, Solanum nigrum, Urtica urens, Datura stramonium, Portulaca oleracea, Ballota nigra, Parietaria officinalis, Verbascum sinuatum, Artemisia campestris, Echium italicum, Malva sylvestris, Cirsium vulgare, Populus canadensis, Heliotropium europaeum. In these urban areas and along the railway some alien and invasive species such as, Ailanthus altissima, Robinia pseudoacacia, Dittrichia viscosa, Conyza canadensis, Aster squamatus, etc.,* are very frequent.

Figure 5-106 Village close to Librazhd

X25 Domestic gardens of villages and urban peripheries

There are many gardens and agricultural lands along the railway line. These parcels, often smaller than 0.5 ha, are classified in habitat X25 according to EUNIS. The soils range from shallow with low calcium content to deep soils with higher plant nutrient content. The most important agricultural crops of the agricultural gardens of villages and urban suburbs are: corn, beans, barley, alfalfa, but also by fruit trees (apples, olives, plums, etc.), vineyards, etc.

The spontaneous flora of these agricultural lands is represented by weeds such as: *Agrostemma githago, Ranunculus arvensis, Papaver rhoeas, Buglossoides purpurocaerulea, Legousia speculum-veneris, Capsella bursa-pastoris,* etc., which are more present in winter crops. Nitrophilous plants such as: *Polygonum aviculare, Amaranthus retroflexus, Chamomilla recutita* etc., are more present in spring crops. A high presence of invasive alien species such as *Dittrichia viscosa, Conyza canadensis* and *Aster squamatus* is often observed in these environments.

- ✓ **Section Librazhd-Pogradec**
- ✓ ***Subsection Librazhd-Prrenjas (km 90.2 to 90)***

G1.3 Mediterranean riparian woodland

GPS reference of sampling plots: wp. 54, 67, 63, 68, 70, (km 104.6, 103.5-105.6, 114.6, 123.8-124.5).

As above, this habitat type represents the riparian forests and gallery woods of the mediterranean region. Dominance may be of a single species, of few species or mixed with many species including *Fraxinus, Liquidambar, Platanus, Populus, Salix, Ulmus*.

The railway Rrogozhinë-Prrenjas crosses several streams and rivers, most of them tributaries of Shkumbin River (Paper River, stream of Bradashesh, stream of Graboz, Bushtrica River, etc.).

Some other segments of the railway cross the Shkumbin River or are very close to it (km 88.6, 93-93.4, 94-94.4, 95-95.5, 96.5, etc.).

This habitat type is more typical along the kilometre 94-94.4 of the railway, along the Shkumbin River. Along the segment 103.5-105.6 of the railway and Shkumbin River it is represented by galleries dominated mostly by *Populus nigra* mixed with few young galleries of *Tamarix parviflora*. The railway is very close to Ligosnjes stream (a tributary of Shkumbin River) at the kilometre 123.8-124.5. Along this stream there are good galleries of *Salix alba* mixed with *Populus nigra* and *Ulmus minor*.

G1.78 *Quercus trojana* woodland (km 108.2-111, 111.6-114.6 and 118.6-121.4)

This habitat type represents supra-Mediterranean, and occasionally meso-mediterranean woods dominated by the semi deciduous *Quercus trojana* or its allies. Other typical species include *Quercus pubescens, Carpinus orientalis, Juniperus oxycedrus, Cistus creticus, Fraxinus ornus, Dactylis glomerata, Brachypodium pinnatum, Helictotrichum convolutum* and *Ostrya carpinifolia* (Fig. 11).

Along the railway, the formations with *Quercus trojana*, which are mainly coppice, lie at low altitudes, on dry clay slopes, facing south, and where the influence of Mediterranean climate is high. These oak forests are fragmented and represent the dominant natural formations along the railway in the Librazhd-Prrenjas segment (km 111-108.2; 114.6- 111.6; 121.4-118.6).

Often these oak formations are open and in the shrub layer are dominant *Buxus sempervirens* and *Juniperus oxycedrus*, as well as some maquis elements such as *Colutea arborescens, Phillyrea latifolia, Cercis siliquastrum,* etc. Along the railway more preset are the herb species: *Teucrium polium, Micromeria juliana, Chondrilla juncea, Stipa bromoides, Thymus longicaulis,* etc.

Figure 5-107 Coppice Quercus trojana woodland

J1 Buildings of cities, towns and village

The railway passes through many villages and urban areas. The biggest urban areas in this section are: Librazhd, Prrenjas and the peripheries of Pogradec (Fig. 12). According to the EUNIS classification, all urban, rural, infrastructural and industrial areas, etc., are classified in this habitat type. The vegetation in these urban areas is dominated by ruderal and urbanophile species such as: *Urtica dioica, Sambucus ebulus, Chenopodium album, Cirsium vulgare, Sonchus oleraceus, Solanum nigrum, Urtica urens, Datura stramonium, Portulaca oleracea, Ballota nigra,*

Parietaria officinalis, Verbascum sinuatum, Artemisia campestris, Echium italicum, Malva sylvestris, Cirsium vulgare, Populus canadensis, Heliotropium europaeum. In these urban areas and along the railway some alien and invasive species such as, *Ailanthus altissima, Robinia pseudoacacia, Dittrichia viscosa, Conyza canadensis, Aster squamatus,* etc., are very frequent.

X25 Domestic gardens of villages and urban peripheries

There are many gardens and agricultural lands along the railway line, especially along the Rrogozhine-Bradashesh segment and Prrenjas. These parcels, often smaller than 0.5 ha, are classified in habitat X25 according to EUNIS. The soils range from shallow with low calcium content to deep soils with higher plant nutrient content. The most important agricultural crops of the agricultural gardens of villages and urban suburbs are: corn, beans, barley, alfalfa, but also by fruit trees (apples, olives, plums, etc.), vineyards, etc.

The spontaneous flora of these agricultural lands is represented by weeds such as: *Agrostemma githago, Ranunculus arvensis, Papaver rhoeas, Buglossoides purpurocaerulea, Legousia speculum-veneris, Capsella bursa-pastoris,* etc., which are more present in winter crops. Nitrophilous plants such as: *Polygonum aviculare, Amaranthus retroflexus, Chamomilla recutita* etc., are more present in spring crops. A high presence of invasive alien species such as *Dittrichia viscosa, Conyza canadensis* and *Aster squamatus* is often observed in these environments.

2.2. Subsection Prrenjas-Lin (km 125 to 137.6)

Several types of habitats have been registered in this section of the railway including reed beds and vegetation typical to domestic gardens of villages and urban peripheries or plants in cities, towns and villages.

C1.1 Permanent oligotrophic lakes, ponds and pools (km 126.7)

At kilometre 126.7 the railway goes close to the reservoir of Prrenjas (Fig. 13). There is no macrophytic vegetation while the presence of macroalgae is very poor, probably due to low nutrient (nitrogen and phosphorus) content and acid pH. The terrestrial vegetation along the shore is dominated by *Rubus ulmifolius*, *Robinia pseudoaccacia*, *Ficus carica*, *Cornus mas* etc.

Figure 5-108 Habitats in Prrenjas reservoir

C3.21 *Phragmites australis* bed (km 136.4)

The habitat type represents the reed communities dominated *by Phragmites australis* along the Ohri lake shore (Fig. 14). P. australis often is mixed with Scirpus lacustris. Reeds occur in a considered surface in the shallow water of the lake, forming a very important habitat type

especially for waterbirds. Along the lake shore there are some narrow galleries of Salix alba which border the small parcels of agricultural lands. On both sides of the railway the vegetation is dominated by shrubs with *Rubus ulmifolius and Clematis vitalba*. Thera are also *some Juglans regia* planted.

Figure 5-109 Reed beds close to the lakeshore

J1 Buildings of cities, towns and village

As above. vegetation in these urban areas is dominated by ruderal and urbanophile species of *Urtica dioica, Sambucus ebulus, Chenopodium album, Cirsium vulgare, Sonchus oleraceus, Solanum nigrum, Urtica urens* etc.

X25 Domestic gardens of villages and urban peripheries

These parcels, often smaller than 0.5 ha, are classified in habitat X25 according to EUNIS. The soils range from shallow with low calcium content to deep soils with higher plant nutrient content. The most important agricultural crops of the agricultural gardens of villages and urban suburbs are: corn, beans, barley, alfalfa, but also by fruit trees (apples, olives, plums, etc.), vineyards, etc.

Figure 5-110 Vegetation in urban peripheries

- ✓ ***Subsection Lin-Guri I Kuq (Pogradec) (km 137.6 to 152)***

Several types of habitats have been registered in this section of the railway including chasmophytic vegetation, reed beds and vegetation typical to domestic gardens of villages and urban peripheries or plants in cities, towns and villages.

Ohrid lake habitat type (km 136.4-150)

The railway section Lin-Pogradec runs parallel to the shoreline of Lake Ohrid, particularly in between km 136.4-150, where it closely aligns with the lake.

Lake Ohrid is home to several habitats of conservation interest, including C1.1 Permanent oligotrophic lakes, ponds, and pools; C1.222 Floating rafts of *Hydrocharis morsus-ranae*; C1.225 Mats of Floating *Salvinia natans*; and C3.4 Species poor beds of low-growing water-fringing or amphibious vegetation.

To thoroughly identify and describe these aquatic habitats near the railway, it is imperative to conduct floristic and phytosociological studies of the aquatic vegetation during the flowering season, typically occurring in July and August. This detailed survey can be done during the Detailed Design phase.

Being an oligo-mesotrophic lake, Lake Ohrid is renowned for hosting rare algae species. The shallow waters along the lake shore harbour numerous Characeae species of conservation interest, as documented by Kashta et al. (2013). Notably, *Chara ohridana*, an endemic species of Lake Ohrid, holds a Conservation Status of CR according to the Albanian Red List of 2013. Characeae species often create dense underwater algae beds, classifying them as the habitat type 3140 under the Habitats Directive, specifically referring to hard oligo-mesotrophic waters with benthic vegetation of *Chara spp.*

Kashta et al. (2013) reported that these Characeae species and their beds are present from the lake shore to a depth of 20 metres. The Chara beds extend to the lakeshore in proximity to the railway as well.

Figure 5-111 Habitats in Ohri (Pogradec) lake

H3.1 Acid siliceous inland cliffs (km 139-147)

This habitat represents the rocky serpentine/siliceous slopes, extending inland and populated by chasmophytic vegetation. Along the railway, this habitat is fragmented, very close to it, between kilometre 139-147

The vegetation which is adapted to thrive in this habitat type is generally floristically poor compared with limestone. The edaphic conditions are very extreme and only a small number of species that are adapted to these conditions can survive, but these species are very rare and many of them are with conservation interest.

Because of special ecological conditions of this habitat, potentially many species endemic species and rare species of conservation concern can be found there: *Festucopsis serpentini, Genista hassertiana, Forsythia europaea, Halacsya sendtneri, Hypericum haplophylloides subsp. devollense, Aster albanicus, Cistus albanicus, Centaurea candelabrum, Gladiolus illyricus, Thymus teucrioides, Silene damboldtiana, Athamanta macedonica*, etc.

During the field work in this habitat type were found some typical species such as *Festucopsis serpentini* (endemic of Albania), *Sedum serpentini*, *Euphorbia spinosa, Alyssum murale* and *Asperula scutellaris*.

Figure 5-112 Chasmophytic vegetation

G1.76 Balkano-Anatolian thermophilous *Quercus* forests (km 140.5)

Along the railway, between kilometre 139 and 147, there are often patches of coppice oak mixed forest. This forest is dominated by *Quercus pubescens* and *Quercus frainetto* mixed with *Carpinus orientalis*. In dry hill slopes facing south-southeast there is found even *Quercus trojana*. Some part of the hill slopes with this deciduous mixed forest were planted with Pinus nigra during the communism time in order to prevent erosion. The accompanying species of this coppice oak forest are: *Fraxinus ornus, Cornus mas, Ulmus minor, Hedera helix, Clematis vitalba, Rubus ulmifolius, Malus sylvestris, Acer campestre*, etc. In the drainage channel of the railway there are found some *Platanus orientalis* seedlings.

Figure 5-113 Mixed deciduous forest, dominated by oak species and Carpinus orientalis

C3.21 Phragmites australis bed (km 150)

The habitat type represents the reed communities dominated by *Phragmites australis* along the Ohri lake shore. *Ph. australis* often is mixed with *Scirpus lacustris*. Reeds occur in a considered surface in the shallow water of the lake, forming a very important habitat type especially for water birds. In the lake shore there is a narrow belt of planted *Populus canadensis*.

The railway is next to the asphalt road in a distance about 10-15 m from the lake shore and reeds. Between the railway and lake shore there is a small parcel of arable land. Some observed plant species along the railway, at the kilometre of the 150th, are: *Rubus ulmifolius, Sambucus ebulus, Dactylis glomerata, Alyssum murale, Brachypodium sylvaticum, Equisetum hyemale, Salvia sclarea*, etc.

Figure 5-114 Between the Memlisht and Udënisht villages the railway is very close to the lake shore

J1 Buildings of cities, towns and village

The vegetation in these urban areas is dominated by ruderal and urbanophile species such as: *Urtica dioica, Sambucus ebulus, Chenopodium album, Cirsium vulgare, Sonchus oleraceus, Solanum nigrum, Urtica urens, Datura stramonium, Portulaca oleracea, Ballota nigra, Parietaria officinalis, Verbascum sinuatum, Artemisia campestris, Echium italicum, Malva sylvestris, Cirsium vulgare, Populus canadensis, Heliotropium europaeum.* In these urban areas and along the railway some alien and invasive species such as, *Ailanthus altissima, Robinia pseudoacacia, Dittrichia viscosa, Conyza canadensis, Aster squamatus,* etc., are very frequent.

Figure 5-115 Train station of Guri i Kuq (Pogradec)

X25 Domestic gardens of villages and urban peripheries

The spontaneous flora of these agricultural lands is represented by weeds such as: *Agrostemma githago, Ranunculus arvensis, Papaver rhoeas, Buglossoides purpurocaerulea, Legousia speculum-veneris, Capsella bursa-pastoris,* etc., which are more present in winter crops. Nitrophilous plants such as: *Polygonum aviculare, Amaranthus retroflexus, Chamomilla recutita* etc., are more present in spring crops. A high presence of invasive alien species such as *Dittrichia viscosa, Conyza canadensis* and *Aster squamatus* is often observed in these environments.

Figure 5-116 Gardens and agricultural lands next to the railway

5.2.12.2.2 Fauna of the railway and surrounding habitats

The railway goes through several types of habitats and as such is inhabited by a variety of fauna species that are related with pine forests, evergreen shrubs, riparian forests, arable land, urban areas, railway tunnels, riverine habitats, reservoir and natural lakes, rocky slopes and cliffs, oak forests, reedbeds etc.

A range of fauna species, terrestrial, aquatic and semi-terrestrial are connected to such habitats in terms of shelter, foraging, reproduction etc. Some species are permanent to the above habitats while others are migratory and use the area either for wintering, breeding or as a passage area towards their wintering or breeding grounds.

The aquatic habitats seemed better studied and there are some bibliographical references concerning water bodies such as Shkumbini river and Ohrid lake. Meanwhile, terrestrial habitats are less covered by different sources mentioned in the methodology part of this report.

Some 374 species of vertebrates are expected in the areas traversed by the railway including mammals, birds, reptiles, amphibians and fish (following Table). For other species, particularly invertebrates, the literature research provides information for Ohrid Lake as this water body is Biosphere Reserve, Important Bird and Biodiversity Area, Candidate Emerald Site and a Landscape Protected Area.

Table 5-43 Vertebrates along the railway Rrogozhine-Pogradec

Nr.	Vertebrates	Number of species
1	Mammals	54
2	Birds	252
3	Amphibians	10
4	Reptiles	21
5	Fish	35
	Total	**372**

Many of the present species are threatened at International (IUCN Red List) or National (Albanian Red List). Some species belong to the Annexes of Habitats Directive and Bird Directive while some species have a restricted range by being endemic or sub-endemic species. Lake Ohrid in particular is rich in restricted range species. Ten of seventeen identified fish species are endemic. They include the Koran (Al), a salmonid Ohrid trout – *Salmo letnica* (VU – Vulnerable according to the IUCN Red List of Threatened Species) and Belvica *Acantolingua ohridana* (VU).

The analysis of the species of conservation concern will be undertaken in a specific report assessing the Priority Biodiversity Features and Critical Habitats along the railway.

- **Detailed description of fauna species along the railway**

Section Rrogozhine-Librazhd

- ***Subsection Rrogozhinë-Mirakë (km 39 to 90.2)***

Several fauna species have been registered in this section of the railway including birds, mammals, amphibians and reptiles present in Pine tree forests, shrubs, riparian woodland along Shkumbini river as well as other habitats in urban are such as domestic gardens of villages, arable lands and urban infrastructure.

The urban areas of Rrogozhine, Elbasan are inhabited by animals connected to urban habitats. Among birds, the most common are Passerines such as House Sparrow (*Passer hispaniolensis*), Turtle Dove (*Streptopelia decaocto*), Swallows and Swifts. The presence of mammals, reptiles and amphibians here is limited as such species are relatively shy to humans.

The riverine habitats of Shkumbini river and other streams offer habitats for feeding Cormorants, Herons, Gulls, Waders etc. Among the mammals, the downstream of Shkumbini is used by mammals including the Common Otter (*Lutra lutra*), Golden Jackal (*Canis aureus*) etc.

A study on fish in Shkumbini river reported 17 species (Cake & Miho 2005). Cyprinid species were dominant. *Alburnoides bipunctatus bipunctatus*, *Barbus meridionalis peteny* and *B. m. rebeli*, *Chondrostoma nasus nasus*, *Leuciscus cephalus albus*, *Nemachilus barbatulus sturanyi* and *Pachychilon pictum* were the most abundant. *B. graecus, Ch. n. nasus, Gobio gobio albanicus* and *G. g. lepidolaemus* were present only in western plain part, after Elbasani town.

Amphibians are particularly related to permanent or temporary riverine habitats and drainage ditches. Some of the most conspicuous species are Agile frog (*Rana dalmatina*), Balkan frog (*Pelophylax kurtmuelleri*) etc.

The arable land surrounding Shkumbini river is used by a variety of species including birds, mammals, and reptiles. Birds include mostly passerines as well as birds of prey, herons etc. Reptiles such as the European pond turtle (*Emys orbicularis*), Hermann's tortoise (*Testudo hermanni*) are quite frequent.

Forests, either planted ones or natural vegetation, and scrubs are used mostly by birds, mammals and reptiles. Among birds, the most common species are passerines such as warblers, tits, corvids etc.

Railway tunnels are particularly used by nocturnal species including owls and bats. It is very likely that some 20 species of bats use the railway area for foraging while some of them have been located in tunnels of the railway (Theou & Loce 2019)

The railway infrastructure is particularly used by reptiles. This is more accentuated in the last years in places where the railway infrastructure has not been functional and allowing us the presence of reptiles that use the area in early morning for warming.

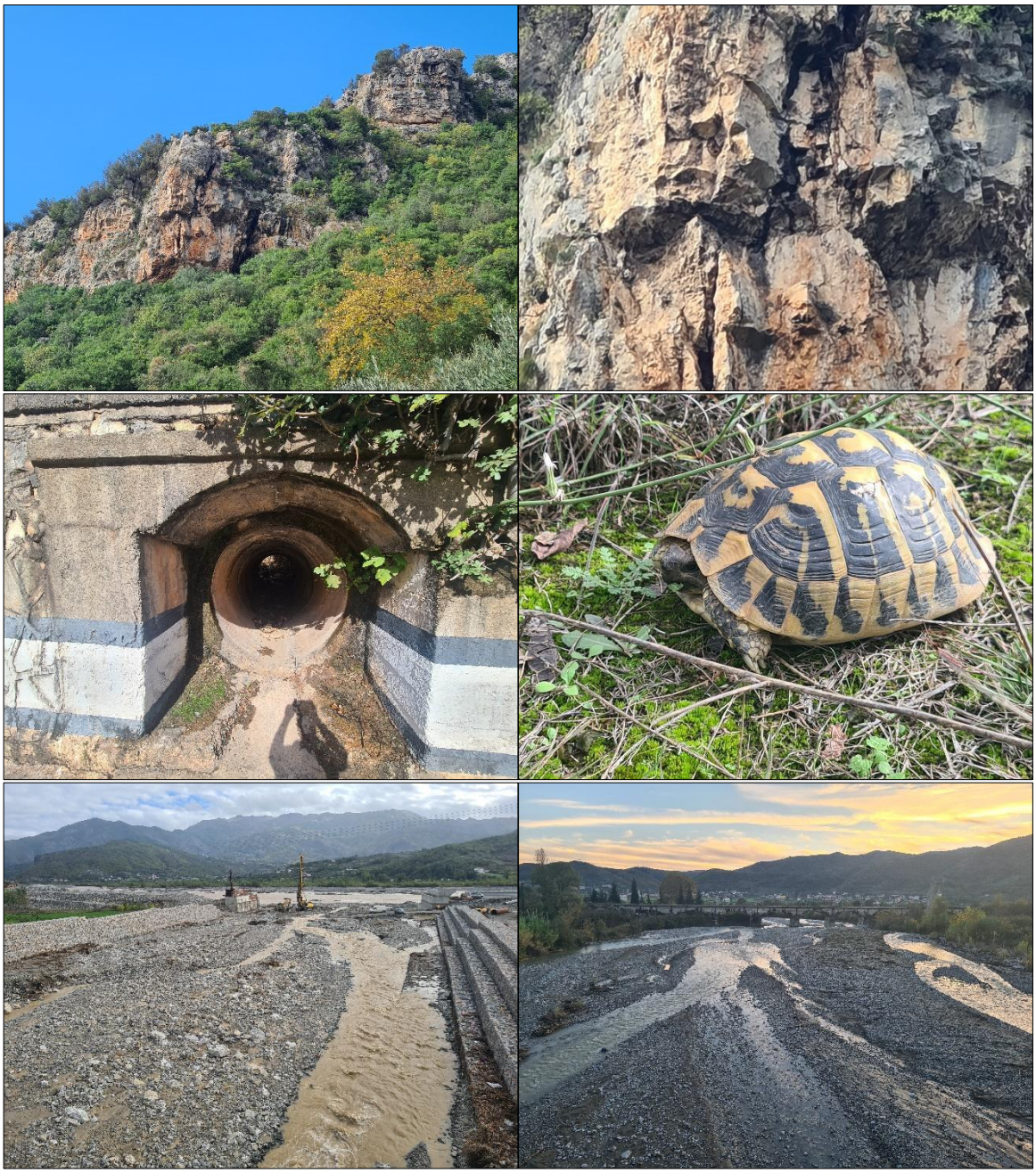


Figure 5-117 Fauna habitats in section Rrogozhine-Mirake

- ***Subsection Mirake-Librazhd (km 90 to 99)***

As in the above section, the species present here are related to shrubs, riparian woodland along Shkumbini river, plants in rock fissures and cracks, oak woodland as well as plants in domestic gardens of villages and urban peripheries or plants in cities, towns and villages.

In contrast to the above section, we have observed here some specific birds including Crag martins, (*Hirundo rupestris*), Northern Raven (*Corvus corax*), Common Buzzard (*Buteo buteo*) etc.

The pine forests were particularly used by Common Chaffinch (*Fringilla coelebs*) and Great Tit (Parus major). Scrub layer presented an important habitat for other passerine species such as Eurasian Blackcap (*Sylvia atricapilla*), Wren (*Troglodytes troglodytes*) etc.

- Section Librazhd-Pogradec
  - ***Subsection Librazhd-Prrenjas (km 90 to 125)***

As in the above section, the species present here are related to shrubs, riparian woodland along Shkumbini river, plants in rock fissures and cracks, oak woodland as well as plants in domestic gardens of villages and urban peripheries or plants in cities, towns and villages.

In contrast to the above section, we have observed here some specific birds including Crag martins, (*Hirundo rupestris*), Northern Raven (*Corvus corax*), Common Buzzard (*Buteo buteo*) etc.

The pine forests were particularly used by Common Chaffinch (*Fringilla coelebs*) and Great Tit (Parus major). Scrub layer presented an important habitat for other passerine species such as Eurasian Blackcap (*Sylvia atricapilla*), Wren (*Troglodytes troglodytes*) etc.

  - ***Subsection Prrenjas-Lin (km 125 to 137.6)***

This section is similar to the previous one, with the exception of aquatic habitats along Ohrid lake including reed beds and vegetation typical to domestic gardens of villages and urban peripheries or plants in cities, towns and villages.

Present species in the aquatic habitats are described below in section Lin-Guri i Kuq (Pogradec).

Figure 5-118. Fauna habitats in Section Prrenjas-Lin

Table 5-44:Mammals present in the project area and their conservation status

Nr	Scientific name	Common name	Presence at the railway	IUCN/National Status	Annex II & IV EHD
1	*Erinaceus roumanicus*	Eastern hedgehog	+		
2	*Neomys anomalus*	Miller's water shrew	+		
3	*Crocidura leucodon*	Bi-coloured white-toothed shrew	+		
4	*Crocidura suaveolens*	Lesser white-toothed shrew	+		
5	*Suncus etruscus*	Pygmy white-toothed shrew	+		
6	*Talpa stankovici*	Balkan mole	+		
7	*Rhinolophus ferrumequinum*	Greater horseshoe bat	+	LC/LRcd	II & IV
8	*Rhinolophus hipposideros*	Lesser horseshoe bat	+	LC/LRnt	II & IV
9	*Myotis blythii*	Lesser mouse-eared bat	+		II & IV
10	*Myotis mystacinus/davidii*	Whiskered Bat	+		
11	*Myotis emarginatus*	Geoffroy's bat	+	LC/DD	II & IV
12	*Myotis myotis*	Greater mouse -eared bat	+		II & IV
13	*Pipistrellus kuhlii*	Kuhl's pipistrelle	+		
14	*Pipistrellus nathusii*	Nathusius Pipistrelle	+		
15	*Pipistrellus pipistrellus*	Common pipistrelle	+		
16	*Pipistrellus pygmaeus*	Soprano pipistrelle	+		
17	*Hypsugo savii*	Savi's pipistrelle	+		
18	*Nyctalus leisleri*	Leisler's bat	+		
19	*Nyctalus lasiopterus*	Greater noctule	+		
20	*Nyctalus noctula*	Noctule	+		
21	*Eptesicus serotinus*	Serotine	+		
22	*Vespertilio murinus*	Parti-coloured bat	+		
23	*Plecotus auritus*	Brown long-eared bat	+		
24	*Plecotus macrobullaris*	Mountain long-eared bat	+		
25	*Miniopterus schreibersii*	Schreiber's bat	+	VU/LRnt	II & IV
26	*Barbastella barbastellus*	Western Barbastelle	+	NT/LC	II & IV
27	*Lepus europaeus*	Brown hare	+		
28	*Sciurus vulgaris*	Red squirrel	+		
29	*Microtus arvalis*	Common vole	+		
30	*Microtus rossiaemeridionalis (levis)*	Sibling vole	+		
31	*Microtus subterraneus*	Common pine vole	+		
32	*Apodemus flavicollis*	Yellow-necked mouse	+		
33	*Apodemus mystacinus (epimelas)*	Rock mouse	+		
34	*Apodemus sylvaticus*	Wood mouse	+		
35	*Rattus norvegicus*	Brown rat	+		
36	*Rattus rattus*	Black rat	+		
37	*Mus domesticus*	Western house mouse	+		
38	*Mus macedonicus*	Balkan short-tailed mouse	+		
39	*Mus musculus*	Eastern house mouse	+		
40	*Glis glis*	Fat dormouse	+		
41	*Muscardinius avellanarius*	Common dormouse	+		
42	*Canis lupus*	Wolf	+	LC/LRnt	II & IV
43	*Canis aureus*	Golden Jackal	+		

44	*Vulpes vulpes*	Red fox	+		
45	*Ursus arctos*	Brown Bear	+	LC/VU	II & IV
46	*Mustela nivalis*	Weasel	+		
47	*Mustela putorius*	Western polecat	+		
48	*Martes foina*	Beech Marten	+		
49	*Meles meles*	Badger	+		
50	*Lutra lutra*	Otter	+	NT/VU	II & IV
51	*Felis sylvestris*	Wildcat	+		
52	*Lynx lynx balcanicus*	Lynx	+ in adj. areas	CR/CR	II & IV
53	*Sus scrofa*	Wild Boar	+		
54	*Capreolus capreolus*	Roe deer	+		

Section Lin-Guri i Kuq (Pogradec) (km 137.6 to 152)

Lake Ohrid is of tectonic origin and, having an estimated age of about two to three million years (reviewed in Albrecht & Wilke 2008), is considered the oldest lake in Europe. The lake is located between Macedonia and Albania. Its catchment area (combined with Lake Prespa) comprises about 2,600 km2 (Matzinger et al. 2006 a) and the lake's surface is about 358 km2. Its maximum depth is 289 m; the mean depth is 151 m (Popovska & Bonacci 2007). In view of nutrient loading, the water is categorised as oligotrophic (Sarafiloska & Patceva 2012, Patceva et al. 2009, Peveling et al. 2015).

It is an area of major conservation importance. The IBA is located within the Pogradec Terrestrial/Aquatic Protected Landscape (PPL) meanwhile the entire lake is internationally recognized as UNESCO world Natural and Cultural heritage (the Macedonian part of the lake gained the status since 1979 whereas the Albanian part since 2019). 9,700 ha of IBA covered by Protected Landscape Area.

Figure 5-119 Fauna habitats in Section Lin-Pogradec

Lake Ohrid is a superlative natural phenomenon, providing refuge for numerous endemic and relict freshwater species of flora and fauna dating from the tertiary period. As a deep and ancient lake of tectonic origin, Lake Ohrid has existed continuously for approximately two to three million years. Its oligotrophic waters conserve over 200 species of plants and animals unique to the lake, including algae, turbellarian flatworms, snails, crustaceans and 17 endemic species of fish including two species of trout, as well as a rich birdlife.

The fish fauna of Lake Ohrid is represented by 17 autochthonous species from four families: Salmonidae (2), Cyprinidae (12), Cobitidae (1), Nemacheilidae (1) and Anguillidae (1) and 6 allochthonous species (belonging to four families) (Table below). With the exception of eels, none of them is a migratory species.

Table 5-45 Fish species of Lake Ohrid and their native status

No.	Scientific name	Common name	Status
	Cyprinidae		
1	*Alburnoides ohridanus*	Ohrid spirlin	Native
2	*Alburnus scoranza*	Bleak	Native
3	*Barbus rebeli*	Barbel	Native
4	*Carassius gibelio*	Prussian carp	Alien, 1983
5	*Chondrostoma ohridanus*	Ohrid nase	Native
6	*Cyprinus carpio*	Carp	Native
7	*Gobio ohridanus*	Ohrid gudgeon	Native
8	*Pachychilon pictum*	Moranec	Native
9	*Pelasgus minutus*	Ohrid minnow	Native
10	*Phoxinus lumaireul*	Minnow	Native
11	*Pseudorasbora parva*	Stone moroko	Alien, 1970's
12	*Rhodeus amarus*	Bitterling	Alien, 1990's
13	*Rutilus ohridanus*	Ohrid roach	Native
14	*Scardinius knezevici*	Rudd	Native
15	*Squalius squalus*	Ohrid chub	Native
	Salmonidae		
16	*Oncorhynchus mykiss*	Rainbow trout	Alien, 1974
17	*Salmo letnica*	Ohrid trout	Native
18	*Salmo ohridanus*	Ohrid belvica	Native
	Anguillidae		
19	*Anguilla anguilla*	European eel	Native
	Centrarchidae		
20	*Lepomis gibbosus*	Pumpkinseed	Alien, 1990's
	Cobitidae		
21	*Cobitis ohridana*	Spined loach	Native
	Nemacheilidae		
22	*Barbatula sturanyi*	Stone loach	Native
	Poeciliidae		
23	*Gambusia holbrooki*	Mosquitofish	Alien, 1940's

The lake is rich in invertebrates. Hauffe *et al*. 2011 identified 68 gastropod species (molluscs), with 50 of them (=73.5%) being endemic. At present the gastropod fauna comprises 72 species from which 56 are considered as endemic for the lake.

The amphipod (crustacean) fauna of Lake Ohrid comprises 11 species (Karaman 1987), nine of them are endemic (Sapkarev 1998).

The ostracod (crustacean) fauna in Lake Ohrid includes 52 species of which 33 are considered as endemic, characterised by an extraordinary range of shell shapes (Albrecht & Wilke 2008).

In Lake Ohrid 30 endemic species of Ciliophora (Ciliates) have been recorded (Stankovic 1960). Many taxa are parasitic and presumably coevolved with their native host, mainly oligochaetes and tricladids (Albrecht & Wilke 2008).

This is an important site for wintering waterfowl, the most numerous species being Eurasian Coot *Fulica atra*. Counts were carried out in 1995-2022 (numbers given refer to waterfowl numbers for the Albanian part of the lake only) and provide an average number of 21,210 individuals. The highest figure of wintering waterbirds is registered in 1996 with 46,300 waterbirds.

It is highly protected National and Internationally. The IBA is located within the Pogradec Terrestrial/Aquatic Protected Landscape (PPL) meanwhile the entire lake is internationally

recognized as UNESCO world Natural and Cultural heritage (the Macedonian part of the lake gained the status since 1979 whereas the Albanian part since 2019). 9,700 ha of IBA covered by Protected Landscape Area.

The site holds the following Vulnerable and endangered species (IUCN Red List)

- Common Pochard (*Aythya ferina*) – Regular wintering bird considered as **Vulnerable** by IUCN. The average number for 1995-2022 is c. 490 individuals with a maximum of 970 individuals recorded in January 1999.
- Velvet Scoter (*Melanitta fusca*) – Wintering bird considered as **Vulnerable** by IUCN. Observed respectively in 2000 with 2 individuals, in 2018 with 4 individuals.
- Horned Grebe (*Podiceps auritus*) - Wintering bird considered as **Vulnerable** by IUCN. It has been observed from 1995 until 2013 with a maximal number of 6 individuals.
- Long-tailed Duck (*Clangula hyemalis*) - Wintering bird considered as **Vulnerable** by IUCN. Has been observed in 1995; 2008; 2009 and in 2014 with a maximal number of 3 individuals.
- European Turtle-dove (*Streptopelia turtur*) considered as **Vulnerable** by IUCN. It is present during the breeding season in the surrounding areas of the lake.

The site regularly holds significant numbers of a Near Threatened species (NT).

Table 5-46Near threatened bird species in Lake Ohrid (Albanian part)

No.	English name	Scientific name	IUCN Red list
1	Dalmatian Pelican	*Pelecanus crispus*	NT
2	Pallid Harrier	*Circus macrourus*	NT
3	Rock Partridge	*Alectoris graeca*	NT
4	Redwing	*Turdus iliacus*	NT

The site is known or thought to hold, on a regular basis, >= 20,000 waterbirds or >= 6,700 pairs of seabirds of one or more species.

Ohrid lake holds on a regular basis >=21,210 waterbirds during the wintering season.

Ecological structure and functions needed to maintain viability

The consultation with multiple stakeholders, including local authorities has confirmed that the proposed project is adjacent to some significant biodiversity feature already identified by the project team. This includes all the protected areas of Pogradec Protected Landscape, Managed Nature Reserve of Kuturman-Qafe Bush described above as well as areas of international importance and conservation concern such as:

- **Candidate Emerald Site RNM Kuturman-Qafe Bush (AL0000018),**
- **Candidate Emerald Site of Pogradec Protected Landscape (AL0000019),**
- Important Bird and Biodiversity Area (IBA) Lake Ohrid and the surrounding area (AL002),
- Key Biodiversity Area (KBA) of Lake Ohrid and surrounding area,
- UNESCO Transboundary World Natural and Cultural Heritage Site (in 2019) and
- Transboundary Biosphere Reserve Ohrid-Prespa (designated in 2014)

The Emerald Network is an ecological network of Areas of Special Conservation Interest (ASCIs), which was established to conserve the species and habitats of the Bern Convention requiring specific protection measures.

The table below gives the list of the nearest emerald sites to the railway line.

Table 5-47Cadidate Emerald Sites in the wide project area

No	Candidate Emerald Sites in Albania	Site Code	Type of site	Distance from the railway line
1	Pogradec Protected Landscape	AL0000019	IBA; KBA; Transboundary World Heritage and Cultural Site, Transboundary Biosphere Reserve	The railway goes through the protected area whose whole territory has a third level of protection. In accordance with the Law 10001/2017 “On protected areas” "Third level of protection" has the function of preserving nature and biodiversity in harmony with the development of socio-economic and tourist activities, infrastructure for the residents of the area and the business community . The activities for the rehabilitation of the existing railway are allowed by the legislation on protected areas. Nevertheless, article 6(3) of the Habitats Directive requires appropriate assessment to be carried out if a planned project might affect integrity of a Natura 2000 site. Considering the Emerald sites are predecessors of Natura 2000 sites in non-EU countries, an Appropriate Assessment is needed also for the Candidate Emerald Site of Pogradec.
2	Nature Managed Reserve Kuturman-Qafe Bush	AL0000018		The railway goes through the protected area, in the subzone of Traditional Use and Sustainable Development with the second level of protection. This ensures a territory with low impact and control of economic, social, agribusiness, entertainment, sports and ecotourism activities, infrastructure construction according to urban development plans and tourism approved by the National Council of the Territory (KKT), which do not affect the ecological integrity of the natural ecosystem and respect the functions of the protected area, the ecological values and those of the natural and cultural landscape. The activities for the rehabilitation of the existing railway are allowed by the legislation on protected areas. .An Appropriate Assessment is not considered relevant for this site since the railway crosses the Candidate Emerald Site of Kuturman-Qafe Bush through a tunnel.

5.2.12.3 Important Bird and Biodiversity Areas and Key Biodiversity Areas

The concept of Important Bird and Biodiversity Areas (IBAs) was developed by BirdLife International as a network of places or sites of international significance for the conservation of birds and other biodiversity features. These sites provide the BirdLife Partnership and planning or decision-making authorities of different countries with a focus for conservation action, planning, and advocacy.

Key Biodiversity Areas (KBA) focus on safeguarding global biodiversity and are recognised as vital land, freshwater, and marine sites for threatened plants and animals. They are currently identified using the "Global Standard for the Identification of KBAs" set out by the IUCN in 2016. These criteria have quantitative thresholds devised over years of planning. KBAs extend the IBA concept to other taxonomic groups and are now being identified in many parts of the world, by a range of organisations. All IBAs are KBAs, but some KBAs are not IBAs (i.e. they are significant for the conservation of other taxa, but not birds). Nevertheless, the IBA network has proved a good approximation to the overall network of KBAs, as it includes the bulk of other target species and the most significant sites.

The Important Bird and Biodiversity Area of Lake Ohrid and the surrounding area (AL002) *and Key Biodiversity Area of Lake* Ohrid and surrounding area *(AL010)*

This is an important site for wintering waterfowl. The International Waterbird Census undertaken in 1995-2022 provided an average number of 21,210 individuals per January each year (numbers given refer to waterbird numbers for the Albanian part of the lake only). The highest figure of wintering waterbirds is registered in 1996 with 46,300 waterbirds.

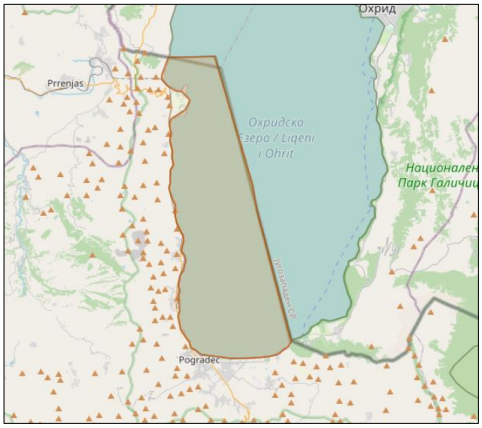


Figure 5-120 IBA Ohrid lake and the surroundings

5.2.12.4 Preliminary Critical Habitat Assessment

In order to manage risk and meet lender requirements, the Project intends to implement good international practices by aligning with European Investment Bank (EIB) Environmental and Social Standards (February 2022) including Standard 4 on Biodiversity and Ecosystems.

The Project is about to complete an Environmental and Social Impact Assessment (ESIA). The following Preliminary Critical Habitats Assessment aims to inform the ESIA about habitats and species of conservation concern and foresee avoidance and mitigation measures that ensure no net reduction for Priority Biodiversity Features and net positive impact for Critical Habitats.

This assessment is considered as preliminary as it is based mostly on bibliographical data rather than extended baseline surveys. Therefore, this assessment needs to be repeated during the Detailed Design phase coinciding with the collection of data from extended field surveys.

For this preliminary assessment, the purpose is to:

- Identify Critical Habitats
- Identify Priority Biodiversity Features
- Identify natural and modified habitats

- Understand the implications of the findings of the CHA for the Project; and
- Recommended next steps for the Project.

5.2.12.4.1 Definition of Critical Habitats and Priority Biodiversity Features

EIB Environmental and Social Standard 4 (ESS 4) identifies three categories of habitat: critical habitat (CH), natural habitat (NH) and semi-natural habitat (SNH). These categories are based on (i) habitat condition (or 'quality' or 'state') and (ii) significance for biodiversity. Semi-natural, natural and critical habitat refers to the biodiversity value of the area as determined by species, ecosystems, and ecological processes. ESS 4 further identifies Priority Biodiversity Features (PBFs) as those features which require consideration during project impact assessment and mitigation, but of lower sensitivity than features which are CH-qualifying.

According to the EIB Environmental and Social Standards (February 2022) the Critical habitat is the most sensitive of the high-value biodiversity features and is defined as comprising one of the following:

a. A highly threatened and/or unique ecosystem;
b. A habitat of priority and/or significant importance to critically endangered, endangered or vulnerable species, as defined by the IUCN Red List of threatened species[13] and in relevant national legislation;
c. A habitat of priority and/or significant importance to a population, range or distribution of endemic or restricted-range species, or highly distinctive assemblages of species;
d. A habitat required for the survival of migratory species and/or congregatory species;
e. Biodiversity and/or an ecosystem of significant social, economic or cultural importance to local communities and indigenous groups;
f. A habitat of key scientific value and/or associated with key evolutionary processes.

Indicative thresholds for these criteria are presented in the Guidance Note for Standard 4 in Biodiversity and Ecosystems:

Criterion 1: Highly threatened or unique ecosystems.
Areas will be considered critical habitat under Criterion 1 if they are occupied by or are needed to support:

a) Priority Habitats listed in Annex I of the Habitats Directive and habitats considered to be their equivalent in countries outside the EU;
b) ≥5% of the global extent of an ecosystem type meeting the criteria for IUCN's Red List of Ecosystems with a status of critically endangered or endangered;
c) Examples of ecosystems outside the EU and not yet assessed by IUCN, but determined to be of high priority for conservation on the basis of regional or national level systematic conservation planning or informed specialist input.

Criterion 2: Population of critically endangered, endangered or vulnerable species, as defined by the IUCN Red List of threatened species and in relevant legislation.
Areas will be considered critical habitat under Criterion 2 if they are occupied by or are needed to support:

a. A population of an IUCN Red-listed endangered or critically endangered species that is ≥ 0.5% of the global population and/or ≥ 5 established reproductive units18 of an endangered or critically endangered species;

b. Significant concentration of an IUCN Red-listed vulnerable species or of multiple IUCN Red-listed vulnerable species, especially where the loss of the area would result in the change of the IUCN Red List status to endangered or critically endangered.
c. Nationally or regionally-important concentration of a species listed as endangered or critically endangered on a regional/national IUCN Red List, or equivalent on national/regional listing.
d. A population of species listed in Annex II and IV of the Habitats Directive.

Criterion 3: Population range or distribution of endemic or restricted-range species, or highly distinctive assemblages of species.

Areas will be considered critical habitat under Criterion 3 if:

a. They regularly hold ≥10% of the global population size and support ≥10 reproductive units of an endemic or restricted-range species.
b. They are considered by relevant specialists to support unique or rare assemblages of species that occur there habitually, predictably or repeatedly. The constituent species may not meet other critical habitat thresholds mentioned here in their own right, but may present assemblages that are considered important to maintain high biodiversity in the area.

Criterion 4: Habitat required for the survival of migratory species and/or congregatory species.

Areas will be considered as critical habitats under Criterion 4 if:

a. They sustain ≥ 1%of the global population of a migratory or congregatory species at any point of the species' lifecycle on a cyclical or otherwise regular basis.
b. They are needed to support migratory or congregatory species during periods of environmental stress.

Criterion 5: Biodiversity and/or ecosystem with significant social, economic, or cultural importance to local communities and indigenous groups.

Areas of semi-natural and natural habitat used by indigenous peoples and local communities to obtain essential or priority benefits will be considered critical from an ecosystem service perspective. Priority ecosystem services are services (including cultural services) on which people depend strongly for their livelihood or wellbeing, with limited access to acceptable alternatives.

Criterion 6: Habitat of key scientific value and/or associated with key evolutionary processes.

This may include, but is not limited to, exceptional representations of:

a) Landscapes with high spatial heterogeneity and therefore high levels of species diversity;
b) Environmental gradients, also known as ecotones, that produce transitional habitat which is associated with the process of speciation and high species and genetic diversity;
c) Edaphic interfaces that juxtapose soil types (e.g. serpentine outcrops, limestone and gypsum deposits), which have led to the formation of unique plant communities;
d) Connectivity between habitats (e.g. biological corridors) with importance for species migration and gene flow, which is especially important in fragmented habitats and for the conservation of metapopulations. This also includes biological corridors across altitudinal and climatic gradients and from "crest to coast."

e) Sites of demonstrated importance to climate change adaptation for either species or ecosystems.

5.2.12.4.2 Assessment approach

CH determination was based on the following steps:

1. **Collection and verification of available biodiversity information from Project reports, literature review, and expert opinion;**

A long-list of species predicted to occur within each of the terrestrial and aquatic scoping areas was compiled from a spatial analysis of the IUCN Red List, global distribution data on biodiversity, Project reports and additional scientific literature.

Previous evaluations of the potential presence of critical habitat for this Project were referred to for this assessment, as were baseline surveys of biodiversity carried out as part of the ESIA.

2. **Identification of the Ecologically Appropriate Area for Analysis (EAAAs);**

The assessment of critical habitat under ESS4 criteria 1-3 relies on defining appropriate EAAAs, taking into account the distribution of species or ecosystems (within and sometimes extending beyond the project's area of influence) and the ecological patterns, processes, features, and functions that are necessary for maintaining them. For species which were determined likely to exceed the relevant CH threshold(s) (Criteria 1-3) within the scoping area of the railway, their key habitat associations were identified. These habitats were then used to define the EAAA for each species within each scoping area. Where the relevant CH thresholds are exceeded, the EAAA is confirmed as CH.

A general EAAA was defined including Ohrid lake and the valley of Shkumbini river (Map 5). This is the right EAAA for aquatic species as well for the terrestrial species keeping in mind that the majority of aquatic species of lake Ohrid are present as well in Shkumbini river. The same approach is considered as acceptable for terrestrial species as the valley of Shkumbini river serves as a geographic boundary for most of the terrestrial species including mammals, reptiles, amphibians and the majority of birds present along Shkumbini river.

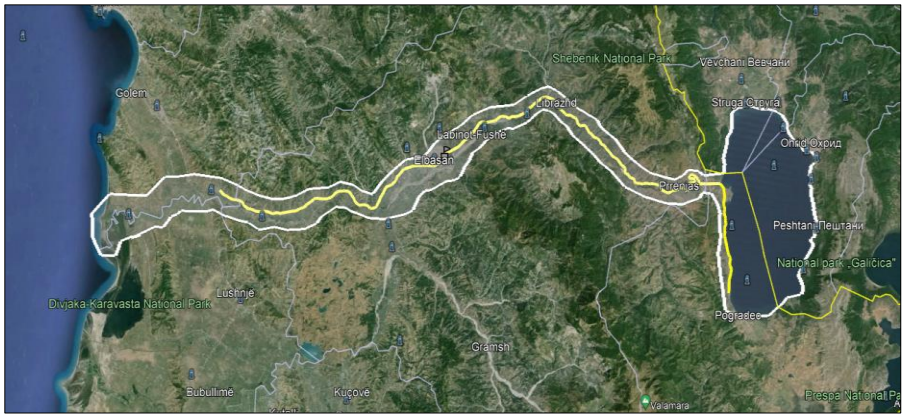


Figure 5-121The EAAA for aquatic and terrestrial species present in the project area

Where there was insufficient information available to make a definitive conclusion, a precautionary approach was taken whereby a species was assumed present in numbers to qualify the relevant scoping area as CH. Three levels of certainty are used when determining CH-status of a species in the relevant EAAA:

- Confirmed, when the species has been recorded in sufficient numbers to exceed the relevant threshold;
- Likely, when the balance of evidence suggests threshold exceedance – however population counts or estimates are not available;
- Possible, when there is an indication that a threshold may be exceeded, however more evidence is required to make a determination.

For many species, population estimates were not available at either the global or local level. In this case, species-range was used as a proxy for population (i.e. 10% of the range would contain 10% of the population).

3. Completion of assessments against ESS 4 criteria for biodiversity and ecosystems to identify which biodiversity features meet the relevant thresholds for CH.

An initial screening of the species identified as present in the relevant scoping areas was completed to identify a list of candidate species (Appendix 1) for assessment against ESS 4 criteria for CH. This initial screening discounted Non Priority Habitats (for Criterion 1), Least Concern and Near Threatened species (for Criterion 2) and no range-restricted species (for Criterion 3).

5.2.12.4.3 Critical Habitats Assessment findings

Critical habitat qualifying biodiversity

Criterion 1: Highly threatened or unique ecosystems

Lake Ohrid is a freshwater ecosystem, outside the EU and not yet assessed by IUCN, but of high priority for conservation on the basis of high level of endemism for several aquatic species. It provides refuge for numerous endemic and relict freshwater species of flora and fauna dating from the tertiary period. As a deep and ancient lake of tectonic origin, Lake Ohrid has existed continuously for approximately two to three million years. Its oligotrophic waters conserve over 200 species of plants and animals unique to the lake, including algae, turbellarian flatworms, snails, crustaceans and 17 endemic species of fish including two species of trout, as well as a rich birdlife.
Based on the above description, Lake Ohrid could be considered as a **Unique Ecosystem**.

Criterion 2-3: Species of conservation concern or restricted range

43 species qualify, or potentially qualify, as CH under ESS 4 Criteria 2 or 3, with some species qualifying under more than one Criterion. These species consist of three Amphibians, 13 Fish, 11 Mammals, 5 Reptiles and 11 Plants , following table :

Table 5-48: Critical Habitat qualifying species under Criteria 1-3

Scientific name	Common name	IUCN/National Status	Annex II & IV EHD	CH criteria	CH trigger species	Habitats	Critical Habitat	Justification
Amphibians								
Bombina variegata	Yellow-bellied toad	LC/LRcd	II and IV	2d	Confirmed	Coniferous, deciduous and mixed forests, bushlands and meadows, floodplains and grasslands.	Wetland and aquatic habitats	The species belongs to Annex II and IV of EU Habitats Directive. In accordance with Criterium 2d. A population of species listed in Annex II and II of Habitats Directive, the wetland habitat within the EAAA are considered as Critical Habitat for this species
Pelophylax shqipericus	Albanian Water Frog	VU/NE		2b, 3a	Confirmed	Temporary and permanent water bodies, edges of lakes and slow-flowing rivers, vegetated aquatic areas.	Wetland and aquatic habitats	This IUCN Vulnerable restricted-range species (estimated extent of occurrence: 10,387 km2) occurs in Albania and southern Montenegro at elevations below 500 m asl (IUCN 2019). More than Almost 30% of its global range overlaps with the EAAA for the species. Thus, it is likely that the EAAA supports ≥10% of the global population of this species, and contains a nationally-important population, and therefore qualifies the aquatic EAAA as CH under Criteria 2b and 3a.
Triturus cristatus	Great Crested newt	LC/LRlc	II and IV	2d	Confirmed	Permanent stagnant and in semi-flowing waters such as ponds, rarely lakes, flooded quarries, irrigation channels and ditches.	Wetland and aquatic habitats	This species belongs to Annex II and IV of EU Habitats Directive. In accordance with Criterium 2d. A population of species listed in Annex II and II of Habitats Directive, the wetland habitat within the EAAA are considered as Critical Habitat for this species
Fish								
Alburnoides ohridanus	Ohrid Spirlin	VU/LC		2c, 3c	Confirmed	Inland lake	Inland lake	This Globally Vulnerable (VU) species is endemic to Lake Ohrid with all the Extent of Occurrence within the EAAA of Lake Ohrid. The EAAA regularly holds ≥10% of the global population size and supports ≥10 reproductive units of this endemic or restricted-range species.
Alburnus scoranza	Bleak	LC / LC		3a	Confirmed	Freshwater lakes and streams	Wetland and aquatic habitats	This migratory species is not mapped as present in Shkumbini river although reported in the floodplain. Assuming that these floodplain observations are correct, the aquatic EAAA would likely contain >10% of the population, and the aquatic EAAA would qualify as CH under Criterion 3a.

Scientific name	Common name	IUCN/National Status	Annex II & IV EHD	CH criteria	CH trigger species	Habitats	Critical Habitat	Justification
Anguilla anguilla	European eel	CR		2a, 2c	Confirmed	Small streams to large rivers and lakes, in estuaries, lagoons and coastal waters	Wetland and aquatic habitats	This globally Critically Endangered (CR) migratory species has a range overlap of 0.01% with the aquatic scoping area, but has been recorded at multiple survey locations in Shkumbini river as well as Lake Ohrid. The species is therefore confirmed to qualify under Criterion 2a and 2c.
Barbus prespensis	Prespa barbell	LC/CR		2c, 3a	Likely	Freshwater and brackish lakes and streams	Wetland and aquatic habitats	This Critically Endangered species in Albania, spends most of its life in lakes except during reproduction (July) when it migrates into tributaries to spawn. It has a range overlap of 5% with the EAAA for the species and it has been recorded in Shkumbini river and Myzeqe floodplain. Given the species' confirmed presence and level of range overlap with the EAAA, the aquatic habitat are considered likely to support >1% of the global population. Therefore, the habitat qualifies the EAAA as CH under criterion 3a.
Barbus rebeli	Western Balkan Barbel	LC/LRnt		3a	Confirmed	Freshwater and brackish lakes and streams	Ohrid lake	This restricted range species has a range overlap of 5% with the EAAA for the species and it has been recorded in Ohrid lake. Given the species' confirmed presence and level of range overlap with the EAAA, the aquatic habitats is considered likely to support >10% of the global population and therefore qualifies the EAAA as CH under criterion 3a.
Cobitis ohridana	Ohrid Spined loach	LC/LRcd		3a	Confirmed	Freshwater (=Inland waters)	Ohrid lake	This restricted range species has a range overlap of 5% with the EAAA for the species and it has been recorded in Ohrid lake. Given the species' confirmed presence and level of range overlap with the EAAA, the aquatic habitats is considered likely to support >10% of the global population and therefore qualifies the EAAA as CH under criterion 3a.
Gobio ohridanus	Ohrid gudgeon	VU/LRnt		3a	Confirmed	Freshwater (=Inland waters)	Ohrid lake	This Globally Vulnerable (VU) species is endemic to Lake Ohrid with all the Extent of Occurrence overlapping within the EAAA of the species in Lake Ohrid. The EAAA regularly holds ≥10% of the global population size and supports ≥10 reproductive units of this endemic or restricted-range species.
Pachychilon pictum	Albanian roach	LC/LC		3a	Confirmed	Freshwater (=Inland waters)	Lake and river	This restricted range species has a range overlap of 5% with the EAAA for the species and it has been recorded in Ohrid lake and Shkumbini river. Given the species' confirmed presence and level of range overlap with the EAAA, the aquatic habitat is considered likely to support

Scientific name	Common name	IUCN/National Status	Annex II & IV EHD	CH criteria	CH trigger species	Habitats	Critical Habitat	Justification
								>10% of the global population and therefore qualifies the EAAA as CH under criterion 3a.
Pelasgus minutus	Ohrid minnow	DD/LC		3a	Confirmed	Freshwater (=Inland waters)	Lake and river	This restricted range species has a range overlap of 10% with the EAAA for the species and it has been recorded in Ohrid lake. Given the species' confirmed presence and level of range overlap with the EAAA, the aquatic habitat is considered likely to support >10% of the global population and therefore qualifies the EAAA as CH under criterion 3a.
Rutilus ohridanus	Stone moroko	LC/LC		3a	Confirmed	Freshwater (=Inland waters)	Lake and river	This restricted range species has a range overlap of 15% with the EAAA for the species and it has been recorded in Ohrid lake. Given the species' confirmed presence and level of range overlap with the EAAA, the aquatic habitat is considered likely to support >10% of the global population and therefore qualifies the EAAA as CH under criterion 3a.
Oxynoemacheilus pindus	Pindus Stone Loach	VU/LC		3a	Confirmed	Freshwater (=Inland waters)	River	This Globally Vulnerable (VU) and restricted range species has a range overlap of 10% with the EAAA for the species and it has been recorded in Shkumbin river. Given the species' confirmed presence and level of range overlap with the EAAA, the aquatic habitat is considered likely to support >10% of the global population and therefore qualifies the EAAA as CH under criterion 3a.
Salmo letnica	Ohrid Trout	DD/VU		3a	Confirmed	Freshwater (=Inland waters)	Lake	This Vulnerable (VU) species in Albania is endemic to Lake Ohrid with all the Extent of Occurrence overlapping within the EAAA of the species in Lake Ohrid. The EAAA regularly holds ≥10% of the global population size and supports ≥10 reproductive units of this endemic or restricted-range species.
Salmo ohridanus	Belushka	VU/VU		2b, 3a	Confirmed	Freshwater (=Inland waters)	Lake	This Globally Vulnerable (VU) species is endemic to Lake Ohrid with all the Extent of Occurrence overlapping within the EAAA of the species in Lake Ohrid. The EAAA regularly holds ≥10% of the global population size and supports ≥10 reproductive units of this endemic or restricted-range species.
Mammals								

Scientific name	Common name	IUCN/National Status	Annex II & IV EHD	CH criteria	CH trigger species	Habitats	Critical Habitat	Justification
Barbastella barbastellus	Western Barbastelle	NT/LC	II & IV	2d	Possible	Forest, shrubland, rocky areas (eg. inland cliffs, mountain peaks), caves and subterranean habitats (non-aquatic).	Forest, shrubland and rocky areas	This species belongs to Annex II and IV of EU Habitats Directive. In accordance with Criterium 2d, a population of species listed in Annex II and II of Habitats Directive, the habitats within the EAAA are considered as Critical Habitat for this species.
Canis lupus	Grey Wolf	LC/LRnt	II & IV	2d	Confirmed	Forest, shrubland, grassland, wetlands (inland), rocky areas (eg. inland cliffs, mountain peaks), artificial/terrestrial	Forest, shrubland, grassland, wetlands (inland) and rocky areas	This species belongs to Annex II and IV of EU Habitats Directive. In accordance with Criterium 2d, a population of species listed in Annex II and II of Habitats Directive, the habitats within the EAAA are considered as Critical Habitat for this species.
Lutra lutra	Eurasian Otter	NT/VU	II & IV	2d	Confirmed	Terrestrial, freshwater (=inland waters) and marine	Forest, shrubland, grassland and Wetlands	This species belongs to Annex II and IV of EU Habitats Directive. In accordance with Criterium 2d, a population of species listed in Annex II and II of Habitats Directive, the wetland habitats within the EAAA are considered as Critical Habitat for this species.
Lynx lynx balcanicus	Balkan Lynx	CR/CR	II & IV	2a, 2c, 2d	Confirmed	Forested areas	Forest, shrubland, grassland, rocky areas (eg. inland cliffs and mountain peaks)	This Critically Endangered (CR) species, both globally and at national level is also part of Annex II and IV of EU Habitats Directive and it might fulfil Criterium 2a and 2c. In accordance with Criterium 2d, a population of species listed in Annex II and II of Habitats Directive, the habitats within the EAAA are considered as Critical Habitat for this species.
Miniopterus schreibersii	Schreiber's bent-winged bat	VU/LRnt	II & IV	2d	Confirmed	Forest, shrubland, grassland, caves and subterranean habitats (non-aquatic), artificial/terrestrial	Caves	This Globally Vulnerable (VU) species is also part of Annex II and IV of EU Habitats Directive. It fulfils Criterium 2d, meaning that habitats within the EAAA are considered as Critical Habitat for this species.
Myotis blythii	Lesser mouse-eared bat	LC/LC	II & IV	2d	Confirmed	Forest, shrubland, grassland, caves and subterranean habitats (non-aquatic), artificial/terrestrial	Caves	This Globally Vulnerable (VU) species is also part of Annex II and IV of EU Habitats Directive. It fulfils Criterium 2d, meaning that habitats within the EAAA are considered as Critical Habitat for this species.

Scientific name	Common name	IUCN/National Status	Annex II & IV EHD	CH criteria	CH trigger species	Habitats	Critical Habitat	Justification
Myotis emarginatus	Geoffroy's bat	LC/DD	II & IV	2d	Confirmed	Forest, shrubland, grassland, caves and subterranean habitats (non-aquatic), artificial/terrestrial	Caves	This Globally Vulnerable (VU) species is also part of Annex II and IV of EU Habitats Directive. It fulfils Criterium 2d, meaning that habitats within the EAAA are considered as Critical Habitat for this species.
Myotis myotis	Greater mouse - eared bat	LC/LC	II & IV	2d	Confirmed	Shrubland, grassland, caves and subterranean habitats (non-aquatic), artificial/terrestrial	Caves and tunnels	This species is part of Annex II and IV of EU Habitats Directive. It fulfils Criterium 2d, meaning that habitats within the EAAA are considered as Critical Habitat for this species.
Rhinolophus ferrumequinum	Greater horseshoe bat	LC/LRcd	II & IV	2d	Confirmed	Forest, shrubland, grassland, caves and subterranean habitats (non-aquatic), artificial/terrestrial	Forest, shrubland, grassland, caves, tunnels and subterranean habitats (non-aquatic), artificial/terrestrial	This species is part of Annex II and IV of EU Habitats Directive. It fulfils Criterium 2d, meaning that habitats within the EAAA are considered as Critical Habitat for this species.
Rhinolophus hipposideros	Lesser horseshoe bat	LC/LRnt	II & IV	2d	Confirmed	Forest, shrubland, grassland, caves and subterranean habitats (non-aquatic), artificial/terrestrial	Forest, shrubland, grassland, caves, tunnels and subterranean habitats (non-aquatic), artificial/terrestrial	This species is part of Annex II and IV of EU Habitats Directive. It fulfils Criterium 2d, meaning that habitats within the EAAA are considered as Critical Habitat for this species.
Ursus arctos	Brown Bear	LC/VU	II & IV	2d	Confirmed	Forest, shrubland, grassland, wetlands (inland), artificial/terrestrial	Forest, shrubland and grassland	This Vulnerable (VU) species at national level, is also part of Annex II and IV of EU Habitats Directive. It fulfils Criterium 2d, meaning that habitats within the EAAA are considered as Critical Habitat for this species.
Reptiles								
Emys orbicularis	European pond turtle	NT/LRnt	II & IV	2d	Confirmed	Freshwater	Semi-aquatic - ponds, lakes, brooks, streams,	This species is part of Annex II and IV of EU Habitats Directive. It fulfils Criterium 2d, meaning that habitats within the EAAA are considered as Critical Habitat for this species.

Scientific name	Common name	IUCN/National Status	Annex II & IV EHD	CH criteria	CH trigger species	Habitats	Critical Habitat	Justification
							rivers, drainage canals.	
Mauremys rivulata	Western Caspian Turtle	LC/VU	II & IV	2d	Confirmed	Wetlands (inland), marine coastal/supratidal, artificial/aquatic & marine	Low-moving and standing freshwater bodies, permanent and temporary, usually with muddy bottom and dense aquatic vegetation	This species is part of Annex II and IV of EU Habitats Directive. It fulfils Criterium 2d, meaning that habitats within the EAAA are considered as Critical Habitat for this species.
Telescopus fallax	European cat snake	LC/LRlc	II & IV	2d	Confirmed	Forest, shrubland, rocky areas (eg. inland cliffs, mountain peaks), artificial/terrestrial	Rocks in shrubby landscapes	This species is part of Annex II and IV of EU Habitats Directive. It fulfils Criterium 2d, meaning that habitats within the EAAA are considered as Critical Habitat for this species.
Testudo hermanni	Hermann's tortoise	NT/LRnt	II & IV	2d	Confirmed	Forest, shrubland, Artificial/Terrestrial	Forest and shrubland	This species is part of Annex II and IV of EU Habitats Directive. It fulfils Criterium 2d, meaning that habitats within the EAAA are considered as Critical Habitat for this species.
Zamenis situla	Leopard snake	LC/CR	II & IV	2d	Confirmed	Shrubland, Artificial/Terrestrial	Shrubland	This species is Critically Endangered (CR) in Albania and it is part of Annex II and IV of EU Habitats Directive. It fulfils Criterium 2d, meaning that habitats within the EAAA are considered as Critical Habitat for this species.
Plants								
Festucopsis serpentini		LC/VU		3a	Confirmed	Serpentine rocks	Crevices in gullies, deep slopes and gorges on serpentine rock	This species is endemic to Albania with at least 10% of the Extent of Occurrence within the EAAA. The EAAA regularly holds ≥10% of the global population size and supports ≥10 reproductive units of this endemic or restricted-range species.
Forsythia europaea	European forsythia	LC/VU		3a	Confirmed	Shrubland	Serpentine rock	This restricted range species has a range overlap of 10% with the EAAA for the species and it has been recorded in serpentine rock along Shkumbini valley. Given the species' confirmed presence and level of range overlap with the EAAA, the habitat is considered likely to support >10% of the global population and therefore qualifies the EAAA as CH under criterion 3a.

Scientific name	Common name	IUCN/National Status	Annex II & IV EHD	CH criteria	CH trigger species	Habitats	Critical Habitat	Justification
Halacsya sendtneri		LC/EN		3a	Possible	Shrubland	Serpentine rock	Less than 10% of the extent of occurrence. Nevertheless, the habitat could support ≥10 reproductive units of this endemic or restricted-range species.
Hypericum haplophylloides subsp. devollense		LC/LRcd		3a	Possible	Shrubland	Serpentine rock	This restricted range species has a range overlap of 10% with the EAAA for the species and it has been recorded in serpentine rock along Shkumbini valley. Given the species' confirmed presence and level of range overlap with the EAAA, the habitat is considered likely to support >10% of the global population and therefore qualifies the EAAA as CH under criterion 3a.
Aster albanicus		LC/EN		3a	Possible	Shrubland	Serpentine rock	Less than 10% of the extent of occurrence. Nevertheless, the habitat could support ≥10 reproductive units of this endemic or restricted-range species.
Cistus albanicus		LC/EN		3a	Possible	Shrubland	Serpentine rock	Less than 10% of the extent of occurrence. Nevertheless, the habitat could support ≥10 reproductive units of this endemic or restricted-range species.
Centaurea candelabrum		LC/EN		3a	Possible	Shrubland	Serpentine rock	Less than 10% of the extent of occurrence. Nevertheless, the habitat could support ≥10 reproductive units of this endemic or restricted-range species.
Gladiolus illyricus		LC/		3a	Possible	Shrubland	Serpentine rock	Less than 10% of the extent of occurrence. Nevertheless, the habitat could support ≥10 reproductive units of this endemic or restricted-range species.
Thymus teucrioides		LC/DD		3a	Possible	Shrubland	Serpentine rock	Less than 10% of the extent of occurrence. Nevertheless, the habitat could support ≥10 reproductive units of this endemic or restricted-range species.
Silene damboldtiana				3a	Possible	Shrubland	Serpentine rock	Less than 10% of the extent of occurrence. Nevertheless, the habitat could support ≥10 reproductive units of this endemic or restricted-range species.
Athamantha macedonica		LC/EN		3a	Possible	Shrubland	Serpentine rock	Less than 10% of the extent of occurrence. Nevertheless, the habitat could support ≥10 reproductive units of this endemic or restricted-range species.

Criterion 4: Habitat required for the survival of migratory species and/or congregatory species

Ohrid Lake is Biosphere Reserve, an Important Bird and Biodiversity Area, a Key Biodiversity Area, a Candidate Emerald Site, A Ramsar Site (North Macedonia) and a Protected Area in Albania and North Macedonia.

During winter, the site hosts 50,000-80,000 migratory waterbirds. The site supports thus migratory or congregatory species during periods of environmental stress.

Based on the above arguments, Ohrid Lake qualifies for Critical Habitat.

Criterion 5: Biodiversity and/or ecosystem with significant social, economic, or cultural importance to local communities and indigenous groups.

Ohrid Lake is a UNESCO World Heritage Site. It is used by local communities to obtain essential or priority benefits in the form of ecosystem services including productive services, and cultural services. These ecosystem services are crucial for the local communities' livelihood.

Based on the above arguments, Ohrid Lake qualifies for Critical Habitat.

Criterion 6: Habitat of key scientific value and/or associated with key evolutionary processes.

Lake Ohrid is a superlative natural phenomenon, providing refuge for numerous endemic and relict freshwater species of flora and fauna dating from the tertiary period. As a deep and ancient lake of tectonic origin, Lake Ohrid has existed continuously for approximately two to three million years. Its oligotrophic waters conserve over 200 species of plants and animals unique to the lake, including algae, turbellarian flatworms, snails, crustaceans and 17 endemic species of fish including two species of trout, as well as a rich birdlife.

The fish fauna of Lake Ohrid is represented by 17 autochthonous species from four families: Salmonidae (2), Cyprinidae (12), Cobitidae (1), Nemacheilidae (1) and Anguillidae (1) and 6 allochthonous species (belonging to four families) (Table 3). With the exception of eels, none of them is a migratory species.

Based on the above, Lake Ohrid is a landscape with high spatial heterogeneity and therefore high levels of species diversity. As such, Lake Ohrid qualifies for Critical Habitat.

5.2.12.5 Findings on Biodiversity and Critical Habitats

- Some 100 plant taxa were identified along the Rrogozhinë-Pogradec railway; Nevertheless, the list of species present in the exiting railway is higher considering that the survey duration is limited.
- Some rare and endemic species were recorded and are present in serpentine habitats and Lake Pogradec (Ohrid Lake);
- The survey recorded the presence of 12 different habitats and 374 vertebrate species; Nevertheless, the list of species present in the exiting railway would be higher considering that the survey duration has been limited in time, access in some areas (tunnels important for bats and other nocturnal animals) and some railways segments was difficult and further surveys needed during the detailed design project phase;

- Pogradec (Ohrid) Lake conserves over 200 species of plants and animals, endemic algae, turbellarian flatworms, snails, crustaceans and 17 endemic species of fish;

- The project area crosses through the protected areas of Pogradec Protected Landscape and Managed Nature Reserve of Kuturman-Qafe Bush. Both areas are designated as well as:

    - Candidate Emerald Site RNM Kuturman-Qafe Bush (AL0000018),
    - Candidate Emerald Site of Pogradec Protected Landscape (AL0000019),
    - Important Bird and Biodiversity Area (IBA) Lake Ohrid and the surrounding area (AL002),
    - Key Biodiversity Area (KBA) of Lake Ohrid and surrounding area,
    - UNESCO Transboundary World Natural and Cultural Heritage Site (in 2019), *and*
    - Transboundary Biosphere Reserve Ohrid-Prespa (designated in 2014).

- The Emerald Network is an ecological network of Areas of Special Conservation Interest (ASCIs), which was established to conserve the species and habitats of the Bern Convention requiring specific protection measures. Article 6(3) of the Habitats Directive requires appropriate assessment to be carried out if a planned project might affect integrity of a Natura 2000 site. Considering the Emerald sites are predecessors of Natura 2000 sites in non-EU countries, an Appropriate Assessment is needed also for the Candidate Emerald Sites of Pogradec. Considering that the railway crosses the Candidate Emerald Sites of Kuturman-Qafe Bush through a tunnel, an Appropriate Assessment is not considered relevant for this site.

- The preliminary Critical Habitat Assessment basen mainly on data obtained from literature, identified the following:

A. Lake Ohrid is a freshwater ecosystem, outside the EU and not yet assessed by IUCN, but of high priority for conservation on the basis of high level of endemism for several aquatic species. Lake Ohrid could be considered as a **Unique Ecosystem. It meets the threshold for Criteria 1**.
B. 43 species which **meet the thresholds for Criteria 2-3**

Five habitats are assessed as Critical: (a) Shkumbin river mostly for restricted range fish species, (b) Ohrid lake for restricted range aquatic species, (c) caves in the surroundings and railway tunnels for bats, (d) surrounding forest and shrubland for reptiles and (e) serpentine habitats for plants of restricted range.

C. Lake Ohrid **meets the Criteria 4, 5 and 6 for Critical Habitat**

Lake Ohrid supports migratory or congregatory species during periods of environmental stress. The ecosystem services of Lake Ohrid are crucial for the local communities' livelihood. Finally, Lake Ohrid is a landscape with high spatial heterogeneity and therefore high levels of species diversity.

The importance of the above findings will be further elaborated during ESIA. Nevertheless, it's worth stressing here that in accordance with Standard 4 of the EIB ESS, the project should not lead to a net reduction in the population of any vulnerable, endangered or critically endangered species over a reasonable period of time. In addition, positive conservation outcomes (Net Positive Impact) and continued ecological functionality are achieved through appropriate compensation measures for residual impacts that would otherwise occur despite impact avoidance, minimisation and restoration measures. As a last resort and in response to residual impacts, compensation measures may be implemented to reach a minimum of no loss of biodiversity overall. If the project is taking place in an area of critical habitat, a Net Positive Impact on biodiversity and ecosystem services

must be achieved. Furthermore, compensation or offsets shall not be used as a mechanism to achieve no loss or a Net Positive Impact until other forms of mitigation have been implemented to the fullest extent possible.

5.2.13 Waste

5.2.13.1 Materials and method

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

- Yearly report on Environmental Situatation in Albania , 2022 (of National Environment Agency);
- Environmental Strategic Assessment Report for Rrogozhine, Elbasan , Prenjas ,Librazhd , Pogradec Municipalities ;
- Consultations with the affected municipalities (Elbasan, Peqin, Rrogozhine, Librazhd, Prrenjas, Pogradec);
- Site visits;
- Other relevant studies on Integrated Management of Waste

5.2.13.2 Baseline Information

Pursuant[94] to DCM no. 538 dated 22.09.2021, for some additions to the Decision of the Council of Ministers number 687, dated 29.07.2015 "On the adoption of rules for keeping, updating and publishing waste statistics". Local government units have the obligation to submit data on waste streams generated in the territory they administer.

Urban waste

The municipal waste collection and transfer service is organized either through the municipality itself based on their technical structures or the service is subcontracted to private companies[95].

Table 5-49 Generated waste[96]

No.	Municipality	Amount of waste (kg)
2022		
1	Rrogozhinë	3,668,000
2	Pogradec	11,807,000
3	Prrenjas	2,935,000
4	Peqin	3,082,000
5	Elbasan	27,596,000
6	Librazhd	2,410,000
2021		
1	Rrogozhinë	27,515,50
2	Pogradec	12,534,640
3	Prrenjas	4,706,500

[94] https://akm.gov.al/ova_doc/raporti-per-gjendjen-e-mjedisit-2022/

[95] Burimi: Raport i GIZ/DKT. Të dhëna të sakta për mbetjet bashkiake si bazë për zhvillimin e politikave dhe përmirësimin e menaxhimit të mbetjeve për qytetarët

[96] https://akm.gov.al/ova_doc/raporti-per-gjendjen-e-mjedisit-2022/

No.	Municipality	Amount of waste (kg)
4	Elbasan	27,595,623
5	Peqin	3,587,100
6	Librazhd	2,409,600
2020		
1	Rrogozhinë	4,875,000
2	Pogradec	12,740,840
3	Prrenjas	3,080,000
4	Elbasan	23,316,000
5	Peqin	3,587,100
6	Librazhd	3,022,000

Source: Report of GIZ//DKT. Accurate data on municipal waste as a basis for developing policies and improving waste management for citizens.

Table 5-50 Final waste disposal facilities

No.	Municipality/County	Waste collection point
1	Rrogozhinë	Peqin Cementery (Illegal storage area)
2	Pogradec	Collection point Maliq
3	Korçë County	Collection point Maliq
4	Elbasan County	Elbasan Incinerator
5	Prrenjas	Krastë
6	Peqin	Cemetery
7	Librazhd	Elbasan Incinerator
8	Elbasan	Elbasan Incinerator

5.2.13.2.1 Elbasan

The waste of the Chemical Industry (such as the waste containing dangerous substances) is the most prominent, since this type of industry is more present in the district of Elbasan.

Nowadays, 5 municipalities[97] within the district transfer their waste to the Elbasan incinerator (respectively: Elbasan, Cërriku, Belshi, Librazhdi and Gramshi,). Prrenjasi, Peqini deposit the waste in their municipal landfills.

[97] https://akm.gov.al/ova_doc/raporti-per-gjendjen-e-mjedisit-2021/

Table 5-51 Weighing waste according to the GIZ/DKT project

No.	Municipality	Population (corrected MF formula)	No of villages	No. of the villages receiving the service	No. of the population served	Service coverage (%)	The result of weighing in the municipality for 6 days (in kg)	Annual assessment (average in tons)	Waste generation rate (kg/ person/ day)
1	Gramsh	24,231	95	20	11,937	49%	45,115	1,176	0.13
2	Prrenjas	24,906	26	12	13,217	53%	56,280	2,935	0.32
3	Peqin	26,136	51	45	24,054	92%	59,113	3,082	0.32
4	Cerrik	27,445	28					3,047	2.75
5	Librazhd	31,892	52					2,410	0.21
6	Belsh	19,503	34					2,045	0.29
7	Elbasan	141,714	116					27,596	0.53
8	County of Elbasan	295,827	402	77	49,207	65%	160,508	42,290	0.39

The service coverage on average for the urban area of the whole County is 100%, while in the rural areas it is 50%, which is within the minimum service standard defined by the National Strategy for the urban area, while almost half of the standard for the rural area.

Regional Environmental Agency (REA) representatives think that the cleaning company evacuates about 105 tons per day. Regardless of the coverage area, the quality of the service is not at the right level, as it is performed with primitive means.

The waste disposal site, which is still used by the **Elbasan Municipality**, is located 75 m away from the banks of the Shkumbin River in the southern part of the city of Elbasan. This landfill is classified as unsanitary (beyond any permitted standards). The waste that is deposited is solid urban waste, mainly from the city area, while the possibility of depositing inert waste is not excluded. Currently, this landfill, as well as other collection points, are undergoing the waste transfer and rehabilitation process, since with the completion of the construction of the landfill in the storage area of Elbasan, the waste will have a safer final destination. During these years, several efforts and feasibility studies have been made, as well as projects for the determination of a suitable territory for the construction of a sanitary landfill for the disposal of waste in the Municipality of Elbasan.

The Elbasan landfill is located at a distance of 2.5 km from the project's footprint.

Figure 5-122 Elbasan landfill location

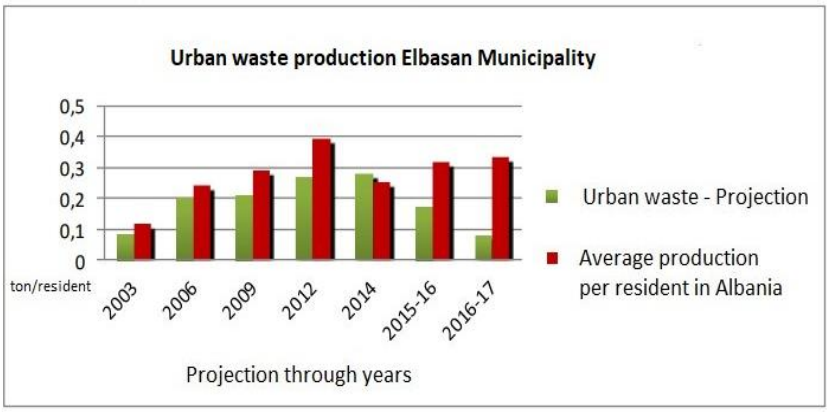


Figure 5-123 Projection of urban waste generation in Elbasan Municipality

5.2.13.2.2 Papër Administrative Unit[98]

Papër AU provides its own waste management service for 80% of its population (1.5 tons/day of waste).

The waste is disposed in the storage place located in the village of Balldren, which does not meet the hygienic and sanitary conditions. This storage site is located 13 km from the center of the Administrative Unit. Uncontrolled storage of inert waste in several locations in Balldren village **are in approximate distance from the project at about 2km.**

[98] Environmental Strategic Assessment Elbasan

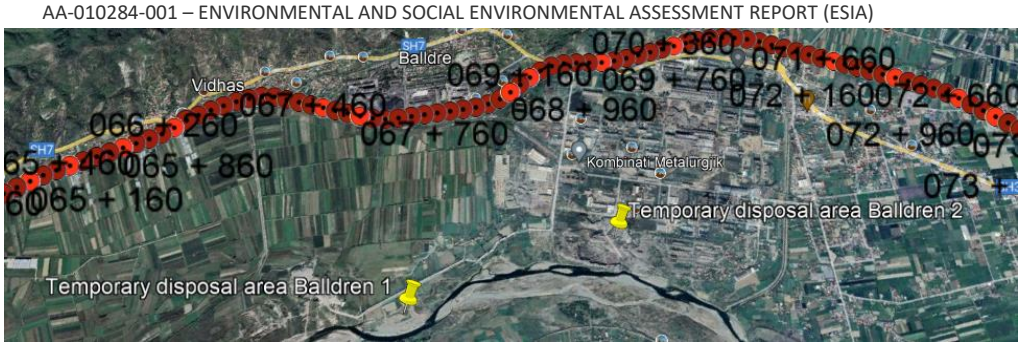


Figure 5-124 Temporary disposal areas location in reference to project footprint

- Inert waste (waste from construction and demolition)

There is no a special disposal area for inert waste in the municipality of Elbasani. In 2014, most of the inert waste was used to fill the swamp pits created by inerts use. However, in most cases, inert waste is deposited in the urban waste disposal site, either as a cover layer or piled in its boundary part.

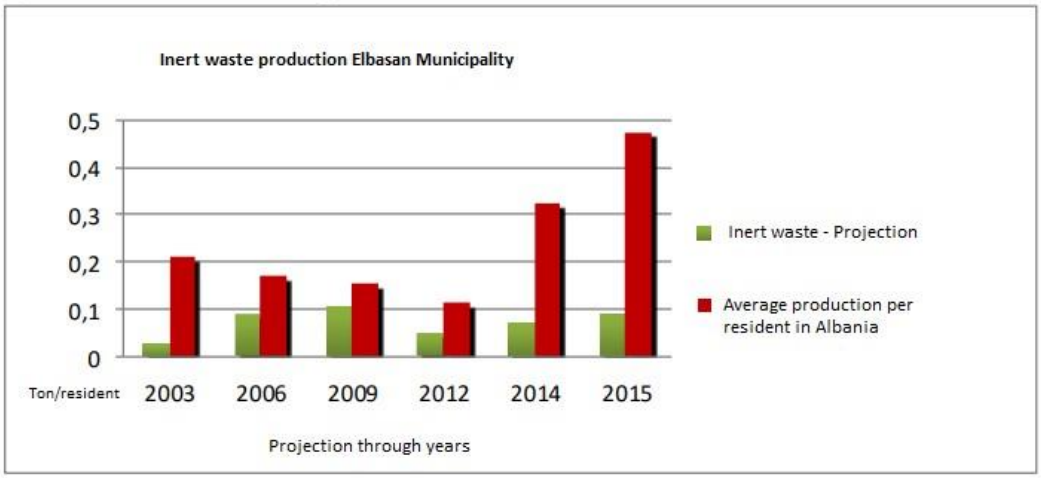


Figure 5-125 Production of inert waste in years, Elbasan Municipality

- Industrial waste

It can be concluded that Elbasan produces about 5,986 tons of industrial waste per year.

It should be noted that some of these activities produce hazardous waste and as such are subject to the treatment of these wastes through Law 10463 dt. 22.09.2011, which specifies that these wastes shall be rigorously monitored, recorded and transported as described in the law.

5.2.13.2.3 Municipality of Prrenjas

With an average of 395 kg/person/year and a total of 3,300,000 kg/year, improper waste management results in uncontrolled disposal, contamination, and adverse effects on air quality and human health. Existing waste poses risks like groundwater contamination, greenhouse gas emissions, disease transmission, and landscape alteration.

Table 5-52:Data on waste management, Prrenjas[99]

No.	Administrative unit	Number of population (corrected mf formula)	No. of villages	No. of the villages receiving the service	No. of the population served	Service Coverage (%)	Frequency of waste collection (times/week)
1	Prrenjas City	5,847	3	3	5,847	100%	6
2	Qukës	8,211	11	6	4,479	55%	2
3	Rrajcë	8,421	7	2	2,406	29%	2
4	Stravaj	2,427	5	1	485	20%	2
5	Prrenjas Municipality	24,906	26	12	13,217	53%	

Table 5-53 The result of the Prrenjas waste weighing exercise

The result of weighing by the municipality for 6 days (in kg)	56,280
Daily waste collection (average in kg)	8,040
Annual assessment (average in tons)	2,935
Waste generation rate (kg/person/day)	0.32
The service provider	Rei
Number of vehicles (technological + open)	3 + 0
Composition of urban versus rural waste (in %)	40 - 60
Percentage of population covered by service (average in %)	53%
- urban area	100%
- rural areas	39%

5.2.13.2.4 Municipality of Pogradec

Table 5-54 Data on waste management, Pogradec

No.	Administrative unit	Number of population (corrected mf formula)	No. of villages	No. of the villages receiving the service	No. of the population served	Service Coverage (%)	Frequency of waste collection (times/week)
1	Pogradec City	20,848	1	1	20,848	100%	6
2	Buçimas	15,687	8	8	15,687	100%	2
3	Çerave	7,009	11	10	6,372	91%	2
4	Dardhas	2,182	9	4	970	44%	2
5	Hudenisht	5,990	6	6	5,990	100%	2
6	Proptisht	4,785	15	3	957	20%	2
7	Trebinje	2,481	15	3	496	20%	2
8	Velçan	2,548	8	4	1,274	50%	2
9	Municipality Pogradec	61,530	73	39	52,594	85%	

Table 5-55 The result of the Prrenjas waste weighing exercise

The result of weighing by the municipality for 6 days (in kg)	226,435
Daily waste collection (average in kg)	32,348

[99] https://akm.gov.al/ova_doc/raporti-per-gjendjen-e-mjedisit-2021/

Annual assessment (average in tons)	11,807
Waste generation rate (kg/person/day)	0.53
The service provider	rei
Number of vehicles (technological + open)	7 + 1
Composition of urban versus rural waste (in %)	45 - 55
Percentage of population covered by service (average in %)	85%
- urban area	100%
- rural areas	78%

Table 5-56 The calculated data for the waste produced by each administrative unit, Pogradec

AU	Population	Kg/ person/ year	Waste (Mg/a) 2016	Waste (Mg/a) 2025	Waste (Mg/a) 2025
Pogradec	38,653	0.365	14108	13403	12274
Bucimas	21,180	0.365	7730	7344	6726
Cerrave	9,201	0.256	2350	2233	2045
Hudenisht	10,920	0.256	2790	2651	2427
Proptisht	6,393	0.256	1633	1552	1421
Trebinje	3,197	0.256	816	776	711
Velcan	3,725	0.256	951	904	828
Dardhas	3,794	0.256	969	921	843
Total	**97,063**		**31,351**	**29,784**	**27,276**

- **Industrial Waste**

In the territory of the Municipality of Pogradec, there is no major development towards the industry sector, which is represented by the production of confections and use of mines . The development of mining activities in this municipality has a potential, although in recent years the mining activity has been fading.

The iron and nickel ore deposits (dams) located on the side of the lake are problematic due to the environmental threats they pose. On the map of Albania's Hot Spots, two such located are in Pogradec with about 300,000 tons of granular material: the storage area of the Fe-Ni mine in Gur i Kuq, with an area of about 3 ha, and the area of the Fe-Ni processing factory at Gur i Kuq, with its dam on the shore of the lake, with about 100,000 m3 of sterile. There are also other licensed sources that are not active at the moment, but with their mineral stocks, especially nickel, they pose a danger to the lake and the surrounding lands.

Waste disposal sites

Presently[100], the waste disposal site is situated in an area known as "Prroi i Stegut" within the Buçimas Administrative Unit, approximately 13 km from Pogradec in the direction of the national road to Alarup. It is also notably distant, about 12 km, from the endpoint of the KP 152+860 project.

At this location, the local community engages in spontaneous separation and recycling of waste. This landfill has functioned as such and will continue to do so until the completion and operation of the Maliqi regional landfill.

Figure 5-126 Pogradec landfill location in reference to project footprint

5.2.13.2.5 Municipality of Rrogozhinë:

The Municipality of Rrogozhina disposes of the waste along the Shkumbin River, an unsuitable location lacking a thorough disposal site study, leading to illicit activities in state-owned areas along the river.

This disposal site is situated roughly 2 km away from the project footprint. Additionally, an illegal waste disposal site in Peqin near the cemetery is utilized for storage, positioned approximately 300m from the project track, specifically KP 044+060.

In rural areas, particularly Lekaj and Kryevidh, waste is discarded in a natural pit ,poses significant risks of groundwater pollution due to the geological characteristics of the pit.

5.2.13.2.6 Municipality of Librazhd

The topography[101] of the area, coupled with high infiltration capacity and the presence of numerous underground and surface water sources, discourages conventional solid waste disposal methods.

The waste generated in the Librazhd municipality is deposited in the Elbasan landfill, which collects the waste generated by athe county municipalities and is treated in the incinerator. According to the report on the state of the environment 2022(NEA), Librazhd Municipality deposits waste in the Incinerator in the City of Elbasan.

[100] https://portavendore.al/wp-content/uploads/2018/08/Plan-i-Veprimit-per-menaxhimin-e-integruar-te-mbetjeve-Bashkia-Pogradec-2017-2020.pdf

[101] ENVIRONMENTAL STRATEGIC ASSESSMENT Librazhd

5.2.13.3 Findings

The identified problems in Pogradec:

- Lack of a well-organized system for reduction, collection, and transportation of solid waste. Services are mainly directed towards urban areas, leading to the creation of illegal open landfills in rural areas, pollution hotspots, and territorial space pollution.
- Irregular practices related to waste separation at the source or intermediate waste treatment, mainly in the form of sporadic pilot projects considered unstable. Consequently, the levels of recovery of recyclable waste at the source are extremely low, with only 10% of urban recyclable waste generated, without any composting process.

Substandard management of hazardous waste due to inappropriate separation levels and lack of processing tools. As a result, a significant portion of hazardous waste is exported to other countries through licensing agreements with private companies

The identified problems in Rrogozhinë:

- The absence of composting facilities for organic waste, a lack of transfer stations for sorting and reduction, and the detrimental disposal of waste in drainage channels, adversely affecting both the landscape and water quality.

The identified problems in Librazhd:

The core issue lies in undifferentiated waste accumulation in poorly maintained bins, where it can linger for an extended period, negatively impacting air quality. The way waste is transported, stored, and mechanically covered without any treatment further exacerbates the problem. Additionally, the disposal of waste in administrative units tends to be largely spontaneous.

The identified problems in Elbasan:

In Elbasan, various businesses are active in the field of construction, agri-food, and processing industry, etc. It is estimated that Elbasan Municipality produces a total of about 117 tons of waste per day, of which it has been previously estimated that 14% of them are industrial waste. So it can be concluded that Elbasan produces about 5,986 tons of industrial waste per year.

It should be noted that some of these activities produce hazardous waste and as such are subject to the treatment of these wastes through Law 10463 dt. 22.09.2011, which specifies that these wastes must be rigorously monitored, recorded and transported as described in the law.

Industrial Zone grapples with substantial environmental challenges arising from identified points characterized by heavy metal pollution, dust emissions, and illicit waste disposal practices.

The Elbasan landfill is located at a distance of 2.5 km from the project's footprint. The waste disposal site, is located 75 m away from the banks of the Shkumbin River in the southern part of the city of Elbasan, where there was a daily flow of 105 tons/day and serves a population of 128,418 inhabitants. This landfill is not as per standarts required for waste disposal (beyond any permitted standards);

5.2.14 Wastewater

5.2.14.1 Materials and method

The information on the existing situation regarding waste water is obtained on the existing studies from the following sources:

- Yearly report on Environmental Situatation in Albania (of National

Environment Agency)

- Environmental Strategic Assessment Report for Rrogozhine ,Elbasan , Prenjas ,Librazhd , Pogradec Municipalities ;
- Consultations with the affected municipalities (Elbasan, Peqin, Rrogozhine, Librazhd, Prrenjas, Pogradec) ;
- Site visits;

5.2.14.2 Baseline Information

➢ **Elbasan**[102]

The wastewater generated by the city of Elbasan is discharged untreated into the surrounding environment, as the city lacks a wastewater treatment facility. A Feasibility Study proposes the construction of a treatment plant at a location known as "Damba" to address this issue. Factoring in potential infiltration, the maximum capacity of the proposed wastewater treatment plant is estimated to be around 26,000 m3/day, catering to a population of 135,000 inhabitants at a rate of 135 litters/day per inhabitant.

In the Peqin municipality, specifically within the administrative units of Karine (KP 039+160), Perparim (KP 047+160), and Pajove (KP 050+460), the sewage system is outdated. Some households discharge wastewaters into septic tanks, while others discharge directly into surface waters without undergoing treatment.

➢ **Pogradec**

The wastewater system[103] in this city is well-organized and equipped with a corresponding treatment facility. Wastewater is collected through a network of collectors starting from the city's entrance, near the edge of the lake, extending to the 1 Maji neighbourhood, where a pumping station is located. The collected wastewater is then conveyed to the processing plant located approximately 3 kilometers away in Guras-Zagraçan, with one line extending towards the village of Verdovë, and the other connecting to the plant in Guras via Tushemisht-Drilon;

However, it is important to note that the territories of the former municipalities lack systematized sewage systems and are not integrated into the Purification Plant system. This includes areas previously under the jurisdiction of the Mokra municipality, as well as the administrative unit of Huděnishti, which directly discharges wastewater into Lake Ohrid.

➢ **Rrogozhinë**

In 1967, construction of the sewage system commenced[104] in the city of Rrogozhinë, initially intended for wastewater management. However, not all residential properties are linked to this system. Many buildings still discharge wastewater directly into natural streams or rely on septic tanks. To mitigate wastewater discharge near residential areas, sewage pipelines were installed

[102] Environmental Strategic Assessment Elbasan

[103] Environmental Strategic Assessment Pogradec
https://planifikimi.gov.al/index.php?eID=dumpFile&t=f&f=7409&token=cd513f4d6be9ad11ec8331c4da5f0130b1ded4e1

[104] Environmental Strategic Assessment Rrogozhine

beneath watercourses in 1993 and 2003.

Presently, there are two wastewater outlets in Rrogozhinë, each equipped with manholes featuring brick or concrete walls and either cast iron or concrete covers. Rain grates are limited, primarily found on recently reconstructed main roads. Unfortunately, untreated wastewater is discharged into natural watercourses near the city, posing ongoing health hazards for residents.

Regarding the municipal territory of Rrogozhinë, the project route intersects the administrative unit of Sinaballaj. Wastewater from this area flows untreated into surface watercourses near the project site, specifically in KP 038+060.

Figure 5-127 Irrigation channel in the vicinity of the project

5.2.14.3 Findings

The sewage in almost all municipalities of the project area is discharged without treatment. Missing sewage treatment plant.Discharge of sewage without being treated in treatment plants is a source of contamination of water resources;

There is sewage treatment plant only in municipality of Pogradec.

5.2.15 Hot Spots

5.2.15.1 Materials and method

The information on indetification of hot sports around the project area is obtained on the existing studies from the following sources:

- Yearly report on Environmental Situatation in Albania (of National Environment Agency);
- Environmental Strategic Assessment Report for Rrogozhine , Elbasan , Prenjas ,Librazhd , Pogradec Municipalities ;
- Consultations with the affected municipalities (Elbasan, Peqin ,Rrogozhine, Librazhd, Prrenjas, Pogradec);
- Site visits;

5.2.15.2 Baseline Information

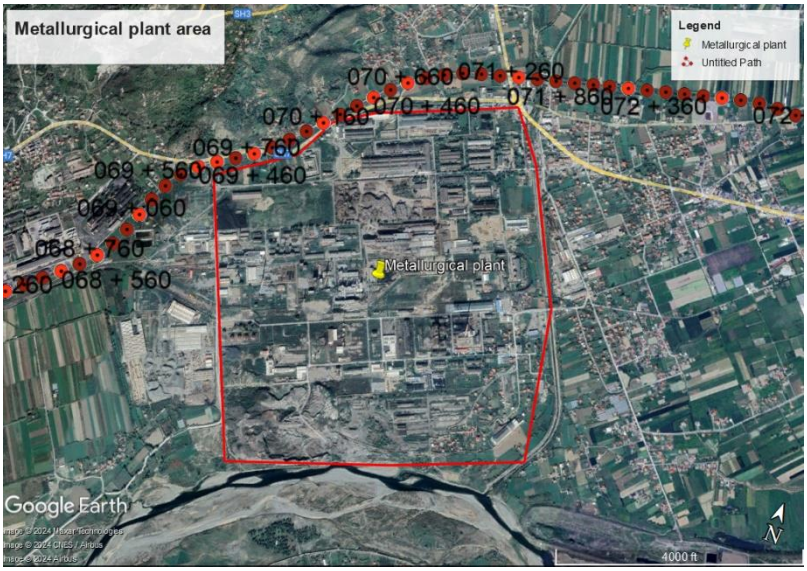
The persistence of chemical contamination from storage in diverse facilities identified as environmental hotspots remains an ongoing concern.

Table 5-57 Hot spots in the study area[105]

Environmental hotspots in Albania	The potential amount of waste they have stored	Description of the condition
Elbasan metal smelting complex	1.5-2.0 million tons	With the highest pollution potential from the waste of heavy metals such as ferronickel and ferrochrome, inherited during the last 35 years, polluting the waters of the Shkumbin River.
The area of Pogradec ferronickel deposits	n/a	In this area, there are deposits of ferronickel waste deposited near the lake of Ohrid from the former mines in the stream, the red stone and Bitinska.
Deposits in Balez Elbasan	216 tons of chemical residues such as dichloromethane, arsenic salts, ammonium nitrates, ammonium hydroxides	In 2008, the deposition of chemical residues such as dichloromethane, arsenic salts, ammonium nitrates, ammonium hydroxides, etc. (pnud) was evidenced. In 2010, about 90 tons of chemicals from the warehouse in Elbasan were repackaged and transported to Germany, Belgium and Greece by a Greek company.

The list of Environmental Hot Spots (Elbasan) also includes:

- The former Ferrochrome smelting plant, which generated 400,000 m3 of industrial waste.
- The Metallurgical Complex, a significant producer of heavy metals and toxic chemicals.
- The Balëz Industry-Mining Supply Company, known for producing 30 tons of Cyanide.



Metallurgical Plant of Elbasan

[105] https://akm.gov.al/ova_doc/raporti-per-gjendjen-e-mjedisit-2021/

Figure 5-128 Elbasan Metalurgic plant location in reference to project footprint

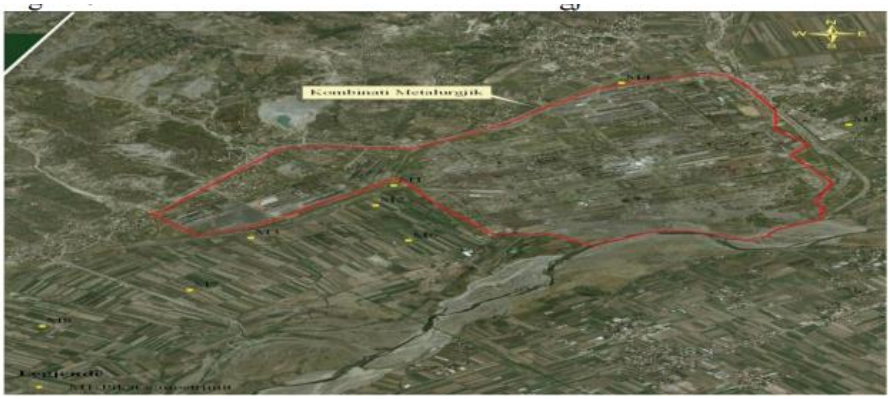


Figure 5-129 Contaminated area of the Metallurgical Plant

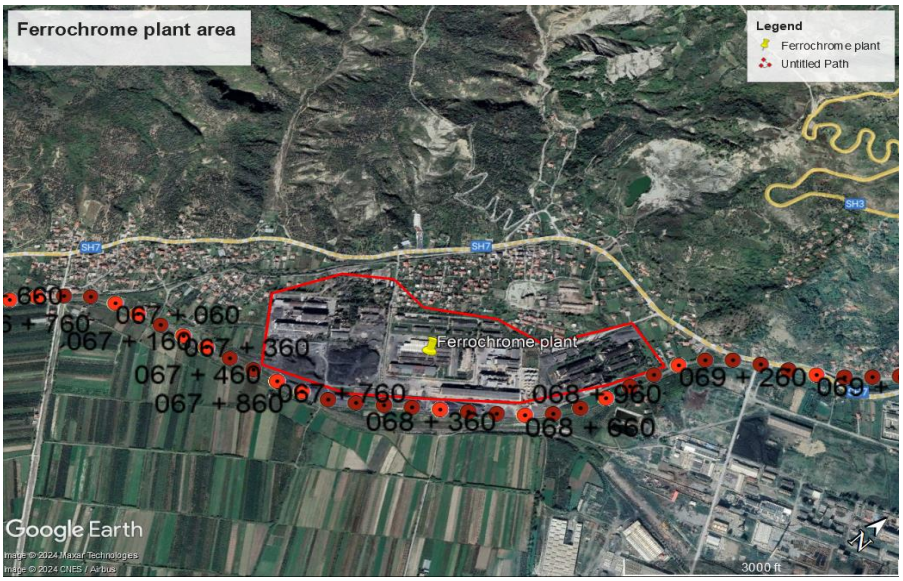


Figure 5-130 Ferrochrome plant location in reference to project footprint

The ferrochrome plant and the Elbasan metallurgical area are situated in close proximity, just a few meters away. The surface of these areas extends along both sides of the project footprint, spanning from KP067+660 to KP071+260.

The Ferrochrome Plant has been classified as one of the 35 environmental hotspots in the country due to its storage of 400,000 m3 of hazardous industrial waste. Numerous studies have been conducted, revealing soil contamination within and around the Metallurgical Plant with heavy metals such as Cd, Zn, Cu, etc. A study by Tota et al. in 2007 indicates that the contamination of agricultural land with heavy metals (Cd, Zn, and Cu) extends in a radius of 2-5 km around the Metallurgical Complex, with more pronounced contamination in the immediate vicinity. Agricultural land in Papër, Bradashesh, and around Metalurgjik is found to be contaminated with Cr.

Figure 5-131 Cyanide storage area Balez location in reference to project footprint

The Balëz Industrial-Mining Supply Company, housing substantial quantities of hazardous materials, is positioned at a considerable distance from the project's footprint, approximately 3 km away.

The Explosives Plant in Mjekës, located approximately 4 km away from the project footprint, has also been utilized for explosive disposal. Consequently, the area surrounding the plant is contaminated with explosives and high levels of heavy metals such as Pb, Cr, Cu, Mn.

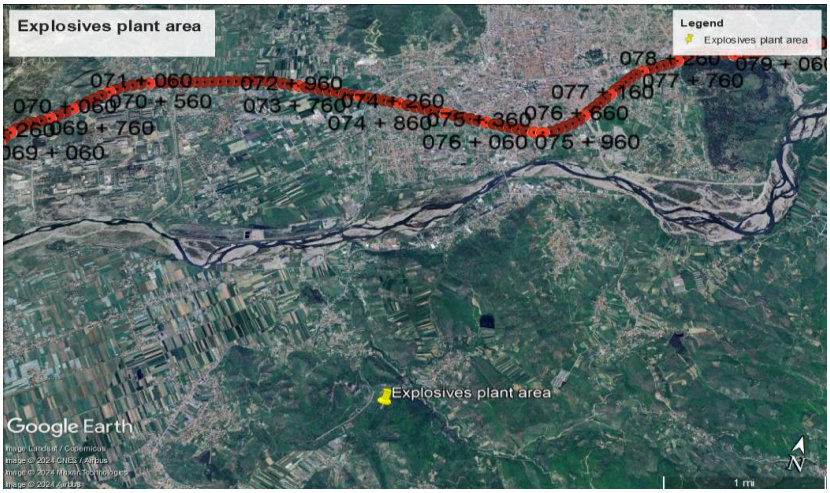


Figure 5-132 Explosive plant location in reference to project footprint

- Other industrial contributors' pollution around the project area:

The cement[106] factory situated in the industrial area of Elbasan is a focal point. Major concerns revolve around the substantial emission of detrimental dust into the atmosphere, negatively

[106] ENVIRONMENTAL STRATEGIC ASSESSMENT Report_Elbasan
https://planifikimi.gov.al/index.php?eID=dumpFile&t=f&f=2293&token=b5d1dee8d90f89cf20d0bc2eabae3e31ff1d5058

impacting both the city and agricultural regions.

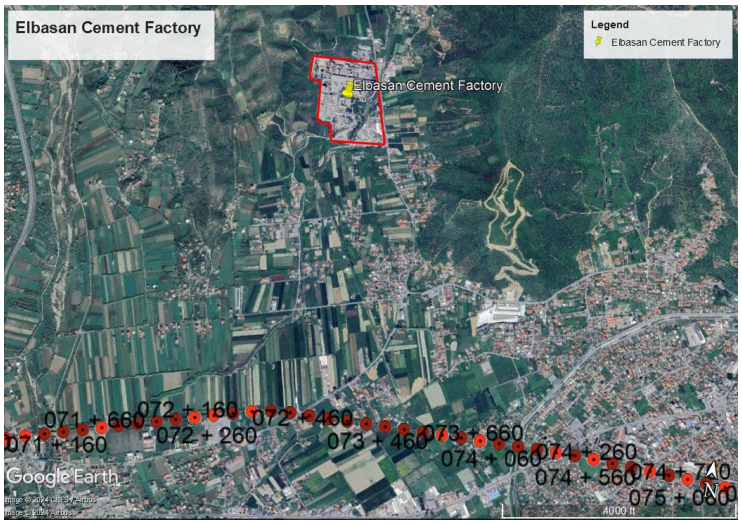


Figure 5-133 Elbasan Cement Factory location in reference to project footprint

- **Pogradec**

The following area has been identified as a "hot spot"

The disposal[107] site of the Fe-Ni “Guri i Kuq” mine, spanning approximately 3 hectares and located 500 meters from the project at KP 152+860.

Figure 5-134 Fe-Ni storage area location in reference to project footprint

The Fe-Ni processing plant, with its storage area on the shore of the lake, with about 100,000 m 3 of sterile, located 200m in distance from the project area KP 152+860.

[107] https://portavendore.al/wp-content/uploads/2018/08/Plan-i-Veprimit-per-menaxhimin-e-integruar-te-mbetjeve-Bashkia-Pogradec-2017-2020.pdf

Figure 5-135 Fe-Ni processing plant location in reference to project footprint

- Librazhd

Still exiting waste from mineral, asbestos from former facilities of HSH still near the project footprint that shall be taken into consideration to be removed dhe rehabilitate.

Figure 5-136:Librazhd _asbesto Kmp 099+260 Ex Superphosphate Storage area with Asbestos

Figure 5-137:Fe -Ni-chrome mineral waste in Librazhd and Xhyre

Contaminated water surfaces[108]

The municipality of Librazhd is distinguished by a substantial water surface, mainly attributed to the Shkumbin river and its primary tributaries such as Rrapuni, Bushtrica, and Gostima. The most severely polluted water surfaces are, in essence, the flows of the Shkumbin river and the Rrapun

[108] ENVIRONMENTAL STRATEGIC ASSESSMENT Librazhd

river, deemed as "hot spot" water locations. This is linked to the direct discharge of the entire urban sewage system into the Shkumbin riverbed, carrying high chemical, physical, and bacteriological loads. Consequently, the stretch from Dragostunja to the bends of Murrashi is notably critical and heavily polluted.

The Shkumbin river itself experiences significant turbidity, driven by three main factors:

- Uncontrolled industrial activities within the surface management structure of mines, primarily operating in the areas of Prrenjas Municipality and partially in Librazhd.
- Erosion phenomenon, visible due to the terrain's nature and exacerbated by aggressive human interventions like the opening of geologically unstudied roads, spontaneous constructions, extensive deforestation, etc.
- Agrochemical practices, including the use of pesticides and chemical fertilizers, coupled with the mass displacement of chemically loaded soils, contribute significantly to surface water pollution.

➢ **Prrenjas**

Various former mining areas, including Pishkash, Katjel, Prrenjas-village, and Skroska, along with their abandoned surface deposits, have been identified as environmentally sensitive hotspots. The deposited materials with high mineral content, such as Cr, Fe, and Ni, significantly impact the fauna and flora of the Shkumbin River and its tributaries. In conclusion, urgent measures are imperative to manage and alleviate the adverse environmental impacts of diverse activities in these areas of Prrenjas.

5.2.15.3 Findings

The Shkumbin River edge area, along the banks of the Shkumbin River, facing the industrial area, confronts challenges primarily associated with the deposition of solid waste containing heavy metals from the Steel Plant and the Mechanical Plant. This contributes to the pollution of the Shkumbin River and its surroundings, with potential consequences for water quality and ecosystems.

Heavy Metal Pollution: Elevated concentrations of heavy metals, including nickel, chromium, cobalt, zinc, iron, and manganese, pose significant environmental and health risks.

Wind Dispersion: The dispersion of pollutants by the wind has a far-reaching impact, affecting both urban and agricultural areas.

Elbasan Industrial Zone grapples with substantial environmental challenges arising from identified points characterized by heavy metal pollution, dust emissions, and illicit waste disposal practices.

5.2.16 Landscape and visual amenity

The landscape and visual amenity use description is based also on the maps of the Protected Areas and Cultural heritage, as well as on the watercourses across the railway line.

5.2.16.1 Materials and method

The key landscape and visual elements that are considered as relevant by the EU directives, the international guidelines, the environmental national legislation, as well as by the best international practice, include topography, protected areas, land cover ,agricultural areas; infrastructure, surface waters, vegetation settlements, emerald network (Natura 2000), natural heritage and sites of particular interest, cultural heritage sites/objects, tourist sites/objects, etc.

There is a lack of national landscape classification, and considerations of the landscape and visual amenities are based on the following issues:

- Geological study of the Project area;
- Topographical study of the Project area;
- General Local Development Plans (Rrogozhine,Peqin , Elbasan ,Librazhd, Prenjas , Pogradec);
- Protected Areas, including nature monuments;
- Natural heritage and sites of particular interest;
- Cultural/historical heritage sites/objects;
- Site visits.

5.2.16.2 Baseline Information

The plain terrain predominates in a delimited zone, primarily tracing the valley of the Shkumbin river. Originating from river sedimentation, this plain unit spans approximately 1.5-2 km in width. The Elbasan field and its adjacent plains lie within this area, crisscrossed by an intricate network of drainage and irrigation canals, alongside lowland streams feeding into the Shkumbin River. This expanse notably impacts the City of Elbasan and the Administrative Units of Shirgjan, Gjergjan, Labinot Fushë, Bradashesh, and Papër. The flow direction of these rivers, including the Shkumbin, typically runs from the east and southeast towards the west and northwest. During periods of heavy rainfall, these rivers, characteristic of Albanian waterways, have been known to breach their banks, inundating nearby agricultural lands.

The Librazhd municipality's landscape reflects neotectonic features prevalent in the continental region, spanning two structural levels. These include the horsts, comprising the mountains encircling the valley, and the graben, which encompasses the Librazhd basin and beyond.

The municipality of Pogradec is situated along the southern shoreline of Lake Ohrid, nestled amidst hills that form a natural amphitheater, gradually descending towards the lake. Positioned at a lowland elevation of 694 meters above sea level, the landscape offers a picturesque vista of the surrounding mountains, reaching heights of approximately 800 meters in the northwest. This area also boasts remnants of the ancient settlement of Dasaretia (Enkelana).

5.2.16.3 Findings

The railway passes across the environmental and social sensitive areas:

- From Km 136- km 152 (Loti 2) the railway passes along a very beautiful scenery for the passengers to be enjoyed,
- River valleys crossed by the RL: Shkumbin river valley, Rrapuni, Lingajca
- Footprint of the project crosses water bodies Shkumbini basin: Shkumbini river, streams , Ohri Lake
- Important historical areas, Domosdova near Project Area /Librazhd;
- Important archaeological heritage (7,500-year-old Palafitti)settlement near Buceze village close to Ohri lake;
- The segment Mirakë – Librazhd passes along the perimeter of the Nature Managed Reserve

Kuturman Qafë – Bushi.

- Lin – Pogradec goes through the Landscape Protected Area of Pogradec. The area is IBA and Emerald site.
- Along the Lin Peninsula, with its natural and cultural assets as the springs of Drilon, numerous endemic species made it part of UNESCO.

Performed field observations showed that the railway rehabilitation will follow the existing track, with minor widening at the level crossings, affecting thin strips of land along the sides, for which no significant land expropriation is required.

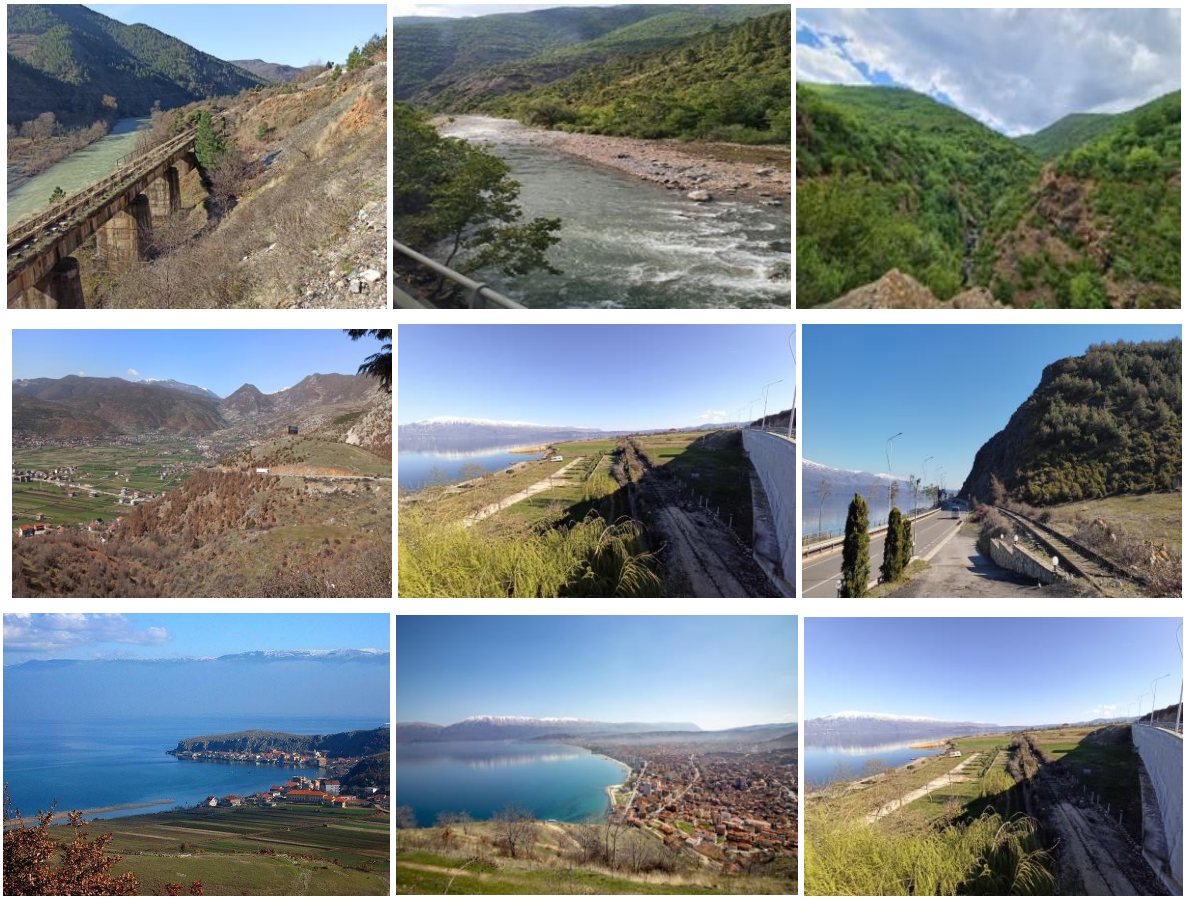


Figure 5-138:Picture showing the beauty of the landscape and nature while passing the railway line

5.3 Cultural heritage

5.3.1. Materials and method

The information on cultural heritage is extracted from the following sources:

- The database of the Institute of Cultural Monuments, Ministry of Culture, Albania;
- Web pages of the affected municipalities;
- Consultations with the affected municipalities;
- Scientific articles on the historical/cultural heritage; and

- Site visits

The location of the cultural heritage sites/objects is defined through the official source maps

https://akpt.maps.arcgis.com/apps/webappviewer/index.html?id=ff270e99f5be45f19c7b7a1e3e618b27 (The national agency of territorial planning)

The cultural heritage issues should be dealt with in compliance with the provisions of the law "On Cultural Heritage and the museums"[109]. Local governments collaborate with the Ministry of Culture to preserve and protect this heritage.

5.3.2. Baseline Information

There is an important historical area: such as the area of Domosdova or areas rich in archaeological heritage such as the recently discovered 7,500-year-old Palafitti settlement near Buceze village close to Ohrid's lakeshore; There are several cultural monuments as castle , bridges near the project line as following :

- ✓ Peqin Castle 300 m away from the RLaxis, KMP 42.8
- ✓ Vidhi Tabakut 270 m away from the RL axis (Peqin) KMP 49.6
- ✓ Ancient bridge in the village of Muriqan, 2 km from the RL
- ✓ Elbasan archaeological site about 800 m from the RL (KMP 76)
- ✓ Mengli Castle 250 m away (KMP 79)
- ✓ The ancient bridge of Kec, 500 m from the axis (at about KMP 90)
- ✓ Haxhi Beqari Bridge 67 m awau from RL (at about KMP 90)
- ✓ The ruins of the ancient bridge 118 m from the RWL (at about KMP 90)
- ✓ The bridge of Kamara, 300 m away from the RL ;(KMP 93.6)
- ✓ The bridge over the Qukes 450 m away from the RL;
- ✓ The ruins of the Byzantine church 330 m from the RL (KM 136);
- ✓ Archaeological heritage area : 8,500-year-old Palafitti ,Buceze village in Lin;
- ✓ Important historical areas ,Domosdova field ;

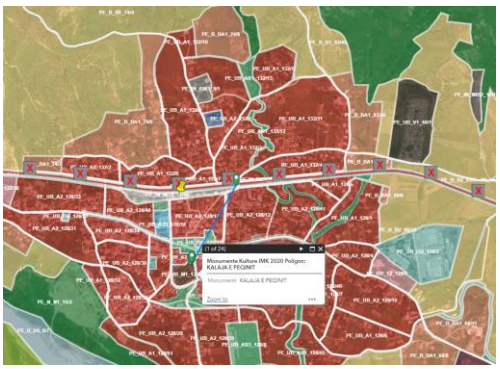


Figure 5-139: Peqin Castle 300 m away from the RW axis, KMP 42.8 Figure 5-140:Vidhi Tabakut 270 m away from

[109] Law 27/2018

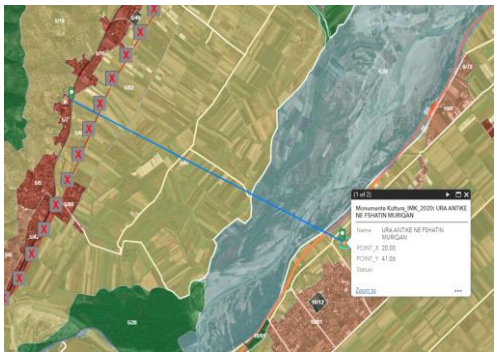
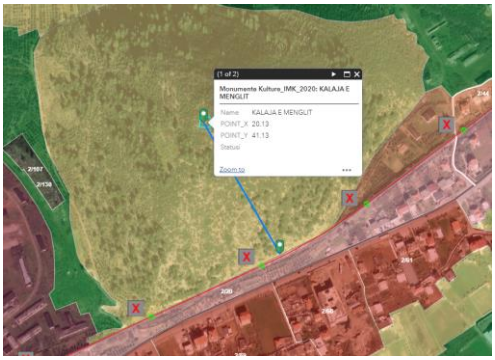


Figure 5-141:Ancient bridge in the village of Muriqan Figure 5-142:Elbasan archaeological site , 800 m from the RWL (KMP 76)



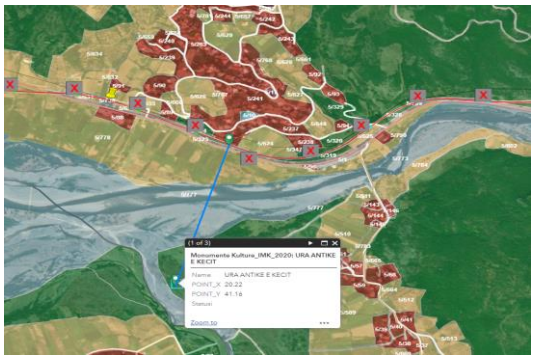
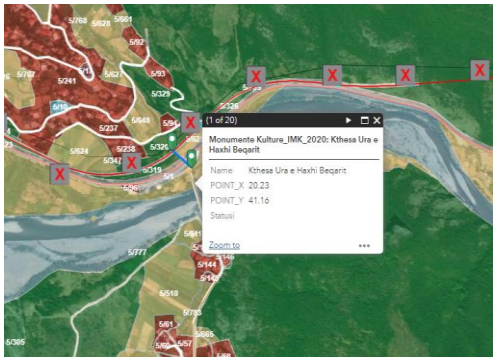


Figure 5-143:Mengli Castle 250 m away (KMP 79) Figure 5-144:The ancient bridge of Kec, 500 m from the axis (at about KMP 90)



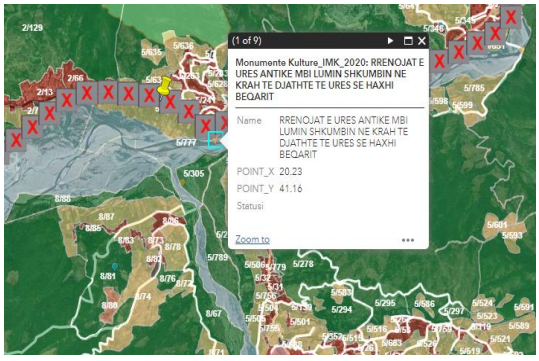


Figure 5-145:Haxhi Beqari Bridge 67 m away from RL (KMP 90) Figure 5-146:The ruins of the ancient bridge (KMP 90)

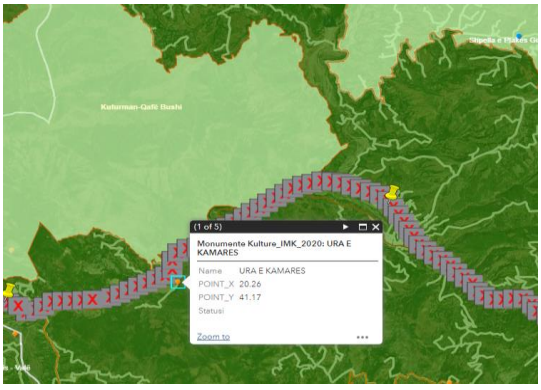


Figure 5-147:The bridge of Kamara ,KMP 93.6

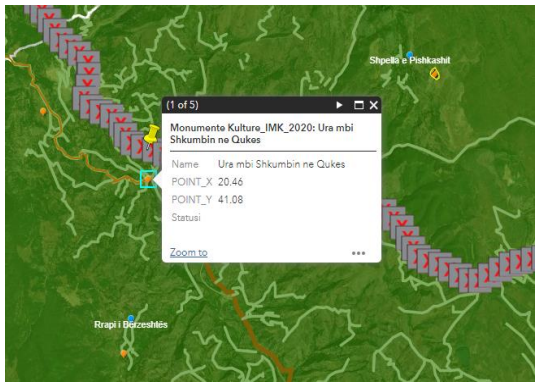


Figure 5-148:The bridge over the Qukes 450 m away from the RL

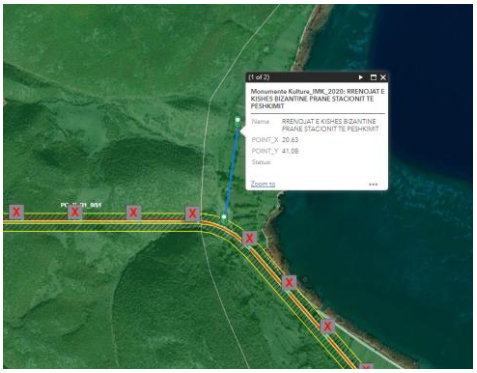


Figure 5-149:The ruins of the Byzantine church 330 m from the RL (KM 136)

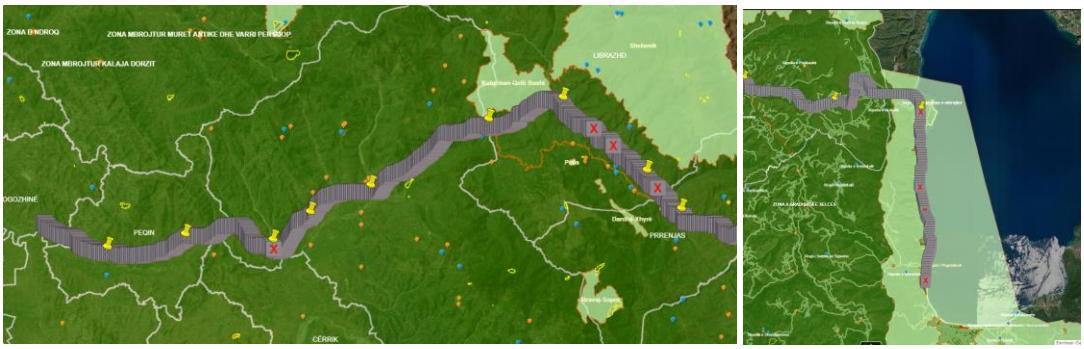


Figure 5-150:Lot 1 & Lot2 (the cultural monuments near the project line)

Figure 5-151:Haxhi Beqari Bridge

Figure 5-152: The bridge of Kamara

Figure 5-153:Archaeological heritage 8,500-year-old Palafitti ,Buceze village in Lin &historical areas of Domosdova

5.3.3. Findings

The wide Project's area includes a high number of historical and archaeological sites. However, the number of cultural monuments and sites close to the railway line is very restrained.

The closest cultural heritage objects/sites to the railway line are as follows:

- ✓ Peqin Castle 300 m away from the RL axis;
- ✓ Vidhi Tabakut 270 m away from the RL axis (Peqin);
- ✓ Elbasan archaeological site about 800 m away from the RL ;
- ✓ Mengli Castle 250 m away from the RL;
- ✓ Haxhi Beqari Bridge 67 m away from RL ;
- ✓ The ruins of the ancient bridge 118 m from the RL
- ✓ The bridge of Kamara , 300 m away from the RL ;

Performed field observations showed that the railway rehabilitation will follow the existing track, with minor widening at the level crossings, affecting thin strips of land along the sides, it is not expected to affect none of the cultural monuments indentified.

5.4 BASELINE INFORMATION ON SOCIO-ECONOMIC ENVIRONMENT

5.4.1 Baseline information on Socio-economic environment

The socio-economic baseline described in the report serves to determine the current social and economic conditions of the inhabited settlements along the railway alignment and to evaluate how these conditions will change from project development.

The socioeconomic section includes an overview of the social and economic conditions of the population within the project study area. The study area aligns in six Municipalities (Local Government Units). It includes the Project Development Area (PDA) – the railway segment route Rrogozhinë - Pogradec in a length of 117 km (Kp.35+345 - Kp.152+700), train stations, access roads needed on the framework of constructing the overpasses /underpasses as well as the road network and other relevant infrastructure. The study area also includes a buffer of 200m from each side of the railway line, which will be the object of the baseline and evaluation. In addition, some social indicators have a broader impact than the study area, so the data on the economic and livelihood of the community will be collected and assessed not only at the settlement level within the boundaries described above but also at the regional and municipal levels.

The social baseline data has been gathered from available secondary sources and primary data gathered during the field visits to the study area during the period August – September 2023. The fieldwork undertaken in August – September 2023, included meetings with 6 municipalities and a detailed site survey by walk-through along the study area. Further site-base level and more updated data is strongly advised to be collected and analyzed during full ESIA study at DD phase.

This section is supported by a series of overview figures and a set of detailed walk-through site maps showcasing settlement-level socioeconomic information including land use, livelihoods, infrastructure, education, health, irrigation type, water access, quality of access roads, and the means of transport.

The chapter on the social economic background is presented in the following according to the subsequent sections for each municipality respectively:

- Historical and Political Overview;
- Demography;
- Economy and Livelihood;
- Land Use and Ownership;
- Infrastructure and Public Services;
- Education and Skills;
- Health;
- Vulnerable groups;
- Limitations on conclusions and data used.

5.4.2 Material and method

The information on the socio-economic situation in the nearby settlements along the railway alignment is extracted from primary and secondary sources being:

- National Geographical Institute, INSTAT database and annual reports for population data, households' size, business register;
- Ministry of Education, Youth and Sports and Ministry of Health and Social Protection web pages; various donors web pages and prepared studies;
- General Local Development Plans and web pages of the affected municipalities;
- Meetings and correspondences with various departments of local government units including Social Services and Economic Support Departments in Municipality of Rrogozhinë, Peqin, Elbasan, Librazhd, Prrenjas, and Pogradec, responsible for implementing the Roma and Egyptian action plans in their respective municipalities and the economic aid scheme;
- Meetings with railway technician responsible for monitoring of the railway line, and other key informants (elderly, heads of Administrative Units);
- Railway line alignment walk through and site visits.

5.4.3 Study limitations

There were several limitations to this study, which relate mainly to:

- lack of disaggregated (at the level of villages/settlements), comparative and updated statistical socio-economic data for the project area. Census 2011 data are too old and not updated. Reports available online, provide general data at the municipalities level, which are not disaggregate at villages/settlements level to allow for better analysis of the affected communities. Websites of affected Municipalities were not up to date with information on socio-economic aspects. This limits a proper analysis of the project area.
- The baseline data have been completed with the data collected during the field survey and meetings in municipalities, however, a substantial amount of household-level socio-economic data will be collected during the census and inventories of assets. The socio-economic survey and census will be prepared during the proposal for expropriation. The socio-economic survey should be linked closely with the census and inventory of assets to provide comprehensive information on households' economic resources, including common property resources. The affected properties will be defined based on the expropriation study along with maps and property ownership information from the cadastre. This information is not available to date.

5.4.4 Historical and Political Overview

Albania is the Parliamentary Republic and its governance is based on free, equal, general, and periodic elections. The system of government in the Republic of Albania is based on the division and balance between the legislative, executive, and judicial powers. The economic system of the Republic of Albania is based on private and public property, as well as on the market economy and the freedom of economic activity. Private and public property are equally protected by law. The Constitution of the Republic of Albania guarantees fundamental human rights and freedoms, political and economic, social, and cultural freedoms, and rights.

Albania is a member of NATO and a candidate country for the European Union membership. Civil society is active but does not have access to decision-making, having only an ascertaining, educational and sensitizing role. Although steps have been taken to make decision-making as open, transparent, and participatory as possible, still much remains to be done to increase the confidence of Albanians that political parties govern in an honest, fair, and responsible way

5.4.5 Administrative organization

Following the Administrative Territorial Reform of 2015, Albania is divided into 12 counties and 61 municipalities. The municipalities are the first level of local governance, while the County represents the second level of local government (LG) and includes several municipalities.

From an administrative point of view, municipalities consist of Administrative Units (AUs) which consist of cities and villages (settlements), while cities are divided into sub-units and neighbourhoods.

Municipalities and Counties are local government units (LGUs) that are organized and operate according to Law No. 139/2015 on Local Government[110]. They operate based on the principle of local autonomy, respect and implement the Constitution, laws and by-laws, as well as being public legal entities. The mayor and a municipal council, elected every four years, run municipalities; similarly, an administrator appointed by the mayor of municipalities runs administrative units. Each village has its own head/elderly elected by the community members.

[110] https://shtetiweb.org/wp-content/uploads/2016/03/LIGJI_139_2015_PER_VETEQEVERISJEN_VENDORE1.pdf

Table 5-58 Counties cover the Study Area of Project[111]

County	Municipalities	Surface	Population
Elbasan	Belsh, Cërrik, Elbasan, Gramsh, Librazhd, Peqin, Prrenjas	3,199 km2	270,074
Korçë	Devoll, Kolonjë, Korçë, Maliq, Pogradec, Pustec	3,711 km2	204,831
Tiranë	Kamëz, Kavajë, Rrogozhinë, Tirana, Vorë	1,652 km2	906,166

Rrogozhinë-Pogradec Railway alignment passes through the territory of 3 Counties: Tiranë, Elbasan, and Korçë; 6 municipalities consisting of 17 administrative units and 43 settlements (6 cities and 37 villages) indirectly affected by the project[112], a part of them crossed, bypassed, or located close to the railway alignment. The table below provides the affected municipalities and the number of administrative units and settlements affected by the project. The municipalities with the highest number of affected settlements are the municipality of Elbasan and Librazhd.

Table 5-59 Administrative organization of the territory crossed by Rrogozhinë-Pogradec Railway[113]

Municipalities Affected	KP	Length of Railway	Administrative Units affected	Settlements (villages) affected
1. Rrogozhinë	35-345-38+780	3.4 km	1. Rrogozhinë;	1. Rrogozhinë;
			2. Sinaballaj;	2. Sinaballaj;
2. Peqin	38+780- 57+200	18.4 km	3. Karinë;	3. Karinë;
			4. Peqin	4. Peqin
			5. Përparim	5. Fatish Çopanaj; 6. Përparim; 7. Lolaj;
			6. Pajovë;	8. Lazarej; 9. Pajovë; 10. Bishqem Fushë; 11. Bishqem; 12. Paulesh.
3. Elbasan	57+200- 89+750	32.5km	7. Papër	13. Murras; 14. Papër; 15. Ullishtaj; 16. Vidhas; 17. Balldre.
			8. Bradashesh	18. Bradashesh
			9. Elbasan	19. Elbasan
			10. Labinot-Fushë	20. Mengel; 21. Labinot-Fushë; 22. Xibrakë.
4. Librazhd	89+750 - 114+600	24.8km	11. Polis	23. Mirakë
			12. Librazhd	24. Librazhd
			13. Librazhd Qendër	25. Librazhd Qendër
			14. Hotolisht	26. Hotolisht; 27. Çerçan; 28. Vulçan; 29. Xhyrë; 30. Vehçan.
5. Prrenjas		19.3 km	15. Qukës	31. Qukës Shkumbin;

[111] Source: https://portavendore.al/

[112] Rrogozhinë-Pogradec is an existing railway line, therefore presence of settlements has been considered mainly in terms of the impact that the railway rehabilitation will bring to the movement of people, vehicles and livestock.

[113] Source of information: https://portavendore.al/

Municipalities Affected	KP	Length of Railway	Administrative Units affected	Settlements (villages) affected
	114+600-133+810			32. Qukës; 33. Pishkash; 34. Pishkash Veri.
			16. Prrenjas	35. Prrenjas-Fshat; 36. Qyteti Prrenjas.
			17. Rrajcë	37. Rrajcë; 38. Kostrican.
6. Pogradec	33+810 – 152+384	18.6 km	18. Udenisht	39. Lin; 40. Buqez; 41. Piskupat; 42. Udenisht; 43. Memlisht.
6 municipalities		**117km**	**18 AU**	**43 settlements**

5.4.6 Local Development Plans

The Law on Local Self-Government in the field of planning and development of the territory, determines, among other things, that the municipalities in the territory of their jurisdiction are responsible for the planning, administration, development and control of the territory, as defined by law and are defined to draft the strategic development plans and programs for local economic development. Currently, all Municipalities have a Local General Plan (LGP) approved on the decision of the National Territorial Council[114]:

- Rrogozhinë Municipality: LGP approved by the National Territorial Council (NTC) Decision no.7, dated 16.10.2017, amended with NTC Decision no. 8, dated 28.12.2020.
- Peqin Municipality: LGP approved by the National Territorial Council (NTC) Decision no.3, dated 28.12.2020.
- Elbasan Municipality: LGP approved by the National Territorial Council (NTC) Decision no.1, dated 29.12.2016, amended with NTC Decision no. 2, dated 24.11.2021, amended with NTC Decision no. 3, dated 25.04.2023.
- Librazhd Municipality: LGP approved by the National Territorial Council (NTC) Decision no.10, dated 08.02.2017, amended with NTC Decision no. 8, dated 28.12.2020.
- Prrenjas Municipality: LGP approved by the National Territorial Council (NTC) Decision no.3, dated 14.04.2017.
- Pogradec Municipality: LGP approved by the National Territorial Council (NTC) Decision no.5, dated 27.07.2022.

The finances of municipalities within the Study Area:

Table 5-60 Total income, expenses and investments of affected municipalities 2021[115]

Municipalities Affected	Incomes (in million ALL)	Expenditures (in million ALL)	Investments (in million ALL)
Rrogozhinë	380	349	49

[114] https://planifikimi.gov.al/index.php?id=732

[115] Source: Ministry of Finance and Economy, Regional statistical yearbook 2022

Municipalities Affected	Incomes (in million ALL)	Expenditures (in million ALL)	Investments (in million ALL)
Peqin	277	283	23
Elbasan	2,008	1,949	235
Librazhd	579	555	154
Prrenjas	361	394	120
Pogradec	1,058	1,044	187

5.4.7 Information for other projects in the project study area

Elbasan-Qafë Thanë Road, Part of Corridor VIII with Significant Impact on Tourism Development is a project being developed in the area of the Project. The project has been divided into eight sections, while the construction is under development for the first two sections. The work schedule anticipates the construction of two other sections in 2024 and the two last ones will start in 2025. The road starts in the village of Labinot Fushë and has a length of 44 kilometres up to Qafë Thanë, the border crossing point with North Macedonia.

5.4.8 Demography

The population figures in Albania are often controversial due to the large discrepancies among census and the civil registry predictions. The population data comparison in years becomes even more difficult due to territorial administrative reform in 2014, when the local administrative units were organised from 375 into 61 municipalities. Data aggregation and segregation is not periodic, and thus difficult to be interpreted.

The overall population in the municipalities in the study area is 308,326/459,037 inhabitants, while the total population of the Affected AU is 181,849/274,202 inhabitants as per population of 2011 census data/Administrative data.

Table 5-61 Demographic data of Affected Municipalities and AU

Municipalities Affected	Population Municipality[116]	Population Municipality[117]	Administrative Units affected	Population AU Affected[118]	Population AU Affected[119]	Settlements (villages) affected
Rrogozhinë	22,148	41,561	Rrogozhinë;	7,049	13,858	Rrogozhinë;
			Sinaballaj;	1,191		Sinaballaj;
Peqin	26,136	39,172	Karinë;	1,350	11,246	Karinë;
			Peqin	6,353		Peqin
			Përparim	3,423	5,673	Fatish Çopanaj; Përparim; Lolaj;
			Pajovë;	6,626	9,125	Lazarej; Pajovë;

[116] Source INSTAT: Census 2011

[117] Letter no. 3556/1 prot., dated 30.11.2017, MINISTRY OF INTERIOR AFFAIRS (POPULATION: CITY, MUNICIPALITY, REGION)

[118] Source INSTAT: Census 2011

[119] Letter no. 3556/1 prot., dated 30.11.2017, MINISTRY OF INTERIOR AFFAIRS (POPULATION: CITY, MUNICIPALITY, REGION)

Municipalities Affected	Population Municipality[116]	Population Municipality[117]	Administrative Units affected	Population AU Affected[118]	Population AU Affected[119]	Settlements (villages) affected
						Bishqem Fushë; Bishqem; Paulesh.
Elbasan	141,714	210,788	Papër	6,348	9,334	Murras; Papër; Ullishtaj; Vidhas; Balldre.
			Bradashesh	10,700	15,476	Bradashesh
			Elbasan	78,703	129,500	Elbasan
			Labinot-Fushë	7,058	6,932	Mengel; Labinot-Fushë; Xibrakë.
Librazhd	31,892	43,518	Polis	3,385	5,185	Mirakë
			Librazhd	6,937	11,723	Librazhd
			Librazhd Qendër	8,551	11,058	Librazhd Qendër
			Hotolisht	5,706	7,084	Hotolisht; Çerçan; Vulçan; Xhyrë; Vehçan.
Prrenjas	24,906	33,052	Qukës	8,211	10,723	Qukës Shkumbin; Qukës; Pishkash; Pishkash Veri.
			Prrenjas	5,847	8,969	Prrenjas-Fshat; Qyteti Prrenjas.
			Rrajcë	8,421	10,450	Rrajcë; Kostrican.
Pogradec	61,530	90,946	Udenisht	5,990	7,866	Lin; Buqez; Piskupat; Udenisht; Memlisht.
Total	**308,326**	**459,037**		**181,849**	**274,202**	

Table 5-62 Population of the Affected Settlements

Municipalities Affected	Administrative Units affected	Population AU Affected[120]	Population AU Affected[121]	Population Density persons/km[2122]	Number of Households [123]	Settlements (villages) affected
Rrogozhinë	Rrogozhinë;	7,049	13,858	560.52	3,465	Rrogozhinë;
	Sinaballaj;	1,191		29.56	2,812	Sinaballaj;

[120] Source INSTAT: Census 2011

[121] Letter no. 3556/1 prot., dated 30.11.2017, MINISTRY OF INTERIOR AFFAIRS (POPULATION: CITY, MUNICIPALITY, REGION)

[122] Source INSTAT: Census 2011

[123] Calculation by authors

Municipalities Affected	Administrative Units affected	Population AU Affected[120]	Population AU Affected[121]	Population Density persons/km²[122]	Number of Households [123]	Settlements (villages) affected
Peqin	Karinë;	1,350	11,246	48.79	1,418	Karinë;
	Peqin	6,353		1,689.5	2,281	Peqin
	Përparim	3,423	5,673	74.21	2,334	Fatish Çopanaj; Përparim; Lolaj;
	Pajovë;	6,626	9,125	108.89	3,869	Lazarej; Pajovë; Bishqem Fushë; Bishqem; Paulesh.
Elbasan	Papër	6,348	9,334	62.23	32,375	Murras; Papër; Ullishtaj; Vidhas; Balldre.
	Bradashesh	10,700	15,476	190.95	1,733	Bradashesh
	Elbasan	78,703	129,500	3,548	1,296	Elbasan
	Labinot-Fushë	7,058	6,932	143.89	2,931	Mengel; Labinot-Fushë; Xibrakë.
Librazhd	Polis	3,385	5,185	37.26	2,765	Mirakë
	Librazhd	6,937	11,723	3,778	1,771	Librazhd
	Librazhd Qendër	8,551	11,058	43.29	2,681	Librazhd Qendër
	Hotolisht	5,706	7,084	32.56	2,242	Hotolisht; Çerçan; Vulçan; Xhyrë; Vehçan.
Prrenjas	Qukës	8,211	10,723	64.85	2,613	Qukës Shkumbin; Qukës; Pishkash; Pishkash Veri.
	Prrenjas	5,847	8,969	453.19	1,967	Prrenjas-Fshat; Qyteti Prrenjas.
	Rrajcë	8,421	10,450	135.93	3,465	Rrajcë; Kostrican.
Pogradec	Udenisht	5,990	7,866	80.28	2,812	Lin; Buqez; Piskupat; Udenisht; Memlisht.
		181,849	**274,202**			

The population of Albania began to decrease in 1990, as a result of mass emigration. During the years 2011-2021, it is estimated that every year an average of 42,000 people emigrated (left the country), while 23,000 people immigrated (entered the country). The main reasons for emigration are related to better opportunities for work, education and health care.

Albanian immigrants have mainly emigrated to neighbouring countries in Italy and Greece. Proximity, similarities in culture and way of life, as well as the formation of the network of immigrants, continue to keep Greece and Italy as the two main countries chosen to live abroad.

Another important factor in the population change is the lower number of births from about 34 thousand in 2011 to about 27 thousand in 2021, while the number of deaths per year has remained between 20 thousand and 22 thousand for the period 2011-2019 but has increased in about 30 thousand deaths in 2021, influenced by the effects of the Covid-19 pandemic.

Table 5-63 Population structure of the local government units along the railway alignment

Municipalities Affected	Population Municipality[124]	Population Municipality[125]	Urban population	Rural Population
Rrogozhinë	22,148	41,561	11,000	30,561
Peqin	26,136	39,172	7,000	32,172
Elbasan	141,714	210,788	129,500	81,288
Librazhd	31,892	43,518	11,723	31,795
Prrenjas	24,906	33,052	8,969	24,083
Pogradec	61,530	90,946	-	90,946
Total	**308,326**	**459,037**	**168,192**	**290,845**

Table 5-64 Population by age distribution

Municipalities Affected	Population 0-14 (Census 2011)	Population 15-64 (Census 2011)	Population 65+ (Census 2011)
Rrogozhinë	20.8%	67.2%	12%
Peqin	21.2%	69.3%	9.5%
Elbasan	20.4%	69.3%	10.3%
Librazhd	22.9%	67%	10.1%
Prrenjas	23.4%	67.3%	9.2%
Pogradec	21.2%	67.9%	10.9%

5.4.9 Ethnicity, language and religion

According to Population and Housing Census 2011, 82.58 % of the population are Albanian by ethnicity. Other groups, Greek, Aromanian and Roma are in smaller percentage. Albanian is the official language. 98.8 % of the population speaks Albanian language, whereas Greek, Macedonian, Aromanian and Roma are native language of minorities group.

Ethnic Albanian population has the largest share of 83 % while other ethnic groups represent only 1.3 % of the total population. Ethnic and cultural composition of Albania is provided in the table below.

Table 5-65 Resident population in Albania as per ethnic and cultural affiliation

Ethnic and cultural affiliation	Resident population	% of resident population
Albanian	2, 312, 356	82.58
Greek	24,243	0.87
Aromanian	8, 266	0.30

[124] Source INSTAT: Census 2011

[125] Letter no. 3556/1 prot., dated 30.11.2017, MINISTRY OF INTERIOR AFFAIRS (POPULATION: CITY, MUNICIPALITY, REGION)

Ethnic and cultural affiliation	Resident population	% of resident population
Roma	8, 301	0.30
Macedonian	5, 512	0.20
Egyptian	3, 368	0.12
Montenegrin	366	0.01
Other	2, 644	0.09
Prefer not to answer	390, 938	13.96
Not relevant/not stated	44, 144	1.58
Total	2, 800, 138	100

Source: INSTAT Population and Housing Census (2011)

According to INSTAT and based on the Census of 2011, in the municipalities along the railway alignment about 93% of the population are Albanians, 13% did not answer/declare their ethnicity [126] and the remaining 0.28% Roma, 0.27% Ashkali and Balkan Egyptians, 0.08 Montenegrins. In the project area, there is no presence of Greek and Macedonian ethnic groups.

Table 5-66 Resident population in the Municipalities along the alignment, as per ethnic and cultural affiliation

Municipality	Population[127]	Albanian
Rrogozhinë	22,148	85.9%
Peqin	26,136	92.17%
Elbasan	141,714	80.49%
Librazhd	31,892	94.79%
Prrenjas	24,906	92.85%
Pogradec	61,530	80.45%

Source: INSTAT Population and Housing Census (2011), own calculations

Table 5-67 Demographic Indicators[128]

Municipality	No. of AU	Natural increase of population	Net internal migration
Rrogozhinë	5	-59	57
Peqin	6	-66	-242
Elbasan	13	-189	-43
Librazhd	7	-66	-467
Prrenjas	4	42	-296
Pogradec	8	-95	-427

At the national level, Roma and Egyptians are currently the poorest and the most marginalized ethno-linguistic groups. Both groups in general suffer from the same issues, lack of skills, low educational levels and discrimination. Nowadays, they have issues on access health care, sanitation, infrastructure, education and poor living conditions (inadequate housing, no assess to water and sewage facilities and no access to electricity). The unemployment rate is very high for Roma, where women have the highest unemployment rate compared to male. Egyptians also face more economic and social problems, mainly because of anthropological specifications, rites,

[126] Prefer not to answer and/or their answers were not relevant/not stated

[127] Population data at municipality level is retrieved and calculated from "Relation to the draft law "On the Administrative Territorial Division the Local Government Units in the Republic of Albania", Annex 2 available at https://reformaterritoriale.qeverisjavendore.gov.al/wp-content/uploads/2018/03/Raporti_i_zonave_funksionale.pdf

[128] Regional statistical yearbook 2022

customs, mentality, and lifestyles different from other groups.

As per Roma Census completed in 2015[129], at the national level the largest Roma population is located in the city of Tirana with about 26%, followed by the city of Elbasan with about 17%, and in third place Korça with 11% of population. As per this census data, distributed in each municipality of Roma and Egyptian population is as follows:

Table 5-68 Roma and Egyptian population in the project area[130]

Municipality	Roma population living in affected municipalities in %	Egyptian population living in affected municipalities in %
Rrogozhinë	0.30%	n/a
Peqin	0.30%	0.66%
Elbasan	0.68%	0.14%
Librazhd	0.01%	n/a
Prrenjas	n/a	n/a
Pogradec	0.28	0.35

Source: Roma Census (2015)

In the project area, Roma ethnic groups are located in Rrogozhinë, Peqin and Elbasan Municipality. There are Roma and Egyptian families living and/or accommodated (including temporary structures) nearby the track of the railway line. This information was discussed and confirmed by the municipalities' employees (Regional Development and Social Services Department During) the consultation meetings held with them.

In addition to primary and secondary data sources, Consultant's railway line alignment walks through and discussions with the railway technician responsible for daily monitoring of the railway line showed presence of Roma and Egyptian communities representatives living and developing economic activities nearby the railway alignment in Rrogozhinë, Peqin, and Elbasan.

Approximately 2,622 Roma and 8,318 Egyptians live in coexistence with the rest of the community in the "5 Maj" neighbourhood in the city of Elbasan. Their main problems are related with education, housing, and unemployment. To their support, Elbasan Municipality is implementing the Local Plan for the Integration of Roma and Egyptians, 2019-2022.

In terms of religion, Muslims are the most represented group followed by Catholics. The representation of other religious groups in Albania is presented on the table below.

Table 5-69 Resident population in Albania as per religious affiliation

Religious affiliation	Resident population	% of resident population
Muslims	1,587,608	56.70
Catholics	280,921	10.03
Orthodox	188,992	6.75
Bektashi	58,628	2.09
Evangelists	3,797	0.14
Other Christians	1,919	0.07
Believers without denomination	153,630	5.49
Atheists	69,995	2.50
Others	602	0.02
Prefer not to answer	386,024	13.79

[129] https://www.osfa.al/sites/default/files/roma_census_albanian.pdf

[130] Source INSTAT: Census 2011

Religious affiliation	Resident population	% of resident population
Not relevant/not stated	68,022	2.43

Source: INSTAT Population and Housing Census (2011)

Regarding the project areas, religion affiliation data are available only at the level of municipalities.

Table 5-70 Resident population in Municipalities along the alignment, as per religious affiliation[131]

Municipality	Population	Religion affiliation			
		Muslims	Catholic	Orthodox	Bektashi
Rrogozhinë	22,148	85.9%	n/a	2.6%	0.8%
Peqin	26,136	75.9%	0.1%	n/a	n/a
Elbasan	141,714	61.6%	1.7%	9.5%	0.7%
Librazhd	31,892	83.6%	n/a	0.6%	n/a
Prrenjas	24,906	77.8%	0.4%	0.5%	n/a
Pogradec	61,530	68.1%	1%	8.4%	0.5%

Source: INSTAT Population and Housing Census (2011)

5.4.10 Education and Skills

In Albania, all citizens have the right to education, regardless of age, gender, or ethnicity, guaranteed by the Constitution of Albania. The Albanian pre-tertiary education system includes pre-school education, basic education (comprising primary and lower secondary education), and upper secondary education (often referred to in Albania as simply secondary education). In 2012, the length of compulsory education increased from eight to nine years, a duration similar to the length of compulsory schooling found in OECD countries. Education is provided by public and private schools. The trend is that the number of enrolments in private schools is increasing.

The number of pupils in pre-university education has a continuous decrease in absolute value. In the school year 2021-22, 453,989 pupils and children were enrolled in pre-university education, marking a decrease of 2.5% compared to 2020-21 and 12.8% compared to 2017-2018. The decrease in the number of pupils in absolute value follows the decrease in the population of the age group that belongs to pre-university education.

The education indicators for the municipalities in our project study area are presented in the following table.

Table 5-71 Pupils distribution by municipalities and level of preuniversity education[132]

Municipalities Affected	No. children in kindergarten	No. of pupils in compulsory education	No. of pupils in high school	% of pupils in General high schools	% of pupils in Art schools	% of pupils in professional schools	Pupil to teacher ratio - PTR - in compulsory education
Rrogozhinë	435	1,681	484	100	0	0	7.6
Peqin	512	2,126	503	100	0	0	9.6
Elbasan	3,929	13,411	5,918	71.4	3.9	24.7	10.9
Librazhd	928	2,934	1,097	100	0	0	8.6
Prrenjas	572	2,642	919	100	0	0	10.9

[131] Source INSTAT: Census 2011

[132] Source: INSTAT Regional Statistical Yearbook 2022

Municipalities Affected	No. children in kindergarten	No. of pupils in compulsory education	No. of pupils in high school	% of pupils in General high schools	% of pupils in Art schools	% of pupils in professional schools	Pupil to teacher ratio - PTR - in compulsory education
Pogradec	1,824	5,917	2,373	89	0	11	10.3

5.4.11 Economic activity

Albanian economy is focused mainly on trade activity with 86 % of all active enterprises involved in provision of services. In 2022, the structure of active enterprises of producers of goods and producers of services is 14% and 86% compared with 37.0 % and 63.0 % in 2019, 35.0 % and 65.0 % in 2018. At the end of year 2022 there are 125,222 active enterprises in Albania.

Based on data of the year 2022, the number of active enterprises in production of goods and production of services in municipalities in the study area are respectively 74 and 397 enterprises in Rrogozhinë, 78 and 328 enterprises in Peqin, 649 and 4,032 enterprises in Elbasan, 80 and 572 enterprises in Librazhd, 53 and 316 enterprises in Prrenjas, and 169 and 1,419 enterprises in Pogradec municipality. Data regarding the total number of active enterprises by economic activity, municipality and the main economic sectors are presented in the following figure.

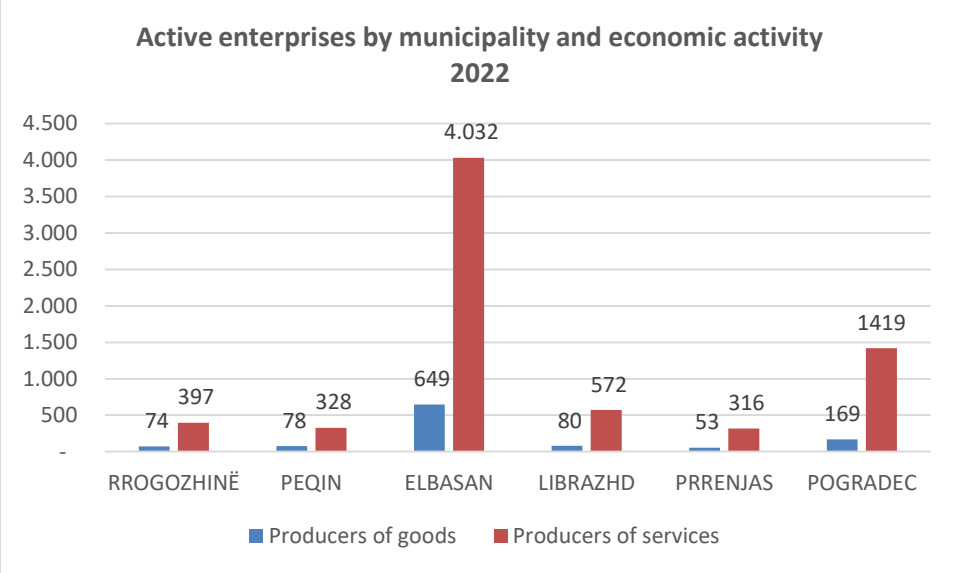


Figure 5-154 Active enterprises by municipality and economic activity[133]

The municipality of Rrogozhinë is aligned in hilly and plain terrain up to the seacoast. The city of Rrogozhinë is the center of the municipality created before ’90 around agro-industry, oil and soap factories, cotton treatment, and food preservation and processing, which have been closed for a long time. The city of Rrogozhinë occupies about a third of the entire resident population of the municipality, while the constituent rural administrative units have limited connections with the center of the municipality.

[133] Source: INSTAT Indicators by Municipalities

The residents of the Peqin municipality are focused mainly on agriculture, viticulture, and poultry breeding activities. The cultivation of olives, greenhouse vegetables, and other agricultural products are also characteristic of the area. Peqin is known for raising turkeys, quite in demand throughout Albania during holidays. Businesses are mainly focused on services, while several olive oil factories have also been developed and operating. Although a good part of the inhabitants is engaged in agriculture, the economic opportunities for them are limited.

A large part of the heavy industry of Albania has its activity in Elbasan Municipality including the steel factory, cement, ferrochrome, etc., which has given this area one of the highest levels of air pollution in the country. The heavy industry employed the largest part of the population of Elbasan before the '90s. In contrast, today only a few thousand residents have been employed in the surviving industry, leaving the rest of the population unemployed. The mountainous areas around Elbasan involve the national park of Gjinar and the historical province of Shpati, which are suitable for nature and cultural tourism, but they are constantly being damaged by illegal logging of trees and have poor road infrastructure.

The municipality of Librazhdi lies in the east of Albania, in an area with rich vegetation, vast forest spaces, and numerous water sources. Librazhdi has been the center of the food industry and the use of forests. Most of the population of this municipality lives in rural areas. The Shebenik-Jabllanicë National Park is one of the rare natural assets with diverse biodiversity. In addition, the area counts 26 other natural monuments, listed as monuments of the first category.

The municipality of Prrenjas includes numerous forest areas, abundant water sources, and fertile land, while its subsoil is rich in chromium. The areas of Rrajca, Qukës, and Stravaj have the largest area of forests, however, intensive exploitation over the past two decades has damaged them to a large extent. The municipality of Prrenjas has a favorable geographical position, as it is located next to two customs points in North Macedonia. Many residents of the area are involved in seasonal work in North Macedonia, to ensure the basic income with which a good part of the families in this municipality live.

The municipality of Pogradec is aligned along Lake Ohrid and the city of Pogradec, and the Administrative Units of Buçimas and Udenisht are oriented towards tourism. Many people from the villages around Pogradec work in daily or seasonal jobs in North Macedonia, mainly in the construction sector and other ordinary jobs.

Table below presents some economic indicators for each of municipality in the Project Study area.

Table 5-72 Economic Indicators by Affected Municipalities[134]

Municipality	No. Active enterprises	Average monthly salary ALL	No. of Cattle Heads (Thousand)	Number of permits issued for new buildings
Rrogozhinë	1,344	46,441	4.9	6
Peqin	1,437	53,292	2.5	3
Elbasan	6,208	51,976	9	55
Librazhd	1,112	51,948	6.3	16
Prrenjas	580	51,987	1.3	23
Pogradec	2,669	46,392	8.4	17

[134] Source: INSTAT Regional Statistical Yearbook 2022

5.4.12 Vulnerable Groups

5.4.12.1 Unemployment

As per INSTAT data, at the country level by end of 2022 the Unemployment rate is 11.3% for men and 11.7 for women of age group 15-65 years. The highest level of unemployment is 20.7% for men and women at the age group 15-29 years.

Steady economic growth over the past decade has not been associated with the same level of human progress and it has not benefitted equally different segments of Albanian society. The latest official poverty figures for Albania date to 2012, when the poverty headcount increased from 12.4% in 2008 to 14.3% in 2012, reaching 18% among women and 20.1% – among children[135]. The level of poverty among Roma and Egyptian population is twice as high as the majority population[136]. The number of persons living under the national poverty line is 400,000. Among them, there are 200,000 persons with disabilities (adults and children).[137]

As per WB poverty projections based on GDP, consumption growth and other data sources suggest there has been a slow decline in poverty. Monetary poverty and material deprivation increased in the seven most affected municipalities in 2019, and overall poverty is expected to increase in 2020 breaking a downward trend.[138]

Albania's population is divided in many respects and differentiate in terms of wealth, education, urban and rural habitat, sex, age, family-based solidarity groups, political affiliations, ethnicity and other criteria. The access of individuals and groups to economic, social and political resources is by far not equal. The inclusion of specific groups therefore requires specific attention and support: the marginalised and vulnerable, the poor, and, as important parts of these groups, the Roma and Egyptians and the persons with disabilities.

There is no single national definition of a "vulnerable group" in Albania, although the term is used in a different context to denote various categories and degrees of social and economic vulnerability. A definition of vulnerable groups is used in article 2/20 of Law no. 7995/1995 "On Promoting Employment"[139], which includes jobseekers of the following categories:

- Mothers with many children;
- Persons aged over 50 years;
- Young people under the age of 18;
- Long-term unemployed jobseekers;
- Family below to the poverty line of Albania;

[135] Living Conditions Measurement Survey – LSMS, 2012

[136] The income for about 54% of Roma families is less than ALL 10,000/month (approximately EUR 80), while 34% of households reported a monthly income of less than ALL 20,000 – Roma Census (2015), pp 27-28

[137] UN Support to Social Inclusion in Albania Programme (2015): Roma and Egyptians in Albania: A socio-demographic and economic profile based on the 2011 census.

[138] WB "Poverty & Equity Brief Albania", April 2020 available at https://databank.worldbank.org/data/download/poverty/33EF03BB-9722-4AE2-ABC7-AA2972D68AFE/Global_POVEQ_ALB.pdf

[139] As amended by the Law no. 9570, dated 3.07.2006

- Victims of trafficking;
- Person who benefits from income support programs;
- Person emerging from unemployment by enterprises and institutions in the process of reform, restructuring and privatization;
- Girls/mothers unemployed;
- Divorced women with social problems;
- Returners from economic migration;
- Newly graduated unemployed in the labor market; person who have served the sentence of imprisonment;
- Person with disabilities;
- Roma and Egyptian community;
- Orphans unemployed.

In addition, in Albania a Social Assistance and Social Care Services system allow disadvantaged persons, groups or families to cope financially with the consequences of social risks. Despite the recent reform of the social protection system, a vital minimum is missing in Albania that would guarantee or provide the sources of basic livelihood of citizens. As per recent discussions, a vital minimum of 17,875 Lek[140] is being discussed and pushed forward by the Ombudsman. Still, this value is 9.9% higher than the minimum pension for urban areas, 37.5% higher than the unemployment allowance and about two times higher than economic assistance, while it is 45.5% lower than the minimum wage.

Social Assistance and Social Care Services in Albania consist of three programs, as follows:

1. Ndihma Ekonomike “Economic Assistance” Program, which is a social assistance program conditioned by the standard of living, through which support in cash or goods, for families and individuals in need is provided;
2. Disability Support Program that provides monthly payments to persons with disabilities who cannot legally benefit from contribution schemes; and
3. The Social Care Services Program, which includes i-Economic Assistance; ii-Disability Support Program; and Social Care Services that are described hereinafter.

5.4.12.2 Social Protection

Social protection in Albania consists of the policies and programs implemented by political and private bodies that aim to reduce poverty and social exclusion of households and individuals at risk of not fulfilling their social and health needs because of their vulnerability.

Social Care Services have been very limited in Albania, largely provided by CSOs and other non-state agencies. Existing social services are fragmented, rudimentary and ad-hoc in nature. The need

[140] Draft Report on Vital Minimum in Albania, UNDP (2021)

for Social Care Services is growing, nevertheless there is there is still only very limited planning to ensure an appropriate matching of supply of services with demand for services.[141]

Economic Assistance

Economic assistance is a periodic cash payment given to families with no or insufficient income based on the points system or the 6% fund that municipalities use to cover poor families not included in the points system as well as some categories of people in need. In 2021, the average number of beneficiary families in the national economic assistance scheme was 62,030 families. The county of Elbasan, which includes the municipalities of Peqin, Elbasan, Librazhd, and Prrenjas of Project Study Area, had the largest number of families with economic assistance with about 26%.

Unemployment payment

During 2021, the average total number of registered unemployed jobseekers was 87,419 people, while the average number of beneficiaries was 4,679 people, representing about 5.3% of the total registered unemployed jobseekers. The county of Elbasan has 9,903 unemployed job seekers registered from which there are 57 women, 42 head of households, 1 person with disability, 51 beneficiaries of economic aid, and 4 beneficiaries of unemployment payment.

Payment for persons with disability

In 2021, about 71,281 people were beneficiaries of disability payments. The county with the largest number of beneficiaries in the disability payment was Elbasan with an average of 47 people per 1,000 inhabitants or 12,259 persons toward 71,281 persons with disability.

Pensions

Pensions are the main category of social benefits and have the largest number of beneficiaries as well as the largest financial expenses in the social protection system in Albania. In 2021, according to the type of pensions, old-age pensions account for 83% of the total number of pensions, pensions disability 10%, and family 7%,

5.4.13 Infrastructure

5.4.13.1 Materials and method

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 included gas pipelines, water supply pipelines, power and telecommunication lines (underground cables and overhead lines), and power substations and cabins.

The infrastructure facilities in the focus of consultant during the site surveys included power lines (110, 220, and 400 kV), power substations and cabins, telecommunication lines (including

[141] UNICEF (2016) "Supporting Planning of Social Care Services, Proposal on Establishing a Package of Services in Albania and Financing Mechanisms", available at https://www.unicef.org/albania/reports/basket-social-care-services

underground cables), water supply pipelines, irrigation and drainage channels, and other objects, part of public or private infrastructure.

5.4.13.2 Baseline Information

The responsible institutions/ companies /operators of the facilities that can be affected by the Project's implementation are as follows:

- OSHEE (State company for Power Distribution): power lines 110 and 220 kV, power substation, power cabins;
- KESH (Albanian Power Corporation – state-owned company): power lines 400 kV;
- Municipalities: water supply facilities, roads, public lighting, public roads, public graveyards, schools, administrative offices;
- Telecom: telecommunication cables and lines

Water supply lines: During the site visits, have identified the water pipeline in Peqin, Elbasan and Librazhd. During the detailed design preparation, the designing team should conduct meetings with the water utility companies' representatives and administrators of the administrative units where the railway line passes.

The same should be said for the irrigation pipes and irrigation/drainage channels, part of the irrigation and drainage network. During the preparation of the Detail Design of the project, the crossing of the railway line with the drainage and irrigation system should be considered and a Hydrologic Study should follow the project to avoid any possible problem. In addition, the system is damaged, and replacement of the existing culverts and construction of some small bridges will be needed along the railway line.

The existing railway is crossing with two open deviation channels built for Hydropower Stations at KP 122+000 – KP 123+000, in Prrenjas area.

In Rajca area is identified a metallic irrigation pipe of diameter 900mm, crossing the railway line at KP 129+600.

5.4.13.3 Constructions near railway line

In addition, have been identified several constructions that will be affected by the project. The table below shows their location and tipology.

Table 5-73 Objects/buildings identified near the railway line (field survay)

KP	Objects with simplified structure
39+600	Karinë 9-year school
40+150	Warehouse 1 floor, 4.5 m, masonry structure
40+930	1 floor storey warehouse, masonry structure
41+900	3 floors dewelling, touching the end of the yard
42+600-43+000	The acces to a dwelling at Peqin Station
44+840	Warehouses, simple structures, wood and metal
45+150	Simple storage structures affected by acess road
48+825	1 floor dwelling, the fence wall and garden might be affected
49+090	1 floor dwelling + annex + hangar (affected by R800)
49+120	2 floor dwelling + annex + hangar (affected by R800)
50+400	Service facility, affected in the corner
50+720	Structured warehouse, affected by Bishqem station

KP	Objects with simplified structure
53+350	2 floors dwelling (6-7 m far from the railway line)
56+010	Facility with simplified structure, guard post at LC 56+032
56+120	Facilities with a simplified structure in the yard
56+270	2 floors dwelling (affected by R=990)
58+590	Fencing wall of a dwelling (structures)
59+520	Warehouse facility with light structure
59+840	Objects with simplified structure
60+000	Fencing wall of a dwelling (structures)
60+820	Bar-Coffee service unit (not affected after correction possibility R=600)
63+610- 63+400	Deviation of R=600, expropriation of agricultural lands (Paper)
74+737-75+529	Elbasan station, abadonated warehouses, occupied territory with urban waste, Kp. 75+350-75+528 9 residential buildings above the railway.
75+529- 75+855	Service facilities + warehouse + residential facilities near the railway, 15 facilities in total
77+750	1 floor dwelling
80+050	Small object with simplified structure
81+830-81+900	3 Small objects, simplified structure
83+300-83+400	Graveyard wall
84+360	Small service objects
84+530	Facility with light structure (barn)
84+600	3 Facility with light structure (barn) + fence
100+050-101+150	service facilities (cars, car services, service, parking)
101+480-101+600	Facilities (Restaurant 2, exchange area 1, parking service)
104+730-105+000	3 Facility with simplified structure (cottage + barn)
107+290	Grocery store service
119+200	Facility with simplified structure
121+930	Channel over tunnel
122+050	Channel over tunnel
123+900	Residential area
124+708-125+968	Prenjas railway station
127+500	Dwelling
127+630	Storage area for Construction materials
128+270	Dwelling
128+201	Facility with a simplified structure
129+470	Dwelling
130+900	Dwelling and a play yard
139+600	Facility with light structure (barn)
144+950	Kastrati distributor (Gas tank)
145+510	Hotel Lyhindas
147+900	Storage area for construction materials
148+370	Storage area for construction materials
148+500	Storage area for construction materials
148+600	Ground occupied by vehicles/equipments
150+850	Construction site
151+400 - 152+727	Pogradec Station, 3 buildings + fencing walls

Figure 5-155 The railway passes through urban areas. The illegal constructions interfere with the territory of the railway line

5.4.13.4 Findings

The infrastructure utilities that should be taken into consideration during the Project's detailed design and project implementation stages include power lines, water supply pipelines, and drainage and irrigation channel.

Regarding the illegal constructions the process will follow EBRD Guidance on resettlement and good practice (section 2.4.3.2.1 in this document) and EIB Standard 6 — INVOLUNTARY RESETTLEMENT, that is elaborated at this stage of the project in the LARF document.

5.5 Stakeholder Engagement

Overall, stakeholder engagement during the preliminary design phase according to EIB and EBRD standards aims to foster a collaborative approach to project development, ensuring that project will be designed in a manner that respects and responds to the needs and interests of all stakeholders involved. By engaging stakeholders, the project identified and understood the stakeholder concerns, expectations, and potential impacts of the project. The early inputs allow for adjustments to project plans and designs and can lead to improvements in the design that enhance project feasibility, effectiveness, and sustainability.

Transparent and inclusive stakeholder engagement processes build trust and credibility among stakeholders, that is crucial for gaining social acceptance and support for the project.

Engaging stakeholders during the preliminary design phase ensures that the project complies with relevant environmental, social, and regulatory standards. This includes addressing concerns related to human rights, cultural heritage, biodiversity conservation, and other pertinent issues.

Effective stakeholder engagement during the preliminary design phase establishes a foundation for continued dialogue and collaboration throughout the project lifecycle. It sets the stage for ongoing communication, consultation, and feedback as the project progresses.

The detailed description of the stakeholders is provided in the SEP document. The recommendations/opinions of the municipalities expressed during the meetings and via formal communictaion have been presented and taken into consideration by the technical team of preliminary design.

During the preliminary desigh were conducted the following meetings:

- Meeting with Albanian Road Authority (ARA), date 29/03/23.

- Meeting with Municipality of Elbasan, date 23/03/23.
- Meeting with Municipality of Rrogozhinë, date 15 Sep 2023.
- Meeting with Municipality of Peqin, date 15 Sep 2023.
- Meeting with Municipality of Elbasan, date 14 Sep 2023.
- Meeting with Municipality of Librazhd, date 18 Sep 2023.
- Meeting with Municipality of Prrenjas, date 18 Sep 2023.
- Meeting with Municipality of Pogradec, date 18 Sep 2023.

To all municipalities amd main institutions affected/interested of the project, the project sent the official letters with the request for review and confirmation for the proposed level crossings Road Underpasses, Road Overpasses, and the information for the closure of unauthorized crossings along the railway. Letters were sent to:

- Albanian National Commission for UNESCO
- Ministry for Europe and Foreign Affairs
- Ministry of Culture
- National Institute of Cultural Heritage Tirana
- Regional Directorate of Cultural Heritage Korçë, date16.02.2024
- Albanian Road Authority, 12.02.2024
- Rrogozhinë Municipality, 12.02.2024
- Peqin Municipality, 12.02.2024
- Elbasan Municipality, 12.02.2024
- Librazhd Municipality, 12.02.2024
- Prrenjas Municipality, 12.02.2024
- Pogradec Municipality, 12.02.2024

Feedback letter was received only from Peqin municipality with some recomandations for improvements that were presented and considered by the technical team.

For the concern expressed by Elbasan Municipalty, the project team in the frame of the preliminary design, has considered a connection node that will ensure access to the existing railway route with the proposed project in the future.

Future Stakeholder Engagement Programme includes disclosure of SEP and NTS of ESIA by HSH on its official website, as part of the activities in the frame of ESIA public consultation and disclosure.

6 Impacts and Mitigations

The likely impacts that may arise from the development of the proposed project conditioned by the technical data provided during the pre-detail design phase of the project, are described in this chapter.

The requests of the national environmental legislation, as well as with the environmental and social requirements of EIB/EBRD are taken into consideration while evaluation of the impacts as per methodology described in the previous chapter of ESIA report.

The characterization of the likely impacts is based on methodology described in chapter 4 (Impacts Assessment Methodology) as well as on the technical data of the project obtained on this preliminary design stage of the project.

The impacts are evaluated separately as per the activities performed during the construction and operation works, as even the impacts are conditioned by the phase of the project (that are different from those during the operational stage, even the sources of impacts are different during these stages);

6.1 Works activity and sources of impacts

6.1.1 Preconstruction, and construction phase

6.1.1.1 Sources of the likely impacts

The preconstruction and construction stages include mainly the following activities:

- Demolitions and removals works:
  - Demolition of concrete structures (concrete layers, walls and other concrete structures)
  - Scarification of the existing asphalt layer
  - Removal of small plants
  - Demolition of the existing bridges, culverts, the existing railway stations buildings;
  - Removal of the existing rails and slippers;
  - Removal of the concrete structures of tunnel to increase the tunnel cross-section to allow the electrification of the railway line;
  - Removal of the existing ballast and whether necessary of the sub-ballast;
  - Removal of the subgrade layer whether necessary;
  - Vegetation clearing for the working strip on both sides of the railway, as well as for the construction of the new service roads;
  - Dismantling of a railway track (including all materials of track line), including transportation and storing of its parts
- Earthwork
- Earthworks for cleaning the drainage channels and retaining walls;
- Pavement Works
- Retaining Walls

- Road Signs and Markings
- Road Bridges, Culverts and Road Drainages
- Construction of any eventual temporary access road;
- Construction of work camps including storage, parking areas, office buildings, equipment repair and maintenance area, etc.;
- Construction of the new railway stations; bridges and culverts;
- Construction of underpasses;
- Rehabilitation works for tunnel;
- Construction of the new service roads;
- Construction of railway line fencing;
- Signalization works
- Rehabilitation of the impacted areas

The construction activities may affect the biophysical, socio-economic and environment indicators through their following requirements:

- Permanent land take for the service roads;
- Temporary land take for the working strip;
- Request of raw material;
- Request of construction materials (bricks, cement, concrete, asphalt, metal, etc.);
- Use of construction machinery and transport vehicles;
- Fuel usage consumption during construction;
- Water Consumption;
- Waste handling and disposal especially inert from demolishing and excavated material;
- Traffic disturbance; etc.

6.1.2 Environmental and Social Indicators

Permanent and Temporary Land Take

The permanent land take includes the land required for service and connectivity roads, Elbasan and Prrenjas stations, deviations from the existing footprint of the railway, the improvement of the existing railway line horizontal alignment, underpass, and pedestrian overpass. The approximately surface of the area (additional land) due to main deviation from existing footprint of the railway is estimated around 61000 m^2;More detail estimation will be done during detail design phase.

The temporary land take includes the working strip area, the work sites mobilization facilities, and any eventual access roads. Special attention should be paid to avoidance or reduction of potential impacts upon the valuable areas from the environmental and social point of view.

Materials usage during Construction

Filling material and aggregate will be obtained from local designated and approved quarries.

The materials and raw materials that will be purchased will be of the highest quality and will be obtained from licensed manufacturers or traders, most of which are located at a distance of a few kilometres from the site.

The following options should be considered for the supply of the filling material:

- Preferably existing quarries and gravel and sand pits.
- The proposed new quarries for ballast material that contain basaltic material should avoid as practical as possible the new access roads.

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

Detail evaluation of the existing location of the ballast as per the quality required will be performed during detailed design phase of the project. Following are shown the locations of existing quarries along the project area. Its evident that there are several quarries near the project area.

Figure 6-1 The location of existing mineral sources along the project area.

Using of natural materials from existing quarries shall be done only to the subject that obtain all necessary permits and certificates for the mines, mineral extraction and transport. Therefore, the environmental aspects and permits of the natural /mineral quarry, extraction and transport, and

quarry rehabilitation shall be done under the responsibility of the suppliers. This impact is not included in ESIA .

The topsoil within the land surface mostly coming from the deviation of the proposed project footprint from existing footprint of the railway, should be removed, temporary stored near the construction site and used for rehabilitation purpose where vegetation shall be grow. The topsoil disturbed temporarily by construction and transport activities should be excavated and stored separately to be replaced on the same surface when the disturbed areas are rehabilitated.

The natural materials used for construction purposes (crushed stone, gravel, sand) or a mixture of above (concrete) are not harmful to the environment. Meanwhile oil, grease, paints etc. may adversely affect the environment.

Fuel Usage: Heavy construction and transport equipment used during the preconstruction and construction phase will be fuelled with diesel fuel, which quality should fulfil the national standards.

Water Consumption: During construction phase, a considerable quantity of water is needed not only for construction purpose but even for needs of staff operating on site for sanitary uses, and to be used on site as prevention measures to reduce dust emissions.

Before starting construction works on the water bodies , the Developer shall obtain the relevant approvals from the water resources administration and management bodies, based on the requirements of the law 111/2012 "On the integrated management of water resources" amended by the law 6/2018 "For some changes and additions, referring to Article 66 "Construction activity on the coast"; The application for obtaining authorization for works on the waterfront is made according to DCM No. 550 dated 15.07.2020 "For the approval of the request forms for approval in principle, for the granting of water use concession, authorization permit for water source use".

Air Emissions: During the construction activities, the air quality will be affected by the heavy equipment and vehicles due to the fuel combustion, as well as from dust particles from demolishing of existing buildings, excavation works, soil movement, transport of the material etc. The main pollutants will be particle matter (TSP.PM10; PM2.5, NO_X, CO, and SO_X.)

Noise Emissions*:* During the construction activities, heavy construction equipment and vehicles are source of noise emissions. The typical construction engines include generator, excavator, backhoe loader, crane, pay-welder, truck, crane, Grader, Water tunk, Concrete mixer, Concrete pump, bitumen matrix plant, Asphalt paver, vehicles , bulldozer, Ham Rubber-iron roller, vibrator etc.

Handling and Disposal of Waste Generation

Waste management must be carried out following the national and EU regulations, the EBRD standards, especially PR3, and the best practice principles.

Hazardous waste such as paints, adhesives, various chemicals must be managed through a third party (contractor) certified by NEA. The contractor shall work to facilitate the safe handling and disposal of waste from the site.

The inert waste that will be generated will be treated according to the requirements of DCM no. 575, dated 24.06.2015 "For the approval of requests for the management of inert waste".

Hazardous and non-hazardous waste should be treated according to the requirements of: DCM no. 371 dated 11.06.2014 "On determining the rules for the delivery of hazardous waste and the approval of the document for the delivery of hazardous waste" and DCM no. 229 dated 23.04. 2014

"for the approval of the rules for the transfer of non-hazardous waste and the document of the transfer of non-hazardous waste".

All waste materials will be collected, stored, and transported separately in appropriate and approved containers. Companies licensed by authorities, obtain relevant permit (Permit III2B) shall be will involve in the project for the transportation, recycling, and disposal of waste.

The design and construction company should aim firstly at the reuse of the solid waste extracted from earthworks.

Important issue related to the waste management (asbestos) generated from demolishing the existing buildings near the project line (near the train stations) shall be taken into consideration during detail design and especially instruction to be given for the Contractor to remove it safety before demolishing the buildings. This include even removing the existing mineral near train stations before starting the construction activities.

6.1.3 Operation and Maintenance impacts

6.1.3.1 Sources of the likely impacts

The operational and maintenance activities include the train's movement and the maintenance of the railway line and other facilities to support operation of the trains.

The impact during this phase have taken into consideration the electrical train operation which have much less impact comparing with diesel ones.

6.1.3.2 Environmental Indicators

During the operation of the railway line, the rolling noise is the main noise source along the whole railway line. All the equipment will comply with the applicable limit values and, where necessary, noise reduction measures will be applied.

Electrical locomotives get the energy required to power their electric motors from power lines that run alongside the track – either on the ground itself or in the form of overhead power lines. Electric motors are far more efficient than internal combustion engines when it comes to creating mechanical energy, and this is particularly relevant with trains.

Electric trains, not only are greener than diesel trains but they're also cheaper and also they are lighter too, so what that means is that when they are on the track they don't damage it so much, so maintenance costs go down too.

An electric train emits between 20% and 35% less carbon per passenger mile than a diesel train . This benefit will only improve as the electricity generation industry reduces its carbon levels. Electric trains also have zero emissions at the point of use, of particular benefit for air quality in pollution hot spots like urban area.

6.2 Impacts and mitigation during design, construction, and operation

During detail design of the project, the Designer shall plan facilities, specific features that minimise complexity and help mitigate risks across the full life cycle of the project. These will further be detailed during detail design phase of the project.

Those mitigation measures have to be in line with the conservation objective of the site expressed in different planning documents retated to the sites of conservation concern and particularly the Landscape Protected Area of Pogradec wich is designated as Candidate Emerald Site of Pogradec Protected Landscape (AL0000019), Important Bird and Biodiversity Area (IBA) Lake Ohrid

and the surrounding area (AL002), Key Biodiversity Area (KBA) of Lake Ohrid and surrounding area, UNESCO Transboundary World Natural and Cultural Heritage Site (in 2019), and Transboundary Biosphere Reserve Ohrid-Prespa (designated in 2014).

In accordance with Management Plan for the Landscape Protected Area of Pogradec (2014-2019), the conservation objectives for the site are:

1. **Consolidation of the management system of the protected area** – Ensuring a correct management of the protected area, by including local actors in a process of stable with the participation of interest groups to contribute to sustainable resource management of the area, maintaining a balance of acceptable among nature conservation and the development of human activities.
2. **Increasing the protection and conservation of habitats and biodiversity** - Preservation of different habitats in protected area, conservation of fauna diversity and the combinations of aquatic and terrestrial ecosystems, ensuring good water quality in the Lake of Pogradec, clean water in rivers and streams and preservation of unique natural and biological processes that support wildlife.
3. **Using the area for tourism and recreational purposes** - Provision and management of the area for recreational and cultural purposes, guaranteeing also the implementation of nature protection objectives and the development of different tourist activities.
4. **Development of sustainable agricultural and socioeconomic activities** – Ensuring environmental health, economic rentability and socio-economic equality in the landscape protected area.
5. **Stimulating scientific research and education** – Stimulation of education, assessment of biological, geophysical and cultural values of nature and protected areas through scientific research.

In this section we are describing general issue for construction, operation and dismount phases based on the technical data we obtain in preliminary design phase.

The potential impacts and the recommended mitigation strategies and measures during the whole project life cycle are described in this section as well.

6.2.1 Biodiversity related impacts and mitigation measures

Based on the baseline assessment, this chapter identifies the main potential impacts on biodiversity receptors from construction phase and operation phase of the railway rehabilitation project. Impacts are evaluated in terms of “significance” with regards to the changes triggered by the Project in question.

As the project’s requirements and activities during the construction works are different from those during the operational stage, the sources of impacts during these stages are described separately.

6.2.1.1 Impacted biological and ecological resources

Most of the Rrogozhinë-Pogradec railway passes through artificial habitats such as urban and rural areas, agricultural lands, tunnels, etc. The longest segments which pass in these artificial habitats occur from km 35.4 to km 84.6, from km 87.6 to km 91.1, from km 97.6 to km 102.2, from km 114.4 to km 118.2, from km 123 to 152.6. The biodiversity values of the crossed areas are limited due to the heavy anthropogenic intervention and the homogeneity of the agricultural habitats, but often these segments are fragmented by natural and semi natural habitats patches of evergreen mediterranean shrubs, pine forest, oak forest, riparian vegetation, rock walls with chasmophytic

vegetation composed by rare and important plant species (see baseline section) .

Design, preconstruction, construction and operation stages

6.2.1.1.1 Impacts on Biodiversity during construction

6.2.1.1.1.1 Impact: Permanent loss or degradation of habitats during the clearing activities within the project footprint

Description of impact

The railway goes mostly through agricultural land, rural and urban areas. Nevertheless, in some parts, the railway crosses through some natural habitats presented in the form of rivers and riparian vegetation as well as deciduous forests, chasmophytic vegetation or Mediterranean maquis alongside the railway.

a. Impact on aquatic/riparian habitats

Along the km 136-152 the railway goes almost parallel with the Ohrid lake shore. Some segments of railway such as km 136.4-137, 139.6-144.6, 145.6-147.4 and 150.5-151 are very close to the lake that represent a Critical Habitat. The aquatic habitats include C1.1 (Permanent oligotrophic lakes, ponds and pools), (C1.222) Floating *Hydrocharis morsus-ranae* rafts, C1.225 (Floating *Salvinia natans* mats), C3.4 Species-poor beds of low-growing water-fringing or amphibious vegetation and habitat C3.21 *Phragmites australis* bed. The construction activities could indirectly impact this habitat through pollution of waters and sedimentation.

b. Impact on G1.78 *Quercus trojana* woodland

The existing railway passes through or close to the oak forest dominated by *Quercus trojana* in km 102.8-103.6, 105.6-106.6, 108.2-111, 111.6-114.6, 118.6-121.4. As it is described in baseline assessment this habitat is dominated by *Quercus trojana* is found on dry clay slopes, facing south, and where the influence of Mediterranean climate. Often these oak formations are open and in the shrub, layer are dominant *Buxus sempervirens* and *Juniperus oxycedrus.* The highest impact in this habitat type is expected to be at the segments of km 102.8-103.6, 105.6-106.6, 109.6-109.8, 112.2-112.6 and 121-121.6, where the railway is going to deviate from the existing railroad. Some patches of this habitat type and species of conservation concern such as *Juniperus oxycedrus* will permanently lose because of clearing. In other segments that pass along this habitat type will be impacted in case of widening of existing railway and due to disturbance will increase the introduction of invasive species.

c. Impact on G1.76 Balkano-Anatolian thermophilous *Quercus* forests

The habitat type occurs fragmented between the km 139 and 147 of the railway, in the form of patches of coppice oak mixed forest with *Quercus pubescens*, *Quercus frainetto* and high presence of *Carpinus orientalis*. The habitat is found in the hill slopes faced to the Ohrid lake and some patches of this oak forest are very close to the lakeshore (km 140.5). The railway and automobilistic road divide this forest from the lakeshore. At km 140.2 the railway is going to have a small deviation that will impact permanently the habitat because of clearing. The other patches of this habitat type along the railway will be impacted in case of widening of existing railway and due to disturbance, there exists thrisk of increasing the introduction of invasive species.

d. Impact on H3.1 Acid siliceous inland cliffs

The railway along the km 95.6, 96.4-96.6, 97-97.7 and in some patches of the km 139-147 is crossing close to the serpentine rock walls with Chasmophytic vegetation that is characterised by a high number of species of conservation interest. In these walls was found *Festucopsis serpentini*, an endemic plant species of Albania and many others described in the baseline are potential to be found there. This habitat type along the railway will be impacted in case of widening of existing railway and due to disturbance, there exists the risk of increasing the introduction of invasive species.

e. Impact on F5.51 Thermo-Mediterranean brushes, thickets and heath-garrigues

Most of the natural vegetation of low hills between the Labinot Fushë and Mengel villages (km 80.4-82.8, 84.6-85.6, 87-87.7, 91.1-91.2, 91.5-91.7) are covered with evergreen mediterranean shrubs (maquis) dominated by *Phillyrea latifolia* mixed with *Olea europaea subsp. oleaser* and *Pistacia lentiscus*. In those hill slopes where the impact of mediterranean climate is low, maquis is mixed with *Carpinus orientalis*, while in hill slopes with high risk of erosion are planted Aleppo pine to prevent the slope erosion. In this segment the existing railway crosses next to this habitat type and in the kilometre of km 85.6-87 and 91.2-91.5 the railroad is going to deviate and goes through the maquis. Clearance will permanently lose the habitat type. The other patches of this habitat type along the railway will be impacted in case of widening of existing railway and due to disturbance, there exists the risk of increasing the introduction of invasive species.

f. Impact on X25 Domestic gardens of villages and urban peripheries and J1 Buildings of cities, towns and villages and J1 Buildings of cities, towns and villages at km 142-143 and 147-147.4.

The railway deviation will cause the loss of X25 Domestic gardens of villages and urban peripheries at km 137-137.2 and 137.6-138.2, as well as the loss of J1 Buildings of cities, towns and villages at km 142-143 and 147-147.4.

Vulnerability

While pollution and sedimentation could be controlled through measures foreseen in chapter XXX, the deviation of the rehabilitated railway and vegetation clearing in the working strip will cause direct impact on the G1.78 *Quercus trojana* woodland, G1.76 Balkano-Anatolian thermophilous *Quercus* forests, H3.1 Acid siliceous inland cliffs and F5.51 Thermo-Mediterranean brushes, thickets and heath-garrigues.

Project Embedded Controls

Aquatic habitats are not directly impacted. They might be indirectly impacted by pollution. Sources of pollution could be controlled through measures foreseen in chapter XXX.

Permanent habitat losses could be reduced through working on one side of the working strip only.

Impact Significance

Table below, provides the magnitude, vulnerability and pre-mitigation impact significance rating for habitat losses.

Table 6-1Magnitude, vulnerability and pre-mitigation impact significance rating for habitat losses

Geographic Scope	Magnitude Rating					Vulnerability	Significance
	Extent	Duration	Scale	Frequency	Magnitude		
Project Area of Influence	Local/regional	Long term	Small- Medium: It is anticipated that this impact would limited to the segments mentioned above. Avoidance and mitigation measures will avoid and reduce its impact.	Constant	Minimal-Small	Medium: Permanent loss at G1.78 Quercus trojana woodland, G1.76 Balkano-Anatolian thermophilous Quercus forests, H3.1 Acid siliceous inland cliffs and F5.51 Thermo-Mediterranean brushes, thickets and heath-garrigues.	Minor/Moderate

Mitigation Strategy and Measures

- Reducing the working area out of the existing railway will reduce the impact on the natural habitats along it.
- Working camps, to be located within the existing railway stations, to reduce the impact during the construction phase.
- The planned service and connectivity roads will be located within the existing local roads, arable lands and the railway line belt. No service and connectivity roads fall within the railway line belt in the line sections crossing the shrubby and forested areas. The expected impacts across the shrubby and forest area will be caused by the vegetation clearing within the working strip.
- Construction activity in the railway segment along the lakeshore must be carried out within August-April in order to avoid disturbance of breeding birds and accidental destruction of nest and offsprings.
- The deviation or widening of the existing railway footprint should be avoided as much as possible especially in the serpentine area where species with conservation concern are found (endemic, rare or endangered species, etc.) and in the sensitive habitats such as aquatic habitats of Ohrid lake and riverine ones. As it is described above, the riparian vegetation will be affected by the deviation of the railway and by construction of the bridges as well. The construction works will temporarily affect the physical and chemical properties of river water, downstream from the working area. Accidental release of chemicals and fuel during the construction work can deteriorate habitat quality. Firstly, digging and similar construction works will affect the sediment and the physical properties of water (mudding). The impact will be reduced downstream from the construction work area, and it will not cause a significant impact along the whole length of the watercourse. The mudding of water flow might locally affect some

freshwater species and their distribution. Since the construction work period is short, the impact is acceptable in case of the application of the environmental protection measures.

- Because of the high sensitivity of aquatic ecosystem, the construction works on watercourses should be conducted during the periods of low water level (works during dry season);
- The duration of any necessary flow diversion should be minimised as much as possible;
- Reed beds along the lake shore are very important for nesting of water birds. Construction activity in the railway segment along the lakeshore must be carried out within August-April in order to avoid disturbance of breeding birds and accidental destruction of nests and offsprings;
- Construction work requires the presence of a botanist to monitoring cases of invasive alien species and recommend control measures;
- Translocation and seed collection will be applied for species of conservation concern in the railway footprint and in the impacted habitats;
- With the application of environmental management plans during the construction period (i.e. usual environmental protection precautionary measures for the construction sites, appropriate waste and soil management, use of approved equipment, etc.) any eventual accident will be significantly reduced.
- Finally, it is recommended that the amount of habitat being lost due to construction, be rehabilitated once the railway is built. The rehabilitation of the habitats and the enhancement of the impacted forests along the segments of the railway crossing through protected areas, will be performed under the supervision of the Regional Agency for Protected Areas. Details on the areas that will be rehabilitated and on those that will be enhanced will be described in the Biodiversity Action Plan (BAP). The main lines of BAP will be provided in the ESMP.

Residual Impact

Deviations of the railway will cause permanent loss of certain habitats. The highest impact in this habitat type is expected to be at the segments of km 85.6-87and 91.2-91.5 (in maquis or Thermo-Mediterranean brushes, thickets and heath-garrigues), 102.8-103.6, 105.6-106.6, 109.6-109.8, 112.2-112.6 and 121-121.6 (*Quercus trojana* woodland), 140.2 (Balkano-Anatolian thermophilous Quercus forests) where the railway is going to deviate from the existing railroad track.

The surface for each habitat should be calculated during the detailed design phase.

6.2.1.1.1.2 Impact: Habitat fragmentation and degradation due to clearance activities

Description of impact

Temporary habitat loss might happen due to the construction activities that will be accompanied with vegetation clearance. That is explained in the above description of impacts in natural habitats. This will cause habitat fragmentation form reptiles, amphibians, small mammals and nesting passerine birds.

Vulnerability

Habitat fragmentation caused during construction phase will continue even during operation phase due to the fencing of the railway line.

Project Embedded Controls

Permanent habitat losses and therefore fragmentation could be reduced through working on one side of the working strip.

Impact Significance

Table below, provides the magnitude, vulnerability and pre-mitigation impact significance rating for habitat fragmentation during construction phase.

Table 6-2Magnitude, vulnerability and pre-mitigation impact significance rating for habitat fragmentation

Geographic Scope	Magnitude Rating					Vulnerability	Significance
	Extent	Duration	Scale	Frequency	Magnitude		
Project Area of Influence	Local/regional	Short term	Small- Medium: It is anticipated that this impact would limited to the segments already mentioned for the permanent loss and degradation of habitats. Avoidance and mitigation measures will avoid and reduce its impact.	Constant	Minimal-Small	Medium: Permanent loss at G1.78 Quercus trojana woodland, G1.76 Balkano-Anatolian thermophilous Quercus forests, H3.1 Acid siliceous inland cliffs and F5.51 Thermo-Mediterranean brushes, thickets and heath-garrigues.	Minor/Moderate

Mitigation Strategy and Measures

- Reducing the working area out of the existing railway will reduce the impact on the natural habitats along it.
- The planned service and connectivity roads will be located within the existing local roads, arable lands and the railway line belt.
- Finally, it is recommended that the amount of habitat being lost due to construction, be rehabilitated once the railway is built. The rehabilitation of the habitats and the enhancement of the impacted forests along the segments of the railway crossing through protected areas, will be performed under the supervision of the Regional Agency for Protected Areas. Details on the areas that will be rehabilitated and on those that will be enhanced will be described in the Biodiversity Action Plan (BAP). The main lines of BAP will be provided in the ESMP.

Residual Impact

Deviations of the railway will cause permanent loss of certain habitats and therefore permanent fragmentation. The highest impact in this habitat type is expected to be at the segments of km 85.6-87and 91.2-91.5 (in maquis or Thermo-Mediterranean brushes, thickets and heath-garrigues), 102.8-103.6, 105.6-106.6, 109.6-109.8, 112.2-112.6 and 121-121.6 (*Quercus trojana* woodland), 140.2 (Balkano-Anatolian thermophilous Quercus forests) where the railway is going to deviate from the existing railroad track.

6.2.1.1.1.3 Impact: Increased mortality due to excavation work and increased traffic load

Description of impact

Some increased mortality might be expected on ground nesting birds, reptiles and amphibians if the construction activities will start and continue during the breeding season. This might result in destruction of nests and killing of offsprings. Increased traffic load in and out of the construction areas may result in increased incidents of killing animals along and crossing the access roads

Vulnerability

Despite the application of mitigation measures, there is a potential risk for mortality during excavation works and traffic during construction.

Project Embedded Controls

The strict application of mitigation measures will ensure limited exposure of animals to mortality due to excavation works and traffic.

Impact Significance

Table below, provides the magnitude, vulnerability and pre-mitigation impact significance rating for Increased mortality due to excavation work and increased traffic load.

Table 6-3 Magnitude, vulnerability and pre-mitigation impact significance rating for increased traffic load

Geographic Scope	Magnitude Rating					Vulnerability	Significance
	Extent	Duration	Scale	Frequency	Magnitude		
Project Area of Influence	Local/regional	Short term	Small- Medium: It is anticipated that this impact would limited due to the mitigation measures	Constant	Minimal-Small	Minor: limited due to application of mitigation measures.	Minor/Moderate

Mitigation Strategy and Measures

- Reducing the working area out of the existing railway will reduce the impact on the natural habitats along it and animals related to natural habitats.
- The planned service and connectivity roads will be located within the existing local roads, arable lands and the railway line belt.
- Avoid clearance of vegetation during breeding season (March - August) in order to not disturb the breeding animals and to not destroy nests and offsprings.
- Undertake the vegetation clearance outside of the breeding season to allow breeding animals to occupy other habitats.
- Undertake vegetation clearance in the presence of an experienced biologist to avoid accidents with wildlife;
- Avoid electrocution of birds and related mortality through the design of electric power lines;
- Avoid blasting during the breeding season (March - August) in order to reduce the disturbance of breeding animals;
- Avoid working at night, where possible, in order to reduce light pollution for animals active at night;

- With the application of environmental management plans during the construction period (i.e. usual environmental protection precautionary measures for the construction sites, appropriate waste and soil management, use of approved equipment, etc.) any eventual accident will be significantly reduced.

Residual Impact

There are no residual impacts in case of strict application of avoidance and mitigation measures

4. Impact: Air pollution

Description of impact

The activities taken during construction could cause air pollution. Traffic load will certainly result in emissions release. Meanwhile construction works such as digging etc. could increase the amount of dust in the air. Both could influence mostly the insectivorous species of birds, mammals, reptiles and amphibians.

Vulnerability

Despite the application of mitigation measures, there is a potential risk for air pollution during construction.

Project Embedded Controls

The strict application of mitigation measures will ensure limited exposure of habitats, flora and fauna to air pollution during the construction phase.

Impact Significance

Table below, provides the magnitude, vulnerability and pre-mitigation impact significance rating for air pollution.

Table 6-4Magnitude, vulnerability and pre-mitigation impact significance rating for air pollution

Geographic Scope	Magnitude Rating					Vulnerability	Significance
	Extent	Duration	Scale	Frequency	Magnitude		
Project Area of Influence	Local/regional	Short term	Small- Medium: It is anticipated that this impact would limited due to the mitigation measures	Constant	Minimal-Small	Minor: limited due to application of mitigation measures.	Negligible/Minor

Mitigation Strategy and Measures

- Implement measure of control of air pollution as foreseen in subchapter XXX.

Residual Impact

There are no residual impacts in case of strict application of avoidance and mitigation measures.

5. Impact: Water pollution

Description of impact

The activities taken during construction could cause water pollution. Activities, service roads, working camps etc, close to water tables could result in pollution of surface waters due to release

of oil and other liquid pollutants. Water pollution impacts all the species and particularly the aquatic species.

Vulnerability

Despite the application of mitigation measures, there is a potential risk for water pollution during the construction phase.

Project Embedded Controls

The strict application of mitigation measures will ensure limited exposure of habitats, flora and fauna to water pollution during the construction phase.

Impact Significance

Table below, provides the magnitude, vulnerability and pre-mitigation impact significance rating for water pollution.

Table 6-5 Magnitude, vulnerability and pre-mitigation impact significance rating for water pollution

Geographic Scope	Magnitude Rating					Vulnerability	Significance
	Extent	Duration	Scale	Frequency	Magnitude		
Project Area of Influence	Local/regional	Short term	Small- Medium: It is anticipated that this impact would limited due to the mitigation measures	Constant	Minimal-Small	Minor: limited due to application of mitigation measures.	Negligible/Minor

Mitigation Strategy and Measures

- Implement measure of control of water pollution as foreseen in subchapter XXX.
- Avoid discharge of solid waste into the river, streams, along the riverbanks, in ponds and water reservoirs and whatever natural or human made water course;
- Avoid discharge of waste waters and into natural or human made water courses, ponds and reservoirs;
- Apart from other measures foreseen in the ESIA for avoiding the pollution of surface and underground waters, an emergency plan should be in place to control the pollution in case there are emergencies involving leaked oil and other water pollutants;

6. Impact: Noise and light pollution

Description of impact

Machineries will cause increased noise that apart disturbance could cause abandoning of breeding activities. Noise during the breeding season could be very disruptive to breeding birds' activity with the group of songbirds suffering the most as they rely on calls and songs for communicating with each-other.

Light pollution could also be a factor of influence as light could increase disturbance and change insect distribution due to the interaction of the latter with light.

Vulnerability

Despite the application of mitigation measures, there is a potential risk for noise and light pollution during the construction phase.

Project Embedded Controls

The strict application of mitigation measures will ensure limited exposure of fauna to noise and light pollution during the construction phase.

Impact Significance

Table below, provides the magnitude, vulnerability and pre-mitigation impact significance rating for noise and light pollution.

Table 6-6 Magnitude, vulnerability and pre-mitigation impact significance rating for noise and light pollution

Geographic Scope	Magnitude Rating					Vulnerability	Significance
	Extent	Duration	Scale	Frequency	Magnitude		
Project Area of Influence	Local/regional	Short term	Small- Medium: It is anticipated that this impact would limited due to the mitigation measures	Constant	Minimal-Small	Minor: limited due to application of mitigation measures.	Minor/Moderate

Mitigation Strategy and Measures

- Implement measure of control of noise and light pollution as foreseen in subchapter XXX.
- Avoid blasting during the breeding season (March - August) in order to reduce the disturbance of breeding animals;
- Avoid working at night, where possible, in order to reduce light pollution for animals active at night;
- Significant noise and human activity should be limited as much as possible to reduce disruption of terrestrial and riparian vertebrates' movement;
- Offer artificial resting and/or breeding structures for wildlife using the tunnels for resting and/or breeding animals.

Residual Impact

There are no residual impacts in case of strict application of avoidance and mitigation measures.

7. Impact: Persecution and disturbance of wildlife

Description of impact

Construction work (dumping and road construction) and human presence could be very disruptive to shy animals such as birds of prey and other large birds, mammals etc. On the other hand, human force could be used in wildlife persecution including illegal killing. In reaction, those animals tend to abandon the project area. This could be problematic for breeding animals with some of them abandoning the breeding activity.

Vulnerability

Despite the application of mitigation measures, there is a potential risk for persecution and disturbance.

Project Embedded Controls

The strict application of mitigation measures will ensure limited exposure of fauna to persecution and disturbance during the construction phase.

Impact Significance

Table below, provides the magnitude, vulnerability and pre-mitigation impact significance rating for persecution and disturbance.

Table 6-7 Magnitude, vulnerability and pre-mitigation impact significance rating for persecution and disturbance

Geographic Scope	Magnitude Rating					Vulnerability	Significance
	Extent	Duration	Scale	Frequency	Magnitude		
Project Area of Influence	Local/regional	Short term	Small- Medium: It is anticipated that this impact would limited due to the mitigation measures	Constant	Minimal-Small	Minor: limited due to application of mitigation measures.	Minor/Moderate

Mitigation Strategy and Measures

- Avoid clearance of vegetation during breeding season (March - August) in order to not disturb the breeding animals and to not destroy nests and offsprings. Undertake the vegetation clearance outside of the breeding season to allow breeding animals to occupy other habitats. Undertake vegetation clearance in the presence of an experienced biologist to avoid accidents with wildlife;
- Avoid blasting during the breeding season (March - August) in order to reduce the disturbance of breeding animals;
- Significant noise and human activity should be limited as much as possible to reduce disruption of terrestrial and riparian vertebrates' movement;
- Employees must be restricted from engaging in hunting while on duty;
- Conduct a training program for the employees on the code of conduct and care for the wildlife prior to start-up of construction work.

6.2.1.2 Impacts on biodiversity during operation

a) Impact : Habitat fragmentation and degradation due to clearance activities

Description of impact

Except for fencing, the railway will not cause additional habitat fragmentation as it follows the existing railway track. The minor deviations described above are not expected to have a significant contribution in habitat fragmentations. Meanwhile, the fencing of the railway would be an obstacle for crossing animals including mammals, reptiles, amphibians etc.

Other impacts, including the eventual temporary access roads and the working strip area are already rehabilitated through the mitigation measures related mainly to biodiversity and land use.

Vulnerability

Habitat fragmentation will continue even during operation phase due to the fencing of the railway line.

Project Embedded Controls

Fragmentation could be minimised through the presence and design of culverts and fauna crossings.

Impact Significance

Table below, provides the magnitude, vulnerability and pre-mitigation impact significance rating for habitat fragmentation during operation phase.

Table 6-8 Magnitude, vulnerability and pre-mitigation impact significance rating for habitat fragmentation during operation

Geographic Scope	Magnitude Rating					Vulnerability	Significance
	Extent	Duration	Scale	Frequency	Magnitude		
Project Area of Influence	Local/regional	Long term	Medium: It is anticipated that this impact would be felt mostly for medium and large mammals. Mitigation measures will reduce the impact of fragmentation.	Constant	Minimal-Small	Medium: Partilcularly felt by medium and large mammals	Minor/Moderate

Mitigation Strategy and Measures

- Develop a Detailed Design of the Rehabilitation of the Corridor VIII Rrogozhina-Pogradec. The detailed design will ensure profound baseline surveys for Critical Habitats, review the assessed impacts and review and improve the proposed avoidance and mitigation measures as well as reassess the proposals for offsetting;
- Develop a Biodiversity Monitoring and Management Plan for relevant biodiversity features and those qualifying as Critical Habitats. This will allow the monitoring of project impacts, the avoidance and reduction of impact where possible and foresse for more specific restoration measures;
- Avoid/minimise any eventual access roads during the detailed design stage.
- Create wildlife passages to reduce the effects of habitat fragmentation. Provide further clarifications during the detailed design stage for further technical provisions on wildlife passages);
- Restore the riparian habitats in those sections of the railway that will be affected by the construction of the railway bridges. This measure will mitigate the impact for plants and animals present in riparian habitats;
- Increase the number of culverts and the culverts' cross-section to ensure the crossing of the railway line by mammals and other non-flying animals;

- Construct underground passages for small animals including reptiles, amphibians;

Residual Impact

Fragmentation can be mitigated by appropriate number of culverts, appropriate design and locations of culverts and fauna passages.

b) Impact : Mortality due to train traffic

Description of impact

Some increased mortality might be expected on mammals, reptiles and amphibians trying to cross the railway. Nevertheless, fencing will limit the crossing of animals and mortality is expected to be limited Furthermore, this impact could be minimised through the presence and design of culverts and fauna crossings.

Vulnerability

Despite the application of mitigation measures, there is a potential risk for mortality from train traffic.

Project Embedded Controls

The strict application of mitigation measures will ensure limited exposure of animals to mortality due to traffic during operation.

Impact Significance

Table below, provides the magnitude, vulnerability and pre-mitigation impact significance rating for Increased mortality due to traffic load during operation.

Table 6-9 Magnitude, vulnerability and pre-mitigation impact significance rating for traffic load during operation

Geographic Scope	Magnitude Rating					Vulnerability	Significance
	Extent	Duration	Scale	Frequency	Magnitude		
Project Area of Influence	Local/regional	Short term	Small- Medium: It is anticipated that this impact would limited due to the mitigation measures	Constant	Minimal-Small	Minor: limited due to application of mitigation measures.	Minor/Moderate

Mitigation Strategy and Measures

- Avoid clearance of vegetation during breeding season (March - August) in order to not disturb the breeding animals and to not destroy nests and offsprings.
- Undertake the vegetation clearance outside of the breeding season to allow breeding animals to occupy other habitats.
- Maintain wildlife passages to reduce the effects of accidental kills;
- Maintain the mesh size of the railway fence to be large enough to not allow the passage of small, medium and large mammals and other non-flying animals;

Residual Impact

There are no residual impacts in case of strict application of avoidance and mitigation measures

c) Impact : *Bird mortality due to collision and electrocution*

Description of impact

Cases of bird collisions with electric power lines and subsequent deaths of collided birds are well known and particularly frequent if the overhead lines occur in areas of high mobility for birds such as wetlands and particularly Important Bird and Biodiversity Areas. This could be the case for the overhead power lines going close to Shkumbini river as well as those adjacent to Lake Ohrid known as an Important Bird and Biodiversity Area. Typically, birds susceptible to collisions include soaring birds, nocturnal birds as well as waterbirds when the overhead lines occur close to wetland areas.

Apart from collision, power lines might cause electrocution which is usually the case for birds using the power lines pylons for perching or resting. This might be the case mostly for large birds and particularly for birds of prey that use the pylons for perching.

The identification of areas of higher collision and electrocution risk has to be further investigated during the Detailed Design phase in order to avoid and mitigate both those factors responsible for bird mortality.

Vulnerability

Despite the application of mitigation measures, there is a potential risk for mortality due to collision and electrocution.

Project Embedded Controls

The strict application of mitigation measures will ensure limited exposure of birds to mortality due to collision and electrocution.

Impact Significance

Table below, provides the magnitude, vulnerability and pre-mitigation impact significance rating for increased mortality due to collision and electrocution.

Table 6-10 Magnitude, vulnerability and pre-mitigation impact significance rating for increased mortality due to collision and electrocution

Geographic Scope	Magnitude Rating					Vulnerability	Significance
	Extent	Duration	Scale	Frequency	Magnitude		
Project Area of Influence	Local/regional	Short term	Small- Medium: It is anticipated that this impact would limited due to the mitigation measures	Constant	Minimal-Small	Minor: limited due to application of mitigation measures.	Minor/Moderate

Mitigation Strategy and Measures

- Study the project area in order to identify the areas of collision risk and mitigate bird mortality related to collision by putting appropriate bird diverters in areas of high mobility for birds in order.

- Avoid electrocution of birds and related mortality through the design of electric power lines;
- Undertake bird fatality monitoring to assess mortality due to collision and electrocution and apply further preventive measures.

Residual Impact

There are no residual impacts in case of strict application of avoidance and mitigation measures.

d) Impact : Air and water pollution

Description of impact

Air and water pollution is expected to be lower because the locomotive will be electric with no source for air and water pollutants released during transport. Furthermore, the train will reduce the need for car transport contributing thus to the reduction of other modes of transport including the vehicles powered by fossil fuels.

Vulnerability

Despite the application of mitigation measures, there is a potential risk for air pollution during operation in areas where there has been no train traffic in recent years.

Project Embedded Controls

The strict application of mitigation measures will ensure limited exposure of habitats, flora and fauna to air pollution during the construction phase.

Impact Significance

Table below, provides the magnitude, vulnerability and pre-mitigation impact significance rating for air pollution.

Table 6-11 Magnitude, vulnerability and pre-mitigation impact significance rating for air pollution during operation

Geographic Scope	Magnitude Rating					Vulnerability	Significance
	Extent	Duration	Scale	Frequency	Magnitude		
Project Area of Influence	Local/regional	Short term	Small- Medium: It is anticipated that this impact would limited due to the mitigation measures	Constant	Minimal-Small	Minor: limited due to application of mitigation measures.	Negligible/Minor

Mitigation Strategy and Measures

- Implement measure of control of air pollution as foreseen in subchapter XXX.
- Implement measure of control of water pollution as foreseen in subchapter XXX.
- Apart from other measures foreseen in the ESIA for avoiding the pollution of surface and underground waters, an emergency plan should be in place to control the pollution in case there are emergencies involving leaked oil and other water pollutants;

Residual Impact

There are no residual impacts in case of strict application of avoidance and mitigation measures.

e) Impact : Noise and light pollution

Description of impact

Train traffic will be particularly felt in tunnels and bridges of those segments where the railway has not been functional during the last years. In the absence of railway activity, the tunnels have been used by diurnal and nocturnal species of fauna including swallows, bats and perhaps owls. It is very likely that railway traffic will cause noise and vibration although the level of noise and vibration will be rather limited due to the electric locomotive. On the other hand, this might cause abandonment of the bridges and tunnels by the above mentioned fauna species and groups.

Light pollution could also be a factor of influence as light could increase disturbance and change insect distribution due to the interaction of the insects with light.

Nevertheless, both impacts are expected to be of minor to moderate significance due to the limited amount of fauna species, the limited number of specimens for the present species and the possibilities for other nesting or resting places in the vicinity of the railway.

Vulnerability

Despite the application of mitigation measures, there is a potential risk for noise and light pollution during the operation phase.

Project Embedded Controls

The strict application of mitigation measures will ensure limited exposure of fauna to noise and light pollution during the operation phase.

Impact Significance

Table below, provides the magnitude, vulnerability and pre-mitigation impact significance rating for noise and light pollution during the operation phase.

Table 6-12Magnitude, vulnerability and pre-mitigation impact significance rating for water pollution during operation

Geographic Scope	Magnitude Rating					Vulnerability	Significance
	Extent	Duration	Scale	Frequency	Magnitude		
Project Area of Influence	Local/regional	Short term	Small- Medium: It is anticipated that this impact would limited due to the mitigation measures	Constant	Minimal-Small	Minor: limited due to application of mitigation measures.	Minor/Moderate

Mitigation Strategy and Measures

- Implement measure of control of noise and light pollution as foreseen in subchapter XXX.
- Check the efficiency of the artificial resting and/or breeding structures for wildlife using the tunnels for resting and/or breeding wildlife.
- In case of no efficiency provide better structures for resting and/or breeding wildlife.

Residual Impact

There are no residual impacts in case of strict application of avoidance and mitigation measures.

f) Impact : Human disturbance of wildlife

Description of impact

Access in the railway will be controlled and limited to only maintenance activities. The level of human disturbance is expected to be much less compared with the current use of the railway and its facilities.

Vulnerability

Despite the application of mitigation measures, there is a limited potential risk for human disturbance.

Project Embedded Controls

The strict application of mitigation measures will ensure limited exposure of fauna to disturbance during the operation phase.

Impact Significance

Table below, provides the magnitude, vulnerability and pre-mitigation impact significance rating for disturbance.

Table 6-13 Magnitude, vulnerability and pre-mitigation impact significance rating for human disturbance during operation

Geographic Scope	Magnitude Rating					Vulnerability	Significance
	Extent	Duration	Scale	Frequency	Magnitude		
Project Area of Influence	Local/regional	Short term	Small- Medium: It is anticipated that this impact would limited due to the mitigation measures	Constant	Minimal-Small	Minor: limited due to application of mitigation measures.	Minor/Moderate

Mitigation Strategy and Measures

- Conduct a training program for the employees on the code of conduct and care for the wildlife during the railway operation phase.
- Develop a Detailed Design of the Rehabilitation of the Corridor VIII Rrogozhina-Pogradec. The detailed design will ensure profound baseline surveys for Critical Habitats, review the assessed impacts and review and improve the proposed avoidance and mitigation measures as well as reassess the proposals for offsetting;
- Develop a Biodiversity Monitoring and Management Plan for relevant biodiversity features and those qualifying as Critical Habitats. This will allow the monitoring of project impacts, the avoidance and reduction of impact where possible and foressee for more specific restoration measures;

- Undertake any vegetation clearance for maintenance purposes outside of the breeding season to allow breeding animals to occupy other habitats.

g) Impact : Vegetation fires

Description of impact

The operation of the railway can cause fires in vegetation along the railway for several reasons. The train braking can produce sparks, particularly in situations where a brake shoe is worn down to the backing plate resulting in the steel backing plate contacting the steel wheel tread. Downhill braking or emergency brake situations may generate high temperatures in railway wheels. Roller bearings on rail car axles may occasionally fail or burn off, which can cause a derailment and possibly a fire. In electrical trains the high voltage cable supplying power to the motor can on occasion sustain damage and potentially cause a fire as well.

Vulnerability

Despite the application of mitigation measures, there is a potential risk for vegetation fires.

Project Embedded Controls

The strict application of mitigation measures will ensure limited exposure to vegetation fires.

Impact Significance

Table below, provides the magnitude, vulnerability and pre-mitigation impact significance rating for vegetation fires.

Table 6-14 Magnitude, vulnerability and pre-mitigation impact significance rating for vegetation fires

Geographic Scope	Magnitude Rating					Vulnerability	Significance
	Extent	Duration	Scale	Frequency	Magnitude		
Project Area of Influence	Local/regional	Short term	Small- Medium: It is anticipated that this impact would limited due to the mitigation measures	Constant	Minimal-Small	Minor: limited due to application of mitigation measures.	Minor/Moderate

Mitigation Strategy and Measures

- Removing vegetation frequently from the railway is highly required in order to avoid spreading of fires in the natural vegetation around.
- Conduct a training program for the employees on the code of conduct and control of vegetation fires.
- Have in place an emergency plan in case of vegetation fires.

6.2.1.3 Net Positive Impact strategy

a. Potential impacts upon Critical Habitats and their biodiversity

The Critical Habitat (CH) qualifying features are identified in *Chapter 2. Critical Habitat Assessment* and information on them is summarised as below: Critical Habitat of Lake Ohrid, a freshwater ecosystem of high priority for conservation on the basis of high level of endemism for several

aquatic species. It meets the threshold for Criteria 1 Unique Ecosystem, Criteria 4. Habitat required for the survival of migratory species and/or congregatory species, Criteria 5. Biodiversity and/or ecosystem with significant social, economic, or cultural importance to local communities and indigenous groups and Criteria 6. Habitat of key scientific value and/or associated with key evolutionary processes. In addition, five habitats are assessed as Critical: (a) Shkumbin river mostly for restricted range fish species, (b) Ohrid lake for restricted range aquatic species, (c) caves in the surroundings and railway tunnels for bats, (d) surrounding forest and shrubland for reptiles and (e) serpentine habitats for plants of restricted range.

Besides, the CH assessment has identified forest, shrubland and rocky areas as Critical Habitat for reptiles, bats and other mammals and caves as CH for bat species.

Furthermore, serpentine rocks have been identified as Critical Habitat for several species of restricted range plants.

The mitigation and offset measures foreseen under ESIA should ensure Net Positive Impact (NPI) for features qualified as Critical Habitats.

The rehabilitated railway will go through the Critical Habitat of Lake Ohrid. Furthermore, the railway goes close to four habitats assessed as Critical: (a) Shkumbin river mostly for restricted range fish species, (b) Ohrid lake for restricted range aquatic species, (c) caves in the surroundings and railway tunnels for bats, (d) surrounding forest and shrubland for reptiles and (e) serpentine habitats for plants of restricted range.

Based on the baseline information, a rapid assessment of the impact upon the protected areas would give the following results.

Table 6-15 Rapid assessment of the protected areas on both sides of the railway line

No	Protected Area	Distance	Comment
1	NMR of Qafe Bush - Kuturman (3,598 ha) Additional designations: Candidate Emerald Site	Crossed by the railway line; Important for large mammals;	The railway goes through the protected area, in the subzone of Traditional Use and Sustainable Development with the second level of protection. This ensures a territory with low impact and control of economic, social, agribusiness, entertainment, sports and ecotourism activities, infrastructure construction according to urban development plans and tourism approved by the National Council of the Territory (KKT), which do not affect the ecological integrity of the natural ecosystem and respect the functions of the protected area, the ecological values and those of the natural and cultural landscape. The activities for the rehabilitation of the existing railway are allowed by the relevant legislation “On protected areas”.
2	Pogradec lake Landscape Protected Area (23,027 ha)	Crossed by the railway line; Important for migratory birds	The railway goes through the protected area whose whole territory has a third level of protection. In accordance with the Law 10001/2017 “On protected areas” "Third level of protection" has the function of preserving nature and biodiversity in harmony with the development of socio-

No	Protected Area	Distance	Comment
	Additional designations: Candidate Emerald Site, IBA, KBA, Biosphere Reserve.	and numerous endemic species of fish and other aquatic taxa	economic and tourist activities, infrastructure for the residents of the area and the business community. The activities for the rehabilitation of the existing railway are allowed by the current legislation on protected areas. Nevertheless, the project will have a direct impact on this Critical Habitat as a result of limited deviations in km 137-137.2, 137.6-138.2, 140.2-141, 142-143, 147-147.4 associated with permanent and temporary habitat loss, disturbance, noise, and air pollution during construction and operation. The permanent losses extend to the chasmophytic vegetation and will demand offsetting. The other natural habitat losses would be temporary and not significant because the current project is a rehabilitation project and the accompanying infrastructure will be more or less similar to the one previously used by the current railway infrastructure. Furthermore, the impacted natural habitats will be restored after the end of construction activities. Finally, the impacted areas lay at the terrestrial part of the protected area, thus far from the aquatic habitats that compose the area of the highest interest for biodiversity. The permanent loses will be compensated through habitat rehabilitation efforts in open areas created by changes on the curves and rehabilitation of forested parts in areas today covered by extensive grazing

6.2.1.4 Description of impacts upon Fauna of the Critical Habitats

Animal species will **temporarily** lose parts of their habitat; most of them will move to other parts of similar habitats that will not be affected by the rehabilitation of the railway. The disturbance of habitats of animals during the construction period will take place within a narrow strip of land. Nevertheless, the rehabilitated railway is expected to cause further fragmentation due to its fencing**.**

Meanwhile, impact on aquatic species will be felt in river crossings as well as by pollution during construction.

Impact on terrestrial species is mitigated through the measures foreseen for air quality, noise and vibrations, climatic conditions, climate change, geological issues and above all by those mentioned in the Biodiversity avoidance and mitigation measures.

Impact on aquatic species is expected to be temporary and only during the construction period associated with potential risk of pollution.

Description of impacts upon Flora of the Critical Habitats

As stated before, there will be permanent natural habitat loss in:

- km 85.6-87 and 91.2-91.5 with minor clearances of the F5.51 Thermo-Mediterranean brushes, thickets and heath-garrigues;
- km 93.2-93.4, 101.8-102, 104 with minor clearances of small parts of the riparian vegetation;
- km 102.8-103.6, 105.6-106.6, 109.6-109.8, 112.2-112.6 and 121-121.6 with clearance of G1.78 *Quercus trojana* woodland; *and*
- km 140.2-141 with clearance of the G1.76 Balkano-Anatolian thermophilous Quercus forest.

Besides, there is temporary habitat loss due to the construction activities that will be accompanied with vegetation clearance. That is explained in the above description of impacts in natural habitats. These activities might affect certain habitats available to reptiles, amphibians, small mammals and nesting passerine birds.

Considering the limited amount of habitat loss, the temporary patterns of the loss and the availability of similar habitats in the surroundings of the construction sites, the impact on habitats during construction would be of minor to moderate significance.

b. Measures to ensure Net Positive Impact

The measures foreseen under the ESIA aim to implement the mitigation hierarchy as mentioned in EIB ESS 4.

Fauna

Lake Ohrid has been designated as Landscape Protected Area, UNESCO Biosphere Reserve, Candidate Emerald Site, IBA and KBA mainly due to its richness of aquatic biodiversity including endemic species of molluscs, fish and the migratory birds. Those major features have served as well for qualifying it a Critical Habitat in accordance with Criteria 1, 4, 5 and 6 (EIB ESS 4). Therefore, measures for ensuring Net Positive Impact should focus mainly on aquatic species.

For terrestrial species, the existing underpasses, bridges, and road culverts play the role of wild fauna passages. Nevertheless, the project plans to add a number of culverts and to increase their diameter size. Therefore, the small fauna will have more possibilities to safely pass under the railway line. The added new box culverts and the replacement of the existing ones will facilitate the fauna mobility. The new and the replaced box culverts will have a bigger diameter than the existing ones: the new box culverts will be large enough (size 2x2 m or 2x3m) to allow the passage of mammals such as Grey Wolf Red Fox, Badger etc. The culverts are designed to avoid blocking from sediments, to allow for regular maintenance and the temporary flows. This will lead to a Positive Net Impact for the fauna mobility during the operation of the rehabilitated railway.

Regarding temporary habitat loss for the flora due to construction works, the working strip is narrow (4 metres), therefore, the impact on flora is expected to be of minor significance.

Avoidance measures

The avoidance measures below will aim to avoid any possible impact occurring during construction and operation. The avoidance measures include:

- Avoid clearance of vegetation during breeding season (March - August) in order not to disturb the breeding animals and not to destroy nests and offsprings. Undertake the vegetation clearance outside of the breeding season to allow breeding animals to occupy other habitats.
- Avoid working at night, where possible, in order to reduce light pollution for animals active at night.
- Avoid discharge of solid waste into the river, streams, along the riverbanks, in ponds and water reservoirs and whatever natural or human made water course.
- Avoid discharge of waste waters into natural or human made water courses, ponds and reservoirs.
- Avoid storage of large quantities/volume of waste by removing frequently/regularly any food waste or similar attractants for animals, especially carnivores.
- Avoid creating dump sites that would attract omnivorous species and scavengers.

Mitigation measures

- Significant noise and human activity should be limited as much as possible to reduce disruption of mobility for terrestrial and riparian vertebrates.
- Employees must be restricted from engaging in hunting while on duty.
- Conduct a training program for the employees on the code of conduct and care for the wildlife.
- Conduct a training program for the employees on the code of conduct and care for the wildlife prior to start-up of construction work.
- Reduce at maximum blasting and tree falling during the breeding season (March-August). This period is considered as construction restriction period, as most of the terrestrial and riparian vertebrate species do breed in the respective period.
- Employ qualified expertise for pre construction surveys in order to avoid direct impact (destruction of nest, killing of offsprings) if construction works have to take place during the breeding season.
- Employ qualified expertise for pre construction surveys in order to avoid project activities in areas of high density for breeding birds.
- Ensure the mesh size of the fence to be large enough to allow the passage of small, medium and large mammals and other non-flying animals.

Flora

Temporary habitat loss in Landscape Protected Area of Pogradeci lake

There is temporary habitat loss due to the construction activities that will be accompanied with vegetation clearance.

Avoidance measures

- Avoidance of vegetation clearing on the right side of the railway line corresponding with mountain slopes covered with deciduous forests and sites of chasmophytic vegetation. The working strip will be located only on the left of the railway line. Other avoidance measures are specifically mentioned below when discussing monitoring and control of the invasive alien species.

Mitigation measures

- Minimization of vegetation clearing on the left side of the railway line

Compensation/Restoration measures

- Develop and implement a Biodiversity Offset Strategy and Plan (BOSP). This document will explain how the offset will be developed to compensate for the critical habitat loss and ensure "Net Positive Impact" of the project.

- Restoration of the vegetation within the working strip once the construction works are achieved. The rehabilitation works must start immediately after the end of construction activities within this section. The restoration activities will be included in the BAP, which will be detailed by the construction Contractor. The detailed preparation and the monitoring of BAP will be supervised by the environmental institutions (RAPA Korca and REA Korca)

- The Consultant recommends using native species to be planted during the vegetation rehabilitation activities. The proposed native species will be identified during the Detailed Design phase.

- Create and rehabilitate, wherever possible, the riparian forest

- Create and rehabilitate, wherever possible, the deciduous forest impacted during construction

Permanent habitat loss in Landscape Protected Area of Pogradec Lake

Some residual impacts will remain regardless of the avoidance, mitigation and restoration measures taken by the project during the construction works. Residual impacts will occur only due to construction and operation of railway stations as well as passages and new service roads. Nevertheless, the surface of natural habitats to be impacted by such residual effects is minimal and mostly in the Landscape Protected Area of Pogradec Lake. The size of the residual effect will be calculated during the detailed design phase.

Potential restoration measures are related to the forestation of an area at least equal to the lost vegetation one. The species to be planted would be the same as those being lost. Once these offset measures are implemented there will be no net losses at mid-term (the necessary time for vegetation growth). Since the compensated area will be properly restored and protected from overgrazing and cutting, it is believed that the intervention will produce Net Positive Impacts.

Biodiversity Action Plan Framework

A **Biodiversity Management Plan (BMP) and a Biodiversity Action Plan** approved by the EIB, should be developed and implemented by the Contractor to ensure that the project, particularly in the

section located in the Landscape protected Area of Pogradec Lake, will not have any adverse impact on biodiversity. The BMP will describe the Biodiversity Offset Strategy and explain how the offset will be developed to compensate for the critical habitat loss and ensure "Net Positive Impact" occurs through (i) create and rehabilitate, wherever possible, the riparian forest and (ii) create and rehabilitate, wherever possible, the deciduous forest impacted during construction.

The detailed preparation and the monitoring of BAP will be supervised by the environmental institutions (RAPA Korca and REA Korca, Environmental specialists of the Municipality of Korca and its Directory of Forestry).

This plan should respect the following framework:

- Responsibility for development and implementation of the Plan: Contractors
- The time frame when the Plan should be developed: Pre construction phase (in time for EIB approval 6 months before the start of the construction works)
- The timeframe when the Plan should be revised: 3 months after any substantial Project change
- Necessary approval of the Plan should be conducted by EIB 3 months before the start of construction works.

Scope of Biodiversity Management Plan
For the design of the Biodiversity Management Plan the following objectives must be met:

Prerequisites:

- Stakeholder engagement and consultation;
- **Organisation of awareness campaign and educational activities for both the staff working on the reconstruction activities but also the local communities**
- Partnerships evaluation;
- Consider biodiversity priorities, resource/staff availability, and timing and costs issues;
- A baseline survey of biodiversity and indicators selection; and
- The target of 'no net loss' to biodiversity.

The necessary actions to implement these activities are:

- Monitoring: Identify organisation(s) with responsibility for managing monitoring activities and reporting on the progress being made on individual actions. A dedicated team will be appointed to implement the Biodiversity Action Plan made up of employed staff members, independent consultants, and scientific entities or of NGO's given the necessary funding to implement the works. The monitoring will be intended to determine the potential effects on biodiversity generated by the project introduced changes in comparison with the baseline. The monitoring program should be implemented according to the specific pipeline sections requirements, and the defined conservation priorities, to make sure that the introduced mitigation measures and restoration works are effective and to identify the corrective actions in case deficiencies are identified.

- Evaluation: Biodiversity Management Plan will review indicators and performance against objectives, targets, and stakeholder expectations to measure how well the Biodiversity Management Plan has been implemented, and how successful it has been. Periodically a review of objectives and targets will be made to determine their achievement or not, and the eventual need to introduce the required enhancements for the action plan.

- Reporting: The communication and verification of the progress and outcomes of the Biodiversity Management Plan to all interested parties will help to build support and increase the probability of success for current and future biodiversity-related activities. The participation of the local people will be the key source for the evaluation of indirect impacts from logging, hunting, fishing, or overharvesting. Therefore, the inclusion of such people within stakeholder engagement groups will be essential in the success of all the Biodiversity Management Plan elements and will also help to manage expectations, to promote the partnership approach, help improve local livelihood and to avoid conflict. Reporting will be performed through the development of alternative, independent mechanisms, such as a website on biodiversity activities, which will include the development of tools to report data internally, making data available for reference and decision making to practitioners, management and to local NGO and government groups for species and habitat records.

The following topics must be additionally addressed by Biodiversity Management Plan:

- *The invasive species management plan*
    - The invasive plant species have been recognized as the main drivers of negative impacts due to the vegetation damage during the construction work. For this reason, the management of invasive species must be performed with additional care, and it represents a priority for this project. This is especially important as proper invasive species management will lead to positive impacts on some habitats, thus creating net gain.
    - The most important precondition for invasive species management is knowledge about the invasive species presence (as some new invasive species can be introduced), their proper removal and recovery of native vegetation cover that will be resilient to new invasion. To assure that the goal of permanent invasive species elimination is achieved, monitoring has to be applied and repeated if necessary. Details about the invasive species management and monitoring of the success will be developed within the Restoration and rehabilitation plan
    - The special effort of invasive species management should be implemented in protected areas.
    - Roles and Responsibilities, Resources, Monitoring and Corrective Actions.
- *Vegetation recovery*
    - Activities connected to vegetation measures should be supervised by botanists to see that all measures are performed as it was planned.

- The vegetation recovery must be focused on recovering the species or habitats identified as priority biodiversity features/critical habitats or creating the habitat conditions that will support species identified as priority biodiversity features regarding this project.

- Internal training of Contractor´s workers on main provisions of the Plan must be carried out before the start of construction works. Records of trained personnel should be kept and regularly updated Minimal action required

These measures have been developed to satisfy the main objectives of the Biodiversity Management Plan:

- Measures listed in this section for the Biodiversity and Protected areas protection should be developed:

  - All construction works should be performed outside of the period of nesting of most wetland birds that have been recorded in the wider project area (from March till the end of August)

  - All construction works should be performed with constant surveillance of ornithologists to assure the proper implementation of measures regarding avoidance of impact on birds (avoiding the most sensitive time of the year and the day).

  - All working vehicles should be carefully washed with hot water before moving into the vicinity of Lake Pogradec (Ohrid) to prevent the introduction of invasive species.

  - During the rehabilitation work on the railway line in the Landscape Protected Area of Pogradec Lake, constant supervision of biologists or other related experts for nature conservation must be present to assure no additional surfaces will be damaged.

  - Establish the work camps and pipes yards in distance from Pogradec lake to reduce as much as possible the impacts upon the aquatic species qualifying the lake as a Critical Habitat.

  - Heavy machinery and vehicles that will be used during the construction works should be carefully washed (with an accent on washing the wheels) before the start of construction works to lower the possibility of spreading the seed of invasive plant species. Washing should be repeated whenever machinery and vehicles are transported into the vicinity of Pogradec lake.

  - If the invasive plant species appear within the working corridor during the construction work, they should be removed and properly deposited. After the reinstatement activities, the presence of invasive species should be monitored and in case additional measures will be implemented.

  - After the finishing of the construction works, adequate tree and shrub species should be planted in the appropriate area for the project to have a net gain of biodiversity and to prevent the establishment of invasive plant species.

- On all sites where vegetation cover would be removed or damaged by accident, a mixture of grasses and legumes should be sowed to prevent soil erosion, introduction and spreading of invasive plant species.
- If the invasive plant species appear within the working corridor during the construction work, they should be removed and properly deposited. After the reinstatement activities, the presence of invasive species should be monitored and in case additional measures will be implemented.
- **The plan is envisaged to be performance-based and must be compliant with EIB ESS 4. In case the set objectives are not achieved, other mitigation measures should be considered, applied, and monitored.**

6.2.2 Air quality

Design, preconstruction, and construction stages

Potential impacts and sources of impact

Air pollution will result during the construction activities, such as the emission of dust from demolishing of existing structures and buldings , the processes of excavation works, dust from transport ,gases by the heavy equipment and vehicles due to the fuel combustion, as well as from dust particles from soil movement , transport of the material etc.

This impact will be local and only during the construction phase. Potentially it may result a moderate increase in the level of PM10 and PM2.5 in the air near the construction site.

Dust and gas emissions potentially affect health of workers and the residents / local near construction site , vegetation ,water sources especially taking into consideration the footprint of the project go through along Shkumbini .

Impacts on local air quality are likely to occur during construction and preliminary phase (pre-construction), and decommissioning phase;

Temporary dust emissions will be emitted from earthworks, clearing vegetation, earth excavations, vehicle movement, stockpiles, unpaved surfaces, etc. near the Project area.

Temporary emissions of exhaust gases into the atmosphere from vehicles involved in the construction of the Project (ie, emissions from excavators, bulldozers, trucks, vehicles/cars) ,from use of equipment, such as generators, during work activities.

Potentially Impacted Receptors

Potential receptors in the study area consist mainly of the residential population living near the proposed footprint of the railway especially near the train stations in urban area (Rrogozhine , Peqin ,Elbasan ,Librazhd, Prrenjas , Pogradec).

- Air quality in the vicinity of the construction area
- Human Health Impacts;
- Dust Soiling Effects on People and Property;
- Ecological Impacts.

The main pollutants will be particle matter (TSP;PM10;PM2.5 .)

Gas emissions: The main pollutants that are associated with working machinery and transport vehicles are : NO2, CO, benzene (C6H6), VOC ;

Potential impacts during Construction phase

The most sensitive indicators potentially will affect the air quality close to the working site (based even in the existing air quality near the project area) are PM10; NO2 ;

Dust consists of large airborne particles that are stable residents in the atmosphere for short periods of time after release because they are heavy enough to fall out of the air relatively quickly. Therefore, the effects of these emissions will be localized and they do not represent long-term or widespread changes in local air quality, but they may be a source of concern and complaints from communities if they are located close to residential areas and/or properties. . This is of particular importance in the summer period, especially near work zones and along parts of roads that are in poor or unpaved conditions.

It is worth noting that most dust emissions are likely to occur during the working hours of the construction activity. The effect of dust in the air depends in depends on a number of factors, including the direction and strength of the wind, rainfall, local topography and the presence of barrier structures (buildings, trees, etc.) that can capture or stop dust before it reaches sensitive sites or receptors.

The US EPA indicates that "rainfall > 0.2 mm/hr will effectively reduce dust and wind speeds > 5.3 m/s are usually a prerequisite to lift dust from open surfaces.

Based on [142]EPA concludes that:

- During the most extreme wind events and speeds, dust will typically travel no more than 200 m from the source before becoming airborne;
- At the highest wind speeds, dust is unlikely to travel more than 500 m from the source; and,
- Precipitation > 0.2 mm/hour is likely to effectively reduce dust emissions.

Referring to the baseline conditions, climacteric conditions, the impact on air quality within project developed area and receptors within 200 m from the dust source will be affected and will be more significant during the preconstruction and construction phase, due to the works activities performed during this phase.

Another possible source of air pollution is exhaust emissions related to road traffic, vehicle movement and machinery operation; the main pollutants of concern are NOx, PM10 and PM2.5. Emissions from vehicle and machinery exhaust will be fairly limited in quantity and duration, with an overall impact significance of negligible to small, and are therefore not considered to contribute significantly to baseline levels.

Table 6-16:Key Potential Impacted receptors

Impact	Construction	Operation

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https://www.miga.org/sites/default/files/archive/Documents/Vol%20II_Annex%20C_Air%20Quality_Final_Sept%202016.pdf

Temporary the residents living near the footprint , Human Health Impacts;	X	
Ecological Impacts.	X	

An appraisal has been carried out to assess the risk to sensitive receptors as a result of dust soiling, health impacts and ecology impacts due to the Construction Phase in accordance with the IAQM Guidance. This appraisal reviews the sensitivity of the site's location with respect to dust nuisance, human health and ecological impacts and then calculates a risk of impact using the magnitude of site activities.

Receptor sensitivity can be described, as follows, with respect to human health as per the IAQM Guidance:

- **High sensitivity receptor with respect to human health – surrounding land where:**
  - Locations where members of the public are exposed over a time period relevant to the air quality limit value for PM10 (in the case of the 24-hour limit value, a relevant location would be one where individuals may be exposed for eight hours or more in a day); or
  - Indicative examples include residential properties. Hospitals, schools and residential care homes should also be considered as having equal sensitivity to residential areas for the purposes of this assessment.
- **Medium sensitivity receptor with respect to human health – surrounding land where:**
  - Locations where the people exposed are workers, and exposure is over a time period relevant to the air quality limit value for PM10 (in the case of the 24-hour limit value, relevant location would be one where individuals may be exposed for eight hours or more in a day); or
  - Indicative examples include office and shop workers but will generally not include workers occupationally exposed to PM10, as protection is covered by Health and Safety at Work legislation.
- **Low sensitivity receptor with respect to human health – surrounding land where:**
  - Locations where human exposure is transient; or
  - Indicative examples include public footpaths, playing fields, parks and shopping streets.

These major dust generating activities are divided into four types (where relevant) to reflect their different potential impacts, as outlined below:

- Demolition;
- Earthworks;
- Construction; and
- Trackout.

Track out is defined by the IAQM as the 'transport of dust and dirt from the construction/demolition site onto the public road network, where it may be deposited and then re-suspended by vehicles using the network'.

Table 6-17:Sensitivity of the Area to Dust Soiling Effects on People and Property (IAQM 2014)

Receptor Sensitivity	Number of Receptors	Distance from Source (m)			
		<20	<50	<100	<350
High	>100	High	High	Medium	Low
	10 - 100	High	Medium	Low	Low
	1 - 10	Medium	Low	Low	Low
Medium	>1	Medium	Low	Low	Low
Low	>1	Low	Low	Low	Low

Table 6-18:Sensitivity of the Area to Human Health Impacts (IAQM 2014)

Receptor Sensitivity	Annual Mean PM_{10} Concentration	Number of Receptors	Distance from Source (m)				
			<20	<50	<100	<200	<350
High	> 32µg/m^3	>100	High	High	High	Medium	Low
		10 - 100	High	High	Medium	Low	Low
		1 - 10	High	Medium	Low	Low	Low
	28µg/m^3 - 32µg/m^3	>100	High	High	Medium	Low	Low
		10 - 100	High	Medium	Low	Low	Low
		1 - 10	High	Medium	Low	Low	Low
	24µg/m^3 - 28µg/m^3	>100	High	Medium	Low	Low	Low
		10 - 100	High	Medium	Low	Low	Low
		1 - 10	Medium	Low	Low	Low	Low
	< 24µg/m^3	>100	Medium	Low	Low	Low	Low
		10 - 100	Low	Low	Low	Low	Low
		1 - 10	Low	Low	Low	Low	Low
Medium	> 32µg/m^3	>10	High	Medium	Low	Low	Low
		1 - 10	Medium	Low	Low	Low	Low
	28µg/m^3 - 32µg/m^3	>10	Medium	Low	Low	Low	Low
		1 - 10	Low	Low	Low	Low	Low
	24µg/m^3 - 28µg/m^3	>10	Low	Low	Low	Low	Low

Receptor Sensitivity	Annual Mean PM_{10} Concentration	Number of Receptors	Distance from Source (m)				
			<20	<50	<100	<200	<350
		1 - 10	Low	Low	Low	Low	Low
	< 24µg/m³	>10	Low	Low	Low	Low	Low
		1 - 10	Low	Low	Low	Low	Low
Low	-	1+	Low	Low	Low	Low	Low

Dust deposition impacts on ecology can occur due to chemical or physical effects. This includes reduction in photosynthesis due to smothering from dust on the plants and chemical changes such as acidity to soils. Often impacts will be reversible once the works are completed, and dust deposition ceases.

Table 6-19:Sensitivity of the Area to Ecological Impacts (IAQM 2014)

Receptor Sensitivity	Distance from Source (m)	
	<20	<50
High	High	Medium
Medium	Medium	Low
Low	Low	Low

Operation and maintenance

As the trains will be electrical one , during operation and maintenance it is not expected to have direct emission in the air.

Electric Trains are more efficient than diesel trains[143].They are reliable, cost-effective, and, above all, environmentally friendly. Electric trains have made significant strides in terms of sustainability and efficiency. They use electric motors to power their movement, which makes them less reliant on fossil fuels. This means that they produce fewer greenhouse gas emissions, which makes them one of the most sustainable transportation options available. In addition, electric trains are incredibly energy-efficient, with some models capable of returning up to 92% efficiency of energy consumption.

On the other hand, diesel trains use diesel fuel to power their engines which produce greenhouse gases, noise pollution, and particulate emissions. Moreover, Diesel trains have a much lower energy

[143] https://flarecompare.com/Renewable%20Energy%20Technology/Electric%20trains%20vs.%20diesel%20trains/

efficiency than electric trains. Typically, diesel trains can return between 20-30% efficiency of energy consumption, while electric trains can return up to 92%.

Maintenance and Operating Costs: Electric trains have lower maintenance costs as they have fewer moving parts than diesel trains. This means that there are fewer components to maintain, repair or replace, resulting in lower maintenance and operating costs.

In contrast, diesel trains have more moving parts, which require more frequent maintenance, and repairs. This makes them more expensive, with some estimates suggesting that diesel trains can cost up to three times as much to maintain than electric trains.

Performance and Speed :Electric trains are known to be much faster and efficient than diesel trains. They can reach faster speeds and accelerate more quickly. This is largely due to the electric motor's capability to change speed instantly, whereas diesel trains require speed changes made via gear changes, which takes more time.

In conclusion, electric trains are more energy-efficient, more sustainable, cheaper to maintain and operate, and faster than diesel trains. As the world moves towards a more sustainable future, it seems apparent that electric trains will continue to dominate the transportation industry.

Decommissioning activities

During this phase dust will be generated, vehicle emissions and increased traffic for of a similar intensity as during construction; as a result, impacts will be similar to those experienced during the construction phase.

Prior to mitigation **impacts on air quality are rated to be of moderate significance**. Management and mitigation measures will be similar to those during construction phase. Therefore, residual impact after management and mitigation measures is minor

Table 6-20:Impact expected

Air quality	Impact expected	
	Construction	Operation
Project Development Area/Construction site	**Moderate significance**	**Minor**
Decommissioning activities	**Moderate significance**	

Mitigation Strategies

Construction Phase

- The appointed Contractor shall provide a site hoarding of 2.4m height along sensitive boundaries, close to the resident area to minimize the potential increasing dust impacts off-site.
- Remove existing asbestos from the existing buildings (that shall be demolished) by specialised trained staff (to avoid asbestos spreading in the air) before starting construction activity .
- Minimise open excavation areas; minimise vegetation clearance (when is possible) to reduce exposure of bare soil, and revegetate cleared areas as soon as possible;
- Restrict vehicle speeds on construction sites and all access roads to minimize potential generation of dust;

- Material handling systems and site stockpiling of materials will be designed and laid out to minimize exposure to wind.
- Water misting or sprays (or similar dust suppression methods) will be used as required if particularly dusty activities are necessary during dry or windy periods;
- During movement of dust-generating materials both on and off-site, trucks will be covered with tarpaulin and before entrance onto public roads/ resident area , trucks will be checked to ensure the tarpaulins are properly in place;
- Daily visually monitor of presence of dust on site and monitor the air quality by the laboratory based on the provisions of the relevant regulations, including the DCM 352/2015 "On the assessment of environmental air quality and the requirements related to some pollutants".
- Contractor will keep the effectiveness of the mitigation measures under review and revise them as necessary. In the event of dust nuisance occurring outside the works boundary, movements of materials likely to raise dust will be curtailed and satisfactory procedures implemented to rectify the problem.
- Take appropriate measures, including personal protective equipment (PPE) to protect the health of the workers from the dust and polluting substances;
- Respect the deadlines for technical control of the vehicles;
- Use fuels, which comply 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);

Mitigation of impacts in relation to generation of dust and vehicle / machinery emissions will be managed
through the development of the ESMP/CEMP for the construction phase which will specify appropriate measures for the management of site clearance, excavation and construction activities.

Residual Impact

Following implementation of mitigation measures described above, the residual impact is considered to be minor and only during construction phase.

Residual Impact Significance

Table 6-21:Residual Impact

Air quality	Residual Impact	
	Construction	Operation
Project Development Area/ Construction site	Minor	Negligible
Decommissioning activities	Minor	

Conclusion: 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.

6.2.3 Noise and vibrations

Design, preconstruction, and construction phase

Sources of impacts:

The urban centres crossed by the railway line from Rrogozhine to Pogradec . The railway line runs across the urban and rural area as Rrogozhine , Peqin , Paper, Elbasan , Labinot Fushe, Xibrake , Mirake ,Librazhde, Xhyre ,Qukes, Perrenjas(Loti1) and Rrajce, Urake, Piskupat, Hdenisht ,Memlisht (Pogradec Loti 2) well as along the protected area (Kuturman -Qafa e Bushit Lot 1) and Lake of Ohri(Loti 2).

Noise and vibrations will be generated mainly from the demolition of existing buildings and structures as stations, bridges, culverts, etc., and construction activities , transport vehicles, which are going to be generally heavy trucks and various machinery like excavators, diggers, scrapers, cranes, etc.

Noise and vibration emissions are likely to occur during construction, operation and decommissioning phases.

Potential receptors in the study area consist mainly of the residential population living near the proposed footprint of the railway especially residents close to train stations (urban area);

- Noise and vibration emissions due to earthworks and any potential rehabilitation of access roads in the area nearby;
- Noise and vibration emissions from vehicle movement, transportation activities and working machineries involved in Project construction (i.e., excavators, bulldozers, trucks, roller, etc.);
- Increased traffic causes noise and vibration impacts as well . Project related traffic is limited to daytime;
- Noise emissions from the use of equipment during work activities (e.g., generators).

The Noise Level Guidelines (IFC, WHO) refer to noise originating from facilities as well as stationary noise sources, and are commonly applied as design standards for industrial and infrastructure facilities. The Albanian Government[144] also provides similar guidelines and standards to ensure industrial activities are compatible with a clean and safe environment.

Based on the best practice the following criteria have been used for the assessment/rating of constructional and operational noise impacts. The impact assessment methodology for residential receptors is done based on the following table:

Table 6-22: Impact Assessment Methodology for Residential Receptors

	Major	Moderate	Minor	Negligible	Not Significant
Construction and Decommissioning Noise	Noise level >15 dBA above criteria.	Noise level between 10 to 15 dBA above criteria.	Noise level up to 10 dBA above criteria.	Noise level up to5 dBA above criteria.	Noise level below criteria.
Operational Noise	Noise level between >10 dBA above criteria.	Noise level between 5 to 10 dBA above criteria.	Noise level between 3 and 5 dBA above criteria and	Noise level below criteria but above baseline < 3 dBA.	Noise level > 10 dBA below criteria and below baseline.

[144] Ministerial Guideline No. 8, dated 27.11.2007 “On the noise limit levels in certain environments”.

			above baseline.		

Note: Criteria for construction is 70 dBA; criteria for house receptors are 55 dBA (daytime); daytime is 07:00 to 22:00; night time is 22:00: 07:00.

Vibration

The level of vibrations at the sensitive receptors in sensitive areas as (archaeological site, houses etc) potentially impacted during construction or operation activities shall be meet the requests as per standarts :"Vibrations in buildings - Part 3: Effects on structures), 3- 10 mm/s, (at 20 Hz).

The measurements shall be performed in accordance with the ISO 4866:2010 method "Mechanical vibration and shock — Vibration of fixed structures — Guidelines for measuring vibrations and evaluating their effects on structures".

Table 6-23:The evaluation of the degree of vibrations shall meet the criteria as per the standard: DIN4150, 1-3, Vibrations in buildings - Part 3: Effects on structures.

Environment	Vibration (mm/s)
Buildings with commercial and industrial destination:	20-50
Residential building	4-20
Buildings sensitive to vibrations, with special internal values	**3-10**

Construction activity is generally undertaken in the open area , is usually of a temporary duration, and varying levels of noise are produced by several different types of noise sources.

Noise and vibration levels created by construction machineries and equipment can vary greatly and depend on factors such as characteristic of the terrane (natural barriers as trees ,forest ,relieve reduce the impact and make possible to limit the spread of the noise), type of equipment, the specific model, duration of the activity, and the condition of the equipment. There are no standardized criteria for assessing construction noise and associated impacts, and consequently such criteria must be determined on a project specific basis. The Project construction noise criteria should take into account the existing noise environment, the absolute noise levels during construction activities, and the receptor land use.

The following reviews of recognised construction noise guidelines provide guidance to develop suitable construction noise criteria. For construction, noise criteria of 70 dB LAeq, 1-hr are set to take account of the fact that it is temporary, and to acknowledge that construction work by its very nature is noisy and a lower, strictly enforced criteria, can limit development.

The table below shows the noise level generated by some vehicles and machinery, which are used in the construction works.

Table 6-24_Construction machinery and the related 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 machinery	103
8	Truck on gravel road	64
9	Truck on asphalt road	61

The Albanian Law No.9774, of 12.7.2007; "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 as per order No.8, of 27.11.2007 "On the limits for noises in specific environments", presented in the table below.

Table 6-25: Noise generation levels depending on the environment

Specific environment	Critical health effect(s)	LAeq [dB]	Time base [hours]	LAmax, fast [dB]
Outdoor living area	Serious annoyance, daytime and evening Moderate annoyance, daytime and evening	55 50	16 16	- -
Dwelling, indoors Inside bedrooms	Speech intelligibility and moderate annoyance, daytime and evening Sleep disturbance, night-time	35 30	16 8	 45
Outside bedrooms	Sleep disturbance, window open (outdoor values)	45	8	60
School class rooms and pre-schools, indoors	Speech intelligibility, disturbance of information extraction, message communication	35	during class	-
Pre-school ;Bedrooms, indoors	Sleep disturbance	30	sleeping -time	45
School, playground outdoor	Annoyance (external source)	55	during play	-
Hospital, ward rooms, indoors	Sleep disturbance, night-time Sleep disturbance, daytime and evenings	30 30	8 16	40 -

Hospitals, treatment rooms, indoors	Interference with rest and recovery	#1		
Industrial, commercial, shopping and traffic areas, indoors and Outdoors	Hearing impairment	70	24	110
Ceremonies, festivals and entertainment events	Hearing impairment (patrons:<5 times/year)	100	4	110
Public addresses, indoors and outdoors	Hearing impairment	85	1	110
Music through headphones/ Earphones	Hearing impairment (free-field value)	85 #4	1	110
Impulse sounds from toys, fireworks and firearms	Hearing impairment (adults) Hearing impairment (children)	- -	- -	140 #2 120 #2
Outdoors in parkland and conservation areas	Disruption of tranquillity	#3		

Note:

#1: as low as possible;
#2: peak sound pressure (not LAmax, fast), measured 100 mm from the ear;
#3: existing quiet outdoor areas should be preserved and the ratio of intruding noise to natural background sound should be kept low;
#4: under headphones, adapted to free-field values
-LAeq (dBA) = equivalent to a level measured at scale A
-LAmax Fast (dB) = Measured level at scale A in "Fast" mode (fast)

Operation Phase

Source of noise and vibrations

The main source of noise and vibration is the interaction between the train's wheels and rails, which leads to a vibration that is perceived as noise[145]. The trains' noise and vibrations are proportional to their speed[146]. The railway noise is a concern, overall when it is caused by freight trains and/or trains containing older wagons or engines, especially during the night[147].

Based on the existing study (Rail Transit: Addressing Wheel/Rail Noise at the Source) ,the mainly source of noise and vibrations during operation are as follows:

- A source associated with the railway components (structure and substructure) and configuration (curves, etc.).
- Sources associated with the railway line maintenance and routine activities.

The noise sources associated with the railway components and configuration include[148]:

a. Rolling noise, which is caused by wheel and rail vibrations induced at the wheel/rail contact. Rolling noise is the most important source of noise from railways.

[145] European Commission. Science for Environment Policy. Noise abatement approaches. April 2017

[146] Rail Transit: Addressing Wheel/Rail Noise at the Source

[147] "Reducing Railway Noise Pollution". A Study requested by the European Parliament. 2012

[148] Railway Noise and Vibration: Mechanisms, Modelling and Means of Control, David Thompson, 2009

b. Curve squeal noise, which is caused by the interaction between wheel and rail. It is associated with the contact occurring during curving.

c. Bridge noise, which depends on the type of bridge. Dynamic forces acting on it excite the bridge.

d. Aerodynamic noise, which is caused by air flow over various parts of the train.

e. Ground noise and vibrations, which occur in two ways: a-low frequency, vibration, which is associated mostly with heavy freight trains at particular sites; and high-frequency vibration that is associated mostly with tunnels in urban areas. This vibration can be significant also for surface trains when noise barriers block out the direct airborne sound[149].

f. Engine noise, which is associated with lower speeds up to about 30 km/h.

The noise and vibrations generated from the above-mentioned sources can increase because of other factors associated with the design of the horizontal alignment and of the rails that include:

- Train movements on curved track sections which can generate wheel squeal;
- Passage of trains over rail track discontinuities such as switches, dragging equipment, wheel impact detectors, joints for signalization, and at-grade intersections with roads and other rail infrastructure.

Sources associated with the railway lines and station activities: The typical noise sources associated with the daily activity of the railway lines and stations during the operation stage include[150]:

- Trains' horn, warning signals at level crossings, etc.;
- Stations operations involving trains stopping and starting, assembling of trains, shunting of cars (switching), retarders, use of signalling devices, repair work;
- Extended idling of locomotives on railway lines, rail sidings, or in yards;
- Audible warning devices, whether mounted on the train or near at-grade road crossings;
- Intermodal stations operations, including the transfer of containers;
- Repairing works (loose joints, rough rail, and ground settlements); etc.

Sensitive Receptors during Construction and operation Phase

- Project workers will be exposed to noise from construction machinery as well as, potentially, hand-arm vibration from hand-held power tools, or whole-body vibrations from surfaces on which the worker stands or sits.
- Residents close to the project footprint especially in urban area ;
- Fauna will be exposed

[149] Railway Noise and Vibration: Mechanisms, Modelling and Means of Control, David Thompson, 2009

[150] https://otc-cta.gc.ca/eng/railway_noise_measurement

- Other potential noise emissions may arise from vehicle movements in the project area. The roads to be used during construction period pass in vicinity of resident areas, these increased traffic causes noise and vibration impacts.

Potential Impacts Construction and Operation phase :

Temporary adverse impacts on the fauna, and the health of workers and local population.

Project related traffic is limited to daytime, therefore impacts from noise and vibration are considered minimal;

The impacts are characterized as short-term since they will last until the end of the construction period. During the initial stage of project mobilization there will be increased level of traffic while equipment and materials are transported to the construction site.

Vehicle movement will continue during the whole duration of the project, nevertheless it is expected that the movement will vary according to the planned works; sometimes it will decrease and other times it will increase. The noise might be felt more in the inhabited areas where the vehicles will pass. However, noise and vibration emissions from vehicle movement are predicted to be less significant than other types of noise and vibration generation sources (construction activity) and short-term.

Operation and maintenance

Install noise barrier to the resident buildings close to the project area. A preliminary evaluation of the noise barrier is assessed during this phase of the project. Determination of the exact location where noise barriers shall be installed shall be evaluated during detail design phase of the project, taking into consideration even Noise modelling study to per performed.

Table 6-26 Sections recommended for installing noise barrier(preliminary assessment)

No	Rrogozhine- Prrenjas Loti 1		
	KMP Start from :to	L/R Left /Right	m
1	035+384	R	100
2	035+600	R	300
3	035+600	L	400
4	036+000	R	150
5	037+900	R	150
6	037+900	L	120
7	038+150	R	30
8	038+350	L	60
9	038+450	R	30
10	038+450	L	30
11	038+550	R	40
12	039+100	R	90
13	039+500	L	150
14	039+500	R	150
15	039+800	R	100
16	040+150	R	80
17	040+150	L	100

No	Rrogozhine- Prrenjas Loti 1		
	KMP Start from :to	L/R Left /Right	m
18	040+300	R	40
19	040+300	L	60
20	040+900	R	180
21	041+250	R	170
22	041+500	R	200
23	041+800	R	110
24	042+000	R	50
25	042+180	R	90
26	042+180	L	60
27	042+300	R	100
28	042+300	L	200
29	042+600	L	900
30	042+800	L	200
31	042+800	R	200
32	045+600	R	800
33	045+600	L	800
34	046+600	L	1000

No	Rrogozhine- Prrenjas Loti 1		
	KMP Start from :to	L/R Left /Right	m
35	047+500	R	250
36	048+000	R	250
37	048+000	L	100
38	048+500	R	100
39	048+800	R	30
40	048+901	R	30
41	049+250	R	300
42	049+250	L	250
43	049+900	L	150
44	050+400	L	200
45	050+600	R	150
46	050+900	L	100
47	050+900	R	70
48	052+000	R	350
49	053+000	R	250
50	054+400	R	100
51	054+600	L	50
52	054+600	R	75
53	054+800	L	100
54	054+800	R	80
55	055+100	R	200
56	055+100	L	50
57	055+600	L	40
58	055+900	L	120
59	055+600	L	200
60	055+600	R	100
61	056+250	R	50
62	057+000	R	100
63	057+201	R	40
64	058+300	R	40
65	058+500	L	40
66	058+500	R	100
67	058+700	R	400
68	059+101	R	60
69	059+400	R	150
70	059+601	L	120
71	059+902	R	40
72	060+000	R	40
73	060+201	L	60

No	Rrogozhine- Prrenjas Loti 1		
	KMP Start from :to	L/R Left /Right	m
74	060+802	R	100
75	061+000	L	130
76	062+700	L	55
77	063+250	L	40
78	063+451	R	80
79	064+450	L	60
80	064+500	R	130
81	065+500	R	180
82	065+901	R	180
83	066+000	L	250
84	066+800	L	130
85	066+850	R	40
86	067+200	L	100
87	069+500	L	100
88	069+900	L	270
89	070+900	R	50
90	072+401	R	30
91	073+000	L	200
92	073+501	R	150
93	073+500	L	200
94	073+901	L	360
95	074+100	R	300
96	076+000	L	3000
97	076+001	R	1600
98	080+000	R	250
99	080+801	R	200
100	081+002	L	120
101	081+003	R	130
102	081+504	R	150
103	081+605	R	350
104	082+206	R	100
105	082+607	R	100
106	083+008	R	330
107	083+409	L	200
108	083+600	R	150
109	084+401	L	50
110	084+500	L	130
111	093+201	L	500
112	098+000	L	130

No	Rrogozhine- Prrenjas Loti 1		
	KMP Start from :to	L/R Left /Right	m
113	098+001	R	130
114	099+600	R	300
115	099+801	R	100
116	099+802	L	100
117	100+070	L	100
118	100+071	R	100
119	100+500	R	60
120	100+601	L	40
121	100+700	L	200
122	100+700	R	200
123	104+801	L	100
124	105+000	L	40
125	107+301	R	40
126	107+702	L	150
127	108+000	R	60
128	109+000	R	40
129	109+700	R	40
130	114+300	R	100
131	114+800	R	200
132	115+000	L	200
133	115+501	R	130
134	115+800	L	150
135	116+200	L	150
136	116+800	L	60
137	116+801	R	60
138	118+000	R	200
139	118+201	R	50
140	118+400	R	100
141	119+201	R	80
142	121+200	R	100
143	123+800	R	100

No	PRRENJAS – POGRADEC Lot 2		
	KMP Start from :to	L/R Left /Right	m
1	127+200	R	170
2	127+200	L	170

No	PRRENJAS – POGRADEC Lot 2		
	KMP Start from :to	L/R Left /Right	m
3	127+801	R	250
4	128+202	R	150
5	128+403	L	50
6	129+204	L	150
7	129+405	R	150
8	130+000	L	150
9	130+401	R	150
10	130+602	R	130
11	130+803	L	100
12	130+800	R	50
13	131+101	R	140
14	131+102	L	180
15	131+503	R	250
16	131+800	L	200
17	131+800	R	200
18	132+001	L	200
19	132+000	R	160
20	132+201	R	180
21	134+202	L	250
22	132+603	R	100
23	136+804	L	50
24	137+405	R	40
25	1139+606	R	170
26	141+000	R	150
27	142+200	R	200
28	145+501	L	40
29	147+402	R	125
30	147+603	L	50
31	147+804	L	270
32	148+305	L	72
33	148+300	R	190
34	150+401	R	100
35	151+000	L	25
36	151+500	L	130
37	151+500	R	130
38	151+901	L	60

Potential impacts and suggested noise exposure limits

The World Health Organization (WHO) has classified traffic noise, including road, rail, and air traffic, as the second most important cause of ill health in Western Europe, behind only air pollution caused by very fine particulate matter[151]

The WHO Environmental Noise Guidelines for the European Region[152] (2018) recommends reducing average noise levels produced by railway traffic below 54 dB, as railway noise above this level is associated with adverse health effects.

For night noise exposure, the guideline recommends reducing noise levels produced by railway traffic during nighttime below 44 dB, as nighttime railway noise above this level is associated with adverse effects on sleep.

To reduce health effects, the guideline recommends that policy-makers implement suitable measures to reduce noise exposure from railways for the population exposed to levels above the guideline values, for both average and night noise exposure values.

Good International Practice on the best ways to reduce the railway noise

The noise protection barriers (protection at the propagation path) and insulating windows (protection at the receiver) are only locally effective and often require high investments to protect wider parts of railway networks. In contrast, noise should ideally be reduced at the source because these measures have a network-wide effect.

As shown in the table below[153], most of the noise is generated at the source and therefore noise reduction at the source should be taken into account primarily.

Table 6-27Range of noise reduction measures

No	Mitigation measure	Min reduction	Max. reduction
1	Composite brake blocks on freight wagons	8 dB(A)	10 dB(A)
2	Noise barriers (2m high)	5 dB(A)	10 dB(A)
3	Wheel absorbers	2 dB(A)	7 dB(A)
4	Rail tuned absorbers	3 dB(A)	7 dB(A)

On the infrastructure side, friction modifiers, rail dampers and slab track are cost-effective measures to reduce noise. In densely populated areas and highly trafficked railway sections, usage of noise barriers or coverings cannot be avoided.

The adverse impacts from noises and vibrations generated during preconstruction and construction and operation works are temporary and of local extent. They can be evaluated as

[151] https://www.eea.europa.eu/themes/human/noise

[152] https://www.euro.who.int/__data/assets/pdf_file/0008/383921/noise-guidelines-eng.pdf

[153]ttps://www.europarl.europa.eu/RegData/etudes/etudes/join/2012/474533/IPOL-TRAN_ET(2012)474533_EN.pdf

probable and of moderate significance and can be mitigated by taking the appropriate mitigation measures.

Table 6-28:Expected adverse impacts on the fauna, and the health of workers and local population.

Noise and vibration	Impact expected	
	Construction	Operation
Construction site	Moderate	
Residents close to footprint of the project	Moderate	Moderate
Fauna	Moderate	Moderate
Decommissioning activities	Moderate	

Mitigation measures

During design and construction stage

Suggested mitigation measures

The suggested mitigations measures Construction phase include:

- Equipment maintenance, and noise/ vibration emissions and monitoring during construction will be managed through the development of a robust Construction Environmental Management Plan (CEMP) and CTMP(Contract traffic management plan)
- Development of the OHSMP (Workplace Health & Safety Plan for protection of workers and equipment with adequate PPE);
- Avoid construction camps as far away as possible from inhabited areas, and areas of high fauna values;
- Avoid the construction activities during the reproduction periods of the fauna, especially across the forested and shrubby areas along the railway line (refer to the biodiversity impact assessment);
- Avoid simultaneous work activities that generate high levels of noise/ vibration emissions especially near the sensitive receptors;
- Prior notification of local residents in case of important work activities that generate noise and/or vibrations;
- Monitoring of the level of vibration at the sensitive receptors in sensitive areas as (archaeological site, houses etc) potentially impacted during construction or operation activities
- Apply the best standards and practices in case of use of blasting for demolishing the existing structures;
- Limit the working hours of machinery that generate high noise /or and vibration;
- Conduct regularly the technical control of construction engines and transport vehicles;
- Respect the official standards on noise and vibrations as provided for in the Albanian Law 9774/2007; “On evaluation and administration of noises in the environment”;

- Monitor the noises and vibrations from project activities as provided by the MoE Ordinance 1037/1, dated 12.04.2011 "On the assessment and management of environmental noise**".**

The mitigation measures taken into consideration in the Project design include:

- The consultant on detail design phase shall consider the appropriate ground conditions, including the materials that provide for the base of the railway, to reduce the vibration disturbance ;
- The Project's detail design shall determinate the exact location where the noise barriers shall be installed based on noise modeling study; The Consultant shall recommend the appropriate type of noise barrier for each segment, in function of the local features.
- High noise barriers impact the landscape; therefore, the detailed design phase must select appropriate barriers based on natural features and specific conditions.
- Wherever possible, installation of transparent barriers along service roads is preferable to opaque ones, as they help car drivers' visibility and allow for landscape visibility;
- Whether possible, the installation of transparent barriers across natural landscape, valley , agricultural area is preferable, to not affect the landscape.

The Consultant (on detail design phase) shall take into c onsideration the location of the sensitive sites/objects/facilities, including cultural heritage and historical/religious sites/objects, and educational and health facilities.

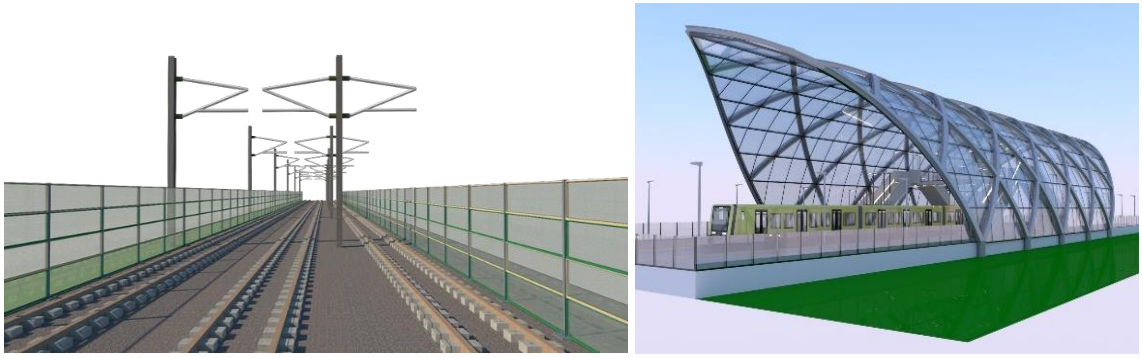


Figure 6-2Transparent noise barrier recommended

During operation and maintenance

a. Preferring using electrical trains versus diesel
b. Good maintenance of the trains whole railway components (superstructure, substructure and superstructure);
c. Good maintenance of the noise barriers.

Options for reducing the rolling noise and vibration

Three options are possible for reducing the rolling noise and vibration, as follows:

1. Mitigation at the source;
2. Mitigation at the propagation path; and
3. Mitigation at the receiver.

Electric trains emit less noise than diesel trains.

Since this phase of the project is not detailed, the detailed technical data about the trains, the locations where the noise barrier shall be installed, the type and configurations of the noise barrier, and even the impact will be assessed in more detailed during the detail design phase of the project.

The main characteristics of a noise barriers will be taken into consideration in detail design phase as (the geometry, including the high and the inclination; the insulating capacity; the visual aspect, which should fit as practical as possible to the local environment.)

The noise barrier designer (in detail design phase) should always take into consideration the so-called “canyon effect”, which is the sound reflection between the train body and the barrier.

Another efficient noise barriers are considered soil berms, which are also environmentally friendly. Their weak point is the excessive thickness compared to the other types of barriers (walls in stone, wood, steel, glass, plastic, etc.).

Mitigation at the receiver (e.g. houses close to the railway), which is not within the control of the railway institutional system. That requires the insulation of walls and windows against noise that can be applied to the buildings close to the railway line.

Cumulative effect

Cumulative impact on noise shall be taken into consideration during detail design phase due to the noise generated by vehicles traveling on the highway, almost close to or very close to the track of the railway project.This will be evaluated at noise modelling study.

Residual Impact

Table 6-29:Expected adverse impacts on the fauna, and the health of workers and local population.

Noise and vibration	Residual Impact	
	Construction	Operation
Construction site	Minor	
Residents close to footprint of the project	Minor	Negligible
Fauna	Minor	Negligible
Decommissioning activities	Minor	

6.2.4 Impacts on Climate Change and Adaption

6.2.4.1 Design, preconstruction, and construction

The adverse impacts on climate change from project are likely to occur during construction phase.

During the construction phase, as a result of construction works (heavy machineries operation, vehicles and road traffic) negative impacts are related due to the release of air pollutants and dust generation (particulate matter). The primary contributors to air emissions and CO2 would arise from mobile and/or stationary sources, such as on and off-road vehicles, diesel generation sets, use of heavy equipment, etc.

The preconstruction and construction activities may affect the climate through the increase of CO2 concentration removing of vegetation due to the earthworks for construction purposes , vegetation clearing alongside the working strip both sides of the railway line, as well as in a direct way by a generation of gaseous effluents generated from construction machinery and transport vehicles.

Construction activities can influence also water quality. Construction activities could also cause an increase in suspended solids in aquatic environments, which could result in siltation of feeding sites and breeding grounds of some species, particularly for fish species ;

However, it can be anticipated that potential negative impacts will not be significant and will be reduced to a degree, with proper mitigation measures.

Project footprint is situated over the sea level and no significant /minor risk from flooding . The impacts from Global Climate change to floods can minorly influence the footprint of the project.

The impacts of weather on railway infrastructure should be considered in the decision-making process for maintenance and renewal programmes, as part of asset management strategies, to help minimize the risk or severity of impacts.

All components of the railway infrastructure such as tracks, catenary (connections of the electric network with the electric locomotive), bridges, embankments, rails, etc., are affected by extreme weather events. In some cases, such as tracks, higher temperatures/lower temperatures, rain and snow storms can lead to traffic disruptions and in worst cases lead to track damage. However, in some cases, it is difficult to measure the impact of these events on the railway infrastructure. Therefore, an adequate understanding of weather events during the planning, design, operation and maintenance of railway infrastructure should be evaluated to increase the serviceability and lifetime of the assets.

It is not expected changes in climate characteristics along the whole area crossed by the railway line.

Table 6-30Potential impact

Climate Change	Expected Impact	
	Construction	Operation
Regional /National	Minor	Minor

Recommended measures to be considered take into account the following:

- The clearance of vegetation in the area of the project is associated with negative impacts, with regards to CO2 emissions, as well as the reduction of greenhouse gas emissions absorbed through natural processes.
- Taking into account the size of the area that will be cleared, the type of vegetation in area, and the limited extent to which vegetation is required to be cleared for constructing

the project, the overall impact significance of the construction of the project on the **climate of the area can be characterized as negligible**.

- Schedule the earthworks for the railway body and the drainage system outside the rainy periods to avoid erosion and sedimentation.
- Regularly maintain all diesel-powered equipment and reduce idling time to avoid emissions and improve fuel efficiency
- Implement best practice procedures to control vehicle / equipment air emissions (such as turning off equipment when not in use)
- Vehicle / equipment exhausts observed to be emitting significant black smoke from their exhausts will be serviced/ replaced.
- We recommend the use of modern, well-maintained and efficient machinery and vehicles meeting applicable emission performance standards during construction that would minimize emissions.
- Good Environmental Practices will be recommended within the Construction Environmental Management
- Plan (CEMP). The use of best/international construction techniques and management and maintenance will help improve overall efficient use of resources and fuel.
- Preference on choosing of areas with poor vegetation for construction purpose (where it is possible) to avoid lose of vegetation . The local roads should be used as access roads. The working strip should be minimized as much as possible. Besides, it is suggested to apply the practices for mitigation related mainly to air quality, biodiversity, and land use.
- Rehabilitation of all impacted green area after construction activity by using the existing vegetation.
- The generation of gaseous effluents from construction machinery and transport vehicles can be mitigated by applying the mitigation measures related to air quality.

In a conclusion, the impact of the climatic characteristics on the project's activities is expected to be insignificant, it is no expected that the current climatic conditions will affect the project's activities;

6.2.4.2 Operation and maintenance

Impact of the climatic conditions on the project activities:

For the operation phase the project will have a moderate positive impact on climate change referring reduction of CO_2 emissions avoided due to operating the electric trains.

Climate Change Resilience and Vulnerability Assessment Report (CC Report) is drafted for this project .Main topics are included as following :

Impacts on the components of infrastructure and the services

In detail, the implication of hydro meteorological factors in vulnerable direct assets (assets of railway structures) and indirect (effects derived from infrastructural problems) are given below.

Track railway slope refers to the slope of the railway track.

Many slopes along the railway were built more than 60 years ago, before modern design standards existed. The average angle of these slopes is usually much higher than would normally be allowed for modern transport infrastructure. The problem of slopes is a problem especially in the segment Librazhd - Perrenjas. Common problems affecting slopes are shallow landslides caused by high rainfall. Deep rotational failures caused by weak subsoils which are caused by

increased loading and/or changes in water location, slope geometry or inclination; and rockslides caused by freeze-thaw effects.

Shallow failures

Shallow landslides usually occur after periods of high rainfall on high-angle slopes where there is poor soil cohesion or distinct shallow horizons have formed. Examples of shallow landslides on the lines are encountered in the Elbasan - Librazhd and Librazhd - Lin segments and occur near the entrance of the tunnels where the slope angles are usually the highest.

Because of the relatively small volume of soil involved, the consequences of shallow distortional landslides occurring on embankments (when the track is over the fault) are usually low. In cuts where the track is below the slope, the impact is closely related to the space between the edge of the slope and the track. In cases where the failed material covers the tracks, it derails unless adequate detection monitoring is in place. Repeated failures along the shear lines are also a feature of this failure type.

Deep rotational failures

Deep rolling slope problems usually involve large volumes of material and in this case the track is involved along with the slope in which soil displacements require long term work.

Retaining walls

Most modern retaining walls are flexible embedded structures that mobilize soil strength to provide stability. However, given the railway's 60-plus year age, a large proportion of the load-bearing structures are gravity structures, which rely on a combination of the structure's own weight and the retained soil for stability. These walls are not homogeneous (eg, they are built from discrete blocks) and it is not easy to assess structural integrity, the condition of the drainage system or to determine the condition at the wall-soil interface, which is critical. Given their low safety margins, these structures are particularly sensitive to any changes in loading.

Tunnels

Weather impacts on tunnels include flooding and drainage problems, which lead to increased stress and seepage/ice formation. Icing leads to ice hitting passing trains (either falling or crossing the gauge line)—especially a safety hazard for drivers and/or a potential derailment hazard if it falls on the tracks. Heavy rainfall can cause flooding and temporary closures. A more serious problem is coastal flooding of tunnels, which can result in the need to reroute sections of track. The tunnels that can be most affected by this phenomenon are those of Librazhd - Lin, Pogradec.

Track

Extreme heat causes the steel rail to expand, leading to the risk of buckling. This increases the risk of train derailment, jeopardizing the safety of passengers.

Track flooding is also a serious problem that can lead to derailments. When the track is located near a watercourse prone to flooding, embankment erosion can occur, where the supporting soil can be eroded. The most likely for this to happen is in the field of Elbasan and in the gorge of Librazhdi, especially the segment of the railway station.

Strong winds can also cause objects, such as fallen trees, to block the line.

Segment sidings on switching tracks (movable sections of track that allow trains to move from one line to another) can easily fail during floods, high temperatures (excessive expansion of the shift mechanism) or low temperatures (from ice or snow), thereby causing service interruption.

The presence of leaves on the tracks during the fall can also cause derailment problems - that is, wet leaf matter on the tracks is pressed by passing trains into a smooth coating that reduces wheel grip. In these conditions, trains must travel more slowly to reduce the risk of "overrunning stations", where the train cannot brake efficiently enough to come to a complete stop near the platform.

Bridges

During flood events, material can be washed away from surrounding foundations into the water - a process known as scour/erosion.

The loss of material causes - at a minimum - a loss of stiffness and can lead to collapse. Foundation scour has been identified as the leading cause of bridge failure worldwide and has led to the failure of many important railway bridges. Bridges founded on shallow foundations are more vulnerable. Considering the technology developed in the 70s of the last century, it is assumed that a rigorous engineering inspection of their sustainability regarding floods is necessary. The intervention, if it is evident, can be done in today's conditions of the development of knowledge and climate information.

Electrical Substation and telecommunication as railway infrastructure

Overhead power line integrity can be affected by heat (excessive damping) or cold. Strong winds can also knock down power lines or their supporting structures.

Freezing rain can lead to rapid ice accumulation on wires and support structures. This significant additional load can form, during high winds, into aerodynamic shapes that then cause excessive cable movement leading to failure of cables or junctions.

Sensitive electronic signaling equipment can overheat in hot weather, especially if placed in poorly ventilated enclosures; and - where alongside the tracks - can be prone to flooding. Signaling systems that use electrical currents in the tracks to detect trains can also be disrupted by leafy material on the rails, as such material interferes with wheel-rail contact.

In the assessment, it is considered important to highlight in particular some expected consequences of climate change in the future, consequences which have high significance and probability in the past events in the local climate of Albania, such as: landslides, rock falls and wild fire which were present in the forest segments and on the steep terrain of the railway.

Exposure is moderately influenced by expected extreme temperatures and high impact by Wild Fire for all electric cables, electric substation and all other equipment. Exposure is higher in two consequences due to slates: in landslides and rock fall in a steep segment Librazhd - Perrenjas.

Particularly influenced by the exposure scoring and less influenced by sensitivity Vulnerability is high in areas of high temperatures (mainly due to wild fire), extreme rain fall (Land Slides and Rock Fall)

Adaptation approaches are usually driven by the goal of risk mitigation by considering the following:

a) Increased resilience — i.e., adaptation reduces risk by increasing protection against the risks involved, thereby reducing the vulnerability of assets to risks and thereby allowing continued operation under a wider range of conditions. For example, raising electrical systems above anticipated flood water levels either temporarily or permanently;

b) Asset redundancy within the system—that is, additional or alternative capacity exists to enable continued service even if the infrastructure asset is unable to function;
c) Quick activation and/or recovery — i.e., infrastructure plan management has the capacity available to provide timely and effective feedback to restore infrastructure and thus services. This may include temporary interventions such as portable flood barriers to control and limit damage to infrastructure and speed up recovery.

Mitigation Measures:

The Albanian railway system should consider a comprehensive long-term and proactive strategy for climate adaptation of the railway infrastructure for the future according to European guidelines that include "soft" adaptive measures and focus on:

- Risk and vulnerability assessment should not be carried out only on the basis of past events. An exploratory approach should be followed considering various well-developed technologies and tools to be applied in conjunction with existing methods. Using artificial intelligence (AI) methods to detect, predict and recommend the necessary measures, adapting both, satellite and field monitoring equipment, to be able to be proactive against uncertain future conditions for rail transport threats and vulnerable areas.
- When designing or building new infrastructure, measures should be taken to incorporate climate adaptation so that the effects of extreme weather events can be minimal.
- There is a need to increase public knowledge and awareness of the potential threats of climate events to rail infrastructure to reduce unnecessary costs, loads and inconveniences that occurred due to unjustified traffic interruptions and other effects.
- Necessary emergency plans should be developed for forecasting the climate as well as measuring the impacts on the railway infrastructure that can reduce the consequences due to unexpected climatic events.
- From a governmental perspective, the necessary policy development and revision of standards should be initiated and encouraged to accommodate future climate change needs throughout the life cycle phases of railway infrastructure.

Green & Grey Mitigation Measures are included in the Climate Change Resilience and Vulnerability Assessment Report (CC Report) is drafted for this project.

Table 6-31 Adaption measures on vulnerable infrastructure assets

Impact	Adaptation	Characterization of vulnerability
Slope failure	Re-engineering of slopes to change grade, improve drainage or provide stabilization; local monitoring	Reducing vulnerability through robustness
Slope failures— shallow failures	Detailed slope risk evaluation model for Albanian railway	Enabling prediction of when and where debris flow is most likely to occur, thus enabling better vulnerability assessment to be factored into warnings
Slope failures— shallow failures	Vegetation management to enhance slope stability	Reducing vulnerability
Slope failures— deep rotational failures	Vulnerability mapping by geo-hazard organizations	Enabling improvements in risk assessment
Failure of retaining wall	Upgrading drainage, rock bolting/anchoring, regrouping	Reducing vulnerability by managing pressure on retaining wall structure
Flooding and icing in tunnel	Pressure relief duct and ventilation shaft shields inside the tunnel; applying hydrophobic coatings in tunnel structures	Diverting water and ice build-up outside gauge of tunnel thus reducing impact
Track buckling	Maintenance of track to ensure pre-stressing of rail and ballast strength is maintained; Use of slab track as an alternative to ballasted track— slab track is less able to buckle; Painting rails white at particular buckle-prone locations, to reduce solar gain	Pre-stressing enables expansion to occur safely and ballast prevents lateral motions, reducing both vulnerability and impacts; Reducing vulnerability; Reducing vulnerability
Flooding of track, points and crossing	Maintenance and upgrade of drainage, including outfalls, for higher capacities predicted by higher precipitation intensities; Elevation of the track and/or other assets.	Enhancing redundancy through increased capacity, reducing vulnerability; Reduced vulnerability
Bridge scour	Risk-informed inspection of assets, both routinely and after flood events.	Enabling improvements in risk assessment both in short-term forecasting and long-term
Bridge scour	Foundation countermeasures or replacement	Reducing vulnerability of asset

Impact	Adaptation	Characterization of vulnerability
Low-temperature issues at points and crossings	Enhanced heating units, predictive failure maintenance and changing materials used for low-temperature tolerance	Reducing vulnerability and/or impacts
Windblown debris	Vegetation management; engagement with adjoining landowners to control vegetation and land use; fencing	Reducing secondary hazard and impacts
Permafrost related track deformation	Insulation of embankments; sun sheds; high-albedo surfacing materials; air ducts in embankments; heat drains; thermosyphons	Reducing vulnerability and impacts

An assessment of the impact of climate change on the results of the flood hazard and risk mapping is fundamental to ensure their usefulness for the Albanian water sector. Regarding responses to climate change at the national level, there is currently a "National Adaptation Planning (NAP) to Climate Change in Albania" document published in late 2021. Albania submitted its Nationally-Determined Contribution (NDC) to the UNFCCC in 2016. Through its NDC commitments, Albania is working to support its wider development goals, which are geared to increase resilience to climate change impacts[154].

Floods constitute the most dangerous natural disaster for Albania as the country is highly exposed since its river's profiles (high slopes in upper parts of the basin and very low slopes in the coastal plains) cause floods with low concentration times and increased hydrograph peaks. Keeping in mind the flood protection system's deficient status currently in Albania, it would be very difficult to look only into the marginal effects of climate change on flood management.

The main predicted impact on future flood management is not only climate-related, but associated also with future social, economic, and infrastructure development. Without a doubt, the impact of climate change on flooding in the future will be very significant and should not be underestimated, since the flood hazard is increasing.

Carefully designed climate change adaptation measures for long-term flood planning must be developed.

Among the existing studies, maximal values of precipitation have an increasing tendency because an increase in the frequency of intensive precipitation is expected to occur, and this will cause an increase in flood frequency maximum in the future. Return periods of the floods are expected to decrease, in line with those for heavy precipitation events. There is already evidence of climate change increasing the frequency of high rainfall events and flooding as a consequence. The coastal area is flooded not only from rivers but also by sea inundation water (storm surges).

During operation and maintenance, the likely impacts of the project on the climate changes are evaluated of moderate probability, almost insignificant, and national extent. They can be mitigated by applying the required fuel quality standards.

Table 6-32Residual Impact

Climate Change	Residual Impact	
	Construction	Operation
Regional /National	Minor	Negligible

6.2.5 Geological Impact

Most of the project's alignment passes on a flat terrain, composed of soil deposits, while the rest is in a hilly area, which consist of molasses, limestones, melange formations-blocks in the

[154] Preliminary Design for the Rehabilitation of the Corridor VIII Rrogozhina - Pogradec Section, Albania – Hydrology & Climate Change Study

matrix and ultra-basics rocks, which have been intensively affected by the tectonic movements and weathering crust processes.

The mass movements mainly occurred on the railway along cut slopes. They are classified in the rocks fall, debris slide, earth slides and erosion. Most of the landslides in studied area are rock falls, which move very fast, therefore they are a real potential risk for the for the railway users.

Debris slides: (The hills zone of Labinot Fushë up to Xibrakë village; The hills zone of Xibrakë village up to Rapuni stream valley; The hills zone of Buqëz-Piskopat villages up to Udenisht village)

Earth flow:The hills zone of Bishqemi village up to Paper village; The hills zone of Librazhd town up to Prenjas village.

Erosion: Extremely intensive erosion between Elbasan and Prrenjes town has been occurred over route embankment, as a result of high quantities of precipitation along railway area. This phenomenon occurred because of the lack of drainage infrastructure, such as drainage ditches, etc.

The project area extends from Rrogozhina town up to Guri i Kuq village (Pogradec).

6.2.5.1 Design, preconstruction, and construction stages

Source of Impact

Demolition works of the existing structures, bridges especially near the area potentially have erosion risk as well as construction works to built the new ones , construction works to ensure protection against erosion within the river and streambeds may affect the rivers and streambeds' erosion.

The vegetation clearing and the earthworks for drainage channels and retaining walls, as well as the construction of underpasses constitute other sources of erosion and sedimentation.

Potential impacts: As mentioned above, the geological risks that may occur during construction activities include mainly erosion and subsidence.

Degradation of soil quality due to excavation activities, improper disposal of spoil material, nutrient decline of soil quality and higher compaction, etc.;

Impacts in surrounding of working areas, drainage and irrigation system;

Degradation of soil quality due to potential contamination of soils and waters through such activities as effluent disposal (i.e., wastewaters), or through such processes as spillages and improper management of wastes;

Soil erosion, especially slope area and during removing vegetation;

Soil mass movement that could cause small landslides and blockages of the irrigation and drainage channels.

Typically, the excavation process and removal of the topsoil and vegetation could result in alterations to the drainage and surface run-off regime on-site, particularly during the wet season.

Potentially may have accidental events (spills, leaks and uncontrolled releases) due to the presence of hazardous materials on site, including fuel(during construction activity). Storage and handling of hazardous and non-hazardous wastes within the site may pose risks for possible contamination of soil, especially in cases of improper waste management practices.

Based on the above-mentioned discussions, impacts on soil are considered negative and both direct and indirect. However, the changes on soil will be temporary, only during the construction phase and the scale of the impacts will be at a local level.

During preconstruction and construction stages, the likely impacts associated with the geological features can be evaluated of medium probability, of local extent, and of low to moderate magnitude. It is expected to result in an overall low significance because of the appropriate mitigation measures already undertaken during the design stage. These measures should be strictly applied by the construction company.

Operation and maintenance

The Project's components and activities are not a source of erosion, sedimentation, and subsidence during the operational phase.

Rehabilitation works including rehabilitation of the vegetation cleared for retaining walls and drainage system are measures to be implemented against erosion, sedimentation, and subsidence during the operational phase.

Table 6-33 Impact Expected

Geology	Impact expected	
	Construction	Operation
Construction site /local level extent	Moderate	Minor

Proposed mitigation measures: The mitigation measures include measures against erosion and subsidence, as follows:

- Mitigation measures to avoid/reduce erosion and sedimentation, include:
  - Minimize the working areas within the rivers and stream beds;
  - Consultant(detail design phase) shall evaluate and choose an appropriate design on protection works against rivers and streams erosion;
  - Consultant shall avoid/minimize any eventual construction of new access roads, and use as much as possible of the existing communal and rural roads;
  - Minimize the vegetation clearing when it is possible;
  - Minimize work on soft ground in wet weather, wherever possible,
  - Compact as soon as practicable the filling material of the railway line body to prevent the run-off to surface waters.
- Mitigation measures to avoid subsidence, include:

  During detail design phase the Consultant shall take into consideration:
  - Prepare a detailed and well-studied geotechnical model of railway line track;
  - Identify locations that need specific preventive measures to be implemented;
  - Recommend appropriate material for the railway line body;
  - Use the proper quality of filling material to be used (remove the existing one when it is not appropriate);
  - Select the appropriate design and depth for the bridge's foundations
  - During construction activity, the Contractor shall development of an Erosion and Sediment Control procedure within the CEMP to prevent

- During operation phase, HSH shall monitor and maintain appropriately the protection works against erosion within the river Shkumbini and streambeds and remediated whether necessary.

Conclusion: The adverse impacts associated with the geological features during the operation phase can be evaluated as of low probability, of local extent and low magnitude. It is expected they to result in an overall low significance to insignificant.

Table 6-34 Residual Impact

Geology	Residual Impact	
	Construction	Operation
Construction site /local level extent	**Minor**	**Negligible/ not significant**

6.2.6 Groundwater

The railway footprint passes Shkumbini water basin that is considered water with good quality and important for drinking water supply.

Within the Shkumbin basin, the waters exhibit generally favourable physic-chemical characteristics. They are categorized as fresh, ranging from moderately hard to very hard, and are weakly alkaline.

The groundwater within this basin typically exhibits favourable physic-chemical properties. It serves as a source of drinking water for both the populace and commercial enterprises. However, the presence of NO2, NO3, and NH4 in the groundwater is attributed to the failure to enforce designated zones of strictness and sanitary protection during drilling operations; (refer to ground water baseline chapter 4)

There are around 77 intersections where railway crosses streams with a catchment area greater than 1 km2. This streams due to their mountainous nature during the rainfall storms bring very rapidly the flows causing like this the flash flood which can be dangerous to hydraulic structures. These streams bring alluvions also thy cause erosion.

Along the railway on the right side (direction Rrogozhine-Pogradec) there is the Irrigation channel which goes parallel with railway from Peqin up to Rrogozhina. Should pay attention to not affect the channel if there is needed to widen the railway track.

In the area of Perrenjas and Rrajca railway intersects few drainage and irrigation channels. Mainly this are small channels in the areas they intersect the railway there are culverts. In this area there is no issue regarding the malfunction of irrigation or drainage area.

There is also an irrigation channel which is important because it feeds the Artificial Lake of Prrenjas and it crosses the railway on the south east corner of the reservoir. (refer to the Hydrogeological study)

Source of Impact

Key potential impacts on groundwater resources may include as follows:

- Earthworks

- Degradation groundwater quality as a result of accidental leaks/spills or siltation due to earthworks;
- Using not efficiently of water sources
- Not proper management of sewage and waste

Design, preconstruction, and construction stages

Potential impacts on groundwater

Construction activities could affect natural irrigation and drainage patterns in the project footprint area. Excavation works for the foundations opening, hard structures, levelling and reshaping of slopes and deepening of drainage channels in the project sites could modify, deteriorate, damage and/or cause blockages in the irrigation and drainage system. The potential impacts on the groundwater associated with different preconstruction and construction activities as demolition of existing structures , bridges and culverts, construction of substructure, service roads,stations, drainage system, protection works against erosion, fencing, underpasses,.).

- Disruption of the irrigation and drainage patterns due to earthworks ;
- Potentially degradation groundwater quality as a result of accidental leaks/spills or siltation due to earthworks;
- Not proper management of waste , material storaged that may lead to water quality impacts from run-off entering, and improper drainage channels inside construction area; Liquid effluents will also arise from washing of equipment potentially may impact ground water.
- Earthworks in the project area may increase the erosion, especially during rainfall events, which may increase the suspended sediment concentrations and pollute water resources;
- Potentially sewage may contaminate potable water penetrate from the construction workforce (toilets and washing facilities)

Evaluation of potable wells close to the footprint of the railway shall be done during detail design phase in order to avoid potential contaminations due to the construction activities .

Operation and maintenance

Due to using electrical trains, even the impact on water bodies during operation phase is considered no significant

The only expected impacts may happen in case of any major accident crashing the diesel cars/vehicles. This may be avoided by implementing and monitoring very good system of signalization.

No adverse impacts on groundwater are expected during operation if the required maintenance standards are applied.

Table 6-35Potential mpact

Ground water	Potential Impact	
	Construction	Operation
Water bodies near the project area	**Moderate**	**Negligible**

Proposed mitigation measures

Implementation of good construction practice for the reduction of potential impacts of discharges into the soil and the water bodies, 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:

- The irrigation and drainage pattern/network close to project site shall not be altered, but kept disciplined and functional to the maximum extent possible with the natural/ existing water flowing, channel depth and slope inclination to prevent blockages and/or flooding in surrounding lands;
- 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 watercourse bodies;
- Work camps to be located at the appropriate distance from surface waters.
- Is recommended work camps to be established within the existing Railway Stations, where there is free space to be updated as camp sites and has still available the needed infrastructure (electricity, water supply & sewerage) to avoid disturbing inhabited areas, water resources, and areas of high biodiversity values. The existing location of the train Stations are distanced of potential areas affected by flooding;
- Avoid the pollution of water bodies from waste generated from constructions works and human activity of the workers involved in the project;
- Project has taken into consideration rehabilitation of existing local roads' network to avoid opening of any new access road. Despite of other benefits, this also contributes on avoiding of erosion and run-off sediments to water bodies (Shkumbini river, Ohri lake and their main streams contributors);
- 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 ground waters (permeable cover layers);
- Avoid wastewater discharge on the ground within the rivers and streambeds during the construction of bridges and culverts;
- During construction activity, the appointed Contractor shall develop an Irrigation and Drainage Preservation Procedure within theCEMP(Contract Environmental Management Plan). Procedure should clearly define mitigation and management measures for temporal diversion of the channels when necessary or when construction works are being implemented and especially for works performed in water bodies (bridges , culverts);
- During construction activity, the appointed Contractor Develop an Erosion and Sediment Control Procedure within the CEMP to define measures that prevent and/or reduce impacts and control the risk of erosion and sedimentation impacts on existing water bodies in the project area. This measure could include potential silt fencing in specific working locations, changes or improvements in the project design, erosion

protection interventions, reshaping of slopes, hydro-seeding or planting of vegetation, etc.;

- Operation phase : implementing and monitoring very good system of signalization.

If the due mitigation measures are taken, the likely adverse impacts on ground waters can be evaluated of low probability and magnitude and local extent. They can be reduced to insignificant if appropriate mitigation measures are undertaken.

The likely adverse impacts on the groundwater are evaluated of low probability and magnitude. They can be reduced to insignificant/Negligible if appropriate mitigation measures are undertaken.

Table 6-36 Residual impact

Ground water	Residual Impact	
	Construction	Operation
Water bodies near the project area / local extent	**Minor**	**Negligible**

6.2.7 Surface Waters

Railway Rrogozhinë - Pogradec routes in the Central Albania form East to West.Mainly all the Railway route is located in Shkumbini River Basin. And only a small part of Railway passes along Ohri Lake Part of Black Drin River Basin[155].

Shkumbin River is one of the most important rivers in Albania. The main tributaries of Shkumbin River are the Dushna, Radicina, Bushtrica, Rrapuni, Gostima, Zaranika, Kushnja and Zalli i Paprit streams.

The key potential impacts on surface water may include as follows:

- Removing the existing waste /debris, minerals
- Demolishing of existing structure close to water bodies
- Earthworks in the project area may increase the erosion, especially during rainfall events, which may increase the suspended sediment concentrations and pollute water resources;
- Disruption of the irrigation and drainage channels due to earthworks
- Degradation of surface water as a result of accidental leaks/spills or siltation due to earthworks;
- Liquid effluents will also arise from washing of equipment
- Not good waste storage management, material storage may lead to impact surface water from run-off,.

Sensitive receptors

[155] Preliminary Design for the Rehabilitation of the Corridor VIII Rrogozhina - Pogradec Section, Albania – Hydrology & Climate Change Study 2024;

The most impacted receptors will be the water quality in the crossing points of railway line with the surface water during construction activity.

Most important crossing of the railway line on the water bodies belongs to Loti1 (section from Rrogozhine up to Prrenjas).There in no any significant crossing on water bodies for the section Prrenjas –Pogradec .

Water bodies potentially impacted are River Shkumbini and the tributaries of Shkumbin rivers .

Most important water crossing potentially impacted are listed as following,

Loti 1

Section_Rrogozhine -Elbasan

- Km 38+078 – Concrete Arch Bridge. The bridge crosses a small creek.
- Km 38+938 – Concrete Arch Bridge .stream
- Km 45+766 – Concrete Arch Bridge The bridge crosses a small stream
- Km 47+884 – Concrete Arch Bridge. The bridge crosses a stream.
- Km 50+350 – Concrete Arch Bridge . The bridge crosses stream Pajova
- Km 52+639 –Bridge . The bridge crosses stream
- Km 53+003 – Concrete Arch Bridge. The bridge crosses a small stream
- Km 53+565 – Concrete Arch Bridge. The bridge crosses stream
- Km 54+037 – Arc Concrete Bridge. The bridge crosses a small stream
- Km 57+192 –Bridge. The bridge crosses stream
- Km 59+158 –Bridge. The bridge crosses small stream
- Km 60+554 –Bridge. The bridge is located close to Shkumbini River
- Km 61+689 – Concrete Arch Bridge (Paper) The bridge crosses **Paper River**
- Km 71+391 – Concrete Arch Bridge The bridge crosses stream
- Km 73+872 – Reinforced Concrete Beam Bridge .crosses stream

Section : Elbasan- Librazhd

- Km 76+676 – Reinforced Concrete Beam Bridge
- Km 77+947 – Reinforced Concrete Beam Bridge crosses a small stream
- Km 84+390– Concrete Beam Bridge crosses a small stream
- Km 88+387– Reinforcement Concrete Slab Bridge
- Km 88+635– Reinforcement Concrete Slab Bridge
- Km 93+912– Reinforced Concrete Beam Bridge
- Km 94+302 – Concrete Reinforced Beam Bridge
- Km 94+444 – Reinforced Concrete Beam Bridge
- Km 95+121 – Reinforced Concrete Beam Bridge

- Km 95+184 – Reinforced Concrete Beam Bridge
- Km 95+458 – Beam Bridge (Bridge of Murash 1) Shkumbini river
- Km 96+542 – Reinforced Concrete Beam Bridge (Bridge of Murash 2, Shkumbini River
- Km 97+850 – Reinforced Concrete Beam Bridge main stream Librazhd

Librazhd – Pogradec section

- Km 108+689 – Reinforced Concrete Beam Bridge;Hotolisht over Quku stream
- Km 111+047 – Reinforced Concrete Beam Bridge ;small stream
- Km 114+656 – Beam Bridge (Bridge of Bushtrica) no water.
- Km 114+ 446– Beam Bridge small stream
- Km 118+808 – Reinforced Concrete Beam Bridge Pishkash village over a small stream
- Km 121+096 – Reinforced Concrete Beam Bridge near Prrenjas ;no water
- Km 121+919 – Beam Bridge;no water

Section Prrenjas – Pogradec Loti 2: No bridges

Impacts Design, preconstruction and construction stages

During the construction it is expected impact on water quality, increased sediment on waters and deterioration of water quality ;

Potentially degradation water quality as a result of accidental leaks/spills or siltation due to earthworks;

Not proper management of waste, material storaged that may lead to water quality impacts from run-off entering, and improper drainage channels inside construction area

Earthworks in the project area may increase the erosion, especially during rainfall events, which may increase the suspended sediment concentrations and pollute water resources;

Sewage can contaminate surface water if it is discharged without prior treatment;

The demolition of bridges and culverts, the activity of transport trucks and working machinery, construction / rehabilitation works for protecting the rivers/streams banks from erosion, may affect the surface waters;

Operation and maintenance

No significant/ Negligible impacts are expected during the operation stage taken into consideration that the trains will be electrical..

Designer in Detail design phase is recommended that maintenance service area of the trains/ locomotive and wagons, not to be located close to the surface waters or in its vicinity;

Surface water	Potential Impact	
	Construction	Operation
Water bodies near the project area / crossing points with railway line	**Moderate**	**Negligible**

Mitigation Construction phase :

Before starting the construction works for the construction of the bridges planned as an integral part of the project, the company must ensure obtaining of the relevant approvals from the bodies of administration and management of water resources, based on the requirements of Law 111/2012 "On the integrated management of water resources". amended by Law 6/2018 "For some changes and additions, referring to Article 66 "Construction activity on the coast"; The application for obtaining authorization for works on the waterfront is made according to VKM No. 550 dated 15.07.2020 "For the approval of the request forms for the approval in principle, for the granting of the water use concession, of the authorization permit for the use of the water resource".

Disposal of inert solid waste generated during the road construction phase according to best available practices. The installation of silt fences (barriers) that prevent soil measures from rainwater.

Removal of unnecessary inert material from the construction site to the final place of storage or reuse (if applicable).

The use of the best work practices during the opening of the channels that have been effective in protecting the sides of the channels from erosion.

The Constractor shall draft specific methodologies for works near water bodies, which include specific measures for prevention of impact and mitigating measures in case of impact on water bodies .The methodologies will be based on the chosen method of works for the construction of bridges/tunnels as follows:

- Isolation of the working area and ensuring the free flow of water in the river in a natural way,
- Disposal of inert solid waste according to best available practices;
- Installing g silt fences (barriers) that prevent soil measures from rainwater especially in the river banks.
- Removal of unnecessary inert material from the construction site to the final place of storage or reuse (if applicable);
- It is not allowed to discharge any type of pollutant into water sources, such as: cement, concrete, lime, various chemicals and fuels;
- Concrete mixer washing areas (Eco-pits) are built not near the river bank, but at a distance of at least 100 m, to ensure that the water is not polluted.
- The used water/effluent will not be discharged into the river waters but only into waste water treatment plants approved by the local authorities.
- Construction raw materials will be deposited at least 100 m away from the banks of rivers/rivers.
- The storage of chemicals and oils should be done in a separate and safe area away from the banks of rivers, at least 100 m.
- Every container for holding chemicals and oils must be equipped with a secondary container with a capacity of 110% of the capacity of the container holding the effluent to ensure that the chemicals do not drip into the ground and then into the water.

- Immediate isolation of any possible accidental contamination on the ground or on the surface of the river and the reaction to clean up the pollution.
- Spill kit for the reaction in case of contamination must be available at the site.
- Staff training in case of leakage response
- Continuous monitoring of water quality, before the start of the works, during the works and at the end of the works, 100 m upstream and 100 m downstream from the works area, referring to the main surface water quality parameters.
- The discharge waters in the receiving water environments, after being treated in advance, shall meet the requirements according to DCM No. 177, dated 31.3.2005 "On the allowed rates of liquid discharges and zoning criteria of receiving water environments".
- The ESMP includes the main lines of a Pollution Prevention and Response Plan which shall be prepared in detail by the Construction and Operation Companies;
- The ESMP includes also the main lines of an Emergency Response Plan which shall be further developed in detail by the Construction and 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.**
- Regular maintenance of all machinery to prevent engine oil and fuel leaks;
- Keep vehicles and machinery as far as practicable from water bodies
- Consultant in DD stage shall take into consideration the location of camps to distanced from the water bodies and recommended to be used the facilities of existing stations .
- Avoid the pollution of surface water from waste generated from works camps activities, including wastewater, food, plastic, etc.;
- Minimize as much as practicable the vegetation clearing to avoid soil erosion and therefore the increase of turbidity in the closest surface waters;
- Stockpiling out of the construction sites will be prohibited and areas close to water bodies will be avoided;
- Contractor shall foresee measures to prevent the run-off of sediment from the working areas to surface waters in the work methodology as per specific locations and works planned to be performed
- Avoid water discharge directly to surface waters without previous treatment.

Electrical trains have no significant impact during operation phase on water bodies.

Conclusion: It is not expected any adverse impact on surface waters during operation if the required maintenance standards are applied.

If the due mitigation measures are taken, the likely adverse impacts on surface waters can be evaluated of low probability and magnitude and local extent. They can be reduced to insignificant if appropriate mitigation measures are undertaken.

Residual Impact after implementing prevention measures recommended on the surface waters are evaluated of low probability and minor. They can be reduced to insignificant if appropriate mitigation measures are undertaken.

Table 6-37 Residual Impact

Surface water	Residual Impact	
	Construction	Operation
Water bodies near the project area / crossing points with railway line	Minor	Negligible

6.2.8 Flooding

6.2.8.1 Source of Impact Design, preconstruction and construction stages

As it is described in baseline chapter the Project area is not considered vulnerable to negative impacts from flooding.

The plain terrain predominates in a delimited zone, primarily tracing the valley of the Shkumbin river. Originating from river sedimentation, this plain unit spans approximately 1.5-2 km in width. The Elbasan field and its adjacent plains lie within this area, crisscrossed by an intricate network of drainage and irrigation canals, alongside lowland streams feeding into the Shkumbin River. This expanse notably impacts the City of Elbasan and the Administrative Units of Shirgjan, Gjergjan, Labinot Fushë, Bradashesh, and Papër. The flow direction of these rivers, including the Shkumbin, typically runs from the east and southeast towards the west and northwest. During periods of heavy rainfall, these rivers, characteristic of Albanian waterways, have been known to breach their banks, inundating nearby agricultural lands.

There are identifies around 77 intersections where railway crosses streams with a catchment area greater than 1 km2. This streams due to their mountainous nature during the rainfall storms bring very rapidly the flows causing like this the flash flood which can be dangerous to hydraulic structures. These streams bring alluvions also they cause erosion[156].

Along the railway alignment there are irrigation or drainage channels which intersect the railway or go parallel with it. Along the railway on the right side (direction Rrogozhine-Pogradec) there is the Irrigation channel which goes parallel with railway from Peqin up to Rrogozhina. Should pay attention to not affect the channel if there is needed to widen the railway track.

In the area of Perrenjas and Rrajca railway intersects few drainage and irrigation channels. Mainly this are small channels in the areas they intersect the railway there are culverts. In this area there is no issue regarding the malfunction of irrigation or drainage area. There is also an irrigation channel which is important because it feeds the Artificial Lake of Prrenjas and it crosses the railway on the south east corner of the reservoir.

Potentially sources that may affect agricultural land include:

- Sedimentation deposits in box culverts and ditches, particularly at the plain area of the railway line.
- Blockage of culverts and bridge openings by debris during the major stream

[156] Hydrology & Climate Change Study (Preliminary Design for the Rehabilitation of the Corridor VIII Rrogozhinë- Pogradec Section, Albania)

Sources of impacts and potential impacts:

Construction works performed in the period of heavy rainfalls may cause an inundation of the land on both parts of the railway line within the field sections where the railway line runs in low terrains crossed by rivers. That occurs because of the temporary demolition of the existing culverts and drainage channels and the blockage of the drainage system because of earthworks. Impacts are more pronounced within the railway line sections in the field area, Papër, entrance of Elbasan city where that are flooded by Shkumbini river ,Bradashesh from Kusha stream, the village of Çengelaj-Peqin. The inundation of the agricultural land will damage the agricultural plants.

Operation and maintenance

No adverse effects of the Project on flooding during the operation phase is expected.

The detail design shall revised all details to takes into consideration all the mitigation measures to avoid the eventual impacts of the Project's components on the flooding.

Flooding	Potential Impact	
	Construction	Operation
Flat area near the culverts /bridges and ditches	Minor	Negligible

6.2.8.2 Proposed mitigation measures

Proposed mitigation measures:

The designer has proposes measures against erosion in bridge and river banks.

- Bridges entry and exit arrangements and protection works

In order to avoid any erosion phenomena near the bridges, protection at the natural stream bed and banks is proposed. Link Mattresses is to be used to provide revetment protection for rivers, channels and streams, following the graph recommendations.

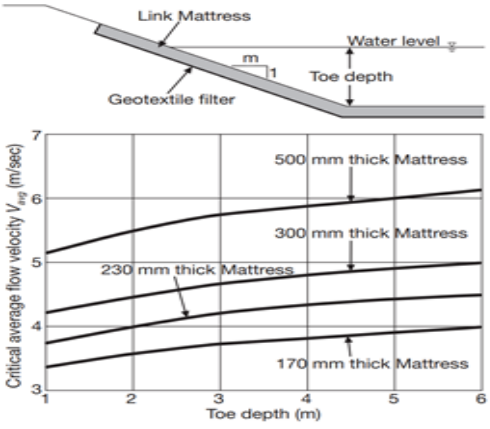


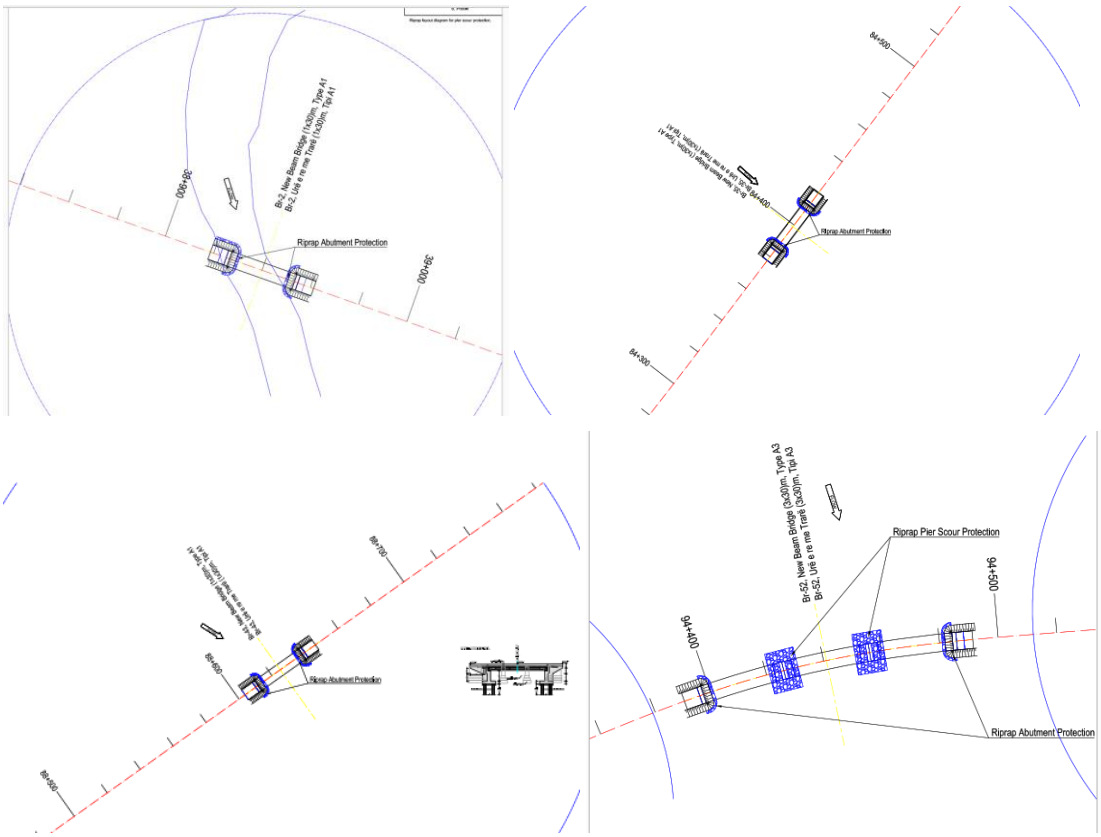
Figure 6-3 Stream Protection at bridge Locations

The minimum mattress thickness used to protect the river bed is t=30 cm. The maximum recommended slope for a Link Mattress is 1V:1.5H. Link Mattresses laid at steeper slopes may be difficult to construct, and may require additional mechanical fixing to maintain their in-place stability.

Bridges abutments and pier that are in the flood flow are proposed to be protected with riprap of appropriate sizing and weight of stones. If necessary, the flood flow has to be guided with local training works. The plan drawings show the protection proposed to the following bridges foundation:

Table 6-38Bridge piers and abutment protection

No.	Protection measures
1	river bank protection Ch. 93+200
2	river bank protection Ch. 94+200
3	river bank protection Ch. 97+000
4	river bank protection Ch. 101+300
5	river bank protection Ch. 102+000
6	river bank protection Ch. 104+100
7	bridge Ch. 38+950 riprap abutment protection
8	bridge Ch. 84+400 riprap abutment protection
9	bridge Ch. 88+630 riprap abutment protection
10	bridge Ch. 94+440 riprap abutment and pier protection
11	bridge Ch. 104+580 riprap abutment protection
12	bridge Ch. 108+100 riprap abutment protection



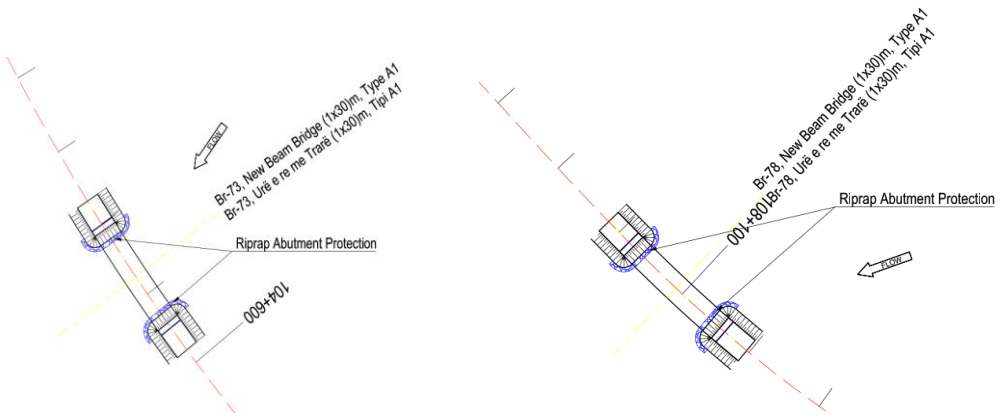


Figure 6-4:riprap abutment protection

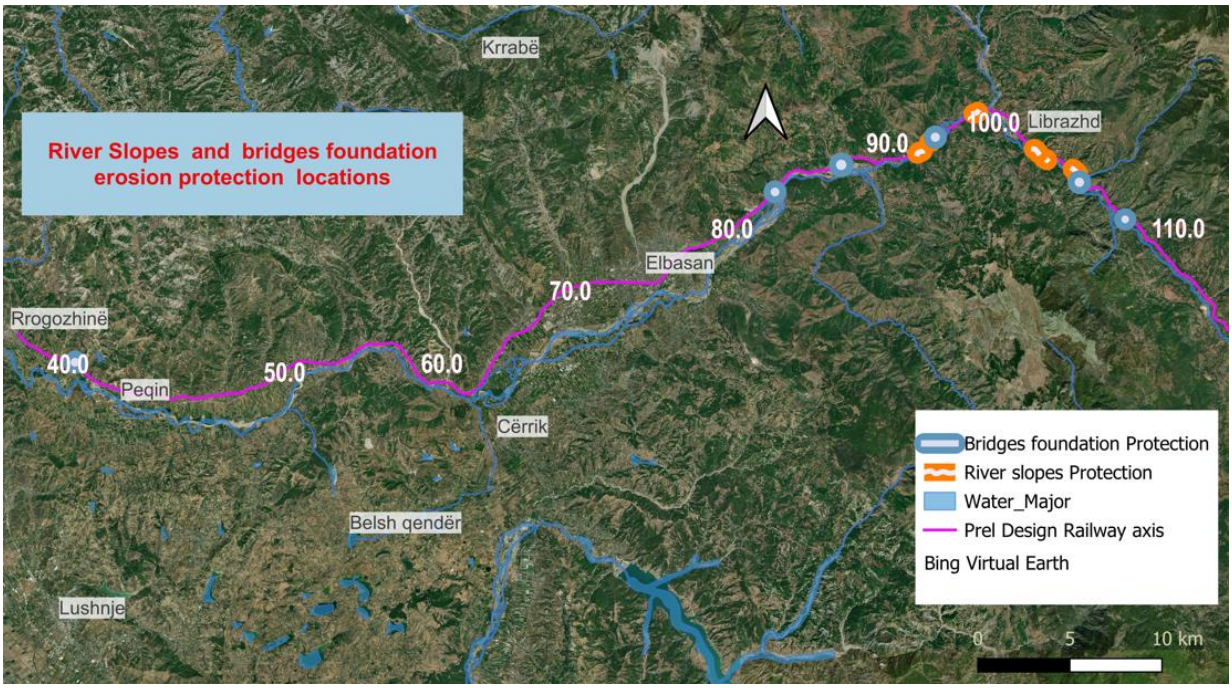


Figure 6-5:The locations of the bridge foundation protection measures in blue and the river slope protection in orange

A set of general measures of good design and construction practices are foreseen by the Consultant, as follows:

The general measures of good construction practice for the reduction of potential impacts of any eventual inundation during the demolition of the existing culverts and construction of the new ones and the increase of the vertical railway line alignment include the following:

- Work camps to be located at the appropriate distance from the areas likely to be affected by inundation;
- Schedule earthworks and culverts' demolition works in the dry period;
- The maintenance of the drainage system (drainage channels and culverts) and the cleaning of any eventual vegetation under the bridges during operation phase

Residual Impact.

If the above-mentioned mitigation measures are taken into consideration, the likely adverse effects on flooding can be evaluated on low probability and magnitude and of local extent;

Flooding	Residual Impact	
	Construction	Operation
Flat area near the culverts /bridges and ditches	Minor	Negligible

6.2.9 Landscape and visual issues

Source of impact

Landscape effects include direct and indirect effects on the landscape as well as effects on the general landscape character.

Design, preconstruction, and construction stages

During preconstruction and construction, the landscape and visual amenity will be affected from:

- Demolishing the existing structures and buildings;
- Vegetation clearing
- Construction works
- The presence of construction material and machineries
- Installing the power electrical lines for electrical trains

The railway line passes through a very beautiful natural scenery and this impact during construction activity will be located but significant.

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.

The expected adverse effects on visual amenities will be temporary and will last only during the construction stage, excepting the following project's components:

Since almost the footprint of the proposed project as well as the locations of the stations are located almost on the same footprint as the existing one, it is not expected to have an impact on the landscape after the construction phase.

The only impact is expected to be in the deviation sections of the line proposed according to the project, referring to the existing line, which in fact mainly belongs to agricultural land.

Table 6-39Main Railway Lines Alignment segments, deviating from the existing railway

From Ch	To Ch	Relative Impact	Deviation aver. dist.	Corridor width	Area Estimate (in ares or 100m2)
39+000	39+600	Minor	~ 8.5 m		27
44+200	45+700	Minor	~ 9.0 m		72
58+700	59+500	Minor	~ 2.0 m		9
60+500	61+000	Major	~ 20.0 m		53
62+650	63+400	Major	~ 100.0 m	~ 28.0 m	185
66+900	67+150	Minor	~ 5.0 m		7
69+100	69+550	Minor	~ 7.8 m		19
77+600	77+800	Minor	~ 4.5 m		5
78+500	78+850	Major	~ 24.0 m		45
85+500	86+350	Major	~ 17.0 m		77
86+400	87+000	Major	~ 30.0 m	~ 27.0 m	95
89+150	89+500	Minor	~ 7.0 m		13
132+800	133+050	Minor	~ 1.0 m		2

The sum of the areas of the above main segments of deviation makes the rough estimate around 61000 m² (≈6.1 ha)

Visual impacts are relating on a combination of the visibility of the specific component being evaluated and the context of the existing visual environment in which the component would be located.

Railroad upgrades minimally affect the visual environment along the project area .

The upgraded track, railroad bed, bridges, and culverts would appear similar to the existing visual environment.

For safety considerations, the right-of-way would be fenced presenting a minor visual impact by the addition of a chain-link fence to these environments.

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.

Operation Phase:

Source of impact

- Installing noise barrier close to the residents
- Presence of fencing in both parts of the railway line. This impact can be evaluated as probable, of the local extent, and low magnitude. It can be mitigated by choosing the appropriate design and colours for the fencing.
- Installing electrical power lines for electrical trainsis considered asignificant impacts especially when power line is placed near particular landscape significance.

Installing electrical power lines:One of the primary advantages of overhead line electrification is its ability to carry high-voltage power. This higher voltage allows for efficient power transmission over long distances, reducing energy losses and enabling power supply substations to be spaced further apart.

Another advantage of overhead lines is their compatibility with longer and heavier trains. The high-voltage power supply eliminates the need for onboard transformers, reducing the weight and cost of rolling stock. In turn, this can increase the capacity of trains and allow for higher passenger numbers and improved operational efficiency.

One significant disadvantage is the visual impact of the wires and support structures on the surrounding landscape. Overhead lines can be considered unsightly, especially in scenic areas or urban environments with strict aesthetic requirements.

Another challenge is the need for extensive infrastructure modifications. Bridges, tunnels, and other structures along the railway route must be adjusted to provide sufficient clearance for the overhead wires. This can be costly and time-consuming, especially in densely populated areas.

Further, overhead lines are more susceptible to weather-related disruptions. Strong winds, heavy snowfall, and ice accumulation can cause wires to sag or break, leading to service disruptions and maintenance requirements.Therefore regular inspection and maintenance are necessary to ensure the system is reliable.

The overhead electrical lines would include catenary supports at regular intervals, and electrical wires along the length of the line. The overhead catenary system would be visible to occupants of adjacent properties and motorists at crossing or paralleling locations. The electrical infrastructure would also be visible to residents of homes adjacent to the railroad.

Figure 6-6The overhead electrical lines

The impact of operation phase are considered permanent.

Landscape and protected areas and natural heritage

During construction activity the effects on landforms and visual amenities that can be associated with the protected areas and natural heritage within the wide project's area are :

- The segment Mirakë – Librazhd passes along the perimeter of the Nature Managed Reserve Kuturman Qafë – Bushi;
- Lin – Pogradec goes through the Landscape Protected Area of Pogradec. The area is IBA and Emerald site.
- Important historical areas, Domosdova near Project Area /Librazhd;

In this context, the sensitivity of receptors is considered to be low-moderate and the magnitude is considered to be medium.

Receptors of impact:Local Communities, Visitors, Tourists

Landscape and visual issues	Potential Impact	
	Construction	Operation
landscape visual and landscape character	**Moderate**	**Minor**

Mitigation measures:

Generally, mitigation is appropriate where facilities are most visible and present a change to the existing visual environment, but are not outweighed by safety considerations.

Mitigating impacts to the visual environment generally involves screening a facility or structure, or blending its design with the surrounding environment.

The project has the potential to alter the aesthetics of certain properties and districts where new stations, parking lots, or crossings are proposed.

The proposed visual mitigation measures include siting and designing facilities to minimize changes to the visual landscape, and minimizing vegetation removal along the right-of-way.

The specific mitigation measures proposed for visual impacts are listed :

Potential Mitigation Measure	Implementation Schedule
Install screening in selected locations	During Detail design
Select station lighting fixtures, designs, and technologies that minimize night sky impacts	During Detail design
Install station lighting that minimizes night-sky impacts	During construction
Design facilities and structures to blend with the surrounding landscape	During Detail design

Screening

Facilities or structures may be screened from view by natural or man-made barriers. Typically, the choice of a screening method is based upon the surrounding environment: natural visual barriers, such as vegetation screens, are best suited to natural environments. Physical placement of the facilities, removed from view by the majority of the general public, can also function as a form of screening. Manmade barriers, such as walls or fences, function well in a built environment. Vegetation may also be suitable within the built environment if the surrounding properties include landscaping elements.

Unnecessary clear-cutting of trees and vegetation along the railroad rights-of-way that would have an adverse visual impact on residential properties or open spaces would be avoided. Existing trees and vegetative screening would be retained to visually buffer properties from the rail lines to the extent feasible and with due regard for public safety, operational requirements, cost, and maintenance considerations.

Design

Facilities or structures may also be designed to blend with the surrounding visual environment. This can be accomplished by designing architecturally consistent or unobtrusive structures

Sation platforms and weather shelters, on the other hand, are unobtrusive structures that fit well in most built environments.

Where prudent, equipment including traffic signals and controller cabinets, street lights, street furniture, overhead catenary system poles, and railroad signal equipment housings would be dark colored to reduce the visual impact of this equipment.

The stations will be constructed as new ones, the architectures and design will fit with the landscape and will improve it significantly.

Additional mitigation measures will be explored in the final design,(detail design)

The mitigation measures to reduce any potential effect on the landscape, during the construction phase, include:

- Removal of the material resulting from the demolition of stations, bridges, and culverts and disposed them to the approved disposal area.
- Limit and phase vegetation clearance and the footprint of construction activities to what is absolutely essential;
- Avoid excavation, handling and transport of materials which may generate dust under very windy conditions;
- Keep construction sites tidy and all activities, material and machinery contained within an area that is as small as possible;
- Respect the footprint of the project, avoiding using temporary land in vegetated area ;
- Avoid vegetation clear where it is not necessary
- Rehabilitate disturbed areas incrementally and as soon as possible, not necessarily waiting until completion of the construction phase;
- Fencing the construction site/camps during construction works;

- The main characteristics of a noise barriers will be taken into consideration in detail design phase as (the geometry, including the high and the inclination; the insulating capacity; the visual aspect, which should fit as practical as possible to the local environment.)
- The visible elements might be designed that their appearance would actually enhance the local environment. It suggests that the concept of art in transit, now largely oriented to station areas, might be expanded to include the traction power infrastructure along the entire line.
- In segments where the visual environment is particularly sensitive, the catenary supports may be designed to a lower-profile appearance to minimize impacts to surrounding visual environment. In DD phase thisissue shall be taken into consideration by designers.
- Choosing the best option on electrical power to reduce as much as possible visual impact
- Choosing the appropriate design and colours for the fencing of the railway;

In general, the rehabilitation of existing railway , presents moderate impacts to the visual environment. The visual impacts would vary locally and by individual component.
Considering the application of the abovementioned mitigation measures, the residual overall impact can be evaluated of low significance.

Landscape and visual issues	Residual Impact	
	Construction	Operation
landscape visual and landscape character	Minor	Minor

6.2.10 Cultural Heritage

6.2.10.1 Design, preconstruction, and construction stages

Within the whole project area, there are several known and recorded historical and cultural heritage sites or monuments. Since in this phase of the project ,the Consultant has identified all the known cultural heritage sites/objects within the Project area referring existing documents / web/ relevant sources.

Detail investigation on cultural heritage will be developed during detail design phase to identify all archaeological sites/monuments possibly impacted by the project footprint.

According to EBRD PR8 (Cultural Heritage), “the client will carry out meaningful consultation and information provision in respect of the project with all key stakeholders with the view of:

- identifying cultural heritage likely to be affected;
- understanding the significance of cultural heritage to stakeholders & local communities;
- assessing the impacts and risks;
- applying mitigation hierarchy;

- identifying opportunities for potential community benefit.

According to Law 17/2018 "On the cultural heritage and Museums", before starting the construction works, The develop shall obtain relevant approval from the Institutions (Archaeological Survey Agency (ASA).

Preconstruction and construction phase

Potential impacts: Damage to cultural heritage from earthworks for the construction of the railway line, stations, service roads, and level crossings; circulation of heavy trucks over the known and not yet discovered cultural objects/sites, etc. The adverse impact on these objects/sites would be high, irreversible, permanent, and of regional to national importance.

The wide Project's area includes a high number of historical and archaeological sites. However, the number of cultural monuments and sites close to the railway line is very restrained.

The closest cultural heritage objects/sites to the railway line are as follows:

- ✓ Peqin Castle 300 m away from the RL axis;
- ✓ Vidhi Tabakut 270 m away from the RL axis (Peqin);
- ✓ Elbasan archaeological site about 800 m away from the RL ;
- ✓ Mengli Castle 250 m away from the RL;
- ✓ Haxhi Beqari Bridge 67 m away from RL ;
- ✓ The ruins of the ancient bridge 118 m from the RL
- ✓ The bridge of Kamara , 300 m away from the RL ;

Operation and maintenance

It is not expected any negative impact on cultural heritage during the operation phase.

It is expected that during operation phase to have positive impacts due to increasing possibilities of the people to visit the cultural heritage sites/ monuments as:

- Archaeological heritage area: 8,500-year-old Palafitti,Buceze village in Lin;(Pogradec , Lot2);
- There are several cultural monuments/bridges/ near the RL footprint (as Haxhi Beqari bridge in Miraka) but not only;
- Important historical areas: the area of Domosdova (Librazhd)Lot 1;

Figure 6-7 Potential Negativ Impact

Cultural Heritage	Potential Negativ Impact	
	Construction	Operation
Not identified cultural monuments /site likely to be affected	**Minor**	**Negligible**
Existing identified cultural monuments /site likely to be affected	**Negligible**	**Negligible**

Suggested mitigation measures:

Identify in detail, by an overview of the existing cultural heritage and archaeological sites near the railway line potentially being impacted from the project, during detail phase or before starting construction activity by involving specialised cultural heritage, archaeological expert.

Archaeological survey is also requesting even as per EBRD PR 8 standards, and the Albanian Law 17/2018 require the application of the "chance find procedure".

All contractual personnel will be trained to stop all activities if any valuable historical or pre-historical items are found. If this happens, construction will not begin again until authorized by the competent public institution for the protection of cultural heritage.

The likely impacts to not identified cultural monuments /site might be evaluated of low probability, low to not significant magnitude, and national extent. The potential impacts on the already identified cultural heritage can be evaluated of low probability, of very low significance, and regional extent.

Table 6-40:Residual Impact

Cultural Heritage	Residual Impact	
	Construction	Operation
Not identified cultural monuments /site likely to be affected	low to not significant	Not expected
Existing identified cultural monuments /site likely to be affected	Not expected any impact	Not expected

6.2.11 Waste generation

6.2.11.1 Design, preconstruction, and construction stages

The main source of waste generation will be preconstruction and construction activities

Sources of impacts

During its life cycle, mainly during the construction phase, will include numerous work activities such as demolishing of existing structures , site clearance, removal of vegetation, excavation works, setting up of labour and staff working facilities (base camp), that will generate different types and amounts of wastes (solid and liquid wastes).

The largest quantities of wastes are expected to be non-hazardous, however there may be certain hazardous wastes that may be generated in small quantities.

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:* excavated material, debris, vegetation, metallic, concrete and woody waste, limestone, sand and gravel, packaging waste, which are included in the category of solid wastes;
- *Hazardous waste:* asbestos, minerals /ore; Oils, fuel, grease, paints, etc., which represent the category of hazardous waste, deriving from construction activities.

Typically, the following types of wastes will be generated due to the development of the project:

- Existing mineral/ore disposed close to the existing stations (Xhyre, Librazhd, Preenjas, Pogradec);
- Existing asbestos before demolishing the existing structures in (Xhyre, Librazhd, Prenjas, Pogradec);

- Construction debris from demolition of the existing bridges, culverts which will generate a considerable amount of concrete and metallic waste.
- The removal of the rails and sleepers will generate metallic, concrete, and wood waste.

  Old railway sleepers: removing the existing railway sleepers. Wooden railway sleepers, or crossties, soaked in creosote are used in railway .Wooden sleepers shall be removed and disposed of. New research suggests that many of the wooden sleepers exceed the critical creosote limit set by the European Union and when they are disposed of they should be treated as hazardous waste.[157]

- Excavated soil material due to earthworks and construction activities;
- Vegetation clearing
- Municipal and domestic solid waste from workforce; The working staff involved in the project will produce packaging and sanitary wastes.
- Sanitary waste and sewage from workforce;
- Waste oil leaking from generator and other construction machinery;
- Urban waste such as packages bags, plastics, paper/cardboard, etc.;
- Empty paint containers, metal scrap, paints, varnishes, adhesives, anti-corrosive substances, etc.;
- Waste generated from maintenance of construction machinery and transport vehicles (used tires, batteries, oils, etc. from vehicles) is expected.

Operation Phase:

As technical routine maintenance of construction machinery and transport vehicles will generate waste that is characteristic for the maintenance activities as (used tires, batteries, oils, etc. from vehicles) is expected.

Receptors

- Potential receptors will be local communities, houses within and/or nearby the project area.
- Local administrative unites that manage the landfill of the waste
- Improper management of solid and liquid waste may lead to air, water, soil pollution and odour nuisances in and around the project site.

The table below gives an indicative overview of the expected types of waste generated during the construction and operation activities. This list is systematized according to the classification of the European Waste Catalogue[158] and the Albanian Catalogue of Waste[159]. Both these catalogues are identical.

[157] https://www.woodguide.org/files/2014/07/EU-railway-sleepers.pdf

[158] https://ec.europa.eu/environment/waste/framework/list.htm

[159] DCM No. 99, dated 18.02.2005 "On the approval of the Albanian Waste Catalogue" amended, European Waste Catalogue and international

17 CONSTRUCTION AND DEMOLITION WASTES (INCLUDING EXCAVATED SOIL FROM CONTAMINATED SITES)

17 01 concrete, bricks, tiles and ceramics

17 01 01 concrete

17 01 02 bricks

17 01 03 tiles and ceramics

17 01 06* mixtures of, or separate fractions of concrete, bricks, tiles and ceramics containing hazardous substances

17 01 07 mixtures of concrete, bricks, tiles and ceramics other than those mentioned in 17 01 06

17 02 wood, glass and plastic

17 02 01 wood

17 02 02 glass

17 02 03 plastic

17 02 04* glass, plastic and wood containing or contaminated with hazardous substances

17 03 bituminous mixtures, coal tar and tarred products

17 03 01* bituminous mixtures containing coal tar

17 03 02 bituminous mixtures other than those mentioned in 17 03 01

17 03 03* coal tar and tarred products

17 04 metals (including their alloys)

17 04 01 copper, bronze, brass

17 04 02 aluminium

17 04 03 lead

17 04 04 zinc

17 04 05 iron and steel

17 04 06 tin

17 04 07 mixed metals

17 04 11 cables other than those mentioned in 17 04 10

17 05 soil (including excavated soil from contaminated sites), stones and dredging spoil

17 05 03* soil and stones containing hazardous substances

17 05 04 soil and stones other than those mentioned in 17 05 03

17 05 06 dredging spoil other than those mentioned in 17 05 05

17 05 08 track ballast other than those mentioned in 17 05 07

17 06 insulation materials and asbestos-containing construction materials

17 06 01* insulation materials containing asbestos

17 06 03* other insulation materials consisting of or containing hazardous substances

17 06 04 insulation materials other than those mentioned in 17 06 01 and 17 06 03 17 06 05* construction materials containing asbestos

17 08 gypsum-based construction material

17 08 01*gypsum-based construction materials contaminated with hazardous substances
17 08 02gypsum-based construction materials other than those mentioned in 17 08 01

17 09 other construction and demolition wastes

17 09 04 mixed construction and demolition wastes other than those mentioned in 17 09 01, 17 09 02 and 17 09 03

20 MUNICIPAL WASTES (HOUSEHOLD WASTE AND SIMILAR COMMERCIAL, INDUSTRIAL AND INSTITUTIONAL WASTES) INCLUDING SEPARATELY COLLECTED FRACTIONS

20 01 separately collected fractions (except 15 01)

20 01 01 paper and cardboard
20 01 02 glass
20 01 08 biodegradable kitchen and canteen waste
20 01 10 clothes
20 01 11 textiles
20 01 13* solvents
20 01 14* acids
20 01 15* alkalines
20 01 19* pesticides
20 01 27* paint, inks, adhesives and resins containing hazardous substances
20 01 28 paint, inks, adhesives and resins other than those mentioned in 20 01 27
20 01 29* detergents containing hazardous substances
20 01 30 detergents other than those mentioned in 20 01 29
20 01 32 medicines other than those mentioned in 20 01 31
20 01 33* batteries and accumulators included in 16 06 01, 16 06 02 or 16 06 03 and unsorted batteries and accumulators containing these batteries
20 01 34 batteries and accumulators other than those mentioned in 20 01 33
20 01 35* discarded electrical and electronic equipment other than those mentioned in 20 01 21 and 20 01 23 containing hazardous components
20 01 36 discarded electrical and electronic equipment other than those mentioned in 20 01 21, 20 01 23 and 20 01 35
20 01 38 wood other than that mentioned in 20 01 37
20 01 39 plastics
20 01 40 metals
20 01 41 wastes from chimney sweeping
20 01 99 other fractions not otherwise specified

20 02 garden and park wastes (including cemetery waste)

20 02 01 biodegradable waste
20 02 02 soil and stones
20 02 03 other non-biodegradable wastes

20 03 other municipal wastes

20 03 01 mixed municipal waste
20 03 02 waste from markets
20 03 03 street-cleaning residues
20 03 04 septic tank sludge
20 03 06 waste from sewage cleaning
20 03 07 bulky waste

20 03 99 municipal wastes not otherwise specified

Potential Impacts

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:

- Local Administrative unites /Municipalities /cities and villages where the railway line passes ;(Loti 1&Loti 2);
- Nature Managed Reserve Kuturman Qafe – Bushi. KMP 094+960 up KMP 096+960 (Lot1);
- The river Shkumbini where the existing bridges /culverts will be rehabilitated (Loti 1)

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.

Excavated soils: The largest amount of waste that is expected to result during the construction phase will be excavated soils (spoil/ surplus material) from the earthworks and construction activities. Potential impacts may result in case of improper management of these wastes (natural excavated soils) by the Contractor. This includes disposal of excess/surplus material in areas not approved by government institutions/authorities and in non-compliance with the existing national legislation.

The disposal of excess/surplus material in the vicinity of water bodies/water resources (such as drainage and irrigation channels) would represent risk of contamination of these waters and damage to water ecology due to the increased organic matter and turbidity in water, in particular during rainfall periods.

It is anticipated that all excavated material will remain on site, being used backfilling trenches or for use for purpose of the project rehabilitation;

Oher impacts may arise as a result of poor management of hazardous wastes or materials and/or accidental spills of fuel, lubricating oils, etc., in natural excavated soil. In case of contact of a hazardous substance with natural soil it should be handled and managed as a hazardous waste.

Due to deviations it is expected to be generated top soil (natural soil) that shall be stored in a temporary disposal area to be reused in the rehabilitation process and/or reused for the rehabilitation process in the end of construction works.

This approach fits properly with the purpose and objectives of a good waste management practice as required by the national legislation and international best practices.

General urban waste : General urban waste may include a variety of non-hazardous materials, including wood, paper, cardboard, plastics, etc. Urban wastes may also include packaging materials such as plastics, paper and cardboard from the use of equipment, tools and machineries to be used within the scope of the Project. In addition, general urban wastes, similar to household wastes, will be generated by workforce activity during construction work in the project areas, including food residues (organic wastes), paper, bottles and cans and other packaging materials. These residues/wastes shall be collected on-site and further handled, deposited and/or recycled. Several impacts may arise as a result of improper urban waste

management. Potentially it may be soil and surface water contamination in the event of illegal dumping of waste inside and/or outside the project area. These potential impacts besides contamination of environmental elements, also pose a hazard to the generation of unpleasant odours (such as organic wastes).

Improper waste management would result in an unsafe environment for the workforce and the local community in the area, which as a result may pose risks for human health-related issues.

Hazardous wastes: Hazardous wastes can be generated during the construction activities including asbestos and minerals present near the railway line from the facilities that shall be demolished,removing the existing railway sleepers .

Another hazards can be generated during construction activity due to the presence of different substances / materials on-site such as paints, solvents, fuel, oil, additives, etc., which may have to be used during the various work activities. Among the types of hazardous waste that might be generated are: excess concrete quantities (with additives), various paints, solvents and contaminated containers (e.g., used containers of paints, solvents and additives). Hazardous wastes pose higher environmental and human-related health risks, in particular if handled, collected and/or deposited improperly. The effects of hazardous waste are immediate and can cause massive contamination, especially if they get in contact with agricultural lands or even worse in contact with water bodies, which due to free flow may have a direct impact on biodiversity (flora and fauna) and indirect pollution of other habitats in the downstream (water bodies or ground surface).

Sanitation and waste waters: Urban wastewater will be generated during the construction process as a result of workforce activity on-site. Urban wastewater generation can have significant impact on the environment if no precautionary measures are taken to manage, collect and treat them accordingly. Direct discharge into the environment would lead to direct impacts on agricultural lands, contamination of groundwater resources and contamination of surface waters.

The project considers that the management of sanitary wastewaters shall be done through using the existing sewage infrastructure near the existing train stations, construction of septic tank within project area and placement of portable mini-toilets in various working site areas during construction activities if there is no other available sewage system to be used.

The septic tank and portable mini-toilets shall be regularly monitored by the site management team. This will include checking of the wastewater level, periodic emptying, cleaning, collection (usually on weekly basis) ;

The management of the sewages shall be done through subcontractors licensed for collecting, transporting and treatment of sewages .The Contractor should undertake adequate measures to put in place the appropriate number of chemical/mini-toilet facilities and perform adequate management. It is recommended that one mini-toilet should be available to seven persons working on-site during 40-hour week[160];

Potential impact from Wastewater: Temporary impacts on the terrestrial and aquatic biodiversity, ground and surface waters, soil quality, and the health of workers and local population.

[160] According to the BSI standard (BS6465-1-2006),

The main sensitive receiving environments that can be affected from the wastewater include: River Shkumbini :RL passes almostt along /or parallel with river Shkumbini .Following the most sensitive segments of the RL are closer to the water bodies:

- 41-41.6 KMP
- 54 – 54.4 KMP
- 55- 56 KMP
- 58- 63 .6 KMP
- 84.4- 114 KMP RL passes along /parallel with river Shkumbini
- 139.6- 152.6 KMP RL passes along Lake Ohri

Potential impacts during operation phase

During operation, taking into consideration that the trains will be electrical, even the waste generated will be considered minimal quantities of waste that will result from the activities of working staff operating the trains and maintenance of the equipment .

Common types of waste that will be created in the operational phase of the project may include electrical waste (consumables, spare parts) as well as urban waste. These items will be removed outside of the project area.

There will not be any substantial generation of solid wastes; mostly these wastes will be of domestic types and wastes deriving from any maintenance activity.

Potential impacts during decommissioning phase

Impacts from waste generated during the decommissioning phase are considered to be almost the same generated during Project demolishing phase. This phase will include the dismantling and removal of all project structures and facilities.

Expected Impact Significance Construction and Operation phase

The generation of various types of waste (solid and liquid) during the construction and operation phase can result in potential impacts on environment . Inadequate management and disposal of these wastes may result in infiltrations, soil contamination and contamination of water resources in the area, which may lead to direct and indirect impacts on biodiversity and also to the health of the local community. Poor general housekeeping at construction sites and base camp can result in visual impacts to local communities during the construction phase, especially if uncontained solid wastes such as paper, cardboard and plastic packaging is blown off the site. Poor management of waste foods at base camps can attract vermin and may cause impacts to the health of workers.

Following are shown the waste generated during construction activity (approximately) based on preliminary design phase. It is considered a significant amount of waste to be managed based even on the existing situation of not enough capacity/ or not proper landfill being available in the region of the project area .

Table 6-41: The quantity of waste generated during construction phase

No	WASTE GENERATED DURING CONSTRUCTION PHASE		Volume of inert generated from demolishing of existing structures (m^3)	Total Volume of excavated material (soil) (m^3)	Volume of excavated material that can be reused (m^3)	Volume of excavated material to be disposed (m^3)
1	**Structure**					
1.1	LOT I	Rehabilitated Bridges	13,624	160,898		160,898
		Bridges	70,361	203,639		203,639
		Retaining walls	12,379	76,895		76,895
		Culverts	7,648	69,052		69,052
		Road Underpasses	9,758	63,127		63,127
		Road Overpasses	3,603	19,797		19,797
		Pedestrian Underpasses		38,700		38,700
		Pedestrian Overpasses		935		935
1.2	LOT II					
		Bridges	6,556	8,884		8,884
		Retaining walls	3,446	9,743		9,743
		Culverts	3,398	33,552		33,552
		Road Underpasses	1,225	7,725		7,725
		Road Overpasses	1,870	9,830		9,830
		Pedestrian Underpasses	0	31,653		31,653
		Pedestrian Overpasses	0	116		116
2	**Tunnels**					
		demolishing old concrete lining	59,000			
		excavated rock and soil (excluding the above concrete)	0	217,000	195,000	20,000
3	**Stations**		24,945	10,096	0	10,096
4	**EARTHWORKS**			1,718,000	230,000	1,488,000
5	**Side Roads & Level Crossing**		9,142	162,469	89,067	73,402
5	**Side Roads & Level Crossing**		2,514	33,666	21,830	11,836
TOTAL			**229,469**	**2,875,777**	**535,897**	**2,337,880**

The expected Impact from the waste generated during construction phase can be evaluated of significant to moderate level, to an overall Moderate significance and during operation phase minor significance.

Table 6-42 Potential Impact

Waste generation Sensitive receptors	Potential Impact	
	Construction phase	Operation
Local Administrative unites /Municipalities /cities. Needs for landfill to dispose waste generated	**Significant - Moderate**	**Minor**
Water bodies	**Significant - Moderate**	**Minor**
soil contamination	**Significant - Moderate**	**Minor**

Management and Mitigation measures. Construction and Operation phase

Consultant has recommended mitigation measures to be implemented to prevent , mitigate the impact as much as possible based on the best available procedures and standards to be meet required.

EBRD PR3 requires the strategy concerning the waste generated during preconstruction and construction activities to include[161]:

- Avoid or minimize the waste generation;
- Reuse, recycle or recover or reuse waste as a source of energy; and
- Treat and dispose of waste in an environmentally sound manner.

Segregation, reuse and, where feasible, recycling of wastes by registered operator; construction contractor must follow the 3R policy to manage the solid wastes;

The disposal and recycling of waste shall be made in close collaboration with the local government authorities (i.e., municipalities) and licensed waste recycling companies.

The mitigation measures include the following:

Wastewater

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 EBRD PR3, 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)[162] and especially the Urban Waste Water Directive[163].

The work camps is recommended to be installed within the existing stations, to use even the existing facilities of sewage system.

Portable toilet cabins shall be installed through the railway sections located far away from the work camps and the urban areas.

[161] https://www.ebrd.com/news/publications/policies/environmental-and-social-policy-esp.html

[162] https://ec.europa.eu/environment/water/water-framework/index_en.html

[163] https://ec.europa.eu/environment/water/water-urbanwaste/index_en.html

The septic tank shall be built according to the standard construction and isolation standards to avoid any accidental leakage and/or discharge of wastewaters.

Monitoring of wastewater in the septic tank shall be performed periodically by the Contractor;

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 EBRD PR3, 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[164].

The Project design has planned to reuse a part of the excavated material as filling material . This material will be mixed with other one (crushed limestone) and will be reused to fill the railway subgrade.

Waste storage/collection areas shall be fenced, laid at the bottom with an impermeable cover and equipped with relevant signage (e.g., urban waste collection area); any waste fuels/oils or chemicals that may need to be temporarily stored on site will be contained within solid impermeable bunding with 110% capacity of storage containers, to avoid contamination of soils, surface and groundwater in the event of spillage / leakage.

Nearby municipalities may also be contracted for regular disposal of the base camp waste;

Avoidance of refuelling on site to prevent oil spills. If this is not possible procedures will be developed to avoid accidental spillage, like the provision of drip trays and bunding for stores of fuel and waste chemicals/ substances;

The concrete waste that will generated from the demolition of the existing bridges will be reused to fill the railway subgrade both sides of the new bridges when is possible after analysing the quality of it.

A more detail analyses on the material that can be reused will be evaluated by the Consultant during detail design phase and by Contractor /Supervision Engineering during construction activity.

The recycle waste as metallic material will be collected and treated as recycling material by the licenses subcontractors as per the agreement with HSH /Contractors.

The waste resulting from vegetation clearing is recommended to be given to the locals for heating or other domestic purposes.

Food/organic waste and recyclables such as. paper, plastic, scrap metal waste, etc. must be properly segregated and stored in designated waste bins/containers and periodically deposited in approved disposal areas or either sold to licensed recycling companies;

Ensure electrical / used wheels/ use oil waste to be collected separately and/or reused in other forms and locations;

Hazardous waste

Old railway sleepers: Wooden sleepers shall be removed and disposed of. As many of the wooden sleepers exceed the critical creosote limit set by the European Union they should be

[164] https://ec.europa.eu/environment/waste/framework/

treated as hazardous waste[165].

Creosote has been used as a wood preservative for many years and contains toxic chemical compounds including polycyclic aromatic hydrocarbons (PAHs). Some of these are a danger to human health as they are carcinogenic. Creosote is therefore also classified as potentially carcinogenic. While sleepers remain embedded in railway tracks, the creosote is considered to be environmentally safe. However, upon removal, if the total creosote content is greater than the limit set by the European Union, of 1000 ppm dry weight (1 g per kg dry weight), the sleepers should be classified as hazardous waste and disposed of according to the regulations [166]. Under the EU directives[167] , 75/442/EEC, 91/156/EEC and 94/67/EEC, strict precautions are in place for the safe disposal of sleepers as hazardous waste[168].

When sleepers are burnt as ordinary waste, some carcinogenic compounds are released.

To determine whether creosote concentrations generally exceeded the critical limit set by the European Union, researchers measured the PAH content of creosote in samples taken from railway tracks, which represented the generic population of used sleepers. According to international standards, it is suggested that creosote content is represented by the total concentration of sixteen of the PAH compounds (PAH16), including seven that are classed as carcinogenic (PAH7)

The content of compounds found in creosote varies, so the researchers suggest that a critical limit of 150 ppm PAH16 (dry weight) should be set to represent the lower limit of a hazardous concentration of PAH16. Sleepers with levels of creosote content above than this should be classified as hazardous waste and disposed of in the appropriate manner.

The general concentration of creosote was, nevertheless, found to be significantly above the EU's critical creosote limit. Therefore, all creosote railway sleepers should be considered as hazardous waste and disposed of accordingly;

First , the removed sleepers shall be desiposed separately in a safety area monitored by HSH. Analyses to determinate the concentration of coresol ,if the concentrate exeed the EU's critical limit ot not.Based on the results of analyses, they shall be considered as hazardous waste and disposed of accordingly;

If the concentration of coresol is under the critical limit , the sleepers may be used for other purpose (rehabilitatin of existing railway sections as for example internal railway lines of industries, mines for freight train);

Railway sleepers are a versatile and durable material, perfect for a wide range of garden projects as:

Pathways :Replace traditional flagstones, gravel, or paving with sleepers for a unique and eco-friendly alternative.Garden Beds; fencing ; Tables, Benches and Chairs Made from Sleepers

[165] https://www.woodguide.org/files/2014/07/EU-railway-sleepers.pdf

166 : http://europa.eu/scadplus/leg/en/lvb/l21197.htm for a Summary of Waste Disposal Legislation. Directive 2006/12/EC of the European Parliament and of the Council of 5 April 2006 on waste

167 http://ec.europa.eu/environment/waste/legislation/a.htm EU Waste Legislation - Framework Waste Legislation and http://ec.europa.eu/environment/guide/part2c.htm for Overview of EU Environmental Legislation – Waste Management

168 http://europa.eu/scadplus/leg/en/lvb/l28072.htm for the Directive 2000/76/EC of the European Parliament and of the Council of 4 December 2000 on the incineration of waste.

Reusing the sleepers idea

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.

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[169] and in accordance with the: EBRD PR3; 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";

The contractor shall develop a Waste Management Plan (WMP) in compliance with Albanian legislation, EIB Requirements and Good international industry practice that will include arrangements for collecting , disposal of hazardous and non-hazardous waste through licensed waste disposal subcontractors/ companies.

The construction contractor shall ensure to have available adequate waste handling and disposal facilities. Arrangements for collection of non-hazardous and hazardous wastes must include provisions of waste bins equipment on-site. It is recommended that waste bins are segregated according to the stream of waste e.g., organic wastes, hazardous wastes, paper/cardboard wastes, plastic wastes and metallic wastes.

Appropriate handling and storage of hazardous and non-hazardous waste for licensed collection for responsible disposal by registered operator; In each case, the entity/company that will transport or transfer the waste shall be equipped with a license of type III.2.B, as an obligation under Article 57 of Law no. 10463, dated 22.09.2011 "On Integrated Waste Management" as amended;

Monitoring, Recorded and reporting of waste generated

Generated waste quantities -must be recorded in a separate/dedicated register according to the type of waste and the quantities generated. During the waste transfer process, a waste transfer Note (Waste Transfer Note) shall be signed to determine the respective quantities according to the type of waste transferred from the site and the name of the company/entity that will handle these wastes. These data shall be regularly kept by the

[169] https://ec.europa.eu/environment/water/water-framework/groundwater/resource.htm

Contractor during the construction activity, and presented/reported to the government authorities if required;

Training

Conduct continuous training program and education awareness of all employees of the project in regard to waste management practices in order to avoid, reduce the risks of waste generation and potential impact during the construction phase

Residual Impact: Waste generated from construction and operation activities after implementing prevention mitigation measures 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 -minor magnitude and to an overall low significance.

Table 6-43 Residual Impact

Waste generation Sensitive receptors	Residual Impact	
	Construction	Operation
Local Administrative unites /Municipalities /cities. Needs for landfill to dispose waste generated	Moderate - Minor	Negligible general
Water bodies	Minor	Negligible general
Land contamination	Minor	Negligible general

6.2.12 Socio-Economic aspects

6.2.12.1 Economy and employment

Overview

This section presents the potential impacts on the economy and employment as a result of Project related activity. Below are described the key sources of impacts, potentially impacted receptors, baseline and project influencing factors associated with the impacts of the Project on the economy and employment. In addition, it also provided a summary of the anticipated workforce over the time frame of the construction period.

Key Considerations for Assessment of Economy and Employment

Sources of Impact

- A mix of Albanian and international workers hired for the various phases and activities during the construction and function of the project.
- Worker hiring will be done by national Albanian companies (primary contractors) for all construction work.
- Non-local Albanian/Expats workers will be housed in camps. Non-local workers employed by Albanian subcontractors may also be housed in camp.

Potentially Impacted Receptors

- Business and workforce in the project development areas.
- Settlements in the vicinity of the project development area.

Conditions that Potentially Influence Impacts

- Education and skill levels.
- Availability of goods and services: Livestock and services are the most commonly waged jobs in the settlements in the study area.

- High importance to government stakeholders: Albanian government has established several programs to encourage and promote employment (regional labour authority promotion of local employment, training).
- High importance to local stakeholders: the data show that the project's impact area has an unemployment rate at the figures of the national level and a high level of women as housekeepers.
- The main sources of income are from farming, economic support, and private business as their primary source of income.

Highly Vulnerable Groups

- Individuals with low education level;
- Disabled people;
- Households with limited resources and incomes.

Economy and employment impacts will occur due to the direct employment of workers and the procurement of goods and services by the Project. Indirect impacts will be associated with an increase in spending and employment of workers by suppliers to the Project and businesses along the supply chain, as well as induced economic activity and employment associated with workers spending their incomes within the local area.

A new business entering an area can create an increased demand for goods, services, land, and housing, resulting in price inflation. The impacts of price inflation are particularly problematic if much of the local population does not experience economic benefit from the Project (e.g., employment, increased business), or if the incoming population has disproportionately high income relative to the host population, which is likely to be the case for Project workers. This would result in host populations experiencing increased household costs without a corresponding increase in household income and buying power.

Table 6-44 Key Potential Economy and Employment Impacts

Impact	Construction	Operation
Temporary direct and indirect employment opportunities (primarily unskilled)	x	x
Temporary economic impacts from procurement and workers' spending	x	x

Tensions may arise due to the hiring of workers from other areas for positions that local people may perceive they could fill. The potential for this impact is considered in the mitigation measures proposed.

Benefit: Temporary Employment Opportunities

Impact Description

The majority of the direct employment opportunities will be short-term jobs during the civil works and construction phases as indicated. These employment positions will include security and support, security staff, janitors, etc.

Questions about Project-related employment opportunities are the main concerns of the community in the study area. In general, is a feeling that the community should receive some benefit from the Project since they will be subject to most of the impacts; local employment (down to the municipality level and to the settlement level where feasible) is one of the most important benefits that people expect.

So, there are HH in the study area depending on remittance, economic support, and pension income. In summary, employment benefits are expected to be limited by the construction period, and longer, but still temporary, post-construction phase, and the small number of

positions open to unskilled workers. Depending on how workers are recruited, employment opportunities for local settlements may be most significant near the construction site – due to additional employment generated by procurement of services - and where road upgrade is needed.

Vulnerability

The general population's vulnerability to this impact is medium-low. More skilled individuals are more likely to be employed, and these workers generally have less trouble finding work than unskilled workers. Therefore, these benefits may disproportionately go to less vulnerable groups.

Licensing Albanian construction companies for all construction work is another potential for the employment of local employees. However, as these impacts are positive, per the impact assessment methodology, significance ratings for positive benefits are not provided.

Impact Significance

Table 6-45 Impact Significance – Temporary Employment

Geographic Scope	Magnitude Rating					Vulnerability	Significance
	Extent	Duration	Scale	Frequency	Magnitude		
Project Area of Influence	Local	Short term	Small Positive (the direct employment opportunities will be short-term jobs during the construction phase as indicated); Small negative (lower school completion rates, and the high unemployment rates among the young people in the near settlements); Positive (longer-term employment opportunities for more skilled individuals);	Constant	Small	Medium-low	Positive
	Regional	Long term	Small Positive (the direct employment opportunities will be short-term jobs during the construction phase as indicated); Small negative (lower school completion rates, and the high unemployment rates among the young people in the near settlements); Positive (longer-term employment opportunities for more skilled individuals);	Constant	Small	Medium-low	Positive
	National	Long term	Small positives (short-term employment might purchase of goods and services might contribute to the increase of the economy in Albania.	Constant	Small	Medium-low	Positive

Mitigation Strategies – Enhancement of Benefits

While the impacts of employment can be positive, they can also become negative if expectations around employment and hiring practices are not managed and met, or if the local populations perceive hiring practices to be unfair. Consequently, mitigation strategies are recommended related to the development and implementation of consistent and transparent procedures for hiring through the development of a 'Local Content Strategy' guidance document. This document should specifically consider the following:

- clearly define what is considered “local” employment vs national employment;
- maximize local hiring, consistent with having the right skills and experience for positions,
- maximize local procurement of goods and services (construction materials and worker camp material needs);
- communicate frequently and consistently with stakeholders on the number of jobs available;
- develop consistent and transparent hiring practices;
- engage with local government (mayor of municipality, heads of administrative units, heads of settlements), on employment opportunities; and
- before the selection of primary Albanian contractors, specify local hiring and procurement expectations, and, once a contractor is selected, provide training on the Project HSE and socioeconomic policies before the start of construction.

Residual Impact

Rating If controls are implemented, the Project will ensure the positive benefits are sustained and do not result in a negative economic impact on communities. There may be some residual minor price increases in goods in settlements near the construction site. The residual rating remains the same as pre-enhancement measure implementation, as summarized in table below.

Table 6-46 Residual Impact Significance – Temporary Employment

Geographic Scope	Residual Impact	
	Construction	Operation
Project Development Area	Negligible-Minor	Negligible-Minor
Local	Negligible-Minor	Negligible-Minor
Regional	Negligible-Minor	Negligible-Minor

Impact: Temporary Economic Impacts

Impact Description

Economic impacts will occur directly due to the procurement of goods and services by the Project. Indirect economic impacts will be associated with workers spending their incomes within the local area.

Economic Benefits

Detailed information on the procurement needs for the construction phase is not yet available. In general terms, the types of goods and services required will include:

- transport, catering, laundry, food supply, waste disposal.
- supply of construction vehicles and equipment.
- provision of construction materials including aggregates/sand, concrete, and building materials.

Most services (including transport, laundry, catering, etc.) will be sourced from Albanian companies and obtained from within Albania. Albanian companies will have the opportunity to tender for construction contracts. The economic benefits will likely primarily occur at a national rather than a local level unless local community procurement is specifically targeted by the Project. Indirect economic activity due to worker spending is assumed to occur primarily

in the cities of Rrogozhina, Peqin, Elbasan, Librazhd, Prrenjas, and Pogradec. However, other settlements located close to project may see an increase in the purchase of goods and services by workers, such as restaurants and bars.

It is not possible to predict the actual economic benefits in monetary terms at this stage of the Project; therefore, the impacts are qualitatively assessed. Price increases might have a negative economic impact as the project will be associated with worker influx. Such as increases in local housing prices, or the cost of basic goods are anticipated to be minimal.

Vulnerability

The general vulnerability of the population related to economic benefits is low to medium. Private spending by Project workers will primarily benefit local shops, restaurants, bars and cafés and other existing formal businesses in the service sector. Consequently, economic benefits will generally accrue to business owners, who are already more economically stable than those without businesses. With regards to negative economic impacts, the vulnerability of the population to this impact is considered medium. No highly vulnerable groups are identified.

Impact significance

Table 6-47 Impact Significance by Geographic Area – Temporary Economic Impacts

Geographic Scope	Magnitude Rating					Vulnerability	Significance
	Extent	Duration	Scale	Frequency	Magnitude		
Project Area of Influence	Local/regional	Long term	Small Positive (purchase of Project-related goods and services may result in minor economic benefits to the City and Municipal economy); Small negative (price increases for goods in small settlements near active Operation sites due to worker spending) Small Positive (longer-term purchase of Project-related goods and services may result in minor economic benefits to the City and Municipal economies)	Often	Small	Medium-low	Positive
	National	Long term	Small positives (purchase of goods and services might contribute to the increase of the economy in Albania.	Often	Small		Positive

Mitigation Strategies – Enhancement of Benefits

For the positive impacts of benefits to the economy to be optimized, and the potential for price inflation to be minimized, the following strategies will be adopted by the Project.

- As part of the tendering process, require bidders to provide purchasing strategies that stipulate how local procurement of goods will be optimized.
- Provide advance information on tendering opportunities to local businesses through trade and industry organizations.
- Require contractors to show their best efforts to fill unskilled service jobs with residents of the local agricultural settlements and to monitor and report on local

employment.

Residual Impact

Rating If controls are implemented, the Project will be able to optimize the positive benefits to the local population. There may be some residual minor price increases in goods in settlements near PDA. Residual impacts are summarized in table below.

Table 6-48 Residual Impact Significance – Temporary Economic Impact

Geographic Scope	Residual Impact	
	Construction	Operation
Project Development Area	Negligible-Minor	Positive
Local	Positive	Positive
Regional	Positive	Positive

6.2.12.2 Land and Land-Based Livelihoods

Overview

This section presents the potential impacts on existing land-based livelihoods and land values as a result of the project-related activity.

Key Considerations for Assessment of Economy and Employment

Sources of Impact

- Temporary land-take for access roads, working streps, safety zones around construction sites (including road construction) and associated facilities will also be required.
- Permanent land take in Papër area for rerouting of the existing railway line and as the need to fill the technical requirements for radius at KP 62+600 – KP 63+400. Extension of Prrenjas Station, upgrades to existing roads (widening of roads), and of new roads, new reinforcement walls, underground and level crossing passages.
- Decommissioning: There will be temporary working zones associated with the removal of facilities and infrastructure and restoration of the land.

Potentially Impacted Receptors

- Owners and users of land affected by permanent and temporary land take.

Baseline Conditions that Potentially Influence Impacts

- Urban, semi urban, and agricultural land along the railway line.
- The presence of illegal construction along the railway line corridor.

Vulnerable Groups

- No vulnerable groups were identified.

Table 6-49 Key Potential Land Use and Livelihood Impacts

Impact	Construction	Operation
Temporary loss of livelihoods and household income	Yes	No
Permanent loss of livelihoods and household income	Yes	No
Disturbance to crops and beekeeping	No	No
Changes in land values for rental and sale	No	No
Ecosystem Services	No	No

Impact: Temporary/permanent Loss of Livelihoods and Household Income Due to Temporary/Permanent Land Acquisition

Impact Description

PR5 EBRD, and EIB's Standard 6 Involuntary Resettlement, address impacts of Project-related land acquisition, including restrictions on land use and access to assets and natural resources, which may cause physical displacement (relocation, loss of land or shelter), and/ or economic displacement (loss of land, assets or restrictions on land use, assets and natural resources leading to loss of income sources or other means of livelihood).

Resettlement is considered involuntary when affected persons or affected communities do not have the right to refuse land acquisition or restrictions on land use, other assets and natural resources, even if compulsory acquisition is used only as a last resort after a negotiated process.[170]

Vulnerability

The vulnerability of the general population to this impact is considered negligible. The project will be settled in undeveloped land.

Impact Significance

Table 6-50 Impact significance – Loss of livelihoods and household income from permanent land acquisition

Geographic Scope	Magnitude Rating					Vulnerability	Significance
	Extent	Duration	Scale	Frequency	Magnitude		
Project Area of Influence	Local	Long term/Permanent	Small (adaptation to the permanent loss of land will not result in a significant economic decrease.)	Constant	Small	Low	Negligible

Mitigation Measures

- Land for rerouting in Papër will be expropriated based on the Albanian legislation and international standard, EIB STANDARD 6 — INVOLUNTARY RESETTLEMENT, and EBRD PR5.
- EBRD's Environmental and Social Policy, the involuntary resettlement issues are covered by PR5, the main points of which are the following:
    - Avoid or, when unavoidable, minimize, involuntary resettlement by exploring alternative project designs;
    - Mitigate adverse social and economic impacts from the land acquisition or restrictions on affected persons' use of and access to assets and land by (i) providing compensation for loss of assets at replacement cost; and (ii) ensuring that resettlement activities are implemented with appropriate disclosure of information, consultation and the informed participation of those affected;
    - Restore or, where possible, improve the livelihoods and standards of living of displaced persons to pre-displacement levels;
    - Improve living conditions among physically displaced persons through the provision of adequate housing, including the security of tenure at resettlement

[170] EBRD Environmental and Social Policy: PR5

sites.

- Damage compensation prices for various crops will be determined based on market prices, the references of the regional agricultural directorates, specifics of each area, and negotiations with owners.
- Project will implement a community Complaints Register.

- EIB STANDARD 6 — INVOLUNTARY RESETTLEMENT Promoter's responsibility include:
  - Avoid or, when unavoidable, minimise involuntary resettlement by exploring alternative projects, project designs and locations;
  - Avoid any forced evictions;
  - Improve displaced persons' livelihoods or living standards, or at least restore them to pre-project levels;
  - Improve living conditions among displaced poor and other vulnerable groups to at least minimum living standards by promoting adequate housing and security of tenure;
  - Provide timely compensation for loss of assets at the full replacement cost;
  - Ensure the appropriate disclosure of information, consultation and informed participation;
  - Provide access to grievance mechanisms;
  - Consider enabling displaced persons to benefit directly from the project.
- Site Abandonment
  - All equipment and structures will be removed.
  - Site reclamation includes backfilling drainage ditches and holes to ensure the site is level and safe for future operations, ensuring no wastes remain on site, and spreading salvaged subsoil and topsoil back over the site, which will be seeded with a suitable seed mix.

Residual Impact - Permanent Loss of Land

Rating If controls are implemented, the magnitude ratings of impacts during all phases of the Project and in all projects' areas are expected to be reduced to Negligible to Small, resulting in residual impact significance ratings of Negligible to Minor.

Table 6-51 Residual Impact - Permanent Loss of Land

Geographic Scope	Residual Impact	
	Construction	Operation
Project Development Area	Negligible to Minor	Negligible to Minor

6.2.12.3 Workforce Wellbeing

Overview

This section presents potential impacts to workers including conditions which may result in infringement upon their health and safety and other basic rights inscribed in Albanian regulations as well as international law. Impacts are considered broadly across the workforce, including workers directly employed by the project, contractors, and individuals within the supply chain. The key sources of impacts, potentially impacted receptors, baseline and Project influencing factors associated with potential Project impacts on workers. This section of the report considers potential impacts on workers taking into account the Albanian context, as well as the loss of basic workers' rights.

Key Considerations for Assessment of Economy and Employment

Typical Sources of Impacts on the Workforce

- Hazards associated with Project activities; in this case, the various Project components including site preparation and construction; road construction and upgrades;
- Workplace conditions and standards inadequate to ensure workers' health and safety and other rights, particularly within contractor and subcontractor companies.

Potentially impacted receptors

- Local, national or international workers directly engaged in the Project.
- Local, national or international workers engaged through third parties (contractors).
- Workers engaged by the Project's primary suppliers of goods and services.

Particular baseline conditions

- National Labour Laws and health and safety legislation in Albania exist and are aligned with international standards providing a framework for worker management and rights.
- Recent studies indicate that there is a lack of capacity within Albania to fully implement labour laws and health and safety legislation. This situation may result in a gap between what is legally required and the realities on the ground.
- Resistance to joining unions and using collective bargaining due to negative associations with forced work collectives and the diminishment of individual rights and freedoms prominent during the communist era.
- Prevalence of informal employment with a lack of provision by employers of basic worker rights under the Labour Code.[171]
- Informal employment of children in the construction industry[172].

Most Vulnerable Groups

- Impoverished and minority individuals, and individuals with low levels of educational attainment, including children, migrant workers, and women are identified as highly vulnerable worker groups. The general population is assigned medium vulnerability.
- Recent studies indicate that discrimination and marginalization of groups based on ethnicity, nationality, gender and other grounds are widely reported. Such discrimination is linked to a lack of harmonization of laws related to labour and discrimination.

Summary of Key Impacts

Both Project work activities and inadequate workplace conditions within Albania could result in impacts on workers. Key Project impacts in the area of worker management and well-being are summarized in table below and include:

- Worker rights, and specific infringements to those rights, including resolution of labour

[171] European Commission. 2014. Albania Progress Report. European Commission. Available at: http://ec.europa.eu/enlargement/pdf/key_documents/2014/20141008-albania-progress-report_en.pdf

grievances, freedom from unlawful exploitation of child labour, equal opportunity and treatment in employment; and the use of forced or child labour.

- While Project activities are divided into a series of components, including construction in the sea and on the land, internal roads and buildings, and railway, impacts are not distinguished by component as they will rather depend on the policies and procedures of the various contractors which were not available at the time of writing. In the following sections, individual impacts are described, along with embedded controls included in the Project Description, recommended mitigation measures, and ratings of impacts.

Table 6-52 Key Potential Impacts on Workforce Wellbeing

Impact	Construction	Operation
Worker rights	Yes	Yes
Forced labour in the supply chain	Yes	Yes

Impact: Worker Rights

Impact description

The Project may impact the rights of its workforce, including rights related to remuneration, equal opportunity and treatment, occupational health and safety, restrictions on child labour, freedom of association, and social and employment security. While there has been significant improvement in labour and working conditions over the past decade, Albania continues to work with the ILO to improve conditions. Informal employment is identified by the EU Progress Report as a widespread issue affecting job security and social security entitlements and enabling employers to avoid providing rights under the Labour Code (see Baseline).

Inspections of labour conditions within Albanian workplaces have been reported as inadequate, and the number of inspectors is insufficient[173]. These deficiencies, coupled with weak rule of law may result in a lack of full compliance by some Project contractors and suppliers with Albanian legal requirements related to labour conditions. Workers in Albania are not provided with alternative dispute resolution or workplace-level individual grievance mechanisms under Albanian law. These mechanisms are additionally rarely used in practice. While employees' right of access to remedy through the justice system is formally guaranteed, workers' experience is less straightforward given the conditions of the Albanian judicial system, including corruption and lack of independence which undermine public confidence in the rule of law[174].

Lack of access to legal aid may additionally prevent persons with limited resources, including minorities, from using the court system. Both the existence of gender discriminatory legal provisions and insufficient implementation of the Albanian Law on Protection from Discrimination may hinder the realization of equal opportunity and treatment within Albania,

[173] European Commission. 2014. Albania Progress Report. European Commission. Available at: http://ec.europa.eu/enlargement/pdf/key_documents/2014/20141008-albania-progress-report_en.pdf

[174] Nils Muižnieks, Report of the Council of Europe's Commissioner for Human Rights, 16 January 2014. Accessed at https://wcd.coe.int/com.instranet.InstraServlet?command=com.instranet.CmdBlobGet&InstranetImage=2485204&SecMo de=1&DocId=2121982&Usage=2

impacting women and minorities[175].

Representation of women's public office is low, and their participation in the labour market is insufficient, linked to a lack of strategies related to women's employment across municipalities within Albania. Additionally, the National Council on Gender Equality, which met for the first time in March 2014, did not address equal pay, access to credit or entrepreneurship for women. Workers in Albania additionally often face working long working hours which is permitted within certain industries.

Migrant workers are more likely to be found working long hours, especially if they are employed as day workers or informally. In addition, there is resistance within Albania to being involved in unions and collective bargaining due to a negative association with the communist era when people were forced to work in collectives to the detriment of individual rights and freedoms[176].

As such individuals may be less able to protect their rights.

Vulnerability

Young people from low-income households with limited job experience and individuals with low education status and experience levels are particularly vulnerable to violations of their rights as workers and are considered a high vulnerability. The general population is considered medium vulnerable.

Project Embedded Controls

The project committed to adhering to Albanian regulations regarding equal opportunity in employment and worker rights and has committed that contracted workers' employment contracts must satisfy Project policies and Albanian regulations. Failure to comply with these policies, procedures, worksite rules or regulatory requirements or industry codes of practice will result in disciplinary action.

The project will communicate certain conditions of employment to its employees through an employment agreement, specifying:

- position, job description and terms of employment;
- working time and hours;
- Remuneration;
- vacation and holidays;
- illness benefits;
- work absence policies;
- employer obligations;

[175] European Commission. 2014. Albania Progress Report. European Commission. Available at: http://ec.europa.eu/enlargement/pdf/key_documents/2014/20141008-albania-progress-report_en.pdf

[176] Trans Adriatic Pipeline 2015. Trans Adriatic Pipeline Human Rights Impact Assessment Summary Greece, Albania and Italy, 13 April 2015. Accessed at http://www.tapag.com/assets/07.reference_documents/english/HRIA%20Summary/150515_Human%20Rights%20Impact%20Assesseme nt%20Summary_Website.pdf

- disciplinary measures;
- personal data utilization;
- policies around termination and amendments to the agreement.

Failure to comply with the contractor's policies, procedures, work site rules, applicable regulatory requirements or industry codes of practice will result in disciplinary action, specified as verbal or written warnings up to suspension or termination of employment or contract, depending on a review of the incident.

Impact Significance

Table below provides the magnitude, vulnerability and pre-mitigation impact significance rating for worker rights. The impact is rated as Negligible- Minor for the general population, and it is recognized that there are young people from low-income households with limited job experience and individuals with low education status and experience levels who are considered particularly vulnerable to violations of their rights as workers. For these individuals, the impact of violation of worker rights is considered Minor -Moderate. It is noted that these groups may be specific targets for local employment.

Table 6-53 Impact significance – Workers' rights

Geographic Scope	Magnitude Rating					Vulnerability	Significance
	Extent	Duration	Scale	Frequency	Magnitude		
Project Area of Influence	Regional (workers and contractors from other parts of Albania; and international workers)	Long-term	Small- Medium: While embedded controls are in place, existing conditions within Albania and Albanian companies leave the potential for impacts on workers' rights which could include moderate injury, illness or other adverse effects	Constant	Small-medium	Medium: general population High: Groups, in particular youth, with little job experience or education	Minor (general population) Moderate (vulnerable groups
	Local (workers hired from towns located within the project area)	Long-term	Small: While embedded controls are in place, existing conditions within Albania and Albanian companies leave the potential for impacts on workers' rights which could include moderate injury, illness or other adverse effects. Local hires are likely to be few and short-term therefore scale is considered small	Constant	Small-medium	Medium: general population High: Groups, in particular youth, with little job experience or education	Minor (general population) Moderate (vulnerable groups

Mitigation strategy and measures

The worker rights mitigation strategy and measures will focus on the development and implementation of robust policies and procedures to ensure the provision of worker rights for all workers, including Project employees, contractors and subcontractors, including the rights of children to be free of unlawful exploitation of their labour. These measures will cover all activities that constitute the various Project components.

Training of all members of the workforce on their rights guaranteed under Albanian law will be

conducted upon employment and at regular intervals thereafter. Additionally, a culturally appropriate, accessible and anonymous complaints register will be provided for workers (including through contractors) to lodge complaints, and these should be guaranteed to be free from retaliation. Regular monitoring of complaints registers results, to ensure that it is being used, has been made adequately accessible to the workforce, and that grievances are being resolved appropriately, should be conducted. Regular auditing of compliance with policies, procedures, monitoring and training will be conducted, for Project, as well as contractors and subcontractors.

Residual Impact

Rating If controls are implemented, the magnitude ratings of impacts during all phases of the Project area are expected to be reduced minimal - small for all potential workers, resulting in residual impact significance ratings of negligible for the general population and minor for vulnerable groups, as summarized on table below.

Table 6-54 Residual Impact Significance- workers' rights

Geographic Scope	Residual Impact	
	Construction	Operation
Local	Negligible to minor	Negligible to minor
Regional	Negligible to minor	Negligible to minor

Impact: Child and Forced Labor in the Supply Chain

Description of Impact

Child and Forced Labour Albania is a source country for forced child labour, with child labour used in domestic sectors including mining and construction[177]. Due to inconsistent regulatory compliance of Albanian companies particularly within the construction sector, risks exist broadly for the use of forced labour[178]. The Albanian Government lacks adequate resources to enforce its existing laws related to child labour, including forced child labour[179]. Given these conditions, the Project and Project activities, including those of its contractors and supply chain, may generate the use of child labour and forced labour. This would create impacts on children's rights to access education and social development, children's right to not work under circumstances which impact their health and well-being, as well as adults' right to freedom from forced labour. Occupational health and safety incidents may additionally result with greater frequency with the use of child labour. While Project is committed to adherence to Albanian law with regards to child labour and forced labour, child labour continues to be a prominent issue in Albania (See Section Economy, Livelihoods and Employment). Risks associated with the use of child labour exist by nationally based subcontractors and suppliers (who may form part of the supply chain)

[177] European Commission. 2014. Albania Progress Report. European Commission. Available at: http://ec.europa.eu/enlargement/pdf/key_documents/2014/20141008-albania-progress-report_en.pdf

[178] US Department of Labour's Bureau of International Labour Affairs. 2014. 2014 Findings on the Worst Forms of Child Labour (Albania). Accessed http://www.dol.gov/ilab/reports/child-labor/albania.htm#prevalence

[179] 3 Trans Adriatic Pipeline 2015. Trans Adriatic Pipeline Human Rights Impact Assessment Summary Greece, Albania and Italy, 13 April 2015. Accessed at http://www.tapag.com/assets/07.reference_documents/english/HRIA%20Summary/150515_Human%20Rights%20Impact%20Assesseme nt%20Summary_Website.pdf

Vulnerability

Vulnerability This impact may particularly affect children of Roma or Balkan-Egyptian descent as well as street children[180]. These groups are considered highly vulnerable.

Project Embedded Controls

Project committed to adhering to Albanian regulations. While inconsistencies in compliance with Albanian regulations by Albanian companies and inadequate enforcement of the law by the Government were previously noted, the Albanian Labour Code does establish a minimum work age, restricts children from certain working conditions, and prohibits forced labour.

Impact Significance

Table below, provides the magnitude, vulnerability and pre-mitigation impact significance rating for forced labour.

Table 6-55 Impact significance – Child and Forced Labour in the Supply Chain

Geographic Scope	Magnitude Rating					Vulnerability	Significance
	Extent	Duration	Scale	Frequency	Magnitude		
Project Area of Influence	Local/regional	Long term	Small- Medium: It is anticipated that this impact would be rare, and affect a small portion of individuals; effects could result in moderate illness, injury or other adverse condition	Constant	Minimal-Small	Medium: general population High: Children, in particular children of Roma or Egyptian descent and street children	Negligible/ Minor (general population) Minor-Moderate (Vulnerable Groups)

Mitigation Strategy and Measures

The mitigation strategy and measures related to child and forced labour will focus on the development and implementation of a policy prohibiting forced labour within the Project and all contractor and supplier organizations. Suppliers will be screened for the potential for forced and child labour. The Project prohibition against child forced labour will be widely communicated through graphics-based communications materials posted at worksites, with guidance to access the anonymous, retribution-free complaints register should instance of child or forced labour be suspected. The existence of this policy and observed implementation of it through regular, third-party monitoring of all Project work sites, will be conditions of employment or contracts for the provision of labour or supplies. Failure to fully comply with the requirements of such policy will result in immediate termination of the contract.

Residual Impact

Rating If controls are implemented, the magnitude ratings of impacts during all phases of the Project area are expected to be reduced to minimal - small, resulting in residual impact significance ratings of negligible as summarized in tanle below.

[180] 1 US Department of Labour's Bureau of International Labour Affairs. 2014. 2014 Findings on the Worst Forms of Child Labour (Albania). Accessed http://www.dol.gov/ilab/reports/child-labor/albania.htm#prevalence

Table 6-56 Residual Impact Significance- Child and forced labour in the supply chain

Geographic Scope	Residual Impact	
	Construction	Operation
Project Area of Influence	Negligible general	Negligible general

6.2.12.4 Community Health, Safety and Security

Overview

The presence of the Project could affect the health, safety and security of the communities within the Study Area as a result of worker-community interactions, the risk of injury associated with traffic and construction activities, potential exposure to environmental health hazards, reduced access to potable water sources, and a possible strain on health care resources.

Key Considerations for Assessment of Community Health, Safety and Security

Sources of Impact

- Project-related traffic, including heavy machinery and trucks, on public roads, could increase the risk of road traffic accidents and community exposure to air emissions.
- Site and access road construction activities could increase the risk of accidents and injuries, cause noise and visual disturbance, and temporarily impact the quality of surface water used by communities due to site stormwater runoff.
- Potential spills during storage, transport or improper disposal of hazardous materials (e.g., oil from machinery; sanitary waste);
- Communities and stakeholders concern about perceived health and safety risks.

Potentially Impacted Receptors

- Communities along Project transportation routes and near the construction site, waste treatment and disposal centres that will be used by the Project.
- Communities that use water resources for drinking and irrigation will be used or potentially impacted by the Project.
- Communities near primary health care facilities in communities in the project area, including hospitals in the nearby urban centres.

Particular Baseline Conditions

- Limited access to health care especially in rural areas, with hospitals located in cities.
- Variability in access to medical personnel.

Most Vulnerable Groups

- For all community health impacts, the general population is assigned medium vulnerability.

Highly vulnerable groups identified include the following:

- Elderly, children, in particular from settlements around the Project Area of Influence.

Table 6-57 Summary of key impacts Community Health, Safety and Security

Impact	Construction	Operation
Health effects from exposure to air emissions	No	No
Health effects from a decrease in water quality or quantity	No	No
Construction site accidents and injury	Yes	No
Health effects from potential spill	Yes	No
Traffic accidents	Yes	Yes

Noise emissions' health effects	Yes	Yes
Potential fire	Yes	Yes

Summary of Environmental Health Impacts

Impacts related to noise, water, and air quality were assessed in the technical annexes for those subjects. A summary of the impact results and the health implications are provided to have a summary of all health impacts in this section.

Health Impacts due to Noise

For people living in settlements near Project activities, noise generated from the Project would be below levels associated with hearing impairment. However, levels of noise below the hearing impairment threshold have the potential to affect health by increasing stress levels and reducing the quality of life (via sleep disturbance, reduction in productivity (1), blood pressure increases (2), and other health effects.

Health Impacts due to Changes in Air Quality

For people living in settlements near Project activities, the air quality might be decreased as a result of the dust from the transport, emission of vehicles, and other construction and operation activities. However, the baseline levels of the main air quality indicators are defined and will be monitored regularly during all stages of the Project development.

Impact: Summary of Community Health, Safety and Security

Description of Impact

Impacts related to accidents and injuries, potential spills, traffic accidents, noise, and potential fire during construction were assessed in the technical annexes for those subjects. A summary of the impact results and the health implications are provided to have a summary of all health impacts in this section.

Construction site accidents and injury from unsafe conditions at road and construction sites. Inadequate H&S standards or implementation; open ditches; movement of heavy machinery; inadequate signage and unsecured sites (where community members could access).

Health effects from potential spill from spill Traffic accident; corrosion or inadequate storage containers on transport vehicle.

Traffic accidents from vehicle movements transporting personnel and heavy goods vehicles transporting materials.

Potential fire: None (the social receptors are more than 1 km from the site).

Vulnerability

Community members, including children, elders, persons with disability, etc., that use the same roads for school, medical, or other services. Children and elderly are vulnerable at particular risk of diarrheal diseases due to their sanitary behaviors and have poorer immune systems compared to adults and elderly are also considered at higher risk of more severe health outcomes as a result of their frailty. The general population is considered medium vulnerability.

Project Embedded Controls

The project is committed to adhering to Albanian regulations. To manage infectious diseases transmission, the Project will implement the following physical or procedural controls:

- All employees (both direct and contracted) will receive pre-employment and annual medical check-ups, as required under Albanian law.

- Worker camps will have solid and sanitary waste removed or disposed of by 3rd parties.
- Worker camps will secure potable water for workers, to be stored on-site.
- The Project will implement a community Complaints Register.

Impact Significance

Table below, provides the magnitude, vulnerability and pre-mitigation impact significance rating for forced labour.

Table 6-58 Impact significance – Community Health, Safety and Security

Geographic Scope	Magnitude Rating					Vulnerability	Significance
	Extent	Duration	Scale	Frequency	Magnitude		
Project Area of Influence	Local/regional	Short term - long term	Small- Medium: It is anticipated that this impact would be rare, and affect a small portion of individuals; effects could result in moderate illness, injury or other adverse condition	Constant	Minimal-Small	Medium: general population	Negligible/ Minor (general population) Minor-Moderate (Vulnerable Groups)

Mitigation Strategy and Measures

In order to reduce project risk from the key potential unplanned events, the standard mitigation hierarchy should be applied. Unlike impacts from planned activities, mitigation of unplanned events should consider both prevent preventative actions (that reduce the likelihood of the cause of the potential impact) and post-event mitigation that reduces the magnitude of the consequence.

These measures will include, where possible/appropriate:

- reducing Project traffic volume;
- routing traffic to avoid sensitive receptors;
- routing traffic to avoid traffic accident 'hot spots,' as identified by the transportation database maintained by the Albanian Institute of Transport;
- restriction of movements during times where there is more likely to be conflict with other users (e.g., beginning and end of school day or prayer time);
- speed restrictions near sensitive receptors and accident 'hot spots';
- installation of safe crossing areas;
- driver awareness activities about sensitive areas and accident 'hot spots'; and
- awareness raising activities in schools and other sensitive areas.
- Roads will be left clear of obstacles during road construction activities, Road construction equipment will be secured at night in a locked storage area to prevent community members from accessing this equipment;
- In the event of a traffic accident between a Project vehicle (including contractor vehicles) and a community member(s), the Project will contact local emergency services to provide medical support to affected community members. Following any such accidents and of 'near misses', the Project will conduct a root cause

analysis to identify causes and corrective actions that can be implemented.

- The Project will also include 24 hours site security to restrict access to community members. Security will serve to prevent theft and damage of equipment on-site and to avoid potential injury to community members;
- Use signage to clearly marked construction sites;
- Boundaries and barricades to keep people out of dangerous areas;
- Community Safety Awareness Raising - Training/education/awareness to community members well in advance of construction and on an on-going basis to inform local communities about Project construction and the risks of entering construction sites and acceptable alternatives.

Residual Impact

The majority of the mitigation presented is preventative, the primary goal of these measures is to reduce the likelihood of the unplanned event from occurring. However, if these unplanned events occur, Major impacts could still result. In these cases, the post-event measures described in the previous section would apply to manage impacts. Rating If controls are implemented, the magnitude ratings of impacts during all phases of the Project area are expected to be reduced to minimal - small, resulting in residual impact significance ratings of negligible as summarized in table below.

Table 6-59 Residual Impact Significance- Community Health, Safety and Security

Geographic Scope	Residual Impact	
	Construction	Operation
Project Area of Influence	Negligible general	Negligible general

6.2.12.5 Social Cohesion and Community Dynamics

Overview

This impact refers to the interactions and relationships between members of a community and between different communities. It is based on leadership structures, interconnectedness and common ways of life that bind groups together through tradition, land, religion, ethnicity, poverty and other social factors. According to the Organisation for Economic Co-operation and Development, there are three key components to the concept of social cohesion[181].

Key Consideration for Assessment - Social Cohesion and Community Dynamics

Key Components of Social Cohesion

- Social inclusion: Relates to a sense of belonging and equal opportunities without being marginalized or excluded as a result of gender, race, ethnicity, age or physical/mental health and other social factors.
- Social capital: Relates to the inter-connectedness and strength of social groups to influence decisions.
- Social mobility: Relates to the ability of social groups to move freely, without harm or discrimination resulting from social factors.

Sources of Impact

- The influx of economic migrants seeking to benefit through employment or indirect

[181] Organisation for Economic Co-operation and Development (2012) Perspectives on Global Development: Social Cohesion in a Shifting World. Available at:

opportunities, such as procurement;

- High community expectations relating to job opportunities, compensation from land take, community investment and other benefits resulting from the project;
- Induced stress and tensions arising from perceived and real benefits and changes to their natural environment.

Potentially Impacted Receptors

- Households residing in settlements adjacent to project activities where the presence of the workforce is visible;
- Unemployed individuals of working age (15-64), including young people that have returned from abroad due to the European economic crisis, that are actively looking for work.
- Households previously affected by land take or who are currently undergoing a process of negotiation regarding land;
- Local authorities that may feel that their position is at threat resulting from land take or other issues out of their control;
- Women who may be subject to higher levels of tension in the household in a context of recognized high levels of domestic abuse.

Particular Baseline Conditions

- High levels of unemployment, particularly among the youth (age 15-29) and women.
- A higher percentage of households receiving social assistance such as unemployment benefits and pensions compared to the national level;
- All communities in the direct area of influence rely on land-based livelihoods for income and household consumption.
- Settlement heads are active in terms of voicing the concerns and issues within the communities. Historical issues related to incidents of corruption have resulted in a lack of trust in the government.

Summary of Key Impacts

The current economic situation in Albania has created high levels of unemployment and expectations regarding job creation, which are likely to exacerbate the impacts related to social cohesion and community dynamics. This has increased stress and anxiety resulting from job insecurity and low-income levels which were previously supplemented by remittances.

As such, impacts are likely to result from:

- A potential influx of economic migrants creates increased competition for direct and indirect employment opportunities;
- The Presence of the workforce creates tension, particularly in areas where there is a presence of worker camps, resulting from unmet expectations relating to job opportunities; and
- Changes to community dynamics resulting from land take, population increase and workforce presence.

These changes can result in the following:

- Increased stress, tension and feelings of powerlessness associated with the Project, resulting in a decline in mental well-being.

- Increased conflict and tension between communities resulting from land take and compensation payments, either because: alternative land is limited and households feel that they have been unfairly compensated, or because compensation levels result in disparities between households in communities with sources of external income. This includes perceived issues of governance and corruption between settlement heads.
- A decrease in the community's sense of safety and well-being associated with a potential increase in the use of alcohol and other illicit activities such as sex work that are sometimes associated with the presence of workers, and feelings of insecurity around the presence of Project security forces;
- Increase in gender-based violence and abuse resulting from increased stress and tension and a decrease in community sense of safety and wellbeing.

Table 6-60 Impacts - Social Cohesion and community dynamics

Impact	Construction	Operation
A decline in mental wellbeing	Yes	No
Increase in conflict associated with land take	Yes	No
Decrease in sense of safety and well-being associated with alcohol use and other illicit activities and security personnel	Yes	Yes
Increase in gender-based violence	Yes	Yes

Impact: Decline in Mental Wellbeing

Description of Impact

Mental health is defined as a “state of well-being in which every individual realizes his or her own potential, can cope with the normal stresses of life, can work productively and fruitfully, and is able to make a contribution to her or his community (1)”. If not managed carefully, a decrease in mental well-being can lead to mental health issues, including anxiety disorders and depression.

Moreover, there is a distinct correlation between mental well-being and the use of alcohol, tobacco and violence leading to chronic diseases and gender-based violence and abuse, which may increase, as described in this Section.

The presence of the workforce and competition for some jobs might increase pressure on those who are currently unemployed.

The youth are most vulnerable to a decline in mental well-being if the benefits of the project are not felt through economic gain.

Unemployment and financial pressures can lead to feelings of worthlessness, stress and tension. In Albania, particularly in rural areas, men are the main income providers while women are responsible for domestic responsibilities. As such men are pressurized to fulfil their duties to enable the household to function and maintain a basic quality of life. This is not to say that women do not also experience these types of pressures. However, gender-differentiated roles of men and women create different types of stress that can lead to a decline in mental well-being.

In addition to potential mental health impacts associated with the workforce and competition for employment, visual, auditory and olfactory changes associated with the Project during all phases could increase stress or anxiety, in particular for communities located in close proximity to well sites.

Discrete noise specific- and air quality-specific health impacts are discussed in relevant sections, however, the Project could decrease mental well-being for community members exposed to multiple changes to their surrounding environment, especially if the changes occur

together and in a fairly short period of time.

Vulnerability

Unemployed youth and young adult men are considered at a higher risk of decreases in mental health given there are currently high rates of unemployment and alcohol use is not uncommon among this demographic group. The general population is considered to have a medium vulnerability.

Project Embedded Controls

To manage potential impacts on community members' mental well-being associated with competition for employment, demographic shifts, and perceived environmental changes, the Project will implement the following controls:

- The Project will hire people from the area as security personnel.
- The Project will implement a community Complaints Register.

Impact Significance

Table below provides the magnitude, vulnerability and pre-mitigation impact significance rating for the decline in mental well-being.

Table 6-61 Impact significance – Mental wellbeing

Geographic Scope	Magnitude Rating					Vulnerability	Significance
	Extent	Duration	Scale	Frequency	Magnitude		
Project Area of Influence	Local/regional	Long term	Minimal: There is also increased potential for job opportunities resulting from good access to education and a higher skills base. Visual, auditory and olfactory changes associated with the Project are not expected	Rare-Occasional (routine medical care at hospitals likely to be less than at nearby local clinics)	Minimal	Medium: general population	Negligible

Mitigation Strategy and Measures

Mitigation of changes in mental well-being requires the mitigation of risk factors associated with mental health. These mitigation strategies are:

- management of air quality;
- management of noise and vibration;
- local content strategy.

Equally important will be the ongoing communication with and engagement of local communities throughout the exploration program to understand concerns and provide information. This will enable concerns and perceptions to be rapidly and proactively addressed. Key measures to be included in the Stakeholder Engagement Plan related to preventing a decrease in well-being. It is noted that feedback collected through the community complaints register is important to ensure residual community concerns are addressed in a timely and culturally sensitive manner.

Other measures

Meeting with communities in the Project Area of Influence at least one month in advance of the activity and every six months for longer terms activities. These meetings will also provide

fact sheets and remind communities how to contact the project should they have concerns.

Ensure the presence of social monitoring offer / CLO at worksites to ensure the application of management measures and to be available to address community concerns.

Engage with local government and NGOs to discuss challenges regarding mental health, subsistence use and unemployment and collaborate/support initiatives to address these challenges locally.

Residual Impact

Rating If controls are implemented, the magnitude ratings of impacts during all phases of the Project are expected to be reduced from Minimal to Small, resulting in residual impact significance ratings of Negligible to Minor as summarized in table below.

Table 6-62 Residual Impact Significance- Mental wellbeing

Geographic Scope	Residual Impact	
	Construction	Operation
Project Area of Influence	Negligible (general) Minor (vulnerable)	Negligible (general) Minor (vulnerable)

Impact: Increase in Conflict Associated with Land Take

Description of Impact

New development projects can raise stress and tension within communities (intra-community tension) or between communities (inter-community tension) triggering a decrease in mental well-being. The causes of such tensions may be many, but for this project, tension increases will primarily be centred around the land acquisition process due to the following:

- Poor leadership, which at its worst may consist of fraudulent behaviours by those with power, but more commonly consists of poor communication of information concerning a project;
- Inequitable distribution of benefits, or a perception of this; or inequitable distribution of negative impacts, or perception of this.

The levels of compensation payments received by certain landowners may be very significant in comparison to levels of household income. This impact will potentially occur during the preparatory and construction phase as that is when the land will be acquired but may continue for as long as payments are made to some landowners. As increases in tension are more likely to occur within settlements or between only one or two settlements on the construction site, the geographic extent is local.

Vulnerability

No high-vulnerability groups were identified for this impact. The general population is considered to have a medium vulnerability.

Project Embedded Controls

Provided in Land acquisition controls.

Impact Significance

Table below provides the magnitude, vulnerability and pre-mitigation impact significance rating for increased tension and conflict around land acquisition.

Table 6-63 Impact significance – Increase in Conflict Associated with Land Take

Geographic Scope	Magnitude Rating					Vulnerability	Significance
	Extent	Duration	Scale	Frequency	Magnitude		
Project Area of Influence	Local	Long term	Negligible (conflicts within/between settlements will not be discernible at the regional level)	Rare-Occasional	Minimal	Medium: general population	Negligible
	Local	Long term	Small to Medium (even the amount of land will be acquired is not significant)	Constant	Small	Medium	Minor to moderate

Mitigation Strategy and Measures

Mitigation is related to the development and implementation of consistent and transparent procedures for the acquisition of land rights through the Land Acquisition and Livelihood Restoration Framework. This Framework should specifically consider the following:

- The transparency by which land plots are selected.
- The level and manner in which households are compensated such that jealousy issues between landowners are minimized.

Residual Impact

Rating If controls are implemented, the magnitude ratings of impacts during all phases of the Project are expected to be reduced from Minimal to Small, resulting in residual impact significance ratings of Negligible to Minor as summarized in table below.

Table 6-64 Residual Impact Significance- Increase in Conflict Associated with Land Take

Geographic Scope	Residual Impact	
	Construction	Operation
Project Area of Influence	Negligible (general) Minor (vulnerable)	Negligible (general) Minor (vulnerable)

Impact: Decrease in Sense of Safety and Wellbeing Associated with Alcohol Use and Other Illicit Activities and Project Security Personnel

Impact description

Workforce mobilization during all phases of the Project could create temporary demographic shifts in local communities, in particular, if the workforce is primarily male and non-local. These shifts may decrease community members' sense of safety and social well-being of workers engage in drinking in their time off, or if the presence of the workers generates an increase in demand for commercial sex locally. Additionally, the presence of security personnel, although likely to be locally hired, could increase feelings of insecurity, in particular, if the personnel are armed.

While rates of alcohol use in Albania have remained relatively low compared to other European countries, they have increased steadily over the last 10 years.

Albanian authorities report that almost all of the cannabis plant in the country has been destroyed. However, the cannabis industry continues to be a battle that the government is engaged. Industrial development projects are associated with increased local access to a wider range of goods and services, including drugs and alcohol. This increased access may induce greater consumption of alcohol and drugs, in particular for the workforce that is living

temporarily in the area.

Despite being illegal in Albania, commercial sex is a growing concern nationally and in particular in urban areas.

Project-affected communities for this impact include those where the workforce, including security personnel, are likely to spend earnings on alcohol and those towns or cities where the workforce spend leisure time. These likely include the nearby settlements.

Vulnerability

Groups considered to be more vulnerable to feelings of insecurity related to the Project workforce include:

1) women, given the workforce will likely be mostly male and non-local and rural women may feel a certain level of powerlessness due to cultural norms, poverty and lack of access to social and other public safety services; and

2) elderly, given this group can be more sensitive to changes in family and community cohesion and dynamics.

Therefore, women and elderly in the rural communities are considered high vulnerability; the general population is considered to have a medium vulnerability.

Project Embedded Controls

To manage potential impacts on communities' sense of well-being and safety associated with the workforce, the Project will implement the following controls:

- The possession, use, distribution and/or sale of alcohol and/or illegal drugs on a Project work site (which includes vehicles, travel to/from work sites and camp facilities) will be strictly prohibited and, if verified, will result in the immediate removal of the worker from the job and/or the work site.
- Workers are required to report impairment conditions (fatigue, alcohol, drugs, etc.) to the Site Supervisor before the start of work, thereby decreasing the potential for workers to drink during their off-hours.
- Security personnel should be hired from local communities.
- The Project should implement a community Grievance Register.

Impact Significance

Table below provides the magnitude, vulnerability and pre-mitigation impact significance rating for decreased community sense of safety and wellbeing associated with worker leisure-time activities.

Table 6-65 Impact significance – Safety and Wellbeing

Geographic Scope	Magnitude Rating					Vulnerability	Significance
	Extent	Duration	Scale	Frequency	Magnitude		
Project Area of Influence	Local	Long-term	Medium (given the larger workforce presence during construction and Operation)	Often/Constant (presence of workforce potentially living in nearby communities)	Medium	Medium (general population) High (rural women and elderly)	Minor-Moderate (general) Moderate-Major (vulnerable)
	Sub-regional	Long-term	Minimal/Small (given the population size of the city, impacts overall would be only slightly	Occasional (presence of workforce	Minimal/Small	Medium (general population) No high vulnerability groups for	Negligible - Minor

Geographic Scope	Magnitude Rating					Vulnerability	Significance
	Extent	Duration	Scale	Frequency	Magnitude		
			perceptible above baseline conditions)			regional-level impact	

Mitigation Strategy and Measures

The implementation of appropriate management and mitigation measures outlined in Workforce Wellbeing would help reduce the risk of a decrease in the sense of safety and well-being in the community:

- The Code of Conduct will establish policies such as required authorizations for leaving the work camps, and interactions with local communities. Compliance, which would be part of all workers' employment contracts.
- Include workforce management policies, compliance with which would be part of all workers' employment contracts including:
    - zero tolerance policy for participation in illegal activities, including commercial sex;
    - no-alcohol consumption policy within nearby small communities (population under 2,000).
- Part of the construction site management plan requires sign-in and sign-out for all workers leaving the work site;
- All Project workers (including subcontractors) are to receive Cultural Sensitivity training before initiating work.
- Follow the United Nations (UN) Code of Conduct for Law Enforcement Officials for hiring, rules of conduct, training, equipping, and monitoring of security personnel.
- Background clearance requirements of all Project security personnel to include investigation of incidents or allegations of past human rights abuses shall exclude anyone credibly implicated in abuses or incidents from employment.
- All security personnel should be required to receive and pass training on the appropriate use of force aligned with best international practices, per the United Nations Basic Principles on the Use of Force and Firearms by Law Enforcement Officials.
- The use of force will not be sanctioned except for preventive and defensive purposes in proportion to the nature and extent of the threat[182].
- Using feedback collected through the complaints register, audit efficacy and compliance with all workforces, including security personnel, and contract management policies and protocols which are intended to mitigate negative interaction with communities.
- No government security personnel will be used.
- Engage with local authorities (police and settlement heads) on an ongoing basis to discuss potential challenges around workforce management and address issues that

[182] EBRD Performance Requirement 4: Health, Safety and Security; EIB STANDARD 9 — HEALTH, SAFETY AND SECURITY

arise.

Residual Impact

Rating If controls are implemented, the magnitude ratings of impacts during all phases of the Project are expected to be reduced from Minimal to Small, resulting in residual impact significance ratings of Negligible to Minor as summarized in table below.

Table 6-66 Residual Impact Significance- Safety and Wellbeing

Geographic Scope	Residual Impact	
	Construction	Operation
Project Area of Influence	Negligible (general) Minor (vulnerable)	Negligible (general) Minor (vulnerable)

Impact: Increased Gender-Based Violence and Abuse

Impact Description

Gender-based violence and abuse refer to mental and physical abuse men and women may face within the household. They can also be physical, such as sexual abuse and violence. In the Albanian context, women are generally the victims of such acts, both in urban and rural areas.

As documented in the Socioeconomic Baseline regarding gender equality, legally, in Albania, women have the same rights as men, including equal access to education and healthcare. The country's overall societal structure remains patriarchal, but in urban areas, women are gaining increased independence, participating in higher education, entering the workforce, and engaging in politics. In contrast, women in rural areas tend to focus on family-related activities, largely characterized by reproductive responsibilities and contributions to unpaid economic activities.

Project Embedded Controls

No embedded controls.

Impact Significance

Table below provides the magnitude, vulnerability and pre-mitigation impact significance rating related to increased gender-based violence and abuse.

Table 6-67 Impact significance – Increase Gender-Based Violence and Abuse

Geographic Scope	Magnitude Rating					Vulnerability	Significance
	Extent	Duration	Scale	Frequency	Magnitude		
Project Area of Influence	Local	Long-term	Small/Minimal: The increased stress and tension in households resulting from the presence of the project and workforce may slightly increase incidents of gender-based violence and abuse within the household over a long period of time	Often/Constant (presence of workforce potentially living in nearby communities)	Small/Minimal	Medium (general population) High (rural women and elderly)	Negligible-Minor (general) Moderate (vulnerable)
	Sub-regional	Long-term	Minimal: The presence of the project is not likely to affect	Occasional (presence of workforce	Minimal/Small	Medium (general population) No high vulnerability	Negligible - Minor

Geographic Scope	Magnitude Rating					Vulnerability	Significance
	Extent	Duration	Scale	Frequency	Magnitude		
			residents living in the cities.			groups for regional-level impact	

Mitigation Strategy and Measures

Due to the sensitivity of gender-based violence and abuse, monitoring the correlation of increased incidence of these issues as a result of the project resulting from the project is problematic. As such, the project will support and contribute to the prevention of these issues. Measures to improve women's participation and engagement in project decisions will also be taken to provide a space for them to express their views and concerns, supporting women's empowerment in communities.

The project will hold separate women's meetings alongside community meetings to allow them to participate in project decision-making and voice their views/concerns relating to specific issues, as defined in the Stakeholder Engagement Plan (SEP).

Women should be informed about job opportunities arising from the project through community visits, women's NGOs and associations, and general job advertisements, providing them with an opportunity to participate in the recruitment process.

Residual Impact

Rating If controls are implemented, the magnitude ratings of impacts during all phases of the Project areas are expected to be reduced from Small - Medium to Small -Minimal resulting in residual impact significance ratings of Negligible to Minor, see table below.

Table 6-68 Residual Impact Significance - Increased Gender-Based Violence and Abuse

Geographic Scope	Residual Impact	
	Construction	Operation
Project Area of Influence	Negligible (general) Minor (vulnerable)	Negligible (general) Minor (vulnerable)
Regional	Negligible	Negligible

Cumulative impacts

Key Components of cumulative impacts

Significant Potential Impacts Cumulative impacts are those that arise as a result of an impact of the Project when added to impacts from other projects or developments. The assessment extends to potential interactions with Project activities and other activities. Cumulative impacts may have the potential to arise during any stage of the Project.

The current facilities existing or in operation of other projects:

Elbasan-Qafë Thanë Road, Part of Corridor VIII with Significant Impact on Tourism Development is a project being developed in the area of the Project. The project has been divided into eight sections, while the construction is under development for the first two sections. The work schedule anticipates the construction of two other sections in 2024 and the two last ones will start in 2025. The road starts in the village of Labinot Fushë and has a length of 44 kilometres up to Qafë Thanë, the border crossing point with North Macedonia.

The facilities proposed but not yet built:

- No information.

Sources of Impact

The Area of Influence as regards cumulative impacts as defined under EBRD PR 1 EBRD Performance Requirement 1 (para. 9) references the need for the ESIA process to consider the cumulative impacts of the project in combination with impacts from other relevant past, present and reasonably foreseeable developments as well as unplanned but predictable activities enabled by the project that may occur later or at a different location.

The most prevalent anthropogenic activities in the AoI are existing activities (e.g., agricultural development, habitation, road use and resource use). The cumulative impacts of the existing Projects are assessed through consideration of baseline conditions.

- Ecosystems: Habitat fragmentation, and Loss of fish and wildlife populations
- Socioeconomics: Overburden services and Unstable labour markets
- Community structure: Changes in community dynamics as a result of displacement of critical community members.
- Cultural Resource: Cultural site degradation / vandalism and Fragmentation of historic district.

Impact Mitigation

In order to reduce project risk from the key potential unplanned events, the standard mitigation hierarchy should be applied. Unlike impacts from planned activities, mitigation of unplanned events should consider both prevent preventative actions (that reduce the likelihood of the cause of the potential impact) and post-event mitigation that reduces the magnitude of the consequence.

These measures will include, where possible/appropriate:

- reducing Project traffic volume;
- routing traffic to avoid sensitive receptors;
- speed restrictions near sensitive receptors and accident ‘hot spots’;
- installation of safe crossing areas;
- driver awareness activities about sensitive areas and accident ‘hot spots’; and
- awareness raising activities in schools and other sensitive areas.
- Roads will be left clear of obstacles during road construction activities, Road construction equipment will be secured at night in a locked storage area to prevent community members from accessing this equipment;
- In the event of a traffic accident between a Project vehicle (including contractor vehicles) and a community member(s), the Project will contact local emergency services to provide medical support to affected community members. Following any such accidents and of ‘near misses’, the Project will conduct a root cause analysis to identify causes and corrective actions that can be implemented.
- The Project will also include 24 hours site security to restrict access to community members. Security will serve to prevent theft and damage of equipment on-site and to avoid potential injury to community members;
- Community Safety Awareness Raising - Training/education/awareness to community members well in advance of construction and on an on-going basis to inform local communities about Project construction and the risks of entering construction sites and acceptable alternatives.

Residual Impact

Rating If controls are implemented, the magnitude ratings of impacts during all phases of the Project area are expected to be reduced to minimal - small, resulting in residual impact significance ratings of negligible as summarized in table below.

Table 6-69 Residual Impact Significance- Cumulative Impact

Geographic Scope	Residual Impact	
	Construction	Operation
Project Area of Influence	Negligible general	Negligible general

6.2.13 Trans boundary impact

This project is subject of Transboundary impact assessment that shall follow the procedure of cross-border interactions according to the ESPOO Convention, as the segment Lin - Pogradec, after the tunnel, from Km 136.160 to 152+800 passes near Lake Ohrid.The railway line passes close to the shore of the trans boundary lake Ohrid. Albania and North Macedonia have officially designated this territory as a transboundary protected area.

According to the Espoo Convention, Article 1; provides a definition on "Transboundary Impact" which means any impact, not only of a global nature, within the area under the jurisdiction of a Party, caused by a proposed activity, the physical origin of which is wholly or partially within the area of jurisdiction of another Party;

According to Article 6 of Law 10440, "Transboundary assessment of environmental impacts" is the EIA process, which is developed for projects or activities, defined in the annex of the United Nations Convention (ESPOO) "On environmental impact assessment, in a cross-border context", which, based on their location or technology, may have significant negative impacts on the environment of neighboring countries or our country.

Legal framework:

"Convention on Environmental Impact Assessment in Transboundary Context", approved on February 25, 1991, in Espoo - Finland (ratified by the Albanian government).

Law No. 9478, dated 16.2.2006 "For the accession of the Republic of Albania to decisions II/14 and III/7, amendments to the ESPOO Convention "On Environmental Impact Assessment, in a cross-border context".

Law No. 10 431 Date 09.06.2011 "On Environmental Protection"

Law No. 9700, dated 26.3.2007 "On the Protection of the Environment from Transboundary Impacts"

Law No. 10440, dated 05.09.2002 "On Environmental Impact Assessment".

Annex of the United Nations Convention ESPOO (amended according to the amendment of Law No. 9478, dated 16.2.2006) contains the entire list of activities for which cross-border EIA is required, and this project is part of this annex.

The current protection status of the Albanian part of the lake is "Managed Nature Reserves" - National Park (IUCN Category VI).

The Albanian part of Lake Ohrid has been declared a Ramsar site by the Ramsar secretariat and the Albanian Government.

Albania's side of Lake Ohrid was also designated with UNESCO world heritage status in July 2019.

North Macedonia's side of Lake Ohrid was declared a World Heritage Site by UNESCO in 1979,

with the site being extended to also include the cultural and historic area of Ohrid in 1980.

North Macedonia's portion was designated as a protected Ramsar site in 2021.

Initial Notification of the Developer for the project based on Decision no. 598, dated 1.07.2015 for “Determining the rules and procedures for assessing the impact on the cross-border environment" as sent to relevant trans boundary impact stakeholders since during this phase of the project (Feasibility study).

During detail design phase , the project notification procedures will be followed to the cross-border states, based on Decision no. 598, dated 1.07.2015 for determining the rules and procedures for assessing the impact on the cross-border environment", ***at the Institutional and governmental level.***

7 Monitoring program

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 concerning the proposed project are given in the table below. Standarts and methods of monitoring should comply with international, European and/or Albanian standards. DCM 912/2015, "On the EIA methodology" requires the preparation of a monitoring programme, while the Law 10431/2011, "On Environmental Protection", provides for the topics/environmental receptors to be monitored during a project development stage. Article 41 of this law183, the list of these receptors includes:

Water bodies quality monitoring shall be performed in accordance with Water Framework Directive (JASPERS Checklist tool [184]) and the following steps to be followed to check/ensure the compliance of the project with Water Framework Directive[185].

1. **Step 1 - Context and Screening -** Record the future ecological and chemical status objectives for relevant EU protected areas(during detail design)

   Chemical status is determined via the monitoring of the priority and priority hazardous substances covered by the Environmental Quality Standards (EQS) Directive (2008/105/EC as amended). Each substance either meets the relevant EQS or fails to meet it. For a water body to be at good chemical status overall, there must be no failures.

2. **Step 2 - Scoping the assessment** - is used to determine whether any further assessment is needed and, if so, which WFD elements should be investigated.

3. **Step 3 - Further data collection or investigations_** Undertake the data collection and/or commission the investigation(s); then receive and review the outcome(s) to understand:

   - *Could the project have a non-temporary effect on the status of one or more of the WFD elements at the scale of the water body?*
   - *Is the project expected to have an adverse effect on the water-dependent features of relevant EU protected area objectives?*
   - *Are significant in-combination effects on status possible?*

4. **Step 4: The Article 4(7)TESTS**

The Article 4(7) exemption can only be applied if WFD ecological status will be affected as a result of new modifications to the physical characteristics of a surface water body, or if alterations to the level of a groundwater body will affect its status, or if chemical status will be indirectly affected by such changes, or if new sustainable human development activities will cause deterioration from high to good status [662]. Projects not meeting these criteria may not be authorised [757], so early discussion with the WFD competent authority is recommended in such cases. As indicated in the Preamble above, Article 4(7) cannot be applied to a project involving a new (i.e. point source or diffuse) input of pollutants other than in high status water bodies in accordance with the second provision of Article 4(7).

183 Law 10431/2011 "On environmental protection", as amended, Article 41

[184] JASPERS' checklist tool to use when a project could affect the Water Framework Directive (WFD) status of a surface water body or a groundwater body

[185] Water Framework Directive JASPERS Checklist tool (eib.org).

- The quality ofwater bodies water;
- Air quality;
- Waste;
- Noise and vibration;
- The quality of the land/soil;
- Flora, fauna, biodiversity, forests;
- Monitoring of social and cultural receptors (cultural heritage)

Table 7-1Monitoring plan for the proposed project stages

	Receiving environment (as per Law 10431 /2011, Art. 41)	Phase	Yes/ No	Regulations/standards	Comment related to the proposed project	Monitoring indicators	Period of Monitoring
1	Surface water quality						
	Shkumbini River	PC	Y	-Law 111/2012 "On Integrated Water Resources Management"; -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"; -Directive 2006/44 "On the quality of freshwater that needs protection for supporting fish life" Compliance of the project with Water Framework Directive			
		C	Y		Monitoring of water quality in the crossing points of RL with water bodies before construction activity and during cinstruction to ensure the qaultity of water is not impacted due to the contruction activity.	pH value; Dissolved oxygen (DO); Electrical conductivity; Suspended solids. Nitrate; Nitrite; Ammonium; Total Phosphorus; COD;BOD5;Dry residue;Total hardness; Heavy metals	Before construction phase. Periodic monitoring during construction works in accordance with the requirements of environmental national authorities, environmental declaration and on the received complaints (if any). Monitoring with accredited laboratory.
		O	N				
	Pogradeci Lake	PC	Y		To be monitored by Consultant during detail design phase and quarterly by the Contractor during the construction phase	pH value; Dissolved oxygen (DO); Electrical conductivity; Suspended solids; Nitrate; Nitrite; Ammonium; Total Phosphorus; COD; BOD5; Dry residue; Total hardness; Heavy metals	Before construction phase. Periodic monitoring during construction works in accordance with the requirements of environmental national authorities, environmental declaration and on the received complaints (if any). Monitoring with accredited laboratory.
2	Ground water						
	private wells	PC O	Y Y	The assessment of the quality of underground water shall be carried out based on DCM no. 379 dated 25.05.2016, for the approval of the regulation "Quality of drinking water". parameters of underground water	close to the footprint of the railway potentially impacted by construction activity	Parameters pH NH4 mg/l NO3 mg/l NO2 mg/lGeneral Mineralization mg/lOverall hardness ° Chlorine mg/l Na mg/l Mg mg/l	To be monitored by Consultant during detail design phase and quarterly by the Contractor before construction phase, during the construction phase in accordance with the requirements of environmental national authorities, environmental declaration

	Receiving environment (as per Law 10431 /2011, Art. 41)	Phase	Yes/ No	Regulations/standards	Comment related to the proposed project	Monitoring indicators	Period of Monitoring
				Compliance of the project with Water Framework Directive			and on the received complaints (if any). Monitoring with accredited laboratory.
3	Air quality						
	Action area	PC	N	-Law 162/2014 "On environmental air quality protection" -DCM 352/2015 "On the assessment of environmental air quality and the requirements related to some pollutants" -Air Quality Directive (2004/107/EC and 2008/50/EC)	To be monitored by Consultant during detail design phase and quarterly by the Contractor during the construction phase close to resident area. Daily visual monitoring of air quality;		
	Action area	C	Y		Monitor mitigation measures related to air quality that can be affected by earthworks and transport activities	TSP;PM10;PM2.5;CO; NOx;SO2; VOC ;Others (if necessary).	Periodic monitoring during construction works in accordance with the requirements of environmental national authorities, environmental declaration and on the received complaints (if any)
	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 the differentiation of waste collection at source	Monitored by the Consultant /Contractor for the Project's purposes	removing asbestos from existing facilities before demolishing the existing buildings	Remove asbestos by specialised team. Keep records (transfer note) for each type of waste removed and disposed;
	Action area, especially at the stations & bridges and during demolishing the existing buildings and removing asbestos from existing facilities	C	Y		Visual monitoring; Special instructions to be followed especially while removing asbestos before demolishing the existing buildings. Monitor mitigation measures related to waste generated by construction activities Keep records (transfer note) for each type of waste removed and disposed	Evidence of waste dumping or illegal disposal outside approved waste facilities	Periodic monitoring during construction works in accordance with the requirements of environmental national authorities, environmental declaration and on the received complaints (if any)
	Action area	O	Y		Visual monitoring; Monitor waste management	Removing waste generated from operation phase	Periodic monitoring during operation works in accordance with the requirements of environmental national authorities,

	Receiving environment (as per Law 10431 /2011, Art. 41)	Phase	Yes/ No	Regulations/standards	Comment related to the proposed project	Monitoring indicators	Period of Monitoring
							environmental declaration and on the received complaints (if any)
5	Noise						
	Action area	PC	Y	-Law 9774/2007 "On the assessment and management of environmental noise"; -MoE ordinance 1037/1, date 12.4.2011 " On the assessment and management of environmental noise"; -Environmental Noise Directive 2002/49/EC	Measured by the Consultant during the preparation of the DD and ESIA	Noise modelling Leleve of noise LAeq (noise); Vibration level;	during detail design phase
	Action area	C	Y		During working hours, measure noise levels at a distance of one metre from the most affected receptors of any occupied dwelling or other residential building; Monitor mitigation measures related to noise and vibrations that can be generated by demolition, construction and transport activities	Leleve of noise LAeq (noise); Vibration level;	Periodic monitoring during Construction and operation works in accordance with the requirements of environmental national authorities, environmental declaration and on the received complaints (if any)
	Action area	O	Y		Monitoring noise generated by trains once the rehabilitated railway line will be in operation	Leleve of noise LAeq (noise); Vibration level;	Periodic monitoring during Construction and operation works in accordance with the requirements of environmental national authorities, environmental declaration and on the received complaints (if any)
6	Vibration						
	Level of vibration in sensitive areas especially archaeological site, houses , and cultural monument potentially impacted.	PC & C	Y	Measurements of vibration shall be performed as per ISO 4866:2010 , which is applied to all structures built above or below ground. Such structures are used or maintained and include buildings, structures of archaeological and historical value (cultural heritage), bridges and tunnels, gas and liquid installations including pipelines, earth structures (e.g. dykes and	Measured by the Consultant during the preparation of the DD and ESIA Pre construction to evaluate the existing levele of vibration on sensitive receptors ; During operation, measure vibration levels at the most affected receptors of any occupied dwelling or other residential building or cultural monuments; Monitor mitigation measures related to vibrations that can be generated by demolition, construction and transport activities	Vibration level	During detail design phase During preconstruction phase ; Periodic monitoring during Construction in accordance with the requirements of standarts , environmental declaration and on the received complaints (if any)

	Receiving environment (as per Law 10431 /2011, Art. 41)	Phase	Yes/ No	Regulations/standards	Comment related to the proposed project	Monitoring indicators	Period of Monitoring
				embankments) etc.			
7	Soil quality						
	Action area	PC	N	the soil might be polluted by wastewater and hazardous waste)			
	Action area	C	Y		Visual inspection of working areas.Visual inspection of excavation works. Soil quality measurements, if necessary, in case of unplanned soil/land pollution or upon received complaints (if any)		monitoring during construction works in accordance with the requirements of environmental national authorities, environmental declaration and on the received complaints (if any)
	Action area	O	N		Visual monitoring at the stations, especially the freight stations		monitoring during construction works in accordance with the requirements of environmental national authorities, environmental declaration and on the received complaints (if any)
8	Flora, fauna, biodiversity, forest						
	Both sides of the railway line and watercourses	PC	Y	Law 9587/2006 "On Biodiversity Protection"; Law 81/2017 "On Protected Areas"; Law 1006/2008: "On the protection of wild fauna"; Law 10120/2009, "On Protection of the Medicinal Plants"	Biodiversity and protected areas included in the ESIA;		
	Both sides of the railway line and watercourses	C	Y		Visual monitoring; Monitor mitigation measures related to flora, fauna, biodiversity and forest that can be affected by construction and transport activities.	Records and evidence of sensitive biodiversity areas/ habitats/ species/ ecosystems; Specific locations where animals risk to be trapped; Records and evidence of species;	
	Both sides of the railway line and watercourses	O	N		No need for monitoring; Lack of activities that can affect these topics;		
	Cultural heritage						
9	Near the existing identified cultural monuemnts	PC	y	The Cultural Heritage Law 27/2018 "On Cultural Heritage and Museum" Article 146 of Law 27/2018	Cultural heritage induction training and toolbox talks; Implementation of prevention mesures before starting construction works;	Inspection of known cultural heritage sites in the study area; Implementation of all necessary additional measures such as signage, fencing, structural bracing and conservation in case of	Pre construction monitoring in accordance with the requirements of environmental national authorities, environmental declaration and on the received complaints (if any)

	Receiving environment (as per Law 10431 /2011, Art. 41)	Phase	Yes/ No	Regulations/standards	Comment related to the proposed project	Monitoring indicators	Period of Monitoring
						any cultural heritage findings;	
	During excavation works	C	y	The Cultural Heritage Law 27/2018 "On Cultural Heritage and Museum" Article 146 of Law 27/2018	Visual inspections and monitoring during land-clearance and excavation works.Review and audit of mitigation activities to ensure satisfactory of implementation of mitigation measures. Cultural heritage induction training and toolbox talks; .	Chance finds; and, Periodic inspection of known cultural heritage sites in the study area; Implementation of all necessary additional measures such as signage, fencing, structural bracing and conservation in case of any cultural heritage findings;Cultural heritage related grievances and cultural heritage issues raised from consultation with local communities and state authorities	Construction monitoring in accordance with the requirements of environmental national authorities, environmental declaration and on the received complaints (if any)
		O	N				

PC – Preconstruction; C – Construction; O – Operation; Y – Yes; N - No

Other receiving environments to be monitored regard the livelihood restoration and the land acquisition and compensation, as given in the table below.

Table 7-2:Monitoring plan concerning 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; EBRD	-EBRD PR 5; - EIB's Standard 6 Involuntary Resettlement'. -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
Grievances	The number of grievances	Developer/ Consultant /Contractor		To be monitored during project development (DD, Contruction /Operation)

The local community and workforce occupation health and safety should be monitored regularly based on the national regulations, EIB ESS and EBRD performance requirements, as shown in the table below.

Table 7-3:Monitoring plan concerning 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	-EBRD PR 4'; - EIB Standard 9 – Occupational and Public Health, Safety and Security;	During the construction;

			-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 operation
Local community and workforce	Health and safety during operation	-Affected Municipalities; -Municipal Water and Sanitation Companies; -Health institutions	-EBRD PR 4; - EIB Standard 9 – Occupational and Public Health, Safety and Security; -DCM 564/2013: On the approval of the rules "On Minimum Safety and Health Requirements at the Workplace"; -Law 10237/2010: "On occupational safety and health", as amended	During construction; During operation

8 Main Findings

The ESIA report (this document) for this phase of the project (Preliminary design) is part of the Environmental and Social Impact Assessment (ESIA) study package on the Project that is prepared by the consortium SUEZ - Consulting (SAFEGE).

Two main segments of the footprint of the project are:

- Rrogozhine -Prrenjas section (Loti1)
- Prrenjas -Pogradec (Loti 2)

As per the ToR, required standards for the ESIA outputs are prepared and submitted as following documents:

- Environmental and Social Impact Assessment (ESIA);
- Climate Change Resilience and Vulnerability Assessment Report (CC Report);
- Environmental &Social Management Plan (ESMP);
- Land Acquisition and Resettlement Framework (LARF);
- Stakeholder Engagement Plan (SEP);
- Environmental and Social Compliance Summary Table
- Non-Technical Summary (NTS).

The ESIA is structured to fulfil the relevant EU standards and regulatory documents, including the EIA Directive 2011/92/EU (amended in 2014), Birds Directive 2009/147/EC, Habitats Directive 92/43/EEC, the EBRD Environmental and Social Policy (2019), EIB Environment and Social Standards (ESS), and the local procedures and provisions.

Gap analysis on EIA:

Basic laws of the Albanian legislation in the field of environmental protection, environmental assessment, waste management, water sources, air, and biodiversity protection are partly aligned, fully or approximates aligned with EU directives. Referring to the EC Albania report (2021), efforts need to be made to achieve full alignment and implementation in most areas.

Gap analysed are evaluated in the ESIA and recommendations to fill the gaps are included as well.

Refer to Climate change:

- Albania has adopted in December 2020 the climate law, but alignment with the acquits still remains limited.
- The implementation of the climate law will largely depend on future secondary legislation, regulations, and measures delegated to the minister for the environment.
- Lack of specific administrative structures and available staff for handling climate change issues remain a matter of serious concern. As per the Albanian Legal Framework for this project is not required evaluation and assessment of GHG.

Action taken to fill the gaps:

The Consultant has prepared the Climate Change Resilience and Vulnerability Assessment Report (CC Report), as per EU Climate Requirements &regulations.

Refer to Expropriation.

The Albanian law provides regulation only for people having legal rights over the properties and

focuses on assets that may be expropriated or temporarily occupied properties for the public interest.

ESIA process stages

ESIA process stages during preliminary design phase passes through these steps:

- Inception report;
- Option analyses in which were considered and assessed the alternatives proposed.
- ESIA report and relevant supporting documents draft (preliminary design);
- ESIA report and relevant supporting documents final (preliminary design);

Regulatory Framework and Guidelines

According to the EIA Directive 2011/92/EU, as amended, the list of 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);*
- Point 24*: "Any change to or extension of projects listed in this Annex where such a change or extension in itself meets the thresholds, if any, set out in this Annex".*
- 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 during detail design phase;

National regulations and the proposed project

According to the Law 10440/2011 "On EIA"[186], which is in line with the EIA Directive, classifies the railway projects listed in Annex I of the EIA Law as following:

Annex I /Point 7: *"(a) Construction of railway lines for long-distances";*

Despite of the title of the project (rehabilitation), the Project is a railway construction, as the whole railway line (total line 117.3 km long), (but also even considering divided the project in the Lot 1 and Lot 2 separately), including most of the bridges, underpasses, stations, culverts, etc., will be built from the beginning. The new railway line will be located, mostly within the existing track but the construction operation involves whole works as a new project as even the existing line will be demolished.

Conclusion: The Project is listed in Annex I of the EIA Law, and therefore it should be submitted to a "full EIA process", during detail design phase which corresponds to an EIA according to EIA Directive even if the project is considered separately for Lot 1 and Lot 2 (or as a whole one) ;

Environmental and Social Existing Situation

The main findings from existing environmental and social baseline

Air quality :

- Air quality in central area of Elbasan city, for parameters of NO2; VOC; PM2.5; PM10; CO; CO2; O3 in majority of monitored stations exceeded the allowed limits.

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

- Elbasan city is considered as one of the most polluted city in Albania from the industry sources.
- Air quality in Pogradec city shows relatively low concentrations of the emission in the air compared to Elbasani and other cities in Albania ,however, the levels of PM10 and PM2.5 remain a cause for concern, and several factors contribute to this, including a significant number of vehicles , old vehicles , un favorable topography, surrounded by mountains and hills, limiting the smooth circulation of air, use of wood for heating
- Air quality in Librazhd, Prrenjas ,Rrogozhine: The air quality in rural areas is consistently good to very good.
- In urban areas air pollutant primarily attributed to cars, fires, burning of biomass, waste burning, and constructions activity .

Noise level:

- Elbasan: The source of noise emission in the city of Elbasan primarily stemming from transportation, vehicle speed, aging vehicles, and key traffic axes and industry area . During early morning and afternoon hours, both the minimum and maximum noise levels at all monitoring stations exceed both EU and Albanian standards for both day and night periods. The most problematic stations are located near intersections and construction sites;
- Exiting level of noise in Pogradec city show a surpassing of the standard for LAeq/Day and LAeq/Night. The most significant exceedance during the daytime occurs at the “Terminal Crossing” point, whereas during the night, it is observed at the “City Entrance” point, located approximately 3-3.8 km away from the project route.
- In rural areas, the acoustic environment is comparatively better. However, a notable concern arises from noise emissions by sawmills, posing potential impacts on the faunal regime and raising reproductive concerns, especially within bio corridors.

Waste:

Existing wooden sleepers shall be removed and be treated as hazardous waste .
Existing waste from demolishing and abandoned buildings used to be facilities of HSH are still near the train station especially Librazhd, Xhyre ,Perenjas, Pogradec .This waste included asbestos , Fe-Ni , Cr mineral and coke.

Water

Several water bodies are close to the railway footprint and project footprint significantly crosses water resources.

Biodiversity and Ecological sources and protected areas

The Protected Areas of national (and international) protection status:

Section Rrogozhine-Librazhd (Lot 1)

The nature managed reserve of Kuturman-Qafe Bush (Loti 1) , a Candidate Emerald Site, designated as such by Bern Convention on the Conservation of European Wildlife and Natural Habitats. The area is known for the presence of several species of fish, amphibians, reptiles, birds, bats and other mammals, part of the Resolution 6 of the Convention, as well as some other species of flora and fauna of local conservation concern.

Candidate Emerald Site RNM Kuturman-Qafe Bush (AL0000018) [187]

Project footprint passes along the perimeter of the protected area Kuturman Qafe - Bushi (Miraka –Librazhd) from KMP 094+960 up KMP 096+960

Section Librazhd-Pogradec (Loti II)

Pogradec protected landscape ((Category V of IUCN) (Loti II), characterized by rich biodiversity and a high level of endemism, Important Bird and Biodiversity Area (IBA AL002), an Emerald Candidate Site of Pogradec Protected Landscape / (AL0000019), a pilot Natura 2000 site, as well as a trans-boundary natural and culturally sensitive area as part of the whole terrestrial and aquatic area of Ohrid Lake. which are important and sensitive areas regarding overall their aquatic life, including migratory birds;

Subsection Lin-Guri I Kuq (Pogradec) (km 137.6 to 152)

The section goes through the Landscape Protected Area of Pogradeci Lake, the Candidate Emerald Site of Pogradec Protected Landscape (AL0000019), Important Bird and Biodiversity Area (IBA) Lake Ohrid and the surrounding area (AL002)

Social Issue

Urbanized areas affected from informal constructions close to the railroad and informal crossings constituting a risk for the local population;

Hot spots

The list of Environmental Hot Spots includes:

- The former Ferrochrome plant, which generated 400,000 m3 of industrial waste (Loti 1).
- The Metallurgical Plant, producer of heavy metals and toxic chemicals. (Loti 1).
- The Balëz Industry-Mining Supply Company, known for producing 30 tons of Cyanide (the project footprint is not affected about 3 km away). (Loti 1).
- The disposal site of the Fe-Ni "Guri i Kuq" mine, spanning approximately 3 hectares and located 500 meters from the project at KP 152+860 (Loti 2)
- The Fe-Ni processing plant, with its storage area on the shore of the lake, with about 100,000 m 3 of sterile, located 200m in distance from the project area KP 152+860. (Loti2)

Finding of ESIA

There is no any specific restriction from environmental point of view that does not allow rehabilitation of the railway as per the footprint of the project. There is no any interfere with restriction, regulations that condition approvals from the institutions.

The railway line Rrogozhinë – Pogradec passes through six municipalities – Rrogozhinë, Peqin, Elbasan, Librazhd, Prrenjas and Pogradec. The railway line passes mainly through urban, suburban, and agricultural areas and E&S sensitive areas.

One of the most sensitive segment of the project from a natural importance view at Loti 1 is the segment that passes along the perimeter of the protected area Kuturman Qafe -Bushi

[187] https://natura2000.eea.europa.eu/Emerald/SDF.aspx?site=AL0000018

(Miraka –Librazhd) ,from KMP 094+960 up to KMP 096+960 .

At Loti II (Segment Lin – Pogradec) is also very important area as part of Traditional use and sustainable development area of Lake of Pogradec , Protected Landscape, Category V (IUCN), DCM no. 80, dated 18.02.1999. Part of the EMERALD network.

- Lake Ohrid is a freshwater ecosystem, outside the EU and not yet assessed by IUCN, but of high priority for conservation on the basis of high level of endemism for several aquatic species. Lake Ohrid could be considered as a Unique Ecosystem. It meets the threshold for Criteria 1.
- 43 species which meet the thresholds for Criteria 2-3
- Lake Ohrid meets the Criteria 4, 5 and 6 for Critical Habitat

Important river valleys crossed by the railway line: Shkumbin river valley, Rrapuni, Lingajca, sources of ground waters used for irrigation in the Qafe mountainous area that flow toward Ohrid lake and Ohrid's lake itself;

Important historical areas, such as the area of Domosdova or areas rich in archaeological heritage such as the recently discovered 7,500-year-old Palafitti settlement near Buceze village close to Ohrid's lakeshore.

Deviations of the railway will cause permanent loss of certain habitats and therefore permanent fragmentation. The highest impact in this habitat type is expected to be at the segments of km 85.6-87and 91.2-91.5 (in maquis or Thermo-Mediterranean brushes, thickets and heath-garrigues), 102.8-103.6, 105.6-106.6, 109.6-109.8, 112.2-112.6 and 121-121.6 (Quercus trojana woodland), 140.2 (Balkano-Anatolian thermophilous Quercus forests) where the railway is going to deviate from the existing railroad track.

Fragmentation on habitats can be mitigated by appropriate number of culverts, appropriate design and locations of culverts and fauna passages.

The detailed design will ensure profound baseline surveys for Critical Habitats, review the assessed impacts and review and improve the proposed avoidance and mitigation measures as well as reassess the proposals for offsetting.

A considerable debris /inert and excavated material will be generated due to the need of demolishing existing structures and excavation activity as following.

The noise barrier shall be installed where the resident is impacted.

Noise modelling shall be conducted in detail design phase to determine exactly the location of the noise barrier in order not only to reduce the impact of the noise to the close's residents, but only to avoid visual impact in case of installing more barriers than needed.

From Km 136- km 152 (Loti 2) the footprint of the railway passes along a very beautiful scenery for the passengers to be enjoyed, and installing noise barriers not necessary will bring more visual impact than benefits.

Urbanized areas affected from informal constructions close to the railroad and informal crossings constituting a risk for the local population.

Several kilometres of local roads are proposed to be built for reaching the level crossings that will be formalized and secured. The construction of these local roads will replace unauthorized crossings. It is assessed that the land area needed for local roads, outside the railway belt amounts to 18 ha.

The approximately surface of the area (additional land) due to main deviation from existing footprint of the railway is estimated around 61000 m^2; More detail estimation will be done during detail design phase where even RAP will be drafted.

At this stage of project development, it is assessed that the rehabilitation works will not affect any immovable property, such as houses and/or businesses.

The area along both sides of the railway line is populated with illegal constructions from people moved from other areas of Albania. This has led to opening of many unauthorized level crossings along the railway serving to this population.

Across the urban areas (Rrogozhinë, Peqin, Elbasan, Librazhd, Prrenjas and Pogradec) many formal and informal buildings have been built without respecting the appropriate distance from the railway line[188] (25 m from the railway axe as per Albanian Regulation of Technical Use of the Railways). Besides these the buildings have damaged the drainage channels on both sides along the railway.

The actual land-area affected by the railway line is about 64.37 ha (from which 5.38 ha are tunnels), as well as the average surface of the train stations is calculated at about 13.325 ha plus 1.285 ha (train platform surfaces).

The railway line Rrogozhinë - Pogradec passes through 48 Cadastral Zones (CZ) with corresponding parcel numbers owned by the railway (HSH). This ownership at present is identified as public properties even in some cases the areas are occupied illegally by individuals.

RAP shall be drafted during detail design phase;
Mitigation measures are recommended in ESIA for each environmental and social indicators and the residual impact after implementing mitigations is evaluated. Residual impact is considered not significant, mostly reversible and temporally. Mostly of the residual environmental and social impact evaluated are considered negligible to miner- including both construction and operation phase.
Project area of influence for environmental and social indicators has resulted minimal-small after implementing mitigation measures.

[188] DECISION, No. 408, Dated 13.5.2015, FOR THE APPROVAL OF TERRITORY DEVELOPMENT REGULATIONS, Bullet 3, 36 of for constructions along railways, the distances are according to the Railway Code. LAW No. 142/2016, RAILWAY CODE OF THE REPUBLIC OF ALBANIA

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